Malfunction Procedures

Mission Operations Directorate
Operations Division

Generic, Rev F
February 9, 2004

NOTE
For STS-114 and subsequent flights

Verify this is the correct version for the pending operation (training, simulation or flight).
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MISSION OPERATIONS DIRECTORATE

MALFUNCTION PROCEDURES

GENERIC, REVISION F
February 9, 2004

PREPARED BY

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<th>Description</th>
<th>Page</th>
</tr>
</thead>
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<td>MPM MTR INHIBIT DISABLE</td>
<td>12–106</td>
</tr>
<tr>
<td>SSR–2</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>SSR–3</td>
<td>BACKDRIVE TECHNIQUE – JOINT FREE</td>
<td>12–107</td>
</tr>
<tr>
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<td>RMS IFM D&amp;C KIT</td>
<td>12–115</td>
</tr>
</tbody>
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### APU/HYD

#### Nominal Config:
- **(R2)**
- APU OPER 1(2,3) – OFF
- APU FUEL TK VLV 1(2,3) – CL

#### 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%

---

### 1.1a APU FUEL QTY ↓

#### APU FUEL TK P ↑↓

#### 1 SM 86 APU/ HYD

- Match indications in chart to determine failure

#### Chart:

<table>
<thead>
<tr>
<th>(MDU) APU FUEL PRESS</th>
<th>(CRT) APU FUEL TK P psia</th>
<th>(CRT) APU FUEL OUT P psia</th>
<th>(CRT) APU FUEL QTY %</th>
<th>FAILURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>↑↑ or 500 (H)</td>
<td>140</td>
<td>100</td>
<td>XDCR SHIFT OR FAILURE 1</td>
</tr>
<tr>
<td>decr</td>
<td>decr</td>
<td>decr</td>
<td>decr</td>
<td>HYDRAZINE OR N2 LEAKING</td>
</tr>
<tr>
<td>0</td>
<td>0(L)</td>
<td>0</td>
<td>0</td>
<td>N2 LEAKED OUT</td>
</tr>
<tr>
<td>~50, steady</td>
<td>50 ↓</td>
<td>0</td>
<td>~0</td>
<td>HYDRAZINE LEAKED OUT</td>
</tr>
<tr>
<td>0</td>
<td>0(L)</td>
<td>&gt; 140</td>
<td>0</td>
<td>XDCR SHIFT OR FAILURE 1</td>
</tr>
</tbody>
</table>

1.1 Puts qty computation in error. FU OUT P XDCR may be substituted in fuel qty calculation.
1. Transducer shift or failure causes erroneous fuel qty computation. Fuel tank temperature constant will be substituted in calculation.
SM FDA THERMAL LIMITS TABLE

<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 TK SURF</td>
<td>0–160</td>
<td>45</td>
<td></td>
<td>(A12)</td>
</tr>
<tr>
<td>TK HTR</td>
<td>0–160</td>
<td>45</td>
<td>140</td>
<td>APU HTR TK/FU LINE/H2O/SYS</td>
</tr>
<tr>
<td>TEST LN 1</td>
<td>0–250</td>
<td>45</td>
<td>110</td>
<td>1B(2B,3B) – AUTO(OFF)</td>
</tr>
<tr>
<td>TEST LN 2</td>
<td>0–250</td>
<td>45</td>
<td>150</td>
<td>1A(2A,3A) – OFF(AUTO)</td>
</tr>
<tr>
<td>FEED LN</td>
<td>0–250</td>
<td>45</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>PUMP IN</td>
<td>0–250</td>
<td>45</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>DRN LN 1</td>
<td>0–250</td>
<td>43</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>DRN LN 2</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>PUMP OUT</td>
<td>0–250</td>
<td>50</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>BYP LN</td>
<td>0–400</td>
<td>60</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>GGVM SPLY LN</td>
<td>0–450</td>
<td>60</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

2. If subsequent failure occurs in remaining htr ckt, consult MCC
3. SYS 2 upper limit is 195 degF; lower limit is 48 degF
4. 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
5. SYS 2 upper limit is 190 degF
1.1c APU FUEL TK VLV T

**Nominal Config:**
- (A12) APU HTR TK/FU LINE/H2O SYS
  - 1A(2A,3A) – AUTO(OFF)
  - 1B(2B,3B) – OFF (AUTO)
- (R2) APU OPER 1(2,3) – OFF
- APU FUEL TK VLV 1(2,3) – CL
- cb APU FU TK VLV ENA 1A(2A,3A) – cl
- ENA 1B(2B,3B) – cl

**If:**
- APU 1(2,3) FUEL TK VLV T A(B) < 45 degF
- > 140 degF

1. MCC has access to alternate Xdcrs
2. Normal operation of APU available through other fuel tk vlv

3. Open aff cb
4. Select alternate htr
5. Temp returns within limits?
6. Open aff cb
7. HTR/THERMOSTAT FAILURE
8. Select alternate htr
9. APU FUEL TK VLV FAILED OPEN
10. Temp returns within limits?
11. HTR/THERMOSTAT FAILURE

- If APU FUEL TK VLV T A(B): 0 (L) 250 (H)
- XDCR FAILURE
- Open aff cb (R2)
- cb APU FU TK VLV ENA 1(2,3) A(B) – op
- Temp returns within limits?
- XDCR SHIFT OR EXTREMELY COLD THERMAL ENVIRONMENT
- XDCR SHIFT OR EXTREMELY HOT THERMAL ENVIRONMENT
SM ALERT

S86 RSVR/ACC P 1(2,3)
If:
HYD 1(2,3) ACCUM 32 < P < 1930 psia and/or
HYD 1(2,3) RSVR 2 < P < 28 psia

BFS
SM2 HYD ACCUM P 1(2,3)
If:
HYD 1(2,3) ACCUM 32 < P < 1930 psia and/or
HYD 1(2,3) RSVR 2 < P < 28 psia

Nominal Config:
(R2)
HYD MN PUMP PRESS (three) – NORM (LO)
HYD CIRC PUMP (three) – GPC (ON,OFF)
(R4)
HYD BRAKE ISOL VLV 1,2,3 – GPC (tb–CL)
LG EXTEND ISOL VLV – GPC (tb–CL)
(A12)
HYD CIRC PUMP PWR 1 – MNA
2 – MNB
3 – MNC

1.2a RSVR P ↓, ACCUM P ↓

ORB PKT C/L, HYD ACCUM (RSVR) PR LOW

1
(R2)
• √HYD CIRC PUMP 1(2,3) – ON

2
SM 86 APU/HYD
• Confirm HYD CIRC PUMP P
HYD B/U P > 100 psia ?

YES

3
Select alternate pwr
(A12)
• HYD CIRC PUMP 1(2,3) – MNB (MNC,MNA)
• Wait 30 sec

CIRC PUMP P (HYD B/U P) > 100 psia ?

YES

4
(R2)
• Aff HYD CIRC PUMP 1(2,3) – GPC
• Wait 90 sec

CIRC PUMP P (HYD B/U P) > 100 psia ?

YES

5
SM 86 APU/HYD
• √HYD RSVR QTY 1(2,3) reading
HYD RSVR QTY 1(2,3) decreasing ?

YES

6
HYD 1(2,3) CIRC PUMP FAILURE

7
Leave Pump ON

8
Turn off aff Circ Pump
(R2)
• HYD CIRC PUMP 1(2,3) – OFF

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 May be possible to pump fluid from high to low system by pressurizing high qty system relative to low qty system
3 Circ Pumps or APUs must be operating in order to operate HYD BRAKE ISOL VLV, HYD MPS/TVC VLV, or LG EXTEND ISOL VLV if reqd
4 If BFS SM 2, use HYD PRESS 1(2,3)
If: HYD RSVR QTY 1(2,3) < 40% or > 95%
Nominal Config:
(L4:O) cb AC1 φ8 HYD QTY 1 – cl
cb AC2 φ8 HYD QTY 2 – cl
cb AC3 φ8 HYD QTY 3 – cl
APU OFF Config:
(R2) HYD MN PUMP PRESS (three) – NORM (LO)
HYD CIRC PUMP (three) – GPC (ON,OFF)
BLR CNTLR/HTR (three) – A(B)
BLR PWR (three) – OFF
BLR N2 SPLY (three) – OFF
(R4)
HYD BRAKE ISOL VLV 1,2,3 – GPC (tb–CL)
LG EXTEND ISOL VLV – GPC (tb–CL)
HYD MPS/TVC ISOL VLV SYS (three) – ctr (tb–CL)
Hyd system may be lost for entry, depending on size of leak. Sys should remain OFF unless another system lost.

Since GNC on entry S/W will open LG EXTEND ISOL VLV prior to landing and HYD BRAKE ISOL VLV after touchdown, vlv must be reclosed.

Do not operate MPS/TVC vlv in affected system for SSME HYD Repress prior to entry.

Turn on Circ Pump and close HYD LG ISOL VLV in aff system.

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

(R4)
- HYD BRAKE ISOL VLV 1(2,3) – CL
- Hold 5 sec, Yb – CL
- HYD MPS/TVC ISOL VLV SYS 1(2,3) – CL
- Hold 5 sec, Yb – CL
- LG EXTEND ISOL VLV – CL
- Hold 5 sec, Yb – CL

Possible leak downstream of ELEVON/RSB switching vlv and eventually will affect all HYD systems.

CAUTION

HYD SYSTEM LEAK

Return Circ Pump to original position.

HYD CIRC PUMP 1(2,3) – OFF
SM ALERT occurs every time affected Circ Pump cycles ON. This can be prevented by changing FDA S/W pressure threshold for affected system via table maintenance to –1 psia. Refer to APU/HYD SSR–1.
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 Oil MDM failed (M), ITEM 2 –1 EXEC
   If Xdcr failed ↑ (high), ITEM 5 +0 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 Oil MDM failed (M), ITEM 2 –1 EXEC
   If Xdcr failed ↑ (high), ITEM 5 +0 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 Oil MDM failed (M), ITEM 2 –1 EXEC
   If Xdcr failed ↑ (high), ITEM 5 +0 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 +0 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 +0 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 +0 0 0 EXEC
APU/HYD SSR–3
CIRC PUMP XDCR FAILURE WORKAROUND

To allow normal GPC ops of Circ Pumps after accumulator or reservoir press or temp xdcr failure. Procedure changes corresponding upper and lower S/W limits to off–scale low, effectively removing xdcr from Circ Pump control. No action reqd for those params listed in the following tables that have FDA limits off–scale low or blank. They have been already removed 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

<table>
<thead>
<tr>
<th>SM 60 SM TABLE MAINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM 16 + _ (A) _ _ EXEC</td>
</tr>
<tr>
<td>ITEM 17 – 8 0 EXEC</td>
</tr>
<tr>
<td>ITEM 16 + _ (B) _ _ EXEC</td>
</tr>
<tr>
<td>ITEM 17 – 8 0 EXEC</td>
</tr>
</tbody>
</table>

(A) Choose the appropriate lower limit parameter ID number from table
(B) Choose the appropriate upper limit parameter ID number from table
### APU/HYD SSR–3 (Cont)

#### HYDRAULIC SYSTEM 1 PARAMS

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APU/HYD SSR-4
APU FU TK P XDCR FAILURE WORKAROUND

Selection of alternate Xdcr for APU fuel comp

1. For APU 1 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 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 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
Before proceeding, ✓ MCC

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

2. GNC CONFIG
   ASA (four) – ON
   ATVC (four) – ON
   ✓ FCS CH (four) – AUTO
   ✓ MDM All FF and FA – ON
   GNC I/O RESET
   ✓ DAP: A/AUTO/VERN

3. DPS CONFIG
   ✓ MMU 1,2 – ON
   Perform G2 TO G8 TRANSITION (ORB OPS, DPS)
   1: GNC, FCS/DED DIS C/O

4. APU PRESTART
   2: SM 86 APU/HYD
   ✓ APU HYD,W/B status no ↑ or ↓ (except HYD B/U)
   ✓ LG EXTEND ISOL VLV (tb–CL)
   ✓ HYD BRAKE ISOL VLV X tb – CL
   CIRC PUMP (three) – OFF
   BLR N2 SPLY X – ON
   ✓ APU AUTO SHUTDN (three) – ENA
   CNTLR PWR X – ON
   HYD MN PUMP PRESS X – LO
   ✓ APU SPEED SEL (three) – NORM
   ✓ OPER (three) – OFF
   ✓ FUEL TK VLV (three) – CL
   ✓ cb APU FU TK VLV ENA (six) – CL

   Inform MCC: READY FOR APU START

   Wait for MCC GO

5. APU START
   ✓ APU FUEL TK VLV X – OP
   ✓ APU/HYD RDY X tb – gray

   * If tb – bp, ✓ MCC *

   Start Event Timer
   ✓ APU OPER X – START/RUN
   ✓ HYD PRESS X ind – LO/LOW green

   * If APU did not start normally: *
   * APU OPER X – OFF *
   * FUEL TK VLV X – CL *
   * ✓ Shutdn (hyd press) *
   * Report APU F7 lts *
   * APU CNTLR PWR X – OFF *
   * ✓ MCC *

   HYD MN PUMP PRESS X – NORM
   HYD PRESS X ind – HI green

6. MPS/TVC ISOL VLV CONFIG
   ✓ HYD MPS/TVC ISOL VLV X – OP
   Hold 5 sec, ✓ tb – OP
APU/HYD SSR–5 (Cont)

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

If Secondary Actuator Check has not been performed:

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 (*)
C3
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
CRT1
g. NEG STIM – ITEM 20 EXEC (no *)

CRT1
h. Repeat steps c thru e for CH 2, 3, 4

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 Mesg may occur after APU shutdown

10. APU SHUTDOWN

R2
BLR PWR X – OFF
APU OPER X – OFF
FUEL TK VLV X – CL

√ Shutdn (hyd press)
APU CNTLR PWR X – OFF
BLR N2 SPLY X – OFF

11. HYD RECONFIG

R2
HYD CIRC PUMP X – ON
Wait 10 sec
R4
HYD MPS/TVC ISOL VLV X – CL
Hold 5 sec, √tb – CL
R2
HYD CIRC PUMP (three) – GPC

12. GNC/DPS RECONFIG

Perform G8 TO G2 TRANSITION (ORB OPS, DPS)
F8
INST PWR – OFF
O14:F
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 1 TK HTR T
   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 2 1 6 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 9 2 2 1 4 0 EXEC
   ITEM 17 +APU 1 TK HTR T (from SPEC 88) EXEC

2. For APU 2 QTY:
   
   SM 88 APU/ENVIRON THERM
   Note: APU 2 TK HTR T
   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 2 5 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 9 2 2 4 0 EXEC
   ITEM 17 +APU 2 TK HTR T (from SPEC 88) EXEC

3. For APU 3 QTY:
   
   SM 88 APU/ENVIRON THERM
   Note: APU 3 TK HTR T
   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 3 6 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 9 2 3 4 0 EXEC
   ITEM 17 +APU 3 TK HTR T (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

2.3 S–BD/UHF

COMM S–BD PM SCHEMATIC ........................................... 2–8
UPLINK/DOWNLINK COMMUNICATIONS TABLE .......................... 2–10

2.3a NO S–BD COMM: TDRS ........................................ 2–11

2.3b ‘ANTENNA’ ........................................................ 2–15

2.3c NO UHF VOICE (MULTI PNLS) ................................ 2–16

2.4 S62 BCE BYP

PL COMM MALFUNCTION POINTS SCHEMATIC ....................... 2–18

2.4a ‘S62 BCE BYP OFA’ ............................................. 2–19

2.4b OFB ................................................................. 2–21

2.4c OA ................................................................. 2–23

2.4d PL ................................................................. 2–25

2.4e PDI ................................................................. 2–27

2.4f PSP 1(2)’ ......................................................... 2–28

2.4g ‘S62 PDI DECOM FAIL’ ...................................... 2–30

2.5 PSP BIT

2.5a PSP BIT AND/OR FRAME SYNC LOCK FAIL .................. 2–32

2.6 OI DSC

2.6a OI DSC LOSS ...................................................... 2–34

COMM SSR

COMM SSR–1 LOSS OF ALL VOICE COMM ............................... 2–36
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SSR–12 OF3 .......................................................... 2–41
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SSR–15 OA2 .......................................................... 2–45
SSR–16 OA3 .......................................................... 2–46
SSR–17 OI DSC LOST: OF1 .......................................... 2–47
SSR–18 OF2 .......................................................... 2–48
SSR–19 OF3 .......................................................... 2–49
SSR–20 OF4 .......................................................... 2–50
SSR–21 OL1 .......................................................... 2–51
SSR–22 OL2 .......................................................... 2–52
SSR–23 OR1 .......................................................... 2–53
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)

1. MS or R AUDIO pnl must be pwr (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

---

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
- (O9)
- R AUD PWR − AUD/TONE

only
(R14:A)
- cb MNA AUD MS/OS − cl
- cb MNB AUD MIDDECK SPKR/CCU − cl
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 1 PWR: CNTLBC1 AND MNBFLC2

COMM S–BAND PM

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AV BAY 2 = 2
AV BAY 3A = 3A
AV BAY 3B = 3B
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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 in this table because they may appear on SM 2011 even though they have no orbiter communications equipment.
2.3a NO S–BD COMM: TDRS

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 MNB 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

102 only
(R14:A)
- cb MB AUD MIDDECK SPKR/CCU – cl

1 Assumes Ku–Band deployed activated and comm mode

1 Verify comm system config

SM 76 COMMUNICATIONS
- Display S–BAND PM TDRS
- ANT ELEC 1 ON
- XPNDR 1 ON
- PREAMP 1 ON
- PWR AMP 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

1 Verify comm system config

1 Assumes Ku–Band deployed activated and comm mode

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

(NO)

6 Advise MCC of panel A1L and ACCU config

YES

102

YES

NO

7

YES

13

YES

102

YES

102

YES

102

YES

102
7. 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
     DATA RATE RCV HI
     CODING XMIT ON
     CODING RCV 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?
    YES

12. Advise MCC of panel A1L and ACCU config

13. NO

21
2-13

2.3a (Cont)

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

10 Switch to alt freq

(C3)

• S−BAND PM CNTL − CMD

SM 76 COMMUNICATIONS

• If FREQ HI, issue FREQ LOW RTC from MAL CMD TABLE
• If FREQ LO, issue FREQ HI from MAL CMD TABLE

SM 76 COMMUNICATIONS

• S−BAND PM FREQ − HI(LO)
• Wait up to 10 min for TDRS acquisition

Two−way voice ?

14 ANT ELECTRIC SWITCH OR FREQ PROBLEM

YES

NO

15 Maneuver to select another antenna

SM ANTENNA

• MNVR 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 ?

16 ORIGINAL ANTENNA FAILED

YES

NO

17 Try Comm through Ground Site per site coverage

(AHU)

• 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
• S−BAND PM CNTL − PNL

Two−way voice ?

18 TDRS NETWORK OR DUAL HIGH POWER FAILURE

YES

NO

20 MULTIPLE UNEXPLAINED COMM FAILURES

5 9

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, OTS, DFR)

19 Advise MCC of panel A1L and ACCU config

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

03/08/02
The RTC (RESET PL1 or PL2) must be sent prior to any command.

CMD only those RTCs which do not match the expected comm config in block 1.

### MAL CMD TABLE

<table>
<thead>
<tr>
<th>Command Description</th>
<th>RTC Configuration</th>
<th>Command Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue RTC (RESET PL1 or PL2)</td>
<td>RTC - ITEM 13 +710901FF</td>
<td>EXEC (PL1) or 710A01FF EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (PWR AMP 1 OPR ON)</td>
<td>RTC - ITEM 13 +79990033</td>
<td>EXEC (PL1) or 799A0033 EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (ANT ELEC SW1 ON)</td>
<td>RTC - ITEM 13 +7999001F</td>
<td>EXEC (PL1) or 799A001F EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (XPNDR/PREAMP FREQ - HI)</td>
<td>RTC - ITEM 13 +799900FF</td>
<td>EXEC (PL1) or 799A00FF EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (PREAMP 1 ON)</td>
<td>RTC - ITEM 13 +7999003F</td>
<td>EXEC (PL1) or 799A003F EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (NSP 1 ON)</td>
<td>RTC - ITEM 13 +7999005F</td>
<td>EXEC (PL1) or 799A005F EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (DNLINK – HDR)</td>
<td>RTC - ITEM 13 +79990053</td>
<td>EXEC (PL1) or 799A0053 EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (UPLINK – HDR)</td>
<td>RTC - ITEM 13 +7999007E</td>
<td>EXEC (PL1) or 799A007E EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (XPNDR MODE – SGLS)</td>
<td>RTC - ITEM 13 +7999004A</td>
<td>EXEC (PL1) or 799A004A EXEC (PL2)</td>
</tr>
<tr>
<td>Issue RTC (XPNDR/PREAMP MODE – STDN LOW)</td>
<td>RTC - ITEM 13 +79990043</td>
<td>EXEC (PL1) or 799A0043 EXEC (PL2)</td>
</tr>
</tbody>
</table>
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
(Atl)
S−BD PM
ANT SW ELEC − 1
PRE AMP − 1
PWR AMPL
STBY − 1
PWR AMPL
OPER − 1
XPNDR − 1
NSP PWR − 1
### 2.3c NO UHF VOICE (MULTI PNLS)

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

2. **(O6) UHF SQUELCH - OFF**
   - MCC Comm ?
     - YES
     - PRI(SEC) ACCU CIRCUITS FAILURE, AFFECTING UHF
     - YES
     - 259.7 FREQ FAILURE, XMIT AND/OR RCV FAILURE, DEPENDING ON PATH TAKEN
   - NO
     - UHF XMIT FREQ SWITCH FAILURE

3. SQUELCH FAILURE

4. Switch ACCU
   - (C3) AUD CTR - 2(1)
     - MCC Comm ?
       - YES
       - Notify MCC/site prior to changing freq
     - (O6) UHF XMIT FREQ - 296.8
       - MCC Comm ?
         - YES
         - UHF XMIT FREQ SWICH FAILURE
         - YES
         - UHF XMIT FREQ SWITCH FAILURE
     - NO
       - Notify MCC/site prior to changing freq
       - UHF MODE - G
         - MCC Comm ?
           - YES
           - UHF XMIT FREQ SWITCH FAILURE
           - YES
           - UHF XMIT FREQ SWITCH FAILURE
           - YES
           - UHF XMIT FREQ SWITCH FAILURE
           - YES
           - UHF XMIT FREQ SWITCH FAILURE

5. **(O6) Operate without SQUELCH**

6. 259.7 FREQ FAILURE, XMIT AND/OR RCV FAILURE, DEPENDING ON PATH TAKEN

7. Switch to alt UHF freq
   - Notify MCC/site prior to changing freq
   - (O6) UHF XMIT FREQ - 296.8
     - MCC Comm ?
       - YES
       - Notify MCC/site prior to changing freq
       - UHF MODE - G
         - MCC Comm ?
           - YES
           - UHF XMIT FREQ SWITCH FAILURE
           - YES
           - UHF XMIT FREQ SWITCH FAILURE

8. **(O6) Notify MCC/site prior to changing freq**

9. UHF XMIT FREQ SWICH FAILURE

10. Switch to GUARD freq
    - (O6) Notify MCC/site prior to changing freq
    - UHF MODE - G
      - MCC Comm ?
        - YES
        - UHF XMIT FREQ SWITCH FAILURE
        - YES
        - UHF XMIT FREQ SWITCH FAILURE

11. **(O6) Notify MCC/site prior to changing freq**

12. **(O6) Notify MCC/site prior to changing freq**

13. **(O6) Notify MCC/site prior to changing freq**

14. **(O6) Notify MCC/site prior to changing freq**

15. **(O6) Notify MCC/site prior to changing freq**

16. **(O6) Notify MCC/site prior to changing freq**

**Nominal Config:**
- (R14:B) 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

**XMTR range is 350 miles with PWR AMP**

**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**

**Loss of UHF Voice**
If: OF1 or OF2 MDM failure, or Card failure in OF1 or OF2, or OF1/OF2 MDM data path PCMMU failure

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

**SM ALERT**
- S62 BCE BYP OFA

<table>
<thead>
<tr>
<th><strong>2.4a ‘S62 BCE BYP OFA’</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Accompanied by ‘S62 BCE BYP OFB’ and ‘S62 BCE BYP OA’?</td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td>13</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Determine which MDM affected: OF1 or OF2</td>
</tr>
<tr>
<td><strong>SM SYS SUMM 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>On same disp, both FUEL CELL 2 STACK T and FUEL CELL 2 COOL P missing status (M)?</td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>SINGLE CARD LOSS IN OF1 OR OF2 MDM</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>OF1 MDM DETECTED PROBLEM</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>OF2 MDM DETECTED PROBLEM</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>MCC will uplink msg for specific MDM/Card failure</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>On 2nd CRT</td>
</tr>
<tr>
<td><strong>SM 62 PCMMU/PL COMM</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PCMMU I/O RESET PCM – ITEM 5 EXEC (*)</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>TRANSIENT OF1 OR OF2 MDM FAILURE</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Cycle pwr for subject MDMs</td>
</tr>
<tr>
<td></td>
<td>(O14:B)</td>
</tr>
<tr>
<td></td>
<td>• cb MNA OI MDM OF 1/2 A – op</td>
</tr>
<tr>
<td></td>
<td>(O15:B)</td>
</tr>
<tr>
<td></td>
<td>• cb MNB OI MDM OF 1/2 B – op</td>
</tr>
<tr>
<td></td>
<td>(O14:B,O15:B)</td>
</tr>
<tr>
<td></td>
<td>• cb MNA,MNB OI MDM OF 1/2 A,B (two) – cl</td>
</tr>
<tr>
<td><strong>SM 62 PCMMU/PL COMM</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• PCMMU I/O RESET PCM – ITEM 5 EXEC (*)</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Data recovered?</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>TRANSIENT OF1 OR OF2 MDM FAILURE</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td></td>
</tr>
<tr>
<td><strong>14</strong></td>
<td></td>
</tr>
</tbody>
</table>
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. Advise MCC of PCMMU switch

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

4. Change PCDECOM connections (O5,MO30F) as reqd
If:
OF3 or OF4 MDM failure, or Card failure in OF3 or OF4, or OF3/OF4 MDM data path to PCMMU failure

Nominal Config:
(C3)
OI PCMMU PWR − 1
(O14:B,O16:B)
cb MNA,MNB OI
MDM OF 3/4 A,B (two) − cl

1 Accompanied by ‘S62 BCE BYP OFA’ and ‘S62 BCE BYP OA’?

If:
Both FUEL CELL 3 STACK T and FUEL CELL 3 COOL P missing status (M) ?

3 On same disp, both FUEL CELL 2 PUMP and FUEL CELL 3 PUMP missing status (M) ?

4 SINGLE CARD LOSS IN OF3 OR OF4 MDM

5 OF3 MDM DETECTED PROBLEM

6 OF4 MDM DETECTED PROBLEM

7 MCC will uplink msg for specific MDM/Card failure

8 On 2nd CRT

SM 62 PCMMU/PL COMM

PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

Missing status clear on previous lost params?

10 Cycle pwr on subject MDMs

11 TRANSIENT OF3 OR OF4 MDM FAILURE

12 TRANSIENT OF3 OR OF4 MDM FAILURE

13 11 Accompanied by ‘S62 BCE BYP OFB’ and ‘S62 BCE BYP OA’?

14 Data recovered?
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 FDAad

2. Advise MCC of PCMMU switch

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

4. Change PCDDECOM connections (O5,MO30F) as reqd

5. PCMMU I/O RESET PCM − ITEM 5 EXEC (*)

6. Fault msgs recur ?

10. SM 62 PCMMU/PL COMM

11. SM 62 PCMMU/PL COMM

12. SM 62 PCMMU/PL COMM

13. PCMMU I/O RESET PCM − ITEM 5 EXEC (*)

14. Switch to alternate PCMMU

15. Switch to alternate PCMMU

16. TRANSIENT PCMMU MIA FAILURE

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

18. OI MDM MIA PORT FAILURE

19. NO

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. NO

26. Load TFLs

27. Go to COMM SSRs for specific loss actions

28. OI MDM LOST: OF3, COMM SSR−12

29. 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

SM ALERT

S62 BCE BYP OA

COMM

2.4c ‘S62 BCE BYP OA’

1 Accompanied by ‘S62 BCE BYP OFA’ and ‘S62 BCE BYP OFB’?

NO

YES

2 Determine which OA1, OA2, OA3 MDM affected:

SM SYS SUMM 2

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

YES

8 MCC will uplink msg for specific MDM/Card failure

9

10 Cycle pwr on subject MDMs

(O17:D)

MDM OA 1/2/3 – OFF, then ON

SM 62 PCMMU/ PL COMM

PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

Data recovered?

NO

YES

11 TRANSIENT OA1, OA2, OR OA3 MDM FAILURE

12 Switch to alternate PCMMU

(C3) OI PCMMU PWR – 2(1)

(CRT) I/O RESET PCM – ITEM 5 EXEC (*)

Data recovered?

NO

YES

14 HARD FAILURE ON OI MDM DETERMINED IN BLOCK 2

15 OI MDM MIA PORT FAILURE

16

17

18

19

20

21

22

23

24

25

26
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)

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

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 (*)

22. Switch to alternate PCMMU (C3)
    - OI PCMMU PWR − 2(1)

24. Switch to original PCMMU (C3)
    - OI PCMMU PWR − 1(2)

28. DOUBLE FAILURE. ALL OI DATA IS SUSPECT

30. /MCC

4. Change PCDECOM connections (O5, MO30F) as reqd

23. TRANSIENT PCMMU MIA FAILURE

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

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

21. Go to OI MDM LOST: OA3, COMM SSR−16

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

30. /MCC

21. Go to OI MDM LOST: OA3, COMM SSR−16

22. Switch to alternate PCMMU

24. Switch to original PCMMU

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

2.4d ‘S62 BCE BYP PL’

1. FAULT
Msg accompanied by ‘S62 BCE BYP PDI’?

2. SM 62 PCMMU/PL COMM
PCMMU I/O RESET PCM − ITEM 5 EXEC (*)
PDI I/O RESET − ITEM 8 EXEC (*)
Fault msgs repeat?

3. Reestablish PDI/PCM IF
SM 62 PCMMU/PL COMM
PCMMU I/O RESET PCM − ITEM 5 EXEC (*)
‘S62 BCE BYP PL’ msg repeats?

4. Transient PDI/PCM BUS FAILURE

5. Transient PDI LOGIC/PWR FAILURE

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

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?

8. Originally Selected PCMMU MIA or PDI PORT FAILURE

9. 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. Fault msgs repeat?

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
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. MCC has insight on power going to the PDI. MCC may desire not to cycle

5. 'S62 BCE BYP PL' and 'S62 BCE BYP PDI' msgs repeat?

6. Go to LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
1 May occur prior to ‘I/O ERROR PL’ 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.

NOTE: No additional Decom input or FPM format loading possible.

✓ 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**
   - PSP
     - I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)
   - Fault msg repeats?
     - YES
       - Cycle PSP 1(2) pwr
         - (A1L)
         - S−BD PL
           - PWR SEL – BOTH
         - PSP CMD
           - OUTPUT – INTRG (PL UMB)
       - NO
   - NO

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?
     - YES
     - TRANSIENT PSP FAILURE
     - NO
     - Fault msg repeats?
       - YES
         - Cycle PSP 1(2) pwr
           - (A1L)
           - S−BD PL
             - PWR SEL – BOTH
           - PSP CMD
             - OUTPUT – INTRG
         - NO
     - NO

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

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

7. **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 – INTRG (PL UMB)

---

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

---

**Fault msg repeats ?**

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

Indications of PL RCVR lock vary with flight.

Select alternate orbiter S–BD PL comm system

[A1L] S–BD PL
- CNTL – CMD
- PWR SYS – 2(1)
- MOD – OFF
- CNTL – PNL

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

If OIU reqd (√ MCC):
(SSP)
- OIU PWR – OIU 2(1) ON
- OIU Tb – DN (UP)
- To reconfig OIU, √ MCC

[A1L] S–BD PL
PSP CMD
OUTPUT – INTRG?

Locked?

[A1L] S–BD PL FREQ SWEEP – ON (for up to 90 sec until lock), then OFF
- If no lock, √ MCC
2.4g ‘S62 PDI DECOM FAIL’

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 (↑)?

3. TRANSIENT PDI DECOM FAIL OR MOMENTARY LOSS OF PL TLM DATA INPUT TO PDI

4. Does associated DECOM have active PL?

5. NO
   - YES
     - M/C
     - Go to S62 PDI DECOM FAIL (PL OPS, PL SYS, or SODF: ASSY OPS)

6. Does associated DECOM have flt-specific procedures?

7. NO
   - YES
     - Go to S62 PDI DECOM FAIL (PL OPS, PL SYS, or SODF: ASSY OPS)

8. Determine if DECOM indicating fail (↑) operating on RF P/L TLM input
   - Failed PDI DECOM INPUT = 6?

9. Reload DECOM indicated as failed (↑)
   - YES
     - Perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
   - NO

10. Determine if PL INTRG to PSP interface operating properly
    - PSP SYNC BIT and FRAME = YES?

11. PDI DECOM FAILURE

12. DECOM still indicating fail (↑)?

13. TRANSIENT PDI DECOM MEMORY FAILURE

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 OUPUT - 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

Data on display driven by failed DECOM may be static.
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 64 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

- (A1L) S–BD PL
  - CNTL – CMD
  - PWR SYS – 2(1)
  - MOD – OFF
  - CNTL – PNL
- Error msg: 'S62 BCE BYP PSP 1(2)

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
- If OIU reqd (↑ MCC); (SSP)
  - OIU PWR – OIU 2(1) ON
  - OIU tb – DN (UP)
  - To reconfigure OIU, ↑ MCC

Reconfigure 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)

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

If DECOM still indicating fail (↑)?

PL TLM SYS TO PDI INTERFACE FAILURE OR PL TLM SYS PROBLEM

Select alternate S–BD PL Comm sys

SM 62 PCMMU/PL COMM

DECOM FDA still indicating fail (↑)?

PL TLM SYSTEM FAILURE OR PDI CNTL LOGIC FAILURE

PSP 1(2) PDI INTERFACE FAILURE

PL RCVR lock Locked?

S–BD PL
- MOD – ON
- CNTL – CMD

Original PDI DECOM FAILURE

If OIU reqd (↑ MCC)

If OIU reqd (↑ MCC)

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)

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

If DECOM still indicating fail (↑)?
2.5a PSP BIT AND/OR FRAME SYNC LOCK FAIL

1. Determine if PL INTRG operating properly
   - SM 62 PCMMU/PL COMM

   2. If available, config PSP by Item Entry; otherwise, MCC will uplink config CMD on crew call
   - SM 62 PCMMU/PL COMM

   3. TRANSIENT PSP LOGIC FAILURE

   4. Select alt orbiter S-BD PL comm sys
   - (A1L) S-BD PL
     - CNTL - CMD
     - PWR SYS - 1
     - PWR SEL - BOTH

   5. PL RCVR locked?
   - YES
   - NO

   6. PSP CMD OUTPUT - INTRG?
   - YES
   - NO

   7. PAYLOAD SPEC XXX
   - If available, config PSP by Item Entry; otherwise, MCC will uplink config CMD on crew call
   - (A1L) S-BD PL

   8. PL RCVR lock indications vary with flight
COMM 2.5a (Cont)

6
(A1L)
- S-BD PL FREQ SWEEP = ON (for up to 90 sec until lock), then OFF
- If no lock, √MCC

4 5

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

11
√MCC

2.6
Multiple Params Indicate Off-Scale Low (Displaying 'L')

Nominal Config:
(O14:B) cb MNA OI SIG CONDR OF 1/4 A - cl (O15:B) cb MNB OI SIG CONDR OF 1/4 B - cl (O16:B) cb MNC OI SIG CONDR OF 1/4 A - cl (O17:D)

SIMULTANEOUS OCCURRENCE OF THESE FAULT MSGS INDICATES DSC OM3 PROBLEM

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.

• Match param indicators on displays to determine failed DSC
• cb(s) for particular DSC

Simultaneous occurrence of these fault msgs indicates DSC OM3 problem

S69 FUEL CELL
S69 FUEL CELL
H2O
S86 RSVD/ACC
P 1(2,3)
S88 APU/FLU
MP 1(2,3)

COMM 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. cb(s) for particular DSC

Nominal Config:
(O14:B) cb MNA OI SIG CONDR OF 1/4 A - cl (O15:B) cb MNB OI SIG CONDR OF 1/4 B - cl (O16:B) cb MNC OI SIG CONDR OM 1/2 A - cl (O17:D)

12/14/99 2-34 MAL/ALL/GEN F
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 telecom (ORB OPS, PGSC, VIDEO CONFERENCING) in low rate
   PDIP KU BD RATE − LOW
   KU SIG PROC LDR − PL DIGITAL
   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)

<table>
<thead>
<tr>
<th>COLUMNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

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 >>
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.
### ACTIONS

<table>
<thead>
<tr>
<th>if on PCS SYS 1:</th>
<th>if on IMU FAN A:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Perform RECONFIG TO ALT PCS SYS, ECLS SSR−3</td>
<td>• IMU FAN B(C) − ON</td>
</tr>
<tr>
<td></td>
<td>• Monitor Cabin Fan flow by feel</td>
</tr>
<tr>
<td>(L1)</td>
<td>During sleep periods:</td>
</tr>
<tr>
<td>• AV BAY 3 FAN A,B (two) − ON</td>
<td>• CAB FAN A,B (two) − ON</td>
</tr>
<tr>
<td>• HUM SEP A,B (two) − ON</td>
<td>• Maintain LiOH Canister(s)</td>
</tr>
<tr>
<td>if on PCS SYS 2:</td>
<td>change schedule per cue card and FLIGHT PLAN</td>
</tr>
<tr>
<td>(L1)</td>
<td>(R1)</td>
</tr>
<tr>
<td>• MN BUS TIE B,C (two) − ON (tb−ON)</td>
<td>• MIN BUS TIE B,C (two) − ON (tb−ON)</td>
</tr>
<tr>
<td>(L1)</td>
<td>(R14:C)</td>
</tr>
<tr>
<td>• IF FLASH EVAP CNTRL PRI B enabled:</td>
<td>• cb MNB KU ANT HTR − op</td>
</tr>
<tr>
<td>• Perform FES RESTART ECLS SSR−5, using PRI A</td>
<td>• MCC about performing WASTE H2O DUMP</td>
</tr>
<tr>
<td>(R14:C)</td>
<td>(ML86B:A)</td>
</tr>
<tr>
<td>• cb MNA,MNB H2O LINE HTR A, HTR B (two) − cl</td>
<td>• cb MNA,MNB LINE HTR A, HTR B (two) − cl</td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>(L1)</td>
</tr>
<tr>
<td>• cb MNA,MNB EXT ARLK HTR STRUC (two) − cl</td>
<td>• FLASH EVAP CNTRL PRI B enabled:</td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>• FES HTR STRUC (two) − cl</td>
</tr>
</tbody>
</table>

### MEASUREMENT LOSS

- Most PCS 1 measurements
- Av Bay 3 Fan ∆P temp
- (MCC cannot assess) Hum Sep A,B (two)
- Speed Snsr
- Waste Qty 1
- IMU Fan ∆P
- A Speed Snsr
- Cab Fan ∆P
- PPCO2 (MCC cannot assess)
- FC 1 pH Snsr
- FC2 SS1 ∆V
- SS2 ∆V
- SS3 ∆V
- Most FES Feedline A Htr measurements
- Ku Gyro temp monitoring
- Waste Qty 1
- Waste H2O Dump Line T
- N2 Qty (two) 1,2 (OV103,104)
- N2 Qty 2 (OV105)
- Smoke Det A Conc'n Av Bay 2
- A Conc'n Av Bay 3
- Conc'n Cabin
- CO2 Cntlr 1 DC pwr indication
- CO2 Cntlr 1 BED A press
- VAC press
- CO2 Cntlr 1 malf indication
- CO2 Cntlr 2 AC pwr indication
- CO2 Cntlr 2 BED B press
- If no internal airlock: External Airlock LCG EV 1
- Supply Line press
- 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
- External Airlock H2O Shuttf Off Vlv position

### NOTES

1. If condensation in cabin, MCC
2. Buses will be untied for entry. MCC will TMBU FC ∆AMPS 2 limits and notify crew. If loss of comm, reset limits to present value ± 40
3. WST TK will be dumped by time (~2 %/min) to provide ullage to make EOM, MCC will provide the time
4. This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line
5. Smoke Det H/W Alarm still available
6. Xdcrs on disp SM 87 HYD THERMAL will show ‘M’ for some parameters
7. Visibility into Truss Flange temps lost
8. One of two temps in each zone lost
9. Vlv position is normally closed. Position can be verified during EMU recharge
**POLICY**

**MEASUREMENT LOSS**

If on PCS SYS 2:

- Perform RECONFIG TO ALT PCS SYS, ECLS SSR−3
- AV BAY 1 FAN (two) − ON
- H2O PUMP LOOP 2 − ON
- H2O PUMP LOOP 1 − OFF
- Do not don Biomed Electrodes

(R1L)
- CPLY H2O TKC INLET, OUTLET (two) − OP (lb–OP)
- MN BUS TIE C,A (two) − ON (lb–ON)

**SM 66 ENVIRONMENT**
- Monitor AIRLK P and dP/dT for cabin integrity on–orbit

(R1L)
- Most PCS Sys 2 measurements
- Av Bay 1 Fan ∆P temp
- Most H2O Loop 1 measurements
- EGG 1.2 Telemetry
- Sply H2O Qty B Qty D
- FC3 SS1 ∆V SS2 ∆V SS3 ∆V
- Cabin Press Snsr
- N2 Qty 2
- FC2 pH Snsr
- Sply H2O Dump Line T
- Smoke Det A Concnc Av Bay 1 Smoke Det B Concnc Av Bay 3 Smoke Det Concnc Right Flt Deck
- If no internal airlock:
  - External Airlock LCG EV 2 Supply Line press
  - External Airlock H2O Line Zone 1 MNA,B,C Htr ON status
  - Vestibule Temp 1
  - EXT A/L Struc Htr MNA,B Htr ON status
  - Vestibule Isolation Vlv 1 and Depress Vlv 1 op/cl positions

**NOTES**

1. Use interchanger flow to monitor H2O Loop 1 performance if reqd
2. Crossover vlv needs to be checked and TKC unisolated to equalize tks to provide leak protection
3. Buses will be untied for entry. MCC will TMBU FC ∆AMPS 3 limits and notify crew. If loss of comm, reset limits to present value ± 40
4. This action activates dual htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line
5. Smoke det H/W Alarm still available
6. Zone 1 temps verify proper switch config
7. Vestibule Temp 2 available
8. Structural temps verify proper switch config
9. Vlv still operational. Alternate vlv still available
### ACTIONS

**SM 66 ENVIRONMENT**
- Monitor Cabin Press for cabin leaks (L1)
  - AV BAY 2 FAN (two) – ON

**R13U**
- C/W PARAM SEL tw (three) – 105
- C/W LIMIT SET VALUE tw (three) – 1.50
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET
- C/W PARAM SEL tw (three) – 115

**SM 60 SM TABLE MAINT**
- Inhibit S–BD ANT QUAD Alert:
  - Param ID – ITEM 1 +0 9 2 1 0 4 9 EXEC
  - INH – ITEM 10 (15) EXEC

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

**SM 76 COMM**
- Use Interchanger flow to monitor H2O Loop 2 performance if reqd
- Raises H2O Loop 1 Pump Out P Limit
- Lowers H2O Loop 2 Pump Out P Limit
- Causes loss of FC Auto purge capability
- Avoids nuisance alarms

**SM 76 COMM**
- SM 76 COMM display S–BD PM mode static, SM GPC will continue selecting ANT for the mode shown

**SM 76 COMM**
- Force TDRS antenna pointing
- Xdcrs on disp SM 87 HYD THERMAL will show 'M' for some parameters

### MEASUREMENT LOSS

1. Most H2O Loop 2 measurements
   - Cabin dP/dT
   - Av Bay 2 Fan ∆P
   - Av Bay 2 temp (MCC cannot assess)

2. FC Purge Line temps
   - FC3 pH Snsr

3. Antenna Select feedbacks

4. Most FES Feedline B Htr measurements

5. S–BD mode
   - N2 Qty (two) 1,2
   - HYD sys temps

(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

(R11L)
- Supply H2O TKC INLET, OUTLET (two) − OP (lb−OP)

(MO51F)
If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 2 selected:
- Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1/DEACT 2(ACT 2/DEACT 1) (ORB OPS, ECLS)

(ML86B:C)
- cb MNA,MNB EXT ARLK HTR VEST (two) − cl
- cb MNA,MNB EXT ARLK HTR STRUC (two) − cl

### MEASUREMENT LOSS

- Supply H2O Noz T A,B (two)
- Waste H2O Noz T A,B (two)
- Supply H2O Qty C
- Smoke Det B Concн Av Bay 1 Bay 2
- Smoke Det Concн Left Flt Deck
- CO2 Cntlr 1 AC pwr indication
- CO2 Cntlr 1 BED ∆P
- CO2 Cntlr 2 DC pwr indication
- CO2 Cntlr 2 BED A press
- CO2 Cntlr 2 malf indication
- FC 1,2,3 Amps
- If no internal airlock:
  - 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
  - External Airlock H2O Line Zone 2 QD Pnl temp
  - Vestibule Isolation Vlv 2 op/cl positions

### 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
- Both htrs activated since visibility into temps lost
- Viv still operational. Alternate vlv's available
<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  
• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR−3, for ‘M’ Xdcrs on display SM 87 HYD THERMAL  
If Topping Evap enabled:  
• TOP EVAP HTR DUCT − A/B  
If High Load Evap enabled:  
• HI LOAD DUCT HTR − A/B | FC Auto Purge Start discretes  
1 CCTV Camr overtemp discrete  
HYD sys temps  
Fwd,Aft Topping Duct Htr measurements  
Hi Load Outbd Duct Htr measurements  
S−BD Quad Ant Sel 1/2 − GPC  
APU H2O sys temps (Htr mon)  
FC1 SS1 ∆V  
SS2 ∆V  
SS3 ∆V  
If no internal airlock, Vestibule Vlv 2 op/cl position  
PSP output port telemetry | 1 No SM alerts for CCTV overtemp  
2 May get Antenna alerts when manually operating (C3) S−BD PM ANT sw (loss of position discrete to SM)  
3 Buses will be untied for entry. MCC will TMBU FC ∆AMPS 1 limits and notify crew. If loss of comm, reset limits to present value ± 40  
4 Vlv still operational. Alternate vlv s available |

1 No SM alerts for CCTV overtemp  
2 May get Antenna alerts when manually operating (C3) S−BD PM ANT sw (loss of position discrete to SM)  
3 Buses will be untied for entry. MCC will TMBU FC ∆AMPS 1 limits and notify crew. If loss of comm, reset limits to present value ± 40  
4 Vlv still operational. Alternate vlv s available

09/05/03 2−43 MAL/ALL/GEN F
# COMM SSR–14

## OI MDM LOST: OA1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Perform Circ Pump Seq procedures for Circ Pump 1, CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR–1 and SIMULTANEOUS CIRC PUMP ON/GPC OPS, APU/HYD SSR–2</td>
<td>HYD sys pressures and seq discretes</td>
<td>1. GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 1</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 temps HYD sys 1 Accumulator and Reservoir pressure</td>
<td>2. Loss of fuel injector temperature is no–go for non–critical on–orbit burns. The engine will be used for deorbit</td>
</tr>
</tbody>
</table>

If High Load Evap Enabled: (L1)

• HI LOAD DUCT HTR – A/B

• RCS/OMS HTR OMS CRSFD LINES (two) – AUTO

2 L OMS no–go for on–orbit burns

- L OMS Fu Inj T

Hi Load Inbd Duct Htr measurement

Partial insight into OMS CRSFD Line Htr ops

APU 1 Fuel Qty (Meter and CRT)
**COMM SSR–15**  
**OI MDM LOST: OA2**

<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)  
• Perform Circ Pump Seq procedures for Circ Pump 2, CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR–1, and SIMULTANEOUS CIRC PUMP ON/GPC OPS, APU/HYD SSR–2  
• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR–3, for ‘M’ Xdcrs on display SM 87 HYD THERMAL  
(A14)  
• RCS/OMS HTR OMS CRSFD LINES (two) – AUTO  
R OMS no–go for on–orbit burns | 1 FC Purge Line temps  
HYD sys pressures, and seq discretes | 1 Causes loss of FC Auto purge capability  
2 GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 2  
3 Loss of fuel injector temperature is no–go for non–critical on–orbit burns. The engine will be used for deorbit |
| 10/09 | 2–45 | MAL/ALL/GEN F |
**COMM SSR–16**
**OI MDM LOST: OA3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A14)</td>
</tr>
<tr>
<td>• RCS/OMS HTR OMS</td>
</tr>
<tr>
<td>• CRSFD LINES – A AUTO,B AUTO</td>
</tr>
<tr>
<td>• Perform Circ Pump Seq procedures for Circ Pump 3, CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR–1 and SIMULTANEOUS CIRC PUMP ON/GPC OPS, APU/HYD SSR–2</td>
</tr>
<tr>
<td>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR–3, for ‘M’ Xdcrs on display SM 87 HYD THERMAL</td>
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</table>

<table>
<thead>
<tr>
<th>MEASUREMENT LOSS</th>
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<tbody>
<tr>
<td>OMS/RCS Htr monitoring temps</td>
</tr>
<tr>
<td>HYD sys pressures and seq discretes</td>
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<tr>
<td>HYD sys temps</td>
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<tr>
<td>HYD sys 3 Accumulator and Reservoir pressure</td>
</tr>
<tr>
<td>APU 3 Fuel Qty (Meter and CRT)</td>
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<tr>
<td>N2 Qty 1 (OV105)</td>
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<table>
<thead>
<tr>
<th>NOTES</th>
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<tbody>
<tr>
<td>1 GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 3</td>
</tr>
<tr>
<td>ACTIONS</td>
</tr>
<tr>
<td>---------</td>
</tr>
</tbody>
</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 |
| (L1)  
  - Monitor Cabin Fan by feel  
  - During sleep periods: CAB FAN A,B (two) – ON | Cab Fan $\Delta P$ | 2. C/W channels 14,34,54,104,114 also lost but high limit–sensed only |
| (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 $\Delta P$ | 3. WST TK will be dumped by time (~2%/min) to provide ullage to make EOM. MCC will provide the time |
| (R14:C)  
  - cb MNB KU ANT HTR – op | Ku Gyro temp monitoring  
  - Waste Qty A  
  - Waste H2O Dump Line T | 4. This action activates redundant htr’s on Supply H2O Dump Line, Waste H2O Dump Line, and Vacuum Vent Line |
| (ML86B:A)  
  - cb MNA,MNB H2O LINE HTR A,HTR B (two) – cl | Sply H2O Qty A  
  - Smoke Det A Concen Av Bay 2  
  - Concen Av Bay 3 | 5. Smoke Det H/W Alarm still available |
| (ML86B:C)  
  - cb MNA,MNB EXT ARlk HTR STRUC (two) – cl | 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 | 6. Both htrs activated since visibility into temps lost |
| | AC1 volts | 7. Alternate temps available in each zone |

04/15/02
<table>
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<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>GNC 23 RCS</td>
<td>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</td>
<td>1 Auto overpressure protection lost for Fwd RCS Oxidizer Dual Reg failure</td>
</tr>
<tr>
<td>RCS FWD</td>
<td></td>
<td>2 (O3) FWD RCS OXID He 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</td>
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<tr>
<td>ITEM 1 EXEC</td>
<td></td>
<td>3 C/W param 24, 64, 84 also lost, but high limit–sensed only</td>
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<tr>
<td>Reprioritize jets: DES INH on F3,4 jets:</td>
<td></td>
<td>4 Use pnl F9 Meter for insight to AC volts</td>
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<tr>
<td>F3L ITEM 10 EXEC (*)</td>
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<tr>
<td>F4R ITEM 14 EXEC (*)</td>
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<td>F3U ITEM 18 EXEC (*)</td>
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<td>F3D ITEM 24 EXEC (*)</td>
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<td>F4D ITEM 28 EXEC (*)</td>
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<td>F3F ITEM 32 EXEC (*)</td>
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<tr>
<td>Reselect auto deselected jets (2)</td>
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<tr>
<td>Increase PRI Jet Fail Limit:</td>
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<tr>
<td>ITEM 4+4 EXEC</td>
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<tr>
<td>Override Manf vlv status to CL for F3,4 Manifolds: OVRD MANF VLVS</td>
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<tr>
<td>F3 ITEM 42 EXEC (CL)</td>
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<td>F4 ITEM 43 EXEC (CL)</td>
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<tr>
<td>(O8)</td>
<td>Fwd RCS Tk, Manf Press, Qty (Fwd leak detection)</td>
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<tr>
<td>FWD RCS MANF ISOL 5 – CL (lb–CL), then GPC</td>
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<tr>
<td>Perform LOSS OF VERNIER (ORB OPS, RCS)</td>
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<tr>
<td>GNC SYS SUMM 2</td>
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<tr>
<td>2 Monitor FWD RCS He ΔP for leaks. If FWD RCS leak suspected, secure sys and call MCC</td>
<td>Most PCS 2 measurements</td>
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<tr>
<td>v/MCC for sleep config</td>
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<td>If on PCS SYS 2:</td>
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<tr>
<td>• Perform RECONFIG TO ALT PCS SYS, ECLS SSR–3</td>
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<tr>
<td>(R13U)</td>
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<tr>
<td>C/W PARAM SEL tw (three) – 004</td>
<td>3 Cab Press</td>
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<tr>
<td>C/W PARAM – INH</td>
<td>FRCS Fu Tk ULL P</td>
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<tr>
<td>C/W PARAM SEL tw (three) – 016</td>
<td>PPO2 B</td>
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<td>C/W PARAM – INH</td>
<td>H2O Pump P1</td>
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<tr>
<td>C/W PARAM SEL tw (three) – 044</td>
<td>Freon Flow 1</td>
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<td>C/W PARAM – INH</td>
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<tr>
<td>C/W PARAM SEL tw (three) – 105</td>
<td>(A1R) Ops Rcdrs 1(2) Mode tb (two) logic</td>
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<td>C/W PARAM – INH</td>
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<td>C/W PARAM SEL tw (three) – 106</td>
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<td>C/W PARAM – INH</td>
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<tr>
<td>C/W PARAM SEL tw (three) – &gt; 119</td>
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<tr>
<td>AC2 volts</td>
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<td>(Continued)</td>
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### COMM SSR–18 (Cont)
**OI DSC LOST: OF2**

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<tr>
<td>SM 66 ENVIRONMENT</td>
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<tr>
<td>• Monitor AIRLK P and dP/dT for cabin integrity on-orbit</td>
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<tr>
<td>(ML86B:A)</td>
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<tr>
<td>• cb MNA,MNB H2O LINE HTR A, HTR B (two) – cl</td>
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<tr>
<td>5</td>
<td>Sply H2O Qty B,D</td>
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<td>Cabin Press Snsr</td>
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<td>Sply H2O Dump Line T</td>
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<tr>
<td>6</td>
<td>Smoke Det A Concn Av Bay 1</td>
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<tr>
<td>6</td>
<td>Smoke Det B Concn Av Bay 2</td>
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<tr>
<td>6</td>
<td>Smoke Det Concn Right Flt Deck</td>
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<td>6</td>
<td>If no internal airlock, External Airlock LCG EV 2 Supply Line press</td>
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<tr>
<td>7</td>
<td>Smoke Det H/W Alarm still available</td>
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### COMM SSR–19
**OI DSC LOST: OF3**

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<tr>
<td>SM 66 ENVIRONMENT</td>
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</tr>
<tr>
<td>• Monitor CABIN PRESS for cabin leaks on-orbit</td>
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<td>(R13U)</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 115</td>
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<tr>
<td>• C/W PARAM - INH</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 116</td>
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<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
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<tr>
<td>1</td>
<td>Cabin dP/dT</td>
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<td>1</td>
<td>H2O Pump P2</td>
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<td>Freon Flow 2</td>
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<tr>
<td>2</td>
<td>Smoke Det B Concn Av Bay 1</td>
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<tr>
<td>2</td>
<td>Smoke Det Concn Left Flt Deck</td>
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<td>3</td>
<td>Fwd RCS Fu Tk T</td>
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<td>4</td>
<td>If no internal airlock: External Airlock Lower Bulkhead temp</td>
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<td>4</td>
<td>External Airlock H2O Line Zone 1,2 LCG 2 temp</td>
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<td>4</td>
<td>External Airlock H2O Line Zone 2 QD Pnl temp</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>AC3 volts</td>
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04/17/02

**COMM SSR–19 (Cont)**

**OI DSC LOST: OF3**

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<tr>
<td>(ML86B:C)</td>
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<tr>
<td>• cb MNA,MNB EXT AIRLK HTR STRUC (two) – cl</td>
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<tr>
<td>1</td>
<td>C/W params 51,71,94 are also lost, but high limit–sensed only</td>
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<tr>
<td>2</td>
<td>Smoke Det H/W Alarm still available</td>
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<td>3</td>
<td>Fwd RCS PASS Fu qty degraded, BFS Fu qty lost</td>
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<tr>
<td>4</td>
<td>Both htrs activated since visibility into temps lost</td>
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<tr>
<td>5</td>
<td>Crossover vlv needs to be checked and TKC unisolated to equalize tks to provide leak protection</td>
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<tr>
<td>6</td>
<td>Use pnl F9 Meter for insight to AC volts</td>
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04/17/02
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<tr>
<th>ACTIONS</th>
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<tbody>
<tr>
<td>RCS FWD</td>
<td>Jet Pc, Pc discrete, Injector temps (Jet fail–off, leak RM detection)</td>
<td>1. Without F1F, F2F no low Z translation capability; –X only one jet (usually 2)</td>
</tr>
<tr>
<td>• ITEM 1 EXEC</td>
<td></td>
<td>2. Auto overpressure protection lost for Fwd RCS Fuel Dual Reg failure</td>
</tr>
<tr>
<td></td>
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<td>3. (O3) FWD RCS Fuel He TK P and FWD RCS OXID PRPLT TK P ind on meter is lost</td>
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<td>RCS FWD</td>
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<tr>
<td>• ITEM 1 EXEC</td>
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<tr>
<td>DES INH on F1,2 JETS</td>
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</tr>
<tr>
<td>• F1L ITEM 8 EXEC (*)</td>
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<tr>
<td>• F2R ITEM 12 EXEC (*)</td>
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<td>• F1U ITEM 16 EXEC (*)</td>
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<td>• F2U ITEM 20 EXEC (*)</td>
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<td>• F1D ITEM 22 EXEC (*)</td>
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<td>• F2D ITEM 26 EXEC (*)</td>
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<td>• F1F ITEM 30 EXEC (*)</td>
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<td>• F2F ITEM 34 EXEC (*)</td>
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<td>• Reselect auto deselected jets (2)</td>
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<tr>
<td>Increase PRI Jet Fail Limit:</td>
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<tr>
<td>• ITEM 4+4 EXEC</td>
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<tr>
<td>Override Manf vlv status to CL for F1,2 Manifolds:</td>
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<tr>
<td>OVRD MANF VLVS</td>
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<td>• F1 ITEM 40 EXEC (CL)</td>
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<td>• F2 ITEM 41 EXEC (CL)</td>
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<td>GNC 23 RCS</td>
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<td>RCS FWD</td>
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<td>• ITEM 1 EXEC</td>
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<td>Reprioritize jets:</td>
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<tr>
<td>DES INH on F1,2 JETS</td>
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<tr>
<td>• F1L ITEM 8 EXEC (*)</td>
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<td>• F2R ITEM 12 EXEC (*)</td>
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<td>• F1U ITEM 16 EXEC (*)</td>
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<td>• F2U ITEM 20 EXEC (*)</td>
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<td>• F1F ITEM 30 EXEC (*)</td>
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<td>• F2F ITEM 34 EXEC (*)</td>
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<td>• ITEM 4+4 EXEC</td>
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<td>Override Manf vlv status to CL for F1,2 Manifolds:</td>
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<tr>
<td>OVRD MANF VLVS</td>
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<td>• F1 ITEM 40 EXEC (CL)</td>
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<td>• F2 ITEM 41 EXEC (CL)</td>
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<td>GNC SYS SUMM 2</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) – 006</td>
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<tr>
<td>• C/W PARAM – INH</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
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<tr>
<td>1</td>
<td>Fwd RCS TK and Manf Press and Qty</td>
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<tr>
<td>2</td>
<td>Fwd RCS OX Tk ULL P</td>
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<tr>
<td>3</td>
<td>If no internal airlock, External Airlock LCG EV 1 Supply Line press</td>
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03/07/00

GNC 23 RCS

MAL/ALL/GEN F
## Actions

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<tbody>
<tr>
<td><strong>ITEM 2 EXEC</strong></td>
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<tr>
<td>Reprioritize jets:</td>
</tr>
<tr>
<td>DES INH on L1,2 JETS</td>
</tr>
<tr>
<td>L2L ITEM 10 EXEC (*)</td>
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<tr>
<td>L1L ITEM 14 EXEC (*)</td>
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<tr>
<td>L2U ITEM 18 EXEC (*)</td>
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<td>L1U ITEM 20 EXEC (*)</td>
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<td>L2D ITEM 26 EXEC (*)</td>
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<tr>
<td>L1A ITEM 32 EXEC (*)</td>
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<tr>
<td>Reselect auto deselected jets (2)</td>
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<tr>
<td>Increase PRI Jet Fail Limit:</td>
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<tr>
<td><strong>ITEM 4+3 EXEC</strong></td>
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<td>Override Manf vlv status to CL for L1,2 Manifolds:</td>
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<td>OVRD MANF VLVS</td>
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<tr>
<td>L1 ITEM 40 EXEC (CL)</td>
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<td>L2 ITEM 41 EXEC (CL)</td>
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<tr>
<td>If I'CNCT config:</td>
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<tr>
<td><strong>ITEM 48 EXEC (INH)</strong></td>
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</table>

### RCS L 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. (O7) 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

## Measurement Loss

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<tbody>
<tr>
<td>Jet Pc, Pc discrete, Injector temps (Jet fail–off, leak RM detection)</td>
</tr>
</tbody>
</table>

### Measurement Loss Notes

2. Left RCS Tank and Manf Press and Qty (leak detection lost)

### RCS L Notes

3. L OMS Fu Tk ULL pressure
4. L OMS Fu Inject T

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**03/08/02**

2–51

MAL/ALL/GEN F
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<td>1  Prior to deorbit, override L3 Manf vlv status to OP</td>
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<tr>
<td>RCS L</td>
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<td>2  Auto overpressure protection lost for L RCS Fuel Dual Reg failure</td>
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<tr>
<td>• ITEM 2 EXEC</td>
<td></td>
<td>3  (O3) L RCS FUEL He TK P, L OMS OXID TK P, and (F7) L OMS N2 TK P, L OMS Pc ind on meter is lost. (O3) L RCS FUEL PRPLT QTY ind on meter is invalid</td>
</tr>
<tr>
<td>Reprioritize jets</td>
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<tr>
<td>DES INH on L3,4 jets:</td>
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<tr>
<td>• L4L ITEM 8 EXEC (*)</td>
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<tr>
<td>• L3L ITEM 12 EXEC (*)</td>
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<td>• L4U ITEM 16 EXEC (*)</td>
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<td>• L4D ITEM 24 EXEC (*)</td>
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<td>• L3D ITEM 28 EXEC (*)</td>
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<td>• L3A ITEM 30 EXEC (*)</td>
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<tr>
<td>• Reselect auto deselected jets (2)</td>
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<tr>
<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 L3,4 Manifolds:</td>
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<tr>
<td>OVRD MANF VLVS</td>
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<tr>
<td>• L3 ITEM 42 EXEC (CL)</td>
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<tr>
<td>• L4 ITEM 43 EXEC (CL)</td>
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<tr>
<td>If I'CNCT config:</td>
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<tr>
<td>• ITEM 48 EXEC (INH)</td>
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<tr>
<td>GNC SYS SUMM 2</td>
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<tr>
<td></td>
<td>Left RCS TK and Manf Press and Qty (leak detection lost)</td>
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<td>L OMS PC</td>
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<td>L OMS OX Tk ULL pressures</td>
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<td>L RCS Fu Tk ULL pressures</td>
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<tr>
<td>(R13U)</td>
<td>L RCS leak</td>
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<td></td>
<td>L OMS PC</td>
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</tbody>
</table>
### ACTIONS

#### RCS R
- Item 3 EXEC
  - Reprioritize jets:
    - DES INH on R1,2 jets
    - R2R ITEM 10 EXEC (*)
    - R1R ITEM 14 EXEC (*)
    - R2U ITEM 18 EXEC (*)
    - R1U ITEM 20 EXEC (*)
    - R2D ITEM 26 EXEC (*)
    - R1A ITEM 30 EXEC (*)
    - Reselect auto deselected jets (2)
- Increase PRI Jet Fail Limit:
  - Item 4-3 EXEC
    - Override Manf vlv status to CL for R1,2 Manifolds:
      - OVRD MANF VLVS
      - R1 ITEM 40 EXEC (CL)
      - R2 ITEM 41 EXEC (CL)
    - If I’CNCT config:
      - Item 48 EXEC (INH)

#### RCS A
- AFT R RCS MANF ISOL
  - CL (tb–CL), then GPC

#### RCS O
- Perform LOSS OF VERNIER (ORB OPS, RCS)

#### RCS OX
- Monitor R RCS He $\Delta$P for leaks. If R RCS leak suspected, secure sys and call MCC
- MCC for sleep config

#### RCS OMS
- C/W PARAM SEL tw (three) – 066
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 047
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 086
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – > 119

### MEASUREMENT LOSS

Jet PC, PC discrete, Injector temps (Jet fail–off, leak RM detection)

Jet Injection temps (Jet leak RM detection)

### NOTES

1. Prior to deorbit, override R1 Manf vlv status to OP
2. Loss of fuel injector temp is no–go for noncritical on–orbit burns. Engine will be used for deorbit
3. Auto overpressure protection lost for R RCS Oxidizer Dual Reg failure
4. (O3) R RCS OXID He TK P, R RCS OXID PRPLT TK P, R OMS FUEL TK P and (F7) R OMS He P ind on meter is lost. (O3) R RCS OXID PRPLT QTY ind on meter is invalid

2 R OMS no–go for on–orbit burns

R RCS OX ULL pressure

R OMS Fu Tk ULL pressure

R OMS Fu Inj T
### ACTIONS

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<th>RCS R</th>
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<td><strong>ITEM 3 EXEC</strong></td>
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<td>Reprioritize jets:</td>
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<thead>
<tr>
<th>GNC SYS SUMM 2</th>
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<tbody>
<tr>
<td><strong>Monitor R RCS He ∆P for leaks. If R RCS leak suspected, secure sys and call MCC</strong></td>
</tr>
<tr>
<td><em>√ MGC for sleep config</em></td>
</tr>
<tr>
<td><em>P/I OMS Burn Monitor Cue Card to (1) Monitor GMBL Angles and BALL Vlvs for right OMS performance (2)</em>**</td>
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<tr>
<td><em>Perform OMS Pc LOW for R OMS ↓</em>**</td>
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<tbody>
<tr>
<td><em>C/W PARAM SEL tw (three) = 037</em>**</td>
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<tr>
<td><em>C/W PARAM = INH</em>**</td>
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<tr>
<td><em>C/W PARAM SEL tw (three) = 076</em>**</td>
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<tr>
<td><em>C/W PARAM = INH</em>**</td>
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<tr>
<td><em>C/W PARAM SEL tw (three) = 086</em>**</td>
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<tr>
<td><em>C/W PARAM = INH</em>**</td>
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<tr>
<td><em>C/W PARAM SEL tw (three) = 057</em>**</td>
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<tr>
<td><em>C/W PARAM = INH</em>**</td>
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<tr>
<td><em>C/W PARAM SEL tw (three) = &gt; 119</em>**</td>
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### MEASUREMENT LOSS

<table>
<thead>
<tr>
<th>RCS R</th>
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<tbody>
<tr>
<td>Jet Pc, Pc discrete, Injector temps (Jet fail–off, leak RM detection)</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 TK P, R RCS FUEL PRPLT TK P, R OMS OXID TK P and (F7) R OMS N2 TK P, R OMS PC ind on meter is lost. (O3) R RCS FUEL PRPLT QTY ind on meter is invalid

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GNC 23 RCS

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03/08/02
### ACTIONS

(A14)
- RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO, B AUTO

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

(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

1. FC Purge O2 Vent Line temp
   FC Purge H2 Vent Line temp
  2. FC1 Stack temp
  3. MNC volts
  4. HYD sys temps

### NOTES

1. Causes loss of FC Auto purge capability
2. C/W params 1,2,1,41 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

### MEASUREMENT LOSS

<table>
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<tr>
<th>Metric</th>
<th>Value</th>
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<td>1,2</td>
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<tr>
<td>ESS 3AB volts</td>
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<td>FC1 volts</td>
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<td>FC 1,2,3 AMPS</td>
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<tr>
<td>ACTIONS</td>
<td>MEASUREMENT LOSS</td>
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<tr>
<td>(A14)</td>
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<tr>
<td>• RCS/OMS HTR OMS CRSFD LINES – AUTO, B AUTO</td>
<td>OMS/RCS Htr monitoring temps</td>
</tr>
<tr>
<td>(R13U)</td>
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<tr>
<td>1 C/W PARAM SEL tw (three) – 072</td>
<td>FC 2,3 Stack Temp</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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<tr>
<td>• C/W PARAM SEL tw (three) – 003</td>
<td>HYD sys temps</td>
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<tr>
<td>• C/W PARAM – INH</td>
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<td>• C/W PARAM SEL tw (three) – 013</td>
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<td>• C/W PARAM – INH</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 WORKAROUND, APU/HYD SSR–3 for ‘L’ Xdcrs, on display SM 87 HYD THERMAL</td>
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<tr>
<td>If FLASH EVAP CNTLR PRI A enabled:</td>
<td>Most FES Feedline B Htr measurements</td>
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<tr>
<td>• Perform FES RESTART, ECLS SSR–5, using PRI B</td>
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<tr>
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<td>(L1) HI LOAD DUCT HTR – A/B</td>
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<tr>
<td>• Perform ECLS COMPUTATION INHIBIT, ECLS SSR–14, TABLE D for faulty parameters: 925521 SYS 1 N2 TK1 T 925523 SYS 2 N2 TK1 T 925525 SYS 1 N2 TK3 T 925530 SYS 2 N2 PRESS</td>
<td>N2 Qty (two) 1,2</td>
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<td>(A12)</td>
<td>APU H2O sys temps (Htr mon)</td>
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<tr>
<td>• APU HTR TK/FU LINE/H2O/SYS 1A,1B, 3A,3B (four) – AUTO</td>
<td>If no internal airlock: External Airlock H2O Transfer Line press</td>
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<tr>
<td></td>
<td>Vestibule Temp 1</td>
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<td>Vestibule Temp 2</td>
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<td>FC 2,3 volts</td>
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<td>ESS 1BC, 2CA volts</td>
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### Actions

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<th>OMS/RCS Htr monitoring temps</th>
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<tr>
<td>ITEM 48 EXEC (INH) (A14)</td>
<td>HYD sys temps</td>
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<tr>
<td>RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO, B AUTO</td>
<td>HYD Circ Pump 1 press</td>
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<tr>
<td>Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR–3 for ‘L’ Xdcrs, on display SM 87 HYD THERMAL</td>
<td>APU 1 Fuel Qty (Meter and CRT)</td>
</tr>
<tr>
<td>Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR–1 for Circ Pump 1</td>
<td>MPS He Tk P C</td>
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<tr>
<td>(R13U)</td>
<td>MPS He REG P C</td>
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<tr>
<td>C/W PARAM SEL tw (three) – 009</td>
<td>HYD B/U P 1</td>
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<tr>
<td>C/W PARAM – INH</td>
<td>Hi Load Inbd Duct Htr measurement</td>
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<td>C/W PARAM SEL tw (three) – 039</td>
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<td>C/W PARAM – INH</td>
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<tr>
<td>C/W PARAM SEL tw (three) – 099</td>
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<td>C/W PARAM SEL tw (three) – &gt; 119</td>
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<tr>
<td>If High Load Evap enabled: (L1)</td>
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<tr>
<td>HI LOAD DUCT HTR – A/B</td>
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### Measurement Loss

- OMS/RCS Htr monitoring temps
- HYD sys temps
- HYD Circ Pump 1 press
- APU 1 Fuel Qty (Meter and CRT)
- MPS He Tk P C
- MPS He REG P C
- HYD B/U P 1
- Hi Load Inbd Duct Htr measurement

### Notes

- CW params 11.31.61, 72.82 are lost also, but high limit–sensed only
### ACTIONS

<table>
<thead>
<tr>
<th>Actions</th>
<th>Measurement Loss</th>
<th>Notes</th>
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<tbody>
<tr>
<td>GNC 23 RCS</td>
<td>OMS/RCS Htr monitoring temps</td>
<td>1 Causes loss of FC Auto Purge capability</td>
</tr>
<tr>
<td>If I’CNCT config:</td>
<td></td>
<td>2 C/W params 18,48,69 are lost also, but high limit–sensed only</td>
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<tr>
<td>• ITEM 48 EXEC (INH) (A14)</td>
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<tr>
<td>• RCS/OMS HTR OMS CRSF D LINES – A AUTO, B AUTO</td>
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<tr>
<td>When reqd:</td>
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<tr>
<td>• Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)</td>
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<tr>
<td>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR–1, for Circ Pump 2</td>
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<tr>
<td>• Perform APU FUEL TANK P XDUCER FAILURE WORKAROUND, APU/HYD SSR–4 for APU 2</td>
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<tr>
<td>• Perform APU FUEL TANK T XDUCER FAILURE WORKAROUND, APU/HYD SSR–6 for APU 2</td>
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<td>(R13U)</td>
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<td>• C/W PARAM SEL tw (three) – 107</td>
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<td>(O7)</td>
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<td>• AFT R RCS MANF ISOL 5– CL (tb–CL), then GPC</td>
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<td>• Go to LOSS OF VERNIER (ORB OPS, RCS)</td>
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<td>FC Purge H2 Vent Line temp 1</td>
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<td>HYD sys temps</td>
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<td>HYD Circ Pump 2 press</td>
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<td>MPS He REG P L</td>
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</tr>
<tr>
<td></td>
<td>HYD B/U P 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jet Injector temps (Jet leak RM detection)</td>
<td></td>
</tr>
<tr>
<td>ACTIONS</td>
<td>MEASUREMENT LOSS</td>
<td>NOTES</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>(A14)</td>
<td></td>
<td>1 C/W params 28, 58, 59, 117 lost also, but high limit-sensed only</td>
</tr>
<tr>
<td>• RCS/OMS HTR OMS CRSFD LINES – A AUTO, B AUTO</td>
<td>OMS/OMS Htr monitoring temps</td>
<td></td>
</tr>
<tr>
<td>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR–1, for Circ Pump 3</td>
<td>HYD Circ Pump 3 press</td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 • C/W PARAM SEL tw (three) – 029</td>
<td>MPS He Tk P R</td>
<td></td>
</tr>
<tr>
<td>1 • C/W PARAM – INH</td>
<td>MPS He REG P R</td>
<td></td>
</tr>
<tr>
<td>1 • C/W PARAM SEL tw (three) – 059</td>
<td>EVAP OUT T 2</td>
<td></td>
</tr>
<tr>
<td>1 • C/W PARAM – INH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 • C/W PARAM SEL tw (three) – 117</td>
<td>HYD sys temps</td>
<td></td>
</tr>
<tr>
<td>1 • C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR–3, for ‘L’ Xdcrs on display SM 87 HYD THERMAL</td>
<td>MPS He Tk P R</td>
<td></td>
</tr>
<tr>
<td>• Perform APU FUEL TANK P XDCR FAILURE WORKAROUND, APU/HYD SSR–4 for APU 3</td>
<td>MPS He REG P R</td>
<td></td>
</tr>
<tr>
<td>• Perform APU FUEL TANK T XDCR FAILURE WORKAROUND, APU/HYD SSR–6 for APU 3</td>
<td>EVAP OUT T 2</td>
<td></td>
</tr>
<tr>
<td>• Go to ECLS COMPUTATION INHIBIT, ECLS SSR–14, TABLE D for faulty parameter: 925526 SYS 1 N2 TK4 T</td>
<td>MPS He Tk P R</td>
<td>2 Recoverable by TMBU</td>
</tr>
<tr>
<td>2 N2 Qty 1 (OV105)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

09/10/03 2–59 MAL/ALL/GEN F
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HYD sys 1 Accumulator pressure</td>
<td></td>
<td>1 GPC capability to monitor HYD Accumulator pressure lost for system 1. HYD Reservoir pressure monitoring remains</td>
</tr>
</tbody>
</table>
## COMM SSR–31
**OI DSC LOST: OP1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NONE</td>
<td>MNA PPCA1 Volts, Tk 6,8 Tk Press, Qty, EDO Pallet temp measurements</td>
<td>1 Loss of instrumentation only</td>
</tr>
</tbody>
</table>

## COMM SSR–32
**OI DSC LOST: OP2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NONE</td>
<td>MNB PPCA2 Volts, Tk 7,9 Tk Press, Qty, EDO Pallet temp measurements</td>
<td>1 Loss of instrumentation only</td>
</tr>
</tbody>
</table>
4.1 PRIMARY C/W
   4.1a PRIMARY C/W ................................................................. 4–4
   4.1b ALL ANNUN LTS ON EXCEPT BACKUP C/W ALARM ..................... 4–7
   4.1c NONRESETTABLE MA LT OR TONE ........................................ 4–8
   4.1d PRI C/W SYS ANNUNCIATES FALSE ALARM ............................ 4–11

4.2 OTHER C/W
   4.2a NONRESETTABLE BACKUP C/W ALARM LT ............................ 4–22
   4.2b MA LT & C/W TONE – NO ANNUN LT ................................. 4–23
   4.2c KLAXON – NO RAPID dP/dT ............................................. 4–27
   4.2d SIREN – NO SMOKE DETN LT .......................................... 4–29
   4.2e PRI C/W SYS FAILS TO ANNUNCIATE OUT–OF–LIMIT PARAM .... 4–30
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

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

   No param tripped
   - Some erroneously tripped params
   - Accounted for all tripped params

4.1b 1

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
     lt off ?

   NO

12. For erroneously tripped param

   YES

4.1d 12

4.1d 13
For any nuisance alarms that cannot be inhibited, use 4.1b to pwrdn PRI C/W or use 4.1c to disable tone.

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

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

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

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.

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

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
  - (F7)

2. TRANSIENT INDUCED PWR SPLT OR TIMING FAILURE

3. C/W SYS A PWR SPLT 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 3P
    106  FREON FLOW 1
    116  FREON FLOW 2

- (R13U)
  - C/W PARAM SEL tw (three) – > 119

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 lts, ACCU, sleep station tones)

Items lost:
- (F7)
  - All C/W annun lts
- (R13U)
  - C/W status pnl lts, functions
- (F2,F4,A7U,MOS52J)
  - 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

6. C/W Sys B redundancy

To pwrd Sys B redundantly:
- Go to CAUTION AND WARNING ELECTRONICS UNIT CONTINGENCY POWER (IFM)
**4.1c NONRESETTABLE MA LT OR TONE**

**C/W MSTR ALARM**

(Cannot be reset by depressing any MSTR ALARM pb)

Caused by:
- Lamp driver failed on C/W Sys A(B) MA
- Signal failed on C/W Sys A(B)
- EMER, C/W, or SM alarm failed on Constant retriggering caused by PRI C/W trig mem or self-test 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

**Illuminated MA It 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**

**1 Constant alarm tone ?**

YES

**2** (F2,F4,A7U, MO52J)

More than one MSTR ALARM It on ?

YES

**3 LAMP DRIVER FAILED ON**

**4** (O13:C)

- cb ESS 2CA CW B – op (MA)

F2(F4,A7U)

- MSTR ALARM pb – off

MSTR ALARM It off ?

YES

**5 C/W SYS A MASTER ALARM LT CIRCUIT FAILURE**

**6 Tone disable**

(O5,O9,L9,A13,R10, MO42F, MO58F)

- AUD PWR (seven) – AUD (OFF)

Klaxon or Siren in MIDDECK speaker

Klaxon or Siren in OS speaker

No Klaxon or Siren

**7 C/W SYS B MSTR ALARM LT Ckt 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 1BC 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 1BC C/W A – cl (MA)

F2(F4,A7U)

- MSTR ALARM pb – off

**12**

**13**
Illuminated MA It bulbs are mounted in sealed assy

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

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

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

NOTE
Bkup C/W Alarms must be MSG RESET to prevent masking of subsequent Backup C/W Alarms

Bkup C/W Alarm Annun It cannot be reset
Sleep station hdst tones
Emer tones to dedicated speaker coil

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

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

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

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

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

Additional Its which light during C/W MEM − READ indicate tripped params that are not inhibited

Sleep Station Hdst has constant tone
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 (O13C) and receiving alarm tones.

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

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 (O13C) and receiving alarm tones.

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

3 20 21

21. Inhibit tripped param

- C/W PARAM SEL tw – param number
- C/W PARAM – INH

A7U(F2,F4)
- MSTR ALARM It – off

MSTR ALARM It – off ?

23. Are all tripped params inhibited?

YES

22. PRI C/W TRIGGER MEMORY FAILURE

- Singly enable all but last param inhibited in block [21]; expect C/W Alarm with each enable

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

20

24. Reenable param

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

26. Reenable param

- C/W PARAM SEL tw – Param number
- C/W PARAM – INH

25

28. Disable C/W Sys A tones

(R13U)
- C/W TONE VOL A – ccw (using screwdriver)

(MO42F)
- BYP TONE VOL – ccw
- MIDDECK SPKR AUD TONES – ACCU

(O5,09,A13,R10, 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)

02/23/00
4.1d PRI C/W SYS ANNUNCIATES FALSE ALARM

(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

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 Correct param inhibit status can be verified using PRIMARY C/W PARAMETER MATRIX Cue Card
2 Depending on param value, lt 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, √ param select capability with INH/ENA capability verification using procedure in block 13

1 (F7) BACKUP C/W ALARM lt on w/o CRT fault msg?

2 Refer to PRIMARY C/W PARAMETER MATRIX (Cue Card)
   • C/W PARAM STATUS − TRIP

3 Param normally inhibited?

4 Inhibit param
   • C/W PARAM SEL tw − desired param
   • C/W PARAM − INH
   • C/W PARAM SEL tw − > 119
   (F7) C/W Annun lt off?

6 PRI C/W INHIBIT MEMORY FAILURE

7 PARAM ENABLED INADVERTENTLY

8 (F7) C/W ANNUN LT CKT FAILED ON

9 IN ADDITION TO OTHER SYS PROBLEM, PRI C/W (F7) ANNUN LT SELECT CKT FAILURE

11 Reconfig
   • Annun lt status as each out−of−limit param is inhibited
   (R13U)
   • C/W PARAM SEL tw − desired param
   • C/W PARAM − INH
   (F7) C/W Annun lt off?

12

(7.5b) 60

(R13U)
• C/W PARAM STATUS − INH (hold during next step)
• C/W MEM − CLEAR, then READ
• Compare INH with MEMORY (equiv to tripped lts)

All MEMORY (tripped) param INH
Any MEMORY (tripped) param not INH

10

1 (F7) C/W MEM − CLEAR

3 (F7) C/W Annun lt on?

10
Prior to changing any param limit value, √ param select capability with INH/ENA capability verification using procedure in block 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 ?

√ Limits

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

Limits correct ?

√ 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 ?

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

√ Param shift high

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

Param still out-of-limit ?

Find param trip value

• Decr UPPER limit increments until MSTR ALARM tripped
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

---

4.1d (Cont)

18. (R13U) C/W LIMIT SET
   - VALUE tw = 0.00
   - LIMIT – LOWER
   - FUNC – SET, then READ (√value)
   - C/W
   - PARAM STATUS – TRIP

   Param still out–of–limit ?

   YES

   21. Find param trip value
      - Incr LOWER limit in increments until MA tripped

   NO

   20. √ Param shift low

   22. √ UPPER limit function

   (R13U) C/W LIMIT SET
   - √ VALUE tw = 0.00
   - LIMIT – UPPER
   - FUNC – SET, then READ (√value)
   - C/W
   - PARAM STATUS – TRIP

   Param still out–of–limit ?

   YES

   23. √ PRI C/W value
      - If analog param, use PRIMARY TO BACKUP C/W ANALOG PARAMETER CALIBRATION (REF DATA, C/W) to estimate PRI C/W value in EU and set new limits to indicate significant change

   NO

   24. PARTIAL PRI C/W SNSR, MULTIPLEXER OR LIMIT sense FAILURE

   25. UPPER LIMIT HAS BECOME LOW LIMIT

   26. For each erroneously tripped param:
      (R13U) C/W
      - PARAM SEL tw – (param number)
      - PARAM – INH
      - PARAM STATUS – INH (√status)

   27. Reset LOWER limit to correct value

   28. PARTIAL PRI C/W MULTIPLEXER, AMPLIFIER, OR LIMIT sense CKT FAILURE

   29. PARAM SIGNAL CONDITIONER FAILURE

---

01/02/96  4–13  MAL/ALL/GEN F
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

30 \(\sqrt{\text{Param Select bit failed to '1'}}\)

- C/W LIMIT SET VALUE tw – 0.00
- C/W PARAM SEL tw – 000
  - INH
  - STATUS – INH (\(\sqrt{\text{status}}\))
  - ENA
  - STATUS – INH (\(\sqrt{\text{status}}\))

Determine which param INH/ENA:

<table>
<thead>
<tr>
<th>000</th>
<th>001</th>
<th>002</th>
<th>004</th>
<th>008</th>
<th>010</th>
<th>015</th>
<th>022</th>
<th>020</th>
</tr>
</thead>
</table>
| None of those listed

31 \(\sqrt{\text{PARAM SEL}}\)

- CKT FAILURE
- LIMIT VALUE CHANGE
- CAPABILITY
- PROBABLY
- AFFECTED

32 \(\sqrt{\text{Param select for bit failed to '0'}}\)

- C/W LIMIT SET VALUE tw – 4.75
- C/W PARAM SEL tw – 119
  - INH
  - STATUS – INH (\(\sqrt{\text{status}}\))
  - ENA
  - STATUS – INH (\(\sqrt{\text{status}}\))

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, Transient problem</td>
</tr>
<tr>
<td>119 088 075</td>
<td>Units 2, 2 from XY2, XY3, XY6, XY7 *</td>
</tr>
<tr>
<td>119 088 073</td>
<td>Units 4, 4 from XY4, XY5, XY6, XY7 *</td>
</tr>
<tr>
<td>109 088 067</td>
<td>Tens 1, Subtract 10 from X1Z, X3Z, X5Z, X7Z, X9Z *</td>
</tr>
<tr>
<td>119 088 057</td>
<td>Tens 2, 20 from X2Z, X3Z, X6Z, X7Z *</td>
</tr>
<tr>
<td>119 088 037</td>
<td>Tens 4, 40 from X4Z, X5Z, X6Z, X7Z *</td>
</tr>
<tr>
<td>111 080 077</td>
<td>Units 8, Subtract 8 from XY8, XY9 *</td>
</tr>
<tr>
<td>110 080 070</td>
<td>All Units, Only param XY0 selectable</td>
</tr>
<tr>
<td>119 008 077</td>
<td>Tens 8, Subtract 80 from X8Z, X9Z *</td>
</tr>
<tr>
<td>109 008 007</td>
<td>All Tens, Only param X0Z selectable</td>
</tr>
<tr>
<td>100 000 000</td>
<td>All Tens &amp; Units, Only param 000 &amp; 100 selectable</td>
</tr>
<tr>
<td>019 088 077</td>
<td>Hundreds, Only param 0YZ selectable</td>
</tr>
<tr>
<td>010 080 070</td>
<td>Hund &amp; Units, Only param 0Y0 selectable</td>
</tr>
<tr>
<td>009 008 007</td>
<td>Hund &amp; Tens, Only param 00Z selectable</td>
</tr>
<tr>
<td>000 000 000</td>
<td>All, Only param 000 selectable</td>
</tr>
</tbody>
</table>

**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**

33

**NO**

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

### Param Select/Results

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

**YES**

- **43** PARAM SELECT SINGLE BIT FAILED TO '1'

- **47**

**NO**

- **44** PARAM SEL CKT FAILURE LIMIT VALUE CHANGE CAPABILITY PROBABLY AFFECTED

- **47**
Prior to changing param limit, verify that 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.

### C/W PARAMS

- **Param inhibited per PRIMARY C/W PARAMETER MATRIX (Cue Card)**
- **Use C/W & FDA TABLE (REF DATA, C/W) to reset param limits for:**
  - **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 ∆P
    - 106 FREON FLOW 1
    - 116 FREON FLOW 2

(R13U)
- **C/W PARAM SEL tw > 119**
4. Limit value set confirmation

(R13U)
- C/W LIMIT SET VALUE tw – 3.90
- C/W LIMIT SET VALUE tw – 2.60
- C/W LIMIT SET VALUE tw – 4.90

51 Limit value bit failure confirmation

(R13U)
- C/W LIMIT SET FUNC – SET, then READ (‘/’ value)
- ‘/’ Limit value set/read combination for failure mode

Set/Read

<table>
<thead>
<tr>
<th>BCD Bit</th>
<th>First</th>
<th>Second</th>
<th>Failed to ‘1’</th>
<th>Limit Set Value Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>.05</td>
<td>0.00/0.10</td>
<td>3.90/3.95</td>
<td>.05</td>
<td>Add .05 to 0 Hundredths value sel</td>
</tr>
<tr>
<td>.05</td>
<td>0.00/0.20</td>
<td>2.60/2.70</td>
<td>.05</td>
<td>Add .1 to 0,2,4,6,8 Tenth values sel</td>
</tr>
<tr>
<td>.05</td>
<td>0.00/0.40</td>
<td>3.90/3.90</td>
<td>.05</td>
<td>Add .2 to 0,1,4,5,8,9 Tenth values sel *</td>
</tr>
<tr>
<td>.05</td>
<td>0.00/0.80</td>
<td>2.60/2.40</td>
<td>.05</td>
<td>Add .4 to 0,1,2,3,8,9 Tenth values sel *</td>
</tr>
<tr>
<td>.05</td>
<td>0.00/1.00</td>
<td>2.60/3.60</td>
<td>.05</td>
<td>Add .8 to 0,1,2,3,4,5,6,7 Tenth values sel *</td>
</tr>
<tr>
<td>.05</td>
<td>0.00/2.00</td>
<td>4.90/0.50</td>
<td>.05</td>
<td>Add 1 to 0,2,4 Units values sel *</td>
</tr>
<tr>
<td>.05</td>
<td>0.00/4.00</td>
<td>2.60/0.20</td>
<td>.05</td>
<td>Add 2 to 0,1,4 Units values sel *</td>
</tr>
</tbody>
</table>

* 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

NO

52 LIMIT VALUE SINGLE BIT FAILED TO ‘1’

53 LIMIT VALUE CKT FAILURE, PARAM SELECT CAPABILITY PROBABLY AFFECTED

(R13U)
- C/W PARAM – ENA

54

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>Failed to '0'</th>
<th>Limit Value Select Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.65 5.95</td>
<td>None</td>
<td>transient problem</td>
</tr>
<tr>
<td>3.60 5.90</td>
<td>.05</td>
<td>subtract .05 from X,Y5*</td>
</tr>
<tr>
<td>3.65 5.85</td>
<td>tenths 1</td>
<td>subtract .1 from X.1Z, X.3Z, X.5Z, X.7Z, X.9Z*</td>
</tr>
<tr>
<td>3.45 5.95</td>
<td>tenths 2</td>
<td>.2 X.2Z, X.3Z, X.6Z, X.7Z*</td>
</tr>
<tr>
<td>3.25 5.95</td>
<td>tenths 4</td>
<td>.4 X.4Z, X.5Z, X.6Z, X.7Z*</td>
</tr>
<tr>
<td>3.65 5.15</td>
<td>tenths 8</td>
<td>.8 X.8Z, X.9Z*</td>
</tr>
<tr>
<td>3.05 5.05</td>
<td>all tenths</td>
<td>only X.0Z selectable</td>
</tr>
<tr>
<td>3.00 5.00</td>
<td>.05 &amp; all tenths</td>
<td>X.00 selectable</td>
</tr>
<tr>
<td>2.65 4.95</td>
<td>units 1</td>
<td>subtract 1 from 1.YZ, 3.YZ, 5.YZ*</td>
</tr>
<tr>
<td>1.65 4.95</td>
<td>units 2</td>
<td>2 2.YZ, 3.YZ*</td>
</tr>
<tr>
<td>3.65 1.95</td>
<td>units 4</td>
<td>4 4.YZ, 5.YZ*</td>
</tr>
<tr>
<td>0.65 0.95</td>
<td>all units</td>
<td>only 0.YZ selectable</td>
</tr>
<tr>
<td>0.05 0.05</td>
<td>units &amp; tenths</td>
<td>only 0.0Z selectable</td>
</tr>
<tr>
<td>0.60 0.90</td>
<td>units &amp; .05</td>
<td>only 0.Y0 selectable</td>
</tr>
<tr>
<td>0.00 0.00</td>
<td>all</td>
<td>only 0.00 selectable</td>
</tr>
</tbody>
</table>

**NOTE**

* 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

(R13U)
- 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

Param Sel/Results

<table>
<thead>
<tr>
<th>000 099 055</th>
<th>tw Bit Shorted</th>
</tr>
</thead>
<tbody>
<tr>
<td>015 099 055</td>
<td>Units 1</td>
</tr>
<tr>
<td>015 105 065</td>
<td>Units 2</td>
</tr>
<tr>
<td>015 105 055</td>
<td>Units 4</td>
</tr>
<tr>
<td>015 099 065</td>
<td>Units 8</td>
</tr>
<tr>
<td>022 099 055</td>
<td>Tens 1</td>
</tr>
<tr>
<td>022 031 027</td>
<td>Tens 2</td>
</tr>
<tr>
<td>022 031 055</td>
<td>Tens 4</td>
</tr>
<tr>
<td>022 099 027</td>
<td>Tens 8</td>
</tr>
</tbody>
</table>

Param Select Changes, Notes

- Param XY1, XY3, XY5, XY7, XY9 selectable *
- XY2, XY3, XY6, XY7 selectable *
- XY4, XY5, XY6, XY7 selectable *
- XY8, XY9 selectable *
- Param X1Z, X3Z, X5Z, X7Z, X9Z selectable *
- 02Z, 03Z, 06Z, 07Z selectable *(a)
- 04Z, 05Z, 06Z, 07Z selectable *(a)
- 08Z, 09Z selectable *(a)

NOTE
* 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 T enths selection. For ‘T ens’ 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 ?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>61</td>
</tr>
</tbody>
</table>

PARAM SELECT tw SIGNAL SHORTED

PARAM SELECT CKT FAILURE
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 Result**

<table>
<thead>
<tr>
<th>tw BCD</th>
<th>Signal Shorted</th>
<th>Limit Value Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>3.60 2.50</td>
<td></td>
</tr>
<tr>
<td>0.60</td>
<td>3.60 1.50 Units 1</td>
<td>Value 1.YZ, 3.YZ, 5.YZ selectable *</td>
</tr>
<tr>
<td>0.60</td>
<td>3.60 2.50 Units 2</td>
<td>Value 2.YZ, 3.YZ selectable *</td>
</tr>
<tr>
<td>0.60</td>
<td>1.20 1.10 Units 4</td>
<td>Value 4.YZ, 5.YZ selectable *</td>
</tr>
<tr>
<td>1.50</td>
<td>4.50 2.50 Tenths 1</td>
<td>Value X.1Z, X.3Z, X.5Z, X.7Z, X.9Z selectable *</td>
</tr>
<tr>
<td>1.50</td>
<td>3.60 3.50 Tenths 2</td>
<td>Value X.2Z, X.3Z, X.6Z, X.7Z selectable *</td>
</tr>
<tr>
<td>1.50</td>
<td>3.60 2.50 Tenths 4</td>
<td>Value X.4Z, X.5Z, X.6Z, X.7Z selectable *</td>
</tr>
<tr>
<td>1.50</td>
<td>4.50 3.50 Tenths 8</td>
<td>Value X.8Z, X.9Z selectable *</td>
</tr>
</tbody>
</table>

* 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 = 1.05). 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**
  - LIMIT VALUE SELECT tw SIGNAL SHORTED TO STRUCTURE

- **NO**
  - LIMIT VALUE CKT FAILURE PARAM SELECT CAPABILITY PROBABLY AFFECTED

- **R13U**
  - C/W PARAM − ENA
4.2a NONRESETTABLE BACKUP C/W ALARM LT

1. 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

2. Backup C/W Alarms must be msg reset to prevent masking of subsequent Backup C/W Alarm.

3. To extinguish (F7) Backup C/W Alarm lt, remove bulbs or select (C3) C/W MODE – ACK

---

**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

**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

- **NOTE**
  - Do not perform msg reset

- Second fault msg trigger MSTR ALARM ?
- Change a second backup C/W param limit and generate fault msg
- Third fault msg trigger MSTR ALARM ?

---

**FIRST F7 BACKUP C/W ALARM LT ANNUN LAMP FAILED ON**

1. PRIMARY C/W Annun lt on ?

2. **YES**
   - SM 60 TABLE MAINT
     - Change a backup C/W param limit and trigger alarm
     - F2(F4,A7U)
       - MSTR ALARM pb – off

3. **NO**

4. C/W SYS B BKUP C/W ALARM CKT FAILED ON

5. C/W SYS A BKUP C/W ALARM CKT FAILED ON

6. BKUP C/W ALARM ANNUN LAMP FAILED ON

7. Reset limits
   - Reset BACKUP C/W ALARM limits
   - MSG RESET

8. Enable Sys B
   - (O13:C)
     - cb ESS 2CA C/W B – op
   - F2(F4,A7U)
     - MSTR ALARM pb – off

9. Reset limits
   - Reset BACKUP C/W ALARM limits
   - MSG RESET
4.2b MA LT & C/W TONE - NO ANNUN LT

1 ANNU INTEN sw must be in non-failed position for normal (F7) C/W lt ops
2 Verify lamp holder properly seated
3 If reqd. IFM LIGHTBULB CHANGEOUT procedure may be used to swap bulbs with spare annunciator
4 Use pnl A7U (MO52J) MSTR ALARM pb to reset alarms. If pnl F2(F4) pb must be used, pressing pb quickly may allow MA to reset without tripping cb. Pnl F7 annunciator lost

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

C/W

MSTR ALARM Lt and 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

1 (O6):
* ANNUN INTEN – other position, adjust as reqd
(F7) C/W Annun lt on ?

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

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

5 (O13:A)
* cb ESS 1BC C/W A open ?

6 (C3)
* C/W MODE – ACK
(O13:A)
* cb ESS 1BC C/W A – cl (MA)

7 (F7) C/W ANNUN PWR SHORT

8 PWR LOST TO PRI C/W, C/W SY S A

9 C/W MODE test
F2(F4)
* MSTR ALARM pb – push (hold)
(F7) Any Annun lt on ?

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

11
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 lights 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 2 – 0450281
   Sys 3 – 0450381
   FC H2O VLV T
   Sys 1 – 0450412
   Sys 2 – 0450422
   Sys 3 – 0450432
   FC H2O VLV T

11 SM alert tone will trigger C/W tone without MA lit. Requires MA reset. Klaxon or Siren will also trigger C/W tone.
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 1 BC C/W A – cl
- (O13:C) cb ESS 2 CA C/W B – cl
- (C3) C/W MODE – NORM
- (R13U) Annun ltg sys operational
- Smoke detn sys operational

CAB dP/dT indicates decay rate (−dP/dT) which:
- Exceeds 0.08
  \[ \approx 0.0 \]

1. SM 66
   - ENVIRONMENT
   - SM SYS
   - SUMM 1

2. Cabin P decreasing?
   - NO
   - YES
   
3. CAB dP/dT
   - SNSR FAILURE

4. Pwrdn Spkrs
   - (A13) • OS AUD SPKR PWR – OFF
   - (MO42F) • MIDDECK SPKR AUD SPKR PWR – OFF

   NOTE
   - If Klaxon triggered during next step, note which spkr has Klaxon

5. Go to O2(N2)
   - • FLOW HIGH/CAB P LOW/dP/dT (ORB PKT, ECLS)

6. Reconfig
   - (O15:D) • cb MNB PPO2 C CAB dP/dT – op
   - • Go to ECLS COMPUTATION INHIBIT, ECLS SSR−14, TABLE C

7. C/W SYS B
   - KLAXON TRIGGER THRESHOLD SHIFTED. SYS LOST

8. CW SYS A
   - KLAXON TRIGGER THRESHOLD SHIFTED. SYS LOST

9. Reconfig
   - F2(F4,A7U)
     - • MSTR ALARM pb – off
   - (A13)
     - • OS AUD SPKR PWR – as desired
   - (MO42F)
     - • MIDDECK SPKR AUD PWR – as desired

10. Siren A
    - (L1)
      - • SMOKE DETN CKT TEST – A
      - • After 15–25 sec, \( \sqrt{ } \) for siren (MA)

11. CW SYS A
    - EMER TONE TRIG Ckt failure, KLAXON MAY BE TRIGGERED WITH SUBSEQUENT C/W TONE OR SM TONE

12. 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

13. Siren

14. No Siren

12/14/99
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.

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

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)
   - MIDDLE SPKR
     AUD PWR – as desired
If C/W Sys A failed, Siren may occur with Klaxon, C/W tone, or SM tone.

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.

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

C/W SIREN – NO SMOKE DETN LT

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

2. √Smoke Conc
   - SM SYS SUMM 1
   - Any emergency smoke param > 2.2 or increasing > .4 within 20 sec ?
   - YES
   - NO

3. Smoke Detn A test
   - 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. Snsr reset
   - SMOKE DETN CKT TEST – OFF
   - SMOKE DETN SNSR – RESET

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

6. C/W SYS A
   - SIREN TRIGGER CKT FAILED ON

7. C/W SYS B
   - SIREN TRIGGER CKT FAILED ON

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

9. Snr reset
   - SMOKE DETN CKT TEST – OFF
   - SMOKE DETN SNSR – RESET

10. SIREN TRIGGER CKT FAILED ON

11. Snr reset
   - SMOKE DETN CKT TEST – OFF
   - SMOKE DETN SNSR – RESET

12. SMOKE DETN CKT TEST – OFF
   - SMOKE DETN SNSR – RESET

13. SMOKE DETN CKT TEST – OFF
   - SMOKE DETN SNSR – RESET
**C/W**

**PRI C/W SYS FAILS TO ANNUNCIATE OUT-OF-LIMIT PARAM**

1. **Valid Param Inhibit status**
   - C/W PARAM STATUS – INH
   - Param in question inhibited?

2. **PARAM SEL for erroneously tripped param**
   - C/W PARAM SEL tw – XXX (Param number)
   - C/W PARAM – INH
   - C/W PARAM STATUS – INH (√/status)
   - ENA
   - C/W PARAM STATUS – INH (√/status)
   - Param was INH then ENA?

3. **Enable param**
   - NOTE Annunciation lit 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 (√/status)
   - C/W PARAM SEL tw > 119
   - Param enabled?

4. **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 (√/value)
   - Repeat last two steps for LOWER limit

5. **INHIBIT MEMORY FAILURE**

6. **PARAM INHIBITED INADVERTENTLY**

7. **Set limits for each erroneous limit**
   - C/W LIMIT SET VALUE tw – correct value
   - LIMIT – UPPER(LOWER)
   - FUNC – SET, then READ (√/value)

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

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

**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

**If:**
- Pri C/W Sys Snsr Multiplexer
- Limit Value Limit Sense
- Inhibit Memory or Param Select failure

**NOTE:**
- Annunciator lit 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 (√/status)
- C/W PARAM SEL tw > 119
- Param enabled?

**NOTE:**
- C/W Alarm triggered by Backup C/W Sys
4 Notify MCC of change in PRI C/W param and limit values
5 Bi-level params are identified in NOTES column of C/W & FDA Table (REF DATA, C/W)
6 If pnl indication and primary C/W param values agree, Snsr or Signal Conditioner failed
7 Partial PRI C/W MULTIPLEXER, SNSR, OR LIMIT SENSE CRT FAILURE
8 If analog param, use PRIMARY TO BACKUP C/W ANALOG PARAMETER CALIBRATION (REF DATA) to estimate PRI C/W value in EU and set new limits to indicate significant change

4−31 MAL/ALL/GEN F
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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
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)

Mission–dependent

Payload Bus Interfaces

FLEX MDMs, FLEX PAIRS

Computer Data Bus Network
5.1a CS SPLIT

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)

If: Fail−to−sync
Force fail−to−sync

IOP or CPU detected hw errors
Illegal BCC Xmr failed ON

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

Nominal Config:
Single GNC Ops
GPC PWR 1,2,3,4,5 (five) – ON
GPC OUTPUT 1,2,3,4 (three) – NORM
GPC mode 1,4 (two) – RUN
2,3 (two) – HALT
Appropriate AV BAY FAN – ON

S/W dump SM GPC and GNC GPC if IDPs/CRTs available (do not use GPC/CRT key)
Perform GPC S/W INITIATED MEM DUMP
DPS SSR−2

Safe SM systems
MCC for comm config and radiation constraints
If no comm
KU PWR – STBY
CNTL – PNL, CMD
Perform COMM LOST, steps 7 and 8 (ORB PKT, COMM)

SM 62 PCMMU/PL COMM
FORMAT FXD – ITEM 1 EXEC (*)
If reqd, perform PL/DPS RECONFIG
Secure (PL SYS or SODF: ASSY OPS)

Secure RMS
If reqd
SM 94 PDRS CONTROL
Note WR range, PL ID, PL INIT ID, EE ID, SPEC 95 overrides

Secure GPC 1 and GPC 4
(CRT)
DAP: FREE

Activate GPC 2 (new GNC GPC)
(G0)
GPC 2 PWR – ON
GPC 2 OUTPUT – NORM
GPC MODE 2 – STBY (tb−RUN), then RUN

MC2 NBAT setup for target GPC 2

GNC 0 GPC MEMORY
If currently active IMU was in STBY or IMU currently in STBY was active during time of G2 freeze–dry, do not assign associated string

Allocate assign GPC, all FC strings (except as noted above), CRTs, and MMUs to GPC 2
PL/12 and LDBs 1.2 deassigned

Perform GNC OPS Transition
DAP: FREE pb – press and hold during OPS transition
Pri RJD DRIVER (eight) – OFF
RJD MANF L5/F5/R5 DRIVER – ON

GNC, OPS 201 PRO
Were all FC strings assigned in block 2 (IMU STBY issue)?

GNC 21 IMU and Restring
GNC 21 IMU ALIGN
Desel aff IMU from block 5
Configure all IMU from block 5 to STBY(OPE) as reqd to match GRP B PWRDN (PWRUP)
(no * until restring)

GNC 0 GPC MEMORY
Assign remaining FC string to GPC 2
GPC, OPS 201 PRO
MCC for resel of aff IMU

Reestablish GNC Operational Config
Pri RJD DRIVER (eight) – as reqd

GNC 20 DAP CONFIG
Load desired DAP A/B per DAP Cue Card

GNC 22 S TRK/COAS CNTL
S TRK – Y, Z; STAR TRK – ITEM 3.4 EXEC (*)

GNC 21 IMU ALIGN

GNC 23 RCS
JET RESET – ITEM 45 EXEC
If L(R) OMS/RCS 1/CNCT L(R) OMS – ITEM 5(6) EXEC

If orbiter altitude control reqd:
DAP: INRTL/VERN (ALT)

Manual antenna commanding may be reqd because orbiter state vector is not being ICC’d to SM GPC
If unable to perform GPC S/W dump of GPC 1 or 4 (no IDP/CRT Interface), MCC for possible HISAM Dump after block 9
Do not perform keyboard entries or sw throws 10 sec before and after moding PASS GPCs to RUN or making OPS transition requests
MCC will uplink state vector. If no comm at AOS, sel best antenna
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)
10 Activate GPC 3 (new SM GPC)

- GPC 3 PWR - ON
- GPC 3 OUTPUT - NORM
- GPC MODE 3 - STBY (to RUN), then RUN

SM 1 DPS UTILITY
- UL CNTL ENA - ITEM 36 (*)
- CKPT RETRV ENA - ITEM 12 EXEC (*)

11 Perform SM OPS Transition

(O6)
- GPC 3 PWR - ON
- GPC 3 OUTPUT - NORM
- GPC MODE 3 - STBY (to RUN), then RUN

SM 0 GPC MEMORY
- CONFIG - ITEM 1 - EXEC
- Assign target GPC, PL 1/2, CRTs, LAUNCH 1, and MMUs to GPC 3
- IDP/CRTX MAJ FUNC - SM
- GPC/CRT - SM
- GPC/X EXEC
- SM, OPS 201 PRO
- SM ANTENNA

12 Reload TFLs

- Perform LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

13 Reactivate RMS (if reqd)

If RMS PWR PRI (MCIU powered):
- SM 94 PDRS CONTROL
  - Expect MA, C/W GPC DATA It on
  - IO 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)

14 Reconfig for newly established SM GPC

- Verify MCC uplinks complete, including state vector uplink

SM 1 DPS UTILITY
- UL CNTL ENA
- GPC 3 OUTPUT - TERM (tb–bp)
- GPC 3 AUTO - ITEM 35 EXEC (*)
- GPC 3 PWR - OFF

15 Reestablish Attitude, as reqd

UNIV PTG
- Load desired att (√ FLIGHT PLAN)
- Init TRK (MNVR) - ITEM 19 (18) EXEC
- DAP: AUTO

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

17 Is GPC 1 & 4 recovery to be attempted now?

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

19 Attempt to recover GPC 1

- Perform GPC IPL−PASS, DPS SSR−8

GPC 1 recovered?

20 Attempt to recover GPC 4

- Perform GPC IPL−PASS, DPS SSR−8

GPC 4 recovered?

21

22

23

24
Do not perform keyboard entries or sw throws 10 sec before and after moding PASS GPCs to RUN or making OPS transition requests.

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.

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, pwr–on IDP/CRT for at least 30 sec before pwr–off.

Avoid using GPC–1 or GPC–4 for critical burns or PROX OPS until GPC dump analysis confirms the GPC is not considered transient.
### EXPAND SET

**NOTE**

Do not perform any keyboard item entries or switch throws 10 sec before and after making an OPS transition request.

#### CONFIGURE FOR SET EXPANSION

<table>
<thead>
<tr>
<th>CRT</th>
<th>GNC 0 GPC MEMORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• If MM202:</td>
</tr>
<tr>
<td></td>
<td>GNC, OPS 201 PRO</td>
</tr>
<tr>
<td></td>
<td>• CONFIG – ITEM 1 +2 EXEC</td>
</tr>
<tr>
<td></td>
<td>• Assign MC2 per table</td>
</tr>
</tbody>
</table>

#### OPS MODE RECALL

<table>
<thead>
<tr>
<th>C3(A6U)</th>
<th>DAP: FREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRT</td>
<td>GNC, OPS 201 PRO</td>
</tr>
<tr>
<td></td>
<td>Pause = 30 sec</td>
</tr>
<tr>
<td></td>
<td>(DAP settling), then</td>
</tr>
<tr>
<td>C3(A6U)</td>
<td>DAP: as reqd</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONFIG GPC</th>
<th>Dual G2 (1&amp;2)</th>
<th>Dual G2 (2&amp;4)</th>
<th>Triple G2 (1&amp;2&amp;4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>02040</td>
<td>2</td>
<td>12040</td>
</tr>
<tr>
<td>12000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| STR 1   | 2            |
|        |              |
|        | 4            |
| PL 1/2 |              |

| CRT 1   | DO NOT MODIFY NBAT |
|        | DO NOT MODIFY NBAT |
| 2       | DO NOT MODIFY NBAT |
| 3       | DO NOT MODIFY NBAT |
| 4       | DO NOT MODIFY NBAT |

| L 1     | 2            |
|         |              |
|         |              |

| MM 1    | 2            |
|         |              |
|         |              |
GNC downlist will default to lowest ID GPC in G2 set. MCC may request downlister change following OPS Mode Recall.

Crew GO for Error Log Resets without prior MCC concurrence.
If BFS S/W initiates restart

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

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

2. GNC 0 BFS MEMORY
   - Big ‘X’ and ‘POLL FAIL’ driven on CRT 3 MDU?
     - YES
     - Displayed properly?
       - YES
       - MCC
       - NO

3. MCC

4. BFS GPC FAILURE

5. Pwr off failed GPC
   - GPC PWR – OFF

6. Go to SINGLE GPC FAIL, GPC FRP−1

5.1b ‘BFS GPC FAIL (BITE)’ (ORBIT)
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.

RS 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.

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 all RS GPCs in OPS 0, CRT assignments are determined by target NBAT.

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

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

OPS transition may require up to 68 sec to complete

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

Cycling pwr causes positioning of tape which may require up to 34 sec

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

Perform OPS MODE RECALL to remove identified (selected) GPC

Any target GPC(s) complete transition ?

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

Any RS F−T−S GPC still in common set ?

Pwr off F−T−S GPC

Perform DPS SSR−3 to config all buses to successful GPC(s)

GNC OPS XXX PRO

Any target GPC(s) complete transition ?

GNC OPS XXX PRO

On MCC GO, Cycle MMU(s) pwr (O14,O15,F)

Wait up to 34 sec, retry transaction

Transaction successful ?

Select alternate SW copy for GNC MF

X: GNC 0 GPC MEMORY

• ITEM 53 +2 EXEC

Retry transition

Transition successful ?

Both MMUs FAILED OR BCE FAILURE(S)

S/W COPY PROBLEM ON MMU(S)

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

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

GNC FAILURE

RECOVERED GPC WITH XMT−RCVR FAILURE, OR MMU AND GPC RCVR FAILURE OR GPC−TO−GPC OVERLAY AND SOURCE GPC RCVR FAILURE

RECOVERED GPC WITH RCVR−RCVR FAILURE, OR MMU AND GPC RCVR FAILURE OR IPL SOURCE sw AND GPC RCVR FAILURE

TRANSIENT MMU PROBLEM AND MMU OR BCE FAILURE

TRANSPORT 5.2a (Cont)
Any previously failed MMU should be prime selected for GNC prior to OPS transition.

OPS transition may require up to 68 sec to complete.

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.

Cycling pwr causes positioning of tape which may require up to 34 sec.

1. Any previously failed MMU should be prime selected for GNC prior to OPS transition.
2. OPS transition may require up to 68 sec to complete.
3. If original transition G2/G8 and in OPS 0, transition to G2, then G8 to avoid illegal entry msg.
4. Solid State MMU power cycle shuts down the associated solid state recorders. MCC commanding may be reqd.
5. Cycling pwr causes positioning of tape which may require up to 34 sec.
Selecting failed MMU for GNC MF protects against GPC RCV failures occurring after OPS transition prepositioning.
If OPS 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 OPS XTION (with MCC concurrence) or SM roll-in request.

If MMU busy for > 70 sec (non-IPL), or > 2 min (IPL), MMU assumed failed. For MCC implemented use of MMU, time may be considerably longer.

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

Cycling pwr causes positioning of tape which may require up to 34 sec.

Nominal Config:
- (O14:F) MMU 1 − ON
- (O15:F) MMU 2 − ON
- (O6) IPL SOURCE − OFF
Health of affected MMU can be verified by GNC OPS XTION (with MCC concurrence) or SM roll-in request.
5.2d ‘TIME MTU’

1. FAULT

   2. Only one GPC reports ‘TIME MTU’ msg ?
      
      YES →
      
      3. GNC(SM) 2 TIME
         • Perform TRY on accumulator that is selected by common set ITEM 34(35,36) EXEC
         
         YES →
         
         4. GPC OSC DRIFT
            • Go to BCE STRG X (ORB PKT, DPS)

         NO →
         
         5. TRANSIENT GPC OSC DRIFT

   NO →

   6. ‘I/O ERROR FF1(2,3)’ msg occurs ?
      
      NO →
      
      7. MDM I/O ERROR (ORB PKT, DPS)

   YES →

   8. Any ‘BCE STRG 1(2,3) MTU’ msg accompany ‘TIME MTU’ fault msg ?
      
      NO →
      
      9. Multiple ‘BCE STRG MTU’ fault msgs occur simultaneously ?
         
         YES →
         
         10. Go to BCE STRG X (ORB PKT, DPS)

         NO →
         
         11. √ Status of MTU

   NO →

   12. MTU OSC FAILURE

   YES →

   13. ‘↓’ displayed opposite MTU ACCUM 1(2,3) ?
      
      NO →
      
      14. TRANSIENT BUS NOISE

      YES →

      15. MTU ACCUM 1(2,3) FAILURE

Nominal Config:
(O6) MTU − AUTO (O13:A)
cb ESS 1BC MTU A − cl (O13:C)
cb ESS 2CA MTU B − cl

If GPC GMT time source change

1. 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
Crew cannot tell which oscillator is currently selected.

5 GPCs will remain on internal time.

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

7 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.

Actual Time Sync may take up to 2 min to perform. Make no keyboard entries until Time Sync completes.

GNC 2 TIME
• Perform Time Sync (ITEM 38 EXEC)

CAUTION

1. AFTER 2 min, did GPCs accept any accumulator time?

2. MCC to verify GPCs have correct time

3. BOTH MTU OSCs FAILED OR MTU_PWR FAILURE

4. Is BFS currently active?

5. BFS remains on internal time

6. Upon BFS activation, go to BFS GMT/MET

7. MCC for time recovery procedure

CAUTION

8. BFS will lose proper time if taken to HALT or powered off

9. If proper time is lost:
   • MCC for time recovery procedure

Manually select alternate oscillator (O6)
• OSC – 2(1)
5.2f CHECKPOINT FAIL

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

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

1. SPEC 999 may be blank
2. Solid State MMU power cycle shuts down the associated solid state recorders. MCC commanding may be reqd
3. MMUs may be used for all other transactions
4. MCC commanding may be reqd for possible S/W dump of SM GPC

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

DPS

S60 CHECKPT FAIL

1. ‘I/O ERROR
   MMU 1(2)’ fault msg also annunciated?
   YES
   2
   (C2)
   • SPEC 999 PRO
   Roll-in successful?
   NO
   5.2a 3
   4
   On MCC GO,
   Cycle pwr of selected MMU 1(2)
   (O14.O15:F)
   • MMU 1(2) – OFF, then ON
   6
   • After 34 sec,
   retry SM Checkpoint
   Checkpoint successful?
   NO
   7
   MMU 1(2) WRITE PROBLEM
   YES
   8
   TRANSIENT
   MMU 1(2) WRITE PROBLEM
   5
   POSSIBLE
   GPC SM
   CHECKPOINT
   S/W PROBLEM

2. ‘OFF/BUSY
   MMU 1(2)’ fault msg also annunciated?
   NO
   3
   5.2b 1

3. ‘OFF/BUSY
   MMU 1(2)’ fault msg also annunciated?
   NO
   3
   5.2b 1

4. ‘I/O ERROR
   MMU 1(2)’ fault msg also annunciated?
   YES
   2
   (C2)
   • SPEC 999 PRO
   Roll-in successful?
   NO
   5.2a 3
   4
   On MCC GO,
   Cycle pwr of selected MMU 1(2)
   (O14.O15:F)
   • MMU 1(2) – OFF, then ON
   6
   • After 34 sec,
   retry SM Checkpoint
   Checkpoint successful?
   NO
   7
   MMU 1(2) WRITE PROBLEM
   YES
   8
   TRANSIENT
   MMU 1(2) WRITE PROBLEM

5. POSSIBLE
   GPC SM
   CHECKPOINT
   S/W PROBLEM

6

7

8
5.3a ‘I/O ERROR FF(FA)’

1. IOP OR BCE XMTR/RCVR FAILURE
   - If IOP or BCE XMTR/RCVR failure is indicated, follow the subsequent steps:
     1. Check if the failure is a reoccurring issue after restringing the GPC.
     2. Perform a failure assessment to determine if the failure is related to a specific GPC.

2. Following steps may result in a GPC F-T-S.
   - Failure assessment to be continued at this time?
     - Yes
     - No

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.

5. If G8 OPS, delay G2 freeze-dry activity until after transition back to G2.

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

7. 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.

8. 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.

9. If G8 OPS, delay G2 freeze-dry activity until after transition back to G2.
Go to MDM (REF) for summary of data lost on non-recovered MDM

Multiple MDM failures if any: ‘BCE STRG’
‘MDM OUTPUT’
during attempt to recover ‘I/O ERROR’
‘I/O ERROR’
during attempt to recover ‘MDM OUTPUT’

Outputs may be good, erroneous or non-existent.
At later time, MCC may wish to perform MM202 OMS TVC chk to assess MDM’s output capability

If next ELEC, ECLS, APU/HYD, GNC, RCS, or DPS failure causes loss of fail-safe capability in FCS or RCS, the MDM may be repowered in order to regain any remaining output capability

If failed MDM is FF1, FF2, or FF3, MDM may be candidate for MDM CHANGEOUT (IFM), √MCC

From ORB PKT C/L, I/O ERROR FF(FA)

17. Same fault msg recur during recovery attempt?

18. MULTIPLE MDM FAILURES

19. √MCC if any unexplained msg on string during port moding

20. BCE RCVR OR XMTR/RCVR FAILURE

21. Safe F−T−S GPC

22. TOTAL MDM INPUT FAILURE

23. Pwr off MDM

(06) Att MDM FF(FA) − OFF

24. Time permitting, go to DPS, GPC FRP−1

25. Pwr off reconfigure equipment specific to failed MDM

<table>
<thead>
<tr>
<th>FF1</th>
<th>FF2</th>
<th>FF3</th>
<th>FF4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(O14:F)</td>
<td>(O15:F)</td>
<td>(O16:F)</td>
<td>(O16:F)</td>
</tr>
<tr>
<td>• RJDF 1B DRIVER</td>
<td>• RJDF 2B DRIVER</td>
<td>• RJDF 2B DRIVER</td>
<td>• RJDF 2A DRIVER</td>
</tr>
<tr>
<td>(O14:E) MNA</td>
<td>(O15:E) MNB</td>
<td>(O16:E) MNC</td>
<td>(O16:E) MNC</td>
</tr>
<tr>
<td>• RADAR ALTM 1</td>
<td>• RADAR ALTM 2</td>
<td>• MLS 3</td>
<td>• ADTA 3</td>
</tr>
<tr>
<td>• MNL • ADTA 1</td>
<td>• ADTA 2</td>
<td>• ADTA 3</td>
<td>• ADTA 4</td>
</tr>
<tr>
<td>• STAR TRKR −Z</td>
<td>• STAR TRKR −Y</td>
<td>• STAR TRKR −Y</td>
<td>• STAR TRKR −Y</td>
</tr>
<tr>
<td>• √ ACCEL 1</td>
<td>• √ ACCEL 2</td>
<td>• √ ACCEL 3</td>
<td>• √ ACCEL 4</td>
</tr>
<tr>
<td>(O7) /TACAN 1</td>
<td>(O7) /TACAN 2</td>
<td>(O7) /TACAN 3</td>
<td>(O7) /TACAN 3</td>
</tr>
<tr>
<td>FA1</td>
<td>FA2</td>
<td>FA3</td>
<td>FA4</td>
</tr>
<tr>
<td>(O15:F)</td>
<td>(O16:F)</td>
<td>(O14:F)</td>
<td>(O14:F)</td>
</tr>
<tr>
<td>• RJDA 1B DRIVER</td>
<td>• RJDA 2B DRIVER</td>
<td>• RJDA 1A DRIVER</td>
<td>• RJDA 2A DRIVER</td>
</tr>
<tr>
<td>(O15:A)</td>
<td>(O15:A)</td>
<td>(O16:A)</td>
<td>(O15:A)</td>
</tr>
<tr>
<td>• RGA 1</td>
<td>• RGA 2</td>
<td>• RGA 3</td>
<td>• RGA 4</td>
</tr>
<tr>
<td>(O8)</td>
<td>(O8)</td>
<td>(O8)</td>
<td>(O8)</td>
</tr>
<tr>
<td>• R OMS TK ISOL A − CL (fb−CL)</td>
<td>• R OMS TK ISOL A − CL (fb−CL)</td>
<td>• R OMS TK ISOL A − CL (fb−CL)</td>
<td>• R OMS TK ISOL A − CL (fb−CL)</td>
</tr>
</tbody>
</table>

26. √MCC regarding powering off associated IMU

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

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

√MCC regarding powering off associated IMU.
Go to MDM (REF) for summary of data lost on nonrecovered MDM.

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>IMU</td>
</tr>
<tr>
<td>STKR</td>
<td>MTU</td>
<td>MTU</td>
</tr>
<tr>
<td>MLS</td>
<td>NSP</td>
<td>NSP</td>
</tr>
<tr>
<td>ADTA</td>
<td>GPS</td>
<td>GPS</td>
</tr>
</tbody>
</table>

'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).

Multi-serial I/O msgs occur?

<table>
<thead>
<tr>
<th>Card Adrs</th>
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<th>G8</th>
</tr>
</thead>
<tbody>
<tr>
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<td>IMU</td>
<td>IMU</td>
</tr>
<tr>
<td>MTU</td>
<td>STKR</td>
<td></td>
</tr>
<tr>
<td>NSP</td>
<td>ADTA</td>
<td></td>
</tr>
<tr>
<td>GPS</td>
<td>GPS</td>
<td></td>
</tr>
</tbody>
</table>

'DS STRG' msg(s) indicated:

- STKR
- ADTA
- MLS

MTU

IMU

NSP

GPS

TAC

A and B

C and D

MTU/MDM SERIAL INTERFACE FAILURE

STAR TRKR - Z

O6 and O14:E

O15:E

O16

O16

STAR TRKR - Y

O6 and O15:E

ADTA 1

O14:E

O15

O16

O16

ADTA 2

O14:E

O15

O16

O16

ADTA 3

O14:E

O15

O16

O16

ADTA 4

O14:E

O15

O16

O16

Did 'STRG' msg repeat?

MDM TACAN CARD FAILURE

GNC I/O RESET

MDM SERIAL I/O CARD FAILURE

Cycle LRU pwr

- Cycle cb and/or pwr sw as reqd:

STAR TRKR - Z

O6 and O14:E

O15:E

O16

O16

STAR TRKR - Y

O6 and O15:E

ADTA 1

O14:E

O15

O16

O16

ADTA 2

O14:E

O15

O16

O16

ADTA 3

O14:E

O15

O16

O16

ADTA 4

O14:E

O15

O16

O16

 transient LRU PWR FAILURE OR CONFIG PROBLEM

Go to RCS RM LOSS (ORB PKT, RCS)
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.

MDM outputs may still be good. MCC will advise if MDM should be turned off. Refer to MDM (REF DATA) for summary of data.

140 sec pwr–amp warmup
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 announce 'I/O ERROR PL 1(2)' msg?

13. ALTERNATE MDM PORT FAILURES

YES

14. IOP XMTR/RCVR FAILURE ON SM GPC

15. Recovery reqd for current ops?

NO

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

YES

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

18. If BFS not presently reqd

(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)

10

• If BFS presently reqd:

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

19

10
5.3e ‘I/O ERROR FLEX’

If:
- MDM FLEX failure
- IOP failure
- IOP Xmr/Rcvr failure
- Pallet electrical 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 announced?
   - NO
   - YES
     - Go to PL1(2) MDM I/O ERROR; PL1(2) MDM OUTPUT (ORB PKT, DPS)

2. Try reset
   - FAULT
   - SM I/O RESET
     - NO
     - YES
       - ‘I/O ERROR FLEX’ msg recur?
         - NO
         - YES
           - Perform PL/DPS RECONFIG, (PL SYS or SODF: ASSY OPS)
           - MCC go for pwr cycle?
             - NO
             - YES
               - Cycle MDM pwr
                 - (L12)
                   - MDM FLEX – OFF, then ON
                   - SM I/O RESET
                 - ‘I/O ERROR FLEX’ msg recur?
                   - NO
                   - YES
                     - TRANSIENT MDM FAILURE

3. Cycle MDM pwr
   - (L12)
     - MDM FLEX – OFF, then ON
     - SM I/O RESET
   - ‘I/O ERROR FLEX’ msg recur?
     - NO
     - YES
       - MSENT MDM FAILURE

4. TRANSIENT MDM FAILURE
   - Go to PL/DPS RECONFIG, (PL SYS or SODF: ASSY OPS)

5. If:
   - MDM FLEX failure
   - IOP failure
   - IOP Xmr/Rcvr failure
   - Pallet electrical failure

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

6. MCC go for pwr cycle?
   - NO
   - YES
     - Cycle MDM pwr
       - (L12)
         - MDM FLEX – OFF, then ON
         - SM I/O RESET
       - ‘I/O ERROR FLEX’ msg recur?
         - NO
         - YES
           - FLEX MDM FAILURE

7. Is this FLEX MDM part of a FLEX pair?
   - NO
   - YES
     - Mode Ports if payload buses not previously moded; otherwise, MCC go for pwr cycle?

8. FLEX MDM FAILURE
   - Go to PL/DPS RECONFIG, (PL SYS or SODF: ASSY OPS)

9. TRANSIENT MDM FAILURE
   - Go to PL/DPS RECONFIG, (PL SYS or SODF: ASSY OPS)

10. Mode Ports if payload buses not previously moded; otherwise, MCC go for pwr cycle?
    - (Alt) FLEX PWR – OFF
    - (Alt) FLEX PWR – ON
    - SM 1 DPS UTILITY
      - PORT ASSIGN STRING PL 1/2 SEC(PR1) – ITEM 24(23) EXEC (*)
      - ‘I/O ERROR FLEX’ msg recur?
        - NO
        - YES
          - FLEX MDM FAILURE

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

12. MCC go for pwr cycle?
    - NO
    - YES

13. FLEX MDM FAILURE
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.
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.

**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?

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

3. FAULT
   - SM I/O RESET

4. TRANSIENT ERROR

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

7. FLEX pair onboard?

8. MDM FLEX INPUT CARD FAILURE

9. TRANSIENT INPUT CARD ERROR

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

11. ‘BCE BYP FLEX’ msg recur?

12. Go to PL/DPS RECONFIG
   - PL SYS or SODF: ASSY OPS

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

   EXEC ( )

   ‘BCE BYP FLEX’ msg recur?
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. 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.

2. Associated GCIL Decoder now disabled. Associate recorders will now use pnl A1 sw positions.

Nominal Config: (O6) MDM PL1,2 – ON

If:
- PL MDM Card failure
- IOP failure
- IOP XMTR/RCVR failure

5.3g ‘BCE BYP PL1(2)’

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>'I/O ERROR' or MDM OUTPUT PL1(2)' msg also annunciated?</td>
</tr>
<tr>
<td>2</td>
<td>Go to PL1(2) MDM I/O ERROR; PL1(2) MDM OUTPUT (ORB PKT, DPS)</td>
</tr>
<tr>
<td>3</td>
<td>FAULT</td>
</tr>
<tr>
<td>4</td>
<td>SM I/O RESET</td>
</tr>
<tr>
<td>5</td>
<td>TRANSIENT ERROR</td>
</tr>
<tr>
<td>6</td>
<td>If reqd, perform PL/DPS RECONFIG. (PL SYS or SODF: ASSY OPS)</td>
</tr>
<tr>
<td>7</td>
<td>If PSP reqd</td>
</tr>
<tr>
<td>8</td>
<td>Cycle MDM pwr</td>
</tr>
<tr>
<td>9</td>
<td>If PSP reqd</td>
</tr>
<tr>
<td>10</td>
<td>Mode Ports if payload buses not previously moded; otherwise, 'MCC</td>
</tr>
<tr>
<td>11</td>
<td>TRANSIENT PL1(2) INPUT CARD ERROR</td>
</tr>
<tr>
<td>12</td>
<td>If PSP reqd</td>
</tr>
<tr>
<td>13</td>
<td>PL1(2) MDM INPUT CARD FAILURE</td>
</tr>
<tr>
<td>14</td>
<td>PORT DEPENDENT PL1(2) FAILURE</td>
</tr>
</tbody>
</table>

If reqd, perform PL/DPS RECONFIG. (PL SYS or SODF: ASSY OPS)
5.4a ‘I/O ERROR CRT 1(2,3,4)’

1. If failure does not clear, any SPEC or roll-in DISP active or buried on failed CRT will be trapped in GPC SW and counted against 2 SPEC/roll-in DISP limit per MF. Affected SPECs/roll-in DISPs are still available on other CRTs. SPEC/roll-in DISPs are released via OPS transition or DEU equivalent RESUME. If DISP was called up over a SPEC, two DEU equivalent RESUMEs may be reqd.

2. Both big ‘X’ and ‘POLL FAIL’ msgs appear for complete data path failure. Appearance of only one msg indicates either GPC or DEU internal S/W or HDW error has occurred. ‘MCC’

3. GPC will fail-to-sync after two consecutive nonuniversal I/O errors.

4. Any kybd entry just prior to I/O ERROR CRT 1(2,3,4)’ msg may have to be reentered.

Nominal Config:
(C2)
CRT1,2 PWR – ON/OFF
CRT3 PWR – OFF
CRT4 PWR – ON/OFF
(For CRTs 1,2,4: two of three will remain ON as reqd)

1 CRT unreadable or totally blank (i.e., no Time Fields, SPL etc.)?

2 CRT 1(2,3,4) PWR LOSS, DEU S/W OR HDW FAIL, UNINTENTIONAL DEU LOAD, OR DEU LOAD sw FAILURE

3 ‘DEU LOAD’ msg on CRT?

4 Is detecting GPC, PASS GNC, GPC, and currently more than one GNC GPC?

5 How many redundant set GPCs detected error:

6 Big ‘X’ and ‘POLL FAIL’ msg on CRT screen?

7 GPC fail-to-sync?

8 GPC BCE RCVR FAILURE

9 Call up Fault display on affected CRT

10 TRANSIENT GPC BCE RCVR FAILURE

11 TRANSIENT ERROR (ANY OF THE FOLLOWING): CHECKSUM MISCOMPARE, GPC BCE RCVR, GPC BCE XMIT, CRT RCVR, CRT XMIT

12 SPEC or roll-in DISP called up on failed CRT and AOS?

13 ‘MCC for uplink of RESUME via DEU equivalent

14

15

16

10/10/01

5-34

MAL/ALL/GEN F
If failure does not clear, any SPEC or roll-in DISP active or buried on failed CRT will be trapped in GPC SW and counted against 2 SPEC/roll-in DISP limit per MF. Affected SPECs/roll-in DISPs are still available on other CRTs. SPEC/roll-in DISP can be released via OPS transition or DEU equivalent RESUME. If DISP was called up over a SPEC, two DEU equivalent RESUMEs may be reqd.

GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.
If failure does not clear, any SPEC or roll-in DISP active or buried on failed CRT will be trapped in GPC SW and counted against 2 SPEC/roll-in DISP limit per MF. Affected SPECs/roll-in DISPs are still available on other CRTs. SPEC/roll-in DISP can be released via OPS transition or DEU equivalent RESUME. If DISP was called up over a SPEC, two DEU equivalent RESUMEs may be reqd.

Both big 'X' and 'POLL FAIL' msgs appear for complete data path failure. Appearance of only one msg indicates either GPC or DEU internal S/W or HDW error has occurred. √ MCC

Any kybd entry just prior to 'I/O ERROR CRT 1(2,3,4)' msg may have to be reentered

GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.
Nominal Config:
(C2) CRT1(2,4) PWR – ON
(C2,R11) CRT3 PWR – OFF
(C2,R11) CRT4 PWR – ON
(For CRTs 1,2,4: two out of three will remain ON as reqd)

If:
• Kybd Adapter A failure
• Kybd Adapter B failure
• DEU memory parity error
• DEU CPU self–test failure
• DEU pwr transient (BFS annunciated only)
• Keycode compare failure
• DEU CPU S/W failure

1 CRT screen unreadable or totally blank (i.e., no Time Fields, SPL, etc.)?
2 MCC go for pwr cycle?
3 • (C2) CRT1(2,3,4) PWR  –  OFF, then ON) repeat if reqd)
• After 30 sec, Time Field appears (upper RH corner) ?
4 DEU CPU SELF–TEST FAIL, DEU MEMORY PARITY ERROR, OR DEU CPU S/W FAILURE
5 (C2) • Call up OTP BITE status display on aff CRT
• ITEM B EXEC OTP display appears ?
6 • MCC, DEU IPL may be reqd
7 Problem on CRT 3 ?
8 Select alternate kybd to call up OTP BITE status display (C2)
• L(R) CRT SEL  – 3
• ITEM B EXEC OTP display appears ?
9 Reselect initial kybd for further testing (C2)
• R(L) CRT SEL  – 3
10 (C2) • CRT1(2,4) PWR  –  ON
• Attempt to call up OTP BITE status display after each pwr cycle
• ITEM B EXEC OTP display appears ?
11 Alternate kybd to call up OTP BITE status display
12 • ITEM B EXEC OTP display appears ?
User cannot RESUME CRT display. Any SPEC or roll-in DISP called on CRT will remain counted against 2 SPEC/2 roll-in DISP limit. SPEC/roll-in DISP can be released via OPS transition.

Listed status words for single failures only. Multiple failures summed. For multiple failures, record BITE words and continue.

Probability exists for getting memory parity error when MF sw for affected CRT is moved from one position to another (i.e., GNC to SM) (SMS DO23).

Expect BITE words of 8202, 8100, 2000 after execution of ITEM A.
User cannot RESUME CRT display. Any SPEC or roll-in DISP called on CRT will remain counted against 2 SPEC/2 roll-in DISP limit. SPEC/roll-in DISP can be released via OPS transition.

Expect BITE words of 8202, 8100, 2000 after execution of ITEM A.

GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, deassign CRT first. Note that BC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

DEU flag tripped for CPU S/W fail, DEU memory parity error, or Kybd Adapter A/B fail errors. Continue CRT use.

Restart polling for PASS CRT (BFS does not inhibit polling for BITE errors).

Reset BITE flags on CRT if reqd
- Manually twist flag cw to stop, then ccw to stop
DPS

5.4c DEU OR DU FLAG TRIPPED

1

If:
- Appropriate DEU BITE bit set
- Appropriate DU BITE bit set
- DEU/DU flag mechanical failure
- DEU pwr supply error

False

1. 'CRT BITE 1 (2,3,4)' msg being annunciacted for this CRT?

YES → 5.4b 1

NO → 2

2. Reset DEU or DU flag
   - Manually twist flag cw to stop, then ccw to stop
   - Flag reset?

YES → 3

NO → 4

3. TEMPORARY DEU OR DU BITE
   REGISTER BIT SET

4. (C2)
   - Call up OTP BITE status display on all CRT
   - ITEM B EXEC
   - ITEM D +OF 4 9 EXEC
   - Record both rows of nine hex words
   - Report to MCC

5. DEU/DU FLAG
   MECHANICAL FAILURE,
   PHOSPHOR PROTECT
   CIRCUITRY ACTIVE (DU
   FLAG), OR DEU
   PWR SUPPLY ERRROR (DEU
   FLAG)

YES → 2

NO → 7

6. (C2) Deselect OTP BITE status display
   - ITEM E EXEC
   - (C2,R11)
   - CRT1(2,3,4) PWR – OFF, ON (repeat if reqd)
   - Attempt to reset flags
   - MCC for further analysis

7.
### DPS 5.4c (Cont)

1. Continue CRT use
2. Cycling pwr may result in 'I/O ERROR CRT 1(2,3,4)' msg
3. Listed status words for single failures only. Multiple failures summed. For multiple failures, record BITE words and continue
4. Unit is force air–cooled via cabin fans. User should perform cabin fan ops

<table>
<thead>
<tr>
<th>BIT WORDS</th>
<th>FAILURE</th>
<th>FLAG TRIPPED</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200</td>
<td>IPL performed</td>
<td>DEU</td>
</tr>
<tr>
<td>A200</td>
<td>IPL error</td>
<td>DEU</td>
</tr>
<tr>
<td>9200</td>
<td>IPL circuit check error</td>
<td>DEU</td>
</tr>
<tr>
<td>8A00</td>
<td>Symbol generator intensity parity error</td>
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</tr>
<tr>
<td>8600</td>
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<td>8244</td>
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<td>DEU</td>
</tr>
<tr>
<td>8001</td>
<td>DU power supply error</td>
<td>DU</td>
</tr>
</tbody>
</table>

8. Problem DU temperature status (BSW 2 = 8200) ?

9. (C2) Deselect OTP BITE status display
   - ITEM E EXEC
   - Resume specs on aff CRT, pwr unit OFF
   - √ MCC

10. (C2,R11)
    - CRT1(2,3,4) PWR – OFF, ON (repeat if reqd)

11. BITE words 8200 8000 0000 ?
    - YES
    - TRANSIENT NONCRITICAL BITE AS NOTED
    - (C2) Deselect OTP BITE status display
      - ITEM E EXEC
      - Reset DEU(DU) flag
      - Manually twist flag cw to stop, then ccw to stop

12. (C2) Deselect OTP BITE status display
    - ITEM E EXEC
    - √ MCC for further analysis

13. NONCRITICAL BITE AS NOTED

14. (C2) Deselect OTP BITE status display
    - ITEM E EXEC
    - √ MCC for further analysis
Abnormal SPL Response From Keyboard Input

1. If: Kybd failure: Key jammed
Key failed open circuit
DEU Kybd Adapter A(B)
L(R) CRT SEL Switch mal

- CRT BITE 1(2,3,4) and POLL FAIL msg being annunciated for this CRT?
  - Yes: 5.4b
  - No: 2

2. SPEC or roll-in DISP called up on failed CRT and AOS?
  - Yes: 3
  - No: 2

3. Isolate CRT via GPC/CRT (if fwd kybd, both affected CRTs)
   - GPC/CRT OX EXEC
   - Individual keystrokes
   - ITEM 1 +2 3 4 5 6 7 8
   - ITEM 9 - A B C D E F EXEC
   - FAULT SUMM SYS SUMM GPCR/CRT I/O RESET OPS SPEC O PRO
   - RESUME ACK (no SPL interface) MSG RESET (no SPL interface) CLEAR
   - Failure occurs on aft DEU/CRT?
     - Yes: 10
     - No: 5

4. All keystrokes show abnormal SPL response?
   - Yes: 6
   - No: 7

5. Jammed KEY, KEY FAILED OPEN CIRCUIT, OR DEU KYBD ADAPTER A MAL
   - CRT4 PWR – OFF, then ON (repeat if reqd)
   - Test kybd after each pwr cycle. If key appears to be jammed, attempt to free. If fault does not clear, continue use of CRT for monitoring. Reassign CRT to desired GPC
   - Select desired MAJ FUNC (isolated CRT)
   - GPC/CRT X 4 EXEC
   - MCC, KEY changeout may be reqd

6. Trapped SPEC or roll-in DISP will be cleared at OPS transition if SPEC/DISP is not RESUMEd and GPC/CRT interface is not regained

7. If DISP was called up over SPEC, two RESUME DEU equivalents may be reqd to clear trapped SPEC

8. GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always desassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry

Notes (cont)

2. SPEC key also displays freeze function. Therefore, big ‘X’ will be removed upon depression of SPEC key and will reappear 3 sec after next keystroke. MSG RESET and ACK have no SPL interface. User should attempt to verify these keys work properly when CRT assigned to GPC or MCC for downlist verification.
GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.
Big 'X' appears when DEU does not receive display update commands for 3 sec. POLL FAIL appears when DEU does not receive poll or time update commands for 3 sec.

User may have to establish alternate CRT interface to BFS or PASS as appropriate in order to observe fault msgs.

GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

SPECs and roll-in DISPs will be trapped in GPC software associated with failed CRT if GPC/CRT reassignment is performed and GPC/CRT interface is not regained. Affected SPECs and roll-in DISPs are still available on other CRTs, but trapped SPEC or roll-in DISP reduces SPEC or roll-in DISP allocation from 2 to 1 for associated major function.

Trapped SPEC or roll-in DISP will be cleared at OPS transition if SPEC/DISP is not RESUMEd and GPC/CRT interface is not regained.

If DISP was called up over SPEC, two RESUME DEU equivalents may be reqd to clear trapped SPEC.

Continue use of CRT.
5–45

GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

SPECS and roll-in DISPs will be trapped in GPC software associated with failed CRT if GPC/CRT reassignment is performed and GPC/CRT interface is not regained. Affected SPECS and roll-in DISPs are still available on other CRTs, but trapped SPEC or roll-in DISP reduces SPEC or roll-in DISP allocation from 2 to 1 for associated major function.

Trapped SPEC or roll-in DISP will be cleared at OPS transition if SPEC/DISP is not RESUMEd and GPC/CRT interface is not regained.

If DISP was called up over SPEC, two RESUME DEU equivalents may be reqd to clear trapped SPEC.

Continue use of CRT.

Cycling pwr may result in I/O ERROR CRT 1(2,3,4) msg.

### Diagram

1. Reassign CRT to another GPC in different MAJ FUNC or to the BFS (C2/R11,C3)
   - Select desired MAJ FUNC
   - (if reqd) GPC/CRT X X EXEC
   - BFC CRT DISP – ON
   - BFC CRT SEL - 1+2(2+3,3+1)
   - Problem recur?

2. GPC/CRT S/W ERROR (BFS), BFC CRT SEL DISCRETE FAILURE, OR IPL SOURCE SWITCH FAILURE
   - Select desired MAJ FUNC
   - GPC/CRT X 4 EXEC
   - Problem recur?

3. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

4. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

5. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

6. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

7. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

8. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

9. DEU S/W ERROR OR DEU HDW ERROR
   - Select desired MAJ FUNC
   - GPC/CRT X4 EXEC
   - Problem recur?

10. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

11. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

12. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

13. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

14. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

15. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

16. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

17. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

18. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

19. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

20. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

21. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

22. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

23. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

24. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

25. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

26. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

27. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

28. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

29. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

30. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

31. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

32. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

33. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

34. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

35. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

36. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

37. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

38. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

39. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

40. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

41. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

42. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

43. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

44. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

45. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?

46. DEU S/W ERROR OR DEU HDW ERROR
    - Select desired MAJ FUNC
    - GPC/CRT X4 EXEC
    - Problem recur?
GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

Continue use of CRT

Cycling pwr may result in I/O ERROR CRT 1(2,3,4) msg

Test BFC CRT DISP and SEL switches. CRT 1,2,3 must be pwrd ON and assigned to PASS for this test.

- BFC CRT DISP – OFF
- SEL – 1+2
- 2+3
- 3+1

Problem occurs on other CRTs?

- Reassign CRT as desired
- /MCC for further analysis

Attempt to clear fault by cycling switch

- BFC CRT DISP – ON,OFF (several times; final sw position OFF)
- If fault does not clear, select appropriate CRT for fault (typically CRT 3) and contact MCC for further analysis

Continued use of CRT

Problem recur?

- MCC for further analysis

Problem recurs?

- Reassign affected CRT to original commanding GPC

- Select desired MAJ FUNC
- GPC/CRT X4 EXEC

- Reassign CRT as desired
- /MCC for further analysis

- Test BFC CRT DISP and SEL switches. CRT 1,2,3 must be pwrd ON and assigned to PASS for this test

- Select desired MAJ FUNC
- GPC/CRT X4 EXEC

Reassign affected CRT to original commanding GPC

Select desired MAJ FUNC
- GPC/CRT X4 EXEC

Problem recur?

- MCC for further analysis

Problem recur?

- MCC for further analysis

Problem recur?
1 If screen blank, verify that BRIGHTENER cntl on CRT adjusted properly.

2 If only time fields, SPL, msg line on CRT and assigned to BFS, \( \checkmark \) CRT MF sw not in PL.

3 GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

4 Continue use of CRT.
GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

SPECs and roll-in DISPs will be trapped in GPC software associated with failed CRT if GPC/CRT reassignment is performed and GPC/CRT interface is not regained. Affected SPECs and roll-in DISPs are still available on other CRTs, but trapped SPEC or roll-in DISP reduces SPEC or roll-in DISP allocation from 2 to 1 for associated major function.

DEU S/W ERROR, DEU SYMBOL GENERATOR FAILURE, OR DU FAILURE

DEU IPL or DEU/CRT changeout may be reqd

Reassign CRT to another GPC in different MAJ FUNC or to/from BFS.

Select desired MAJ FUNC
(if reqd) GPC/CRT X X EXEC
or
BFC CRT DISP – ON(OFF)
BFC CRT SEL – 1+2(2+3, 3+1)

If DISP was called up over SPEC, two RESUME DEU equivalents may be reqd to clear trapped SPEC.
Because of differences between PASS/BFS S/W implementation, ignore any BFS 'I/O ERROR PCM' fault msg.

**Nominal Config:** (C3)
O I PCMMU
PWR – 1
FORMAT – GPC

---

1. If data path fail from PCMMU to GPC: SM BCE XMTR or RCRV fail PCMMU MIA XMTR or RCRV fail Total PCMMU fail

2. **TRANSIENT** SM GPC OR OI SYSTEM INTERFACE PROBLEM

3. If BFS in HALT, activate BFS to param status
   (O6)
   For BFS GPC:
   - GPC MODE – HALT
   - GPC PWR – ON
   - MODE – STBY (tb–RUN)

4. **YES** For missing params
   (C3)
   - BFC CRT DISP – ON
   - BFC CRT SEL – as reqd

5. **PCMMU 1(2) FAILURE**

6. **SM GPC/PCMMU DATA PATH FAILURE**

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

8. **MCC**

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

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

11. I/O ERROR PCM msg recur ?

---

**DPS**

**SM ALERT**

**I/O ERROR PCM**

**5.5a ‘I/O ERROR PCM’ (SM)**

---

**PCMMU**

**5.5**

01/02/96  5–50  MAL/ALL/GEN F
DPS 5.5a (Cont)

6

9 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 ?
YES

12 SM GPC BCE XMTR/RCVR FAILURE

14 Reassign SM GPC
• Perform SM REASSIGNMENT, DPS SSR–4
  * MCC for SM GPC assignment

15 Switch back to original PCMMU
(C3) • OI PCMMU PWR – 2(1)

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

'I/O ERROR PCM' msg recur ?
YES

16 • MCC

7 15

10 PCMMU MIA XMTR/RCVR FAILURE

11 Reload TFLs
• Perform LOAD PCMMU FORMAT (ORB OPS FS)

13 If BFS not presently reqd
(C3) • BFC CRT DISP – OFF
•* All IDPs deassigned from BFS
(O6) For BFS GPC:
• GPC MODE – HALT (tb–bp)
  • GPC OUTPUT – NORM

16 • MCC

NO

NO

YES
5–52

DPS

SM ALERT

I/O ERROR PCM

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

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

5.5b ‘I/O ERROR PCM’ (BFS)

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. MCC

6. Cycle pwr on suspect MDMs OF1/2
   -cb MNA,MNB OI
   -MDM OF 1/2/3 A,B (two) – op, then cl
   -Data recovered ?

7. MCC

8. TRANSIENT OI MDM FAILURE

9. MCC

10. Cycle pwr on suspect MDM
    -cb MNA,MNC OI
    -MDM OF 3/4 A,B (two) – op, then cl
    -Data recovered ?

11. TRANSIENT OI MDM FAILURE

12. Cycle pwr on suspect MDMs OF3/4
    -cb MNA,MNC OI
    -MDM OF 3/4 A,B (two) – op, then cl
    -Data recovered ?

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

10/09/03
On kybd assigned to Mem config which annunciated fault msg:
• I/O RESET
Msg recur?

Yes

1
On kybd assigned to Mem config which annunciated fault msg:
• I/O RESET

2
TRANSIENT GPC TO PCMMU INTERFACE FAILURE

No immediate impact

4
5
MCC to continue

3
Which annunciating GPC:

SM

5.5a

Annunciating GPC same as downlist GPC?

Yes

2
Which GNC GPC annunciated error:

GNC 0 GPC MEMORY

GNC 0 GPC MEMORY

Annunciating GPC same as downlist GPC?

No

9
DOWNLIST GPC TO PCMMU INTERFACE FAILURE

Yes

10
GNC GPC simplex?

NO

9
DOWNLIST GPC TO PCMMU INTERFACE FAILURE

12
Select alternate downlist GPC

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

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

1
I/O RESET not reqd to reestablish downlist. Action only verifies that anomaly continues

2
All PASS GPCs output downlist. PCMMU ignores all but selected downlist GPC

02/23/00
5–53
MAL/ALL/GEN F
MEDS OVERVIEW

[POWER AND INTERNAL 1553B DATA BUS CONFIGURATION]
1. MCC for possible IFM replacement

2. 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.

3. 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'.

4. Following blocks will test IDP capabilities remaining after BITE.

- 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) pwr loss
  - IDP 1(2,3,4) H/W or S/W fail
  - 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

- 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

- Call up GPC FAULT SUMM on all CRT MDU

- Fault SUMM appear?
  - YES
  - NO

- IDP PWR LOSS OR H/W OR S/W FAILURE

- If MCC GO:
  - (C2,R11) IDP/CRT PWR – OFF,ON

- MDU still autonomous or blank?
  - YES
  - NO

- IDP PWR LOSS OR FAILURE

- Big X and POLL FAIL msg on CRT MDU?
  - YES
  - NO

- 'BITE FAIL IDP 1(2,3,4)' msg for affected IDP?
  - YES
  - NO

- 'IDP DEFAULT LOAD FAIL' or 'VM LOAD IN PROGRESS' msg for affected IDP?
  - YES
  - NO

- Perform CST on affected IDP

- Fault SUMM appear?
  - YES
  - NO

- 'IDP DEFAULT LOAD FAIL', 'VM LOAD IN PROGRESS'

- 'IDP DEFAULT LOAD FAIL', 'VM LOAD IN PROGRESS'

- Transient IDP PWR LOSS OR FAILURE

- Transient GPC BCE DK XMTR AND/OR RCVR, IDP DK XMTR AND/OR RCVR FAIL

- Transient GPC BCE DK XMTR AND/OR RCVR, IDP DK XMTR AND/OR RCVR FAIL

- Transient GPC BCE DK XMTR AND/OR RCVR, IDP DK XMTR AND/OR RCVR FAIL

- IDP CPS MODE FAILURE
5.6a (Cont)

12  13

14
- Call up ADI display on aff CRT MDU

ADI display appear and no OFF flag?

YES

17 GOOD IDP/FC CAPABILITY

29

NO

18 PARTIAL IDP/FC FAILURE

29

15
- (Aff CRT MDU)
- DATA BUS SELECT each FC BUS

ADI display recovered?

YES

20 IDP LOAD SW FAILURE OR IDP H/W FAILURE

21 IDP H/W FAILURE

22 UNINTENTIONAL IDP LOAD OR IDP H/W TRANSIENT

16 IDP FLT INST CAPABILITY FAIL

29

19
- (C2,R11L)
- (Aff) IDP/CRT PWR – OFF,ON
- Determine which condition recurs

20
- 'VM LOAD IN PROGRESS'
- 'IDP DEFAULT LOAD FAIL'

None of the above

5.6g  2

5.6e  5

5

IDP cannot be used in DPS mode
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, always deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.
If:

- IDP H/W or s/w failure
- IDP pwr transient (BFS annunciated only)
- Keyboard Adapter A and/or B failure

1. 'POLL FAIL' msg should appear on affected MDU in DPS mode (PASS). BFS does not inhibit polling for BITE errors.

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).

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, deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

4. If error is Keyboard Adapter A(B) fail, failure may be associated with a specific key input.

5. IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes.
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).

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, deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT keyboard entry.

5. IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes.

---

DPS 5.6b (Cont)

11 Test failed using both keyboards?

12 KEYBOARD ADAPTER A,B FAILURE

13 TEST SUCCESSFUL ON ONLY ONE KEYBOARD. KEYBOARD ADAPTER A(B) FAILURE. IDP FUNCTIONAL WITH ONLY ONE KEYBOARD

14 Restart polling (C2, R11L)
   - Select desired MAJ FUNC
   - GPC/CRT X X EXEC

NO
Abnormal Response from Keyboard Input

1. 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

   **5.6c** ABNORMAL RESPONSE FROM KEYBOARD INPUT

   1. **CRT BITE 1(2,3,4)** msg being annunciated for this IDP?
      - YES 5.6b 1
      - NO 2

   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 affected IDPs simo)
      - If fwd keyboard, verify ACTIVE KYBD: X,X' does not show the same keyboard active on both IDP displays
      - Monitor 'KEYSTROKE: XXXXXXXXXX' while depressing individual keystrokes
      - Test all keys (using both IDPs if fwd keyboard)
      - Record any abnormal response

   3. Response nominal?
      - YES
      - NO 4

   4. TRANSIENT KEY OR KEYBOARD ANOMALY

   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)
DPS 5.6c (Cont)

2

Power cycle IDPs showing abnormal response
(C2, R11L)
• (All) IDP/CRT PWR – OFF, ON
• Test keyboard as in block 2
• Determine which response occurs

4

Keyboard test nominal

5

TRANSIENT KEY OR KEYBOARD ANOMALY

6

JAMMED KEY

7

L(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

MAL/ALL/GEN F

05/12/00 5–62
**5.6d BIG ‘X’ ACROSS MDU AND/OR ‘POLL FAIL’**

1. **Big ‘X’** Across MDU and/or ‘POLL FAIL’

   - If:
     - IDP S/W error
     - IDP H/W error
     - GPC S/W error
     - BFS CRT SEL discrete failure
     - BFC CRT DISP sw failure
     - IPL SOURCE sw failure
     - Procedural error

   - 

2. **'CRT BITE 1 (2,3,4)’ msg being annunciated for this IDP?**
   - YES → 5.6b 1
   - NO

3. **GPC ‘I/O ERROR CRT 1(2,3,4)’ msg being annunciated for this IDP?**
   - YES → 5.6a 23
   - NO

4. **IDP now assigned to BFS via BFC CRT DISP/SEL switches?**
   - YES → 4 BFS MODE tb RUN?
     - YES → 5 BFS S/W FAILURE
     - NO → 8 Cycle switches which affect BFS IDP assignments
     - NO

5. **BFS S/W FAILURE**

6. **MCC**

7. **Assign affected IDP to PASS**
   - (C3)
     - BFC CRT DISP – OFF
     - (if reqd) GPC/CRT PASS GPC/X EXEC

   If dual cmdrs result:
   - /MCC

   - Big X POLL FAIL with PASS?
     - NO
     - YES 21

8. **Cycle switches which affect BFS IDP assignments**
   - (O6)
     - IPL SOURCE – MMU 1/MMU 2, then OFF (several times: final sw position OFF)
     - BFS CRT DISP – OFF, then ON (several times: final sw position ON)

   - Problem recur with BFS?
     - NO
     - YES 11

9. **TRANSIENT**
   - BFC CRT SEL DISCRETE OR IPL SOURCE SWITCH FAILURE

1. **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.

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. 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.

---

03/22/00

5–63

MAL/ALL/GEN F
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.

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).
DPS 5.6d (Cont)

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 (C2/R11)
- 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

5 IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes
DPS

MDU Anomaly

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), CRT1(2,3,4), AFD1(2)

If:

- MDU S/W or H/W fail
- Edgekey fail
- IDP/FC interface fail
- MDU pwr fail

---

**5.6e MDU ANOMALY**

1. **MDU OVERTEMP mduX** msg?
   - NO
   - YES → 2

2. (MDU)
   - (Aff) MDU PWR – OFF, ON
   - Report to MCC

3. GPC `I/O Error CRT X` msg annunciated?
   - NO
   - YES → 5.6a
   - YES → 1

4. MDU Autonomous?
   - NO
   - YES → 5.6g

5. **`VM LOAD IN PROGRESS`** msg?
   - NO
   - YES → 5.6a
   - YES → 19

6. Red `X` over Edgekey or no response to input?
   - NO
   - YES → 7

7. (MDU)
   - (Aff) MDU PWR – OFF, ON
   - Problem recur?
   - YES

8. USER DEPRESSED EDGEKEY FOR > 3 SEC OR TRANSIENT EDGEKEY FAIL OPEN/CLOSE

9. Call up SUBSYS STATUS (OMS/MPS, SPI HYD/APU) FLT INST, and DPS displays on aff MDU

10. Error data only on SUBSYS STATUS display(s)?
    - NO
    - YES → 5.6f

11. Error data only on FLT INST display(s)?
    - NO
    - YES → 12

12. Error data only on FLT INST display(s)?
    - NO
    - YES → 2

13. 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

14. (Aff MDU) DATA BUS select each FC BUS
    - Inform MCC of display status for each FC bus
    - FLT INST display recovered?
      - NO
      - YES → 15

15. PARTIAL IDP/FC INTERFACE FAILURE
3. IDP cannot be used in FLT INST mode. May be usable in DPS and subsystem display modes.

4. For MDU BITE caused by EEPROM failure, CST or pwr cycle should not be performed on MDU.

5. 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’.

20. Erroneous data only on DPS displays?

22. MDU display totally blank?

25. CRT MDU?

27. (R14:A) All MNA(B,C) cb – op?

30. POSSIBLE ELECTRICAL PROBLEM. DO NOT ATTEMPT TO RESET cb

21. • Report to MCC

19. (All MDU) PORT SELECT (to alt IDP)
   • Report to MCC

18. TRANSIENT FC INTERFACE FAIL AT IDP

17. TOTAL FC INTERFACE FAIL AT IDP

16. (C2,R11L)
   • (aff) IDP/CRT PWR – OFF,ON
   • If reqd port select to original IDP

14

12

23. Was ‘BITE FAIL mdx’ msg annunciacted?

24. • MCC before proceeding

26. Perform CST on aff MDU
   • MAIN MENU: MEDS MAINT:
     CST: START MDU
   • Record results displayed in affected MDU box on MEDS MAINT display
   • Report results to MCC

28. (MDU)
   • (aff) MDU PWR – OFF,ON

29. MDU H/W OR S/W FAILURE

31. TRANSIENT MDU ANOMALY

32. • MCC for possible MDU cb cycle

33
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 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.

If: ADC Port failure
- ADC H/W failure
- ADC S/W failure
- ADC power loss/fail
- Subsystem XDCR, DSC or MDM fail

1. **Inform MCC of status of display(s)**
   - Subsys status display(s) normal?
     - NO
       - Note config of MDU exhibiting problem:
         - MDU:
         - Selected Port/IDP:
         - Display:
       - Is all MNA(B) ADC 1A/2A(1B/2B) cb – op?
         - NO
           - Refer to MEDS overview for lost display capabilities
         - YES
           - POSSIBLE ELECTRICAL PROBLEM. DO NOT ATTEMPT TO RESET cb

2. **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
   - On MCC GO:
     - (R14A)
     - (R14B) MNA(B) ADC 1A/2A (1B/2B) cb – op
     - Reset all MEDS faultmsgs
     - (R14B) MNA(B) ADC 1A/2A (1B/2B) cb – cl
   - Msg recur?
     - NO
     - YES

3. **Possible electrical problem. Do not attempt to reset cb**
   - Same display for alternate ADC on CRT MDU given in block
   - Problem recur?
     - NO
     - YES

4. **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
   - On MCC GO:
     - (R14A)
     - (R14B) MNA(B) ADC 1A/2A (1B/2B) cb – op
     - Reset all MEDS fault msgs
     - (R14B) MNA(B) ADC 1A/2A (1B/2B) cb – cl
   - Msg recur?
     - NO
     - YES

5. **Possible electrical problem. Do not attempt to reset cb**
   - Same display for alternate ADC on CRT MDU given in block
   - Problem recur?
     - NO
     - YES

6. **Possible electrical problem. Do not attempt to reset cb**
   - Same display for alternate port of affected ADC on CRT MDU given in block
   - Problem recur?
     - NO
     - YES

7. **Possible electrical problem. Do not attempt to reset cb**
   - Same display for alternate port of affected ADC on CRT MDU given in block
   - Problem recur?
     - NO
     - YES

8. **Possible electrical problem. Do not attempt to reset cb**
   - Same display for alternate port of affected ADC on CRT MDU given in block
   - Problem recur?
     - NO
     - YES

9. **Possible electrical problem. Do not attempt to reset cb**
   - Same display for alternate port of affected ADC on CRT MDU given in block
   - Problem recur?
     - NO
     - YES

10. **Possible electrical problem. Do not attempt to reset cb**
    - Same display for alternate port of affected ADC on CRT MDU given in block
    - Problem recur?
      - NO
      - YES

11. **Possible electrical problem. Do not attempt to reset cb**
    - Same display for alternate port of affected ADC on CRT MDU given in block
    - Problem recur?
      - NO
      - YES

12. **Possible electrical problem. Do not attempt to reset cb**
    - Same display for alternate port of affected ADC on CRT MDU given in block
    - Problem recur?
      - NO
      - YES

13. **Possible electrical problem. Do not attempt to reset cb**
    - Same display for alternate port of affected ADC on CRT MDU given in block
    - Problem recur?
      - NO
      - YES

14. **Possible electrical problem. Do not attempt to reset cb**
    - Same display for alternate port of affected ADC on CRT MDU given in block
    - Problem recur?
      - NO
      - YES
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.

4 Purpose of this chart is to select MDU that will always be connected to other IDP associated with problem. CRT MDU is chosen since it will always be connected to that IDP.

10 Perform ADC CST from alt IDP using CRT MDU given in block 20

13 MAIN MENU: MEDS MAINT: CST: START ADCXX

Record results that are displayed in affected ADC box on MEDS MAINT display

14 Cycle ADC cb (R14A): (Aff) MNA(B) ADC 1A/2A (1B/2B) cb – op

(Alt) 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

15 Refer to MEDS OVERVIEW for lost display capabilities

NO

16 TRANSIENT ADC ANOMALY

---

<table>
<thead>
<tr>
<th>MDU with Subsys Display problem</th>
<th>Currently Selected Port (noted in block 2)</th>
<th>Use this CRT MDU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDR1</td>
<td>Pri</td>
<td>CRT4</td>
</tr>
<tr>
<td>CDR2</td>
<td>Pri</td>
<td>CRT2</td>
</tr>
<tr>
<td>CRT1</td>
<td>Sec</td>
<td>CRT1</td>
</tr>
<tr>
<td>MFD1</td>
<td>Pri</td>
<td>CRT1</td>
</tr>
<tr>
<td>CRT3</td>
<td>–</td>
<td>CRT4</td>
</tr>
<tr>
<td>MFD2</td>
<td>Pri</td>
<td>CRT2</td>
</tr>
<tr>
<td>CRT2</td>
<td>–</td>
<td>CRT4</td>
</tr>
<tr>
<td>PLT1</td>
<td>Pri</td>
<td>CRT1</td>
</tr>
<tr>
<td>PLT2</td>
<td>Sec</td>
<td>CRT1</td>
</tr>
<tr>
<td>CRT4</td>
<td>–</td>
<td>CRT3</td>
</tr>
<tr>
<td>AFD1</td>
<td>Pri</td>
<td>CRT1</td>
</tr>
<tr>
<td></td>
<td>Sec</td>
<td>CRT1</td>
</tr>
</tbody>
</table>
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 CRT1</td>
<td></td>
</tr>
<tr>
<td>CDR2</td>
<td>Pri CRT4</td>
<td></td>
</tr>
<tr>
<td>CRT1</td>
<td>– CRT4</td>
<td></td>
</tr>
<tr>
<td>MFD1</td>
<td>Pri CRT4</td>
<td></td>
</tr>
<tr>
<td>CRT3</td>
<td>– CRT1</td>
<td></td>
</tr>
<tr>
<td>MFD2</td>
<td>Pri CRT4</td>
<td></td>
</tr>
<tr>
<td>CRT2</td>
<td>– CRT4</td>
<td></td>
</tr>
<tr>
<td>PLT1</td>
<td>Pri CRT4</td>
<td></td>
</tr>
<tr>
<td>PLT2</td>
<td>Pri CRT1</td>
<td></td>
</tr>
<tr>
<td>CRT4</td>
<td>– CRT1</td>
<td></td>
</tr>
<tr>
<td>AFD1</td>
<td>Pri CRT1</td>
<td></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>HYD/APU</td>
<td>IDP 2 ADC 1A CRT1</td>
<td>IDP 4 ADC 1B CRT3</td>
<td></td>
</tr>
</tbody>
</table>

03/22/00
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’
If MCC GO:
(C2,R11)
• (All) IDP OFF, ON
MDU still autonomous?

NO
19
TRANSIENT IDP ANOMALY

YES

17

13

18
MDU PORT FAILURE AS NOTED

18

20
IDPx HARD FAILED. REFER TO MEDS OVERVIEW FOR LOST CAPABILITY

DPS 5.6g (Cont)
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 a critical burn requires a Dual G2 config, recovered GPC will be made a 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 a 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 an embedded part of this FRP

1. GNC GPC FAILURE OR SM GPC FAILURE
   2. G2FD 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
   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 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
   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 ?
      GNC or G2FD
      SM
   15. FNL CONFIG:
      Single G2, Dual G2
      1 G2 1 G2FD 1 SM 1 BFS
      2 G2 0 G2FD 1 SM 1 BFS
   16. 10
   17. 10

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 H/W 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

10/20/00 5–74 MAL/ALL/GEN F
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 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).
**GPC FRP−1 (Cont)**

**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**
Do not perform any keyboard item entries or switch throws 10 sec before and after making an OPS transition request

- **If RNDZ NAV enabled:**
  
  | DAP: | LVLH |
  | GNC UNIV PTG |
  | CNCL − ITEM 21 EXEC |
  
- **CONFIGURE FOR SET CONTRACTION**
  
  If MM202: GNC, OPS 201 PRO
  
  | CONFIG − ITEM 1 +2 EXEC |
  |
  | CONFIG − GPC 10000 12000 |
  | Single G2 | Dual G2 |
  | STR 1 | 2 |
  | 2 | 1 |
  | 3 | 1 |
  | 4 | 1 |
  | 1/2 | 0 |
  | L | 0 |
  | 2 | 0 |
  | MM | 1 |
  | 2 | 1 |
  | 3 | 0 |
  | 4 | 1 |
  | CRT | 1 |
  | 1 | 1 |
  | 2 | 2 |
  | 3 | 0 |
  | 4 | 2 |
  | DAP: as reqd |
  
- **OPS MODE RECALL**
  
  | DAP: | FREE |
  | VERN(ALT) |
  |
  | CRT | 1 |
  | 1 | 1 |
  | 2 | 2 |
  | 3 | 0 |
  | 4 | 2 |
  | L | 0 |
  | 2 | 0 |
  | MM | 1 |
  | 2 | 1 |
  | 3 | 0 |
  | 4 | 2 |
  | CRT | 1 |
  | 1 | 1 |
  | 2 | 2 |
  | 3 | 0 |
  | 4 | 2 |
  | DAP: as reqd |
  
- **FREEZE DRY GPC**
  
  | MAJ FUNC − PL |
  | GPC/CRT G2FD/X EXEC |
  |
  | CONFIG − ITEM 45 +2 EXEC |
  | GPC − ITEM 46 +3 EXEC |
  | STORE − ITEM 47 EXEC |
  | Store complete when MC = 02 (~30 sec) |
  | All IDPs deassigned from FD GPC |
  
- **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 downlist change following OPS Mode Recall

**13** Crew “GO” for Error Log resets without prior MCC concurrence

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11/01/00 5–76 MAL/ALL/GEN F
### EXPAND SET

#### NOTE
Do not perform any keyboard item entries or switch throws 10 sec before and after making an OPS transition request.

- **If RNDZ NAV enabled:**
  - DAP: LVLH
  - GNC UNIV PTG
  - CNCL - ITEM 21 EXEC

- **CONFIGURE FOR SET EXPANSION**
  - If MM202: GNC, OPS 201 PRO
  - GNC 0 GPC MEMORY
  - CONFIG - ITEM 1 +2 EXEC
  - Assign MC2 per table

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<tr>
<td>CRT</td>
<td>1(\uparrow) 2(\downarrow) 3(\uparrow) 4(\uparrow)</td>
<td>DON'T MODIFY NBAT</td>
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<tr>
<td>L</td>
<td>1(\downarrow) 2(\uparrow)</td>
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<tr>
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<td>1(\uparrow) 2(\downarrow)</td>
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- **OPS MODE RECALL**
  - DAP: FREE
  - CRT GNC, OPS 201 PRO
  - Pause ~30 sec (DAP settling), then DAP: as reqd
**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)

### Initial Config FRP−3

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**a.** Remove GPC2 from MC3

```plaintext
GNC 0 GPC MEMORY
- Config – ITEM 1 +3 EXEC
- Modify MC3 per table
- GNC OPS 301 PRO (√DAP)
```

**b.** Establish new BFS in GPC 2

- Perform GPC IPL – MENU OPTION (PASS/BFS) . . . . DPS SSR−7
- GPC OUTPUT – BKUP
- MODE – RUN

```plaintext
GNC 50 HORIZ SIT – √PASS R/W sel
```

---

MAL/ALL/GEN F
GPC FRP–3 (Cont)

c. Attempt recovery of failed GPC

- Perform GPC IPL–PASS ........................................ DPS SSR–8
- If GPC recovered, perform step d

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Final Config for GPC 5

- Not Recovered

| STR 1 | 1 | 4 |
| 2     | 2 | 3 |
| 3     | 3 | 4 |
| 4     | 4 | 1 |
| PL 1/2|   |   |
| CRT 1 | 1 | 4 |
| 2     | 2 | 3 |
| 3     | 3 | 0 |
| 4     | 4 | 0 |
| L     | 1 | 0 |
| 2     | 2 | 0 |
| MM 1  | 1 | 1 |
| 2     | 2 | 3 |

GPC recovered, establish a four GPC redundant set

- Config – ITEM 1 +3 EXEC
- Modify MC3 per table
- GNC OPS 301 PRO (√DAP)
- (BFS) GNC, OPS 000 PRO
- 301 PRO

GNC 0 GPC MEMORY

- Config – ITEM 1 +3 EXEC
- Modify MC3 per table
- GNC OPS 301 PRO (√DAP)
- (BFS) GNC, OPS 000 PRO
- 301 PRO

GNC 50 HORIZ SIT - √PASS R/W sel

Final Config for GPC 5

- Recovered

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GPC 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)

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

2. **If SM GPC currently active**:
   - O6 a. If SM GPC OUTPUT – TERM:
     - SM GPC OUTPUT – NORM
     - BFS ENGAGE pb – push (reset engage discretes)
   - b. If SM GPC self–fail CAM II on:
     - Perform PL/DPS RECONFIG (PL OPS or PL SYS or
       SODF: ASSY OPS):
       - SM 1 DPS UTILITY
       - CHECKPOINT RETRIVE DISABLE:
   - C2
   - O6 SM GPC MODE – STBY, then RUN
   - C2 SM, OPS 201 PRO
   - c. 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):
   - Perform GPC IPL – PASS
   - (DPS SSR–8)

4. **For first successfully IPL’d GPC, establish SM GPC**:
   - Perform SM REASSIGNMENT
   - (DPS SSR–4)

5. **Select MET as MISSION TIME**:
   - C2 MISSION TIME MET – ITEM 2 EXEC

6. **Hardware dump the remaining failed GPCs** (if step 3
   performed, do not dump IPL’d GPCs):
   - a. Perform GPC HDW INITIATED MEM DUMP
     - (DPS SSR–1)
   - b. Repeat last step for each GPC
     - (DPS SSR–1)
   - c. BFS ENGAGE pb – push (reset engage discretes)

7. **Attempt recovery of each dumped GPC**:
   - a. Perform IPL:
     - Perform GPC IPL–PASS
     - Repeat for each dumped GPC
     - (DPS SSR–8)
   - b. Configure GPCs:
     - If 1 PASS GPC, go to step 8
     - If 2 PASS GPCs, go to steps 9–11
     - If 3 PASS GPCs, go to steps 12–14
     - If 4 PASS GPCs, go to steps 15–18

8. **One PASS GPC, config for ENTRY**:
   - a. Perform LOAD PCMMU FORMAT (ENTRY) (ORB OPS FS,
      COMM/INST)
   - b. Perform GNC REASSIGNMENT (G3)
     - (DPS SSR–3)
   - c. Go to step 19; PASS IMU attitude reference recovery

---

### GPC IPL’d

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GPC FRP–4 (Cont)

9. Two PASS GPCs:
   a. OI PCMMU FORMAT – FXD
   b. Establish single G3 config in lowest number GPC:
      Perform GNC REASSIGNMENT(G3) ............ DPS SSR–3
   c. Perform step 19: PASS IMU attitude reference recovery, then:
   d. If ORBIT config desired, go to step 11

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10. Entry config desired, establish dual G3 config:
   a. Perform SM CHECKPOINT INITIATE
      (ORB OPS, DPS)
   b. Perform LOAD PCMMU FORMAT (ENTRY)
      (ORB OPS FS, COMM/INST)
   c. Perform GNC REASSIGNMENT
      (G3) ............ DPS SSR–3

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### Additional Details

- **GPC F** FRP−4 (Cont)
- 10. (Cont)
### GPC FRP–4 (Cont)

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### 11. Orbit config desired, establish single G2:

a. Secure BFS:

(BFS) GNC, OPS 000 PRO

b. Perform GNC REASSIGNMENT (G3 to G2)...

PASS GPCs

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| **CONFIG GPC** |
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b. Perform LOAD PCMMU FORMAT (ORBIT)

(c. Perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)

d. If applicable, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)

e. Configure IDPs:

(GPC/CRT 03 EXEC

GPD/CRT DESIRED GPC/4 EXEC

f. SM GPC OUTPUT – TERM

g. Reselect MTU accumulator:

SM(GNC) 2 TIME

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- **NOTE:** Down arrows will remain for accumulators not selected by GPC driving SPEC. If TRY is not successful, do not perform TIME SYNC. Continue with procedures, √ MCC
11. (Cont)

### Final Config for Two PASS GPCs and Orbit Desired

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01/07/99  5–85  MAL/ALL/GEN F
## GPC FRP–4 (Cont)

11. (Cont)

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### C3

12. Three PASS GPCs:
   a. OI PCMMU FORMAT – FXD
   b. Establish G3 redundant set:
      Perform GNC REASSIGNMENT (G3) . . . . DPS SSR–3
   c. Perform step 19: PASS IMU attitude reference recovery, then:

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13. Config for ORBIT:
   a. Secure BFS:
      C2
         (BFS) GNC, OPS 000 PRO
      C3
         BFC CRT DISP – OFF
            SEL = 3+1
      √ All IDPs deassigned from BFS
      O6
         BFS GPC MODE – STBY/HALT (tb–bp)
         OUTPUT – NORM
   b. Perform GNC REASSIGNMENT (G3 to G2) ……….. DPS SSR–3
   c. Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
   d. If applicable, perform LOAD PDI DECOM FORMAT
      (ORB OPS FS, COMM/INST)
   e. Configure IDPs:
      GPC/CRT 03 EXEC
      DESIRED GPC/4 EXEC
   f. SM GPC OUTPUT – TERM
   g. Reselect MTU accumulator:
      SM(GNC) 2 TIME
      MTU ACCUM 1(2,3) TRY – ITEM 34(35,36)

   NOTE
   Down arrows will remain for accumulators not selected by
   GPC driving SPEC. If try is not successful, do not perform
   TIME SYNC. Continue with procedures, √ MCC
   h. If single GNC GPC config desired, go to step 14

14. Establish single GNC GPC config:
   a. Perform GNC REASSIGNMENT (G2) …………. DPS SSR–3
   b. Perform FREEZE–DRY REASSIGNMENT (G3) ……… DPS SSR–5
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### GPC FRP–4 (Cont)

15. Four PASS GPCs:

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<tr>
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C3

a. OI PCMU FORMAT – FXD
b. Establish G3 redundant set:
   - Perform GNC REASSIGNMENT (G3)  
   - DPS SSR–3

c. Perform step 19: PASS IMU attitude reference recovery, then:

<table>
<thead>
<tr>
<th></th>
<th>CONFIG GPC</th>
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<th>12000</th>
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<tbody>
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16. Freeze–dry GPC:

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</tr>
<tr>
<td>MM 1 2</td>
<td>3 3</td>
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</table>

a. Perform GNC REASSIGNMENT (G3)  
   - DPS SSR–3

b. Perform FREEZE–DRY REASSIGNMENT (G3)  
   - DPS SSR–5
17. Config for ORBIT:
   a. Secure BFS:
      C2  (BFS) GNC, OPS 000 PRO
      C3  BFC CRT DISP – OFF
      SEL  – 3+1
      √ All IDPs deassigned from BFS
      O6  BFS GPC MODE  –  STBY,HALT (tb–bp)
      OUTPUT  –  NORM
   b. Perform GNC REASSIGNMENT (G3 to G2) .................  DPS SSR–3
   c. Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
   d. If applicable, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
   e. Configure IDPs:
      C2  GPC/CRT 03 EXEC
      GPC/CRT DESIRED GPC/4 EXEC
      O6  SM GPC OUTPUT  –  TERM
   f. Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
   g. Reselect MTU accumulator:
      SM(GNC) 2 TIME
      MTU ACCUM 1(2.3) TRY  –  ITEM 34(35,36)
   h. If single GNC GPC config desired, perform step 18

      CONFIG  GPC  2 12000
      STR   1 2 2
             3 1
             4 2
      PL    1/2 0
      CRT   1 1
             2 2
             3 0
             4 2
      L     1 0
             2 0
      MM    1 1
             2 2

      NOTE
      Down arrows will remain for accumulators not
      selected by GPC driving SPEC. If TRY is not
      successful, do not perform TIME SYNC.
      Continue with procedures, √MCC

      Final Config for
      GPCs 1,2,3,4
      Dual GNC GPCs

      GPC OPERATIONS 1 2 3 4 5
      OPS         G2  G2  G3FD SM  BFS
      POWER OUTPUT MODE  ON  ON  ON  ON  ON
      OUTPUT MODE  NORM  NORM  NORM  TERM  NORM
      RUN  RUN  HALT  RUN  HALT
      CONFIG
      GPC  2 12000 4(5) 0040 3(FD) 00300
       STR 1 2 0 0 3
       2 1 0 0 3
       3 1 0 0 3
       4 2 0 0 3
       PL 1/2 0 4 0
       CRT 1 2 4 3
       2 2 4 3
       3 0 4 3
       4 2 4 0
       L 1 0 4 0
       2 0 4 0
       MM 1 2 4 3
       2 2 4 3

02/23/00  5–90  MAL/ALL/GEN F
GPC FRP–4 (Cont)

18. Establish single GNC GPC config:
   a. Perform GNC REASSIGNMENT (G2) ............... DPS SSR–3

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   | CRT 1 1    | 1 1|
   | 2 1        | 1 1|
   | 3 0        | 0 0|
   | 4 1        | 1 1|

   | L 1 2      | 0 0|
   | 2 0        | 0 0|

   | MM 1 2     | 1 2|
   | 2 1        | 1 2|

b. Perform FREEZE–DRY REASSIGNMENT (G2) .... DPS SSR–5

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   | 2 2        | 2 2|
   | 3 0        | 0 0|
   | 4 2        | 2 2|

   | L 1 2      | 0 0|
   | 2 0        | 0 0|

   | MM 1 2     | 2 2|
   | 2 2        | 2 2|

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Final Config for GPCs 1, 3, 4

Single GNC GPC

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| CRT 1 2    | 1 2|
| 2 1        | 2 2|
| 3 0        | 2 2|
| 4 1        | 2 2|

| L 2 1      | 0 0|
| 2 0        | 0 0|

| MM 2 1     | 1 2|
| 2 1        | 2 2|
GPC FRP–4 (Cont)

19. PASS IMU attitude reference recovery:

O6
a. √ STAR TRKR PWR (two) – ON

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 the HUD and MATRIX alignment:

c. Deselect two IMUs leaving one IMU selected:

IMU DES 1(2,3) – ITEM 7(8,9)

d. Maneuver to attitude for subsequent HUD alignment:

STAR PAIRS PAD/CUE CARD (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):

NOTE

BFS DISENGAGE can be verified Big X/POLL FAIL on MDU in DPS mode commanded by IDP 1, BFS GPC OUTPUT tb – bp (pnl O6), and BFC It flashing (pnl F2/F4)

C2

√ BFC CRT DISP – ON

SEL – 3+1 (BFS commanding MDUs via IDPs 3 and 1)

√ PASS GNC GPC driving MDUs via IDP 2

Deassign IDP 1 from PASS:

Via IDP 2, GPC/CRT 01 EXEC (BFS still commanding MDU via IDP 1)

On MCC GO, perform BFS disengage:

F6

BFC – DISENGAGE (repeat, as reqd)

C3

DAP: INRTL

Verify BFS disengage

* If only PASS disengages:

* BFS commanding MDUs via IDPs 1 and 3,

* GNC GPC(s) OUTPUT tb – gray (pnl O6),

* SPEC 6, GNC √ no ↓ on strings)

* BFS, OPS 000 PRO

* GPC 5 OUTPUT – NORM

* – BACKUP

* Verify BFS disengage

* BFS, OPS 301 PRO

C2

BFS – I/O RESET

Reassign IDP 1, as desired

F6/F8

ADI ATT (two) – REF

ADI REF pb – push

f. Perform IMU REFERENCE RECOVERY AFTER GNC GPCs IPL’d, GNC FRP–1 (GNC)

g. Go to step x

If good comm and uplink CMD capability:

Recover IMU attitude reference utilizing IMU/IMU alignments:

h. Deselect two IMUs leaving best IMU selected:

√ MCC for best IMU

IMU DES 1(2,3) – ITEM 7(8,9)

NOTE

Post BFS DISENGAGE, IMUs will be drifting uncompensated until MMREAD step is complete. Steps between BFS DISENGAGE and MMREAD must be performed without delay to reduce IMU drift
i. Disengagement of BFS:

**NOTE**

BFS DISENGAGE can be verified by Big X/POLL FAIL (on MDU in DPS mode commanded by IDP 1), BFS GPC OUTPUT tb − bp (pnl O6), and BFC lt flashing (pnl F2/F4)

C2

- BFS CRT DISP − ON
- SEL − 3+1 (BFS commanding MDUs via IDPs 3 and 1)
- PASS GNC GPC commanding MDUs via IDP 2

Deassign IDP 1 from PASS:

- Via IDP 2, GPC/CRT 01 EXEC (BFS still commanding MDUs via IDP 1)

On MCC GO, perform BFS disengage:

F6 BFS − DISENGAGE (repeat, as reqd)

C3

DAP: INRTL

Verify BFS disengage

- If only PASS disengages:
- (BFS commanding MDUs via IDPs 1 and 3),
- GNC GPC(s) OUTPUT tb − gray (pnl O6),
- SPEC 6, GNC ∨ no ↓ on strings)
- BFS, OPS 000 PRO
- GPC 5 OUTPUT − NORM
- GPC 5 OUTPUT − BACKUP
- Verify BFS disengage
- BFS, OPS 301 PRO

C2 BFS − I/O RESET

Reassign IDP 1, as desired

j. 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 MMREAD:

MMREAD − ITEM 19 EXEC (*)

When MMREAD complete:

MMREAD − ITEM 19 (no *)

**NOTE**

‘IMU BITE/T’ may be annunciated until MMREAD is performed to restore IMU gyro delta bias terms

Recover Attitude Reference on one IMU:

k. Confirm with MCC that REFSMMAT uplink has been performed. Do not proceed without confirmation

l. Execute a modified IMU/IMU alignment:

**CAUTION**

IMU/IMU ALIGN MUST BE MANUALLY TERMINATED AS SOON AS DELTA ANGLES ON SPEC 21, FOR THE IMU BEING ALIGNED, ARE LESS THAN 0.05 IN ALL THREE AXES. THIS WILL OCCUR JUST PRIOR TO NOMINAL ALIGNMENT COMPLETION

GNC 21 IMU ALIGN

Utilize as reference the best IMU currently selected by RM:

IMU/IMU − ITEM 14 + ___ EXEC

MCC for IMU to be aligned:

ALIGN IMU 1(2,3) − ITEM 10(11,12) EXEC (*)

EXEC − ITEM 16 EXEC (*)

Manually TERMAINT alignment as soon as delta angles on SPEC 21, for IMU being aligned, are less than 0.05 in all three axes:

TERM − ITEM 17 EXEC

02/23/00
m. Configure DAP:
   √ DAP: INRTL
   DAP ROT: PULSE/PULSE/PULSE

n. Deselect currently selected IMU (no selected IMUs):
   IMU DES – ITEM 7(8,9) EXEC (*)

o. Reselect IMU aligned in step l:
   IMU DES – ITEM 7(8,9) EXEC (no *)

p. Configure DAP:
   √ DAP: INRTL
   DAP ROT: DISC/DISC/DISC

Recover Attitude Reference on remaining two IMUs and desired platform skew on two IMUs:

q. Execute a nominal IMU/IMU alignment to recover attitude reference on all IMUs:

   **NOTE**
   Manual termination should not be performed. Alignment will require 3–4 min
   
   [GNC 21 IMU ALIGN]
   Utilize IMU recovered in step l (currently selected by RM) as reference:

   IMU/IMU – ITEM 14 + ___ EXEC
   Select other two IMUs for alignment:
   ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
   EXEC – ITEM 16 EXEC (*)

r. When IMU/IMU alignment complete, reselect all IMUs:
   IMU DES – ITEM 7(8,9) EXEC (no *)

Reestablish desired platform skew on remaining IMU:

s. Confirm with MCC that second REFSSMAT uplink has been performed. Do not proceed without confirmation

t. Execute a nominal IMU/IMU alignment to reestablish skew on all IMUs:

   **NOTE**
   Manual termination should not be performed. Alignment will require 3–6 min
   
   [GNC 21 IMU ALIGN]
   Align IMU previously utilized as reference in step q:
   ALIGAN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
   Utilize either of the other two IMUs as current reference:
   IMU/IMU – ITEM 14 + ___ EXEC
   EXEC – ITEM 16 EXEC (*)

u. Mnvr to acquire stars using AUTO DAP for STRK align. Only Stars 11–60 are available in OPS3:
   choose appropriate star pair from pad STAR PAIRS PAD/CUE CARD (ORB OPS FS, PTG)

v. If STAR TRKRs powered on in step a, configure STAR TRKRs and open doors:
   GNC I/O RESET
   [GNC 22 S TRK/COAS CNTL]
   If SHUTTER – CL:
   ITEM 15(16) EXEC (*)
   ITEM 15(16) EXEC (no *)
   S TRK DR CNTL SYS (two) – OP
   √ POS tb (two) – bp (start timer)
   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
   STAR TRK – ITEM 3,4 EXEC (*)

w. If reqd, perform IMU ALIGN – S TRK (ORB OPS, GNC)

x. If only one GPC recovered:
   GNC, OPS 201 PRO
   GNC, OPS 301 PRO
   (BFS) GNC, OPS 000 PRO
   (BFS) GNC, OPS 301 PRO
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

<table>
<thead>
<tr>
<th>ASCENT (G1)</th>
<th>ORBIT (G2,G8/S2)</th>
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</thead>
<tbody>
<tr>
<td>a–h</td>
<td>i–q</td>
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### ASCENT

#### Initial ASCENT Config – Av Bay 1

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GPC FRP–7 (Cont)

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
   • 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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   C2  
   • GNC GPC 0 MEMORY
   • CONFIG ITEM 1–2 EXEC
   • Modify MC 2 per table
   • GNC, OPS 201 PRO
   • GNC UNIV PTG

d. Transition to OPS 2

   • Perform SM REASSIGNMENT ..................... DPS SSR–4

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<td>4</td>
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</table>

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:
   •/ All IDPs deassigned from BFS
   C3  
   • BFC CRT DISP – OFF
   • GPC MODE 3  –  STBY,HALT (tb–bp)
   • OUTPUT 3  –  NORM
   O6  
   • GPC MODE 5  –  STBY,HAL (tb–bp)
   • GPC 5 MODE   –  STBY (tb–RUN)
   • GPC 5 MODE   –  HALT (tb–bp)

Re–IPL GPC 5:

   • Perform GPC IPL – PASS ......................... DPS SSR–8
   • GPC MODE 5  –  STBY (tb–bp),HALT
   • – STBY (tb–RUN)
   • – HALT (tb–bp)
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>
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<td>:E</td>
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<td>BRAKES MNC – OFF</td>
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<td>TACAN 1 MODE – OFF</td>
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<tr>
<td>O8</td>
<td>MLS 1 – OFF</td>
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</tr>
<tr>
<td>L4: P</td>
<td>cb AC3 9A LG SNSR 1 – op</td>
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</table>

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

j. Single G2 GPC ops
- Perform GNC REASSIGNMENT ......................... DPS SSR–3
GPC FRP−7 (Cont)

If Av Bay 1, use BFS for systems monitoring:
- Perform SM CHECKPOINT INITIATE (ORB OPS, DPS)
- If reqd, perform PL/DPS 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)
- √ 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:

- 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
  - MDU PWR OFF as desired
  - BFS CRT DISP − OFF
  - √ All IDPs deassigned from BFS
  - 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

---

**TABLE**

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<tr>
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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
   ✷ GNC UNIV PTG
   ✷ 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

Av Bay 1                               Av Bay 2
O6               ✷ GPC 1 MODE – HALT       ✷ GPC 2 MODE – HALT
                           4 MODE – STBY (tb–bp), HALT       5 MODE – STBY (tb–bp), HALT
                           – STBY (tb–RUN)
                           – HALT (tb–bp)

p. Config LRU switches:

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<td>O16:A</td>
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<td>:E</td>
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<td>✷ TACAN 1 MODE – OFF</td>
<td>✷ TACAN 2 MODE – OFF</td>
<td>✷ MLS 2.3 (two) – OFF</td>
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<td>O8</td>
<td>✷ MLS 1 – OFF</td>
<td>✷ MLS 1 – OFF</td>
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<td>✷ cb AC2 φA LG SNSR 2 – op</td>
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**GPC FRP-7 (Cont)**

q. If Av Bay 2, S/W dump newly IPL'd BFS GPC:
   - Perform GPC S/W INITIATED MEM DUMP (Target GPC3)  
   - \(\text{DPS SSN-2}\)

C3
   - BFS CRT DISP - OFF
   - All IDPs reassigned from BFS

O6
   - GPC MODE 3 - STBY/HALT (tb-bp)
   - \(\text{\checkmark}\) 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)

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DPS SSR−1
GPC HDW INITIATED MEM DUMP

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
MO42F GPC MEM DUMP − 1(2,3,4,5)
Perform next step at noted dump time

2. If tape−driven MMU, √ MCC to ensure OPS RCDR 1(2) configured for dump

3. SM 62 PCMMU/PL COMM
   If reqd, load dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

4. If PASS:
   Select failed GPC X as downlister (avoids downlist contention)
   SM(GNC) 0 GPC MEMORY
   DOWNLIST GPC − ITEM 44 + X EXEC

O6 5. 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 GPC MODE 1(2,3,4,5) − HALT (stops dump)
   OUTPUT 1(2,3,4,5) − NORM

6. If PASS:
   Select lowest ID GNC GPC X as downlister
   SM(GNC) 0 GPC MEMORY
   DOWNLIST GPC − ITEM 44 + X EXEC

MO42F 7. GPC MEM DUMP − OFF

8. 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. If vehicle configured with tape-driven MMU: √ MCC to ensure OPS RCDR 1(2) configured for dump

2. **SM 62 PCMMU/PL COMM**
   If reqd, load dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

3. **If PASS:**
   a. If GNC, SM, or PL9 Memory Dump:
      On display assigned to GPC to be dumped,
      
      GNC(SM,PL) 0 GPC MEMORY
      
      If a specific GNC GPC to be dumped,
      √ DOWNLIST GPC – ITEM 44 +X EXEC
      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
      DOWNLIST GPC – ITEM 44 +X EXEC
      DUMP START/STOP – ITEM 43 EXEC
      Item 40 (up), 41 (down) entries begin counting
      Dump complete when ITEMS 40,41 blank
      DOWNLIST GPC – ITEM 44 +X EXEC (lowest ID GNC GPC)

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4. **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)

5. **SM 62 PCMMU/PL COMM**
   If reqd, load post-dump TFL:
   LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
DPS SSR–3
GNC REASSIGNMENT

1. If target GPC MODE = HALT:
   - L1
     - Appropriate AV BAY FAN = ON
     - Target GPC PWR = ON
   - O6
     - MODE = STBY (tb–RUN), RUN

2. If 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 (*)
     - C3
       - UPLK = manually config for AOS/LOS

   **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

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

8. Using display assigned to a current redundant set GNC GPC,
   - IDP/CRT MAJ FUNC = GNC

9. GNC, OPS XX 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)
DPS SSR–4
SM REASSIGNMENT

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:
   L1 √ Appropriate AV BAY FAN − ON
   O6 √ Target GPC PWR − ON
       MODE − STBY (tb−RUN), RUN

3. √ Target GPC OUTPUT − NORM

4. If target GPC not in OPS 0:
   
   GNC 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
   DOWNLIST 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 (*)
   C3 UPLK − manually config for AOS/LOS
       If checkpoint previously done, CKPT RETRV ENA − ITEM 12 EXEC (*)

C2 7. Desired IDP/CRT MAJ FUNC − SM
    R11L 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:
   O6 Target SM GPC OUTPUT – TERM
   SM(GNC) 1 DPS UTILITY
   UL CNTL
   AUTO – ITEM 35 EXEC (*)
   C3 UPLK – ENA
   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

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)
DPS SSR–6
CONTINGENCY/VARIABLE S/W INITIATED MEM DUMP

NOTE
Perform AOS

1. If vehicle configured with tape–driven MMU: √ MCC to ensure OPS RCDR 1(2) configured for dump

2. **SM 62 PCMMU/PL COMM**
   If reqd, load TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

3. If PASS:
   a. On display assigned to GPC to be dumped:
      
      SM(GNC) 0 GPC MEMORY
      If GNC GPC to be dumped, √ DOWNLIST GPC – 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:
      √ Appropriate AV Bay Fan – ON
      √ Target GPC PWR – ON
      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: √ 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
      (128 If G1/G3, T12 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):

      | MP/OPS | GNC | SM | OPS 0 (PL9) |
      |--------|-----|----|-------------|
      | DUMP TIME | 2.2 | 5.7 | 9.7         |

      If GNC GPC or OPS 0 GPC was dumped:
      √ DOWNLIST GPC – ITEM 44 +X EXEC (lowest ID GNC GPC)
      If OPS 0/PL9 GPC was dumped:
      
      OPS 0 ENA – ITEM 49 EXEC (no *)
   e. Perform step 5

4. If BFS:
   a. MEMORY DUMP (setup):
      If partial dump required: √ 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)

5. **SM 62 PCMMU/PL COMM**
   If reqd, load post–dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
DPS SSR−7
GPC IPL MENU OPTION (PASS/BFS)

NOTE
√MCC for reapplication of GMEMs as reqd

1.  SM 1 DPS UTILITY
   IPL SOURCE SW MASK − ITEM 38 EXEC (no *)
   
C2    IDP/CRT 3(1,2) PWR − ON
C3    BFC CRT DISP − ON
       SEL − 3+1(1+2, 2+3) (Expect big ‘X’, POLL FAIL on MDU in DPS mode)

O6    IPL SOURCE − MMU 1(2)
       GPC MODE 1(2,3,4,5) − HALT (tb−bp)
       OUTPUT 1(2,3,4,5) − NORM (tb−bp)

4.  GPC PWR 1(2,3,4,5) − OFF, ON
    If BFS engaged:
    F7    FLT CNTLR PWR − ON
           BFS ENGAGE pb − push
    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:
    O6    IDP LOAD 3(1,2) − LOAD
           GPC MODE 1(2,3,4,5) − STBY (Tape−driven MMU: tb remains bp, expect CAM diagonal for 1 sec and
           Master Alarm) (Solid State MMU: tb remains bp, no CAM diagonal or Master Alarm expected)

7.  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)

8.  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 (GPCIPL 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)
   O6    b.  When tb − RUN or 2 min:
           GPC MODE 1(2,3,4,5) − RUN
           OUTPUT 1(2,3,4,5) − NORM (tb−gray)
   C2,R11  Desired IDP/CRT MAJ FUNC − PL
           BFC CRT DISP − OFF
           GPC/CRT IPL’d GPC/desired IDP EXEC
   O6    c.  If PL 0 GPC MEMORY does NOT appear in 2 min:
           GPC MODE 1(2,3,4,5) − HALT
           If first attempt:
   C3    BFS CRT DISP − ON
   O6    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
      √O1 PCMMU FORMAT = GPC
      X: SM 62 PCMMU/PL COMM
      PCMMU FMT SEL FXD = ITEM 1 EXEC (*)

   b. IPL SOURCE – OFF

   c. Load desired copy of BFS software from MM:
      ITEM 2(4) EXEC (*)

   d. If ‘BSL XX.XX.XXX.XXX LOADED’ does not appear within 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)

   e. If ‘BSL XX.XX.XXX.XXX LOADED’ appears (within 2 min),
      MSG RESET pb – push (repeat until ‘MSGS STILL IN LIST’ = 0)

   f. Expect ‘KSC XX.XX.XXX.XXX LOADED’
      If ‘KSC XX.XX.XXX.XXX LOADED SET MMU SEL SW TO OFF’ appears,
      continue with procedure and notify MCC when convenient
      MSG RESET pb – push (repeat until ‘MSGS STILL IN LIST’ = 0)

   g. √IDP/CRT MAJ FUNC – GNC
      If GNC 0 BFS MEMORY does not appear within 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)
      If second attempt:
      GPC PWR 1(2,3,4,5) – OFF

   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 000 PRO
      GNC, OPS 201 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
      Reconfig DAP and attitude per FLIGHT PLAN

   j. Select program PCMMU FORMAT:
      √O1 PCMMU FORMAT = GPC
      X: SM 62 PCMMU/PL COMM
      PCMMU FMT PGM – ITEM 2 EXEC
      Power off IDP/CRTs as reqd

   11. SM 1 DPS UTILITY
      IPL SOURCE SELECT SW MASK – ITEM 38 EXEC (*)

02/14/02
DPS SSR–8  
GPC IPL–PASS

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)

4. **GPC PWR 1(2,3,4,5)** – OFF,ON  
If BFS engaged:  
F7   
   FLT CNTLR PWR – ON  
   BFS ENGAGE pb – push

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 (Tape–driven MMU: tb–RUN within 2 min, expect CAM diagonal for 1 sec and Master Alarm) (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)  
   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:

- Fault GNC SYS SUMM 1 OVERRIDE
- Horiz SIT (1)
- Vert SIT (1-2)
- XXXXX MNVR YYYY S TRK/COAS CNTL
- XXXXXX TRAJ IMU ALIGN

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. √ CRT(2,3,4) PWR -- ON
   CRT(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 DEU 1(2,3,4) LOAD -- LOAD (repeat if reqd)
   √ DEU LOAD msg appears on CRT
   IF NO RESPONSE
   C2/R11L CRT(2,3,4) PWR -- OFF, then ON
   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 DEU 1(2,3,4) LOAD -- LOAD (repeat if reqd)
   √ DEU LOAD msg appears on CRT
   IF NO RESPONSE OR 'IPL INCOMPLETE' MSG APPEARS ON CRT
   C2/R11L CRT(2,3,4) PWR -- OFF, then ON
   DEU 1(2,3,4) LOAD -- LOAD (repeat if reqd)

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 CRT(2,3,4) PWR -- OFF, then ON
   DEU 1(2,3,4) LOAD -- LOAD (repeat if reqd)

5. When active display appears,
   C2/R11L CRT(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
### 6.1 AV BAY/CAIN AIR

- **6.1a** 'S66 CABIN FAN' – CABIN FAN ΔP
- **6.1b** 'S66 AV BAY 1(2,3) TEMP' – AV BAY TEMP
- **6.1c** 'S66 AV BAY 1(2,3) FAN' – AV BAY FAN ΔP
- **6.1d** 'S66 IMU FN SPD A(B,C)' 'S66 IMU FAN ΔP' – CABIN IMU

### 6.2 CABIN ATM

- **6.2a** (see Note A) – O2(N2) FLOW ↑
- **6.2b** (see Note A) – CABIN PRES ↑↓
- **6.2c** 'S66 CABIN PPO2 A(B)' – PPO2 ↑↓
- **6.2d** 'S66 CAB N2 REG P 1(2)' – N2 REG P ↑↓
- **6.2e** 'S66 CAB O2 REG P 1(2)' – O2 REG P ↑
- **6.2f** RESERVED not used
- **6.2g** 'S66 CAB N2 QTY 1(2)' – N2 QTY ↓
- **6.2h** RESERVED not used
- **6.2i** 'S66 CAB H2O N2 P 1(2)' – H2O TK N2 P ↓

### 6.3 RESERVED

### 6.4 FREON/H2O LOOP

- **6.4a** (see Note A) – EVAP OUT T ↑↓
- **6.4b** (see Note A) – FREON FLOW LOW
- **6.4c** RESERVED not used
- **6.4d** 'S88 FRN PL HX 1(2)' – FRN FLOW PROP VLV, PL HX FLOW ↓
- **6.4e** 'S88 FRN AFT CP 1(2)' – AFT COLDPLATE FLOW ↓
- **6.4f** 'S88 FREON QTY 1(2)' – ACCUM QTY ↓
- **6.4g** 'S88 EVAP Hi LD TEMP' – EVAP TEMP HI LOAD INBD (OUTBD) DUCT(NOZ) ↑↓
- **6.4h** 'S88 EVAP TOP TEMP' – EVAP TOPPING DUCT T FWD (AFT), L(R) ↑↓
- **6.4i** 'S88 EVAP TOP TEMP' – EVAP TOPPING L(R) NOZ ↑↓
- **6.4j** 'S88 EVAP FDLN T A(B)' – EVAP FDLN TEMP FWDMID, AFT, TOP HI LOAD, ACCUM) ↑↓
- **6.4k** RESERVED not used
- **6.4l** 'S88 H2O PUMP P 1(2)' – H2O PUMP P 1(2) ↑↓
- **6.4m** 'S88 H2O PUMP 1(2) ΔP' – H2O ACCUM QTY 1(2) ↑↓
- **6.4n** 'S88 H2O LOOP 1(2) QTY' – H2O ACCUM QTY 1(2) ↑↓
- **6.4o** 'S88 H2O LOOP 1(2) FLOW' – ICH FLOW 1(2) ↓
- **6.4p** 'S88 H2O LOOP 1(2) TEMP' – H2O ICH OUT T 1(2) ↓,
  CAB HX IN T 1(2) ↓,
PUMP OUT T 1(2) ↑↓

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**NOTE A**
The identified MAL represents a support procedure that is entered from other procedures or on MCC call
6.5  **SPLY H2O**

SUPPLY H2O SCHEMATIC .......................... 6–66
SUPPLY H2O STORAGE SCHEMATIC .................. 6–68
6.5a RESERVED ..................................... not used
6.5b RESERVED ..................................... not used
6.5c ‘S66 SPLY H2O TEMP’
   ‘S66 WASTE H2O TEMP’ – WASTE H2O PRESS ↑↓,
   SUPPLY(WASTE) H2O DMP
   LN T ↑↓, SUPPLY(WASTE)
   NOZ T A(B) ↑ .............................. 6–69
6.5d ‘S66 SPLY H2O PRES’ – H2O SPLY PRESS ↑ .................. 6–71

6.6  **EXT A/L**

6.7a EXT A/L H2O LN T ↑↓ .......................... 6–72
6.7b STRUC T ↑↓ .................................. 6–73

6.8  **CO2**

6.8a ‘S66 CO2 RL SYS MALF’ – CO2 CNTLR 1(2) ↓ .................. 6–74
6.8b ‘S66 CO2 RL SYS PCO2’
   ‘S66 CAB PPCO2’ – PPCO2 ↑ .................. 6–77

**ECLS SSR**

ECLS

SSR–1 RESERVED ................................. not used
SSR–2 FES CORE FLUSH PROCEDURE ............... 6–78
SSR–3 RECONFIG TO ALT PCS SYS (AUTO OPS) .... 6–80
SSR–4 H2O LOOP .................................. 6–83
SSR–5 FES RESTART .............................. 6–85
SSR–6 CABIN EQUIP PWRDN ....................... 6–86
SSR–7 FLASH EVAPORATOR CHECKOUT ............ 6–87
SSR–8 SMALL CABIN–LEAK ISOL ................... 6–89
SSR–9 RAD ISOL RECOVERY ....................... 6–91
SSR–10 H2O PUMP OPS VIA GPC ................. 6–92
SSR–11 FES FEEDLINE PURGE .................... 6–93
SSR–12 AV BAY FIRE RECOVERY/RECONFIG ...... 6–95
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**ECLS FRP**

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

‘S66 CAB HX OUT TEMP’ ‘S66 CAB ARLK PRESS’
‘S78 CABIN O2 CONC’ ‘177 EXT A/L PRESS’
‘SM1 SMOKE CAB L FD’ ‘177 A/L VEST DP’
‘SM1 SMOKE CAB R FD’ ‘177 AL H2O LCG P1(2)’
‘SM1 SMOKE CAB HX’ ‘177 AL H2O XFER P’
‘SM1 SMOKE BAY 1(2,3) A(B)’
‘S66 VAC VNT N2 TEMP’
6.1 AV BAY/ CABIN AIR

6.1a ‘S66 CABIN FAN’ – CABIN FAN ΔP .............................. 6–4
6.1a ‘SM1 CABIN FAN’ – CABIN FAN ΔP .............................. 6–4
6.1b ‘SM2 AV BAY TEMP’ – AV BAY TEMP .............................. 6–5
6.1c ‘SM2 AV BAY FAN’ – AV BAY FAN ΔP .............................. 6–6
6.1d ‘SM1 CABIN IMU’ – CABIN IMU .............................. 6–8

6.2 CABIN ATM

6.2c ‘SM1 CABIN PPO2’ – PPO2 ↑↓ ...................................... 6–21

6.4 FREON/H2O LOOP

6.4f ‘SM0 THRM FRN’ – ACCUM QTY ↓ .............................. 6–45
6.4g ‘SM0 THRM EVAP’ – EVAP TEMP HI LOAD INBD (OUTBD) DUCT(NOZ) ↑↓ .............................. 6–47
6.4h – EVAP TOPPING DUCT T FWD(AFT), L(R) ↑↓ .............................. 6–48
6.4i – EVAP TOPPING L(R) NOZ ↑↓ ....................................... 6–49
6.4j – EVAP FDLN TEMP FWD(MID,AFT, TOP,HI LOAD,ACCUM) ↑↓ .............................. 6–50

The following Fault Msgs have no corresponding MAL procedures in this book:
SM1 CABIN HX T
SM2 TEMP
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 overtemping avionics while MCC is evaluating failure

### Nominal Config:
- L4:K
  - cb AC1 0B CAB AIR S/C – cl
  - cb AC2 CAB FAN B (three) – cl
  - cb AC3 CAB FAN A (three) – cl
  - (L4:L)
  - cb AC1 0A CAB T CNTLR 1 – cl
  - cb AC2 0A CAB T CNTLR 2 – cl (L1)
  - CAB FAN A(B) – ON
  - CAB TEMP CNTLR – 1(2)
  - CAB TEMP – as reqd

If:
- CABIN FAN ΔP < 4.2 or > 6.8
  - (< 2.8 or > 4.88 if 10.2 ops)

### 6.1a CABIN FAN ΔP

1. Turn off Cabin Fan
   - SM SYS SUMM 1
   - SM 66 ENVIRONMENT
   - (L1) CAB FAN A(B) – OFF
   - (CRT) CAB FAN ΔP = 0.0 (L) ?

   **NO**

2. Turn on alternate Cabin Fan
   - (L1) CAB FAN B(A) – ON
   - (CRT) CAB FAN ΔP indicates:
     - 0.0 (L)
     - NORMAL
     - ‘↓’
     - ‘↑’ or ‘H’

3. CABIN FAN ΔP INST FAILURE

4. Turn on original Cabin Fan
   - (L1) CAB FAN A(B) – ON
   - ✓ CAB FAN B(A) – OFF
   - Monitor flow by feel

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
   - (CRT) CABIN FAN ΔP normal ?

   **NO**

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 filters
    - ✓ Perform FLIGHT DECK PORT, STBD AND MIDDECK FILTER CLEANING (IFM)
    - (CRT) CABIN FAN ΔP normal ?

    **NO**

11. CLOGGED LRU FILTER(S) CAUSED AIR FLOW BLOCKAGE

12. Turn on original Cabin Fan
    - (L1) CAB FAN A(B) – ON
    - CAB FAN B(A) – OFF

13. AIR DUCT BLOCKAGE OR SNSR SHIFTED HIGH DUE TO SLOPE CHANGE
ECLS

6.1b AV BAY TEMP

1. **SM SYS SUMM 2**
   - SM 66 ENVIRONMENT
   - Temps high and increasing in more than one bay?

2. **(CRT) AV BAY 1(2,3) TEMP decr?**
   - YES → 6.4p
   - NO → 6.1c

3. **Air cooling**
   - **L1**
     - AV BAY 1(2,3) FANS A,B (two) - ON
   - YES
   - NO → 5

4. **DEGRADED AIR COOLING OR TEMP XDCR FAILURE**
   - YES → 7
   - NO → 8

5. **H2O cooling**
   - **L1**
     - Switch H2O Loops
     - Wait 5 min
   - YES
   - NO → 6

6. **DEGRADED H2O LOOP**
   - YES → 9
   - NO → 10

7. **TEMP XDCR FAILURE**
   - YES
   - NO → 10

8. **Reconfig**
   - (L1)
     - Go to ECLS SSR-4
     - RECONFIG TO ALT H2O LOOP

9. **Go to ECLS SSR-4**
   - YES
   - NO → 10

10. **Reconfig**
    - (L1)
      - Reconfig AV BAY 1(2,3) FANS to original config
      - Reconfig H2O Loops to original config

11. **Reconfig**
    - (L1)
      - On MCC GO:
        - Reconfig AV BAY 1(2,3) FANS to original config

---

**Nominal Config:**
- **(L4:G)**
  - cb AC1 φA,φB,φC
  - AV BAY 1 FAN A (three) - cl
  - cb AC2 φA,φB,φC
  - AV BAY 1 FAN B (three) - cl
  - cb AC3 φA,φB,φC
  - AV BAY 3 FAN A (three) - cl
- **(L4:H)**
  - cb AC1 φA,φB,φC
  - AV BAY 3 FAN B (three) - cl
  - cb AC2 φA,φB,φC
  - AV BAY 2 FAN A (three) - cl
  - cb AC3 φA,φB,φC
  - AV BAY 2 FAN B (three) - cl

**H2O LOOP Nominal Config:**
- Refer to 6.4l

---

1. Temps can be read from meter on pnl O1
2. √ MCC to determine exact failure

---

12/14/99
1 If AV BAY 1(2,3) S/C cb is open, /C0112 MCC before attempting to reset cb

2 With loss of ∆P, 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

5 or > 4.3 (5.9 if 10.2 ops)

6 Switch to alternate fan in aff BAY

7 AV BAY FAN 1(2,3) ∆P INST FAILURE

8 Turn on both fans in aff AV BAY

9 (CRT) AV BAY FAN ∆P normal?

10 AV BAY FAN FAILURE OR ALT AV BAY FAN CHECK VALVE FAILED OPEN

11 If Upgraded AV BAY FAN:

6.1b Nominal Config:

(L4:H)

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 φ6 AV BAY 2 S/C – cl
cb AC2 φ6 AV BAY 3 S/C – cl
cb AC3 φ6 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
MCC about checking AV BAY duct integrity after completing next step.

MCC about performing pwrdn of affected bay before performing AV BAY filter cleaning.

---

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)
(CRT) AV BAY 1(2,3) FAN ΔP within limits ?

15 CLOGGED DEBRIS TRAP CAUSED AIR BLOCKAGE

16 AIR DUCT BLOCKAGE

17 Safe avionics
- Go to DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP–7 (DPS)
If SM 2 not available, use BFS SYS SUMM 1 to monitor IMU FAN $\Delta P$.

Monitor Speed Snsr '↓' for fan failure if IMU $\Delta P$ is lost.

Nominal Config:
- (O14:B)
  - cb MNA OI H2O BYP LOOP 1 SNSR – cl (L4:J)
  - cb AC1 IMU FAN A (three) – cl (L4:J)
  - cb AC2 IMU FAN B (three) – cl (L4:J)
  - cb AC3 IMU FAN C (three) – cl (L4:J)
  - cb AC3 φB SIG CONDR IMU FAN – cl (L1)
  - IMU FAN B(C,A) – ON

If IMU Fans off, do not operate IMUs for more than 30 min; otherwise, IMUs may be damaged.
Monitor Speed Snsr '↓' for fan failure if IMU ∆P 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

Turn on alternate fan

(L1)
- IMU FAN C(A,B) – ON

(CRT) IMU FAN ∆P indicates:

0.0 'L'

Normal

'↑' or 'H'

IMU FAN C(A,B) CHECK VLV FAILED OPEN

IMU FAN ∆P INST FAILURE

IMU FAN B(C,A) – ON

IMU FAN C(A,B) – OFF

/Inlet screen for blockage

- Perform MIDDECK (OVERHEAD) FILTER CLEANING (IFM) for IMU filter only

(CRT) IMU FAN ∆P normal?

YES

CLOGGED DEBRIS TRAPS CAUSED AIR BLOCKAGE

IMU FAN C(A,B) – ON

IMU FAN B(C,A) – OFF

NO

AIR DUCT BLOCKAGE

Restore cooling

- Go to CONTINGENCY COOLING – IMU (IFM)

Turn on original fan

(L1)
- IMU FAN B(C,A) – ON
- IMU FAN C(A,B) – OFF

0.0 'L'

IMU FAN ∆P indicates:

'↓'

Normal

'↑' or 'H'

INLET SCREEN FOR BLOCKAGE

CLOGGED DEBRIS TRAPS CAUSED AIR BLOCKAGE

NO

AIR DUCT BLOCKAGE

Restore cooling

- Go to CONTINGENCY COOLING – IMU (IFM)

Turn on original fan

(L1)
- IMU FAN B(C,A) – ON
- IMU FAN C(A,B) – OFF

0.0 'L'

IMU FAN ∆P indicates:

'↓'

Normal

'↑' or 'H'

INLET SCREEN FOR BLOCKAGE

CLOGGED DEBRIS TRAPS CAUSED AIR BLOCKAGE

NO

AIR DUCT BLOCKAGE

Restore cooling

- Go to CONTINGENCY COOLING – IMU (IFM)
Monitor Speed Snsr '↓' for fan failure if IMU ∆P is lost

Fan currently selected is the only operational fan available

'⇒' MCC for proper IMU config and ops

If (pnl L4) cb AC3 φB SIG CONDR IMU FAN – op, '⇒' MCC before attempting to reset

Second 'S66 CABIN IMU' msg will be generated. This is expected as Speed Snsr S/C failure will affect each IMU Fan
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
This procedure should only be entered directly for CAB P ↑

2 Cabin Press Relief vlv crack at 15.5 psid. Full flow at 16.0 psid

3 Use number in parenthesis for 10.2 psia cabin ops

4 MCC to determine exact failure. Suspect snsr yielding alarm

5Unless failure is linear shift of Xdcr reading, loss of cabin pressure Xdcr causes loss of BFS BU dP/dT software computation

6 This step is accomplished after SM 2 becomes available

---

Nominal Config: (ORBIT)
Refer to 6.2a

---

1 This procedure should only be entered directly for CAB P ↑

2 Cabin Press Relief vlv crack at 15.5 psid. Full flow at 16.0 psid

3 Use number in parenthesis for 10.2 psia cabin ops

4 MCC to determine exact failure. Suspect snsr yielding alarm

5Unless failure is linear shift of Xdcr reading, loss of cabin pressure Xdcr causes loss of BFS BU dP/dT software computation

6 This step is accomplished after SM 2 becomes available
Cabin Press Relief vlv s crack at 15.5 psid. Full flow at 16.0 psid

Use number in parenthesis for 10.2 psia cabin ops

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

If N2 needed, opening N2 SYS 1,2 REG INLET could feed possible leak into cabin

Procedure should be expedited to prevent exceeding 25% O2 for 14.7 psi ops or 28.5% for 10.2 psi ops

CAUTION
6–17
MAL/ALL/GEN F

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
(L2)
- O2 XOVR SYS 1.2 (two) – CL

(CRT) CABIN SYS and/or PPO2 still incr?

43 Isolate LEH Manifold

(AW82B)
- EMU 1.2 OXYGEN (two) – CL

44 (MIDDECK FLR)
- EMU O2 ISOL VLV – CL

45 (C5)
- DIRECT O2 vlv – CL
(C7)
- LEH O2 SPLY 1.2 vlv (two) – CL
(L2)
- O2 XOVR SYS 1 – OP

(CRT) CABIN P and/or PPO2 incr?

46 LEAK IN O2 LEH/EMU MANIFOLD LINES

48 (L2)
- O2 SYS 2(1) SPLY – CL (tb–CL)

(CRT) CABIN P and/or PPO2 still incr?

49 O2 SYS 1(2) SPLY LINE LEAK

50 (L2)
- O2 SYS 1(2) SPLY – CL (tb–CL)
- O2 SYS 2(1) SPLY – CL (tb–CL)
- O2 XOVR SYS 1(2) – OP

51 Reduce Cabin P

GO TO
69

If 10.2 psi ops:
- MCC for P&I changes to 10.2 psi maintenance and repress procedures

69

52 O2 SYS 2(1) SPLY LINE LEAK

53 (L2)
- O2 XOVR SYS 1(2) – OP

54

55

56

57

58

59

07/22/03

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 Maintaining VAC VLV – CL to EOM may cause odor buildup due to inability to vent wet trash overboard

13 EMU drain is lost

14 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

54 Determine which previous steps isolated leak

55 LEAKING POSITIVE PRESS RELIEF VLV

56 Reenable NON–LEAKING VLV ONLY with following step

57 Did verifying CABIN VENT vlvs stop leak ?

58 LEAKING CABIN VENT VLVS AND/OR VLVS NOT IN PROPER CONFIG

59 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

60 Determine where leak is in vacuum vent line

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

61 LEAK IN VACUUM VENT LINE UPSTREAM OF WCS OR EDO WCS VAC VLV

62 WCS or EDO WCS:

WCS

EDO WCS

63 "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 ?

64 Continue to EOM

65 LEAK IN EMU DRAIN LINE OVERBOARD

66 Disconnect EMU drain QD

(WCS)

• Remove kickplate

• Locate EMU drain hose (left center of QD row)

• Disconnect QD

• Reinstall hose block, filter, urinal hose

67 LEAK IN VACUUM VENT LINE DOWNSTREAM OF WCS OR EDO WCS VAC VLV, UPSTREAM OF VAC VENT ISOL VLV

68 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

(WCS/EDO WCS)

• VAC VLV – OP

69 LEAKING VACUUM VENT LINE

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

70 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

71 LEAKING VACUUM VENT LINE

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

72 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

(WCS/EDO WCS)

• VAC VLV – OP

73 LEAKING VACUUM VENT LINE

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

74 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

(WCS/EDO WCS)

• VAC VLV – OP

75 LEAKING VACUUM VENT LINE

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

76 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

(WCS/EDO WCS)

• VAC VLV – OP

77 LEAKING VACUUM VENT LINE

(WCS/EDO WCS)

• VAC VLV – CL

• √MCC for dP/dT

GND reported dP/dT = .000 ?

78 Reconfig

(L2)

• CAB RELIEF A,B (two) – ENA (tb–ENA)

If 14.7 psi ops:

• √14.7 CAB REG INLET SYS 1(2) – OP

(WCS/EDO WCS)

• VAC VLV – OP
Possible loss of O2 Supply to EMUs or O2 transfer to ISS
**ECLS 6.2b (Cont)**

12. Maintaining VAC VLV – CL to EOM may cause odor buildup due to inability to vent wet trash overboard.

16. 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.
If prior to performing on-orbit PCS config, low PPO2 could be caused by PCS 14.7. 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.

1. Use number in parenthesis for 10.2 psia cabin ops.

2. 02/N2 CNTLR VLV flows N2 in OP position, and O2 in CL position.

---

CAUTION

- Monitor lowest reading of PPO2 SNSR A/B. If either PPO2 A or B < 2.50, don QDM.

---

1. 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. 02/N2 CNTLR VLV flows N2 in OP position, and O2 in CL position.
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. \(\checkmark\) MCC for further troubleshooting of that system

5 Either Cabin P is within no flow region on cabin regulator or lost AUTO function on O2/N2 CNTL VLV. \(\checkmark\) MCC for further troubleshooting of that system

---

**ECLS 6.2c (Cont)**

17 SM2 available? 

18 SM 66 ENVIRONMENT 

19 Determine if cntl vlv failed 

   (L2) O2/N2 CNTLR VLV SYS 1(2) – CL

   (CRT) O2/N2 CNTL VLV 1(2) – CL

20 PPO2 CNTL (1(2) FAILURE

21 SM SYS SUMM 1

22 O2/N2 CNTL VLV SYS 1(2) FAILURE

23 Use same PCS with reverse PPO2 Cntl

24 Determine if cntl vlv failed 

   (L2) O2/N2 CNTLR VLV SYS 1(2) – CL

   (CRT) O2 FLOW SYS 1(2) > 0.0 ?

25 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

26 (CRT) N2 FLOW SYS 1(2) > 0.0 ?

27 O2/N2 CNTL VLV SYS 1(2) FAILURE

28 FAILURE IS INDETERMINATE AT THIS TIME

29 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

30 \(\checkmark\) Auto function

   (L2) PPO2 SNSR/VELV – REV

   O2/N2 CNTLR VLV SYS 1(2) – AUTO

31 PPO2 CNTL (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

---

12/14/99 6–22 MAL/ALL/GEN F
12/14/95 6–23 MAL/ALL/GEN F

ECLS 6.2c (Cont)

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
snr 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
SNRS/VLV.

39 SM2
available?

39 SM2
available?

CAUTION

(CRT)
- Monitor lowest
reading of PPO2
SNRS A(B). If
either PPO2 A or
B < 2.50, don
QDM

40 SM 66
ENVIRONMENT

41 PPO2 B(A)
SNRS FAILED
STATIC (WITHIN
LIMITS)

CAUTION

- Monitor good
PPO2 Snrs A(B),
C. If PPO2 drops
below 2.50 psi,
don QDM

42 PPO2 A(B)
SNRS FAILED
HIGH/LOW (OUT
OF LIMITS)

43 If failed snsr
controls PPO2:
(L2)
- PPO2
SNRS/ VLVS –
REV

44 PROBABLE
PPO2 SNRS A(B)
FAILURE

45 Yes

45 MCC

46 Go to ECLS
COMPUTATION
INHIBIT, ECLS
SSR 14, Table A

47 SM SYS SUMM 1

48 Determine if
cntl vlv failed

48 Determine if
cntl vlv failed

(CRT) N2 FLOW
SYS 1(2) > 0.0 ?

49 O2/N2
CNTLR VLVS SYS
1(2) FAILURE

50 Go to
RECONFIG TO ALT
PCS SYS, ECLS
SSR 13

51 (CRT)
O2 FLOW SYS 1(2)
> 0.0 ?

52 O2/N2
CNTLR VLVS SYS
1(2) FAILURE OR
N2 SYS 1(2)
FAILURE

53 (CRT)
CABIN PRESS
> 14.5 psi

54 14.7 psi
CABIN REG 1(2)
FAILURE

55 FAILURE IS
INDETERMINATE
AT THIS TIME

34

56 Go to
RECONFIG TO ALT
PCS SYS, ECLS
SSR 13

57 Only MCC can
determine exact
failure. Suspect snsr
yielding alarm. MCC
will determine
whether to go to
REVERSE on PPO2
SNRS/ VLVS.
ECLS

6.2d N2 REG P ↑↓

1 If PL N2 line in use, √ MCC for further isolation

Nominal Config:
(ORBIT)
Refer to 6.2a

N2 REG P 1(2)
> 260 psia
< 150 psia

SM ALERT

S66 CAB N2 REG P 1(2)

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) ?

N2 REG P 1(2) XDCR FAILURE

N2 REG P 1(2) (MO10W)
• N2 XOVER vlv – CL

N2 XOVER vlv – CL

N2 SYS 1(2) REG INLET – CL (lb–CL)
• O2/N2 CNTLR VLV SYS 1(2) – CL

N2 SYS 1(2) REG INLET – CL (lb–CL)
• H2O TK N2 REG INLET SYS 1 (SYS 2) vlv – CL
• PL N2 SYS 1 (SYS 2) vlv – CL

N2 XOVER vlv – CL

N2 SYS 1(2) REG INLET – CL (lb–CL)
• O2/N2 CNTLR VLV SYS 1(2) – CL

N2 XOVER vlv – CL

N2 LINE LEAK

N2 LINE LEAK

10.2 psi ops ?

Did anomaly occur on active PCS ?

Did anomaly occur on active PCS ?

remain on current PCS

• √ MCC regarding mid-flight PCS 1(2) config

Remain in current PCS config

• √ MCC for P&I changes to repress procedure

12 Remain in current PCS config

10 Go to RECONFIG TO ALT PCS SYS, ECLS SSR–3

8 Did anomaly occur on PCS SYS 1 ?

No

Yes

No

Yes

8

9

12

12

11

10

8
6.2e O2 REG P ↑

1. Bleed down O2 pressure line
   - O2/N2 CNTLR VLV SYS 1(2) – CL
   - 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:
   - LEH O2 8 vlv – CL

   O2 REG P 1(2) – 15.0 psi?

   NO

   2. O2 REG P 1(2) XDCR FAILURE

   YES

   3. O2 REG 1(2) SHIFTED HIGH

   NO

   4. If bleed orifice installed:
      - LEH O2 8 vlv – OP

   5. Remain in current PCS config
      - MCC for P&I changes to repress procedure

   6. Did anomaly occur on active PCS?

   YES

   7. Go to RECONFIG TO ALT PCS SYS, ECLS SSR–3

   NO

   8. Remain on current PCS
      - MCC regarding mid-flight PCS 1(2) config

Nominal Config:
(ORBIT)
Refer to 6.2a

1. Cabin press must drop low enough to open 14.7 psia CABIN REG and bleed O2 Line

2. High O2 REG P could possibly be caused by spec leakage through regulator

3. For 10.2 psi ops, O2 will be supplied as reqd, via the direct O2 vlv

11/14/99
ECLS

6.2g N2 QTY ↓

18
1

SM
ALERT

S66 CAB N2
QTY 1(2)
4
N2 QTY SYS 1(2)
< 100 (two tk sys)
< 150 (three tk sys)
< 200 (four tk sys)

Nominal Config:
(ORBIT)
Refer to 6.2a

2

1 N2 QTY low in NO 2 PRESS OR
both sys ?
TEMP/XDCR
USED IN QTY
YES
COMP FAILED OR
SHIFTED
4

3 LEAK IN
COMMON N2 TK
MANF

(ML86B:D)
• cb MNA,MNB
MMU GN2 SPLY
ISOL VLV A,B
(two) – cl
(R13L)
• MMU GN2 SPLY
ISOL VLV A,B
(two) – CL
(tb–CL)

5

Reconfig for
manual atmosphere
management
(L2)
• N2 SYS 1
SPLY – CL
(tb–CL)
NO

7

6

LEAK IN
MMU GN2 SPLY
LINE

•

YES

15
Attempt LK isol

9 Reconfig
non–leaking sys

(ML86B:D)
• cb MNA,MNB
MMU GN2 SPLY
ISOL VLV A,B
(two) – op

3 MCC. If cabin
press decreases
because of N2 TK
isolation, cabin
repress may be
attempted. Isolate
tks after each
repress attempt

Check MMU/
FSS QDs for
possible leakage,
then open SPLY
ISOL vlv one at a
time to see if leak
isolated

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

• MCC for P&I
changes to
repress
procedure

2
11

YES 10

UNISOLABLE
SYS 1 LEAK

Reactivate

PCS

NO

12 N2 QTY 2
decreasing ?

2 Flight length will
depend on remaining
quantity

(L2)
• N2 SYS 1
SPLY – OP
(tb–OP)

(L2)
• N2 SYS 1
SPLY – CL
(tb–CL)
• N2 SYS 2 REG
INLET – CL
(tb–CL)
N2 QTY 1
decreasing ?

1 MCC to
determine exact
failure

4

N2 QTY still
decreasing ?

8

3

(L2)
• N2 SYS 2 REG
INLET – OP
(tb–OP)

NO 13

LEAK IN N2
SYS 2 SPLY LINE

YES

14

Attempt LK isol

15

(L2)
• N2 SYS 2 REG
INLET – OP
(tb–OP)
• N2 SYS 1 REG
INLET – CL
(tb–CL)
N2 QTY 2
decreasing ?

10.2 psi ops ?
YES

9

NO

16 LEAK IN N2
SYS 1 SPLY LINE

YES

18

N2 QTY 2 still
decreasing ?

•
3
YES 19

UNISOLABLE
SYS 2 LEAK

Go to
RECONFIG TO
ALT PCS SYS,
ECLS SSR–3

20 Reconfig
non–leaking sys
(L2)
• N2 SYS 1 REG
INLET – OP
(tb–OP)

NO

3

12/14/99

17 Reconfig
non–leaking sys
(L2)
• N2 SYS 1
SPLY – OP
(tb–OP)

Attempt LK isol

(L2)
• N2 SYS 1
SPLY – OP
(tb–OP)
• N2 SYS 2
SPLY – CL
(tb–CL)

NO

6–26

MAL/ALL/GEN F


Nominal Config:  Refer to 6.2a

6.2i H2O TK N2 P

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

6.2a

1. ALERT

2. SM ALERT

3. Nominal Config: (ORBIT) Refer to 6.2a

4. H2O TK N2 P < 13.0 psig

5. H2O TK N2 REG 1(2) XDCR FAILURE

6. (L1) PRESS – CL

7. H2O ALT PRESS – CL

8. /C0112 H2O TK N2 P1 incr above 15 psig (CRT) H2O TK N2 P1(2) incr above 15 psig

9. /C0112 H2O TK N2 P2 incr above 15 psig (CRT) H2O TK N2 P1(2) incr above 15 psig

10. H2O TK N2 REG INLET SYS 1,2 vlv – CL

11. SYSTEM CONFIG CAUSED LOW P (ML26C)

12. H2O TK N2 ASSOCIATED SYS FAILURE

13. 2 H2O TK N2 Ps agree?

14. Restart FES

15. Go to FES RESTART, ECLS SSR–5

16. N2 LEAK

17. Go to FES RESTART, ECLS

18. Troubleshoot Sys 1 N2 Reg

19. Troubleshoot Sys 2 N2 Reg

20. Troubleshoot Sys 2 N2 Reg
Repurization 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 vlv are not closed prior to working block steps.

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.

11/08/01
1. Failed open ck vlvs downstream of each HUM SEP could allow WST TK to flood HUM SEP

2. \( \sqrt{ } \) MCC to determine exact failure

3. MCC has only indication of relative humidity

---

ECLS

S66 HUMID SEP A(B)

HUMIDITY SEP A(B) underspeed

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

---

6.2j HUMID SEP ↓

1. SM 66 ENVIRONMENT

HUMID SEP B(A) "↓"?

2. (CRT) Does HUMID SEP A and/or B have "↓"?

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT

4. (CRT) WST Qty 1 decreasing?

5. \( \sqrt{ } \) sw position

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 "↓"?

10. HUMIDITY SEP B(A) FAILED DUE TO ELECTRICAL FAILURE

11. (L1) Is HUM SEP with "↓" in ON position?

12. (CRT) Does HUMID SEP A(B) have "↓" and HUMID SEP B(A) have "↑"?

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

(CRT) HUMIDITY SEP A(B) "↑"?

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

(CRT) HUMIDITY SEP B(A) OR SPEED SNSR B(A) FAILURE

17. HUMIDITY SEP B(A) OR SPEED SNSR B(A) FAILURE

18. HUMIDITY SEP B(A) ON DISCRETE IS FAILED ON

19. HUMIDITY SEP SNSR SIG CONDITIONER FAILED

20. • Monitor for visible condensation in cabin as indication of SEP failure

---

12/14/99 6–29 MAL/ALL/GEN F
EVAPORATORS
H2O LOOPS
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 ΦΦ FREON SIG CONDR (two) – cl
cb AC2.3 ΦΦ FREON FLOW PROP 1,2 (two) – cl
(L4:N)
cb AC2 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 MNB FREON RAD CNTL 1,2 (two) – cl
(O17:C)
SIG CONDR
FREON A – AC2
B – AC3
(L1)
FREON PUMP LOOP 1,2 (two) – cl
RAD CNTLR OUT TEMP – NORM
LOOP 1,2 (two) – cl
AUTO A(B)
BYP VLV
MAN SEL 1,2
(two) – cl
MODE 1,2 (two) – cl
NH3 CNTLR A,B - OFF
FLASH EVAP CNTLR
PRI A(B) – ON
B(A) – OFF
SEC – A(B) SPLY
OFF
(Cont in notes column)
ECLS 6.4a (Cont)

5 6

8 (CRT) FREON LOOP 1(2) ACCUM QTY:
"L" (~ -11) or > 12 % ≤ 12%

9 INADVERTENT RAD ISOL DUE TO INSTRUMENTATION OR LOGIC FAILURE

10 FREON LOOP 1(2) LEAK

11 Reestablish radiator flow
• Go to RADIATOR ISOL RECOVERY, ECLS SSR−9

12 SM OPS 2 available ?

13 Both FREON LOOPS RAD OUT T > 65 ?

14 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 T ≤ 12 degF, decr to < 60 degF, 2 min after MODE 1 – AUTO ? NO YES

15 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 ?

17 FREON LOOP 1(2) RAD CNTLR AUTO A(B) CONTROLLING HIGH

16 FREON LOOP 1(2) RAD FLOW CNTL VLV FAILED IN MIN FLOW POSITION

18 FREON LOOP 1 RAD CNTLR AUTO A(B) FAILURE

3 Loss of RFCA – Next PLS depending on H2O quantities
ECLS 6.4a (Cont)

16 29 42

19 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 2(1) – ICH (tb–ICH)
- Perform FES RESTART, ECLS SSR–5
- Go to LOSS OF 1 FREON LOOP (ORB PKT, PWRDN)

28 Switch to alternate CTRL in bypassed loop
(L1)
- RAD BYP VLV MODE 1(2) – AUTO
- RAD CTRL LOOP 1(2) – AUTO B(A)(wait 90 sec, monitor tb)

20 Switch to alternate RAD CTRL in LOOP 2
(L1)
- RAD BYP VLV MODE 2 – MAN
- RAD CTRL LOOP 2 – AUTO B (AUTO A)
- After 10 sec, RAD BYP VLV MODE 2 – AUTO

21 FES in use?
YES

22 TRANSIENT RAD OUT T > 68 degF
CAUSED BY ATTITUDE OR TEMPORARY HEAT LOAD

23 TRANSIENT RAD OUT T > 65 degF
CAUSED BY ATTITUDE OR TEMPORARY HEAT LOAD

24 Go to FES RESTART, ECLS SSR–5

25 FREON LOOP 2 RAD CTRL A(B) FAILURE

26 POOR HEAT REJECTION ATTITUDE OR RAD 1 OR 2 FLOW CNTL VLV FAILED IN MIN FLOW POSITION

27 MCC before deploying radiators (ORB OPS)
- If Evap Out T ≤ 68 degF:
  Perform FES RESTART, ECLS SSR–5 >>
- If Evap Out T > 68 degF:
  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)

29 RAD BYP VLV FAILED IN BYP

30 Bypass logic A in bypassed LOOP 1(2)
(L1)
- RAD BYP VLV MODE 1(2) – AUTO
- RAD CTRL LOOP 1(2) – OFF
(L4;P)
- cb AC2(AC3) φ6 RAD CTRL 1A(2A) – op
(L1)
- RAD CTRL LOOP 1(2) – AUTO B
- Wait 90 sec

31 FREON LOOP 1(2) RAD CTRL A(B) FAILURE

32 FREON LOOP 1(2) RAD CTRL A BYPASS LOGIC FAILED

33 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 30

34

35

36
1. If OPS 2 not available, use EVAP OUT T
2. Loss of RFCA – Next PLS depending on H2O quantities
3. If RAD OUT T > 65 degF not explainable by attitude, troubleshoot radiators. Go to block 15
4. Expect same transient on next daylight pass if same attitude
5. SEC CNTLR controls at 62 degF.
6. If EVAP OUT T < 62 degF, SEC CNTLR operation cannot be verified. Further troubleshooting reqd to determine complete failure
7. If EVAP OUT T > 60 degF:
   - Use (ORB PKT, PRIOR PWRDN) (lettered 11−1) to maintain EVAP OUT TEMP < 65 degF

8. Average FREON RAD OUT T > 68 degF?
9. Restart FES (L1)
   - FLASH EVAP CNTLR
     - PRI A(B) – OFF
     - B(A) – ON
10. FREON LOOP EVAP OUT T 1,2 ≤39 degF after 30 sec?
11. Switch to alternate FES CNTLR (L1)
12. Switch to FES SEC CNTLR (L1)
13. Switch to FES SEC CNTLR (L1)
14. Switch to FES SEC CNTLR (L1)
15. Switch to FES SEC CNTLR (L1)
16. TOPPING EVAP FAILURE
17. FLASH EVAP CNTLR SEC – OFF
18. FLOW CONTROL VLV FAILED IN MAX FLOW POSITION CAUSING RADS TO IMMEDIATELY BYPASS
19. Deploy Radiators
   - Perform RAD STOW/DEPLOY (ORB OPS, ECLS)
   - If EVAP OUT T > 60 degF:
     - FREON FLOW PROP VLV 1,2 (two) – ICH (tb−ICH)
     - Active H2O LOOP 1(2) BYP MAN – DECR (hold 35 sec)
   - MCC
   - Use (ORB PKT, PRIOR PWRDN) (lettered 11−1) to maintain EVAP OUT TEMP < 65 degF
ECLS 6.4a (Cont)

From ORB PKT, EVAP OUT T LOW

48
• Maintain high heat load (RADS HIGH) until NH3 depleted (NH3 depletion indicated by EVAP OUT T > 55 degF for 2 min)

49
• Maintain high heat load (RADs high or RAD bypassed) until flow rates become erratic in leaking loop

50
Return to initial config

51
Return to initial config

(L1)
If FREON LOOP 1(2) deactivated:
• FREON PUMP LOOP 1(2) – B

(L2)
• O2 SYS 1,2 SPLY (two) – OP
  Wait 3 min (for cold Freon slug to pass through Freon-to-Water Interchanger)

(L1)
• H2O PUMP LOOP 1 – GPC
• RAD CNTLR OUT TEMP – NORM

PL Loop present ?

52
Return to initial config

(L1)
• FLOW PROP VLV LOOP 1,2 (two) – ICH (tb–ICH)

53
PL cooling reqd ?

54
• Deactivate PL Loop

55
Return to initial Flow Prop Vlv config

(L1)
• FLOW PROP VLV LOOP 1/2 – PL HX (tb–PL)

56
• If FES reqd, Go to FES RESTART, ECLS SSR-5

• Leaking FREON PUMP LOOP 1(2) – OFF
• Good FREON Pump Loop 2(1) – B

• O2 SYS 2(1) SPLY – OP (tb–OP)
• Stow radiator in aff loop
• Perform RAD STOW/DEPLOY (ORB OPS)

• FLOW PROP VLV LOOP 2(1) – ICH (tb–ICH)

• Inhibit FREON LOOP 1(2) FREON FLOW parameter 106(116)

• Perform LOSS OF 1 FREON LOOP (ORB PKT, PWRDN)

• Leaking FREON PUMP LOOP 1(2) – OFF if not SM OPS 2
• O2 SYS 1(2) SPLY – CL (tb–CL)

• O2 SYS 2(1) SPLY – OP (tb–OP)

• RAD CNTLR OUT TEMP – NORM

• Maintain high heat load (RADs HIGH or RAD bypassed) until flow rates become erratic in leaking loop

• Maintain high heat load (RADs high or RAD bypassed) until flow rates become erratic in leaking loop

• Maintain high heat load (RADs high or RAD bypassed) until flow rates become erratic in leaking loop
**ECLS 6.4b FREON FLOW LOW**

1. SM 88 APU/ENVIRO THERM
   - Note Freon flow rate
   FREON FLOW ‘↓’ or ‘L’?

   - NO → 33
   - YES → 7

2. SIG CONDR AC3 PWR FAILURE

3. (CRT) if FREON ISOL 1(2) = ISOL
   - Go to RAD ISOL RECOVERY, ECLS SSR-9

4. (L1) FLOW PROP VLV tlb – PL?
   - NO → 11

5. Is FREON FLOW > 1300 ?
   - YES → 16
   - NO → 7

6. SIG CONDR AC2 PWR FAILURE

7. ✶ SIG CONDR B
   (CRT) FREON LOOP 1 FREON FLOW ‘L’ and ACCUM QTY ‘L’?
   - NO → 11

8. ✶ φ FREON SIG CONDR – op
   (L4:N) cb AC3

9. (O17) ✶ SIG CONDR FREON B – AC2
   - Any indications remain?
   - NO → 2
   - YES → 11

10. SIG CONDR OR SW SHORT

11. ✶ SIG CONDR FAILURE

12. ✶ SIG CONDR A
   (CRT) FREON LOOP 2 FREON FLOW ‘L’ and ACCUM QTY ‘L’?
   - NO → 11

13. ✶ φ FREON SIG CONDR – op
   (L4:N) cb AC2

14. (O17) ✶ SIG CONDR FREON A – AC3
   - Any indications remain?
   - NO → 6
   - YES → 17

15. OPS 2 available?
   - YES → 16
   - NO → 18

16. SIG CONDR OR SW SHORT

17. ✶ SIG CONDR FAILURE

18. ✶ SIG CONDR FAILURE

Note: Freon flow rate SM 88 APU/ENVIRO THERM

From ORB PKT, FREON FLOW LOW

FREON FLOW meter on pnl O1 may be used as alternate

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

15

18 (CRT) Aff Freon Loop ACCUM QTY ≤ 3% ?

3 4

22 N2 LEAK RESULTING IN PUMP CAVITATION AND LOOP LOSS

23 Radiators in bypass ?

24 (L1)
- Aff RAD BYP VLV MODE 1(2) – AUTO
- Cycle RAD CNTLR LOOP 1(2) – OFF, AUTO A (wait 90 sec)
- RAD BYP VLV tb (two) – RAD

25 (L1)
- RAD BYP VLV MODE 1(2) – MAN
- RAD BYP VLV MAN SEL 1(2) – BYP (tb–BYP, ∼ 3 sec)

27 (CRT) Freon FLOW return to normal ?

28 (L1)
- RAD BYP VLV MODE 1(2) – MAN
- RAD BYP VLV MAN SEL 1(2) – BYP (tb–BYP, ∼ 3 sec)
- RAD CNTLR LOOP 1(2) – OFF

29 BOTH PUMPS DEGRADED OR LOOP BLOCKAGE

30 BLOCKAGE IN RADIATOR

31 (L1)
- Aff RAD BYP VLV MODE 1(2) – AUTO
- Cycle RAD CNTLR LOOP 1(2) – OFF, AUTO A (wait 90 sec)
- RAD BYP VLV tb (two) – RAD

32 BOTH PUMPS DEGRADED OR LOOP BLOCKAGE

33 (CRT) Freon LOOP 1(2) ACCUM QTY ≥ 70% ?

34 N2 LEAK IN ACCUM RESULTING IN OCCASIONAL PUMP CAVITATION

35 CW FAILURE OR TRANSIENT FAILURE

36 MCC

26 BLOCKAGE IN BYPASS LEG

29 BOTH PUMPS DEGRADED OR LOOP BLOCKAGE

32 BOTH PUMPS DEGRADED OR LOOP BLOCKAGE

41
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

**SM 60 SM TABLE MAINT**

- If LOOP 1:
  - ITEM 1 +0 6 3 1 1 0 0 EXEC
- If LOOP 2:
  - ITEM 1 +0 6 3 1 3 0 0 EXEC

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

**SELECTED**

- SM ALERT IN LIMIT SET 1 WHEN FLOW PROP VLV IS IN PL

**C/W FAILURE OR TRANSIENT FAILURE**

- Reset SM ALERT limits on aff loop

**SM 60 SM TABLE MAINT**

- Deactivate pump in aff loop:
  - FRESH 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)

- If FREON FLOW < 750 lb/hr (OSL) or MCC call

**Deactivate pump in aff loop:**
- FRESH 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)**
ECLS 6.4b (Cont)

15

42 (CRT)
- Note PL HX
FLOW rate in aff
loop

Radiator in
Bypass ?

YES

43 (CRT) PL HX
FLOW 1(2) < 220
lb/hr if (L1) FLOW
PROP VLV LOOP
1(2) – ICH or PL
HX FLOW 1(2)
< 950 lb/hr if (L1)
FLOW PROP VLV
LOOP 1(2) – PL
HX ?

NO

44 (CRT) PL HX
FLOW 1(2) > 350
lb/hr if (L1) FLOW
PROP VLV LOOP
1(2) – ICH or PL
HX FLOW 1(2)
> 1300 (OSH) lb/hr
if (L1) FLOW PROP
VVL LOOP 1(2) – PL
HX ?

NO

45 XDCR SHIFT
(ARS ICH LEG)

YES

46 (CRT) PL HX
FLOW 1(2) < 200
lb/hr if (L1) FLOW
PROP VLV LOOP
1(2) – ICH or PL
HX FLOW 1(2)
< 900 lb/hr if (L1)
FLOW PROP VLV
LOOP 1(2) – PL
HX ?

NO

47 (CRT) PL HX
FLOW 1(2) > 300
lb/hr if (L1) FLOW
PROP VLV LOOP
1(2) – ICH or PL
HX FLOW 1(2)
> 1300 (OSH) lb/hr
if (L1) FLOW PROP
VVL LOOP 1(2) – PL
HX ?

YES

48 BLOCKAGE
IN LOOP (ARS
ICH LEG)

50 XDCR SHIFT
(ARS ICH LEG)

51 (CRT) AFT CP
FLOW > 450 lb/hr ?

YES

52 (CRT) Aff
FREON LOOP
ACCUM QTY = 3%
or less ?

NO

53 FREON
LOOP LEAK

NO

54 LOOP
BLOCKAGE (IN PL
AND ARS ICH
LEG)

YES

55 (CRT) Aff
FREON LOOP
ACCUM QTY ≥ 75%

NO

56 N2 LEAK
RESULTING IN
PUMP
CAVITATION AND
LOOP LOSS

NO
ECLS
SM
ALERT
S88 FRN PL HX
1(2)
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

6.4d FRN FLOW PROP VLV
PL HX FLOW ↓

1 N2 leak across
FCL accum bellows
can cause cavitations
of pump. Frequent
cavitation = loop loss

1

2 pMCC. With
Sig Condr or sw
short, do not operate
FREON SIG CONDR
sw(s) on pnl O17

SM 88 APU/
ENVIRON THERM
Note:
FREON FLOW
PL HX FLOW
PL HX FLOW ‘↓’ or NO 2 (CRT) FREON NO 3 CLASS 3
‘L’ ?
ALARM S/W
LOOP ACCUM
FAULT OR
QTY ≥ 70% ?
YES
TRANSIENT
YES
FAILURE
4 (L1) FLOW
PROP VLV
1
tb − ICH ?
5 N2 LEAK
6
NO
YES
RESULTING IN
•p MCC
OCCASIONAL
27
PUMP
CAVITATION
7

•p SIG CONDR A
(CRT) FREON
LOOP 1 PL HX
FLOW ‘L’ FREON
LOOP 2 FREON
FLOW ‘L’, and
FREON LOOP 2
ACCUM QTY ‘L’ ?

2
YES 8

(L4:N) cb AC2
ΦB FREON SIG
CONDR − op ?
NO

YES

9

SIG CONDR
OR SW SHORT
12

13

16

19

20

NO

10

11
(O17)
• SIG CONDR
FREON A −
AC3
Any indications
remain ?
YES

13 SIG CONDR
FAILURE

14

(CRT)
If FREON ISOL 1(2)
= ISOL:
• Go to RAD ISOL
RECOVERY,
ECLS SSR−9

NO 12

SIG CONDR
AC2 PWR
FAILURE

10

•p SIG CONDR B

2

YES 15
(CRT) FREON
(L4:N) cb AC3 YES 16 SIG CONDR
LOOP 2 PL HX
ΦB FREON SIG
OR SW SHORT
FLOW ‘L’, FREON
CONDR − op ?
LOOP 1 FREON
NO
FLOW ‘L’, and
FREON LOOP 1
10
17
ACCUM QTY
NO‘L’ ?
(O17)
• SIG CONDR
FREON B −
18 (CRT) FREON
AC2
FLOW < 1300
NO
19 SIG CONDR
Any
indications
lb/hr ?
remain ?
AC3
PWR
NO
YES
YES
FAILURE

21

6.4b 51
20 SIG CONDR
FAILURE

02/28/02

6−42

10

MAL/ALL/GEN F


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.
AFT CP FLOW < 200 lb/hr

1. SM 88 APU/ENVIRON THERM
   - Note AFT CP FLOW
   - FREON LOOP AFT CP FLOW ≤ 'L' or ≥ 'M'?

2. Either FREON LOOP ACCUM QTY ≥ 70%?

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE

4. N2 LEAK RESULTING IN OCCASIONAL PUMP CAVITATION

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?

6. Radiators in bypass?

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?

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?

10. XDCR SHIFT, SMALL BLOCKAGE IN LOOP (AFT CP LEG), OR INSTRUMENTATION FAILURE

11. BLOCKAGE IN LOOP (AFT CP LEG)

1. N2 leak across FCL ACCUM bellows. Frequent cavitation = loop lost
2. Loss of FCL definition next PLS entry
6.4f ACCUM QTY ↓

1. SM 88 APU/ENVIRON THERM
   - FREON ISOL 1 = ISOL
   - FREON ISOL 2 = ISOL
   - FREON ISOL 1.2 ≠ ISOL

2. SIG COND A
   - (CRT) FREON LOOP 1 ACCUM QTY ‘L’ and FREON FLOW ‘L’?

3. SIG COND B
   - (CRT) FREON LOOP 1 ACCUM QTY ‘L’ and FREON FLOW ‘L’?

4. (CRT) FREON LOOP 1(2) ACCUM QTY:
   - ‘L’ (~ −11) or > 12%
   - ≤ 12%

5. CLASS 3
   - ALARM S/W FAULT, TRANSIENT FAILURE, OR INSTRUMENTATION OR LOGIC FAULURE

6. FREON LEAK
   - WITH ISOL S/W FAILURE OR ISOL MODE SWITCH IN MANUAL

7. FREON LOOP 1(2) FLOW = ‘L’?
   - NO

8. FREON LOOP 1(2) DEPLETED
   - NO

9. Manually isolate Aff Radiator
   - (L2)
   - FREON ISOL MODE − MAN
   - Aff FREON ISOL LOOP − ISOLATE

10. CLASS 3
    - ALARM S/W FAULT, TRANSIENT FAILURE, OR INSTRUMENTATION OR LOGIC FAULURE

11. Loss of one FREON LOOP = next PLS Entry

12. ACCUM QTY < 12%

13. SM 0 THRM FRN

14. BFS
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
Upon initial activation of heaters, FDA limits are not enabled until following time has elapsed:

- INBD: 25 min
- OUTBD: 16 min
- NOZ: 40 min

If noz htr failed, HI LOAD EVAP still operational. If inbd/outbd duct htr failed, HI LOAD EVAP lost.

Loss of insight requires dual htr ops when htrs are activated.

If:

1. SM 88 APU/ENVIRON THERM
2. EVAP TEMP HI LOAD INBD (OUTBD) DUCT (NOZ) = ‘↑’ or ‘H’ (400 degF) ?
3. Switch htrs
   - HI LOAD DUCT HTR – B(A,C)
   - Temp(s) incr ?
4. Switch to dual htrs
   - HI LOAD DUCT HTR – A/B
   - Temp(s) incr ?
5. HTR A(B,C) THERMOSTAT OR TEMP_CNTL FAILED OFF (OP)
6. Cold ENVIRONMENT, DUAL HTR OPERATION REQD
7. SNSR FAILURE
8. Switch htrs
   - HI LOAD DUCT HTR – B(A,C)
   - Temp(s) decr ?
9. HTR A(B,C) THERMOSTAT OR TEMP_CNTL FAILED ON (CLOSED)
10. Monitor remaining duct temps to htr ops
Topping FES still operational if left, right htr's failed. Loss of fwd or aft htr could result in duct freezing and eventual loss of topping FES

2 If instr loss is on either fwd or aft duct, then dual htr ops is reqd as these htr's are considered mandatory

3 If instr loss is on either left or right duct, then only single htr ops is reqd

1 S88/BFS SM 0 degF
   FWD > 330
   FWD < 100
   AFT > 330
   AFT < 100

S88 ONLY
   L degF
   L > 245
   L < 50
   R degF
   R > 245
   R < 50

**ECLS 6.4h EVAP TOPPING DUCT T**
**FWD(AFT), L(R) ↑↓**
Topping FES still operational with Noz Htr failed off as long as fwd and aft duct htrs are operational.

ECLS 6.4i EVAP TOPPING L(R) NOZ ↑↓

1. SM ALERT
   - S88 EVAP TOP TEMP
   - SM 0 THRM EVAP
   - SM ALERT

2. (CRT) EVAP TEMP NOZ TOPPING L(R) = '↑' or 'H' (250 degF) ?
   - YES
   - TEMP NOZ TOPPING L(R) = '↓' or 'L' (0 degF) ?
   - YES
   - CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE
   - NO
   - Switch htrs
     (L1)
     - TOP EVAP HTR NOZ L(R) - B AUTO (A AUTO)
     - Temp(s) incr ?
     - NO
     - SNSR FAILURE
     - NO
     - YES
     - HTR A(B) TEMP CNTLR FAILED ON
     - (L1)
     - TOP EVAP HTR NOZ L(R) - A AUTO (B AUTO)

3. NO
   - YES
   - EVAP TEMP NOZ TOPPING L(R) = 'L' (0 degF) ?
   - YES
   - NO
   - NO
   - SNSR FAILURE
   - NO
   - YES
   - HTR A(B) TEMP CNTLR FAILED ON
   - (L1)
   - TOP EVAP HTR NOZ L(R) - B AUTO (A AUTO)
**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 1 A(B), MID 2 A(B), AFT A(B), HI LOAD A(B), ACCUM A(B) = '↑' or 'H' (160 degF) ?
   - YES
   - 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) ?

2. **Switch htrs**
   - (L2)
   - Flash EVAP FDLN HTR A(B) SPLY – 2(1)
   - Temp(s) incr ?
   - NO
   - 7. **SNSR FAILURE**
   - YES
   - NO
   - 6. **HTR 1(2) THERMOSTAT FAILURE**
   - 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

5. **Switch htrs**
   - (L2)
   - Flash EVAP FDLN HTR A(B) SPLY – 2(1)
   - Temp(s) decr ?
   - YES

6. **HTR 1(2) THERMOSTAT FAILURE**

7. **SNSR FAILURE**

8. **SNSR FAILURE**

9. **HTR 1(2) THERMOSTAT FAILURE**

---

**MAL/ALL/GEN F**  
**6–50**  
**12/14/95**
H2O LOOP
(F7)
Light on if:
H2O LOOP 1(2) PUMP OUT P
< 19.5(45) psia
> 79.5(81) psia
Backup C/W
ALARM
(F7)
SM88 H2O PUMP P 1(2)
SM2 H2O PUMP P 1(2)

Light on if:
H2O LOOP 1(2) PUMP OUT P
< 19.5(45) psia
> 79.5(81) psia
SM ALERT
SM88 H2O PUMP P 1(2)

Light on if:
H2O LOOP 1(2) PUMP OUT P
< 50 psia
> 75 psia
or
< 20 psia
(inactive loop)
or,
light on if:
H2O LOOP 1(2) PUMP ΔP
< 33 psid
> 46 psid
or
> 5 psid
(inactive loop)

Nominal Config:
(L4:F)
H2O LOOP PUMP
cb AC1 φA,φB,φC
1A/2 – op
cb AC2 φA,φB,φC
1B – cl
cb AC3 φA,φB,φC
2 – cl
(L4:L)
cb AC3 φA H2O CNTLR 1 – cl
(L4:K)
cb AC1 φA H2O CNTLR 2 – cl
(O14:B)
cb MNA OI H2O BYP LOOP 1 SNSR – cl
(O15:B)
cb MNB OI H2O BYP LOOP 2 SNSR – cl
(Cont in notes column)

6.4I H2O PUMP P 1(2) ↑↓

1
SM 88 APU/ENVIRON THERM

2
C/W OR SM FAILURE OR TRANSIENT

3
MCC

4
PUMP OUT P XDCTR SHIFT

5
H2O LOOP 1(2) PUMP OUT T 'L'
and PUMP ΔP 'L'
and ACCUM QTY 'L'? NO

6
H2O LOOP 1(2) ACCUM QTY 'L'? NO

7
H2O LOOP 1(2) ACCUM QTY:

'↑' or '↓'

8
INST FAILURE

9
H2O LOOP 1(2) ACCUM QTY:

'↑'

10
Status of alt loop

11
FREON/H2O LEAKAGE AT INTERCHANGER

12
Alt LOOP PUMP sw position:

GCP
OFF
ON

13
H2O LOOP 1(2) PUMP ΔP:

'↑' or '↓'

14
PUMP OUT P XDCTR SHIFT OR ACCUM GN2 LEAK, NO ACTION REQD

15
NO

16

17

18

1
Meter on pnl O1 is alternate readout source

2
√ MCC about reset cb

3
Normal accum quantities are about 45, 55 for H2O LOOP 1, H2O LOOP 2, respectively

4 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

5 Possible next PLS. √ MCC

6 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

7 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

8 If repeated occurrence (same loop), √ MCC for possibilities of ruptured bellows causing GN2 precharge and H2O to mix, or stuck bellows

Nominal Config:
(Cont)
(L4:L)
cb AC2 φA CAB T CNTLR 1 – cl
cb AC1 φA CAB T CNTLR 2 – cl
(L1)
H2O PUMP LOOP 1(2) – ON
1(2) – GPC 1 – B(A)
H2O LOOP 1 BYP MODE – MAN
H2O LOOP 2 BYP MODE – AUTO
Possible next\ PLS, √/MCC
If repeated\ occurrence (same\ loop), √/MCC for\ possibilities of\ ruptured bellows\ causing GN2\ precharge and H2O\ to mix, or stuck\ bellows
Only PUMP\ OUT P is available\ on board while in\ BFS
If both loops are\ failed:
(\L1)\ H2O PUMP LOOP 1,2 \− \OFF, then go\ to LOSS OF 2 H2O\ LOOPS (ORB PKT,\ PWRDN)
As pumps utilize\ H2O flow for active\ cooling, extreme or\ total blockage will\ result in overheating\ and failure of the\ pump within min

### 6.4l (Cont)

<table>
<thead>
<tr>
<th>15</th>
<th>Inhibit PUMP OUT P alarms of aff loop;</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>LOOP 1</td>
</tr>
<tr>
<td></td>
<td>(R13U)</td>
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<tr>
<td></td>
<td>• Inhibit LOOP 1 PUMP OUT P (param 105)</td>
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<td></td>
<td>C/W limits</td>
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<td>LOOP 2</td>
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<td>(R13U)</td>
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<td></td>
<td>• Inhibit LOOP 2 PUMP OUT P (param 115)</td>
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<tr>
<td></td>
<td>C/W limits</td>
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<tr>
<td></td>
<td>SM 60 SM TABLE MAINT</td>
</tr>
<tr>
<td></td>
<td>• ITEM 1+0 6 1 2 6 0 0 EXEC</td>
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<tr>
<td></td>
<td>• Inhibit B/U C/W ITEM 15 EXEC</td>
</tr>
<tr>
<td></td>
<td>• Inhibit SM ALERT ITEM 10 EXEC</td>
</tr>
</tbody>
</table>

![Flowchart Diagram]

- **Loop 1**
  - 6.4m
  - 7
  - 13
  - 14
  - 6.4o

- **Loop 2**
  - 13

**H2O LOOP 1(2) BLOCKAGE OR FLOW RESTRICTION**

**PUMP DEGRADATION OR FAILURE**

**Aff LOOP PUMP sw \− ON when fault was annunciated ?**

**Problem in BOTH PUMPS OR DOWNSTREAM IN LOOP**

**Problem ONLY IN PUMP B(A)**

**Aff LOOP PUMP sw \− ON when fault was annunciated ?**

**Deactivate H2O LOOP 2**

**Aff LOOP PUMP sw \− ON when fault was annunciated ?**

**No action reqd**

**Deactivate H2O LOOP 2**

(L1) \• H2O PUMP LOOP 2 \− OFF

**Aff LOOP PUMP sw \− ON when fault was annunciated ?**

**Reconfig LOOP 1**

(L1) \• H2O PUMP LOOP 1 \− GPC
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

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

Pump function sw ON position still available with full cooling capability
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

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

MCC about reset cb

Nominal Config:
Refer to 6.4l
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

Pump function sw ON position still available with full cooling capability
Pump function sw ON position still available with full cooling capability.

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.

Crew may opt to have MCC manage software limit via TMBU.
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

ECLS 6.4n H2O ACCUM QTY 1(2) ↑↓
1. Possible next PLS: √ MCC

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 psia normally.
### 6.4o H2O ICH FLOW 1(2) ↓

#### Nominal Config:
Refer to 6.4l

| 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 |
| 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 |
| 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 |
| Pump function sw ON position still available |

#### 1 H2O LOOP 1(2) ICH FLOW < 550 lb/hr

| 1 | SM 88 APU/ENVIRON THERM |
| 2 SM FAILURE OR TRANSIENT |
| 3 All LOOP PUMP sw position: |
| 4 INCORRECT SM ALERT LIMIT SELECTION BY SM PRECONDITIONING DUE TO FAILURE AT PUMP SW CONTACT OR SOFTWARE |
| 5 Activate pump of aff loop |
| 6 (CRT) H2O LOOP 1(2) ICH FLOW ‘NORMAL’? |
| 7 SELECTED SM ALERT IS NOT CONSISTENT WITH PUMP STATUS. SM ALERT IN LIMIT SET 1 (LOW:550) WHEN PUMP INACTIVE |
| 8 Adjust to max H2O LOOP ICH FLOW in aff loop |
| 9 Deactivate pump of aff loop |

#### 6.4l

| 6.4l 17 |
| 6.4l 18 |
| 6.4l 39 |

### Instructions:

1. **H2O LOOP 1(2) ICH FLOW:**
   - Normal
   - ‘ ’ or ‘ ‘

2. **SM FAILURE OR TRANSIENT**

3. **All LOOP PUMP sw position:**
   - OFF
   - ON
   - GPC

4. **INCORRECT SM ALERT LIMIT SELECTION BY SM PRECONDITIONING DUE TO FAILURE AT PUMP SW CONTACT OR SOFTWARE**

5. **Activate pump of aff loop**

6. **(CRT) H2O LOOP 1(2) ICH FLOW ‘NORMAL’?**

7. **SELECTED SM ALERT IS NOT CONSISTENT WITH PUMP STATUS. SM ALERT IN LIMIT SET 1 (LOW:550) WHEN PUMP INACTIVE**

8. **Adjust to max H2O LOOP ICH FLOW in aff loop**
   - H2O LOOP 1(2) PUMP OUT P:
     - ≤ 60 psia
     - ≥ 67 psia
     - > 60 psia and < 67 psia

9. **Deactivate pump of aff loop**

10. **H2O LOOP 1(2) PUMP OUT T: degF**

11. **Record temp of aff H2O LOOP**

12. **H2O LOOP ICH FLOW incr?**

---

03/16/01

6–60

MAL/ALL/GEN F
If problem recurs, reconfig to alternate H2O LOOP, ECLS SSR-4
ICH FLOW BYP VLV may be at full ICH flow position when fault annunciated
H2O LOOP 1:
  ECLSS SC11, MDM OF1
H2O LOOP 2:
  ECLSS SC12, MDM OF2
Manual override adjustment may still be available, 
Possible next PL, 
If BYP vlv drive control on both loops failed, activate both H2O LOOPS
Wait 5 min, compare with value in block
If aff LOOP Pump sw ON at time of fault annunciation, LOOP BYP VLV MODE – AUTO
Adjust to decr H2O LOOP ICH FLOW of affected loop
H2O LOOP 1(2) ICH FLOW XDCR SHIFT
H2O LOOP 1(2) ICH FLOW INST FAILURE
BYP CNTLR MTR DRIVE FAILURE, H2O LOOP 1(2) ICH FLOW INSUFFICIENT
All LOOP Pump sw position ON when fault was annunciated?
If aff Loop Pump sw GPC at time of fault annunciation, restore config
Deactivate aff loop
Go to RECONFIG TO ALT H2O LOOP, ECLS SSR-4
Inhibit SM ALERT limits on H2O LOOP ICH FLOW of aff loop
SM 60 SM TABLE MAINT
  If LOOP 1:
    • ITEM 1
      +0 6 1 2 7 4 2
      EXEC
  If LOOP 2:
    • ITEM 1
      +0 6 1 2 7 2 2
      EXEC
    • INH – ITEM 10
      EXEC
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

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'?

2 (CRT)
Average FREON LOOP EVAP OUT T 1.2 < 35 degF?

3 LOW FREON LOOP TEMP

4 H2O LOOP 1(2) ICH OUT T SNSR INST FAILURE

5 Inhibit SM ALERT limits on H2O LOOP ICH OUT T of all loop
SM 60 SM TABLE MAINT

6 (CRT)
H2O LOOP 1(2) CAB HX IN T:
L
Normal

7 (CRT)
H2O LOOP 1(2) PUMP OUT T:
Normal
L
H
↓
↑

8 CLASS 3 ALARM S/W FAULT OR SNSR TRANSIENT

9 H2O LOOP 1(2) PUMP OUT T SNSR FAILURE

10 Aff LOOP PUMP sw position - ON ?

11 PUMP OUT T SNSR SHIFT LOW OR TEMP EXCURSION AT NONACTIVATED LOOP

12 Aff LOOP PUMP sw position - ON ?

13 PUMP OUT T SNSR SHIFT HIGH OR TEMP EXCURSION AT NONACTIVATED LOOP

14

15 YES

16 NO

17

18

19

20

21

22

23
MAL/ALL/GEN F

12/15/99 6–64  MAL/ALL/GEN F

ECLS 6.4p (Cont)

1. MCC to reset LOOP 1: (L4: L) cb AC2 ΦA CAB T CNTLR 1
   LOOP 2: (L4: L) cb AC1 ΦA CAB T CNTLR 2

2. MCC for further pwrdn reqd and H2O loop flowrate management

31. Aff loop:
   LOOP 2
   LOOP 1

34. SM 66 ENVIRONMENT
   YES

35. ICH PERFORMANCE DEGRADATION

36. Complete reconfig
   • Go to RECONFIG TO ALT H2O LOOP, ECLS SSR–4

37. H2O LOOP 2(1) PUMP OUT T < 90 degF after 10 min?
   NO

38. CABIN TEMP CNTL 1 SIG CONDITIONER FAILURE

39. Inhibit SM ALERT limits on H2O LOOP CAB HX IN T of all 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

40. Go to Priority Pwrdn Groups A and B, and CABIN EQUIP PWRDN, ECLS SSR–6
6.5c **WASTE H2O PRESS \( \uparrow, \downarrow \), SUPPLY(WASTE) H2O DMP LN T \( \uparrow, \downarrow \), SUPPLY(WASTE) NOZ T A(B) \( \uparrow \)

**Nominal Config:**

(Cont)

(ML86B:B)

- cb MNA WASTE H2O TK1 VLV – cl
- cb MNA H2O DUMP ISOL – cl
- cb MNA VAC VENT ISOL VLV – cl
- cb MNB WASTE H2O TK1 DRAIN – op
- cb MNB VAC VENT NOZ HTR – cl
- cb MNB VAC VENT ISOL VLV – cl
- cb MNA SPLY H2O TKD OUTLET – cl
- cb MNB SPLY H2O TKD INLET – cl

(ML26C)

- SPLY H2O GN2 TKA SPLY vlv – OP
- SPLY H2O GN2 TK VENT vlv – PRESS
- SPLY H2O TK A INLET – OP (tb−OP)
- SPLY H2O TK A OUTLET – OP (tb−OP)
- XOVR VLV – CL (tb−BP)
- DUMP ISOL VLV – CL (tb−OP)
- DUMP VLV – CL (tb−BP)
- DUMP VLV ENA NOZ HTR – OFF
- GALLEY SPLY VLV – OP (tb−OP)
- B SPLY ISOL VLV – OP (tb−OP)
- (ML31C)
- WASTE H2O TK1 DRAIN VLV – CL (tb−BP)
- TK1 VLV – OP (tb−OP)
- DUMP ISOL VLV – OP (tb−OP)

(ML31C)

- WASTE H2O TK1 DRAIN VLV – CL (tb−BP)
- TK1 VLV – OP (tb−OP)
- DUMP ISOL VLV – OP (tb−OP)

(ML31C)

- WASTE H2O TK1 DRAIN VLV – CL (tb−BP)
- TK1 VLV – OP (tb−OP)
- DUMP ISOL VLV – OP (tb−OP)

(Cont in notes column)
1. If SUPPLY H2O NOZ HTR:
   (R11L)
   - √ SPLY H2O DUMP VLV ENA/NOZ HTR – OFF
     (ML86B:A)
     - cb MNC SPLY H2O DUMP VLV/NOZ HTR – op
   If WASTE H2O NOZ HTR:
     (ML31C)
     - √ WASTE H2O DUMP VLV ENA/NOZ HTR – OFF
       (ML86B)
       - cb MNA WASTE H2O DUMP VLV/NOZ HTR – op

2. Switch htrs
   (ML86B:A)
   - cb MNA H2O LINE HTR A – op(cl)
   - cb MNB H2O LINE HTR B – cl(op)
   (CRT) SUPPLY (WASTE) H2O DMP LN T incr ?

3. LINE HTR FAILED OFF
   (ML86B:A)
   - cb MNA H2O LINE HTR A – cl
   - cb MNB H2O LINE HTR B – cl

4. Switch htrs
   (ML86B:A)
   - cb MNA H2O LINE HTR A – op(cl)
   - cb MNB H2O LINE HTR B – cl(op)
   (CRT) SUPPLY (WASTE) H2O DMP LN T decr ?

5. DUMP LINE TEMP XDHR FAILURE
   (CRT) SUPPLY (WASTE) H2O DMP LN T incr ?

6. Config both htrs
   (CRT) SUPPLY (WASTE) H2O DMP LN T decr ?
   (ML86B:A)
   - cb MNA H2O LINE HTR A – cl
   - cb MNB H2O LINE HTR B – cl

7. LINE HTR FAILED ON
   (CRT) SUPPLY (WASTE) H2O DMP LN T decr ?

8. Config both htrs
   (CRT) SUPPLY (WASTE) H2O DMP LN T incr ?

9. If SUPPLY H2O NOZ HTR:
   (R11L)
   - √ SPLY H2O DUMP VLV ENA/NOZ HTR – OFF
     (ML86B:A)
     - cb MNC SPLY H2O DUMP VLV/NOZ HTR – op
   If WASTE H2O NOZ HTR:
     (ML31C)
     - √ WASTE H2O DUMP VLV ENA/NOZ HTR – OFF
       (ML86B)
       - cb MNA WASTE H2O DUMP VLV/NOZ HTR – op

10. Switch htrs
    (ML86B:A)
    - cb MNA H2O LINE HTR A – op(cl)
    - cb MNB H2O LINE HTR B – cl(op)

11. LINE HTR FAILED OFF
    (ML86B:A)
    - cb MNA H2O LINE HTR A – cl
    - cb MNB H2O LINE HTR B – cl

12. Switch htrs
    (ML86B:A)
    - cb MNA H2O LINE HTR A – op(cl)
    - cb MNB H2O LINE HTR B – cl(op)

13. LINE HTR FAILED OFF
    (ML86B:A)
    - cb MNA H2O LINE HTR A – cl
    - cb MNB H2O LINE HTR B – cl

14. Switch htrs
    (ML86B:A)
    - cb MNA H2O LINE HTR A – op(cl)
    - cb MNB H2O LINE HTR B – cl(op)

15. DUMP LINE TEMP XDHR FAILURE
    (CRT) SUPPLY (WASTE) H2O DMP LN T decr ?

16. Config both htrs
    (CRT) SUPPLY (WASTE) H2O DMP LN T incr ?

17. LINE HTR FAILED OFF
    (ML86B:A)
    - cb MNA H2O LINE HTR A – cl
    - cb MNB H2O LINE HTR B – cl

18. √ Tk inlet
    (ML31C)
    - WASTE H2O TK 1 VLV – OP ?

19. √ H2O TK N2 P
    (CRT) Is H2O TK N2 P1 and P2 = WASTE H2O PRESS ?

20. WASTE TK 1 VLV CLOSED INADVERTENTLY
    (CRT) Did qty incr ?

21. √ For blockage
    (CRT)
    - Record WASTE H2O QTY 1:
      - If 4(5,6,7,8) crewmembers onboard, wait 99 (80,66,57,50) min; then continue
    (CRT) Did qty incr ?

22. Reconfig
    (ML31C)
    - WASTE H2O TK 1 VLV – OP (b–OP)

23. WASTE H2O QTY 1 ≤ 5 ?
    (CRT)
    - WASTE H2O TK 1 VLV – OP (b–OP)

24. XDCR FAILED OR SHIFTED
    (CRT)
    - SUPPLY (WASTE) H2O DMP LN T incr ?
    - SUPPLY (WASTE) H2O DMP LN T decr ?

25. H2O LEAK
    UPSTREAM OF ISOL VLV,
    H2O LEAK
    DOWNSTREAM OF ISOL VLV, OR
    XDCR FAILED OR SHIFTED
    (CRT)
    - SUPPLY (WASTE) H2O DMP LN T incr ?
    - SUPPLY (WASTE) H2O DMP LN T decr ?

26. BLOCKAGE IN WASTE TK INLET LINE
    (CRT)
    - SUPPLY (WASTE) H2O DMP LN T incr ?
    - SUPPLY (WASTE) H2O DMP LN T decr ?

27. XDCR FAILED OR SHIFTED
    (CRT)
    - SUPPLY (WASTE) H2O DMP LN T incr ?
    - SUPPLY (WASTE) H2O DMP LN T decr ?
If Comm, √MCC for exact qty to dump

2. Reset TKC limit to detect next worst case failure (blockage at TKB inlet)

3. Crew may opt to have MCC make S/W limit change via TMBU

4. Alternate FC relief path will be operating when TKA is ≥ 95

If SUPPLY H2O PRESS > 40.0 psia

From ORB PKT, H2O SPLY PRESS HIGH

S66 SPLY H2O PRES

1. WATER TKS HARD FILLED

2. 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

3. SM 66 ENVIRONMENT

   Is SUPPLY H2O QTY A < 95 ?

   NO

   YES

   SM 60 SM TABLE MAINT

4. Transfer H2O to TKB,D

   (R11L)
   • SPLY H2O TKA OUTLET – OP (tb–OP)
   • When SUPPLY H2O QTY A has decr 3%, continue:
     • SPLY TKA OUTLET – CL (tb–CL)
   (CRT) SUPPLY H2O PRESS decr ?

   NO

   YES

5. XDCR SHIFTED OR FAILED HIGH

   6. Reset TKB limits

   SM 60 SM TABLE MAINT
   • ITEM 1
     ➖0 6 2 0 4 2 0
     EXEC
   • Set upper limit to 93%
If both zone temps are indicating high, check MCC. Possible external heat load due to attitude is causing high temps.
If two or more temps are indicating high, check MCC. Possible external heat load due to attitude is causing high temps.

1. INTERNAL TEMP: UPR (LWR) BKHD T < 40 UPR (LWR BKHD T > 113
EXTERNAL TEMP: AFT STRUC T < 40 AFT STRUC T > 113

Nominal Config:
(ML86B:C)
• cb MNA EXT ARLK HTR STRUC – cl(op)
• cb MNB EXT ARLK HTR STRUC – op(cl)

177 A/L STRUC T

177 EXTERNAL AIRLOCK
Affected temps indicate:

1. All three temps affected?
   YES
   NO

2. Only one zone affected?
   YES
   NO

3. FAILED CLOSED OPERATIONAL AND OVERTEMP THERMOSTATS IN ONE HTR STRING

4. LOSS OF MNA(MNB) PWR SOURCE OR MNA(MNB) MPC 1(2) RELAY OPEN

5. Switch to alternate htr pwr source
   (ML86B:C)
   • cb MNB (MNA,MNC) EXT ARLK HTR STRUC – cl
   • cb MNA (MNB,MNC) EXT ARLK HTR STRUC – op

6. Switch to alternate htr string
   (ML86B:C)
   • cb MNB (MNA,MNC) EXT ARLK HTR STRUC – cl
   • cb MNA (MNB,MNC) EXT ARLK HTR STRUC – op
SM ALERT

S66 CO2 RL SYS MALF

↓ will only illuminate for 6 sec
CO2 RMVL SYS CNTLR 1(2) FAIL lt – on/off
CO2 RMVL SYS CNTLR 1(2) OPER lt – off

Nominal Config:
(ML86B: E)
cb MNA CO2 SYS 1 CNTLR – cl
cb MNB CO2 COM INSTR – cl
cb MNC CO2 SYS 2 CNTLR – cl
(MOS1F) CO2 RMVL SYS CNTLR 1(2)
MNA(C) – ON
cb AC1(3) (three) – cl
CNTLR 1(2) FAIL lt – off
CNTLR 1(2) OPER lt – on
(MO31C) VAC VENT ISOL VLV BUS SEL – MNA
VAC VENT ISOL VLV CNTL – OP (tb–OP)

SM 66 ENVIRONMENT

• Match indications in chart to determine failure

<table>
<thead>
<tr>
<th>FAILURE CASE</th>
<th>(MOS1F) CO2 RMVL SYS 1(2) FAIL lt</th>
<th>(MOS1F) CO2 RMVL SYS 1(2) OPER lt</th>
<th>(CRT) CO2 CNTLR 1(2) *</th>
<th>(CRT) S66 CO2 RMVL SYS MALF fault msg</th>
<th>FAILURE MODE (Assumes all sw in nominal config)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OFF</td>
<td>ON</td>
<td>*</td>
<td>NO</td>
<td>DEGRADED CO2 REMOVAL CAPABILITY</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
<td>OFF</td>
<td>BLANK</td>
<td>YES</td>
<td>LOSS OF MNA(C) PWR</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
<td>OFF</td>
<td>BLANK</td>
<td>NO</td>
<td>LOSS OF AC 1(3) Φ A PWR</td>
</tr>
<tr>
<td>4</td>
<td>ON</td>
<td>OFF</td>
<td>*</td>
<td>YES</td>
<td>CNTLR 1(2) FAULT SHUTDN</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
<td>OFF</td>
<td>*</td>
<td>NO</td>
<td>CNTLR 1(2) COMMON BITE</td>
</tr>
<tr>
<td>6</td>
<td>OFF</td>
<td>OFF</td>
<td>BLANK</td>
<td>NO</td>
<td>CNTLR 1(2) TOTAL PWR FAILURE</td>
</tr>
</tbody>
</table>
2 Has CO2 RMVL SYS reconfig been accomplished due to previous CNTLR failure?

4 (MD54G)
- Install one LiOH Canister
- Contact MCC for implementation of LiOH plan

7 Deactivate CO2 Removal System
(MO51F)
- CO2 RMVL SYS CNTLR 1(2) MODE − STBY (Hold 3 sec)
- Wait 6 sec
- CO2 RMVL SYS OPER II − off
- CO2 RMVL SYS MNA(C) − OFF
- CO2 RMVL SYS AC 1(3) − OFF (Hold 3 sec)
- cb CO2 RMVL SYS AC 1(3) (three) − op

8 FAILURE MODE IN BLOCK 1 FOR CONTROLLER 1(2) ONLY

9 • Continue nominal ops on SYS 2(1)

10 • Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1/DEACT 2 (ACT 2/DEACT 1) (ORB OPS, ECLS)

6 FAILURE MODE IN BLOCK 1 AFFECTS BOTH CONTROLLERS

5 • Available PPCO2 indications (20 min)
- Increasing or steady
- Decreasing

11
1. System isolates beds for 2 min 6 sec out at every 11 min

2. ∆P value in parenthesis corresponds to 10.2 psia cabin environment

3. MCC before performing IFM

4. Allow 26 min for system cycle

---

1. Cycle CNTLR pwr
2. CO2 RMVL SYS MNA(C) – OFF
3. CO2 RMVL SYS AC 1(3) – OFF
4. CO2 RMVL SYS CNTLR 1(2) FAIL It – off
5. CO2 RMVL SYS AC 1(3) – ON
6. CO2 RMVL SYS MNA(C) – ON
7. CO2 RMVL SYS CNTLR 1(2) MODE – OPER
8. Wait 6 sec
9. CO2 RMVL SYS CNTLR 1(2) OPER It – on

Did system shut down?

10. YES
11. NO
12. NO
13. YES
14. NO
15. YES
16. YES

---

1. CO2 RMVL SYS FILTER ∆P (Monitor for 2 min)
2. ∆P > 0.5 (0.35) ?
3. YES
4. NO

---

11. (CRT)
12. • Filter for blockage and proper setting of flow control vlv
13. • Perform EDO RCRS: FILTER CLEANING (IFM)
14. to clean inlet filter
15. • EDO RCRS: FLOW CONTROL VALUE ADJUSTMENT (IFM) to verify vlv position setting matches crew size
16. • Continue nominal ops

---

1. Environment
2. SM 66
3. • Cycle CNTLR pwr
4. • CO2 RMVL SYS MNA(C) – OFF
5. • CO2 RMVL SYS AC 1(3) – OFF
6. • CO2 RMVL SYS CNTLR 1(2) FAIL It – off
7. • CO2 RMVL SYS AC 1(3) – ON
8. • CO2 RMVL SYS MNA(C) – ON
9. • CO2 RMVL SYS CNTLR 1(2) MODE – OPER
10. • Wait 6 sec
11. • CO2 RMVL SYS CNTLR 1(2) OPER It – on
12. • Adjust inlet filter
13. • Perform EDO RCRS: FILTER CLEANING (IFM)
14. to clean inlet filter
15. • EDO RCRS: FLOW CONTROL VALUE ADJUSTMENT (IFM) to verify vlv position setting matches crew size
16. • Continue nominal ops

---

1. System isolates beds for 2 min 6 sec out at every 11 min
2. ∆P value in parenthesis corresponds to 10.2 psia cabin environment
3. MCC before performing IFM
4. Allow 26 min for system cycle

---

1. System isolates beds for 2 min 6 sec out at every 11 min
2. ∆P value in parenthesis corresponds to 10.2 psia cabin environment
3. MCC before performing IFM
4. Allow 26 min for system cycle

---

11. (CRT)
12. • CO2 RMVL SYS FILTER ∆P (Monitor for 2 min)
13. • ∆P > 0.5 (0.35) ?
14. • YES
15. • NO

---

3. Did system shut down?
4. YES
5. NO
6. YES
7. NO
8. YES
9. NO
10. YES
11. NO
12. NO
13. NO
14. NO
15. NO
16. NO

---

1. System isolates beds for 2 min 6 sec out at every 11 min
2. ∆P value in parenthesis corresponds to 10.2 psia cabin environment
3. MCC before performing IFM
4. Allow 26 min for system cycle

---

11. (CRT)
12. • CO2 RMVL SYS FILTER ∆P (Monitor for 2 min)
13. • ∆P > 0.5 (0.35) ?
14. • YES
15. • NO

---

3. Did system shut down?
4. YES
5. NO
6. YES
7. NO
8. YES
9. NO
10. YES
11. NO
12. NO
13. NO
14. NO
15. NO
16. NO

---

1. System isolates beds for 2 min 6 sec out at every 11 min
2. ∆P value in parenthesis corresponds to 10.2 psia cabin environment
3. MCC before performing IFM
4. Allow 26 min for system cycle

---

11. (CRT)
12. • CO2 RMVL SYS FILTER ∆P (Monitor for 2 min)
13. • ∆P > 0.5 (0.35) ?
14. • YES
15. • NO

---

3. Did system shut down?
4. YES
5. NO
6. YES
7. NO
8. YES
9. NO
10. YES
11. NO
12. NO
13. NO
14. NO
15. NO
16. NO

---

1. System isolates beds for 2 min 6 sec out at every 11 min
2. ∆P value in parenthesis corresponds to 10.2 psia cabin environment
3. MCC before performing IFM
4. Allow 26 min for system cycle
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.

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

L1 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
   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

SM 88 APU/ENVIRON THERM
**ECLS SSR–2 (Cont)**

**TOPPING CORE FLUSH (RADS NOT ACTIVATED)**

**L1**
1. **TOP EVAP HTR DUCT – A/B**
2. Proceed when TOPPING DUCT temps within limits (no ↓; if PASS SM 88 available, TOP FWD(AFT) > 120 degF)
3. **FLASH EVAP CNTLR SEC – OFF**
4. **HI LOAD EVAP – OFF**
5. **FLASH EVAP CNTLR SEC – ON (wait 30 sec)**
6. **OFF (wait 30 sec)**
7. Repeat steps 4 and 5 three times, then:
   - **FLASH EVAP CNTLR SEC – ON**
8. **FLASH EVAP CNTLR SEC – OFF**
9. **HI LOAD EVAP – ENA**
10. **FLASH EVAP CNTLR PRI B – ON (wait 2 min)**
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)**

**CRT**

1. **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)**
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)**

**L1**

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**
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)**
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. **TOP EVAP HTR DUCT – A(B)**
### ECLS SSR-3
**RECONFIG TO ALT PCS SYS (AUTO OPS)**

1. 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.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loss of PCS Sys 1(2) O2 or N2 → 10.2 psi ops? → YES → 4 NO → 6.2b 78 82</td>
</tr>
<tr>
<td>2</td>
<td>SM 66 ENVIRONMENT</td>
</tr>
<tr>
<td></td>
<td>Reconfig to alternate system</td>
</tr>
<tr>
<td></td>
<td>(L2) ATM PRESS CONTROL</td>
</tr>
<tr>
<td></td>
<td>• O2/N2 CNTLR VLV SYS 1(2) – CL</td>
</tr>
<tr>
<td></td>
<td>• 2(1) – AUTO</td>
</tr>
<tr>
<td></td>
<td>(O1)</td>
</tr>
<tr>
<td></td>
<td>• O2/N2 FLOW SEL – SYS 2(1) O2</td>
</tr>
<tr>
<td></td>
<td>• PPO2 SEL – SNSR B(A)</td>
</tr>
<tr>
<td></td>
<td>(MO10W)</td>
</tr>
<tr>
<td></td>
<td>• 14.7 PSI CABIN REG INLET SYS 2(1) – OP</td>
</tr>
<tr>
<td></td>
<td>• 1(2) – CL</td>
</tr>
<tr>
<td></td>
<td>• H2O TK N2 REG INLET SYS 2(1) – OP</td>
</tr>
<tr>
<td></td>
<td>• 1(2) – CL</td>
</tr>
<tr>
<td></td>
<td>• O2 REG INLET SYS 2(SYS 1) – OP</td>
</tr>
<tr>
<td></td>
<td>• 1(SYS 2) – CL</td>
</tr>
<tr>
<td></td>
<td>(CRT)</td>
</tr>
<tr>
<td></td>
<td>• N2 REG P 2(1) 185–240 psia</td>
</tr>
<tr>
<td></td>
<td>• O2 REG P 2(1) 90–125 psia</td>
</tr>
</tbody>
</table>

If Cabin Press ≤ 15.2 psia >>
ECLS SSR–3   (Cont)

3

If Cabin Press > 15.2 psia

• MIDDECK FLOODS AIRLK 2 – ON/OFF

• Equalization vlv caps (two) – remove, stow
• Equalization vlv (two) – OFF
• Open, stow HATCH
• Rotate vent duct into airlock

• cb MNB PPO2 C CAB dP/dT – op

• AIRLK DEPRESS vlv cap – vent, remove
• Depress Cabin to ops level

• AIRLK DEPRESS vlv – 5
  - If ‘S66 CABIN PPO2 A(B)’
  - AIRLK DEPRESS vlv – CL
  - 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

5

• Reconfig from Cabin Depress

• AIRLK DEPRESS vlv – CL, capped

4

If Cabin Press ≤ 10.6 psia >>

10.2 psi reconfig

• ATM PRESS CONTROL
  - O2/N2 CNTLR VLV SYS 1 – CL (O2)
  - 2 – OP (N2)

• H2O TK N2 REG INLET SYS 1 – CL
  - 2 – OP

(L2)

• DIRECT O2 vlv – OP
  - When PPO2 = 3.45,
  - DIRECT O2 vlv – CL
  - Continue to depress Cabin and add O2 as reqd

• MCC for P&I changes to repress procedure

(MO10W)

• N2 REG P 2(1) 185–240 psia
• O2 REG P 2(1) 90–110 psia
• P&I change to Cabin Maintenance:
  - Change ‘SYS 1’ to ‘SYS 2’
  - MCC for P&I changes to repress procedure

(CRT)

• P&I change to Cabin Maintenance:
  - Change ‘SYS 1’ to ‘SYS 2’
  - MCC for P&I changes to repress procedure

(MO13Q)

• MIDDECK FLOODS AIRLK 2 – OFF/ON

2 Swap PCS feeding nitrogen.
Oxygen fed via Direct O2

12/15/99 6–81 MAL/ALL/GEN F
ECLS SSR–3  (Cont)

If Cabin Press > 10 psi

(O15:D)
• cb MNB PPO2 C CAB dP/dT – op

(AW82B)
• AIRLK DEPRESS vlv – vent, remove

• Depress Cabin to ops level

(AW82B)
• AIRLK DEPRESS VLV – 5
  • if ‘S66 CABIN PPO2’ AIRLK
  • DEPRESS vlv – CL
  • (MO10) 2
  • 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 < 2.5
• 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
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.

2. Loss of bypass controller results in loss of all instrumentation in affected loop except flow and some temperatures.

3. 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.

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 3Φ) OR AC3 (ΦA OR 3Φ)
- BUS FAILURE: AC3 (ΦB OR ΦC) OR NO FAILURE: BUS BALANCING REQD

New active loop:

<table>
<thead>
<tr>
<th>LOOP 1</th>
<th>LOOP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R13U)</td>
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</tr>
<tr>
<td>Inhibit LOOP 2 PUMP OUT P (param 115)</td>
<td>Inhibit LOOP 1 PUMP OUT P (param 105)</td>
</tr>
<tr>
<td>Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia)</td>
<td>Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)</td>
</tr>
<tr>
<td>Reconfig B/U C/W</td>
<td>Reconfig B/U C/W</td>
</tr>
<tr>
<td>SM 60 SM TABLE MAINT</td>
<td>SM 60 SM TABLE MAINT</td>
</tr>
<tr>
<td>ITEM 1 - 0612700 EXEC</td>
<td>ITEM 1 - 0612600 EXEC</td>
</tr>
<tr>
<td>ITEM 15 EXEC</td>
<td>ITEM 15 EXEC</td>
</tr>
<tr>
<td>ITEM 1 - 0612600 EXEC</td>
<td>ITEM 1 - 0612700 EXEC</td>
</tr>
<tr>
<td>ITEM 11 - 45 EXEC</td>
<td>ITEM 11 - 45 EXEC</td>
</tr>
<tr>
<td>ITEM 11 - 95 EXEC</td>
<td>ITEM 11 - 95 EXEC</td>
</tr>
</tbody>
</table>

New active loop:

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<th>LOOP 2</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 0.70 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 0.70 vdc (19.5 psia)</td>
</tr>
<tr>
<td>Reconfig B/U C/W</td>
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</tr>
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</tr>
<tr>
<td>ITEM 11 - 45 EXEC</td>
<td>ITEM 11 - 45 EXEC</td>
</tr>
<tr>
<td>ITEM 11 - 95 EXEC</td>
<td>ITEM 11 - 95 EXEC</td>
</tr>
</tbody>
</table>
### 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)

#### LOOP 2
- Inhibit LOOP 1 PUMP OUT P (param 105)
- Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)

#### 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)

#### LOOP 2
- Inhibit LOOP 1 PUMP OUT P (param 105)
- Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)
Prior flight experience has demonstrated that FES shut downs are most likely in this temp range.

To ensure positive FES restart, RADs are placed in HIGH to impose a load on FES.

TOPPING EVAP will overtemp shut down when inlet temp exceeds ∼ 68 degF and HI LOAD not activated.

Heat load beyond capability of topping evap.
Use one IDP/CRT with one MDU

F6/F8/A6U  FLT CNTLR PWR (three) – OFF

O14:E  √ cb MNA DDU L AFT (two) – op
O15:E  √ cb MNB DDU L/R (two) – op
O16:E  √ cb MNC DDU R AFT (two) – op

L1  CAB TEMP – COOL (as reqd, WARM)
Minimize ltg

W1–10  Install Window Shades (ten)

O19  TV PWR – OFF
A3  MON 1,2 – OFF
R11  VTR PWR – OFF

MO39M  MIDDECK COMM CCU PWR – OFF
MO42F  SPKR AUD SPKR PWR – OFF
     PWR – OFF

MO58F  MIDDECK CCU AUD PWR – OFF
GALLEY  DC PWR BUS A – OFF
        B – OFF

MA73C:G  cb AC3 GALLEY FAN (three) – op
         or
      Food Warmer – OFF, √ light – off
All middeck lts – off
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 SPL – 1(2)
B SPL – 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

SM 88 APU/ENVIRON THERM

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

L1  1. HI LOAD EVAP – ENA
   FLASH EVAP CNTLR SEC – A SPL
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

SECONDARY CONTROLLER, HI LOAD FES, FEEDWATER A CHECKOUT

L1  1. HI LOAD EVAP – ENA
   FLASH EVAP CNTLR SEC – B SPL
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 SPL

02/25/00
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)
   PRI A – OFF
   B – OFF
   SEC – OFF

2. RAD BYP VLV LOOP 1,2 MODE (two) – MAN
   MAN SEL (two) – BYP until tb – BYP

CRT
3. When EVAP OUT T > 47 degF, FLASH EVAP CNTLR PRI A – ON
   After 60 sec, √EVAP OUT T – 39 degF ± 1 degF

L1
4. FLASH EVAP CNTLR PRI A – OFF
   B – ON

CRT
5. After 60 sec, √EVAP OUT T – 39 degF ± 1 degF

L1
6. 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

CRT
7. 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

L1
2. √RAD OUT T – 39 degF (FES to STBY)
   Pwrdn and/or change attitude if necessary

CRT
3. RAD CNTLR OUT T – HIGH
   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

CRT
8. FLASH EVAP CNTLR PRI B – OFF, ON
   √RAD OUT T – 39 degF ± 1 degF
   CNTLR OUT T – HIGH
   After 2 min, √EVAP OUT T – 39 degF ± 1 degF

L1
9. RAD CNTLR OUT T – NORM
   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

| SM 66 ENVIRONMENT | OR | SM SYS SUMM 1 |

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
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)

MO51F
8. If flown, deactivate CO2 RMVL SYS:
   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 urinary hose (at hose block), hose block, and filter
    Place Gray Tape over center tube (EMU drain)

MIDDECK
13. A/L HATCH – CL (per decal)
    Equal vlv (two) – OFF

RECOVERY STEPS (On MCC call)
L2
14. CAB RELIEF A – ENA (tb–ENA)

15. CAB RELIEF B – ENA (tb–ENA)

ML31C
16. VAC VENT ISOL VLV CNTL – OP (tb–OP)
   If flown, reactivate CO2 RMVL SYS:
   MOS51F
   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
ECLS SSR-8 (Cont)

WCS/ EDO  
WCS

17. VAC VLV – OP

PCS CONFIG (On MCC call)
18. MCC for PCS config and TIG time (if necessary)

LEAK SEALING (On MCC call)
19. Go to CABIN LEAK SEALING (PROCEDURES A thru F, IFM)
ECLS SSR–9
RAD ISOL RECOVERY

NOTE
Procedure reestablishes radiator flow after an inadvertent isolation
due to an 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 – RADIATOR (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 – RADIATOR (hold 5 sec)
L1 10. After 5 min, RAD OUT TEMP – NORM
If FES reqd, go to FES RESTART, ECLS SSR–5
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 2 0 6 4 1 EXEC
   17 +9 9 9 9 9 9 EXEC
   16 +9 2 0 6 4 0 EXEC
   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:
   L4:F
   4. cb AC1 H2O LOOP PUMP 1 A/2 (three) – cl
   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
   8. H2O PUMP LOOP 2 – OFF
   O1
   9. H2O PUMP OUT PRESS – 1
   If WCL 2 for continuous ops:
   L4:F
   10. cb AC1 H2O LOOP PUMP 1 A/2 (three) – cl
   L1
   11. H2O PUMP LOOP 2 – GPC
      √ LOOP 2 BYP MODE – AUTO
      √1 BYP MODE – MAN
   12. H2O PUMP LOOP 1 – OFF
   O1
   13. √ 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

14. SM OPS 000 PRO
15. SM OPS 201 PRO
16. S98 APU/ENVIRON THERM
   √ H2O LOOP PUMP OUT P 1(2): 61–69
17. If reqd:
   S94 PDRS CONTROL
   I/O ON – ITEM 5 EXEC(*)
   SAFING – CANCEL
18. SM(GNC,PL) 1 DPS UTILITY
   CKPT RETRV ENA – ITEM 12 EXEC (*)
   UL CNTL AUTO – ITEM 35 EXEC (*)
19. If reqd, perform PL/DPS RECONFIG. (PL SYS: or SODF: ASSY OPS)
20. 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 0.70 vdc (19.5 psia)</td>
<td>● Change Loop 2 PMUP OUT P (param 115) lower C/W limit to 1.50 vdc (45 psia) and Loop 1 (param 105) to 0.70 vdc (19.5 psia)</td>
</tr>
</tbody>
</table>

Reconfig B/U C/W
SM 60 SM TABLE MAINT
● ITEM 1 +9 6 1 2 6 0 0 EXEC
● ITEM 11 +6 7 5 EXEC
● ITEM 1 +9 6 1 2 7 0 0 EXEC
● ITEM 11 +1 9 8 EXEC
Reconfig B/U C/W
SM 60 SM TABLE MAINT
● ITEM 1 +9 6 1 2 7 0 0 EXEC
● ITEM 11 +6 7 5 EXEC
● ITEM 1 +9 6 1 2 6 0 0 EXEC
● ITEM 11 +1 9 8 EXEC
ECLS SSR–11
FES FEEDLINE PURGE

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 – OFF
   √ B – OFF
   √ SEC – OFF

R11L 2. SPLY H2O DUMP ISOL VLV – CL (tb–CL)
   √ VLV – CL (tb–CL)

3. Unstow (top drawer of IFM container):
   Free Fluid Nozzle
   Y/R QD Adapter
   Towel

WCS 4. Install red–banded side of Y/R QD Adapter to Free Fluid Nozzle

NOTE
Hold Towel around Free Fluid Nozzle in the following step to soak up any H2O that leaks out of Nozzle during installation.

5. Install yellow–banded side of Y/R QD Adapter to CONT H2O X–TIE POT QD

If only B FDLN requires purging:

NOTE
After evacuation of B FDLN, SPLY H2O can be managed in normal fashion by SPLY H2O dumps or boiling thru FES A SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)

ML31L 6. SPLY H2O TKD OUTLET – CL (tb–CL)
   R11L 7. TKB.TKB.TKC OUTLET – CL (tb–CL)
   √ B SPLY ISOL VLV – OP
   √ XOVR VLV – OP (tb–OP)
   √ DUMP ISOL VLV – OP (tb–OP)

L1 8. RAD CNTLR OUT TEMP – HI
   O1 9. When EVAP OUT T > 47 degF,
   FLASH EVAP CNTLR PRI B – ON
   10. When FES shuts down and EVAP OUT T again > 47 degF,
       FLASH EVAP CNTLR PRI B – OFF, ON
       11. Repeat step 10 until EVAP OUT T remains at ~57 degF,
           then FLASH EVAP CNTLR PRI B – OFF
   R11L 12. SPLY H2O B SPLY ISOL VLV – CL
   13. XOVR VLV – CL (tb–CL)
   14. DUMP ISOL VLV – CL (tb–CL)
   15. TKB OUTLET – OP (tb–OP)
   L2 16. FLASH EVAP FDLN HTR B SPLY – OFF
   L1 17. √ CNTLR SEC – A SPLY

If only A FDLN requires purging:

NOTE
After evacuation of A FDLN, SPLY H2O can be managed using FES B and SPLY H2O TKS C and/or D SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)

R11L 18. SPLY H2O TKA,TKB OUTLET – CL (tb–CL)
   √ XOVR VLV – CL (tb–CL)
   √ DUMP ISOL VLV – OP (tb–OP)

L1 19. RAD CNTLR OUT TEMP – HI
   O1 20. When EVAP OUT T > 47 degF,
   FLASH EVAP CNTLR PRI A – ON
   21. When FES shuts down and EVAP OUT T again > 47 degF,
       FLASH EVAP CNTLR PRI A – OFF, ON
       22. Repeat step 20 until EVAP OUT T remains at ~57 degF,
           then FLASH EVAP CNTLR PRI A – OFF
   R11L 23. SPLY H2O DUMP ISOL VLV – CL (tb–CL)
   L2 24. FLASH EVAP FDLN HTR A SPLY – OFF
   L1 25. √ CNTLR SEC – B SPLY
ECLS SSR−11 (Cont)

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

25. Perform steps 6 thru 11, then:
L1
FLASH EVAP CNTLR PRI A − ON
26. Perform steps 20 thru 22, then:
L2
27. FLASH EVAP FDLN HTR A,B SPLY (two) − OFF
L1
28. TOP EVAP HTR DUCT − OFF
    NOZ L,R (two) − OFF
29. RAD CNTLR OUT TEMP − NORM
WCS
30. Remove Y/R QD Adapter from CONT H2O X–TIE POT QD
R11L
31. SPLY H2O DUMP ISOL VLV − OP (tb−OP)

NOTE
✓ MCC for possible SPLY H2O DUMP after completion of procedure

Stow Tools and Towel
NOTES
1. This procedure is used to restore a single fault tolerance condition to orbiter 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>
</tr>
</thead>
<tbody>
<tr>
<td>ANTISKID</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUD CTR</td>
<td>1,2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRAKES</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C/W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OI MDM</td>
<td>OF1</td>
<td>OF2</td>
<td>OF3</td>
</tr>
<tr>
<td>OI DSC</td>
<td>OF1</td>
<td>OF2</td>
<td>OF3</td>
</tr>
<tr>
<td>PL MDM</td>
<td>PL1</td>
<td>PL2</td>
<td></td>
</tr>
<tr>
<td>Minimum Equip reqd for SFT</td>
<td>Av Bay 1</td>
<td>Av Bay 2</td>
<td>Av Bay 3A</td>
</tr>
<tr>
<td>3 of 4 FF MDMs</td>
<td>FF1</td>
<td>FF2, FF4</td>
<td>FF3</td>
</tr>
<tr>
<td>3 of 4 ADTAs</td>
<td>1,3</td>
<td>2, 4</td>
<td></td>
</tr>
<tr>
<td>3 of 4 AAs</td>
<td>1, 4</td>
<td>2, 3</td>
<td></td>
</tr>
<tr>
<td>2 of 3 MLSs</td>
<td>1</td>
<td>2, 3</td>
<td></td>
</tr>
<tr>
<td>2 of 3 TACANs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2 of 3 FMCAs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3 of 5 GPCs</td>
<td>1,4</td>
<td>2, 5</td>
<td>3</td>
</tr>
</tbody>
</table>

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

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
ECLS SSR–12 (Cont)

If Av Bay 1 affected:

L4:G
1. cb AC2 \(\Phi\)A,\(\Phi\)B,\(\Phi\)C AV BAY 1 FAN B (three) – cl
   SM 67 ELECTRIC
   Note AC2 AMPS
L1
2. AV BAY 1 FAN B – ON
   If AC AMPS not incr 0.5–0.9 amps/\(\Phi\) or
   AV BAY 1 FAN \(\Delta P\) < 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:

L4:H
4. cb AC3 \(\Phi\)A,\(\Phi\)B,\(\Phi\)C AV BAY 2 FAN B (three) – cl
   SM 67 ELECTRIC
   Note AC3 AMPS
L1
5. AV BAY 2 FAN B – ON
   If AC AMPS not incr 0.5–0.9 amps/\(\Phi\) or
   AV BAY 2 FAN \(\Delta P\) < 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:

L4:H
7. cb AC1 \(\Phi\)A,\(\Phi\)B,\(\Phi\)C AV BAY 3 FAN B (three) – cl
   SM 67 ELECTRIC
   Note AC1 AMPS
L1
8. AV BAY 3 FAN B – ON
   If AC AMPS not incr 0.5–0.9 amps/\(\Phi\) or
   AV BAY 3 FAN \(\Delta P\) < 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:
F. IMU FAN RECONFIG

**SM 66 ENVIRONMENT**

If Av Bay 1 affected:
- 1. IMU FAN C(B) – OFF
- CRT: If IMU FAN ΔP < 3.7 or > 4.95
- L1 2. IMU FAN C(B) – ON
  - B(C) – OFF
- CRT 3. √ IMU FAN ΔP OK

If Av Bay 2 affected:
- L1 4. IMU FAN A(O) – OFF
- CRT: If IMU FAN ΔP < 3.7 or > 4.95
- L1 5. IMU FAN A(C) – ON
  - C(A) – OFF
- CRT 6. √ IMU FAN ΔP OK

If Av Bay 3A affected:
- L1 7. IMU FAN A(B) – OFF
- CRT: If IMU FAN ΔP < 3.7 or > 4.95
- L1 8. IMU FAN A(B) – ON
  - B(A) – OFF
- CRT 9. √ IMU FAN ΔP 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

If AC Bus is suspect, go to step 13

1. Isolate 3Φ bus per table

**NOTE**

3Φ AC UTIL PWR cbs are located
on pnl L4:B

**SM 67 ELECTRIC**

O13:A(C,E) 2. cb ESS 1BC (2CA,3AB) AC1(AC2,AC3) SNSR – cl
R1 3. Aff AC BUS SNSR – OFF

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>15</td>
<td>5</td>
</tr>
<tr>
<td>ΦB</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>ΦC</td>
<td>12</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>13</td>
<td>5</td>
</tr>
<tr>
<td>AC3</td>
<td>3Φ</td>
<td>1</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>
ECLS SSR−12 (Cont)

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
   √ Aff AC VOLTS > 110 and < 120
   √ Aff AC AMPS < 1
If AC VOLTS, AMPS limits exceeded:
5. Aff INV/AC BUS − OFF (tb−OFF)
   INV PWR − OFF (tb−OFF)
6. cb aff AC CONTR ΦA − cl
7. Repeat steps 4 thru 6 for ΦB, then ΦC
If no phases recovered:
O13:A(C,E)
8. cb ESS 1B(2A,3AB) AC1(AC2,AC3) SNSR − op
If any phase recovered:
9. Aff INV/AC BUS SNSR − AUTO
10. For recovered phases, all single Φ cbs − cl
If all 3 Φs recovered:
11. All 3Φ cbs − cl
If 2 or 3Φs recovered:
12. Perform FC RESTART, EPS SSR−6
13. Perform all AC Bus Loss Actions (assume shorted Φ), if reqd

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

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
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
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

L1     FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
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>SM 60 SM TABLE MAINT</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 – ITEM 16 +9 2 3 3 EXEC</td>
<td>CONSTANT ID – ITEM 16 +9 2 3 3 EXEC</td>
<td>CONSTANT ID – ITEM 16 +9 2 3 3 EXEC</td>
<td></td>
</tr>
<tr>
<td># Update of CONSTANT ID</td>
<td># Update of CONSTANT ID</td>
<td># Update of CONSTANT ID</td>
<td></td>
</tr>
<tr>
<td>CONSTANT VALUE – ITEM 17 +0 EXEC</td>
<td>CONSTANT VALUE – ITEM 17 +0 EXEC</td>
<td>CONSTANT VALUE – ITEM 17 +0 EXEC</td>
<td></td>
</tr>
<tr>
<td># Update of CONSTANT VALUE</td>
<td># Update of CONSTANT VALUE</td>
<td># Update of CONSTANT VALUE</td>
<td></td>
</tr>
</tbody>
</table>

• Notify MCC of disabled constant

TABLE B
O2 CONCENTRATION COMPUTATION INHIBIT

<table>
<thead>
<tr>
<th>SM 60 SM TABLE MAINT</th>
<th>PARAM ID – ITEM 1 +9 0 0 0 0 EXEC</th>
</tr>
</thead>
<tbody>
<tr>
<td># Update of PARAM ID</td>
<td>INH – ITEM 10 EXEC</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>
<thead>
<tr>
<th>SM 60 SM TABLE MAINT</th>
<th>CONSTANT ID</th>
<th>NAME</th>
<th>CONSTANT ID</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM 16 + __ __ __ __ EXEC</td>
<td>(ID numbers below)</td>
<td>ITEM 17 + __ EXEC</td>
<td>(1 = transducer is OK, 0 = transducer is faulty)</td>
<td></td>
</tr>
<tr>
<td>CONSTANT ID</td>
<td>NAME</td>
<td>CONSTANT ID</td>
<td>NAME</td>
<td></td>
</tr>
<tr>
<td>925521</td>
<td>SYS 1 N2 TANK 1 TEMP FLAG</td>
<td>925526</td>
<td>SYS 1 N2 TANK 4 TEMP FLAG</td>
<td></td>
</tr>
<tr>
<td>925522</td>
<td>SYS 1 N2 TANK 2 TEMP FLAG</td>
<td>925527</td>
<td>SYS 2 N2 TANK 3 TEMP FLAG</td>
<td></td>
</tr>
<tr>
<td>925523</td>
<td>SYS 2 N2 TANK 1 TEMP FLAG</td>
<td>925528</td>
<td>SYS 2 N2 TANK 4 TEMP FLAG</td>
<td></td>
</tr>
<tr>
<td>925524</td>
<td>SYS 2 N2 TANK 2 TEMP FLAG</td>
<td>925529</td>
<td>SYS 1 N2 PRESS FLAG</td>
<td></td>
</tr>
<tr>
<td>925525</td>
<td>SYS 1 N2 TANK 3 TEMP FLAG</td>
<td>925530</td>
<td>SYS 2 N2 PRESS FLAG</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>SM 60 SM TABLE MAINT</th>
<th>CONSTANT ID</th>
<th>NAME</th>
<th>VEHICLE CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM 16 + __ __ __ __ EXEC</td>
<td>(ID numbers below)</td>
<td>ITEM 17 + __ EXEC</td>
<td>(1 = tank active, 0 = tank inactive)</td>
</tr>
<tr>
<td>CONSTANT ID</td>
<td>NAME</td>
<td>VEHICLE CONFIG</td>
<td></td>
</tr>
<tr>
<td>925531</td>
<td>SYS 1 N2 TANK 1 FLAG</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>925532</td>
<td>SYS 1 N2 TANK 2 FLAG</td>
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FREE WATER LEAKING FROM HUM SEP

CAUTION
Leave one Humidity Sep running continuously. Deactivating both Humidity Separators simultaneously could cause further flooding of Humidity Sep and damage Humidity Sep when restarted.

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
      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. Perform HUM SEP AIR OUTLET H2O ABSORPTION (IFM)
8. Go to HUM SEP CONTINGENCY H2O REMOVAL (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 1SYS 2 vlv (two) – OP
   ISOL SYS 1SYS 2 vlv (two) – OP
   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 1SYS 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
ECLS SSR–18
SMALL SUPPLY H2O LEAK ISOL

NOTE
This procedure assumes that MCC is available for assistance and would inform crew of tank C leak (which is normally isolated) or dump line leak at nozzle. This procedure also assumes that tanks B, D are tied together and that tank C is isolated. Also note that Supply H2O tanks remain pressurized during troubleshooting.

SM 66 ENVIRONMENT

L1 1. FLASH EVAP CNTLR PRI A,B – OFF
R11L SPLY H2O XOVR vlv – CL (tb–CL)
B SPLY ISOL VLV – CL (tb–CL)
MCC,CRT If no TK QTY decr or incr at a reduced rate:
Perform steps 8, 10 >>
R11L SPLY H2O DUMP ISOL VLV – CL (tb–CL)
MCC,CRT If no SPLY H2O TK QTY decri or incr at a reduced rate:
Perform steps 8–11 >>
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 decri 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 decri:
ML31C SPLY H2O TK D INLET, OUTLET (two) – CL (tb–CL)
CRT If SPLY H2O TK QTY D decri:
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 decri or incr at a reduced rate:
Perform steps 6, 8, 9, 11 >>
MCC,CRT If no SPLY H2O TK QTY decri 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)
B OUTLET – OP (tb–OP)
CRT If SPLY H2O TK QTY B decri:
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 H20 decri or ~0:
Perform steps 9–11 using FES CNTRL PRI B on MCC call
R11L SPLY H2O TK B INLET – OP (tb–OP) >>
Perform steps 6, 8, 9, 11 (leak at tank B inlet manifold)
SPLY H2O TK B OUTLET – OP (tb–OP) >>
MCC,CRT 5. IF SPLY H2O TK QTY A decri or incr at reduced rate:
R11L SPLY H2O GALLEY SPLY VLV – CL (tb–CL)
MCC,CRT If SPLY H2O TK QTY A decri or incr at reduced rate:
R11L SPLY H2O TK A INLET – CL (tb–CL)
MD23R Open middeck pnl and disconnect lower (FC) QD on microbial filter
CRT If SPLY H2O TK QTY A decri:
Perform step 6
Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK A on MCC call
R11L 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 SPLY VLV – OP (tb–OP)
MD80R Open middeck pnl and inspect for free H2O
Perform steps 6, 8, 9, 11 on MCC call

MCC to restore Galley ops >>

07/22/03 6–103 MAL/ALL/GEN F
ECLS SSR–18 (Cont)

6. H2O TK N2 ISOL SYS 1, SYS 2 vlv – CL
   SPLY H2O GN2 TANK A SPLY – OP
   VENT – VENT
   Expect audible vent and ‘S66 WASTE H2O PRES’ alert for Waste Pres ‘↓’

7. SPLY H2O GN2 TANK A SPLY – OP
   VENT – PRESS
   H2O TK N2 ISOL SYS 1, SYS 2 vlv – OP
   Expect ‘S66 CAB H2O N2 P1, P2’ msgs for H2O TK N2 P ‘↓’

8. SPLY H2O XOVR vlv – OP (tb–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 troubleshooting.

**SM 66 ENVIRONMENT**

**CREW**
1. Report any increase in pungent odor

**ML31C**
- WASTE H2O DUMP ISOL VALV - CL (tb–CL)

**CRT**
2. If WASTE H2O QTY 1 decr:
   - **L1**
     - HUM SEP A,B – OFF
     - Terminate WCS use
   - **ML31C**
     - WASTE H2O TK 1 VALV – CL (tb–CL)
   - **CRT**
     - If WASTE H2O QTY 1 decr:
       - **L1**
         - FLASH EVAP CNTLR PRI A,B – OFF
       - **MO10W**
         - H2O TK N2 ISOL SYS 1,2 VALV (two) – CL
       - **ML26C**
         - SPLY H2O GN2 TANK A SPLY – OP
     - VENT – VENT
     - Expect ‘S66 WASTE H2O PRES’ msg
     - If WASTE H2O QTY 1 decr AT SAME RATE with no pungent odor (Bellows leak):
       - Perform steps 5, 6, 8 >>

4. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for WST TANK

**ML31C**
- WST H2O TK 1 VALV – CL (tb–CL)

**MCC,**
- Perform steps 5, 6, 8 >>

5. MCC for Waste Dump plan >>

**CLEAN UP STEPS**
5. MCC to install CWC at CONT – XTIE/WST H2O QD
6. MCC to install WST TK N2 Supply with IFM
7. MCC to install CWCs at Humidity Separator outlet and WCS Urine QD

**ML26C**
8. SPLY H2O GN2 TANK A SPLY – OP
   - VENT – PRESS
   - MO10W
     - H2O TK N2 ISOL SYS 1,2 VALV (two) – OP
     - Expect ‘S66 CAB H2O N2 P1, P2’ msgs for H2O TK N2 P ↓
   - **L1**
     - HUM SEP B – ON
     - Perform TOPPING FES STARTUP (ORB OPS, ECLS)
     - Continue WCS ops as reqd
9. MCC to perform SUPPLY(WASTE) H2O PURGE FROM DUMP LINE(S) (IFM)
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 SPLY H2O QTY C,D decr or filling at a decr rate:
   If SPLY H2O QTY A,B > 90%, provide ullage in Tk A,B (on MCC call):
      1. Perform steps 4–5 of CWC FILL using SHUTTLE/ISS H2O CONTAINER FILL (ORB OPS, ECLS); no samples or additives required
         When SPLY H2O QTY A < 80% on MCC call:
            2. Perform step 9 of CWC FILL using SHUTTLE/ISS H2O CONTAINER FILL (ORB OPS, ECLS), then:
            3. If SPLY H2O QTY C,D still decr or filling at a decr rate, continue procedure at step 31; otherwise, continue with step B
MCC/CRT Determine if external airlock flown
SM 177 EXTERNAL AIRLOCK
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 call >>

B. DETERMINE IF EXTERNAL AIRLOCK FLOWN

SM 66 ENVIRONMENT

C. LEAK DETERMINATION A/B SIDE
MCC/CRT If SPLY H2O QTY A,B decr or filling at a decr rate:
R11L 7. SPLY H2O GALLEY SPLY VLV – CL (tb–CL)
MCC/CRT If SPLY H2O QTY A,B incr at nominal rate (leak in Galley):
   8. Perform steps 53–54 using FES PRI B on MCC call
   9. √ MCC to restore Galley ops >>
R11L 10. SPLY H2O DUMP ISOL vlv – CL (tb–CL)
MCC/CRT If SPLY 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 call >>
   13. TK B OUTLET (two) – CL (tb–CL)
MCC/CRT If SPLY H2O QTY A decr (leak in TK A):
ML66BA 14. cb MNB SPLY H2O TK B INLET - cl
   15. SPLY H2O TK INLET – OP (tb–OP)
   16. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK A on MCC call; dump TK A to ~0%, then:
      17. √ MCC to restore Galley ops
      18. Perform steps 51–55 using FES PRI B on MCC call >>
MCC/CRT If SPLY H2O QTY B decr (leak in TK B):
   20. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK B on MCC call; dump TK B to ~0%, then:
      21. Perform steps 51–55 using FES PRI B on MCC call >>
MCC/CRT If SPLY H2O QTY C,D not filling or filling at a decr rate (leak in Inlet Manifold or Galley Supply Line):
   22. Open LEB access pnil on middeck floor and disconnect lower (FC) QD from Microbial Filter (IFM, IFM PROCEDURES, GALLEY, FAILED SUPPLY LINE, BYPASS, step 1)
      If SPLY H2O QTY C,D filling at a nominal rate (leak in Galley Supply Line):
         23. √ MCC to restore Galley ops
         24. Perform steps 51, 53–55 >>
      If SPLY H2O QTY C,D still not filling or filling at a decr rate (leak in A/B Inlet Manifold; depress H2O Tanks):
         25. Open LEB access pnil on middeck floor and reconnect lower (FC) QD from Microbial Filter
         26. Perform steps 48–53, 55 >>
ML66BA 27. cb MNB SPLY H2O TK B INLET – cl
   28. SPLY H2O TKA,B INLET (two) – OP (tb–OP)
   29. Open LEB access pnil on middeck floor and reconnect lower (FC) QD to Microbial Filter
   30. Perform steps 54–55 using FES PRI B on MCC call >>

Cont next page
D. **LEAK DETERMINATION C/D SIDE**

**MCC/CRT**
- If SPLY H2O QTY C,D decr:

**MCC/CRT**
- If SPLY H2O QTY C,D const (leak in FES Feedline B):
  - 32. Perform step 54 using FES PRI A on MCC call >>

**R11L**
- 33. SPLY H2O TKC INLET,OUTLET (two) – CL (tb–CL)

**ML31C**
- 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)
  - 36. TKD INLET – OP (tb–OP)
  - 37. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK C on MCC call; 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)
  - 40. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK D on MCC call; 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)
  - 42. TKD INLET – OP (tb–OP)
  - 43. Perform steps 54–55 using FES PRI A on MCC call >>

**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)
  - 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 ↓

**R11L**
- 50. SPLY H2O GN2 TK VENT vlv – VENT

**ML31C**
- 51. DUMP ISOL – OP (tb–OP)

**MO13Q**
- 52. GALLEY SPLY 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
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 vlvs (two) – CL
- O₂ REG INLET SYS 1, SYS 2 vlvs (two) – OP

MA9L
- Unstow O₂ Bleed Orifice Assembly

MO69M
- LEH O₂ 8 vlvs – CL
- Insert O₂ Bleed Orifice Assembly into LEH O₂ 8 QD
- LEH O₂ 8 vlvs – OP

CABIN REPRESS

SET C&W LIMITS

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<th>PARAMETER NAME</th>
<th>C/W</th>
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NOTE
Expect possible ‘S66 CAB O₂ FLO 2’ C&W alarm during execution of next step

MO10W
- 14.7 CAB REG INLET SYS 2 vlvs – OP

* If C&W alarm:
  * CABIN ATM and/or B/U ‘S66 CABIN PPO2 A(B)’
  * Expect possible ‘S66 CAB N₂ FLO 1’ C&W alarm during execution of next step
  * 14.7 CAB REG INLET SYS 2 vlvs – CL
  * When N₂ FLOW SYS 1 < 1.0 or CABIN PRESS > 14.7, 14.7 CAB REG INLET SYS 1 vlvs – CL

When O₂ FLOW SYS 2 < 1.0 or CABIN PRESS > 14.7, 14.7 CAB REG INLET SYS 2 vlvs – CL

If prior to sleep:
- 14.7 CAB REG INLET vlvs (two) – CL

RESET C&W LIMITS

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Pen and Ink PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS) to perform this procedure each sleep period if necessary
ECLS FRP–2
POST–FIRE CABIN CLEANUP CONTINUATION

NOTE
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
   c. Report contaminant levels to MCC

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LiOH/ATCO/CHARCOAL CHANGEOUT CRITERIA
If ATCO canister not yet installed:
   2. When HCL < 5 ppm, install ATCO (in place of one LiOH canister)
If CO2 Removal Sys flown:
   3. Replace charcoal canister after 2 hr
   4. When HCN < 0.7 ppm or stable, replace charcoal canister with LiOH canister
If no CO2 Removal Sys flown:
   5. Every 15 min replace one LiOH canister
   6. When HCN < 0.7 ppm or stable, changeout LiOH canister(s) per preflight schedule
   7. When CO < 55 ppm replace ATCO canister with LiOH canister

WARNING
If any crewmember exhibits adverse symptoms when visors are raised, lower all visors. Symptoms could include the following:
Irritation of the eyes, nose, throat
Cough, difficulty breathing
Headache, nausea

8. Raise visors on MCC call
   * If loss of communications, visors/QDMs down until all the following limits are met: *
     * No visible indication of smoke in cabin
     * Cabin smoke detector readings are < 1.2
     * No symptoms of smoke inhalation
     * HCN < 0.7 ppm  HCL < 1 ppm  CO < 20 ppm

9. If symptoms experienced prior to donning QDM/LES, QDM/LES may be doffed only if all crewmembers are symptom free for > 10 min

10. If CO2 Removal Sys flown, on MCC call, perform CO2 REMOVAL SYS CNTLR 1(2)
    CONFIG (ORB OPS, ECLS), then:

11. If QDM/visor flow must continue, initiate O2 control: perform CONTINGENCY CABIN O2
    CONTROL, ECLS, FRP–3; otherwise, Y/MCC for backout steps >>
NOTE
This procedure is applicable for:
- Cabin/Av Bay Fire
- Level 4 Hazardous Spill
- Unisolatable O2 Leak into cabin

For Av Bay fires: Ensure purge initiated before start of depress

TMAX DETERMINATION
1. Determine TMAX from table & graph below:
   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. If TMAX < 3 hr, install ATCO if not already performed

   a. Time to 8 psi (from chart at right) = ______ hr
   b. Time of purge (from graph below) + ______ hr
      Latest TIG: - 1:00 hr
   c. TMAX = ______ hr

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DEPRESS & PURGE SETUP

MO32M, MO69M, C6

3. LEH 1(2 . . . 8) – OP (as reqd)

L2

4. O2 XOVR SYS 1,2 (two) – OP
5. O2/N2 CNTLR VLV SYS 1,2 (two) – OP (N2 flow)
If LES helmet donned:
   6. TABS/Visor – CL
   7. LES O2 – ON

MO10W

8. 14,7 CAB REG INLET SYS 1, SYS 2 vlv (two) – CL
9. O2 REG INLET SYS 1, SYS 2 vlv (two) – CL

START DEPRESS TO 8 PSI

AW82B

10. AIRLK DEPRESS vlv cap – vent, remove, stow
11. Throttle AIRLK DEPRESS vlv until desired EQ dP/dT is established as follows per table below; tape in place
    (dP/dT sensor response lags approx 1 min)

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>EQ dP/dT</th>
<th>AIRLK DEPRESS VLV CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire (Cab/Av Bay)</td>
<td>– 0.10</td>
<td>Throttled</td>
</tr>
<tr>
<td>Haz Spill</td>
<td>– 0.10</td>
<td>Throttled</td>
</tr>
<tr>
<td>O2 Leak – 3 (lbm/hr)</td>
<td>– 0.02</td>
<td>Throttled</td>
</tr>
<tr>
<td>6</td>
<td>– 0.04</td>
<td>Throttled</td>
</tr>
<tr>
<td>9</td>
<td>– 0.07</td>
<td>Throttled</td>
</tr>
<tr>
<td>12</td>
<td>– 0.10</td>
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<td>15</td>
<td>– 0.13</td>
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<td>18</td>
<td>– 0.16</td>
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<tr>
<td>21</td>
<td>– 0.19</td>
<td>Throttled</td>
</tr>
<tr>
<td>24</td>
<td>– 0.22</td>
<td>Throttled</td>
</tr>
</tbody>
</table>

NOTE
If SM SYS SUMM not available, EQ dP/dT = dP/dT x 14.7/Cab Press

If prior to OPS 3, when Cab Press < 10.0 psia:
12. CM1 perform LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN)
   CM2 continue with procedure
O2 MANAGEMENT DURING 8 PSIA PURGE

When Cab Press = 8 psia:
- Maintain PPO2 between 2.8 and 3.05 psia for the duration of purge

13. Close Inner Hatch

If O2 leak ≤ 9 lb/hr or ≤ 4 crew on QDM/LESs:

14. EQUAL vlv (one) − OFF

When PPO2 ≥ 3.05:

15. EQUAL vlv (without cap) − NORM, install cap

When PPO2 ≤ 2.8:

16. EQUAL vlv (one) − remove cap, OFF

17. Continue O2 mgmt per steps 15, 16

18. When ready for entry or LES/QDMs no longer reqd, go to step 24

When PPO2 ≥ 3.05:

19. EQUAL vlv (without cap) − NORM, install cap

When PPO2 ≤ 2.8:

20. EQUAL vlv cap (one) − remove, temp stow

21. EQUAL vlv cap − reinstall

Other EQUAL vlv − NORM, capped

22. Continue O2 mgmt per steps 20, 21

23. When ready for entry or LES/QDMs no longer reqd, go to step 24

END PURGE AND REPRESS

NOTE

~82 lbm N2 reqd for total repress from 8 psia

24. Prepare for entry or purge termination

If QDM/Visor O2 reqd through entry:

25. Post D/O Burn:

14.7 CAB REG INLET SYS 1,SYS 2 (two) – OP >>

If QDM/Visor O2 no longer reqd:

26. Inner hatch EQUAL vlv caps (two) − remove, stow

27. When ΔP < 0.5, open, stow Inner Hatch

28. AIRLK DEPRESS vlv − CL

29. vlv cap − reinstall

30. O2/N2 CNTLR SYS 2 − AUTO

31. O2 REG INLET SYS 2 − OP

32. 14.7 CABIN REG INLET SYS 1,SYS 2 (two) − OP

If Av Bay fire, √MCC to terminate AV BAY PURGE

33. Disconnect, stow IFM hoses and free fluid nozzle

If Cab Press > 13 psia following repress, backout of LOSS OF CAB PRESS PWRDN may be performed

If N2 not depleted after repress, reconfig PCS:

34. Go to PCS 1(2) CONFIG (ORB OPS, ECLS)
### 7.1 FC REAC/PMP/STACK T

<table>
<thead>
<tr>
<th>7.1a</th>
<th>RESERVED</th>
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<tr>
<td>7.1b</td>
<td>‘S69 FC STACK T 1(2,3)’</td>
<td>FC STACK T 1(2,3) ↑↓</td>
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<tr>
<td>7.1c</td>
<td>‘S69 FC H2 PUMP 1(2,3)’</td>
<td>H2 PUMP ↑↓</td>
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<td>FC PURGE SEQ</td>
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</thead>
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<td>‘S67 MAIN BUS V A(B,C)’</td>
<td>FUEL CELL VOLTS ↑↓, FUEL CELL AMPS ↑↓, MAIN BUS V A(B,C) ↑↓</td>
</tr>
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<tr>
<td>7.3d</td>
<td>‘S69 FC EXIT T 1(2,3)’</td>
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<td>FUEL CELL COOL P ↑↓ (CIL)</td>
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<td>‘S69 FC H2O PRI 1(2,3)’</td>
<td>FUEL CELL H2O LN T ↑↓</td>
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<td>7.3g</td>
<td>‘S69 FC H2O RLF 1(2,3)’</td>
<td>FUEL CELL H2O RLF VLV T ↑↓, FUEL CELL H2O RLF LINE T ↑↓</td>
<td>7–32</td>
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<td>7.3h</td>
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<td>7.3i</td>
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<td>FUEL CELL O2(H2) PURGE</td>
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<td>7.3j</td>
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<td>FUEL CELL O2(H2) FLOW ↑</td>
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<td>7.3k</td>
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<td>‘168 PALLET V A(B)’</td>
<td>PALLET VOLTS ↓</td>
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<tr>
<td>7.4c</td>
<td>‘168 PALLET T’</td>
<td>PALLET TEMP ↑↓</td>
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<th>AC VOLTS 1(2,3) ↑↑</th>
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<td>‘S67 AC OVLD 1(2,3) ↓’</td>
<td>AC OVLD 1(2,3) ↓</td>
<td>7–47</td>
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<tr>
<td>7.5c</td>
<td>‘S67 AC AMPS 1(2,3)’</td>
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<td>7–54</td>
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7.6a RESERVED .............................................. not used

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‘168 O2(H2) TK P 6(7,8,9)’

7.6c RESERVED .............................................. not used

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7.6e RESERVED .............................................. not used

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7.6g RESERVED .............................................. not used

7.6h RESERVED .............................................. not used

7.6i RESERVED .............................................. not used

7.6j RESERVED .............................................. not used

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‘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>FLC1 (CIL)</td>
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<td>7–122</td>
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<td>EPS SSR–24</td>
<td>R1A1</td>
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<td>EPS SSR–25</td>
<td>A6&amp;A14</td>
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<td>FLC2 (CIL)</td>
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<td>SSR-147</td>
<td>MNB/C POD/AMC2</td>
<td>7–281</td>
</tr>
<tr>
<td>SSR-148</td>
<td>MNC/A POD/AMC3</td>
<td>7–281</td>
</tr>
<tr>
<td>SSR-150</td>
<td>ALTERNATE PRIMARY PAYLOAD PWR</td>
<td>7–282</td>
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<td>SSR-200</td>
<td>AC PWR TRANSFER CABLE</td>
<td>7–283</td>
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<td>SSR-201</td>
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<td>PREFLIGHT TEST BUS USE</td>
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- ‘SM1 MAIN BUS V A(B,C)’
- ‘SM1 DC VOLT FC 1(2,3)’ – FUEL CELL VOLTS ↑↓, FUEL CELL AMPS ↑↓, MAIN BUS V A(B,C) ↑↓ 7–18
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Confirming cue of STARTUP HTR activity is READY FOR LOAD tb – bp whenever htr cycles ON.

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.

FC STARTUP HTR may be used to cntl STACK T to acceptable temp by holding or maintaining FC START sw in START.

If FC operating and:
- STACK T > 243.7 or < 172.5 degF
If FC shutdn and:
- STACK T > 243.7 or < 50.8

FC STACK TEMP ind:
- Off-scale LOW or HIGH
- > 172 degF and < 243 degF
- < 172 degF
- > 243 degF

Ops < 172 degF may result in FC damage.

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

Perform BUS TIE (Cue Card)

Possible Freon Loop Problem

FC THERMAL CONTROL AND SUSTAINER HTR FAILED OFF

Maintain FC START sw in START

Restore nominal bus–tie config

Perform BUS TIE (Cue Card)

Observe amps of aff FC and tied FC

Observe amps of aff FC and tied FC

Perform BUS TIE (Cue Card)

B/U C/W FAILURE OR TRANSIENT

WARNING in text ?

WARNING

If FC LOAD (FC VOLTS X AMPS)/STACK T

< 3.5 < 180 or > 212

< 3.5 > 190 or < 222

< 7.5 > 198 or < 238

FC < 50.8 or SHTD > 212

12/21/99
Loss of correct precondition check for STACK T FDA Class 3 limit set based on kW for this FC

11. Total FC kW:
   - > 18
   - ≤ 18

15. SM SYS SUMM 1
   - Tie all three MN Buses
     - MN BUS TIE A.B.C (three) – ON (tb–ON)

17. Disconnect aff FC from MN BUS
   - ESS BUS SOURCE FC1(FC2,FC3) – OFF
   - FC/MN BUS A(B,C) – OFF (tb–OFF)

19. Aff FC volts
   - DC Volt/Amp sel – FC1 (FC2,FC3)
   - > 32.5 V ?

23. Inhibit FC Startup Htr
   - FC VOLTS SNSR SHIFT (CONTINUE OPS)

24. Aff MN BUS voltage
   - Voltage/ MN BUS voltage agree within 1V ?

25. Aff FC current
   - Current < 54 amps or > 360 amps ?

27. Aff FC current
   - Current < 54 amps or > 360 amps ?

28. STARTUP HTR FAILED ON
   - FC VOLTS SNSR SHIFT (CONTINUE OPS)

31. Reconnect aff FC to MN Bus
   - FC/MN BUS A(B,C) – ON (tb–ON)
   - ESS BUS SOURCE FC1(FC2,FC3) – ON

32. Restore nominal bus–tie config

33. Is STACK T within proper limits for FC kW level ?

34. TRANSIENT ALARM OR FDA FAILURE

35. TRANSPORT ALARM OR FDA FAILURE

4. 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 ∆amps changes.

If loss of comm, reset ∆amps limits to present value ± 40 (± 40 takes into account possible differences in FC V–I curves which would cause a ∆amps change with a load change).

Depending on load, may take several hours for performance change. Do not purge this 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.
7–11

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 DEG F OF EACH OTHER DURING COOLDOWN.

LOWER LIMIT ON ALLOWABLE TEMP FOR REUSABLE FC IS 48 DEG F (INCLUDES XDRCR ERROR). FC MUST BE RESTARTED TO MAINTAIN TEMP ABOVE 48 DEG F. 50.8 DEG F WAS SELECTED DUE TO BEING CLOSEST VALUE TO 48 DEG F IN PRIMARY C/W SYSTEM.

WITH LOSS OF FC STACK T, FC TEMP MAY BE OBTAINED ONLY FROM FC EXIT T.

FC SUSTAINING HEATER MAINTENING STACK TEMP.

AFTER COOLDOWN, FC MAY BE USABLE ON CYCLIC BASIS OR WITH EXTENSIVE VEHICLE PWRDWN.

LEAVE FC IN STBY MODE. MCC ANALYSIS MAY DETERMINE LATER NEED FOR FC SHUTDOWN.

DISCONNECT AFF FC FROM MN BUS.

CLASS 3 ALARM FAULT OR TRANSIENT

STBY MODE.

MCC ANALYSIS MAY DETERMINE LATER NEED FOR FC SHUTDN.

GO TO FC SAFING (ORB PKT, EPS).

GO TO LOSS OF 1 FC (ORB PKT, PWRDWN).

SM 60 SM TABLE MAINT.

ITEM 1
+0 4 5 0 1 2 0 (220, 320) EXEC
ITEM 10 EXEC
ITEM 15 EXEC

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC CURRENT SNSR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T < 50.8 DEG F AND [EXIT T – STACK T] < 15 DEG F ?

GO TO FC RESTART, EPS SSR–6

YES

NO

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR FAILURE

FC CURRENT SNSR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)

FC STACK T XDRCR BIAS OR FAILURE

FC STACK T XDRCR BIAS OR FAILURE

INHIBIT FC STACK T PRI AND B/U C/W.

(CRT)
**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  
FC2 CNTLR – ON  
FC3 CNTLR – ON (R1)  
FC1, FC2, FC3 RDY  
tb (three) – gray  
FC1, FC2, FC3  
COOL PUMP ∆P  
tb (three) – gray

**7.1c H2 PUMP ±**

1. SM 69 FUEL CELLS  
Which conditions exist for FC H2 PUMP (VOLTS)?
   - < 0.2
   - > 0.2 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________  

5. POSSIBLE 2Φ FC H2 PUMP OPERATIONS

6. POSSIBLE DEGRADED H2 PUMP

7. (CRT)  
   - Note aff AC AMPS  
   - φA________  
   - φB________  
   - φC________  

8. STALLED H2 PUMP OR PUMP PWR LOSS  
3Φ AC AMPS decr 0.7–0.9 amps/Φ  
or 2Φ AC AMPS decr 0.9–1.2 amps/Φ?

9. Go to FC SHUTDN (Cue Card)

10. SHIFTED OR FAILED XDCR  

11. Restart all FC  
   - Perform FC POWERUP, 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)

13. Normal H2 Pump range 0.28–0.65 volt. See Table A

14. If degradation of H2 pump worsens, FC should be shut down so that pump could be used during entry

15. Non-satisfactory H2 pump ops would eventually be reflected in FC amps (low) SSDV (erratic), exit temp, and FC pH (event)

16. 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

From ORB PKT, EPS, FC 1(2,3) H2 PUMP, step 4

From ORB PKT, EPS, FC 1(2,3) H2 PUMP, step 7

From ORB PKT, EPS, FC 1(2,3) H2 PUMP, step 8
### FC PUMP PACKAGE POWER RANGES

#### 3-PHASE OPERATION

<table>
<thead>
<tr>
<th>LOAD</th>
<th>COOLANT PUMP</th>
<th>H2 PUMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AMPS/PHASE</td>
<td>AMPS/PHASE</td>
</tr>
<tr>
<td>NORMAL</td>
<td>0.51</td>
<td>0.3</td>
</tr>
<tr>
<td>OVERLOAD</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>STALL</td>
<td>1.0</td>
<td>1.2</td>
</tr>
</tbody>
</table>

#### 2-PHASE OPERATION

<table>
<thead>
<tr>
<th>LOAD</th>
<th>COOLANT PUMP</th>
<th>H2 PUMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL (open motor winding)</td>
<td>0.62</td>
<td>0.45</td>
</tr>
<tr>
<td>NORMAL (1Φ 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>
</tbody>
</table>

Table A
EPS

FC PURGE TEMP

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

1 GPC PURGE OR INSTRUMENTATION
FAILURE. LOSS OF AUTO PURGE
SEQUENCE

2 Go to FUEL CELL PURGE –
MANUAL (ORB OPS, EPS)

1 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

2 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

FC PURGE SEQ

If:

S/W detects AUTO
PURGE SEQ, Purge line htrs
ON–signal has
been lost after
GPC AUTO
PURGE SEQ
initiated

Nominal Config:
(R11U)
FC PURGE HTR –
GPC

2 MDM CHANNEL OR
INSTRUMENTATION
FAILURE. LOSS OF AUTO PURGE
SEQUENCE

2 Go to FUEL CELL PURGE –
MANUAL (ORB OPS, EPS)
After individual pH alarm, 10 min could elapse before H2O Line pH alarm activates.

FC health and performance will be monitored for 1 hr. If signs of FC flooding occur, FC Safing will be performed.

May take as long as 20 min for aff FC H2O to reach galley QD.

Waiting 1 hr may allow transient pH condition to clear.
TKB may be contaminated. TKB will be dumped and then flushed per nominal TKB management.

SPLY TKA will be dumped periodically to flush pH out of system.

If not previously performed, config FES and SPLY H2O TKs.

Results of FC H2O SPLLY LINE FLUSH (IFM):

- TK A usable
- TK A not usable (contaminated)

On MCC call, perform SUPPLY/WASTE H2O DUMP (ORB OPS, ECLS) for contaminated tanks.

Dump SPLY H2O TK A

Perform FC H2O SPLLY LINE FLUSH (IFM)

Reconfig FES and SPLY H2O TKs
1. 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.

2. FC Stack Temp Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU.

3. If hi amps caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications.

4. Consult MCC for powerup.

5. If SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:

   \[ \text{AMPS (±50)} = \text{O}_2 \text{ FLOW} \times 47 \]
   \[ \text{AMPS (±68)} = \text{H}_2 \text{ FLOW} \times 377 \]

6. 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:

(Cont)

- PL PRI FC3 – OFF (tb–OFF)
- PL PRI MNB – OFF (tb–OFF)
- PL PRI MNC – ON (tb–ON)

If FC operating:

- FC/MAIN BUS A(B,C) – OFF (tb–OFF)
- MN BUS TIE A(B,C) – OFF (tb–OFF)
- MN BUS TIE B(C,A) – OFF (tb–OFF)

If FC shutdn:

- Aff FC/MN BUS – OFF (tb–OFF)
- Aff FC REAC (two) – CL

If FC operating and:

- VOLTS < 27.5 vdc > 32.5 vdc
- FC AMP < 54 > 410

If FC shutdn and:

- VOLTS < current C/W FDA lower limit, > current C/W FDA upper limit

If FC operating and:

- C/W FAULT OR TRANSIENT

No of the above
13-14

15
SM 67 ELECTRIC

FC AMPS > 360 ?

YES

NO

16
Coming thru block 4 ?

YES

NO

17
Is FC VOLTS still < 27.5 or
MN VOLTS still < 27.0 ?

YES

NO

18
SM 69 FUEL CELLS

Does FC AMPS (± 50) = O2 FLOW x 47.5
or
FC AMPS (± 68) = H2 FLOW x 377 ?

YES

NO

19
All FC connected to PRI Payload Bus ?

YES

NO

20
DEGRADED FC

21
PL disconnect

(R1)

- PL PRI (three) –
OFF (tb-OFF)

FC AMPS > 360 ?

YES

NO

22
Perform PRIORITY PWRDN (ORB PKT) as reqd

FC AMPS > 360 ?

YES

NO

23
All MN Buses powered after untie ?

YES

NO

24
TIE BUS SHORT

25
PAYLOAD SHORT

26
MN BUS OR TIE BUS SHORT

27
Go to EPS BUS LOSS, SSR–10 MNA (SSR–30 MNB, SSR–50 MNC)

28
If any MN BUS not pwrd:

- Perform BUS TIE (Cue Card)

29
EXCESSIVE FC LOADING

30
Go to MN BUS UNDERVOLTS/
FC VOLTS, step 6
(ORB PKT, EPS)

31
Perform MANUAL PURGE (ORB OPS, EPS) of
degraded fuel cell

FC volt/amps within .5V of nominal FC Performance
Curve, FUEL CELL V–I PERFORMANCE PLOT (ORB OPS, EPS) ?

YES

NO

32
Go to FC SAFING (ORB PKT, EPS)

33
Continue to use FC with bus tied
and reduced loads

34

MCC analysis reqd before increasing loads on FC

7–19
Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit class 3 FDA via TMBU. Class 2 FDA still exists.

If SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:

\[ \text{AMPS} \ (\pm 50) = \text{O}_2 \ FLOW \times 47.5 \]

\[ \text{AMPS} \ (\pm 68) = \text{H}_2 \ FLOW \times 377 \]

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.

Shorts between FC and main bus contactor, short at main terminal, or short at main terminal.

WARNING

Do not stop FC until COOL P < 15 and STACK T < 243.

- Go to EPS BUS LOSS, SSR–10 MNA (SSR–30 MNB, SSR–50 MNC)
- Go to FC SHUTDN (Cue Card)
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.
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.

Due to limited resolution of F9 meter, close comparison may be unobtainable.
7.3d FUEL CELL EXIT T \(\uparrow\downarrow\)

1. Is FC shutdn? 
   - YES: "MCC, or if MCC not available, continue"
   - NO: "Wait 2 min"

2. SM 69 FUEL CELLS FC EXIT T
   - Wait 2 min
   - NEITHER \(\uparrow\) NOR \(\downarrow\)

3. SM OPS 2 (4) available?
   - NO: "FC EXIT T > 164 and incr?"
   - YES: "FC COOLANT LOOP FAILURE"

4. CLASS 3 C/W ALARM FAULT OR THERMAL TRANSIENT

5. FC EXIT T > 164 and incr?
   - NO: "FC COOLANT LOOP FAILURE"
   - YES: "FC1, FC2, FC3 (three) COOL T > 140 degF?"

6. FC1 (FC2, FC3) H2O LN T < EXIT T?
   - YES: "Perform MN BUS TIE (Cue Card)"
   - NO: "FREON COOLANT LOOP PROBLEM"

- Transient loads may cause EXIT T < LN T for up to 2 min
- Data indicates H2O LN T < EXIT T by up to 15 degF
- 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

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
MCC will monitor FC performance by observing \( \Delta \text{amps} \) change.

If loss of comm., reset \( \Delta \text{amps} \) limits to present value ± 40 (± 40 takes into account possible differences in FC V–I curves which would cause a \( \Delta \text{amps} \) 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 ~3% change in KOH concentration.
Nominal KOH concentration is ~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 sufficient 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.

ITEM 1 + 0 4 5 0 1 3 0 (230,330) EXEC

ITEM 10 EXEC
If FC operating and:
- COOL P < 50 psia
- > 75 psia
If FC shutdn:
- COOL P < current C/W FDA lower limit
- > 75 psia

1. **ERRATIC FC COOL T on SM 69 display may also be indicative of pre–htr internal leak.**

2. **S69 FC COOL P 1(2,3)**

3. **BFS SM1 FC COOL P 1(2,3)**

If FC operating and:
- COOL P < 50 psia
- > 75 psia
If FC shutdn:
- COOL P < current C/W FDA lower limit
- > 75 psia

1. **7.3e FUEL CELL COOL P ↑↓**

2. **1** Is FC shutdn? **YES 53**

3. **2** SM 69 FUEL CELLS
   FC COOL P is:
   - ‘↓’ or ‘↑’? **NO**
   - Class 3 ALARM FAULT OR TRANSIENT

4. **3** Perform BUS TIE
   (Cue Card)

5. **4** 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. **5** From ORB PKT, EPS, FC COOL P, step 3

7. **6** PRE–HTR LEAK, FC REG FAILURE, OR COOLANT LOOP LEAKAGE

8. **7** Go to FC SAFING (ORB PKT, EPS)

9. **8** SM 69 FUEL CELLS
    FC COOL P is:
    - ‘↑’ or ‘H’
    - ‘↓’ or ‘L’
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.
8 For FES ops, SPLY H2O TKB, TKC, TKD may need to be repressurized. 
\[\text{MCC}\]

9 For Dual Gas Regulator shift high, reactants may be venting through purge line. If Reac Vlvs are not open, FC could evacuate (i.e., safe)

\[\text{EPS 7.3e (Cont)}\]

1. Restart FC
2. Sply H2O dumps
3. Perform FC SHUTDN (Cue Card)
4. Bakeout Purge lines
5. CLASS 3 ALARM FAULT OR TRANSIENT
6. Go to FC SAFING (ORB PKT, EPS)

55. COOL P increasing?
56. PRE-HTR LEAK, FC REG FAILURE, OR ORBITER FREON LOOP TO FC COOLANT LOOP LEAK

57. FC COOL P steady or decreasing:
- STDY > 1 min
- DECR at anytime

58. FC COOL P: NEITHER ↑ NOR ↓
- ↑
- ↓

59. FC VOLTS < 34 VOLTS?
60. FC COOL P < 20 psia?
61. FC COOL P > 20 psia?

62. Open Reac Vlvs
63. Go to FC SAFING (ORB PKT, EPS)
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.
Nominal Config: (R11U)
FC H2O LINE
HTR – A AUTO
(B AUTO)

If:
H2O LN T
< 60 degF
> 185 degF

1. SM 69 FUEL CELLS
FC H2O LN T ↑↓
NEITHER
‘↓’
‘↑’

2. CLASS 3
ALARM S/W
FAULT OR
TRANSIENT

3. FC shutdn in
standby or low load
(< 70 amps)?

CAUTION

4. H2O LINE T
XDCR FAILURE

5. (R11U)
• FC H2O LINE
HTR sw position:
OFF
A AUTO
or B AUTO

6. (R11U)
• FC H2O LINE
HTR sw position:
OFF?

7. HTRS NOT
ACTIVATED

8. Activate htr
• FC H2O LINE
HTR – A AUTO
• Temp incr

9. Switch htr
• FC H2O LINE
HTR – A AUTO
(B AUTO)
H2O LN T incr?

10. HTR
FAILURE

11. Switch to
alternate htr
• FC H2O LINE
HTR – A AUTO
(B AUTO)
Temp decr?

12. H2O LINE T
XDCR FAILURE

13. POSSIBLE
H2O LINE HTR
CIRCUIT DRIVER
FAILED ON OR
TEMP XDCR
FAILURE

14. H2O LINE
TEMP XDCR OR
HTR CKT DRIVER
FAILED ON

15. H2O LINE
HTR A(B)
THERMOSTAT
FAILED ON

16. No further
action reqd

Overtemp caused by driver or thermostat failure will only occur if FC shutdn in standby, or lightly loaded. Failure at normal loads not detectable.
7.3g FUEL CELL H2O RLF VLV T
FUEL CELL H2O RLF LINE T

1 Switching htrs
isolated failed circuit

If:
FC H2O RLF VLV T
< 60 degF
> 185 degF

NEITHER ↑ NOR ↓

3 Switch htr
(R11U)
FC H2O RELIEF HTR – B AUTO (A AUTO)
Temp incr ?

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

8 FC H2O RELIEF VLV (LINE) TEMP XDCR FAILURE OR HTR DRIVER A(B) FAILED ON

9 Switch htr to nominal config
(R11U)
• FC H2O RELIEF HTR – A AUTO (B AUTO)

2 CLASS 3 ALARM S/W FAULT OR TRANSIENT

Nominal Config:
(R11U)
FC H2O LINE HTR – A AUTO (B AUTO)

If:
FC H2O RLF LINE T
< 60 degF
> 185 degF

S69 FC H2O RLF 1(2,3)

S69 FC H2O RLF LINE
If GPC Auto Purge in progress, expect FC PURGE SEQ msg

1. If:
   - FC PURGE LN O2 T > 380 degF or
   - FC PURGE LN H2 T1 > 380 degF or
   - FC PURGE LN H2 T2 > 380 degF
   - SM 69 FUEL CELLS

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

EPS

7.3i FUEL CELL O2(H2) PURGE LN T ↑
If bus short caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications.

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.

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.

During purge, FC amps must be < 350 (430 for contingency ops) to avoid Dual Gas Regulator freezeup.

Do both flows correspond to FC AMPS?

If FC purge reqd

3

FC PURGE HTR sw position:

ON

GPC or OFF

7.3j FUEL CELL O2(H2) FLOW

1

Is FC shutd?

YES

2

SM 69 FUEL CELLS

FC O2(H2) FLOW

↑?

CAUTION

During purge, FC amps must be < 350 (430 for contingency ops) to avoid Dual Gas Regulator freezeup.

3

CLASS 3 ALARM S/W FAULT, CLEARED BUS SHORT, OR TRANSIENT HIGH FLOW

4

Either manual or GPC purge sequence in progress?

NO

5

Close all FC Purge Vlv

(R11U)

− CL

6

• Record Flows and Amps

All FC O2 Flow H2 Flow Amps

7

Compare Flow with Amps

Compare FC AMPS with flow calculations as follows:

O2 FLOW X 47.5 = FC AMPS (± 50)

H2 FLOW X 377 = FC AMPS (± 60)

Do both flows correspond to FC AMPS?

8

PURGE FLOW PLUS HIGH FC DEMAND TRIPPED ALARM

CAUTION

During purge, FC amps must be < 350 (430 for contingency ops) to avoid Dual Gas Regulator freeze–up.

9

(CRT) FC O2 FLOW ↑?

10

If FC purge reqd

11

EXCESSIVE LOAD ON FC OR POSSIBLE BUS SHORT

12

FC PURGE HTR sw position:

ON

GPC or OFF

13

7.3b
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.

12

13 Activate Purge Htr if more than 3 hr to entry
(R11U)
• FC PURGE HTR – ON (turn Purge Htr OFF 3 hr prior to entry)

12

14 Both Reac flows high?

15 DUAL REG SHIFT, POSSIBLE REAC VENTING OR FC INTERNAL LOADING, POSSIBLE REG FREEZEUP AND LOSS OF PRESSURE REGULATION

16 Perform FC SHUTDN (Cue Card)

17 Restore nominal purge htr config
(R11U)
• Wait 30 min
• FC PURGE HTR – GPC

18 FLOW METER SNSR SHIFT OR REAC LEAK, POSSIBLE REG FREEZEUP AND LOSS OF FC

19 MCC or if MCC not available within 10 min and flow still ↑, continue

20 Perform FC SHUTDN (Cue Card), but leave reactant vls open

21 All FC O2(H2) flow < 2 (0.2)?

23 FLOW METER FAILURE

22 REAC LEAK

24 Perform SSR–6 FC RESTART
Neither FC O₂ FLOW ↑ nor FC H₂ FLOW ↑
Either or both FC O₂(H₂) FLOW ↑

Between 55 and 70 and STDY > 10 min
> 70 or < 55 or DECR at any time

If FC O₂ FLOW ↑
• ITEM 1
  + 0450160 (260,360) EXEC
  • ITEM 10 EXEC

If FC H₂ FLOW ↑
• ITEM 1
  + 0450170 (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:**

- If pre-htr reconfig: FC H2O RELIEF HTR – A AUTO
- If post-htr reconfig: FC H2O RELIEF HTR – B AUTO

**1 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)

- If pre-htr reconfig:
  - FC H2O RELIEF HTR – A AUTO
- If post-htr reconfig:
  - FC H2O RELIEF HTR – B AUTO
If:
FC ALT H2O RLF T < 60 degF
> 185 degF

Nominal Config:
(R11U)
FC H2O LINE
HTR – A AUTO
(B AUTO after Htr
reconfig in ORB
OPS)

1. SM 69
   FUEL CELLS
   FC ALT H2O RLF T
   ↑ or ↓
   NEITHER
   ↓
   ↑

2. CLASS 3
   ALARM S/W
   FAULT OR
   TRANSIENT

3. (R11U)
   FC H2O LINE
   HTR sw position
   OFF?
   YES
   NO

4. HTRS NOT
   ACTIVATED

5. Activate htr
   (R11U)
   FC H2O LINE
   HTR – A AUTO
   (B AUTO)
   (CRT)
   Temp incr
   YES
   NO

6. Switch htr
   FC H2O LINE
   HTR – A AUTO
   (B AUTO)
   (CRT) FC ALT H2O
   RLF T incr?
   YES
   NO

7. HTR
   FAILURE

8. Switch htr
   (R11U)
   FC H2O LINE
   HTR – A AUTO
   (B AUTO)
   (CRT) Temp decr?
   YES
   NO

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

FC ALT
H2O RLF LINE T
normally controlled
to 70–90 degF
7.4 DC VOLTAGE

1. Default limits are OSL, OSH
2. A ∆AMPS 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.
If: PALLETV A(B) < 26.0

Nominal Config:
(A15:B)
cb PPCA CONT PWR (two) – cl PALLETPWR tb (two) – ON (R14:B)
cb MNA PALLETDSC 1A/2B – cl cb MNB PALLETDSC 1B – cl cb MNC PALLETDSC 2A – cl

1. (A15:B) Aff PALLETPWR tb – OFF?

2. (A15:B)
   • (Aff) PALLETPWR – ON (tb–ON)

3. INADVERTENT DISCONNECT

4. Which PALLETV ↓:
   A
   B

5. (A15:H)
   • CRYO O2 TK6 HTR – TEST (1 sec), RELEASE

6. (A15:H)
   • CRYO O2 TK6 HTR – RESET

7. POSSIBLE BUS LOSS

8. (A15:H)
   • CRYO O2 TK6 HTR – RESET

9. BUS LOST

10. If no comm:
    • Go to BUS LOSS: MNB PPC2, EPS SSR–49a

11. XDCR FAIL

12. BUS LOST
    • Go to BUS LOSS: MNA PPC1, EPS SSR–27
EPS 7.4c PALLET TEMP ↑↓

1. Switch heaters
   (A15:C)
   PALLET HTRS
   • A(B) – OFF
   • B(A) – AUTO

2. SM 168 CRYO PALLETS
   Aff Pallet T between –45 and 130?

3. HTR FAILURE
   YES

4. XDCR FAIL
   NO

PALLET T
< –45
> 130

Nominal Config:
(A15:C)
PALLET HTRS
A(B) – AUTO
B(A) – OFF
(R14:B)
cb MNA PALLETS
DSC 1A/2B – cl
cb MNB PALLETS
DSC 1B – cl
cb MNC PALLETS
DSC 2A – cl

1 May take several minutes
AC OVERLOAD alarm?

1. YES  →  7.5b
2. NO

2. √ AC volts

3. SM 67 ELECTRIC
   SM SYS SUM1
   - AC1,2,3 V φA, φB, φC (nine) - read volts:
   - Single φ > 123 or between 10 and 110 vac
   - Multi φ < 110
   - Only one φ < 10 vac
   - All φ > 110 and < 123 vac

4. F9 meter read off-scale low for affected phase?
   - YES
   - NO → 4 CRT INSTRUMENTATION FAILURE

5. COMMON CIRCUIT TO TELEMETRY AND F9 METER FAILED

6. √ AC Bus Snr

7. FROM ORB PKT, EPS, AC VOLTS, step 2

8. AC1(2,3) AC VOLTAGE PRIMARY C/W PARAM 033 (043,053) FAILURE

9. AC1(2,3) BUS SNSR OR FUSE FAILURE

10. Inhibit C/W
   - (R13U)
   - C/W MEM - CLEAR
   - (L4, M473C)
   - Advise MCC if any cb tripped

11. TRANSIENT UNDERVOLTAGE OR BACKUP C/W FAILURE

12. (C3,R13U)
   - C/W PARAM SEL tw (three) - 033(043,053)
   - C/W PARAM - INH
   - C/W PARAM SEL tw > 119

1. AC bus voltage can be read on pnl F9
2. Transformer action of 3Φ mtr loads will cause single phase that has been disconnected from its Inverter to have voltage > 10 and < 110 vac
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). This limit change is not necessary for the upper limit due to AUTO TRIP function
4. Still have primary C/W AC VOLTAGE alarm capability. Backup C/W lost for affected phase
5. Lost AC1(2,3) AC VOLTAGE primary C/W alarm capability. Still have AUTO TRIP and BACKUP C/W AC VOLTAGE sensing
6. If inhibit does not extinguish light, remove bulb if desired

Nominal Config:
- (R1)
- cb AC CONTR AC1, 2, 3 φA, φB, φC (nine) - op AC BUS SNSR 1, 2, 3 (three) - AUTO TRIP (O13:A)
- cb ESS 1BC AC 1 SNSR - cl (O13:C)
- cb ESS 2CA AC 2 SNSR - cl (O13:E)
- cb ESS 3AB AC3 SNSR - cl
- cb ESS 1BC AC 1 SNSR - cl (O13:C)
- cb ESS 2CA AC 2 SNSR - cl (O13:E)
- cb ESS 3AB AC3 SNSR - cl

Light on if:
- AC φ voltage < 102–108 vac for 6.5–8.5 sec or > 123–127 vac for 50–90 msec
- F9 meter read off-scale low for affected phase
- F9 meter read off-scale low for affected phase
- F9 meter read off-scale low for affected phase

F9 meter read off-scale low for affected phase

Light on if:
- AC φ voltage < 108 vac for 1–3 sec or > 123 vac for 1–3 sec

NOTE
Monitor AC VOLTAGE lt (F7) during next step and expect C/W ALARM

(R1)
- If all AC BUS SNSR - OFF (1 sec), then AUTO TRIP
AC VOLTAGE lt stayed lit when AC BUS SNSR sw - OFF
C/W Alarm within 10 sec after selecting AUTO TRIP
No C/W Alarm
7–43

MAL/ALL/GEN F
5 Lost
AC1(2,3)AC
VOLTAGE primary
C/W alarm capability,
Still have AUTO
TRIP and Backup
C/W AC VOLTAGE
sensing
10 Nominal config
may be restored if
reqd
<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>15</td>
<td>5</td>
</tr>
<tr>
<td>ΦB</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>ΦC</td>
<td>12</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>

39 Isolate Φ for possible overvolt

(L4, MA73C)

- cb – open all AC1(2,3)  ΦA/ΦB/ΦC
- cbs (including 3Φ ganged cb) on failed bus

Number of cb to open:

37

40

(R1)

- cb AC CONTR AC1(2,3)  ΦA/ΦB/ΦC – cl
- AC BUS SNSR 1(2,3) – OFF

NOTE
After next step, if AC Amps >14 or Volts < 110 or > 123 Vac, place INV/AC BUS 1(2,3) – OFF immediately

- INV/AC BUS 1(2,3) – OFF (tb–ON)

(CRT) AC AMPS > 14

(CRT) AC VOLTS < 110 or > 123 Vac ?

41

(L4, MA73C)

- cb – close all cbs opened in block 39

42

AC1(2,3) ΦA (ΦB,ΦC) PHASE INVERTER FAILURE

43

UNANNUNCIATED OVERLOAD

44 Pwrdn Inverter

(R1)

- INV/AC BUS 1(2,3) tb – OFF
- INV PWR 1(2,3) – OFF (tb–OFF)
- cb AC CONTR AC1(2,3)  ΦA/ΦB/ΦC – op

NOTE
Expect C/W AC VOLTAGE alarm ~7 sec after next step

- AC BUS SNSR 1(2,3) – AUTO TRIP

45

Snr monitor

NOTE
Bus disconnect and/or C/W ALARM may occur after next step

(R1)

- AC BUS SNSR 1(2,3) – MONITOR

Bus disconnect and C/W ALARM

C/W ALARM only

No C/W ALARM

46

AC1(2,3) BUS VOLTAGE SNSR FAILED, FALSE OVERVOLT ALARM

47

NOTE
Next step may cause AC BUS disconnect and C/W AC VOLTAGE alarm

(R1)

- AC BUS SNSR 1(2,3) – OFF (1 sec), then AUTO TRIP

Bus disconnected ?

48

51

YES

NO

50

54

57

53

56

55

58

59

60

61

62

失電 AC1(2,3) AC VOLTAGE primary C/W ALARM and AUTO TRIP capability. Still have BACKUP C/W AC VOLTAGE sensing

Pnl L4 cb UTILITY PWR is 3Φ

07/17/00
Lost AC1(2,3) AC VOLTAGE primary C/W ALARM and AUTO TRIP capability. Still have BACKUP C/W AC VOLTAGE sensing.

Still have BACKUP C/W AC VOLTAGE sensing.

Removing single Φ loads permits lighter loaded motors to support heavier loaded motors by coupling energy via unpowered Φ. Cabin fan on two Φs cannot support additional single Φ loads. All three cbs must be closed to start cabin fan but unpowered Φ cb should be open while running.

Unannunciated overload
Inverter failure

Which failure mode:

Reconfig

(R1)
cb AC CONTR AC1(2,3) ΦA (ΦB,ΦC) – op

(R1)
AC BUS SNSR 1 (2,3) – OFF (1 sec), then MON
INV/AC BUS 1(2,3) – ON (tb–ON)
cb AC CONTR AC1(2,3) ΦA (ΦB,ΦC) – op

Reconfig

(R1)
• cb AC CONTR AC1(2,3) ΦA (ΦB,ΦC) – op

(MA73C:F)
• √ MCC for cb AC1 MAR 3Φ reconfig

Number of cbs to be closed:

<table>
<thead>
<tr>
<th>Bus</th>
<th>number cb</th>
<th>Row</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC1 3Φ</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>ΦA(B,C)</td>
<td>9</td>
<td>C,D,E,G,H,I,J,M,N</td>
</tr>
<tr>
<td>AC2 3Φ</td>
<td>9</td>
<td>C,D,E,F,G,H,I,J,M</td>
</tr>
<tr>
<td>AC3 3Φ</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>ΦA(B,C)</td>
<td>8</td>
<td>C,D,E,F,G,H,I,M</td>
</tr>
</tbody>
</table>

(MA73C)
AC1 3Φ | 4         | C,D |
| ΦA(B,C) | 4         | E,G,H,I |
| AC2 3Φ | 9         | C,D,E,F,G |
| ΦA(B,C) | 4         | E,G,H,I |
| AC3 3Φ | 7         | C,D,E,F,G |
| ΦA(B,C) | 3         | G,H,I |
AC OVERLOAD
(F7)
BACKUP C/W
ALARM
(F7)
S67 AC OVLD
1(2,3) ↓
BFS
SM1 AC
OVLD 1(2,3)

Light on if:
AC Φ Inverter
output current
> 14.5 amps for
10–20 sec
or
> 17.3–21.1 amps
for 4–6 sec

Nominal Config:
(R1)
cb AC CONTR AC1, AC2,AC3 ΦA,ΦB, ΦC (nine) – op
AC BUS SNSR 1,2,3 (three) – AUTO
TRIP (O13:A)
cb ESS 1BC AC1 SNSR – cl (O13:C)
cb ESS 2CA AC2 SNSR – cl (O13:E)
cb ESS 3AB AC3 SNSR – cl

7.5b AC OVLD 1(2,3) ↓

7.5a 1
1

• √AC volts

SM 67 ELECTRIC
BFS, SM SYS
SUMM 1
• AC V ΦA,ΦB, ΦC, 1,2,3 (nine) – read
Any Φ < 110 vac

3
• Go to AC
OVERLOAD
(ORB PKT, EPS)

4 √Short
(R1)
• cb AC CONTR
AC1(AC2,AC3) ΦA,ΦB,ΦC (three) – cl
• INV PWR
1(2,3) – ON
(tb–ON)
• INV/AC BUS
1(2,3) – ON
(tb–ON)
(CRT)
• Read AC amps
on all Φs
(R1)
• INV/AC BUS
1(2,3) – OFF
(tb–OFF)

All Φ ≤ 1 amp
3Φ > 1 amp
2Φ > 1 amp
1Φ > 1 amp

7 AC1(AC2,
AC3) ΦA(ΦB,ΦC) SHORT

5 AC1(2,3) 3Φ
BUS SHORT

6 Reconfig
(R1)
• INV PWR
1(2,3) – OFF
(tb–OFF)
• cb AC CONTR
AC1 (AC2,AC3) ΦA,ΦB,ΦC (three) – op

14

2Φ SHORT

8

9

BUS LOSS
EPS
AC1 SSR–110
AC2 SSR–120
AC3 SSR–130

15

25

7.5a 25

2 Isolate 3Φ bus
(L4,MA73C)
• cb – open all AC1(2,3)
ΦA(ΦB,ΦC) cb (including
3Φ ganged cb) on failed
bus

Number of cb to open:

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1 AC volts can be
read on pnl F9

Pnl L4 cb
UTILITY PWR is 3Φ
7.5b (Cont)

1. Ensure Pnl L4 cb
2. Utility PWR is 3Φ
3. Lost AC1(AC2,AC3) AC voltage primary C/W alarm capability. Still have AUTO TRIP and B/U C/W AC voltage alarm capability.

**EPS**

8

9. √Φ to Φ short to gnd

For one of two shorted Φs:
(R1)
- cb AC CONTR AC1(AC2,AC3) ΦA(ΦB,ΦC) – op
- INV/AC BUS 1(2,3) – ON

(CRT)
- Read AC amps on all Φs
(R1)
- INV/AC BUS 1(2,3) – OFF

Any Φ > 1 amp? YES NO

10. AC1(AC2,AC3) ΦA(ΦB,ΦC) TO ΦB (ΦC,ΦA) SHORT

11. AC1(2,3) ΦA(ΦB,ΦC) TO ΦB (ΦC,ΦA) SHORT

12. Declare one of the two shorted Φs failed

See CRITICAL EQUIPMENT LOST – AC1(AC2,AC3) (REF DATA)

13. Isolate 2 shorted Φ, repower 1 good Φ

For good Φ:
(R1)
- cb AC CONTR AC1(AC2,AC3) ΦC(ΦA,ΦB) – op

For two shorted Φ:
- cb AC CONTR AC1(AC2,AC3) ΦA,ΦB(ΦB,ΦC or ΦC,ΦA) (two) – cl
- INV PWR 1(2,3) – OFF (tb–OFF)
- cb AC CONTR AC1(AC2,AC3) ΦA,ΦB(ΦB,ΦC or ΦC,ΦA) (two) – op

For good Φ:
- cb AC CONTR AC1(AC2,AC3) ΦC(ΦA,ΦB) – cl

NOTE
Expect C/W AC VOLTAGE alarm after next step (∼7 sec)
- AC BUS SNSR 1(2,3) – AUTO TRIP
- INV/AC BUS 1(2,3) – ON
- cb AC CONTR AC1(AC2,AC3) ΦC(ΦA,ΦB) – cl

14. Reconnect equipment to two good Φ

(L4,MA73C)
- cb – close all on two good Φ except 3Φ ganged cbs

Number of cbs to close:

<table>
<thead>
<tr>
<th></th>
<th>L4</th>
<th>MA73C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1 ΦA</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>ΦB</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>ΦC</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>AC2 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 ΦA</td>
<td>13</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>

15

[Flowchart diagram with steps numbered 8 to 15, including decision points and actions for handling shorted phases.]
If failed bus is AC2(3), CABIN FAN B(A) may not start on remaining two phases.

ΦA, ΦC reqd to use UTILITY PWR for direct connection to single food warmer.

**NOTE**
After next step, expect C/W AC VOLTAGE alarm.

15. Repwr 2 good Φ
   (R1)
   For two good Φ:
   • cb AC CONTR AC1(AC2,AC3) ΦB, ΦC (ΦC, ΦA or ΦA, ΦB) (two) – op
   For shorted Φ:
   • cb AC CONTR AC1(AC2,AC3) ΦA(ΦB, ΦC) – cl
   • INV PWR 1(2,3) – OFF (tb–OFF)
   • cb AC CONTR AC1(AC2,AC3) ΦA(ΦB, ΦC) – op
   • cb AC CONTR AC1(AC2,AC3) ΦB, ΦC (ΦC, ΦA, or ΦA, ΦB) (two) – cl

16. AC1 PKT C/L backout
   If ΦA good:
   • LTG PNL L/CTR – as reqd
   • LTG PNL R INST – as reqd
   If ΦB good:
   • LTG PNL L OVHD – as reqd
   • LTG PNL NUMERIC – as reqd
   If ΦC good:
   • TACAN 1 MODE – as reqd
   • cb AC CONTR AC1(AC2,AC3) ΦB, ΦC (ΦC, ΦA, or ΦA, ΦB) (two) – op
   • cb AC CONTR AC1(AC2,AC3) ΦB, ΦC (ΦC, ΦA, or ΦA, ΦB) (two) – cl
   • INV PWR 1(2,3)  – OFF (tb–OFF)
   • cb AC CONTR AC1(AC2,AC3) ΦB, ΦC (ΦC, ΦA, or ΦA, ΦB) (two) – cl
   • FC1(FC2,FC3) COOL PUMP ΔP tb – gray

17. Reconnect FC
   (R1)
   When FC1(FC2,FC3) RDY tb – gray:
   • FC/MN BUS A(B,C) – ON (tb–ON)
   • FC/MN BUS A(B,C) – ON (tb–ON)
   • ESS BUS SOURCE FC1(FC2,FC3) – ON
   • MN BUS TIE A(B,C) – OFF (tb–OFF)
   • B(C,A) – OFF (tb–OFF)

18. AC3 PKT C/L backout
   If ΦA good:
   • no reconfg reqd
   If ΦB good:
   • LTG PNL L/CTR – as reqd
   • MS LTG PNL – as reqd
   • SIG CONDR FREON B – AC3(AC2)
   • TACAN 1 MODE – as reqd
   • ΦA, ΦC good:
   • TACAN MODE 1,2 (two) – as reqd
   • ΦA, ΦC reqd to use UTILITY PWR for direct connection to single food warmer

**BUS LOSS EPS**
AC1 ΦA SSR–111
ΦB SSR–112
ΦC SSR–113

AC3 ΦA SSR–131
ΦB SSR–132
ΦC SSR–133
FC being used to determine if AC problem is due to 3Φ motor stall. FC pumps may be exposed to stall conditions; therefore, do not hold START sw longer than 5 sec.

6

19

Attempt FC start

(L4:C)

- cb AC1(2,3)
- ΦA,ΦB,ΦC
- FC1(2,3) PUMPS (three) – cl

(R1)

- INV/AC BUS 1(2,3) – ON (tb–ON)
- FC1(FC2,FC3) REAC – OP (tb–OP)
- FC1(FC2,FC3) – START (max 5 sec)

FC1(FC2,FC3) COOL PUMP ΔP

YES

21

FC coolant pump stalling

- FC1(FC2,FC3) – STOP (1 sec)
- INV/AC BUS 1(2,3) – OFF (tb–OFF)

NO

Reconnect FC to MN Bus

(R1)

- When FC1 (FC2,FC3) RDY
- FC/MN BUS A(B,C) – ON (tb–ON)
- ESS BUS SOURCE FC1(FC2,FC3) – ON
- MN BUS TIE A(B,C) – OFF (tb–OFF)
- MN BUS TIE B(C,A) – OFF (tb–OFF)

22

NOTE

AC OVERLOAD Alarm may occur after next step

(R1)

- AC BUS SNSR – MON

(F7)

- Note C/W Alarms

Only AC OVERLOAD Alarm

AC VOLTAGE and AC OVERLOAD Alarms

No Alarms

23

24

AC BUS SNSR FAILURE

AC BUS SNSR MULTI-PHASE OVLD DETECTION FAILURE

25

26

(R1)

- AC BUS SNSR
- AC1(AC2,AC3) – OFF

27

BUS LOSS

EPS

AC2 ΦA SSR–121
ΦB SSR–122
ΦC SSR–123

17

16

10

20

AC2 PKT C/L backout

If ΦA good:

- LTG PNL R OVHD – as reqd

If ΦB good:

- LTG INST OVHD – as reqd

If ΦC good:

- LTG PNL R – as reqd

- SIG CONDR FREON A – AC2(AC3)

When FC1 (FC2,FC3) RDY

tb – gray:

- FC1(FC2,FC3) – STOP (1 sec)
- INV/AC BUS 1(2,3) – OFF (tb–OFF)

21

If ASC PKT C/L AC2 (2 or 3Φ) FAILED BUS LOSS ACTION performed:

- FLASH EVAP FDLN HTR SPLY (two) – as reqd
- TACAN MODE 1,3 (two) – as reqd

27

28

BUS LOSS

EPS

AC2 ΦA
ΦB
ΦC

SSR–121
SSR–122
SSR–123

29

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50
Lost AC1 (AC2,AC3) AC VOLTAGE primary C/W alarm capability, Still have AUTO TRIP and B/U C/W AC VOLTAGE alarm capability
Some AC Loads have high starting currents which should stabilize within 5 sec.

Normally cb(s) will open with loads in excess of 3 amps.

Lost AC1(AC2, AC3) overload and over-voltage auto trip protection along with AC OVERLOAD C/W Alarm.

Only B/U C/W AC VOLTAGE Alarm remains. No AUTO TRIP exists for AC1(AC2,AC3).

NOTE AC OVERLOAD alarm may occur after next step.

AC OVERLOAD alarm ?

AC BUS SNSR 1(2,3) – MONITOR

cb AC CONTR

AC1(AC2,AC3) ΦA(ΦB,ΦC) – op

AC OVERLOAD CIRCUIT FAILED ON

AC1(AC2, AC3) ΦA(ΦB,ΦC) BUS SNSR OVERLOAD FAILURE OR TRANSIENT OVERLOAD

AC BUS SNSR 1(2,3) – AUTO TRIP

Advise MCC if any cb open on pns L4 or MA73C

• C/W PARAM sel – 063 (073, 083)
• C/W PARAM – INH
• C/W PARAM sel tw – > 119
• C/W MEM – CLEAR

TRANSIENT SHORT ON AC BUS OR LRU(S), OR TRANSIENT AC BUS SNSR PROBLEM

NOTE

For 3Φ loads, all three cbs must be closed simultaneously

(L4, MA73C)

• Close cb(s) opened in block 2

AMPS change > 2 (amps/phase) for any load

All cb(s) closed without excessive currents

SHORT IN LRU AND cb DID NOT OPEN

• Open cb(s) for LRU with short

AMPS change > 2 (amps/phase) for any load

All remaining cb(s) cl or isolated

Reconfig loads

Reconfig BUS LOSS IMMEDIATE ACTION loads as reqd to verify critical equipment operational status

MCC

Inhibit AC VOLTAGE and AC OVERLOAD Pri C/W

(L4, MA73C)

• Close cb(s) opened in block 2

Reconfig BUS LOSS IMMEDIATE ACTION loads as reqd to verify critical equipment operational status

MCC

Inhibit AC VOLTAGE and AC OVERLOAD Pri C/W

(R13U)

C/W PARAM sel – 033 (043, 053)
• C/W PARAM – INH
• C/W PARAM sel – 063 (073,083)
• C/W PARAM – INH
• C/W PARAM sel – > 119

NOTE

For 3Φ loads, all three cbs must be closed simultaneously

(L4, MA73C)

Close cb(s) opened in block 2
11 Removing single \( \Phi \) loads and opening aff cb to Cabin Fan will maximize coupled energy available to heavier loaded mtrs without overstressing lighter loaded mtrs. All three cabin fan cbs must be closed to start fan but unpowered \( \Phi \) cb should be open while fan running.

12 Lost AC1(AC2, AC3) backup C/W OVLD alarm capability.

13 If shorted bus is AC2(3), CABIN FAN B(A) will not start on remaining two phases.

14 OVLD Alarm capability remains via backup C/W.

15 Lost OVLD Pri C/W alarms only. Auto trip still available.

**NOTE**

AC1(AC2, AC3) φA(φB,φC) φA(φB,φC) – cl

Expect C/W AC VOLTAGE Alarm after next step

- INV/AC BUS 1(2,3) – OFF
- INV PWR 1(2,3) – OFF
- cb AC CONTR AC1(AC2,AC3) φA(φB,φC) – op

(L4,MA73C)

\( \Phi \) cb – open all AC1(2,3) φA(φB,φC) cbs (including 3 φ ganged cbs)

**NOTE**

AC BUS 1(2,3) φA(φB,φC) OVERLOAD ALARM DRIVER FAILED ON

Number of cb to open:

<table>
<thead>
<tr>
<th>BUS</th>
<th>L4</th>
<th>MA73C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1 φΦ</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>AC1 φA</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>AC1 φB</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>AC1 φC</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>AC2 φΦ</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>AC2 φA</td>
<td>15</td>
<td>4</td>
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<tr>
<td>AC2 φB</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>AC2 φC</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>AC3 φΦ</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>AC3 φA</td>
<td>15</td>
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<tr>
<td>AC3 φB</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>AC3 φC</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

**BUS LOSS**

<table>
<thead>
<tr>
<th>BUS</th>
<th>EPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1 φΦ</td>
<td>SSR–111</td>
</tr>
<tr>
<td>AC1 φA</td>
<td>SSR–112</td>
</tr>
<tr>
<td>AC1 φB</td>
<td>SSR–113</td>
</tr>
<tr>
<td>AC2 φΦ</td>
<td>SSR–121</td>
</tr>
<tr>
<td>AC2 φA</td>
<td>SSR–122</td>
</tr>
<tr>
<td>AC2 φB</td>
<td>SSR–123</td>
</tr>
<tr>
<td>AC3 φΦ</td>
<td>SSR–131</td>
</tr>
<tr>
<td>AC3 φA</td>
<td>SSR–132</td>
</tr>
<tr>
<td>AC3 φB</td>
<td>SSR–133</td>
</tr>
</tbody>
</table>
7.5c AC BUS CURRENT HIGH

If: AC AMPS 1(2,3) > 10 amps

1 AC amps

SM SYS SUMM 1

More than one φ has high amps?

NO

YES

2 On aff Bus

(MA73C)

• cb – open all except rows E & F

3 CNTL LIMIT SW SIGNAL

FAILURE CAUSES UNWANTED RUN/STALL MTR CURRENTS

4 (MA73C,L4,R11)

• cb – op and cl φA,φB,φC together on each 3φ load noting AC amps change on aff bus

Normal cb current listed in parentheses

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>AC1 (AMPS/φ)</th>
<th>ID (AMPS/φ)</th>
<th>AC3 (AMPS/φ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>:E WCS FAN SEP PAYLOAD</td>
<td>1 (.9)*</td>
<td>2 (.9)*</td>
<td>AC2 (0)*</td>
</tr>
<tr>
<td>(L4) UTILITY PWR (3φ cb)</td>
<td>(0)</td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td>:C FC PUMPS</td>
<td>1 (.8)</td>
<td>2 (.8)</td>
<td>3 (.8)</td>
</tr>
<tr>
<td>:D C,R ENG</td>
<td>C (&lt;1.6)*</td>
<td>C (&lt;1.6)*</td>
<td>R (&lt;1.6)*</td>
</tr>
<tr>
<td>:E R,L ENG</td>
<td>R (&lt;1.6)*</td>
<td>L (&lt;1.6)*</td>
<td>L (&lt;1.6)*</td>
</tr>
<tr>
<td>:F H2O LOOP PUMP</td>
<td>1A/2 (.1)*</td>
<td>1B (.1)*</td>
<td>2B (.1)</td>
</tr>
<tr>
<td>:G AV BAY FAN</td>
<td>1A (.9)*</td>
<td>1B (.9)</td>
<td>3A (.9)*</td>
</tr>
<tr>
<td>:H AV BAY FAN</td>
<td>3B (.9)</td>
<td>2A (.9)</td>
<td>2B (.9)*</td>
</tr>
<tr>
<td>:I IMU FAN</td>
<td>A (.2)*</td>
<td>B (.2)</td>
<td>C (.2)*</td>
</tr>
<tr>
<td>:J HUM SEP</td>
<td>A (.3)*</td>
<td>B (.3)</td>
<td></td>
</tr>
<tr>
<td>:K CAB FAN</td>
<td></td>
<td>B (1.7)*</td>
<td>A (1.7)</td>
</tr>
<tr>
<td>:M,N FREON LOOP PUMP</td>
<td>1A (1.7)*</td>
<td>1B (1.7)</td>
<td>2A (1.7)*</td>
</tr>
</tbody>
</table>

Any current decr?

NO

YES

4 (CRT) Any AC amps excessive?

5 EXCESSIVE 3φ LOAD ON AC1(2,3)

6 CURRENT LIMITED SHORT OR EXCESSIVE MTR LOAD

7 (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

1 ([CRT]) Any AC amps excessive ?

NO

YES

5

6

7
8  [Partial short]
   (L4,R11,MA73C)
   • cb – op and cl single Φ load, one at a time
   • Monitor amps for proper change on all Φ

Normal cb current (orbit & entry prep)

<table>
<thead>
<tr>
<th>Phi row</th>
<th>AC1 ΦA</th>
<th>AC1 ΦB</th>
<th>AC1 ΦC</th>
<th>AC2 ΦA</th>
<th>AC2 ΦB</th>
<th>AC2 ΦC</th>
<th>AC3 ΦA</th>
<th>AC3 ΦB</th>
<th>AC3 ΦC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4) J</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
<td>-</td>
</tr>
<tr>
<td>(L4) K</td>
<td>-.1</td>
<td>-.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
<td>-</td>
</tr>
<tr>
<td>(L4) L</td>
<td>5</td>
<td>-.1</td>
<td>-</td>
<td>5</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
<td>-.1</td>
<td>&lt;.1</td>
<td>-</td>
</tr>
<tr>
<td>(L4) N</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>-.1</td>
<td>-</td>
<td>6</td>
<td>-.1</td>
<td>-</td>
</tr>
<tr>
<td>(L4) O</td>
<td>-.1</td>
<td>-.1</td>
<td>-.1</td>
<td>-.1</td>
<td>-.1</td>
<td>-.1</td>
<td>-.1</td>
<td>-.1</td>
<td>-</td>
</tr>
<tr>
<td>(L4) P</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>&lt;.1</td>
<td>7</td>
<td>8</td>
<td>&lt;.1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>(L4) Q</td>
<td>&lt;.1</td>
<td>1.9</td>
<td>&lt;.2</td>
<td>1.3</td>
<td>&lt;.2</td>
<td>&lt;.2</td>
<td>&lt;.2</td>
<td>&lt;.2</td>
<td>&lt;.2</td>
</tr>
<tr>
<td>(L4) R</td>
<td>&lt;.5</td>
<td>&lt;.2</td>
<td>-</td>
<td>&lt;.3</td>
<td>-</td>
<td>&lt;.6</td>
<td>&lt;.6</td>
<td>-</td>
<td>-</td>
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<tr>
<td>(MA73C)</td>
<td>-</td>
<td>1.3</td>
<td>&lt;.1</td>
<td>&lt;.5</td>
<td>&lt;.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(CRT) Any cb with excessive load? YES

10 [Current snsr]
   (R1)
   • cb AC CONTR AC1(2,3) ΦA(ΦB,ΦC) – cl
   • INV/AC BUS 1(2,3) – OFF (tb–OFF)

(Amps > 1 with INV/AC BUS disconnected?) NO

13 [SOFT SHORT ON AC1(2,3) ΦA(ΦB,ΦC) BUS]

14 [CURRENT XDCR SHIFTED HIGH]

15 [Monitor FC for performance change]

16 [Off–load Bus]
   (L4, P, Q, R)
   • cb AC1(2,3) ΦA(ΦB,ΦC) (three) – op

(CRT) Φ amps < 8? NO

17 [Select alternate system]

18 [Maintain AC BUS 1(2,3) Φ amps < 8 for continuous loads by transferring following loads:]

   (L1)
   • Freon Loop Pump
   • Cabin Fan
   • Av Bay Fan
   • H2O Loop Pump
   • IMU Fan
   • Hum Sep

   (MA73C)
   • PL AC2 3Φ
   • PL AC3 3Φ

12 Which equip shows excessive current:
   • FC Pumps
   • Other

19 [Monitor Bus for performance change]

11 Some payload AC equip may be unpwr or configured to alternate pwr source

9 Depending on subsystem, further short isolation sw ops may be available

3 Refer to block 4 for normal equipment config and bus loading

5 [SOFT SHORT IN LOAD]

8 TACAN load of 1.5 amps during entry prep

1 Mtr vlv operating load of .3 amp

2 Mtr vlv operating load of .2 amp

7 Mtr vlv operating load of .2 amp

6 Mtr vlv operating load of .3 amp

.1 amp steady state.

.2 amp with mtr vlv operating

11/21/99
## EPS 7.5c (Cont)

12 If shorted bus is AC2(3), CABIN FAN B(A) will not start on remaining two phases.

### 20 Isolate shorted Φ

(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>
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<td>5</td>
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<tr>
<td>AC2 3Φ</td>
<td>0</td>
<td>9</td>
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<tr>
<td>ΦA</td>
<td>15</td>
<td>5</td>
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<tr>
<td>ΦB</td>
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<tr>
<td>ΦC</td>
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<tr>
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<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
### 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 A</td>
<td>O2 TK1 HTR A</td>
<td>(R1) O2 TK1 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>O2 TK1 HTR B</td>
<td>O2 TK1 HTR B</td>
</tr>
<tr>
<td>O2 TK 2 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>
</tr>
<tr>
<td>O2 TK 3 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 A</td>
<td>(A11) CRYO TK4 HTR O2 A</td>
<td>(A11) CRYO TK4 HTR O2 A</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 A</td>
<td>(A15) CRYO TK5 HTR O2 A</td>
<td>(A15) CRYO TK5 HTR O2 A</td>
</tr>
<tr>
<td>B</td>
<td>CRYO TK5 HTR O2 B</td>
<td>CRYO TK5 HTR O2 B</td>
</tr>
<tr>
<td>O2 TK 6 A</td>
<td>N/A</td>
<td>PALLET O2 TK6 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET O2 TK6 HTR B</td>
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<td>O2 TK 7 A</td>
<td>N/A</td>
<td>PALLET O2 TK7 HTR A</td>
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<td>B</td>
<td>N/A</td>
<td>PALLET O2 TK7 HTR B</td>
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<tr>
<td>O2 TK 8 A</td>
<td>N/A</td>
<td>PALLET O2 TK8 HTR A</td>
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<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET O2 TK8 HTR B</td>
</tr>
<tr>
<td>O2 TK 9 A</td>
<td>N/A</td>
<td>PALLET O2 TK9 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET O2 TK9 HTR B</td>
</tr>
</tbody>
</table>

#### HYDROGEN

<table>
<thead>
<tr>
<th>HEATER SET</th>
<th>FIVE–TK SET</th>
<th>FIVE–TK SET + PALLET</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2 TK 1 A</td>
<td>H2 TK1 HTR A</td>
<td>(R1) H2 TK1 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>H2 TK1 HTR B</td>
<td>H2 TK1 HTR B</td>
</tr>
<tr>
<td>H2 TK 2 A</td>
<td>H2 TK2 HTR A</td>
<td>H2 TK2 HTR A</td>
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<tr>
<td>B</td>
<td>H2 TK2 HTR B</td>
<td>H2 TK2 HTR B</td>
</tr>
<tr>
<td>H2 TK 3 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 A</td>
<td>(A11) CRYO TK4 HTR H2 A</td>
<td>(A11) CRYO TK4 HTR H2 A</td>
</tr>
<tr>
<td>B</td>
<td>CRYO TK4 HTR H2 B</td>
<td>CRYO TK4 HTR H2 B</td>
</tr>
<tr>
<td>H2 TK 5 A</td>
<td>(A15) CRYO TK5 HTR H2 A</td>
<td>(A15) CRYO TK5 HTR H2 A</td>
</tr>
<tr>
<td>B</td>
<td>CRYO TK5 HTR H2 B</td>
<td>CRYO TK5 HTR H2 B</td>
</tr>
<tr>
<td>H2 TK 6 A</td>
<td>N/A</td>
<td>PALLET H2 TK6 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET H2 TK6 HTR B</td>
</tr>
<tr>
<td>H2 TK 7 A</td>
<td>N/A</td>
<td>PALLET H2 TK7 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET H2 TK7 HTR B</td>
</tr>
<tr>
<td>H2 TK 8 A</td>
<td>N/A</td>
<td>PALLET H2 TK8 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET H2 TK8 HTR B</td>
</tr>
<tr>
<td>H2 TK 9 A</td>
<td>N/A</td>
<td>PALLET H2 TK9 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>N/A</td>
<td>PALLET H2 TK9 HTR B</td>
</tr>
</tbody>
</table>
F

MAL/ALL/GEN

O2(H2) TK
AUTO Control
pressure
ranges: TK1/2:
803–854 (200–226)
TK 3–9:
832–882 (217–243)

For destratified
Tk, natural heat leak
into tk will eventually
build pressure back
up.

Operating htrs
below critical
pressure could be
hazardous in
presence of
two–phase fluid.
Therefore, htrs are
left deactivated.

Sub–buses are:
TK1: ESS2CA
O13 & R14
TK2: ESS1BC
O13 & R14
TK3: ESS3AB
ML86B
TK4: ESS1BC
ML86B
TK5: ESS2CA
ML86B
TK6: ESS1BC
FD
TK7: ESS1BC
FD
TK8: ESS2CA
FD
TK9: ESS2CA
FD

Sub–buses affected the tank
listed below:

Sub–bus actions:

TKs in
common MANF
< 800 (200) psia?

11

All TKs in
common MANF
< 800 (200) psia?

11

P ↑

P ↓

10

12

TANK LEAK OR
DESTRATIFICATION

SYSTEM
LEAK OR HTR
FAILURE

13

14

Go to CRYO
O2(H2) LEAK
(ORB PKT, EPS)

Go to BUS LOSS
SSR–84
(75, 95, 73, 85, 74,
74, 83, 83) for all
TK 1
(2, 3, 4, 5, 6, 7, 8, 9)

15

08/12/03  7–60  MAL/ALL/GEN F
Use pnl O2 meter or 168 CRYO PALLET (BFS) for TK P if SM2 not available.

Once htrs are deactivated in tk with high P, the P should decrease to normal value.

Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack.

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 xdcr 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
6,7
8,9
TK5 not paired
13 TKs 1,2 cannot be operated simultaneously if a manifold vlv is closed
Assumes both Manf vlv's 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

If:
- O2 MANF P < 200 psia (740 psia for BFS)
- H2 MANF P < 150 psia (189.9 psia for BFS)

1. Both O2(H2) MANF Ps agree with each other?
   - YES: Go to CRYO O2(H2) LEAK (ORB PKT , EPS)
   - NO: LARGE LEAK INDICATED

2. INSTRUMENTATION FAILURE

3. If CRYO LEAK procedure not already in progress
   - Go to CRYO O2(H2) LEAK (ORB PKT, EPS)

4. (R1) Both O2(H2) MANF VLV TK tb – OP?
   - YES: INSTRUMENTATION
   - NO: O2(H2) LEAK

5. INSTRUMENTATION FAILURE

6. (CRT) Do two or more TK Ps connected to aff Manf disagree with Manf P?
   - YES: INSTRUMENTATION FAILURE
   - NO: O2(H2) LEAK

7. Do aff P and TK P agree with manf P?
   - YES: O2(H2) LEAK
   - NO: ASAP

8. (R1)
   - O2(H2) MANF VLV TK 1,2 (two) – OP

9. (CRT) Both O2(H2) Manf Ps agree with each other?
   - YES: TK SPLYL BLOCKAGE
   - NO: INSTRUMENTATION FAILURE

10. ASAP
    - O2(H2) MANF VLV TK 1(2) – CL

11. Go to CRYO O2(H2) LEAK (ORB PKT, EPS)

12. (CRT) Both O2(H2) Manf Ps agree with each other?
    - YES: TK SPLYL BLOCKAGE
    - NO: INSTRUMENTATION FAILURE

13. TK SPLYL BLOCKAGE

14. Reconfig Manf Vlv's to original config
    - O2(H2) MANF VLV TK 1(2) – CL

15. INSTRUMENTATION FAILURE
    - Config aff tk htrs to OFF
    - Config other tk htrs to AUTO (Pnl nomenclature listed in CRYO Table A)
1. 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.

2. Stratification normally occurs when htrs are operating for long periods of time and during periods of attitude holds.

3. MCC will determine cryo management plan.

If:

- H2 HTR T > 210 degF

- S68 H2 HTR T 1(2,3,4,5)
- 168 H2 HTR T 6(7,8,9)

Do either of the following conditions exist?

- QTY < 5%
- H2 T > 130 degF

- Aff P increasing?

- Transducer failure or possible tank stratification

From ORB PKT, EPS, CRYO O2(H2) PRESS/TEMP HIGH, step 5

SM 68 CRYO SYSTEM
SM 168 CRYO PALLET

- Deact all htrs in aff tk(s)
- Config aff HTRS – OFF per CRYO TABLE A

- TANK AT RESIDUAL QTY

- Failed–on HTR

- MCC

- Any unaffected H2 TK HTR in AUTO
- H2 MANF VLV TK 1,2 (two) – op (tb–op)

Reconfig to htrs in alternate tank

12/21/99

7–64

MAL/ALL/GEN F
If all Snsrs in tk (or one A and one B Snsr) indicate tripped, deactivate all htrs in affected tk and open manf vlvs. Do not reconfig htrs in other tk.

Unless htr pwr in both tks is approx equal, pressurization rates will not be equal and quantity imbalance will eventually result.

Use CRYO Table A to determine which htr sets were active.

1. If all Snsrs in tk (or one A and one B Snsr) indicate tripped, deactivate all htrs in affected tk and open manf vlvs. Do not reconfig htrs in other tk.
2. Unless htr pwr in both tks is approx equal, pressurization rates will not be equal and quantity imbalance will eventually result.
3. Use CRYO Table A to determine which htr sets were active.

1. If all Snsrs in tk (or one A and one B Snsr) indicate tripped, deactivate all htrs in affected tk and open manf vlvs. Do not reconfig htrs in other tk.
2. Unless htr pwr in both tks is approx equal, pressurization rates will not be equal and quantity imbalance will eventually result.
3. Use CRYO Table A to determine which htr sets were active.
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 Htr 2 and all Cryo Pallet tank htrs have no associated hardware C/W.

Nominal Config:
Refer to 7.6b

---

 EPS

---

7.6I O2 HTR T

---

1. SM 68 CRYO SYSTEM
SM 168 CRYO PALLE
Deact all htrs in aff tk(s)
- Config aff htrs – OFF per CRYO TABLE A

2. TANK AT RESIDUAL QTY

3. Is QTY in aff tk < 55% and both A,B Htrs in AUTO?

4. INSUFFICIENT QTY FOR DUAL HTR OPS

5. Config for half htrs
- Aff O2 TK HTR A – AUTO

6. Are both HTR T > 349 degF?

7. SINGLE HIGH TEMP IS PROBABLY INSTRUMENTATION FAILURE

8. Aff P increasing?

9. PROBABLE TANK STRATIFICATION

10. Reconfig to htrs in alternate tank
- Any unaffected O2 TK HTR A in AUTO
- O2 MANF VLV TK 1,2 (two) – op (tb–op)

11. (R1)
- Aff O2 TK HTRS – TEST
- Aff TK P still increasing?

12. FAILED–ON HTR

13. MCC

14. FAILED ON HTR NOW DEACTIVATED. DO NOT RESET TK HTR SNR

15. Inhibit Aff TK HTR T HARDWARE C/W

---

HTR 1 HTR 2
TANK 1 CH 001 TANK 1 CH 011
TANK 2 CH 021 TANK 2 CH 031
TANK 3 CH 041 TANK 3 CH 051
TANK 4 CH 061 TANK 4 CH 071
TANK 5 CH 081 TANK 5 N/A
The FCMS application has capability to display FC single cell voltages and also to record those cell voltages in ASCI 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 the format fcXXXXXX.fcv or fcXXXXXX.ZIP where ‘XXXXXX’ references the GMT of the first data point of the file dropping the hundreds place for the day. Every recorded data file 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.

*The FCMS Application can be run on any one of the following PGSCs
a. WinDecom PGSC
b. Any End User Networked PGSC using a network cable
c. Any End User PGSC connected to WinDecom serial port (com 1) using RS232Y Cable

If WinDecom currently running
Double–click ‘Shuttle Apps’ > ‘WinDecom’ > ‘WinDecom shutdown’
Sel ‘OK’ to shutdown Telemetry System

**ACTIVATION**
1. WinDecom PGSC – on
   End user PGSC pw– on (if used)
2. Disconnect PCMMU cable from PCMMU expansion port on WinDecom PGSC
   If reqd, disconnect PCMMU cable from pnl O5 PCMMU 2 outlet
3. Connect FCMS cable from pnl O5 PCMMU 2 outlet to PCMMU expansion card port on WinDecom PGSC

**NOTE**
FCMS cable pin out is different than standard PCMMU data cable
EPS SSR−1 (Cont)

4. cb MNA FC PCM − cl

WinDecom PGSC
5. At Startup Menu, sel PCMMU Expansion Unit config

**NOTE**
Minimizing FCMS App will reduce PGSC resources being used

FCMS Application
7. If reqd for End User PGSC, sel appropriate Expansion unit config at startup menu
9. Verify data being received on crew FCMS display
10. Record full rate data file using record option unless otherwise specified by MCC (Either full rate or one sample every X seconds for X hours)
11. When recording is complete, transfer data file (fcXXXXX.ZIP) from C:\SPOCAPPS\FCMS directory to C:\oca_down directory on Proshare PGSC, notify MCC

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)

When open circuit recording complete, notify MCC
16. FC/MN BUS ___ − ON
17. ESS BUS SOURCE FC ___ − ON
18. Bus Tie config per MCC

DEACTIVATION
1. cb MNA FC PCM − op

WinDecom PGSC
2. Close FCMS application
   If End User PGSC used
   Disconnect and stow RS232Y cable
   Shutdown Windows − as reqd

WinDecom PGSC
3. To exit:
   Double−click ‘Shuttle Apps’ > ‘Fuel Cell Monitoring’ > ‘WinDecom Shutdown’
4. Perform as reqd
   Disconnect FCMS cable
   Shutdown Windows
   Disconnect pwr cable

5. Connect PCMMU cable between WinDecom’s PCMMU expansion card port and pnl O5 PCMMU 1 outlet
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.
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.
1. Decrease in FC COOL P with fuel cell shutdn and REAC vlvs closed may indicate internal leak, crossover, or reactant leak.
2. FC SUBSTACK ∆VOLTS are not usable when fuel cell is shut down.

3. Change FC1 H2O LN T SM ALERT lower limit to 50.8 degF
   - ITEM 1 +045 02 81 EXEC
   - ITEM 2 +5 08 0 EXEC

4. Change FC COOL P SM ALERT lower limit to present value minus 5.0 psi
   - ITEM 1 +045 01 47 EXEC
   - ITEM 2 +5 08 0 EXEC

5. Inhibit FC1 ∆V SS 1,2,3 SM ALERT
   - ITEM 1 +045 01 02 EXEC
   - ITEM 10 EXEC
   - ITEM 1 +045 01 03 EXEC
   - ITEM 10 EXEC
   - ITEM 1 +045 01 04 EXEC
   - ITEM 10 EXEC

6. Inhibit FC2 ∆V SS 1,2,3 SM ALERT
   - ITEM 1 +045 02 02 EXEC
   - ITEM 10 EXEC
   - ITEM 1 +045 02 03 EXEC
   - ITEM 10 EXEC
   - ITEM 1 +045 02 04 EXEC
   - ITEM 10 EXEC

7. Inhibit FC3 ∆V SS 1,2,3 SM ALERT
   - ITEM 1 +045 03 02 EXEC
   - ITEM 10 EXEC
   - ITEM 1 +045 03 03 EXEC
   - ITEM 10 EXEC
   - ITEM 1 +045 03 04 EXEC
   - ITEM 10 EXEC

8. Inhibit FC1 H2 PUMP STATUS SM ALERT
   - ITEM 1 +045 01 14 EXEC
   - ITEM 10 EXEC

9. Inhibit FC2 H2 PUMP STATUS SM ALERT
   - ITEM 1 +045 02 14 EXEC
   - ITEM 10 EXEC

10. Inhibit FC3 H2 PUMP STATUS SM ALERT
    - ITEM 1 +045 03 14 EXEC
    - ITEM 10 EXEC

11. Inhibit FC1 READY SM ALERT
    - ITEM 1 +045 01 05 EXEC
    - ITEM 10 EXEC

12. Inhibit FC2 READY SM ALERT
    - ITEM 1 +045 02 05 EXEC
    - ITEM 10 EXEC

13. Inhibit FC3 READY SM ALERT
    - ITEM 1 +045 03 05 EXEC
    - ITEM 10 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.
**EPS SSR-4**

**FC STANDBY**

1. If not tied, perform BUS TIE (Cue Card), then:
   - ESS BUS SOURCE FC1(2,3) – OFF
   - FC/MN BUS A(B,C) – OFF (tb–OFF)
   - FC1(2,3) COOL Pump ∆P (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?

2. SM 60 SM TABLE MAINT

Which FC to STANDBY?

<table>
<thead>
<tr>
<th>FC1</th>
<th>FC2</th>
<th>FC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

3. Change FC1
   H2O LN T SM ALERT lower limit to 50.8 degF

   - ITEM 1: +050181 EXEC
   - ITEM 2: +5080 EXEC

4. Change FC2
   H2O LN T SM ALERT lower limit to 50.8 degF

   - ITEM 1: +050281 EXEC
   - ITEM 2: +5080 EXEC

5. Change FC3
   H2O LN T SM ALERT lower limit to 50.8 degF

   - ITEM 1: +050381 EXEC
   - ITEM 2: +5080 EXEC

6. Change FC1
   VOLTS SM ALERT lower limit to 31.0 volts and upper limit to +37.5

   - ITEM 1: +050100 EXEC
   - ITEM 2: +3100 EXEC
   - ITEM 3: 3750 EXEC

7. Change FC2
   VOLTS SM ALERT lower limit to 31.0 volts and upper limit to +37.5

   - ITEM 1: +050200 EXEC
   - ITEM 2: +3100 EXEC
   - ITEM 3: 3750 EXEC

8. Change FC3
   VOLTS SM ALERT lower limit to 31.0 volts and upper limit to +37.5

   - ITEM 1: +050300 EXEC
   - ITEM 2: +3100 EXEC
   - ITEM 3: 3750 EXEC

9. Inhibit FC1 ∆V SS 1,2,3 SM ALERT

   - ITEM 1: +050102 EXEC
   - ITEM 10 EXEC
   - ITEM 1: +050103 EXEC
   - ITEM 10 EXEC
   - ITEM 1: +050104 EXEC
   - ITEM 10 EXEC

10. Inhibit FC2 ∆V SS 1,2,3 SM ALERT

    - ITEM 1: +050202 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +050203 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +050204 EXEC
    - ITEM 10 EXEC

11. Inhibit FC3 ∆V SS 1,2,3 SM ALERT

    - ITEM 1: +050302 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +050303 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +050304 EXEC
    - ITEM 10 EXEC

12

13

14
Increase in FC Amps beyond the FDA limit while fuel cell is in STANDBY may indicate external load on the fuel cell.

- **Change FC1 AMPS SM ALERT** lower limit to −10.00 and upper limit to +20.00
- **Change FC2 AMPS SM ALERT** lower limit to −10.00 and upper limit to +20.00
- **Change FC3 AMPS SM ALERT** lower limit to −10.00 and upper limit to +20.00

---

**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.

- EC/MN BUS A(B,C) – ON (tb–ON)
- ESS BUS SOURCE FC1(2,3) – ON
- FC1(2,3) COOL PUMP 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?

- **SM 60 SM TABLE MAINT**
  - Which FC out-of-STANDBY?
    - FC1
    - FC2
    - FC3

- Change FC1 H20 LN T SM ALERT lower limit to 60 degF
- Change FC2 H20 LN T SM ALERT lower limit to 60.0 degF
- Change FC3 H20 LN T SM ALERT lower limit to 60.0 degF

---

Change FC1 AMPS SM ALERT lower limit to −10.00 and upper limit to +20.00
- **ITEM 1** +0 4 5 0 1 0 1 EXEC
- **ITEM 2** -1 0 0 0 EXEC
- **ITEM 3** +2 0 0 0 EXEC

Change FC2 AMPS SM ALERT lower limit to −10.00 and upper limit to +20.00
- **ITEM 1** +0 4 5 0 2 0 1 EXEC
- **ITEM 2** -1 0 0 0 EXEC
- **ITEM 3** +2 0 0 0 EXEC

Change FC3 AMPS SM ALERT lower limit to −10.00 and upper limit to +20.00
- **ITEM 1** +0 4 5 0 3 0 1 EXEC
- **ITEM 2** -1 0 0 0 EXEC
- **ITEM 3** +2 0 0 0 EXEC
21 Change FC1
VOLTS SM ALERT
lower limit to 27.5 volts and the upper limit to 32.5
- ITEM 1 $0.000100$ EXEC
- ITEM 2 $0.000250$ EXEC
- ITEM 3 $0.000250$ EXEC

22 Change FC2
VOLTS SM ALERT
lower limit to 27.5 volts and the upper limit to 32.5
- ITEM 1 $0.000200$ EXEC
- ITEM 2 $0.000250$ EXEC
- ITEM 3 $0.000250$ EXEC

23 Change FC3
VOLTS SM ALERT
lower limit to 27.5 volts and the upper limit to 32.5
- ITEM 1 $0.000300$ EXEC
- ITEM 2 $0.000250$ EXEC
- ITEM 3 $0.000250$ EXEC

24 Enable FC1
$\Delta V SS 1,2,3$ SM ALERT
- ITEM 1 $0.000100$ EXEC
- ITEM 9 EXEC
- ITEM 1 $0.000100$ EXEC
- ITEM 9 EXEC
- ITEM 9 EXEC

25 Enable FC2
$\Delta V SS 1,2,3$ SM ALERT
- ITEM 1 $0.000200$ EXEC
- ITEM 9 EXEC
- ITEM 1 $0.000200$ EXEC
- ITEM 9 EXEC
- ITEM 9 EXEC

26 Enable FC3
$\Delta V SS 1,2,3$ SM ALERT
- ITEM 1 $0.000300$ EXEC
- ITEM 9 EXEC
- ITEM 1 $0.000300$ EXEC
- ITEM 9 EXEC
- ITEM 9 EXEC

27 Change FC1
AMPS SM ALERT
lower limit to +54.0 and upper limit to +150.00
- ITEM 1 $0.000101$ EXEC
- ITEM 2 $0.000400$ EXEC
- ITEM 3 $0.000000$ EXEC

28 Change FC2
AMPS SM ALERT
lower limit to +54.0 and upper limit to +150.00
- ITEM 1 $0.000201$ EXEC
- ITEM 2 $0.000400$ EXEC
- ITEM 3 $0.000000$ EXEC

29 Change FC3
AMPS SM ALERT
lower limit to +54.0 and upper limit to +150.00
- ITEM 1 $0.000301$ EXEC
- ITEM 2 $0.000400$ EXEC
- ITEM 3 $0.000000$ EXEC

30 FC
out-of-ST ANDBY complete
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
   - cb AC1 (AC2,AC3) ΦA,ΦB,ΦC
   - FC1(FC2,FC3) PUMPS – cl
   - (O14,O15,O16)
   - FC1(FC2,FC3) CNTLR – ON

2. SM 60 SM TABLE MAINT
   Which FC is being reactivated?
   - FC1
   - FC2
   - FC3

3. If previously inhibited, enable FC1 \(\Delta V\) SS 1,2,3 SM ALERT
   - ITEM 1
     +0450102 EXEC
   - ITEM 9 EXEC
   - ITEM 1
     +0450103 EXEC
   - ITEM 9 EXEC
   - ITEM 1
     +0450104 EXEC
   - ITEM 9 EXEC

4. If previously inhibited, enable FC2 \(\Delta V\) SS 1,2,3 SM ALERT
   - ITEM 1
     +0450202 EXEC
   - ITEM 9 EXEC
   - ITEM 1
     +0450203 EXEC
   - ITEM 9 EXEC
   - ITEM 1
     +0450204 EXEC
   - ITEM 9 EXEC

5. If previously inhibited, enable FC3 \(\Delta V\) SS 1,2,3 SM ALERT
   - ITEM 1
     +0450302 EXEC
   - ITEM 9 EXEC
   - ITEM 1
     +0450303 EXEC
   - ITEM 9 EXEC
   - ITEM 1
     +0450304 EXEC
   - ITEM 9 EXEC

6. Is SM available?
   - YES
   - NO

7. If previously inhibited, enable FC1 H2 PUMP STATUS SM ALERT
   - ITEM 1
     +0450114 EXEC
   - ITEM 9 EXEC

8. If previously inhibited, enable FC3 H2 PUMP STATUS SM ALERT
   - ITEM 1
     +0450314 EXEC
   - ITEM 9 EXEC

9. Is SM available?
   - YES
   - NO

10. If previously changed, reset FC1 VOLTS SM ALERT lower limit to 27.50
    - ITEM 1
      +0450110 EXEC
    - ITEM 2
      +2750 EXEC

11. If previously changed, reset FC2 VOLTS SM ALERT lower limit to 27.50
    - ITEM 1
      +0450200 EXEC
    - ITEM 2
      +2750 EXEC

12. If previously changed, reset FC3 VOLTS SM ALERT lower limit to 27.50
    - ITEM 1
      +0450300 EXEC
    - ITEM 2
      +2750 EXEC

13. SM ALERT
14. SM ALERT
15. SM ALERT
10

13 If previously changed, reset FC1 AMPS SM ALERT upper limit to 360.0
- ITEM 1 +0.450.1.0 EXEC
- ITEM 3 +36.0 EXEC

14 If previously changed, reset FC2 AMPS SM ALERT upper limit to 360.0
- ITEM 1 +0.450.2.0 EXEC
- ITEM 3 +36.0 EXEC

15 If previously changed, reset FC3 AMPS SM ALERT upper limit to 360.0
- ITEM 1 +0.450.3.0 EXEC
- ITEM 3 +36.0 EXEC

16 If previously changed, reset FC1 FLOW O2,H2 SM ALERT upper limits to 11.1 and 1.6, respectively
- ITEM 1 +0.450.16.0 EXEC
- ITEM 3 +1.1 EXEC
- ITEM 1 +0.450.12.0 EXEC
- ITEM 3 +1.6 EXEC

17 If previously changed, reset FC2 FLOW O2,H2 SM ALERT upper limits to 11.1 and 1.6, respectively
- ITEM 1 +0.450.26.0 EXEC
- ITEM 3 +1.1 EXEC
- ITEM 1 +0.450.22.0 EXEC
- ITEM 3 +1.6 EXEC

18 If previously changed, reset FC3 FLOW O2,H2 SM ALERT upper limits to 11.1 and 1.6, respectively
- ITEM 1 +0.450.36.0 EXEC
- ITEM 3 +1.1 EXEC
- ITEM 1 +0.450.32.0 EXEC
- ITEM 3 +1.6 EXEC

19 SM SYS SUMM 1
SM 69 FUEL CELLS

Prior to FC start, note and record the following:

FC1(2,3) VOLS: ________ 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
May expect FC pH FSM when FC is started on some fuel cells due to addition of pH self-test capability.

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).

Failure of COOL PUMP ∆P 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.

On MCC GO:
- FC1(2,3) – START (hold until FC1(2,3) COOL PUMP ∆P tb–gray, but not more than 10 sec)

NOTE
May expect ‘S69 FC PH 1(2,3)’ msg
- Record time of FC start: MET _ _ _/_ _/

FC1(2,3) COOL PUMP ∆P tb – gray ?

YES

On MCC GO:
- FC1(2,3) – START (hold > 30 sec)

NO

21
• MCC for proper AC currents

22
• FC1(2,3) H2 PUMP status

< 0.3
H2 PUMP FAIL

Between 0.3 and 0.8
Normal ops

Between 0.8 and 3.0
POSSIBLE PUMP STALL DUE TO CONDENSING H2O

Between 3.0 and 4.5
2Φ ops

> 4.5
H2 PUMP FAIL, POSSIBLE PUMP STALL DUE TO CONDENSING H2O

23
(R11U)
• Aff FC PURGE VLV – OP

24

37

26

26
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

(R1)
- FC/MAIN BUS A(B,C) – ON (tb−ON)
- ESS BUS SOURCE FC1(FC2,FC3) – ON

- Monitor FC for 10 min to see if any of the following conditions exist:
  - FC1(2,3)STACK T < 185 or > 243
  - FC1(2,3) EXIT T < 130 or > 160
  - FC1(2,3) STACK T – EXIT T) < 30 or > 70
  - FC1(2,3) \(\Delta V_{SS} \) 1.2, or 3 > 150
  - FC1(2,3) pH \(\downarrow\) continuously for > 10 min

- Break Bus Tie

(R1)
- MN BUS TIE (three) – OFF

- MCC If no MCC:
  - Go to FC SHUTDN, EPS SSR-2 (Cue Card)
38 Which FC is being restarted?

FC1
FC2
FC3

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

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

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

43 Is SM available?

44 Go to FUEL CELL PURGE − MANUAL (ORB OPS, EPS) on aff fuel cell

45 Is MCC able to TMBU BACKUP C&W and SM ALERTS?

46 Fuel cell restart complete. Use standard ORB PKT, EPS procedures as reqd
61 If reqd, enable FC1 READY SM ALERT
- ITEM 1
  +0.450105 EXEC
- ITEM 9 EXEC

62 If reqd, enable FC2 READY SM ALERT
- ITEM 1
  +0.450205 EXEC
- ITEM 9 EXEC

63 If reqd, enable FC3 READY SM ALERT
- ITEM 1
  +0.450305 EXEC
- ITEM 9 EXEC

64 If reqd, change FC1 COOL PRESS SM ALERT lower limit to 50.0 psi
- ITEM 1
  +0.450147 EXEC
- ITEM 2
  +5.0 EXEC

65 If reqd, change FC2 COOL PRESS SM ALERT lower limit to 50.0 psi
- ITEM 1
  +0.450247 EXEC
- ITEM 2
  +5.0 EXEC

66 If reqd, change FC3 COOL PRESS SM ALERT lower limit to 50.0 psi
- ITEM 1
  +0.450347 EXEC
- ITEM 2
  +5.0 EXEC

67 If reqd, change FC1 H2O LN T SM ALERT lower limit to 60 degF
- ITEM 1
  +0.450181 EXEC
- ITEM 2
  +6.0 EXEC

68 If reqd, change FC2 H2O LN T SM ALERT lower limit to 60 degF
- ITEM 1
  +0.450281 EXEC
- ITEM 2
  +6.0 EXEC

69 If reqd, change FC3 H2O LN T SM ALERT lower limit to 60 degF
- ITEM 1
  +0.450381 EXEC
- ITEM 2
  +6.0 EXEC

70 Go to FUEL CELL AUTO PURGE (ORB OPS, EPS)
FC startup complete.
- Use standard ORB PKT, EPS procedures as reqd
EPS SSR–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 is 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
   - (L1)
     - 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)
     - cb AC2 CAB FAN B (three) – 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 LiOH can changeout and cabin fan filter cleaning

5. May receive 'S67 AC AMPS' msg

6. Reconfig back to alternate equipment

7. SM 66 ENVIRONMENT

8. CAB FAN ∆P > 4.49 (2.8) ?
   - Yes
     - Install sw guard (stowed in IFM Tool Kit) over CAB FAN B sw
   - No
     - 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 aff phase CAB FAN B – 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
    - 1/C0112 MCC for further action
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 ∆P 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

12. (R1)
   • AC BUS SNSR
     3 – OFF (1 sec), then MON

13. NOTE
    Expect S88 and S66 msgs
    (L1)
    • IMU FAN C – ON
    • AV BAY 2 FAN B – ON, A – OFF
    
    If Av Bay Fan Upgrade Kit not installed in AV BAY 3A, then:
    • AV BAY 3 FAN A – ON, B – OFF
      • H2O PUMP LOOP 2 – ON
      • FREON PUMP LOOP 2 – A
    (Galley)
    • OVEN FAN – ON
    (L4:K)
    • cb AC3 CAB FAN A (three) – cl

14. On MCC GO:
    (L1)
    • CAB FAN B – OFF, A – ON

15. SM 66 ENVIRONMENT
    CAB FAN ∆P > 4.49 (2.8) ?
    YES
    (L4:K)
    • cb AC3 aff phase
      CAB FAN A – op
    (L1)
    • Install sw guard (stowed in IFM Tool Kit) over CAB FAN A sw

16. NO
    18. NOTE
        Expect S88 and S66 msgs
        (L1)
        • FREON PUMP LOOP 2 – B
        • H2O PUMP LOOP 2 – GPC
        • AV BAY 2 FAN A – ON, B – OFF
        
        If Av Bay Fan Upgrade Kit not installed in AV BAY 3A, then:
        • AV BAY 3 FAN B – ON, A – OFF
          • IMU FAN C – OFF
        (Galley)
        • OVEN FAN – OFF, as reqd

17. (L1)
    • CAB FAN A – OFF, B – ON
    Report the status of the following circuit breakers, then:
      (L4:K)
      • cb AC3 CAB FAN A (three) – op

19. (R1)
    • AC BUS SNSR
      3 – OFF (1 sec), then AUTO TRIP
    • MCC for further action
Reconfig 3Φ AC equipment to bus with lost phase to create an induced voltage reqd to start large fan

Value in ( ) is the ∆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

Report the status of the following circuit breakers, then:

If Ø A lost:

- H2O PUMP LOOP 1 (two) – ON, B
- AV BAY 1 FAN B – ON, A
- HUM SEP A – OFF
- IMU FAN A – OFF

If ØB(ØC) lost:

- H2O PUMP LOOP 1 (two) – GPC, B
- AV BAY 1 FAN B – ON, A
- HUM SEP A – OFF
- IMU FAN A – OFF
1. Reconfig 3Φ AC equipment to bus with lost phase to create an induced voltage reqd to start large fan

2. Value in ( ) is the ∆P when the Cabin Press is at 10.2 psi

3. May receive 'S67 AC AMPS' msg

4. Reconfig back to alternate equipment

5. 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

6. The Av Bay air cooled equipment must be powered down due to loss of Av Bay Air Cooling
### 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 – B
  3. 3 FAN B – A
  4. FUSION PUMP LOOP 1 – A
  5. 2 – B

- **(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)**
  9. GG/FP 1 – A AUTO
  10. 3 – B AUTO
  11. LUBE OIL LINE 1 – A AUTO
  12. 3 – B AUTO
  13. TKFU LN/H2O 1A,3B (two) – AUTO

  - TKFU LN/H2O 1B,3A (two) – AUTO
  - HYD HTR
  - SPD BK A – B
  - B – OFF
  - BDY FLP A – A
  - B – OFF
  - ELEV A – AUTO
  - B – OFF
  - CIRC PUMP 3 – MNA

- **(A14)**
  18. FWD RCS – A AUTO
  19. L POD A – B AUTO
  20. R POD B – B AUTO
  21. OMS CRSFD LINES – A AUTO

### 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.

- **(L1)**
  31. TOP EVAP HTR DUCT – B
  32. AV BAY 1 FAN B – ON
  33. 2 FAN A – B
  34. FUSION PUMP LOOP 1 – B
  35. CABIN FAN B – ON
  36. FES FEEDLINE HTR A SUP – 2

- **(R1/A11/A15)**
  37. CRYO O2,H2 TK 2,3,4 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
  - PL PRI MNB – ON (tb–ON)
  - MNB – OFF (tb–OFF)
  - FC3 – OFF (tb–OFF)

- **(A12)**
  39. GG/FP 1 – B AUTO
  40. 2 – A AUTO
  41. LUBE OIL LINE 1 – B AUTO
  42. 2 – A AUTO
  43. TKFU LN/H2O 1B,2A (two) – AUTO

  - TKFU LN/H2O 1A,2B (two) – OFF
  - HYD HTR
  - SPD BK A – B
  - B – OFF
  - BDY FLP B – A
  - A – OFF
  - ELEV B – AUTO
  - A – OFF
  - HYD
  - CIRC PUMP 1 – MNB

### 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.

- **(L1)**
  61. TOP EVAP HTR DUCT – C
  62. AV BAY 2 FAN B – ON
  63. 3 FAN A – B
  64. FREON PUMP LOOP 2 – A
  65. CABIN FAN A – B

- **(L2)**
  66. FES FEEDLINE HTR B SUP – 1

- **(R1/A11/A15)**
  67. CRYO O2,H2 TK 1 HTR B (two) – AUTO

  - CRYO O2,H2 TK 1 HTR A (two) – OFF
  - CRYO O2,H2 TK 2 HTR A (two) – AUTO
  - CRYO O2,H2 TK 2 HTR B (two) – OFF
  - CRYO O2,H2 TK 4 HTR A (two) – AUTO
  - CRYO O2,H2 TK 5 HTR B (two) – AUTO
  - CRYO O2,H2 TK 5 HTR A (two) – OFF

- **(A12)**
  68. GG/FP 2 – B AUTO
  69. 3 – A AUTO
  70. LUBE OIL LINE 2 – B AUTO
  71. 3 – A AUTO
  72. TKFU LN/H2O 2B,3A (two) – AUTO

  - TKFU LN/H2O 2A,3B (two) – OFF
  - HYD
  - CIRC PUMP 2 – MNC

- **(A14)**
  74. L POD B – B AUTO
  75. R POD B – A AUTO
  76. R POD B – A AUTO
  77. R POD B – B AUTO
  78. R POD B – A AUTO
  79. R POD B – A AUTO

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12/21/99

7–91

MAL/ALL/GEN F
EXPLANATORY NOTES FOR BUS LOSS SSRs

Bus Loss SSRs contain all the orbiter reconfig steps necessary following a bus loss for > 10 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.
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(Continued)

**CREW INDICATIONS**

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC1 PUMPS, pH Snr</td>
<td>(F7)</td>
</tr>
<tr>
<td>Purge Viv</td>
<td></td>
</tr>
<tr>
<td>O2.H2 Flow Xdors</td>
<td></td>
</tr>
<tr>
<td>MNA pwr to AUX PLA Bus</td>
<td></td>
</tr>
<tr>
<td>ESS2CA</td>
<td></td>
</tr>
<tr>
<td>ESS3AB</td>
<td></td>
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<tr>
<td>CNTLB1,2,3</td>
<td></td>
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<tr>
<td>CNTLCA1,2,3</td>
<td></td>
</tr>
<tr>
<td>MNA pwr to CSEPL1,2,3</td>
<td></td>
</tr>
<tr>
<td>AC1 φA,φB,φC Inverters</td>
<td></td>
</tr>
<tr>
<td>MNA pwr to CABPL1,2,3</td>
<td></td>
</tr>
<tr>
<td>Av Bay 3 Agent discharge capability</td>
<td></td>
</tr>
<tr>
<td>EMU 1,2 PWR/BATT Charger</td>
<td></td>
</tr>
<tr>
<td>MNA pwr</td>
<td></td>
</tr>
<tr>
<td>APU 1 GG/Fu Pump Htrs A</td>
<td></td>
</tr>
<tr>
<td>APU 3 GG/Fu Pump Htrs B</td>
<td></td>
</tr>
<tr>
<td>APU 1 Lube Oil Line Htrs A</td>
<td></td>
</tr>
<tr>
<td>APU 3 Lube Oil Line Htrs B</td>
<td></td>
</tr>
<tr>
<td>APU 1 Tk/Fu Ln Htrs A</td>
<td></td>
</tr>
<tr>
<td>APU 1 Inj H2O Htrs A</td>
<td></td>
</tr>
<tr>
<td>3 Tk/Fu Ln Htrs B</td>
<td></td>
</tr>
<tr>
<td>Rud/Spd Brake Htr A</td>
<td></td>
</tr>
<tr>
<td>Body Flap Htr A</td>
<td></td>
</tr>
<tr>
<td>Elevon Actr Htrs A</td>
<td></td>
</tr>
<tr>
<td>MASTER ALARM Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>SM ALERT Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>MDU CRT 1 blanks</td>
<td></td>
</tr>
<tr>
<td>MDU MFD 2 blanks</td>
<td></td>
</tr>
<tr>
<td>MDU PLT 1 blanks</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. Buses remained pwrd
2. Pwrs PL Timing Buffer and OIU 1 (if flown). OIU 1 redundant pwr MNB MPC2 via CAB PL3
3. Indications do not appear until jet commanded
4. If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
## EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| (A12)  | HYD CIRC  
• PUMP PWR 1 – MNB  
• 3 – MNC | Circ Pump 1 MNA pwr  
3 MNA pwr | **3**  
Indications do not appear until jet commanded |
| 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 A (SEC) – ON (if reqd)  
• TOP EVAP HTR NOZ L – B AUTO  
• TOP EVAP HTR DUCT – B | Freon Loop 1 Rad Cntlr B  
2 Rad Cntlr B  
FES Pri B Cntlr  
Top Evap L Noz Htr A  
Top Evap Duc L,R,Fwd,Alt Htr A  
Hi Load Duc Outbd,Inbd Noz Htr A | **5**  
After MET 3:30, tb already bp  
**6**  
Viv holds position. N2 Sys 2 remains |
| If HI LOAD EVAP enabled:  
• HI LOAD DUCT HTR – B(C) | FES H2O Fdln A Htrs 1 (all)  
FES H2O Fdln B Htrs 2 (all)  
Auto radiator isolation function | **7**  
Crew and ground have lost PPCO2 XDCR if Cabin Air Sig Condr not recovered |
| (L2)  | FLASH EVAP FDLN  
• HTR A SPLY – 2  
• B SPLY – 1  
• FREON ISOL MODE – OFF | Port RMS:  
Primary pwr  
MCIU  
Mid MRL Mtr 1  
Alt MRL Mtr 2  
Shldr Brake Rel  
Htr A  
D&C Primary ltg | **8**  
B/U pwr remains for RMS ops |
| (A8L)  | PORT RMS HTR A – OFF  
PORT RMS HTR B – AUTO | MLS 1  
Radar Altm 1 | **9**  
All brakes ON and safing initiated |
| (O6)  | ANNUN BUS SEL ACA 1 – MNB  
For attitude control, LOSS OF VERNIER (ORB OPS, RCS) | ACA 1 MNA pwr  
RCS Manf L5 RJD pwr (L5L,L5D)  
RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D) | **10**  
Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists |
| Refer to OMS/RCS Slide Rule for vlv loss info  
Reconfig following vlv(s) only if leak isolation reqd: (O7)  
• AFT L RCS He PRESS A,B  
• R RCS He PRESS A  
• AFT R RCS He PRESS A  
• FWD RCS He PRESS A | L,R,F RCS He Pr Isol A GPC Cntl and man CL capability  
Aft L RCS He Pr Isol B man OP capability | **11**  
Viv holds position. Man OP capability remains |
| 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 | Aft RCS L,R Jet 2 Htrs | **12**  
Viv holds position. Man CL and full GPC cntl remains |

(Continued)

(Continued) (Continued)

10/14/03 7–97 MAL/ALL/GEN F
**CREW INDICATIONS**

**MAL/ALL/GEN F**

Prior to using L(R) OMS:

- **26** Save L OMS for deorbit (If reqd for on-orbit burn, √ MCC)

**24** Prior to using L(R) OMS:

- **(08)** If Straight Feed config, Left OMS XFEED B – OP (tb–OP). Otherwise, √ MCB

- **(C2)** L IDP/CRT SEL – 3

- **(G2, G8, S2)** GPC/CRT 01 EXEC

**SM 1 DPS UTILITY**

- **(R11U)** MS AUD CNTL – PS

**MMU ASSIGN**

- **(A14)** RCS/OMS HTR

**OMS ENG/XFEED VLV REDUNDANCY**

- **(ML866A)** cb MNB H2O LINE HTR B – cl

**WB BAY DOORS**

- **(A15D,E,F,G)** For any Pallet Cryo Tk Htr A in AUTO:

- **(A15C)** Pallet HTS R A – OFF

- **(ML866B:D)** cb MMU PORT-STBD HTR B (two) – cl

**MMU PORT,STBD HTR B (two) – cl**

- **(A15D,E,F,G)** For any Pallet Cryo Tk Htr A in AUTO:

- **(A15C)** Pallet HTS R A – OFF

**MMU Port,Stbd Htr A**

- **(A15D,E,F,G)** For any Pallet Cryo Tk Htr A in AUTO:

**MMU Port,Stbd Htr A**

**Pallet Cryo Tk 6–9 Htrs A**

- **(A15D,E,F,G)** For any Pallet Cryo Tk Htr A in AUTO:

**Pallet Structural Htrs A**

- **(A15D,E,F,G)** For any Pallet Cryo Tk Htr A in AUTO:

**PLBD:**

- **(C/L Lat 1–4, 5–8, 9–12 Mtrs 1**

**Port/Stbd Fwd Bkhd Mtrs 1 Port Aft Bkhd Mtr**

**Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw**

**L OMS GN2 Press Vlv Op TM**

**L,R OMS He Pr Isol A GPC Op Cntl**

**L,R OMS He Vap Isol 1 GPC Op Cntl**

**SM 168 CRYO PALLET**

**Pallet Volts MNA – 0↓**

**MMU GN2 SPLLY VLV A**

**Port R–D & b Htrs – bp**

**RETEM LAT b – bp**

**Rate Hold b – OFF**

**Rate Scale b – gray**

**Soft Stop b – gray**

**Brakes b – OFF**

**LAT/REL/RDY**

**RETEN LAT**

**DPY/STO**

**SM 94 PDRS CONTROL**

**Indications lost:**

- **Mid MRL Mtr 1 LAT/REL/RDY**

**Alt MRL Mtr 2 LAT/REL/RDY**

**If cooling by FES B only:**

- **‘S88 EVAP OUT T1’**

**‘S88 EVAP OUT T2’**

**WASTE H2O TK 1 VLV**

**WASTE H2O DUMP ISOL VLV**

**WASTE H2O DUMP VLV**

**WASTE H2O TKG OUTLET**

**AWB2D**

**EMU 2 H2O SPLY, WASTE**

**tb (two) – CL**

**If OMS Gmb/Gmb Abs value > 2 deg:**

- **C/W OMS TVC It – on ‘L OMS GMBL’**

**SM 168 CRYO PALLET**

**Pallet Volts MNA – 0↓**

**MMU GN2 SPLLY VLV A**

**Port R–D & b Htrs – bp**

**RETEM LAT b – bp**

**Rate Hold b – OFF**

**Rate Scale b – gray**

**Soft Stop b – gray**

**Brakes b – OFF**

**LAT/REL/RDY**

**RETEN LAT**

**DPY/STO**

**SM 94 PDRS CONTROL**

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**WASTE H2O DUMP ISOL VLV**

**WASTE H2O DUMP VLV**

**WASTE H2O TKG OUTLET**

**AWB2D**

**EMU 2 H2O SPLY, WASTE**

**tb (two) – CL**

**If OMS Gmb/Gmb Abs value > 2 deg:**

- **C/W OMS TVC It – on ‘L OMS GMBL’**

**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**

**During Rad Dpy/Sto ops:**

**(R13L)**

**R–F–L MID tb – bp**

**EVENT TIME ind – blank**

**Loss of redundant path for MNB CDR 1 (S)**

**MDU CDR 2 (P)**

**Loss of redundant capability for MNB DA2 failure**

**Selecting failed MNB for GNC MF protects against GPC M/NR failure after OPS XTION prepositioning**

**MMU ASSGN**

**SM 1 DPS UTILITY**

**(G2, G8, S2)**

**EPS SSR–10 (Cont)**

**BUS LOSS: MNA DA1**

**CREW INDICATIONS**

**MAL/ALL/GEN F**

**Notes**

- **(9)** All brakes ON and safing initiated

- **(11)** Viv holds position

- **(15)** Maintains deorbit capability for MNB DA2 failure

- **(18)** Loss of redundant port to the following:
  - MNB CDR 1 (S)
  - MDU CDR 2 (P)

- **(11)** Viv holds position

- **(19)** Only listen capability restored for MS ATU (CCU only)

- **(20)** 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

- **(21)** Htr B remains

- **(22)** Htr A remains

- **(23)** Viv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge

- **(24)** L OMS N2 P VLV:
  - If Eng – ARM/PRESS, assume viv OP L,R OMS ENG VLV 1: Assume Viv 1 status same as Viv 2

- **(25)** Maint Cntl remains. Redundant Isol remains

- **(26)** Maintains He Isol redundancy
### 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>If Waste H2O Dump reqd:</td>
<td>L OMS Pri TVC</td>
<td>If OMS Gmbl Cmd Abs value &gt; 2 deg and Sec TVC selected:</td>
<td>11</td>
</tr>
<tr>
<td>• Perform WASTE H2O SYS BACKUP DUMP (IFM)</td>
<td>R OMS Sec TVC</td>
<td>C/W OMS TVC It – on ‘R OMS GMBL’</td>
<td>27</td>
</tr>
<tr>
<td>If on PCS1:</td>
<td>Waste H2O:</td>
<td>If Hum Sep A ON:</td>
<td>28</td>
</tr>
<tr>
<td>• Perform RECONFIG TO Alt PCS SYS, ECLS SSR–3</td>
<td>Dump Vlv Cntl</td>
<td>‘S66 HUMID SEP’</td>
<td>02/N2 Cntl Vlv 1 normally closed when unpowered</td>
</tr>
<tr>
<td>If reqd during entry (&lt; 120K ft):</td>
<td>O2/N2 Cntl Sys 1:</td>
<td>If H2O Loop 1 Pump A active:</td>
<td>29</td>
</tr>
<tr>
<td>(L1)</td>
<td>O2/N2 Sys 1 Flow Xdcrs</td>
<td>‘S88 H2O LOOP 1 FLOW’</td>
<td>PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig</td>
</tr>
<tr>
<td>• NH3 CNTLR B – PRI/GPC</td>
<td>O2 Sys 1 Sply Vlv Cntl</td>
<td>‘S88 H2O LOOP 1 TEMP’</td>
<td></td>
</tr>
<tr>
<td>(ML31C)</td>
<td>N2 Sply Vlv 1 Cntl</td>
<td>‘S88 H2O PUMP P 1’</td>
<td></td>
</tr>
<tr>
<td>• VAC VENT ISOL VLV BUS SEL – MNB</td>
<td>N2 Reg Inlet Vlv 1 Cntl</td>
<td>(O1)</td>
<td></td>
</tr>
<tr>
<td>If AC Pwr Transfer cable to be installed to regain AC:</td>
<td>O2 Xovr Vlv 1 OP capability</td>
<td>H2O PUMP OUT PRESS LOOP 1 ind – 20–25 psia</td>
<td></td>
</tr>
<tr>
<td>• Go to EPS SSR–200; otherwise, continue with Bus Loss Actions</td>
<td>O2/N2 Cntl Vlv 1 man Cntl</td>
<td>If first AA failure and S/W Processing Accel data:</td>
<td></td>
</tr>
<tr>
<td>If Cab Temp Cntl 2 active:</td>
<td>PPO2 Snsr A</td>
<td>RM FAIL ACC</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>Cabin Press Snsr Emer dP/dT B/U Comp</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>• CAB TEMP CNTLR – OFF</td>
<td>CO2 Rmvl Sys Cntl 1:</td>
<td>CCTV Video and TV Annul its lost if MNA selected for VCU</td>
<td></td>
</tr>
<tr>
<td>(MD44F)</td>
<td>Fan AC1 pwr</td>
<td>CCTV Mon 1 lost</td>
<td></td>
</tr>
<tr>
<td>• Remove pin from SEC Actuator and BYP vlv linkage, connect linkage to PRI Actuator</td>
<td>Compressor AC1 pwr</td>
<td>STAR TRKR DR POS – Y</td>
<td></td>
</tr>
<tr>
<td>If H2O Loop 2 Pump A active:</td>
<td>FC3 Redundant Reac Vlv Cntl on pnl C3</td>
<td>OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw – 115</td>
<td>NH3 Sys A Pri Cntl</td>
<td>L ADP deploy time incr from 15 to 30 sec</td>
<td></td>
</tr>
<tr>
<td>• PARAM – INH</td>
<td>Vac Vent Isol Vlv MNA Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If first AA failure and S/W Processing Accel data:</td>
<td></td>
<td>CCTV Mon 1 lost</td>
<td></td>
</tr>
<tr>
<td>• H2O Loop 2 Out P</td>
<td>If OMS Gmbl Cmd Abs value &gt; 2 deg and Sec TVC selected:</td>
<td>RM FAIL ACC</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw – &gt; 115</td>
<td>C/W OMS TVC It – on ‘R OMS GMBL’</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>SM 60 TABLE MAINT</td>
<td>O2/N2 Cntl Vlv 1 man Cntl</td>
<td>CCTV Video and TV Annul its lost if MNA selected for VCU</td>
<td></td>
</tr>
<tr>
<td>• Inhibit 0612705, 0612700, 0612740, 0612710</td>
<td>Impending:</td>
<td>CCTV Mon 1 lost</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td>STAR TRKR DR POS – Y</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>CCTV Video and TV Annul its lost if MNA selected for VCU</td>
<td>CCTV Mon 1 lost</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If first AA failure and S/W Processing Accel data:</td>
<td>RM FAIL ACC</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If H2O Loop 1 Pump A active:</td>
<td>‘S88 H2O LOOP 1 FLOW’</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If OMS Gmbl Cmd Abs value &gt; 2 deg and Sec TVC selected:</td>
<td>‘S88 H2O LOOP 1 TEMP’</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If Hum Sep A ON:</td>
<td>‘S88 H2O LOOP 1 PUMP P 1’</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If Hum Sep A ON:</td>
<td>(O1)</td>
<td></td>
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<tr>
<td>(Continued)</td>
<td></td>
<td>H2O PUMP OUT PRESS LOOP 1 ind – 20–25 psia</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If APUs active, and using BLR CNTLR/HTR 1B or 3A:</td>
<td>If if first AA failure and S/W Processing Accel data:</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>C/W APU TEMP It – on after – 2 min</td>
<td>If if first AA failure and S/W Processing Accel data:</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>If APUs active, and using BLR CNTLR/HTR 1B or 3A:</td>
<td>If if first AA failure and S/W Processing Accel data:</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>CCTV Video and TV Annul its lost if MNA selected for VCU</td>
<td>CCTV Mon 1 lost</td>
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<td></td>
</tr>
</tbody>
</table>

**NOTES**

- EQUIP/FUNCTION LOST
- CREW INDICATIONS
- NOTES

**EQUIP/FUNCTION LOST**

- L OMS Pri TVC
- R OMS Sec TVC
- Waste H2O:
  - Dump Vlv Cntl
  - Noz Htr
- O2/N2 Cntl Sys 1:
  - O2/N2 Sys 1 Flow Xdcrs
  - O2 Sys 1 Sply Vlv Cntl
  - N2 Sply Vlv 1 Cntl
  - N2 Reg Inlet Vlv 1 Cntl
  - O2 Xovr Vlv 1 OP capability
  - O2/N2 Cntl Vlv 1 man Cntl
  - PPO2 Snsr A
- Cabin Press Snsr Emer dP/dT B/U Comp
- CO2 Rmvl Sys Cntl 1:
  - Fan AC1 pwr
  - Compressor AC1 pwr
- FC3 Redundant Reac Vlv Cntl on pnl C3
- NH3 Sys A Pri Cntl
- Vac Vent Isol Vlv MNA Cntl
- Cabin Temp Cntl 2 and Hx Byp Vlv Mtr 2
- Inhibit 0612705, 0612700, 0612740, 0612710
- If OMS Gmbl Cmd Abs value > 2 deg and Sec TVC selected: C/W OMS TVC It – on ‘R OMS GMBL’
- If Hum Sep A ON: ‘S66 HUMID SEP’
- If H2O Loop 1 Pump A active: ‘S88 H2O LOOP 1 FLOW’ ‘S88 H2O LOOP 1 TEMP’ ‘S88 H2O PUMP P 1’
- If if first AA failure and S/W Processing Accel data: RM FAIL ACC
- Impending: ‘S66 CO2 RL SYS PCO2’
- CCTV Video and TV Annul its lost if MNA selected for VCU
- CCTV Mon 1 lost
- STAR TRKR DR POS – Y
  - OP/CL time incr from 8 to 16 sec
  - L ADP deploy time incr from 15 to 30 sec

**CREW INDICATIONS**

- If OMS Gmbl Cmd Abs value > 2 deg and Sec TVC selected: C/W OMS TVC It – on ‘R OMS GMBL’
- If Hum Sep A ON: ‘S66 HUMID SEP’
- If H2O Loop 1 Pump A active: ‘S88 H2O LOOP 1 FLOW’ ‘S88 H2O LOOP 1 TEMP’ ‘S88 H2O PUMP P 1’
- If if first AA failure and S/W Processing Accel data: RM FAIL ACC

**NOTES**

- Vlv holds position
- Vlv fails closed
- IFM or real–time flow test will be required
- MCC for additional direction
- 02/N2 Cntl Vlv 1 normally closed when unpowered
- PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig
- Not yet active on all vehicles
- Sys A Sec Cntl man on capability remains
- Lose Auto Temp Cntl via Cntrl 2 and H2O Loop 2 Cabin Hx In Temp snsr. Hx Byp vlv holds position. May be repwrd after AC Pwr Transfer Cable connected
- Inhibits H2O Loop 2 Pump dP, Pump Out Press, Pump Out Temp, Accum Qty, respectively
### EPS SSR–10 (Cont)
#### BUS LOSS: MNA DA1

#### ACTIONS
- WCS
  - MODE – AUTO
  - CRADLE – AUTO
  - Hose stowed in cradle
  - WCS ON lt – 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

- EDO WCS
  - URINAL SEL – SEP 2
  - WCS PWR SEL – OFF 1, AUTO 2
  - URINE DIVERTER VLV – FAN SEP 2

- (R2)
  - BLR CNTLR/HTR 1 – A
  - 3 – B

- (L1)
  - HUM SEP A – OFF
  - B – ON
  - IMU FAN A – OFF
  - B(C) – ON
  - H2O PUMP LOOP 1 – ON, B

- H2O PUMP LOOP 2 – OFF
- AV BAY 1 FAN A – OFF
- Y/B – ON
- AV BAY 2 FAN (two) – ON
- AV BAY 3 FAN A – ON
- B – OFF
- FREON PUMP LOOP 1 – B
- 2 – A

- (MO13Q)
  - If Arlk/Tnl Fan active:
    - ARLK FAN A – OFF
    - B – ON

- During sleep periods:
  - CAB FAN (two) – ON

#### EQUIP/FUNCTION LOST
- WCS Fan/SEP 1
- Sep Fan 1 Mtr Relay
- Urine Fan 1
- Urine Sep 1
- Commode Fan 1
- Controller MNA pwr
- Compactor MNA Cntl
- H2O Blr 1B 3A
- Hyd H2O Blr Cntlr 1B
- Humidity Sep A
- IMU Fan A

H2O Loop 2 Byp Cntlr, Sig Condr
- H2O Loop 2 Byp Vlv pwr
- 2 Pump GPC Cntl
- 1 Pump A
- 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
- Cabin Air Sig Condr (ECLS SC6)

### CREW INDICATIONS
- 34 H2O Loop 2 Byp vlv holds position
- 35 H2O Loop 2 Pump Out Press, Pump ∆P, Accum Qty, Pump Out Temp snrs lost
- 36 May be repwd after AC Pwr Transfer Cable connected

### NOTES
- 37 AV Bay 2 Fan ∆P, Air Out Temp snrs lost

Use streamers (if flown) or monitor by feel during wake period if Cabin Air Sig Condr not recovered

AC1 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNA DA1 ACTIONS column. No additional bus isolation steps reqd.

#### BUS ISOLATION
- ONLY ON MCC CALL, PERFORM
  - MDU CRT 1 PWR – OFF
  - MDU MFD 2 PWR – OFF
  - MDU PLT 1 PWR – OFF
  - (C2)
  - IDP/CRT 1 PWR – OFF
  - (O6)
  - STAR TRKR PWR – Z – OFF
  - (C8)
  - RADAR ALTM 1 – OFF
  - MLS 1 – OFF

(Continued)
**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- **(O14:B)**
  - cb MNA
  - OI SIG CONDR
    - OF 1/4 A – op
  - OI SIG CONDR
    - OM 1/2 A – op
  - OI MDM OF 1/2 A – op
  - OI H2O BYP LOOP 1
    - SNSR – op
  - MNC CONTR – op
  - MSN TIMER FWD – op
  - EVENT TIMER AFT – op

- **(O14:C)**
  - cb MNA
  - TACAN 1 – op
  - SMOKE DETN L/R FLT
    - DK – op
  - SMOKE DETN BAY
    - 2A/3B – op
  - FIRE SUPPR BAY 3 – op
  - UTIL PWR O19/MOS2J – op
  - FLOOD L CNSL – op
  - ANNUN FWD ACA 1 – op
  - cb MNA CRYO O2 HTR
    - TK1 SNSR 1 – op
  - cb RAD ISOL CONTR – op

- **(O14:D)**
  - cb MNA
  - FREON RAD CNTLR 1 – op
  - FREON RAD CNTLR 2 – op
  - N2 SPLY 1 – op
  - O2/N2 CNTLR 1 – op
  - O2 XOVR 1 – op
  - N2 REG INLET 1 – op
  - CAB VENT – op
  - VENT ISOL – op

- **(O14:E)**
  - cb MNA
  - RDR ALTM 1 – op
  - MLS 1 – op
  - ADTA 1 – op
  - S TRK – Z – op
  - ACCEL 1 – op
  - DDU L – op
  - AFT – op
  - NWS – op

- **(R11U)**
  - FC PURGE VLV 1 – CL
  - FC STARTUP HTR 1 – ENA

---

**EQUIP/FUNCTION LOST**

- **(O14:B)**
  - H2O Byp Loop 1 Snsr
    - (ECLS SC11)
  - Fwd Mission Timer
  - Aft Event Timer

- **(O14:C)**
  - Tacan 1
  - L/R Flt Dk Smoke Detectors
  - Av Bay 2 Smoke Detector A
  - Av Bay 3A Smoke Detector B
  - MNA Utility pwr
  - L Console Floodlt
  - Cryo O2 Tk1 Htr Current Snsr 1
  - Auto radiator isolation function

- **(O14:D)**
  - Cabin Vent Vlv
    - Vent Isol
  - ADTA 1
  - AA 1
  - NWS 1

- **(O14:F)**
  - ATVC 2 Isol ME
  - FC1 Startup Htr Inh capability

---

**CREW INDICATIONS**

- **(40)** Redundant pwr source remains for equipment
- **(41)** H2O Loop 1
  - Intchr Flow rate and IMU Fan ∆P snsrs lost
- **(42)** Cabin Smoke Detector remains
- **(43)** Current Snsr 2 remains
- **(44)** Ctrlr A remains
- **(45)** NWS 2 is still available
- **(46)** Six vlvs fail to non–isolation position

---

**NOTES**

- EQUIP/FUNCTION LOST
- CREW INDICATIONS
- NOTES

---

**10/14/03**
### BUS ISOLATION

<table>
<thead>
<tr>
<th>(R14:A)</th>
<th>ONLY ON MCC CALL, PERFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb MNA AUD MS</td>
<td>op</td>
</tr>
<tr>
<td>ADC 1A/2A</td>
<td>op</td>
</tr>
<tr>
<td>MDF 2</td>
<td>op</td>
</tr>
<tr>
<td>PLT 1</td>
<td>op</td>
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</table>

<table>
<thead>
<tr>
<th>(R14:B)</th>
<th>cb MNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb PALLET/DSC</td>
<td></td>
</tr>
<tr>
<td>1A/2B</td>
<td>op (EDO)</td>
</tr>
<tr>
<td>3A</td>
<td>op (EDO)</td>
</tr>
<tr>
<td>UHF</td>
<td>op</td>
</tr>
<tr>
<td>GCILC</td>
<td>op</td>
</tr>
<tr>
<td>_CNTL BUS BC1/2/3</td>
<td>op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(R14:D)</th>
<th>cb MNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV C AFT BAY CAMR/PAN–TILT</td>
<td>op</td>
</tr>
<tr>
<td>TV C AFT BAY CAMR HTR</td>
<td>op</td>
</tr>
<tr>
<td>TV C AFT BAY PAN–TILT HTR</td>
<td>op</td>
</tr>
<tr>
<td>TV CONTR UNIT</td>
<td>op</td>
</tr>
<tr>
<td>MON 1</td>
<td>op</td>
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</table>

<table>
<thead>
<tr>
<th>(A7U)</th>
<th>PL BAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOOD AFT STBD</td>
<td>OFF</td>
</tr>
<tr>
<td>FWD PORT</td>
<td>OFF</td>
</tr>
<tr>
<td>DOCKING</td>
<td>OFF</td>
</tr>
<tr>
<td>PORT RMS LIGHT</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(A7L)</th>
<th>IF DOCKING MISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb DEP MNA SYS 1 VENT</td>
<td>ISOL</td>
</tr>
<tr>
<td>cb DEP MNA SYS 1 VENT</td>
<td>– op</td>
</tr>
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### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>MS ATU</th>
<th>OS SU</th>
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<tbody>
<tr>
<td>UHF Splx Pwr Amp</td>
<td>GCIL MNA pwr</td>
</tr>
<tr>
<td>MNA pwr for Cntl BC1,2,3</td>
<td>Buses</td>
</tr>
<tr>
<td>TV C Aft Bay Camr and Pan–Tilt</td>
<td>TV C Aft Bay Camr Htr</td>
</tr>
<tr>
<td>TV C Aft Bay Camr Pan–Tilt Htr</td>
<td>Video Cntl Unit MNA pwr</td>
</tr>
<tr>
<td>CTVM 1</td>
<td></td>
</tr>
<tr>
<td>PS Floodlt</td>
<td>TV D STBD RMS Camr and Pan–TILT</td>
</tr>
<tr>
<td>TV D STBD RMS Camr Htr</td>
<td>TV D STBD RMS Camr PAN–TILT Htr</td>
</tr>
<tr>
<td>PLB Aft Stbd Floodlt</td>
<td>Fwd Port Floodlt</td>
</tr>
<tr>
<td>Docking Floodlt</td>
<td>Port RMS lt</td>
</tr>
<tr>
<td>Vest Depl Vlv Sys 1 Vent</td>
<td>Vest Isol</td>
</tr>
<tr>
<td>MNA A7</td>
<td>Fwd Truss Docking lt</td>
</tr>
<tr>
<td>Port Vestibule Docking lt</td>
<td>DSP SYS PWR SYS 1 Pwr</td>
</tr>
<tr>
<td>DSP SYS 1 Pwr</td>
<td>PSU MNA Pwr</td>
</tr>
<tr>
<td>MNA pwr to DSP Logic buses</td>
<td>OFF</td>
</tr>
<tr>
<td>1,3</td>
<td>MNA Pyro System</td>
</tr>
<tr>
<td>External Airlock lts 1,4</td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
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<tbody>
<tr>
<td>40 Redundant pwr source remains for equipment</td>
</tr>
<tr>
<td>47 Capability to xmit to gnd from UHF degraded</td>
</tr>
<tr>
<td>48 GCIL also pwrd via MNC cb</td>
</tr>
<tr>
<td>49 MNB pwr may be selected via TV pwr sw (pnl A7) or GCIL if reqd</td>
</tr>
<tr>
<td>50 All docking mechanisms will have single mtr times</td>
</tr>
<tr>
<td>51 Logic buses 1(3) remain pwrd via MNB(MNC)</td>
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</table>
### EPS SSR-10 (Cont)
#### BUS LOSS: MNA 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>MADS W/B FDM, WBSC, SGSC, ACIP PCM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A7L) MADS</td>
<td>• STRAIN GAGE – OFF</td>
<td>MNA FMC1 Bus pwr</td>
<td>11 Vlv Holds Position</td>
</tr>
<tr>
<td></td>
<td>• W/B/ACIP PCM – OFF</td>
<td>AMC1 Bus pwr</td>
<td>21 Htr B Remains</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MMC1 Bus pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MMC3 Bus pwr</td>
<td></td>
</tr>
<tr>
<td>(MA73C:A:B) MCA LOGIC MNA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• FWD 1 – OFF</td>
<td></td>
<td>43 Current Snsr 2 Remains</td>
</tr>
<tr>
<td></td>
<td>• AFT 1 – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MID 1,3 (two) – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA H2O LINE</td>
<td>11 Sply H2O TKA Inlet Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HTR A – op</td>
<td>11 Sply H2O TKD Outlet Vlv Cntl</td>
<td></td>
</tr>
<tr>
<td>• cb MNA SUPPLY H2O TKA INLET – OP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA SUPPLY H2O TKB OUTLET – OP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA WASTE H2O DUMP VLV/NOZ HTR – OP</td>
<td></td>
<td></td>
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<tr>
<td>(ML86B:B)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• cb MNA WASTE H2O TK1 VLV – op</td>
<td>11 Waste H2O TK1 Inlet Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA SPLY H2O TKD OUTLET – op</td>
<td>11 Sply H2O TKD Outlet Vlv Cntl</td>
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<tr>
<td>• cb MNA WASTE H2O DUMP ISOL – op</td>
<td>11 Waste H2O Dump Isol Cntl</td>
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<tr>
<td>• cb MNA VAC VENT ISOL VLV – op</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA WCS CNTLR – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA GALLEY OVEN – op</td>
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<tr>
<td>(ML86B:D)</td>
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<tr>
<td>cb MNA MMU</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• PORT/STBD HTR A</td>
<td>21 MMU Port, Stbd Htr A</td>
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</tr>
<tr>
<td></td>
<td>(two) – op</td>
<td></td>
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<tr>
<td>• GN2 SPLY ISOL VLV A – op</td>
<td>11 MMU GN2 Sply Isol Vlv A</td>
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<tr>
<td>(ML86B:E)</td>
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<tr>
<td>cb MNA EMU 2 H2O</td>
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</tr>
<tr>
<td>• SPLY – op</td>
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<tr>
<td>• WASTE – op</td>
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<tr>
<td>cb MNA FLOOD</td>
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</tr>
<tr>
<td>• TNL ADAPT 2 – op</td>
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<tr>
<td>(ML86B:F)</td>
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<tr>
<td>cb MNA FLOODS</td>
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<tr>
<td>• MIDDECK 1/8 – op</td>
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<tr>
<td>• WMC/MO13Q – op</td>
<td></td>
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<tr>
<td>• AIRLK 1 – op</td>
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<tr>
<td>cb MNA CRYO</td>
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<tr>
<td>• O2 HTR TK3 SNSR 1 – op</td>
<td>43 Cryo O2 Tk3 Htr Current Snsr 1</td>
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<tr>
<td>• O2 HTR TK5 SNSR 1 – op (OV104, OV105)</td>
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(Continued)

10/14/03

7–103

MAL/ALL/GEN F
### BUS ISOLATION

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<th>BUS ISOLATION</th>
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<tbody>
<tr>
<td>(A15:H,I,J,K)</td>
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<tr>
<td>• cb MNA TK6–TK9 O2 HTR SNSR 1 – op</td>
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### EQUIP/FUNCTION LOST

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<tr>
<th>EQUIP/FUNCTION LOST</th>
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<tr>
<td>Cryo O2 Tk 6–9 Htr Current Snsr 1</td>
</tr>
<tr>
<td>CDR HUD</td>
</tr>
<tr>
<td>Port,Stbd Rad Dpy/Sto Mtr 1 Port,Stbd Rad Lat 1–6, 7–12 Mtrs 1</td>
</tr>
<tr>
<td>Fwd RCS Jet 1 Htr</td>
</tr>
<tr>
<td>L OMS Purge Vlv 1,2</td>
</tr>
<tr>
<td>L OMS Eng Pr Vlv Coil 1</td>
</tr>
<tr>
<td>L OMS Cntl Vlv 1,2 Coils 1</td>
</tr>
<tr>
<td>R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2</td>
</tr>
<tr>
<td>OMS Qty Gaging</td>
</tr>
<tr>
<td>APU 1 Cntr Pwr Sply A 1 Fu Tk Vlv A 1 GBX GN2 Repress Vlv</td>
</tr>
<tr>
<td>3 Cntr Pwr Sply B 3 Fu Tk Vlv B</td>
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<tr>
<td>Hyd Rsrvr 1 Qty Snsr</td>
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<tr>
<td>TVC Hyd Sys 1 Isol Cntl</td>
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<tr>
<td>Hyd Brake Isol Vlv 1 Cntl</td>
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<td>LG Extnd Isol Vlv</td>
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<tr>
<td>Vlv 1</td>
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<tr>
<td>NWS Hyd Sys 1</td>
</tr>
<tr>
<td>Ý Star Trkr Dr Sys 1 OP/CL capability LH Vents 5,6,8,9 Mtrs 1</td>
</tr>
<tr>
<td>RH Vents 1,2,3,5,6 Mtrs 1</td>
</tr>
<tr>
<td>L ADP Deploy Mtr 1</td>
</tr>
<tr>
<td>Htr Cntrr 1</td>
</tr>
<tr>
<td>Hyd Main Pump 1 Depress Solenoid RPC A</td>
</tr>
<tr>
<td>Hyd Main Pump 3 Depress Solenoid RPC B</td>
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<tr>
<td>Atm Press Cntl O2 Sys 1 Sply Vlv Cntl</td>
</tr>
<tr>
<td>EMU 2 Sply and Waste H2O Vlv Cntl</td>
</tr>
<tr>
<td>EMU 1.2 Pwr/Batt Chgr MNA pwr</td>
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<tr>
<td>PL Reten Sys A Rel/Lat Mtrs</td>
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<tr>
<td>MPS: Ctr Eng He Intercon Outlet Vlv</td>
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<tr>
<td>Ctr Eng He Isol A</td>
</tr>
<tr>
<td>Pneu He Isol 1</td>
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<tr>
<td>He Sply Blowdn Vlv 1,2</td>
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<tr>
<td>Prplt F/D Inbd LH2 Vlv</td>
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<tr>
<td>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>Ku–Bd Jettison Sys A</td>
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<tr>
<td>Tacan 1</td>
</tr>
<tr>
<td>Freon Loop 1,2 Cntrln B Rad Byp Vlv Mtrs</td>
</tr>
<tr>
<td>Ops Hyd Actr Instr</td>
</tr>
<tr>
<td>MNB pwr select capability remains</td>
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### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctr MPS He reg A &lt; 680 during entry (MM303)</td>
</tr>
</tbody>
</table>

### NOTES

<table>
<thead>
<tr>
<th>NOTES (Cont)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Vlv fails closed. Aft compartment, OMS pods, ET umbilical cavity will not be purged during entry (MM304)</td>
</tr>
<tr>
<td>11 Vlv holds position</td>
</tr>
<tr>
<td>23 Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/ recharge</td>
</tr>
<tr>
<td>52 Snsr 2 remains</td>
</tr>
<tr>
<td>53 No purge. Wait 10 min between burns</td>
</tr>
<tr>
<td>54 Unable to confirm redundant coils</td>
</tr>
<tr>
<td>55 Redundant coils remain</td>
</tr>
<tr>
<td>56 MCC for OMS Qrys. Alt Qrys are frozen on</td>
</tr>
<tr>
<td>57 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>
</tr>
<tr>
<td>61 Hyd Sys 2 still available for NWS</td>
</tr>
<tr>
<td>62 Mtr 2 remains</td>
</tr>
<tr>
<td>63 Htr Cntrr 2 remains</td>
</tr>
<tr>
<td>64 Redundant RPC remains</td>
</tr>
<tr>
<td>65 MNB pwr select capability remains</td>
</tr>
<tr>
<td>66 Vlv fails closed</td>
</tr>
</tbody>
</table>
**EPS SSR–11**  
**BUS LOSS: MNA FPC1**  
(includes MNA FLC1, MNA FMC1, AC1)

<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 FC1 SHUTDN (FC SHUTDN Cue Card), pwrd not needed, then:</td>
<td>2</td>
<td>FC1 Pumps &amp; pH Snr</td>
</tr>
<tr>
<td>(R1)</td>
<td>●  AC CONTR AC1 (three) – cl</td>
<td></td>
<td>AC1 φα, φβ, φC Inverters</td>
</tr>
<tr>
<td></td>
<td>● INV/AC BUS 1 – OFF (tb–OFF)</td>
<td></td>
<td>C/W FC PUMP It – on</td>
</tr>
<tr>
<td></td>
<td>● PWR 1 – OFF (tb–OFF)</td>
<td></td>
<td>C/W AC VOLT It – on</td>
</tr>
<tr>
<td></td>
<td>●  AC CONTR AC1 (three) – op</td>
<td></td>
<td>C/W FREON LOOP It – on</td>
</tr>
<tr>
<td>3</td>
<td>● Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN</td>
<td>4</td>
<td>Fwd RCS He Press Isol A</td>
</tr>
<tr>
<td></td>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
<td></td>
<td>GPC Cntl and man CL capability</td>
</tr>
<tr>
<td></td>
<td>Reconfig following vlv(s) only if leak isolation reqd:</td>
<td>5</td>
<td>RCS Manf F1 RJD Driver (F1F,F1L,F1U,F1D)</td>
</tr>
<tr>
<td></td>
<td>● FWD RCS He PRESS A</td>
<td></td>
<td>MMU 1</td>
</tr>
<tr>
<td>(C2)</td>
<td>● L IDP/CRT SEL – 3 On MCC GO:</td>
<td></td>
<td>EMU 1,2 Pwr/Batt Chgr MNA pwr</td>
</tr>
<tr>
<td></td>
<td>● GPC/CRT 01 EXEC</td>
<td></td>
<td>Port RMS:</td>
</tr>
<tr>
<td>7</td>
<td>SM 1 DPS UTILITY</td>
<td>6</td>
<td>IDP 1</td>
</tr>
<tr>
<td>(G2,G8,S2)</td>
<td>● GNC – ITEM 1 EXEC</td>
<td></td>
<td>Mid MRL Mtr 1</td>
</tr>
<tr>
<td></td>
<td>● SM – ITEM 4 EXEC</td>
<td></td>
<td>Alt MRL Mtr 2</td>
</tr>
<tr>
<td></td>
<td>● OPS – ITEM 8 EXEC</td>
<td></td>
<td>Shldr Brace Release</td>
</tr>
<tr>
<td>(A14)</td>
<td>● RCS/OMS HTR FWD RCS – B AUTO</td>
<td></td>
<td>D&amp;C Primary Ltg</td>
</tr>
<tr>
<td></td>
<td>If EMU(s) in battery charge mode:</td>
<td></td>
<td>Av Bay 3 agent discharge capability</td>
</tr>
<tr>
<td></td>
<td>● PWR/BATT CHGR EMU 1(2) BUS SEL – MNB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ABL)</td>
<td>● PORT RMS HTR A – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● PORT RMS HTR B – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-seat ingress:</td>
<td></td>
<td>LOOP 2 ind – 0 psia</td>
</tr>
<tr>
<td></td>
<td>● Discharge handheld fire ext into AV BAY 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If AC Pwr Transfer Cable to be installed to regain AC:</td>
<td></td>
<td>RCS/OMS PRPLT QTY Gage and MSN TIMER ind – blank</td>
</tr>
<tr>
<td></td>
<td>● Go to EPS SSR–200; otherwise, continue with bus loss actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fwd RCS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>He PRESS A tb – bp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TK ISOL 3/4/5 tb – bp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MANF ISOL 1 tb – bp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L ADP deploy time incr from 15 to 30 sec</td>
</tr>
</tbody>
</table>

(Continued)

(Continued)
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Cab Temp Cntlr 2 active: (L1)</td>
<td>CAB TEMP CNTLR – OFF</td>
<td>STAR TRKR DR POS – Y</td>
<td>9 All brakes ON and safing initiated</td>
</tr>
<tr>
<td>• CAB TEMP CNTLR – OFF</td>
<td></td>
<td>OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td>(MD44F)</td>
<td></td>
<td>(L1) If H2O PUMP LOOP 1 A active:</td>
<td></td>
</tr>
<tr>
<td>• Remove pin from SEC Actuator and BYP vlv linkage, connect linkage to PRI Actuator</td>
<td></td>
<td>‘S88 H2O LOOP 1 FLOW’</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• CAB TEMP CNTLR – 1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td></td>
<td>If H2O PUMP LOOP 1 A active:</td>
<td></td>
</tr>
<tr>
<td>H2O LOOP 2 OUT P</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 1’</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw – 115</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 2’</td>
<td></td>
</tr>
<tr>
<td>• PARAM – INH</td>
<td></td>
<td>‘S88 FREN FLOW LOOP 1’</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw – &gt; 119</td>
<td></td>
<td>‘S88 FREN FLOW LOOP 2’</td>
<td></td>
</tr>
<tr>
<td>(O1)</td>
<td></td>
<td>‘S88 FREN FLOW LOOP 3’</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>‘S88 FREN FLOW LOOP 3’</td>
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<td></td>
<td>‘S88 FREN FLOW LOOP 3’</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>SM 60 SM TABLE MAINT</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• Inhibit 0612705, 0612700, 0612740, 0612710</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>(R2)</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• BLR CNTLR/HTR 1 – A</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• 3 – B</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>HUM SEP A – OFF</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• √ B – ON</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• IMU FAN A – OFF</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• B(C) – ON</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 – ON, B</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 2 – OFF</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>(F7)</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>H2O Loop 2 Byp Cntrl, Sig Condr</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>H2O Loop 2 Byp Vlv pwr</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>2 Pump GPC Cntl</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>1 Pump A</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>Av Bay 1 Fan A</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>Av Bay 2 Sig Condr, Xdors (ECLS SC3)</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>Av Bay 3 Fan B</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>Freon Loop 1 Pump A</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>2 Pump B</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>(MO13Q)</td>
<td></td>
<td>‘S88 FREN PUMP LOOP 3’</td>
<td></td>
</tr>
<tr>
<td>If Arlk/Tnl Fan active:</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• ARLK FAN A – OFF</td>
<td></td>
<td>(MO51F)</td>
<td></td>
</tr>
<tr>
<td>• B – ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(WCS)</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• √ MODE – AUTO</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• √ CRADLE – AUTO</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• Hose stowed in cradle</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• WCS ON It – OFF</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – OFF</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• HOSE BLOCK – SEP 2</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</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>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – 2</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>During sleep periods:</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>• CAB FAN (two) – ON</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td></td>
<td>‘S66 CO2 RL SYS PCO2’</td>
<td></td>
</tr>
</tbody>
</table>

10/14/03
### Actions

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(EDO WCS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• URINAL SEL – SEP 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• WCS PWR SEL – OFF 1, AUTO 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• URINE DIVERTER VLV – FAN SEP 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform LOSS OF 1 FC (ORB PKT, PWRDN)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(MO51F) If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 1 selected:

- Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1/DEACT 2(ACT 2/DEACT 1) (ORB OPS, ECLS)

20 CO2 Rmvl Sys Cntlr 1

21 BUS ISOLATION

- ONLY ON MCC CALL, PERFORM
- MDU CRT 1 PWR – OFF
- (C2)
- IDP/CRT 1 PWR – OFF
- (O14:C)
  - cb MNA FIRE SUPPR BAY 3 – op
- (O14:F)
  - MMU 1 – OFF
- (MA73:CA)
  - MCA LOGIC MNA FWD 1 – OFF

22 MNA FMC1 Bus pwr

23 CDR HUD
  - Y Star Trkr Dr Sys 1
  - OP/CL capability
  - L ADP Dpy Mtr 1
  - Htr Cntlr 1

24 RH Vents 1,2,3,5,6 Mtrs 1
  - LH Vents 5,6,8,9 Mtrs 1

25 LG Extend Vlv 1

26 MNA pwr to Ctrl Buses AB1, AB2,AB3,CA1,CA2,CA3

27 ET Door Mtr:
  - C/L Lat Actr 1 Mtr 1
  - Actr 2 Mtr 1
  - L Dr Closure Mtr 1
  - Uplock Lat Mtr 1

28 NWS Hyd Sys 1

29 Freon Loop 1,2 Cntlr B Rad Byp Vlv Mtrs
  - Port,Stbd Rad Lat 1–6, 7–12 Mtrs 1
  - Port,Stbd Rad Dpy/Sto Mtr 1

PLBD:
  - C/L Lat 1–4, 5–8, 9–12 Mtrs 1
  - Port,Stbd Fwd Blkhd Mtr 1
  - Port Aft Blkhd Mtr 1
  - Stbd Door Mtr 1

PL Reten Sys A Rel/Lat Mtrs

20 PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig

21 AC1 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNA FPC1 ACTIONS column. No additional bus isolation steps reqd

22 Mtr 2 remains

23 Htr Cntlr 2 remains

24 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

25 Buses remain pwrd

26 Redundant mtrs remain

27 Hyd Sys 2 still available for NWS

28 Bypass vlv holds position and Cntlr A Rad Byp Vlv Mtr remains
## EPS SSR–12
### BUS LOSS: MNA MPC1
(Includes MNA MMC1 & MNA MMC3)

<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 MNA BUS TIE (BUS TIE Cue Card)</td>
<td>FC1 Purge Viv</td>
<td>1 Buses are tied due to: Loss of FC1 Purge capability. As FC1 loses performance, tied FC will pick up load, slowing FC1 degradation. If degradation projection does not allow nominal EOM, FC1 will be shutdn. √ MCC, Loss of FC1 SS ∆V Snsrs. Change in ∆Amps &gt;12 amps indicates possible cell crossover problem. ∆Amps shift due to loss of FC1 Purge capability is indicated by change in ∆Amps between pre and post purge readings. MCC will aid in this determination.</td>
</tr>
<tr>
<td></td>
<td>• Monitor, record ∆amps between FC1 and tied FC</td>
<td>O2,H2 Flow Xdcrs SS ∆V Snsrs.</td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td>• PL CAB – MNB</td>
<td>MNA pwr to CABPL1,2,3 buses</td>
<td></td>
</tr>
<tr>
<td>(A8L)</td>
<td>• PORT RMS HTR A – OFF</td>
<td>Port RMS: Primary pwr Mid MRL Mtr 1 Aft MRL Mtr 2 Htr A</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• TOP EVAP HTR DUCT – B</td>
<td>Top Evap Duct Fwd,Aft Htrs A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If Hi Load Evap enabled: HI LOAD DUCT HTR – B (C)</td>
<td>Hi Load Duct Outbd,Inbd Htrs A</td>
<td></td>
</tr>
<tr>
<td>(L2)</td>
<td>• FLASH EVAP FDLN HTR</td>
<td>FES H2O Fdln A Mid 2 Htr 1 B Mid 2 Htr 2</td>
<td></td>
</tr>
<tr>
<td>(R11U)</td>
<td>• FC H2O LINE HTR – B AUTO</td>
<td>FC H2O Line Htrs A Relief Htrs A</td>
<td></td>
</tr>
<tr>
<td>(MA73C:C:D)</td>
<td>• MCA PWR AC1 3Φ MID 1,3 (two) – op</td>
<td>Port,Stbd Rad Lat 1–6,7–12 Mtrs 1 Limit sw</td>
<td></td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>• MNB EXT ARLK HTR STRUC – cl</td>
<td>Port,Stbd Rad Dpy/Sto Mtrs 2 Limit sw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For PLBD ops:</td>
<td>Port,Stbd Rad Dpy/Sto Mtrs 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OP/CL Drs in man mode</td>
<td>Ext A/L Structural Htrs MNA pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 B/U pwr remains for RMS ops. All brakes ON and safing initiated</td>
<td>PLBD: C/L Lat 1–4,5–8,9–12 Mtrs 1 Port,Stbd Fwd Blkhd Lat Mtrs 1 Port Aft Blkhd Lat Mtr 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Single mtr time. One failure away from loss of two out of three MRLs. EVA or jettison capability exists</td>
<td>PLB Aft Stbd Floodlt Fwd Port Floodlt Docking Floodlt Port RMS lt</td>
<td></td>
</tr>
<tr>
<td>(A7U)</td>
<td>PL BAY FLOOD</td>
<td>Vest Dep Viv Sys 1 Vent Vent Isol</td>
<td></td>
</tr>
<tr>
<td>(A7L)</td>
<td>IF DOCKING MISSION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• cb DEP MNA SYS 1 VENT ISOL – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• cb DEP MNA SYS 1 VENT – op</td>
<td></td>
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<td>(Continued)</td>
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</tr>
</tbody>
</table>

## BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

| (R11U) | • FC PURGE VLV 1 – CL | FC Start Up Htr Inh capability |
|        | • FC STARTUP HTR 1 – ENA | |
| (A7U)  | PL BAY FLOOD | |
|        | • AFT STBD – OFF | |
|        | • FWD PORT – OFF | |
|        | • DOCKING – OFF | |
|        | • PORT RMS LIGHT – OFF | |
| (A7L)  | IF DOCKING MISSION | |
|        | • cb DEP MNA SYS 1 VENT ISOL – op | |
|        | • cb DEP MNA SYS 1 VENT – op | |

(Continued)
### BUS LOSS: MNA MPC1

**EPS SSR–12 (Cont)**

Includes MNA MMC1 & MNA MMC3

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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td><strong>(A7L)</strong> IF DOCKING MISSION</td>
<td><strong>MNA A7</strong></td>
<td><strong>2</strong> Vlv holds position. Sys 2 remains</td>
<td><strong>EQUIP/FUNCTION LOST</strong></td>
</tr>
<tr>
<td>cb DOCK LT MNA</td>
<td>Fwd Truss Docking It</td>
<td><strong>8</strong> MNB htrs remain</td>
<td><strong>CREW INDICATIONS</strong></td>
</tr>
<tr>
<td>• TRUSS FWD – op</td>
<td>Port Vestibule Docking It</td>
<td><strong>10</strong> All docking mechanisms will have single mtr times</td>
<td><strong>NOTES</strong></td>
</tr>
<tr>
<td>• VEST PORT – op</td>
<td>DSP SYS 1 Pwr</td>
<td><strong>11</strong> Logic buses 1(3) remain pwrwd via MNB(MNC)</td>
<td></td>
</tr>
<tr>
<td>• SYS PWR SYS 1 MNA – OFF</td>
<td>PSU MNA Pwr</td>
<td><strong>12</strong> Buses remain pwrwd</td>
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</tr>
<tr>
<td>• PSU PWR MNA – OFF cb MNA</td>
<td>MNA pwr to DSP Logic buses 1,3</td>
<td></td>
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<tr>
<td>• LOGIC 1 – op</td>
<td>MNA Pyro System</td>
<td></td>
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<tr>
<td>• 3 – op</td>
<td>External Airlock Its 1,4</td>
<td></td>
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</tr>
<tr>
<td>• PYRO PWR MNA – OFF LIGHTS</td>
<td>MADS W/B FDM, WBSC, SGSC, ACIP PCM</td>
<td></td>
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</tr>
<tr>
<td>• AIRLK 1/4 MNA – OFF</td>
<td>MNA MMC1 and MNA MMC3 Bus pwr</td>
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<td></td>
</tr>
<tr>
<td><strong>(A7L)</strong> MADS</td>
<td>MNA pwr to ESS2CA and ESS3AB AUXPLA Bus Pwr</td>
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<tr>
<td>• STRAIN GAGE – OFF</td>
<td>Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs Man Cntrl</td>
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<tr>
<td>• WB/ACIP PCM – OFF</td>
<td>ATM Press Cntrl O2 Sys 1 Sply Vlv Cntrl</td>
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<tr>
<td><strong>(MA73C;A,B)</strong></td>
<td>Port Rad Dpy/Sto Mtr 1 Stbd Rad Dpy/Sto Mtr 1 LH Vents 5,6 Mtrs 1 RH Vents 3,5,6 Mtrs 1</td>
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<tr>
<td>• MCA LOGIC MNA MID 1,3 (two) – OFF</td>
<td>Cryo O2 Tk 6–9 Htr Current Snsr 1</td>
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<tr>
<td><strong>(A15;H,I,J,K)</strong></td>
<td>FC3 Redundant Reac Vlv Close Cntrl on pnl C3</td>
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<tr>
<td>• cb MNA TK6–TK9 O2 HTR SNSR 1 – op</td>
<td>Ext A/L Structural Htrs MNA pwr</td>
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<tr>
<td><strong>(ML86B;C)</strong></td>
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<tr>
<td>• cb MNA EXT ARLK HTR STRUC – op</td>
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<tr>
<td><strong>(ML86B;D)</strong></td>
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<tr>
<td>• cb MNA FC PCM – op</td>
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</tbody>
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10/14/03 7–109 MAL/ALL/GEN F
**EPS SSR–13**  
**BUS LOSS: MNA APC1**

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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tr>
<td>For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</td>
<td>2 RCS Manf L5 RJD pwr (L5L,L5D)</td>
<td>MASTER ALARM</td>
<td>1 Indications do not appear until jet commanded</td>
</tr>
<tr>
<td>Refer to OMS/ RCS Slide Rule for vlv loss info (use APC 4 Slide for Aft RCS)</td>
<td>3 Alt L, R RCS He Pr Isol A GPC Cntl and Man CL capability</td>
<td>(F7) C/W RCS JET lt – on</td>
<td>2 Manf status not automatically declared closed. Fail–offs will occur when jets commanded</td>
</tr>
<tr>
<td>GNC 23 RCS</td>
<td>If OMS GMBL cmd abs value &gt; 2 deg: C/W OMS TVC lt ‘L OMS GMBL’ (3,B)</td>
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<td></td>
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<tr>
<td>DES INH on L Manf 3 Jets:</td>
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</tr>
<tr>
<td>• ITEM 2 EXEC</td>
<td>6 Alt L RCS He Pr Isol B Man OP capability</td>
<td>If OMS GMBL cmd abs value &gt; 2 deg and Sec TVC selected: C/W OMS TVC lt ‘R OMS GMBL’ (3,B)</td>
<td></td>
</tr>
<tr>
<td>• L3L ITEM 12 EXEC (*)</td>
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<tr>
<td>• L3D ITEM 28 EXEC (*)</td>
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<tr>
<td>• L3A ITEM 30 EXEC (*)</td>
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<tr>
<td>• Sel alt pod(s) PRI JET FAIL LIMIT to 6</td>
<td></td>
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</tr>
<tr>
<td>5 Reconfig following vlv(s) only if leak isolation reqd: (O7)</td>
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<tr>
<td>• AFT L RCS He PRESS A,B</td>
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<tr>
<td>• R RCS He PRESS A</td>
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<tr>
<td></td>
<td>APU HTR TK/FU LINE/H2O</td>
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<tr>
<td>• SYS 1A – OFF</td>
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<tr>
<td>• 1B – AUTO</td>
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<tr>
<td>• 3A – AUTO</td>
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<td>• 3B – OFF</td>
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<tr>
<td>HYD HTR</td>
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<tr>
<td>• RUD SPD BK A – OFF</td>
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<tr>
<td>• B – AUTO</td>
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<td></td>
<td>RCS/OMS HTRS</td>
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<tr>
<td>• L POD (two) – A OFF, B AUTO</td>
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<tr>
<td>• R POD (two) – B OFF, A AUTO</td>
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<tr>
<td>• OMS CRSFD LINES (two) – A OFF, B AUTO</td>
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<tr>
<td>9 Prior to using L(R) OMS: (O8)</td>
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<tr>
<td></td>
<td>L(R) OMS He PRESS/VAP</td>
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<tr>
<td>• ISOL A – OP</td>
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<tr>
<td>• B – GPC</td>
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<tr>
<td></td>
<td>L(R) OMS He Vap Isol 1 GPC Cntl</td>
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<tr>
<td>10 L OMS Pri TVC</td>
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<tr>
<td></td>
<td>R OMS Sec TVC</td>
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<tr>
<td>GNC XXXXX</td>
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<tr>
<td>M/NVR YYYY</td>
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<tr>
<td>Sel L OMS SEC TVC:</td>
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<tr>
<td>• L OMS GMBL SEC – ITEM 30 EXEC</td>
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<tr>
<td>Sel R OMS PRI TVC:</td>
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<tr>
<td>• R OMS GMBL PRI – ITEM 29 EXEC</td>
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</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

10/14/03
### EQUIP/FUNCTION LOST

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<th>NOTES</th>
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<td>PUMP 1 – B AUTO</td>
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<td>3 – A AUTO</td>
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<tr>
<td>APU HTR</td>
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<tr>
<td>LUBE OIL LINE 1 – B AUTO</td>
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<td>LUBE OIL LINE 3 – AAUTO</td>
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<td>APU HTR TK/FU LINE/H2O</td>
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<tr>
<td>SYS 1A – OFF</td>
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<tr>
<td>1B – AUTO</td>
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<td>3A – AUTO</td>
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<td>HYD HTR</td>
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<td>RUD SPD BK A – OFF</td>
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<td>BDY FLP A – OFF</td>
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<td>ELEVON A – OFF</td>
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<tr>
<td>B – AUTO</td>
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<tr>
<td>HYD CIRC PUMP</td>
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<td>PWR 1 – MNB</td>
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<td>3 – MNC</td>
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<td>FLASH EVAP FDLN</td>
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<td>B SPLY – 1</td>
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<td>BLR CNTLR/HTR</td>
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<tr>
<td>1 – A</td>
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<tr>
<td>3 – B</td>
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<tr>
<td>RCS Manf L5 RUD pwr</td>
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<tr>
<td>L5L,L5D</td>
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<tr>
<td>L Pod A Htrs (all)</td>
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<tr>
<td>R Pod B Htrs (partial)</td>
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<tr>
<td>OMS Crsfd Ln A Htrs (all)</td>
<td></td>
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<tr>
<td>Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability</td>
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</tr>
<tr>
<td>Aft L,R RCS He Pr Isol B man OP capability</td>
<td></td>
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</tr>
<tr>
<td>Aft L,R RCS TK ISOL 3/4/5 A CL microswitch feedback</td>
<td></td>
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</tr>
</tbody>
</table>

**EQUIP/FUNCTION LOST**

1. MASTER ALARM
2. C/W RCS JET lt – on
3. SM ALERT Light/Tone – on
4. Top Evap L Noz Htr A
5. Top Evap Duct L,R Htrs A
6. Hi Load Duct Noz Htr A
7. FES Pri B Cntl
8. Top Evap L Noz Htr A
9. Top Evap Duct L,R Htrs A
10. Hi Load Duct Noz Htr A
11. FES H2O Fdln A Htrs 1 (all except MID 2)
12. FES H2O Fdln B Htrs 2 (all except MID 2)
13. Hyd H2O Blr 1 Cntlr B
14. 3 Cntlr A
15. FES H2O Fdln A Htrs 1 (all except MID 2)
16. FES H2O Fdln B Htrs 2 (all except MID 2)
17. Hyd H2O Blr 1 Cntlr B
18. 3 Cntlr A
19. Ref to OMS/RCS Slide Rule for vlv loss info
20. Recon fig following vlv(s) only
21. If I'CNCT config:
22. Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability
23. Aft L,R RCS He Pr Isol B man OP capability
25. Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability
26. Aft L,R RCS He Pr Isol B man OP capability
27. Aft L,R RCS TK ISOL 3/4/5 A CL microswitch feedback
28. Aft L,R RCS TK ISOL 3/4/5 A CL microswitch feedback
29. If OMS GMBL cmd abs value > 2 deg: C/W OMS TVC lt L OMS GMBL (3,B)
30. If OMS GMBL cmd abs value > 2 deg and TVC selected: C/W OMS TVC lt R OMS GMBL (3,B)
31. If cooling by FES B only: C/W FREON LOOP if 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'

**Crew Indications**

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
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
5. Full vlv capability remains
6. Man OP capability remains
7. Manf status not automatically declared closed. Fail–offs will occur when jet commanded
8. Htr B remains
9. Htr A remains
10. Do not reconfig for reg switch or I'CNCT procedures
11. Vlv holds position. Man CL, full GPC Cntl remains

**Notes**

- EQUIP/FUNCTION LOST
- CREW INDICATIONS
- ACTIONS
- ACTIONS (Continued)
- NOTES
- (Continued)
## EPS SSR–14 (Cont)

### BUS LOSS: MNA APC4

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<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| **12** | **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  
- 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  
- Save L OMS eng for deorbit (If reqd for additional on-orbit burns, \(\sqrt{\text{MCC}}\))  
- O8  
  - If Straight feed config, L OMS Crossfeed B – OP (tb–OP). Otherwise, \(\sqrt{\text{MCC}}\)  
- Prior to using L(R) OMS:  
  - O8  
  - L(R) OMS He PRESS/VAP  
  - ISOL A – OP  
  - B – GPC  
- GNC XXXXX  
  - MNVR YYYY  
  - (3,B)  
- Sel L OMS SEC TVC:  
  - L OMS GMBL SEC – ITEM 30 EXEC  
- Sel R OMS PRI TVC:  
  - R OMS GMBL PRI – ITEM 29 EXEC  
- If reqd during entry \(< 120k \text{ ft})$:  
  - L1  
  - NH3 CNTLR B – PRI/GPC  
  - If NH3 CNTLR A(B) – SEC/ON reqd, then:  
  - L1  
  - H2O PUMP LOOP 1,2  
  - (two) – ON  
  - \(\sqrt{\text{FLOW PROP VLV LOOP}}\)  
  - (two) – ICH  
  - Activate PL H2O LOOP(s) (if applicable) | L OMS GN2 Press Vlv OP TM  
  - Eng Pr Vlv Coil 1  
- O8  
  - OMS Eng/Crossfeed Vlv Redundancy  
- L,R OMS He Pr Isol A GPC Cntl  
- L,R OMS He Vap Isol 1 GPC Cntl  
- L OMS Eng Cntl Vlv 1,2 Coils 1  
- R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2  
- L OMS Purge Vlv 1,2  
- OMS Qty Gage  
- L OMS Pri TVC  
- R OMS Sec TVC  
- NH3 Sys A Pri Cntlr and Auto Sw over to Sec Cntlr |  
| **13** |  
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| **24** |  
| **25** |  

### CAUTION

- No purge. Wait 10 min between burns
- \(\sqrt{\text{MCC}}\) for OMS Qty. Disregard qty's on meter and
- GNC SYS SUMM 2
- Sys A Sec Cntlr man on capability remains
- Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
- Vlv B remains
- Pwr Sply A remains. Turbine speed ind lost
- Vlv A remains

### BUS ISOLATION

| (MA73C:B)  
- MCA LOGIC MNA  
- AFT 1 – OFF  

### NOTES

- Maintains control capability for APC3 failure
- Lost TM:
  - GNC SYS SUMM 2
- L OMS N2 P VLV:  
  - If Eng – ARM/PRESS, assume vlv OP  
  - L,R OMS ENG VLV 1:  
  - Assume Vlv 1 status same as Vlv 2
- Unable to confirm redundant coils
- Maintains deorbit capability for MNB DA2 failure
- Vlv fails closed. Man cntl remains. Redundant Isols remain
- Maintains He Isol redundancy
- Redundant coils remain
- No purge. Wait 10 min between burns
- \(\sqrt{\text{MCC}}\) for OMS Qty. Disregard qty's on meter and
- GNC SYS SUMM 2
- Sys A Sec Cntlr man on capability remains
- Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
- Vlv B remains
- Pwr Sply A remains. Turbine speed ind lost
- Vlv A remains

### BUS ISOLATION

| ONLY ON MCC CALL, PERFORM  
- APU 1 Cntlr pwr Sply A  
  - 1 Fu Tk Vlv A  
  - 1 GBX GN2 Repress Vlv  
  - 3 Cntlr pwr Sply B  
  - 3 Fu Tk Vlv B  

### NOTES

- BUS ISOLATION ONLY ON MCC CALL, PERFORM
- APU 1 Cntlr pwr Sply A  
  - 1 Fu Tk Vlv A  
  - 1 GBX GN2 Repress Vlv  
  - 3 Cntlr pwr Sply B  
  - 3 Fu Tk Vlv B
**BUS LOSS: MNA APC4**

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<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<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>
</tr>
<tr>
<td>4</td>
<td>LG Extend Isol Vlv Cntl</td>
<td></td>
<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>
</tr>
<tr>
<td>3</td>
<td>TVC Hyd Sys 1 Isol Cntl</td>
<td></td>
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</tr>
<tr>
<td>26</td>
<td>NWS Hyd Sys 1</td>
<td></td>
<td>26  Hyd Sys 2 still available for NWS</td>
</tr>
<tr>
<td>27</td>
<td>Hyd Main Pump 1 Depress Solenoid RPC A</td>
<td></td>
<td>27  Redundant RPC remains</td>
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<tr>
<td>27</td>
<td>Hyd Main Pump 3 Depress Solenoid RPC B</td>
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<tr>
<td>28</td>
<td>ATVC 2 Isol ME</td>
<td></td>
<td>28  Six vlvs fail to non-isolation position</td>
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<tr>
<td>29</td>
<td>L OMS Purge Vlv 1.2 Qty gauging</td>
<td></td>
<td>29  Vlv fails closed</td>
</tr>
<tr>
<td>29</td>
<td>He Sply Blowdn Vlv 1,2</td>
<td></td>
<td>30  Vlv fails closed. Redundant vlv remains</td>
</tr>
<tr>
<td>30</td>
<td>Pneu He Isol 1</td>
<td></td>
<td>31  Vlv fails closed. Aft compartment, OMS pods, and ET Umbilical cavity will not be purged during entry (MM304)</td>
</tr>
<tr>
<td>30</td>
<td>Ctr Eng He Isol A</td>
<td></td>
<td>32  Vlv holds position. Loss of manual capability to inert LH2 manf</td>
</tr>
<tr>
<td>29</td>
<td>Ctr Eng He Intercon Outlet Vlv</td>
<td></td>
<td>33  Redundant mtrs remain</td>
</tr>
<tr>
<td>31</td>
<td>He Sply Blowdn Vlv 1,2</td>
<td></td>
<td>34  Actuators continue to operate until Stow, Rel/Lat, or OP/CL sw is taken to GND or OFF</td>
</tr>
<tr>
<td>32</td>
<td>Prplt F/D Inbd LH2 Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>ET Door Mtrs: C/L Lat Actr 1 Mtr 1 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>C/L Lat Actr 2 Mtr 1 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>L Dr Closure Mtr 1 GPC CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>L Dr Uplock Lat Mtr 1 GPC Lat capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### ACTIONS

Refer to OMS/RCS Slide Rule for vlv loss info. Reconfig following vlv(s) only if leak isolation reqd:  
- FWD RCS He PRESS A

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

2. RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)

3. Av Bay 3 agent discharge capability

### CREW INDICATIONS

- MASTER ALARM Light/Tone – on
- C/W RCS JET lt – on
- F RCS D(F,L,U) JET

### NOTES

1. Vlv holds position. Man OP capability remains
2. Do not reconfig for reg switch or I’CNCNT 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

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

- cb MNA FIRE SUPPR BAY 3 – op

- L ADP Htr Cntr 1
### ACTIONS

1. **APU HTR**
   - GAS GEN/FUEL PUMP 1 – B AUTO
   - GAS GEN/FUEL PUMP 3 – AUTO
   - LUBE OIL LINE 1 – B AUTO
   - LUBE OIL LINE 3 – A AUTO

2. **APU HTR TK/FU LINE/H2O**
   - SYS 1A – OFF
   - SYS 1B – AUTO
   - SYS 3A – AUTO
   - SYS 3B – OFF

3. **HYD HTR**
   - RUD SPD BK A – OFF
   - RUD SPD BK B – AUTO
   - BDY FLP A – OFF
   - BDY FLP B – AUTO
   - ELEV A – OFF
   - ELEV B – AUTO

4. **HYD CIRC PUMP**
   - PWR 1 – MNB
   - PWR 3 – MNC

5. **FLASH EVAP CNTLR PRI A(SEC) – ON (if reqd)**
   - TOP EVAP HTR NOZ L – B AUTO
   - TOP EVAP HTR DUCT – B

6. **FES Pri B Cntlr**
   - Top Evap L Noz Htr A
   - Top Evap Duct L,R Htrs A
   - Hi Load Duct Noz Htr A

7. **FES H20 Fdln Htr A**
   - FES H20 Fdln A Htrs 1 (all except MID 2)
   - FES H20 Fdln B Htrs 2 (all except MID 2)

8. **RCS/OMS HTR OMS**
   - CRSFD LINES (two) – A OFF, B AUTO

9. **GNC 23 RCS**
   - Re prioritize L,R Marf 2 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest priority, etc
   - Set alt pod(s) PRI JET FAIL LIMIT to 6

### EQUIP/FUNCTION LOST

1. **APU 1 GG/Fu Pump Htrs A**
2. **APU 3 GG/Fu Pump Htrs B**
3. **APU 1 Lube Oil Line Htrs A**
4. **APU 3 Lube Oil Line Htrs B**

5. **APU 1 Tk/Fu Ln Htrs A**
6. **APU 3 Tk/Fu Ln Htrs B**

7. **Rud/Spd Brake Htr A**
8. **Body Flap Htr A**
9. **Elevon Actr Htrs A**

10. **Circ Pump 1 MNA pwr**
11. **3 MNA pwr**
12. **FES Pri B Cntlr**
13. **Top Evap L Noz Htr A**
14. **Top Evap Duct L,R Htrs A**
15. **Hi Load Duct Noz Htr A**
16. **FES H20 Fdln Htr A**
17. **Hyd H20 Blr 1 Cntlr B**
18. **3 Cntlr A**
19. **RCS Manf L5 RJD pwr**
20. **(L5L,L5D)**

### CREW INDICATIONS

1. **MASTER ALARM**
   - Light/Tone – on

2. **HYD BRAKE ISOL VLV 1**
   - tb – OP

3. **HYD MPS/TVC ISOL VLV SYS 1**
   - tb – CL

4. **AFT L RCS He PRESS A**
   - tb – bp

5. **AFT R RCS He PRESS A**
   - tb – bp

6. **AFT LR RCS TK ISOL 3/4/5A**
   - tb (two) – bp (if lvlv in CL position)

### NOTES

1. Indications do not appear until jet commanded
2. **TIME CRITICAL**
3. If cooling by FES only using PRI B CNTLR:
   - C/W FREON LOOP
   - It – on
   - ‘S88 EVAP OUT T1’
   - ‘S88 EVAP OUT T2’

4. Vlv holds position
5. Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position
6. 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
7. Manf status not automatically declared closed. Fail–offs will occur when jet commanded
8. Do not reconfig for reg switch or I’CNCT procedures
9. Vlv holds position. Man CL and full GPC Cntl remain

### ACTION

10. **RCS Manf L5 RJD pwr**
11. **(L5L,L5D)**

### EQUIP/FUNCTION LOST

12. **OMS Crsfd Ln A Htrs (partial)**
13. **Alt LR RCS He Pr Isol A**
14. **GPC Cntl and man CL capability**
15. **Alt LR RCS He Pr Isol B man OP capability**
16. **Aft RCS L,R Jet 2 Htrs**

### ACTIONS

17. **APU HTR TK/FU LINE/H2O**
18. **Sys 1A – OFF**
19. **1B – AUTO**
20. **3A – AUTO**
21. **3B – OFF**

22. **HYD HTR**
23. **RUD SPD BK A – OFF**
24. **B – AUTO**
25. **BDY FLP A – OFF**
26. **B – AUTO**
27. **ELEV A – OFF**
28. **B – AUTO**

29. **HYD CIRC PUMP**
30. **PWR 1 – MNB**
31. **3 – MNC**

32. **Flash Evap Fdln Htr**
33. **A SPLY – 2**
34. **B SPLY – 1**

35. **Blr Cntlr/Htr 1 – A**
36. **B – 3**

37. **Rcs Manf L5 Rjd Pwr**
38. **(L5L,L5D)**

39. **Indications do not appear until jet commanded**
40. **If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp**
41. **If cooling by FES only using PRI B CNTLR:**
42. **C/W FREON LOOP**
43. **It – on**
44. **‘S88 EVAP OUT T1’**
45. **‘S88 EVAP OUT T2’**

46. **Hyd H20 Blr 1 Cntlr B**
47. **3 Cntlr A**
48. **RCS Manf L5 Rjd Pwr**
49. **(L5L,L5D)**

50. **OMS Crsfd Ln A Htrs (partial)**
51. **Alt LR RCS He Pr Isol A**
52. **GPC Cntl and man CL capability**
53. **Alt LR RCS He Pr Isol B man OP capability**

54. **Aft RCS L,R Jet 2 Htrs**

55. **RCS/OMS HTR OMS**
56. **CRSFD LINES (two) – A OFF, B AUTO**

57. **Refer to OMS/RCS Slide Rule for lvlv loss info. Reconfig following lvlv(s) only if leak isolation reqd:**
58. **Aft L RCS He PRESS A,B**
59. **R RCS He PRESS A**
60. **GNC 23 RCS**

61. **Re prioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest priority, etc**
62. **Set alt pod(s) PRI JET FAIL LIMIT to 6**

63. **(Continued) (Continued)**
**EPS SSR–16 (Cont)**

**BUS LOSS: MNA ALC1**

### ACTIONS

- **If ICNCT config:**
  - (O7) AFT L RCS TK ISOL 3/4/5 A – GPC (tb-bp)
  - (O7) AFT R RCS TK ISOL 3/4/5 A – GPC (tb-bp)

- **Save L OMS eng for deorbit**
  - (If reqd for additional on-orbit burns, √ MCC)

- **Prior to using OMS:**
  - (O8) L(R) OMS He PRESS/VAP
  - • ISOL A – OP
  - • B – GPC

  If reqd during entry
  - (< 120K ft): (L1)
  - • NH3 CNTLR B – PRI/GPC
  - (If NH3 CNTLR A(B) – SEC/ON reqd, then:
    - (L1)
    - • H2O PUMP LOOP 1,2 (two) – ON
    - • √ FLOW PROP VLV LOOP 1,2 (two) – PL HX
  - If applicable
  - • Activate P/L H2O LOOP(s)

### EQUIP/FUNCTION LOST

- **AFT L,R RCS TK ISOL 3/4/5 A CL microswitch feedback**

- **L OMS GN2 Press Vlv OP TM**

- **L OMS Eng Pr Vlv Coil 1**

- **L,R OMS He Pr Isol A GPC Cntl**

- **NH3 Sys A Pri Cntlr & Auto sw over to Sec Cntl**

### CREW INDICATIONS

- Ctr MPS He Reg A < 680 during entry (MM303)

### NOTES

- **Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position**

- **L OMS N2 P VLV:**
  - If Eng – ARM/PRESS, assume vlv OP

- **Unable to confirm redundant coils**

- **Maintains He Isol redundancy**

- **Vlv fails closed. Man cntl remains. Isol B remains**

- **Sys A Sec Cntlr man on capability remains**

- **Redundant coils remains**

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- **NONE**

- **L OMS Cntl Vlv 1,2 Coils 1**

- **R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2**

- **OMS Qty gauging**

- **L OMS GN2 Purge Vlv 1,2**

- **APU 1 Fu Tk Vlv A**

- **3 Fu Tk Vlv B**

- **Hyd Brake Isol Vlv 1 Cntl**

- **TVC Hyd Sys 1 Isol Cntl**

### CAUTION

- No purge. Wait 10 min between burns

- **Vlv fails closed**

- **Vlv holds position. Loss of manual capability to inert LH2 Mant**

- **Vlv fails closed. Redundant vlv remains**

- **Vlv fails closed. Aft compartment, OMS pods, and ET umbilical cavity will not be purged during entry (MM304)**

---

05/18/00  
7–116  
MAL/ALL/GEN F
### EPS SSR–17
#### BUS LOSS: MNA FMC1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L1)</td>
<td>H2O PUMP LOOP 1 – B</td>
<td>MASTER ALARM Light/Tone – on 1</td>
<td>Vu holds position</td>
</tr>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
<td>H2O Loop 1 Pump A</td>
<td>SM ALERT Light/Tone – on 2</td>
<td>If this action taken, H2O Pump Loop 2 must be pwrd</td>
</tr>
<tr>
<td>GNC 23 RCS</td>
<td>Override F1 Manf status to OP:</td>
<td>RM DLMA MANF 3</td>
<td>Mtr 2 remains</td>
</tr>
<tr>
<td>Override F1 Manf status to OP:</td>
<td>RCS FWD ITEM 1 EXEC</td>
<td>FWD RCS</td>
<td>Htr Cntr 2 remains</td>
</tr>
<tr>
<td>• RCS FWD ITEM 1 EXEC</td>
<td>MANF VLVS 1 OVRD ITEM 40 EXEC</td>
<td>TK ISOL 3/4/5 tb – bp</td>
<td></td>
</tr>
<tr>
<td>• MANF VLVS 1 OVRD ITEM 40 EXEC</td>
<td></td>
<td>MANF ISOL 1 tb – bp</td>
<td></td>
</tr>
<tr>
<td><strong>BUS ISOLATION</strong></td>
<td></td>
<td>L ADP deploy time incr from 15 to 30 sec 1</td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td>STAR TRKR DR POS – Y OP time incr from 8 to 16 sec 1</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>H2O PUMP LOOP 1 – OFF</td>
<td>If H2O PUMP LOOP 1,A active:</td>
<td></td>
</tr>
<tr>
<td>(MA73C:A)</td>
<td>MCA LOGIC MNA FWD 1 – OFF</td>
<td>C/W H2O LOOP lt – on</td>
<td></td>
</tr>
<tr>
<td>MCA LOGIC MNA FWD 1 – OFF</td>
<td>MNA FMC 1 Bus pwr</td>
<td>‘S88 H2O LOOP 1 FLOW’</td>
<td></td>
</tr>
<tr>
<td>RH Vent 1.2 Mtr 1</td>
<td>L ADP Deploy Mtr 1 Disc 1 3</td>
<td>‘S88 H2O LOOP 1 TEMP’</td>
<td></td>
</tr>
<tr>
<td>Htr Cntr 1</td>
<td>Y Star Trkr Dr Sys 1 OP/CL capability 4</td>
<td>‘S88 H2O PUMP P’</td>
<td></td>
</tr>
<tr>
<td>PORT RMS Mid MRL Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR–18
#### BUS LOSS: MNA MMC1

<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>db MCA PWR AC1 3Φ MID 1 – op</td>
<td>RAD CNTL STBD tb – bp</td>
<td>1</td>
</tr>
<tr>
<td>For PLBD ops:</td>
<td>Port Rad Lat 1–6,7–12 Mtrs 1 Limit sw 1</td>
<td>SM (BFS SM 63) PL BAY DOORS 2</td>
<td></td>
</tr>
<tr>
<td>• OP/CL Drs in man mode</td>
<td>Port Rad Dyp/Sto Mtr 1 Stbd Rad Dyp/Sto Mtr 2 Limit sw 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLBD:</td>
<td>C/L Lat 9–12 Mtr 1 Port,Stbd Fwd Blkhd Lat Mtrs 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13L)</td>
<td>RAD CNTL PORT tb – bp 1</td>
<td>If PORT RAD pnl stowed:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If PORT RAD pnl stowed:</td>
<td>RAD CNTL PORT tb – bp 2</td>
<td></td>
</tr>
<tr>
<td>(SM)</td>
<td>RAD CNTL STBD tb – bp 1</td>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’</td>
<td></td>
</tr>
<tr>
<td></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>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’</td>
<td></td>
</tr>
<tr>
<td>(SM)</td>
<td>PL BAY DOORS 2</td>
<td>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td>(A8L)</td>
<td>PORT RMS:</td>
<td>SM 94 PDRS CONTROL</td>
<td>1</td>
</tr>
<tr>
<td>PORT RMS:</td>
<td>RETEN LAT tb – bp 1</td>
<td>Indications lost:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R–F–L MID tb – bp 2</td>
<td>Mid MRL Mtr 1 LAT/REL/RDY</td>
<td></td>
</tr>
</tbody>
</table>

12/21/99  7–117  MAL/ALL/GEN F
### EPS SSR–19
**BUS LOSS: MNA MMC3**

<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>cb MCA LOGIC MCA PWR AC1 3 MCA MID 3 – op</td>
<td>Stbd Rad Lats 1–6,7–12 Mtr 1 Limit sw</td>
<td>MNA MMC3 Bus pwr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stbd Rad Dpy/Sto Mtr 1 Port Rad Dpy/Sto Mtr 2 Limit sw</td>
<td>LH Vents 5,6 Mtr 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLBD: C/L Lat 1–4,5–8 Mtr 1 Port Aft Blkhd Lats Mtr 1</td>
<td>PORT RMS:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MNA MMC3 Bus pwr</td>
<td>SM 94 PDRS CONTROL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indication lost:</td>
</tr>
<tr>
<td>2</td>
<td>For PLBD ops: • OP/CL Drs in man mode</td>
<td></td>
<td>Aft MRL Mtr 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LAT/REL/RDY</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:B) • MCA LOGIC MNA MID 3 – OFF</td>
<td>MNA MMC3 Bus pwr</td>
<td>MNA MMC3 Bus pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LH Vents 5,6 Mtr 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. If AC1 MM3 cb not opened, Lat Mtr 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
## EPS SSR–20
### BUS LOSS: MNA AMC1

<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:B)
- MCA LOGIC MNA AFT 1 − OFF

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH Vent 8,9 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNA AMC1 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET Door Mtrs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L Lat Actr 1 Mtr 1 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L Lat Actr 2 Mtr 1 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Dr Closure Mtr 1 GPC CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Dr Uplock Lat Mtr 1 GPC Lat capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC pwr removal capability via Limit sw for ET Dr Mtrs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L Lat Actr 1 Mtr 1 2 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Dr Closure Mtr 1 Uplock Lat Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LG Extend Isol Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NWS Hyd Sys 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. 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
2. Redundant mtrs remain
3. Actuators continue to operate until the Stow, Rel/Lat, or OP/CL sw is taken to GND or OFF
4. Hyd Sys 2 still available for NWS
### Actions

1. MS AUD CNTL - PS
   - PS ATU PNL config for use

### Bus Isolation

**Only on MCC call, perform**

1. MS ATU, CCU, FD Spkr
2. CCTV Video lost if MNA selected for VCU
3. CCTV Mon 1 lost

**Notes**

- Only listen capability regained for MS ATU (CCU only)
- Causes loss of redundant path for ACCU config control bits, loss of xmit capability via CCU, loss of FD spkr
- Redundant pwr source remains for equipment
- Possible loss of capability for xmitting to gnd via UHF
- GCILC also pwrd via MNC cb
- Buses remain powered
- MNB pwr may be selected via TV pwr sw (pnl A7) or GCILC, if reqd
- IDP 1 and IDP 2 ADC data lost. MDU port select may be reqd
### EPS SSR-22
BUS LOSS: MNA O14&A8

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A8L)</td>
<td>Port RMS:</td>
<td>1</td>
<td>1</td>
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<tr>
<td></td>
<td>Primary pwr</td>
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<td></td>
<td>Htr A</td>
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<tr>
<td></td>
<td>Port RMS D&amp;C tb</td>
<td>2</td>
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<tr>
<td></td>
<td>bp</td>
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<tr>
<td></td>
<td>except:</td>
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<tr>
<td></td>
<td>BRAKES tb</td>
<td></td>
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<tr>
<td></td>
<td>− OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RATE MIN tb</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>− OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RATE HOLD tb</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>− OFF</td>
<td></td>
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<tr>
<td></td>
<td>SOFT STOP tb</td>
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<td></td>
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<tr>
<td></td>
<td>− gray</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RATE SCALE tb</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>− gray</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON control for RCS</td>
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</tr>
<tr>
<td></td>
<td>Manf F1 RJD pwr</td>
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<tr>
<td></td>
<td>(F1F,F1L,F1U,F1D)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **BUS ISOLATION**
  - ONLY ON MCC CALL, PERFORM
  - NONE

- **NOTES**
  - 1 B/U drive capability remains. All brakes ON and safing initiated
  - 2 All brakes ON and safing initiated
  - 3 If driver sw OFF when bus failed, F1 Manf Drivers lost
### EPS SSR–23
### BUS LOSS: MNA O14

#### ACTIONS

1. **MN BUS TIE C − ON**
   - (TB−ON)
2. **If RAD CNTLR LOOP 1,2 − AUTO B:**
   - Perform ON−ORBIT RAD CNTLR SWITCH, ECLS SSR−13 for Freon Loop 1,2
3. **If on PCS 1:**
   - Perform RECONFIG TO ALT PCS SYS, ECLS SSR−3
4. **If ACA 1 − MNA pwr:**
   - ACA 1 MNA pwr
5. **If ACA 1  − MNA, lights lost:**
   - CAB VENT ISOL tb − bp
   - N2 SYS 1 SPLY tb − bp
   - N2 SYS 1 REG INLET tb − bp
   - O2/N2 FLOW SYS 1 ind − 0 pph
   - CAB PRESS ind − 0 psia
   - PPO2 SNSR A ind − 0 psia
   - MSN TIME ind − blank
   - EVENT TIME ind − blank

#### EQUIP/FUNCTION LOST

- Freon Loop 1,2 Rad Cntlr B
- Auto radiator isolation function
- MLS 1
- Radar Altm 1
- O2/N2 Cntl Vlv 1 man Cntl
- PPO2 Snsr A
- Cabin Press Snsr
- Emer dP/dT B/U comp

#### CREW INDICATIONS

- MASTER ALARM Light/ Tone − on
- C/W CAB ATM lt − on
- SM ALERT Light/ Tone − on
- S66 IMU FAN DP
- S66 CABIN PPO2 A
- S66 CABIN PRES
- S88 H2O LOOP 1 FLOW
- SM0 TIRE PRESS
- S78 CABIN O2 CONC
- If ADTA 1, MLS 1, −Z STAR TRKR pwrd:
  - 'BCE STRG 1 ADTA' (3,B)
  - 'BCE STRG 1 MLS' (3)
  - 'BCE STRG 1 STKR'
- CAB VENT ISOL tb − bp
- N2 SYS 1 SPLY tb − bp
- N2 SYS 1 REG INLET tb − bp
- **(O1)** O2/N2 FLOW SYS 1 ind − 0 pph
- **(O2)** CAB PRESS ind − 0 psia
- **(O3)** PPO2 SNSR A ind − 0 psia
- **(O4)** MSN TIME ind − blank
- **(O5)** EVENT TIME ind − blank
- **(O6)** If first AA failure and S/W processing accel data:
  - 'RM FAIL ACC' (3)
- **(O7)** CAB VENT ISOL tb − bp
- **(O8)** Inhibits Cabin P, Cabin PPO2A, Cabin O2 Flow 1, Cabin N2 Flow 1, IMU Fan dP, and H2O Loop ICH Flow 1 respectively
- **(O9)** Inhibits Primary C/W for Cabin P, Cabin PPO2A, Cabin O2 Flow 1 and Cabin N2 Flow 1 respectively

#### NOTES

- **1** FC3 only one failure away (loss of ESS3AB) from inability to bus tie
- **2** H2O Loop 1 Intchg rate and IMU fan dP snsrs lost
- **3** ACA recovered by switching to alternate pwr
- **4** After MET 3:30, tb already bp
- **5** Vlv holds position
- **6** Vlv fails closed.
- **7** O2/N2 Cntl Vlv 1 normally closed when unpowered
- **8** Inhibits Cabin P, Cabin PPO2A, Cabin O2 Flow 1, Cabin N2 Flow 1, IMU Fan dP, and H2O Loop ICH Flow 1 respectively
- **9** Inhibits Primary C/W for Cabin P, Cabin PPO2A, Cabin O2 Flow 1 and Cabin N2 Flow 1 respectively

#### SM 60 SM TABLE MAINT

- Inhibit 0612405, 0612511, 0612105, 0612553, 0612869, 0612869
- Perform ECLS COMPUTATION INHIBIT, ECLS SSR−14 Table B

- Inhibit 0612405, 0612511, 0612105, 0612553, 0612869, 0612869
- Perform ECLS COMPUTATION INHIBIT, ECLS SSR−14 Table B

- Pre−seat ingress for entry:
  - discharge hand−held fire ext
  - into AV BAY 3

#### (Continued)

10/14/03 7–122 MAL/ALL/GEN F
### BUS ISOLATION

<table>
<thead>
<tr>
<th>BUS ISO</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>
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</tr>
<tr>
<td>(O6)</td>
<td>• S TRK PWR –Z – OFF</td>
<td></td>
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<tr>
<td>(O8)</td>
<td>• RDR ALTM 1 – OFF</td>
<td></td>
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<tr>
<td></td>
<td>• MLS 1 – OFF</td>
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<tr>
<td>(O14:B)</td>
<td></td>
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<tr>
<td></td>
<td>• OF 1/4 A – op</td>
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<tr>
<td></td>
<td>• OM 1/2 A – op</td>
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<tr>
<td></td>
<td>• 1/2 A – op</td>
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<td></td>
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<tr>
<td></td>
<td>• 3/4 A – op</td>
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<tr>
<td></td>
<td>• cb MNA OI MDM OF</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• CRYO O2 Tk 1 Htr Current Snsr 1 – op</td>
<td></td>
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<tr>
<td>(O14:C)</td>
<td></td>
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<tr>
<td></td>
<td>• TACAN 1 – op</td>
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<tr>
<td></td>
<td>• SMOKE DETN L/R FLT DK – op</td>
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<tr>
<td></td>
<td>• SMOKE DETN BAY 2A/3B – op</td>
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<tr>
<td></td>
<td>• FIRE SUPPR BAY 3 – op</td>
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<tr>
<td></td>
<td>• UTIL PWR O19/MO52J – op</td>
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<tr>
<td></td>
<td>• FLOOD L CNSL – op</td>
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<tr>
<td></td>
<td>• ANNUN FWD ACA 1 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• cb MNA CRYO O2 HTR TK1 SNSR 1 – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• RAD ISOL CONTR – op</td>
<td></td>
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<tr>
<td>(O14:D)</td>
<td></td>
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<tr>
<td></td>
<td>• FREON RAD CNTRL 1,2 (two) – op</td>
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<tr>
<td></td>
<td>• N2 SPLY 1 – op</td>
<td></td>
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<tr>
<td></td>
<td>• O2/N2 CNTRL 1 – op</td>
<td></td>
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<tr>
<td></td>
<td>• O2 XOV R 1 – op</td>
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<td></td>
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<tr>
<td></td>
<td>• N2 REG INLET 1 – op</td>
<td></td>
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<tr>
<td></td>
<td>• CAB VENT – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• VENT ISOL – op</td>
<td></td>
<td></td>
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<tr>
<td>(O14:E)</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>• RDR ALTM 1 – op</td>
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<tr>
<td></td>
<td>• MLS 1 – op</td>
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<td></td>
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<tr>
<td></td>
<td>• ADTA 1 – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• S TRK –Z – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• ACCEL 1 – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• DDU LAFT (two) – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• NWS – op</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

- Z Star Tracker Dr OP capability
- Z Star Tracker
- H2O Byp Loop 1 Snsr (ECLS SC11)
- Tire Press Sig Cond A1,A2
- Fwd Mission Timer
- Aft Event Timer
- Tacan 1
- L/R Flt Dk Smoke Detectors
- Av Bay 2 Smoke Detector A
- Av Bay 3 Smoke Detector B
- Av Bay 3 agent discharge capability
- MNA Utility pwr
- L Console Floodlt
- Dry O2 Tk 1 Htr Current Snsr 1
- Auto radiator isolation function
- Cabin Vent Vlv
- ADTA 1

### CREW INDICATIONS

- 2 H2O Loop 1 Intchg flowrate and IMU fan ∆P snrs lost
- 10 Redundant pwr source remains for equip
- 11 Redundant measurement remains. FDA Alarm – BFS only; OPS 3,6
- 12 Cabin Smoke Detector remains
- 13 Current Snsr 2 remains
- 14 Cntlr A remains
- 15 NWS 2 still available
### 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>Buses remain pwrd</td>
</tr>
<tr>
<td></td>
<td>MNA pwr to ESS2CA, ESS3AB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

| NONE | | | |

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### 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></td>
<td>Single mtr time</td>
</tr>
<tr>
<td>• Reprioritize FRCS Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</td>
<td>(A6U) PL RETEN RDY tb – bp RETEN/LAT tb – bp</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>PL Reten Sys A Rel/Lat Mtrs ROEU Logic Pwr Sys 1 Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) ODA mtr 1 latch/release</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

| NONE | | | |

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10/14/03

7-124

MAL/ALL/GEN F
## EPS SSR–26
### BUS LOSS: MNA ML86B

### ACTIONS

#### (ML86BA)
- cb MNB H2O LINE HTR B – cl

#### (ML86BD)
- cb MNB MMU
- PORT, STBD HTR B (two) – cl

If Waste H2O Dump reqd:
- Perform WASTE WATER SYS BACKUP DUMP (IFM)

#### (ML31C)
- VAC VENT ISOL VLV BUS SEL – MNB

#### (WCS)
- V/Cr - AUTO
- Vac Vent Isol MNA Cntl
- Hose stowed in cradle
- WCS Sep Fan 1 Mtr Relay

#### (EDO WCS)
- WCS PWR SEL – OFF 1, AUTO 2

#### (GALLEY)
- OVEN/RHS – OFF
- Oven Electronics Assy
- Config for backup H2O dispense per ECLS

#### (MO51F)
If CO2 Rmvl SYS flown and if CO2 Rmvl SYS Cntlr 1 selected:
- Perform CO2 Rmvl SYS Cntlr CONFIG: ACT 1/DEACT 2 (ACT 2/DEACT 1) (ORB OPS, ECLS)

#### (ML86B:C)
- cb MNB(MNC) EXT ARLK HTR LINE ZN1 – cl
- cb MNB(MNC) EXT ARLK HTR LINE ZN2 – cl
- cb MNB EXT ARLK HTR STRUC – cl

If in Rendezvous or Docked:
- cb MNB EXT ARLK HTR VEST Z1/2/3 – cl

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 H2O Line Htrs A:</td>
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<td></td>
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<tr>
<td>Waste Dump Line Htr A</td>
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<td></td>
</tr>
<tr>
<td>Vac Vent Ln Htr A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMU Port, Stbd Htr A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Waste H2O:</td>
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<td></td>
</tr>
<tr>
<td>Dump Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noz Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vac Vent Isol MNA Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCS Sep Fan 1 Mtr Relay</td>
<td></td>
<td></td>
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<tr>
<td>Controller MNA pwr</td>
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<tr>
<td>Compactor MNA Cntl</td>
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<tr>
<td>Galley Electronics Assy</td>
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<tr>
<td>Oven</td>
<td></td>
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</tr>
<tr>
<td>4 One of six htr strips Galley Hov H2O Tk</td>
<td></td>
<td></td>
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<tr>
<td>5 CO2 Rmvl Sys Cntlr 1</td>
<td></td>
<td></td>
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<tr>
<td>6 Ext A/L H2O and Structural Htrs MNA pwr</td>
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</tr>
</tbody>
</table>

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

#### (ML86BA)
- 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

(Continued)
**BUS ISOLATION**

<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>ONLY ON MCC CALL, PERFORM</td>
<td>Waste H2O Dump Isol Cntl Tk1 Inlet Vlv Cntl</td>
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<tr>
<td>(ML86B:B) cb MNA WASTE H2O</td>
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</tr>
<tr>
<td>• TK1 VLVL − op</td>
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<tr>
<td>• DUMP ISOL − op</td>
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<tr>
<td>cb MNA SPLY H2O</td>
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<tr>
<td>• TKD OUTLET − op</td>
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<tr>
<td>cb MNA VAC</td>
<td></td>
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<tr>
<td>• VENT ISOL VLVL − op</td>
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<td></td>
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<tr>
<td>cb MNA</td>
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<tr>
<td>• WCS CNTLR − op</td>
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<tr>
<td>• GALLEY OVEN − op</td>
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<tr>
<td>(ML86B:D) cb MNA MMU</td>
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<tr>
<td>• PORT, STBD HTR A (two) − op</td>
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<tr>
<td>• GN2 SPLY ISOL VLVL − op</td>
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<tr>
<td>cb MNA PYRO JETT SYS A</td>
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<tr>
<td>• KU ANT − op</td>
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<tr>
<td>• STBD RMS − op</td>
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<td></td>
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<tr>
<td>(ML86B:E) cb MNA EMU 2 H2O</td>
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<tr>
<td>• SPLY − op</td>
<td></td>
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<tr>
<td>• WASTE − op</td>
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<tr>
<td>cb MNA FLOOD</td>
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<tr>
<td>• TNL ADAPT 2 − op</td>
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<tr>
<td>cb MNA</td>
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<tr>
<td>• CO2 SYS 1 CNTLR − op</td>
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<tr>
<td>(ML86B:F) cb MNA FLOODS</td>
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<tr>
<td>• MIDDECK 1/8 − op</td>
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<tr>
<td>• WMC/MO13Q − op</td>
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<tr>
<td>• AIRLK 1 − op</td>
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<tr>
<td>(ML86B:C) cb MNA EXT ARLK HTR LINE ZN1 − op</td>
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<tr>
<td>• cb MNA EXT ARLK HTR LINE ZN2 − op</td>
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<tr>
<td>• cb MNA EXT ARLK HTR STRUC − op</td>
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<tr>
<td>• cb MNA EXT ARLK HTR VEST Z1/2/3 − op</td>
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<tr>
<td>(ML86B:D) cb MNA FC PCM − op</td>
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<tr>
<td>7 Cryo O2 Tk 3 Htr Current Snsr 1</td>
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<tr>
<td>Cryo O2 Tk 5 Htr Current Snsr 1 (OV105 only)</td>
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<tr>
<td>1 MMU Port, Stbd Htr A</td>
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<tr>
<td>2 MMU GN2 Sply Isol Vlv A</td>
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</tr>
<tr>
<td>8 Ku−Bd Jettison Sys A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 EMU 2 Sply H2O Vlv Cntl Waste H2O Vlv Cntl Ext A/L H2O and Structural Htrs MNA pwr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middeck Floodlts 1,8 WMC Floodlt, MO13Q pnl lt 2 Airlk Floodlt 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 MNB and MNC line htrs remain. MNB struc and vestibule htrs remain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Current Snsr 2 remains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Sys B remains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Lost capability to observe and record FC single cell voltages</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### EPS SSR–27
**BUS LOSS: MNA PPC1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
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<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A15:D,E,F,G) <strong>For any Pallet Cryo Tk Htr A in Auto:</strong></td>
<td>Pallet Cryo Tk 6–9 Htrs A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Aff) TK HTR A – OFF</td>
<td>SM ALERT Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B – AUTO</td>
<td>(FSMs) 168 PALLET V A</td>
<td></td>
</tr>
<tr>
<td>(A15:C) <strong>PALLETS HTRS A – OFF</strong></td>
<td>Pallet Structural Htrs A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B – AUTO</td>
<td>SM 168 CRYO PALLET</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pallet Volts MNA –0 ↓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM

(A15:B)
- PALLETS PWR PPCA−1 MNA – OFF

**EPS SSR–28**
**BUS LOSS: MNA A15EDO**

<table>
<thead>
<tr>
<th>ACTIONS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td>1 Srnr 2 remains</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM

(A15:H,I,J,K)
- cb PALLET MNA TK6–9 O2 SNSR 1 – op

**EPS SSR–29**
**BUS LOSS: MNA A7**

<table>
<thead>
<tr>
<th>ACTIONS</th>
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<th>NOTES</th>
</tr>
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<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td>1 DSP SYS 1 PWR still available to all users except MNA A7</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM

(A7L)
- IF DOCKING MISSION
  - cb DEP MNA SYS 1
  - VENT ISOL – op
  - VENT – op
  - LIGHTS
  - AIRLK 1/4 MNA – OFF
  - CB DOCK LT
  - MNA TRUSS FWD – op

- cb DEP MNA SYS 1 VENT ISOL tp – bp
- VEST DEP VLV SYS 1 VENT ISOL tp – bp
- DSP SYS PWR SYS 1 tp – OFF

- Vestibule Depress Vlv Sys 1 Vent Isol
- Vestibule Depress Vlv Sys 1 Vent
- External Airlock lts 1,4 Fwd Truss Docking lt

10/14/03
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<tbody>
<tr>
<td>• Perform FC2 SHUTDN (FC SHUTDN Cue Card)</td>
<td>FC2 Pumps and pH Snsr Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor MNB pwr to AUX PLB BUS ESS1B C ESS3AB CNTLAB1,2,3 CNTLBC1,2,3</td>
<td>MASTER ALARM Light Tone on SM ALERT Light/Tone on</td>
<td>1 Buses remain pwrd</td>
</tr>
<tr>
<td>• Perform LOSS OF 1 FC (ORB PKT, PWRDN)</td>
<td>MNB pwr to CABPL 1,2,3 buses AC2 φA,φB,φC Inverters</td>
<td>(F6) MDU CDR 2 blanks</td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td>O2,H2 Tk1 HTRS A AUTO</td>
<td>(F7) MDU CRT 2 blanks MDU MFD 1 blanks C/W CABIN ATM lt on C/W MN BUS UNDERVOLT lt on C/W AC Volt lt on C/W FC PUMP lt on C/W FREON LOOP lt on C/W RCS JET lt on</td>
<td>2 Pwrs PL Timing Buffer, OIU 1, and OIU 2 (if flown), OIU 1 redundant pwr MNA MPC1 via CAB PL3</td>
</tr>
<tr>
<td>• PL CAB MNA</td>
<td>Cryo O2(H2) Tk2,3,4 Htrs A if in Auto Cryo O2,H2 Tk2,3,4 Htrs B</td>
<td>[COMM LOST] All S–BD A/G voice lost if Sys 1 selected Middeck Spkr audio lost</td>
<td>3 Indications do not appear until jet commanded</td>
</tr>
<tr>
<td>• cb AC CONTR AC2 φA,φB,φC (three) op</td>
<td>Pallet Structural Htrs B</td>
<td>(LIGHTS LOST) R Ovhd pnl (pnls O1,O2,O3,O8,O9,O16,O17) R Pnl (pnls F4,F8,F9, R1,R2,R4) Ovhd instr (pnls O1,O2,O3) OS Numeric (pnls A2,A4) L Seat/Ctr Cnsl Floodlts R Ovhd Cnsl Floodlt OS Floodlt Middeck Floodlts 2,6 Bank Floodlts 2/4 PHS Floodlt Airlock Floodlt 3 PLB Fwd Bklt Floodlt PLB Mid Port Floodlt PLB Fwd Stbd Floodlt TA Floodlt 3</td>
<td>4 MNA PPC1 will now supply 100% of pwr to A and B Cryo Tk Htrs</td>
</tr>
<tr>
<td>(A15:C)</td>
<td>Redundant pwr to Pallet Cryo Tk 6–9 Htrs B</td>
<td>Av Bay 1 Agent discharge capability</td>
<td>5</td>
</tr>
<tr>
<td>(A15:D,E,F,G)</td>
<td>That at least one htr (A or B) per Tk turned off</td>
<td>APU 1 GG/Fu Pump Htrs B APU 2 GG/Fu Pump Htrs A APU 1 Lube Oil Line Htrs B 2 Lube Oil Line Htrs A 1 Tk/Fu Line Htr B APU 1 GG Inj H2O Htrs B 2 Tk/Fu Line Htr A</td>
<td>5</td>
</tr>
<tr>
<td>(A12)</td>
<td>APU HTR</td>
<td>Rudder/Speed Brake Htr B</td>
<td>6</td>
</tr>
<tr>
<td>• GAS GEN/FUEL PUMP 1 A AUTO</td>
<td>LUBE OIL LINE 1 A AUTO</td>
<td>Body Flap Htr B Elev Act Htr B Aft Fuselage Htrs A</td>
<td>Rad isolation may cause FES shutdown</td>
</tr>
<tr>
<td>• GAS GEN/FUEL PUMP 2 B AUTO</td>
<td>LUBE OIL LINE 2 B AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LUBE OIL LINE 1 A AUTO</td>
<td>APU HTR TK/FU LINE/H2O SYS 1A AUTO</td>
<td>1 B OFF</td>
<td></td>
</tr>
<tr>
<td>• LUBE OIL LINE 2 B AUTO</td>
<td>2A OFF</td>
<td>2B AUTO</td>
<td></td>
</tr>
<tr>
<td>• HYD HTR</td>
<td>HYD HTR</td>
<td>HYD HTR</td>
<td></td>
</tr>
<tr>
<td>• RUD SPD BK A AUTO</td>
<td>RUD SPD BK A AUTO</td>
<td>B OFF</td>
<td></td>
</tr>
<tr>
<td>• BDFLP A AUTO</td>
<td>BDFLP A AUTO</td>
<td>B OFF</td>
<td></td>
</tr>
<tr>
<td>• ELEV A AUTO</td>
<td>ELEV A AUTO</td>
<td>B OFF</td>
<td></td>
</tr>
<tr>
<td>• B OFF</td>
<td>B OFF</td>
<td>AFT FUS A OFF</td>
<td></td>
</tr>
<tr>
<td>• AFT FUS A OFF</td>
<td>AFT FUS A OFF</td>
<td>B AUTO</td>
<td></td>
</tr>
<tr>
<td>• HYD CIRC</td>
<td>HYD CIRC</td>
<td>C/W CABIN ATM</td>
<td></td>
</tr>
<tr>
<td>• PUMP PWR 1 MNA</td>
<td>PUMP PWR 1 MNA</td>
<td>C/W CABIN ATM</td>
<td></td>
</tr>
<tr>
<td>• 2 MNC</td>
<td>2 MNC</td>
<td>C/W CABIN ATM</td>
<td></td>
</tr>
</tbody>
</table>
If PSP and/or INTRG reqd for PL or ISS ops:

- S−BD PL PWR SYS  −  2
- S−BD PL CNTL  −  PNL
- S−BD PL CNTL   −  CMD
- Reconfig PSP
- Perform PL INTRG REACQ (if reqd)

If OIU reqd, CABLE SWAP (IFM PROCEDURES, IFM) will be reqd to regain OIU cmd via OIU 1 and PSP 2

If Hi Load Evap enabled:

- HI LOAD DUCT HTR  −  B(C)
- Hi Load Duct Inbd,Outbd Noz Htrs B

If Sys 1 pwrd:

- 'S62 BCE BYP PSP 1'
- Loss of PL TLM and CMD
- If PDI FDA enabled:
  - 'S62 PDI DECOM FAIL'

SM 168 CRYO PALLET
Pallet Volts MNB −0−

SM 212 OIU
OIU 2 TEMP ≥ 140

SM 62 PCMMU/PL COMM
If OIU 2, active possible msg 'S62 PDI DECOM FAIL'

FWS EVENT TIME ind − blank

HYD MPS/TVC ISOL VLV SYS 2 tb − CL
HYD BRAKE ISOL VLV 2 tb − OP

If Sys 1 pwr:

- 'S62 BCE BYP PSP 1'
- Loss of PL TLM and CMD
- If PDI FDA enabled:
  - 'S62 PDI DECOM FAIL'

Prox Snr Electronics Box 2

- Port RMS:
  - B/U Pwr
  - MPM Mtr 2
  - Fwd MRL Mtr 1
  - Mid MRL Mtr 2
  - D&C B/U edge itg
  - Htr B
  - Jettison Sys A
  - Deadface Relays

- MLS 2
- RA 2

(Continued)
ACCA 1 MNB pwr
ACCA 2/3 MNB pwr
RCS Manf R5 RJD pwr
(R5R, R5D)

RCS manf F2 RJD pwr
(F2F, F2R, R2U, F2D)
F.LR RCS He Pr Isol A man
OP capability
F.R RCS He Pr Isol B GPC
Cntl, man CL capability

If Site AOS and using S–BD
Ant Elect 1:
‘ANTENNA’ (2)

If Hum Sep B ON:
‘S66 HUMID SEP B’

If Cabin Fan B ON:
C/W AV BAY/CAB AIR
It – on
‘S66 CABIN FAN’

If IMU Fan B ON:
‘S66 IMU FAN DP’
‘S66 IMU FAN SPD B’

If Freon Loop 1 Pump B ON:
‘S88 FREON FLOW 1’
‘S88 FRN AFT CP 1’
‘S88 FRN PL HX 1’

If H2O Loop 1 Pump B ON:
C/W H2O LOOP It
‘S88 H2O LOOP 1 FLOW’
‘S88 H2O LOOP 1 TEMP’
‘S88 H2O PUMP P 1’

If Freon sig condr A(B) on pnl
O17:
C in AC2 position:
‘S88 FREON FLOW 2(1)’
‘S88 FREON QTY 2(1)’

NOTES
EQUIP/FUNCTION LOST
CREW INDICATIONS
### EQUIP/FUNCTION LOST

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<tr>
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<th>EQUIP/FUNCTION LOST</th>
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<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>For PLBD ops: • OP/CL Drs in man mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PLBD: C/L Lat 13–16 Mtr 2 Port Door Mtr 2 Stbd Door Mtr 2 Port, Stbd Fwd Bkhd Mtr 2 Port, Stbd Door Mtr 1 CL Limit sws</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L OMS He Pr Isol B and Vap Isol 2 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R OMS He Pr Isol A, B man Cntl and Vap Isol 1,2 man A, B Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OMS Eng/Xfeed Redundancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supply H2O Dump Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMU 1.2 Pwr/Batt Chgr MNB pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aft RCS L, R Jet 1 Htrs Fwd RCS Jet 3 Htrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video Cntl Unit MNB pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FC1 Redundant Reac Vlv Cntl on pni C3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L OMS Sec TVC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vac Vent Isol MNB Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NH3 Sys B Sec Cntl</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

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<tr>
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<th>NOTES</th>
</tr>
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<tbody>
<tr>
<td>L OMS ENG VLV 2: Assume VLV 2 status same as VLV 1</td>
<td></td>
</tr>
<tr>
<td>CCTV video TV Annun Its lost if MNB selected for VCU</td>
<td></td>
</tr>
<tr>
<td>CCTV Mon 2 lost (VTR input lost)</td>
<td></td>
</tr>
<tr>
<td>If APU active and using BLR CNTLR/HTR 1A or 2B: C/W APU TEMP lt – on after ~2 min</td>
<td></td>
</tr>
<tr>
<td>SM (BFS, SM) 63 PL BAY DOORS</td>
<td></td>
</tr>
<tr>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’</td>
<td></td>
</tr>
<tr>
<td>During MAN PLBD OP/CL single mtr run noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td>If OMS Gmbl cmd abs value &gt; 2 deg and Sec TVC selected: OMS TVC C/W lt ‘L OMS GMBL’</td>
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</tr>
<tr>
<td>If first AA failure and S/W Processing Accel data: ‘RM FAIL ACC’</td>
<td></td>
</tr>
<tr>
<td>If first RGA failure and rates sensed: ‘RM FAIL RGA’</td>
<td></td>
</tr>
<tr>
<td>Star Trkr Dr – Z OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td>L, R ADP deploy times incr from 15 to 30 sec</td>
<td></td>
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<tr>
<td>FREON FLOW LOOP 2(1) ind – 443 pph</td>
<td></td>
<td></td>
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</tr>
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<tr>
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</tr>
<tr>
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### NOTES

- 10/14/03 7–131 MAL/ALL/GEN F
### ACTIONS

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 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

[EDO WCS]
- URINAL SEL – SEP 1
- WCS PWR SEL – AUTO 1, OFF 2
- URINE DIVERTER VLV FAN SEP 1

(R2)
- BLR CNTLR/HTR 1 – B
- 2 – A

(L4:F)
- cb AC1 H2O LOOP PUMP 1A/2 (three) – cl

(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
- AV BAY 1 FAN B – OFF
  - A – ON
  - 2 FAN A – OFF
  - B – ON
- AV BAY 3 FAN A,B (two) – ON
- FREON PUMP LOOP 1 – A

(MO13Q)
- If Arlk/Tnl Fan active:
  - ARLK FAN B – OFF
  - √ A – ON

(O17:C)
- SIG CONDR FREON A – AC3
- SIG CONDR FREON B – AC3

(CDR’s SEAT)
- SEAT PWR – AC3

(PLT’s SEAT)
- SEAT PWR – AC3

- If Cab Temp Cntlr 1 active:
  - (L1)
  - CAB TEMP CNTLR – OFF

(MD44F)
- Remove pin from PRI Actuator BYP viv linkage, connect linkage to SEC Actuator

(Continued)

### EQUIP/FUNCTION LOST

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<tr>
<td>37</td>
<td>Av Bay 3 Fan ΔP, Air Out Temp Snsrs lost</td>
</tr>
<tr>
<td>38</td>
<td>Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td>39</td>
<td>Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td>40</td>
<td>Lose Auto Temp Cntvl via Cntlr 1 and Cabin Temp, Cabin Hx Air Out Temp, and H2O Loop 1 Cabin Hx In Temp snsrs. Hx Byp Vlv holds position</td>
</tr>
</tbody>
</table>

(Urine Sep 2  Fan 2  Commode Fan 2  Controller MNB pwr  Compactor MNB Cntl)

(Hyd H2O Blr 1 Cntl A  2 Cntl B)

(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)

(Arlk/Tnl Fan B)

(Freon Sig Condr A AC2 pwr (ECLS SC 1A)  Freon Sig Condr B AC2 pwr (ECLS SC 1B))

(CDR Seat Adj via AC2 pwr)

(PLT Seat Adj via AC2 pwr)

(Cabin Temp Cntlr 1, Hx Byp Vlv Mtr 1)

(Continued)
**EPS SSR–30 (Cont)**

**BUS LOSS: MNB DA2**

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L1) ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:N) • H2O PUMP LOOP 1 – OFF</td>
<td>Freon Loop 1.2 Rad Isol Motor A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C2) • IDP/CRT 2 PWR – OFF</td>
<td></td>
<td></td>
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<tr>
<td>(C3) • MSTR MADS PWR – OFF</td>
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<tr>
<td>(O6) • STAR TRKR PWR – Y – OFF</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(O8) • RADAR ALTM 2 – OFF • MLS 2 – OFF</td>
<td>RGA 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:A) • RGA 2 – OFF</td>
<td>H2O Byp Loop 2 Snsr (ECLS SC12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:B) • cb MNB OI SIG CONDR • OF 1/4 B – op • OF 2/3 A – op • cb MNB • OM 1/2 B – op • OI MDM OF 1/2 B – op • OI SIG CONDR OM 3A – op</td>
<td>Aft Mission Timer Fwd Event Timer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:C) • cb MNB • TACAN 2 – op • SMOKE DETN BAY 1B/3A – op • FIRE SUPPR BAY 1 – op • UTIL PWR F1/MO13Q – op • FLOOD R CNSL – op • LCTR – op • ANNUN FWD ACA 1 – op • ANNUN FWD ACA 2/3 – op • ANNUN AFT ACA 4/5 – op • CRYO O2 HTR TK2 SNSR 2 – op • GPS 2 PRE AMP L UPPER – op</td>
<td>Tancan 2 Av Bay 1 Smoke Det B, Av Bay 3 Smoke Det A MNB Utility pwr R Console Floodlt L Seat/Ctr Console Floodlt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A15:H,I,J,K) • cb MNB TK6–TK9 O2 HTR SNSR 2 – op</td>
<td>Cryo O2 Tk2 Htr Current Snsr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:D) • FREON RAD CNTLR 1 – op • FREON RAD CNTLR 2 – op</td>
<td>Cryo O2 Tk6–9 Htr Current Snsr 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
### BUS ISOLATION

- ONLY ON MCC CALL, PERFORM
- • PPO2 C CAB dP/dT – op
- • 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

(O15:E)
- cb MNB
- • RDR ALTM 2 – op
- • ADTA 2 – op
- • STAR TRKR -Y – op
- • ACCEL 2 – op
- • DDU L – op
- • R – op
- • DRAG CHUTE SYS 2 – op
- (O15:F)
- • MMU 2 – OFF

(R1)
- • PL AFT MNB – OFF

(R11U)
- • FC PURGE VLV 2 – CL
- • FC STARTUP HTR 2 – ENA

(R14:A)
- • cb MNB AUD MIDDECK SPKR – op
- • ADC 1B/2B – op
- • MDU MFD 1 – op
- • MDU CDR 2 – op

(R14:B)
- • cb MNB CNTL BUS CA 1/2/3 – op
- • cb PALLET/DSC 1B – op (EDO)
- • 4B – op (EDO)

(R14:C)
- • cb MNB KU
- • ELEC – op
- • ANT HTR – op
- • CABLE HTR – op

(R14:D)
- • cb MNB
- • TV A FWD BAY CAMR/ PAN–TILT – op
- • TV A FWD BAY CAMR HTR – op
- • TV A FWD BAY PAN–TILT HTR – op
- • TV CONTR UNIT – op
- • TV MON 2 – op

(R14:E)
- • cb MNB
- • OS FLOOD – op
- • RMS PORT RMS TV CAMR/PAN–TILT – op
- • RMS PORT RMS TV CAMR HTR – op
- • RMS PORT RMS TV PAN–TILT HTR – op

### EQUIP/FUNCTION LOST

- Cabin Relief Vlv A Cntl NWS – 2
- ADTA 2
- Drag Chute, PLT Arm
- ASA 4 Isol
- ATVC 3 Isol ME
- 4 Isol ME
- MNB pwr for CNTL CA 1,2,3 Buses
- Ku–Bd sys (/F and cont Unit, RDR)
- Sig Proc & Dpy Assy
- Deployed Assy Htrs
- TV A Fwd Bay Camr/Pan–Tilt
- TV A Fwd Bay Camr Htr
- TV A Fwd Bay Camr Pan–Tilt Htr
- CCTV Mon 2
- OS Floodlt
- Port RMS Camr/Pan–Tilt
- Port RMS Camr Htr
- Port RMS Camr Pan–Tilt Htr

### CREW INDICATIONS

- 1 Buses remain pwr
- 7 Vlv holds position
- 44 Redundant pwr source remains for equipment
- 49 NWS 1 still available
- 50 CDR Arm remains
- 51 Six vlvs fail to non–isolation position
- 52 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 ISOLATION**

<table>
<thead>
<tr>
<th>ONLY ON MCC CALL, PERFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A7U) PL BAY FLOOD</td>
</tr>
<tr>
<td>• FWD BND – OFF</td>
</tr>
<tr>
<td>• MID PORT – OFF</td>
</tr>
<tr>
<td>• FWD STBD – OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(A7L) IF DOCKING MISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• cb DEP MNB SYS 2 VENT ISOL – op</td>
</tr>
<tr>
<td>• cb DEP MNB SYS 2 VENT – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(A7L) IF DOCKING MISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb DOCK LT MNB</td>
</tr>
<tr>
<td>• TRUSS AFT – op</td>
</tr>
<tr>
<td>• VEST STBD – op</td>
</tr>
<tr>
<td>• SYS PWR SYS 2 MNB – OFF</td>
</tr>
<tr>
<td>• PSU PWR MNB – OFF</td>
</tr>
<tr>
<td>• LOGIC 1 – op</td>
</tr>
<tr>
<td>• 2 – op</td>
</tr>
<tr>
<td>• LIGHTS</td>
</tr>
<tr>
<td>• AIRLK 2/3 MNB – OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(MA73C:A,B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA LOGIC MNB</td>
</tr>
<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>

<table>
<thead>
<tr>
<th>(ML86B:A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb MNB</td>
</tr>
<tr>
<td>• H2O LINE HTR B – op</td>
</tr>
<tr>
<td>• SUPPLY H2O TKB INLET – op</td>
</tr>
<tr>
<td>• SUPPLY H2O TKC OUTLET – op</td>
</tr>
<tr>
<td>• SUPPLY H2O DUMP ISOL – op</td>
</tr>
<tr>
<td>• SUPPLY H2O B SPLY ISOL VLV – op</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>(ML86B:B)</th>
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<tbody>
<tr>
<td>cb MNB</td>
</tr>
<tr>
<td>• VAC VENT NOZ HTR – op</td>
</tr>
<tr>
<td>• WASTE H2O TK1 DRAIN – op</td>
</tr>
<tr>
<td>• SUPPLY H2O TKD 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>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(ML86B:D)</th>
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</thead>
<tbody>
<tr>
<td>cb MNB MMU</td>
</tr>
<tr>
<td>• PORT;STBD HTR B – op</td>
</tr>
<tr>
<td>• GN2 SPLY ISOL VLV B – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(ML86B:E)</th>
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</thead>
<tbody>
<tr>
<td>cb MNB SEAT</td>
</tr>
<tr>
<td>• LEFT – op</td>
</tr>
<tr>
<td>• RIGHT – op</td>
</tr>
<tr>
<td>• cb MNB FLOOD</td>
</tr>
<tr>
<td>• TNL ADAPT 3 – op</td>
</tr>
<tr>
<td>• cb MNB</td>
</tr>
<tr>
<td>• CO2 COM INSTR – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(ML86B:F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb MNB FLOODS</td>
</tr>
<tr>
<td>• MIDDECK 2/6 – op</td>
</tr>
<tr>
<td>• BUNK 2/4 – op</td>
</tr>
</tbody>
</table>

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**EQUIP/FUNCTION LOST**

<table>
<thead>
<tr>
<th>DSP PWR SYS 2 tb – OFF</th>
</tr>
</thead>
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<tr>
<td>• PLB Fwd Blkhd Floodlt Mid Port Fwd Floodlt</td>
</tr>
<tr>
<td>• Vest Dep Vlv Sys 2 Vent Vent Isol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MNB A7</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Aft Truss Docking lt Stbd Vestibule Docking lt</td>
</tr>
<tr>
<td>• DSP SYS 2 Pwr PSU MNB Pwr</td>
</tr>
<tr>
<td>• MNB pwr to DSP Logic buses 1,2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External Airlock lts 2,3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• MNB FMC2 Bus pwr</td>
</tr>
<tr>
<td>• AMC2 Bus pwr</td>
</tr>
<tr>
<td>• MMC1,MMC2,MMC3,MMC4 Bus pwr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7 Sply H2O TKB Inlet Vlv Cntl</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Sply H2O TKC Outlet Vlv Cntl</td>
</tr>
<tr>
<td>7 Sply H2O B Sply ISOL Vlv Cntl</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste H2O Vac Vent Noz Htr Tk1 Drain Vlv Cntl</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Sply H2O TKD Inlet Vlv Cntl</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WCS Press Xdcr Galley H2O Htrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMU Port,Stbd Htr B</td>
</tr>
<tr>
<td>GN2 Sply Isol Vlv B</td>
</tr>
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<table>
<thead>
<tr>
<th>CO2 Rmvl Sys Filter dP</th>
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</thead>
<tbody>
<tr>
<td>CO2 Rmvl Sys Vacuum Press</td>
</tr>
<tr>
<td>CO2 Rmvl Sys PPRCO2 Snr Inlet Temp</td>
</tr>
<tr>
<td>TA Floodlt 3</td>
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<table>
<thead>
<tr>
<th>Middeck Floods 2,6 Bunk Floodlts 2,4</th>
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**CREW INDICATIONS**

<table>
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<th>NOTES</th>
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<tbody>
<tr>
<td>7 Vlv holds position</td>
</tr>
<tr>
<td>25 Htr A remains</td>
</tr>
<tr>
<td>53 All docking mechanisms will have single mtr times</td>
</tr>
<tr>
<td>54 Logic buses 1(2) remain pwrd via MNA(MNC)</td>
</tr>
<tr>
<td>55 No redundancy</td>
</tr>
</tbody>
</table>

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(Continued)
## BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- PHS – op
- Airlk 3 – op
- HTR TK3 SNSR 2 – op
- TK4 SNSR 1 – op
- cb MNB CRYO O2

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PHS Floodlt Airlk Flood 3 Cryo O2: Tk 3 Htr Current Snr 2 4 Htr Current Snr 1</td>
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<tr>
<td>47</td>
<td>Port,Stbd Rad Mtrs 2 Dpy capability Port,Stbd Rad Lat 1–6 Mtrs 2</td>
<td></td>
<td></td>
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<tr>
<td>47</td>
<td>Fwd RCS Jet 2 Htrs L OMS ENG Press Viv Coil 2, Cntl Viv 1,2 Coll 2</td>
<td></td>
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<tr>
<td>56</td>
<td>OMS Qty Gauging for all L OMS single engine burns</td>
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<tr>
<td>47</td>
<td>Hyd Brake Isol Viv 2 Cntl</td>
<td></td>
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</tr>
<tr>
<td>60</td>
<td>APU 1 Cntlr Pwr Sply B 1 Fuel Tk Viv B 2 Cntlr Pwr Sply A 2 Fuel Tk Viv A</td>
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<tr>
<td>61</td>
<td>APU 2 GBX GN2 Repress Viv Hyd Rsrv 2 Qty Snr</td>
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<tr>
<td>63</td>
<td>Freon Loop 2 Cntl A Rad Byp Viv Mtr Man Cntl</td>
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<tr>
<td>64</td>
<td>Freon Loop 1 Cntl A Rad Byp Viv Mtr</td>
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</tr>
<tr>
<td>7</td>
<td>Freon Loop 1 Flow Prop Viv Freon Loop 1 Cold Plate Flow Xdcr</td>
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<tr>
<td>65</td>
<td>L/R ADP Dpy Mtrs 2 Htr Cntl 2 RH Vents 1,2,6,8,9 Mtrs 2 LH Vents 1,2,3,5,8,9 Mtrs 2</td>
<td></td>
<td></td>
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<tr>
<td>66</td>
<td>Tacan 2</td>
<td></td>
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<tr>
<td>68</td>
<td>NLG B/U Rel and Ext Sys 2 LMG, RMG B/U Rel Sys 2</td>
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<td></td>
</tr>
<tr>
<td>63</td>
<td>−Y Star Trkr Dr OP and Sys 2 CL capability −Z Star Trkr Dr Sys 1 OP/CL capability</td>
<td></td>
<td></td>
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<tr>
<td>67</td>
<td>PL Reten Sys B Rel/Lat Mtrs Ku Ant Sto/Dpy Mtr 2</td>
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<tr>
<td>69</td>
<td>MPS: L Eng He Intercon Outlet Viv L Eng He Isol A</td>
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<tr>
<td>69</td>
<td>Prxu He Isol 2</td>
<td></td>
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<tr>
<td>69</td>
<td>Prpit F/D Inbd LO2 Viv Outbd LH2 Viv</td>
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<tr>
<td>70</td>
<td>Mant Repress LH2 Viv 1,2</td>
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<tr>
<td>71</td>
<td>ET Door Mtrs: C/L Lat Actr 1 Mtr 2 L Dr Uplock Lat Mtr 2 R Dr Closure Mtr 2 Uplock Lat Mtr 2</td>
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<tr>
<td>72</td>
<td>NWS Hyd Sys 2</td>
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<tr>
<td>73</td>
<td>Ops Hyd Actr Instr Hyd Main Pump 2 Depress Solenoid RPC A Hyd Main Pump 1 Depress Solenoid RPC B</td>
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<tr>
<td>73</td>
<td>Hyd Main Pump 2 Depress Solenoid RPC A Hyd Main Pump 1 Depress Solenoid RPC B</td>
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</tr>
<tr>
<td>7</td>
<td>Vlv holds position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Vlv holds position, Loss of redundant hyd NLG deploy and NWS redundancy if failed closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Current Snr 1 remains</td>
<td></td>
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<tr>
<td>56</td>
<td>Current Snr 2 remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Mtrs 2 stow capability unaffected</td>
<td></td>
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<tr>
<td>58</td>
<td>Redundant coils remain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>√ MCC for OMS Qty</td>
<td></td>
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</tr>
<tr>
<td>60</td>
<td>Pwr supply A remains, Turbine speed ind lost</td>
<td></td>
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</tr>
<tr>
<td>61</td>
<td>Vlv fails closed. Redundant vlv remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Pwr supply B remains. GG Bed T and GBX P lost when APU running</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Cntlrs A,B Rad Byp Viv Mtrs Auto Cntl and Cntl B Rad Byp Viv Mtr Man Cntl remain</td>
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<tr>
<td>64</td>
<td>Bypass vlv holds position and Cntl B Rad Byp Viv Mtr remains</td>
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<tr>
<td>65</td>
<td>Mtr 1 remains</td>
<td></td>
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</tr>
<tr>
<td>66</td>
<td>Htr Cntl 1 remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>√ MCC for stow reqmts</td>
<td></td>
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</tr>
<tr>
<td>68</td>
<td>Vlv fails closed</td>
<td></td>
<td></td>
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<tr>
<td>69</td>
<td>Vlv holds position, Loss of manual capability to inert LO2 and LH2 Manf</td>
<td></td>
<td></td>
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<tr>
<td>70</td>
<td>Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</td>
<td></td>
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<tr>
<td>71</td>
<td>Redundant mtrs remain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Hyd Sys 1 still available for NWS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>Redundant RPC remains</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Perform FC2 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed, then:

1. dc AC CONTR AC2 (three) – cl
2. INV/AC BUS 2 – OFF (tb–OFF)
3. INV PWR 2 – OFF (tb–OFF)
4. dc AC CONTR AC2 (three) – op

Refer to OMS/RCS Slide Rule for vlv loss info
Reconfig following vlv only if leak isolation reqd:

1. FWD RCS He PRESS A,B
2. ANTR SW ELEC – 2
3. XPNDR – 2
4. PWR AMPL OPER – 2 (F2F,F2R,F2U,F2D)
5. PM, FM Ant Sw 1
6. NSP 1/COMSEC 1
7. S−BD PL Intrg 1
8. PSP 1

If simo loss of MNA & MNB:
- NSP ENCRYPTION MODE – SEL
- NSP ENCRYPTION SEL – BYP
- Reconfig PSP
- Perform PL INTRG REACQ (if reqd)

If no comm:
- S−BD PM CNTL – PNL
- S−BD FM PWR – 2
- S−BD PM CNTL – CMD

If OIU reqd:
- OIU PWR – OIU 2 ON
- OIU tb – DN
- V MCC, OIU reconfig

If MCC GO:
- EPS SSR−31
- BUS LOSS: MNB FPC2 (Includes MNB FLC2, MNB FMC2, AC2)

**TIME CRITICAL**

FC2 must be shutdn within 9 min to avoid potentially hazardous condition

Will be repwrd after AC Pwr Transfer Cable connected

Man CL and full GPC cntl remains. Vlv holds position

Man OP capability remains. Vlv holds position

Do not reconfig for reg switch or 1’CNTCT procedures

Possible

S88 EVAP OUT T 1/2
RM DLMA MANF
S88 I/O ERROR CRT 2
S66 CABIN FAN
S66 IMU FAN DP
S66 IMU FN SPD B

When gear deployed, tb will not indicate DN

IOU 2 interfaces with PSP 2 for commanding

Vlv holds position

Loss of redundant port to the following:
- MDU CDR 2 (S)
- MDU MFD 1 (P)
- MDU PLT 1 (P)
- MDU PLT 2 (S)
- MDU AFD 1 (S)

(Continued)
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPS UTILITY (G2,G8,S2)</td>
<td>MMU 2</td>
<td>(A4)</td>
<td>11 Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning</td>
</tr>
<tr>
<td>MMU ASSIGN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• GNC – ITEM 2 EXEC</td>
<td></td>
<td></td>
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<tr>
<td>• SM – ITEM 3 EXEC</td>
<td></td>
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<tr>
<td>• PL – ITEM 5 EXEC</td>
<td></td>
<td></td>
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<tr>
<td>• OPS 0 – ITEM 7 EXEC</td>
<td></td>
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</tr>
<tr>
<td>If EMU(s) in battery charge mode: (AW18H)</td>
<td>EMU 1,2 Pwr/Batt Chgr MNB pwr</td>
<td>If site AOS and using S–BD Ant Elec 1: ANTENNA (2)</td>
<td></td>
</tr>
<tr>
<td>• PWR/BATT CHGR EMU</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1(2) BUS SEL – MNA</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pre–seat ingress for Entry:</td>
<td>Av Bay 1 agent discharge capability</td>
<td>If Sys 1 pwr: ‘S62 BCE BYP PSP1′ Loss of PL TLM and CMD</td>
<td></td>
</tr>
<tr>
<td>• Discharge handheld fire ext into AV BAY 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If AC Pwr Cable to be installed to regain AC:</td>
<td></td>
<td>If PDI FDA Enabled: ‘S62 PDI DECOM FAIL’</td>
<td></td>
</tr>
<tr>
<td>• Go to EPS SSR–200; otherwise, continue with Bus Loss Actions</td>
<td></td>
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<tr>
<td>(R2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BLR CNTRL/HTR 1 – B</td>
<td>Hyd H2O Blr 1 Cntlr A</td>
<td>If Freon Loop 1 Pump B ON: ‘S88 FREON FLOW 1′ ‘S88 FRN AFT CP 1′ ‘S88 FRN PL HX 1′</td>
<td></td>
</tr>
<tr>
<td>• 2 – A</td>
<td>2 Cntlr B RSVR 2 Qty Snsr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform RAD ISOL RECOVERY, ECLS SSR–9 for Freon Loop 2</td>
<td>Humidity Sep B</td>
<td>If Freon Sig Condr A(B) (O17:C) in AC2 position: ‘S88 FREON FLOW 2(1)′ ‘S88 FRN PL HX 1(2)′ ‘S88 FREON QTY 2(1)′</td>
<td></td>
</tr>
<tr>
<td>(L4:F)</td>
<td>Cabin Fan B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>IMU Fan B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>H2O Loop 1 Pump B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HUM SEP B – OFF</td>
<td>Av Bay 1 Fan B</td>
<td>If H2O Loop 1 Pump B ON: C/W H2O LOOP lt ‘S88 H2O LOOP P 1′ ‘S88 H2O LOOP 1 FLOW′ ‘S88 H2O LOOP 1 TEMP’</td>
<td></td>
</tr>
<tr>
<td>• A – ON</td>
<td>Av Bay 2 Fan A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CAB FAN B – OFF</td>
<td>Av Bay 3 Sig Condr, Xdcrs (ECLS SC4)</td>
<td>H2O PUMP OUT PRESS LOOP 1 ind – 20–25 psia</td>
<td></td>
</tr>
<tr>
<td>• A – ON</td>
<td>Freon Loop 1 Pump B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• IMU FAN B – OFF</td>
<td>(MOI3Q)</td>
<td>If APUs active and using H2O Blr Cntrl 2B(3A): C/W APU TEMP lt after – 2 min</td>
<td></td>
</tr>
<tr>
<td>• A(C) – ON</td>
<td>If ARLK Fan active:</td>
<td>During Rad Dpy/Sto ops: (R13L) RAD LAT CNTRL lbs (two) indicate single mtr ops</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 – A</td>
<td>• ARLK FAN B – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AV BAY 1 FAN B – OFF</td>
<td>• √ A – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A – ON</td>
<td>• H2O PUMP LOOP 1 – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2 FAN A – OFF</td>
<td>2 – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• B – ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AV BAY 3 FAN A,B (two) – ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FREQON PUMP LOOP 1 – A</td>
<td>(O1) FREON FLOW LOOP 2(1) ind – 578 pph</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MOI3Q)</td>
<td></td>
<td>If H2O Loop 1 Pump B ON: C/W H2O LOOP lt</td>
<td></td>
</tr>
<tr>
<td>If ARLK/Tnl Fan active:</td>
<td></td>
<td>‘S88 H2O LOOP P 1′ ‘S88 H2O LOOP 1 FLOW′ ‘S88 H2O LOOP 1 TEMP’</td>
<td></td>
</tr>
<tr>
<td>• ARLK FAN B – OFF</td>
<td>(O17:C)</td>
<td>If APUs active and using H2O Blr Cntrl 2B(3A): C/W APU TEMP lt after – 2 min</td>
<td></td>
</tr>
<tr>
<td>• √ A – ON</td>
<td></td>
<td>During Rad Dpy/Sto ops: (R13L) RAD LAT CNTRL lbs (two) indicate single mtr ops</td>
<td></td>
</tr>
<tr>
<td>(WCS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• √ MODE – AUTO</td>
<td>WCs Fan/Sept 2</td>
<td></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></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>
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</tr>
<tr>
<td>• HOSE BLOCK – SEP 1</td>
<td></td>
<td></td>
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</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 – 1</td>
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### 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>(EDO WCS)</td>
<td><strong>URINAL SEL − SEP 1</strong>&lt;br&gt;• WCS PWR SEL − AUTO 1, OFF 2&lt;br&gt;• URINE DIVERTER VLV FAN SEP 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(CDR's SEAT)</td>
<td>• CDR SEAT PWR BUS SEL − AC3 (dn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PLT's SEAT)</td>
<td>• PLT SEAT PWR BUS SEL − AC3 (dn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:N)</td>
<td>• cb AC2 ΦC RAD ISOL A − op&lt;br&gt;• MDU CRT 2 PWR − OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• CAB TEMP CNTLR − OFF&lt;br&gt;• CAB TEMP CNTLR − 2&lt;br&gt;• Perform LOSS OF 1 FC (ORB PKT, PWRDN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• CAB TEMP CNTLR − 2&lt;br&gt;• Perform LOSS OF 1 FC (ORB PKT, PWRDN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MD44F)</td>
<td>• Remove pin from PRI Actuator and BYP vlv linkage&lt;br&gt;• Connect linkage to SEC Actuator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C2)</td>
<td>• IDP/CRT 2 PWR − OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:F)</td>
<td>• MMU 2 − OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A7L)</td>
<td>• MADS RCDR PWR − OFF</td>
<td></td>
<td></td>
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<tr>
<td>(MA73C:A)</td>
<td>• MCA LOGIC MNB FWD 2 − OFF</td>
<td></td>
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</tr>
<tr>
<td>(O15:C)</td>
<td>• cb MNB FIRE SUPPR BAY 1 − op</td>
<td></td>
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<tr>
<td></td>
<td><strong>Urine Sep 2</strong>&lt;br&gt;Fan 2&lt;br&gt;Commode Fan 2</td>
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<tr>
<td></td>
<td><strong>CDR Seat Adj via AC2 pwr</strong>&lt;br&gt;<strong>PLT Seat Adj via AC2 pwr</strong>&lt;br&gt;Cabin Temp Cntlr 1 and Hx Byp vlv Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Freon Loop 1 Cntlr A Rad Byp Vlv Mtr</strong>&lt;br&gt;Freon Loop 1 Flow Prop Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19)</td>
<td><strong>10</strong> Freon Loop 1,2 Rad Isol Motor A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19)</td>
<td><strong>20</strong> Freon Loop 1,2 Rad Isol Motor A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19)</td>
<td><strong>21</strong> MNB Pwr to CNTL Buses AB1,AB2,AB3,BC1,BC2,BC3&lt;br&gt;MADS Rcdr&lt;br&gt;All MADS and ACIP data&lt;br&gt;MNB FMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19)</td>
<td><strong>22</strong> NLG B/U Rel and Ext Sys 2&lt;br&gt;LMG, RMRG B/U Rel Sys 2&lt;br&gt;LG Extend Vlv 2&lt;br&gt;NWS Hyd Sys 2&lt;br&gt;−Y Star Trkr Dr Sys 2 OP/CL capability&lt;br&gt;−Z Star Trkr Dr Sys 1 OP/CL capability</td>
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</tbody>
</table>

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

| L1 | H2O PUMP LOOP 1 − OFF<br>2 − ON | | |
| L1 | CAB TEMP CNTLR − OFF<br>CAB TEMP CNTLR − 2<br>Perform LOSS OF 1 FC (ORB PKT, PWRDN) | | |
| **18** Freon Loop 1,2 Rad Isol Motor A | | |
| **19** Freon Loop 1,2 Rad Isol Motor A | | |

### NOTES

- **10** Freon Loop 1,2 Rad Isol Motor A
- **11** Freon Loop 1,2 Rad Isol Motor A
- **12** MADS Rcdr<br>All MADS and ACIP data<br>MNB FMC2 Bus pwr
- **13** NLG B/U Rel and Ext Sys 2<br>LMG, RMRG B/U Rel Sys 2<br>LG Extend Vlv 2<br>NWS Hyd Sys 2<br>−Y Star Trkr Dr Sys 2 OP/CL capability<br>−Z Star Trkr Dr Sys 1 OP/CL capability
- **14** Freon Loop 1,2 Rad Isol Motor A
- **15** Freon Loop 1,2 Rad Isol Motor A
- **16** MADS Rcdr<br>All MADS and ACIP data<br>MNB FMC2 Bus pwr
- **17** NLG B/U Rel and Ext Sys 2<br>LMG, RMRG B/U Rel Sys 2<br>LG Extend Vlv 2<br>NWS Hyd Sys 2<br>−Y Star Trkr Dr Sys 2 OP/CL capability<br>−Z Star Trkr Dr Sys 1 OP/CL capability
<table>
<thead>
<tr>
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<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>24</td>
<td>ET Door Mtr's:</td>
<td></td>
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<tr>
<td></td>
<td>C/L Lat Actr 1 Mtr 2</td>
<td></td>
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<tr>
<td></td>
<td>L Dr Uplock Lat Mtr 2</td>
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<tr>
<td></td>
<td>R Dr Closure Mtr 2</td>
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<tr>
<td></td>
<td>Uplock Lat Mtr 2</td>
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<tr>
<td>25</td>
<td>Port RMS:</td>
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<tr>
<td></td>
<td>MPM Mtr 2</td>
<td></td>
<td></td>
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<tr>
<td>26</td>
<td>Fwd MRL Mtr 1</td>
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<tr>
<td>27</td>
<td>D&amp;C B/U edge ltg</td>
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<tr>
<td>27</td>
<td>Ku Ant Sto/Dpy Mtr 2</td>
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<tr>
<td></td>
<td>PL Reten Sys B Rel/Lat Mtr</td>
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</tr>
<tr>
<td>27</td>
<td>Port,Stbd Rad Lat 1–6 Mtr 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. **EQUIP/FUNCTION LOST**
   - **Actions**: L, R ADP Dpy Mtr 2, Htr Cntlr 2, RH Vents 1, 2, 6, 8, 9 Mtr 2, LH Vents 1, 2, 3, 5, 8, 9 Mtr 2.
   - **Crew Indications**:
     - 2: Will be repwrd after AC Pwr Transfer Cable connected.
     - 24: Redundant mtrs remain.
     - 25: Single mtr time. One failure away from EVA to stow MPM or from RMS jettison. May be repwrd after AC Pwr Transfer Cable connected.
     - 26: Single mtr time. May be repwrd after AC Pwr Transfer Cable connected.
     - 27: MCC for stow reqmts.

2. **BUS LOSS: MNB FPC2**

3. **Bus Loss Details**
   - EPS SSR−31 (Cont)
   - BUS LOSS: MNB FPC2
   - BUS LOSS: MNB FPC2
### ACTIONS

1. Perform MNB BUS TIE (BUS TIE Cue Card)
2. Monitor, record ∆amps between FC2 and tied FC
3. PL CAB − MNA
4. PORT RMS HTR B − OFF
5. PORT RMS HTR A − AUTO
6. TOP EVAP HTR DUCT − A
7. PL BAY DOORS
8. MNB pwr to CABPL1,2,3 Buses

### EQUIP/FUNCTION LOST

1. FC2 Purge Vlv
2. MNB pwr to CABPL1,2,3 Buses
3. Port RMS: B/U pwr
4. MPM Mtr 2
5. Fwd MRL Mtr 1
6. Mid MRL Mtr 2
7. Htr B

### CREW INDICATIONS

1. (L2) O2 SYS 2 SPLY tb − CL
2. (LIGHTS LOST) PLB Fwd Bikhd Floodlt
3. (A8L) PORT RMS:
   - DPY/STO tb − bp
   - RETEN LAT tb − bp
   - R−L FWD tb − bp
4. SM 94 PDRS CONTROL
5. SM 201 ANTENNA
6. SM (BFS SM 63)
7. SM 212 OIU

### NOTES

1. Buses are tied due to:
   - 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.
   - √ MCC and Loss of FC2 SS ∆ V Snsrs. Change in ∆Amps > 12 amps indicates possible cell crossover problem. The ∆Amps shift due to loss of FC2 purge capability is indicated by change in ∆Amps between pre− and post−purge readings. MCC will aid in this determination
2. Vlv holds position
3. Pwrs PL Timing Buffer, OIU 1, and OIU 2 (if flown). OIU 1 redundant pwr MNA MPC1 via CAB PL3
4. Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
5. Single mtr time
6. 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 Cntl sw placed to OFF
7. MNA htrs remain

---

(Continued)
# EPS SSR-32 (Cont)
## BUS LOSS: MNB MPC2

### BUS ISOLATION

- **ONLY ON MCC CALL, PERFORM**
  - (R11U)
    - FC PURGE VLV 2 − CL
    - FC STARTUP HTR 2 − ENA
  - (A7U)
    - PL BAY FLOOD
    - FWD BHD − OFF
    - MID PORT − OFF
    - FWD STBD − OFF
- **ONLY ON MCC CALL, PERFORM**
  - (A7L)
    - IF DOCKING MISSION
      - cb DEP MNB SYS 2 VENT ISOL − op
      - cb DEP MNB SYS 2 VENT − op
  - (A7L)
    - IF DOCKING MISSION
      - cb DOCK LT MNB
      - TRUSS AFT − op
      - VEST STBD − op
      - SYS PWR SYS 2 MNB − OFF
      - PSU PWR MNB − OFF
      - cb MNB
      - LOGIC 1 − op
      - 2 − op
    - LIGHTS
      - AIRLK 2/3 MNB − OFF
  - (A7L)
    - MADS PCM − OFF
  - (MA73C:A,B)
    - MCA LOGIC MNB MID (four) − OFF

### EQUIP/FUNCTION LOST

- FC2 Startup Htr Inhibit capability
- PLB Fwd Blkhd Floodlt
  - Mid Port Floodlt
  - Fwd Stbd Floodlt
- Vest Dep Vlv Sys 2 Vent
  - Vest Is
- MNB A7
  - Aft Truss Docking It
  - Stbd Vestibule Docking It
  - DSP SYS 2 pwr
  - PSU MNB pwr
- MNB pwr to DSP Logic buses 1,2
- External Airlock Its 2,3
- MADS PCM
- MNB MMC1,2,3,4 Bus pwr
- Freon Loop 2 Cntlr A Rad
  - Byp Vlv Mtr Man Cntl
  - Atm Press Cntl O2 Sys 2 Sply Vlv Cntl
  - Port,Stbd Rad Mtrs 2 Dpy capabilty
  - LH Vent 3,5 Mtrs 2
  - RH Vent 6 Mtrs 2
  - MNB pwr to ESS1BC, ESS3AB
  - AUX PLB BUS Pwr
  - Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw
  - Ku−Bd Sys Deployed Assy including Htr Ckts (Rdr & Comm)
  - Redundant Ku−Bd Xmit Enable
  - Redundant Ku−Bd Boom Stow Enable II Excitation Signal
  - Cryo O2 Tk 6−9 Htr Current Snsr 2
  - FC1 Redundant Reac Vlv Close Cntl on pnl C3
  - cb MNB EXT ARLK HTR STRUC − op

### CREW INDICATIONS

- DSP SYS PWR SYS 2 tb − OFF
  - 2 Vlv holds position
  - 7 MNA htrs remain
  - 8 All docking mechanisms will have single mtr times
  - 9 Logic buses 1(2) remain pwrd via MNA(MNC)
  - 10 Cntlr. A,B Rad Byp Vlv Mtr Auto Cntl and Cntlr B Rad Byp Vlv Mtr Man Cntl remain
  - 11 Mtr 2 stow capability remains
  - 12 Buses remain pwrd
  - 13 With an inoperative limit sw, mtr will continue to run until DPY/STO sw placed to GND position
  - 14 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
  - 15 MNC MMC2 pwr for Ku−Bd Xmit Enable signal remains
  - 16 MNC MMC2 pwr remains to supply pwr to Boom stow Enable II sigmal for stow mtr
  - 17 Snsr 1 remains

### NOTES

- **EQUIP/FUNCTION LOST**
  - CREW INDICATIONS
  - BUS ISOLATION
  - MAL/ALL/GEN F

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03/20/01
### ACTIONS

<table>
<thead>
<tr>
<th>No.</th>
<th>EQUIP/FUNCTION LOST</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1) Aft L,R RCS He Pr Isol A man OP capability</td>
<td>1) Man CL and full GPC cntl remains. Vlv holds position</td>
<td><strong>1</strong> Man CL and full GPC cntl remains. Vlv holds position</td>
</tr>
<tr>
<td>2</td>
<td>2) Aft R RCS He Pr Isol B GPC Cntl and man CL capability</td>
<td>2) Indicates do not appear until jet commanded</td>
<td><strong>2</strong> Indications do not appear until jet commanded</td>
</tr>
<tr>
<td>3</td>
<td>3) RCS Man R5 RJD pwr (R5R,R5D)</td>
<td>(F7) C/W RCS JET lt – on</td>
<td><strong>3</strong> Do not reconfig for reg switch or 'I’CNT procedures</td>
</tr>
<tr>
<td>4</td>
<td>4) APU 1 GG Inj H2O Htrs B, Rudder/Speed Brake Htr B, APU 2 Fu TK Vlv A CL capability via APU 2 Auto Shutdn Signal</td>
<td>(FSM) R RCS D, R JET</td>
<td><strong>4</strong> Man OP capability remains. Vlv holds position</td>
</tr>
<tr>
<td>5</td>
<td>5) Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl</td>
<td></td>
<td><strong>5</strong> Manf status not automatically declared closed. Fail−offs will occur when jet commanded</td>
</tr>
<tr>
<td>6</td>
<td>6) Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man A,B Cntl</td>
<td></td>
<td><strong>6</strong> In event of APU 2 auto shutdn, vlv remains OP until pwr removed by APU FUEL TK VLV sw throw</td>
</tr>
<tr>
<td>7</td>
<td>7) L OMS Sec TVC</td>
<td></td>
<td><strong>7</strong> Lost TM: GNC SYS SUMM 2</td>
</tr>
<tr>
<td>8</td>
<td>8) Aft PL MNB pwr</td>
<td></td>
<td><strong>8</strong> L OMS ENG VLV 2: assume VLV 2 status same as VLV 1</td>
</tr>
<tr>
<td>9</td>
<td>9) ASA 4 Isol ATVC 4 Isol ME</td>
<td></td>
<td><strong>9</strong> Maintains He Isol redundancy</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

- Refer to OMS/RCS Slide Rule for vlv loss info
- Reconfig following vlv(s) only if leak isolation reqd:
  - AFT R RCS He PRESS A,B
  - L RCS He PRESS A
  - For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)

- (A12) APU HTR TK/FU LINE/H2O
  - SYS 1A – AUTO
  - 1B – OFF
  - HYD HTR RUD SPD
  - BK A – AUTO
  - B – OFF

- Prior to using L(R) OMS:
  - (O8)
  - L OMS He PRESS/VAP ISOL
  - A – GPC
  - B – OP

- R OMS He PRESS/VAP ISOL
  - A(B) – GPC
  - B(A) – CL

- (A14) RCS/OMS HTR
  - R POD (two) – A OFF, B AUTO
  - OMS CRSFD LINES – A AUTO, B OFF
  - L POD (two) – A AUTO, B OFF

- GNC XXXXX MNVR YYYY
- Sel L OMS PRI TVC:
  - GMBL L PRI – ITEM 28 EXEC

### BUS ISOLATION

- ONLY ON MCC CALL, PERFORM
- (R1)
  - PL AFT MNB – OFF

### CREW INDICATIONS

- MASTER ALARM Light/ Tone – on
- If OMS GMBL cmd abs value > 2 deg and Sec TVC selected:
  - C/W OMS TVC lt – on
  - ‘L OMS GMBL’ (3,B)

- BUS ISOLATION ONLY ON MCC CALL, PERFORM

- ASA 4 Isol ATVC 4 Isol ME

### NOTES

- GNC SYS SUMM 2
- L OMS ENG VLV 2: assume VLV 2 status same as VLV 1
- Maintains He Isol redundancy
- Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
- GPC cntl remains. Vlv fails closed
- B Htrs remain
- A Htrs remain
- Six vlvs fail to non−isolation position
### Actions

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GAS GEN/FUEL PUMP 1 – A AUTO</td>
<td></td>
</tr>
<tr>
<td>• GAS GEN/FUEL PUMP 2 – B AUTO</td>
<td></td>
</tr>
<tr>
<td>• LUBE OIL LINE 1 – A AUTO</td>
<td></td>
</tr>
<tr>
<td>• LUBE OIL LINE 2 – B AUTO</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR TK/FU LINE/H2O</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SYS 1A – AUTO</td>
<td></td>
</tr>
<tr>
<td>• 1A – OFF</td>
<td></td>
</tr>
<tr>
<td>• 2A – OFF</td>
<td></td>
</tr>
<tr>
<td>• 2B – AUTO</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(L1)</th>
<th>HYD HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>• RUD SPD BK A – AUTO</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td></td>
</tr>
<tr>
<td>• BDY FLR A – AUTO</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td></td>
</tr>
<tr>
<td>• ELEV A – AUTO</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td></td>
</tr>
<tr>
<td>• HYD CIRC PUMP</td>
<td></td>
</tr>
<tr>
<td>• PWR 1 – MNB</td>
<td></td>
</tr>
<tr>
<td>• 2 – MNC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(R2)</th>
<th>BLR CNTLR/HTR 1 – B</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 2 – A</td>
<td></td>
</tr>
</tbody>
</table>

| (L2) | FLASH EVAP FDLN HTR A SPLY – 1 |

### Equip/Function Lost

<table>
<thead>
<tr>
<th></th>
<th>APU 1 GG/Fu Pump Htrs B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HYD MPS/TVC ISOL VLV</td>
</tr>
<tr>
<td>2</td>
<td>SYS 2 tb – CL</td>
</tr>
<tr>
<td>3</td>
<td>HYD BRAKE ISOL VLV 2</td>
</tr>
<tr>
<td>4</td>
<td>B tb – OP</td>
</tr>
<tr>
<td>5</td>
<td>AFT R RCS He PRESS B</td>
</tr>
<tr>
<td>6</td>
<td>AFT L RCS TK ISOL 3/4/5</td>
</tr>
<tr>
<td>7</td>
<td>B tb – bp (if vlv in CL position)</td>
</tr>
</tbody>
</table>

### Crew Indications

<table>
<thead>
<tr>
<th></th>
<th>1 MASTER ALARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>HYD MPS/TVC ISOL VLV</td>
</tr>
<tr>
<td>3</td>
<td>SYS 2 tb – CL</td>
</tr>
<tr>
<td>4</td>
<td>HYD BRAKE ISOL VLV 2</td>
</tr>
<tr>
<td>5</td>
<td>AFT R RCS He PRESS B</td>
</tr>
<tr>
<td>6</td>
<td>AFT L RCS TK ISOL 3/4/5</td>
</tr>
</tbody>
</table>

### Notes

1. Indications do not appear until jet commanded
2. Time Critical
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. Manf status not automatically declared closed. Fail-offs will occur when jet commanded
8. Man CL and GPC cntl remains. Vlv holds position
9. Do not reconfig for reg switch or I’CNCT procedures
### Actions

<table>
<thead>
<tr>
<th>(A14)</th>
<th>RCS/OMS HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>• R POD (two) − A OFF, B AUTO</td>
<td></td>
</tr>
<tr>
<td>• L POD (two) − A AUTO, B OFF</td>
<td></td>
</tr>
<tr>
<td>• CRSFD LINES − A AUTO, B OFF</td>
<td></td>
</tr>
</tbody>
</table>

| (O8) | Straight feed config. Right OMS Crossfeed A − OP (tb−OP), Otherwise √ MCC |
|      | Right OMS TK ISOL A − CL (tb−CL) |

Prior to using L(R) OMS:

| (O8) | L OMS He PRESS/VAP ISOL |
|      | A − GPC |
|      | B − OP |

For SSME Hyd Repress:

| (R4) | HYD MPS/TVC ISOL, VLV SYS 1,3 (two) − OP, wait 10 sec, then CL |

**GNC XXXXX**

| **MNVR YYYY** | **Sel L OMS PRI TVC:** |
|              | • GMBL L PRI − ITEM 28 EXEC |

If reqd during entry (< 120K ft):

| (L1) | NH3 CNTLR A(B) − PRC/GPC |

### Equip/Function Lost

| (10) |
| R Pod A Htrs (all) |
| L Pod B Htrs (partial) |

| (11) |
| OMS Crsfd Ln Htrs B |

| (12) |
| OMS Engine/Crossfeed Valve Redundancy |
| OMS Eng/XFeed Redundancy |

| (15) |
| Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl |
| Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man OP |

| (3) |
| MPS/TVC Hyd Sys 2 Isol Cntl |

### Crew Indications

| (3) | Vlv holds position |
| (10) | B Htrs remain |
| (11) | A Htrs remain |
| (12) | Maintain deorbit capability for MNC DA3 failure |
| (13) | Maintains deorbit capability for CNTL AB1 failure |
| (14) | Maintains He Isol redundancy |
| (15) | Man cntl remains. Vap Isol closes, Primary Isol normally closed |
| (16) | Lost TM: GNC SYS SUMM 2 |

### Bus Isolation

| **ONLY ON MCC CALL, PERFORM** |
| (R1) | PL AFT MNB − OFF |
| (O15A) | RGA 2 − OFF |

| (MA73C:B) | MCA LOGIC MNB AFT 2 − OFF |
| L OMS Eng Press Vlv Coil 2, Cntl Vlv 1.2 Coil 2 |
| OMS Qty Gaging for all L OMS Single engine burns |
| NWS Hyd Sys 2 |
| Hyd Brake Isol Vlv 2 Cntl |
| Hydra Main Pump 1 Depress Solenoid RPC B |
| Hydra Main Pump 2 Depress Solenoid RPC A |

**(Continued)**
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freon Loop 1 Cold Plate Flow Xdcr</td>
<td>L MPS He Reg A &lt; 680 during entry (MM 303)</td>
<td>26 Pwr Sply A remains. Turbine speed ind lost</td>
<td></td>
</tr>
<tr>
<td>26 APU 1 Cntrl Pwr Sply B Fu Tk Vlv B</td>
<td>27 Vlv A remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 APU 2 Cntrl Pwr Sply A Fu Tk Vlv A</td>
<td>28 Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 GBX GN2 Repress Vlv</td>
<td>29 Vlv B remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 MPS:</td>
<td>30 Vlv fails closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 L Eng He Intercon Outlet Vlv</td>
<td>31 Vlv fails closed, Redundant vlv remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 L Eng He Isol A Pneu He Isol 2</td>
<td>32 Vlv holds position. Loss of manual capability to inert LO2 and LH2 manfs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 Prplt F/D Inbd LO2 Vlv Outbd LH2 Vlv</td>
<td>33 Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 Manf Repress LH2 Vlv 1,2</td>
<td>34 Redundant mtrs remain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34 ET Door Mtrs: C/L Lat Actr 1 Mtr 2 GPC Cntl L Dr Uplock Lat Mtr 2 GPC Lat capability R Dr Uplock Lat Mtr 2 GPC Lat capability R Dr Closure Mtr 2 GPC CL capability</td>
<td>35 Actuators continue to operate until Stow, Rel/Lat, or OP/CL sw is taken to OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 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>
<td></td>
</tr>
</tbody>
</table>
### EPS SSR-35
### BUS LOSS: MNB FLC2

#### ACTIONS
Refer to OMS/RCS Slide
- Rule for valve loss info
  - Reconfig following vlv(s) only if leak isolation reqd:
    - FWD RCS He PRESS A,B

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **1** | Fwd RCS He Press Isol A:
  - Man OP capability |
| **2** | Master Alarm
  - Light Tone – on |
| **3** | S–BD PM Sys 1:
  - Xpndr 1
  - Pre Amp 1
  - FM, PM Auto sw 1 |
| **4** | S–BD PL Intrg 1
  - NSF 1 |
| **5** | S–BD FM Sys 1
  - Man Op F2 RJD pwr (F2F, F2R, F2U, F2D) |

#### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</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>
</tbody>
</table>

#### NOTES

**EQUIP/FUNCTION LOST**

1. Indications do not appear until jet commanded.
2. Do not reconfig for reg switch or I’CNCT procedures.
4. FSM caused by antenna miscompare.
5. REACQ and PSP reconfig procedures are flight specific. If reqd, procedure can be found in payload or ISS specific books.
6. When gear deployed, tb will not indicate DN.
7. OIU 2 interfaces with PSP 2 for commanding.
9. Htr Cntl 1 remains.
10. Override F2 Manf status to:
    - RCS FWD – ITEM 1 EXEC
    - MANF VLVS 2 OVRD – ITEM 41 EXEC

---

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **1** | MNB FIRE SUPPR
  - BAY 1 – op |
| **2** | LR ADP Htr Cntl 2
  - Arm |
| **3** | LMG, NLG, B/U Rel 2 Fire 2, Arm |

---

**04/20/01**

**7-147**

**MAL/ALL/GEN F**
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A12</td>
<td>APU HTR</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GAS GEN/FUEL PUMP 1 – A AUTO</td>
</tr>
<tr>
<td></td>
<td>GAS GEN/FUEL PUMP 2 – B AUTO</td>
</tr>
<tr>
<td></td>
<td>LUBE OIL LINE 1 – A AUTO</td>
</tr>
<tr>
<td></td>
<td>LUBE OIL LINE 2 – B AUTO</td>
</tr>
<tr>
<td></td>
<td>APU HTR TK/FU LINE/H2O</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SYS 1A – AUTO</td>
</tr>
<tr>
<td></td>
<td>1B – OFF</td>
</tr>
<tr>
<td></td>
<td>2B – AUTO</td>
</tr>
<tr>
<td></td>
<td>HYD HTR</td>
</tr>
<tr>
<td></td>
<td>RUD SPD BRK A – AUTO</td>
</tr>
<tr>
<td></td>
<td>BDY FLP A – AUTO</td>
</tr>
<tr>
<td></td>
<td>ELEV A – AUTO</td>
</tr>
<tr>
<td></td>
<td>B – OFF</td>
</tr>
<tr>
<td></td>
<td>ELEV A – AUTO</td>
</tr>
<tr>
<td></td>
<td>B – OFF</td>
</tr>
<tr>
<td></td>
<td>HYD CIRC PUMP</td>
</tr>
<tr>
<td></td>
<td>PWR 1 – MNA</td>
</tr>
<tr>
<td></td>
<td>2 – MNC</td>
</tr>
<tr>
<td></td>
<td>FLASH EVAP CNTLR PR1 AB – ON (if reqd)</td>
</tr>
<tr>
<td></td>
<td>TOP EVAP HTR</td>
</tr>
<tr>
<td></td>
<td>NOZ L – A AUTO</td>
</tr>
<tr>
<td></td>
<td>R – B AUTO</td>
</tr>
<tr>
<td></td>
<td>DUCT – A</td>
</tr>
<tr>
<td></td>
<td>If Hi Load Evap enabled:</td>
</tr>
<tr>
<td></td>
<td>HI LOAD DUCT HTR – A(C)</td>
</tr>
<tr>
<td></td>
<td>FLASH EVAP FDLN HTR A SPLY – 1</td>
</tr>
<tr>
<td></td>
<td>BLR CNTLR/HTR 1 – B</td>
</tr>
<tr>
<td></td>
<td>2 – A</td>
</tr>
<tr>
<td></td>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
</tr>
<tr>
<td></td>
<td>Reconfig following vlv(s) only if leak isolation reqd:</td>
</tr>
<tr>
<td></td>
<td>AFT R RCS He PRESS A,B</td>
</tr>
<tr>
<td></td>
<td>L RCS He PRESS A</td>
</tr>
<tr>
<td></td>
<td>For attitude control:</td>
</tr>
<tr>
<td></td>
<td>Perform LOSS OF VERNIERS (ORB OPS, RCS)</td>
</tr>
<tr>
<td></td>
<td>RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO, B OFF</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APU 1 GG/Fu Pump Htrs B</td>
</tr>
<tr>
<td></td>
<td>APU 2 GG/Fu Pump Htrs A</td>
</tr>
<tr>
<td></td>
<td>APU 1 Lube Oil Line Htrs B</td>
</tr>
<tr>
<td></td>
<td>APU 2 Lube Oil Line Htrs A</td>
</tr>
<tr>
<td></td>
<td>APU 1 Tk/Fu Line Htr B</td>
</tr>
<tr>
<td></td>
<td>APU 2 Tk/Fu Line Htr A</td>
</tr>
<tr>
<td></td>
<td>Body Flap Htr B</td>
</tr>
<tr>
<td></td>
<td>Elev Act Htr B</td>
</tr>
<tr>
<td></td>
<td>Rud/Spd Brake Htr B</td>
</tr>
<tr>
<td></td>
<td>Circ Pump 1 MNB pwr</td>
</tr>
<tr>
<td></td>
<td>2 MNB pwr</td>
</tr>
<tr>
<td></td>
<td>FES Sec Cntlr</td>
</tr>
<tr>
<td></td>
<td>Top Evap L Noz Htr B</td>
</tr>
<tr>
<td></td>
<td>R Noz Htr A</td>
</tr>
<tr>
<td></td>
<td>Duct L,R Htrs B</td>
</tr>
<tr>
<td></td>
<td>HI Load Duct Noz Htr B</td>
</tr>
<tr>
<td></td>
<td>FES H2O Fdln A Htrs 2 (all except Mid 2)</td>
</tr>
<tr>
<td></td>
<td>Hyd H2O Blr 1 Cntlr A</td>
</tr>
<tr>
<td></td>
<td>2 Cntlr B</td>
</tr>
<tr>
<td></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></td>
<td>RCS Manf R5 RJD pwr (R5R,R5D)</td>
</tr>
<tr>
<td></td>
<td>Aft L,R RCS Jet 1 Htrs</td>
</tr>
<tr>
<td></td>
<td>OMS Crsfld Ln B Htrs (partial)</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</td>
</tr>
<tr>
<td></td>
<td>Tone – on</td>
</tr>
<tr>
<td>3</td>
<td>HYD BRAKE ISOL VLV 2 tb – OP</td>
</tr>
<tr>
<td>4</td>
<td>HYD MPS/TVC ISOL VLV SY2 tb – CL</td>
</tr>
<tr>
<td>5</td>
<td>AFT R RCS He PRESS B</td>
</tr>
<tr>
<td></td>
<td>tb – bp</td>
</tr>
<tr>
<td>6</td>
<td>AFT L,R RCS TK ISOL 3/4/5</td>
</tr>
<tr>
<td></td>
<td>B tb – bp (if vlv in CL position)</td>
</tr>
<tr>
<td></td>
<td>(F7)</td>
</tr>
<tr>
<td></td>
<td>If APUs active and using BLR CNTLR/HTR 1A or 2B</td>
</tr>
<tr>
<td></td>
<td>C/W APU TEMP lt – on</td>
</tr>
<tr>
<td></td>
<td>after –2 min</td>
</tr>
<tr>
<td></td>
<td>(F7)</td>
</tr>
<tr>
<td></td>
<td>C/W RCS JET lt – on</td>
</tr>
<tr>
<td></td>
<td>(FSM)</td>
</tr>
<tr>
<td></td>
<td>R RCS D,R JET</td>
</tr>
</tbody>
</table>

### NOTES

1. Indications do not appear until jet commanded |
2. TIME CRITICAL |
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. Man CL and full GPC Cntl remains. Vlv holds position |
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. Do not reconfig for reg switch or I’CNCT procedures |
10. Manf status not automatically declared closed. Fail-offs will occur when jet commanded
### ACTIONS

<table>
<thead>
<tr>
<th>If ICNCT config: (O7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AFT L RCS TK ISOL 3/4/5 B – GPC (tb–bp)</td>
</tr>
<tr>
<td>• AFT R RCS TK ISOL 3/4/5 B – GPC (tb–bp)</td>
</tr>
<tr>
<td>(O8)</td>
</tr>
<tr>
<td>• Right OMS TK ISOL A – CL (tb–CL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prior to using L OMS: (O8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L OMS He PRESS/VAP ISOL</td>
</tr>
<tr>
<td>• A – GPC</td>
</tr>
<tr>
<td>• B – OP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For SSME Hyd Repress: (R4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• HYD MPS/TVC ISOL VLV SYS 1.3 (two) – OP</td>
</tr>
<tr>
<td>• Wait 10 sec, then CL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If reqd during entry (&lt; 120K ft): (L1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• NH3 CNTLR A(B) – PRI/GPC</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>NONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 L OMS Eng Pr Viv Coil 2 and Cntl Viv 1,2 Coils 2</td>
</tr>
<tr>
<td>15 OMS Qty gauging for all L OMS single engine burns</td>
</tr>
<tr>
<td>16 APU 1 Fu Tk Viv B</td>
</tr>
<tr>
<td>16 2 Fu Tk Viv A</td>
</tr>
<tr>
<td>16 TVC Hyd Sys 2 Isol Cntl</td>
</tr>
<tr>
<td>3 Hyd Brake Isol 2 Cntl</td>
</tr>
<tr>
<td>17 NWS Hyd Sys 2</td>
</tr>
<tr>
<td>18 MPS:</td>
</tr>
<tr>
<td>18 L Eng He Intercon Outlet Viv</td>
</tr>
<tr>
<td>16 L Eng He Isol A</td>
</tr>
<tr>
<td>16 Pneu He Isol 2</td>
</tr>
<tr>
<td>19 Prplt F/D Inbd LO2 Viv</td>
</tr>
<tr>
<td>19 Outbd LH2 Viv</td>
</tr>
<tr>
<td>20 Manf Repress LH2 Viv 1,2</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>AFT L,R RCS TK ISOL 3/4/5 B CL microswitch feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS Eng/Xfeed Redundancy</td>
</tr>
<tr>
<td>L OMS He Pr Isol B GPC Cntl</td>
</tr>
<tr>
<td>MPS/TVC Hyd Sys 2 Isol Cntl</td>
</tr>
<tr>
<td>NH3 Sys B Sec Cntlr man ON capability</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>L MPS He Reg A &lt; 680 during entry (MM303)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed</td>
</tr>
<tr>
<td>4 Vlv holds position</td>
</tr>
<tr>
<td>6 Full vlv capability remains. If switch in CL, vlv will continuously drive to Cl position</td>
</tr>
<tr>
<td>11 Maintains deorbit capability for CNTL AB1 failure</td>
</tr>
<tr>
<td>12 To maintain He Isol redundancy</td>
</tr>
<tr>
<td>13 Man cntlr remains</td>
</tr>
<tr>
<td>14 Sys B Pri Cntlr, auto switchover to Sec Cntlr remain</td>
</tr>
<tr>
<td>15 ( \checkmark ) MCC for OMS Q tys</td>
</tr>
<tr>
<td>16 Vlv fails closed. Redundant vlv remains</td>
</tr>
<tr>
<td>17 Hyd Sys 1 still available for NWS</td>
</tr>
<tr>
<td>18 Vlv fails closed</td>
</tr>
<tr>
<td>19 Vlv holds position. Loss of manual capability to inert LO2.LH2 Manfs</td>
</tr>
<tr>
<td>20 Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) − cl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 − A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GNC 23 RCS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Override F2 Manf status to OP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• RCS FWD ITEM 1 EXEC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MANF VLVs 2 OVRD ITEM 41 EXEC</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:A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MCA LOGIC MNB FWD 2 − OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNB FMC2 Bus pwr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L, R Vents 1,2 Mtrs 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADP Deploy Mtrs 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deploy Disc 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 − Y Star Trkr Dr Sys 2 OP/CL capability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 − Z Star Trkr Dr Sys 1 OP/CL capability</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CREW INDICATIONS**

- MASTER ALARM Light/Tone – on
- SM ALERT Light/Tone – on
- RM DLMA MANF
- (F2) H2O Loop 1 Pump B
- Override F2 Manf status to OP

### 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></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:A)

• MCA LOGIC MNB MID 1 − OFF

MNB MMC1 Bus pwr

LH Vent 5 Mtr 2
<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 AC2 3Φ MID 2 – op</td>
<td>Stbd Rad Lat 1–6 Mtr 2 Limit sw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For PLBD ops:</td>
<td>Stbd Rad Mtr 2 Dpy capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• OP/CL Drs in man mode MANUAL PLBD CLOSING (DEORB)</td>
<td>PLBD: C/L Lat 13–16 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft Bkhd Lat 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>Stbd Door Mtr 1 CL Limit sw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCA LOGIC MNB MID 2 – OFF</td>
<td>MNB MMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PORT RMS:</td>
<td>Port RMS: MPM Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fwd MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LH Vent 3 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</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>(MA73CA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MCA LOGIC MNB MID 2 – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg (ST63) PBD CONFIG</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A8L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PORT RMS: RETEN LAT tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R–F–L FWD tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM 94 PDRS CONTROL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indication lost: Mid MRL Mtr 1 LAT/REL/RDY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R13L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>During RAD Dpy ops: RAD CNTL STBD tb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM 94 PDRS CONTROL</td>
<td>indicates single mtr ops</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 MPM or from RMS jettison
4 Single mtr time
### 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>
<td>NONE</td>
<td></td>
</tr>
</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>
</tbody>
</table>

1. Port Rad Lat 1–6 Mtr 2 Limit sw
   Port Rad Mtr 2 Dpy capability

2. PLBD:
   Port, Stbd Fwd Blkhd Lat Mtr 2
   Stbd Door Mtr 2
   Port Door Mtr 1 CL Limit sw

3. MNB MMC4 Bus pwr

4. RH Vent 6 Mtr 2

5. Port RMS:
   Mid MRL Mtr 2

6. Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw
   Redundant Ku−Band Xmit Enable
   Redundant Boom Stow Enable II Excitation Signal

#### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

(MA73C:B)

- MCA LOGIC MNB MID 4 – OFF

- MNB MMC4 Bus pwr

---

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

4. With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed in GND position

5. Redundant pwr (MNC) enables Ku−Band xmit

6. MNC MMC2 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs

---

10/14/95  7−152  MAL/ALL/GEN F
## 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>
</table>
| NONE    | MNB AMC2 Bus pwr LH,RH Vents 8,9 Mtrs 2 | NONE | 1 Redundant mtrs remain  
2 Actuators continue to operate until the Stow, Rel/Lat, or OP/CL sw is taken to OFF |

### BUS ISOLATION
- ONLY ON MCC CALL, PERFORM (MA73C:B)
- MCA LOGIC MNB AFT 2 – OFF

1. ET Door Mtrs:  
   - C/L Lat Actr 1 Mtr 2 GPC Cntl  
   - L Dr Uplock Lat Mtr 2 GPC Lat capability  
   - R Dr Uplock Lat Mtr 2 GPC Lat capability  
   - R Dr Closure Mtr 2 GPC CL capability

2. 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
### 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>
<tbody>
<tr>
<td>[A7U]</td>
<td>Video Ctrl Unit MNB pwr</td>
<td>CCTV Video and TV Annun lost</td>
<td>1 IDP3, IDP4 ADC data lost, MDU port select may be required</td>
</tr>
<tr>
<td>(R14:C)</td>
<td>MDU CDR 2</td>
<td>OS Floodlt lost</td>
<td>2 MNA and MNC pwr sources remain</td>
</tr>
<tr>
<td>(A12)</td>
<td>MDU MFD 1</td>
<td>(FSM) BCE BYP KU '2'</td>
<td>3 Redundant pwr source remains for equipment</td>
</tr>
<tr>
<td></td>
<td>ADC 1B/2B</td>
<td>Meters:</td>
<td>4 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>
<tr>
<td></td>
<td>VPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OSVS OUT 2A video input to VPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middeck ATU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MNB Pwr for CNTL CA1,2,3 Buses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV A Fwd Bay Camr and Pan–Tilt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV A Fwd Bay Camr Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV A Fwd Bay Camr Pan–Tilt Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CCTV Mon 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OS Floodlt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camr/Pan–Tilt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camr Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camr Pan–Tilt Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### 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>
<tbody>
<tr>
<td>(A8L)</td>
<td>Port RMS:</td>
<td>NONE</td>
<td>1 If Driver sw OFF when bus failed, F2 Manf Drivers lost</td>
</tr>
<tr>
<td></td>
<td>B/U pwr Htr B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PORT RMS HTR B – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PORT RMS HTR A – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C3)</td>
<td>All MADS equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RUDF 1A Drivers ON Cntl (Jets F2F,F2R,F2U,F2D)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

10/28/03

7–154 MAL/ALL/GEN F
### EPS SSR–45
### BUS LOSS: MNB O15

<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>TF TIE MNA – ON</td>
<td>MASTER ALARM</td>
<td>1 FC1 only one failure away (loss of ESS1BC) from inability to bus tie</td>
</tr>
<tr>
<td></td>
<td>(tb−ON)</td>
<td>Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>Perform ON–ORBIT RAD</td>
<td>(F7) C/W CAB ATM It SM ALERT Light/Tone – on Fwd EVENT TIME ind blank</td>
<td></td>
</tr>
<tr>
<td>CNTLR SWITCH, ECLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSRR–13 for Freon Loop 1,2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(F6,F8)</td>
<td>HSI SEL SOURCE (two) –</td>
<td>(A4) MSN TIME ind blank</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(other than MLS 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(F6,F8)</td>
<td>RADAR ALTM – 1</td>
<td>(O1) CABIN dP/dT ind – .45</td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td>ANNUN BUS SEL</td>
<td>O2/N2 FLOW SNSR 1 ind – 0 pph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ACA 1 – MNA</td>
<td>PPO2 SNSR B,C ind – 0 psia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2/3 – MNC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A6U)</td>
<td>ANNUN BUS SEL – MNC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If on PCS 2:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Perform RECONFIG TO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT PCS SYS, ECLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SSRR–3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If ADTA 2, MLS 2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>–Y Star Trkr pwrd:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BCE STRG 2 ADTA (3,B) BCE STRG 2 MLS (3) BCE STRG 3 STKR (2,3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L2)</td>
<td>CABIN RELIEF A tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(F3)</td>
<td>NWS FAIL lt – on</td>
<td></td>
<td>6 Current Snsr 1 remains</td>
</tr>
<tr>
<td></td>
<td>NWS 2 selected:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(F3) NWS FAIL lt – on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13 U)</td>
<td>C/W PARAM SEL tw (three) – 044, 024, 064</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM – INH</td>
<td></td>
<td>7 Inhibits Cabin PPO2 B, Cabin O2 Flow 2, Cabin N2 Flow 2, and H2O Loop ICH Flow 2 respectively</td>
</tr>
<tr>
<td></td>
<td>• C/W MEM – CLEAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prior to seat ingress for entry: discharge handheld ext into AV BAY 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Av Bay 1 Agent discharge capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8 Inhibits Primary C/W for Cabin PPO2 B, Cabin O2 Flow 2, and Cabin N2 Flow 2 respectively</td>
</tr>
</tbody>
</table>

---

7–155 MAL/ALL/GEN F

08/20/03
### BUS ISOLATION
- **ONLY ON MCC CALL, PERFORM**
- **(O6)**
  - STAR TRKR PWR − Y − OFF
- **(O8)**
  - RADAR ALTM 2 − OFF
  - MLS 2 − OFF
- **(O15:B)**
  - OI SIG CONDR OF 1/4 B − op
  - OI SIG CONDR OF 2/3 A − op
  - OI SIG CONDR OM 1/2 B − op
  - OI SIG CONDR OM 3 A − op
  - OI H2O BYP LOOP 2 SNSR − op
  - OI TIRE PRESS − op
  - MNA CONTR − op
  - MSN TIMER AFT − op
  - EVENT TIMER FWD − op
- **(O15:C)**
  - TACAN 2 − op
  - SMOKE DETN BAY 1B/3A − op
  - FIRE SUPPR BAY 1 − op
  - UTIL PWR F1/MO13Q − op
  - FLOOD R CNSL − op
  - LCTR − op
  - ANNUN FWD ACA 1,2/3 (two) − op
  - ANNUN AFT ACA 4/5 − op
  - CRYO O2 HTR TK2 SNSR 2 − op
  - GPS 2 PRE AMPL UPPER − op
- **(O15:D)**
  - FREON RAD CNTLR 1,2 (two) − op
  - PPO2 C CAB dp/dT − op
  - N2 SPLY 2 − op
  - O2/N2 CNTLR 2 − op
  - O2 XOVR 2 − op
  - N2 REG INLET 2 − op
  - CAB RELIEF A − op
  - NWS − op
  - GPS 2 PRE AMPL LOWER − op
- **(O15:E)**
  - RADAR ALTM 2 − op
  - MLS 2 − op
  - ADTA 2 − op
  - STAR TRKR − Y − op
  - ACCEL 2 − op
  - DDU L − op
  - R − op
  - DRAG CHUTE SYS 2 − op

### EQUIP/FUNCTION LOST
- − Y Star Trkr Dr OP capability Trkr
- H2O Byp Loop 2 Snsr (ECLS SC12)
- Tire Press Sig Condr A3,A4
- Aft Mission Timer
- Fwd Event Timer
- Cryo O2 Tk2 Htr Current Snsr 2
- PPO2 Snsr C
- Cabin Relief Vlv A Cntlr
- NWS 2
- ADTA 2
- AA2
- Left DDU MNB pwr
- Right DDU MNB pwr
- Drag Chute, PLT Arm

### CREW INDICATIONS
- **3** Vlv holds position
- **6** Current Snsr 1 remains
- **9** Redundant pwr source remains
- **10** H2O Loop 2 ICH Flow Rate snr lost
- **11** Redundant measurement remains. FDA Alarm BFS only; OPS 3,6
- **12** Ctrl B remains
- **13** NWS 1 still available
- **14** CDR Arm remains

---

07/22/03 7−156 MAL/ALL/GEN F
# EPS SSR-46
## BUS LOSS: MNB 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>MNB pwr to CNTLAB 1,2,3, CNTLB C 1,2,3, ESS1BC, ESS3AB</td>
<td>NONE</td>
<td>1 Buses remain pwrd</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>NONE</td>
</tr>
</tbody>
</table>
## 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><strong>GNC 23 RCS</strong></td>
<td>Fwd RCS Jet 2,3 Hrs</td>
<td><strong>SM 97 RETENTION</strong></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>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONLY ON MCC CALL, PERFORM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MSTR MADS PWR – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROEU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic Pwr Sys 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orbiter arm drive mtr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ODM mtr 2 – mate B, demate B, relax B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODA mtr 2 latch/release</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTIONS</td>
<td>EQUIP/FUNCTION LOST</td>
<td>CREW INDICATIONS</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>(ML86B:A)</td>
<td>• cb MNA H2O LINE HTR A – cl</td>
<td>H2O Line Htr B: Waste Dump Line Sply Dump Line Vac Vent Line</td>
</tr>
<tr>
<td>(ML86B:B)</td>
<td>• cb MNA MMU • PORT,STBD HTR A (two) – cl</td>
<td>2 MMU Port,Stbd Htr B</td>
</tr>
<tr>
<td>(ML31C)</td>
<td>• VAC VENT ISOL VLV BUS SEL – MNA</td>
<td>Vac Vent Isol Vlv MNB Cntl</td>
</tr>
<tr>
<td>(WCS)</td>
<td>• √ MODE – AUTO • √ CRADLE – AUTO • √ HSE 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</td>
<td>WCS Sep Fan 2 Mtr Relay</td>
</tr>
<tr>
<td>(EDO WCS)</td>
<td>• WCS PWR SEL – AUTO 1, OFF 2</td>
<td>Controller MNB pwr WCS Compactor MNB Cntl</td>
</tr>
<tr>
<td>(CDR's SEAT)</td>
<td>• CDR SEAT PWR BUS SEL – AC3 (dn)</td>
<td>CDR Seat Adj via AC2 pwr</td>
</tr>
<tr>
<td>(PLT’s SEAT)</td>
<td>• PLT SEAT PWR BUS SEL – AC3 (dn)</td>
<td>PLT Seat Adj via AC2 pwr</td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>• cb MNA(MNC) EXT ARLK HTR LINE 2N1 – cl • cb MNA(MNC) EXT ARLK HTR LINE 2N2 – cl • cb MNA EXT ARLK HTR STRUC – cl</td>
<td>1 Sply H2O Dump Isol Vlv Mnb Cntl</td>
</tr>
</tbody>
</table>

(Continued)
### 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>(ML86B:A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cb MNB</td>
<td>Sply H2O:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tk B Inlet Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tk C Outlet Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B Sply Isol Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:B)</td>
<td>Waste H2O Vac Vent Noz Htr</td>
<td>4</td>
<td>One htr strip pwrd by MNA ML86B still remains. Water will still heat, but at a very slow rate</td>
</tr>
<tr>
<td></td>
<td>Tk 1 Drain Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sply H2O Tk D Inlet Vlv Cntl</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WCS Press Xdcr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Galley Hot H2O Htr (Five of six htr strips lost)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>(ML86B:D)</td>
<td>MMU Port Htr B</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Htr B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GN2 Sply Isol Vlv B</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:E)</td>
<td>Port RMS:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jett Sys A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deadface Relays</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:F)</td>
<td>Middeck Floodlts 2.6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bunk Floodlts 2/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHS Floodlt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Airlk Floodlt 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>Cryo O2 Tk 3 Htr Current</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cryo O2 Tk 4 Htr Current</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ext A/L H2O Line and Structural Htrs MNB pwr</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A/L H2O Isol Vlv Cntl</td>
<td>1</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 pwrdd 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 Snr 1 remains
**8** Current Snr 2 remains

---

10/14/03
### EPS SSR–49a
**BUS LOSS: MNB PPC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A15:C)</td>
<td>Pallet Structural Htrs B</td>
<td>SM ALERT Light/Tone – on</td>
<td>1 MNA PPC1 will now supply 100% of pwr to A and B Cryo Tk Htrs</td>
</tr>
<tr>
<td>• Pallet Htrs B – OFF</td>
<td></td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>• A – AUTO</td>
<td>1 Redundant pwr to Pallet Cryo Tk 6–9 Htrs B</td>
<td>168 Pallet V B</td>
<td></td>
</tr>
<tr>
<td>(A15:D,E,F,G)</td>
<td></td>
<td>SM 168 CRYO PALLET</td>
<td></td>
</tr>
<tr>
<td>• &quot;That at least one Htr (A or B) per Tk turned off&quot;</td>
<td>Pallet Volts MNB – 0 ↓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A15:B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pallet Pwr MNB – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR–49b
**BUS LOSS: MNB A15EDO**

<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>Cryo O2 Tk 6–9 Htr Current Snsr 2</td>
<td></td>
<td>1 Snsr 1 remains</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A15:H,I,J,K)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNB Tk6–Tk9 O2 HTR SNSR 2 – op</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR–49c
**BUS LOSS: MNB A7**

<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>Vestibule Depress Vlv Sys 2 Vent Isol Vestibule Depress Vlv Sys 2 Vent</td>
<td>1 DSP SYS 2 pwr still available to all users except MNB A7</td>
<td></td>
</tr>
<tr>
<td>• cb MNB SYS 2 VENT ISOL – op</td>
<td>DSP SYS PWR SYS 2 tb – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNB SYS 2 VENT – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LTS AIRLK 2/3 MNB – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb DOCK LT MNB TRUSS AFT – op</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ATL) IF DOCKING MISSION</td>
<td>Vestibule Depress Vlv Sys 2 Vent Isol Vestibule Depress Vlv Sys 2 Vent External Airlock Its 2,3 Aft Truss Docking It</td>
<td>1 DSP SYS 2 pwr still available to all users except MNB A7</td>
<td></td>
</tr>
</tbody>
</table>
### 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 PRT, PWRDN)
3. CB AC CONTR AC3
4. CB AC CONTR AC3
5. CB AC CONTR AC3
6. CB AC CONTR AC3
7. O2,H2 MANF VLV TK1,2 (four) – OP
8. O2,H2 TK3 HTR A – AUTO
9. 10/14/03

#### EQUIP/FUNCTION LOST

1. FC3 Pumps and pH Snr
2. Purge Vlv
3. O2,H2 Flow Xdors
4. Cell Perf Monitor
5. MNC pwr to ESS1BC
6. ESS2CA
7. CNTLB1,2,3
8. 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 CDR 1 blanks
6. MDU PLT 2 blanks
7. MDU PLT 2 blanks
8. MDU AFDR 1 blanks
9. MDU AFDR 1 blanks

#### 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 repwrd 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: IDP 3
6. MDU MFD 1 (S)
7. MDU MFD 2 (S)
8. MDU MFD 2 (S)
9. If Aud Ctr 2 selected, all intercomm, A/G, and recorded voice lost until AUD CTR 1 selected
10. MDU MFD 1 (S)
11. MDU MFD 2 (S)
12. MDU MFD 2 (S)
13. MDU MFD 2 (S)

**TIME CRITICAL**

- If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
- Rad isolation may cause FES shutdown

---

**Notes and Comments:**

- Possible 'S88 EVAP OUT T 1(2)'
- SM0 THRMD/HYD (B)
- BCE STRG 3 ADTA (3,B)
- BCE STRG 4 ADTA (3,B)
- BCE STRG 3 MLS (3)
**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) APU HTR TK/FU LINE/H2O SYS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A – AUTO</td>
<td>APU 2 Tk/Fu Ln Htr B</td>
<td>(FSMs)</td>
<td>2 May be repwrd after AC Pwr Transfer Cable connected</td>
</tr>
<tr>
<td>2B – OFF</td>
<td>3 Tk/Fu Ln Htr A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A – OFF</td>
<td>APU 3 GG Inj H2O Htrs 3A, 23A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3B – AUTO</td>
<td>Aft Fuselage Hyd Htrs B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYD HTR</td>
<td>(A1R) S−BD FM PWR − 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFT FUS A – AUTO</td>
<td>S−BD Fm Sig Proc 2, Xmt 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B − OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C5)</td>
<td></td>
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<tr>
<td>S−BD PM CNTL – PNL</td>
<td>O2 EMER tb – bp</td>
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<tr>
<td>− CMD</td>
<td>CAB RELIEF B tb – bp</td>
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<tr>
<td>AUD CTR – 1</td>
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<td>(FSMs)</td>
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<tr>
<td>I/O ERROR CRT 3</td>
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<tr>
<td>I/O ERROR CRT 4</td>
<td>RM DLMA MANF</td>
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<tr>
<td>S67 FPC/FLC3</td>
<td>S67 MPC 3</td>
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<tr>
<td>S67 APC/ALC C</td>
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<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>If SYS 2 pwrd:</td>
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<tr>
<td>‘S62 BCE BYP PSP2’ ‘S88 EVAP OUT T2’</td>
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<tr>
<td>Loss of PL TLM and CMD</td>
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<tr>
<td>If PDI FDA enabled:</td>
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<tr>
<td>‘S62 PDI DECOM FAIL’</td>
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<tr>
<td>Perform RAD ISOL RECOVERY, ECLS SSR–9 for FES Loop 1</td>
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<td>(C3)</td>
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<tr>
<td>S−BD PM CNTL – PNL</td>
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<tr>
<td>− CMD</td>
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### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>Actions</th>
<th>CREW INDICATIONS</th>
<th>Notes</th>
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<tbody>
<tr>
<td>(O8) FWD RCS He PRESS B</td>
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<tr>
<td>GNC 23 RCS</td>
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<tr>
<td>• Reprioritize L,R Manf 3,4 Jets to highest priority: DES INH twice all other jets; highest priority first, then next highest priority, etc.</td>
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<tr>
<td>• Set aft pod(s) PRI JET FAIL LIMIT of 6</td>
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<tr>
<td>21 Save R OMS for deorbit (if reqd for additional on-orbit burns, <em>MCC)</em></td>
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<tr>
<td>21 Prior to using L(R) OMS: (O8)</td>
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<tr>
<td>23 R OMS He PRESS/VAP ISOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A − GPC</td>
<td></td>
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<tr>
<td>• B − OP</td>
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<tr>
<td>24 R OMS He Vap Isol 2 GPC Cntl</td>
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</tr>
<tr>
<td>24 R OMS He Pr Isol B GPC Cntl</td>
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</tr>
<tr>
<td>25 L OMS He Pr/Vap Isol A,B man Cntl</td>
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<td></td>
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<tr>
<td>10 R OMS Pri TVC</td>
<td></td>
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<tr>
<td>26 MNC Circ Pump 2 pwr</td>
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<tr>
<td>26 L,R Pod Htrs B (partial)</td>
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<tr>
<td>(A6U) ANNUN BUS SEL − MNB</td>
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<tr>
<td>(A12) HYD CIRC PUMP</td>
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<tr>
<td>• PWR 2 − MNB</td>
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<tr>
<td>• 3 − MNA</td>
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<tr>
<td>(A14) RCS/OMS HTR</td>
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</tr>
<tr>
<td>• L POD (two) − A AUTO, B OFF</td>
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<tr>
<td>• R POD (two) − A AUTO, B OFF</td>
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<tr>
<td>(AW18D) AIRLK AUD CNTL − MIDDECK</td>
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<tr>
<td>(R11U) FC H2O LINE HTR − A AUTO</td>
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<tr>
<td>• FC H2O RELIEF HTR − A AUTO</td>
<td></td>
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<tr>
<td>For PLBD ops:</td>
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<td></td>
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<tr>
<td>• OP/CL Drs in man mode</td>
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<tr>
<td>If supply H2O dump reqd:</td>
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<tr>
<td>For TK A and/or TK B</td>
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<tr>
<td>• Perform SUPPLY H2O SYS BACKUP DUMP TK A,B (IMF)</td>
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<tr>
<td>For TK C and/or TK D</td>
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<tr>
<td>• Perform SUPPLY WATER DUMP USING FES (OPB OPS, ECLS) using FLASH EVAP CNTLR PRI B</td>
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<td>(Continued)</td>
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</tbody>
</table>

### NOTES

| (R11L) SPLY H2O GALLEY SPLY                 | Vlv holds position                                    |
| VLV tb − bp                                |                                                       |                     |
| SPLY H2O TXC INLET tb − bp                 |                                                       |                     |
| (R13L) RAD CNTL STBD,PORT (two) tb − bp    |                                                       |                     |
| (A8L) PORT RMS:                            |                                                       |                     |
| • DPY/STO tb − bp                          |                                                       |                     |
| • RETEN LAT tb − bp                        |                                                       |                     |
| • R−F−L AFT tb − bp                        |                                                       |                     |
| SM 94 PDRS CONTROL                        |                                                       |                     |
| Indications lost:                          |                                                       |                     |
| • MPM Mtr 1 ST O/DPY                       |                                                       |                     |
| • Fwd MRL Mtr 2                            |                                                       |                     |
| • LAT/REL/RDY                              |                                                       |                     |
| • Att MRL Mtr 1                            |                                                       |                     |
| • LAT/REL/RDY                              |                                                       |                     |
| (AW82D) EMU 1 H2O SPLY,WASTE               |                                                       |                     |
| tb − CL                                    |                                                       |                     |
| STAR TRKR DR POS − Z                       |                                                       |                     |
| OP/CL time incr from 8–16 sec              |                                                       |                     |
| If Cabin Fan A selected: \ C/W AV BAY/CAB AIR \ lt − on 'S66 CABIN FAN' |                     |
| If site AOS and using S−BD ANT ELEC 2: 'ANTENNA' |                     |
| If H2O Loop 2 Pump active: 'S88 H2O PUMP P2' |                                                       |                     |
| If OMS Gmbl cmd abs value > 2 deg: \ C/W OMS TVC It − on 'R OMS GMBL' |                     |
| (F7) If APUs active and using BLR CNTLR/HTR 2A or 3B: \ C/W APU TEMP It − on after −2 min |                     |
| If first RGA failure and Rates sensed: \ 'RM FAIL RGA' |                     |
| If ANNUN BUS SEL ACA 2/3 − MNC, L/R Event Seq Its lost |                     |
| (L2) O2 EMER tb − bp                       |                                                       |                     |
| CAB RELIEF B tb − bp                        |                                                       |                     |

(Continued)
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>For SSME Hyd Repress: (R4)</td>
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<tr>
<td>• HYD MPS/TVC ISOL LVLV SYS 1,2 (two) − OP, wait 10 sec, then CL</td>
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<tr>
<td>If reqd during entry (&lt; 120K ft): (L1)</td>
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<tr>
<td>• NH3 CNTLR A − PRI/GPC</td>
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<tr>
<td>If reqd for Post Rollout: (L1)</td>
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<tr>
<td>• NH3 CNTLR B − SEC/ON</td>
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<tr>
<td>If AC Pwr Transfer Cable to be installed to regain AC:</td>
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<tr>
<td>• Go to EPS SSR−200; otherwise, continue with bus loss actions</td>
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<td>(R2)</td>
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<tr>
<td>• BLR CNTLR/HTR 2 − B</td>
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<tr>
<td>• 3 − A</td>
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<td>(MO51F)</td>
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<tr>
<td>If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 2 selected:</td>
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<tr>
<td>• Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1/DEACT 2/ACT 2/DEACT 1 (ORB OPS, ECLS)</td>
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<td>(L4:F)</td>
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<tr>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) − cl</td>
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<td>(L1)</td>
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<tr>
<td>• IMU FAN B(A) − ON</td>
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<tr>
<td>• C − OFF</td>
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<tr>
<td>• H2O PUMP LOOP 2 − GPC</td>
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<tr>
<td>• Perform SSR−10 (H2O Loop 2 only); H2O PUMP OPS via GPC, ECLS</td>
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<tr>
<td>• H2O PUMP LOOP 1 − OFF</td>
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<tr>
<td>• CAB FAN A − OFF</td>
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<tr>
<td>• B − ON</td>
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<tr>
<td>• AV BAY 1 FAN A,B (two) − ON</td>
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<tr>
<td>• √ AV BAY 2 FAN A − ON</td>
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<td>• B − OFF</td>
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<tr>
<td>• 3 FAN A − OFF</td>
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<tr>
<td>• √ B − ON</td>
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<tr>
<td>• FREON PUMP LOOP 2 − B</td>
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<td>(Q17:C)</td>
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<tr>
<td>• SIG CONDR FREON A − AC2</td>
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<tr>
<td>• SIG CONDR FREON B − AC2</td>
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<tr>
<td>(CDR SEAT PNL)</td>
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<tr>
<td>• CDR SEAT PWR BUS SEL − AC2 (up)</td>
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<td>(PLT SEAT PNL)</td>
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<td>• PLT SEAT PWR BUS SEL − AC2 (up)</td>
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<td>(O8)</td>
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<tr>
<td>• Right OMS XFEED B − OP (tb−OP)</td>
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**Notes:**

- 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
- H2O Loop 1 Pump Out P, Pump ∆P, Accum Qty, Pump Out Temp snrs lost
- Freon Loop 1 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
- Maintains deorbit capability for CNTL BC1 failure

**Crew Indications:**

- SM (BS,SM) 63 PL BAY DOORS
  - 10 Vlv holds position
  - 27 Sys A Pri Cntlr, auto switchover to Sec Cntlr remain
  - 28 Sys B Sec Cntlr man On capability remains
  - 29 Not yet active on all vehicles
  - 30 PEVs, Actuators, Bed A P, Bed B P, Bed dP will be recovered after system reconfig
  - 31 H2O Loop 1 Pump Out P, Pump ∆P, Accum Qty, Pump Out Temp snrs lost
  - 32 Av Bay 1 Fan ∆P, Air Out Temp snrs lost
  - 33 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
  - 34 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
  - 35 Maintains deorbit capability for CNTL BC1 failure

**Equipment/Function Lost:**

- 10 MPS/TVC Hyd Sys 3 Isol Cntl
- 27 NH3 Sys A Sec Cntlr man On capability
- 28 NH3 Sys B Pri Cntlr
- 29 Hyd H2O Blr 2 Cntlr A
- 30 CO2 Rmvl Sys Cntlr 2 Fan AC3 pwr Compressor AC3 pwr
- 31 IMU Fan C
- 32 H2O Loop 2 Pump man ON capability
- 33 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
- 34 Maintains deorbit capability for CNTL BC1 failure
### ACTIONS

<table>
<thead>
<tr>
<th>SM 60 SM TABLE MAINT</th>
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<tbody>
<tr>
<td>• Inhibit 0612605, 0612600, 0612640, 0612610</td>
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</table>

### EQUIP/FUNCTION LOST

| 36 |
| Freon Loop 1, 2 Rad Isol Motor B |

### CREW INDICATIONS

| 10 |
| Vlv holds position |

### NOTES

| 36 |
| Inhibits H2O Loop 1 Pump ∆P, Pump Out Temp, Accum Qty, respectively |

| 37 |
| AC3 bus isolation for AC Pwr Transfer Cable installation accomplished in MNC DA3 ACTIONS column. No additional bus isolation steps reqd |

| 38 |
| Motor A remains |

| 39 |
| Redundant pwr source remains |

| 40 |
| Current Snsr 1 remains |

| 41 |
| Current Snsr 2 remains |

| 42 |
| If Emer O2 Mission Kit not flown, cb is open prelaunch |

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(Continued)
### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- **(O16:E)**
  - cb MNC
  - ADTA 3, 4 (two) – op
  - MLS 3 – op
  - DDU R AFT (two) – op
  - RCS/OMS PRPLT QTY GAUGE – op
  - DRAG CHUTE SYS 1 – op

- **(A7U)**
  - PL BAY
  - FLOOD AFT PORT – OFF
  - MID STBD – OFF

- **(A7L)**
  - IF DOCKING MISSION
    - PYRO PWR MNC – OFF
    - cb MNC
    - LOGIC 2 – op
    - 3 – op

- **(R11U)**
  - FC PURGE VLV 3 – CL
  - FC START UP HTR 3 – ENA
  - IDP/CRT 4 PWR – OFF
  - MDU CRT 4 PWR – OFF
  - MDU AFD 1 PWR – OFF

- **(R14:A)**
  - cb MNC
    - AUD CTR 2 – op
    - AUD PS/AIRLK – op
    - MDU CDR 1 – op
    - MDU PLT 2 – op
    - MDU AFD 1 – op

- **(R14:B)**
  - cb PALLETT/DSC
    - 2A – op (EDO)
    - 3B/4A – op (EDO)

- **(R14:C)**
  - cb MNC KU SIG PROC – op

- **(R14:D)**
  - cb MNC B
    - TV B KEEL/EVA CAMR/PAN–TILT – op
    - TV B KEEL/EVA CAMR HTR – op
    - TV B KEEL/EVA PAN–TILT HTR – op
    - cb MNC TV CAB – op

- **(R14:E)**
  - cb MNC MS FLOOD – op

### EQUIP/FUNCTION LOST

- ADTA 3, 4
- MLS 3
- RCS/OMS Prplt Qty Gauge
- Drag Chute, CDR Arm
- ATVC 1 Isol ME
- PLB Aft Port Floodlt
- Mid Stbd Floodlt
- MNC Pyro system
- MNC pwr to DSP Logic buses 2,3
- UHF redundant pwr
- GCIL redundant pwr
- MDM cmd to CCTV Sys
- MNC pwr for CNTLAB 1,2,3 Buses
- Ku–Bd Sys Rdr & Comm I/F Cont Unit (EA1), Ku Comm Sig Proc
- TV B Keel/EVA Camr Pan/Tilt Htr
- TV B Keel/EVA Camr Pan/Tilt Htr
- Flt, Middeck TV Camrs and VFMs
- MS Floodlt

### CREW INDICATIONS

- **43**
  - PLT Arm remains
- **44**
  - Six vlvs fail to non–isolation position
- **45**
  - Logic buses 2(3) remain pwrd via MNB(MNA)
- **46**
  - Redundant pwr source remains for equipment
- **47**
  - 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

### NOTES

- 10/14/03
- 7–167
- MAL/ALL/GEN F
### BUS ISOLATION

**ML86B:F**
- MNC FLOODS
  - MIDDECK 5/7 – op
  - MIDDECK 3/4/MO13Q – op
  - BUNK 1/3 – op
  - AIRLK 4 – op

**MA73C:A:B**
- MCA LOGIC MNC FWD
  - 3 – OFF
- MCA LOGIC MNC MID
  - 2 – OFF
- MCA LOGIC MNC MID
  - 4 – OFF
- MCA LOGIC MNC AFT
  - 3 – OFF

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>Item</th>
<th>(Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNC FM3 Bus pwr</td>
<td></td>
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<tr>
<td>MMC2 Bus pwr</td>
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<tr>
<td>MMC4 Bus pwr</td>
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<tr>
<td>AMMC Bus pwr</td>
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</tr>
<tr>
<td>Ku Ant Sto/Opy Mtr 1</td>
<td></td>
</tr>
<tr>
<td>R HUD</td>
<td></td>
</tr>
<tr>
<td>– Z Star Trkr Dr Sys 2 OP/CL capability</td>
<td></td>
</tr>
<tr>
<td>PL MNC Cur Sig Condrt</td>
<td></td>
</tr>
<tr>
<td>Port, Stbd Rad Dpy/Sto Mtr 2</td>
<td></td>
</tr>
<tr>
<td>Port, Stbd Rad Lat 7–12 Mtrs 2</td>
<td></td>
</tr>
<tr>
<td>R ADP Dpy Mtr 1</td>
<td></td>
</tr>
<tr>
<td>Htr Cntr 1</td>
<td></td>
</tr>
<tr>
<td>LH Vents 1.2,3 Mtrs 1</td>
<td></td>
</tr>
<tr>
<td>6 Mtrs 2</td>
<td></td>
</tr>
<tr>
<td>RH Vents 8.9 Mtrs 1</td>
<td></td>
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<tr>
<td>3,5 Mtrs 2</td>
<td></td>
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<tr>
<td>NMG Extend Sys 1</td>
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</tr>
<tr>
<td>NMG, LMG, RMD Bkup Rel Sys 1</td>
<td></td>
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<tr>
<td>Sply H2O TK A Out Vlv Cntrl</td>
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</tr>
<tr>
<td>C In Vlv Cntrl</td>
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</tr>
<tr>
<td>Galley H2O Sply Vlv Cntrl</td>
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<tr>
<td>Ku–Bd Jettison Sys B</td>
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<tr>
<td>Port RMS Jettison Sys B</td>
<td></td>
</tr>
<tr>
<td>EMU 1 Waste H2O Vlv Cntrl</td>
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</tr>
<tr>
<td>Sply H2O Vlv Cntrl</td>
<td></td>
</tr>
<tr>
<td>TA Floodlt 4</td>
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<tr>
<td>Cryo O2 Tk4 Htr Current</td>
<td></td>
</tr>
<tr>
<td>Snsr 2</td>
<td></td>
</tr>
<tr>
<td>(OV104, OV105)</td>
<td></td>
</tr>
<tr>
<td>Cryo O2 Tk5 Htr Current</td>
<td></td>
</tr>
<tr>
<td>Snsr 2</td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- 10 Vlv holds position
- 40 Current Snsr 1 remains
- 48 MCC for Ku Ant stow reqmts
- 49 Redundant mtr remains
- 50 Htr Cntr 2 remains
- 51 LG can still be deployed by redundant Pyro Blup Rel Sys 2 and by Pri Hyd Sys. NMG extension pwr assist available from redundant sys. NMG can also be deployed by Hyd Sys 2
- 52 SYS A remains
- 53 One failure away from loss of jettison capability
- 54 Normally not installed
### BUS ISOLATION


### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>RLY PWR (six) – op</th>
</tr>
</thead>
<tbody>
<tr>
<td>R OMS ENG Pr Vlv Coil 1</td>
</tr>
<tr>
<td>R OMS ENG Cntl Vlv 1, 2 Coils 1</td>
</tr>
<tr>
<td>R OMS Purge Vlv 1, 2</td>
</tr>
<tr>
<td>OMS QTY Gauging for all R OMS Single Engine burns Press Vlv Op Sig</td>
</tr>
<tr>
<td>APU 2 Cntl Sply B pwr</td>
</tr>
<tr>
<td>3 Cntl Sply A pwr</td>
</tr>
<tr>
<td>2 Fu Tk Vlv B</td>
</tr>
<tr>
<td>3 Fuel Tk Vlv A</td>
</tr>
<tr>
<td>APU 3 GBX GN2 Repress Vlv</td>
</tr>
<tr>
<td>10 Hyd Brake Isol 3 Cntl Rsvr 3 Qty Snsr</td>
</tr>
<tr>
<td>10 EMU 1 Waste H2O Vlv Cntl Sply H2O Vlv Cntl</td>
</tr>
<tr>
<td>62 Freon Loop 1 Cntl A Rad Byp Vlv Mtr man Cntl</td>
</tr>
<tr>
<td>63 Freon Loop 2 Cntl A Rad Byp Vlv Mtr</td>
</tr>
<tr>
<td>10 Freon Loop 2 Flow Prop vlv Freon Loop 2 Cold Plate Flow Xdcr</td>
</tr>
<tr>
<td>MPS:</td>
</tr>
<tr>
<td>R Eng He Intercon Outlet Vlv</td>
</tr>
<tr>
<td>L Eng He Xovr Vlv</td>
</tr>
<tr>
<td>R Eng He Isol A</td>
</tr>
<tr>
<td>Mant Repress LO2 Vlv 1, 2</td>
</tr>
<tr>
<td>Prplt F/D Outbd LO2 Vlv</td>
</tr>
<tr>
<td>67 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1</td>
</tr>
<tr>
<td>68 No WOW Relay K9, K11, K13 PLBD:</td>
</tr>
<tr>
<td>C/L Lat 1–4, 5–8 Mtrs 2 9–12 Mtr 2 13–16 Mtr 1 Stbd Aft Blikhd Mtr 1 Port Aft Blikhd Mtr 2 Door Mtr 1</td>
</tr>
<tr>
<td>69 Hyd Main Pump 3 Depress Solenoid RPC A Hyd Main Pump 2 Depress Solenoid RPC B</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

| R MPS He reg A < 680 during entry MM303 |

### NOTES

| Vlv holds position |
| Unable to confirm redundant coils |
| Redundant coils remain |
| Vlv fails closed |

**CAUTION**

No purge. Wait 10 min between burns

**CAUTION**

\( \vdash \) MCC for OMS Tot Qtys. Aft Qtys are found on GNC SYS SUMM 2

10/14/03

7–169 MAL/ALL/GEN F
## 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>1</td>
<td>Perform FC3 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed, then:</td>
<td><strong>MASTER ALARM</strong></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(R1)</td>
<td></td>
<td>CRITICAL</td>
</tr>
<tr>
<td></td>
<td>• cb AC CONTR AC3 (three) − cl</td>
<td></td>
<td>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></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• INV PWR 3 − OFF (tb−OFF)</td>
<td></td>
<td>Will be repwrd after AC Pwr Transfer Cable connected</td>
</tr>
<tr>
<td></td>
<td>• cb AC CONTR AC3 (three) − op</td>
<td>Pattern S−BD A/G voice lost if Sys 2 selected</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(C2)</td>
<td></td>
<td>Loss of redundant port to the following:</td>
</tr>
<tr>
<td></td>
<td>• IDP CRT SEL − 1</td>
<td></td>
<td>IDP 3</td>
</tr>
<tr>
<td></td>
<td>• R IDP CRT SEL − 2</td>
<td></td>
<td>MDU CDR 1 (P)</td>
</tr>
<tr>
<td></td>
<td>On MCC GO:</td>
<td></td>
<td>MDU MFD 1 (S)</td>
</tr>
<tr>
<td></td>
<td>• GPC/CRT 03 EXEC</td>
<td></td>
<td>MDU MFD 2 (S)</td>
</tr>
<tr>
<td></td>
<td>• 04 EXEC</td>
<td></td>
<td>MDU PLT 2 (P)</td>
</tr>
<tr>
<td></td>
<td>(A1L)</td>
<td></td>
<td>4</td>
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<tr>
<td></td>
<td>S−BD PM</td>
<td></td>
<td>REACQ (if reqd)</td>
</tr>
<tr>
<td></td>
<td>• ANT SW ELEC − 1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>• XPNDR − 1</td>
<td></td>
<td>Rad isolation may cause FES shutdown</td>
</tr>
<tr>
<td></td>
<td>• PWR AMPL OPER − 1</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>• STBY − 1</td>
<td></td>
<td>IU 1 interfaces with PSP 1 for commanding</td>
</tr>
<tr>
<td></td>
<td>• PRE AMPL − 1</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>NSP</td>
<td></td>
<td>Instrumentation loss caused rad isolation</td>
</tr>
<tr>
<td></td>
<td>• PWR − 1</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>If comm lost:</td>
<td></td>
<td>Vív holds position. Do not reconf for reg switch or l/CNgT procedures</td>
</tr>
<tr>
<td></td>
<td>(C3)</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>• S−BD PM CNTL − PNL</td>
<td></td>
<td>Will indicate DN when NLG down</td>
</tr>
<tr>
<td></td>
<td>• CMD</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>If OIU reqd:</td>
<td></td>
<td>Will not indicate DN when RMG down</td>
</tr>
<tr>
<td></td>
<td>(SSP)</td>
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<td>11</td>
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<tr>
<td></td>
<td>• OIU PWR − OIU 1 ON</td>
<td></td>
<td>KU−BAND CONT STOW − EA1</td>
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<tr>
<td></td>
<td>• OIU UP − UP</td>
<td></td>
<td>ALTERNATE POWER</td>
</tr>
<tr>
<td></td>
<td>• √MCC, OIU reconf</td>
<td></td>
<td>IFM reqd to stow Ku Ant. Jettison reqd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope</td>
</tr>
<tr>
<td></td>
<td>(L4:P)</td>
<td></td>
<td>12</td>
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<tr>
<td></td>
<td>• cb AC2 φA LG SNSR 2 − cl</td>
<td></td>
<td>Performing DIRECT STOW, MECH SSR−5, may be reqd. √MCC</td>
</tr>
<tr>
<td></td>
<td>Refer to OMS/RCS Slide Rule for vlv info reconf following vlv(s) only if leak isolation reqd:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(O8)</td>
<td></td>
<td></td>
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<td></td>
<td>• FWD RCS He PRESS B</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</td>
<td>Pattern S−BD A/G voice lost if Sys 2 selected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R14:C)</td>
<td></td>
<td>MDU AFD 1 (P)</td>
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<tr>
<td></td>
<td>• cb MNC KU SIG PROC − op</td>
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<td>4</td>
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<td></td>
<td>(Continued)</td>
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<td>5</td>
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<td>6</td>
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<td></td>
<td></td>
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<td>7</td>
</tr>
<tr>
<td>2</td>
<td>FC3 Pumps and pH Snsr</td>
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<td>8</td>
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<tr>
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<td>AC3 φA,φB,φC Inverters</td>
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<tr>
<td></td>
<td>IDP 3.4</td>
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<td>MDU CRT 3.4</td>
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<tr>
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<td>S−BD FM Sys 2</td>
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<td>12</td>
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<tr>
<td></td>
<td>Xpndr 2</td>
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<tr>
<td></td>
<td>Pre Amp 2</td>
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<tr>
<td></td>
<td>Pwr Amp 2</td>
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<tr>
<td></td>
<td>PM,FM Ant Sw 2</td>
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<tr>
<td></td>
<td>NSP 2/COM SEC 2</td>
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<tr>
<td></td>
<td>S−BD PL Intrg 2</td>
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<tr>
<td></td>
<td>PSP 2</td>
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<td></td>
<td>S−BD FM Sys 2</td>
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<td>Prox Snsr Electronics Box 1</td>
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<tr>
<td></td>
<td>Fwd RCS He Press Isol B man OP capability</td>
<td>Pattern S−BD A/G voice lost if Sys 2 selected</td>
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<td>RCS Manf F5 RJD pwr (F5L,F5R)</td>
<td>Pattern S−BD A/G voice lost if Sys 2 selected</td>
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<tr>
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<td>RCS Manf F4 RJD pwr (F4R,F4D)</td>
<td>Pattern S−BD A/G voice lost if Sys 2 selected</td>
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</tr>
<tr>
<td></td>
<td>Ku−Bd Sys Rdr &amp; Comm I/F Cont Unit (EA1)</td>
<td>Pattern S−BD A/G voice lost if Sys 2 selected</td>
<td></td>
</tr>
</tbody>
</table>

10/14/03  7−170  MAL/ALL/GEN F
**Pre-seat ingress for Entry:**
- Discharge handheld fire ext into AV BAY 2

**If AC Pwr Transfer Cable to be installed to regain AC:**
- Go to EPS SSR−200; otherwise, continue with bus loss actions

**SM 60 SM TABLE MAINT**
- Inhibit 0612605, 0612600, 0612640, 0612610

**CDR SEAT PNL**
- CDR SEAT PWR BUS SEL − AC2 (up)

**PLT SEAT PNL**
- PLT SEAT PWR BUS SEL − AC2 (up)

**SIG CONDR FREON A − AC2**
- Freon Sig Condr A AC3 pwr (ECLS SC 1A)

**BLR CNTLR/HTR 2 − B**
- Hyd H2O Blr 2 Cntlr A 3 Cntlr B

**cb AC1 H2O LOOP PUMP 1A/2 (three) − cl**

**IMU FAN B(A) − ON**
- C − OFF

**H2O PUMP LOOP 2 − GPC**
- Perform (H2O Loop 2 only) H2O PUMP OPS via GPC, ECLS SSR−10

**H2O PUMP LOOP 1 − OFF**
- 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

**FREON PUMP LOOP 2 − B**

**CO2 RMLVL SYS flown and if CO2 RMLVL SYS CNTLR 2 selected:**
- Perform CO2 RMLVL SYS CNTLR CONFIG: ACT 1/DEACT 2 (ACT 2/DEACT 1) (ORB OPS, ECLS)

**H2O LOOP 1 Byp Cntl A**
- Hyd H2O Blr 2 Cntlr A 3 Cntlr B

**Rsvr 3 Qty Snsr**

**CO2 RMLVL SYS CNTLR 2**
- CO2 Rmvl Sys Cntlr 2

**IMU Fan C**
- H2O Loop 2 Pump man ON capability
- H2O Loop 1 Byp Cntlr, Sig Condr
- H2O Loop 1 Byp vlv pwr
- Cabin Fan A
- Av Bay 1 Sig condr, Xdcrs (ECLS SC2)
- Av Bay 2 Fan B
- Av Bay 3 Fan A
- Freon Loop 2 Pump A

**AIR TEMP AV BAY ind − 45 degF**
- FREON FLOW 1 ind − 578 pph
- R ADP deploy time incr from 15 to 30 sec

**STAR TRKR DR POS − Z**
- OP/CL time incr from 8 to 16 sec

**Impending:**
- ‘S66 CO2 RL SYS PCO2’
- ‘S66 CAB PPCO2’

**CO2 RMVL SYS CNTLR 2 FAIL lt on**

**HYD/A PU**
- HYD QTY 3 ind − 0%
- APU QTY 2 ind − 0%

**FWD RCS**
- TK ISOL 1/2 tb − bp
- MANF ISOL 4 tb − bp
- 5 tb − bp

**R VIV holds position**

**H2O LOOP 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accm Qty snsrs lost**

**CO2 RMVL SYS CNTLR 2 FAIL lt on**

**CO2 Rmvl Sys Cntlr 2**

**MPM and MRLS may be repwrd after AC Pwr Transfer Cable connected**

**Single mtr time.**
- One failure away from EVA to stow MPM or from RMS jettison

**Single mtr time.**
- If unlatched, one failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS

**Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accm Qty, respectively**

**Viv holds position**

**Freeon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accm Qty snsrs lost**

**Freeon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accm Qty snsrs lost**

**H2O Loop 1 Pump Out P, Pump ΔP, Accm Qty, Pump Out Temp snsrs lost**

**AV Bay 1 Fan ΔP, Air Out Temp snsrs lost**

**PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig**

(Continued)
## BUS LOSS: MNC FPC3

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- MDU CRT 3 PWR − OFF
- cb AC3 φC RAD ISOL B − op
- IDP/CRT 3 PWR − OFF
- cb MNC FIRE SUPPR BAY 2 − op
- MDU CRT 4 PWR − OFF
- IDP/CRT 4 PWR − OFF
- cb MNB KU ELEC − op

### EQUIP/FUNCTION LOST

- Freon Loop 1,2 Rad Isol Motor B
- MNC FMC 3 Bus pwr
- AC3 FMC3 Bus Pwr
- LH Vents 1,2,3 Mtr 1
- 6 Mtr 2
- Z Star Trkr Dr Sys 2 OP/CL capability
- R ADP Dpy Mtr 1
- PLT HUD
- R ADP Htr Cntr 1
- NLG Ext Sys 1
- NLG,LMG,RMG Bkup Rel Sys 1
- MNC Pwr to CNTL Buses BC1,BC2,BC3,CA1,CA2, CA3
- ET Door Mtrs:
  - C/L Lat Actr 2 Mtr 2
  - L Dr Closure Mtr 2
  - R Dr Closure Mtr 1
  - Uplock Lat Mtr 1
- Freon Loop 2 Cntr A Rad Byp Vlv Mtr
- Freon Loop 2 Flow Prop Vlv
- Port, Stbd Rad Lat 7−12 Mtrs 2
- Port, Stbd Rad Dpy/Sto Mtrs 2
- PLBD:
  - C/L Lat 1−4, 5−8 Mtrs 2
  - 9−12 Mtr 2
  - 13−16 Mtr 1
  - Stbd Aft Blkhd Mtr 1
  - Port Aft Blkhd Mtr 2
  - Door Mtr 1
- Ku Ant Sto/Dpy Mtr 1

### CREW INDICATIONS

- Vlv holds position
- AC3 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNC FPC 3 ACTIONS column. No additional bus isolation steps reqd
- Motor A remains
- Mtr 2 remains
- Htr Cntr 2 remains
- 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
- Redundant mtrs remain
- Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains
- MCC for Ku Ant stow reqmts

### NOTES

10/14/03 7−172 MAL/ALL/GEN F
### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FC3 Purge Vlv</td>
</tr>
<tr>
<td></td>
<td>O2,H2 Flow Xdors</td>
</tr>
<tr>
<td></td>
<td>SS ( \Delta V ) Snsrs</td>
</tr>
<tr>
<td>1</td>
<td>FES H2O Fdln B Mid 2 Htr 1</td>
</tr>
<tr>
<td></td>
<td>Aft Fuselage Htrs B</td>
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<tr>
<td>2</td>
<td>FC H2O Line Htrs B</td>
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<tr>
<td></td>
<td>Relief Htrs B</td>
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<tr>
<td></td>
<td>Noz Htr</td>
</tr>
<tr>
<td>2</td>
<td>Port,Stbd Rad Lat 7−12 Mtr 2</td>
</tr>
<tr>
<td></td>
<td>Limit sw</td>
</tr>
<tr>
<td>2</td>
<td>Port,Stbd Dpy/Sto Mtrs 1</td>
</tr>
<tr>
<td></td>
<td>Limit sw</td>
</tr>
<tr>
<td>2</td>
<td>Port,Stbd Dpy/Sto Mtrs 2</td>
</tr>
<tr>
<td></td>
<td>Limit sw</td>
</tr>
<tr>
<td>3</td>
<td>Port,Stbd Rad Floodlt</td>
</tr>
<tr>
<td></td>
<td>Mid Stbd Floodlt</td>
</tr>
<tr>
<td>4</td>
<td>MNC Pyro system</td>
</tr>
<tr>
<td>4</td>
<td>MNC pwr to DSP Logic buses 2,3</td>
</tr>
<tr>
<td>5</td>
<td>RGA 3</td>
</tr>
<tr>
<td>6</td>
<td>FC3 Startup Htr INH capability</td>
</tr>
<tr>
<td>5</td>
<td>MNC MMC2, MNC MMC4</td>
</tr>
<tr>
<td></td>
<td>Bus pwr</td>
</tr>
<tr>
<td>6</td>
<td>MNC pwr to ESS1BC,2CA</td>
</tr>
<tr>
<td></td>
<td>Freon Loop 1 Cntr A Rad Byp Vlv Mtr man Cntrl</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R13L) RAD CNTL PORT,STBD (two) tb − bp</td>
<td>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. ( \sqrt{MCC} ) Loss of FC3 SS ( \Delta V ) Snsrs. Change in ( \Delta V ) Amps &gt;12 amps indicates possible cell crossover problem. ( \Delta V ) Amps shift due to loss of FC3 purge capability is indicated by change in ( \Delta V ) Amps between pre− and post−purge readings. MCC will aid in this determination</td>
</tr>
<tr>
<td>(Lights Lost) PLB Floods Aft Port, Mid Stbd</td>
<td></td>
</tr>
<tr>
<td>If first RGA failure and rates sensed: ‘RM FAIL RGA’ (3)</td>
<td></td>
</tr>
<tr>
<td>If FC H2O Rfl Htrs in B AUTO: SM ALERT Light/Tone – on ‘S69 FUEL CELL’</td>
<td></td>
</tr>
<tr>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td></td>
</tr>
<tr>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’</td>
<td></td>
</tr>
<tr>
<td>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td>SM 94 PDRS CONTROL</td>
<td></td>
</tr>
<tr>
<td>Indications lost:</td>
<td></td>
</tr>
<tr>
<td>MPM Mtr 1 STO/DPY Fwd MRL Mtr 2 LAT/REL/RDY</td>
<td></td>
</tr>
<tr>
<td>Fwd MRL Mtr 2 LAT/REL/RDY</td>
<td></td>
</tr>
<tr>
<td>Aft MRL Mtr 1 LAT/REL/RDY</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td></td>
</tr>
</tbody>
</table>

### 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
  - MNC LOGIC 2 – op
  - 3 – op

- **(O16A)**
  - RGA 3 – OFF

- **(R11U)**
  - FC PURGE VLV 3 – CL
  - FC STARTUP HTR 3 – ENA

- **(MA73CA,B)**
  - MCA LOGIC MNC MID 2.4 (two) – OFF

- **(L1)**
  - TOP EVAP HTR DUCT – A(B)
  - If HI Load Evap enabled: HI LOAD DUCT HTR – A(B)

For PLBD ops:
- OP/CL Drs in man mode

---

10/14/03
### BUS ISOLATION

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port RMS:</td>
</tr>
<tr>
<td>7 MPM Mtr 1</td>
</tr>
<tr>
<td>8 Fwd MRL Mtr 2</td>
</tr>
<tr>
<td>8 Aft MRL Mtr 1</td>
</tr>
<tr>
<td>RH Vent 3 Mtr 2</td>
</tr>
<tr>
<td>5 Mtr 2</td>
</tr>
<tr>
<td>LH Vent 3 Mtr 2</td>
</tr>
<tr>
<td>6 Mtr 2</td>
</tr>
<tr>
<td>9 Ku Ant Dpy/Sto Mtr 1 Limit sw</td>
</tr>
<tr>
<td>10 Redundant Ku Band Xmit Enable</td>
</tr>
<tr>
<td>11 Redundant Boom Stow Enable II Excitation Signal</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</td>
</tr>
<tr>
<td>8 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td>9 With an inop limit sw, mtr will continue to run until primary sw returned to GND</td>
</tr>
<tr>
<td>10 Redundant sig (MNB) enables Ku Band Xmit</td>
</tr>
<tr>
<td>11 MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs</td>
</tr>
</tbody>
</table>
### 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>DES INH on L Manf 3 Jets:</td>
<td>If OMS GMBL cmd abs value &gt; 2 deg:</td>
<td>1. Maintains control capability for APC4 failure</td>
</tr>
<tr>
<td></td>
<td>• ITEM 2 EXEC</td>
<td>C/W OMS TVC It – on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• L3L ITEM 12 EXEC (*)</td>
<td>‘R OMS GMBL’ (3,B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• L3D ITEM 28 EXEC (*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• L3A ITEM 30 EXEC (*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set aft pod(s) PRI JET FAIL LIMIT to 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Refer to OMS/RCS Slide Rule for vlv loss info (use APC6 Slide for Aft RCS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reconfg following vlv(s) only if leak isolation reqd:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(O7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AFT L RCS He PRESS B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• R RCS He PRESS B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(A12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>APU HTR TK/FU LN/H2O</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SYS 3B – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(A14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCS/OMS HTR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• L POD (two) – A AUTO, B OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• R POD (two) – A AUTO, B OFF</td>
<td></td>
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<tr>
<td>5</td>
<td>Prior to using L,R OMS:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(O8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R OMS He PRESS/VAP ISOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• A – GPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• B – OP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>L OMS He PRESS/VAP ISOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• A(B) – GPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• B(A) – CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>R OMS He Vap Isol 2 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>R OMS He Pr Isol B GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>L OMS He Pr Isol A,B man Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>R OMS Pri TVC</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>GNC XXXXX MNVR YYYYYY (3,B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sel R OMS SEC TVC:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• GMBL SEC R – ITEM 31 EXEC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

(R1)

• PL AFT MNC – OFF

(Aft Payload C pwr)

R OMS BPV 2 OP sig

APU 2 Fu Tk Vlv B

01/05/00 7–175 MAL/ALL/GEN F
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| (L1)    | • FLASH EVAP CNTRL PRI A − OFF  
• FLASH EVAP CNTRL PRI B(SEC) − ON (If reqd)  
• TOP EVAP HTR NOZ R − A(AUTO)  
If HI LOAD EVAP enabled:  
• HI LOAD DUCT HTR − A(B) | Flash Evap Cntlr Pri A  
Topping Evap R Noz Htr B  
Hi Load Duct Noz Htr C | 1 Vlv holds position  
2 Do not reconfig for reg switch or I’CNCT procedures  
3 Man CL and GPC cntl 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 | |
| (L2)    | • FLASH EVAP FDLN HTR B SPLY − 2 | FES H2O Fdln B Htrs 1 (all except Mid 2)  
Aft L RCS He Press Isol B  
GPC Cntl and man CL capability  
Aft R RCS He Press Isol B  
man OP capability | If cooling by FES only:  
C/W FREON LOOP lt − on  
’S88 EVAP OUT T 1’  
’S88 EVAP OUT T 2’ | |
| (O7)    | • AFT L RCS He PRESS B  
• R RCS He PRESS B | Aft RCS L,R Jets 3,4 Htrs | If OMS Gmb1 cmd abs value > 2 deg:  
C/W OMS TVC lt − on  
‘R OMS GMBL’ RS (3,B)  
No R MPS He usage during entry (MM304) | |
| (A12)   | • BLR CNTRL/HTR 2 − B  
• 3 − A | Hyd H2O Blr 2 Cntlr A  
Blr 3 Cntlr B | |
| (A2)    | • APU HTR TK/FU LINE H2O  
SY 2A − AUTO  
2B − OFF  
SY 3A − OFF  
3B − AUTO  
APU HTR GAS GEN/FUEL  
PUMP 2 − A AUTO  
3 − B AUTO | APU 2 TK/FU Ln Htr B  
3 TK/FU Ln Htr A  
3 GG Inj H2O Htrs 3A,23A | |
| (A14)   | • RCS/OMS HTR  
L POD (two) − A AUTO, B OFF  
R POD (two) − A AUTO, B OFF  
APU HTR  
LUBE OIL LINE 2 − A AUTO  
LUBE OIL LINE 3 − B AUTO  
HYD CIRC  
PUMP PWR 2 − MNB  
3 − MNA  
APU HTR GAS GEN/FUEL  
PUMP 2 − A AUTO  
3 − B AUTO | APU 2 Lube Oil Ln Htr B  
APU 3 Lube Oil Ln Htr A  
Circ Pmp 2 MNC pwr  
3 MNC pwr  
L,R Pod Htrs B (partial) | |

(Continued)
6 Save R OMS Eng for deorbit
(If reqd for additional
on-orbit burns, \*MCC)

Prior to using L(R) OMS:

8 R OMS He PRESS/VAP ISOL
• A – GPC
• B – OP

L OMS He PRESS/VAP ISOL
• A(B) – GPC
• B(A) – CL

GNC XXXXX
MNVR YYYYY

Sel R OMS SEC TVC:
• GMBL SEC R – ITEM 31 EXEC

For SSME Hyd Repress:
(R4)
• HYD MPS/TVC ISOL VLV
SYS 1,2 (two) – OP, wait
10 sec, then CL

If reqd during entry
(< 120K ft):
(L1)
• NH3 CNTLR A – PRI/GPC
If reqd for Post Rollout:
• NH3 CNTLR B – SEC/ON

If NH3 CNTLR A(B) – SEC/ON reqd, then:
(L1)
• H2O PUMP LOOP 1,2
(two) – ON
• FLOW PROP VLV LOOP
1,2 (two) – ICH
If applicable:
• Activate PL H2O LOOP(s)

BUS ISOLATION

ONLY ON MCC CALL,
PERFORM
(R1)
• PL AFT MNC – OFF

(MA73C:B)
• MCA LOGIC MNC AFT 3 – OFF

GNC SYS SUMM 2

1 Vlv holds position
6 Lost TM:

8Unable to confirm
redundant coils

7 Maintains He Isol
redundancy

9 Vlv normally
closed. Man cntl
remains

10 Prevents
simultaneous opening
of parallel reg paths
and possibly rupturing
burst disk

11 Vlv normally
closed. GPC cntl
remains

12 Sys A Pri Cntlr,
auto switchover to Sec
Cntlr remain

13 Sys B Sec Cntlr
man On capability
remains

14 Six vlvs fail in
non–isolation position

15 Pwr Sply A
remains. Turbine
Speed ind lost

16 Vlv fails closed.
Redundant vlv remains

17 Pwr Sply B
remains. GG Bed T
and GBX P ind lost
when APU running

18 Redundant RPC
remains

(Continued)
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hyd Brake Isol 3 Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>R OMS Cntl Vlv 1,2 Coils 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>OMS Qty Gauging for all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>R OMS single engine burns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>R OMS Purge Vlv 1,2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Aft RCS L,R Jet 5 Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>MPS: R Eng He Intercon Outlet Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>R Eng He Isol A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>L Eng He Xovr Vlv</td>
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<tr>
<td>23</td>
<td>Manf Repress LO2 Vlv 1,2</td>
<td></td>
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<tr>
<td>24</td>
<td>Prplt F/D Outbd LO2 Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>ET Door Mtrs: C/L Lat Actr 2 Mtr 2 GPC Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>L Dr Closure Mtr 2 GPC CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>R Dr Closure Mtr 1 GPC CL capability</td>
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<td></td>
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<tr>
<td>25</td>
<td>R Dr Uplock Lat Mtr 1 GPC Lat capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>AC Pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 2 Mtr 2</td>
<td></td>
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<tr>
<td>25</td>
<td>L Dr Closure Mtr 2</td>
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</tr>
<tr>
<td>25</td>
<td>R Dr Closure Mtr 1</td>
<td></td>
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</tr>
<tr>
<td>25</td>
<td>Uplock Lat Mtr 1</td>
<td></td>
<td></td>
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<tr>
<td>21</td>
<td>R MPS He reg A &lt; 680 during entry (MM303)</td>
<td></td>
<td>1 Vlv holds position</td>
</tr>
<tr>
<td>19</td>
<td>Redundant coils remain</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>20</td>
<td>MCC for OMS Qtys</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>22</td>
<td>No Purge, Wait 10 min between burns</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>23</td>
<td>Vlv fails closed</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>24</td>
<td>Vlv fails closed, Redundant vlv remains</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>25</td>
<td>Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>25</td>
<td>Vlv holds position. Loss of manual capability to inert LO2 manf</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>26</td>
<td>Redundant mtrs remain</td>
<td></td>
<td>26</td>
</tr>
</tbody>
</table>
### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| (A1L)  | S–BD PM  
• ANT SW ELEC – 1  
• XPNDR – 1  
• PWR AMPL OPER – 1  
• PWR AMPL STBY – 1  
• PRE AMP – 1  
NSP  
• PWR – 1  
If PSP and/or INTRG reqd for  
PL or ISS ops:  
• S–BD PL PWR SYS – 1  
• CNTL – PNL  
• – CMD  
Reconfig PSP  
Perform PL INTRG  
REACQ (if reqd) | S–BD PM Sys 2:  
FM, PM Ant Sw 2  
Xpndr 2  
Pwr Ampl 2  
Pre Amp 2  
NSP 2  
S–BD PL Intrg 2  
PSP 2 | (COMM LOST)  
All S–BD A/G voice lost if  
Sys 2 selected |
| (A1R)  | S–BD FM PWR – 1  
If no comm:  
(C3)  
• S–BD PM CNTL – PNL  
• – CMD |
| (C3)  | S–BD FM Sys 2  
If no comm:  
(C3)  
• S–BD PM CNTL – PNL  
• – CMD |
| GNC 23 RCS  | RCS Manf F5 RJD pwr  
(F5L,F5R)  
RCS Manf F4 RJD pwr  
(F4R,F4D)  
Fwd RCS He Press Isol B  
man OP capability  
Av Bay 2 agent discharge capability |
| Override F4 Manf status to  
CL:  
• RCS FWD – ITEM 1  
EXE  
• MANF VLVS 4 OVRD – ITEM 43 EXEC  
Refer to OMS/RCS Slide  
Rule for vlv loss info  
Reconfig following vlv only if  
leak isolation reqd:  
(O8)  
• FWD RCS He PRESS B  
• Pre–seat ingress for  
Entry, discharge hand–held  
fire ext into AV BAY 2 |
| BUS ISOLATION  | R ADP Htr Ctrl 1  
NWS fail indication (pnl F2)  
NLG, RMG B/U Rel 1 Fire 2,  
Arm |
| ONLY ON MCC CALL,  
PERFORM  | |
| (O16C)  | e/ MNC FIRE SUPPR  
BAY 2 – op  |
| 10 | 1 | 2 | 3 |

**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 Cntlr 2  
remains
EPS SSR–56
BUS LOSS: MNC ALC3

**ACTIONS**

<table>
<thead>
<tr>
<th>(L1)</th>
<th>(L2)</th>
</tr>
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<tbody>
<tr>
<td>• FLASH EVAP CNTLR PRI A – OFF</td>
<td>• FLASH EVAP CNTLR PRI B(SEC) – ON (If reqd)</td>
</tr>
<tr>
<td>• TOP EVAP HTR NOZ R – A AUTO</td>
<td>• HI LOAD EVAP enabled:</td>
</tr>
<tr>
<td></td>
<td>• HI LOAD DUCT HTR – A(B)</td>
</tr>
<tr>
<td>• FLASH EVAP FDLN HTR B SPLÝ – 2</td>
<td>Refer to OMS/RCS Slide Rule for bus loss info</td>
</tr>
</tbody>
</table>

Reconfig following vlv(s) only if leak isolation reqd:

<table>
<thead>
<tr>
<th>(O7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AFT R RCS He PRESS B</td>
</tr>
<tr>
<td>• L RCS He PRESS B</td>
</tr>
</tbody>
</table>

**EQUIP/FUNCTION LOST**

<table>
<thead>
<tr>
<th>(R4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HYD BRAKE ISOL VLV 3 tb – OP</td>
</tr>
<tr>
<td>1 HYD MPS/TVC ISOL VLV SYS 3 tb – CL</td>
</tr>
<tr>
<td>1 AFT L RCS He PRESS B</td>
</tr>
<tr>
<td>1 AFT L,R RCS MANF ISOL 5 (two) tb – bp</td>
</tr>
</tbody>
</table>

**CREW INDICATIONS**

<table>
<thead>
<tr>
<th>(F7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>If cooling by FES only:</td>
</tr>
<tr>
<td>C/W FREON LOOP</td>
</tr>
<tr>
<td>It – on ‘S88 EVAP OUT T1’</td>
</tr>
<tr>
<td>‘S88 EVAP OUT T2’</td>
</tr>
</tbody>
</table>

**NOTES**

| 1 Vlv holds position |
| 2 Do not reconfig for reg switch or I’CNCT procedures |
| 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 |
| 4 If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp |
| 5 R OMS GN2 Press Vlv OP |
| 6 R OMS Eng Pr Vlv Coil 1 |
| 8 Vlv normally closed. Man cntl remains |

**GNC SYS SUMM 2**

R OMS N2 P VLV If Eng – ARM/PRESS, assume vlv OP

**R OMS Eng Pr Vlv Coil 1**

**HYD BRAKE ISOL VLV 3 tb – OP**

**HYD MPS/TVC ISOL VLV SYS 3 tb – CL**

**TIME CRITICAL**

**If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp**

**Notes:**

**EQUIP/FUNCTION LOST**

<table>
<thead>
<tr>
<th>(R4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HYD BRAKE ISOL VLV 3</td>
</tr>
<tr>
<td>1 HYD MPS/TVC ISOL VLV SYS 3</td>
</tr>
</tbody>
</table>

**CREW INDICATIONS**

<table>
<thead>
<tr>
<th>(R7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 AFT L RCS He PRESS B</td>
</tr>
<tr>
<td>1 AFT L,R RCS MANF ISOL 5</td>
</tr>
</tbody>
</table>

**NOTES**

| 1 Vlv holds position |
| 2 Do not reconfig for reg switch or I’CNCT procedures |
| 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 |
| 4 If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp |
| 5 Lost TM: |
| 6 Unable to confirm redundant coils |
| 7 Maintains He Isol redundancy |
| 8 Vlv normally closed. Man cntl remains |

**GNC SYS SUMM 2**

R OMS N2 P VLV If Eng – ARM/PRESS, assume vlv OP

**Notes:**

**EQUIP/FUNCTION LOST**

<table>
<thead>
<tr>
<th>(R4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HYD BRAKE ISOL VLV 3</td>
</tr>
<tr>
<td>1 HYD MPS/TVC ISOL VLV SYS 3</td>
</tr>
</tbody>
</table>

**CREW INDICATIONS**

<table>
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<tbody>
<tr>
<td>1 AFT L RCS He PRESS B</td>
</tr>
<tr>
<td>1 AFT L,R RCS MANF ISOL 5</td>
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</tbody>
</table>

**NOTES**

| 1 Vlv holds position |
| 2 Do not reconfig for reg switch or I’CNCT procedures |
| 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 |
| 4 If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp |
| 5 Lost TM: |
| 6 Unable to confirm redundant coils |
| 7 Maintains He Isol redundancy |
| 8 Vlv normally closed. Man cntl remains |

**GNC SYS SUMM 2**

R OMS N2 P VLV If Eng – ARM/PRESS, assume vlv OP

**Notes:**

**EQUIP/FUNCTION LOST**

<table>
<thead>
<tr>
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<tr>
<td>1 HYD BRAKE ISOL VLV 3</td>
</tr>
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</tr>
</tbody>
</table>

**CREW INDICATIONS**

<table>
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<tbody>
<tr>
<td>1 AFT L RCS He PRESS B</td>
</tr>
<tr>
<td>1 AFT L,R RCS MANF ISOL 5</td>
</tr>
</tbody>
</table>

**NOTES**

| 1 Vlv holds position |
| 2 Do not reconfig for reg switch or I’CNCT procedures |
| 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 |
| 4 If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp |
| 5 Lost TM: |
| 6 Unable to confirm redundant coils |
| 7 Maintains He Isol redundancy |
| 8 Vlv normally closed. Man cntl remains |

**GNC SYS SUMM 2**

R OMS N2 P VLV If Eng – ARM/PRESS, assume vlv OP

**Notes:**
### EPS SSR−56 (Cont)
#### BUS LOSS: MNC ALC3

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>If reqd during entry (&lt; 120K ft): (L1)</td>
<td>NH3 CNTLR A − PRI/GPC</td>
<td>R MPS He reg A &lt; 680 during entry (MM303)</td>
<td>1 Vlv holds position</td>
</tr>
<tr>
<td>• NH3 CNTLR A − PRI/GPC</td>
<td>NH3 Sys A Sec Cntlr man On capability</td>
<td>9 Sys A Pri Cntrl, auto switchover to Sec Cntlr remain</td>
<td></td>
</tr>
<tr>
<td>If reqd for Post Rollout:</td>
<td>NH3 CNTLR B − SEC/ON</td>
<td>10 Sys B Sec Cntlr man On capability remains</td>
<td></td>
</tr>
<tr>
<td>• NH3 CNTLR B − SEC/ON</td>
<td>11 Redundant coils remain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If NH3 CNTLR A(B) − SEC/ON reqd, then: (L1)</td>
<td>H2O PUMP LOOP 1,2 (two) − ON</td>
<td>12 MCC for OMS Qtls</td>
<td></td>
</tr>
<tr>
<td>• FLOW PROP VLV LOOP 1,2 (two) − ICH</td>
<td>NH3 Sys B Pri Cntrl and Auto sw over to Sec Cntlr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If applicable:</td>
<td>Activate PL H2O LOOP(s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### BUS ISOLATION

<table>
<thead>
<tr>
<th>ONLY ON MCC CALL, PERFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
</tr>
<tr>
<td>Hyd Brake Isol 3 Cntrl</td>
</tr>
<tr>
<td>APU 2 Fu Tk Vlv A</td>
</tr>
<tr>
<td>3 Fu Tk Vlv A</td>
</tr>
<tr>
<td>R OMS Eng Cntrl Vlv 1,2</td>
</tr>
<tr>
<td>Coils 1</td>
</tr>
<tr>
<td>OMS Qty Gauging for all R OMS Single Engine burns</td>
</tr>
<tr>
<td>R OMS Purge Vlv 1,2 Aft RCS L,R Jet 5 Htr</td>
</tr>
<tr>
<td>MPS:</td>
</tr>
<tr>
<td>R Eng He Intercon Outlet Vlv</td>
</tr>
<tr>
<td>R Eng He Isol A</td>
</tr>
<tr>
<td>L Eng He Xovr Vlv</td>
</tr>
<tr>
<td>Manf Repress LO2 Vlv 1,2</td>
</tr>
<tr>
<td>Prplt F/D Outbd LO2 Vlv</td>
</tr>
</tbody>
</table>

#### CAUTION

<table>
<thead>
<tr>
<th>No Purge. Wait 10 min between burns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vlv fails closed. Redundant vlv remains</td>
</tr>
<tr>
<td>Vlv fails closed</td>
</tr>
<tr>
<td>Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)</td>
</tr>
<tr>
<td>Vlv holds position. Loss of manual capability to inert LO2 manf</td>
</tr>
</tbody>
</table>
### 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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GNC 23 RCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Override F4 Manf status to OP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• RCS FWD – ITEM 1 EXEC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MANF VLVS 4 OVRD – ITEM 4 EXEC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BUS ISOLATION
**ONLY ON MCC CALL, PERFORM**

- **(MA73C:A)**
  - MCA LOGIC MNC FWD 3 – OFF

### NOTES
1. Vlv holds position
2. Mtr 2 remains
3. Htr Cntlr 2 remains

---

### 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>Stbd Rad Lat 7–12 Mtr 2 Limit sw</td>
<td><strong>(R13L)</strong></td>
<td></td>
</tr>
<tr>
<td>• cb MCA PWR AC3 3Φ MID 2 – op</td>
<td>Port Rad Dpy/Sto Mtr 1 Limit sw</td>
<td>RAD CNTL PORT tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Rad Dpy/Sto Mtr 2</td>
<td>If STBD RAD pnl deployed: RAD CNTL STBD tb – bp</td>
<td></td>
</tr>
<tr>
<td>For PLBD Ops:</td>
<td>PLBD: C/L Lat 1–4 Mtr 2 5–8 Mtr 2 Port Alt Bkhd Lat Mtr 2</td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td></td>
</tr>
<tr>
<td>• OP/CL Drs in man mode. MANUAL PLBD CLOSING (DEORBIT PREP)</td>
<td></td>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PB0 CONFIG’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MNC MMC2 Bus pwr</td>
<td>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LH Vents 3 Mtr 1 6 Mtr 2</td>
<td>(A8L)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Ku Ant Dpy/Sto Mtr 1 limit sw</td>
<td>PORT RMS: DPY/STO tb – bp R–F–L AFT tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Redundant Ku–Band Xmit Enable</td>
<td>RETEN LAT tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 Redundant Boom Stow Enable II Excitation Signal</td>
<td>SM 94 PDRS CONTROL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Port RMS Alt MRL Mtr 1</td>
<td>Indications lost: MPM Mtr 1 STO/DPY Aft MRL Mtr 1 LAT/REL/RYD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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></td>
<td>Mtr 1 will continue to drive until Sys B Cntl sw is taken to OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>With an inoperative limit switch, mtr will continue to run until stow sw returned to gnd</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Redundant sig (MNB) enables Ku–Band Xmit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II Signal for Stow mtrs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Single mtr time</td>
<td></td>
</tr>
</tbody>
</table>

### BUS ISOLATION
**ONLY ON MCC CALL, PERFORM**

- **(MA73C:A)**
  - MCA LOGIC MNC MID 2 – OFF

---

01/06/00 7–182 MAL/ALL/GEN F
## EPS SSR–59
**BUS LOSS: MNC MMC4**

### ACTIONS

(MA73c:D)
- cb MCA PWR AC3 3Φ  MID 4 – op

For PLBD ops:
- OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP)

### EQUIP/FUNCTION LOST

1. Port Rad Lat 7–12 Mtr 2 Limit sw
2. Port Rad Dpy/Sto Mtr 2
3. Stdtd Rad Dpy/Sto Mtr 1 Limit sw

**PLBD:**
- C/L Lat 9–12 Mtr 2
- 13–16 Mtr 1
- Port Att Bkhd Lat Mtr 1
- Port Door Mtr 1
- Port Door Mtr 2 CL Limit sw

### CREW INDICATIONS

(R13L)
- RAD CNTL STBD tb – bp
- If PORT RAD pnl deployed:
  - RAD CNTL PORT tb – bp

**SM (BFS SM 63) PL BAY DOORS**
- During MAN PLBD OP/CL:
  - If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'
  - Single mtr run time noted on actuators listed at left

**PORT RMS:**
- SM 94 PDRS CONTROL
  - Indications lost:
    - Fwd MRL Mtr 2
    - LAT/REL/RDY

### 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. Mtr 1 will continue to drive until Sys A Cntl sw is taken to OFF
4. Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
## EPS SSR-60
### BUS LOSS: MNC 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>RH Vents 8,9 Mtr 1</td>
<td>NONE</td>
<td>1 Redundant mtrs remain</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- (MA73C:B)
  - MCA LOGIC MNC AFT 3 – OFF

<table>
<thead>
<tr>
<th>1</th>
<th>ET Door Mtrs:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C/L Lat Actr 2 Mtr 2 GPC Cntl</td>
</tr>
<tr>
<td></td>
<td>L Dr Closure Mtr 2 GPC CL capability</td>
</tr>
<tr>
<td></td>
<td>R Dr Closure Mtr 1 GPC CL capability</td>
</tr>
<tr>
<td></td>
<td>R Dr Uplock Lat Mtr 1 GPC Lat capability</td>
</tr>
</tbody>
</table>

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

MNC AMC3 Bus pwr
**EPS SSR–61**  
**BUS LOSS: MNC R14**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C3)</td>
<td>Audio Center 2</td>
<td>MS Floodlt lost</td>
<td>1</td>
</tr>
<tr>
<td>(AW18D)</td>
<td>A/L ATU, EMU CCU 1,2</td>
<td>Comm via PS ATU lost</td>
<td>2</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>(R14:A)</td>
<td>Aud CTR 2 – op</td>
<td>If operating Ku–Band comm, no U/L voice</td>
<td></td>
</tr>
<tr>
<td>cb MNC</td>
<td>LSU AU–LK AU–LK – op</td>
<td>1</td>
<td>If AUD CTR 2 selected, all intercom, A/G, recorded voice lost until AUD CTR 1 selected</td>
</tr>
<tr>
<td></td>
<td>MIDDECK</td>
<td>2</td>
<td>Ku comm function lost. RDR function OK</td>
</tr>
<tr>
<td>(R14:B)</td>
<td>MDU CDR 1 – op</td>
<td>(F6) MDU CDR 1 blanks</td>
<td></td>
</tr>
<tr>
<td>cb MNC</td>
<td>MDU PLT 2 – op</td>
<td>(F8) MDU PLT 2 blanks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MDU AFD 1 – op</td>
<td>(AFT) MDU AFD 1 blanks</td>
<td></td>
</tr>
<tr>
<td>(R14:C)</td>
<td>PALLET/DSC</td>
<td>BUS ISOLATION ONLY ON MCC CALL, PERFORM</td>
<td></td>
</tr>
<tr>
<td>cb MNC</td>
<td>Ku Comm Sig Proc</td>
<td>(F6) MDU CDR 1 blanks</td>
<td>3 Redundant pwr source remains for equipment</td>
</tr>
<tr>
<td>(R14:D)</td>
<td>TV MNC</td>
<td>(F8) MDU PLT 2 blanks</td>
<td></td>
</tr>
<tr>
<td>cb MNC</td>
<td>Flt, Middeck TV Camrs, VFM</td>
<td>(AFT) MDU AFD 1 blanks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV B Keel/EVA TV B Keel/EVA Camr/Pan–Tilt TV B Keel/EVA Camr Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV B Pan–Tilt TV B Pan–Tilt Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS Floodlt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R14:E)</td>
<td>MS Floodlt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- (R14:A)
- cb MNC
- 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
- (R14:D)
- cb MNC TV
- CAB – op
- cb MNC TV B KEEL/EVA
- CAMR/PAN–TILT – op
- CAMR HTR – op
- KEEL/EVA PAN–TILT HTR – op
- (R14:E)
- cb MNC MS FLOOD – op
- MDU CDR 1 PWR – OFF
- MDU PLT 2 PWR – OFF
- MDU AFD 1 PWR – OFF

10/14/03
7–185
MAL/ALL/GEN F
### 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>1 ON Cntl of RCS F4 Manf Drivers (F4D,F4R)</td>
<td></td>
<td>1 F4 Manf Drivers lost if both F3 Driver sw and F4 Driver sw OFF when bus failed. F1 Driver sw now controls pwr to F3 Manf Drivers</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(F6,F8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A6U)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **BUS TIE MNB – ON (tb–ON)**
2. **ANNUN BUS SEL ACA 2/3 – MNB**
3. **HSI SEL SOURCE (two) – other than MLS 3**
4. **ANNUN BUS SEL – MNB**

1. **ACAS 2/3 MNC pwr**
2. **ACAS 4/5 MNC pwr**
3. **ACAS 2/3 MNC pwr**

### NOTES

- FC2 only one failure away (loss of ESS2CA) from inability to bus tie
- ACAs recovered by switching to alternate pwr
- If EMER O2 Mission Kit not flown, cb is opened prelaunch

10/14/03

(Continued)
### ACTIONS

- Pre-seat ingress for entry,
- Discharge handheld fire extinguisher into AV BAY 2

### EQUIP/FUNCTION LOST

- Av Bay 2 Agent discharge capability

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- **(O8)**
  - MLS 3  –  OFF
  - R SEAT/CTR CNSL FLOOD  –  OFF
- (O16:\)
  - cb MNC
  - O1 SIG CONDR OM3
  - B  –  op
  - O1 SIG CONDR OF 2/3
  - B  –  op
  - O1 MDM OF 3/4 B  –  op
  - MNB CONTR  –  op
  - AUX TIMING BUFF  –  op

- **(O16:C)**
  - cb MNC
  - TACAN 3  –  op
  - SMOKE DETN CAB  –  op
  - SMOKE DETN BAY
  - 1A/2B  –  op
  - UTIL PWR A11/A15/MO30F  –  op
  - FIRE SUPP BAY 2  –  op
  - FLOOD R CTR  –  op
  - ANNUN FWD ACA 2/3  –  op
  - ANNUN AFT ACA 4/5  –  op
  - CRYO O2 HTR TK1 SNSR 2  –  op
  - CRYO O2 HTR TK2 SNSR 1  –  op

- **(O16:D)**
  - cb MNC
  - H2O ALT PRESS  –  op
  - O2 EMER  –  op
  - CAB RELIEF B  –  op

- **(O16:E)**
  - cb MNC
  - ADTA 3,4 (two)  –  op
  - MLS 3  –  op
  - DDU R, AFT (two)  –  op
  - RCS/OMS PRPLT QTY GAUGE  –  op
  - DRAG CHUTE SYS 1  –  op

### CREW INDICATIONS

1. If EMER O2 Mission Kit not flown, cb is opened prelaunch
2. Redundant pwr remains
3. L,R L+ DK smoke detectors remain
4. Current Snr 1 remains
5. Current Snr 2 remains
6. Vlv remains closed
7. Vlv holds position
8. Vlv holds position
9. MCC for total OMS Qys. Aft Qys are found on GNC SYS SUMM 2
10. PLT Arm remains

---

**Notations:**

- **3** If EMER O2 Mission Kit not flown, cb is opened prelaunch.
- **4** Redundant pwr remains.
- **5** L,R L+ DK smoke detectors remain.
- **6** Current Snr 1 remains.
- **7** Current Snr 2 remains.
- **8** Vlv remains closed.
- **9** Vlv holds position.
- **10** MCC for total OMS Qys. Aft Qys are found on GNC SYS SUMM 2.
- **11** PLT Arm remains.
**EPS SSR–64**  
**BUS LOSS:** MNC R1A1

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNC pwr to CNTLBC1,2,3 and CNTLCA1,2,3</td>
<td>1</td>
<td>Cntl Buses remain pwrd</td>
</tr>
<tr>
<td>MNC pwr to ESS1BC, ESS2CA</td>
<td>2</td>
<td>ESS1BC and ESS2CA remain pwrd</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

---

**EPS SSR–65**  
**BUS LOSS:** MNC A14

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fwd RCS Jet 4,5 Htrs</td>
<td>1</td>
<td></td>
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</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

---

**EPS SSR–66**  
**BUS LOSS:** MNC ML86B

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDR Seat Adj via AC3 pwr</td>
<td>1</td>
<td>Viv holds position</td>
</tr>
<tr>
<td>PLT Seat Adj via AC3 pwr</td>
<td>1</td>
<td>If SPLY H2O DUMP VLV ENA/NOZ HTR – OFF, tb unpwrd and already bp</td>
</tr>
<tr>
<td>Supply H2O: Dump Viv Cntl Noz Htr Xovr Viv Cntl</td>
<td>1</td>
<td>PEVs, Actuators, Bed A P, Bed B P, Bed dP will be recovered after system reconfig</td>
</tr>
<tr>
<td>CO2 Rmvl Sys Cntlr 2</td>
<td>3</td>
<td>MNA,MNB line htrs remain</td>
</tr>
<tr>
<td>Ext A/L H2O Line Htrs MNC pwr</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
## BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

(ML86B:A)
- cb SPLY H2O
- GALLEY SPLY – op
- XOVR VLVL – op
- TK C INLET – op
- TK A OUTLET – op
- DUMP VLVL/NOZ HTR – op

(ML86B:D)
- cb PYRO JETT SYS B
- KU ANT – op
- PORT RMS – op
- STBD RMS – op

(ML86B:E)
- cb MNC EMU 1 H2O
- WASTE – op
- SPLY – op
- cb MNC SEAT
- L – op
- R – op
- cb MNC FLOOD
- TNL ADAPT 4 – op
- cb MNA CO2 SYS 2
- CNTLR – op

(ML86B:F)
- cb MNC FLOODS
- MIDDECK 5/7 – op
- MIDDECK 3/4/MO13Q – op
- BUNK 1/3 – op
- AIRLK 4 – op
- cb MNC CRYO
- O2 HTR TK4 SNSR 2 – op

(OV105 only)
- cb MNC CRYO O2 HTR
- TK5 SNSR 2 – op

(ML86B:C)
- cb MNC EXT ARLK HTR
- LINE ZN1 – op
- cb MNC EXT ARLK HTR
- LINE ZN2 – op

## EQUIP/FUNCTION LOST

<table>
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<tr>
<th>BUS ISOLATION</th>
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<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
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<tr>
<td>(ML86B:A)</td>
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<tr>
<td>cb SPLY H2O</td>
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<tr>
<td>GALLEY SPLY – op</td>
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<tr>
<td>XOVR VLVL – op</td>
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<tr>
<td>TK C INLET – op</td>
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<tr>
<td>TK A OUTLET – op</td>
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<tr>
<td>DUMP VLVL/NOZ HTR – op</td>
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<tr>
<td>(ML86B:D)</td>
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<tr>
<td>cb PYRO JETT SYS B</td>
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<tr>
<td>KU ANT – op</td>
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<tr>
<td>PORT RMS – op</td>
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<tr>
<td>STBD RMS – op</td>
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<tr>
<td>(ML86B:E)</td>
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<tr>
<td>cb MNC EMU 1 H2O</td>
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<tr>
<td>WASTE – op</td>
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<tr>
<td>SPLY – op</td>
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<tr>
<td>cb MNC SEAT</td>
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<tr>
<td>L – op</td>
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<tr>
<td>R – op</td>
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<tr>
<td>cb MNC FLOOD</td>
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<tr>
<td>TNL ADAPT 4 – op</td>
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<tr>
<td>cb MNA CO2 SYS 2</td>
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<tr>
<td>CNTLR – op</td>
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<tr>
<td>(ML86B:F)</td>
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<tr>
<td>cb MNC FLOODS</td>
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<tr>
<td>MIDDECK 5/7 – op</td>
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<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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<tr>
<td>cb MNC CRYO</td>
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<tr>
<td>O2 HTR TK4 SNSR 2 – op</td>
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<tr>
<td>(OV105 only)</td>
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<tr>
<td>cb MNC CRYO O2 HTR</td>
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<tr>
<td>TK5 SNSR 2 – op</td>
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<tr>
<td>(ML86B:C)</td>
</tr>
<tr>
<td>cb MNC EXT ARLK HTR</td>
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<tr>
<td>LINE ZN1 – op</td>
</tr>
<tr>
<td>cb MNC EXT ARLK HTR</td>
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<tr>
<td>LINE ZN2 – op</td>
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</table>

## CREW INDICATIONS

<table>
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<tr>
<th>CREW INDICATIONS</th>
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</thead>
<tbody>
<tr>
<td>1 Vlv holds position</td>
</tr>
<tr>
<td>4 MNA,MNB line htrs remain</td>
</tr>
<tr>
<td>5 Sys A remains</td>
</tr>
<tr>
<td>6 One failure away from loss of jettison capability</td>
</tr>
<tr>
<td>7 Normally not installed</td>
</tr>
<tr>
<td>8 Current Snsr 1 remains</td>
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## NOTES

<table>
<thead>
<tr>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>1 Galley H2O Sply VlvCntl</td>
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<tr>
<td>1 Sply H2O Tk C In VlvCntl</td>
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<tr>
<td>1 Sply H2O Tk A Out VlvCntl</td>
</tr>
<tr>
<td>Dump Noz Htr</td>
</tr>
<tr>
<td>5 Ku–BD Jettison Sys B</td>
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<tr>
<td>6 Port RMS Jettison Sys B</td>
</tr>
<tr>
<td>1 EMU 1 Waste H2O VlvCntl</td>
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<tr>
<td>Sply H2O VlvCntl</td>
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<tr>
<td>TA Floodlt 4</td>
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<tr>
<td>Middeck Floodlts 3,4,5,7</td>
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<tr>
<td>MO13Q Pnl It 1</td>
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<tr>
<td>Bunk Floodlts 1/3</td>
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<tr>
<td>Airlk Floodlt 4</td>
</tr>
<tr>
<td>Cryo O2 Tk4</td>
</tr>
<tr>
<td>Current Snsr 2</td>
</tr>
<tr>
<td>(OV105 only)</td>
</tr>
<tr>
<td>Cryo O2 Tk5 Current Snsr 2</td>
</tr>
<tr>
<td>Ext A/L H2O Line Htrs MNC pwr</td>
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<tr>
<td>ACTIONS</td>
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**NOTES** (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>Pri C/W Sys, Annun pnl F7 AC1 Bus Snsr</td>
<td>(F9) ESS 1BC DC VOLTS - OSL</td>
<td>3 FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost</td>
</tr>
<tr>
<td>(O13:A) cb ESS 1BC</td>
<td>Cryo O2,H2 Tk2 Htrs Auto ops Cryo O2,H2 Tk2 Qty Xdcrs</td>
<td>SM 67 ELECTRIC ESS 1BC VOLTS &lt; 20</td>
<td>6 Retain backup C/W thru Sys B. Ref C/W MAL 4.1b[5] for C/W capabilities lost. Only two of four bulbs lit in MA lt</td>
</tr>
<tr>
<td>(O13:B) cb ESS 1BC</td>
<td>Cryo O2,H2 Tk2 Htrs Auto ops Cryo O2,H2 Tk2 Qty Xdcrs</td>
<td>(O2) CRYO O2,H2 TK2,4 QTY METER (four) - 0%</td>
<td>16 Disables AC1 AUTO TRIP. AC1 Voltage and OVLD c/w lost</td>
</tr>
<tr>
<td>(R14:F) cb ESS 1BC</td>
<td>Airlock Floodlt 2 Tnl Adapt Floodlt 1</td>
<td>Airlock Floodlt 2 lost Tnl Adapt Floodlt 1 lost</td>
<td>17 MNA PPC1 bus pwr remains; tb pwr lost</td>
</tr>
<tr>
<td>(ML68B:G) cb ESS 1BC</td>
<td>Cryo O2,H2 Tk4 Htrs Auto ops Cryo O2,H2 Tk4 Qty Xdcrs</td>
<td>Cryo Tk2,Tk4 Htr Snsr Test/ Reset sw</td>
<td>18 AC1 inverters and buses remain pwrwd, but sws and tb lost. INV/AC BUS 1 sw inop. INV PWR 1 sw also inop</td>
</tr>
<tr>
<td></td>
<td>Cryo Tk2,Tk4 Htr Snsr Test/ Reset sw</td>
<td></td>
<td>19 Vlv closes. Redundant vlv B remains</td>
</tr>
<tr>
<td></td>
<td>Cryo Tk2,Tk4 Htr Snsr Test/ Reset sw</td>
<td></td>
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</table>
### 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></td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>Capability to switch to MADS Rcdr Trk Seq 2</td>
<td></td>
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</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</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cryo O2,H2 Tk1 Manf Vlv Cntl</td>
<td>(F7) C/W FC REAC lt C/W FC PUMP lt SM ALERT Light/Tone</td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>FC1 must be shut down within 9 min to avoid potentially hazardous condition</td>
<td>(R1) O2 MANF VLV TK1 tb − CL H2 MANF VLV TK1 tb − CL FC1 REAC (two) tb − CL FC1 RDY tb − bp FC1 COOL PUMP ΔP tb − bp (FSMs) S68 H2 MANF VLV S68 O2 MANF VLV S69 FC PUMP 1 S69 FC REAC 1 S69 FC H2 PUMP 1</td>
<td></td>
</tr>
</tbody>
</table>

**TIME CRITICAL**

**FC1 Coolant Pump ΔP tb lost**
### ACTIONS

| (A11) | CRYO TK4 HTR O2,H2 A,B (four) – OFF |

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>(ML86B:G)</th>
<th>cb ESS 1BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOOD AIRLK 2 – op</td>
<td></td>
</tr>
<tr>
<td>FLOOD TNL ADAPT 1 – op</td>
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</tr>
<tr>
<td>CRYO CNTLR O2,H2 TK4 (two) – op</td>
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</tr>
<tr>
<td>CRYO QTY O2,H2 TK4 (two) – op</td>
<td></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 |
| Cryo O2,H2 Tk4 Qty Xdcrs |

### CREW INDICATIONS

| MASTER ALARM |
| Light/Tone – on |
| C/W O2 PRESS lt |
| C/W H2 PRESS lt |
| (FSMs) |
| S68 H2 CNTL P 4 |
| S68 O2 CNTL P 4 |
| (O2) |
| CRYO O2,H2 QTY TK4 meters (two) = 0% |

### NOTES

Airk Floodlt 2 lost |
TA Floodlt 1
<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>FC1 Controller and Pumps</td>
<td>MASTER ALARM</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td>FC1 SHUTDN (FC SHUTDN Cue Card),</td>
<td>(F7)</td>
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<tr>
<td></td>
<td>then</td>
<td>C/W FC PUMP lt</td>
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<td>(R1)</td>
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<tr>
<td></td>
<td>MNA pwr to CABPL 1,2,3 Buses</td>
<td>FC1 RDY tb – bp</td>
<td>2</td>
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<tr>
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<td>FC1 COOL PUMP ΔP</td>
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<td>tb – bp</td>
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<td>GPC Mode sw Halt Contacts for GPCs 1,</td>
<td>(FSMs)</td>
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<tr>
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<td>4 (pnl O6)</td>
<td>S69 FC H2 PUMP 1</td>
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<td>GPC Output sw Terminate capability</td>
<td>S69 FC PUMP 1</td>
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<td>for GPCs 1,4 (pnl O6)</td>
<td>(F9)</td>
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<td>ESS 1BC DC VOLTS</td>
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<td>– OSL</td>
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<td>FUEL CELL PURGE – MANUAL (ORB OPS, EPS)</td>
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<td>SM 67 ELECTRIC</td>
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<td>ESS1BC Volts 25–32V</td>
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<td>FC1 Auto purge capability</td>
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<td>Pallet Cryo Tk 6,7 Htrs Auto ops</td>
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<td>OIU 1 MNA pwr</td>
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<td>AUXPLA Bus</td>
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<tr>
<td></td>
<td>AC1 Inverters:</td>
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<tr>
<td></td>
<td>Input DC Pwr Cntl</td>
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<tr>
<td></td>
<td>Inv/AC Bus Cntl</td>
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<td></td>
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<tr>
<td></td>
<td>Cryo O2 Tk2,4 Htr Snsr</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Test/Reset sw</td>
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<tr>
<td></td>
<td>TACAN 1 Auto Self Test</td>
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<tr>
<td></td>
<td>BUS ISOLATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NONE</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>INV PWR 1 and INV/AC BUS 1 switches</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and buses remain pwrd. INV PWR 1 and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INV/AC BUS 1</td>
<td></td>
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</tr>
</tbody>
</table>

**FC1 must be shut down within 9 min to avoid potentially hazardous condition**

**Pwrs PL Timing Buffer and OIU 1 (if flown). OIU 1 redundant pwr MNB MPC2 via CAB PL3**

**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**

**FC1 Coolant Pump ΔP tb lost**

**Caused by loss of purge vlv sw position TM**

**OIU 1 redundant pwr MNB MPC2 via CAB PC3**

**AC1 inverters and buses remain pwrd. INV PWR 1 and INV/AC BUS 1 switches and INV PWR 1 tb lost**
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(O5)</td>
<td>- L AUD CNTL − R</td>
<td>1 L Audio pwr</td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td>* MTU − OSC 2</td>
<td>MTU Pwr Sply A/Osc 1</td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td>- O2,H2 TK1,3 HTRS A (four) − AUTO</td>
<td>Cryo Tk1 O2,H2 Htrs Auto ops if O2,H2 Tk2 Htrs A(B) in Auto</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- O2,H2 TK2 HTRS A,B (four) − OFF</td>
<td>Cryo Tk2 O2,H2 Htrs Auto ops</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- O2,H2 MANF VLV TK2 (two) − OP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If add’l ltg reqd: (C3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* EMER LTG − ON/OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>To release crewmember from constant monitoring requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>* Perform C&amp;W EU CONTINGENCY POWER (IFM)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)

01/06/00
### Actions

**ONLY ON MCC CALL, PERFORM**

(O13:A)
- cb ESS1BC
- C/W A – op
- AC1 SNSR – op
- MTU A – op

(O13:B)
- cb ESS1BC
- CRYO CNTLR O2,H2 TK2 (two) – op
- CRYO QTY O2,H2 TK2 (two) – op

(R14:F)
- cb ESS1BC
- FLOOD L GLRSHLD – op
- AUD L – op

### Equip/Function Lost

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Pri C/W Sys, Annun Pnl F7</td>
</tr>
<tr>
<td>7</td>
<td>AC1 Bus Snsr</td>
</tr>
<tr>
<td></td>
<td>Cryo O2,H2 Tk2 Htrs Auto ops</td>
</tr>
<tr>
<td></td>
<td>Cryo O2,H2 Tk2 Qty Xdcrs</td>
</tr>
<tr>
<td>8</td>
<td>LG ARM/DN Reset capability</td>
</tr>
<tr>
<td></td>
<td>ESS pwr to FC/MN BUS A and MN BUS TIE A Pwr Contactor Cntl</td>
</tr>
</tbody>
</table>

### Crew Indications

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>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 Its</td>
</tr>
<tr>
<td>7</td>
<td>Disables AC1 Auto Trip. AC1 Voltage and OVLD C/W lost</td>
</tr>
<tr>
<td>8</td>
<td>Switches and tbs still operate</td>
</tr>
</tbody>
</table>

**EPS SSR-75 (Cont)**

**BUS LOSS: ESS1BC O13&R14**

01/06/00

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MAL/ALL/GEN F
<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), then:</td>
<td>1 FC2 Controller and Pumps</td>
<td>1 All comm lost via AUD CTR 1 R AUDIO lost</td>
<td>FC2 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td>(R1) • PL CAB – MNA</td>
<td>2 FC Reac Vlv Cntl via pnl R1 sw</td>
<td>R Glareshield Floodlit lost</td>
<td></td>
</tr>
<tr>
<td>(C3) • AUD CTR – 2</td>
<td>3 MNB pwr to CABPL 1,2,3 Buses</td>
<td>MASTER ALARM Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>(O9) • R AUD CNTL – L</td>
<td>4 Audio Center 1</td>
<td>(F7) C/W O2 PRESS lt – on</td>
<td></td>
</tr>
<tr>
<td>(O6) • MTU – OSC 1</td>
<td>5 R Audio pwr</td>
<td>C/W H2 PRESS lt – on</td>
<td></td>
</tr>
<tr>
<td>If add’l ltg reqd:</td>
<td>6 MTU Pwr Sply B/Osc 2</td>
<td>C/W FC PUMP lt – on</td>
<td></td>
</tr>
<tr>
<td>(R1) • O2.H2 MANF VLV TK1 (two) – OP</td>
<td>7 R Glareshield Floodltts via pnl O8 sw</td>
<td>C/W PRI C/W lt – on</td>
<td></td>
</tr>
<tr>
<td>• O2.H2 TK1 HTRS A,B (four) – OFF</td>
<td>8 Cryo O2,H2 Tk2 Manf Vlv Cntl Cryo Tk2 O2,H2 Htrs Auto ops if O2,H2 Tk1 Htrs A(B) in Auto Cryo Tk1 O2,H2 Htrs Auto ops Pallet Cryo Tk 8,9 Htrs Auto ops</td>
<td>C/W BACKUP C/W ALARM lt – on</td>
<td></td>
</tr>
<tr>
<td>• O2,H2 TK2,3 HTRS A (four) – AUTO</td>
<td>9 GPC Mode sw Halt Contacts for GPCs 2.5 (pnl O6)</td>
<td>Two of four bulbs in MA lts – inoperative</td>
<td></td>
</tr>
<tr>
<td>When reqd:</td>
<td>10 GPC Output sw Terminate capability for GPCs 2.5 (pnl O6)</td>
<td>SM ALERT lt/Tone – on</td>
<td></td>
</tr>
<tr>
<td>• Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)</td>
<td>11 All FC Auto Purge capability</td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>11 If GPC 2 or 5 dump reqd, attempt S/W dump in RUN</td>
<td>S69 FC PUMP 2</td>
<td>S69 FC REAC 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S67 ESS BUS V 2CA</td>
<td>S68 O2 CNTL P 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S68 H2 CNTL P 1</td>
<td>S68 O2 MANF VLV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S69 FC H2 PUMP 2</td>
<td>S69 FC H2 PUMP 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A15) PALLET PWR MNB tb – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pwrs PL Timing Buffer and VTR</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></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>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Floodltts available via EMER LTG (C3, ML18F)</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vlv holds position, but tb and sw lost</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MNB PPC2 bus pwr remains; tb pwr lost</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Caused by loss of FC Purge Htr – GPC sw position TM pwr</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwr–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>
<td>11</td>
<td></td>
</tr>
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</table>
## EPS SSR–80 (Cont)
### BUS LOSS: ESS2CA DA2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| 12 To release crewmember from constant monitoring requirement: Perform C/W EU CONTINGENCY POWER (IFM) | 3 FC/MN BUS B tb – OFF  
3 MN BUS TIE B tb – OFF  
3 PL PRI MNB tb – OFF  
14 INV/AC BUS 2 tb – OFF  
8 O2 MANF VLV TK2 t – CL  
8 H2 MANF VLV TK2 t – CL  
8 FC2 REAC (two) tb – CL  
FC2 RDY tb – bp  
FC2 COOL PUMP ∆P tb – bp | 8 Viv holds position, but tb and sw lost  
12 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 annunciated and subsequent orbiter problems would not trigger aural alarm | 3 FC/MN BUS B and MN BUS TIE B sws work, but tbs lost |
| 13 | C/W Sys B Alarm Tones  
AC2 Bus Snr | (R1) IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS 2CA DA2 bus | |
| 16 BUS ISOLATION | (O13:C) c/w ESS 2CA  
• C/W B – op  
• AC2 SNSR – op  
• MTU B – op | (R14:F) cb ESS 2CA  
• FLOOD R GLRSHLD – op  
• AUD R – op  
• CTR 1 – op | (F9) ESS2CA DC VOLTS – OSL  
SM 67 ELECTRIC  
ESS2CA Volts < 20 |
| (O13:D) cb ESS 2CA  
• CRYO CNTLR O2,H2 TK1 (two) – op  
• CRYO QTY O2,H2 TK1 (two) – op | (OV105 only) cb ESS 2CA  
• CRYO CNTLR O2,H2 TK5 (two) – OP | (OV105 only) cb ESS 2CA  
• CRYO CNTLR O2,H2 TK5 (two) – OP | |
| (OV105 only)  
• CRYO QTY O2,H2 TK5 (two) – OP | (OV105 only) cb ESS 2CA  
• CRYO CNTLR O2,H2 TK5 (two) – OP | (OV105 only) cb ESS 2CA  
• CRYO CNTLR O2,H2 TK5 (two) – OP | |
| | Cryo O2,H2 Tk1 Htr Snr Test/Reset sw  
Cryo O2,H2 Tk1 Qty Xdcrs | Cryo O2 Tk1 Htr Snr Test/Reset sw  
Cryo O2 Tk5 Htr Snr Test/Reset sw | |
| 14 AUX PL B BUS  
AC2 Inverters:  
Input DC Pwr Cntl  
INV/AC BUS Cntl  
ESS pwr to FC/MN BUS B and MN BUS TIE B Pwr Ctlr Cntl  
MNB/PRIPL and MNC/PRIPL pwr–of capability via Spacelab Pwr–Kill Signal | 18 FC3/PRIPL pwr–of capability of SL not affected  
MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected | |
| 18 Tacan 2 Auto Self–Test | 19 Viv closes. Redundant vlv B remains | |
| 19 APU 2 Fu Tk Viv A | 19 | |

07/22/03

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MAL/ALL/GEN F
### 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>AC2 Inverters Input DC Pwr Cntl</td>
<td>(R1)</td>
<td>Loss of tb and sw, Inverters remain pwrd</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

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### 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 FC2 Reac Vlv Cntl via pnl R1 sw</td>
<td>(F7)</td>
<td>TIME CRITICAL</td>
</tr>
<tr>
<td>2</td>
<td>Cryo O2,H2 Tk2 Manf Vlv Cntl MNB/PRIPL and MNC/PRIPL pwr–off capability via Spacelab Pwr–Kill Signal</td>
<td>(R1)</td>
<td>FC2 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td>3</td>
<td>O2 MANF VLV TK2 tb – CL</td>
<td>O2 MANF VLV TK2 tb – CL</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>FC2 REAC (two) tb – CL</td>
<td>FC2 REAC (two) tb – CL</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>FC2 COOL PUMP ∆P tb – bp</td>
<td>FC2 COOL PUMP ∆P tb – bp</td>
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</table>

<table>
<thead>
<tr>
<th>(FSMs)</th>
<th>S69 FC PUMP 2</th>
<th>S69 FC PUMP 2</th>
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<tbody>
<tr>
<td></td>
<td>S69 FC REAC 2</td>
<td>S69 FC REAC 2</td>
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<tr>
<td></td>
<td>S69 FC H2 PUMP 2</td>
<td>S69 FC H2 PUMP 2</td>
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<td></td>
<td>S68 H2 MANF VLV</td>
<td>S68 H2 MANF VLV</td>
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<tr>
<td></td>
<td>S68 O2 MANF VLV</td>
<td>S68 O2 MANF VLV</td>
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</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

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02/25/00 7–199 MAL/ALL/GEN F
**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>1</td>
</tr>
<tr>
<td></td>
<td>(R1) PL CAB − MNA</td>
<td>MNB pwr to CABPL 1,2,3 Buses</td>
<td>• FC2 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td>When reqd:</td>
<td>2</td>
<td>All FC Auto Purge capability</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Perform FUEL CELL PURGE − MANUAL (ORB OPS, EPS)</td>
<td>GPC Mode sw Halt Contacts for GPCs 2,5 (Pnl O6) GPC Output sw Terminate capability for GPCs 2,5 (pnl O6)</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>If GPC 2 or 5 dump reqd, attempt S/W dump in RUN</td>
<td>Pallet Cryo Tk 8,9 Htrs Auto ops</td>
<td>4</td>
</tr>
<tr>
<td>(A15)</td>
<td>If Tks 8,9 in use:</td>
<td>OIU 2 OIU 1 MNB pwr</td>
<td>5</td>
</tr>
<tr>
<td>(R1)</td>
<td>• O2,H2 Tk3 HTR A (two) − AUTO</td>
<td>OIU 2 TEMP ≥ 140</td>
<td>6</td>
</tr>
<tr>
<td>If OIU reqd:</td>
<td>2</td>
<td>OIU 2 OIU 1 MNB pwr</td>
<td></td>
</tr>
<tr>
<td>(SSP 1)</td>
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<td></td>
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<tr>
<td>(AIL)</td>
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<td></td>
</tr>
<tr>
<td>• S−BD PL PWR SYS − 1 CNTL − PNL − CMD</td>
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**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

<table>
<thead>
<tr>
<th>ACTIONS</th>
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<th>NOTES</th>
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<tbody>
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<td>AUX PL B BUS</td>
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<tr>
<td>AC2 Inverters:</td>
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<td>4</td>
</tr>
<tr>
<td>Input DC Pwr Cntl Inv/AC Bus Cntl</td>
<td></td>
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</tr>
<tr>
<td>Tacan 2 Auto Self−Test</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cryo O2 Tk1 Htr Snsr Test/Reset sw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(OV105 only) Cryo O2 Tk5 Htr Snsr Test/Reset sw</td>
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</table>

**07/22/03**

**7−200**

**MAL/ALL/GEN F**
### ACTIONS

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<table>
<thead>
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<tbody>
<tr>
<td>1</td>
<td>Audio Center 1</td>
</tr>
<tr>
<td>2</td>
<td>R Audio pwr</td>
</tr>
<tr>
<td>3</td>
<td>MTU Pwr Sply B/OSC 2</td>
</tr>
<tr>
<td>4</td>
<td>Cryo Tk2 O2,H2 Htrs Auto ops if O2,H2 Tk1 Htrs A(B) in Auto</td>
</tr>
<tr>
<td>5</td>
<td>Cryo Tk1 O2,H2 Htrs Auto ops</td>
</tr>
<tr>
<td>6</td>
<td>R Glareshield Floodlights via pnl O8 sw</td>
</tr>
<tr>
<td>7</td>
<td>Cfry O2,H2 Qty Tk1 Meter (two) – 0%</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All Comm lost via AUD CTR 1 selected</td>
</tr>
<tr>
<td>2</td>
<td>R Audio lost</td>
</tr>
<tr>
<td>3</td>
<td>R Glareshield Floodlight lost</td>
</tr>
<tr>
<td>4</td>
<td>MASTER ALARM Light/Tone – on</td>
</tr>
<tr>
<td>5</td>
<td>C/W O2 PRESS lt – on</td>
</tr>
<tr>
<td>6</td>
<td>C/W H2 PRESS lt – on</td>
</tr>
<tr>
<td>7</td>
<td>C/W PRI C/W lt – on</td>
</tr>
<tr>
<td>8</td>
<td>C/W BACKUP C/W ALARM lt – on</td>
</tr>
<tr>
<td>9</td>
<td>Two of four bulbs in MA lts – inoperative</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>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>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>3</td>
<td>Flood lt available via EMER LTG (C3, ML18F)</td>
</tr>
<tr>
<td>4</td>
<td>Retain C/W Sys light tones (Pri &amp; B/U) Ref C/W MAL 4.1a 8 for C/W capabilities lost. Only two of four bulbs lit in MA lt. PRIMARY C/W, BACKUP C/W ALARM lts are not resettable</td>
</tr>
<tr>
<td>5</td>
<td>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 annunciated and subsequent orbiter problems would not trigger aural alarm</td>
</tr>
<tr>
<td>6</td>
<td>AC2 bus remains pwrd. INV/AC BUS 2 sw works, but tb lost</td>
</tr>
<tr>
<td>7</td>
<td>IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS2CA O13&amp;R14 bus</td>
</tr>
<tr>
<td>8</td>
<td>Disables AC2 Auto Trip. AC2 Voltage and OVLD C/W lost</td>
</tr>
<tr>
<td>9</td>
<td>Switches and tbs still operate</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>(O13:C)</td>
<td>cb ESS 2CA</td>
</tr>
<tr>
<td></td>
<td>C/W B – op</td>
</tr>
<tr>
<td></td>
<td>AC2 SNSR – op</td>
</tr>
<tr>
<td></td>
<td>MTU B – op</td>
</tr>
<tr>
<td>(O13:D)</td>
<td>cb ESS 2CA</td>
</tr>
<tr>
<td></td>
<td>CRYO CNTLR O2,H2 TK1 (two) – op</td>
</tr>
<tr>
<td></td>
<td>CRYO QTY O2,H2 TK1 (two) – op</td>
</tr>
<tr>
<td>(R14:F)</td>
<td>cb ESS 2CA</td>
</tr>
<tr>
<td></td>
<td>FLOOD R GLRSHLD – op</td>
</tr>
<tr>
<td></td>
<td>AUD R – op</td>
</tr>
<tr>
<td></td>
<td>CTR 1 – op</td>
</tr>
</tbody>
</table>

<p>| | |</p>
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<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C/W Sys B Alarm Tones</td>
</tr>
<tr>
<td>2</td>
<td>AC2 Bus Snsr</td>
</tr>
<tr>
<td>3</td>
<td>Cryo O2,H2 Tk1 Htrs Auto ops</td>
</tr>
<tr>
<td>4</td>
<td>Cryo O2,H2 Tk1 Qty Xdcrs</td>
</tr>
<tr>
<td>5</td>
<td>ESS pwtr to FC/MN BUS B and MN BUS TIE B Pwr Contactor Cntl</td>
</tr>
</tbody>
</table>

(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 OV105 and Tk5 in use: (R1)  
• O2,H2 TK3 HTR A – AUTO | (OV105)  
Cryo Tk5 O2,H2 Htrs if in Auto | (OV105)  
MASTER ALARM  
Light/Tone – on | |
| BUS ISOLATION  
(ML86B;G)  
(OV105 only)  
cb ESS 2CA  
• CRYO CNTLR O2,H2 TK5  
(two) – op  
• CRYO QTY O2,H2 TK5  
(two) – op | (OV105)  
Cryo O2,H2 Tk5 Qty Xdcrs | (F7)  
(OV105)  
C/W O2 PRESS lt  
C/W H2 PRESS lt | |
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### ACTIONS

| 1 | Perform FC3 SHUTDN  
   (FC SHUTDN Cue Card) |
|---|---|
| 2 | O2,H2 MANF VLV TK1,2  
   (four) – OP |
| 3 | O2,H2 TK1,2 HTRS A  
   (four) – AUTO |
| 4 | FC GPC Purge Seq Start sw |
| 5 | GPC Mode sw Halt Contacts for GPC 3 (pnl O6)  
   GPC Output sw Terminate capability for GPC 3 (pnl O6) |
| 6 | If GPC 3 dump reqd, attempt S/W dump in RUN |

### 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 | FC3 BUS C tb – OFF  
   MN BUS TIE C tb – OFF  
   INV/AC BUS 3 tb – OFF  
   PL PRI FC3 tb – OFF  
   PL PRI MNC tb – OFF  
   FC3 REAC (two) tb – CL  
   FC3 RDY tb – bp  
   FC3 COOL PUMP ∆P tb – bp  
   AC3 Bus Snsr  
   Computer Status Matrix (pnl O1) and CCIU  
   Emer Ltg capability (Middeck Floodlts 6,7,8, LIR Girshld Floodlts, OS Floodlt)  
   Cryo O2,H2 Tk3 Htrs Auto ops  
   Cryo O2,H2 Tk3 Qty Xdcrs  
   AC3 Inverters:  
   Input DC Pwr Cntl  
   INV/AC Bus Cntl  
   Cryo O2 Tk3 Htr Snsr Test/Reset sw |
| 4 | (R1) |
| 5 | (O13:E) |
| 6 | (ML18F) |
| 7 | (ML68bG) |
| 8 | (FSMs)  
   S67 ESS BUS V 3AB  
   S68 H2 CNTL P 3  
   S68 O2 CNTL P 3  
   S69 FC PUMP 3  
   S69 HC REAC 3  
   S69 H2 PUMP 3  
   (F9) |
| 9 | SM 67 ELECTRIC  
   ESS 3AB DC VOLTS ind – OSL |
| 10 | (O1) |

### CREW INDICATIONS

| 1 | MASTER ALARM  
   Light/Tone – on  
   C/W O2 PRESS lt – on  
   C/W H2 PRESS lt – on  
   C/W FC REAC lt – on  
   SM ALERT lt/Tone on  
   FC3 STRUCT RTN tb – OFF  
   GPC Purge Seq Start capability remains using TMBU or SM 60 constant.  
   MCC will normally initiate auto purge via TMBU |
| 2 | (F7)  
   C/W O2 PRESS lt – on  
   C/W H2 PRESS lt – on  
   C/W FC REAC lt – on  
   SM ALERT lt/Tone on  
   FC3 STRUCT RTN tb – OFF |
| 3 | (FSMs)  
   S67 ESS BUS V 3AB  
   S68 H2 CNTL P 3  
   S68 O2 CNTL P 3  
   S69 FC PUMP 3  
   S69 HC REAC 3  
   S69 H2 PUMP 3  
   (F9) |
| 4 | SM 67 ELECTRIC  
   ESS 3AB DC VOLTS ind – OSL |
| 5 | (O1) |

### NOTES

| 1 | TIME CRITICAL |
| 2 | FC must be shut down within 9 min to avoid potentially hazardous condition  
   FC/MN BUS C and MN BUS TIE C switches work, but tbs are lost  
   Viv holds position, but tb and sw lost.  
   Redundant Reac Vlv Close Cntl on pnl C3 remains |
| 3 | Switch works, but tb lost  
   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  
   AC3 inverters and buses remain pwrd.  
   INV PWR 3 and INV/AC BUS 3 switches and tbs lost  
   FC3 Coolant Pump ∆P tb lost |
| 4 | Disables AC3 Auto Trip.  
   AC3 Voltage and OVLD C/W lost |
### 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>11</td>
<td>Lost BFS select and BF engage capability to all GPCs</td>
<td>2</td>
<td>FC/MN BUS C and MN BUS TIE C switches work, but tbs are lost</td>
</tr>
<tr>
<td>12</td>
<td>FC3/PRIPL pwr–off capability via Spacelab Pwr–Kill Signal</td>
<td>11</td>
<td>Pressing Engage button will cause all PASS GNC GPCs to go to software halt</td>
</tr>
<tr>
<td></td>
<td>Tacan 3 Auto Self Test</td>
<td>12</td>
<td>MNB/PRIPL and MNC/PRIPL pwr–off capability of SL not affected. FC3/PRIPL sw, pnl R1 not affected</td>
</tr>
<tr>
<td>2</td>
<td>ESS pwr to FC/MN BUS C and MN BUS TIE C Pwr Contactor Cntl</td>
<td>13</td>
<td>Vlv closes. Redundant vlv B remains</td>
</tr>
<tr>
<td>13</td>
<td>APU 3 Fu Tk Vlv A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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></td>
<td>(R1) INV PWR 3 tb – OFF</td>
<td>1</td>
</tr>
<tr>
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<td>2</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- (C3) • EMER LTG – OFF/ON
- (ML18F) • EMER LTG – ON/OFF

---

01/06/00 7–204 MAL/ALL/GEN F
# EPS SSR–92
**BUS LOSS:** ESS3AB MPC3

<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 FC3 SHUTDN (FC SHUTDN Cue Card)</td>
<td>1 FC3 Controller and Pumps FC3 Reac Vlv Cntl via pnl R1 sw</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2 FC3 Reac Vlv Cntl via pnl R1 sw</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>2 (FC SHUTDN Cue Card)</td>
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<tr>
<td></td>
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<td>2 BUS ISOLATION</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 FC3/PRIPL pwr–off capability via Spacelab Pwr–Kill Signal</td>
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<td>3 FC3/PRIPL pwr–off capability via Spacelab Pwr–Kill Signal</td>
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<tr>
<td></td>
<td></td>
<td>4 FC3 REAC (two) tb – CL FC3 RDY tb – bp FC3 COOL PUMP ∆P tb – bp</td>
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<td></td>
<td>4 FC3 COOL PUMP ∆P tb – bp</td>
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<td></td>
<td>4 S69 FC PUMP 3 S69 FC REAC 3 S69 FC H2 PUMP 3</td>
<td></td>
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<tr>
<td></td>
<td>MASTER ALARM Light/Tone – on</td>
<td>1 TIME CRITICAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C/W FC REAC lt – on C/W FC PUMP lt – on</td>
<td></td>
<td>FC3 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td></td>
<td>FC3 REAC (two) tb – CL FC3 RDY tb – bp FC3 COOL PUMP ∆P tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S69 FC PUMP 3 S69 FC REAC 3 S69 FC H2 PUMP 3</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>MNB/PRIPL and MNC/PRIPL pwr–off capability of SL not affected, FC3/PRIPL sw pnl R1 not affected</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FC3 Coolant Pump ∆P tb lost</td>
<td></td>
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</tbody>
</table>

02/25/00 7–205 MAL/ALL/GEN F
**ACCTIONS**

1. Perform FC3 SHUTDN (FC SHUTDN Cue Card)
2. If GPC 3 dump reqd, attempt S/W dump in RUN

**EQUIP/FUNCTION LOST**

1. FC3 Controller and Pumps
2. FC GPC Purge Seq Start sw
3. GPC Mode sw Halt Contact for GPC 3 (pnl O6)
   GPC Output sw Terminate capability for GPC 3 (pnl O6)
4. FC3 RDY tb – bp
5. Emer Ltg capability (Middeck Floodlts 6, 7, 8, L,R Girshld Floodlts OS Floodlt)
6. Lost BFS select and BFS engage capability to all GPCs
7. AC3 Inverters:
   - Input DC Pwr Cntl
   - INV/AC Bus Cntl
   - Cryo O2 Tk3 Htr Snsr Test/Reset sw
   - Tacan 3 Auto Self–Test

**CREW INDICATIONS**

- MASTER ALARM
  - Light/Tone – on
- C/W FC PUMP lt
- FC3 COOL PUMP ∆P tb – bp
- SM 67 ELECTRIC
  - ESS3AB DC VOLTS – OSL
- ESS3AB Volts 25–32V

**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. Pressing the engage button will cause all PASS GNC GPCs to go to software halt
5. Ltg pwr remains via individual lt sws
6. AC3 Inverters and Buses remain pwrd, INV PWR 3 and INV/AC BUS 3 switches lost and INV PWR 3 tb lost
### 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>
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<td>(O1) GPC status its lost</td>
<td>2 AC1 Bus remains pwr’d. INV/AC BUS 3 sw works but tb lost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 Disables AC3 Auto Trip. AC3 Voltage and OVLD C/W lost</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- (O13:E)
  - cb ESS 3AB
  - AC3 SNSR − op
  - GPC STAT − op
- (O1)
  - AC3 Bus Snsr
  - Computer Status Matrix (pnl O1) and CICU

### 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 Tkn O2 Htr Auto ops</td>
<td>Master Alarm Light/Tone − on</td>
<td></td>
</tr>
<tr>
<td>• O2,H2 TK1,2 HTRSA (four) − AUTO</td>
<td></td>
<td>(F7) C/W O2 PRESS It</td>
<td></td>
</tr>
<tr>
<td>• O2,H2 MANF VLV TK 1,2 (four) − OP</td>
<td></td>
<td>C/W H2 PRESS It</td>
<td></td>
</tr>
<tr>
<td>(ML86B:G)</td>
<td>Cryo O2,H2 Tk3 Qty Xdcrs</td>
<td>(FSMs) S68 H2 CNTL P 3</td>
<td></td>
</tr>
<tr>
<td>cb ESS 3AB</td>
<td></td>
<td>S68 O2 CNTL P 3</td>
<td></td>
</tr>
<tr>
<td>• CRYO CNTLR O2,H2 TK3 (two) − op</td>
<td></td>
<td>(O2) CRYO O2,H2 QTY TK3 METER (two) ind − 0%</td>
<td></td>
</tr>
<tr>
<td>• CRYO QTY O2,H2 TK3 (two) − op</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- (ML86B:G)
  - cb ESS 3AB
  - CRYO CNTLR O2,H2 TK3 (two) − op
  - CRYO QTY O2,H2 TK3 (two) − op
  - Cryo O2,H2 Tk3 Qty Xdcrs

---

10/14/03 7−207 MAL/ALL/GEN F
<table>
<thead>
<tr>
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<th>EQUIP/FUNCTION LOST</th>
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<th>NOTES</th>
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<tbody>
<tr>
<td>(A12)</td>
<td>APU HTR</td>
<td>CRT 1 blanks</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>APU 1 GG/Fu Pump Htrs A</td>
<td>SM ALERT Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>APU 3 GG/Fu Pump Htrs B</td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>APU 1 Lube Oil Line Htrs A</td>
<td>S68 H2 MANF VLV</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1 Tk/Fu Ln Htrs A</td>
<td>S68 O2 MANF VLV</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>APU 1 1.2 GG Inj H2O Htrs 4A,5A</td>
<td>SM67 THRM HYD</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>APU 3 Tk/Fu Ln Htrs B</td>
<td>S67 CNTL BUS V</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Elevon Actr Htrs A</td>
<td>S69 FC REAC 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Aft Fuselage Htrs A</td>
<td>I/O ERROR CRT 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Circ Pump 1 MNA pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3 MNA pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>Flash Evap Cntlr Pri B GPC Sel capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Top Evap Duct Fwd,Aft L,R Htrs A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hi Load Duct Outbd,Inbd Noz Htrs A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L2)</td>
<td>Flash Evap Fdln HTR B SPLY – 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R2)</td>
<td>BLR CNTLR/HTR 1 – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Aft L RCS He Pr Isol A man CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Aft L RCS Xleed Vlv 3/4/5 man CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>R OMS He Press Isol A man Cntl and He Vap Isol 1,2 man Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>R OMS Tk Isol A man CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fwd RCS He Press Isol A man CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>PLBD: C/L Lat 9–12 Mtr 1 Port,Stbd Fwd Bikhd Mtrs 1 Stbd Door Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RCS Manf F1 RJD pwr (F1F, F1L, F1U, F1D)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O14)</td>
<td></td>
<td></td>
<td></td>
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<tr>
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**Continued**

If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp.

SM 67 ELECTRIC

CNTL AB1 Volts < 20

During Rad Dpy/Sto:

- (R13L)
  - RAD CNTL tbs (four) indicate single mtr ops
- L ADP deploy time incr from 15 to 30 sec

STAR TRKR DR POS –Y OP/CL time incr from 8 to 16 sec

If APUs active and using BLR CNTLR/HTR 1B:

- C/W APU TEMP lt – on after ~2 min

Ku Band A,B, GMBL and PA TEMP Read High ↑

During PLBD OP/CL, single mtr run time noted on actuators listed at left

SM 76 COMMUNICATIONS

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<tr>
<th>SM (BFS,SM) 63 PL BAY DOORS</th>
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### ACTIONS

<table>
<thead>
<tr>
<th>(C2)</th>
<th><strong>EQUIP/FUNCTION LOST</strong></th>
<th>(C2A)</th>
</tr>
</thead>
</table>
| • L IDP/CRT SEL − 3 On MCC GO:  
• GPC/CRT 01 EXEC | MDU CRT 1  
IDP 1 | (C2A2) |
| (G2,G8,S2) MMU ASSIGN  
• GNC − ITEM 1 EXEC  
• SM − ITEM 4 EXEC  
• PL − ITEM 6 EXEC  
• OPS 0 − ITEM 8 EXEC | (O14)  
MMU 1 | |
| (R11U)  
• FC H2O RELIEF HTR − B AUTO  
• FC H2O LINE HTR − B AUTO | (R11U)  
FC1 Purge Viv man Cntl | |

**When reqd:**

• For FC1, perform FUEL CELL PURGE − AUTO  
(ORB OPS, EPS)

**During OPS 8:**

**GNC 43 CONTROLLERS**

Deselect L Pnl Trim L1:  
• DES PNL TRIM L1 − ITEM 36 EXEC
Deselect Bdy Flp UP/DN L1:  
• DES BDY FLP L1 − ITEM 19 EXEC

**RCS/OMS HTR**

• FWD RCS − B AUTO  
• L POD (two) − A OFF,  
B AUTO

**GNC 23 RCS**

• Reprioritize L, R Manf 2  
Jets to first priority:  
DES INH twice, all other jets  
next highest priority first, then  
next highest priority, etc  
• Set aft pod(s) PRI JET FAIL  
LIMIT to 3

**If reqd during entry (< 120K ft):**

<table>
<thead>
<tr>
<th>(L1)</th>
<th><strong>CREW INDICATIONS</strong></th>
<th><strong>NOTES</strong></th>
</tr>
</thead>
</table>
| • NH3 CNTLRR(A(B) − PRI/  
GPC | 7  
Vlv normally closed | |
| If AB1,2,3 unpwrd at same  
time:  
(ALL)  
• NSP ENCRYPTION  
MODE − SEL  
• NSP ENCRYPTION  
SEL − BYP | 9  
Loss of redundant port to the following:  
MDU CDR 1 (S)  
MDU CDR 2 (P)  
MDU MFD 2 (P)  
MDU PLT 1 (S) | |

**If AB1,2,3 unpwrd at same  
time:**

| (A1A2) | **COMSEC 1 & 2 Pwr  
Redundancy** | **(Continued)** |
|--------|------------------|-----------------|
| NH3 Sys A Sec Cntlr man  
ON capability | 15  
When SM not  
available, use NSP  
block to inhibit UL  
cmds.  
‘BCE STRG 1(3) NSP’ annunciates  
it requires GNC  
I/O RESET after  
UPLK − ENA for AOS | |

**If 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**

---

**MAL/ALL/GEN F**

---

**EPS SSR−100 (Cont)**

**BUS LOSS: CNTLAB1**
### EPS SSR–100 (Cont)
### BUS LOSS: CNTLAB1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| If CCTV reqd: (A7U)  
• TV PWR CONTR UNIT – MNB | | | |
| BUS ISOLATION | | | |
| ONLY ON MCC CALL, PERFORM | | | |
| • MDU CRT 1 PWR – OFF (C2) | | | |
| • IDP/CRT1 PWR – OFF (O14:F) | | | |
| • MMU 1 – OFF (F3) | | | |
| • TRIM RHC PNL – ENA (R4) | | | |
| • PNL – OFF (R14D) | | | |
| • cb MNA TV CONTR UNIT – op (A7U) PL BAY | | | |
| • FLOOD AFT STBD – OFF (R1A2) | | | |
| • FLOOD FWD PORT – OFF (A8L) | | | |
| • FLOOD FWD BHD – OFF (R14A) | | | |
| | | | |
| BUS ISOLATION | | | |
| ONLY ON MCC CALL, PERFORM | | | |
| • MDU CRT 1 PWR – OFF (C2) | | | |
| • IDP/CRT1 PWR – OFF (O14:F) | | | |
| • MMU 1 – OFF (F3) | | | |
| • TRIM RHC PNL – ENA (R4) | | | |
| • PNL – OFF (R14D) | | | |
| • cb MNA TV CONTR UNIT – op (A7U) PL BAY | | | |
| • FLOOD AFT STBD – OFF (R1A2) | | | |
| • FLOOD FWD PORT – OFF (A8L) | | | |
| • FLOOD FWD BHD – OFF (R14A) | | | |

(Continued)
### BUS ISOLATION

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>RJDF 1B F1 Mant Logic sw pwr (F1F,F1L,F1U,F1D)</td>
</tr>
<tr>
<td>24</td>
<td>LADI Att Ref Set capability</td>
</tr>
<tr>
<td>25</td>
<td>Rad Ctrl Sys: Port Lat 7–12 Mtr 1 Dpy/Sto Mtr 1 Stbd Lat 1–6 Mtr 1 Dpy/Sto Mtr 2</td>
</tr>
<tr>
<td>26</td>
<td>APU 1 Fu Tk Vlv A Cntl Pwr Sply A APU 1 GBX GN2 Repress Vlv</td>
</tr>
<tr>
<td>27</td>
<td>Hyd Main Pump 1 Depress Solenoid RPC A</td>
</tr>
<tr>
<td>28</td>
<td>Hyd Main Pump 3 Depress Solenoid RPC B</td>
</tr>
<tr>
<td>29</td>
<td>TVC Hyd Sys 1 Isol man Cntl Hyd Brake Isol 1 man Cntl NLG Backup Rel and Extension Sys 2 LGM, RMG Backup Rel Sys 2 LG Extend Vlv 2 NWS Hyd Sys 2</td>
</tr>
<tr>
<td>30</td>
<td>EMU 1.2 Pwr/Batt chgr MNA pwr</td>
</tr>
<tr>
<td>31</td>
<td>−Y Star Trkr Dr Sys 1 OP/CL capability</td>
</tr>
<tr>
<td>32</td>
<td>LADP Dpy Mtr 1 Htr Cntl 1</td>
</tr>
<tr>
<td>33</td>
<td>PL Reten Sys A Rel/Lat Mtrs</td>
</tr>
<tr>
<td>34</td>
<td>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</td>
</tr>
<tr>
<td>35</td>
<td>6 Ku−Band Temp Meas PA, Rcvr, A&amp;B Gimbal, Rate Snr, Ant Feed</td>
</tr>
<tr>
<td>36</td>
<td>L OMS Arm 1, Arm/Press 1 sw Contacts L OMS Eng Pr Vlv Coil 1, Cntl Vlv 1,2 Coils 1</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Driver pwr to F1 jets lost if RJDF 1B Driver sw OFF (O14:F)</td>
</tr>
<tr>
<td>24</td>
<td>NWS fail light still driven by miscompare logic feedback on rollout</td>
</tr>
<tr>
<td>25</td>
<td>Redundant mtrs remain</td>
</tr>
<tr>
<td>26</td>
<td>Vlv closes. Redundant vlv remains</td>
</tr>
<tr>
<td>27</td>
<td>Redundant pwr sply remains. GG Bed T and GBX P ind lost when APU running</td>
</tr>
<tr>
<td>28</td>
<td>Redundant RPC remains</td>
</tr>
<tr>
<td>29</td>
<td>Vlv holds position. GPC OP capability remains during entry</td>
</tr>
<tr>
<td>30</td>
<td>Loss of redundant hyd NLG deploy and NWS redundancy</td>
</tr>
<tr>
<td>31</td>
<td>Hyd Sys 1 still available for NWS</td>
</tr>
<tr>
<td>32</td>
<td>MNB pwr select capability remains</td>
</tr>
<tr>
<td>33</td>
<td>Mtr 2 remains</td>
</tr>
<tr>
<td>34</td>
<td>Htr Cntl 2 remains</td>
</tr>
<tr>
<td>35</td>
<td>L OMS auto shutdown if Pc &lt; 80% and ‘↓’ on MNVR EXEC display</td>
</tr>
<tr>
<td>36</td>
<td>Redundant coils remain</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>NWS fail lt (for actuator pressure sw)</td>
</tr>
</tbody>
</table>

### NOTES

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**Actions**

- **(A12)** APU HTR
  - GAS GEN/FUEL PUMP 1 − B AUTO
  - APU HTR TK/FU LINE/H2O/1A,2A
  - SYS 1A − OFF
  - SYS 1B − AUTO
  - SYS 2A − AUTO
  - SYS 2B − OFF
- HYD HTR
  - RUD SPD BK A − OFF
  - RUD SPD BK B − AUTO
  - CIRC PUMP PWR 1 − MNB
- **(L1)** HYD PUMP LOOP 1 − B
  - FLASH EVAP CTLR PRI A − ON (if reqd)
  - TOP EVAP HTR NOZ L − A AUTO
  - TOP EVAP HTR DUCT − B
  - If Hi Load Evap enabled
  - HI LOAD DUCT HTR − B(C)
- **(R2)** HYD PUMP LOOP 1 − B
  - FLASH EVAP FDLN HTR A − 2
- Place CDR disp sws (eight) to green dot position:
- **(F6)** AIR DATA − NAV
- ADI ATT − LVLH
- ERR − MED
- RATE − MED
- HSI SEL MODE − ENTRY
- HSI SEL SOURCE (two) − NAV 3
- **(F7)** RADAR ALTM − 2
- Refer to OMS/RCS Slide Rule for vlv loss info:
- Reconfig following vlv(s) only if leak isolation reqd:
- **(O7)** AFT R RCS He PRESS A
- L, R RCS XFEED 3/4/5
- **(O8)** L OMS XFEED A
- R OMS XFEED A

**Equip/Function Lost**

- **(A12)** APU 1 GG/Fu Pump Htrs A
  - APU 1 TK/Fu Ln Htrs A
  - APU 2G Inj H2O Tank Htrs 1A,2A
  - APU 3 Tk/Fu Ln Htrs B
- Rud/Snd Brk Htr A
- Circ Pump 1 MNA pwr
- **(L1A2)** H2O Loop 1 Pump A man ON capability
  - Flash Evap Cntr Pri B man ON Sel capability
  - Top Evap L Noz Htr B
  - Top Evap Duct Fwd,Aft L,R Htrs A
  - Hi Load Duct Outbd,Inbd Htrs A
  - Hi Load Duct Htr B(C)
  - Flash Evap CTLR PRI B man ON Sel capability
  - Top Evap L Noz Htr B
  - Top Evap Duct Fwd,Aft L,R Htrs A
  - Hi Load Duct Outbd,Inbd Htrs A
- **(F6A1)** Air Data Source Sel capability
  - L ADI Att, Err, Rate Sel capability
- **(F6A5)** L HSI Mode, Source Sel capability
- **(F6A7)** L Radar Altm Sel capability
- **(O7)** Aft L RCS He Pr Isol A man Cntl and GPC CL capability
  - Aft R RCS He Pr Isol A man CL capability
  - Aft L, R RCS Xfeed Vlv 3/4/5 man CL capability
- **(O8)** L,R OMS Tk Isol A man CL cap
  - L,R OMS Xfeet Vlv man CL cap
  - Fwd RCS He Pr Isol A man Cntl and GPC CL cap
  - Fwd RCS Tk Isol 3/4/5 man CL and man Ovrd of GPC CL cap
- **(R13A2)** PLBD:
  - C/L Lat 1−4, 5−8 Mtrs 1
  - Port Att Bkhd Mtr 1
- **(R4)** LG Extend Isol Vlv man Cntl

**Crew Indications**

- **(F7)** C/W RCS JET lt − on
- SM ALERT Light/Tone − on
- **(FSMs)** SM 67 ELECTRIC
- CNTL AB2 Volts < 20
- During Rad Dpy/Sto ops:
  - (R13L) RAD CNTL tbs (four) indicate single mtr ops
  - If H2O PUMP LOOP 1,A active:
    - C/W H2O LOOP lt − on
    - 'S88 H2O PUMP P1'
    - 'S88 H2O LOOP 1 FLOW'
    - 'S88 H2O LOOP 1 TEMP'
  - (O1) H2O PUMP OUT PRESS meter ind − 20−25 psia
- L ADP deploy time incr from 15 to 30 sec
- STAR TRKR DR POS − Y CL time incr from 8 to 16 sec
- (F7) If APUs active and using H2O BLR CTLR/HTR 1B:
  - C/W APU TEMP lt − on after −2 min
- **(SM)** (BFS,SM) 63 PL BAY DOORS
  - During PLBD OP/CL, single mtr run time noted on actuators listed at left

**Notes**

- **(1)** Indications do not appear until jet commanded
  - **(2)** In OPS 2, FES GPC cmd is not present, but one may be sent if reqd
  - **(3)** Pri B GPC Sel capability remains. Pri A and Sec Cntrls remain
  - **(4)** Vlv holds position. Isol B remains
  - **(5)** Do not reconfig for reg switch or I’CNTM procedures
  - **(6)** Vlv holds position
  - **(7)** Pwr to MCA Drivers lost through ENABLE sw
  - **(8)** Vlv holds position, GPC OP capability remains during entry

10/14/03  7−212  MAL/ALL/GEN F
### ACTIONS

| (R1) | If TK1 in use: O2,H2 TK1 | (R1A2) | Cryo O2,H2 Tk1 Manf Vlv Cntl
| (A15) | Pallet Cryo Tk 6–9 Htrs A man On Cntl |

- **HTR A** (two) − AUTO
- **B** (two) − OFF

| (R2) | If TK3 in use: O2,H2 TK3 HTR | (R2) | Hyd H2O Blr 1 Cntl |
| (O14) | RCS Manf F1 RJJD pwr (F1F,F1L,F1U,F1D) |

- **HTR A** (two) − OFF
- **B** (two) − AUTO

### EQUIP/FUNCTION LOST

| (R1A2) | 7 | Cryo O2,H2 Tk1 Manf Vlv Cntl |
| (A15) | Pallet Cryo Tk 6–9 Htrs A |

- **Cryo O2,H2 Tk1 Htrs B**
- **Cryo O2,H2 Tk3 Htrs A**

### CREW INDICATIONS

| 7 | Vlv holds position |
| 10 | Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired |
| 11 | Manf status not automatically declared closed. Jet fail−offs may occur |

### NOTES

| 7 | Vlv holds position |
| 10 | Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired |
| 11 | Manf status not automatically declared closed. Jet fail−offs may occur |
| 12 | Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning |
| 13 | When SM unavailable, use NSP block to inhibit UL Cmds. 'BCE STRING 1(3) NSP' annunciates and it requires GNC I/O RESET after UPLK − ENA for AOS |
| 14 | Vlv normally closed |
| 15 | B Htrs remain |
| 16 | RM sw downmodes to 2−level for −X position |

### SM 1 DPS UTILITY

| (G2,G8,S2) | MMU ASSIGN |
| (A1A2) | NSP ENCRYPTION MODE − SEL |
| (C3) | FC3 Redundant Reac Vlv Close Cntl |
| (A14) | RCS/OMS HTR |
| 15 | Fwd RCS A Htrs (all) |
| 16 | L Pod A Htrs (partial) |

### GNC 23 RCS

| Override F1 Manf status to CL: |
| (R2) | BLR CNTLR/HTR 1 − A |
| (C3A5) | Uplink switch GPC block of UL Cmds capability |
| (A11) and no SM GPC: |
| (C3) | UPLK − NSP BLK |
| (A1L) | NSP ENCRYPTION MODE  − SEL |

### RCS/OMS HTR

| Fwd RCS − B AUTO |
| L Pod (two) − A OFF, B AUTO |

### SM 1 DPS UTILITY

| (F1F,F1L,F1U,F1D) | RCS FWD − ITEM 1 EXEC |
| (F1U) | MANF VLVS 1 OVRD − ITEM 40 EXEC |

### MMU 2

| MMU ASSIGN |
| SM − ITEM 2 EXEC |
| PL − ITEM 3 EXEC |
| OPS 0 − ITEM 7 EXEC |

### MMU 2

| (C3) | FC3 Redundant Reac Vlv Close Cntl |

### RCS/OMS HTR

| Fwd RCS A Htrs (all) |
| L Pod A Htrs (partial) |

### 3−level sw RM for −X Sense

| (C6A1) | 3−level sw RM for −X Sense |

### PALLET STRUCTURE HTR A STBD

| (A1A2) | COMSEC 1,2 Key |

### PALLET HTR A − OFF

| (A15) | Pallet Structure Htr A Stbd |
| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |
| (A15) | Pallet Structure Htr A Stbd |

### PALLET HTR A − OFF

| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |

### PALLET HTR A − OFF

| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |

### PALLET STRUCTURE HTR A STBD

| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |

### PALLET STRUCTURE HTR A STBD

| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |

### PALLET STRUCTURE HTR A STBD

| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |

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| If AB1,2,3 unpwrd at same time: |
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| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |

### PALLET STRUCTURE HTR A STBD

| If AB1,2,3 unpwrd at same time: |
| (A1L) | NSP ENCRYPTION MODE − SEL |
**EPS SSR−101 (Cont)**
**BUS LOSS: CNTLAB2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>If reqd during entry (&lt; 120K ft): (L1) • NH3 CNTLR A(B) − PRI/GPC</td>
<td>(L1A2) NH3 Sys B Sec Cntlr man ON capability</td>
<td>7 Vlv holds position</td>
<td></td>
</tr>
<tr>
<td>(R2) • MPS He I’CNECT CTR − GPC</td>
<td>(R2) Ctr MPS He Intercom Vlvvs man Cntl</td>
<td>17 Sys B Pri Cntlr, Auto switchover to Sec Cntlr remain</td>
<td></td>
</tr>
<tr>
<td>(R4) • MPS FILL/DRAIN LH2 INBD − GND</td>
<td>(R4) Prplt F/D LH2 Inbd Vlv man Cntl</td>
<td>18 Loss of manual capability to inert LH2 Manf</td>
<td></td>
</tr>
<tr>
<td>(O15:F) • MMU 2 − OFF</td>
<td>(O17) ATVC 2 Isol ME</td>
<td>19 Six vlvvs fail to non−isolation position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R1A2) FC1 Reac Vlv Cntl via pnl R1 sw</td>
<td>20 Vlv holds positions. FC1 Redundant Reac Vlv Close Cntl on pnl C3 remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R2) FC1 STOP capability via START/STOP sw (pnl R1)</td>
<td>21 FC1 can be stopped via FC1 CNTLR sw (O14:A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(L2A1) Atm Press Cntl O2 Sys 1 Sply Vlv Cntl</td>
<td>22 Vlv holds position, Sys 2 remains</td>
<td></td>
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<tr>
<td></td>
<td>(F6) L HUD</td>
<td>23 Redundant mtrs remain</td>
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<tr>
<td></td>
<td>(F6A1) L ADI Att Ref Set capability</td>
<td>24 Mtr 2 remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R4) TVC Hyd Sys 1 Isol man Cntl</td>
<td>25 Htr Cntl 2 remains</td>
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<tr>
<td></td>
<td>(O6) −Y Star Trkr Dr Sys 1 CL capability</td>
<td>26</td>
<td></td>
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<tr>
<td></td>
<td>(C3A5) L ADP Deploy Mtr 1 Htr Cntl 1</td>
<td>Driver pwr to L5 jets lost if L5/F5/R5 Driver sw OFF (O16:F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R2) L MPS He Isol B man Cntl</td>
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<tr>
<td></td>
<td>(R13A2) Rad Cntl Sys Port Lat 1−6 Mtr 1 Dpy/Sto Mtr 1 Stbd Lat 7−12 Mtr 1 Dpy/Sto Mtr 2</td>
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<tr>
<td></td>
<td>(O15) RJDA L Vernier Logic pwr (L5L)</td>
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### EQUIP/FUNCTION LOST

<table>
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<th>ACTIONS</th>
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<tr>
<td>(R2) ET Door Mtrrs</td>
</tr>
<tr>
<td>C/L Lat Actr 1 Mtr 2 man</td>
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<tr>
<td>Stow capability</td>
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<tr>
<td>C/L Lat Actr 2 Mtr 2 man</td>
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<tr>
<td>Stow capability</td>
</tr>
<tr>
<td>L Dr Uplock Lat Mtr 2 man Cntl</td>
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<tr>
<td>R Dr Closure Mtr 2 man Cntl</td>
</tr>
<tr>
<td>R Dr Uplock Lat Mtr 2 man Cntl</td>
</tr>
<tr>
<td>(C3A1)</td>
</tr>
<tr>
<td>27 L OMS ARM 2, ARM/PRESS 2 sw Contacts</td>
</tr>
<tr>
<td>28 L OMS Eng Pr Vlv Coil 2, Cntl Vlv 1,2 Coils 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Redundant mtrs remain</td>
</tr>
<tr>
<td>27 L OMS auto shutdown if Pc &lt; 80% and ↓ on MNVR EXEC display</td>
</tr>
</tbody>
</table>

**CAUTION**
- No Purge. Wait 10 min between burns
- 28 Redundant coils remain |
- 29 Vlv closes. Redundant vlv remains |
- 30 Redundant RPC remains |
EPS SSR-102
BUS LOSS: CNTL3
(Includes MNA FMC1, MNA MMC1, MNA MMC3, MNA AMC1)

<table>
<thead>
<tr>
<th>ACTIONS</th>
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<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>(A12)</td>
<td>APU HTR</td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>• GAS GEN/FUEL PUMP</td>
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<tr>
<td></td>
<td>1 A AUTO</td>
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<tr>
<td></td>
<td>• LUBE OIL LINE 1</td>
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<tr>
<td></td>
<td>A AUTO</td>
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<tr>
<td></td>
<td>APU HTR TK/FU LINE/H2O’</td>
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<tr>
<td>1</td>
<td>• SYS 1A - OFF</td>
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<td></td>
<td>• 1B - AUTO</td>
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<td></td>
<td>1 3B - AUTO</td>
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<tr>
<td>HYD HTR</td>
<td>• BDY FLP A - OFF</td>
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<td></td>
<td>• B AUTO</td>
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<tr>
<td></td>
<td>• CIRC PUMP PWR 1</td>
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<tr>
<td></td>
<td>- MNA</td>
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<tr>
<td>(R2)</td>
<td>• BLR CNTLR/HTR 1,3</td>
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<td></td>
<td>(two) - B</td>
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<td>(A14)</td>
<td>RCS/OMS HTR</td>
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<tr>
<td></td>
<td>• OMS CRSFD LINES</td>
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<tr>
<td></td>
<td>- A OFF, B AUTO</td>
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<tr>
<td>(L1)</td>
<td>• H2O PUMP LOOP 1</td>
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<tr>
<td></td>
<td>- B</td>
<td></td>
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<tr>
<td></td>
<td>• TOP EVAP HTR DUCT</td>
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<tr>
<td></td>
<td>- B</td>
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<tr>
<td></td>
<td>If Hi Load Evap enabled:</td>
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<td></td>
<td>• HI LOAD DUCT HTR</td>
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<td></td>
<td>- B (C)</td>
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<tr>
<td></td>
<td>Refer to OMS/RCS Slide</td>
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<tr>
<td></td>
<td>Rule for vlv loss info</td>
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<tr>
<td>(MA73C:C:D)</td>
<td>• cb MCA PWR AC1 3Φ</td>
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<tr>
<td></td>
<td>• MID 1,3 (two) - op</td>
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<tr>
<td></td>
<td>For PLBD ops:</td>
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<tr>
<td></td>
<td>• OP/CL Drs in man mode</td>
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<tr>
<td></td>
<td>Do not perform if AB1,2,3</td>
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<tr>
<td></td>
<td>unpwrd at same time:</td>
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<tr>
<td></td>
<td>GNC 23 RCS</td>
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<tr>
<td></td>
<td>Override F1 Manf status to</td>
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<td></td>
<td>OP:</td>
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<td>• RCS FWD - ITEM 1</td>
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<td>EXEC</td>
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<tr>
<td></td>
<td>• MANF VLVS 1 OVRD -</td>
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<td>ITEM 40 EXEC</td>
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<td>• PLT RHC pb - push, if</td>
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<td>BFS engage reqd</td>
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<tr>
<td>(A12)</td>
<td>APU 1 GG/Fu Pump Htrs</td>
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<td></td>
<td>B 1 Lube Oil Line Htrs B</td>
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<tr>
<td></td>
<td>1 Tk/Fu Ln Htrs A</td>
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<tr>
<td>(A12)</td>
<td>APU 3 Tk/Fu Ln Htrs B</td>
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<td>(A14)</td>
<td>OMS Crsfd Lns Htrs A</td>
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<td>(L1A2)</td>
<td>H2O Loop 1 Pump A</td>
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<td>Top Evap Fwd,Aft Htrs A</td>
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<tr>
<td>(R2)</td>
<td>Hyd H2O BLR 1,3 Cntrl A</td>
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<td>(MA73C)</td>
<td>Port,Stbd Rad Lat 1–6,7–12</td>
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<tr>
<td></td>
<td>Mtrs 1 Limit sw</td>
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<tr>
<td>(MA73C)</td>
<td>PLBD:</td>
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<tr>
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<td>C/L Lat 1–4,5–8,9–12</td>
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<td>Mtrs 1</td>
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<td>Port,Stbd Fw Blkhd Mtrs 1</td>
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<td>Port Aft Blkhd Mtr 1</td>
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<td>Stbd Door Mtr 1</td>
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<td>Port Door Mtr 2 CL Limit sw</td>
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<td>(F6)</td>
<td>CDR BFS no eng capability</td>
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<td>GPC 1,2,4 no eng capability</td>
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<td>COMSEC 1 &amp; 2 Pwr Redundancy</td>
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<tr>
<td>(O8)</td>
<td>Flow Prop Vlv Loop 1</td>
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<td>- bp</td>
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<tr>
<td>(L1)</td>
<td>Flow Prop Vlv operation not affected</td>
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<tr>
<td></td>
<td>Hi Load Duct Outbd,Inbd Noz</td>
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<tr>
<td></td>
<td>Cntlr A</td>
<td></td>
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<tr>
<td>(O7)</td>
<td>Att R RCS He Press Isol A</td>
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<td>man Cntlr, GPC CL capability</td>
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<tr>
<td>(R13L)</td>
<td>RAD CNTL STBD tb - bp</td>
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<td>PORT tb - bp</td>
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<tr>
<td>(MA73C)</td>
<td>Port,Stbd Rad Lat 1–6,7–12</td>
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<tr>
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<td>Mtrs 1 Limit sw</td>
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<td></td>
<td>LADP deploy time incr from 15 to 30 sec</td>
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<tr>
<td>(F7)</td>
<td>If APUs active and using H2O BLR CNTLR/HTR 1A or 3A:</td>
<td></td>
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<tr>
<td></td>
<td>C/W APU TEMP lt - on after ~2 min</td>
<td></td>
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</tr>
</tbody>
</table>

1 Freon Loop 1
2 Flow Prop Vlv operation not affected
3 Vlv holds position
4 If AC1 cb not opened, Lat Mtrs 1 of actuators for Port,Stbd Rad Lat 1–6,7–12 continue to run until Sys A Lat Cntlr sw placed to OFF. Other equip pwrd by AC1 MMC1 and AC1 MMC3 are lost because MNA MMC1 and MNA MMC3 lost
5 Vlv holds position, GPC OP capability remains, Isol B remains. Auto Overpress protection lost on R RCS A reg

**TIME CRITICAL**
If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

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

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09/16/03
### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>ACTIONS</th>
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<tbody>
<tr>
<td>6 AB1,2,3 unpwrd at same time: (A1L) NSP ENCRYPTION MODE − SEL NSP ENCRYPTION SEL − BYP. No SM GPC or LOS: (C3) UPLK − NSP BLK</td>
<td>If AB 1,2,3 unpwrd at same time: (A1A2) COMSEC 1,2 Key</td>
<td>STAR TRKR DR POS − Y OP/CL time incr from 8 to 16 sec</td>
<td>6 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>
<tr>
<td>(A15) If Tk6−Tk9 in use: • (Afl) TK HTRS A − OFF • B − AUTO • PALLET HTR A − OFF • B − AUTO</td>
<td>UPLK − NSP BLK</td>
<td>(A8L) PORT RMS: Dpy/Sto tb − bp Reten Lat tb − bp R−F−L MID tb − bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

NONE

### SM 94 PDRS CONTROL

Indications lost: Mid MRL Mtr 1 LAT/REL/RDY Atl MRL Mtr 2 LAT/REL/RDY

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8 HTR Cntrl 2 remains</td>
<td>9 Mtr 2 remains</td>
<td>10 Htr Cntrl 2 remains</td>
</tr>
</tbody>
</table>

### EPS SSR–102 (Cont)

### BUS LOSS: CNTLAB3

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td>NONE</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>7 LG Extend Vlv 1</td>
<td>(MA73C) Std Rad Dpy/Sto Mtr 1 Port Rad Dpy/Sto Mtr 1 − Y Star Trkr Dr Sys 1 OP/CL capability</td>
<td>STAR TRKR DR POS − Y OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td>8 NWS Hyd Sys 1</td>
<td></td>
<td>(L1) If H2O PUMP LOOP1.A ON: C/W H2O LOOP lt − on 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' (O1) H2O PUMP OUT PRESS LOOP 1 ind − 20−25 psia</td>
<td></td>
</tr>
<tr>
<td>9 LH Vents 5,6,8,9 Mtrs 1 RH Vents 1,2,3,5,6 Mtrs 1</td>
<td></td>
<td>(A8L) PORT RMS: Dpy/Sto tb − bp Reten Lat tb − bp R−F−L MID tb − bp</td>
<td></td>
</tr>
<tr>
<td>10 L ADP Deploy Mtr 1 Disc 1 Htr Cntrl 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 APU 3 Fu Tk Vlv B Cntrl Pwr B Sply B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 (C3A6) Fwd Pnl Trans X,Y Norm, Pulse, and Fwd Pnl Roll, Pitch, Yaw Disc Rate, Pulse, Select capability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Fwd Pnl Trans Z High, Norm, Pulse Sel capability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Fwd Pnl Trans Low Z Sel capability</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>15 Fwd Pnl PRT,ALT,VERN Sel capability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Fwd Pnl PCT Exec capability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 MPS Inbd LH2 Prplt Vlv man Cntl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 MPS Pneu He Isol 1 man Cntl R MPS Pneu He Isol B man Cntl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C) ET Door Mtrs: C/L Lat Acr 1 Mtr 1 GPC Cntrl C/L Lat Acr 2 Mtr 1 GPC Cntrl L Dr Closure Mtr 1 GPC CL capability L Dr Unlock Lat Mtr 1 GPC Lat capability</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

05/07/01

7−217

MAL/ALL/GEN F
## EPS SSR-102 (Cont)
### BUS LOSS: CNTLAB3

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C)</td>
<td>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>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C)</td>
<td>Port RMS: Mid MRL Mtr 1 Alt MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists.
### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A12)</td>
<td>APU HTR</td>
</tr>
<tr>
<td>1</td>
<td>GAS GEN/FUEL PUMP</td>
</tr>
<tr>
<td>1</td>
<td>1 − A AUTO</td>
</tr>
<tr>
<td>1</td>
<td>GAS GEN/FUEL PUMP</td>
</tr>
<tr>
<td>2</td>
<td>2 − B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>LUBE OIL LINE</td>
</tr>
<tr>
<td>2</td>
<td>2 − B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>APU HTR TK/FU LINE/H2O/</td>
</tr>
<tr>
<td>1</td>
<td>1 − SYS 1A</td>
</tr>
<tr>
<td>1</td>
<td>1 − 1B</td>
</tr>
<tr>
<td>1</td>
<td>2A − OFF</td>
</tr>
<tr>
<td>1</td>
<td>2B − AUTO</td>
</tr>
<tr>
<td>1</td>
<td>HYD HTR</td>
</tr>
<tr>
<td>1</td>
<td>BDY FLP A − AUTO</td>
</tr>
<tr>
<td>1</td>
<td>B − OFF</td>
</tr>
<tr>
<td>1</td>
<td>CIRC PUMP PWR 1 −</td>
</tr>
<tr>
<td>1</td>
<td>MNA</td>
</tr>
<tr>
<td>1</td>
<td>CIRC PUMP PWR 2 −</td>
</tr>
<tr>
<td>1</td>
<td>MNC</td>
</tr>
<tr>
<td>1</td>
<td>(A1L)</td>
</tr>
<tr>
<td>1</td>
<td>S−BD PM</td>
</tr>
<tr>
<td>1</td>
<td>ANT SW ELEC − 2</td>
</tr>
<tr>
<td>1</td>
<td>XPNDR − 2</td>
</tr>
<tr>
<td>1</td>
<td>PWR AMPL OPER − 2</td>
</tr>
<tr>
<td>1</td>
<td>STBY − 2</td>
</tr>
<tr>
<td>1</td>
<td>PRE AMP − 2</td>
</tr>
<tr>
<td>1</td>
<td>NSP</td>
</tr>
<tr>
<td>1</td>
<td>PWR − 2</td>
</tr>
<tr>
<td>1</td>
<td>If PSP and/or INTRG</td>
</tr>
<tr>
<td>1</td>
<td>reqd for PL or ISS</td>
</tr>
<tr>
<td>1</td>
<td>ops:</td>
</tr>
<tr>
<td>1</td>
<td>S−BD PL PWR SYS − 2</td>
</tr>
<tr>
<td>1</td>
<td>CNTL − PNL</td>
</tr>
<tr>
<td>1</td>
<td>CMD</td>
</tr>
<tr>
<td>1</td>
<td>Reconfig PSP</td>
</tr>
<tr>
<td>1</td>
<td>Perform PL INTRG REACQ</td>
</tr>
<tr>
<td>1</td>
<td>(if reqd)</td>
</tr>
<tr>
<td>1</td>
<td>(A1R)</td>
</tr>
<tr>
<td>1</td>
<td>S−BD FM PWR − 2</td>
</tr>
<tr>
<td>1</td>
<td>If no comm:</td>
</tr>
<tr>
<td>1</td>
<td>(C3)</td>
</tr>
<tr>
<td>1</td>
<td>S−BD PM CNTL − PNL</td>
</tr>
<tr>
<td>1</td>
<td>− CMD</td>
</tr>
<tr>
<td>1</td>
<td>If OIU reqd:</td>
</tr>
<tr>
<td>1</td>
<td>(SSP)</td>
</tr>
<tr>
<td>1</td>
<td>OIU PWR − OIU 2 ON</td>
</tr>
<tr>
<td>1</td>
<td>OIU tb − DN</td>
</tr>
<tr>
<td>1</td>
<td>'MCC, OIU reconfig</td>
</tr>
<tr>
<td>1</td>
<td>(L1)</td>
</tr>
<tr>
<td>1</td>
<td>TOP EVAP HTR NOZ L</td>
</tr>
<tr>
<td>1</td>
<td>− B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>TOP EVAP HTR DUCT</td>
</tr>
<tr>
<td>1</td>
<td>− A</td>
</tr>
<tr>
<td>1</td>
<td>If Hi Load Evap</td>
</tr>
<tr>
<td>1</td>
<td>enabled:</td>
</tr>
<tr>
<td>1</td>
<td>HI LOAD DUCT HTR −</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>(R2)</td>
</tr>
<tr>
<td>1</td>
<td>BLR CNTLR/HTR 2 −</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>(R1A2)</td>
</tr>
<tr>
<td>1</td>
<td>Top Evap L Noz Htr</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>Top Evap Duct Fwd,Aft Htrs B</td>
</tr>
<tr>
<td>1</td>
<td>Hi Load Duct Outbd,Inbd Noz Htrs B</td>
</tr>
<tr>
<td>1</td>
<td>GL L Lat 13−16 Mtr 2</td>
</tr>
<tr>
<td>1</td>
<td>Sbtl Aft Bikhd Mtr 2</td>
</tr>
<tr>
<td>1</td>
<td>Port Drive Mtr 2</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASTER ALARM</td>
<td></td>
</tr>
<tr>
<td>Light/Tone − on</td>
<td></td>
</tr>
<tr>
<td>(F7)</td>
<td></td>
</tr>
<tr>
<td>SM ALERT</td>
<td></td>
</tr>
<tr>
<td>Light/Tone − on</td>
<td></td>
</tr>
<tr>
<td>SM 67 ELECTRIC</td>
<td></td>
</tr>
<tr>
<td>CNTL BC1 Volts &lt; 20</td>
<td></td>
</tr>
<tr>
<td>C/W RCS JET lt  − on</td>
<td></td>
</tr>
<tr>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>S69 FC H2O RLF HTR</td>
<td></td>
</tr>
<tr>
<td>S67 CNTL BUS V</td>
<td></td>
</tr>
<tr>
<td>S66 APU/HYD W/B</td>
<td></td>
</tr>
<tr>
<td>SM0 THRM HYD</td>
<td></td>
</tr>
<tr>
<td>F,L,R RCS L,R,D JET</td>
<td></td>
</tr>
<tr>
<td>(COMM LOST)</td>
<td></td>
</tr>
<tr>
<td>All S−BD A/G voice lost if Sys 1 selected</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td></td>
</tr>
<tr>
<td>RAD BYP VLY 2 tb − bp</td>
<td></td>
</tr>
<tr>
<td>If Site AOS and using S−BD Ant Elec 1:</td>
<td></td>
</tr>
<tr>
<td>'ANTENNA'</td>
<td></td>
</tr>
<tr>
<td>If NSP 1 selected:</td>
<td></td>
</tr>
<tr>
<td>'BCE STRG 1 NSP'</td>
<td></td>
</tr>
<tr>
<td>During Rad Dpy/Sto:</td>
<td></td>
</tr>
<tr>
<td>(R13L)</td>
<td></td>
</tr>
<tr>
<td>RAD CNTL STBD tb</td>
<td></td>
</tr>
<tr>
<td>Indicates single mtr ops</td>
<td></td>
</tr>
<tr>
<td>RAD LAT CNTL lbs (two)</td>
<td></td>
</tr>
<tr>
<td>Indicate single mtr ops</td>
<td></td>
</tr>
<tr>
<td>L,R ADP deploy time incr</td>
<td></td>
</tr>
<tr>
<td>from 15 to 30 sec</td>
<td></td>
</tr>
<tr>
<td>STAR TRKR DR POS − Y CL</td>
<td></td>
</tr>
<tr>
<td>time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td>STAR TRKR DR POS − Z</td>
<td></td>
</tr>
<tr>
<td>OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td>If SYS 1 pwrd:</td>
<td></td>
</tr>
<tr>
<td>'S62 BCE BYP PSP 1'</td>
<td></td>
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<tr>
<td>Loss of PL TLM and CMD</td>
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<tr>
<td>If PDI FDA enabled:</td>
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<tr>
<td>'S62 PDI DECOM FAIL'</td>
<td></td>
</tr>
<tr>
<td>If first RGA failure and rates sensed:</td>
<td></td>
</tr>
<tr>
<td>'RM FAIL RGA' (3)</td>
<td></td>
</tr>
<tr>
<td>If OIU 2 interfaces with PSP 2 for commanding</td>
<td></td>
</tr>
<tr>
<td>If OIU reqd:</td>
<td></td>
</tr>
<tr>
<td>(SSP)</td>
<td></td>
</tr>
<tr>
<td>OIU PWR − OIU 2 ON</td>
<td></td>
</tr>
<tr>
<td>OIU tb − DN</td>
<td></td>
</tr>
<tr>
<td>'MCC, OIU reconfig</td>
<td></td>
</tr>
<tr>
<td>(L1A2)</td>
<td></td>
</tr>
<tr>
<td>Top Evap L Noz Htr A</td>
<td></td>
</tr>
<tr>
<td>Top Evap Duct Fwd,Aft Htrs B</td>
<td></td>
</tr>
<tr>
<td>Hi Load Duct Outbd,Inbd Noz Htrs B</td>
<td></td>
</tr>
<tr>
<td>PLBD: C/L L Lat 13−16 Mtr 2</td>
<td></td>
</tr>
<tr>
<td>Sbtl Aft Bikhd Mtr 2</td>
<td></td>
</tr>
<tr>
<td>Port Drive Mtr 2</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

- If not done within 20 min, may freeze N2H4 and lose APU.
- However, SM ALERT occurs above freezing temp.
- Indications do not appear until jet commanded.
- Msg occurs only if B AUTO (pnl R12U) selected for FC H2O Relief Htr.
- FSM caused by antenna miscompare.
- REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books.
- OIU 2 interfaces with PSP 2 for commanding.
- Pwr to MCA Drivers lost through ENABLE sw.

06/13/01 7−219  MAL/ALL/GEN F
### Actions

<table>
<thead>
<tr>
<th>(O8)</th>
<th>9</th>
<th>OMS Eng/Xfeed Vlv Redundancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• If Straight feed config, Right OMS Crossfeed A − OP (R−OP)</td>
<td>10</td>
<td>F,R,RCS He Press Isol B man CL capability</td>
</tr>
<tr>
<td>• Refer to OMS/RCS Slide Rule for vlv loss info</td>
<td>10</td>
<td>L OMS Tk Isol B man CL capability</td>
</tr>
<tr>
<td>• Reconfig following vlv(s) only if leak isolation reqd:</td>
<td>10</td>
<td>R,L OMS Xfeed Vlv B man CL capability</td>
</tr>
<tr>
<td>(O7)</td>
<td>(O8)</td>
<td>L OMS XFEED B</td>
</tr>
<tr>
<td>(O8)</td>
<td>(O8)</td>
<td>R OMS XFEED B</td>
</tr>
<tr>
<td>(O8)</td>
<td>(O8)</td>
<td>FWD RCS He PRESS B</td>
</tr>
</tbody>
</table>

If BC1,2,3 unpwr'd at same time:

<table>
<thead>
<tr>
<th>GNC 23 RCS</th>
<th>11</th>
<th>Override F2 Manf status to CL:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• RCS FWD − ITEM 1 EXEC</td>
<td></td>
<td>(O8) RCS Manf F5,L5,R5 RDJ pwr (F5,L5,R5,R5,R5)</td>
</tr>
<tr>
<td>• MANF VLVS 2 OVRD − ITEM 41 EXEC</td>
<td></td>
<td>(A14) Aft RCS L,R Jet 1 Htrs</td>
</tr>
</tbody>
</table>

For attitude control, perform RCS, LOSS OF VERNIERS (ORB OPS):

<table>
<thead>
<tr>
<th>GNC 23 RCS</th>
<th>12</th>
<th>RCS Manf F5,L5,R5 RDJ pwr (F5,L5,R5,R5,R5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reprioritize L,R Manf 1 Jets to first priority: DES INH twice, all other jets highest priority first, then next highest priority, etc</td>
<td></td>
<td>(A14) Fwd RCS Htrs B (all)</td>
</tr>
<tr>
<td>• Set aft pod(s) PRI JET FAIL LIMIT to 3</td>
<td></td>
<td>L Pod Htrs B (all)</td>
</tr>
</tbody>
</table>

| (A14) | 14 | L Pod Htrs B (all) |
| RCS/OMS HTR | | R Pod Htrs A (all) |
| • FWD RCS − A AUTO | | (R11U) FC H2O Line Htrs B |
| • L POD (two) − A AUTO, B OFF | | Relief Htrs B |
| • R POD (two) − A OFF, B AUTO | | Vent Line Htrs B |

| (R11U) | 14 | Barrel Htrs B |
| FC H2O | | Rl Noz Htrs B |
| • LINE HTR − A AUTO | | FC2 Purge Vlv man Cntl |
| • RELIEF HTR − A AUTO | | (R11U) FC2 Purge Vlv man Cntl |

When reqd:

| (R11U) | 14 | FC2 Purge Vlv man Cntl |
| For FC2, perform FUEL CELL PURGE − AUTO (ORB OPS, EPS) | | (O8) L,R OMS He Press Isol B man Cntl and VAP ISOL 1.2 Man B Cntl |

Prior to using L(R) OMS:

| (O8) | 14 | L,R OMS He Press/VAP |
| • L,R OMS He PRESS/VAP | | (O8) L,R OMS He Press Isol B man Cntl and VAP ISOL 1.2 Man B Cntl |
| • ISOL A (two) − OP, then | | (A7A1) Video Cntl Unit MNB pwr |
| • − GPC | | |
| • B (two) − GPC | | |

If CCTV reqd:

| (A7A1) | 15 | Video Cntl Unit MNB pwr |
| (A7U) | 15 | Video Cntl Unit MNB pwr |

(Continued)
### Actions

**If EMU(s) in battery charge mode:**
- PWR/BATT CHGR EMU 1(2) BUS SEL − MNA

**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

**For SSME Hyd Repress:**
- HYD MPS/TVC ISOL VLV SYS 1,3 (two) − OP
- Wait 10 sec, then CL

### Equip/Function Lost

- (FPC2/AW18H)
  - EMU 1,2 Pwr/Batt Chgr MNB pwr

### Crew Indications

- **R1A2**
  - Cryo O2,H2 Tk2,4 Htrs A man On Cntl
  - Cryo O2,H2 Tk2 Manf Vlv Cntl

### Notes

- **15** 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)
- **16** Vlv holds position
- **17** Vlv holds position. Loss of manual capability to inert LO2 and LH2 Manfs
- **18** Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
- **19** Vlv holds position. FC2 Redundant Reac Vlv Close Cntl on pnl C3 remains
- **20** FC2 can be stopped via FC2 CNTLR sw on pnl O15:A
- **21** Cntlrs A, B Rad Byp Vlv Mtrs Auto Cntl and Cntlr B Rad Byp Vlv Mtr Man Cntl remain
### BUS ISOLATION

<table>
<thead>
<tr>
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<td>PL Reten Sys B Rad/Lat Mtrs</td>
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<td>Direct Stow Mtr 2</td>
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<td>Redundant Stow Initiate</td>
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<td>Signal to Ku–Band</td>
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<td>CDR Dpy Fire 2</td>
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<td>Jett Fire 2</td>
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### CREW INDICATIONS

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<tr>
<td>22</td>
<td>Vlv holds position. Sys 1 remains</td>
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<td>23</td>
<td>Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</td>
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<td>24</td>
<td>Single mtr time</td>
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<td>25</td>
<td>WARNING</td>
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<td>Driver pwr to F2 jets lost if RJDF 1A Driver sw OFF (pnl O15:F)</td>
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<td>26</td>
<td>Redundant pwr sply remains. Turbine speed ind lost</td>
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<td>27</td>
<td>Redundant RPC remains</td>
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<tr>
<td>28</td>
<td>Vlv closes. Redundant vlv A remains</td>
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<tr>
<td>29</td>
<td>Loss of redundant hyd NLG deploy and NWS redundancy</td>
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<tr>
<td>30</td>
<td>Hyd Sys 1 still available for NWS</td>
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<tr>
<td>31</td>
<td>Vlv holds position. GPC cntl remains. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed</td>
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<td>32</td>
<td>Mtr 1 remains</td>
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<td>33</td>
<td>Redundant stow initiate sig (CNTL CA1) to Ku–Band remains</td>
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<td>Plt Dpy/Jett remains</td>
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### EQUIP/FUNCTION LOST

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<td>(A1L)</td>
<td>S−BD PM</td>
<td>All S−BD A/G voice lost if sys 2 selected</td>
<td><strong>1</strong> If S−BD PM Sys 2 being used at time of bus failure, A/G comm capabilities lost until Sys 1 selected</td>
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<td>• ANT SW ELEC − 1</td>
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<td>• XPNDR − 1</td>
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<td>• PWR AMP OPER − 1</td>
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<td>• PWR AMP − 1</td>
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<td>• PWR − 1</td>
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<td>If PSP and/or INTRG reqd for 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>• − CMD</td>
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<td></td>
<td>• Reconfig PSP</td>
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<td>• Perform PL INTRG REACQ (if reqd)</td>
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<td>• S−BD FM PWR − 1</td>
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<td>If no comm:</td>
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<td>• − CMD</td>
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<td>• APU HTR</td>
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<td>• GAS GEN/FUEL PUMP 2 − B AUTO</td>
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<td>• APU HTR TK/FU LINE/H2O/</td>
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<td>• SYS 1A − AUTO</td>
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<td>• 2B − AUTO</td>
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<td>• HYD HTR</td>
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<td>• ELEV A − AUTO</td>
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<td>• B − OFF</td>
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<td>• CIRC PUMP PWR 2 − MNC</td>
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<td>• H2O PUMP LOOP 1 − A</td>
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<td>If using Sec Cntrl:</td>
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<td>• FLASH EVAP CNTLR SEC − ON</td>
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<td>• TOP EVAP HTR DUCT − A</td>
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<td>If Hi Load Evap enabled:</td>
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<td>• HI LOAD DUCT HTR − A(C)</td>
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<td>• Elevon Actr Htrs B</td>
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<td>• Circ Pump 2 MNB pwr</td>
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<td>• H2O Loop 1 Pump B man ON cap</td>
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<td>• FES Sec Cntrl GPC Sel capability</td>
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<td>• Top Evap Duct Fwd,Aft Htrs B</td>
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<td>• Hi Load Duct Outbd,Inbd Noz Htrs B</td>
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<td>• FES H2O Fdln A Htrs 2 (all)</td>
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<td>• AC2 pwr to:</td>
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<td>• Orbiter arm drive mtr</td>
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<td>• ODM mtr 2 − mate B, demate B, relax B</td>
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<td>• ODA mtr 2 latch/ release</td>
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<td>• PLBD: Port,Stbd Fwd Bklhd Mtrs 2 Stbd Door Mtr 2</td>
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### CREW INDICATIONS

- **SM 67 ELECTRIC**
- **CNTL BC2 Volts < 20**
- **TIME CRITICAL**
- If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
- **Sec Cntrl Man ON Sel capability remains. Pri A,B Cntrls remain.**
- **Single mtr time**
- **Pwr to MCA Drivers lost through ENABLE sw**

### NOTES

- If S−BD PM Sys 2 being used at time of bus failure, A/G comm capabilities lost until Sys 1 selected
- Indications do not appear until jets commanded
- REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books
- If OIU reqd with PSP 1 for commanding
- If OIU 1 interfaces with PSP 1 for commanding
- If site AOS and using S−BD Ant Elec 2: ‘ANTENNA’
- If H2O PUMP LOOP 1,B active:
  - C/W H2O LOOP lt
  - ‘S88 H2O LOOP 1 TEMP’
- During Rad Dpy/Sto:
  - If APUs active and using H2O BLR CNTLR/HTR 2B:
    - C/W APU TEMP lt − on after ∼2 min
    - If sys pwrd:
      - ‘S62 BCE BYP PSP 2’
      - Loss of PL TLM and CMD
      - If PDI FDA enabled:
        - ‘S62 PDI DECOM FAIL’
- During PLBD OP/CL, single mtr run time noted on actuators listed at left
### ACTIONS

Refer to OMS/RCS Slide Rule for vlv loss info  
Reconfig following vlv(s) only if leak isolation reqd:  
- L OMS XFEED B  
- R OMS XFEED B  

(R1)

If Tk2 in use:  
- O2,H2 Tk2  
  - HTR A (two) – OFF  
  - B (two) – AUTO  

(A11)

If Tk4 in use:  
- O2,H2 Tk4  
  - HTR A (two) – OFF  
  - B (two) – AUTO  

(R1)

- O2 Tk3 HTR A – AUTO  
- H2 Tk3 HTR A,B – AUTO  

(R2)

- BLR CNTLR/HTR 2 – A  

(C2)

- R IDP/CRT SEL – 3  
On MCC GO:  
- GPC/CRT O2 EXEC

### EQUIP/FUNCTION LOST

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<td>10</td>
<td>F,R RCS He Pr Isol B man Cntl, GPC CL capability</td>
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<td>L OMS Tk Isol B man CL capability</td>
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<td>L,R OMS Xfeed Vlv B man CL capability</td>
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<td>Cryo O2,H2 Tk2 Manf Vlv Cntl</td>
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**GNC 23 RCS**

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<td>ITEM 1,41 EXEC</td>
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<td>HYD H2O Blr 2 Cntlr B</td>
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<td>15</td>
<td>MDU CRT 2 IDP 2</td>
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<tr>
<td>15</td>
<td>FC1 Redundant Reac Vlv Cntl</td>
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<tr>
<td>15</td>
<td>RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)</td>
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<tr>
<td>15</td>
<td>RCS Manf F5/R5/L5 RJD pwr (F5L,F5R,L5L,L5D,R5R, R5D)</td>
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<tr>
<td>17</td>
<td>Uplink switch GPC Block of UL Cmd capability</td>
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<tr>
<td>17</td>
<td>Air Data Source Sel capability</td>
<td></td>
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<tr>
<td>17</td>
<td>R ADI Att, Err, Rate Sel capability</td>
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<tr>
<td>17</td>
<td>R HSI Mode, Source Sel capability</td>
<td></td>
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<tr>
<td>17</td>
<td>R Radar ALTM Sel capability</td>
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**EPS SSR−104 (Cont)**

<table>
<thead>
<tr>
<th>ACT</th>
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<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Vlv holds position. GPC OP capability remains. Isol A remains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Do not reconfig for reg switch or I'CNCT procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Vlv holds position. Man OP and full GPC Cntl remains</td>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>Vlv holds position</td>
<td></td>
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<tr>
<td>14</td>
<td>Refer to EPS 7.6 CRYO TABLE A for switch nomenclature</td>
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<tr>
<td>15</td>
<td>Loss of redundant port to the following:</td>
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<tr>
<td>16</td>
<td>MDU CDR 2 (S)</td>
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<tr>
<td>16</td>
<td>MDU MFD 1 (P)</td>
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<tr>
<td>16</td>
<td>MDU PLT 2 (S)</td>
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<tr>
<td>16</td>
<td>MDU AFD 1 (S)</td>
<td></td>
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<tr>
<td>15</td>
<td>Manf status not automatically declared closed. Jet fail−offs may occur</td>
<td></td>
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<tr>
<td>17</td>
<td>When SM not available, use NSP block to inhibit UL cmds. “BCE STRING 1(3) NSP” annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS</td>
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### EPS SSR–104 (Cont)

**BUS LOSS: CNTLBC2**

#### ACTIONS

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<thead>
<tr>
<th>When reqd:</th>
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<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td><strong>(A6U)</strong></td>
<td>FC2 Purge Vlv man Cntl</td>
<td>13</td>
<td>Vlv holds position</td>
</tr>
<tr>
<td>If SENSE – – Z:</td>
<td>(A6A1) 3–Level sw RM for –X Sense</td>
<td>18</td>
<td>Vlv normally closed</td>
</tr>
<tr>
<td>• SENSE – –X</td>
<td></td>
<td>19</td>
<td>RM sw downmodes to 2–level for –X position</td>
</tr>
<tr>
<td>• Wait 1 sec, reposition as desired</td>
<td></td>
<td>20</td>
<td>Left Trim and Body Flap control remains. Right Trim and Body Flap cntl function is regained after the lost contacts have been deselected in OPS–8 (3,B)</td>
</tr>
<tr>
<td>During OPS 8:</td>
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<tr>
<td><strong>GNC 43 CONTROLLER</strong></td>
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</tr>
<tr>
<td>• Diesel Pnl Trim R2:</td>
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<td></td>
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<tr>
<td>• DES PNL TRIM R2 ITEM 39 EXEC</td>
<td></td>
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<tr>
<td>• Diesel R Bdy Flp up/dn R2:</td>
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</tr>
<tr>
<td>• DES BDY FLP UP/DN R2 ITEM 22 EXEC</td>
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<tr>
<td><strong>For SSME Hyd Repress:</strong></td>
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<td></td>
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<tr>
<td>• HYD MPS/TVC ISOL VLV SYS 1, 2 – OP, wait 10 sec, then CL</td>
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<tr>
<td>• If reqd during entry (&lt; 120K ft):</td>
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<tr>
<td>• NH3 CNTLR A – PRI/GPC</td>
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<tr>
<td>• If reqd for Post Rollout:</td>
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<tr>
<td>• NH3 CNTLR B – SEC/ON</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</td>
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<td></td>
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<tr>
<td>• LOOP 1 (two) – ON, A(B)</td>
<td></td>
<td></td>
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<tr>
<td>• LOOP 2 – ON</td>
<td></td>
<td></td>
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<tr>
<td>• FLOW PROP VLV LOOP (two) – ICH</td>
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</tr>
<tr>
<td>• Activate PL H2O loop(s) (if applicable)</td>
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<tr>
<td>• RCS/OMS HTR</td>
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<tr>
<td>• FWD RCS – A AUTO</td>
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<td></td>
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<tr>
<td>• L POD (two) – A AUTO, B OFF</td>
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<tr>
<td>• R POD (two) – A OFF, B AUTO</td>
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<tr>
<td><strong>BUS ISOLATION</strong></td>
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</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
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</tr>
<tr>
<td>• MDU CRT 2 PWR – OFF</td>
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</tr>
<tr>
<td>• IDP/CRT2 PWR – OFF</td>
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<tr>
<td><strong>(F3)</strong></td>
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<tr>
<td>• R TRIM RHC/PNL – ENA</td>
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<tr>
<td>• PNL – OFF</td>
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<tr>
<td><strong>(R2)</strong></td>
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<tr>
<td>• MPS He I’CNECT L – GPC</td>
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<tr>
<td><strong>(R4)</strong></td>
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<tr>
<td>• MPS FILL/DRAIN LO2 INBD – GND</td>
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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
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<tbody>
<tr>
<td>25</td>
<td>ASA 4 Isol Driver pwr</td>
<td>8 Single mtr time</td>
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<tr>
<td>13</td>
<td>Atm Press Cntl O2 Sys 2 Sply Vlv Cntl</td>
<td>13 Vlv holds position</td>
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<td></td>
<td></td>
<td>25 Six vlvs fail to non-isolation position</td>
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<td>26 Vlv holds position, FC2 Redundant Reac Vlv Close Cntl on pnl C3 remains</td>
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<td></td>
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<td>27 Able to stop FC2 via FC2 CNTLR sw (pnl O15:A)</td>
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<td>28 Use Fwd pnl C3 pbs</td>
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<td>29 Redundant mtrs remain</td>
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<td>30 Htr Cntls 1 remain</td>
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<td>31 Sys 1 remains</td>
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<td>32 Hyd Sys 1 still available for NWS</td>
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<td>33 Loss of redundant hyd NLG deploy and NWS redundancy</td>
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<td>34 Mtr 1 remains</td>
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<td>35 Redundant pwr sply remains. GG Bed T and GBX P ind lost when APU running</td>
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<td>36 Redundant RPC remains</td>
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<td>37 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</td>
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<tr>
<td>(A6A1)</td>
<td>C MPS He Isol B man Cntl</td>
<td>25 ASA 4 Isol Driver pwr</td>
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<tr>
<td></td>
<td>R ADI Att Ref set capability</td>
<td>13 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl</td>
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<td></td>
<td></td>
<td>26 FC2 Reac Vlv Cntl via pnl R1 sw</td>
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<td>27 FC2 STOP capability via START/STOP sw (pnl R1)</td>
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<tr>
<td>(A6A1)</td>
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<td>(R1A2)</td>
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<td>28 Aft Pnl Trans X,Y Norm and Pulse Sel capability</td>
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<td>28 Aft Pnl Trans Z High,Norm, and Pulse Sel capability</td>
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<td>28 Aft Pnl Trans Low Z Sel capability</td>
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<td>28 Aft Pnl Rot Roll,Pitch,Yaw Disc Rate, and Pulse Sel capability</td>
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<td></td>
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<td>28 Aft Pnl PRI,ALT,VERN Sel capability</td>
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<td>28 Aft Pnl PCT Exec capability</td>
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<tr>
<td>(R1A2)</td>
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<td>(R2)</td>
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<tr>
<td>(R13A2)</td>
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<td>29 Rad Cntl Sys: Port,Stbd Lat 1−6 Mtr 2 Stbd Dpy/Sto Mtr 1</td>
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<tr>
<td>(C3A5)</td>
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<td>29 L,R ADP Dpy Mtrs 2 Htr Cntls 2</td>
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<td>(O6)</td>
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<td></td>
<td>29 −Y Star Trkr Dr Sys 2 OP/CL capability</td>
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<td>29 −Z Star Trkr Dr Sys 1 CL capability</td>
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<td>(F6A5, F8A5)</td>
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<td>31 NLG Bkup Release,Extension Sys 2</td>
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<tr>
<td></td>
<td></td>
<td>31 LMG, RMG Bkup Release Sys 2</td>
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<td>32 NWS Hyd Sys 2</td>
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<td>33 LG Extend Vlv 2</td>
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<td>(R13A2)</td>
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<td>(R13A2)</td>
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<tr>
<td>(R2)</td>
<td></td>
<td>34 Ku Ant Sto/Dpy Mtr 2 Direct Sto Mtr 2</td>
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<td>35 APU 2 Cntlr pwr Sply A APU 2 GBX GN2 Repress Vlv</td>
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<td>36 Hyd Main Pump 2 Depress Solenoid RPC A</td>
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<td>36 Hyd Main Pump 1 Depress Solenoid RPC B</td>
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<tr>
<td>(R13A2)</td>
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<td>(R13A2)</td>
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<td>37 MPM Mtr 2</td>
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<td>37 Fwd MRL Mtr 1</td>
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<td>37 Mid MRL Mtr</td>
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**EPS SSR-104 (Cont)**
**BUS LOSS: CNTLBC2**

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<tr>
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<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td></td>
<td>(O17) Freon Loop 1 Cold Plate Flow Xdcr</td>
<td></td>
<td>38 Vlv closes, Redundant Vlv A remains</td>
</tr>
<tr>
<td></td>
<td>Aft PL MNB current Xdcr</td>
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<td>39 PLT Dpy/Jett remains</td>
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<tr>
<td>38</td>
<td>(R2) APU 2 Fu Tk Vlv B</td>
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<tr>
<td>39</td>
<td>(F2,F3) CDR Dpy Fire 1</td>
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<td>39</td>
<td>Jett Fire 1</td>
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### EQUIP/FUNCTION LOST

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<th>NOTES</th>
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<tr>
<td>(A12) <strong>APU HTR</strong></td>
<td><strong>(F7)</strong> If APUs active and using H2O BLR CNTLR/HTR 1A or 2A: C/W APU TEMP it on after -2 min</td>
<td><strong>TIME CRITICAL</strong></td>
</tr>
<tr>
<td><strong>GAS GEN/FUEL</strong></td>
<td><strong>(O8)</strong> If H2O PUMP LOOP 1, B – ON:</td>
<td></td>
</tr>
<tr>
<td>PUMP 2 – A AUTO</td>
<td>C/W H2O LOOP It – on</td>
<td>*</td>
</tr>
<tr>
<td><strong>LUBE OIL LINE 2 – A AUTO</strong></td>
<td><em>S88 H2O PUMP P1</em></td>
<td></td>
</tr>
<tr>
<td><strong>APU HTR TK/FU LINE/H2O/1</strong></td>
<td><em>S88 H2O LOOP 1 FLOW</em></td>
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<tr>
<td><strong>SYS 1A – AUTO</strong></td>
<td><em>S88 H2O LOOP 1 TEMP</em></td>
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</tr>
<tr>
<td><strong>HYD HTR</strong></td>
<td><strong>(O1)</strong> H2O PUMP OUT PRESS LOOP 1 meter ind – 20–25 psia</td>
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</tr>
<tr>
<td><strong>RUD SPD BK A – AUTO</strong></td>
<td><strong>(L1A2)</strong> H2O Loop 1 Pump B</td>
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</tr>
<tr>
<td><strong>LUBE OIL LINE 2 – A AUTO</strong></td>
<td><strong>(L1)</strong> H2O PUMP LOOP 1 – A</td>
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</tr>
<tr>
<td><strong>CH CIRCUIT PUMP 2 MNC PWR</strong></td>
<td><strong>(L1)</strong> H2O PUMP LOOP 1 – A</td>
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<tr>
<td><strong>HYD HTR</strong></td>
<td><strong>(L1)</strong> H2O PUMP LOOP 1 – A</td>
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</tr>
<tr>
<td><strong>RUD SPD BK B – OFF</strong></td>
<td><strong>(L1)</strong> H2O PUMP LOOP 1 – A</td>
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</tr>
<tr>
<td><strong>CIRCUIT PUMP 2 MNC PWR</strong></td>
<td><strong>(L1)</strong> H2O PUMP LOOP 1 – A</td>
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### CREW INDICATIONS

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<tr>
<th>ACTIONS</th>
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<th>NOTES</th>
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<tbody>
<tr>
<td><strong>SM ALERT Light/Tone – on S67 CNTL/ESS V</strong></td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>SM 67 ELECTRIC CNTL BC3 Volts &lt; 20</strong></td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>RM DLMA MANF</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>FWD RCS MANF ISOL 2</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>tb – bp</strong></td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>If H2O PUMP LOOP 1, B – ON:</strong></td>
<td><strong>(SM)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>C/W H2O LOOP It – on</strong></td>
<td><strong>(SM)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>‘S88 H2O PUMP P1’</strong></td>
<td><strong>(SM)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>‘S88 H2O LOOP 1 FLOW’</strong></td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>‘S88 H2O LOOP 1 TEMP’</strong></td>
<td><strong>(SM)</strong></td>
<td></td>
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<tr>
<td><strong>(O1)</strong> H2O PUMP OUT PRESS LOOP 1 meter ind – 20–25 psia</td>
<td><strong>(SM)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>(F7)</strong> If APUs active and using H2O BLR CNTLR/HTR 1A or 2A: C/W APU TEMP it on after -2 min</td>
<td><strong>(SM)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>L/R ADP deploy time incr from 15 to 30 sec</strong></td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>STAR TRKR DR POS (two) OP/CL time incr from 8 to 16 sec</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>SM (BFS SM 63) PL BAY DOORS</strong></td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>In AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’</strong></td>
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<td><strong>SM 94 PDRS CONTROL</strong></td>
<td><strong>(SM)</strong></td>
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<td><strong>Indications lost:</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>MPM Mtr 2 STO/DPY Fwd MRL Mtr 1</strong></td>
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<td><strong>LAT/REL/RDY Mid MRL Mtr 2</strong></td>
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<td>(A14)</td>
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<tr>
<td>OMS Crstfd Ln Htrs B (all)</td>
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<td>H2O PUMP LOOP 1 – A</td>
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<td><strong>tb – bp</strong></td>
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<tr>
<td><strong>If H2O PUMP LOOP 1, B – ON:</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>C/W H2O LOOP It – on</strong></td>
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<tr>
<td><strong>‘S88 H2O PUMP P1’</strong></td>
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<tr>
<td><strong>‘S88 H2O LOOP 1 FLOW’</strong></td>
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<tr>
<td><strong>‘S88 H2O LOOP 1 TEMP’</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>(O1)</strong> H2O PUMP OUT PRESS LOOP 1 meter ind – 20–25 psia</td>
<td><strong>(SM)</strong></td>
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</tr>
<tr>
<td><strong>(F7)</strong> If APUs active and using H2O BLR CNTLR/HTR 1A or 2A: C/W APU TEMP it on after -2 min</td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>L/R ADP deploy time incr from 15 to 30 sec</strong></td>
<td><strong>(SM)</strong></td>
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<tr>
<td><strong>STAR TRKR DR POS (two) OP/CL time incr from 8 to 16 sec</strong></td>
<td><strong>(SM)</strong></td>
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<td><strong>SM (BFS SM 63) PL BAY DOORS</strong></td>
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*Not applicable*
### ACTIONS

If NH3 CNTLR A(B) – SEC/ON reqd, then:
- L2  H2O PUMP
  - LOOP 1 (two) – ON, A(B)
  - LOOP 2 – ON
  - FLOW PROP VLV LOOP (two) – ICH

If applicable:
- Activate PL H2O LOOP(s)

### EQUIP/FUNCTION LOST

| (MA73C) | Port RMS; MPM Mtr 2 |
| (L1)    | Fwd MRL Mtr 1 |
|        | Mid MRL Mtr 2 |

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM
- (L1) SMOKE DETN CKT TEST – OFF

### CREW INDICATIONS

| (Continued) |
| 7 | Single mtr time. One failure away from EVA to stow MPM or from RMS jettison |
| 8 | Single mtr time |

#### WARNING

Driver pwr to F4/F5 Jets lost only if both RJDF 2B and L5/F5/R5 Driver sws (pnl O16:F) OFF simultaneously.

| 9 | Six vlvls fail to non-isolation position |
| 10 | Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired |
| 11 | Use pb on AFT pnl A6 |
| 12 | Stow capability remains |

### NOTES

- EQUIP/FUNCTION LOST
- CREW INDICATIONS
- NOTES

10/14/03  7–229  MAL/ALL/GEN F
### EPS SSR–105 (Cont)

#### BUS LOSS:  CNTLBC3

<table>
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<tr>
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<td>14</td>
<td>ET Door Mtrs:</td>
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<tr>
<td></td>
<td>C/L Lat Actr 1 Mtr 2 GPC Cntl</td>
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<td></td>
<td>L Dr Uplock Lat Mtr 2 GPC Lat capability</td>
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<td></td>
<td>R Dr Uplock Lat Mtr 2 GPC Lat capability</td>
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<td></td>
<td>R Dr Closure Mtr 2 GPC CL capability</td>
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<td>(MA73C)</td>
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<td>AC pwr removal capability via Limit sw for ET Dr Mtrs:</td>
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<td></td>
<td>Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw</td>
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<td></td>
<td>Redundant Ku–Bd Xmit Enable Signal</td>
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<td>Redundant Ku–Bd Boom Stow Enable II Excitation Signal</td>
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<td>APU 3 Fu Tk Viv B</td>
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<td></td>
<td>14 Redundant mtrs remain</td>
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<tr>
<td></td>
<td>15 With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed to GND position</td>
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<td></td>
<td>16 MNC MMC2 pwr for Ku–Bd Xmit Enable signal remains</td>
<td></td>
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<tr>
<td></td>
<td>17 MNC MMC2 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs</td>
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<tr>
<td></td>
<td>18 Viv closes. Redundant Viv A remains</td>
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</tbody>
</table>
Appliance Heat Transfer

- Gas GEN/Fuel Pump 2 – A AUTO
- Gas GEN/Fuel Pump 3 – B AUTO
- Lube Oil Line 3 – B AUTO
- APU HTR TK/FU Line/H2O Line/B
- SYS 2A – AUTO
- SYS 2B – OFF
- SYS 3A – OFF
- SYS 3B – AUTO

Hydraulic Heat Transfer

- Aft Fuselage Htrs B
- HYD CIRC PUMP PWR 2 – MNC
- HYD CIRC PUMP PWR 3 – MNC
- H2O Loop 2 Pump GPC Ctrl
- Flash Evap Cntlr Pri A
- Flash Evap Duct L,R Fwd, Aft Htrs C
- Flash Evap Duct Inbd, Outbd Htrs C
- Flash Evap Fdln Htrs B
- MDU CRT 3
- MDU CDR 1 (P)
- MDU MFD 1 (S)
- MDU MFD 2 (S)
- MDU AFD 1 (S)
- MDU PLT 2 (P)

Reconfig following vlv(s) only if leak isolation reqd:

- Aft L RCS He Press Isol B man CL capability
- Aft L RCS Tk Isol 1/2 man CL capability
- Aft L RCS Xfeed Vlv 1/2 man CL capability

If HI LOAD EVAP enabled:

- HI LOAD Duct Htr 3B

On MCC GO:

- GPC/CRT 03 EXEC
- PLB Floodlts lost:
- Mid Stbd
- Aft Port
- Docking

If APUs active and using BLR CNTLR/HTR 3B:

- C/W APU TEMP lt  – on after ∼2 min

During PLBD OP/CL, single mtr run time noted on actuators listed at left

During Rad Dpy/Sto ops:

- RAD CNTL PORT tb indicates single mtr ops
- RAD LAT CNTL STBD tb indicates single mtr ops
- R ADP deploy time incr from 15 to 30 sec

During PLBD OP/CL, single mtr run time noted on actuators listed at left

If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

- PLB Floodlts lost:
- Mid Stbd
- Aft Port
- Docking

Loss of redundant port to the following:

- MDU CDR 1 (P)
- MDU MFD 1 (S)
- MDU MFD 2 (S)
- MDU AFD 1 (S)
- MDU PLT 2 (P)

- Do not reconfig for reg switch or ‘CNCT procedures

References:

- EPS SSR−106
- BUS LOSS: CNTLCA1

Actions:

- APU HTR
- Gas GEN/Fuel Pump 2 – A AUTO
- Gas GEN/Fuel Pump 3 – B AUTO
- Lube Oil Line 3 – B AUTO
- APU HTR TK/FU Line/H2O Line/B
- SYS 2A – AUTO
- SYS 2B – OFF
- SYS 3A – OFF
- SYS 3B – AUTO

Equip/Function Lost:

- APU 2 GG/Fu Pump Htr B
- APU 3 GG/Fu Pump Htr A
- APU 3 Tk/Fu Ln Htr A
- Aft Fuselage Htrs B
- Circ Pump 2 MNC pwr
- FES Cntlr Pri A
- Hi Fusing Dct L,R Fwd, Aft Htrs C
- Hi Load Duct Inbd, Outbd Htrs C
- FES H2O Fdln B Htrs 2 (all)
- MDU CRT 3
- MDU CDR 1 (P)
- MDU MFD 1 (S)
- MDU MFD 2 (S)
- MDU AFD 1 (S)
- MDU PLT 2 (P)

Crew Indications:

- SM ALERT Light/Tone – on CRT 3 blanks
- SM 67 ELECTRIC
- CNTL CA1 < 20 V

Notes:

- If BFS in GPC 3 or 5, move BFS
- If BFS in GPC 1, 2, or 4; and engage reqd, use pb CDR RHC
- Override F3 Manf status to CL:
- GPC/CRT 03 EXEC
- GNC 23 RCS
- RCS FWD – ITEM 1 EXEC
- MANF VLVS 3 OVRD – ITEM 42 EXEC
- (A12)
- RCS/OEM HTR R POD (two) – A AUTO, B OFF
- Refer to OMS/RCS Slide Rule for vlv loss info
- Reconfig following vlv(s) only if leak isolation reqd:
- Aft L RCS He Press Isol B man CL capability
- Aft L RCS Tk Isol 1/2 man CL capability
- Aft L RCS Xfeed Vlv 1/2 man CL capability

Time Critical:

- If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

- Loss of redundant port to the following:
- MDU CDR 1 (P)
- MDU MFD 1 (S)
- MDU MFD 2 (S)
- MDU AFD 1 (S)
- MDU PLT 2 (P)

- Do not reconfig for reg switch or ‘CNCT procedures

- Refer to OMS/RCS Slide Rule for vlv loss info
- Reconfig following vlv(s) only if leak isolation reqd:
- Aft L RCS He Press Isol B man CL capability
- Aft L RCS Tk Isol 1/2 man CL capability
- Aft L RCS Xfeed Vlv 1/2 man CL capability

- Do not reconfig for reg switch or ‘CNCT procedures

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(Continued)
## EPS SSR–106 (Cont)

### BUS LOSS: CNTLCA1

<table>
<thead>
<tr>
<th>(O8)</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• R OMS TK ISOL B</td>
<td></td>
</tr>
</tbody>
</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

When reqd:
- For FC3, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)

Prior to using L OMS:
- (O8) L OMS He PRESS/VAP ISOL
  - A – GPC
  - B – OP

For SSME Hyd Repress:
- (R4) HYD MPS/TVC ISOL VLV SYM 1.2 – OP, wait 10 sec, then CL

If reqd during entry (< 120K ft):
- (L1) NH3 CNTLR A(B) – PRI/GPC

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**
- MDU CRT 3 PWR – OFF
- (C2) IDP/CRT3 PWR – OFF
- (R2) MPS He I’CNECT R – GPC
- (R4) MPS FILL/DRAIN LO2 OUTBD – GND
- (O16) RGA 3 – OFF

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>(O8)</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>R OMS Tk Isol B man CL capability</td>
<td></td>
</tr>
</tbody>
</table>

| (A14) | R OMS Tk Isol B man CL capability |

| (R11U) | FC3 Purge Vlv man Cntl |

| (O8) | L OMS He Press Isol A man Cntl, He Vap Isol 1.2 man A Cntl |

| (R4) | MPS/TVC Hyd Sys 3 Isol man Cntl |

| (L1A2) | NH3 Sys B Sec Cntl man Cntl |

### CREW INDICATIONS

- **6** Vlv normally closed
- **7** Sys B Pri Cntlr, auto switchover to Sec Cntlr remain
- **8** Loss of manual capability to inert LO2 Manf
- **9** Six vlvls fail to non–isolation position
- **10** Redundant mtr remains
- **11** Htr Cntl 2 remains
- **12** Vlv holds position, FC3 Redundant Reac Vlv Close Cntl on pnl C3 remains
- **13** FC3 can be stopped via FC3 CNTLR sw (O16:A)

### NOTES

**EQUIP/FUNCTION LOST**

**CREW INDICATIONS**

**NOTES**

- **6** Vlv normally closed
- **7** Sys B Pri Cntlr, auto switchover to Sec Cntlr remain
- **8** Loss of manual capability to inert LO2 Manf
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BUS ISOLATION

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<tbody>
<tr>
<td>(C3)</td>
<td>FC2 Redundant Reactor Valve Close Ctrl</td>
<td></td>
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<tr>
<td>(R1A2)</td>
<td>Cryo O2,H2 Tk1 Htr A man On and Tk3 Htr B man On Ctrl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R2)</td>
<td>L MPS He Isol B man Ctrl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13A2)</td>
<td>PLBD: C/L Lat 1−4, 5−8 Mtrs 2 Port Alt Blkhd Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A15)</td>
<td>Pallet Structure Htr B Stbd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A8L)</td>
<td>Port RMS: Fwd MRL Mtr 2 Mid MRL Mtr 2 Aft MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1A2)</td>
<td>Freon Loop 2 Ctrl A Rad Byp Vlv Mtr man Ctrl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A6A1)</td>
<td>Aft ADI Att ref set capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O16)</td>
<td>RJDF 2A F3 Manf Logic pwr (F3L,F3D,F3U,F3F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C3A1)</td>
<td>R OMS Eng Pr Vlv Coil 1 and Ctrl Vlv 1.2 Coils 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R4)</td>
<td>Hyd Brake Isol 3 man Ctrl (F6A5,F8A5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td>LG Extend Vlv 1 NWS Hyd Sys 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13A2)</td>
<td>Rad Ctrl Sys: Stbd Rad Lat 7−12 Mtr 2 Port Rad Dpy/Sto Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R2)</td>
<td>ET Door Mtrs: C/L Lat Atr 1 Mtr 1 man Sto capability C/L Lat Atr 2 Mtr 1 man Sto capability L Dr Closure Mtr 2 man Ctrl L Dr Unlock Lat Mtr 1 man Ctrl R Dr Unlock Lat Mtr 1 man Ctrl</td>
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<tr>
<td>(Continued)</td>
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</tbody>
</table>

NOTES

EQUIP/FUNCTION LOST

10 Redundant mtr remains
14 Auto Ctrl of these Htrs also lost if single Htr Ops and tank not paired
15 Pwr to MCA Drivers lost through ENABLE sw
16 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
17 Ctrlrs A, B Rad Byp Vlv Mtr Auto Ctrl and Ctrl B Rad Byp Vlv Mtr Man Ctrl remain

CAUTION

19 Redundant coils remain
20 R OMS auto shdtn if Pc < 80% and '↓' on MNVR EXEC display
21 Vlv holds position. GPC capability remains
22 Lost Hyd deploy capability for all Ldg Grs. Pyro Backup Release Sys will deploy Ldg Grs. NLG can also be deployed by Hyd Sys 2
23 Hyd Sys 2 still available for NWS

WARNING

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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>(R13A2) Ku Ant Sto/Dpy Mtr 1 Direct Sto Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>(R13A2) Redundant Sto Initiate Signal to Ku−Band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>(O17) Freon Loop 2 Cold Plate Flow Xdcr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>(R2) APU 1 Fu Tk Vlv B Hyd Main Pump 3 Depress Solenoid RPC A Hyd Main Pump 2 Depress Solenoid RPC B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>(O17) Aft PL MNC current Xdcr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>(F3,F4) PLT Dpy Fire 2 Jett Fire 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
- EQUIP/FUNCTION LOST
  - BUS LOSS: CNTLCA1
  - Mtr 2 remains
  - Redundant stow initiate sig (CNTL BC1) to Ku−Band remains
  - Vlv fails closed. Redundant vlv remains
  - Redundant RPC remains
  - CDR Dpy/Jett remains

**CREW INDICATIONS:**

**BUS ISOLATION:**

**EQUIP/FUNCTION LOST:**

**NOTES:**

**EPS SSR−106 (Cont)**

**BUS LOSS: CNTLCA1**
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(A12)</td>
<td><strong>APU HTR GAS GEN/FUEL</strong></td>
</tr>
<tr>
<td></td>
<td><strong>APU HTR TK/FU LINE/H2O</strong></td>
</tr>
<tr>
<td></td>
<td><strong>SYS 2A</strong> – AUTO</td>
</tr>
<tr>
<td></td>
<td><strong>B AUTO</strong></td>
</tr>
<tr>
<td></td>
<td><strong>3A – OFF</strong></td>
</tr>
<tr>
<td></td>
<td><strong>HYD CIRC PUMP PWR</strong></td>
</tr>
<tr>
<td></td>
<td><strong>3 – MNA</strong></td>
</tr>
<tr>
<td>(R1)</td>
<td><strong>If TK1 in use:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>O2,H2 TK1 HTR B</strong></td>
</tr>
<tr>
<td></td>
<td>(two) – AUTO</td>
</tr>
<tr>
<td></td>
<td><strong>O2,H2 TK1 HTR A</strong></td>
</tr>
<tr>
<td></td>
<td>(two) – OFF</td>
</tr>
<tr>
<td>(A15)</td>
<td><strong>If OV105 and Tk5 in use:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>O2,H2 TK5 HTR B</strong></td>
</tr>
<tr>
<td></td>
<td>(two) – AUTO</td>
</tr>
<tr>
<td></td>
<td><strong>O2,H2 TK5 HTR A</strong></td>
</tr>
<tr>
<td></td>
<td>(two) – OFF</td>
</tr>
<tr>
<td>(R2)</td>
<td><strong>If TK3 in use:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>O2,H2 TK3 HTR A</strong></td>
</tr>
<tr>
<td></td>
<td>(two) – AUTO</td>
</tr>
<tr>
<td></td>
<td><strong>O2,H2 TK3 HTR B</strong></td>
</tr>
<tr>
<td></td>
<td>(two) – OFF</td>
</tr>
<tr>
<td>(R1A2)</td>
<td><strong>Cryo O2,H2 Tk1 Htr A</strong></td>
</tr>
<tr>
<td>(A15)</td>
<td><strong>Cryo O2,H2 Tk3 Htr B</strong></td>
</tr>
<tr>
<td>(R2)</td>
<td><strong>Pallet Cryo Tk 6−9 Htr B</strong></td>
</tr>
<tr>
<td>(C2)</td>
<td><strong>Pallet Structure Htr B Port</strong></td>
</tr>
<tr>
<td>(L1)</td>
<td><strong>BLR CNTLR/HTR 3</strong> – A</td>
</tr>
<tr>
<td>(C3)</td>
<td><strong>FC2 Redundant Reac Vlv</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Close Cntl</strong></td>
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### EQUIP/FUNCTION LOST

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<tr>
<td>(A12)</td>
<td><strong>APU 3 GG/Fu Pmp Htrs A</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2 Tk/Fu Ln Htrs B</strong></td>
</tr>
<tr>
<td>(F7)</td>
<td><strong>SM ALERT Light/Tone – on</strong></td>
</tr>
<tr>
<td>(FSMs)</td>
<td><strong>2 C/W FREON LOOP lt – on</strong></td>
</tr>
<tr>
<td>(R2)</td>
<td><strong>Circ Pump 3 MNC pwr</strong></td>
</tr>
<tr>
<td>(F7)</td>
<td><strong>R RCS D(L,U,F) JET</strong></td>
</tr>
<tr>
<td>(R2)</td>
<td><strong>TOP EVAP HTR DUCT</strong></td>
</tr>
<tr>
<td>(C3)</td>
<td><strong>MDU CRT 4</strong></td>
</tr>
<tr>
<td>(R2)</td>
<td><strong>Hi Load Duct Inbd,Outbd, Noz Htrs C</strong></td>
</tr>
<tr>
<td>(R1A2)</td>
<td><strong>FES Cntlr Pri A</strong></td>
</tr>
<tr>
<td>(A15)</td>
<td><strong>Pri B and Sec Cntls</strong></td>
</tr>
<tr>
<td>(A12)</td>
<td><strong>Hi Load Evap Duct Fwd,Aft Htrs C</strong></td>
</tr>
<tr>
<td>(R1A2)</td>
<td><strong>Pri A GPC Sel capability remains. Pri B and Sec Cntls remain</strong></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>(F7)</td>
<td><strong>SM 67 ELECTRIC</strong></td>
</tr>
<tr>
<td>(F7)</td>
<td><strong>CNTL CA2 &lt; 20 V</strong></td>
</tr>
<tr>
<td>(R13L)</td>
<td><strong>RAD CNTL PORT tbs (two)</strong></td>
</tr>
<tr>
<td>(R1)</td>
<td><strong>MDU AFD 1 (P)</strong></td>
</tr>
<tr>
<td>(F7)</td>
<td><strong>STAR TRKR DR POS −Z CL</strong></td>
</tr>
<tr>
<td>(R1)</td>
<td><strong>Pri A GPC Sel capability remains. Pri B and Sec Cntls remain</strong></td>
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### NOTES

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<table>
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<tbody>
<tr>
<td>1</td>
<td><strong>TIME CRITICAL</strong></td>
</tr>
<tr>
<td>2</td>
<td><strong>Indications do not appear until jets commanded</strong></td>
</tr>
<tr>
<td>3</td>
<td><strong>If GPC commands CRT</strong></td>
</tr>
<tr>
<td>4</td>
<td><strong>Loss of redundant port to the following:</strong></td>
</tr>
<tr>
<td>5</td>
<td><strong>MDU AFD 1 (P)</strong></td>
</tr>
<tr>
<td>6</td>
<td><strong>During Rad Dpy/Sto ops:</strong></td>
</tr>
<tr>
<td>7</td>
<td><strong>R RCS D(L,U,F) JET</strong></td>
</tr>
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### EQUIP/FUNCTION LOST (Continued)

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<td>(A12)</td>
<td><strong>FC2 Redundant Reac Vlv</strong></td>
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<td><strong>Close Cntl</strong></td>
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<td>(A15)</td>
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<tr>
<td>(A15)</td>
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**EPS SSR–107**
**BUS LOSS: CNTLCA2**

10/14/03

7–235

MAL/ALL/GEN F
**EPS SSR−107 (Cont)**

**BUS LOSS: CNTLCA2**

<table>
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<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info. Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT L,R RCS TK 1/2 • XFEED 1/2</td>
<td>(O7) 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 (O8) R OMS Tk Isol B man CL capability FWD RCS: Tk Isol 1/2 man CL and man Ovrd of GPC CL capability</td>
<td>? Do not reconfig for reg switch or l’CNCT procedures</td>
<td>7</td>
</tr>
<tr>
<td>When reqd: • Perform FC3 purges in AUTO mode (ORB OPS)</td>
<td>(R11U) FC3 Purge Vlv man Cntl</td>
<td>8 Vlv normally closed</td>
<td>8</td>
</tr>
<tr>
<td>(A6U) • ADI ATT – LVLH • ERR – MED • RATE – MED</td>
<td>(A6A1) Alt ADI capability: Att Sel Error Scale Sel Rate Scale Sel Att ref set</td>
<td>9 Manf status not automatically declared closed. Jet fail−offs may occur</td>
<td>9</td>
</tr>
<tr>
<td>(A14) RCS/OMS HTR • R POD (two) – A AUTO, B OFF</td>
<td>(A14) R Pod B Htrs (partial)</td>
<td>10 RM sw downmodes to 2−level for −X position</td>
<td>10</td>
</tr>
<tr>
<td>GNC 23 RCS Override F3 Manf status to CL: • RCS FWD – ITEM 1 EXEC • OVRD MANF VLVS STAT 3 – ITEM 42 EXEC</td>
<td>(O16) RCS Manf F3 RJD pwr (F3L,F3D,F3U,F3F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A6U) If SENSE −Z: • SENSE − −X • Wait at least 1 sec, then reposition as desired</td>
<td>(A6A1) 3−level sw RM for −X Sense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GNC 23 RCS • Reprioritize L,R Manf 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 to 6</td>
<td>(A14) Aft RCS L,R Jet 4 Htr</td>
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<td>(Continued)</td>
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### ACTIONS

**During OPS 8:**
- **DES PNL TRIM R1**
- **DES BDY FLP R1**

For SSME Hyd Repress:
- **HYD MPS/TVC ISOL VLV SYS 1,2**

If reqd during entry (< 120K ft):
- **NH3 CNTLR A(B) – PRI/GPC**

### EQUIP/FUNCTION LOST

- **R Trim RHC – INH capability**
- **R Bdy Flp – UP/DN capability**
- **MPS/TVC Hyd Sys 3 Isol man Cntl**
- **NH3 Sys A Sec Cntl man On capability**
- **FC3 Reac Vlv Cntl via pnl R1 sw**
- **FC3 STOP capability via START/STOP sw**
- **R ADP Dpy Mtr 1 Hr Cntl 1**
- **Alt Panel Trans X,Y, Norm, Pulse, Rot Roll, Pitch, Yaw Disc Rate, and Pulse Sel capability**
- **Alt Pnl Trans Z High,Norm Pulse Sel capability**
- **Alt Pnl Trans Low Z Sel capability**
- **Alt Pnl PRI,ALT,VERN Sel capability**
- **Alt Pnl PCT Exec capability**

- **NLG Ext Sys 1, LMG, RMG Bkup Rel Sys 1**
- **R MPS He Isol A man Cntl**

- **Rad Cntl Sys: Port RAD Lat 7−12 Mtr 2 Dpy/Sto Mtr 2**

### CREW INDICATIONS

- **L Trim and Body Flap cntls remain.**
- **Right Trim and Body Flap cntl function is regained after lost contacts have been deselected in OPS−8 (3,B)**
- **Sys A Pri Cntl, auto switchover to Sec Cntl remain**
- **Vlv holds position, FC3 Redundant Reac Vlv Close Cntl on pnl C3 remains**
- **FC3 can be stopped via FC3 CNTLR sw (pnl O16:A)**
- **Hr Cntl 2 remains**
- **Use pbs at pnl C3**
- **Redundant coils remain**
- **R OMS auto shtdn if Pc < 80% and ↓' on MNVR EXEC display**

### NOTES

- **BUS ISOLATION**
  - **TRIM RHC – ENS**
  - **PNL – OFF**
  - **IDP/CRT4 PWR – OFF**
  - **MDU CRT 4 PWR – OFF**

- **EPS SSR−107 (Cont)**

- **BUS LOSS: CNTLCA2**

- **BUS LOSS**
  - **TRIM RHC – ENS**
  - **PNL – OFF**

- **NLG Ext Sys 1, LMG, RMG Bkup Rel Sys 1**

- **R MPS He Isol A man Cntl**

- **CAUTION**
  - **No Purge. Wait 10 min between burns**
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<td></td>
<td>(A8L) Port RMS MPM Mtr 1</td>
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<td>(R2) ET Door Mtr:</td>
<td>C/L Lat Acct 1 Mtr 2 man Stow capability</td>
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<td>R Dr Closure Mtr 1 man Cntl</td>
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<td>(R13A2) 21 Ku Ant Sto/Dpy Mtr 1 Direct Sto Mtr 1</td>
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<td>(R2) APU 2 Fu Tk Vlv A Cntl Pwr Sply B</td>
<td>13 Redundant mtrs remain</td>
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<td></td>
<td>Hyd Main Pump 3 Depress Solenoid RPC A</td>
<td>20 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</td>
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<td>Hyd Main Pump 2 Depress Solenoid RPC B</td>
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<td>C/L Lat 9–12 Mtr 2 13–16 Mtr 1 Stbd Aft Blkd Mtr 1 Port Door Mtr 1</td>
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<td>PLTB:</td>
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<td>C/L Lat 9–12 Mtr 2 13–16 Mtr 1 Stbd Aft Blkd Mtr 1 Port Door Mtr 1</td>
<td>24 Redundant RPC remains</td>
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<td>(F3,F4) 26 PLT Dpy Fire 1 Jett Fire 1</td>
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<td>25 Pwr to MCA Drivers lost through ENABLE sw</td>
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<td>ACTIONS</td>
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<td>APU 3 GG/Fu Pump Htrs B</td>
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<td>TIME CRITICAL</td>
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<td>if Tk2 in use:</td>
<td>Cryo O2,H2 Tk2 Htrs B</td>
<td>CNTL CA3 Volts &lt; 20</td>
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<td>O2, H2 Tk2</td>
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<td>HTR B (two) – OFF</td>
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<td>if TK4 in use:</td>
<td>Cryo O2,H2 Tk4 Htrs B</td>
<td>FWD RCS TK ISOL 1/2</td>
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<td>BLR CNTLR/HTR 2</td>
<td>Hyd H2O Blr 2 Cntlr A</td>
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<td>CRYO TABLE A for</td>
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<td>OP/CL time incr from 8 to 16</td>
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<td>(MA73C)</td>
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<td>RCS Manf F4 RJD pwr</td>
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(Continued)
### ACTIONS
For PLBD ops:
- OP/CL Drs in man mode

- TOP EVAP HTR DUCT – A(B)
  If HI LOAD EVAP enabled:
  - HI LOAD DUCT HTR – A(B)

### BUS ISOLATION
ONLY ON MCC CALL, PERFORM

### EQUIP/FUNCTION LOST

| (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 Blkhd Mtr 2  
          | Stbd Aft Blkhd Mtr 1  
          | Port Door Mtr 1  
          | Stbd Door Mtr 2 CL Limit sw |

| (L1A2) | Topping Evap Duct Fwd, Aft Htrs C  
        | Hi Load Duct Outbd, Inbd  
        | Noz Htrs C |

### CREW INDICATIONS

### NOTES

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<tr>
<th>SM (BFS, SM) 63 PL BAY DOORS</th>
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<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’</td>
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</table>
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 |

<table>
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<tr>
<th>SM 94 PDRS CONTROL</th>
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</table>
Indications lost:  
MPM Mtr 1 STO/DPY  
Fwd MRL Mtr 2  
LAT/REL/RDY  
Aft MRL Mtr 1  
LAT/REL/RDY |

### SHEET 1 OF 2

| (MA73C) | Aft RCS L, R Jet 5 Htrs  
          | C MPS He Isol B man Cntl  
          | − Z Star Trkr Dr Sys 2 OP/CL capability  
          | R ADP Deploy Mtr 1  
          | Deploy Disc 1  
          | Htr Cntlr 1  
          | 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  
          | 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 Lat Mtr 1  
          | Port RMS:  
          | MPM Mtr 1  
          | Fwd MRL Mtr 2  
          | Aft MRL Mtr 1 |

(Continued)
## EPS SSR-108 (Cont)
### BUS LOSS: CNTLCA3

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
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<tr>
<td>12</td>
<td>Ku Ant Sto/Dpy Mtr 1 Limit sw and Stow capability</td>
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<td>13</td>
<td>Redundant Ku−Bd Xmit Enable Signal</td>
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<td>14</td>
<td>Redundant Boom Stow Enable II Excitation Signal</td>
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<td>APU 3 FU Tk Vlv A</td>
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<td>Cntlr pwr Sply A</td>
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<td>GBX GN2 Repress Vlv</td>
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**NOTES:**

- **BUS LOSS:** CNTLCA3
- **CREW INDICATIONS:**
  12. With an inop limit sw, mtr will continue to run until primary sw returned to GND
  13. MNB MMC4 pwr for Ku−Bd Xmit Enable Signal remains
  14. MNB MMC4 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs
  15. Vlv closed. Redundant vlv remains
  16. Redundant pwr sply remains
### EPS SSR–109
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.
**EPS SSR–110**
**BUS LOSS: AC1**
(Includes all AC1 sub-buses)

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R2)</td>
<td>• Perform FC1 SHUTDN FC SHUTDN (Cue Card)</td>
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<tr>
<td>(L1)</td>
<td>• HUM SEP A – OFF</td>
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<td></td>
<td>● B – ON</td>
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<td></td>
<td>• IMU FAN A – OFF</td>
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<td>● B(C) – ON</td>
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<td>• H2O PUMP LOOP 1 (two) – OFF, B</td>
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<td>● H2O LOOP 1 BYP MODE – AUTO</td>
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<td>• AV BAY 1 FAN A – OFF</td>
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<td>• AV BAY 2 FAN (two) – ON</td>
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<td>• AV BAY 3 FAN A – OFF</td>
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<td>• FREON PUMP LOOP 1 – B</td>
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<td>• FREON PUMP LOOP 2 – A</td>
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<td>If Arlk/Tnl Fan active:</td>
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<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
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<td>• URINE DIVERTER VLV – FAN SEP 2</td>
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<td>• HUM SEP A ON:</td>
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<td></td>
<td>‘S66 HUMID SEP A’</td>
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### Actions

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<tbody>
<tr>
<td>If CAB TEMP CNTLR 2 active: (L1)</td>
<td>Cabin Temp Cntlr 2, Hx Byp Vlv Mtr 2</td>
<td>If IMU FAN A ON: &quot;S66 IMU FN SPD A&quot; &quot;S66 IMU FAN DP&quot;</td>
<td>(MO51F)</td>
</tr>
<tr>
<td>• CAB TEMP CNTLR – OFF (MD44F)</td>
<td>• CO2 Rmvl Sys: Cntlr 1 Fan AC1 pwr Compressor AC1 pwr</td>
<td>If APU active and using H2O BLR CNTLR/HTR 1B or 3A, then C/W APU TEMP lt on after ~2 min</td>
<td>(Continued)</td>
</tr>
<tr>
<td>• Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR (L1)</td>
<td></td>
<td>STAR TRKR DR POS – Y OP/CL time incr from 8 to 16 sec</td>
<td>(Continued)</td>
</tr>
<tr>
<td>• CAB TEMP CNTLR – 1 (MO51F)</td>
<td></td>
<td>L ADP deploy time incr from 15 to 30 sec</td>
<td>(Continued)</td>
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<tr>
<td>If CO2 Rmvl SYS flown and if CO2 Rmvl SYS CNTLR 1 selected:</td>
<td></td>
<td>If Freon Loop 2 Pump B on:</td>
<td>(Continued)</td>
</tr>
<tr>
<td>• Perform CO2 Rmvl SYS CNTLR CONFIG: ACT 1/DEACT 2(ACT 2/DEACT 1) (ORB OPS, ECLS)</td>
<td></td>
<td>‘S88 FREON FLOW 2’ ‘S88 FRN AFT CP 2’ ‘S88 FRN PL HX 2’</td>
<td>(Continued)</td>
</tr>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS and FMC1 Slide for Fwd RCS)</td>
<td></td>
<td>(O1) FREON FLOW LOOP 2 ind – 578 pph</td>
<td>(Continued)</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

| (MA73CC) cb MCA PWR | AC1 3Φ FWD 1 – op MID 1 – op | | |
| (MA73CD) cb MCA PWR | AC1 3Φ MID 3 – op AFT 1 – op | | |
| (MA73CE) cb AC1 WCS FAN SEP 1 (three) – op | | | |
| (MA73CF) cb AC1 | RMS PRI ФА – op | | |
| • MAR 3Φ – op | | | |
| • OPS INST HYD ACTR ФC – op | | | |
| IF DOCKING MISSION | | | |
| • cb AC1 ARLK/TNL FAN A (three) – op | | | |

### EQUIP/FUNCTION LOST

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<tr>
<td>(MO51F) CO2 Rmvl SYS CNTLR 1 FAIL lt on Impending</td>
<td>If IMU FAN A ON: &quot;S66 IMU FN SPD A&quot; &quot;S66 IMU FAN DP&quot;</td>
<td>(Continued)</td>
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<tr>
<td>If CO2 Rmvl SYS CNTLR 1 selected</td>
<td>If APU active and using H2O BLR CNTLR/HTR 1B or 3A, then C/W APU TEMP lt on after ~2 min</td>
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<td>If Freon Loop 2 Pump B on:</td>
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<td>If Freon Loop 2 Pump B on:</td>
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<td>‘S88 FREON FLOW 2’ ‘S88 FRN AFT CP 2’ ‘S88 FRN PL HX 2’</td>
<td>(O1) FREON FLOW LOOP 2 ind – 578 pph</td>
<td>(Continued)</td>
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### NOTES

- If Freon Loop 2 Pump B on, single mtr run time noted on actuators listed at left
- During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops
- During PLBD OP/CL, single mtr run time noted on actuators listed at left
<table>
<thead>
<tr>
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<td>(MA73CHJ)</td>
<td>• cb AC1 FWD RCS VLV (three) – op</td>
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<td>• cb AC1 AFT POD VLV GP (three) – op</td>
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<td>(L4:A–E)</td>
<td>• cb UTIL PWR F1/MO52J</td>
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<td>• AC1 – op</td>
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<td>• cb AC1</td>
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<td>• FC1 PUMPS (three) – op</td>
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<td>• CTR ENG (three) – op</td>
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<td>• R ENG (three) – op</td>
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<td>(L4:F–J)</td>
<td>• √ H2O LOOP PUMP 1A/2 (three) – op</td>
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<td>• AV BAY 1 FAN A (three) – op</td>
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<td>• AV BAY 3 FAN B (three) – op</td>
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<td>• HUM SEP A (three) – op</td>
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<td>(L4:K)</td>
<td>• pha H2O CNTLR 2 – op</td>
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<td>• phb CAB AIR S/C – op</td>
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<td>(L4:L)</td>
<td>• pha CAB T CNTLR 2 – op</td>
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<td>• phb AV BAY 2 S/C – op</td>
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<td>• pha CAB T CNTLR 2 – op</td>
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<td>• phb AV BAY 2 S/C – op</td>
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<td>• phc CAB AIR S/C – op</td>
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<td>(L4:O)</td>
<td>• pha BLR HYD BYP 1B – op</td>
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<td>• phb HYD QTY 1 – op</td>
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<td>• phc BLR HYD BYP 3A – op</td>
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<td>• pha RAD CNTLR 1B – op</td>
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<td>• phb RAD CNTLR 2B – op</td>
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<td>• phc TACAN 1 – op</td>
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<td>(L4:Q)</td>
<td>• pha LTG PNL L/CTR – op</td>
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<td>• phb LTG PNL L OVHD – op</td>
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<td>• phc LTG INST OS – op</td>
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<td>cb AC1</td>
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<td>● φA LG INST R – op</td>
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<tr>
<td>● φB NUMERIC FWD – op</td>
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### EQUIP/FUNCTION LOST

| Inst Its R                  |
| Numeric Its (pnl O3,F7)     |
| (RCS/OMS Prplt Qty, Gauge, Mission and Event Timers) |

| LH Vents 5,6 Mtrs 1         |
| Stbd Rad 1 Lat 1–6,7–12     |
| Mtrs 1                      |
| Stbd Rad Dpy/Sto Mtr 1      |

| ET Door Mtr:                |
| C/L Lat Actr 1,2 Mtr 1      |
| L Dr Closure Mtr 1          |
| Uplock Lat Mtr 1            |

### CREW INDICATIONS

| 12 Redundant mtr remains   |
| 15 MCC for total OMS Qtys. Aft Qtys are found on |

### NOTES

GNC SYS SUMM 2

---

10/14/03
### ACTIONS

| (L1) | • HUM SEP A – OFF  
| •  /C0112 | • IMU FAN A – OFF  
| •  /C0112 | • H2O PUMP LOOP 1 Byp Mode – AUTO  
| •  (two) – ON, B  
| •  /C0112 | • H2O PUMP LOOP 2 – OFF  
| •  /C0112 | • FREON PUMP LOOP 1 – ON  
| •  /C0112 | • FREON PUMP LOOP 2 – OFF  
| •  /C0112 | • AV BAY 1 Fan A – OFF  
| •  /C0112 | • AV BAY 3 Fan B – OFF  
| •  /C0112 | • ARLK FAN A – OFF  
| •  /C0112 | • ARLK FAN B – ON  
| •  (MO13Q) | If Arlk/Tnl Fan active:  
| •  (R2) | • BLR CNTLR/HTR 1 – A  
| •  (MD44F) | • SM 60 SM TABLE MAINT  
| •  (L1) | • CAB TEMP CNTLR 2 active:  
| •  (L1) | • CAB TEMP CNTLR – OFF  
| •  (MD44F) | • Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR  
| •  (MO13Q) | If CAB TEMP CNTLR 1 active:  
| •  (R13U) | • C/W PARAM SEL tw (three) – 033,115  
| •  (WCS) | • V/MODE – AUTO  
| •  (EDO WCS) | • URINAL SEL – SEP 2  

### EQUIP/FUNCTION LOST

| 1Φ of Hum Sep A  
| 1Φ of IMU Fan A  
| H2O Loop 2 Byp Cntlr, Sig Cond; Byp Byp pwr  
| 1Φ of H2O Loop 2 Pump GPC Cntlr pwr  
| 1Φ of H2O Loop 1 Pump A Freon Loop 1 Pump A  
| 1Φ of Av Bay 1 Fan A  
| 1Φ of Av Bay 3 Fan B  
| 1Φ of Arlk/Tnl Fan A  
| Hyd H2O Blr 1 Cntlr B  
| 1Φ of FC1 H2 Pump  
| 1Φ of FC1 Coolant Pump  
| Cabin Temp Cntlr 2, Hx Byp Vlv Mtr 2  
| 1Φ of WCS Fan/Sept 1  
| Urine Sep Fan 1  
| 1Φ of Commode Fan 1  

### CREW INDICATIONS

| MASTER ALARM  
| Light/Tone – on  
| (F7) | C/W AC VOLT lt – on  
| (F9) | Inhibit 0612705, 0612700, 0612740, 0612710  
| SM ALERT Light/Tone – on  
| (F9) | AC1 ΦA AC volts < 90  
| (LIGHTS LOST) | Instr lts R (pnlsls C2,F8,F9)  
| (SM) | AC1 ΦA AC volts < 90  
| (SM) | S67 AC VOLTS 1  
| (SM) | S69 FC H2 PUMP 1  
| (SM) | S86 WSB T  
| (SM) | SM0 THR MTD HYD  
| (SM) | S88 H2O PUMP P 2  
| (SM) | S88 H2O LOOP 2 Qty  
| (O1) | If H2O Pump Loop 1, A active:  
| • S88 H2O Loop 1 P 1  
| • H2O Pump Out Press LOOP 1 ind – 40–45 psia  
| • If IMU Fan A ON:  
| • ‘S66 IMU FN SPD A’  
| • ‘S66 IMU Fan DP’  
| • If HUM SEP A ON:  
| • ‘S66 HUMID SEP A’  
| • If APUs active, and using BLR CNTLR/HTR 1B:  
| • C/W APU TEMP lt – on  
| • after ~2 min  

### NOTES

2. Inhibits H2O Loop 2 Pump A, Pump Out Press, Pump Out Temp, and Accum Qty, respectively
3. If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W
4. Lose Auto Temp Cntlr via Cntlr 2 and H2O Loop 2 Cabin Hx In Temp snsr. Hx Byp vlv holds position
5. Inhibits Primary C/W for AC1 voltage and H2O Loop 2 Pump A
6. For EDO WCS, Urine Fans and Seps are DC motors. AC converted to DC internal to controller. Design is such that loss of one AC phase results in loss of Urine Fan or Sep.
Commode Fans may work with 1 Φ down; however, crew actions will pwr fans through alternate pwr source, with full 3 Φ pwr. For WCS, 2 Φ ops will result in degraded airflow. Urine Fan, Seps are unusable for urine collection or EMU drain
### ACTIONS

If bus shorted:
- Open all AC1 ΦA cbs that pwr 3Φ loads on pnls L4: C−J,M,N (9 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)

(MO51F)
- If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 1 selected:
  - Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1/DEACT 2 (ACT 2/DEACT 1)
  - (ORB OPS, ECLS)

If bus not shorted:
- Perform the following BUS ISOLATION steps

### BUS ISOLATION

**IF BUS NOT SHORTED, PERFORM**

<table>
<thead>
<tr>
<th>L4(K)</th>
<th>cb AC1 ΦA H2O CNTLR 2 − op</th>
</tr>
</thead>
<tbody>
<tr>
<td>L4(L)</td>
<td>cb AC1 ΦA CAB T CNTLR 2 − op</td>
</tr>
<tr>
<td>L4(O)</td>
<td>cb AC1 ΦA BLR HYD BYP 1B − op</td>
</tr>
<tr>
<td>L4(P)</td>
<td>cb AC1 ΦA RAD CNTLR 1B − op</td>
</tr>
<tr>
<td>L4(Q)</td>
<td>cb AC1 ΦA LTG PNL L/CTR − op</td>
</tr>
<tr>
<td>L4(R)</td>
<td>cb AC1 ΦA INST R − op</td>
</tr>
<tr>
<td>MA73C(F)</td>
<td>cb AC1 RMS PRI ΦA − op</td>
</tr>
</tbody>
</table>

**EQUIP/FUNCTION LOST**

- **7** 1Φ of AC Utility Power Outlets at F1 and MO52J
- **8** AC1 FMC1 Bus pwr
  - MMC1 Bus pwr
  - MMC3 Bus pwr
  - AM1 Bus pwr
- **9** CO2 Rmvl Sys Cntlr 1
  - 1Φ of CO2 Rmvl Sys:
    - Fan AC1 pwr
    - Compressor AC1 pwr

**CREW INDICATIONS**

- **7** CO2 RMVL SYS CNTLR 1 FAIL it − on
  - Impending:
    - ‘S66 CO2 RL SYS PCO2’
    - ‘S66 CAB PPCO2’

**NOTES**

- **7** MCC will provide equipment reconfig info if required
- **8** Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts. 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
- **9** PEVs, Actuators, Bed A P, Bed B P, Bed dP will be recovered after system reconfig
- **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

**7−249**

**MAL/ALL/GEN F**
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HUM SEP A – OFF</td>
<td>1Φ of Hum Sep A</td>
<td>MASTER ALARM Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>• √B – ON</td>
<td>1Φ of IMU Fan A</td>
<td>(F7) C/W AC VOLT lt – on</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 H2O Loop 2 Pump</td>
<td>C/W AV BAY/CAB AIR lt – on</td>
<td>2 Av Bay 2 Fan ∆P, Air Temp snrs lost</td>
</tr>
<tr>
<td>• H2O PUMP LOOP 2 – OFF</td>
<td>1Φ of H2O Loop 1 Pump A</td>
<td>SM ALERT Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 (two) – GPC, B</td>
<td>Av Bay 2 Sig Condr, Xdcrs (ECLS SC3)</td>
<td>(F7) EVENT TIME ind blank</td>
<td></td>
</tr>
<tr>
<td>• AV BAY 2 FAN (two) – ON</td>
<td>1Φ Freon Loop 1 Pump A</td>
<td>(F9) AC1 Φ Volts &lt; 90</td>
<td></td>
</tr>
<tr>
<td>• FREON PUMP LOOP 1 – B</td>
<td>2 Pump B</td>
<td>(LIGHTS LOST) Pnl its L/OH (pnls O5, O6, O7, O13, O14, O15)</td>
<td></td>
</tr>
<tr>
<td>• Freon Pump Loop 2 – A</td>
<td>1Φ of AV Bay 1 Fan A</td>
<td>3 Crew and gnd have lost PPCO2 Xdcrs</td>
<td></td>
</tr>
<tr>
<td>• √AV BAY 1 FAN A – OFF</td>
<td>1Φ of AV Bay 3 Fan B</td>
<td>4 Use streamers (if flown) or monitor by feel during wake period</td>
<td></td>
</tr>
<tr>
<td>• 3 FAN A – ON</td>
<td>1Φ of Arlk/Tnl Fan A</td>
<td>5 CO2 partial Press and Cabin Fan ∆P snrs lost</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td>2 Av Bay 2 Sig Condr, Xdcrs (ECLS SC6)</td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>(MO13Q)</td>
<td>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>1Φ of Arlk/Tnl Fan A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• B – ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During sleep periods:</td>
<td>(L1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CAB FAN (two) – ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – 033,074</td>
<td>1Φ of WCS Fan/ Sep 1</td>
<td>(O1) AIR TEMP AV BAY 2 – 45 degF</td>
<td>6 Inhibits Primary C/W for AC1 voltage and Cabin Fan ∆P</td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td></td>
<td>(O3) RCS/OMS PRPLT QTY Gage and MSN TIME ind blank</td>
<td></td>
</tr>
<tr>
<td>• MEM – CLEAR</td>
<td>1 If H2O PUMP LOOP 1, A active:</td>
<td>If H2O PUMP LOOP 1, A active:</td>
<td>7 For EDO WCS, Urine Fans and Sep are DC mtrs. AC converted to DC internal to controller. Design is such that loss of one AC phase results in loss of Urine Fan or Sep. Commode Fans may work with 1Φ down; however, crew actions will pwr fans through alternate pwr source with full 3Φ pwr. For WCS, 2Φ ops will result in degraded airflow. Urine Fan, Sep are unusable for urine collection or EMU drain</td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td>H2O LOOP C/W lt ‘S88 H2O PUMP P 1’ (O1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(WCS)</td>
<td>1Φ of WCS Fan/ Sep 1</td>
<td>H2O PUMP OUT PRESS LOOP 1 – 40–45 psia</td>
<td>8 MCC will provide equipment reconfig info if reqd</td>
</tr>
<tr>
<td>• √MODE – AUTO</td>
<td></td>
<td>Urine Fan 1 Sep 1</td>
<td></td>
</tr>
<tr>
<td>• √CRADLE – AUTO</td>
<td>1Φ of Commode Fan 1</td>
<td>1Φ of Commode Fan 1</td>
<td></td>
</tr>
<tr>
<td>• Hose stowed in cradle</td>
<td>1Φ of FC1 H2 Pump</td>
<td>1Φ of FC1 H2 Pump</td>
<td></td>
</tr>
<tr>
<td>• WCS ON lt – OFF</td>
<td>1Φ of FC1 Coolant Pump</td>
<td>1Φ of FC1 Coolant Pump</td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – OFF</td>
<td>1Φ of CO2 Rmvl Sys: Fan AC1 pwr</td>
<td>1Φ of CO2 Rmvl Sys: Fan AC1 pwr</td>
<td></td>
</tr>
<tr>
<td>• HOSE BLOCK – SEP 2</td>
<td>Compressor AC1 pwr</td>
<td>Compressor AC1 pwr</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>(EDO WCS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• URINAL SEL – SEP 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• URINE DIVERTER VLV – FAN SEP 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>(MO51F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTRL 1 selected:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform CO2 REMOVAL SYSTEM CNTRL 1(2) CONFIG (ORB OPS, ECLS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1Φ of CO2 Rmvl Sys: Fan AC1 pwr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Compressor AC1 pwr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1Φ of AC Utility Power Outlets at F1 and MO52J</td>
<td></td>
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<tr>
<td>(Continued)</td>
<td>(Continued)</td>
<td>(Continued)</td>
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</tbody>
</table>
**EPS SSR–112 (Cont)**  
**BUS LOSS: AC1 φB**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| 9. If bus shorted:  
• Open all AC1 φB cbs that pwr 3Φ loads on pyls L4: C–J,M,N (9 cbs), MA73C: E,G,H,I (4 cbs)  
• Open all AC1 3Φ ganged cbs on pyls L4: B (1 cb), MA73C: C,D,F (5 cbs) | AC1 FMC1 Bus pwr  
MMC1 Bus pwr  
MMC3 Bus pwr  
AMC1 Bus pwr | 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. 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 – op  
(L4:L)  
• cb AC1 φB AV BAY 2  
S – op  
(L4:O)  
• cb AC1 φB HYD QTY 1 – op  
(L4:P)  
• cb AC1 φB RAD CNTLR  
2 – op  
(L4:Q)  
• cb AC1 φB LTG PNL L  
OVHD – op  
(L4:R)  
• cb AC1 φB NUMERIC  
FWD – op | Port RMS:  
1Φ of Mid MRL Mtr 1  
Aft MRL Mtr 2 | |  
| 11. Freon Loop 2 Cntlr B Rad Byp Vlv Mtr | Hyd Rsvr 1 Qty Snsr | |  
| Pnl Its L/OH (pnl0 O5,O6,O7, O13,O14,O15) | | Numeric lts (pnl0 O3,F7) (RCS/OMS Prplt Qty Gage, Mission, and Event Timers) |  |
| 12. If Arlk/Tnl Fan active:  
• ARLK FAN A – OFF  
• B – ON | | |  

**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 | 1 For unshorted bus, perform single pwr isolation steps to prevent powering single phase loads with coupled energy from remaining two phases |  
| (L1)  
• HUM SEp A – OFF  
• B – ON  
• IMU FAN A – OFF  
• B(C) – ON  
• H2O PUMP LOOP 2 – ON  
• H2O PUMP LOOP 1 (two) – GPC, B  
• FREON PUMP LOOP 1 – B  
• 2 – A  
• AV BAY 1 FAN A – OFF  
• 3 FAN A – ON  
• B – OFF | 1Φ of Hum Sep A  
1Φ of IMU Fan A  
1Φ of H2O Loop 2 Pump GPC Cntlr pwr  
1Φ of H2O Loop 1 Pump A | 2 If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W |  

(F7)  
C/W AC VOLT lt – on  
SM ALERT Light/Tone – on  
(F9)  
AC1 φC AC volts < 90  
(LIGHTS LOST)  
Orbit Sta Instr lts (pnl0 A1,A2)  
(FSMs)  
S67 AC VOLTS 1  
S69 FC H2 PUMP 1  
S86 WSB T  
SM0 THRM HYD | | |  

HYD/APU  
APU H2O QTY 3 – 0% | | |  

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<thead>
<tr>
<th>NOTES</th>
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<tbody>
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## ACTIONS

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
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</tbody>
</table>

### EDO WCS
- URINAL SEL – SEP 2
- URINE DIVERTER VLV – FAN SEP 2

### SM 60 SM TABLE MAINT
- Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts

If bus shorted:
- Open all AC1 φC cbs that pwr 3Φ loads on pnsls L4: C,J,M,N (9 cbs), MA73C: E,G,H,I (4 cbs)
- Open all AC1 3Φ ganged cbs on pnsls L4: B (1 cb), MA73C: C,D,F (5 cbs)

If bus not shorted:
- Perform the following BUS ISOLATION steps

### BUS ISOLATION
**IF BUS NOT SHORTED, PERFORM**

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<thead>
<tr>
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# NOTES

**EQUIP/FUNCTION LOST**

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**CREW INDICATIONS**

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**NOTES**

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</thead>
<tbody>
<tr>
<td>ACTIONS</td>
<td>EQUIP/FUNCTION LOST</td>
<td>CREW INDICATIONS</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>(MA73C:F)</td>
<td>Ops Hyd Actr Instr</td>
<td></td>
</tr>
<tr>
<td>• φ AC1 OPS INST HYD ACTR ΦC – op</td>
<td>Port RMS: 1Φ of Mid MRL Mtr 1 Aft MRL Mtr 2</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>L ADP deploy time incr from 15 to 30 sec</td>
<td>Redundant mtr remains</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

- AC1 FMC1 Bus pwr
- RH Vent 1,2 Mtr 1
- L ADP Dpy Mtr 1
- −Y Star Trkr Dr Sys 1 OP/CL capability

### 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>Single mtr time</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

- PLBD:
  - C/L Lat 9–12 Mtr 1
  - Port,Stbd Fwd Blkhd Mtrs 1
  - Stbd Door Mtr 1
  - RH Vents 3,5,6 Mtrs 1
  - AC1 MMC1 Bus pwr

- Port Rad Lat 1–6, 7–12 Mtrs 1
- Dpy/Sto Mtr 1
- PL Reten Sys A Rel/Lat Mtrs

- Port RMS Mid MRL Mtr 1
- ROEU

- Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A)

- ODA mtr 1 latch/release

### 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>Single mtr time</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

- PLBD C/L Lat 1–4, 5–8 Mtrs 1
- Port Aft Blkhd Mtr 1
- LH Vents 5,6 Mtrs 1
- AC1 MMC3 Bus pwr
- Stbd Rad Lat 1–6, 7–12 Mtrs 1
- Dpy/Sto Mtr 1

- Port RMS Aft MRL Mtr 2
### 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>
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</tbody>
</table>

#### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

(1) **ET Door Mtrs:**
- C/L Lat Actr 1 Mtr 1
- 2 Mtr 1
- L Dr Closure Mtr 1
- Uplock Lat Mtr 1


### EPS SSR–120
**BUS LOSS: AC2** *(Includes all AC2 sub–buses)*

<table>
<thead>
<tr>
<th>ACTION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</table>

#### ACTION

1. Perform FC2 SHUTDN (FC SHUTDOWN Cue Card)
2. Av Bay 3 Sig Condr, Xdcrs
3. Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost
4. Braking/Skid Cntl Box A,B enabled before WOW
5. Instrumentation loss caused rad isolation
6. Brake/Skid Cntl Box A,B enabled before WOW
7. Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost
8. When gear deployed, be will not indicate DN
9. Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty snsrs lost

#### NOTES

**TIME CRITICAL**

FC2 must be shut down within 9 min to avoid potentially hazardous condition
### ACTIONS

- **(PLT SEAT PNL)**
  - PLT Seat Adj via AC2 pwr
- **(R13U)**
  - C/W PARAM SEL tw
    - (three) – 043,072,102
  - C/W PARAM – INH
  - C/W PARAM SEL tw
    - (three) – > 119
  - C/W PARAM  −  INH
- **(WCS)**
  - √/MODEL  −  AUTO
  - √/CRADLE  −  AUTO
  - √/Hose stowed in cradle
  - √/WCS ON lt  −  OFF
  - Fan Sep SEL sw  −  OFF
  - HOSE BLOCK  −  SEP 1
- **(EO WCS)**
  - Urinal SEL  −  SEP 1
  - Urine DIVERTER VLV  −  FAN SEP 1
  - If CAB TEMP CNTLR 1 active:
    - (L1)
      - CAB TEMP CNTLR  −  OFF
    - (MD44F)
      - Remove pin from PRI
        ACTUATOR and BYP Vlv
        linkage, connect linkage to
        SEC ACTUATOR
    - (L1)
      - CAB TEMP CNTLR  −  2
  - Refer to OMS/RCS Slide
    Rule for vlv loss info (use
    FPC2 Slide for Aft RCS and
    FMC2 for Fwd RCS)

### EQUIP/FUNCTION LOST

- PLT Seat Adj via AC2 pwr
- WCS Fan/Sep 2
- Urine Sep 2
- Fan 2
- Commode Fan 2
- Cabin Temp Cntrl 1 and Hx Byp Vlv Mtr 1

### CREW INDICATIONS

- **(R1)**
  - FC2 COOL PUMP ∆P
  - Ib – bp
- **(O1)**
  - AIR TEMP AV BAY 3  −  45 degF
  - FREON FLOW LOOP 2  −  578 pph
  - AIR TEMP CAB HX OUT  −  45 degF
- **(A4)**
  - Mission and Event Timers
    blank
  - If Freon Loop 1 Pump B ON:
    - ‘S88 FREON FLOW 1’
  - If APU active and using H2O
    Blr Cntrl 1A or 2B:
    - C/W APU TEMP lt  −  on
      after ∼2 min
  - If H2O Loop 1 Pump B active:
    - H2O LOOP C/W lt  −  ‘S88
      H2O LOOP 1 FLOW’
    - ‘S88 H2O LOOP 1 TEMP’
    - ‘S88 H2O PUMP P1’
  - **(O1)**
    - H2O PUMP OUT PRESS LOOP 1  −  20−25 psia
    - L/R ADP deploy times incr
      from 15 to 30 sec
    - During PLBD OP/CL, single
      mtr run time noted on
      actuators listed at left

### NOTES

- **(R1)** Inhibits Primary
  C/W for AC2 Voltage, FC2 Stack Temp, and
  Pump ∆P
- **(O1)** Lose Auto Temp
  Cntlr via Cntlr 1 and
  Cabin Temp, Cabin Hx
  Air Out Temp and H2O
  Loop 1 Cabin Hx In
  Temp snrs. Hx Byp
  Vlv holds position
- **(R13L)** Redundant mtr
  remains

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

- **(MA73C:C)**
  - cb MCA PWR
    - AC2 3Φ FWD 2  −  op
    - AC2 3Φ MID 1  −  op
    - AC2 3Φ MID 2  −  op
  - 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 Bkhd Mtr 2
      - Port Door Mtr 2
      - Stbd Rad Lat 1–6 Mtr 2
      - LH Vent 3 Mtr 2

(Continued)
<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>(MA73C:D)</td>
<td>Ku Ant Sto/Dpy Mtr 2</td>
<td>13</td>
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<tr>
<td>cb MCA PWR</td>
<td>AC2 AMC2 Bus pwr</td>
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<tr>
<td>• AC2 3Φ AFT 2 – op</td>
<td>LH,RH Vents 8.9 Mtr 2</td>
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<tr>
<td>• AC2 3Φ MID 3 – op</td>
<td>AC2 MMC3 Bus pwr</td>
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<tr>
<td>• AC2 3Φ MID 4 – op</td>
<td>PL Reten Sys B Rel/Lat Mtrs</td>
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<tr>
<td>(MA73C:E)</td>
<td>AC2 MMC4 Bus pwr</td>
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<tr>
<td>cb AC2 WCS FAN SEP 2</td>
<td>PLBD Port,Stbd Fwd Blkhd</td>
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<tr>
<td>(three) – op</td>
<td>Mtr 2</td>
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<tr>
<td>cb AC2 PAYLOAD 3Φ</td>
<td>PLBD Stbd Door Mtr 2</td>
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<tr>
<td>– op</td>
<td>Port Rad Lat 1–6 Mtr 2</td>
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<tr>
<td>(MA73C:F)</td>
<td>AC2 pwr to MS,PS Patch pnl</td>
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<tr>
<td>cb AC2</td>
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<tr>
<td>• RMS B/U ΦA – op</td>
<td>Port RMS:</td>
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<td>• OPS INST HYD ACTR</td>
<td>MPM Mtr 2</td>
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<tr>
<td>ΦC – op</td>
<td>Mfd MRL Mtr 1</td>
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<tr>
<td>(MA73C:G)</td>
<td>Mid MRL Mtr 2</td>
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<td>IF DOCKING MISSION</td>
<td>D&amp;C B/U edge ltg</td>
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<tr>
<td>• cb AC2 ARLK/TNL FAN B</td>
<td>Ops Hyd Actr Inst</td>
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<td>(three) – op</td>
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<tr>
<td>cb AC2</td>
<td>Arlk/Tnl Fan B</td>
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<tr>
<td>• FWD RCS VLV (three) – op</td>
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<tr>
<td>• AFT POD VLV GP 2</td>
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<td>(three) – op</td>
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<tr>
<td>(L4:C–E)</td>
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<tr>
<td>cb AC2</td>
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<tr>
<td>• FC2 PUMPS (three) – op</td>
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<td>• CTR ENG (three) – op</td>
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<td>• L ENG (three) – op</td>
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<td>(L4:F–I)</td>
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<tr>
<td>cb AC2</td>
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<tr>
<td>• H2O LOOP PUMP 1B (three) – op</td>
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<tr>
<td>• AV BAY 1 FAN B (three) – op</td>
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<tr>
<td>• AV BAY 2 FAN A (three) – op</td>
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<tr>
<td>• IMU FAN B (three) – op</td>
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<td>(L4:J–K)</td>
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<td>cb AC2</td>
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<tr>
<td>• HUM SEP B (three) – op</td>
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<tr>
<td>• CAB FAN B (three) – op</td>
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<td>(L4:L)</td>
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<td>cb AC2</td>
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<td>• GA CAB T CNTLR 1 – op</td>
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<tr>
<td>• GB AV BAY 3 S/C – op</td>
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<td>(L4:M)</td>
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<tr>
<td>cb AC2</td>
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<tr>
<td>• FREON LOOP 1 PUMP B (three) – op</td>
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<td>NOTES</td>
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<tr>
<td>EQUIP/FUNCTION LOST</td>
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<tr>
<td>BUS LOSS: AC2</td>
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## EPS SSR–120 (Cont)

### BUS LOSS: AC2

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<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>(L4:N) cb AC2</td>
<td>• φA FREON FLOW PROP 1 – op</td>
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<td>• φB FREON SIG CONDR – op</td>
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<td>• cb AC2 φC RAD ISOL A – op</td>
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<td>(L4:C)</td>
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<tr>
<td></td>
<td>• φA BLR HYD BYP 1A – op</td>
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<td>• φB HYD QTY 2 – op</td>
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<td>• φC BLR HYD BYP 2B – op</td>
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<td>• φA LG SNSR 2 – op</td>
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<td>• φB RAD CTNLR 1A – op</td>
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<td>• φC TACAN 2 – op</td>
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<td>(L4:R) cb AC2</td>
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<tr>
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<td>• φA LTG PNL R OVHD – op</td>
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<td>• φB LTG PNL R – op</td>
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<td></td>
<td>• φC LTG NUMERIC OS – op</td>
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<td>• cb AC2 φB LTG INST OVHD – op</td>
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<td>16 Freon Loop 1 Flow Prop Vlv</td>
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<td></td>
<td></td>
<td>17 Freon Loop 1,2 Rad Isol Motor A</td>
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<td>18 Hyd Rsrv 2 Qty Snsr</td>
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<td>19 Freon Loop 1 Cntlr A Rad Byp Vlv Mtr Tacan 2</td>
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<td>20 R Ovhd Pnl Lts</td>
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<td>21 R Pnl Lts OS Numeric Lts</td>
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<td>22 Ovhd Inst Lts</td>
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<td></td>
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<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 NLG, LMG B/U Rel 2 Fire 2, Arm</td>
<td></td>
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<td>13 Redundant mtr remains</td>
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<td>16 Flow prop vlv holds position</td>
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<td>17 Motor B remains</td>
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<td></td>
<td>18 Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains</td>
<td></td>
</tr>
</tbody>
</table>
### ACTIONS

- **[L4:F]**
  - cb AC1 H2O LOOP PUMP 1A/2 (three) – cl

- **[L1]**
  - HUM SEP A – ON
  - HUM SEP B – OFF
  - IMU FAN A(C) – ON
  - IMU FAN B – OFF
  - H2O PUMP LOOP 1 (two) – GPC,A
  - H2O PUMP LOOP 2 – ON
  - IMU FAN A(C) – ON
  - IMU FAN B – OFF
  - H2O PUMP LOOP 1 (two) – A
  - AV BAY 1 FAN A – ON
  - AV BAY 1 FAN B – OFF
  - AV BAY 2 FAN A – OFF
  - AV BAY 2 FAN B – ON
  - FMO13Q
    - If Arlk/Tnl Fan active:
      - ARLK FAN B – OFF
      - ARLK FA/C0112 A – ON
  - cb AC3 φA LG SNSR 1 – cl
  - [R2]
    - BLR CNTLR/HTR 1 – B
  - 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
  - EDO WCS
    - URINAL SEL – SEP 1
    - URINE DIVERTER VLV – FAN SEP 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
      - CAB TEMP CNTLR – 2

### EQUIP/FUNCTION LOST

- **[FL]**
  - 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 AV Bay 1 Fan B
  - 1Φ of AV Bay 2 Fan A
  - 1Φ of WCS Fan/Sept 2
  - 1Φ of WCS Fan/Sept 2
  - 1Φ of WSS B
  - 1Φ of Cabin Fan B
  - 1Φ of Commode Fan 2
  - Cabin Temp Cntlr 1, Hx Byp
  - Vlv Mtr 1

### CREW INDICATIONS

- **[F7]**
  - C/W AC VOLT lt – on
  - SM ALERT Light/Tone – on
  - AC2 φA AC volts < 90
  - (LIGHTS LOST)
    - R Ovhd pnl lts (pnls O1,O2,
      O3,O8,O9,O16,O17)
  - (F6/F8)
    - LDG GEAR L, NOSE tb – bp
  - (O1)
    - AIR TEMP CAB HX OUT
      ind – 45 degF
  - (O1)
    - H2O LOOP OUT PRESS
      LOOP 1 ind – 40–45 psia
  - (O1)
    - If IMU FAN B ON:
      - ‘S66 IMU FAN DP’
      - ‘S66 IMU FN SPD B’
    - If IMU FAN B ON:
      - ‘S66 IMU FAN DP B’
  - If H2O PUMP LOOP 1,B active:
    - C/W H2O LOOP lt – on
      ‘S88 H2O LOOP P 1’
    - If H2O PUMP LOOP 1,B active:
      - C/W H2O LOOP lt – on
        ‘S88 H2O LOOP P 1’
  - If HUM SEP B ON:
    - ‘S66 HUMID SEP B’
  - If APUs active and using BLR
    CNTLR/HTR 1A:
    - C/W APU TEMP lt – on
      after –2 min

### 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 When gear deployed, tb will not
  indicate DN
- 4 Brake/Skid Cntl
  Box A,B enabled before WOW
- 5 For EDO WCS,
  Urine Fans and Seps
  are DC mtrs.
  AC converted to DC
  internal to controller.
  Design is such that
  loss of one AC phase
  results in loss of Urine
  Fan or Sep.
  Commode Fans may
  work with 1 Φ down;
  however, crew actions
  will pwr fans through
  alternate pwr source,
  with full 3 Φ pwr.
  For WCS, 2 Φ ops will
  result in degraded
  airflow.
  Urine Fan,
  Seps are unusable for
  urine collection or
  EMU drain
- 6 Lose Auto Temp
  Cntlr via Cntlr 1 and
  Cabin Temp, Cabin Hx
  A Out Temp and H2O
  Loop 1 Cabin Hx In
  Temp nsns Hx Byp
  Vlv hold position

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**Continued**

**Continued**
**EPS SSR–121 (Cont)**

**BUS LOSS: AC2 φA**

<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>(R13U)</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 043 (AC2 voltage)</td>
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</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</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 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td>1φ of FC2 H2 Pump</td>
<td>7</td>
<td>Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from two phases into short</td>
</tr>
<tr>
<td>If bus shorted:</td>
<td>1φ of FC2 Coolant Pump</td>
<td>8</td>
<td>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</td>
</tr>
<tr>
<td>• Open all AC2 φA cbs that pwr 3φ loads on pnl L4: C–K,M (10 cbs), pnl MA73C: E,G,H,I (4 cbs)</td>
<td>If bus shorted: AC2 payload 3φ Bus pwr (pwr s MS, PS Patch panel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Open all AC2 3φ ganged cbs on pnl MA73C: C–G (9 cbs)</td>
<td></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**

(L4:L)
- • cb AC2 φA CAB T CNTLR 1 – op
- (L4:N)
- • cb AC2 φA FREON FLOW PROP 1 – op
- (L4:O)
- • cb AC2 φA BLR HYD BYP 1A – op
- (L4:P)
- • cb AC2 φA LG SNSR 2 – op
- (L4:Q)
- • cb AC2 φA LTG PNL R OVD – op
- (MA73C:F)
- • cb AC2 RMS B/U φA – op

- Freon Loop 1 Flow Prop Vlv
- R Ovhd pnl lts (pnl s O1,O2, O3,O8,O9,O16,O17)
- Port RMS:
  - D&C B/U edge ltg
  - MPM Mtr 2
  - FWD MRL Mtr 1
  - MID MRL Mtr 2
- NLG, LMG B/U Rel 2 Fire 2, Arm
- FC2 pH Snsr

7 For unshorted bus, perform single φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

10 Flow prop vlv holds position
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<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 psi to trigger C/W</td>
</tr>
<tr>
<td>• HUM SEP A – ON</td>
<td>1Φ of IMU Fan B</td>
<td>C/W AC VOLT lt</td>
<td>2 Av Bay 3 Fan ΔP, Air Out Temp snsrs lost</td>
</tr>
<tr>
<td>• B – OFF</td>
<td>1Φ of H2O Loop 1 Pump B</td>
<td>C/W FREON LOOP lt</td>
<td>3 Freon Loop 2 Pump switched to avoid having both Freon loops powered by AC1</td>
</tr>
<tr>
<td>• IMU FAN A(C) – ON</td>
<td>2 AV Bay 3 Sig Condr,Xdcrs (ECLS SC4)</td>
<td>SM ALERT Light/Tone</td>
<td>4 Instrumentation loss caused rad isolation</td>
</tr>
<tr>
<td>• B – OFF</td>
<td>1Φ of Freon Loop 1 Pump B</td>
<td></td>
<td>5 Rad isolation may cause FES shutdown</td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 (two) – GPC,A</td>
<td>AV Bay 1 Fan B</td>
<td></td>
<td>6 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td>• AV BAY 3 FAN (two) – ON</td>
<td>1Φ of Av Bay 2 Fan A</td>
<td></td>
<td>7 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td>• FREON PUMP LOOP 1,2 (two) – A</td>
<td>1Φ of Arlk/Tnl Fan B</td>
<td></td>
<td>8 For EDO WCS, Urine Fans and Seps are DC mtrs. AC converted to DC internal to controller. Design is such that loss of one AC phase results in loss of Urine Fan or Sep. Commode Fans may work with 1Φ down; however, crew actions will pwr fans through alternate pwr source, with full 3Φ pwr. For WCS, 2Φ ops will result in degraded airflow. Urine Fan and Seps are unusable for urine collection or EMU drain</td>
</tr>
<tr>
<td>• AV BAY 1 FAN A – ON</td>
<td>1Φ of Cabin Fan B</td>
<td>SM 60 SM TABLE MAINT</td>
<td>9 For EDO WCS, Urine Fans and Seps are DC mtrs. AC converted to DC</td>
</tr>
<tr>
<td>• B – OFF</td>
<td>Freon Sig Condr A AC2 pwr (ECLS SC1A)</td>
<td>HYD/PU</td>
<td>10</td>
</tr>
<tr>
<td>• 2 FAN A – OFF</td>
<td>Freon Sig Condr B AC2 pwr (ECLS SC1B)</td>
<td>HYD QTY 2 – 0%</td>
<td>11</td>
</tr>
<tr>
<td>• B – ON</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>• Perform RAD ISOL RECOVERY, ECLS SSR−9 for Freon Loop 2</td>
<td>Freon Sig Condr A AC2 pwr (ECLS SC1A)</td>
<td>HYD/PU</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Freon Sig Condr B AC2 pwr (ECLS SC1B)</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>• If Arlk/Tnl Fan active:</td>
<td>Freon Sig Condr A AC2 pwr (ECLS SC1A)</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>• ARLK FAN B – OFF</td>
<td>Freon Sig Condr B AC2 pwr (ECLS SC1B)</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>• √ A – ON</td>
<td></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – 043 (AC2 voltage)</td>
<td>1Φ of FC2 H2 Pump</td>
<td>HYD QTY 2 – 0%</td>
<td>18</td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td>1Φ of FC2 Coolant Pump</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – 0.3</td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>• C/W VOLT lt</td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>• C/W VOLT lt</td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>• SM 60 SM TABLE MAINT</td>
<td>SM 60 SM TABLE MAINT</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>• Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td>Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>• WCS</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>• MODE – AUTO</td>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>• √ CRADLE – AUTO</td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>• √ Hose stowed in cradle</td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>• √ WCS ON lt – OFF</td>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>• FAN SEP SEL sw – OFF</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>• HOSE BLOCK – SEP 1</td>
<td></td>
<td></td>
<td>31</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>32</td>
</tr>
<tr>
<td>• FAN SEP SEL sw – 1</td>
<td></td>
<td></td>
<td>33</td>
</tr>
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</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>(EDO WCS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- URINAL SEL – SEP 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- URINE DIVERTER VLV – FAN SEP 1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9 If bus shorted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 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)</td>
<td>Urine Sep 2 Fan 2 1φ of Commode Fan 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Open all AC2 3φ ganged cbs on pnl MA73C: C–G (9 cbs)</td>
<td>If bus shorted:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AC2 FMC2 Bus pwr</td>
<td></td>
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<tr>
<td></td>
<td>MMC1 Bus pwr</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>MMC2 Bus pwr</td>
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<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>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 If bus not shorted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perform the following BUS ISOLATION steps</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>
</tr>
<tr>
<td>(L4:L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cb AC2 φB AV BAY 3</td>
<td>Hyd Rdvr 2 Qty Snsr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S/C – op</td>
<td>Freon Loop 1 Cntlr A Rad Byp Vlv Mtr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H2O Ln pH Snsr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:N)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cb AC2 φB FREON SIG CONDR – op</td>
<td>R pnl ltg (pnlis F4,F8,F9,R1, R2,R4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ovhd Instr ltg (pnlis O1,O2, O3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:O)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cb AC2 φB HYD QTY 2 – op</td>
<td>Port RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1φ of MPM Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FWD MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MID MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:P)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cb AC2 φB RAD CNTLR 1A – op</td>
<td>1φ of AC2 payload</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3φ Bus pwr (pwrs MS, PS Patch pnl)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:Q)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cb AC2 φB LTG PNL R – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:R)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cb AC2 φB INST OVHD – op</td>
<td></td>
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</tr>
</tbody>
</table>

For EDO WCS, Urine Fans and Seps are DC mtrs. AC converted to DC internal to controller. Design is such that loss of one AC phase results in loss of Urine Fan or Sep. Commode Fans may work with 1φ down; however, crew actions will pwr fans through alternate pwr source, with full 3φ pwr. For WCS, 2φ ops will result in degraded airflow. Urine Fan and Seps are unusable for urine collection or EMU drain.

Ganged cb. Isolation of shorted phase req’d to prevent coupling of energy from remaining two phases into short.


Ganged cb. Isolation of shorted phase req’d to prevent coupling of energy from remaining two phases into short.

For unshorted bus, perform single φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases.

Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains.
### ACTIONS

- **(L4:F)**
  - C/C AC1 H2O LOOP PUMP 1A/2 (three) – cl

- **(L1)**
  - HUM SEP A – ON
  - IMU FAN A(C) – ON
  - IMU FAN B – OFF
  - H2O PUMP LOOP 1 (two) – GPC/A
  - H2O PUMP LOOP 2 – ON
  - FREON PUMP LOOP 1.2 (two) – A
  - AV BAY 1 FAN A – ON
  - 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 MEM – CLEAR
  - C/W PARAM SEL tw (three) – > 119

- **(WCS)**
  - √/MODE – AUTO
  - √/CRADLE – AUTO
  - √/Hose stowed in cradle
  - √/WCS ON It – OFF
  - H2O PUMP OUT PRESS
  - 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

- **(EDO WCS)**
  - Urinal SEL – SEp 1
  - URINE DIVERTER VLV – FAN SEp 1

### EQUIP/FUNCTION LOST

- 1Φ of FC2 H2 Pump
- 1Φ of FC2 Coolant Pump

### CREW INDICATIONS

- MASTER ALARM Light/Tone – on

### 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. For EDO WCS, Urine Fans and SEps are DC mtrs. AC converted to DC internal to controller. Design is such that loss of one AC phase results in loss of Urine Fan or Sep. Commode Fans may work with 1Φ down; however, crew actions will pwr fans through alternate pwr source with full 3Φ pwr. For WCS, 2Φ ops will result in degraded airflow. Urine Fan and SEps are unusable for urine collection or EMU drain.
## EPS SSR–123 (Cont)

### BUS LOSS: AC2 ΦC

#### ACTIONS

4 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 cb1 on pnl MA73C: C–G (9 cbs)

5 If bus not shorted:
- Perform the following BUS ISOLATION steps

#### EQUIP/FUNCTION LOST

4 AC2 FMC2 Bus pwr

MMC1 Bus pwr

MMC2 Bus pwr

MMC3 Bus pwr

MMC4 Bus pwr

AMC2 Bus pwr

5 Freon Loop 1.2 Rad Isol

Motor A

Tacan 2

Orbit Sta Numeric Ltg (pnls A2,A4)

Ops Hyd Act Inst

Port RMS:

1Φ of MPM Mtr 2

FWD MRL Mtr 1

MID MRL Mtr 2

1Φ of AC2 payload

3Φ Bus pwr (pwr MS, PS Patch pnl)

#### CREW INDICATIONS

4 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

6 For unshorted bus, perform single isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

7 Motor B remains

#### NOTES

4 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

6 For unshorted bus, perform single isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

7 Motor B remains
**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></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

(ONLY ON MCC CALL, PERFORM)

(MA73C:C)

- cb MCA LOGIC MCA PWR
- AC2 3Φ FWD 2 – op

- AC2 FMC2 Bus pwr
- L/R Vents 1-2 Mtrs 2
- ADP Dpy Mtrs 2
- Y Star Trkr Dr Sys 2 OP/CL capability
- Z Star Trkr Dr Sys 1 OP/CL capability

**NOTES**

1. Redundant mtr remains

**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

- AC2 MMC1 Bus pwr
- LH Vent 5 Mtr 2

**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>
</tbody>
</table>

**BUS ISOLATION**

(ONLY ON MCC CALL, PERFORM)

(MA73C:C)

- cb MCA LOGIC MCA PWR
- AC2 3Φ MID 2 – op

- AC2 MMC2 Bus pwr
- PLBD C/L Lat 13–16 Mtr 2
- Stbd Aft Bkhd Mtr 2
- Port Door Mtr 2
- Stbd Rad Lat 1–6 Mtr 2
- LH Vent 3 Mtr 2

**CREW INDICATIONS**

- SM (BFS SM 63)
- PL BAY DOORS

**NOTES**

1. Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
2. Single mtr time
### 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></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>
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</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
  - Port RMS Mid MRL Mtr 2
  - Ku Ant Sto/Dpy Mtr 2

- SM (BFS SM 63) PL BAY DOORS
  - 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></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:
  - C/L Lat Actr 1 Mtr 2
  - L Dr Uplock Lat Mtr 2
  - R Dr Closure Mtr 2
  - Upload Lat Mtr 2

- Redundant mtrs remain
### ACTIONS

<table>
<thead>
<tr>
<th>1</th>
<th>Perform FC3 SHUTDN (FC SHUTDN Cue Card) then:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R2)</td>
<td>• BLR CNTLR/HTR 2 − B</td>
</tr>
<tr>
<td>(L4+F)</td>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) − cl</td>
</tr>
<tr>
<td>(L1)</td>
<td>• IMU FAN B(A) − ON</td>
</tr>
<tr>
<td>(L4:F)</td>
<td>• cb AC2 ΦA LG SNSR 2 − cl</td>
</tr>
<tr>
<td>(O17:C)</td>
<td>• SIG CONDR FREON A − AC2</td>
</tr>
<tr>
<td>(CDR SEAT PNL)</td>
<td>• CDR SEAT PWR BUS SEL − AC2 (up)</td>
</tr>
<tr>
<td>(PLT SEAT PNL)</td>
<td>• SEAT PWR BUS SEL − AC2 (up)</td>
</tr>
<tr>
<td>SM 60 SM TABLE MAINT</td>
<td>• Inhibit 0612605, 0612600, 0612640, 0612610</td>
</tr>
<tr>
<td>(R13U)</td>
<td>• C/W PARAM SEL tw (three) − 082, 112, 053, 105, 115</td>
</tr>
<tr>
<td>(C/W PARAM)</td>
<td>• C/W PARM − INH</td>
</tr>
<tr>
<td>(C/W PARAM)</td>
<td>• C/W MEM − CLEAR</td>
</tr>
<tr>
<td>(C/W PARAM SEL tw)</td>
<td>• C/W PARAM SEL tw (three) − &gt; 119</td>
</tr>
<tr>
<td>Refer to OMS/ RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS, and FMC3 for Fwd RCS)</td>
<td></td>
</tr>
<tr>
<td>ACTIONS</td>
<td>EQUIP/FUNCTION LOST</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>ONLY ON MCC CALL, PERFORM</strong></td>
<td></td>
</tr>
<tr>
<td>(MO51F) If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTRL 2 selected: • Perform CO2 RMVL SYS CNTRL CONFIG: ACT 1/DEACT 2/ACT 2/DEACT 1 (ORB OPS, ECLS)</td>
<td>CO2 Rmvl Sys: Cntlr 2 Fan AC3 pwr</td>
</tr>
<tr>
<td>(MA73C:C) cb MCA LOGIC MCA PWR • AC3 3Φ FWD 3 − op</td>
<td></td>
</tr>
<tr>
<td>• AC3 3Φ MID 2 − op</td>
<td></td>
</tr>
<tr>
<td>(MA73C:D) cb MCA LOGIC MCA PWR • AC3 3Φ AFT 3 − op</td>
<td></td>
</tr>
<tr>
<td>• MID 4 − op</td>
<td></td>
</tr>
<tr>
<td>(MA73C:E) cb AC3 PAYLOAD 3Φ − op</td>
<td></td>
</tr>
<tr>
<td>(MA73C:G) cb AC3 GALLEY FAN (three) − op</td>
<td></td>
</tr>
<tr>
<td>(MA73C:H1) cb AC3 FWD RCS VLV (three) − op • cb AC3 AFT POD VLV GP 3 (three) − op</td>
<td></td>
</tr>
<tr>
<td>(L4:A) • cb UTIL PWR A15/MO13Q AC3 − op</td>
<td></td>
</tr>
<tr>
<td>(L4:C−E) cb AC3 • FC3 PUMPS (three) − op • R ENG (three) − op • L ENG (three) − op</td>
<td></td>
</tr>
<tr>
<td>(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</td>
<td></td>
</tr>
<tr>
<td>(L4:J) cb AC3 • IMU FAN C (three) − op • QA SIG/CONDR HUM SEP − op • QB SIG/CONDR IMU FAN − op</td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td></td>
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<tr>
<td><strong>(Continued)</strong></td>
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10/14/03 7-268 MAL/ALL/GEN F
## EPS SSR–130 (Cont)
### BUS LOSS: 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>ONLY ON MCC CALL,</strong> <strong>PERFORM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:K,L) cb AC3</td>
<td>2 Freon Loop 2 Flow Prop Vlv</td>
<td>15 Redundant mtrs remain</td>
<td></td>
</tr>
<tr>
<td>• CABIN FAN A (three) − op</td>
<td></td>
<td>18 Motor A remains</td>
<td></td>
</tr>
<tr>
<td>• φA H2O CNTLR 1 − op</td>
<td></td>
<td>19 Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains</td>
<td></td>
</tr>
<tr>
<td>• φB AV BAY 1 S/C − op</td>
<td>Freon Loop 1,2 Rad Isol Motor B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:M,N) cb AC3</td>
<td>Freon Loop 1,2 Rad Isol Motor B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FREON LOOP 2 PUMP A (three) − op</td>
<td>Hyd Rsvr 3 Qty Snsr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• φA FREON FLOW PROP 2 − op</td>
<td>Freon Loop 2 Cntlr A Rad Byp Vlv Mtr Tacan 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• φB FREON SIG/COND 2 − op</td>
<td>Sta 1,2 COAS ltg pwr MS pnlIts (pnlS R10,R12) OS pnlIts (pnlS A1,A2,A6,A7,A8,A13,L9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:N) cb AC3</td>
<td></td>
<td>L/Ctr Inst Its (pnlS C2,F6,F7)</td>
<td></td>
</tr>
<tr>
<td>• φC RAD ISOL B − op</td>
<td></td>
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<tr>
<td>(L4:O) cb AC3</td>
<td></td>
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<tr>
<td>• φA BLR HYD Byp 1A − op</td>
<td></td>
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<tr>
<td>• φB HYD QTY 3 − op</td>
<td></td>
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<tr>
<td>• φC BLR HYD Byp 3B − op</td>
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<tr>
<td>(L4:P) cb AC3</td>
<td></td>
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<tr>
<td>• φA LG SNSR 1 − op</td>
<td></td>
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<tr>
<td>• φB RAD CNTLR 2A − op</td>
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<tr>
<td>• φC TACAN 3 − op</td>
<td></td>
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<tr>
<td>(L4:Q) cb AC3</td>
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<tr>
<td>• φA LTG COAS − op</td>
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<tr>
<td>• φB LTG PNL MS − op</td>
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<tr>
<td>• φC LTG PNL OS − op</td>
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<tr>
<td>(L4:R) cb AC3</td>
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<td></td>
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<tr>
<td>• φB INST L/CTR − op</td>
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<tr>
<td>(L4:R)</td>
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<tr>
<td>• φB INST L/CTR − op</td>
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<tr>
<td>(L4:S,T) cb AC3</td>
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<tr>
<td>• φA HYD RSVR 3 − op</td>
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<tr>
<td>• φB HYD RSVR 4 − op</td>
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<tr>
<td>• φC HYD RSVR 5 − op</td>
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<tr>
<td>(L4:U,V) cb AC3</td>
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<tr>
<td>• φA INST L/CTR − op</td>
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<tr>
<td>• φB INST L/CTR − op</td>
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<tr>
<td>(L4:W,X) cb AC3</td>
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<tr>
<td>• φA LTG COAS − op</td>
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<tr>
<td>• φB LTG PNL MS − op</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• φC LTG PNL OS − op</td>
<td></td>
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<tr>
<td>(L4:Y,Z) cb AC3</td>
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<tr>
<td>• φA HYD RSVR 3 − op</td>
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<tr>
<td>• φB HYD RSVR 4 − op</td>
<td></td>
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<td></td>
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<tr>
<td>• φC HYD RSVR 5 − op</td>
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</tbody>
</table>

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10/14/03

7–269

MAL/ALL/GEN F
### ACTIONS

<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>(L4:F)</td>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>MASTER ALARM</td>
<td>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>• IMU FAN B – ON</td>
<td>Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √ C – OFF</td>
<td>(F7) C/W AC VOLT It – on</td>
<td>Indicates DN when NLG down</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 (two) – ON, B</td>
<td>C/W H2O LOOP II – on</td>
<td>H2O Loop 1 Pump Out Press, Pump ∆P, Accum Qty, Pump Out Temp snrs lost</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 – GPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS SSR−10</td>
<td></td>
<td>Will not indicate DN when RMG down</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 – OFF</td>
<td></td>
<td>H2O Loop 1 Byp Vlv holds position</td>
</tr>
<tr>
<td></td>
<td>• FREON PUMP LOOP 2 – B</td>
<td></td>
<td>Brake/Skid Cntl Box A,B enabled before WOW</td>
</tr>
<tr>
<td></td>
<td>• √ AV BAY 2 FAN A – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √ B – OFF</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• √ 3 FAN A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √ B – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:P)</td>
<td>• cb AC2 φA LG SNSR 2 – cl</td>
<td>HYD/APU APU H2O QTY 2 ind – 0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If H2O PUMP LOOP 2 active:</td>
<td>Inhibits H2O Loop 1 Pump ∆P, Pump Out Press, Pump Out Temp, Accum Qty, respectively</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘S88 H2O PUMP P 2’</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(O1) H2O PUMP OUT PRESS LOOP 2 ind – 40−45 psia</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If APUs active and using BLR CNTRL/HTR 2A:</td>
<td>MCC will provide equipment reconfig info if reqd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C/W APU TEMP It – on</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>after −2 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If IMU FAN C ON:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S66 IMU FAN DP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S66 IMU FN SPD C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If CO2 Removal Sys Cntrl 2 selected:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(MO51F) CO2 RMVL SYS CNTRL 2 FAIL It – on</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>If bus shorted:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AC3 payload 3Φ Bus pwr (pwr from MS, PS Patch panel)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>AC3 FMC3 Bus pwr</td>
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<td></td>
<td></td>
<td>MMC4 Bus pwr</td>
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<td></td>
<td></td>
<td>AMCM Bus pwr</td>
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<td></td>
<td></td>
<td>1Φ of AC Utility Power Outlets at A15 and MO13Q</td>
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<tr>
<td>(Continued)</td>
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</tbody>
</table>

### NOTES

1. If H2O Loop 2 Pump active, Loop 2 Pump Out Press must drop below 45 psia to trigger C/W
2. Indicates DN when NLG down
4. Will not indicate DN when RMG down
5. H2O Loop 1 Byp Vlv holds position
6. Brake/Skid Cntl Box A,B enabled before WOW
7. Inhibits H2O Loop 1 Pump ∆P, Pump Out Press, Pump Out Temp, Accum Qty, respectively
8. Inhibits Primary C/W for H2O Loop 1,2 Pump P and AC3 voltage
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 unpwring sub−buses: SSR−134, SSR−135, SSR−136, SSR−137
10. Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short
11. MCC will provide equipment reconfig info if reqd
### Actions

(M051F)

- If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 2 selected:
  - Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1/DEACT 2/ACT 2/DEACT 1
  - (ORB OPS, ECLS)

13 If bus not shorted:
  - (L1)
  - Install sw guard (stowed in IFM tool kit) over Cab Fan A sw
  - Perform the following BUS ISOLATION steps

### Bus Isolation

If BUS NOT SHORTED, PERFORM

- (L4:J)
  - Fan AC3 ΦA SIG CONDR
  - Hum SEP – op

- (L4:L)
  - Fan AC3 ΦA H2O
  - CNTLR 1 – op

- (L4:N)
  - Fan AC3 ΦA FREON FLOW
  - PROP 2 – op

- (L4:O)
  - Fan AC3 ΦA BLR HYD
  - BVP 2A – op

- (L4:P)
  - Fan AC3 ΦA LG SNSR 1 – op

- (L4:Q)
  - Fan AC3 ΦA LTG COAS – op

### Equip/Function Lost

- 12 CO2 Rmvl Cntlr 2
  - 1 Φ of CO2 Rmvl Sys:
    - Fan AC3 pwr
    - Compressor AC3 pwr

### Crew Indications

(M051F)

- CO2 RMVL SYS CNTLR 2
  - FAIL lt – on
  - Impending:
    - 'S66 CO2 RL SYS PCO2'
    - 'S66 CAB PPCO2'

### Notes

12 PEVs, Actuators, Bed A dP, Bed B dP, and Fan dP will be recovered after system recovered

13 For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

14 Switch guard installed to prevent Cab Fan A from being turned off during LOH can changeout and cabin fan filter cleaning

15 Hum Sep A,B Speed Norm snsrs lost

16 Vlv holds position
<table>
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<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></td>
<td>(L1)</td>
<td>(F7)</td>
<td>2 Av Bay 1 Fan ΔP, Air Out Temp snsrs lost</td>
</tr>
<tr>
<td></td>
<td>• IMU FAN B – ON</td>
<td>C/W AC VOLT lt</td>
<td>3 Instrumentation loss caused rad isolation</td>
</tr>
<tr>
<td></td>
<td>• V/C – OFF</td>
<td>C/W FREON LOOP lt</td>
<td>4 Rad isolation may have caused FES shutdown</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 (two) – ON,B</td>
<td>SM ALERT lt</td>
<td>5 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 –</td>
<td>C/W H2O PUMP lt</td>
<td>6 Freon Loop 2 P/L Hx Flow Rate Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td>(FSMs)</td>
<td>7 Inhibits Primary C/W for AC3 Voltage and H2O Loop 2 Pump P</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>S67 AC VOLTS 3</td>
<td>8 Sets H2O Loop 1 Pump P low limit to 45 psia</td>
</tr>
<tr>
<td></td>
<td>• AV BAY 1 FAN (two) – ON</td>
<td>S69 FC H2 PUMP 3</td>
<td>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 unpwring sub-buses: SSR–134, SSR–135, SSR–136, SSR–137</td>
</tr>
<tr>
<td></td>
<td>• FREON PUMP LOOP 2 – B</td>
<td>S86 HYD RSVR Q</td>
<td>10 Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts</td>
</tr>
<tr>
<td></td>
<td>• √ AV BAY 2 FAN A – ON</td>
<td>SM2 HYD QTY (B)</td>
<td>11 MCC will provide equipment reconfig info if reqd</td>
</tr>
<tr>
<td></td>
<td>• V/B – OFF</td>
<td>S66 AV BAY 1 FAN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √ 3 FAN A – OFF</td>
<td>S66 IMU FN SPD B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• V/B – ON</td>
<td>S88 FREON FLOW 1</td>
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<tr>
<td></td>
<td>• Av Bay 1 Sig Condr, Xdcrs (ECLS SC2)</td>
<td>(O13U)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of IMU Fan C</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of H2O Loop 2 Pump man ON capability</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td>(O17:C)</td>
<td>• SIG CONDR FREON A – AC2</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SIG CONDR FREON B – AC2</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td>• C/W PARAM SEL tw (three) – 053,115</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM – INH</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of AV Bay 2 Fan B</td>
<td>1Φ of AV Bay 3 Fan A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of AV Bay 2 Fan B</td>
<td>1Φ of AV Bay 3 Fan A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of AV Bay 3 Fan A</td>
<td>1Φ of AV Bay 3 Fan A</td>
<td></td>
</tr>
<tr>
<td>SM 60 SM TABLE MAINT</td>
<td>1Φ of Cabin Fan A</td>
<td>1Φ of Cabin Fan A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td>5 Freon Sig Condr A AC3 pwr (ECLS SC1A)</td>
<td></td>
</tr>
<tr>
<td>(MO51F)</td>
<td>• If CO2 RMVL SYS flwn and if CO2 RMVL SYS CNTLR 2 selected;</td>
<td>6 Freon Sig Condr B AC3 pwr (ECLS SC1B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Perform CO2 RMVL SYS CNTLR CONFIG: ACT 1 / DEACT 2 (ACT 2/DEACT 1) (ORB OPS, ECLS)</td>
<td>(O1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of FC3 H2 Pump</td>
<td>1Φ of FC3 Coolant Pump</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of FC3 H2 Pump</td>
<td>1Φ of FC3 Coolant Pump</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of CO2 Rmvl Sys: Fan AC3 pwr Compressor AC3 pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If bus shorted:</td>
<td>If bus shorted:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Open all AC3 φB cbs that pwr 3Φ loads on pns L4: C–I,K,M (9 cbs), MA73C: G–I (3 cbs)</td>
<td>AC3 payload 3Φ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Open all AC3 φB ganged cbs on pns L48 (1 cb), MA73C: C–G (7 cbs)</td>
<td>Bus pwr (pws MS, PS Patch panel)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Open all AC3 φB ganged cbs on pns L48 (1 cb), MA73C: C–G (7 cbs)</td>
<td>AC3 FM/C3 Bus pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of AC Utility Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outlets at A15 and MO13Q</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Continued)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10/14/03 7–272 MAL/ALL/GEN F
### EPS SSR–132 (Cont)

#### 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>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| If bus not shorted:  
(L1)  
- Install sw guard (stowed in IFM tool kit) over Cab Fan A sw  
- Perform the following BUS ISOLATION steps |                     |       |
| 13      |                     |                  |       |
| • Switch guard installed to prevent Cab Fan A from being turned off during LOH can changeout and cabin fan filter cleaning |                     |       |
| 14      |                     |                  |       |
| IMU Fan Sig Condr (ECLS SC7) |                     |       |
| Hyd Rsrv 3 Qty Snr |                     |       |
| Freon Loop 2 Cntr A Rad Byp Vlv Mtr |                     |       |
| MS pnl Its (pnl R10,R12) |                     |       |
| L/Ctr Inst Its (pnl C2,F6,F7) |                     |       |
| Port RMS:  
1Φ of MPM Mtr 1  
FWD MRL Mtr 2  
AFT MRL Mtr 1 |                     |       |
| 1Φ of AC3 payload  
3Φ Bus pwr (pwrs MS, PS Patch pnl) |                     |       |
**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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>1Φ of IMU Fan C</td>
<td>1. H2O Loop 2 Pump Out Press must drop below 45 psia to trigger C/W</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• IMU FAN B – ON</td>
<td>1Φ of H2O Loop 2 Pump man</td>
<td>2. Inhibits Primary C/W for AC3 Voltage and H2O Loop 2 Pump P</td>
</tr>
<tr>
<td></td>
<td>• √ C – OFF</td>
<td>ON capability</td>
<td>3. Sets H2O Loop 1 Pump P low limit to 45 psia</td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 (two) – ON,B</td>
<td>1Φ of Freon Loop 2 Pump A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 – GPC</td>
<td>1Φ of AV Bay 2 Fan B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td>1Φ of AV Bay 3 Fan A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>1Φ of Cabin Fan A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FA/C0112 C – OFF</td>
<td>Hyd H2O Blr 3 Cntlr B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td>1Φ of FC3 H2 Pump</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>1Φ of FC3 Coolant Pump</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FA/C0112 C – OFF</td>
<td>1 Φ of CO2 Rmvl Sys: Fan AC3 pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √ C – OFF</td>
<td>Compressor AC3 pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FAN B – ON</td>
<td>4. If bus shorted:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √ C – OFF</td>
<td>AC3 payload 3Φ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 (two) – ON,B</td>
<td>Bus pwr (powers MS, PS Patch panel)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 – GPC</td>
<td>AC3 FMC3 Bus Pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td>MMC2 Bus Pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>MMC4 Bus Pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FA/C0112 C – OFF</td>
<td>AMC3 Bus Pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>5. Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FA/C0112 C – OFF</td>
<td>After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring subbuses: SSR–134, SSR–135, SSR–136, SSR–137</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td>6. For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>7. MCC will provide equipment reconfig info if reqd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FA/C0112 C – OFF</td>
<td>8. Switch guard installed to prevent Cab Fan A from being turned off during LOH can changeout and cabin fan filter cleaning</td>
<td></td>
</tr>
</tbody>
</table>

SM 60 SM TABLE MAINT

• Reset upper limit of 0450034 (FC3 H2 PUMP STATUS) to current value + 0.3 volts

(MOS1F)
If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 2 selected:
• Perform CO2 RMVL SYS CNTLR CONFIG (ACT 1/DEACT 2(ACT 2/DEACT 1) (ORB OPS, ECLS)

If bus shorted:
• Open all AC3 ΦC cbs that pwr 3Φ loads on pns L4: C–I,K,M (9 cbs), MA73C: G–I (3 cbs)
• Open all AC3 ΦC ganged cbs on pns L4:B (1 cb), MA73C: C–G (7 cbs)

If bus not shorted:
• Install sw guard (stowed in IFM tool kit) over Cab Fan A sw
• Perform the following BUS ISOLATION steps

(Continued)
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 IF BUS NOT SHORTED, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:N) • cb AC3 φC RAD ISOL B – op</td>
<td>Freon Loop 1,2 Rad Isol Motor B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:O) • cb AC3 φC BLR HYD BYP 3B – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:P) • cb AC3 φC TACAN 3 – op</td>
<td>Tacan 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:Q) • cb AC3 φC LTG PNL OS – op</td>
<td>OS pnl lts (pnls A1,A2,A6, A7,A8,A13,L9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port RMS: 1Φ of MPM Mtr 1 FWD MRL Mtr 2 AFT MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of AC3 payload 3Φ Bus pwr (pwrs MS, PS Patch pnl)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 Motor A remains</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 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></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

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC3 FMC3 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>LH Vent 1,2 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>R ADP Dpy Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>−Z Star Trkr Dr Sys 2 OP/CL capability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1 Redundant mtr remains

---

## 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></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

(MA73C:C)
• cb MCA LOGIC MCA PWR
  - AC3 3Φ MID 2 – op

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC3 MMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PLBD C/L Lat 1–4 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5–8 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Port Aft Bkhd Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Stbd Rad Lat 7–12 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Dpy/Sto Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LH Vent 6 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Port RMS Aft MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>KU ANT Dpy/Sto Mtr 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- SM (BFS SM 63) PL BAY DOORS
  During PLBD OP/CL, single mtr run time noted on actuators listed at left

(R13L)
During Rad Dpy/Sto ops, RAD CNTL STBD tb (two) indicates single mtr ops

### NOTES

1 Single mtr time
2 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></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73:C:D)
- cb MCA LOGIC MCA PWR
- AC3 3Φ MID 4 – op

**EQUIP/FUNCTION LOST**

Port RMS:
- MPM Mtr 1
- Fwd MRL Mtr 2

SM (BFS SM 63) PL BAY DOORS
During PLBD OP/CL, single mtr run time noted on actuators listed at left

(R13L)
During Rad Dpy/Sto ops, RAD CNTL PORT tb (two) indicates single mtr ops

1 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison

2 Single mtr time

---

### 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></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73:C:D)
- cb MCA LOGIC MCA PWR
- AC3 3Φ AFT 3 – op

**EQUIP/FUNCTION LOST**

AC3 AMC3 Bus pwr
- RH Vents 8,9 Mtr 1

ET Door Mtrs:
- C/L Lat Actr 2 Mtr 2
- L Dr Closure Mtr 2
- R Dr Closure Mtr 2
- Uplock Lat Mtr 1

AC3 MMC4 Bus pwr
- PLBD C/L Lat 9–12 Mtr 2
- 13–16 Mtr 1
- Stbd Aft Blkhd Mtr 1
- Port Door Mtr 1
- RH Vents 3,5 Mtrs 2
- Port Rad Lat 7–12 Mtr 2
- Dpy/Sto Mtr 2

1 Redundant mtrs remain
## 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>1</td>
<td>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>

### BUS ISOLATION
ONLY ON MCC CALL, PERFORM
(MA73C:)
• cb AC1 FWD RCS VLV (three) – op

## 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>1</td>
<td>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>

### BUS ISOLATION
ONLY ON MCC CALL, PERFORM
(MA73C:)
• cb AC2 FWD RCS VLV (three) – op

## 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>1</td>
<td>The following tb indications do not change position in response to cmds: (O8) FWD RCS TK ISOL 1/2 MANF ISOL 3 4</td>
<td>1 Vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

### BUS ISOLATION
ONLY ON MCC CALL, PERFORM
(MA73C:)
• cb AC3 FWD RCS VLV (three) – op
### 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:i)

- 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:i)

- 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

- 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></td>
<td>1 Vlv remains in last commanded position</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

- AFT POD VLV LOGIC GP 1/3, 1/2 (two) – OFF

1 OMS Qty Gauging Degraded

- (O8) L,R OMS TK ISOL A tb – bp
- L OMS XFEED A tb – bp

- (O7) AFT L,R RCS TK ISOL 3/4/5 A tb – bp
- MANF ISOL 2 tb – bp
- XFEED 3/4/5 tb – bp

- (FSMs) RCS PWR FAIL

1 Vlv remains in last commanded position

2 MCC for impacts to OMS Gauging

01/06/00

7−280

MAL/ALL/GEN F
### 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</td>
<td></td>
<td>(O8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>L/R OMS XFEED B tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(O7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AFT L/R RCS TK ISOL 3/4/5 B tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MANF ISOL 1 tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RCS PWR FAIL</td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM

- (MA73Cl)
  - AFT POD VLV LOGIC GP 1/2, 2/3 (two) – OFF

1 Refer to OMS/RCS Slide
Rule for vlv loss info (use FPC2 Slide for Aft RCS)

### 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</td>
<td></td>
<td>(O8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>L/R OMS TK ISOL B tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>R OMS XFEED A tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(O7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AFT L/R RCS TK ISOL 1/2 tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MANF ISOL 3,4 tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>XFEED 1/2 tb – bp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RCS PWR FAIL</td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM

- (MA73Cl)
  - AFT POD VLV LOGIC GP 1/3, 2/3 (two) – OFF

1 Refer to OMS/RCS Slide
Rule for vlv loss info (use FPC3 Slide for Aft RCS)

1 Vlv remains in last commanded position
2 MCC for impacts to OMS Gauging

1 Vlv remains in last commanded position
2 MCC for impacts to OMS Gauging
1.1

Attempt MNC/PRIPL connection again:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>O13:E</td>
<td>1. cb ESS 3AB MNC CONTR – cl</td>
</tr>
<tr>
<td>O14:B</td>
<td>2. cb MNA MNC CONTR – cl</td>
</tr>
<tr>
<td>R1</td>
<td>3. PL PRI MNC – OFF, ON (tb−ON)</td>
</tr>
</tbody>
</table>

If MNC/PRIPL connection failed, attempt FC3/PRIPL connection:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>4. PL PRI MNC – OFF (tb−OFF)</td>
</tr>
<tr>
<td></td>
<td>5. FC3 – ON (tb−ON)</td>
</tr>
</tbody>
</table>

If FC3/PRIPL connection failed, attempt MNB/PRIPL connection:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>O13:C</td>
<td>6. cb ESS 2CA MNB CONTR – cl</td>
</tr>
<tr>
<td>O16:B</td>
<td>7. cb MNC MNB CONTR – cl</td>
</tr>
<tr>
<td>R1</td>
<td>8. PL PRI FC3 – OFF (tb−OFF)</td>
</tr>
<tr>
<td></td>
<td>9. MNB – ON (tb−ON)</td>
</tr>
</tbody>
</table>
NOTE
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).

1. Which AC Bus is affected?

<table>
<thead>
<tr>
<th></th>
<th>AC1</th>
<th>AC2</th>
<th>AC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Isolate AC1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perform FC1 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BLR CNTRL/HTR 1 – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HUM SEP A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IMU FAN A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H2O PUMP LOOP 1 (two) – GPC,B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H2O PUMP LOOP 2 – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AV BAY 1 FAN A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AV BAY 2 FAN A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AV BAY 3 FAN A – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREN PUMP LOOP 1 – B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREN PUMP LOOP 2 – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Isolate AC2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perform FC2 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BLR CNTRL/HTR 1 – B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Isolate AC3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perform FC3 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BLR CNTRL/HTR 2 – B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 – A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If CAB TEMP CNTLR 2 active:

|   | CAB TEMP CNTLR – OFF |
|   | (MD44F) |

   | Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR |
   | (L1) |

   | CAB TEMP CNTLR – 1 |
   | (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 |

If CAB TEMP CNTLR 1 active:

|   | CAB TEMP CNTLR – OFF |
|   | (MD44F) |

   | Remove pin from PRI ACTUATOR and BYP vlv linkage, connect linkage to SEC ACTUATOR |
   | (L1) |

   | CAB TEMP CNTLR – 2 |
   | (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 |

5. If CAB TEMP CNTLR 2 active:

6. If CAB TEMP CNTLR 1 active:

7. TIME CRITICAL

FC must be shut down within 9 min to avoid potentially hazardous condition.

**1**

**TIME CRITICAL**

FC must be shut down within 9 min to avoid potentially hazardous condition.

**1**
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).

Due to the limitations of the AC UTIL OUTLET 3 amp cb, the Cabin Fan and AV Bay Fan cannot be powered on the transfer cable simultaneously.

For MNC short, SSR−6 ties FC3 to MNB through the PL PRI BUS.

If MNA shorted:
- Perform FC POWERUP, EPS SSR−6

If MNB shorted:
- Perform FC POWERUP, EPS SSR−6

If Cabin Fan A reqd:
- Perform FC POWERUP, EPS SSR−6

If AV BAY 3 FAN A reqd:
- Perform FC POWERUP, EPS SSR−6
### CONTINUOUS EQUIPMENT

After cable installation, the following equipment will be powered continuously:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>AC Current (amps/phase)</th>
<th>AC 1 Current after cable installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1) FUEL CELL 1 PUMPS</td>
<td>0.81</td>
<td>0.81 0.81 0.81</td>
</tr>
<tr>
<td>(L4:K) AC1 ΦA H2O CNTLR 2 (S/C)</td>
<td>0.06</td>
<td>0.06 0.06 0.06</td>
</tr>
<tr>
<td>(L4:L) ΦB CAB AIR S/C</td>
<td>0.04</td>
<td>0.04 0.04 0.04</td>
</tr>
<tr>
<td>(L4:K) ΦB AV BAY 2 S/C</td>
<td>0.02</td>
<td>0.02 0.02 0.02</td>
</tr>
<tr>
<td>(L4:O) ΦB HYD QTY 1</td>
<td>0.02</td>
<td>0.02 0.02 0.02</td>
</tr>
<tr>
<td>ΦA BLR HYD BYP SENSOR 1B</td>
<td>0.07</td>
<td>0.07 0.07 0.07</td>
</tr>
<tr>
<td>ΦC BLR HYD BYP SENSOR 3A</td>
<td>0.07</td>
<td>0.07 0.07 0.07</td>
</tr>
<tr>
<td>(L4:L) ΦA CABIN TEMP CNTLR 2 (EL)</td>
<td>0.04</td>
<td>0.04 0.04 0.04</td>
</tr>
<tr>
<td>(MA73C:F) ΦC OPS HYD ACTR INST</td>
<td>0.06</td>
<td>0.06 0.06 0.06</td>
</tr>
<tr>
<td>SUBTOTAL AMPS/PHASE</td>
<td>0.98</td>
<td>0.89 0.94</td>
</tr>
</tbody>
</table>

### INTERMITTENT EQUIPMENT

After cable installation, the following equipment will be available for intermittent operation:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>AC Current (amps/phase)</th>
<th>AC 1 Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:K) AC1 ΦA H2O CNTLR 2 (BYP VLV)</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>(L4:O) ΦA BLR HYD BYP VLV 1B</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>ΦC BLR HYD BYP VLV 3A</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>(L4:P) ΦA RAD CNTLR 1B (FREON</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>LOOP 1 CNTLR B RAD BYP VLV MTR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:C) AC1 3Φ FWD 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH VENTS 1/2 MTR 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Y STAR TRKR DR SYS 1 OP/CL</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>L ADP DPY MTR 1</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>AC1 3Φ MID 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH VENT 3 MTR 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 MTR 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 MTR 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP − .28 CL − .21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP − .59 CL − .29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP − .57 CL − .27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PORT RAD LAT 1−6, 7−12 MTRS 1 (2 ea)</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>PORT RAD DPY/STO MTR 1</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>PLBD C/L LAT 9−12 MTR 1</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>PORT. STBD FWD BLKHD MTRS 1</td>
<td>0.87</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>0.25</td>
<td></td>
</tr>
</tbody>
</table>

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.

If MNA shorted, FC pumps will not be restarted.

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. The cb should not trip 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.

If MNA DA1 is not regained, these mtrs (auto and man cntl) will not be operational.
### EPS SSR−200 (Cont)

#### AC1 LOAD REFERENCE TABLE (Cont)

<table>
<thead>
<tr>
<th>INTERMITTENT EQUIPMENT (Cont)</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC1 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:D) AC1 3Φ MID 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLBD LAT 1−4, 5−8 MTR 1 (2 ea)</td>
<td></td>
<td>.72</td>
</tr>
<tr>
<td>L AFT BLKHD MTR 1</td>
<td></td>
<td>.87</td>
</tr>
<tr>
<td>LH VENTS 5 MTR 1</td>
<td></td>
<td>OP − .69 CL − .47</td>
</tr>
<tr>
<td>6 MTR 1</td>
<td></td>
<td>OP − .57 CL − .27</td>
</tr>
<tr>
<td>STBD RAT LAT 1−6, 7−12 MTRS 1 (2 ea)</td>
<td></td>
<td>.26</td>
</tr>
<tr>
<td>STBD RAD DPY/STO MTR 1</td>
<td></td>
<td>.26</td>
</tr>
<tr>
<td>PORT RMS AFT RETN LAT MTR 2</td>
<td></td>
<td>.25</td>
</tr>
<tr>
<td>AC1 3Φ AFT 1 LH VENT 8/9 MTR 1</td>
<td></td>
<td>OP − .67 CL − .89</td>
</tr>
<tr>
<td>ET DOORS L DRIVE MTR 1</td>
<td></td>
<td>1.06</td>
</tr>
<tr>
<td>L LAT MTR 1</td>
<td></td>
<td>1.28</td>
</tr>
<tr>
<td>C/L LAT 1 MTR 1</td>
<td></td>
<td>.41</td>
</tr>
<tr>
<td>C/L LAT 2 MTR 1</td>
<td></td>
<td>.41</td>
</tr>
<tr>
<td>(MA73C:F) φA RMS PRIMARY</td>
<td></td>
<td>.93</td>
</tr>
<tr>
<td>(MA73CH) FWD RCS VLV (3 ea)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>(MA73C:I) AFT POD VLV GP 1</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>AFT RCS ISOL L MANF 2 FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L MANF 2 OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R MANF 2 FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R MANF 2 OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L TK 3/4/5A FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L TK 3/4/5A OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R TK 3/4/5A FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R TK 3/4/5A OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>RCS XFEED R MANF 3/4/5 FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R MANF 3/4/5 OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L MANF 3/4/5 OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L MANF 3/4/5 OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L OMS XFEED 3/4/5 FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>3/4/5 OX VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>OMS ISOL L FU VLV A</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>L OX VLV A</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R FU VLV A</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>R OX VLV A</td>
<td></td>
<td>.42</td>
</tr>
</tbody>
</table>

Note: Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase
### EPS SSR−200 (Cont)

#### AC1 LOAD REFERENCE TABLE (Cont)

<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>1.68</td>
<td></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>.15</td>
<td></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></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:R) φA LTG R INST</td>
<td>9</td>
<td>.31</td>
</tr>
<tr>
<td>(L4:Q) φC OS LTG INST</td>
<td>9</td>
<td>.13</td>
</tr>
<tr>
<td>(L4:P) φC TACAN 1 (old)</td>
<td>1.66</td>
<td></td>
</tr>
<tr>
<td>(MA73CE) WCS FAN SEP 1</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>(F1/MO52J) AC1 UTILITY POWER</td>
<td>VACUUM CLEANER</td>
<td>1.44</td>
</tr>
<tr>
<td>(MO51F) CO2 RMVL SYS 1(2)</td>
<td>9</td>
<td>.91</td>
</tr>
</tbody>
</table>

**Remarks:**

- 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.

**Total Amps/Phase:**
## EPS SSR–200 (Cont)

### CONTINUOUS EQUIPMENT

After cable installation, the following AC2 equipment will be powered CONTINUOUSLY:

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC2 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1) FUEL CELL 2 PUMPS</td>
<td>.81</td>
<td>.81 .81 .81</td>
</tr>
<tr>
<td>(L4:O) AC2 ΦB AV BAY 3 S/C</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>(L4:O) ΦB HYD QTY 2</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>(L4:L) ΦA CABIN TEMP CNTLR 1 (EL)</td>
<td>.04</td>
<td>.04</td>
</tr>
<tr>
<td>(L4:O) ΦA BLR HYD CNTL SENSOR 1A</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>ΦC BLR HYD CNTL SENSOR 2B</td>
<td>.06</td>
<td>.06</td>
</tr>
<tr>
<td>(L4:P) ΦA LG PROX SNSR 2</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>(MA73C:F) ΦC OPS INST HYD ACTR</td>
<td>.13</td>
<td>.13</td>
</tr>
</tbody>
</table>

**SUBTOTAL AMPS/PHASE:** .99 .85 1.00

### 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>AC2 CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:O) AC2 ΦA BLR HYD BYPASS VLV 1A</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>ΦC BLR HYD BYPASS VLV 2B</td>
<td>.21</td>
<td></td>
</tr>
<tr>
<td>(L4:P) ΦB RAD CNTLR 1A (FREON LOOP 1 CNTLR A RAD BYP VLV MTR)</td>
<td>.17</td>
<td></td>
</tr>
<tr>
<td>(L4:N) ΦA FREON FLOW PROP 1 (VLV)</td>
<td>.30</td>
<td></td>
</tr>
<tr>
<td>(MA73C:C) AC2 3 Φ FWD 2 LH VENTS 1/2 MTR 2</td>
<td>OP – .28 CL – .15</td>
<td></td>
</tr>
<tr>
<td>RH VENTS 1/2 MTR 2</td>
<td>OP – .28 CL – .15</td>
<td></td>
</tr>
<tr>
<td>L,R ADP DPY MTR 2</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>–Y STR TRKR DR SYS 2 MTR CNTL</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>–Z STR TRKR DR SYS 1 MTR CNTL</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ MID 1 LH VENT 5 MTR 2</td>
<td>OP – .65 CL – .33</td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ MID 2 LH VENT 3 MTR 2</td>
<td>OP – .65 CL – .33</td>
<td></td>
</tr>
<tr>
<td>PLBDO PORT DOOR MTR 2</td>
<td>1.64</td>
<td></td>
</tr>
<tr>
<td>STBDO AFT BLKHD LAT MTR 2</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>C/L LATCH 13–16 MTR 2</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>KU BAND ANT DPLY MTR 2</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>STBDO RAD LAT 1–6 MTR 2</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>PORT RMS DPLY MTR 2</td>
<td>.29</td>
<td></td>
</tr>
<tr>
<td>PORT RMS FWD RETN LAT MTR 1</td>
<td>.25</td>
<td></td>
</tr>
</tbody>
</table>

**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 ELIVN PS2 and ME TVC SW VL Vxors**

**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.**
## EPS SSR-200 (Cont)

### AC2 LOAD REFERENCE TABLE (Cont)

<table>
<thead>
<tr>
<th>INTERMITTENT EQUIPMENT (Cont)</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC2 CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:C) (Cont)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ AFT 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH VENTS 8/9 MTR 2</td>
<td>OP − .73 CL − .35</td>
<td></td>
</tr>
<tr>
<td>LH VENTS 8/9 MTR 2</td>
<td>OP − .67 CL − .38</td>
<td></td>
</tr>
<tr>
<td>ET DOORS L LAT MTR 2</td>
<td>1.28</td>
<td></td>
</tr>
<tr>
<td>C/L LAT 1 MTR 2</td>
<td>.41</td>
<td></td>
</tr>
<tr>
<td>ET DOORS R DRIVE MTR 2</td>
<td>1.06</td>
<td></td>
</tr>
<tr>
<td>R LAT MTR 2</td>
<td>1.28</td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ MID 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL RET LAT MTR 2</td>
<td>.41</td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ MID 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH VENT 6 MTR 2</td>
<td>OP − .59 CL − .29</td>
<td></td>
</tr>
<tr>
<td>PLBD STBD DOOR MTR 2</td>
<td>1.64</td>
<td></td>
</tr>
<tr>
<td>PORT FWD BLKHD LAT MTR 2</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>STBD FWD BLKHD LAT MTR 2</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>PORT RAD LAT 1−6 MTR 2</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>DPLY MTR 2</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>PORT RMS MID RETN LAT MTR 2</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>(MA73C:F) PAYLOAD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC2 ΦA RMS BACKUP</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>LEFT SEAT</td>
<td>.99</td>
<td></td>
</tr>
<tr>
<td>AC2 ΦA PORT RMS SHLD BRACE ACTR</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>(MA73C:G) OMS KIT VLV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:H) FWD RCS VLV (3 ea)</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>(MA73C:I) AFT POD VLV GP 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFT RCS ISOL L MANF 1 FU VLV</td>
<td>9.42</td>
<td></td>
</tr>
<tr>
<td>L MANF 1 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R MANF 1 FU VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>L TK 3/4/5B FU VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>L TK 3/5/5B OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R TK 3/4/5B FU VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R TK 3/4/5B OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>OMS XFEED L FU VLV B</td>
<td>.42</td>
<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>

9 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase.
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.

<table>
<thead>
<tr>
<th>CONTINGENCY EQUIPMENT</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC2 CURRENT AFTER CABLE INSTALLED</th>
<th>φA</th>
<th>φB</th>
<th>φC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:F) H2O LOOP PUMP 1B</td>
<td>1.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:G) AV BAY 1 FAN B</td>
<td>.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:H) AV BAY 2 FAN A</td>
<td>.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:I) IMU FAN B</td>
<td>.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:J) HUM SEP B</td>
<td>.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:K) CABIN FAN B</td>
<td>1.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:M) FREON LOOP 1 PUMP B</td>
<td>1.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:L) AC2 ΦA CABIN TEMP CNTLR 1</td>
<td>.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:R) AC2 ΦB LTG INST OVHD</td>
<td>.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:Q) AC2 ΦB OS LTG NUMERIC</td>
<td>.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:P) AC2 ΦC TACAN 2 (old)</td>
<td>1.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:O) AC2 ΦA LTG PNL R OVHD</td>
<td>1.34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:E) WCS FAN SEP 2</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Amps/Phase

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.
**Continued from previous page...**

<table>
<thead>
<tr>
<th>CONTINUOUS EQUIPMENT</th>
<th>AC CURRENT AFTER CABLE INSTALLED</th>
<th>AC CURRENT (amps/phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>After cable installation, the following AC3 equipment will be powered CONTINUOUSLY:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R1) FUEL CELL 3 PUMPS</td>
<td></td>
<td>.81 .81 .81</td>
</tr>
<tr>
<td>(L4:j) AC3 φA HUM SEP S/C</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>(L4:j) AC3 φB IMU FAN S/C</td>
<td></td>
<td>.02 .02</td>
</tr>
<tr>
<td>(L4:l) AC3 φA H2O CNTLR 1 (S/C)</td>
<td></td>
<td>.06 .06</td>
</tr>
<tr>
<td>AC3 φB AV BAY 1 S/C</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>(L4:o) AC3 φB HYD QTY 3</td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>AC3 φA BLR HYD BYP SENSOR 2A</td>
<td></td>
<td>.07</td>
</tr>
<tr>
<td>AC3 φC BLR HYD BYP SENSOR 3B</td>
<td></td>
<td>.07</td>
</tr>
<tr>
<td>(L4:p) AC3 φA LG PROX SNSR 1</td>
<td></td>
<td>.07</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td></td>
<td><strong>1.03</strong></td>
</tr>
</tbody>
</table>

**INTERRUPTED EQUIPMENT**

After cable installation, the following AC3 equipment will be available for INTERRUPTED operation:

<table>
<thead>
<tr>
<th>AC CURRENT (amps/phase)</th>
<th>AC CURRENT AFTER CABLE INSTALLED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:l) AC3 φA H2O CNTLR 1 (BYP VLV)</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>(L4:n) AC3 φA FREON FLOW PROP 2 (VLV)</td>
<td></td>
<td>.30</td>
</tr>
<tr>
<td>(L4:o) AC3 φA BLR HYD BYP VLV 2A</td>
<td></td>
<td>.21</td>
</tr>
<tr>
<td>AC3 φC BLR HYD BYP VLV 3B</td>
<td></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></td>
<td>.17</td>
</tr>
<tr>
<td>(MA73:c) AC3 3φ FWD 3 FWD RCS ISOL TK 1/2 FU VLV</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>TK 1/2 OX VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>MANF 3 FU VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>4 FU VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>4 FU VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>4 FU VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>4 FU VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>4 FU VLV (9)</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>LH VENTS 1/2 MTR 1</td>
<td></td>
<td>.29 .29 .29</td>
</tr>
<tr>
<td>R ADP MTR 1, 18</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>-Z STAR TRKR SYS 2 MTR CNTRL</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>AC3 3φ MID 2</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>LH VENT 3 MTR 1</td>
<td></td>
<td>.59 .59 .59</td>
</tr>
<tr>
<td>LH VENT 6 MTR 2</td>
<td></td>
<td>.59 .59 .59</td>
</tr>
<tr>
<td>PLBD PORT AFT BLKHD LAT MTR 2</td>
<td></td>
<td>.87</td>
</tr>
</tbody>
</table>

**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.

AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at ~4.2 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 1.3 amp/phase for single mtr ops on all associated vent doors.
### AC3 LOAD REFERENCE TABLE (Cont)

#### INTERMITTENT EQUIPMENT (Cont)

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>Phase ΦA</th>
<th>Phase ΦB</th>
<th>Phase ΦC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC3 Φ3 PLBD C/L 1–4 LAT MTR 2</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L 5–8 LAT MTR 2</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KU BAND ANT DPLY MTR 1</td>
<td>.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STBD RAD DPY/STD MTR 2</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAT 7–12 MTR 2</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC3 Φ3 MID 2 PORT RMS AFT SYS RETN LCH MTR 1</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:C) (Cont) AC3 3Φ AFT 3 RH VENTS 8/9 MTR 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET DOORS L DRIVE MTR 2</td>
<td>1.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L LAT 2 MTR 2</td>
<td>.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R DRIVE MTR 1</td>
<td>1.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R LAT MTR 1</td>
<td>1.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC3 3Φ MID 4 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>PLBD PORT DOOR MTR 1</td>
<td>1.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STBD AFT BLKHD LAT MTR 1</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L 9–12 LAT MTR 2</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C/L 13–16 LAT MTR 1</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KU BAND ANT DPY MTR 1</td>
<td>.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PORT RAD DPY MTR 2</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7–12 LAT MTR 2</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PORT RMS DPY MTR 1</td>
<td>.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FWD RETN LAT MTR 2</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:E) PAYLOAD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:G) GALLEY FAN</td>
<td>.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIGHT SEAT</td>
<td>.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:H) FWD RCS VLV (3 ea)</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:I) AFT POD VLV GP 3 AFT RCS ISOL L TK 1/2 FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L TK 1/2 OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R TK 1/2 FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R TK 1/2 OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L MANF 3 FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L MANF 3 OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase
## AC3 LOAD REFERENCE TABLE (Cont)

### INTERMITTENT EQUIPMENT (Cont)

<table>
<thead>
<tr>
<th>Description</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC3 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73Cii) AFT RCS ISOL R MANF 3 FU VLV</td>
<td>.42</td>
<td>φA φB φC</td>
</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>(MA73Cii) AFT POD VLV GP 3</td>
<td></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>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>L MANF 1/2 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R MANF 1/2 FU VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R MANF 1/2 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>OMS XFEED R FU VLV A</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R OX VLV A</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>OMS ISOL L FU VLV B</td>
<td>.42</td>
<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>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 L/CTR</td>
<td>.31</td>
</tr>
<tr>
<td>(L4:P) AC3 φC TACAN 3 (old)</td>
<td>1.66</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>(MO51F) CO2 RMVL SYS 2(1)</td>
<td>.91</td>
</tr>
<tr>
<td>(A15,MO13Q) AC3 UTILITY POWER</td>
<td></td>
</tr>
<tr>
<td>VACUUM CLEANER</td>
<td>1.44</td>
</tr>
<tr>
<td>TOTAL AMPS/PHASE</td>
<td></td>
</tr>
</tbody>
</table>
EPS SSR–201
CRYO HTR MANUAL OPS

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>
<tr>
<td>6</td>
<td>0453100</td>
<td>0454100</td>
</tr>
<tr>
<td>7</td>
<td>0453200</td>
<td>0454200</td>
</tr>
<tr>
<td>8</td>
<td>0453300</td>
<td>0454300</td>
</tr>
<tr>
<td>9</td>
<td>0453400</td>
<td>0454400</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

1. SM ALERT LIMIT SET 1 is used when both heater switches are in OFF or ON. Limit set 2 is used only when one or both heater switches are in AUTO

2. MCC may recommend new lower limit based on TK quantity. Limit supplied is ok for all TK QTYS

3. This procedure assumes that both manifold vlvs are open
EPS SSR–201 (Cont)

3 Activate htrs

Determine appropriate switch(es) that control htr(s) to be operated from EPS.

7.6 CRYO Table A.

Config:
- All TK HTR A (one) – ON
- All other TK HTRS – OFF

4 Wait for alarm

- Wait for ‘S68 CRYO O2(H2)’ or ‘168 O2(H2) TK P’ or if using B/U C/W: ‘S68 CRYO O2(H2) PRES’ or ‘168 PALLEH O2(H2) PRES’

5 Troubleshoot alarm per appropriate Mal procedure

6 Pressures

- All TK HTR A – OFF. Half heaters are sufficient
- Cycle HTR A only during subsequent blocks

7 Dual htrs must be used
- All TK HTR B – ON
- Cycle A and B HTRS in subsequent blocks

8 Wait for alarm

- Wait for ‘S68 CRYO O2(H2)’ or ‘168 O2(H2) TK P’ or if using B/U C/W: ‘S68 CRYO O2(H2) PRES’ or ‘168 PALLEH O2(H2) PRES’

9 Pressures

- All TK HTR(s) – OFF

10 Pressures

- All TK HTR(s) – ON
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?
   NO → 35
   YES → 2

2. First FC failure
   Second FC failure

3. Which FC will be recovered:
   FC1 → 8
   FC2 → 9
   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?
   NO → 3
   YES → 6

6. MCC about second FC recovery
   YES → 8
   NO → 7

7. LOSS OF 2ND FC PWRDN completed
   (R1)
   MN BUS TIE (three) – ON (tb–ON)
   FC2 being recovered while FC1 failed

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)

11.

12.

11/06/00
11 If FC2 being recovered
   (R1)
   • PRI PL MNC  – ON (tb–ON)
   • PRI PL FC3  – ON (tb–ON)

12 Perform PREFLIGHT TEST BUS SETUP (IFM)

13 FC3 being recovered while FC1 failed ?

14 Preflight Bus pwrup/FC3 recovery
   (R1)
   • FC3 REAC  – OP (tb–OP)

   SM 67 ELECTRIC
   • Note AC3 AMPS
   (R1)
   • FC3/MN BUS C  – ON (tb–ON)

   (MO52J)
   • DC UTIL PWR MNA  – ON

   IFM Breakout Box:
   • AUX  – ON
   (Preflight Bus is now pwrd)
   • PWR B  – ON
   • "22 lt  – ON
   (R1)
   FC2/MN BUS B tb  – ON ?

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:
• Unpwr DC UTIL OUTLET
• Use normal FDF procedures to recover lost system and shutdn aff FC

WARNING
Preflight Test Bus driver failure may cause FC2 to disconnect from MNB (last good FC/MN Bus). To prevent loss of all main bus pwr, FC3 is connected to MNC BEFORE Preflight Bus pwrup. This ensures at least one FC is connected to its main bus. Only 9 min maximum until FC3 start

9

8 7 4

NO

YES

NO

YES

15

16 21

10

12 13
23

25
• Wait 30 min

All FC STACK TEMP < 185 degF
or
All FC EXIT TEMP < 130 degF or > 160 degF
or
Difference between FC STACK TEMP and EXIT TEMP < 30 degF or > 70 degF ?

YES

26
• Perform FC SHUTDN
(FC SHUTDN Cue Card)

NO

28
Which FC config is present:

29
• FC1 recovered, FC2(3) failed
(R1)
• MN BUS TIE B – ON (tb–ON)
• C – ON (tb–ON)
• A – OFF (tb–OFF)

30
• FC2 recovered, FC1 failed
(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
• FC2 recovered, FC3 failed
(R1)
• MN BUS TIE C – ON (tb–ON)
• A – ON (tb–ON)
• B – OFF (tb–OFF)

32
• FC3 recovered, FC1(2), failed
(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
• FC3 recovered, FC1 and FC2 operating normally
(R1)
• PRI PL MNC – ON (tb–ON)
• FC3 – ON (tb–ON)
• MN BUS TIE B – ON (tb–ON)
• A – OFF (tb–OFF)

• Return to PREFLIGHT TEST BUS SETUP (IFM) to remove and stow cables, etc

34
• Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

36

EPS SSR–202 (Cont)
Crewmember must be able to reach DC UTIL PWR switch while secured in seat.

36 Which Preflight Test Bus reqd:

- 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)

(MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF

37 (R1) MN BUS TIE
- A – ON (tb–ON)
- B – ON (tb–ON)
- C – OFF (tb–OFF)

- PRI PL MNC – ON (tb–ON)
- PRI PL FC3 – ON (tb–ON)

38 (R1) MN BUS TIE
- A – ON (tb–ON)
- B – ON (tb–ON)
- C – OFF (tb–OFF)

- PRI PL MNC – ON (tb–ON)
- PRI PL FC3 – ON (tb–ON)

39 Perform PREFLIGHT TEST BUS SETUP (IFM)

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:

- Unpwr DC UTIL OUTLET
- Use normal FDF procedures to recover lost system

40 If second FC fails during entry, restart IFM recoverable FC:

(MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – ON

(R1)
- Aff FC REAC – OP (tb–OP)
- Aff FC/MN BUS – ON (tb–ON)
- MN BUS TIE (three) – ON (tb–ON)

If FC3 recovered or still operating:
- PRI PL MNC – ON (tb–ON)
- PRI PL FC3 – ON (tb–ON)

If FC1(FC2) recovered:
- MN BUS TIE A(B) – OFF (tb–OFF)
- Remaining good FC MN BUS TIE – OFF (tb–OFF)

41 Preflight Bus reqd:
- Momentarily
- Continuously

42
EPS SSR–202 (Cont)

48 52

54 IFM reqd to maintain entry single fault tolerance in critical system ?

NO

55 • Return to PREFLIGHT TEST BUS SETUP (IFM) to remove and stow cables, etc

YES

56 • Leave IFM installed through T/D

57 If IFM recoverable system/function reqd during entry:

(R1)
• MN BUS TIE B – ON (tb–ON)
  If Preflight 1 used:
• MN BUS TIE A – ON (tb–ON)
  If Preflight 2 used:
• MN BUS TIE C – ON (tb–ON)
• PRI PL MNC – ON (tb–ON)
• FC3 – ON (tb–ON)

(MO30F/MO52J)
• DC UTIL PWR MNC(MNA) – ON

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>
<tr>
<td>GNC FRP</td>
<td>GNC FRP–1</td>
</tr>
<tr>
<td></td>
<td>GNC FRP–2</td>
</tr>
<tr>
<td></td>
<td>GNC FRP–3</td>
</tr>
</tbody>
</table>

| GNC SSR | GNC SSR–1 | ACTIVATE IMU(s) | 8–8 |
| | GNC SSR–2 | MATRIX (STAR) ALIGN USING HUD STAR DATA | 8–8 |
| | GNC SSR–3 | ALIGN USING STR TRKR STAR DATA | 8–10 |
| | GNC SSR–4 | RESERVED | not used |
| | GNC SSR–5 | RESERVED | not used |
| | GNC SSR–6 | RESERVED | not used |
| | GNC SSR–7 | RESERVED | not used |
| | GNC SSR–8 | POSITION OMS THROUGH CG | 8–11 |
| | GNC SSR–9 | RM DESELECTION OF FAILED OPEN THC CONTACT | 8–12 |

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

- AERO DRIVE IMU BITE/T
- DAP DNMODE RM FAIL IMU
- DISPLAY SW A(L,R) RM DLMA IMU
- L(R) OMS GMBL RHC L(R,A)
- NAV EDIT SBTC/THC L(R,A)
- SEL AUTO
- SENSE SW
This Page Intentionally Blank
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

O6 1. Ensure pwr ON to both STAR TRKRs and doors open
   √ STAR TRKR PWR (two) – ON
   √ DR CNTL SYS (two) – OP

2. 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 *)

   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. Reselect one IMU for attitude reference
   [GNC 21 IMU ALIGN]
   √ IMU 1, 2, or 3: DES – ITEM 7,8, or 9 (no *)
   Deselect remaining two IMUs
   √ IMU DES – ITEM 7(8,9) (*)

4. Perform Matrix Align of IMUs 1,2,3 in MATRIX (STAR) ALIGN USING HUD STAR DATA . . . . . . GNC SSR–2

5. Reselect all deselected IMUs
   [GNC 21 IMU ALIGN]
   IMU DES – ITEM 7(8,9) EXEC (no *)

   NOTE
   Do not proceed until uplink of REFSMMATs verified with MCC

6. Reestablish skew between IMUs with IMU TO IMU ALIGN
   Perform IMU ALIGNMENT IMU/IMU – IMUs 1,2,3 using best IMU as reference (ORB OPS, GNC)

   NOTE
   IPL causes loss of previous HUD CAL.
   √ MCC for performing CAL

7. 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, O15:A, O16:A
2. Ensure pwr applied to all IMUs
   IMU 1,2,3 – ON

   If not, ACTIVATE IMU(s) . . . . . . . GNC SSR–1

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)

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
   GNC 21 IMU ALIGN
   √ IMUs: DES – ITEM 7(8,9) EXEC (*)

2. Ensure pwr applied to all IMUs
   If not, ACTIVATE IMU(s) . . . . . . . . GNC SSR–1

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)

4. Enable serial data link
   GNC I/O RESET

   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

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)

   NOTE
   Both nonreference IMUs should be aligned to preclude possibility of IMU RM FAIL (RM threshold reset following any align)

6. Reselect IMUs previously deselected
   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
IMU 1(2,3) – ON
O15:A

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 (STAR) 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
✓ Final test mode display symbology
  (ORB OPS, HUD CALIBRATION, GNC 201)
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)

✓ 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
✓ 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
✓ S TABLE TRK ID 1: (reqd ID)
• ANG DIF 1 ≥ 35 deg, ≤ 145 deg
• ERR 1 ≤ .2
✓ SEL – 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

✓ IMU 1(2,3) STAT – (blank)
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
If Matrix Align
• ALIGN MATRIX – ITEM 15 EXEC (*)
DAP: INRTL
DAP ROT: PULSE/PULSE/PULSE

EXEC – ITEM 16 EXEC (*), Rcd MET ______ : ______ : ______
✓ EXEC – ITEM 16 (no *)
DAP: as reqd
If Star Align
STAR ALIGN – ITEM 13 EXEC (*)
✓ ANG 1,2,3, ∆X, ∆Y, ∆Z: < = .80
Rcd ANG 1 2 3

∆X ( ) • • ( ) • ( ) • ( ) •
∆Y ( ) • • ( ) • ( ) • ( ) •
∆Z ( ) • • ( ) • ( ) • ( ) •

CAUTION
If ANG ∆X, ∆Y, ∆Z > .80 for two or more IMUs:
DO NOT TORQUE PLATFORMS
EXCEPT UNDER MCC INSTRUCTIONS

CRT EXEC – ITEM 16 EXEC (*), Rcd MET ______ : ______ : ______
✓ EXEC – ITEM 16 (no *)
GNC SSR–2 (Cont)

F6U(F8U) HUD MODE – NORM
F3 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 TRK/COAS CNTL
✓ 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, Rod __ __
   SEL – ITEM 17,18 (*)

GNC 21 IMU ALIGN
✓ IMU 1(2,3) STAT – (blank)
✓ MATRIX – ITEM 15 EXEC (*)
✓ ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
✓ EXEC – ITEM 16 EXEC (*), Rcd MET ____ __ __ __
✓ EXEC – ITEM 16 (no *)
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 XXXX MNVR YYYY**

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 ⬤ EXEC

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:
I 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
   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
   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
   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
      VERIFY ‘↓’ for failed contact

4. RECONFIG DAP
   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, O16:E
      cb DDU L(A) (two) – as reqd
MECH

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9.1a NO MOTION/'OP/CL' NOT BLANK/'O' OR 'C'/R'
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9.1b '?' DISPLAYED IN 'OP/CL' COLUMN ...................................... 9–6
9.1c PBD SEQ FAIL ........................................................................ 9–7
9.1d LATCH GANGL NOT 'OP' IN SINGLE MTR TIME ....................... 9–8
9.1e 'CL' IN SINGLE MTR TIME ...................................................... 9–10
9.1f DOOR NOT 'OP' IN SINGLE MTR TIME .................................... 9–12
9.1g 'CL' IN SINGLE MTR TIME ...................................................... 9–15
9.1h PBD CONFIG ......................................................................... 9–17

9.2 RADIATOR

9.2a RAD LAT CNTL PORT(STBD) tb NOT LAT IN 60 SEC
OR REL IN 30 SEC ..................................................................... 9–18
9.2b RAD CNTL tb NOT DPY OR STO WITHIN 50 SEC AND NO
MOTION ...................................................................................... 9–20

9.3 KU ANT

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OR SINGLE MTR DRIVE TIME .................................................... 9–26
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MECH SSR

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### Radiator Power Configuration

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<th>MTR</th>
<th>M–MCA</th>
<th>Bus</th>
<th>Mech Pwr 1</th>
<th>Mech Pwr 2</th>
<th>DC Bus</th>
<th>Cntl Bus</th>
<th>Sys A</th>
<th>Sys B</th>
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- STBD: Starboard
- Port: Portside
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Ref: MA73C: C&D for MCA (cb)
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

   ‘OP/CL’ Status Not Blank after Drive Initiation
   ~10 sec

   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 3-ph MID 1,3 (two) – cl
AC2 3-ph MID 2.4 (two) – cl
AC3 3-ph MID 2.4 (two) – cl
(CRT)
AC POWER – ON (ITEM 1 – *)

2 ‘OP/CL’ OR ‘MICRO–SW STAT’ DISPLAY S/W FAILURE

3 Is ‘FAIL’ indicated or other than R13L sw position?
   (CRT)
   • ‘PBD SW’
   YES

4 PL BAY DR SWITCH FAILURE

CAUTION
Switch bypass must be selected any time AC POWER is ON (*) to prevent inadvertent motion

5 Deselect all ‘MAN SEL’ items
Select affected mechanism
(CRT)

6 • MCC

7 (CRT)
   • Select PBD SW BYPASS – ITEM 14 EXEC (*)
   • Continue ops using PBD sw BYPASS
   • MCC about MTR currents
   • Select alternate S/W: BFS
   • Continue PLBD ops in manual mode

8 PLBD S/W FAILURE

9

10 LATCH OR DOOR DRIVE PDU GEARBOX FAILURE OR JAM

11
Type of failure:

1. Prepare for Deorbit Next PLS

2. MCC for mission duration based on cooling requirements

3. Reopen Port Door

4. MCC, EVA may be required

- (CRT) C/L LATCH, STBD BLKHD, or STBD DOOR failed ‘CL’ (while opening)
- PORT BLKHD or PORT DOOR failed ‘CL’
- Any ONE LATCH Gang failed ‘OP’
- STBD DOOR failed ‘OP’
- PORT DOOR failed ‘OP’
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

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
SY 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 – *)

‘?’ Displayed
in ‘OP/CL’ Column

2
1
1
1
1
5

1.

SM (BFS SM 63)
PL BAY DOORS

‘?’ displayed in
‘OP/CL’ column

‘M’ displayed next to ‘?’

YES

2. PF MDM FAILURE

NO

2

3

4

3.

MICROSW, DISPLAY S/W, OR PF MDM CHANNEL FAILURE

3.

Continue ops in
MANUAL mode

Use ‘MICRO–SW STAT’ for position indication

4.

FAILURES

No

Yes
Although PBD SEQ FAIL will terminate AUTO MODE, ITEM 3 (AUTO MODE SEL) remains selected (*). To reselect AUTO MODE, ITEM 3 must be turned OFF, then ON.
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. LATCH GANG NOT ‘OP’ IN SINGLE MTR TIME

2. (CRT)
   • ‘MICRO–SW STAT’
   At least one ‘O’ microsw = ‘1’ ?
   YES
   3. MICROSW FAILURE
   NO

4. LATCH OBSTRUCTION IN OP DIRECTION

5. • Refer to SYS DATA dwg 14.1–2
   Latch gang visually verified clear of rollers ?
   YES
   6. Do not close latch until EOM door closure
   NO
   1

8. (CRT)
   • Deselect all ‘MAN SEL’ items
   • Select all latch
   Attempt to close latch

   (R13L)
   • PL BAY DR – CL (1 mtr time)
   • PL BAY DR – STOP
   (CRT)
   • ‘MICRO–SW STAT’
   At least one ‘C’ microsw = ‘1’ ?
   YES
   9. TWO–WAY JAM
   NO
   10

13

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

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 – *)
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 NO
11 Continue ops in MANUAL mode
12 JAM IN OPEN DIRECTION
9
13 All latch gang is:
- PORT BLKHD
- STBD BLKHD or C/L
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

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
**9.1e LATCH GANG NOT ‘CL’ IN SINGLE MTR TIME**

1. **Latch Gang Does Not Indicate ‘CL’ 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
     - AC POWER – ON
     - (ITEM 1 – *)

   - **SM (BFS SM 63) PL BAY DOORS**
     - 'OP/CL' column
   - LATCH ‘OP’
   - LATCH ‘?’
   - Neither

   - **At least one ‘C’ microsw = ‘1’?**
     - **YES**
     - **3** MICROSW FAILURE
     - **NO**

   - **LATCH OBSTRUCTION IN CL DIRECTION**

   - **Latch gang visually verified latched?**
     - **YES**
     - **7** Continue ops in MANUAL mode
     - **NO**

   - **Door visually**
     - **Yes**
     - **9** DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
     - **NO**

   - **Refer to SYS DATA dwg 14.1–2**

   - **CB MCA PWR**
     - **AC1 3Φ MID 1,3 (two) – cl**
     - **AC2 3Φ MID 2,4 (two) – cl**
     - **AC3 3Φ MID 2,4 (two) – cl**

   - **AC POWER – ON**
     - **(ITEM 1 – *)

1 Op 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 9.1e (Cont)

1. Attempt to open latch
   - (CRT)
     - Deselect all 'MAN SEL' items
     - Select aff latch
   - At least one 'O' = '1' ?

2. Attempt to close latch
   - (CRT)
     - 'MICRO–SW STAT'
   - At least one 'C' = '1' ?

3. Two-Way Jam
   - MCC for entry loads minimization procedures

4. Intermittent Jam or Obstruction Cleared
   - Continue ops in MANUAL mode

5. Operations 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
**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
- AC POWER – ON
- (ITEM 1 – *)

**DOOR NOT ‘OP’ IN SINGLE MTR TIME**

1. **Door Does Not Indicate ‘OP’ in Single Mtr Time**

   1. **(R13L)**
      - ▶ PL BAY DR – STOP
      - ▶ ‘OP/CL’ column
      - DOOR ‘CL’
      - DOOR ‘RDY’
      - DOOR ‘?’
      - Other

   2. ▶ ‘MICRO–SW STAT’

   3. **DISPLAY S/W FAILURE**

   4. **Select alt S/W:** BFS (PASS)
      - Continue PLBD ops

   5. **SAME NUMBER OF STRIPES**
      - NO
      - YES

   6. ▶ ‘MICRO–SW STAT’

   7. **DOOR OP MICROSW FAILURE**

   8. **ROTARY ACTUATOR OR BLKHD JAM**

   11. **Note point of deformation**

   Close door until deformation relieved (R13L)

   - ▶ PL BAY DR – CL (as reqd)
   - ▶ PL BAY DR – STOP

   10. **Continue PLBD ops in MANUAL mode**

   13. **Continue PLBD ops in MANUAL mode**

---

**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

**EVA reqd to cut PLB door drive linkage for at least one rotary actuator (i.e., one nearest point of deformation)**

**EVA reqd to disconnect PDU**

---

**NOTE:**

- Close door until deformation relieved (R13L)
- ▶ PL BAY DR – CL (as reqd)
- ▶ PL BAY DR – STOP

---

**02/25/00**

**9–12**

**MAL/ALL/GEN F**
MECH 9.1f (Cont)

1. EVA reqd to disconnect PDU
2. Door may interfere with P/L deploy
3. Cmd DOOR CL to see if EVA necessary to CL
4. If door reopen were attempted, two–way jam could occur causing day–1 EVA

13

All door is:

PORT

STBD and > 2 stripes are visible

STBD and < 2 stripes are visible

14

Report to MCC the number of stripes visible

MCC for payload clearance

Is payload clearance sufficient for deploy ?

YES

NO

15

MCC for possible P/L deploy prior to performing subsequent steps

16

Close door in MANUAL mode

(CRT, R13L)

• PL BAY DR – CL

• ‘DOOR’ – CL or

• PL BAY DR – STOP

• ‘OP/CL’ column

DOOR ‘RDY’ or ‘CL’ ?

YES

NO

17

JAM IN OPEN DIRECTION

18

Attempt to close door for 5 sec

(R13L)

• PL BAY DR – CL (5 sec)

• PL BAY DR – STOP

Does entire door move ?

NO

YES

19

TWO–WAY JAM

20

Close/latch doors in MANUAL mode

Prepare for deorbit

21

Open door until deformation relieved

(R13L)

• PL BAY DR – OP (as reqd)

• PL BAY DR – STOP

22

MCC for pwrdn

Prepare for EVA
MECH 9.1f (Cont)

18

23 TWO-WAY JAM

24 JAM IN OPEN DIRECTION

25 If door deformed, open door until deformation relieved
   (R13L)
   • PL BAY DR – OP (as reqd)
   • PL BAY DR – STOP

26
   • MCC for pwrdn
   • Prepare for EVA

27
   • MCC for mission duration based on cooling reqmt

3 EVA reqd to disconnect PDU
7 No EVA reqd to close door
9.1g DOOR NOT ‘CL’ IN SINGLE MTR TIME

1. Door Does Not indicate ‘CL’ 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 – *)

9.1a 1

1. (R13L)
• √ PL BAY DR – STOP
SM (BFS SM 63)
PL BAY DOORS
• √ ‘OP/CL’ column
DOOR ‘OP’
DOOR ‘?’
Neither

9.1b 1

2. Is door deformed (indicated by C/L edge warpage and/or different number of stripes visible on door drive pushrods) ?

3. (CRT)
• √ ‘OP/CL’ column
Is DOOR ‘RDY’ ?

4. BLKHD JAM CAUSED BY THERMAL WARPAGE OR OBSTRUCTION

5. Go to CONTINGENCY PLBD CLOSURE, MECH SSR–2

6. ROTARY ACTUATOR JAM AT POINT OF DEFORMATION

7. Door position on PLBD BLKHD LATCH
GO/NO-GO DIAGRAM, MECH SSR–2, fig. 9–1

8. Note point of deformation

9. (CRT)
• √ ‘MICRO–SW STAT’
Both DOOR ‘C’ microsws = ‘1’ and at least two of three FWD and AFT ‘R’ microsws = ‘1’ ?

10. DISPLAY S/W FAILURE

11. • Select alt S/W: BFS (PASS)
• Continue PLBD ops

12. Door CL MICROSW FAILURE

13. • Continue PLBD ops in MANUAL mode
• Visual verification reqd for latch capture

14

15

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

2. EVA reqd to cut PLB door drive linkage for at least one rotary actuator (i.e., one nearest point of deformation)
14 | DOOR DRIVE
   | PDU GBX
   | FAILURE OR
   | TORQUE TUBE
   | JAM

8

15 | Attempt to
   | open door
   | (R13L)
   | • PL BAY DR –
   | OP (1 mtr time)
   | • PL BAY DR –
   | STOP
   | • √‘OP/CL’ column

16 | JAM IN
   | CLOSE
   | DIRECTION

17 | TWO-WAY
   | JAM

18 | Attempt to
   | close door
   | (R13L)
   | • PL BAY DR –
   | CL (1 mtr time)
   | • PL BAY DR –
   | STOP
   | • √‘OP/CL’ column

19 | Is door ‘RDY’ or
   | ‘CL’ ?

20 | Attempt to
   | open (close) door to
   | relieve deformation
   | (if reqd)
   | (R13L)
   | • PL BAY DR –
   | OP(CL) (as reqd)
   | • PL BAY DR –
   | STOP

21 | Reopen door
   | (R13L)
   | • PL BAY DR –
   | OP (1 mtr time)
   | • PL BAY DR –
   | STOP

22 | • √MCC for pwrdn
   | • Prepare for EVA

CAUTION
Do not open PORT door if < 2 stripes visible on STBD door to prevent door contact

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

3 | EVA reqd to
disconnect PDU

02/28/00
If: Mechanism in transit or microsw failed other than those currently commanded in AUTO mode

**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 – *)
AUTO MODE – SEL
(ITEM 3 – *)

**9.1h PBD CONFIG**

1. (R13L)
   - PL BAY DR SYS 1,2 (two) – DSBL
   - PL BAY DR – STOP

2. FAILED–ON RELAY

   Either LATCH or DOOR could prematurely close (open) or phase–to–phase short could occur if commanded in opposite direction when AC pwr applied

3. MCC to recommend removal of pwr and/or repositioning affected mechanism

4. Use manual mode for all subsequent PLBD ops

5. • "OP/CL" column:
   - '?
   - Column blank for any mechanism not commanded
   - Neither

6. Mechanism affected:
   - DOOR
   - LATCH

7. DOOR ‘CL’ MICROSW FAILURE

8. DISPLAY S/W OR MICROSW FAILURE

9. AUTO SEQUENCE S/W FAILURE

10. (R13L)
    - PL BAY DR SYS 1,2 (two) – ENA
    (CRT)
    - AC POWER ON
    ITEM 1 EXEC (*)
    - Continue using MANUAL mode

11. (R13L)
    - PL BAY DR SYS 1,2 (two) – ENA
    (CRT)
    - AC POWER ON
    ITEM 1 EXEC (*)
    - Continue using MANUAL mode

**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 – *)
AUTO MODE – SEL
(ITEM 3 – *)

**Pass:**
PBD CONFIG

**BFS**

**S63 PBD CONFIG**
1. Opened MCA cbs (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


Nominal Config:
(MA73C)
MNA 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

(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

RMS uncradled ?

1. Continue ops based on PDU actuator times.

2. MCC for next action.

3. Discontinue ops.
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
   - YES

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
   - YES
   - NO

16 MECHANICAL JAM

17 Enable good Port/Stbd Lat Sys

<table>
<thead>
<tr>
<th>Port</th>
<th>Stbd</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 1 – cl</td>
<td>• AC1 3Φ MID 3 – cl</td>
</tr>
<tr>
<td>• AC2 3Φ MID 4 – cl</td>
<td>• AC2 3Φ MID 2 – cl</td>
</tr>
<tr>
<td>• AC3 3Φ MID 4 – cl</td>
<td>• AC3 3Φ MID 2 – cl</td>
</tr>
</tbody>
</table>

18 • If deploying: Deploy good Rad pnl. Go to MECH SSR–1
**9.2b RAD CNTL tb NOT DPY OR STO WITHIN 50 SEC AND NO MOTION**

1. Visually verify anomalous RAD pnl position
   - **YES**
   - **NO**

2. tb or MICROSW FAILURE
   - **YES**
   - **NO**

3. MCC for microsw status and verification of RAD pnl end-of-travel
   - **YES**
   - **NO**

4. MECHANICAL JAM OR MTR FAILURE
   - Anomalous RAD pnl in transit, or fully deployed/stowed:
     - PORT(STBD) fully stowed
     - PORT fully deployed or in transit
     - STBD fully deployed
     - STBD in transit

5. Is RMS Uncradled?
   - **YES**
   - **NO**

6. MCC for RMS cradling
   - **YES**
   - **NO**

7. Enable PORT RAD pnl mtr disabled as a result of RMS PWRUP procedure
   - (MA73C)
     - cb MCA PWR
     - AC1 3φ MID 4 – cl
     - AC2 3φ MID 2, 4 – op
     - AC3 3φ MID 2, 4 – cl

8. ONE-WAY MECHANICAL JAM
   - **YES**
   - **NO**

9. Continue RAD OPS for nominal RAD pnl (If reqd) using MECH SSR–1

10. Is PORT RAD pnl fully deployed or in transit:
    - Fully deployed
    - In transit

11. Config for SINGLE RADIATOR ops
    - Disable nominal PORT(STBD) RAD Latch and RAD Cntl 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
      - (MA73C:C,D)
        - STBD Sys Disable cb MCA PWR
          - AC1 3φ MID 3 – op
          - AC2 3φ MID 2 – op
          - AC3 3φ MID 2 – op

12. What was attempted drive ops at time of failure?
    - STOW
    - DPY

13. Continue RAD OPS for nominal RAD pnl (If reqd) using MECH SSR–1

14. MCC to determine if pwrdn is reqd

15. Config for SINGLE RADIATOR ops

---

**Nominal Config:**
- (MA73C)
- MNA 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
- If RMS uncradled:
  - (MA73C)
    - cb MCA PWR
      - AC2 3φ MID 2 – op
      - AC3 3φ MID 4 – op

---

**Steps:**
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
9. Does anomalous RAD pnl appear to be in desired position?
10. VP OR STOW/DPY OPS unsuccessful, and affected RAD pnl failed in transit
11. ONE-WAY MECHANICAL JAM
12. Config for SINGLE RADIATOR ops
13. Continue RAD OPS for nominal RAD pnl (If reqd) using MECH SSR–1
14. MCC to determine if pwrdn is reqd.
MECH 9.2b (Cont)

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 10 sec max)

Did jammed RAD pnl move?

YES NO

15 Attempt to stow jammed RAD pnl
   (R13L) • √ PL BAY MECH PWR SYS (two) – ON
   On MCC GO:
   • RAD CNTL SYS (two) – STO
   • RAD CNTL SYS (two) – OFF (If no motion, or after tb–STO)

Did jammed RAD pnl move?

YES NO

16 Config for SINGLE RADIATOR ops
   • Disable nominal PORT(STBD) RAD Latch sys
   (MA731C.C.D) PORT Sys Disable cb MCA PWR
   • AC1 3φ MID 1 – op
   • AC2 3φ MID 4 – op
   • AC3 3φ MID 4 – op
   (MA731C.C.D) STBD Sys Disable cb MCA PWR
   • AC1 3φ MID 3 – op
   • AC2 3φ MID 2 – op
   • AC3 3φ MID 2 – op

17 What was attempted ops at time of initial jam?

DEPLOY STOW

20 MECHANICAL JAM

21 INTERMITTENT MECHANICAL JAM OR INTERMITTENT MTR FAILURE

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 Latch STBD (PORT) RAD Latches
   (R13L)
   • RAD LAT CNTL SYS (two) – LAT (√ tb–bp)
   • RAD LAT CNTL SYS (two) – OFF (√ tb–LAT)
   • PL BAY MECH PWR SYS (two) – OFF

24 Enable nominal PORT(STBD) RAD Latch and RAD Cntl sys
   (MA731C.C.D) PORT Sys Enable cb MCA PWR
   • AC1 3φ MID 1 – cl
   • AC2 3φ MID 4 – cl
   • AC3 3φ MID 4 – cl
   (MA731C.C.D) STBD Sys Enable cb MCA PWR
   • AC1 3φ MID 3 – cl
   • AC2 3φ MID 2 – cl
   • AC3 3φ MID 2 – cl

25 Continue RAD OPS for nominal RAD pnl (if reqd) using MECH SSR–1

8 MCC to determine if pwr dn is reqd

9 PDU Actuator Times
   Dual Mtr
   Lat – 30 sec
   Rad – 50 sec
   Single Mtr
   Lat – 60 sec
   Rad – 100 sec
**KU ANT**

**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
  - MECH SSR–7

- (MA73C:B)
  - MCA LOGIC
  - MNB MID 4 – ON

- (MA73C:C)
  - cb MCA PWR AC3 3Φ MID 2 – cl
  - cb MNB PWR AC2 3Φ MID 4 – cl

- (R13L)
  - PL BAY MECH PWR SYS (two) – ON
  - KU ANT – GND
  - KU PWR – OFF

- (A1U)
  - DIGI–DIS SEL – EL/AZ

- (R14:C)
  - cb MNB KU ELEC – op

---

1. **KU ANT tb Not DPY in 46 Sec**

2. **Ant position via visual aids**
   - tb – STO
   - tb – bp

3. **KU ANT DPY/STO sw FAILURE OR JAMMED MECHANISM**

4. **Ant appears fully deployed?**
   - YES
      - Perform CONTINGENCY KU–BD ANT DIRECT STOW, MECH SSR–5
   - NO
      - 10KU ANT tb position
        - tb – bp
        - tb – STO

5. **tb FAILURE**

6. **IFM may be reqd**

7. **Discontinue ops**
   - /MCC

8. **Ant position (visual)**

9. **Ant position via visual aids**
   - tb – STO
   - tb – bp

10. **MECHANICAL FAILURE OR JAMMED MECHANISM**

11. **INTERMITTENT OPS OR JAM IN DPY DIRECTION**

12. **Discontinue ops**

13. **Ant initialization to –Z orientation**

14. **STOW LIMIT SWITCH MECHANISM FAILED OR tb FAILURE**

15. **Continue ops**

16. **DEPLOY LIMIT SWITCH MECHANISM FAILURE OR JAMMED MECHANISM**

17. **Go to CONTINGENCY KU–BD ANT DIRECT STOW, MECH SSR–5**
MECH

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 PWR – ON
(R14:C)
cb MNB KU
ELEC – cl

9.3b KU ANT tb NOT STO IN 46 SEC

1. KU ANT tb Not STO in 46 Sec

2. (R13L)
   - KU ANT – STO
   - PL BAY MECH PWR SYS 1,2
   (two) – OFF
   - !Deployed Assy
   position using visual aids

   Stowed
   Not Stowed

3. • Discontinue ops

4. (R13L)
   - KU ANT tb
   tb – bp
   tb – DPY

5. Prior to redeploying KU BAND Deployed Assy, /KU PWR – OFF, KU PWR must remain off until deployed assy is stowed

6. (A1U)
   - KU PWR – OFF
   - CNTL – PNL
   (R13L)
   - KU ANT – GND

7. (A1U)
   - KU PWR – OFF
   (R13L)
   - KU ANT – GND
   - MECH PWR SYS
   (two) – OFF
   - !MCC

8. • Perform KU–BD ANT DEPLOY
   (ORB OPS)
   • Perform CONTINGENCY
   KU–BD ANT DIRECT STOW,
   MECH SSR–5
   tb – STO
   tb – bp

9. INTERMITTENT
   OPS, OR BOOM
   STOW ENABLE I
   OR II SIGNAL
   FAILED

10. MECHANICAL
   FAILURE OR
   JAMMED
   MECHANISM

11. • Discontinue ops

12. • !MCC

Drive Time
Single mtr –
46 sec
Dual mtr – 23 sec

KU–BAND
CCTV overlay
located in Middeck
Transparency Kit

If limit sw
mechanism failed in
deploy position,
MECH SSR–7 reqd
for subsequent
deploy ops

If Boom Stow
Enable signal failure,
MECH SSR–5 reqd
for stow ops

Antenna jettison
may be reqd; KU–BD
ANT JETTISON
(ORB OPS)

KU PWR must
be turned off prior to
taking KU ANT –
GND to prevent
gimbal locking pins
from retracting
9.3c KU ANT GIMBAL ANGLES INCORRECT AFTER 50 SEC

1. KU–BAND ANTENNA CONTINGENCY DEPLOY/STOW – FAILED DEPLOY/STOW SWITCH (IFM) may be reqd
2. EVA and/or KU–BAND ANTENNA CONTINGENCY STOW–GIMBAL LOCK (IFM) may be reqd
3. Selecting GND will allow ant to assume safe config

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
KU ANT – STO
(A1U)
KU PWR – ON
(R14:C)
cb MNB KU
ELEC – cl

KU ANT Gimbal Movement within 50 Sec and/or Gimbal Angles Incorrect after 50 Sec

RANGE/ELEVATION = –27.0 (± 1.0) and RANGE RATE/AZM = –123.0 (± 1.0)

Different config

1. KU ANT sw FAILURE

2. KU ANT sw FAILURE

3. KU ANT sw FAILURE

4. GIMBAL LOCK FAILURE, α/β GIMBAL FAILURE, OR EA–1 FAILURE

5. KU ANT sw FAILURE

(R13L) • KU ANT – GND
(R13L) • MCC
9.4a 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

Demate tb Not Rel or SM 97 PL RETENTION
Microsw LAT/REL Ind Not Nominal or Single Mtr Drive Time > 18 sec
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

8 EVA capability exists to perform ROEU demate

9 MCC can determine if switch is failed

11 Disable Mtr 2

(R13L)
- PL BAY MECH PWR SYS 2 – OFF

(A6U)
- PL RETEN LAT 2 – REL (36 sec max)
- PL RETEN LAT 2 – OFF

(CRT)
PL SEL X LATCH 2 REL A – 1 ?

12 Disable Mtr 1

(R13L)
- PL BAY MECH PWR SYS 2 – ON
- PWR SYS 1 – OFF

(A6U)
- PL RETEN LAT 2 – REL (36 sec max)
- PL RETEN LAT 2 – OFF

(CRT)
PL SEL X LATCH 2 REL B – 1 ?

14 DEMATE MTR 2 FUNCTION LOST

(R13L)
- PL BAY MECH PWR SYS 2 – ON
- Continue nominal ops

15 MICROSW MISRIGGING, MECHANICAL JAM, OR PL RETEN LAT 2 SW FAILURE

16 DEMATE MTR 1 FUNCTION LOST

(R13L)
- PL BAY MECH PWR SYS 1 – ON
- Continue nominal ops

17

✓ MCC
If PL SEL X LATCH 2 LAT A(B) – 1 ind received in single mtr time, microsw misrigged

MCC can determine which condition exists

One mtr will continue to drive while mating until PL RETEN LAT 2 sw turned OFF

If SYS A Microsw failed, tb will be inaccurate

Expect single mtr drive time for demate

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

MECH 9.4b ROEU MATE – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME
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.
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

---

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
One mtr is 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 lost.

1. Disable Mtr 2
   - (R13L) PL BAY MECH PWR SYS 2 – OFF
   - (A6U) PL RETEN LAT 3 – REL (40 sec max)
   - (CRT) PL SEL X LATCH 3 REL A – 1 ?

4. (R13L) PL BAY MECH PWR SYS 2 – ON
   - Continue nominal ops

7. No
   - 12 Disable Mtr 1
     - (R13L) PL BAY MECH PWR SYS 2 – ON
     - (A6U) PL RETEN LAT 3 – REL (40 sec max)
     - (CRT) PL SEL X LATCH 3 REL B – 1 ?

10. MICROSW MISRIGGING, MECHANICAL JAM, OR PL RETEN LAT 3 SW FAILURE

13. RELEASE MTR 2 FUNCTION LOST

16. RELEASE MTR 1 FUNCTION LOST

19. Yes
   - 15 MICROS
   - 17 MCC

20. (R13L) PL BAY MECH PWR SYS 1 – ON

21. Continue nominal ops
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
LAT A(B)

A
B

LAT 1 1
REL 0 0

LAT 0 1
REL 0 0

LAT 0 0
REL 0 0

LAT 1 1
REL 1 0

LAT 1 1
REL 0 1

LAT 0 0
REL 1 1

2. (A6U) PL RETEN LAT 3 tb – LAT ?

3. tb FAILURE

4. • Continue nominal ops using SM 97

5. MTR OR RELAY FAILURE

6. • Continue nominal ops (expect single mtr latch)

7. PL SEL X LATCH 3 LAT A(B) – 1 ind received in single mtr time (>20 sec) ?

8. LATCH A(B) MICROSW FAILED OPEN

9. RELEASE A(B) MICROSW FAILED CLOSE

10. • Continue nominal ops using SM 97 for nom sys

11. YES

12. NO

13. YES

14. NO

15. YES
One mtr \( \Phi \) 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.

Disable Mtr 1

MICROSW MISRIGGING, MECHANICAL JAM, OR PL RETEN LAT 3 SW FAILURE

MCC
### 9.4e ROEU RELAX – tb NOT NOMINAL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

<table>
<thead>
<tr>
<th>Step</th>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>(A6U)</td>
<td>ROEU demated</td>
</tr>
<tr>
<td>2</td>
<td>tb FAILURE</td>
<td>Continue nominal ops using SM 97</td>
</tr>
<tr>
<td>3</td>
<td>RELAX A(B)</td>
<td>MICROSW FAILED CLOSED</td>
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<tr>
<td>4</td>
<td>RELAX A(B)</td>
<td>MICROSW FAILED OPEN</td>
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<td>5</td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>LAT 1</td>
<td>RELAX A(B)</td>
</tr>
<tr>
<td>7</td>
<td>RELAX A(B)</td>
<td>MICROSW FAILED OPEN</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Continue nominal ops using SM 97 for nom sys</td>
</tr>
<tr>
<td>9</td>
<td>RELAY Failure</td>
<td>Continue nominal ops using SM 97</td>
</tr>
<tr>
<td>10</td>
<td>RELAY Failure</td>
<td>Continue nominal ops using SM 97</td>
</tr>
<tr>
<td>11</td>
<td>(A6U)</td>
<td>ROEU latched</td>
</tr>
<tr>
<td>12</td>
<td>(A6U)</td>
<td>PL RETEN LAT 1 – OFF</td>
</tr>
<tr>
<td>13</td>
<td>tb FAILURE</td>
<td>Continue nominal ops using SM 97</td>
</tr>
<tr>
<td>14</td>
<td>(A6U)</td>
<td>PL RETEN LAT 1 – OFF</td>
</tr>
<tr>
<td>15</td>
<td>MTR OR RELAY FAILURE</td>
<td>Continue nominal ops (expect single mtr relax)</td>
</tr>
<tr>
<td>16</td>
<td>MTR OR RELAY FAILURE</td>
<td>Continue nominal ops (expect single mtr relax)</td>
</tr>
</tbody>
</table>

### Nominal Config:

- **(R13L)**
- PL BAY MECH PWR (two) – ON
- 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 DEMATED

- (A6U)
- PL RETEN LAT 1 tb – REL
- SM 97 PL RETENTION
- PL SEL X LATCH 1 REL A,B – 1

### If MATED and RELAXED

- (A6U)
- PL RETEN LAT 1 tb – REL
- SM 97 PL RETENTION
- PL SEL X LATCH 1 REL A,B – 1

### If MATED and UNLATCHED

- (A6U)
- PL RETEN LAT 1 tb – bp
- SM 97 PL RETENTION
- PL SEL X LATCH 1 REL A,B – 0

---

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
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
5 If PL SEL LATCH 1 REL – 1 ind received in single mtr time, microsw misrigged
6 EVA capability exists to perform ROEU relax
7 PL RETEN LAT 2 sw to demate may be used to relax ROEU. MCC will explain implementation
8 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
9 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)
(MA73CC)
cb MCA PWR AC1 3Φ MID 1 – cl
(MA73CC-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

Continuing from previous page:

1. If SYS A Microsw failed, tb will be inaccurate

2. tb FAILED

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 GRAY

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 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

10/16/00
MECH SSR–2  
CONTINGENCY PLBD CLOSURE  

NOTE  
This procedure assumes that DOOR has jammed in ’RDY’ position resulting from orbiter thermal warpage or debris  

1  
SM (BFS SM 63) PL BAY DOORS  
✓ ’OP/CL’ status:  
• ✓ PORT(STBD) BLKHD LAT (two) – ‘OP’  
• Deselect all ‘MAN SEL’ items  
Select PORT(STBD) ‘MAN SEL’  
• ITEM 13(10) EXEC (*)  
Cycle door open, visually check area of jam for debris or other cause:  
(R13L)  
• PL BAY DR – OP (10 sec)  
• – STOP  
• Perform visual check. If debris or other cause found, ✓ MCC before proceeding  
• PL BAY DR – CL (’RDY’ + 6 sec)  
• – STOP  

2  
(CRT)  
✓ ’OP/CL’ column and visually ✓ door  
Is DOOR ‘CL’ or ‘RDY’ and:  
If FWD:  
Not deformed  
If AFT:  
GO (see fig. 9–1, PLBD BULKHEAD LATCH GO/NO–GO DIAGRAM)  
OTHER  

3  
✓ MCC  
Does time permit one full DAY SIDE PASS TOP SUN ATTITUDE and also MCC determines temperature delta is a problem?  

4  
Open door, complete one DAY SIDE PASS TOP SUN ATTITUDE and close door  
(R13L)  
• PL BAY DR – OP (–63 sec)  
• Complete TOP SUN PASS, then at sunset:  
• PL BAY DR – CL (–63 sec)  

5  
Select PORT(STBD) LATCHES  
(CRT)  
• ITEM 11(8) EXEC (*)  
• ITEM 12(9) EXEC (*)  
Partially close LATCHES and DOOR (R13L)  
• PL BAY DR – CL (–15 sec)  
• Observe aft C/L for deflection (see photo, fig. 9–2)  
• PL BAY DR – STOP  

6  

NOTE  
This procedure assumes that DOOR has jammed in ‘RDY’ position resulting from orbiter thermal warpage or debris
MECH SSR–2 (Cont)

6 (CRT)
• ‘OP/CL’ column and visually ‘DOOR
Is DOOR ‘CL’ or ‘RDY’ and:
If FWD:
  Not deformed
If AFT:
  GO (see fig. 9–1, PLBD BULKHEAD LATCH
  GO/NO–GO DIAGRAM)
OTHER

7 Select PORT(STBD)
FWD/AFT LATCHES
(CRT)
• ITEM 11(8) EXEC (*)
• ITEM 12(9) EXEC (*)

8 Close, latch door
(CRT, R13L)
• PL BAY DR – CL
• ‘FWD/AFT LATCH ‘CL’
• PL BAY DR – STOP
Deselect LATCHES and DOOR
• ITEM 11(8) EXEC (no *)
• ITEM 12(9) EXEC (no *)
• ITEM 13(10) EXEC (no *)

9 (CRT)
Deselect PORT(STBD) DOOR
• ITEM 13(10) EXEC (no *)
(CRT, R13L)
Open LATCHES
• PL BAY DR – OP
• ‘LATCHES – ‘OP’
• PL BAY DR – STOP
(CRT)
Deselect PORT(STBD) LATCHES
• ITEM 11(8) EXEC (no *)
• ITEM 12(9) EXEC (no *)
Select PORT(STBD) DOOR
• ITEM 13(10) EXEC (*)

10 Continue PLBD ops in MANUAL
mode

11 ‘MCC for wave–off capability
Wave off ?
YES

12 Open PLBD
(CRT, R13L)
• PL BAY DR – OP
• ‘DOOR – ‘OP’ (∼63 sec)
• PL BAY DR – STOP
(CRT)
Deselect PORT(STBD) DOOR
• ITEM 13(10) EXEC
Was PORT DOOR just opened ?
YES

13 Open DOOR partially, then close
(R13L)
• PL BAY DR – OP (10 sec)
• – STOP
• – CL (‘RDY’ + 6 sec)

14 (CRT)
• ‘OP/CL’ column and visually ‘DOOR
DOOR ‘CL’ or ‘RDY’ and:
If FWD:
  Not deformed
If AFT:
  GO (see fig. 9–1, PLBD BULKHEAD LATCH
  GO/NO–GO DIAGRAM)
OTHER

15

The following steps risk damaging
PLBD structure as maximum
latching force is used to close
doors

CAUTION

16

19

08/29/97  9–40  MAL/ALL/GEN F
**MECH SSR–2 (Cont)**

14. Problem appears to be in:
   - FWD BLKHD
   - AFT BLKHD

15. Close PORT(STBD) AFT LATCHES, DOOR

   (CRT, R13L)
   Select PORT(STBD) AFT LATCHES
   - ITEM 12(9) EXEC (*)
   - PL BAY DR – CL
   - AFT LATCHES – blank, ‘CL’ (~30 sec)
   - PL BAY DR – STOP

16. Unlatch/open PORT DOOR

   (CRT)
   Select PORT LATCHES
   - ITEM 11 (*)
   - ITEM 12 (*)

17. Deselect PORT LATCHES
   (CRT)
   - ITEM 11(8) EXEC (no *)
   - ITEM 12(9) EXEC (no *)
   - ITEM 13 EXEC (*)

18. Is DOOR ‘CL’ or GO (see fig. 9–1, PLBD BULKHEAD LATCH GO/NO–GO DIAGRAM)?

19. Disable PLBDs

   (CRT, R13L)
   - PL BAY DR SYS 1,2 (two) – DSBL
   - AC POWER OFF – ITEM 2 EXEC (*)
   - IF PASS SM, SM OPS X01 PRO

20. Deselect AFT LATCHES; reselect DOOR, FWD LATCHES

   (CRT)
   - ITEM 11(8) EXEC (*)
   - ITEM 12(9) EXEC (no *)
   - ITEM 13(10) EXEC (*)

   (R13L)
   Close FWD LATCHES, DOOR
   - PL BAY DR – CL
   - FWD LATCHES – blank, ‘CL’ (~30 sec)
   - PL BAY DR – STOP

21. Waveoff 24 hr; remain top sun
   - Prepare for EVA to close doors
   - Attempt MANUAL PLBD close prior to EVA

22. Is STBD DOOR open?

23. YES

24. NO

33. NO
22 

23 Close STBD DOOR, FWD LATCH

(CRT, R13L)
Desselect PORT DOOR, LATCHES
• ITEM 11 EXEC (no *)
• ITEM 13 EXEC (no *)
Select STBD DOOR
• ITEM 10 EXEC (*)
Close STBD DOOR
• PL BAY DR – CL (–63 sec)
• STBD DOOR ‘RDY’
Select STBD FWD LATCH
• ITEM 8 EXEC (*)
• STBD FWD LATCH – blank, ‘CL’ (–30 sec)
• PL BAY DR – STOP
Desselect STBD LATCH, DOOR
• ITEM 8 EXEC (no *)
• ITEM 10 EXEC (no *)

24 Latch doors forward to aft

(CRT, R13L)
Select PORT(STBD) DOOR, CENTER LATCHES 1–4
• ITEM 13(10) EXEC (*)
• ITEM 6 EXEC (*)
Close DOOR and LATCHES
• PL BAY DR – CL
• CENTER LATCHES 1–4 – blank, ‘CL’ (–20 sec)
• PL BAY DR – STOP

(CRT)
Desselect CENTER LATCHES 1–4
• ITEM 6 EXEC (no *)
• Repeat closure for LATCHES 5–8, 9–12, 13–16 in order

(CRT)
Select STBD DOOR
• ITEM 10 EXEC (no *)
• ITEM 13 EXEC (no *)
Desselect STBD LATCH, DOOR
• ITEM 8 EXEC (no *)
• ITEM 10 EXEC (no *)

15

25 Close PORT(STBD) FWD LATCHES, DOOR

(CRT, R13L)
Select PORT(STBD) FWD LATCHES
• ITEM 11(8) EXEC (*)
• PL BAY DR – CL
• FWD LATCHES – blank, ‘CL’ (–30 sec)
• PL BAY DR – STOP

26

(CRT)
• ‘OP/CL’ column and visually ‘DOOR’
Is DOOR ‘CL’ and not deformed?

YES

27 Deselect PORT(STBD) FWD LATCHES, select AFT LATCHES

(CRT)
• ITEM 11(8) EXEC (no *)
• ITEM 12 EXEC (no *)

(R13L)
Close AFT LATCHES, DOOR
• PL BAY DR – CL
• DOOR – ‘CL’
• AFT LATCHES – blank, ‘CL’ (–30 sec)
• PL BAY DR – STOP

(CRT)
Desselect AFT LATCHES, DOOR
• ITEM 12(9) EXEC (no *)
• ITEM 13(10) EXEC (no *)

NO

28 Deselect DOOR, open FWD LATCHES

(CRT, R13L)
• ITEM 13(10) EXEC (no *)
• PL BAY DR – OP
• FWD LATCHES – ‘OP’ (–30 sec)
• PL BAY DR – STOP

(CRT, R13L)
Desselect FWD LATCHES; reselect DOOR, AFT LATCHES
• ITEM 11(8) EXEC (no *)
• ITEM 12(9) EXEC (*)
• ITEM 13(10) EXEC (*)
Close AFT LATCHES, DOOR
• PL BAY DR – CL
• DOOR – ‘CL’
• AFT LATCHES – blank, ‘CL’ (–30 sec)
• PL BAY DR – STOP

29

• Continue PLBD ops in MANUAL mode

30
28

30 Is STBD DOOR open?

31 Close STBD DOOR, FWD LATCHES

• ITEM 12(9) EXEC (no *)
• ITEM 13 EXEC (no *)

32 Latch doors aft to forward

• ITEM 11 EXEC (*)

33 Deselect PORT(STBD) AFT LATCHES, select FWD LATCHES

• ITEM 12(9) EXEC (no *)
• ITEM 11(8) EXEC (*)

34 Disable PLBDs

• ITEM 8 EXEC (no *)
• ITEM 11 EXEC (no *)
• ITEM 13(10) EXEC (no *)

35 Continue PLBD ops in MANUAL mode

18

33 Deselect PORT(STBD) AFT LATCHES, select FWD LATCHES

• ITEM 12(9) EXEC (no *)
• ITEM 11(8) EXEC (*)

(R13L)

Close FWD LATCHES, DOOR
• DOOR – CL
• FWD LATCHES – blank, ‘CL’
• PL BAY DR – STOP

(CRT)

Deselect FWD LATCHES, DOOR
• ITEM 11(8) EXEC (no *)
• ITEM 13(10) EXEC (no *)

24

34 Disable PLBDs

• PL BAY DR SYS 1,2 (two) – DISABLE
• AC POWER OFF – ITEM 2 EXEC (*)

(A7U)

• PL BAY FLOOD (all) – OFF
Figure 9–1.– PLBD bulkhead latch GO/NO–GO diagram.
Shows worst case deflection up of aft breather panel seen on STS–4

Figure 9–2.— Port Aft C/L viewed by Camr C.
Excessive C/L Overlap Noted with PORT DOOR Closed and Latched Entry Req'd Next Opportunity

STBD DOOR extended guide roller trajectory is above point D on DEORBIT PREP C/L NO–GO Diagram

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
   - PL BAY DR – OP
   - STBD DOOR – 'RDY', blank
   - PL BAY DR – STOP
   - PL BAY DR – CL

3. Open PORT BLKHDs to ‘OP’
   - PORT FWD, AFT LATCHES
   - ENTRY DAY NO–GO DIAGRAM C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY, fig. 9–3

4. Deselect 'AUTO MODE SEL'
   - ITEM 3 EXEC (no *)
   - MAN SEL (ten)

5. Open STBD DOOR 2–3 stripes
   - STBD FWD, AFT LATCHES (two) – ‘OP’

6. ENTRY DAY NO–GO DIAGRAM C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY, fig. 9–3

7. Close STBD DOOR until just before contact with PORT DOOR
   - PL BAY DR – OP
   - STBD DOOR – blank
   - PORT FWD, AFT LATCHES (two) – blank
   - PORT FWD, AFT LATCHES (two) – OP
   - PL BAY DR – STOP

8. Open STBD DOOR 2–3 stripes
   - STBD FWD, AFT LATCHES
   - ENTRY DAY NO–GO DIAGRAM C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY, fig. 9–3

9. Open PORT BLKHDs 19 sec
   - PL BAY DR – OP
   - PORT FWD, AFT LATCHES – blank
   - PORT FWD, AFT LATCHES – STOP

10. Deselect PORT FWD, AFT LATCHES
    - ITEM 11 EXEC (no *)
    - ITEM 12 EXEC (no *)

11. Select STBD DOOR
    - ITEM 10 EXEC (no *)

12. Deselect STBD DOOR
    - ITEM 11 EXEC (no *)
    - ITEM 12 EXEC (no *)
10 Open STBD DOOR 2–3 stripes
    (CRT) Select STBD DOOR
    • ITEM 10 EXEC (*)
    (CRT, R13L)
    • PL BAY DR – OP (–25 sec)
    • STBD DOOR – blank
    • PL BAY DR – STOP
    (CRT) Deselect STBD DOOR
    • ITEM 10 EXEC (no *)

14 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 (as reqd)
    • PORT DOOR – ‘RDY’
    • PL BAY DR – STOP
    (CRT) Deselect PORT DOOR
    • ITEM 13 EXEC (no *)

11 Close STBD DOOR until just before contact is made with PORT DOOR
    (CRT) Select STBD DOOR
    • ITEM 10 EXEC (*)
    (CRT, R13L)
    • PL BAY DR – CL
    • STBD DOOR – blank
    • PL BAY DR – STOP
    (CRT) Deselect STBD DOOR
    • ITEM 10 EXEC (no *)

12 Allows LATCHES to latch partially

13 Partially close PORT LATCHES
    (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 (–31 sec)
    • PORT DOOR – ‘CL’
    • PORT FWD, AFT LATCHES – blank
    • PL BAY DR – STOP
    (CRT) Deselect PORT FWD, AFT LATCHES
    • ITEM 11 EXEC (no *)
    • ITEM 12 EXEC (no *)

14 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 (as reqd)
    • PORT DOOR – ‘RDY’
    • PL BAY DR – STOP
    (CRT) Deselect PORT DOOR
    • ITEM 13 EXEC (no *)

15 Repeat blocks 10, 14, 11 as reqd to eliminate overlap

16 Do not close FWD, AFT LATCHES if PORT(STBD) DOOR not ‘RDY’ to prevent DOOR closing onto the latches

CAUTION

12 Center LATCHES visually for LATCH capture using ENTRY DAY NO–GO DIAGRAM C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY, fig. 9–3

12 Center LATCHES for excessive gap. LATCH Guide Roller must be above Passive Stop

16 Select single CENTER LATCH Gang (as reqd)

16 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

13 Deselect single CENTER LATCH Gang (as reqd)

13 Deselect PORT FWD, AFT LATCHES
    • ITEM 13 EXEC (no *)

13 If reqd, deselect PORT DOOR
    • ITEM 13 EXEC (no *)

13 Select PORT DOOR
    • ITEM 13 EXEC (*)

13 (CRT, R13L)
    • PL BAY DR – CL (–31 sec)
    • PORT DOOR – ‘CL’
    • PORT FWD, AFT LATCHES – blank
    • PL BAY DR – STOP
    (CRT) Deselect PORT FWD, AFT LATCHES
    • ITEM 11 EXEC (no *)
    • ITEM 12 EXEC (no *)

13 If reqd, deselect PORT DOOR
    • ITEM 13 EXEC (no *)

13 Select PORT DOOR
    • ITEM 13 EXEC (*)
    • PL BAY DR – OP (as reqd)
    • PORT DOOR – ‘RDY’
    • PORT FWD, AFT LATCHES – blank
    • PL BAY DR – STOP
    (CRT) Deselect PORT FWD, AFT LATCHES
    • ITEM 11 EXEC (no *)
    • ITEM 12 EXEC (no *)

13 If reqd, deselect PORT DOOR
    • ITEM 13 EXEC (no *)
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

(CRT) Deselect STBD FWD, AFT LATCHES
  - ITEM 8 EXEC (no *)
  - ITEM 9 EXEC (no *)
  - If reqd, deselect STBD Door
  - ITEM 10 EXEC (no *)

17 ✓ CENTER LATCHES visually for LATCH capture using ENTRY DAY NO-GO DIAGRAM
   CL/LATCH EXTENDED GUIDE ROLLER TRAJECTORY, 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, 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

(CRT) Deselect single CENTER LATCH Gang (as reqd)

Repeat for all CENTER LATCH Gangs that pass checks

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

(CRT) Deselect PORT FWD, AFT LATCHES
  - ITEM 11 EXEC (no *)
  - ITEM 12 EXEC (no *)
  - If reqd, deselect PORT Door
  - ITEM 10 EXEC (no *)

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

(CRT)
- Deselect STBD FWD, AFT LATCHES
  - ITEM 8 EXEC (no *)
  - ITEM 9 EXEC (no *)
  - If reqd, deselect STBD Door
  - ITEM 10 EXEC (no *)

20 Allows LATCHES to latch partially

(CRT)
- Deselect single CENTER LATCH Gang (as reqd)

Repeat for all CENTER LATCH Gangs that pass checks
MECH SSR–3 (Cont)

2 Allows LATCHES to latch partially

19

20 Complete CENTER LATCH closure

(CRT)
• Select single CENTER LATCH Gang (as reqd)

(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 (as reqd)

• Repeat for all remaining CENTER LATCH Gangs

21

(CRT)
• AC POWER OFF – ITEM 2 EXEC (*)

(R13L)
• PL BAY DR SYS 2 – DSBL

20

08/29/97  9–49  MAL/ALL/GEN F
Figure 9–3.– Entry day NO–GO diagram.
MECH SSR–4
PLBD CHECKOUT AFTER MDM CHANGEOUT

1. √PLBD actuators disabled
   (R13L)
   • PL BAY DR – STOP
   • PL BAY SYS 1,2 (two) – DSBL
   • SM OPS 202 PRO
   • SM/BFS SM 63) PL BAY DOORS
   • √AC POWER OFF (no *)
   • √MAN SEL' (ten) – (no *)
   • /PBD SW BYPASS – (no *)
   • √'OP/CL' column (ten) – ‘OP’

2. On MCC call
   Select CENTER LATCHES 5–8 (CRT)
   • ITEM 4 EXEC (*)
   (R13)
   • PL BAY DR – CL
   • Wait for MCC to verify
   • PL BAY DR – STOP
   • Deselect CENTER LATCHES 5–8 (CRT)
   • ITEM 4 EXEC (no *)

3. Repeat block 2
   for ITEMS 5–13

4. (CRT)
   • AC POWER ON – ITEM 1 EXEC (*)
   (R13L)
   • PL BAY DR SYS 1,2 (two) – ENABLE
   • Wait for MCC to verify
   • PL BAY DR SYS 1,2 (two) – DISABLE
   (CRT)
   • AC POWER OFF – ITEM 2 EXEC (*)

CAUTION

If, during the following test, any ‘OP’ blanks or any PLBD mechanism is observed to be moving:
• PL BAY DR SYS 1,2 (two) – DSBL
  This protects doors from damage caused by inadvertent motion of doors or latches

Procedure assumes doors and latches open
MCC to check MCA relay status
MCC to check enable relay status

PLBD CHECKOUT AFTER MDM CHANGEOUT

08/29/97 9–51 MAL/ALL/GEN F
### MECH SSR–5
### CONTINGENCY KU–BD ANT DIRECT STOW

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC to verify Gimbals are locked before applying this procedure</td>
</tr>
</tbody>
</table>

- Config CCTVs to monitor KU Ant motion
- Point CCTV as reqd
- Record all motion on VTR

<table>
<thead>
<tr>
<th>R13L</th>
<th>✓ PL BAY MECH PWR SYS (two) – OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1U</td>
<td>KU PWR – OFF</td>
</tr>
<tr>
<td></td>
<td>CNTL – PNL</td>
</tr>
<tr>
<td>R13L</td>
<td>ANT – GND</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

- 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

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 To enable mtr 1, this step also disables pwr to:
   PORT FWD BLKHD
   MTR 2
   STBD DOOR
   MTR 2
   STBD FWD BLKHD
   MTR 2

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

3 To enable mtr 1, this step also disables pwr to:
   PORT DOOR
   MTR 2
   STBD AFT BLKHD
   MTR 1
   C/L 9–12 MTR 1

4 To enable mtr 2, this step also disables pwr to:
   PORT DOOR
   MTR 1
   STBD AFT BLKHD
   MTR 1
   C/L 9–12 MTR 1
   C/L 13–16 MTR 1

5 Close PORT DOOR in MANUAL mode

6 PL BAY door fit

7 Reenable MCA Logic pwr

8 Close STBD DOOR

9 Reenable MCA Logic pwr

10 Continue normal PLBD ops
MECH SSR–6 (Cont)

11 Does waveoff capability exist?
   YES

12 Simultaneous door closure
   • Perform SIMULTANEOUS PLBD CL, MECH SSR–3

13
   • MCC

14 Reenable MCA Logic pwr
   MTR 1 (MA73C:A)
   • MCA LOGIC MNB MID 2 – ON
   MTR 2 (MA73C:B)
   • MCA LOGIC MNC MID 4 – ON

15
   • 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
   - (A1U)
     • / KU 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

1. Logic pwr does not inhibit mtr drive capability if pwrd off
2. 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.

11/02/00
2. 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.

3. KU–BD CCTV overlay is located in Middeck Transparency Kit.

MECH SSR–7 (Cont)

6

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 PWR sw is in OFF

9

After 50 sec:

(A2)
- R/EL ind: –29.0 (± 1°)
- R/AZM ind: –125.0 (± 1°)

(A1U)
- KU 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)
- MGA LOGIC MNC MID 2 – ON

For Mtr 2 Microsw Enable
(MA73C:B)
- MGA LOGIC MNB MID 4 – ON
NOTE
This procedure regains radiator panel deploy or stow capability if DPY/STO microsw(s) is (are) failed on, inhibiting deploy/stow mtr 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. Dual or PORT(STBD) RAD Panel OPS reqd?
   - PORT(STBD)
   - Dual Panel

2. Disable STBD(PORT) RAD Latch and RAD Cntl sys
   - (MA73C:C,D) STBD Sys Disable cb MCA PWR
     - AC1 3Φ MID 3 – op
     - AC2 3Φ MID 2 – op
     - AC3 3Φ MID 2 – op
   - (MA73C:C,D) PORT Sys Disable cb MCA PWR
     - AC1 3Φ MID 1 – op
     - AC2 3Φ MID 4 – op
     - AC3 3Φ MID 4 – op

3. Drive operation reqd
   - STOW
   - DPY

4. 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
     - RAD LAT CNTL SYS (two) – OFF
     - (Ib–bp)
     - (Ib–REL)

   Are Deploy OPS reqd for nominal RAD pnl?
   - NO
   - YES

5. Deploy Nominal RAD pnl
   - (R13L)
     - RAD CNTL SYS (two) – DPY (Ib–bp)
     - – OFF (Ib–DPY)

6. PDU Actuator Times
   - (Dual Mtr)
     - Lat – 30 sec
     - Rad – 50 sec
   - (Single Mtr)
     - Lat – 60 sec
     - Rad – 100 sec

2. For either a dual microsw or microsw/mtr failure, failed pnl will be inhibited from driving.
1. **PDU Actuator Times**
   - (Dual Mtr)
     - Lat – 30 sec
     - Rad – 50 sec
   - (Single Mtr)
     - Lat – 60 sec
     - Rad – 100 sec

3. Only nominal RAD Panel tab will be operational.
   MCC verification of AC bus slip currents will verify mechanism end-of-travel

4. For dual microsw failure expect dual mtr drive time. Expect single mtr drive time (drive for 100 sec) for microsw/mtr failure

6. Disable pwr to failed-on microsw(s)

7. DPY RAD pnl with failed-on microsw(s)

8. Enable pwr to failed-on microsw(s)

9. Enable STBD(PORT) RAD sys (if reqd)
Is nominal RAD pnl required to be stowed? [3]

**Yes**
- Stow nominal RAD pnl
  - (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 (√’tb–bp)
    - – OFF (√’tb–STO)

**No**
- Disable pwr to failed–on microsw(s)
  - Port | Stbd
  | (MA73C:A) | (MA73C:B)
  | MTR 1 Microsw | MTR 1 Microsw
  | Disable | Disable
  | MCA LOGIC MNC | MCA LOGIC MNC
  | MID 2 – OFF | MID 4 – OFF
  | (MA73C:B) | (MA73C:B)
  | MTR 2 Microsw | MTR 2 Microsw
  | Disable | Disable
  | MCA LOGIC MNA | MCA LOGIC MNA
  | MID 3 – OFF | MID 1 – OFF

**Yes**
- Stow RAD pnl 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
    - RAD CNTL SYS (two) – OFF (After 50 sec max)
    - Visually verify pnl is stowed
    - √ MCC to confirm pnl is stowed

**No**
- Enable pwr to failed–on microsw(s)
  - Port | Stbd
  | (MA73C:A) | (MA73C:B)
  | MTR 1 Microsw | MTR 1 Microsw
  | Enable | Enable
  | MCA LOGIC MNC | MCA LOGIC MNC
  | MID 2 – ON | MID 4 – ON
  | (MA73C:B) | (MA73C:B)
  | MTR 2 Microsw | MTR 2 Microsw
  | Enable | Enable
  | MCA LOGIC MNA | MCA LOGIC MNA
  | MID 3 – ON | MID 1 – ON

**Yes**
- Latch RAD Latches
  - (R13L)
    - RAD CNTL SYS (two) – LAT (√’tb–bp)
    - – OFF (√’tb–LAT)
    - PL BAY MECH PWR SYS (two) – OFF

**No**
- Enable STBD(PORT) RAD sys (reqd only if PORT(STBD) ops performed)
  - (MA73C:C,D)
    - STBD Sys Enable cb MCA PWR
      - AC1 3Φ MID 3 – cl
      - AC2 3Φ MID 2 – cl
      - AC3 3Φ MID 2 – cl
    - (MA73C:C,D)
      - PORT Sys Enable cb MCA PWR
        - AC1 3Φ MID 1 – cl
        - AC2 3Φ MID 4 – cl
        - AC3 3Φ MID 4 – cl

4–59 MAL/ALL/GEN F
RCS SCHEMATIC ................................................................. 10–3

10.1 RCS JET/DLMA/PWR
  10.1a 'L(R,F) RCS (L,U,D,R,A,F) JET', ‘F(L,R) RCS TK P’,
       ‘F(L,R) RCS LEAK’ .................................................... 10–4
  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 THRMR RCS’ ......................................... 10–16
  10.3b ‘G23 RCS SYSTEM F(L,R)’ .......................................... 10–17

RCS SSR
  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

From ORB PKT C/L, RCS JET FAIL (OFF)

1. GNC 23 RCS
   RCS Jet FAIL–OFF

2. GNC 23 RCS
   • Deselect Jet if not auto deselected

3. Determine if multiple or single FAIL–OFFs:
   Multiple FAIL–OFF
   Single FAIL–OFF

4. Wait for MCC call to proceed with Hot Fire test
   Proceeding with Hot Fire test?
   NO

5. L5L or R5R
   PRCS
   Any other VRCS JET

6. MCC
   Continue nominal ops

7. Go to LOSS OF VERNIERS (ORB OPS, RCS)

8. Perform HOT FIRE RCS, RCS SSR–2

9. Desired vehicle response obtained?
   NO

10. MDM OUTPUT CARD
    FAILURE OR JET DRIVER FAILURE OR JET MECHANICAL FAILURE

11. Pc XDCR FAIL LOW OR Pc DISCRETE FAIL–OFF OR MDM INPUT PARAM FAILURE
If L5L or R5R failed, vernier control available except during certain loaded PDRS ops

MCC for other params possibly lost

Fail–on protection lost for affected jet

MCC call based on jet injector temps
**RCS 10.1a (Cont)**

- **34** (O7,O8)Vlv configured properly and no tb – bp ?
  - **NO**
  - **YES**

- **35** Alt RCS ?
  - **YES**
  - **NO**

- **36** PRCS selected ?
  - **NO**
  - **YES**

- **37** Reconfig DAP
  - **Perform LOSS OF VERNIERS (ORB OPS, RCS)**
  - **CRT**
  - **Monitor ARCS for subsequent fail–offs**

- **38** Associated MANF ISOL 1(2,3,4,5) – CL (tb–CL)
  - **Any tb – bp ?**
    - **NO**
    - **YES**

- **39** Did failures occur in the following Manf groups:
  - L1, R1, L5 or L2, R2 or L3, R3, R5 or L4, R4 ?

- **40** Any sw position and tb disagree ?
  - **NO**
  - **YES**

- **41** PRCS selected ?
  - **NO**
  - **YES**

- **42** Reconfig DAP
  - **Perform LOSS OF VERNIERS (ORB OPS, RCS)**
  - **CRT**
  - **Monitor FRCS for subsequent fail–offs**

- **43** All fail–offs on same Manf ?
  - **NO**
  - **YES**

- **44** All fail–offs on Manf F4 and F5 ?
  - **NO**
  - **YES**

- **45** HELIUM INGESTION

- **46** GNC 23 RCS
  - **Is ICNCT and XFD Line P (OX or FU) < 130 psia ?**
    - **NO**
    - **YES**

- **47** Close aft PRCS Manf vlvls
  - **Return to Straight Feed**

- **48** MDM INPUT (OUTPUT) PARAMS FAIL, OR SIGNAL CONDITIONER CARD FAIL, OR RJD Pc DISCRETES LOST, OR RJD ELECTRICAL FAIL-OFF, OR RJD PWR FAILURE, OR BUS FAILURE

- **49** Leave Manf vlvls – CL
  - **Config vlv to pre–fail config**

- **50** If 3/4/5 Leg aff, establish Vernier Cntl
  - All 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
From ORB PKT, RCS TK P LOW

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

GNC 23 RCS
- RCS FWD – ITEM 1 EXEC (*)
- MANF VLVS OVRD – ITEM 40,41,42,43,44 EXEC
- Prior to deorbit burn, reselect FWD RCS

73 Go to I’CNCT L(R) OMS TO RCS (ORB PKT, RCS)

74 Go to LOSS OF VERNIERS (ORB OPS, RCS)

3 MCC for other params possibly lost
8 H/W C&W remains
13 Use (O3) meter TK P only
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
RCS 10.1a (Cont)

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

77 L/R RCS
- 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, VERN LOST

82 Isolate Manf 5
(O7,08)
- F(L,R) RCS MANF ISOL 5 – CL (tb–CL)

83 Repress PRCS Manifolds
(O7,08)
- 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)
- Wait 2 sec
- MANF ISOL 4 – OP (tb–OP)
- Complete return to desired PRCS config
- /MCC for DAP config

WARNING
Repressing more than one manifold at a time when the manifolds are at low pressure may damage RCS propellant tank
10–10

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.

RCS

10.1b ‘RM DLMA MANF’

If: OX and/or FU vlv miscompare, propellant flow path cannot be verified open.

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

From ORB PKT, RM DLMA MANF

1 Was vlv in transition?

Yes

2 (O8,O7)
More than one tb – bp or FRCS MANF 2 tb – bp?

Yes

(08,07)

10.2a 1

NO

MICROSW FAILURE

3

4 If previous vlv position was OP:

GNC 23 RCS
Override Manf status to OP
RCS MANF VLVS OVRD – ITEM 40 (41,42,43,44) EXEC

5

(O7,O8)
• Cycle aff vlv several times in desired position

GNC 23 RCS
Did failure clear?

6 TRANSIENT MICROSW FAILURE OR STICKY VLV

Yes

7

(O7,O8)
• MANF VLVS STAT agrees with vlv position

MICROSW FAILURE OR VLV FAILED INTERMEDIATE

8

(CRT)

8

(07,08)
• MANF VLVS STAT – CL

9 (07,08)
• All RCS MANF ISOL – GPC

10 If Manf 5:

(CRT)
• Perform LOSS OF VERNIERS (ORB OPS, RCS)

11 MCC for further troubleshooting
1 If subsequent leak on affected manf:

1. If OP, override to CL with ITEM 40–43.
2. To isolate leak, close TK ISOL vlv. Affected RCS MANF ISOL vlv cannot be moved from current status.

2. Failure possibly caused by dual CNTL or dual APC bus failures or CNTL and APC bus failure.

3. Failure possibly caused by loss of MNC APC6 or MNC DA3.

Nominal Config:
(MA73CA)
MCA LOGIC
MNC FWD 3 – ON
(A73CI)
AFT POD VLV
LOGIC GP 1/3 – ON
LOGIC GP 1/2 – ON
LOGIC GP 2/3 – ON
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:H) cb AC1,AC2,AC3 FWD RCS VLV φA,φB,φC (nine) – cl
(MA73C:I) cb AC1,AC2,AC3 AFT POD VLV GP 1/3 – ON 1/2 – ON 2/3 – ON
(R14:C) cb MNC MANF ISOL L5,R5,F5 ENA (three) – cl

10.2a RCS VLV tb – bp

1. More than one tb – bp or FRCS MANF 2 tb – bp?

   YES → 13

   NO → 2

2. Was vlv reconfig in progress?

   NO → 3

   YES → 2b

3. Aff vlv:

   (O7,O8) RCS He PRESS A(B) vlv
   (O8) FWD RCS TK ISOL 1/2
   (O8) FWD RCS TK ISOL 3/4/5
   (O7) AFT L(R) RCS TK ISOL 1/2
   (O7) AFT L(R) RCS TK ISOL 3/4/5 A(B)
   (O7,O8) FWD(AFT L,R) RCS MANF ISOL
   (O7) AFT L(R) RCS XFEED

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. • DAP: FREE
   (O8) • OMS XFEED VLVS (four) – CL (tb–CL)
   (O7) • RCS XFEED VLVS (four) – CL (tb–CL)
   • Return to RCS straight feed
   • DAP: as reqd

11. Remove vlv pwr
    O7(O8)
    • Note aff sw position
    • Aff sw – GPC

12. POTENTIAL MICROSW FAILURE.
    • MCC FOR FAILURE DETERMINATION

12/22/99

MAL/ALL/GEN F

10–12
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.

10.2a (Cont)

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.
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.
RCS Vlv tb and sw Position Disagree

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

10.1a

1. Vlv in commanded position

2. Aff vlv tb – bp?

3. Vlv reconfig in progress?

4. tb FAILURE

5. Switch or tb FAILURE

12/15/95

MAL/ALL/GEN F
RCS 10.3a ‘S89 PRPLT THRM RCS’

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)

1. **SM ALERT**

2. **S89 PRPLT THRM RCS**

   1. **SM 89 PRPLT THERMAL**
      - Which temps are out-of-limits?
      - **NEITHER**
      - **FWD**
      - **AFT**

3. **11.3c**

4. **10.3b**

5. **Switch to other htrs**
   - **(A14) RCS/OMS HTR FWD RCS – B AUTO (A AUTO)**

6. **Temps return to normal control range?**

7. **7 THERMAL/ATTITUDE PROBLEM**

8. **HTRS A(B) FAILURE**

9. **MCC for additional thermal analysis, possible vehicle attitude change, or htr reconfig. Fwd RCS control can be resumed when temps return to normal**

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 xcr 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**
MCC can determine other params possibly lost in same MDM or DSC Card

RCS PVT for affected OXID(FU) may be in error for failed or biased temp or press Xdcr

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

Nominal Config:
O8(O7)
FWD(AFT L, AFT R)
RCS He PRESS
A(B) – GPC
B(A) – CL
(tb–OP)
(tb–CL)
(A14)
RCS/OMS HTR FWD RCS – AUTO
(B AUTO)
RCS/OMS HTR L POD (two) – A AUTO(B AUTO) B OFF(A OFF)
RCS/OMS HTR R POD (two) – A AUTO(B AUTO) B OFF(A OFF)

O3 OXID (FU) PRPLT TK T off-scale high or low?

Switch to other htr/thermostat ckt
Which Pod failed:
FWD RCS L(R) RCS

Temp returns to normal?

HTR/ THERMOSTAT CKT A(B) FAILURE

RCS/OMS HTR
L(R) POD – A OFF(B OFF)
RCS/OMS HTR
L(R) POD – B AUTO(A AUTO)

RCS FWD(L,R) ITEM 1(2,3) EXEC (*)

SM ALERT

G23 RCS SYSTEM F(L,R)

10.3b ‘G23 RCS SYSTEM F(L,R)’

02/09/00
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
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 the MCC. This procedure requires realtime ground verification (24 hr) prior to use.

1. Check config:
   - O7
     √ AFT 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

<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>29 1000</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>30</td>
<td>31 0400</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>32</td>
<td>33 1000</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>34</td>
<td>35 0400</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>36</td>
<td>37 1000</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>38</td>
<td>39 0400</td>
<td>_____</td>
<td>_____</td>
</tr>
</tbody>
</table>

   - 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

<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>TABLE C</th>
<th>TABLE D</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>29 1000</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>30</td>
<td>31 0400</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>32</td>
<td>33 1000</td>
<td>_____</td>
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<td>_____</td>
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</tr>
<tr>
<td>36</td>
<td>37 1000</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>38</td>
<td>39 0400</td>
<td>_____</td>
<td>_____</td>
</tr>
</tbody>
</table>

   - 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.  ✓ FLT CNTLR PWR  –  OFF
       C3  DAP:  INRTL
           DAP ROT:  PULSE/PULSE/PULSE

   O7  2.  L,R RCS TK ISOL (six)  –  CL (tb–CL)
           ✓ XFEED (four)  –  OP (tb–OP)

   3.  If RCS MANF P (OX and FU) > 130, continue
       Otherwise, ✓ MCC >>

   O8  4.  ✓ L(R) OMS He PRESS/VAP ISOL (two)  –  CL
           TK ISOL (two)  –  OP (tb–OP)
           ✓ 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:

<table>
<thead>
<tr>
<th>GNC 20 DAP CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>If PRI:</td>
</tr>
<tr>
<td>ITEM 13 +0.3 EXEC</td>
</tr>
<tr>
<td>ITEM 17 +0.1 EXEC</td>
</tr>
<tr>
<td>If VERN:</td>
</tr>
<tr>
<td>ITEM 26 +0.0 3 EXEC</td>
</tr>
</tbody>
</table>

DAP: A/FREE/PRI/(VERN)
DAP TRANS: PULSE/PULSE/PULSE

If OPS 3:

<table>
<thead>
<tr>
<th>DAP:</th>
<th>INRTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAP ROT:</td>
<td>PULSE/PULSE/PULSE</td>
</tr>
</tbody>
</table>

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 4. √cb L(R) DDU (two) – cl
If VERN Hotfire:

<table>
<thead>
<tr>
<th>GNC 25 RM ORBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW RM INH – ITEM 16 (*)</td>
</tr>
</tbody>
</table>

F7/F8

<table>
<thead>
<tr>
<th>FLT CNTRL PWR L(R) – ON</th>
</tr>
</thead>
</table>

If PRI Hotfire:

<table>
<thead>
<tr>
<th>FLT CNTRL PWR L(R) – ON</th>
</tr>
</thead>
</table>

HOT FIRE (Perform during AOS)
5. If OPS 2:

- Command maneuver per table with RHC(THC) and release

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:
  - DES INH twice (reprioritize, reset RM)
  - Repeat maneuver (expect jet fail–off)
  - 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):
  - Continue vernier control (Failure indication was false, Have lost fail–off protection)
- If jet did not fire (’MCC):
  - If LSL or RSR:
    - Deselect jet
    - Continue vernier control
  - If F5L,F5R, L5D, or R5D:
    - Deselect jet
    - Perform LOSS OF VERN (ORB OPS, RCS)

**CLEAN UP AFTER HOT FIRE**

7. **GNC 23 RCS**
   - Reselect jets deselected in step 2

8. Config DAP: as reqd

9. **FLT CNTLR PWR L(R) – OFF**

10. Config cb L,R DDU (four) – as reqd
## RCS SSR–2 (Cont)

### HOT FIRE TABLE

<table>
<thead>
<tr>
<th>SUBJECT JET</th>
<th>DESELECT JETS</th>
<th>MANEUVER REQD</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1F</td>
<td>F2F, F3F</td>
<td>(-) X TRANSLATION</td>
</tr>
<tr>
<td>F2F</td>
<td>F1F, F3F</td>
<td></td>
</tr>
<tr>
<td>F3F</td>
<td>F1F, F2F</td>
<td></td>
</tr>
<tr>
<td>F1L</td>
<td>F3L, R1R, R2R, R3R, R4R</td>
<td>(+) YAW</td>
</tr>
<tr>
<td>F3L</td>
<td>F1L, R1R, R2R, R3R, R4R</td>
<td></td>
</tr>
<tr>
<td>F5L</td>
<td>R5R</td>
<td></td>
</tr>
<tr>
<td>F2R</td>
<td>F4R, L1L, L2L, L3L, L4L</td>
<td>(-) YAW</td>
</tr>
<tr>
<td>F4R</td>
<td>F2R, L1L, L2L, L3L, L4L</td>
<td></td>
</tr>
<tr>
<td>F5R</td>
<td>L5L</td>
<td></td>
</tr>
<tr>
<td>F1U</td>
<td>F2U, F3U, L2D, L3D, L4D, R2D, R3D, R4D</td>
<td>(-) PITCH</td>
</tr>
<tr>
<td>F2U</td>
<td>F1U, F3U, L2D, L3D, L4D, R2D, R3D, R4D</td>
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</tr>
<tr>
<td>F3U</td>
<td>F1U, F2U, L2D, L3D, L4D, R2D, R3D, R4D</td>
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<tr>
<td>F1D</td>
<td>F2D, F3D, F4D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td>(+) PITCH</td>
</tr>
<tr>
<td>F2D</td>
<td>F1D, F3D, F4D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td></td>
</tr>
<tr>
<td>F3D</td>
<td>F1D, F2D, F4D, L1U, L2U, L4U, R1U, R2U, R4U</td>
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<tr>
<td>F4D</td>
<td>F1D, F2D, F3D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td></td>
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<tr>
<td>L1L</td>
<td>L2L, L3L, L4L, F2R, F4R</td>
<td>(-) YAW</td>
</tr>
<tr>
<td>L2L</td>
<td>L1L, L3L, L4L, F2R, F4R</td>
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<td>L3L</td>
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<td>L4L</td>
<td>L1L, L2L, L3L, F2R, F4R</td>
<td></td>
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<tr>
<td>L5L</td>
<td>F5R</td>
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</tr>
<tr>
<td>L1A</td>
<td>L3A, R1A, R3A</td>
<td>(+) X TRANSLATION</td>
</tr>
<tr>
<td>L3A</td>
<td>L1A, R1A, R3A</td>
<td></td>
</tr>
<tr>
<td>L1U</td>
<td>L2U, L4U, R1U, R2U, R4U, F1D, F2D, F3D, F4D</td>
<td>(+) PITCH</td>
</tr>
<tr>
<td>L2U</td>
<td>L1U, L4U, R1U, R2U, R4U, F1D, F2D, F3D, F4D</td>
<td></td>
</tr>
<tr>
<td>L4U</td>
<td>L1U, L2U, R1U, R2U, R4U, F1D, F2D, F3D, F4D</td>
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<tr>
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<td>L2D, L4D, R2D, R3D, R4D, F1U, F2U, F3U</td>
<td>(-) PITCH</td>
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<tr>
<td>L3D</td>
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</tr>
<tr>
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<td>L2D, L3D, R2D, R3D, R4D, F1U, F2U, F3U</td>
<td></td>
</tr>
<tr>
<td>L5D</td>
<td>R5D</td>
<td></td>
</tr>
<tr>
<td>R1R</td>
<td>R2R, R3R, R4R, F1L, F3L</td>
<td>(+) YAW</td>
</tr>
<tr>
<td>R2R</td>
<td>R1R, R3R, R4R, F1L, F3L</td>
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</tr>
<tr>
<td>R3R</td>
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<td>F5L</td>
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<tr>
<td>R1A</td>
<td>R3A, L1A, L3A</td>
<td>(+) X TRANSLATION</td>
</tr>
<tr>
<td>R3A</td>
<td>R1A, L1A, L3A</td>
<td></td>
</tr>
<tr>
<td>R1U</td>
<td>R2U, R4U, L1U, L2U, L4U, F1D, F2D, F3D, F4D</td>
<td>(+) PITCH</td>
</tr>
<tr>
<td>R2U</td>
<td>R1U, R4U, L1U, L2U, L4U, F1D, F2D, F3D, F4D</td>
<td></td>
</tr>
<tr>
<td>R4U</td>
<td>R1U, R2U, L1U, L2U, L4U, F1D, F2D, F3D, F4D</td>
<td></td>
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<tr>
<td>R2D</td>
<td>R3D, R4D, L2D, L3D, L4D, F1U, F2U, F3U</td>
<td>(-) PITCH</td>
</tr>
<tr>
<td>R3D</td>
<td>R2D, R4D, L2D, L3D, L4D, F1U, F2U, F3U</td>
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<tr>
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<td>R2D, R3D, L2D, L3D, L4D, F1U, F2U, F3U</td>
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</tr>
<tr>
<td>R5D</td>
<td>L5D</td>
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</tr>
</tbody>
</table>
NOTE

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 vlvs. However, since both vlvs are gang–commanded by manual switch settings, one of the vlvs 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
   √ All 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>29</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>29</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) RCS XFEED 1/2(3/4/5) – OP (tb–OP)
Wait 10 sec

O7
L(R) OMS XFEED A,B – CL (tb–CL)
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 >>

If MANF P < 130 psia:

O8
L(R) OMS XFEED A,B – CL (tb–CL)
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)
RCS XFEED 1/2(3/4/5) – CL (tb–CL)
ISOL 1/2(3/4/5 A,B) – OP (tb–OP)
MANF ISOL 1,2(3,4,5) – OP (tb–OP)

O7

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

<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>Value D</th>
<th>Value E</th>
</tr>
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<tbody>
<tr>
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<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 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

<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>Value F</th>
<th>Value G</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 F (MCC supplied)
WRITE – ITEM 25 EXEC
✓ Data values in ACTUAL column agree with Value G (MCC supplied)
### RCS SSR–3 (Cont)

#### TABLE 1

<table>
<thead>
<tr>
<th>X–REF</th>
<th>ADD ID</th>
<th>BIT RESET ADDRESS</th>
<th>COMMANDS</th>
<th>DESIRED</th>
</tr>
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<tbody>
<tr>
<td>(1)</td>
<td></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></td>
<td>L RCS OX 3/4/5 XFEED</td>
<td>0 0 4 0</td>
</tr>
<tr>
<td>(3)</td>
<td></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></td>
<td>R RCS OX 3/4/5 XFEED</td>
<td>0 0 1 0</td>
</tr>
</tbody>
</table>

#### TABLE 2

<table>
<thead>
<tr>
<th>X–REF</th>
<th>ADD ID</th>
<th>BIT SET ADDRESS</th>
<th>COMMANDS</th>
<th>DESIRED</th>
</tr>
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<td></td>
<td>L RCS OX 1/2 XFEED</td>
<td>4 0 0 0</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
<td>L RCS OX 3/4/5 XFEED</td>
<td>0 0 4 0</td>
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<tr>
<td>(3)</td>
<td></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></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

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) one at a time

5. DAP: as reqd
RCS SSR–5
LEAKING RCS PRPLT/He BURN

TERMINATE CONDITIONS
Terminate RCS burn/dump when any one of the following conditions exists:
If He LEAK:
- Aff He P < 456 psia, or
- CUR HP < 95 nmi, or
- Dump Time from below table expired

<table>
<thead>
<tr>
<th>RCS PRPLT TO BE DUMPED TO ACHIEVE MAX BLOWDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRENT NON–LEAKING (OX OR FU)%</td>
</tr>
<tr>
<td>Time from Dump Initiation (M:S)</td>
</tr>
<tr>
<td>24 25 30 35 40 45 50 55 60 65 70 75 80 85 90</td>
</tr>
<tr>
<td>0.00 0.03 0.19 0.34 0.49 0.64 0.84 1.05 1.20 1.34 1.51 1.66 1.80 1.94</td>
</tr>
</tbody>
</table>

If PRPLT LEAK:
First RCS jet FAIL OFF or
CUR HP < 95 nmi

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)

A. IF FRCS –X TRANSLATION:

1. RCS BURN PREP
   - Pri RJRD LOGIC,DVIER (sixteen) – ON
   - O14:F,
   - O15:F,
   - O16:F

   O8
   - FWD He PRESS A(B) – OP (tb–OP)
   - Tk ISOL (two) – OP (tb–OP)
   - MANF ISOL 1,2,3,4 (four) – OP (tb–OP)

   GNC 55 GPS STATUS
   - GPS TO NAV – INH (*)

2. MNVR TO BURN ATTITUDE
   - MCC for preferred burn
   If no COMM, maneuver to closest out–of–plane attitude and execute burn ASAP

   DAP: B1/AUTO/PRI
   - GNC UNIV PTG
   - TGT ID: 2

   If retro burn (heads down):
   - BODY VECTOR: 5
   - P: 88
   - Y: 0
   - OM: 180
   - Start TRK – ITEM 19 EXEC (CUR – *)
   - GNC, OPS 202 PRO

   C2
   - 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, ignore computed ATT, perform burn in final ATT
   Go to step A3

   If out-of-plane burn:
   - BODY VECTOR: 3
   - OM: 90 (270 for nose south)
   - Start TRK – ITEM 19 EXEC (CUR – *)
RCS SSR–5 (Cont)

3. BURN EXEC

F6(F8)

ADJ ERROR/RATE – MED

If retro burn:

ADJ ATT – LVLH

Retro
Heads Down

R: 180
P: 358
Y: 000

If burning OOP, verify burn attitude, execute burn ASAP, and ignore TIG references

GNC 20 DAP CONFIG

P,Y OPTION – ITEM 35,36 EXEC (NOSE)

F7

FLT CNTRL PWR – ON

DAP TRANS: NORM/PULSE/PULSE

TIG–0:30>

DAP: B1/INTL/PRI

ADJ 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)

4. POST BURN RECONFIG

F7

FLT CNTRL PWR – OFF

C2

If retro burn: GNC, OPS 201 PRO

DAP TRANS: PULSE/PULSE/PULSE

GNC 20 DAP CONFIG

P,Y OPTION – ITEM 15,16 EXEC (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/F5/R5 DRIVER – OFF

DAP: as reqd >>

B. If FRCS DUMP:

1. RCS DUMP PREP

O14:F,

√Pri RJD LOGIC,DRIVER (sixteen) – 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)

Perform G2/G8 TO G3 TRANS (ENT PKT, DPS)

2. PERFORM FWD RCS DUMP

GNC DEORB MNVR COAST

FWD RCS ARM – ITEM 36 EXEC

DUMP – ITEM 37 EXEC

When terminate conditions met:

FWD RCS OFF – ITEM 38 EXEC

3. POST DUMP RECONFIG

Perform G3 to G2/G8 TRANS (ENT PKT, DPS)

Reconfig NBAT to pre–dump config

GNC 20 DAP CONFIG

P,Y OPTION – ITEM 15,16 EXEC (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/F5/R5 DRIVER – OFF

DAP: as reqd >>
C. If AFT RCS LEAK, perform +X TRANSLATION:

1. XFEED FROM LEAKING RCS 1/2 LEG TO GOOD RCS 1/2 LEG
   ✓ Pri RJD LOGIC, DRIVER (sixteen) – ON
   ✓ DAP: FREE
   O14:F
   O15:F
   O16:F
   ✓ L_R OMS XFEED (four) – CL (tb–CL)
   O8
   ✓ AFT L_R RCS TK ISOL 3/4/5 (four) – CL (tb–CL)
   O7
   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)
   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)

   If prior config was interconnect:
   GNC 33 RCS
   OMS PRESS ENA OFF – ITEM 7 EXEC (*)
   GNC UNIV PTG
   CNCL – ITEM 21 EXEC

2. MNVR TO BURN ATTITUDE
   ✓ MCC for preferred burn
   If no COMM, maneuver to closest out-of-plane attitude and execute burn ASAP
   DAP: B1/AUTO/PRI
   ✓ GPS TO NAV – INH (*)
   GNC, OPS 202 PRO
   C2
   GNC ORBIT MNVR EXEC
   RCS SEL – ITEM 4 EXEC
   TV ROLL – ITEM 5 +1 EXEC
   If out-of-plane burn:
   TIG – ITEM 10 + (current MET + 10 min) EXEC
   ∆VX – ITEM 19 +0 EXEC
   ∆VY – ITEM 20 –1 0 0 EXEC(+1 0 0 for nose south) EXEC
   ∆VZ – 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
   ∆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
   MNVR – ITEM 27 EXEC (*)

3. BURN EXEC
   F6(F8)
   ADI ERR/RATE – MED
   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 B: P,Y OPTION – ITEM 35,36 EXEC (TAIL)
   F7
   FLT CNTLR PWR – ON
   DAP TRANS: NORM/PULSE/PULSE
   TIG–0:30
   DAP: B/INRTL/PRI
RCS SSR–5 (Cont)

F5 At 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 C10

4. SETUP TO CLEAR He

O7 Leaking RCS TK ISOL 1/2 – CL (tb–CL)
O8 √/L OMS TK ISOL (two) – OP (tb–OP)
XFEED B(A) – OP (tb–OP)

GNC 23 RCS
L OMS → 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

5. SET UP DAP

GNC 20 DAP CONFIG
Change DAP A to A1

6. 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

7. 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
8. 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

9. POST He CLEAR CLEANUP
   F7
   FLT CNTLR PWR – OFF
   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)
   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 >>

10. SYSTEMS CLEANUP FOR He LEAKS
    F7
    FLT CNTLR PWR – OFF
    DAP: FREE
    O7
    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)
    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 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
OMS

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OMS SCHEMATIC .............................................................. 11–3

11.1 L(R) OMS
  11.1a ‘L(R) OMS TK P’ ..................................................... 11–4

11.2 OMS SW/VLV MISCOMP
  11.2a OMS VLV tb – bp ..................................................... 11–10
  11.2b tb AND sw POSITION DISAGREE .................................. 11–12

11.3 OMS PRPLT THERMAL
  11.3a ‘S89 PRPLT THRM OMS’ – PRPLT THRM OMS ...................... 11–14
  11.3b (see Note A) – THRMRPLT ........................................ 11–15
  11.3c ‘S89 PRPLT THRM POD’ – PRPLT THRM POD ....................... 11–16

OMS SSR
  OMS SSR–1 MIXED XFD: OMS PRPLT FAILURE ......................... 11–18

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

11

BFS FSM INDEX

11.3  OMS PRPLT THERMAL

11.3b  ‘SM 0 THRM PRPLT’ – THRM PRPLT ................................. 11–15
11.1 ‘L(R) OMS TK P’

From ORB PKT, OMS N2 TK PRESS LOW

1. SM ALERT msg 'L(R) OMS TK P' occur?
   - YES
   - NO

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?
   - YES
   - NO

5. N2 TK LEAK
   - 6 When TK P < 470 psia

   • P/I DEORBIT OMS BURN Cue Card: 'TIG ~2 All OMS ENG L(R) ~ ARM'

6. N2 REG P decreasing?
   - YES
   - NO

7. N2 LEAK DOWNSTREAM OF CHECK VLV

8. N2 LEAK BETWEEN OMS P VLV AND CK VLV OR N2 RELIEF VLV FAILED OPEN

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 2 display

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

N2 TK P > 564 psia

Attempt repress of N2 sys prior to each burn. Monitor N2 REG P

N2 TK P < 564 psia

Save for Deorbit Burn. Capability exists to allow one additional actuation of bipropellant vlv's 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 ?

7

4  5

11 MDM ANALOG INPUT PARAM LOSS

12 (CRT,C3) N2 REG P decr with sw now in OFF ?

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)

All 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 XDCCR FAILURE OR DSC ANALOG INPUT PARAM LOSS OR N2 REG FAILED CLOSED OR TOTAL LINE BLOCKAGE BETWEEN P VLV AND CK VLV

• MCC for other params possibly lost in same MDM or DSC card
• Do not use engine for additional on–orbit burns
• MCC to determine if engine is usable for deorbit
• N2 REG xdcr and N2 TK P xdcr on CRT have common MDM card. This check detects MDM card failure
• MCC for further engine use
From ORB PKT, OMS TK P LOW, step 28

36 | Aft OMS
---|---
| (O8)
| • L(R) OMS He PRESS/VAP ISOL A – OP
| • Wait 10 sec
| • L(R) OMS He PRESS/VAP ISOL A – CL

37 | (CRT) L(R) OMS FU (OXID) P incr ?
---|---
| YES
| • Vernier control operational
| • DAP: as reqd

38 | L(R) OMS He LINE BLOCKAGE BETWEEN QUAD CHECK VALVE AND FU/OXID TANK

39 | P&I all OMS BURN Cue Cards:
| • √ L(R) OMS He PRESS/VAP ISOL (two) – CL

40 | Vernier control operational
---|---
| (O7)
| • AFT L.R RCS MANF ISOL 5 (two) – GPC (tb–OP)

41 | AFT L.R RCS
---|---
| • MANF ISOL 3,4 (four) – CL (tb–CL)
| • TK ISOL 3/4/5 (four) – CL (tb–CL)
| • MANF ISOL 5 (two) – GPC (tb–OP)

42 | (CRT) Any RCS MANF 3,4 P decr ?
---|---
| YES
| • Repressing more than one manifold at a time when at low pressure may damage RCS propellant tank
| • Vernier control operational
| (O7)
| • AFT L.R RCS MANF ISOL 5 (two) – GPC (tb–CL)
| • AFT L.R RCS TK ISOL 3/4/5 (four) – OP (tb–OP)
| • AFT L.R RCS MANF ISOL 3 (two) – OP (tb–OP)
| • Wait 2 sec
| • AFT L.R RCS MANF ISOL 4 (two) – OP (tb–OP)
| • Go to LOSS OF VERNIERS (ORB OPS, RCS)

43 | FU/OXID LEAK IN L(R) RCS MANF 5

44 | (C3)
---|---
| • DAP: as reqd

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
From ORB PKT, OMS TK P LOW, step 32

47 Aff OMS
- 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 ?

49 Aff OMS feeding OMS Xfeed at time of failure ?

50 GNC 23 RCS
- RCS L – ITEM 2 EXEC

51 Aff OMS
- L(R) OMS He PRESS/VAP ISOL B(A) – OP
- Wait 10 sec
- L(R) OMS He PRESS/VAP ISOL B(A) – CL

52 FROZEN LEAK SOURCE OR PARTIAL He LINE BLOCKAGE TO AFFECTED TANK

53 (CRT) XFEED P DECR or zero ?

54 FU/OXID LEAK IN OMS XFEED LINES

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 ?

59 L(R) OMS He LINE BLOCKAGE BETWEEN He TK AND He PRESS VLV (A,B)

60 L(R) OMS He LINE BLOCKAGE TO AFFECTED TANK

61 Fail all OMS BURN Cue Cards:
- /L(R) OMS He PRESS/VAP ISOL (two) – CL

62 Reconfig OMS
- L(R) OMS TK ISOL (four) – OP (tb–OP)

9 MCC for blowdown capability. If full blowdown exists, continue with nominal mission profile. If not full blowdown, save available blowdown for deorbit burn

10 If not full blowdown, save available blowdown for deorbit burn

11 OMS and RCS operational in nominal config. When reqd or on MCC call, use (O8) L(R) OMS He PRESS VAP ISOL B to repress

12 Perform subsequent burns in blowdown in affected pod to prevent mixture ratio variations

13 MCC on action to be taken to minimize failure effects and config for subsequent burns

14 OMS and RCS operational in nominal config. Do not Xfeed or i’cncnt

02/28/00
From ORB PKT, OMS He TK P LOW, step 2

63 SM ALERT msg 'L(R) OMS TK P' occur ?
       YES

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

1 MCC for other params possibly lost in same MDM or DSC card
2 N2 P available on OMS/MPS
20 He P available on GNC SYS SUMM 2 display
For subsequent reconfig, ignore tb – bp. After vlv commanded, wait 3 sec; then position appropriate sw to GPC.

Nominal Config:
(MA73Cj)
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
**OMS 11.2a (Cont)**

1. Position of aff sw:
   - CL
   - OP

2. Aff OMS vlv – OP
   - Yes

3. Aff OMS vlv – CL
   - NO

4. tb – bp?
   - YES

5. Position sw to mode in which tb – bp occurred
   - NO

6. STICKY LIMIT sw OR VLV, VLV OPERATIONAL
   - YES

7. Perform I’CNCT RETURN (OPS 2,3) (ORB PKT, RCS)
   - All OMS sw – GPC
   - Yes

8. GPC

9. MCC

10. YES

11. NO

12. YES

13. NO

14. YES

15. YES

16. NO
OMS

11.2b OMS VLV tb AND sw POSITION DISAGREE

If:
OMS vlv tb – OP but sw closed
OMS vlv tb – CL but sw open

Nominal Config:
(MA73C C)
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

1 Vlv reconfig in progress ?
\[\begin{array}{c}
\text{YES} \\
\text{NO}
\end{array}\]

2 tb OR sw FAILURE

3 tb FAILURE

4
\[\begin{array}{c}
\text{Perform I’CNCT RETURN (OPS 2,3) (ORB PKT, RCS)} \\
\text{Aff OMS sw – GPC} \\
\text{\textcheckmark MCC}
\end{array}\]
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11.3 PRPLT THERMAL OMS

If:
Any param on OMS Thermal Limit Table out-of-limits
Refer to OMS THERMAL LIMIT TABLE

Nominal Config:
(A14)
RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO (B AUTO), B OFF (A OFF)

1. SM 89 PRPLT THERMAL
   Param(s) out-of-limits high or low:
   ↑
   ↓
   Neither

2. TRANSIENT CONDITION
3. HTR/THERMOSTAT CKT FAILED OFF OR HEATING FROM CONTROLLING CKT INADEQUATE OR INST FAILURE OR BIAS
4. HTR/THERMOSTAT CKT FAILED ON OR EXTREMELY HOT ENVIRONMENT OR INST FAILURE OR BIAS
5. Switch to other htr/thermostat ckts
   (A14)
   RCS/OMS HTR OMS CRSFD LINES
   • A OFF (B OFF)
   • B AUTO (A AUTO)

1. Meg available with SM in RUN mode only
2. Htrs cycling high/low or intermittent xdr failure. MCC
3. Because of insufficient onboard data and complexity of interacting htr/thermostat groups, crew cannot identify specific failure or determine instrument faults
4. 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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>FDA LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>OMS CRSFD L R C XFD OX XXXS XXXS XXXS</td>
<td>50</td>
</tr>
<tr>
<td>GMBL LN XXXS XXXS</td>
<td>50</td>
</tr>
<tr>
<td>DRN OX XXXS XXXS</td>
<td>50</td>
</tr>
<tr>
<td>FU OX</td>
<td>50</td>
</tr>
</tbody>
</table>
**OMS**

**11.3b THRM PRPLT**

- **SM 0 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 OFF (A OFF)

**PRPLT POD OMS CRSFD:**
- ↑
- ↓
- Neither

**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. → MCC for further analysis, possible reconfig, and/or attitude change**

**6 When no onboard thermal visibility into CRSFD LINES (no SM and no BFS) exists, both A, B Htr sets will be turned to AUTO**

**CAUTION**

- Simultaneous operation of both A, B Htr circuits in pods will result in htr burnout

**Switch to other htr/thermostat ckt**

**Which area failed:**
- Right Pod
- Left Pod

**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**

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**Switch to other htr/thermostat ckt**

**Which area failed:**
- Right Pod
- Left Pod

**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. → MCC for further analysis, possible reconfig, and/or attitude change**

**6 When no onboard thermal visibility into CRSFD LINES (no SM and no BFS) exists, both A, B Htr sets will be turned to AUTO**

**Switch to other htr/thermostat ckt**

**Which area failed:**
- Right Pod
- Left 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)

1. SM ALERT
2. S89 PRPLT THRML POD
3. INST FAILURE
4. HTR/ THERMOSTAT CKT FAILED ON OR EXTREMELY HOT ENVIRONMENT OR INST FAILURE OR BIAS
5. HTR/ THERMOSTAT CKT FAILED OFF OR HEATING FROM CONTROLLING CKT INADEQUATE OR INST FAILURE OR BIAS
6. CAUTION
7. TRANSIENT CONDITION
8. Switch to other htr/thermostat ckt
9. Which area failed:
   Right Pod
   Left Pod
10. (A14) RCS/OMS HTR L POD (two) –
   • A OFF(B OFF)
   • B AUTO (A AUTO)

Msg available with SM in RUN mode only

Because of insufficient onboard data and complexity of interacting htr/thermostat groups, crew cannot identify specific failure or determine instrument faults

Htrs cycling high/low or intermittent xdr cr failure. MCC

MCC for further analysis, possible reconfig, and/or attitude change
### POD THERMAL LIMIT TABLE

<table>
<thead>
<tr>
<th>PARAM</th>
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OMS SSR–1
MIXED XFD: OMS PRPLT FAILURE

NOTE
Procedure uses MEMORY READ/WRITE to set appropriate OMS TK ISOL vlvs and OMS XFEED vlvs 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)
   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>
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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

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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

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</table>

6. During AOS, perform reconfig:
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

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TALKBACKS
bp bp

BURN ENGINE
THC + X
OMS % VS RCS
BURN TIME
bp bp

TABLE 8

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TALKBACKS
bp bp

BURN ENGINE
THC + X
OMS % VS RCS
BURN TIME
bp bp

RCS
PDRS

12.1 RMS C/W

12.1a C/W LT(S) ON, BUT RMS MSTR ALARM LT/TONE OFF .......................... 12–4
12.1b MULTIPLE C/W LTS AND PDRS MSGS ............................................. 12–5
12.1c C/W MCIU LT ................................................................................. 12–6
12.1d ABE LT OR S96 PDRS ABE COMM(SY, SP, EP, WP, WY, WR) .......... 12–8
12.1e CONTR ERR LT – S96 PDRS CNTL SY(SP, EP, WP, WY, WR) OR PDRS CNTL POR .................................................. 12–19
12.1f GPC DATA LT OR BCE BYP MCIU ................................................... 12–22
12.1g CHECK CRT LT ............................................................................ 12–24
  – S96 PDRS CKCRT D .................................................................. 12–26
12.1h CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–27
  – S96 PDRS CKCRT SY(SP, EP, WP, WY, WR) .................................. 12–31
12.1i CHECK CRT LT  – S96 PDRS CKCRT EE ......................................... 12–33
12.1j CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–37
  – S96 PDRS CKCRT T CK ................................................................ 12–36
12.1k CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–37
12.1l CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–38
12.1m CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–38
12.1n CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–38
12.1o CHECK CRT LT  – S96 PDRS TEST SPA ........................................... 12–38
12.1p CHECK CRT LT  – S96 PDRS TEST BRK(C/W, NMI, FS, LOSS) ....... 12–40
12.1q CHECK CRT LT  – S96 PDRS CKCRT FS ......................................... 12–42
12.1r RELEASE LT  – PDRS REL .............................................................. 12–43
12.1s RELEASE LT  – PDRS REL (CUE CARD EXECUTED) ....................... 12–44
12.1t DERIGIDIZE LT  – PDRS DERIG (CUE CARD EXECUTED) ................. 12–45
12.1u DERIGIDIZE LT  – PDRS DERIG (CUE CARD EXECUTED) ................. 12–48
12.1v PORT TEMP LT  – PDRS TEMP PORT ............................................ 12–49

12.2 RMS D&C

12.2a MSTR ALARM ON, BUT C/W LT(S) OFF ......................................... 12–52
12.2b BRAKES – ON, BUT BRAKES tb – OFF .......................................... 12–53
  – OFF, BUT BRAKES tb – ON .............................................................. 12–54
12.2c SAFING – AUTO, BUT SAFING tb – bp .......................................... 12–55
12.2d RESERVED .................................................................................. not used
12.2e RESERVED .................................................................................. not used
12.2f SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF .......... 12–57
12.2g SHLDR BRACE REL tb – bp AFTER CMD ....................................... 12–59

12.3 END EFFECTOR

12.3a EE FAILS TO CAPTURE/RIGIDIZE IN AUTO ................................. 12–60
12.3b RELEASE/DERIGIDIZE IN AUTO .................................................. 12–64
12.3c CLOSE IN EE MODE – MAN (EE C/O ONLY) .................................. 12–68
12.3d EE FAILS TO RIGIDIZE IN EE MODE – MAN ............................. 12–69
  (EE CHECKOUT ONLY) ................................................................... 12–69
12.3e EE FAILS TO RELEASE IN EE MODE – MAN .............................. 12–71
12.3f DERIGIDIZE/EXTEND IN MANUAL ............................................... 12–73
12.3g EE tb ABNORMAL WHILE NO EE CMDS .......................... 12–75
  (EE MODE – AUTO OR MAN) ............................................................ 12–75
12.3h EE tb ABNORMAL WHILE EE MODE OFF .................................... 12–77
12.3i CAPTURE SEQ ABORTED (CUE CARD EXECUTED) ....................... 12–79
12.3j NO AUTO RELEASE (CUE CARD EXECUTED) ................................. 12–80
12.3k MANUAL RELEASE (CUE CARD EXECUTED) ................................. 12–82
12.3l DERIGID (CUE CARD EXECUTED) ................................................ 12–84
12.4 RMS OPS
12.4a ARM RESPONSE ABNORMAL IN MANUAL MODES .............. 12–86
12.4b AUTO MODES ........................................ 12–88
12.4c JOINT RESPONSE ABNORMAL IN SINGLE MODE ............ 12–90
12.4d DIRECT MODE ......................................... 12–93

12.5 MPM/MRL
12.5a MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME ........................................... 12–96
12.5b MPM STO – tb NOT STO, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME ........................................... 12–98
12.5c MRL REL – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME ........................................... 12–100
12.5d MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME ........................................... 12–102
12.5e PORT RMS RETEN LATCHES R–F–L tb – bp WHEN CRADLED ................................................................. 12–104
12.5f PORT RMS RETEN LATCHES R–F–L tb – gray WHEN UNCRADLED .............................................................. 12–104

PDRS SSR
PDRS SSR–1 MPM MTR INHIBIT DISABLE ............................. 12–106
SSR–2 RESERVED .............................................. not used
SSR–3 BACKDRIVE TECHNIQUE – JOINT FREE .................. 12–107
SSR–4 RMS IFM D&C KIT .......................................... 12–115
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?
   - YES
   - NO

3. • Use SM ALERT and other cues for failure annunciation
   - Go to appropriate MAL

4. FAULT
   - Any RMS msg?
     - YES
     - NO

5. MCIU Lt on?
   - YES
   - NO 12.1c 1

6. GPC DATA Lt on?
   - YES
   - NO

7. MSTR ALARM CKT FAILURE

8. SM 94 PDRS CONTROL
   - I/O ON – ITEM 5 >?
     - YES
     - NO

9. CRT msg Fault Summ Page
   - Go to appropriate MAL for msg

10. C/W LT(S) FAILED ON

11. • Continue normally.
    Failure will be annunciated by MSTR ALARM

PDRS Fault Msgs

SM ALERT

C/W Lt(s) On, but MSTR ALARM Lt and/or Tone Off (A8U)
12.1b MULTIPLE C/W LTS AND PDRS MSGS

SM ALERT

MSTR ALARM

Multiple C/W Lts

Multiple PDRS msgs

1 (ABU)
- BRAKES – ON
- Perform highest priority MAL (its listed in priority order)

1. C/W MCIU lt
2. C/W ABE lt
3. C/W CONTR ERR lt
4. C/W GPC DATA lt
5. C/W CHECK CRT lt
6. C/W RELEASE lt
7. C/W DERIGID lt
8. C/W PORT TEMP lt
9. C/W SINGULAR lt
10. C/W REACH LIM lt

2 No action reqd
12–6

MAL/ALL/GEN F

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

RMS MSTR ALARM

MCIU

(A8U)

MCIU;

MADC ↓

MCPC ↓

ICF ↓

S96 PDRS MCIU

ICF (MADC, MCPC), PDRS TEST C/W (BRK), BCE BYP MCIU

If:

MADC, MCPC, ICF, Frame Sync, MCIU failure

warning circuit failure

12.1c C/W MCIU LT

12.1a 5
12.1b 1

1

(A8U)

• BRKES – ON

SM 94 PDRS CONTROL

I/O ON – ITEM 5 (*)?

NO

YES

2

Try to reestablish I/O

• I/O ON – ITEM 5 EXEC (*)

NO

YES

3

TRANSIENT MCIU FAIL

TRANSIENT MCIU FAIL

I/O ON – ITEM 5 (*)?

NO

3

MCIU FAILURE

4

SM 94 PDRS FAULTS

At least one of MCIU:

MADC ↓

MCPC ↓

ICF ↓

NO

YES

5

FAULT

'PDRS TEST C/W' ?

NO

YES

7

MCIU FAILURE

DIRECT and B/U drive modes remain. All EE modes remain, but limping unavailable.

8

Try to restart MCIU

SM 94 PDRS CONTROL

• Record WR RANGE

(A8L)

• RMS SEL – OFF

• RMS PWR – OFF (Expect SM ALERT and BCE BYP MCIU msg)

• RMS PWR – PRI (MA)

(CRT)

• I/O ON – ITEM 5 EXEC (*)

(A8L)

• If RMS selected at time of failure, RMS SEL – PORT (MA & SM ALERT possible)

(A8U)

C/W MCIU lt on ?

NO

15

YES

13

MCIU FAILURE

14

DIRECT and B/U drive modes remain. EE MAN and B/U RELEASE remain, but limping unavailable

10

PDTRS TEST C/W ?

YES

16

11

MCIU LT CKT FAILURE IN D&C PNL

12

• Continue ops

9

DIRECT and B/U drive modes remain. All EE modes remain, but limping unavailable

15

14

DIRECT and B/U drive modes remain. EE MAN and B/U RELEASE remain, but limping unavailable

12

• Continue ops

6

11

MCIU LT CKT FAILURE IN D&C PNL

12

• Continue ops
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

---

(A8U)
- SAFING – CANCEL
  (tb–gray)
- If WR RANGE different than recorded value, update WR RANGE on SM 94 (ITEM 26)
- Continue ops

**SM 94 PDRS CONTROL**

15. TRANSIENT MCIU FAILURE

16. PERMANENT MCIU C/W CKT FAILURE

17. EE MAN and B/U RELEASE modes remain. EE AUTO may remain

- If unloaded, √ MCC for possible EE AUTO checkout

18. Continue ops
12.1d C/W ABE LT OR S96 PDRS ABE COMM (SY, SP, EP, WP, WY, WR)

**Nominal Config:**
(A8L)
RMS PWR – PRI
RMS SEL – PORT (CRT)
SM 94 I/O ON – ITEM 5 (*)

**RMS MSTR ALARM**

**SM ALERT**

**ABE**

**S96 PDRS ABE COMM (SY, SP, EP, WP, WY, WR)**

---

**12.1b 1**

1. **BRAKES – ON**

SM 96 PDRS FAULTS

**ABE: COMM 'U'?**

YES

**2**

Reset ABE

SM 94 PDRS CONTROL

- Record WR R

(A8U) Record WR

(A8L)
- RMS SEL – OFF
- RMS SEL – PORT
- If WR changed > 90 deg, update WR R on SM 94 to recorded value (ITEM 26)

Any ABE related annunciations?

YES

**3**

TRANSIENT FAILURE

- Continue nominal ops

**4**

**5**

SM 96 PDRS FAULTS

**ABE BITE: or CHECK CRT:**
SP A BITE TEST: Joint related ABE BITE or BITE TEST for one or more joints?

YES

**6**

SPA OR MCIU FAILURE

**7**

DIRECT and B/U drive modes remain

**8**

Identify failed joint

**ABE BITE: or CHECK CRT:**
SP A BIT T E 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?

YES

**10**

SPA FAILURE

**11**

**12**
12–9 PFRS 12.1d (Cont)

1. B/U drive mode remains. DIRECT mode for five good joints. EE MAN remains. Data for failed joint and joints toward wrist may be unreliable.

2. Full capability will be regained by RMS MCIU CHANGEOUT (IFM).

3. If any wrist joint data is unreliable, EE Auto mode may be lost.

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.

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.

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.

7. For tach failure, rate data is unreliable.

8. For BITE circuit failure, MCIU OVERRIDE: ABE OVRD A (ITEM 36)

9. SM 96 PDRS FAULTS

10. CHECK CRT – EXT FS ‘↓’?

11. SPA OR MCIU FAILURE

12. DIRECT and B/U drive modes remain. EE MAN mode remains, but limping unavailable. Data for failed joint and joints toward wrist may be unreliable.

13. TACHOMETER ELECTRONICS OR BITE CIRCUIT FAILURE

14. DIRECT and B/U drive modes remain. EE MAN mode remains, but limping unavailable. Data for failed joint and joints toward wrist may be unreliable.

15. MCIU FAILURE

16. DIRECT and B/U drive modes remain. EE MAN mode remains, but limping unavailable. Data for all joint unreliable.

17. ABE BITE: MICROCOMPUTER ‘↓’?

18. CHECK CRT: SPA BITE TEST ‘LOSS’ for failed joint?

19. Determine type of BITE

20. CORRUPT BITE AND BITE VERIFICATION DATA

21. TACHOMETER ELECTRONICS OR BITE CIRCUIT FAILURE

22. DIRECT and B/U drive modes remain

23. DIRECT and B/U drive modes remain

24. BACKUP RELAY ‘↓’

25. None

26. Multiple ABE BITE: down arrows for one joint only

27. A/D CONVERTER ‘↓’

28. BRAKE ‘↓’

29. POS ENCODER ‘↓’

30. None

31. BACKUP RELAY ‘↓’

32. MDA DEMAND VOLTAGE ‘↓’

33. MDA OVERCURRENT/MOTOR DRV FAULT ‘↓’

34. TACHOMETER ‘↓’

35. COMMUTATOR ‘↓’

36. TOTAL COMPENSATOR ‘↓’

37. MDA DEMAND VOLTAGE ‘↓’

38. A/D CONVERTER ‘↓’

39. BRAKE ‘↓’

40. POS ENCODER ‘↓’

41. A/D CONVERTER ‘↓’

42. BRAKE ‘↓’

43. POS ENCODER ‘↓’

44. None

45. Multiple ABE BITE: down arrows for one joint only

46. TACHOMETER ELECTRONICS OR BITE CIRCUIT FAILURE

47. DIRECT and B/U drive modes remain

48. MCIU FAILURE

49. DIRECT and B/U drive modes remain

50. EE MAN remains.

51. DIRECT and B/U drive modes remain

52. EE MAN remains.

53. DIRECT and B/U drive modes remain

54. EE MAN remains.

55. DIRECT and B/U drive modes remain

56. EE MAN remains.

57. EE MAN remains.

58. DIRECT and B/U drive modes remain

59. EE MAN remains.

60. DIRECT and B/U drive modes remain

61. EE MAN remains.

62. DIRECT and B/U drive modes remain

63. EE MAN remains.

64. DIRECT and B/U drive modes remain

65. EE MAN remains.
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.
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.

Additional annunciations may be received after ABE reset.

May receive CHECK CRT and DIRECT DRIVE BITE annunciation when driving in Direct mode. Cycle Brake sw to clear failure.
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 failed joint in DIRECT, failure will reannunciate. Recycle arm select to regain computer supported modes.
Removing brakes may result in reannunciation of failure and autobrakes.

Subsequent MDA Demand Voltage BITE possible while driving failed joint. For commutator and MDA demand voltage failures, MCIU 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.

For MDA BITE circuit failure or sluggish joint, MCIU 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 respectively (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes.
MAL/ALL/GEN F

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.
Joint drive test (A8U)
- MODE – DIRECT
- JOINT – failed one
- SINGLE (DIRECT) DR – ‘+’ and ‘–’
- MODE – not DIRECT

Joint drive properly?

NO

101 Joint drive test

SM 94 PDRS (A8U)
CONTROL
- Record WR R

NO

102 FALSE COMMUTATOR BITE

YES

103 DIRECT and B/U drive modes remain

23 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 (on MCC GO)

Did joint drive properly?

NO

104 COMMISSUTATOR DISC FAILURE

YES

105 PRIMARY COMMUTATOR DATA FAILURE

106 MCC

Possible backdrive technique for free joint (PDRS SSR–3) or EVA reqd

107 Reconfig to PRI PWR; if required (A8U)
- RMS SEL – DIRECT
- RMS PWR – B/U (expect SM ALERT and BCE BYP MCIU)
- RMS PWR – B/U JOINT – failed joint
- B/U DRIVE ‘+’ or ‘–’

108 B/U drive mode remains. DIRECT mode for five good joints

107 Reconfig to PRI PWR; if required

109 PRIMARY COMMUTATOR DATA FAILURE

108 B/U drive mode remains. DIRECT mode for five good joints
12.1d (Cont)

109 Monitor SM 96 while cycling brakes

SM 96 PDRS FAULTS

(A8U)
- BRAKES – OFF
- BRAKES – ON

ABE BITE: MDA OVERCURRENT ‘↓’ when BRAKES – OFF?

YES

NO

111 TRANSIENT FAILURE

110 Joint drive test

(A8U)
- BRAKES – ON
- MODE – DIRECT
- JOINT – failed one
- SINGLE (DIRECT) DR – ‘+’ and ‘–’
- MODE – not DIRECT

YES

NO

114 Continue nominal ops

Joint drive properly?

NO

112 MDA FAILURE

113 B/U drive mode remains. DIRECT mode for five good joints

YES

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

24 Subsequent MDA Demand Voltage BITE possible while driving failed joint
Additional annunciations 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.

19

117 Reset ABE

SM 94 PDRS CONTROL
- Record WR R

(A8U)
- Record WR

(A8L)
- RMS SEL - OFF
- RMS SEL - PORT
- If WR changed > 90 deg, update WR R on SM 94 to recorded value (ITEM 26)

118 Joint drive test

(A8U)
- MODE - DIRECT
- JOINT - failed one
- SINGLE (DIRECT) DR - '+' and '–'
- MODE - not DIRECT

Joint drive properly?

YES

121 SPA FAILURE

123 DIRECT and B/U drive modes remain

NO

119 SM 96 PDRS FAULTS

ABE BITE: MDA DEMAND VOLTAGE '↓'?

YES

120 SPA FAILURE

Driving failed joint in B/U may cause loss of B/U mode for all joints

NO

122 SPA FAILURE

124 B/U drive mode remains. DIRECT mode for five good joints

125 DIRECT and B/U drive modes remain for five good joints

- MCC
For tach failure, rate data is unreliable.

26 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.

27 For encoder failure, joint data is unreliable. REACH LIMIT and SOFT STOP annunciations not available for failed joint.
If alarms become a nuisance, use vernier rates, OCAS, or SINGLE EE tb(s) inaccurate. All display data bad.

Full capability may be restored with RMS MCIU CHANGEOUT (IFM)
CAUTION

Arm may have up to 2 ft of uncommanded motion if not captured to constrained payload.

12

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)?

NO

15

16
• BRAKES – OFF
Joint move (visual)?

YES

5

CAUTION

Taking BRAKES OFF may result in unannunciated motion of failed joint. Be ready to apply BRAKES if motion occurs.

NO

BRAKES – ON

17

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)?

NO

JOINT SYNC FAILURE

YES

20
• JOINT – failed one
• BRAKES – OFF
C/W CONTR ERR It back on?

NO

YES

21
JOINT SYNC FAILURE

22
Joint moving (visual)?

YES

31

NO

23
J O I N T E N C O D E R F A I L U R E

24
DIRECT and B/U drive modes remain. If wrist joint failed, AUTO EE mode lost. MAN EE modes remain

Reset ABE command latches
• SAFING – SAFE
• SAFING – AUTO

25
• BRAKES – ON
• MODE – DIRECT
• JOINT – failed one
• SINGLE (DIRECT) DR – ‘+’ and ‘−’
• MODE – not DIRECT
Joint drive properly (visual)?

NO

YES

26
SINGLE, DIRECT, B/U drive modes remain. Joint position data unreliable

27

28
DIRECT and B/U drive modes remain

SM 94 PDRS CONTROL
• POS ENC CK INH – ITEM 12 EXEC

29

30
DIRECT and B/U drive modes remain for good joints, and B/U drive mode only for failed joint
PDRS  12.1e (Cont)

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

Visual √ of joint motion

(A8U)
- BRAKES – ON
- MODE – DIRECT
- SINGLE (DIRECT) DR – ‘+’ or ‘-’ (2 sec max)
- MODE – not DIRECT

Joint drive (visual) ?

NO

Joint angle data

(A8U)
- MODE – DIRECT
- SINGLE (DIRECT) DR – ‘+’ or ‘-’ (2 sec max)
- MODE – not DIRECT

Does joint angle indication change and appear to track motion?

NO

SM 94 PDRS CONTROL
- Record WR R ______
- Record WR ______

(A8L)
- RMS SEL – OFF
- RMS PWR – OFF (Expect SM ALERT and BCE BYP MCIU)
- RMS PWR – B/U
- RMS SEL – PORT

Joint drive (visual) ?

YES

WARNING
Joint may be unrestrained. Watch for drift

Joint angle data

(A8U)
- MODE – DIRECT
- SINGLE (DIRECT) DR – ‘+’ or ‘-’
- MODE – not DIRECT

Were all PYR actual attitude rates zero?

YES

MTR OR STRUCTURE FAILURE, √/MCC

Joint may be unrestrained. Watch for drift

NO

MTR OR STRUCTURE FAILURE, √/MCC

WARNING
Joint may be unrestrained. Watch for drift
Further transients are possible; and if they continue, full capability can be restored with SM GPC REASSIGNMENT and/or RMS MCIU CHANGEOUT (IFM).

If WRR is updated, expect CHECK CRT lt. Lt can be cleared by ITEM 12, 11 on SM 94.

Further transients are possible; and if they continue, full capability can be restored with RMS MCIU CHANGEOUT (IFM).
Is arm latched, captured to a constrained payload, or otherwise restrained?

Yes: MCIU

No: Mode it may not illuminate

Primary pwr may be restored following IFM. Panel edge lighting may not be available

Is joint response normal?

Yes: MCIU PWR FAILURE

No: 

RMS PRIMARY PWR FAILURE (MNA O14&AB PWR)

B/U drive mode remains. B/U PL RELEASE remains

MCC for RMS CONTINGENCY POWERUP (IFM)

Full capability may be restored with MCIU CHANGEOUT (IFM)

Mode it may not illuminate

Primary pwr may be restored following IFM. Panel edge lighting may not be available
If:
SPA Direct Drive circuit failure, SPA BITE Verification Failure, Position Encoder, D&C Comm, EE Fail, Thermistor Circuit, HC, Brake Slip, WR Range out of limits, MOIU BITE Verification Test circuit failure

1 Computer supported modes available but subsequent commutator failure for same joint will not be annunciated or protected by autobrakes

**SM ALERT**

**RMS MSTR ALARM**

**CHECK CRT (A8U)**

12.1g C/W CHECK CRT LT

12.1b

1

12.1h

1

12.1i

1

12.1j

1

12.1k

1

12.1l

2

12.1m

1

12.1n

1

12.1o

1

12.1p

1

12.1q

1

2

SM 96 PDRS FAULTS

CHECK CRT: DIRECT DRIVE BITE '↓' simultaneously for multiple joints?

NO

YES

12

3

Monitor SM 96 while cycling brakes

SM 96 PDRS FAULTS

(A8U)

• BRAKES – OFF

• – ON

ABE BITE:
TOTAL COMPENSATOR '↓' appears when BRAKES – OFF?

NO

YES

12.1d

51

4

CHECK CRT: SPA BITE TEST 'CMTR'?

NO

YES

7

5

MDA CLOCK FAILURE

6

B/U drive mode remains, DIRECT mode for five good joints

1
One failure away from uncommanded joint drive in DIRECT

Joint drive properly?

YES

8 TRANSIENT FAILURE

NO

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

(A8U)
- BRAKES – OFF
- JOINT – any
- MODE – SINGLE, ENTER
- SINGLE (DIRECT) DR – ‘+’ and ‘-’
- BRAKES – ON

Joint drive properly?

YES

NO

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

10 Continue nominal ops

12 Joint drive test

(A8U)
- BRAKES – OFF
- JOINT – any
- MODE – SINGLE, ENTER
- SINGLE (DIRECT) DR – ‘+’ and ‘-’
- BRAKES – ON

Joint drive properly?

YES

NO

SINGLE/ DIRECT DR SW 28V CONTACT FAILED SHORT, BRAKES SW 10V POLE FAILED OPEN, OR MODE SW DIRECT 10V CONTACT FAILED OPEN

14 SINGLE/ DIRECT DR SW 28V CONTACT FAILED SHORT, BRAKES SW 10V POLE FAILED OPEN, OR MODE SW DIRECT 10V CONTACT FAILED OPEN

15

Use SM 95 PDRS OVERRIDE to regain SINGLE drive mode
1 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.

1 DIRECT and B/U drive modes remain. EE MAN and B/U RELEASE remain, but limping not available.

1 2 3
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 EEEU annunciations

3 May receive CHECK CRT and DIRECT DRIVE BITE annunciation when driving in Direct Mode. Cycle Brake 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
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 EEEU annunciations.

5 For MDA BITE circuit failure, computer supported modes available but subsequent MDA failure for same joint will not be annunciated or protected by autobrakes.

6 IF TOTAL COMPENSATOR and MDA DEMAND VOLTAGE occur together, BRAKE and A/D CONVERTER will annunciate due to multiple failure combination.

7 For loss of microcomputer BITE, computer supported modes available but subsequent failure for same joint will not be annunciated or protected by autobrakes.

13 Monitor SM 96 while cycling brakes

SM 96 PDRS FAULTS

• BRAKES – OFF
• - ON

CHECK CRT: SPA BITE TEST 'FS' clears when BRAKES – OFF?

YES

18 DIRECT and B/U drive modes remain

NO

13

15 CORRUPT BITE AND BITE VERIFICATION DATA

18 MDA BITE OR BITE VERIFICATION CIRCUIT FAILURE

19 DIRECT and B/U drive modes remain

17 ABE BITE:

Any new MDA OVERCURRENT/ Motor DRV fault ‘↓’, TOTAL COMPENSATOR ‘↓’, or MDA DEMAND VOLTAGE ‘↓’ when BRAKES – OFF?

20 MICRO-COMPUTER BITE OR FRAME SYNC BITE VERIFICATION CIRCUIT FAILURE

17

YES

15

8

16 DIRECT and B/U drive modes remain

12 (A8U)

• MODE – DIRECT
• JOINT – failed one
• SINGLE (DIRECT) DR – ‘+’ or ‘−’
• MODE – not DIRECT

Joint move (visual)?

YES

25 SPA FAILURE

26 DIRECT and B/U drive modes remain

18

MDA BITE OR BITE VERIFICATION CIRCUIT FAILURE

16 DIRECT mode remains for five good joints. B/U mode remains

11/09/01 PDRS 12.1i (Cont)
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 DIRECT DRIVE BITE failure, DIRECT mode available but for subsequent failure joint could drive in wrong direction or drive two joints simultaneously.

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.
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 EEEU annunciations.

10 For PLL BITE Circuit Failure Subsequent tachometer failure for same joint will be annunciated by POS ENCODER BITE and protected by autobrakes.

11 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.
12.1j C/W CHECK CRT LT – S96 PDRS

CKCRT SY(SP, EP, WP, WY, WR)

1 Joint biases
DDT&E (201)
SY –2.5
SP +2.0
EP +0.5
WP –0.4
WY –1.0
WR +0.1
FOP1 (301)
SY –2.4
SP +2.4
EP –0.0
WP –1.0
WY –1.9
WR +0.3
FOP3 (303)
SY +0.6
SP +1.3
EP –0.6
WP –0.8
WY +0.9
WR +2.6

2 EE tb(s) inaccurate.
All display data bad

3 Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

4 REACH LIMITs and SOFT STOPs annunciation not available for failed joint

Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT

If CKCKT–POS SY (SP, EP, WP, WY, WR) ↓

12.1g 1
12.1e 2

1 (A8U)
* BRAKES – ON
* PARAM sel – JOINT ANGLE

All six Joint Angle readouts equal to joint biases?

2 S96 PDRS CKCRT FS?

3 LOSS OF EXTERNAL FRAME SYNC AT ABE

4 SM 96 PDRS FAULTS
* Identify failed joint

SM 94 PDRS CONTROL
* POS ENC CK INH, ENA – ITEM 12, 11 EXEC

5 EXTERNAL FRAME SYNC FAILURE IN MCIU

6 DIRECT and B/U drive modes remain. MAN and B/U RELEASE EE modes remain

7 (A8U) Failed joint angle readout equal to joint bias?

8 If motion of failed joint could result in collision, Y MCC

* MODE – DIRECT
* JOINT – failed one
* SINGLE (DIRECT) DR – + or – (2 sec max)
* MODE – not DIRECT

Joint move (visual)?

9 JOINT PWR–ON RESET FAILURE. ALL DATA FOR FAILED JOINT IS BAD

10 DIRECT and B/U drive modes remain for good joints, and B/U drive mode only for failed joint. All EE modes remain

11 BRAKES – OFF
Joint move (visual)?

12 CAUTION
Taking BRAKES OFF may result in unannounced motion of failed joint. Be ready to apply BRAKES if motion occurs

13 Taking BRAKES OFF may result in unannounced motion of failed joint. Be ready to apply BRAKES if motion occurs

14 Joint move (visual)?
If loaded and motion of failed joint could result in collision, MCC

CAUTION
Arm may have up to two ft of uncommanded motion if not captured to constrained payload

12 - 32
12
13
14
15
16
17
18
19
20
21
22
23

• MODE – SINGLE, ENTER (lt-on)
• SINGLE (DIRECT) DR – ‘+’ or ‘–’

Joint drive (visual)?

Joint sync failure

Direct and B/U drive modes remain. If wrist joint failed, EE MODE AUTO lost

• BRAKES – ON

• JOINT – failed one
• BRAKES – OFF

C/W CONTR ERR lt?

Joint moving (visual)?

Bra kes – ON

• JOINT ENC ODER FAILURE

Direct and B/U drive modes remain. Joint position data unreliable

Direct, and B/U drive modes remain. If wrist joint failed, EE MODE AUTO lost

Direct and B/U drive modes remain

• POS ENC CK INH – ITEM 12 EXEC

REACH LIMITs and SOFT STOPs annunciation not available for failed joint

Position hold function will not work for failed joint

No

Yes

Yes

Yes

No

12.1j (Cont)
For digital SPA failure, external flags can fail in pairs: CAP/EXTEND OPEN/RIG DERIG/CLOSE

Other CHECK CRT failures will be annunciated with MA and SM msg

Ground can determine which EE Auto functions remain

Full EE AUTO capability may be regained with an MCIU CHANGEOUT (IFM)

‘WR roll range value. Deselecting and reselecting RMS may cause WR roll range value to be incorrect

Additional alarms possible

Subsequent uncommanded release or derigidization will not be annunciated

Further captures may not be possible

Further EE captures planned?

When ready for P/L release, release in EE MODE – MAN. If reqd, use B/U EE RELEASE

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

If EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

If EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

If EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch
EEEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg.

15 Capture

• 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

16 EEEU BITE Ckt Failure OR Wr Digital SPA External Flag Ckt Failure

17 All EE modes remain

18 EE MTR Commutator Failure. EE Not Operational

19 EEEU Capture Failure OR EE Electrical Failure. EE Not Operational

20 (ABU) EE MODE – OFF
EEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg.
MCC may TMBU temp limits to prevent nuisance alarms
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.

Manual modes may be usable without failed axis.

Manual modes are usable with partial HC deflections for failed axis.

Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT
MCC can attempt to correlate jet activity with 'PDRS SLIP' msg or may recommend a joint drive test to ascertain brake health.

If:
BRAKES – ON and MODE – not DIRECT and joint angle motion > I LOADED VALUE

Nominal Config:
(A8U)
RMS SEL – PORT BRAKES – ON BRAKES tb – ON MODE – not DIRECT

1. DAP: FREE (A8U) BRAKES – OFF

2. Check CRT msg FAULT SUMM Page to determine slipped joint(s)

3. RMS unloaded?

4. LOW BRAKE TORQUE

5. BRAKE SLIPPAGE OR LOW BRAKE TORQUE

- WARNING
- Auto Brakes will not stop failed joint if low brake torque

6. (A8U)
- BRAKES – ON
- Remove BRAKES only if attitude control reqd

- WARNING
- MCC
12.1o C/W CHECK CRT LT – S94 PDRS WR R

1. MCC may be able to determine correct value

2. Msg may result because of RMS deselect and reselect, driving WR in B/U, or SM major function move to another GPC

3. WR WRR

   1. –360 to –450
   2. –180 to –360
   3. 0 to –180
   4. 0 to 180
   5. 180 to 360
   6. 360 to 450

4. (A8U)
   - JOINT – WR
   - MODE – DIRECT

5. SINGLE (DIRECT) DR – ‘–’ until motion stops (hard stop)
   - ITEM 26 +1 EXEC
   - Expect MA, REACH LIMIT lt and S/W STOP tb – bp

6. SINGLE (DIRECT) DR – ‘+’ to desired WR angle
   - Continue ops

If WR range does not agree with encoder quadrant

Nominal Config:

(A8L)
RMS PWR – PRI
SEL – PORT

If loaded, damage to RMS and/or PL could result if WR joint driven into hard stop. If loaded, √MCC

SM 94 PDRS CONTROL
- ITEM 26 + correct value (2–5) EXEC

Continue normal ops
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.
Driving failed joint in B/U will blow +28V BDA fuse for all joints. EVA may be reqd to cradle arm

Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

RMS limping will not exist during EE ops. Use EE MAN RELEASE for single joint ops

MCIU BITE verification test will apply brakes 1 sec after brake sw on

Failure will reannunciate with BRAKE sw transition from OFF to ON

RMS temperature monitor mode not available

Additional 'PDRS TEST BRK' and CHECK CRT lt on for 1 sec?

ABE lt and various other failure indications?

STBD PWR FLAG FAILED ON IN MCIU

MODE – not DIRECT

PORT PWR FLAG FAILED OFF IN MCIU

All joints drive?

DIRECT and B/U drive modes remain. MAN and B/U RELEASE EE modes remain. RMS in TEMP MONITOR mode. Only temp data displayed

BRAKES DRIVER OR AUTO BRAKES CIRCUIT FAILURE. BRAKES FAILED ON

DIRECT and B/U drive modes remain for five good joints. Failed joint cannot be driven

DIRECT and B/U drive modes remain

AUTO BRAKES DRIVE CIRCUIT OR BITE VERIFICATION CIRCUIT FAILURE

Continue ops in DIRECT mode or /C0112 MCC

STBD PWR FLAG FAILED ON IN MCIU

• BRAKES – OFF

All joints drive?

BRAKES – OFF?

NO

YES

• BRAKES – ON

MANUAL BRAKE DRIVE CIRCUIT FAILURE. AUTOBRAKES OK

• BRAKES – OFF

NO

YES

• BRAKES – ON

Additional 'PDRS TEST BRK' and CHECK CRT lt on for 1 sec?

NO

YES

CHECK CRT lt on?

NO

YES

RMS SEL – OFF

ABE lt and various other failure indications?

YES

NO

AUTO BRAKES DRIVE CIRCUIT OR BITE VERIFICATION CIRCUIT FAILURE

Continue ops in DIRECT mode or /C0112 MCC

30

• RMS SEL – PORT (MA & SM ALERT)

31

• Continue ops
1. Full capability will be restored with RMS MCIU CHANGEOUT (IFM).

2. Auto brakes available for subsequent loss of External Frame Sync due to SPA detected loss of Frame Sync.

PDRS

12.1q C/W CHECK CRT LT – S96 PDRS CKCRT FS

1. (A8U) • BRAKES – OFF

2. BRAKES – ON

3. EXTERNAL FRAME SYNC BITE CIRCUIT FAILURE

4. EXTERNAL FRAME SYNC BITE VERIFICATION TEST CIRCUIT FAILURE

5. BRAKES – ON
   Direct and B/U drive modes remain

6. Continue ops

If:
MCIU External Frame Sync BITE or BITE Verification Test Circuit failure

RMS MSTR ALARM

CHECK CRT LT
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.

5. EE MAN mode remains. EE AUTO release remains.

6. MECHANICAL FAILURE. EE NOT OPERATIONAL.

7. EE MODE – MAN
   EE MAN CONTR – RIGID, until EXTEND tb – gray (25 sec max)
   EE CAPTURE sw – depress, until CLOSE tb – gray (3 sec max)
   EE MODE – OFF

8. Close tb – gray?

9. DEGRADED CAPTURE BRAKE

10. When derigidizing, uncommanded release alarm possible.
If: Uncommanded release warning

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

12.1s C/W RELEASE LT – PDRS REL (CUE CARD EXECUTED)

If:

1. BRAKES – ON
   EE MODE – OFF
   Was payload released?

   YES

   2. MECHANICAL FAILURE OR DEGRADED CAPTURE BRAKE

   NO

   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

10/16/01
12.1t C/W DERIGIDIZE LT – PDRS DERIG

- DERIGIDIZE (A8U)
- RMS MSTR ALARM
- SM PDRS DERIG (CRT)

If: Uncommanded derigidize warning

Nominal Config:
DAP: VRCS or FREE

1. DERIGID tb used because MSW failure affects RIGID tb
2. RIGID CMD will reset C/W DERIGIDIZE
3. Additional DERIG alarms possible

12.1b 1

1. EE MODE – OFF
   EE checkout?
   YES → 12
   NO → 2

2. Rerigidize in manual
   • DAP: FREE (A8U)
   • EE MODE – MAN
   • EE MAN CONTR – RIGID (hold until DERIGID tb–bp, +5 sec or 25 sec max)
   • EE MODE – OFF

3. (A8U) EE DERIGID tb – bp?
   NO → 10
   YES → 4

4. EE RIGID tb – gray?
   YES → 5 RIGIDIZE BRAKE FAILURE
   NO → 7

5. (RMS RHC)
   • RATE – VERN
   • DAP: FREE, until PL released

6. RIGIDIZE LT – PDRS DERIG

CAUTION
Payload may derigidize during RMS motion
Further uncommanded derigidizations will not be annunciated.

RMS loaded rates can be set via SM 95 PDRS OVERRIDE after next payload capture.

For digital SPA failure, OPEN flag may be failed OFF.

RMS loaded rates can be set via SM 95 PDRS OVERRIDE.

On MCC call: 
EE/GF interface 
(RMS RHG) 
• RATE – VERN 
(ABU) 
• BRAKES – OFF 
(tb-OFF) 
• MODE – END 
EFF, ENTER 
Try to back EE 
off of GF several 
inches 
• BRAKES – ON 
EE/GF interface separates or 
EE DERIGID 
tb – gray? 

EE RIGID MICROSW OR 
DIGITAL SPA 
EXTERNAL FLAG 
Ckt FAILURE, 
FALSE C/W 
DERIGIDIZE 
ALARM 

EE MAN mode 
remains. AUTO 
RELEASE remains 
for MSW failure. 
AUTO CAPTURE 
remains but mtr will 
drive until EE 
MODE – OFF 

EE not 
operational 

EE RIGID 
DRIVE FAILED 
MECHANICALLY 
FREE 

RIGIDIZE 

DRIVE FAILED 
MECHANICALLY 
FREE

EE MAN mode 
remains. AUTO 
RELEASE remains 
for MSW failure. 
AUTO CAPTURE 
available but mtr will 
continue to drive 
until EE MODE – 
OFF

EE not 
operational

EE MODE – MAN 
EE MODE – OFF 

EE MAN mode 
remains. AUTO 
RELEASE remains 
for MSW failure. 
AUTO CAPTURE 
available but mtr will 
continue to drive 
until EE MODE – 
OFF

At time of 
failure: 
EE MODE – MAN 
EE MODE – OFF 

RIGID MSW 
OR DIGITAL SPA 
EXTERNAL FLAG 
FAILURE

10/01/98  12–46  MAL/ALL/GEN F
4 Further uncommanded derigidizations will not be annunciated
6 For digital SPA failure, OPEN flag may be failed OFF
7 RMS loaded rates can be set via SM 95 PDRS OVERRIDE
8 MCC can see 10V contact and determine if limping available for manual rigidization

15 Visual verification of derigid contact short
- EE MODE – MAN
- EE MAN CONTR – RIGID, until RIGID tb – gray
  (5 sec after DERIGID tb–bp, 25 sec max)
- EE MODE – OFF

Did carriage rigidize (visually) ?
YES

NO

16 EE MAN CONTR SW FAILURE. EE MANUAL MODE LOST

17 EE AUTO mode and B/U RELEASE remains

18 RIGID tb – gray ?
YES

NO

19 RIGID MSW FAILURE OR DIGITAL SPA EXTERNAL FLAG CKT FAILURE

20 EE MAN mode remains. AUTO RELEASE remains for MSW failure.
AUTO Capture available, but mtr will continue to drive until EE MODE – OFF

21 EE MAN CONTR SW 10V CONTACT FAILURE

22 EE AUTO mode remains. EE MAN mode available with false uncommanded DERIGID C/W.
Limping may not be available for manual rigidization
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. For digital SPA failure, OPEN flag may be failed off
12.1v C/W PORT TEMP LT – PDRS TEMP PORT

1. (A8U)
   • BRAKES – ON
   • PARAM SEL – PORT TEMP
   • JOINT – CRIT TEMP

2. TEMP ≤ LOW temp alarm limits
   2.1. Other temperatures
   2.2. TEMP > HIGH temp alarm limits

3. HOT THERMAL ENVIRONMENT

4. TRANSIENT FAILURE

5. Both Htrs A and B ON ?
   5.1. Yes
   5.2. No

6. (A8L)
   • PORT HTR A – OFF
   • PORT HTR B(A) – AUTO

7. Joint temps are within limits. Continue ops. Further alarms possible

8. Select alternate htr
   8.1. (A8L)
   8.2. PORT HTR A(B) – OFF
   8.3. PORT HTR B(A) – AUTO

9. (A8U)
   • JOINT – CRIT TEMP
   • Does joint temp decr after 5 min ?
   9.1. Yes
   9.2. No

10. Loaded arm ?
    10.1. Yes
    10.2. No

11. MCC, Reposition of orbiter/arm to cooler attitude may be reqd
    11.1. (A8L)
    11.2. PORT HTR A – ON
    11.3. PORT HTR B – OFF

12. (A8L)
    • Cradle arm ASAP
    • Go to RMS POWERDN (PDRS OPS)
HIGH temp alarm limits:
LED = 172
ABE (SPA) = 106
ABE (EE) = 144
LOW temp alarm limits:
LED = 0
ABE (ALL) = 0

SP ABE and SY ABE represent single temp reading. WP ABE and WY ABE represent single temp reading

MCC may TMBU temp limits to prevent nuisance alarms

Arm qual temp high limits:
LED = 202
ABE = (SPA) = 136
ABE (EE) = 176
Arm qual temp low limits:
LED = –10
ABE = –10

Joint drive test will be reqd if qual limits exceeded. If qual limits exceeded, √MCC
12.2a MSTR ALARM ON, BUT C/W LT(S) OFF

1. (A8U) BRAKES – ON
   MSTR ALARM pb – off
   MSTR ALARM it and tone – off?

2. MSTR ALARM FAILED ON

3. Continue without any further MSTR ALARM cues
   C/W TONE VOL – full ccw

4. (A8U)
   PARAM sel – TEST (30 sec max)
   All RMS C/W Its – on?

5. Only one C/W It off?

6. C/W ANNUN LT FAILURE

7. Select alternate lighting function
   (A8U)
   LTS ANNUN/NUM – BRT (VAR)
   PARAM sel – TEST (30 sec max)
   All RMS C/W Its – on?

8. Go to appropriate MAL for failure

9. LIGHTING CKT OR AC PWR PNL FAILURE

10. BRT/VAR SW CKT FAILURE

11. FAULT
    Go to appropriate MAL for msg

12. FAULT
    PDRS TEST BRK?

13. Any other RMS faults?

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
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

BRAKES – ON BUT BRAKES tb – OFF

1. (A8U) BRAKES – ON
   • MODE – SINGLE, ENTER
   SINGLE tb – on?

2. BRAKES tb CKT FAILURE; BRAKES OK
   • Continue without BRAKES tb

3. BRAKES SW FAILURE. LOSS OF BRAKES AND DIRECT MODE. AUTO BRAKES FOR RUNAWAYS OK

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

6. All computer supported modes and B/U available

Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT
(A8U)
BRAKES – ON

09/18/00
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.

Nominal Config:
(A8L)
RMS SEL – PORT
PWR – PRI

12.2c BRAKES – OFF, BUT BRAKES tb – ON

12.4a 3
12.4b 3
12.4c 3

NO
SINGLE lt – on ?

YES

1
(ABU)
- BRakes – OFF
- MODE – SINGLE, ENTER

2 SAFING tb – bp ?

3 RMS PWR SW CONTACT, RMS SEL SW, MNA MPC1, OR ABE PWR FLAG FUSE FAILED

4 BRAKES tb FAILURE

5 BRAKES SW FAILURE, BRAKES FAILED ON

6 B/U drive mode and B/U RELEASE EE mode may remain

7 Continue without BRAKES tb

8 DIRECT and B/U drive modes remain

BRAKES tb

BRAKES FAILED ON

12.2d 4

11

2 3

4

NO

YES

12.2c BRAKES – OFF, BUT BRAKES tb – ON

1 For RMS pwr sw failure, all ABE data lost. For all other failures, only arm temp data remains.

2 Ground can determine if RMS pwr sw is failed.

3 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.

4 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).

5 RMS limping will not exist during EE ops. Use EE MAN release for single joint ops.
SM 95 ITEM 35 SAFING CAN override is a toggle. If left in place it will override a D&C panel safing command.

MCIU SAFING circuit still operational.

Nominal Config:
- (ABL)
  - RMS PWR – PRI
  - RMS SEL – PORT
- All RMS C/W lts – Off
- MASTER ALARM – Off
- No CRT SM Msgs
- No SM ALERT

1. SAFING – AUTO and SAFING tb – bp
2. SAFING SW 28V CONTACT FAILED OPEN
3. Continue without SAFING tb
4. BRACKES – OFF?
5. MODE – SINGLE, ENTER
6. SINGLE lt – on?
7. If captured to constrained payload or if captured payload near structure, MCC
8. SAFING CAN – ITEM 35 EXEC
9. SAFING SW FAILED TO SAFE
10. SAFING SW 10V POLE FAILED
11. Continue ops with override in place
12. Continue ops with override in place
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.

DIRECT drive, and 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.

Is payload captured?

YES

SAFING SW, SAFING tb, K1, OR K6 RELAY CIRCUIT FAILURE

All drive modes remain. For K1 relay failure, EE RIGID/DERIG function lost

LOSS OF 28V PWR FILTER IN D&C PNL

Computer Supported and B/U drive modes remain. EE man mode lost

MCC for use of RMS IFM D&C KIT

NO

EXTEND tb – bp?

YES

SAFING SW, SAFING tb, K1 CONTACT, OR K6 RELAY FAILURE

All drive modes remain. EE OK

MCC for use of RMS IFM D&C KIT

NO

K1 RELAY FAILURE. EE RIGID AND DERIGID LOST

All drive modes remain

MCC for use of RMS IFM D&C KIT
12.2g SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF

1. (ABU) • BRAKES – ON
   • PARAM SEL – TEST (30 sec max)
   Selected mode
   lt – off
   All lights – off
   Other

2. MODE LT OR MODULE GROUP FAILURE

3. • Continue w/o mode lt

4. LIGHTING CKT OR AC PWR PNL FAILURE

5. • Continue w/o lighting and digits

6. Selected mode DIRECT ?
   NO

7. • If captured to constrained payload or if captured payload near structure, √ MCC

8. • BRAKES – ON
   • JOINT – any
   • SINGLE (DIRECT) DR – ‘+’ or ‘–’
   • MODE – not DIRECT
   Did joint drive ?
   NO
   YES

9. SM 95 PDRS OVERRIDE
   • Rotate Mode switch through its range and √ for ‘*’ in SEL column (ITEMS 2 through 12)
   Any ‘*’ missing or multiple ‘*’ present ?
   NO
   YES

10. MODE SWITCH FAILURE

11. • USE SM 95, ITEMS 1, then 2 through 12, then 13 to work around failed switch

12. (ABU) • BRAKES – OFF
    • MODE – Desired mode, ENTER
    ‘*’ under IND column for desired mode ?
    NO
    YES

13. D&C PANEL ANNUNCIATOR CIRCUIT FAILURE

14. • Use SM 95 for failed indication

15. ENTER SWITCH FAILED OR MODE ENTRY CONDITIONS NOT SATISFIED
    (BRAKES FAILED ON, SINGLE/DD SWITCH FAILED OUT OF DETENT, PROCEED/STOP SWITCH FAILED OUT OF DETENT, OR HC FAILED OUT OF DEADBAND)

16. • √ MCC

Nominal Config:
(MA73C:F)
cb AC1 RMS
PRI øA – cl (ABU)
SAFING tb – GRAY if mode not DIRECT
S/W tb – GRAY if mode not DIRECT or SINGLE (ABL)
RMS PWR – PRI SEL – PORT

If DIRECT:
BRAKES – ON
BRAKES tb – ON

Mode indications can be read using SM 95 PDRS OVERRIDE
Joint Angles can be read using SM 169 PDRS STATUS
May receive CK CRT lt and DIRECT DRIVE BITE ‘↓’ for one or more joints
SM 95 PDRS OVERRIDE available to work around ENTER pb, SINGLE/DD SW or PROCEED/STOP SW. Deflecting HCs may regain manual modes

11/08/01
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 brake sw failure, auto brakes can be removed via SM 94 PDRS CONTROL, ITEM 6, ITEM 5, and SAFING – CANCEL

8

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
   • BRAKES – OFF

20 MODE SWITCH 10V CONTACT OR POLE, OR DIRECT MODE LIGHT DRIVER FAILED

21 BRAKE SWITCH 10V POLE FAILURE

22 Continue w/o DIRECT It
EFFECTOR END

12.3

MAL/ALL/GEN F

12–59

PDRS

12.2h SHLDR BRACE REL tb – bp AFTER CMD

1 (ABU)
• PARAM sel – TEST

1. All A8 lts on ?

2
• Perform RMS POWERUP, steps 1–6 (PDRS OPS)

3
• Perform RMS POWERUP, step 7 (PDRS OPS). Drive SP in DIRECT. Limit SP commanding to 2 sec, then stop

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
• MCC

Nominal Config:
(MA73C:F)

cb AC1 RMS PRI φA – cl (ABL)
RMS PWR – PRI SEL – PORT

SM 94 PDRS
CONTROL
I/O ON – ITEM 5(*)

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

10/26/00
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, DERIG flag may be failed on.

Limping will not occur in EE Manual for Auto Capture contact failure.

RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS D&C IFM KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.

---

**Nominal Config:**

DAP: VERN(FREE)

SAFING tb – gray

**12.3a EE FAILS TO CAPTURE/RIGIDIZE IN AUTO**

1. Which condition:
   - PL constrained
   - EE checkout

2. SM 169 PDRS STATUS
   - END EFFECTOR CLOSE 1?
     - YES
     - NO

3. CLOSE tb FAILURE

4. Continue ops

5. CCTV view
   - EE SNARES fully closed?
     - YES
     - NO

6. CLOSE MSW OR DIGITAL SPA EXTERNAL FLAG FAILURE, LOSS OF AUTO CAPTURE

7. EE MAN mode remains. AUTO RELEASE remains for MSW failure

8. (ABU)
   - EE MODE – MAN
   - EE CAPTURE – depress until CLOSE tb – gray
     - (3 sec max)
   - EE MODE – OFF

9. EE MODE SW, AUTO CAPTURE CONTACT FAILURE

10. EE Manual mode remains. Auto Release may remain
    - EE MODE – AUTO
    - EE RELEASE – depress (MOM)
    - After 3 sec, EE MODE – OFF
    - If CLOSE tb – gray, EE MODE – MAN, then EE RELEASE – depress until OPEN tb – gray
      - (3 sec max), then EE MODE – OFF

11. Joint drive properly?
    - YES
    - NO

12. EE MODE SW, K2 CONTACT, RHC CAPTURE SW, EEEU, SNARE DR, MTR, COMM SCANNER, OR MEGH FAILURE. EE NOT OPERATIONAL

13. MCC for possible IFM

14. K2 RELAY FAILURE, EE CAP/REL AND DIRECT MODE LOST

15. MCC for possible IFM
Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE.

For digital SPA failure, EXTEND flag may be failed OFF causing motor to continue to drive until EE MODE – OFF.

For digital SPA failure, DERIG flag may be failed ON.

PL is at least partially rigidized. Do not derigidize. May be unable to rerigidize.

EE AUTO RELEASE may remain. EE MAN mode remains.
- When release reqd, perform in MAN.
- After PL RELEASE, MCC for AUTO RELEASE check.

EE AUTO RELEASE remains. AUTO RELEASE remains for MSW failure.
17

32 MANUAL RELEASE
• EE MODE – MAN
• EE RELEASE sw – depress (3 sec max)
• EE MODE – OFF

OPEN tb – gray ?

33 RIGID tb FAILURE

34 Continue ops

41 EE MODE SW, EEEU, K1 CONTACT, OR RIGIDIZE DRIVE FAILURE. EE RIGIDIZE/DERIGIDIZE LOST

42 MCC for possible IFM

43 EEEU FAILURE. EE RIGIDIZE DRIVE LOST

44 MCC

31 DIGITAL SPA, EXTERNAL FLAG CKT, RIGID MSW, K1 CONTACT, EE MODE SW, MTR COMM SCANNER, EEEU OR MECHANICAL FAILURE. LOSS OF END EFFECTOR, OR LOSS OF UNCOMMANDED DERIGIDIZE C/W FOR RIGID MSW FAILURE

30 SM 169 PDRS STATUS

END EFFECTOR RIGID 1 ?

1  For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb

4 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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 KI

5 Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE

8 For digital SPA failure, OPEN flag may be failed OFF

17

32 MANUAL RELEASE
• EE MODE – MAN
• EE RELEASE sw – depress (3 sec max)
• EE MODE – OFF

OPEN tb – gray ?

36 MTR, COMM SCAN, EE MODE SW, EEEU, OR MECHANICAL FAILURE. EE NOT OPERATIONAL

37 EXTEND tb – bp ?

38 EE MODE SW, EEEU, RIGIDIZE DRIVE, OR K1 CONTACT FAILURE. EE RIGIDIZE LOST, DERIGIDIZE MAY BE LOST

35 MCC for possible IFM

39 • EE MODE – MAN
• EE MAN CONTR – DERIGID, until EXTEND tb – gray (20 sec max)
• EE MODE – OFF

EXTEND tb – gray ?

40 B/U RELEASE remains

• “MCC for possible IFM

41 EE MODE SW, EEEU, K1 CONTACT, OR RIGIDIZE DRIVE FAILURE. EE RIGIDIZE/DERIGIDIZE LOST

42 MCC for possible IFM

43 EEEU FAILURE. EE RIGIDIZE DRIVE LOST

44 MCC

4 4 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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 KI

5 Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE

8 For digital SPA failure, OPEN flag may be failed OFF

10/17/01
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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.
EE Fails to Derigidize or Release in AUTO

Nominal Config:
DAP: VERN(FREE) (A8U)
SAFING tb – gray

1
(A8U)
• EE MODE – OFF

2 Which condition exists:
RIGID tb – gray  ➔  3
RIGID tb – bp and DERIGID tb – bp  ➔  14
DERIGID tb – gray and OPEN tb – bp  ➔  25
OPEN tb – gray and EXTEND tb – bp  ➔  15

12.3b EE FAILS TO RELEASE/DERIGIDIZE IN AUTO
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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.

Limping will not occur in EE MANUAL for AUTO CAPTURE contact failure.
For digital SPA failure CAPTURE flag may be failed OFF.
1. For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb.

2. For digital SPA failure, DERIG flag may be failed ON.

3. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/ release 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:
DAP: VERN(FREE) (A8U) SAFING tb – gray

EE Fails To Close in EE Mode – Man

EE Fail To Close in EE Mode – Man

1 (A8U)
• EE MODE – OFF
• BRAKES – ON
EE snares fully closed (visually) ?

YES
2 SM 169 PDRS STATUS
END EFFECTOR CLOSE 1 ?

NO

YES
3 CLOSE tb
FAILURE

2

4 CLOSE MSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE, AUTO CAPTURE LOST

5 Continue ops

6 EE MODE – AUTO
EE CAPTURE sw – depress (mom)
Wait 3 sec
EE MODE – OFF
EE CLOSE tb – gray ?

YES
7 EE MAN mode remains. AUTO RELEASE remains for MSW failure

NO

6

8 EE MODE SW, D&C ZENER DIODE, EE MAN CONTR SW SHORT, OR CAPTURE SW CONTACT FAILURE, LOSS OF EE MAN CLOSE CAPABILITY

NO

10

9 EE AUTO mode remains. MAN REL/RIGID/DERIGID may remain

Joint drive properly ?

YES

11 K2 RELAY FAILURE, EE CAP/REL AND DIRECT DRIVE MODE LOST

NO

13 EE MODE SW, K2 CONTACT, RHC CAP SW, EEEU, MTR, COMM SCANNER, OR MECH FAILURE, EE NOT OPERATIONAL

14 ✓ MCC for possible IFM

10/22/01

12–68

MAL/ALL/GEN F
For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE.

RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT).

For digital SPA failure, OPEN flag may be failed OFF causing motor to continue driving snares open during AUTO REL until EE MODE – OFF.

Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE.

Nominal Config:
- DAP: VERN (FREE)
- SAFING tb – gray
- EXTEND tb – gray
- EE MODE, EE MAN CONTR SW, K1 CONTACT, MTR, EEEU, COMM SCAN, D&C ZENER DIODE, MECHANICAL OR RIG DRIVE FAILURE.

EE Failed to Rigidize in Manual (Rigid tb–bp)
- • EE MODE – MAN
- • EE MAN CONTR – DERIG (until DERIGID tb–gray 5 sec max)

RIGIDMSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE.

EE MAN RIGIDIZE CAPABILITY LOST
- • EE MAN CONTR SW CONTACT, OR EEEU FAILURE.

EE may not operate in AUTO mode.
- • /C0112 MCC for possible IFM.
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release 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.
12.3e EE Fails to Release in EE Mode – MAN

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, RHC capture/release 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:
DAP: VERN(FREE) (ABU)
SAFING tb – gray

1. For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb.

2. 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.

3. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release 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 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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

10

13

SM 94 PDRS CONTROL

• Record WR R ________

(A8L)

• RMS SEL – OFF
• RMS PWR – B/U (Expect SM ALERT and BCE BYP MCU)

• RMS SEL – PORT

(A8U)

• B/U PL REL – ON
• Wait 10 sec
• B/U PL REL – OFF

(A8L)

• RMS SEL – OFF
• RMS PWR – PRI (MA)

(CRT)

• I/O ON – ITEM 5 EXEC (*)

(A8L)

• RMS SEL – PORT

(A8U)

• SAFING – CANCEL

(CRT)

• If WR R different, ITEM 26 + (recorded value) EXEC

EE OPEN tb – gray ?

YES

14

• EE MODE – MAN
• EE CAPTURE sw – depress (hold 3 sec max)
• EE MODE – OFF

CLOSE tb – gray ?

NO

15

SNARE DRIVE MECHANICAL FAILURE. EE NOT OPERATIONAL

YES

17

EEEU FAILURE. EE AUTO/MAN RELEASE LOST

18

EE AUTO/MAN modes for CAPTURE/RIGID/DERIGID remain and EE B/U for RELEASE remains

NO

16

CAP/REL SW, EE MODE SW, EEEU, K2 CONTACT, OR PRIMARY SNARE DRIVE MECH FAILURE. EE NOT OPERATIONAL

CLOSE tb – gray ?

NO

19

MCC for possible IFM
12.3f  EE FAILS TO DERIGIDIZE/EXTEND IN MANUAL

Nominal Config:
EE MODE – MAN
DAP: VERN(FREE) (ABU)
SAFING tb – gray

1. If reqd, mnvr RMS to view inside EE
   EE DERIGIDIZE tb – gray ?
   YES 2  Carriage extended (visually) ?
   NO

2. Carriage extended (visually) ?
   YES 17
   NO

3. EE MODE – MAN
   EE MAN CONTR – DERIGID (3 sec)
   EE MODE – OFF
   Did carriage move (visually) ?
   YES
   NO

4. EE MODE – AUTO
   EE RELEASE sw – depress (mom)
   • Wait 28 sec or
   • until EXTEND tb – gray
   • EE MODE – OFF

5. SM 169 PDRS STATUS
   END EFFECTOR DERIG 1 ?
   YES 14
   NO

6. EE MODE SW, MTR, COMM SCANNER, EEEU, K1 CONTACT, OR MECHANICAL FAILURE, EE NOT OPERATIONAL
   YES
   NO

7. DERIGID MSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE, EE AUTO RELEASE LOST
     YES
     NO

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
     YES
     NO

11. EE MAN CONTR SW OR D&C DIODE FAILURE. EE MAN DERIG LOST
     YES
     NO

12. EE MAN CONTR SW, EE MODE SW, D&C DIODE FAILURE. EE MANUAL MODE LOST
     YES
     NO

13. EE AUTO remains. MAN CAPTURE/RELEASE modes may remain

14. DERIG tb FAILURE

15. AUTO mode remains

16. Continue ops

1  For digital SPA failure, CLOSE flag may be failed ON
2  RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/ release 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 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.
1. Assumes PL about to be released
2. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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

12.3g EE tb ABNORMAL WHILE NO EE CMDS (EE MODE – AUTO OR MAN)

**Nominal Config:**
DAP: VERN(FREE)

**EE tb Abnormal While No EE Commands**

1. Arm loaded?
   - YES
     2. EE checkout
     - Other
     5. EE CAP/REL SW FAILURE, MAN/AUTO REL AND DERIGIDIZE LOST
   - NO

- **EE checkouts**
  1. BRAKES – ON
  2. EE MODE – OFF

3. EE MAN CONTR FAILURE. EE MAN MODE LOST
   - NO
   4. EE AUTO mode remains
   - YES
   5. At time of failure:
     - EE MODE – AUTO
     - EE MODE – MAN

6. EXTEND tb – bp
   - CLOSE tb – gray
   - OPEN tb – bp
   - Other

7. DERIG tb – bp?
   - YES
   12.3h 11
   8. EE MAN CONTR SW FAILURE. EE MAN MODE LOST
   - NO

9. EE MODE – AUTO
   - EE REL sw – depress (mom)
   - Wait 3 sec
   - EE MODE – OFF
   - OPEN tb – gray?
     - YES
     - NO

10. EE AUTO mode remains

11. EE MAN CAPTURE CONTACT FAILURE. EE MAN MODE LOST

12.EE CAP/REL SW FAILURE, MAN/AUTO REL AND DERIGIDIZE LOST

13. B/U RELEASE remains. EE AUTO CAPTURE remains using EE mode sw to initiate. One capture remains

14. EE AUTO mode remains

15. Other
MAL/ALL/GEN F

12–76

PDRS 12.3g (Cont)

15 Multiple tbs abnormal?

YES

16

• Check for uncommanded ops

OPEN tb – gray and
CLOSE tb – bp

OPEN tb – bp and
CLOSE tb – gray

17

• EE MODE – MAN
• EE CAP sw – depress (3 sec max)
• EE MODE – OFF

CLOSE tb – gray?

YES

18 EE AUTO RELEASE CONTACT FAILURE. EE AUTO MODE LOST

NO

19 EE CAP/REL
SW FAILURE. EE NOT OPERATIONAL

20 EE AUTO
RELEASE remains, using EE MODE sw to initiate sequence. EE MAN mode remains

12.3h

21

• EE MODE – MAN
• EE REL sw – depress (3 sec max)
• EE MODE – OFF

OPEN tb – gray?

YES

22

• MCC for possible IFM

23 EE AUTO
CAP CONTACT FAILURE. EE AUTO REL LOST

NO

24 EE AUTO
CAPTURE remains, using EE mode sw to initiate. B/U RELEASE remains. One CAPTURE remains if carriage extended

25 EE CAPTURE/RELEASE SW SHORT BOTH POLES. EE MAN/AUTO REL LOST

26 EE AUTO
CAPTURE remains, using EE mode sw to initiate. B/U RELEASE remains. One CAPTURE remains if carriage extended

27

• MCC for possible IFM

2 RMS IFM D&C Kit available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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 RMS limping will occur whenever EE MODE sw is not in OFF position and RMS is in computer supported mode
1 For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb

2 Subsequent slipping may occur

Nominal Config:
DAP: VERN(FREE)

1 Is arm loaded?

2 EE CLOSE tb – bp?

3 OPEN, CAP, RIGID, DERIG, OR EXTEND tb FAILURE

4 (ABU)
• EE MODE – MAN
• EE CAP sw – depress (3 sec max)
• EE MODE – OFF

EE CLOSE tb – gray?

5 SNARE BRAKE SLIP

6 SM 169 PDRS STATUS

END EFFECtor CLOSE 1?

7 CLOSE tb FAILURE

8 CLOSE MSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE. EE AUTO CAPTURE LOST

9 Continue ops

10 AUTO RELEASE remains
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 sent via SM 95 PDRS OVERRIDE.

For digital SPA failure, CAPTURE flag may be failed OFF.
1. Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE.
2. For digital SPA failure, OPEN flag may be failed off.
3. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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. Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE.
5. For digital SPA failure, EXTEND flag may be failed off causing motor to continue to drive until EE MODE – OFF during AUTO RELEASE.

Nominal Config: SAFING tb – gray

1. Is payload snared? YES

2. EE NOT OPERATIONAL

3. MCC for possible IFM or EVA retrieve

4. EE RIGID tb – gray? YES

5. EE DERIGID tb – bp? NO

6. DIGITAL SPA EXTERNAL FLAG CKT, RIGID MSW, K1 CONTACT, EE MODE SW, MTR MODULE, EEEU OR MECHANICAL FAILURE

7. K1, EE MODE SW, COMM SCANNER, EEEU, MECHANICAL FAILURE

8. EE rigidize drive lost

9. Loss of EE or loss of UNCOMMANDED DERIGID C/W for RIGID msw failure
   Stay free drift
   Continue ops
   EE may be partially rigidized
   MCC for EE C/O or possible IFM after payload released

10. EE CAPTURE tb – gray? NO

11. CAPTURE SIGNAL CONDITIONER OR DIGITAL SPA EXTERNAL FLAG FAILED

12. Loss of AUTO CAPTURE UNCOMMANDED RELEASE C/W lost

13. EE CLOSE tb – gray? YES

14. CLOSE MSW CKT FAILED

15. Loss of AUTO CAPTURE AUTO RELEASE remains for msw failure

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, MCC for AUTO RELEASE check
1 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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 For digital SPA, CLOSE flag may be failed ON.

Nominal Config:
SAFING tb – gray

EE Fails to Derigidize or Release in AUTO

1. Is payload released?

2. RIGID tb – gray?

3. EEEU, MTR MODULE, K1 RELAY, EE MODE SW, OR MECHANICAL FAILURE

4. Was payload released in B/U?

5. DAP: FREE
EE MODE – MAN
EE MAN CNTR – DERIGID (until DERIGID tb–gray, 5 sec max)
EE MODE – OFF

6. Loss of EE RIGIDIZE/DERIGIDIZE, CAPTURE/RELEASE may be lost

7. Stay free drift
√ MCC for possible IFM

8. DERIGID tb – gray?

9. • EE MODE – MAN
• EE MAN CONTR – DERIGID (until EXTEND tb–gray, 25 sec max)
• EE MODE – OFF

10. DERIGID MSW OR DIGITAL SPA EXTERNAL FLAGS CKT FAILURE

11. EE AUTO MODE lost. EE AUTO CAPTURE remains for msw failure. PDRS CK CRT lt when EE goes to EXTEND due to microsw miscompare

12. EEEU, EE MODE SW, K1 RELAY, OR MECHANICAL FAILURE. LOSS OF RIGIDIZE/DERIGIDIZE

13. • EE MODE – MAN
• EE MAN CONTR – RIGID (until RIGID tb–gray, 25 sec max)
• EE MODE – OFF
• DAP: as reqd

14. √ MCC for possible IFM

15. DERIGID tb – gray?

16. EE MODE SW OR AUTO RELEASE SW CONTACT FAILURE

17. EE AUTO RELEASE lost. AUTO CAPTURE may remain

18. DERIGID MSW OR DIGITAL SPA EXTERNAL FLAGS CKT FAILURE

19. EE AUTO RELEASE lost. AUTO CAPTURE remains for msw failure

PDRS 12.3j NO AUTO RELEASE (CUE CARD EXECUTED)
RMS IFM D&C Kit available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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, RHC Capture/Release 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.

20 (ABL)
- RMS SEL – OFF
- RMS PWR – PRI (MA)

SM 94 PDRS CONTROL
- I/O ON – ITEM 5 EXEC (*)

ABL
- RMS SEL – PORT

ABU
- SAFING – CANCEL

21 Reconfig EE
SM 94 PDRS CONTROL
- Record WR R

ABL
- RMS SEL – OFF
- RMS PWR – B/U (Expect SM ALERT and BCE BYP MCIU)
- RMS SEL – PORT

ABU
- B/U PL REL – ON
- Wait 10 sec
- B/U PL REL – OFF

ABU
- RMS SEL – OFF
- RMS PWR – PRI (MA)

22 EE MODE – MAN
- EE MAN CONTR – RIGID (until RIGID tb–gray, 25 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 ?

YES

K2 FAILURE

24
- K2, CAPTURE/RELEASE SW, EEEU, EE MODE
SW, OR MECHANICAL FAILURE

NO

25 K2 FAILURE

26 EE AUTO RELEASE lost. MAN RELEASE may remain. AUTO and MAN CAPTURE may remain

- /C0112 MCC for possible IFM

27
- EE MODE – MAN
- EE MAN CONTR – DERIGID (until EXTEND tb–gray, 25 sec max)
- EE MODE – OFF

EXTEND tb – gray ?

NO

YES

28 EEEU, MTR MODULE, K2, MECHANICAL FAILURE, CAP/REL SW TOTAL FAILURE, EE MODE SW

29 EE CAPTURE/RELEASE and DIRECT DRIVE lost
- /C0112 MCC for possible IFM

30 MTR MODULE, EEEU, MECHANICAL, EE MODE SW, OR K1 CONTACT FAILURE

31
- EE MODE – MAN
- EE MAN CAPTURE sw – depress (until CLOSE tb–gray, 3 sec max)
- EE MODE – OFF

CLOSE tb – gray ?

NO

YES

32 K2, CAP SW, MECHANICAL, EEEU OR EE MODE SW FAILURE

33 EE CAPTURE/RELEASE lost
- /C0112 MCC for possible IFM

34 EE not operational
- DAP: as reqd
- /C0112 MCC for possible IFM

35 EEEU FAILURE

36 EE AUTO/MAN RELEASE lost

21
12.3k NO MANUAL RELEASE (CUE CARD EXECUTED)

1. Is payload released?
   - YES
   - NO

2. RIGID tb – gray?
   - YES
   - NO

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?
   - YES
   - NO

10. (ABL)
    - RMS SEL – OFF
    - RMS PWR – PRI

11. K2 RELAY EEEU, EE MODE SW OR MECHANICAL FAILURE

12. EE MODE SW, OR D&C ZENER DIODE, OR RELEASE SW MANUAL CONTACT FAILURE

13. SM 94 PDRS CONTROL
    - I/O ON – ITEM 5 EXEC (*)

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, MTR MODULE, OR MECHANICAL FAILURE

17. EXTEND tb – gray?
   - YES
   - NO

18. EE MODE – MAN
    - MAN MODE lost

19. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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.
12.31 NO MANUAL DERIGID (CUE CARD EXECUTED)

1. Is payload released?
   - NO
   - YES

2. RIGID tb – gray?
   - NO
   - YES

3. • DAP: FREE
   • EE MODE – MAN
   • EE MAN CNTR – DERIGID (2 sec)
   • EE MODE – OFF
   RIGID tb – bp?
   - NO
   - YES

4. EEEU, EE MODE SW, K1, MTR MODULE, OR MECHANICAL FAILURE

5. EE RIGIDIZE/ DERIGIDIZE lost

6. GO for release?
   - NO
   - YES

7. EEEU, D&C ZENER DIODE, K1, 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)

10. SM 94 PDRS CONTROL
    - I/O ON – ITEM 5 EXEC (*)

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. • ABL
   - RMS SEL – PORT

14. • ABL
   - SAFING – CANCEL

15. DERIGID tb – gray?
   - YES
   - NO

16. • EE AUTO RELEASE lost. EE AUTO CAPTURE remains for msw failure. PDRS CK CTR EE and CK CTR it when EE goes to EXTEND due to msw miscompare

17. DERIGID tb – bp?
   - NO
   - YES

18. GO for release?
   - NO
   - YES

Nominal Config:
SAFING tb – gray

1 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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 For digital SPA, CLOSE flag may be failed ON
RMS OPS

12.3I (Cont)

17 DERIGID MSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE

18 EE MODE – AUTO
   RELEASE sw – depress (mom)
   When OPEN tb – gray (8 sec max), EE MODE – OFF
   Mnvr RMS off PL

20 K1, EE MODE SW, EEEU, COMM SCANNER, MTR OR MECHANICAL FAILURE

21 EE DERIGIDIZE DRIVE lost, RECAPTURE lost. MAN RELEASE may remain
   • MCC for possible IFM

22 DERIGIDIZER DIODE, EE MODE SW, EE MAN CONTR SW FAILURE

23 EE AUTO RELEASE lost. EE AUTO CAPTURE remains for msw failure. PDRS CK CRT EE and CK CRT It when EE goes to EXTEND due to msw miscompare

24 EE MANUAL DERIGIDIZE/RELEASE lost

25 EE MODE – AUTO
   EE RELEASE sw – depress (mom)
   (until EXTEND tb–gray, 25 sec max)
   EE MODE – OFF

26 DERIGIDIZER DIODE FAILURE

27 EE MANUAL MODE lost

28 EE MODE SW, MTR MODULE, OR MECHANICAL FAILURE

29 EE not operational
   • MCC for possible IFM

1 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC Capture/Release 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 For digital SPA, CLOSE flag may be failed ON
12.4a ARM RESPONSE ABNORMAL IN MANUAL MODES

Arm Response Not Normal for Commands in Manual Modes

Nominal Config:
- (A8L)
- RMS PWR – PRI
- SEL – PORT
- (A8U)
- SAFING – AUTO
- SAFING tb – gray
- S/W STOP – 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)?

3 BRAKES tb – ON?

4 (A8U)
- RATE – VERN
- MODE – selected one, ENTER

MODE lt – on?

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?

8 VERNIER/COARSE SELECTION FAILURE

9 Use SM 95 PDRS OVERRIDE to override failed switches
- BRAKES – ON

10
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?
YES

11 SLUGGISH OR DEAD RHC/THC AXIS(ES)

NO

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?
YES

NO

14 RATE HOLD SW FAILURE

15 Use MAN modes without RATE HOLD function
• BRAKES – ON
• DAP: as reqd

16 (A8U)
• MODE – SINGLE, ENTER
• Drive each joint in turn ‘+’ and ‘−’

Does joint drive properly?
YES

17 TRANSIENT FAILURE

NO

18
• Continue normal ops
• BRAKES – ON
• DAP: as reqd

19
• BRAKES – ON
• DAP: as reqd

CAUTION

Do not execute if captured to constrained payload or if captured payload should not be moved in SINGLE mode

12–87
Arm Response Not Normal for Commands in Auto Modes

Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT
(A8U)
SAFING tb – gray
S/W STOP – 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)?

3
BRAKES tb – ON?

4
(A8U)
• RATE – VERN
• MODE – selected one, ENTER
MODE lt – on?

5
STOP/PROCEED SW FAILURE

6
(A8U)
• BRAKES – ON
• Use SM 95 PDRS OVERRIDE to override failed switch

Taking Brakes OFF may result in uncommanded motion of arm. Be ready to apply Brakes if motion occurs.
If trajectory is not correct, collision could occur.
Be ready to stop auto seq.

WARNING
If trajectory is not correct, collision could occur. Be ready to stop auto seq.

SM 94 PDRS CONTROL
- ITEM 18 –X POS +Y POS EXEC
- ITEM 20 –Z POS – 12 inches EXEC
- ITEM 21 –P ATT +Y ATT +R ATT EXEC
- ITEM 24 – PL ID EXEC
- ITEM 25 EXEC √GOOD

PROCEED SW FAILURE

AUTO SEQ – STOP
READY It – off and IN PROG lt – on ?

STOP FUNCTION SW FAILURE

TRANIENT FAILURE

Continued 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

Taking BRAKES OFF may result in uncommanded motion of arm. Be ready to apply BRAKES if motion occurs.

Any joint moving (visual)?

Placing mode switch in DIRECT may cause joint motion for selected joint. If motion occurs be ready to take mode switch out of DIRECT.

Is joint moving?

Use SM 95 PDRS OVERRIDE to reassign SINGLE (DIRECT) drive sw to proceed/stop sw.
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.
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.

BACKDRIVE TECHNIQUE – JOINT FREE, PDRS SSR-3 or EVA reqd to cradle arm for failed free joint.

Joint move in both directions?

I/O – ITEM 5 (A8U)

SAFING – CANCEL

If WR angle changed by more than 90 deg, update WR RANGE to recorded value (ITEM 26 on SM 94)

MCC

• BRAKES – ON
• JOINT – failed one
• SINGLE (DIRECT) DR – ‘+’ and ‘-‘

Joint drive properly?

MCC

• BRAKES – ON
• JOINT – failed one
• B/U DR – ‘+’ and ‘-‘

MDA FAILURE

• MODE – not DIRECT

SM 94 PDRS CONTROL

Record WR R

Reconfig to PRI PWR

• RMS SEL – OFF
• RMS PWR – PRI (MA)

SM 94 PDRS CONTROL

I/O – ITEM 5 (*)

• RMS SEL – PORT

SM 94 PDRS CONTROL

I/O – ITEM 5 (*)

• SAFING – CANCEL

SM 94 PDRS CONTROL

I/O – ITEM 5 (*)

• RMS SEL – PORT

MDA FAILURE

FROZEN OR FAILED FREE JOINT

34

Reconfig to PRI PWR

SM 94 PDRS CONTROL

Reconfig to PRI PWR

SM 94 PDRS CONTROL

• SAFING – CANCEL

• SAFING – CANCEL

Direct mode and B/U drive modes remain for good joints. B/U drive mode only for failed joint.

Direct and B/U drive modes remain for good joints. B/U drive mode only for failed joint.

• B/U JOINT – failed one
• B/U DR – ‘+’ and ‘-‘

Joint drive properly?

12.4b

12.4c

12.4a

12.1e

26

25

24

23

22

21

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18

17

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7

6

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4

3

2

1

10/19/01
Joint Response Not Normal for Commands in Direct Mode

Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT
(A8U)
BRAKES – ON
BRAKES tb – ON
SAFING tb – gray

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

12.4d JOINT RESPONSE ABNORMAL IN DIRECT MODE

1. (ABU)
   • 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. (ABU)
   • MODE – DIRECT
   Joint motion of selected joint ?
   
   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. • MODE – not DIRECT

4. SINGLE/DIRECT DR SW SHORT, SINGLE AND DIRECT DRIVE MODES UNAVAILABLE

5. • Use SM 95 PDRS OVERRIDE to reassign SINGLE (DIRECT) drive switch to regain SINGLE drive mode

6. (ABU)
   • SINGLE (DIRECT) DR – each joint in turn ‘+’ and ‘–’
   Two joints drive simultaneously ?
   
   WARNING
   6V/12V JOINT SEL SW CONTACT SHORT, DIRECT DRIVE MODE UNAVAILABLE

7. 6V/12V JOINT SEL SW CONTACT SHORT, DIRECT DRIVE MODE UNAVAILABLE

8. Any joint drive in wrong direction ?

9. ZENER DIODE FAILURE, DIRECT DRIVE MODE LOST
10 Did more than one joint fail to drive at all?

11 SING/DD SW, MODE SW, OR JOINT SW FAILURE, DIRECT DRIVE MODE UNAVAILABLE

12 For SING/DD sw or JOINT sw, use SM 95 PDRS OVERRIDE to regain SINGLE drive mode

13 Test SINGLE (A8U)
- 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 (A8U)
- BRAKES – ON

12.4c 31
1 Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
2 One mtr will continue to run while deploying until PORT RMS STO/DPY sw is turned OFF
3 PDRS SSR–1 MPM 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
3Φ MID 2 – cl
(MA73C:D)
cb MCA PWR AC3
3Φ MID 4 – cl

12.5a MPM DPY – tx NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1 (A8L)
✓ PORT RMS – OFF
(R13L)
✓ PL BAY MECH
PWR 1.2 – OFF

SM 94 PDRS
CONTROL

12
SM 94 PDRS
CONTROL

3 PORT RMS
SW FAILED

5
MCC for possible sw IFM

6 DPY
MICROSW FAILED OPEN

7
Continue ops
Expect nominal drive times

8 STO
MICROSW FAILED CLOSED

9
Continue ops
Expect 68 sec max drive time to stow. tb is accurate

10 DPY
MICROSW FAILED CLOSED

11
Continue ops
Expect 68 sec max drive time to DPY. tb is accurate

12 FAILURE OF PORT RMS SW TO DPY

14

12/19/00
1 Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

4 One mtr will continue to run while stowing until PORT RMS STO/DPY sw is turned OFF

5 RMS should not be used unless shoulder linkage is overcenter locked

6 Signals from Aft, Mid, Fwd, and Shld pedestals command tb. Tb trip tb, all four SYS 1 or SYS 2 indications are reqd

7 MCC can determine if switch is failed
12.5b MPM STO – tb NOT STO, 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 stowing until Port RMS sw is turned OFF

3 Signals from AFT, MID, FWD, and SHLD pedestals command tb. To trip tb, all four SYS 1 or all four SYS 2 indications reqd

4 One mtr will continue to run while deploying until Port RMS STO/DPY sw is turned OFF

Nominal Config:
(MA73C:A)
MCA LOGIC
MNA MID 1 – ON
MNB MID 2 – ON
(MA73C:B)
MCA LOGIC
MNA MID 3 – ON
MNB MID 4 – ON
(MA73C:C)
cb MCA PWR
AC2 3Φ MID 2 – cl
(MA73C:D)
cb MCA PWR
AC3 3Φ MID 4 – cl

Either StO microsw ind '0' after stow
Either DPY microsw ind '1' after stow
Only one StO microsw ind '1' prior to stow
Both StO microsw ind '1' without stow command
Other

Was stow time single mtr time (> 34 sec) ?

SHLD DPY MICROSW FAILED OPEN

PORT RMS SW FAILED TO STOW

STOW RELAY, MTR, OR PORT RMS STO/DPY SW FAILED

SHLD DPY MICROSW FAILED OPEN

17

16
tb FAILURE, STRUCTURAL FAILURE, OR JAM OF PEDESTAL OTHER THAN SHOULDER

15

STOW RELAY, MTR, OR PORT RMS STO/DPY SW FAILED

18

MCC to determine if tb failed

19

+ Continue ops (tb is accurate)
1 Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
5 RMS should not be used unless shoulder linkage is overcenter locked
Refer to RMS — MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

One mtr will continue to drive when commanding release until PORT RMS RETENTION LATCH — 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
MNC MID 2 — ON
(MA73C:B)
MCA LOGIC
MNA MID 3 — 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

cb MCA PWR
AC1 3φ MID 1 — cl
AC2 3φ MID 2 — cl
AC3 3φ MID 2 — cl

cb MCA PWR
AC1 3φ MID 3 — cl
AC2 3φ MID 4 — cl
AC3 3φ MID 4 — cl

Continue ops using SM 94 display

All REL microsw ind ‘1’ prior to commanding REL

Any one pedestal REL 10

Any single rel ind ‘1’ prior to REL command

Other

12 FAILURE OF PORT RMS RETEN LAT SW, ONE POLE OR RELAY OR MTR

6 FAILURE OF PORT RMS RETEN LAT SW TO RELEASE

8 RELEASE MICROSW FAILED OPEN

10 RELEASE MICROSW FAILED CLOSED

13 MCC for possible failure isolation. Single mtr drive time (18 sec) for release. IFM possible if switch failure. Potentially one failure away from ability to safely latch RMS for entry

3 18 sec max drive time to release. If SYS 1 microsw failed, tb is suspect for release. If SYS 2 microsw failed, tb is accurate. Continue ops using SM 94 display

9 Nominal drive time to latch and release, and tb is accurate

7 MCC for possible sw IFM

5 SM 94 PDRS CONTROL

Any one REL pedestal 01

Any one pair of REL ind = ‘0’

14

15

16

17

12.5c MRL REL — tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1 Refer to RMS — MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

2 One mtr will continue to drive when commanding release until PORT RMS RETENTION LATCH — OFF

3 Failed — on microsw disables one mtr. The tb is inaccurate from 8 — 18 sec (latch halfway open at 8 sec)

4 Continue ops using SM 94 display

5 SM 94 PDRS CONTROL

All REL microsw ind ‘1’ prior to commanding REL

Any one pedestal REL 10

Any single rel ind ‘1’ prior to REL command

Other
1 Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

2 One mtr will continue to drive when commanding release until PORT RMS RETEN LAT – OFF

4 tb is activated by receiving all three microsw indications from SYS 1 only

14 FAILURE OF RETEN LAT SW, BOTH POLES

15 SYS 1 REL MICROSW FAILED OPEN

16 PORT 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

PDRS 12.5c (Cont)
12.5d MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1. Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE LATCH) (IFM)

2. One mtr will continue to drive when commanding LATCH until Port RMS RETEN LAT switch is off

3. Failed–on microsw disables one mtr. The tb is inaccurate from 8–18 sec (latch halfway closed 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. (ABL) • PORT RMS RETEN LAT – OFF
   (R13L) • PL BAY MECH PWR 1.2 – OFF

2. PORT RMS RETEN
   tb – LAT?

3. tb FAILURE

4. Continue ops using SM 94 display

5. SM 94 PDRS CONTROL
   All LAT microsw ind ‘1’ prior to commanding LAT
   Any one pedestal
   LAT 10

6. FAILURE OF
   PORT RMS RETEN LAT SW TO LATCH

7. MCC for possible sw IFM

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 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 for entry

14. • Continue ops using SM 94 display

15. Any one LAT
    pedestal 01

16. Any one LAT
    REL
    AFT 11
    MID 11
    FWD 11

17. Any one pair of LAT
    ind = ‘0’

18. SM 94 PDRS CONTROL
   RMS LAT
   AFT 11
   MID 11
   FWD 11

19. Any one of LAT
   AFT 00 00
   MID 00 00
   FWD 00 00

20. “MCC for possible failure isolation

21. Single mtr drive time (18 sec) for LATCH. IFM possible if switch failure. Potentially one failure away from ability to safely latch RMS 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 RMS RETEN LAT switch is off

4 tb is activated by receiving all three microsw indications from SYS 1 only

14 FAILURE OF RETEN LAT SW, BOTH POLES

15 SYS 1 LAT MICROSW FAILED OPEN

16 PORT 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. For LAT, tb is inaccurate. Nominal drive time (8 sec) to LAT and REL

20 • MCC for possible sw IFM

21 • MCC
Inaccurate tb because tb is driven by SYS 1 only

12.5e PORT RMS RETEN LATCHES R–F–L tb – bp WHEN CRADLED

1. SM 94 PDRS CONTROL
   - **RMS**
     - AFT: 11
     - MID: 11
     - FWD: 11?
   - **RDY**
   - YES → 2
   - NO → 4

2. PORT RMS RETEN LATCHES R–F–L tb FAILURE

3. Use SM 94 for pedestal with failed tb

4. MICROSW FAILURE

5. 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

12.5f PORT RMS RETEN LATCHES R–F–L tb – gray WHEN UNCRADLED

1. SM 94 PDRS CONTROL
   - **RMS**
     - AFT: 00
     - MID: 00
     - FWD: 00?
   - **RDY**
   - YES → 2
   - NO → 4

2. PORT RMS RETEN LATCHES R–F–L tb FAILURE

3. Use SM 94 for pedestal with failed tb

4. MICROSW FAILURE

5. When cradling, 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
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NOTE
Use this procedure to replace step 6 of ON–ORBIT INIT (PDRS OPS), or step 5 of RMS PWRDN (PDRS OPS) or step 4 of RMS PWRUP (PDRS OPS)

SM 94 PDRS CONTROL

1. INHIBIT MICROSWITCH
   MA73C:A
   MCA LOGIC MNC MID 2 – OFF
   CRT √RMS STO/DPLY – 0 X 0 X

2. STOW(DEPLOY) MPM
   CAUTION
   If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result
   A8L PORT RMS – STO(DPY) as reqd (68 sec max)
   – OFF
   CRT √MPM is stowed(deployed) using CRT indication (tb inaccurate):
   Stowed: RMS STO/DPLY – 0 1 0 X
   (Deployed: RMS STO/DPLY – 0 X 0 1)
   MCC can verify status of FWD, MID, AFT pedestals
   A8L PORT RMS tb – STO(DPY) >>
   CRT RMS STO/DPLY – X 0 X 0

3. ENABLE BUS
   MA73C:A
   MCA LOGIC MNC MID 2 – ON
   A8L √PORT RMS tb – STO(DPY) >>
   IF RMS STO/DPLY – X 1 X 1:

4. INHIBIT MICROSWITCH
   MA73C:B
   MCA LOGIC MNB MID 4 – OFF
   CRT √RMS STO/DPLY – X 0 X 0

5. STOW(DEPLOY) MPM
   CAUTION
   If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result
   A8L PORT RMS – STO(DPY) as reqd (68 sec max)
   – OFF
   CRT √MPM is stowed(deployed) using CRT indication (tb accurate):
   Stowed: RMS STO/DPLY – 1 0 X 0
   (Deployed: RMS STO/DPLY – X 0 1 0)
   MCC can verify status of FWD, MID, AFT pedestals
   A8L PORT RMS tb – STO(DPY) >>
   CRT RMS STO/DPLY – 1 0 X 0

6. ENABLE BUS
   MA73C:B
   MCA LOGIC MNB MID 4 – ON
   A8L √PORT RMS tb – STO(DPY) >>
   CRT RMS STO/DPLY – 1 0 X 0
PDRS SSR–3
BACKDRIVE TECHNIQUE – JOINT FREE

SP – FAILED

WARNING
PORT RADIATOR must be stowed

NOTE
Can expect CONT ERR and Master Alarm

1. SETUP
   If RADIATORS deployed:
   Perform RAD STOW (ORB OPS, ECLS)
   \( \checkmark \) BRAKES – ON (tb–ON)
   PARAM sel – JOINT ANGLE
   \( \checkmark \) DAP: VERN(FREE)

If SP < 7.5 deg, go to step 3

Calculate IC:
   If SP < 45, IC = \(-(2 \times SP)\)
   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 BRAKES 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 \( \geq \) –15 deg, reconfig EP:
   MODE – DIRECT (lt on)
   DIRECT DR EP to: \(-(2 \times SP)\) 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** (PDLS OPS) >>
PDRS SSR–3 (Cont)

EP – FAILED

NOTE
Can expect CONT 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](IC values)

   MODE – not DIRECT (lt off)

   SM 94 PDRS CONTROL

   AUTO BRAKES 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**
   - 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>CURRENT VALUE</td>
<td>+15</td>
<td>FREE</td>
<td>+10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</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**
   - 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)

   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 CONT 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 (Tb 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
If $-0.1 \leq WP \leq +0.1$, 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 $-0.1 \leq WP \leq +0.1$ 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>
</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 CONT 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>
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<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 BRAKES 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 WP > –2.0 deg,
RATE sw – VERN (RATE MIN tb–ON)

✓ JOINT sel – WY
BRAKES – OFF (tb–OFF)
MODE – END EFF, ENTER
THC – ‘+Y’ (PORT) 1/3 to 1/2 deflection

After 2–3 sec,
THC – ‘–Y’ (STBD) 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 > 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 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’ (STBD) 1/3 to 1/2 deflection

After 2–3 sec,
THC – ‘+Y’ (PORT) full deflection
When WY joint angle is constant:
BRAKES – ON (tb–ON)
Release THC
PDRS SSR–3 (Cont)

If −0.1 ≤ WY ≤ +0.1 deg, go to step 2c
If SP > 120 deg or < 60 deg, go to step 3
If WP > +0.1 deg, repeat step 2b
If WP < −0.1 deg, go to step 2a

2c. If −0.1 ≤ WY ≤ 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>+5</td>
<td>FREE</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</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) >>

3. RECONFIG OF JOINTS
✓ BRAKES – ON (tb–ON)
MODE – DIRECT (lt on)

DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
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<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)
If WP < −0.1 deg, go to step 2a
If WP > +0.1 deg, go to step 2b
PDRS SSR–4
RMS IFM D&C KIT

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–LOADEDRELEASE (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)

CRT If WR R different, ITEM 26 +(recorded value) EXEC

2. IF SHOULDER BRACE RELEASE REQD

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
PDRS SSR–4 (Cont)

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**
   - √ BRAKES – ON (tb–ON)
   - √ tb(s)
   - RIGID CLOSE CAPTURE
   - DERIGID OPEN EXTEND

   **O19**
   - DC UTIL PWR MNA – ON
   - No tb(s) change

   **D&C Kit**
   - EE CAPTURE/RELEASE sw – CAPTURE, until CLOSE tb – gray (3 sec max)
   - No tb(s) change after capture
   - EE RIGID/DERIGID sw – RIGID, until RIGID tb – gray (20 sec max)
   - No tb(s) change after rigidizing
   - EE RIGID/DERIGID sw – DERIGID; until DERIGID,EXTEND tb – gray (20 sec max)
     (MA, DERIGIDIZE It – ON)
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)

RIGID CLOSE CAPTURE

✓ DERIGID OPEN EXTEND

O19 DC UTIL PWR MNA – OFF
To extinguish DERIGIDIZE it, 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, and ‘S96 PDRS ABE’ for five undriven joints)

For other joints:
  Drive ‘+’
  ✓ Correct joint responses
  (Expect MA, CK CRT lt on, 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

O19 DC UTIL PWR MNA – ON
Perform RMS IFM D&C Kit End Effector/Direct Drive function as reqd
O19 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)