

# Malfunction Procedures

**Mission Operations Directorate  
Operations Division**

**Generic, Rev I  
February 9, 2007**

**NOTE**

For STS-117 and subsequent flights

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas



**Verify this is the correct version for the pending operation (training, simulation or flight).**  
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MALFUNCTION PROCEDURES

GENERIC, REV I (Feb 9, 2007)

## PCN-4 (Jul 13, 2007) Sheet 1 of 1

List of Implemented Change Requests (482s):

MAL-1687

**NOTE**

For STS-118 and subsequent flights

Incorporate the following:

1. Replace iii thru x, xix & xx
2. Replace 7-5 & 7-6  
After 7-304, add 7-305 & 7-306

Prepared by:

*Joseph L. Bezovic Jr*  
Book Manager

Approved by:

*Timberly Johnson*  
Manager, Shuttle Procedures Management

Accepted by:

*Michael P. Holt*  
FDF Manager

Encl: 14 pages

**File this PCN immediately behind the front cover as a permanent record**





<b>MALFUNCTION PROCEDURES</b>	<b>GENERIC, REV I (Feb 9, 2007)</b>
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**PCN-3 (Jul 2, 2007) Sheet 1 of 1**

List of Implemented Change Requests (482s):

MAL-1683  
MULTI-1786  
MULTI-1788

<p><b>NOTE</b> For STS-118 and subsequent flights</p>
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Incorporate the following:

1. Replace iii thru x, xix & xx
2. Replace 5-99 & 5-100, 5-103 thru 5-106
3. Replace 8-1 & 8-2, 8-7 thru 8-10 with A8-7 thru B8-10 (8 pages)

Prepared by: *Harold R. Scott 07/02/07*  
Book Manager

Approved by: *Timothy Johnson 7/2/07*  
Manager, Shuttle Procedures Management

Accepted by: *M. J. [Signature]*  
FDF Manager

Encl: 26 pages

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<b>MALFUNCTION PROCEDURES</b>	<b>GENERIC, REV I (Feb 9, 2007)</b>
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**PCN-2 (May 24, 2007) Sheet 1 of 1**

List of Implemented Change Requests (482s):

MAL-1684A

<p><b>NOTE</b> For STS-117 and subsequent flights</p>
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Incorporate the following:

1. Replace iii & iv, ix & x
2. Replace 10-27 thru 10-32  
After page 10-32, add pages 10-33 & 10-34

Prepared by: Harold Scott for Joe Brezani 05/18/07  
 Publication Manager

Approved by: Stu J. P. for  
 Manager, Shuttle Procedures Management

Accepted by: Michael J. Shaw  
 FDF Manager

Encl: 12 pages

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MALFUNCTION PROCEDURES

GENERIC, REV I (Feb 9, 2007)

## PCN-1 (Apr 18, 2007) Sheet 1 of 1

List of Implemented Change Requests (482s):

MAL-1594	MAL-1623	MAL-1640	MAL-1657	MULTI-1723A(R)
MAL-1596	MAL-1624	MAL-1641	MAL-1659	MULTI-1738A
MAL-1598	MAL-1625	MAL-1642A	MAL-1662	MULTI-1756
MAL-1611	MAL-1626	MAL-1643	MAL-1663	
MAL-1612	MAL-1627A	MAL-1644	MAL-1664	
MAL-1613	MAL-1628	MAL-1645	MAL-1665	
MAL-1614	MAL-1631	MAL-1646	MAL-1670	
MAL-1616	MAL-1632	MAL-1648	MAL-1678	
MAL-1617	MAL-1633	MAL-1649	MAL-1679	
MAL-1618	MAL-1634	MAL-1651	MAL-1680	
MAL-1619	MAL-1635	MAL-1652A	MAL-1681	
MAL-1620	MAL-1637	MAL-1653	MAL-1682	
MAL-1621	MAL-1638	MAL-1654A		
MAL-1622	MAL-1639	MAL-1655		

R - Remainder

Incorporate the following:

1. Replace iii thru xxiv
2. Replace 1-1 & 1-2, 1-7 thru 1-12
3. Replace 2-11 thru 2-14, 2-43 & 2-44, 2-55 & 2-56
4. Replace 4-11 & 4-12
5. Replace 5-33 thru 5-48, 5-51 & 5-52, 5-75 & 5-76, 5-97 & 5-98, 5-107 & 5-108
6. Replace 6-13 & 6-14, 6-37 thru 6-42, 6-69 & 6-70, 6-89 & 6-90, 6-109 thru 6-112
7. Replace 7-1 & 7-2, 7-39 thru 7-54  
After 7-66, add 7-66a thru 7-66j  
Replace 7-67 & 7-68, 7-95 thru 7-108b, 7-127 thru 7-154, 7-161 thru 7-164, 7-189 thru 7-208,  
7-213 thru 7-220, 7-225 & 7-226, 7-231 & 7-232, 7-243 & 7-244, 7-247 thru 7-264, 7-273 & 7-  
274, 7-281 & 7-282, 7-291 & 7-292
8. Replace 9-1 thru 9-20, 9-25 thru 9-34, 9-39 thru 9-44  
After 9-44, add 9-44a & 9-44b  
Replace 9-45 & 9-46, 9-53 & 9-54
9. Replace 10-7 & 10-8
10. Replace 12-15 thru 12-24, 12-47 & 12-48, 12-61 thru 12-78, 12-85 & 12-86, 12-107 & 12-108,  
12-115 & 12-116

**NOTE**

For STS-117 and subsequent flights

Prepared by:

*Joseph L. Bezovic Jr*  
Publication Manager

Approved by:

*Michael C. Shaw*  
Manager, Shuttle Procedures Management

Accepted by:

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FDF Manager

Encl: 280 pages

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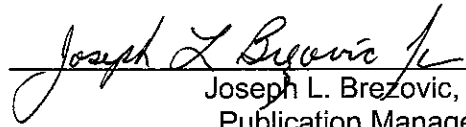
MISSION OPERATIONS DIRECTORATE

**MALFUNCTION PROCEDURES**

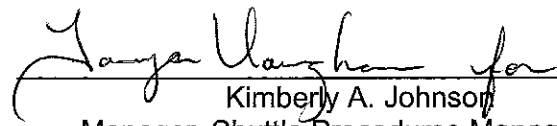
GENERIC, REVISION I

February 9, 2007

PREPARED BY:

  
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Joseph L. Brezovic, Jr.  
Publication Manager

APPROVED BY:

  
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Manager, Shuttle Procedures Management

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Michael T. Hurt  
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Incorporates the following:			
482#:	MAL-1666	MAL-1671	MAL-1675
	MAL-1667	MAL-1672	MAL-1676
	MAL-1668	MAL-1673	MAL-1677
	MAL-1669	MAL-1674	

AREAS OF TECHNICAL RESPONSIBILITY

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C/W	DF7/G. Peck	281-244-7309
DPS	DF32/J. McDonald	281-483-0793
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EPS	DF7/M. Welch	281-483-6602
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OMS/RCS	DF6/T. Campa	281-244-1002
PDRS	DX2/G. Pollock	281-483-0883



MALFUNCTION PROCEDURES

**LIST OF EFFECTIVE PAGES**

	GENERIC 05/10/88	PCN-1	04/18/07	PCN-3	07/02/07
	REV I 02/09/07	PCN-2	05/24/07	PCN-4	07/13/07
Sign Off.....	* ALL/GEN I		2-8 .....		ALL/GEN I
ii .....	* ALL/GEN I		2-9 .....		ALL/GEN I
iii .....	* ALL/GEN I,4		2-10 .....		ALL/GEN I
iv .....	* ALL/GEN I,3		2-11 .....		ALL/GEN I,1
v .....	* ALL/GEN I,3		2-12 .....		ALL/GEN I
vi .....	* ALL/GEN I,4		2-13 .....		ALL/GEN I,1
vii.....	* ALL/GEN I,1		2-14 .....		ALL/GEN I,1
viii.....	* ALL/GEN I,4		2-15 .....		ALL/GEN I
ix .....	* ALL/GEN I,4		2-16 .....		ALL/GEN I
x .....	* ALL/GEN I,4		2-17 .....		ALL/GEN I
xi .....	ALL/GEN I,1		2-18 .....		ALL/GEN I
xii.....	ALL/GEN I		2-19 .....		ALL/GEN I
xiii.....	ALL/GEN I		2-20 .....		ALL/GEN I
xiv.....	ALL/GEN I		2-21 .....		ALL/GEN I
xv .....	ALL/GEN I		2-22 .....		ALL/GEN I
xvi.....	ALL/GEN I,1		2-23 .....		ALL/GEN I
xvii.....	ALL/GEN I,1		2-24 .....		ALL/GEN I
xviii.....	ALL/GEN I,1		2-25 .....		ALL/GEN I
xix.....	ALL/GEN I,4		2-26 .....		ALL/GEN I
xx .....	ALL/GEN I,3		2-27 .....		ALL/GEN I
xxi.....	ALL/GEN I,1		2-28 .....		ALL/GEN I
xxii.....	ALL/GEN I,1		2-29 .....		ALL/GEN I
xxiii.....	ALL/GEN I,1		2-30 .....		ALL/GEN I
xxiv.....	ALL/GEN I		2-31 .....		ALL/GEN I
1-1 .....	ALL/GEN I,1		2-32 .....		ALL/GEN I
1-2 .....	ALL/GEN I		2-33 .....		ALL/GEN I
1-3 .....	ALL/GEN I		2-34 .....		ALL/GEN I
1-4 .....	ALL/GEN I		2-35 .....		ALL/GEN I
1-5 .....	ALL/GEN I		2-36 .....		ALL/GEN I
1-6 .....	ALL/GEN I		2-37 .....		ALL/GEN I
1-7 .....	ALL/GEN I,1		2-38 .....		ALL/GEN I
1-8 .....	ALL/GEN I,1		2-39 .....		ALL/GEN I
1-9 .....	ALL/GEN I		2-40 .....		ALL/GEN I
1-10.....	ALL/GEN I,1		2-41 .....		ALL/GEN I
1-11.....	ALL/GEN I,1		2-42 .....		ALL/GEN I
1-12.....	ALL/GEN I,1		2-43 .....		ALL/GEN I,1
1-13.....	ALL/GEN I		2-44 .....		ALL/GEN I
1-14.....	ALL/GEN I		2-45 .....		ALL/GEN I
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1-21.....	ALL/GEN I		2-52 .....		ALL/GEN I
1-22.....	ALL/GEN I		2-53 .....		ALL/GEN I
2-1 .....	ALL/GEN I		2-54 .....		ALL/GEN I
2-2 .....	ALL/GEN I		2-55 .....		ALL/GEN I,1
2-3 .....	ALL/GEN I		2-56 .....		ALL/GEN I,1
2-4 .....	ALL/GEN I		2-57 .....		ALL/GEN I
2-5 .....	ALL/GEN I		2-58 .....		ALL/GEN I
2-6 .....	ALL/GEN I		2-59 .....		ALL/GEN I
2-7 .....	ALL/GEN I		2-60 .....		ALL/GEN I

\* – Omit from flight book

3-1	ALL/GEN I	5-29	ALL/GEN I
3-2	ALL/GEN I	5-30	ALL/GEN I
4-1	ALL/GEN I	5-31	ALL/GEN I
4-2	ALL/GEN I	5-32	ALL/GEN I
4-3	ALL/GEN I	5-33 thru 5-47	ALL/GEN I,1
4-4	ALL/GEN I	5-48	ALL/GEN I,1
4-5	ALL/GEN I	5-49	ALL/GEN I
4-6	ALL/GEN I	5-50	ALL/GEN I
4-7	ALL/GEN I	5-51	ALL/GEN I,1
4-8	ALL/GEN I	5-52	ALL/GEN I
4-9	ALL/GEN I	5-53	ALL/GEN I
4-10	ALL/GEN I	5-54	ALL/GEN I
4-11	ALL/GEN I,1	5-55	Δ ALL/GEN I
4-12	ALL/GEN I	5-56	ALL/GEN I
4-13	ALL/GEN I	5-57	ALL/GEN I
4-14	ALL/GEN I	5-58	ALL/GEN I
4-15	ALL/GEN I	5-59	ALL/GEN I
4-16	ALL/GEN I	5-60	ALL/GEN I
4-17	ALL/GEN I	5-61	ALL/GEN I
4-18	ALL/GEN I	5-62	ALL/GEN I
4-19	ALL/GEN I	5-63	ALL/GEN I
4-20	ALL/GEN I	5-64	ALL/GEN I
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4-22	ALL/GEN I	5-66	ALL/GEN I
4-23	ALL/GEN I	5-67	ALL/GEN I
4-24	ALL/GEN I	5-68	ALL/GEN I
4-25	ALL/GEN I	5-69	ALL/GEN I
4-26	ALL/GEN I	5-70	ALL/GEN I
4-27	ALL/GEN I	5-71	ALL/GEN I
4-28	ALL/GEN I	5-72	ALL/GEN I
4-29	ALL/GEN I	5-73	ALL/GEN I
4-30	ALL/GEN I	5-74	ALL/GEN I
4-31	ALL/GEN I	5-75	ALL/GEN I,1
4-32	ALL/GEN I	5-76	ALL/GEN I
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5-2	ALL/GEN I	5-78	ALL/GEN I
5-3	ALL/GEN I	5-79	ALL/GEN I
5-4	ALL/GEN I	5-80	ALL/GEN I
5-5	ALL/GEN I	5-81	ALL/GEN I
5-6	ALL/GEN I	5-82	ALL/GEN I
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5-16	ALL/GEN I	5-92	ALL/GEN I
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5-19	ALL/GEN I	5-95	ALL/GEN I
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5-23	ALL/GEN I	5-99	ALL/GEN I,3
5-24	ALL/GEN I	5-100	ALL/GEN I
5-25	ALL/GEN I	5-101	ALL/GEN I
5-26	ALL/GEN I	5-102	ALL/GEN I
5-27	ALL/GEN I	5-103	ALL/GEN I
5-28	ALL/GEN I	5-104	ALL/GEN I,3

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5-105	ALL/GEN I,3	6-55	ALL/GEN I
5-106	ALL/GEN I,3	6-56	ALL/GEN I
5-107	ALL/GEN I	6-57	ALL/GEN I
5-108	ALL/GEN I,1	6-58	ALL/GEN I
5-109	ALL/GEN I	6-59	ALL/GEN I
5-110	ALL/GEN I	6-60	ALL/GEN I
5-111	ALL/GEN I	6-61	ALL/GEN I
5-112	ALL/GEN I	6-62	ALL/GEN I
6-1	ALL/GEN I	6-63	ALL/GEN I
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6-5	ALL/GEN I	6-67	ALL/GEN I
6-6	ALL/GEN I	6-68	ALL/GEN I
6-7	ALL/GEN I	6-69	ALL/GEN I,1
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6-9	ALL/GEN I	6-71	ALL/GEN I
6-10	ALL/GEN I	6-72	ALL/GEN I
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6-13	ALL/GEN I	6-75	ALL/GEN I
6-14	ALL/GEN I,1	6-76	ALL/GEN I
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6-16	ALL/GEN I	6-78	ALL/GEN I
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6-27	ALL/GEN I	6-89	ALL/GEN I,1
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6-33	ALL/GEN I	6-95	ALL/GEN I
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6-38	ALL/GEN I,1	6-100	ALL/GEN I
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6-41	ALL/GEN I,1	6-103	ALL/GEN I
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6-44	ALL/GEN I	6-104b	ALL/GEN I
6-45	ALL/GEN I	6-105	ALL/GEN I
6-46	ALL/GEN I	6-106	ALL/GEN I
6-47	ALL/GEN I	6-107	ALL/GEN I
6-48	ALL/GEN I	6-108	ALL/GEN I
6-49	ALL/GEN I	6-109	ALL/GEN I
6-50	ALL/GEN I	6-110	ALL/GEN I,1
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6-52	ALL/GEN I	6-112	ALL/GEN I,1
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6-54	ALL/GEN I	6-114	ALL/GEN I

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6-116.....	ALL/GEN I	7-60.....	ALL/GEN I
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6-119.....	ALL/GEN I	7-63.....	ALL/GEN I
6-120.....	ALL/GEN I	7-64.....	ALL/GEN I
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7-3.....	ALL/GEN I	7-66a.....	ALL/GEN I,1
7-4.....	ALL/GEN I	7-66b.....	ALL/GEN I,1
7-5.....	ALL/GEN I,4	7-66c.....	ALL/GEN I,1
7-6.....	ALL/GEN I	7-66d.....	ALL/GEN I,1
7-7.....	ALL/GEN I	7-66e.....	ALL/GEN I,1
7-8.....	ALL/GEN I	7-66f.....	ALL/GEN I,1
7-9.....	ALL/GEN I	7-66g.....	ALL/GEN I,1
7-10.....	ALL/GEN I	7-66h.....	ALL/GEN I,1
7-11.....	ALL/GEN I	7-66i.....	ALL/GEN I,1
7-12.....	ALL/GEN I	7-66j.....	ALL/GEN I,1
7-13.....	ALL/GEN I	7-67.....	ALL/GEN I,1
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7-38.....	ALL/GEN I	7-92.....	ALL/GEN I
7-39.....	ALL/GEN I,1	7-93.....	ALL/GEN I
7-40.....	ALL/GEN I,1	7-94.....	ALL/GEN I
7-41.....	ALL/GEN I	7-95.....	ALL/GEN I,1
7-42.....	ALL/GEN I,1	7-96.....	ALL/GEN I,1
7-43.....	ALL/GEN I,1	7-97.....	ALL/GEN I,1
7-44.....	ALL/GEN I,1	7-98.....	ALL/GEN I,1
7-45.....	ALL/GEN I,1	7-99.....	ALL/GEN I,1
7-46.....	ALL/GEN I,1	7-100.....	ALL/GEN I,1
7-47.....	ALL/GEN I,1	7-101.....	ALL/GEN I,1
7-48.....	ALL/GEN I,1	7-102.....	ALL/GEN I,1
7-49.....	ALL/GEN I,1	7-103.....	ALL/GEN I,1
7-50.....	ALL/GEN I,1	7-104.....	ALL/GEN I,1
7-51 thru 7-53.....	ALL/GEN I,1	7-104a.....	ALL/GEN I,1
7-54.....	ALL/GEN I	7-104b.....	ALL/GEN I
7-55.....	ALL/GEN I	7-105.....	ALL/GEN I,1
7-56.....	ALL/GEN I	7-106.....	ALL/GEN I,1
7-57.....	ALL/GEN I	7-107.....	ALL/GEN I,1
7-58.....	ALL/GEN I	7-108.....	ALL/GEN I

7-108a	ALL/GEN I	7-169	ALL/GEN I
7-108b	ALL/GEN I,1	7-170	ALL/GEN I
7-109	ALL/GEN I	7-171	ALL/GEN I
7-110	ALL/GEN I	7-172	ALL/GEN I
7-111	ALL/GEN I	7-173	ALL/GEN I
7-112	ALL/GEN I	7-174	ALL/GEN I
7-113	ALL/GEN I	7-175	ALL/GEN I
7-114	ALL/GEN I	7-176	ALL/GEN I
7-115	ALL/GEN I	7-177	ALL/GEN I
7-116	ALL/GEN I	7-178	ALL/GEN I
7-117	ALL/GEN I	7-179	ALL/GEN I
7-118	ALL/GEN I	7-180	ALL/GEN I
7-119	ALL/GEN I	7-181	ALL/GEN I
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The identified MAL represents a support procedure that is entered from other procedures or on MCC call

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NOTE A

The identified MAL represents a support procedure that is entered from other procedures or on MCC call

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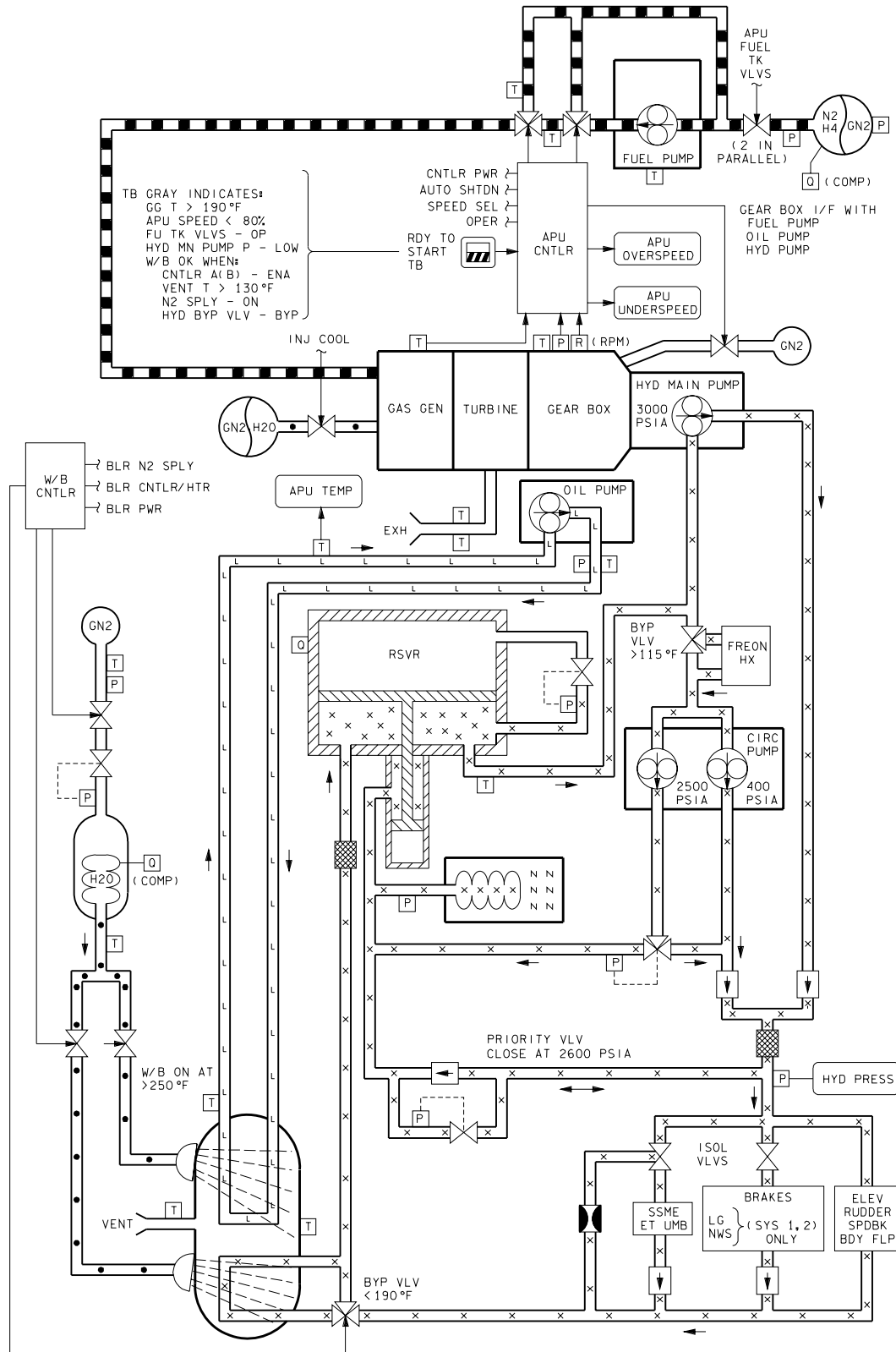
APU/HYD

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# APU/HYD



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APU  
1.1

**APU/HYD**

**1.1a APU FUEL QTY ↓  
APU FUEL TK P ↑↓**

SM  
ALERT

S86 APU  
FUEL 1(2,3)

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

BFS  
SM2 APU  
1(2,3)

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

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

1			
SM 86 APU/HYD			
• Match indications in chart to determine failure			
APU FUEL TK P psia	APU FUEL OUT P psia	APU FUEL QTY %	FAILURE
↑ <sup>1</sup> or 500(H)	< 300 > 150	100	XDCR SHIFT OR FAILURE ①
decr	decr	decr	HYDRAZINE OR N2 LEAKING
0(L)	0	0	N2 LEAKED OUT
80 ↓	0	~0	HYDRAZINE LEAKED OUT
0(L)	< 300 > 150	0	XDCR SHIFT OR FAILURE ①

APU/HYD  
SSR-4

APU/HYD 5  
SSR-5  
steps 1 to 4

APU/HYD  
SSR-4

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

**APU/HYD**

**SM ALERT**

S88 APU TANK T 1(2,3)  
 If APU FUEL T: TK SURF 1(2,3) < 45 degF or TK HTR 1(2,3) < 45 degF > 140 degF

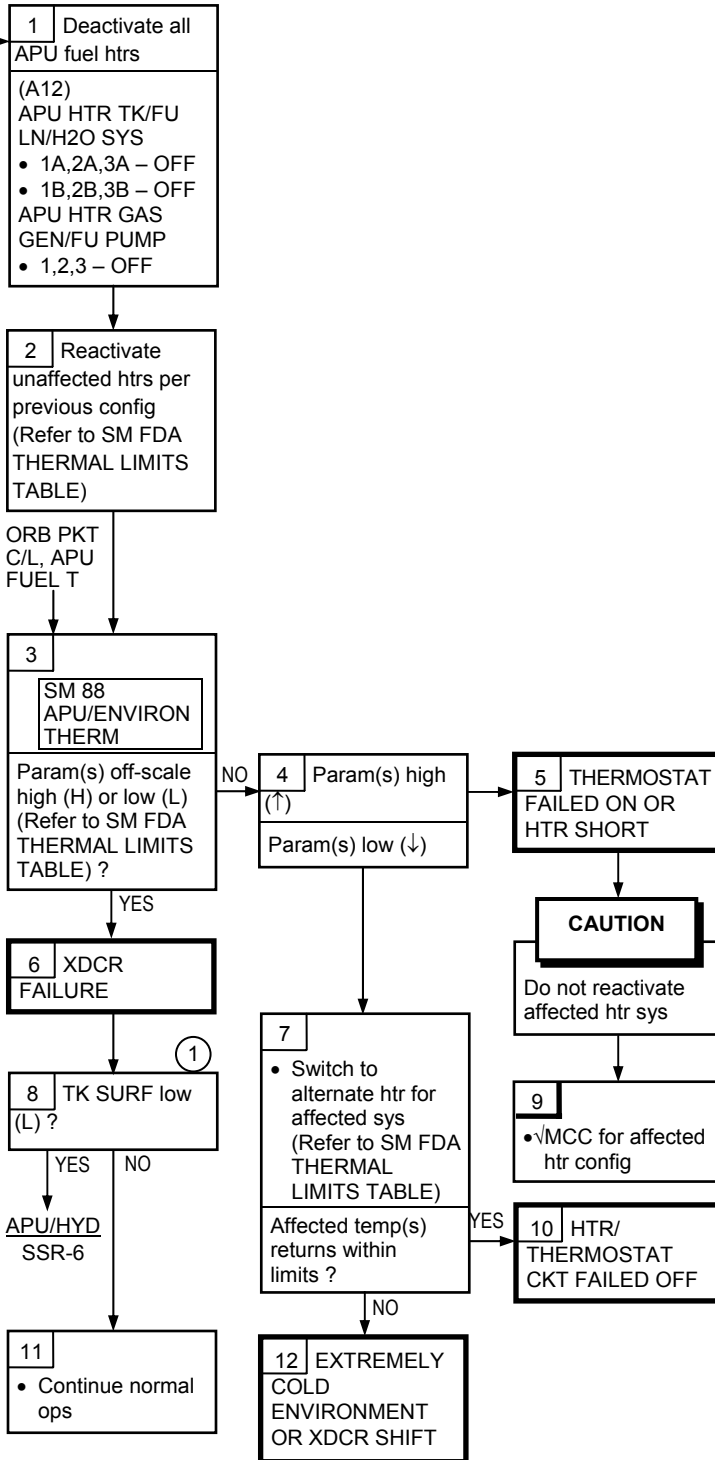
S88 APU FU LN 1(2,3)  
 If APU FUEL T: TEST LN 1 1(2,3) < 45 degF > 110 degF or TEST LN 2 1(2,3) < 45 degF > 150 degF or FEED LN 1(2,3) < 45 degF > 120 degF or PUMP IN 1(2,3) < 45 degF > 125 degF or PUMP DRN LN 1 1(2,3) < 43 degF > 95 degF or PUMP DRN LN 2 < 43 degF 1(3) < 48 degF 2 > 140 degF 1(3) > 195 degF 2

S88 APU FU PMP 1(2,3)  
 If APU FUEL T: PUMP OUT 1(2,3) < 50 degF > 210 degF or PUMP BYP LN 1(2,3) < 60 degF > 200 degF or GG SPLY LN 1(2,3) < 60 degF > 200 degF

S88 APU H2O T 1(2,3)  
 If: H2O LN INJ < 40 degF 1(2,3) > 110 degF 1(3) > 190 degF 2

**Nominal Config:**  
 (A12)  
 APU HTR GAS GEN/FU PUMP 1,2,3 (three) – A AUTO(B AUTO)  
 APU HTR TK/FU LN/H2O SYS 1A,2A,3A (three) – AUTO(OFF)  
 1B,2B,3B (three) – OFF (AUTO)  
 (R2)  
 APU CNTLR PWR 1,2,3 (three) – OFF

**1.1b APU FUEL T: TK SURF ↓, TK HTR ↑↓, TEST LN 1(2) ↑↓, FEED LN ↑↓, PUMP IN ↑↓, PUMP DRN LN 1(2) ↑↓, PUMP OUT ↑↓, PUMP BYP LN ↑↓, GG SPLY LN ↑↓; H2O LN INJ ↑↓**



① Transducer shift or failure causes erroneous fuel qty computation. Fuel tank temperature constant will be substituted in calculation

**APU/HYD 1.1b (Cont)**

**SM FDA THERMAL LIMITS TABLE**

PARAM	XDCR RANGE degF	LOW LIMIT degF	HIGH LIMIT degF	SWITCHES
FUEL T				(A12) (2)
TK SURF	0-160	45		APU HTR TK/FU
TK HTR	0-160	45	140	LN/H2O/SYS
TEST LN 1	0-250	45	110	1B(2B,3B) –
LN 2	0-250	45	150	AUTO(OFF)
FEED LN	0-250	45	120	1A(2A,3A) –
PUMP IN	0-250	45	125	OFF(AUTO)
DRN LN 1	0-250	43	95	
LN 2	0-250	43	140 (3) (4)	
H2O LN INJ	-75-300	40	110 (5)	
FUEL T				(A12) (2)
PUMP OUT	0-250	50	210	APU HTR GAS GEN/
BYP LN	0-400	60	200	FU PUMP 1(2,3) –
GG SPLY LN	0-450	60	200	B AUTO(A AUTO)

(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

**APU/HYD**

**1.1c APU FUEL TK VLV T ↑↓**

SM  
ALERT

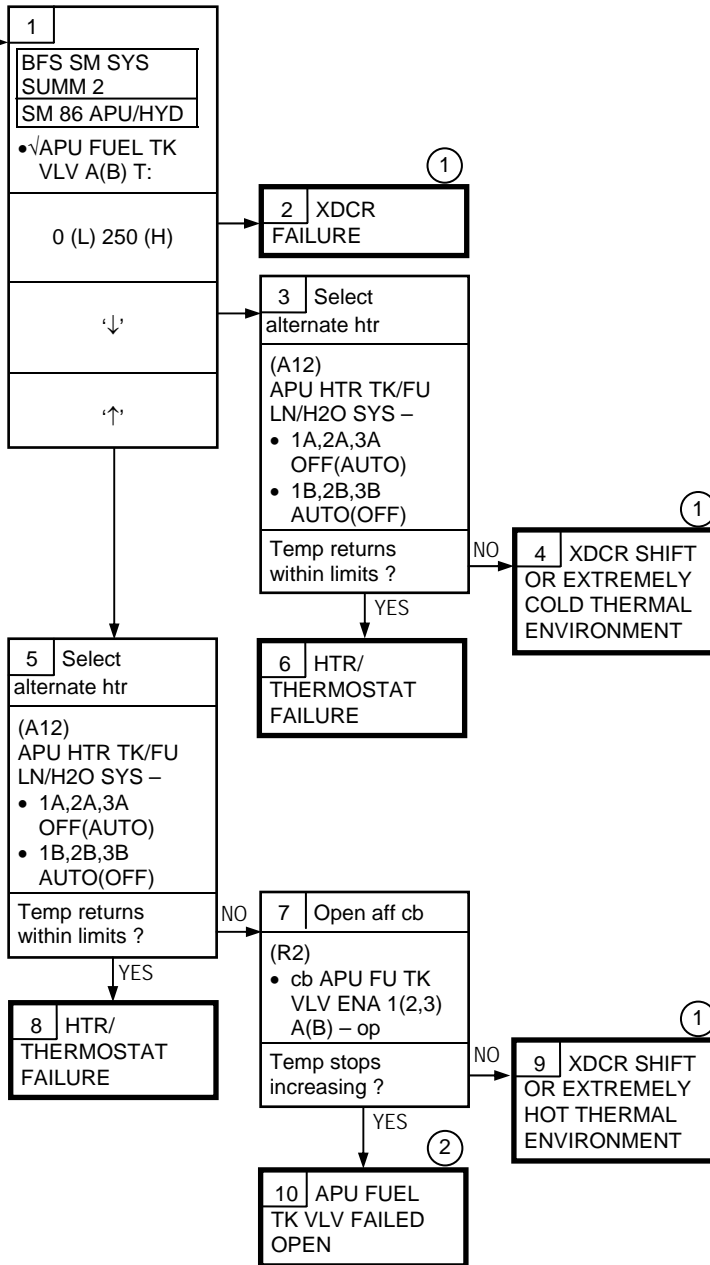
S86 FU TK  
VLV 1(2,3)

BFS  
SM2 FU TK  
VLV APU

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

**Nominal Config:**  
(A12)  
APU HTR TK/FU  
LN/H2O SYS  
1A(2A,3A) –  
AUTO(OFF)  
1B(2B,3B) – OFF  
(AUTO)

(R2)  
APU OPER  
1(2,3) – OFF  
APU FU TK VLV  
1(2,3) – CL  
cb APU FU TK VLV  
ENA 1A(2A,3A) –  
cl  
ENA 1B(2B,3B) –  
cl



① MCC has access to alternate Xdcrs

② Normal operation of APU available through other fuel tk vlv

HYD

1.2

**APU/HYD**

**1.2a RSVR P ↓, ACCUM P ↓**

SM ALERT

S86 RSVR/ACC P 1(2,3)

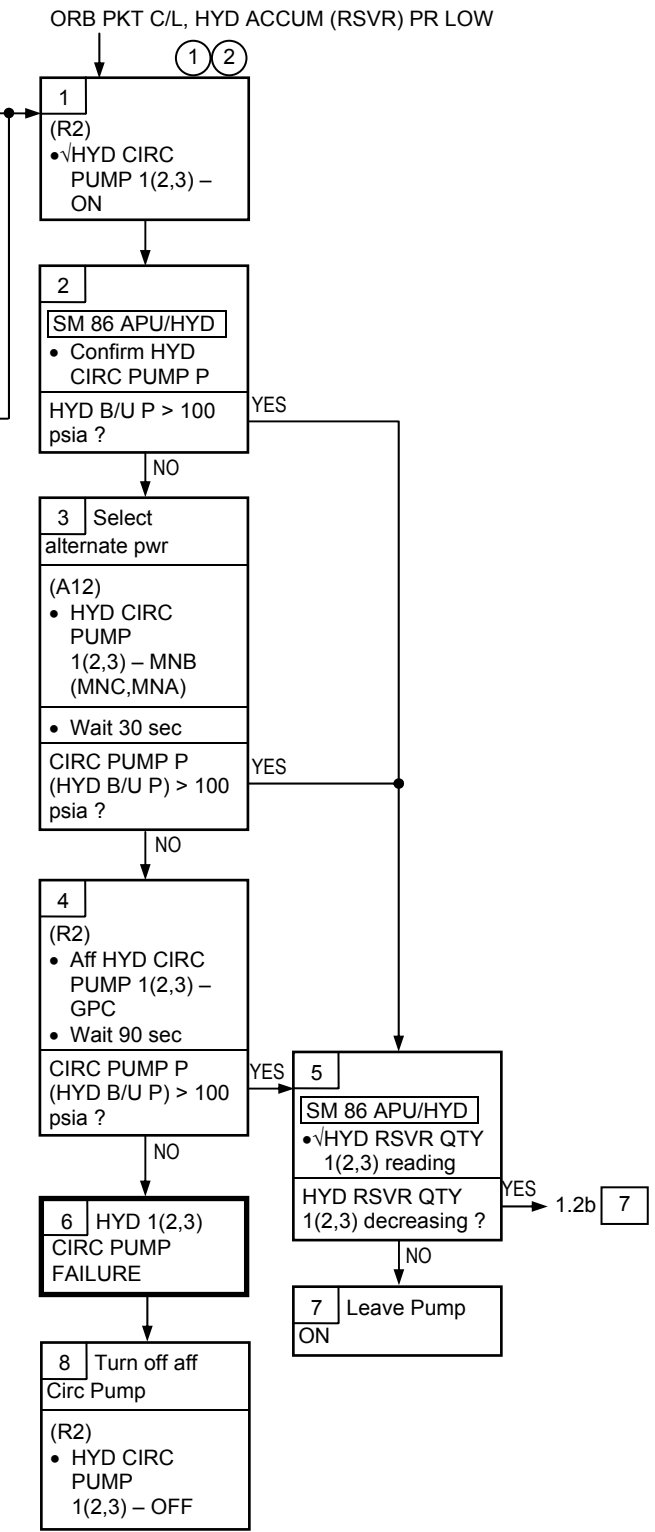
If:  
 HYD 1(2,3)  
 ACCUM 32 < P < 1930 psia  
 and/or  
 HYD 1(2,3) RSVR  
 2 < P < 28 psia

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 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

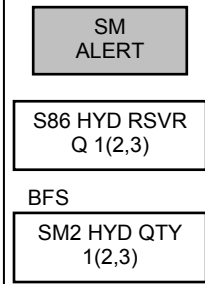
HYD

1.2



**APU/HYD**

**1.2b HYD RSVR QTY ↑↓**

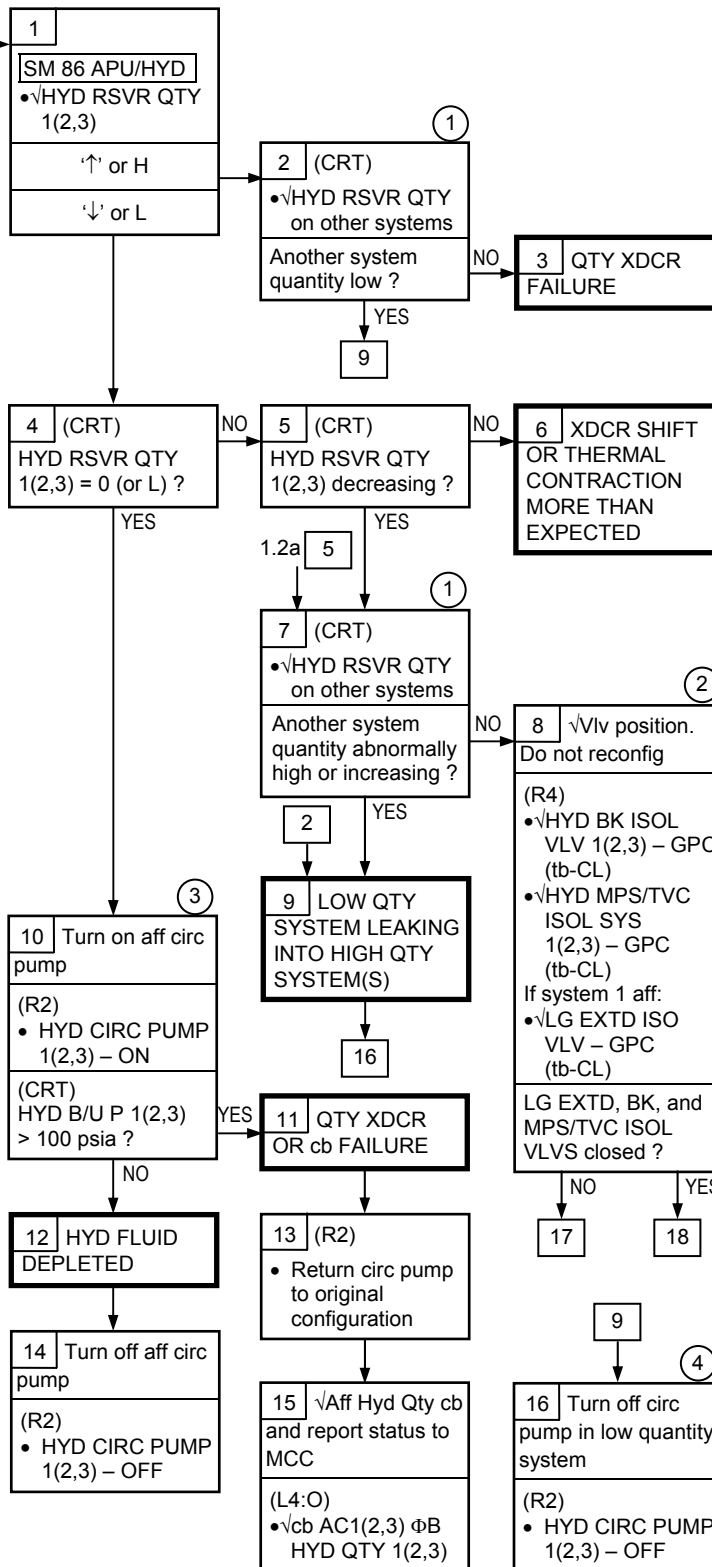


If:  
HYD RSVR QTY 1(2,3) < 40% or > 95%

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

**APU OFF Config:**  
(R2)  
HYD MN PUMP PRESS (three) – NORM  
HYD CIRC PUMP (three) – GPC (ON)  
BLR CNTLR/HTR (three) – A(B)  
BLR PWR (three) – OFF  
BLR N2 SPLY (three) – OFF

(R4)  
HYD BK ISOL VLV (three) – GPC (tb-CL)  
LG EXTD ISO VLV – GPC (tb-CL)  
HYD MPS/TVC ISOL SYS (three) – GPC (tb-CL)



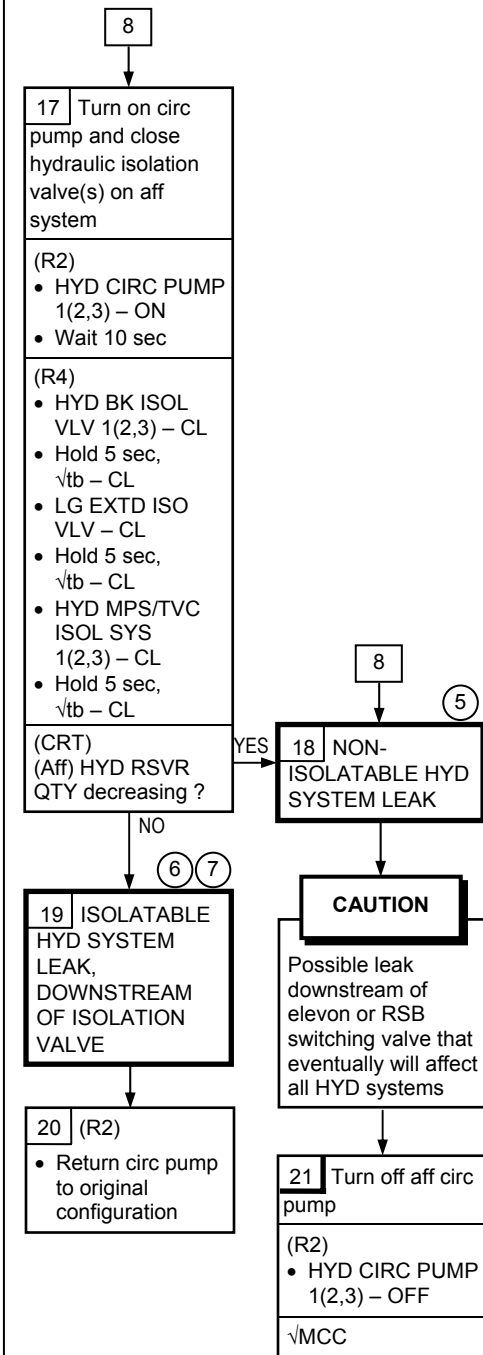
① Normal operating qty approx 60%, but compare qty with previous reading

② Circ pumps or APUs must be operating in order to operate LG EXTD, BK, and MPS/TVC ISOL VLVS if reqd

③ If BFS SYS SUMM 2, use HYD PRESS 1(2,3)

④ May be possible to pump fluid from high to low system by pressurizing high qty system relative to low qty system

**APU/HYD 1.2b (Cont)**



⑤ Hyd system may be lost for entry depending on the size of leak. Sys should remain OFF unless another system lost

⑥ Valve must be closed manually after automatic opening during entry

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

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THERMAL  
HYD

1.3

**APU/HYD**

**1.3a HYD CIRC PUMP P ↓**

**SM ALERT**

S87 CIRC PMP P 1(2,3)

If:  
 (R2)  
 HYD CIRC PUMP 1(2,3) – GPC and SM S/W issued ON command and HYD 1(2,3) CIRC PUMP P < 100 psia or HYD CIRC PUMP 1(2,3) – ON and HYD 1(2,3) CIRC PUMP P < 100 psia

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

ORB PKT C/L, HYD CIRC PUMP PRESS LOW

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

1  
**SM 86 APU/HYD (R2)**  
 • (Aff) HYD CIRC PUMP 1(2,3) – ON  
 • Wait 30 sec  
 HYD B/U P > 100 psia ?

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

3  
**SM 87 HYD THERMAL**  
 HYD CIRC PMP P > 100 psia ?

2

4 HYD CIRC PUMP 1(2,3) PRESS XDCCR FAILURE

5 Select alternate pwr  
 (A12)  
 • HYD CIRC PUMP PWR 1(2,3) – MNB (MNC, MNA)  
 (R2)  
 • (Aff) HYD CIRC PUMP 1(2,3) – ON  
 • Wait 30 sec  
 HYD CIRC PMP P (HYD B/U P) > 100 psia ?

6 MOMENTARY CIRC PUMP CAVITATION, INTERMITTENT PWR FAILURE, OR SLOW START

7 Resume normal ops in original config  
 (R2)  
 • (Aff) HYD CIRC PUMP 1(2,3) – GPC(ON)

8 HYD 1(2,3) CIRC PUMP PRI PWR FAILURE

NO

9  
 • Resume normal ops with alternate pwr selected  
 (R2)  
 • (Aff) HYD CIRC PUMP 1(2,3) – GPC(ON)

10 Select alternate power on remaining circ pumps  
 (A12)  
 • HYD CIRC PUMP PWR 1,2,3 – MNB, MNC, MNA

11 HYD 1(2,3) CIRC PUMP FAILURE

12 (R2)  
 • (Aff) HYD CIRC PUMP 1(2,3) – OFF

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

THERMAL  
 HYD  
 1.3

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APU/HYD  
SSR

## APU/HYD SSR-1 CIRC PUMP PRESS XDCR FAILURE WORKAROUND

To inhibit FDA alarm for affected Circ Pump

1. For Hyd Circ Pump 1 Press Xdcr failure:

SM 60 SM TABLE MAINT

ITEM 1 +0 5 8 0 1 3 7 EXEC

If Xdcr failed '↓' (low), or DSC LOSS (L), or OI MDM failed (M), ITEM 2 -1 EXEC

If Xdcr failed '↑' (high), ITEM 5 +8 0 1 EXEC

2. For Hyd Circ Pump 2 Press Xdcr failure:

SM 60 SM TABLE MAINT

ITEM 1 +0 5 8 0 2 3 7 EXEC

If Xdcr failed '↓' (low), or DSC LOSS (L), or OI MDM failed (M), ITEM 2 -1 EXEC

If Xdcr failed '↑' (high), ITEM 5 +8 0 1 EXEC

3. For Hyd Circ Pump 3 Press Xdcr failure:

SM 60 SM TABLE MAINT

ITEM 1 +0 5 8 0 3 3 7 EXEC

If Xdcr failed '↓' (low), or DSC LOSS (L), or OI MDM failed (M), ITEM 2 -1 EXEC

If Xdcr failed '↑' (high), ITEM 5 +8 0 1 EXEC

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

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

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

SM 60 SM TABLE MAINT

ITEM 16 +0 9 2 1 7 4 2 EXEC

ITEM 17 +8 0 0 EXEC

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

SM 60 SM TABLE MAINT

ITEM 16 +0 9 2 1 8 4 2 EXEC

ITEM 17 +8 0 0 EXEC

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

SM 60 SM TABLE MAINT

ITEM 16 +0 9 2 1 9 4 2 EXEC

ITEM 17 +8 0 0 EXEC

## APU/HYD SSR-3 CIRC PUMP XDCR FAILURE WORKAROUND

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

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

SM 60 SM TABLE MAINT
----------------------

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

- (A) Choose the appropriate lower limit parameter ID number from table
- (B) Choose the appropriate upper limit parameter ID number from table

**APU/HYD SSR-3 (Cont)**

**HYDRAULIC SYSTEM 1 PARAMS**

Param Name	Pump SW Control Constants				FDA		MDM	DSC
	Low limit		High limit		Low limit	High limit		
	ID Number	Value	ID Number	Value	degF	degF		
LINE TEMPS								
ELEVON LOB1	0921728	-30 degF	0921729	-10 degF	-40	250	OF4	OM1
ROB1	0921722	-30 degF	0921723	-10 degF	-40	250	OA2	OM2
RD/SB PDU1	0921738	-35 degF	0921739	-10 degF	-40	250	OA1	OA1
FUS1	0921736	-30 degF	0921737	-10 degF	-40	250	OA2	OA2
BDYFLP FUS1	0921718	-30 degF	0921719	-10 degF	-40	250	OA1	OA1
HYD								
ACCUM P1	0921740	1960 psi	NONE		1930 psi		OA1	OM3
RSVR P1	0920142	32 psi	NONE		28 psi		OA1	OA1

**HYDRAULIC SYSTEM 2 PARAMS**

Param Name	Pump SW Control Constants				FDA		MDM	DSC
	Low limit		High limit		Low limit	High limit		
	ID Number	Value	ID Number	Value	degF	degF		
LINE TEMPS								
ELEVON LIB2	0921822	-30 degF	0921823	-10 degF	-40	250	OF4	OM2
ROB2	0921816	-30 degF	0921817	-10 degF	-40	250	OF4	OM1
RD/SB PDU2	0921832	-35 degF	0921833	-10 degF	-40	250	OA1	OA1
FUS2	0921830	-30 degF	0921831	-10 degF	-40	250	OA2	OA2
BDYFLP PDU2	0921814	-35 degF	0921815	-10 degF	-40	250	OA1	OA1
HYD								
ACCUM P2	0921834	1960 psi	NONE		1930 psi		OA2	OM2
RSVR P2	0920143	32 psi	NONE		28 psi		OA2	OA2

**HYDRAULIC SYSTEM 3 PARAMS**

Param Name	Pump SW Control Constants				FDA		MDM	DSC
	Low limit		High limit		Low limit	High limit		
	ID Number	Value	ID Number	Value	degF	degF		
LINE TEMPS								
ELEVON LOB3	0921920	-30 degF	0921921	-10 degF	-40	250	OA2	OM2
RIB3	0921918	-30 degF	0921919	-10 degF	-40	250	OF4	OM2
RD/SB PDU3	0921930	-35 degF	0921931	-10 degF	-40	250	OA1	OA1
BDYFLP PDU3	0921914	-35 degF	0921915	-10 degF	-40	250	OA3	OA3
HYD								
ACCUM P3	0921932	1960 psi	NONE		1930 psi		OA3	OM2
RSVR P3	0920144	32 psi	NONE		28 psi		OA3	OA3



# APU/HYD SSR-4

## APU FUEL TK P XDRC FAILURE WORKAROUND

Selection of alternate xdcr for APU fuel comp

1. For APU 1 FUEL QTY:

**SM 60 SM TABLE MAINT**

ITEM 16 +0 9 2 2 1 5 0 EXEC  
ITEM 17 +0 EXEC  
ITEM 16 +0 9 2 2 1 5 2 EXEC  
ITEM 17 +1 EXEC

2. For APU 2 FUEL QTY:

**SM 60 SM TABLE MAINT**

ITEM 16 +0 9 2 2 2 5 0 EXEC  
ITEM 17 +0 EXEC  
ITEM 16 +0 9 2 2 2 5 2 EXEC  
ITEM 17 +1 EXEC

3. For APU 3 FUEL QTY:

**SM 60 SM TABLE MAINT**

ITEM 16 +0 9 2 2 3 5 0 EXEC  
ITEM 17 +0 EXEC  
ITEM 16 +0 9 2 2 3 5 2 EXEC  
ITEM 17 +1 EXEC

# APU/HYD SSR-5

## APU FUEL LEAK (NONISOLATABLE)

- Before proceeding, √MCC
- R2 1. STEAM VENT HTR ACTIVATE  
BLR PWR X – ON  
√CNTLR/HTR (three) – B(A)
- O14:F,  
O15:F,  
O16:F  
O17:A  
C3  
O6  
C3(A6U)
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
- O14:F,  
O15:F
3. DPS CONFIG  
√MMU 1,2 – ON  
  
Perform G2 TO G8 TRANSITION (ORB OPS, DPS)  
Use the "If FCS Checkout" steps (TFL change required)  
1: GNC, FCS/DED DIS C/O
- R4  
R2
4. APU PRESTART  
2: SM 86 APU/HYD  
√HYD BK ISOL VLV X tb – CL  
√LG EXTD ISO VLV tb – CL  
BLR N2 SPLY X – ON  
HYD CIRC PUMP X – OFF  
√cb APU FU TK VLV ENA (six) – cl  
√APU FU TK VLV (three) – CL  
√AUTO SHTDN (three) – ENA  
√SPEED SEL (three) – NORM  
√OPER (three) – OFF  
HYD MN PUMP PRESS X – LO  
APU CNTLR PWR X – ON  
  
Inform MCC: READY FOR APU START  
  
Wait for MCC GO
- R2
5. APU START  
APU FU TK VLV X – OP  
√APU/HYD RDY X tb – gray  
  
\* If tb – bp, √MCC \*
- 00:00
- HYD/APU  
R2
- Start Event Timer  
APU OPER X – START/RUN  
√HYD PRESS X ind – LO green  
√APU/HYD RDY X tb – bp  
  
\* If APU did not start normally: \*  
\* APU OPER X – OFF \*  
\* FU TK VLV X – CL \*  
\* √Shutdn (HYD PRESS < 200) \*  
\* Report APU F7 Its \*  
\* APU CNTLR PWR X – OFF \*  
\* √MCC \*
- HYD/APU
- HYD MN PUMP PRESS X – NORM  
√HYD PRESS X ind – HI green
- R4
6. MPS/TVC ISOL VLV CONFIG  
HYD MPS/TVC ISOL VLV SYS X – OP (hold 5 sec, tb–OP)

## APU/HYD SSR-5 (Cont)

- CRT1 7. AEROSURFACE DRIVE  
SURF DR START – ITEM 10 EXEC (\*)
- NOTE  
Pos '↓' may be indicated until HYD SYS is warm
- C3 \* If FCS CH failure (↓) port status, reset aff FCS CH: \*  
\* FCS CH – ORIDE \*  
\* – AUTO \*
8. SECONDARY ACTUATOR CHECK  
On MCC GO:  
After ≥ 30 sec of aerosurface drive:  
SURF DR STOP – ITEM 11 EXEC (\*)  
√Surfaces not moving
- NOTE  
If port does not bypass during check, bypass aff port after APU shutdn:  
SEC ACT BYPASS – ITEM 21 +X X EXEC  
If aff port still does not bypass:  
SEC ACT RESET – ITEM 22 +X X EXEC  
(See DPS DICT, GNC, OPS G8 FOR ITEM ENTRY values)
- CRT1 a. √POS STIM ENA, ITEM 20 – (\*)  
C3 b. √FCS CH 1,2,3,4 – AUTO  
CRT1 c. SEC ACT CK, CH 1 – ITEM 15 EXEC (\*)  
d. √All CH 1 ports bypass '↓'  
STOP – ITEM 19 EXEC (\*)  
C3 e. FCS CH 1 – ORIDE  
CRT1 √All CH 1 ports reset (no ↓)  
C3 FCS CH 1 – AUTO  
f. Repeat steps c thru e for CH 2, 3, 4  
CRT1 g. NEG STIM – ITEM 20 EXEC (no \*)  
h. Repeat steps b thru f
- SURF DR START – ITEM 10 EXEC (\*)
9. APU FUEL DEPLETION AND AERO DRIVE TERMINATION  
After APU shuts down due to fuel depletion:  
SURF DR STOP – ITEM 11 EXEC (\*)
- NOTE  
'AERO DRIVE' Fault Msg may occur after APU shutdown.
- \* If continuous 'AERO DRIVE' Fault Msg: \*  
\* ITEM 15 EXEC (\*) \*
- R2 10. APU SHUTDOWN  
BLR PWR X – OFF  
APU OPER X – OFF  
FU TK VLV X – CL  
√Shutdn (HYD PRESS < 200)  
APU CNTLR PWR X – OFF  
BLR N2 SPLY X – OFF
11. HYD RECONFIG  
HYD CIRC PUMP X – ON  
Wait 10 sec  
R4 HYD MPS/TVC ISOL VLV SYS X – CL (hold 5 sec, tb-CL)  
R2 CIRC PUMP X – GPC
12. GNC/DPS RECONFIG  
Perform G8 TO G2 TRANSITION (ORB OPS, DPS)  
ASA (four) – 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 FUEL T 1 TK HTR

**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 FUEL T 1 TK HTR (from SPEC 88) EXEC

2. For APU 2 QTY:

**SM 88 APU/ENVIRON THERM**

Note: APU FUEL T 2 TK HTR

**SM 60 SM TABLE MAINT**

ITEM 16 +0 9 2 2 2 6 0 EXEC

ITEM 17 +0 EXEC

ITEM 16 +0 9 2 2 2 4 0 EXEC

ITEM 17 +APU FUEL T 2 TK HTR (from SPEC 88) EXEC

3. For APU 3 QTY:

**SM 88 APU/ENVIRON THERM**

Note: APU FUEL T 3 TK HTR

**SM 60 SM TABLE MAINT**

ITEM 16 +0 9 2 2 3 6 0 EXEC

ITEM 17 +0 EXEC

ITEM 16 +0 9 2 2 3 4 0 EXEC

ITEM 17 +APU FUEL T 3 TK HTR (from SPEC 88) EXEC

COMM

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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

COMM

2

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AUDIO

2.1

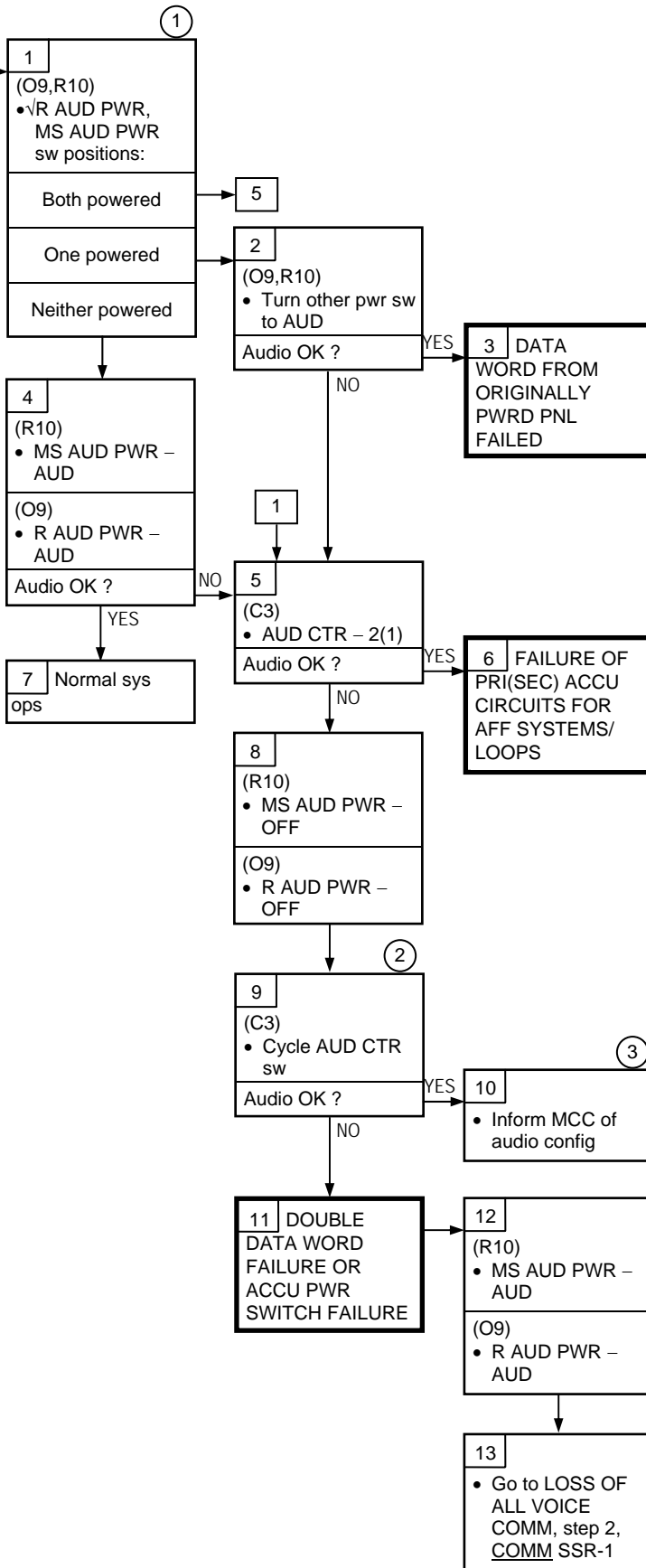
**COMM**

**2.1a NO AUDIO  
(MULTIPLE PNL OR OTHER SUBSYSTEM)**

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

**Nominal Config:**

- (R14:A)  
cb MNA AUD MS  
cb MNB AUD  
MIDDECK SPKR – cl  
cb MNC AUD AUD  
CTR 2 – cl  
cb MNC AUD  
PS/AIRLK – cl  
(R14:F)  
cb ESS 1BC  
AUD L – cl  
cb ESS 2CA  
AUD R – cl  
cb ESS 2CA AUD  
AUD CTR 1 – cl  
(C3)  
AUD CTR – 1  
(R10)  
MS AUD PWR –  
AUD/TONE  
(O9)  
R AUD PWR –  
AUD/TONE  
  
(R14:A)  
cb MNA AUD  
MS/OS – cl  
cb MNB AUD  
MIDDECK  
SPKR/CCU – cl



① MS or R AUDIO pnl must be pwr'd (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



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**COMM**

**2.2a GCIL CONFIG: PNL,  
 KU GMBL TEMP A ↑,  
 KU GMBL TEMP B ↑,  
 KU GYRO TEMP ↑,  
 KU PA TEMP ↑**

SM  
ALERT

- S76 GCIL FAIL
- S76 KU-GMBL A TEMP
- S76 KU-GMBL B TEMP
- S76 KU-GYRO TEMP
- S76 KU-XMTR TEMP

GCIL CONFIG:  
 PNL  
 KU-BAND  
 GMBL A > 150  
 KU-BAND  
 GMBL B > 166  
 GYRO temp > 155  
 KU PA temp > 171

1  
 SM 76  
 COMMUNICATIONS  
 Which param is out of tolerance:  
 KU PA TEMP ↑  
 GCIL CONFIG: PNL ↓  
 KU-BAND GMBL TEMP  
 A ↑, B ↑, or GYRO  
 TEMP ↑

3  
 If AOS:  
 •√MCC  
 If LOS:  
 (R14:C)  
 • cb MNB KU ANT  
 HTR – op

4 MOMENTARY  
 OR CONTINUOUS  
 LOSS OF PWR TO  
 GCIL, WHICH  
 CAUSED COMM  
 SYS CONFIG TO  
 REVERT TO THAT  
 INDICATED BY sw  
 ON PNL A1

5  
 •√MCC for GCIL  
 status

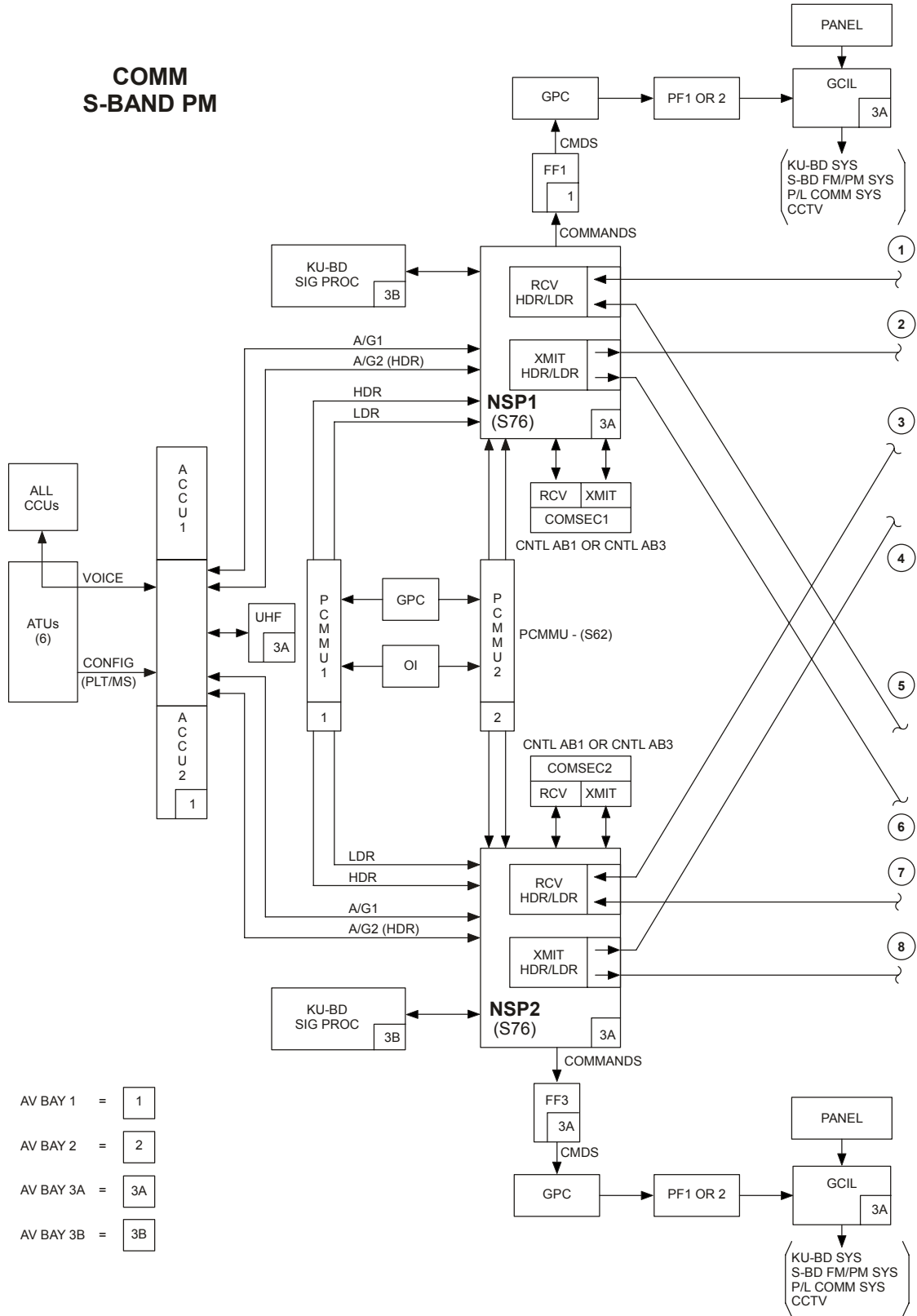
2  
 If AOS:  
 •√MCC  
 If LOS:  
 (A1U)  
 • KU PWR –  
 STBY  
 • KU CNTL –  
 PNL,CMD

① 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

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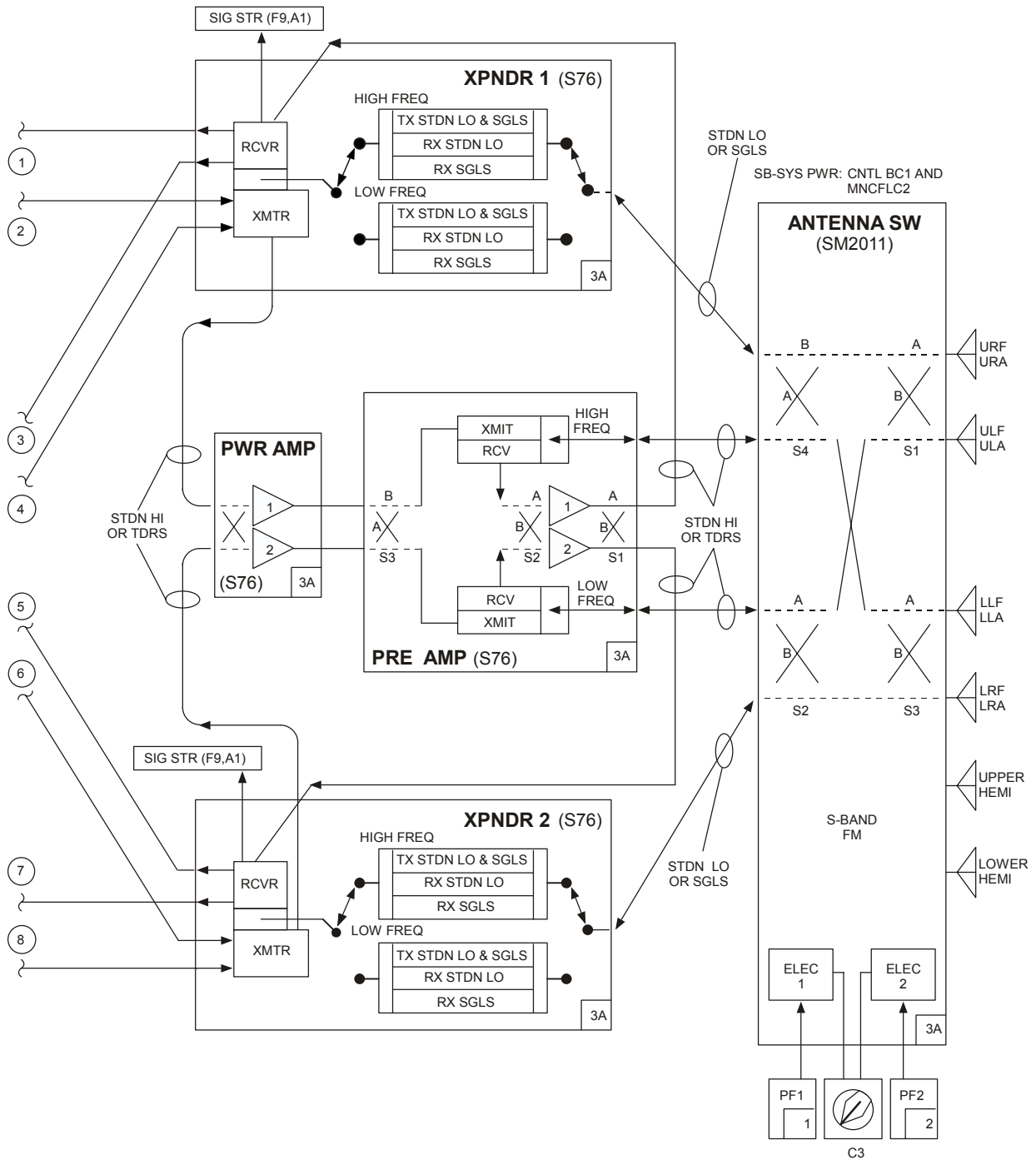
# SB-SYS 1 PWR: CNTLBC1 AND MNBFLC2

## COMM S-BAND PM



S-BD/UHF

# SB-SYS 2 PWR: CNTLBC2 AND MNCFLC3



**UPLINK/DOWNLINK COMMUNICATIONS TABLE**

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

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

**COMM**

**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

1 Verify comm system  
config

SM 76		
COMMUNICATIONS		
•√Display		TDRS
S-BAND PM		
ANT ELEC 1	ON	
XPNDR 1	ON	
PREAMP 1	ON	
PWR AMPL 1		
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 ?

NO → 7

YES → 1

2 Check for Ku-Band  
coverage

(A1U)

- √SIGNAL STR sw – Ku

Meter > 1 ?

NO → 13

YES

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 ?

YES → 4

NO

5 DUAL NSP OR UNEXPLAINED FAILURE

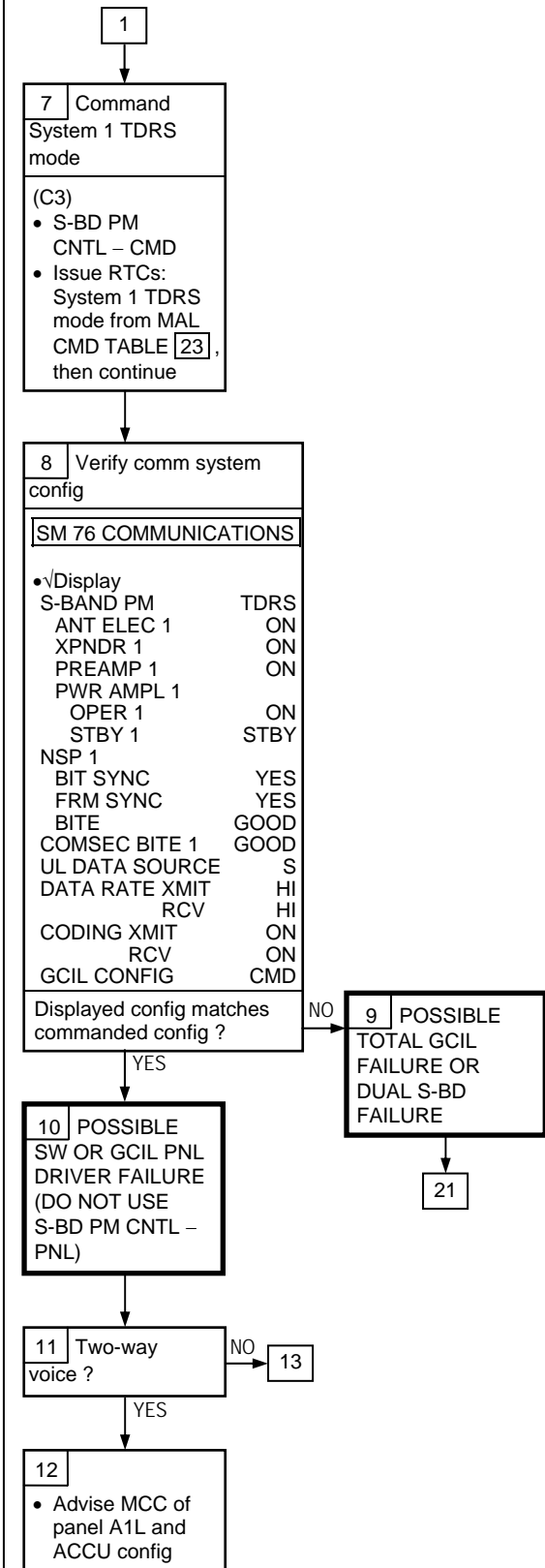
21

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

6 Advise MCC of panel A1L and ACCU config

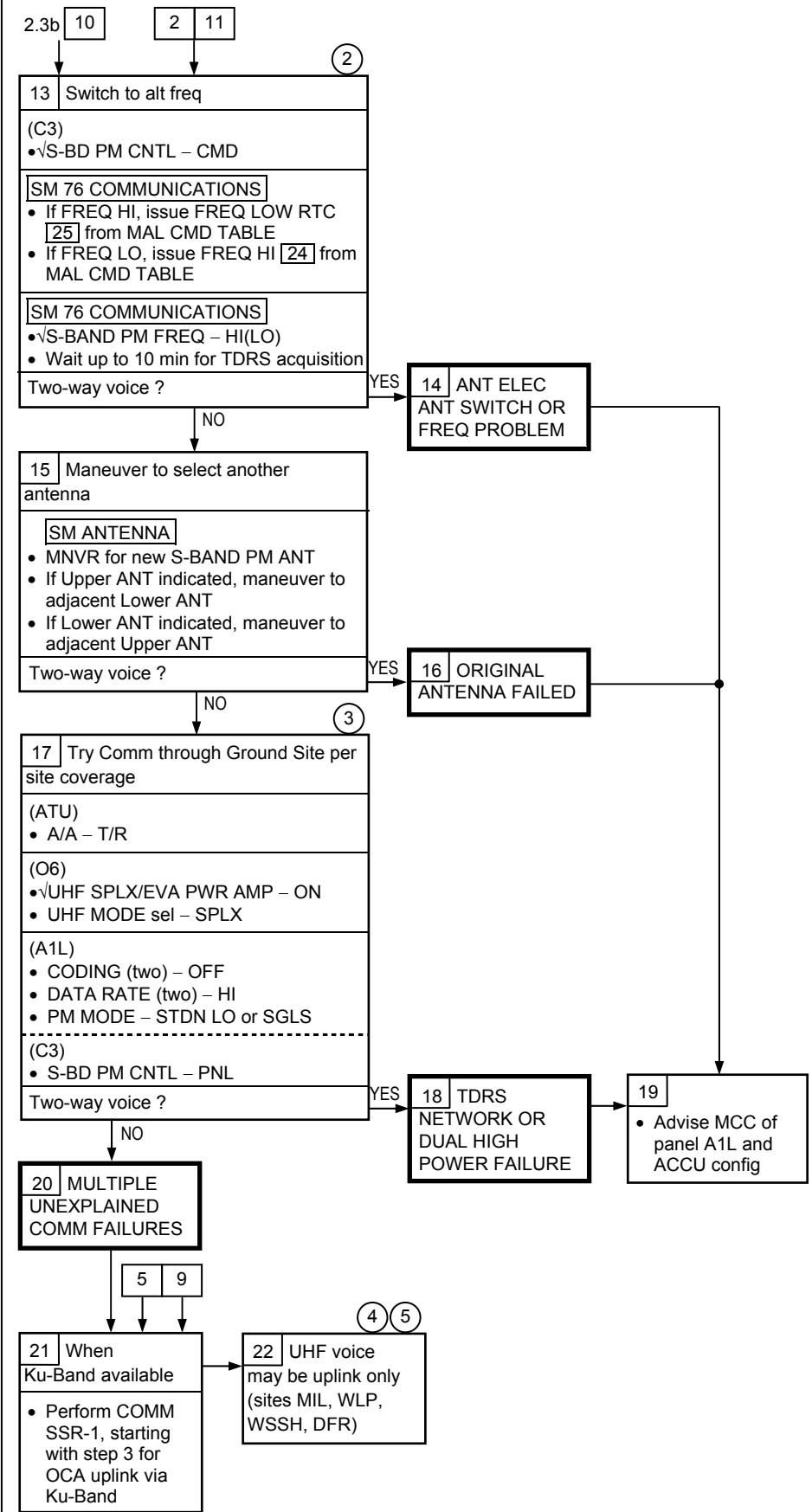
① Assumes Ku-Band deployed activated and comm mode

**COMM 2.3a (Cont)**





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

**COMM 2.3a (Cont)**

⑥ The RTC (RESET PL1 or PL2) must be sent prior to any command

⑦ CMD only those RTCs which do not match the expected comm config in block 1

<b>MAL CMD TABLE</b>	
<p><b>23   SYSTEM 1 TDRS MODE</b></p> <p><b>SM 1 DPS UTILITY</b> <span style="float: right;">⑥ ⑦</span></p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 1 0 9 0 1 F F EXEC (PL1) or 7 1 0 A 0 1 F F EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p>Issue RTC (PWR AMP 1 OPR ON)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 3 3 EXEC (PL1) or 7 9 0 A 0 0 3 3 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (TDRS S-BD MODE)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 F 1 EXEC (PL1) or 7 9 0 A 0 0 F 1 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (ANT ELEC SW1 ON)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 1 F EXEC (PL1) or 7 9 0 A 0 0 1 F EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (XPNDR 1 ON)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 3 E EXEC (PL1) or 7 9 0 A 0 0 3 E EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (PREAMP 1 ON)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 3 9 EXEC (PL1) or 7 9 0 A 0 0 3 9 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (NSP 1 ON)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 5 0 EXEC (PL1) or 7 9 0 A 0 0 5 0 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (DNLINK – HDR)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 5 3 EXEC (PL1) or 7 9 0 A 0 0 5 3 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <ul style="list-style-type: none"> <li>• Reissue RTC (RESET PL1 or PL2) above</li> </ul> <p>Issue RTC (UPLINK – HDR)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 7 EXEC (PL1) or 7 9 0 A 0 0 7 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul>	<p><b>24   FREQ HI</b></p> <p><b>SM 1 DPS UTILITY</b></p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 1 0 9 0 1 E E EXEC (PL1) or 7 1 0 A 0 1 E E EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p>Issue – RTC (XPNDR/PREAMP FREQ – HI)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 4 A EXEC (PL1) or 7 9 0 A 0 0 4 A EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p><b>25   FREQ LOW</b></p> <p><b>SM 1 DPS UTILITY</b></p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 1 0 9 0 1 E E EXEC (PL1) or 7 1 0 A 0 1 E E EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p>Issue RTC (XPNDR/PREAMP FREQ – LOW)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 4 9 EXEC (PL1) or 7 9 0 A 0 0 4 9 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p><b>26   STDN LO</b></p> <p><b>SM 1 DPS UTILITY</b></p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 1 0 9 0 1 E E EXEC (PL1) or 7 1 0 A 0 1 E E EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p>Issue RTC (XPNDR MODE - STDN LOW)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 4 3 EXEC (PL1) or 7 9 0 A 0 0 4 3 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p><b>27   SGLS</b></p> <p><b>SM 1 DPS UTILITY</b></p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 1 0 9 0 1 E E EXEC (PL1) or 7 1 0 A 0 1 E E EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul> <p>Issue RTC (XPNDR MODE – SGLS)</p> <ul style="list-style-type: none"> <li>• RTC – ITEM 13 +7 9 0 9 0 0 4 4 EXEC (PL1) or 7 9 0 A 0 0 4 4 EXEC (PL2)</li> <li>• CMD – ITEM 14 EXEC</li> </ul>

**COMM**

**2.3b 'ANTENNA'**

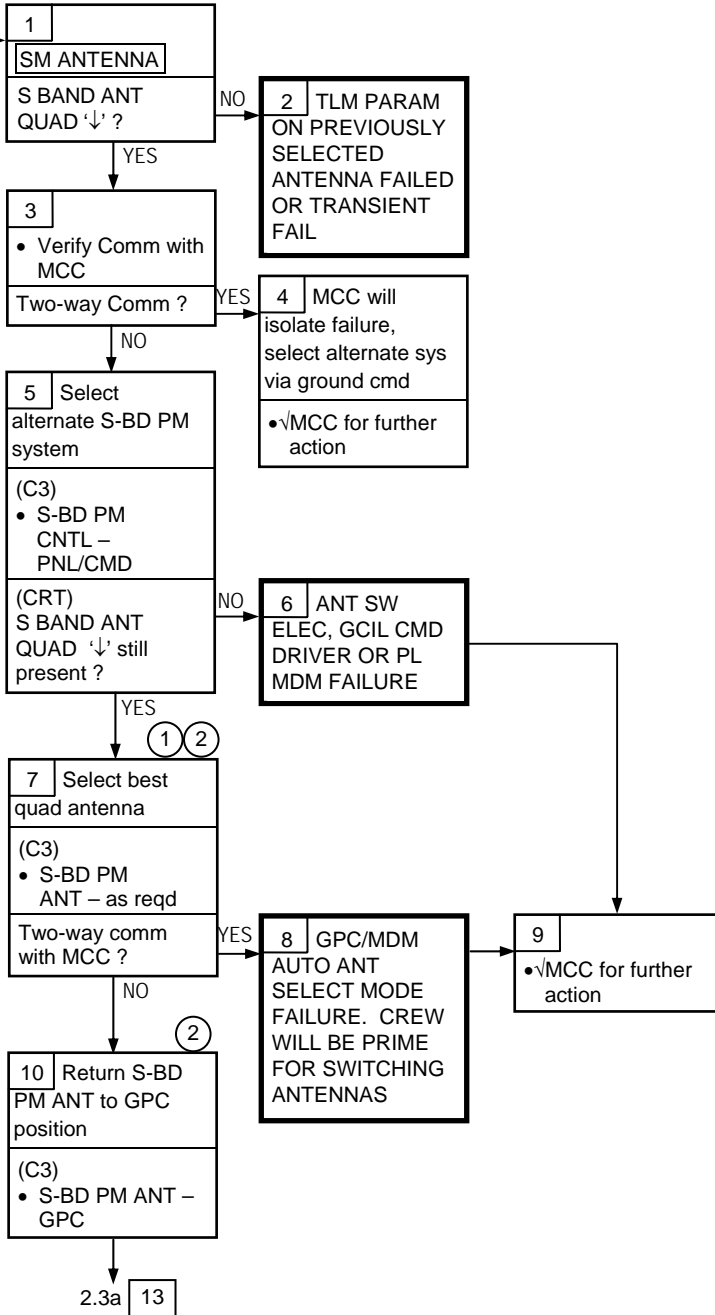
SM ALERT

ANTENNA

If:  
Actual selected quad antenna not the same as S/W commanded antenna, MDM OF3 or OF4 failure, antenna electronics failure, CNTL BC1 failure, PF MDM failure

**Nominal Config:**

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



① Switch failures may prevent certain antennas from being selected

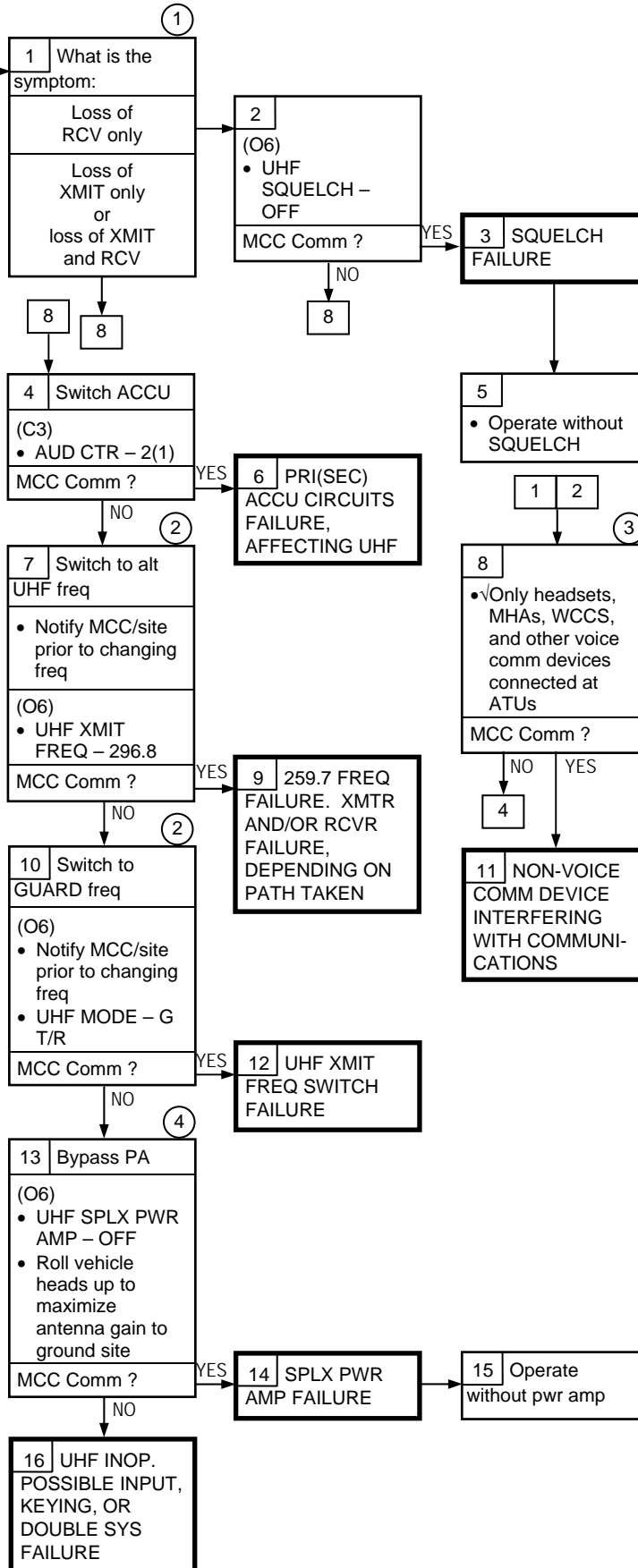
② Pause 2 sec between antenna selections

**COMM**

**2.3c NO UHF VOICE (MULTI PNLS)**

Loss of UHF Voice

**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



① XMTR range is 350 miles with PWR AMP

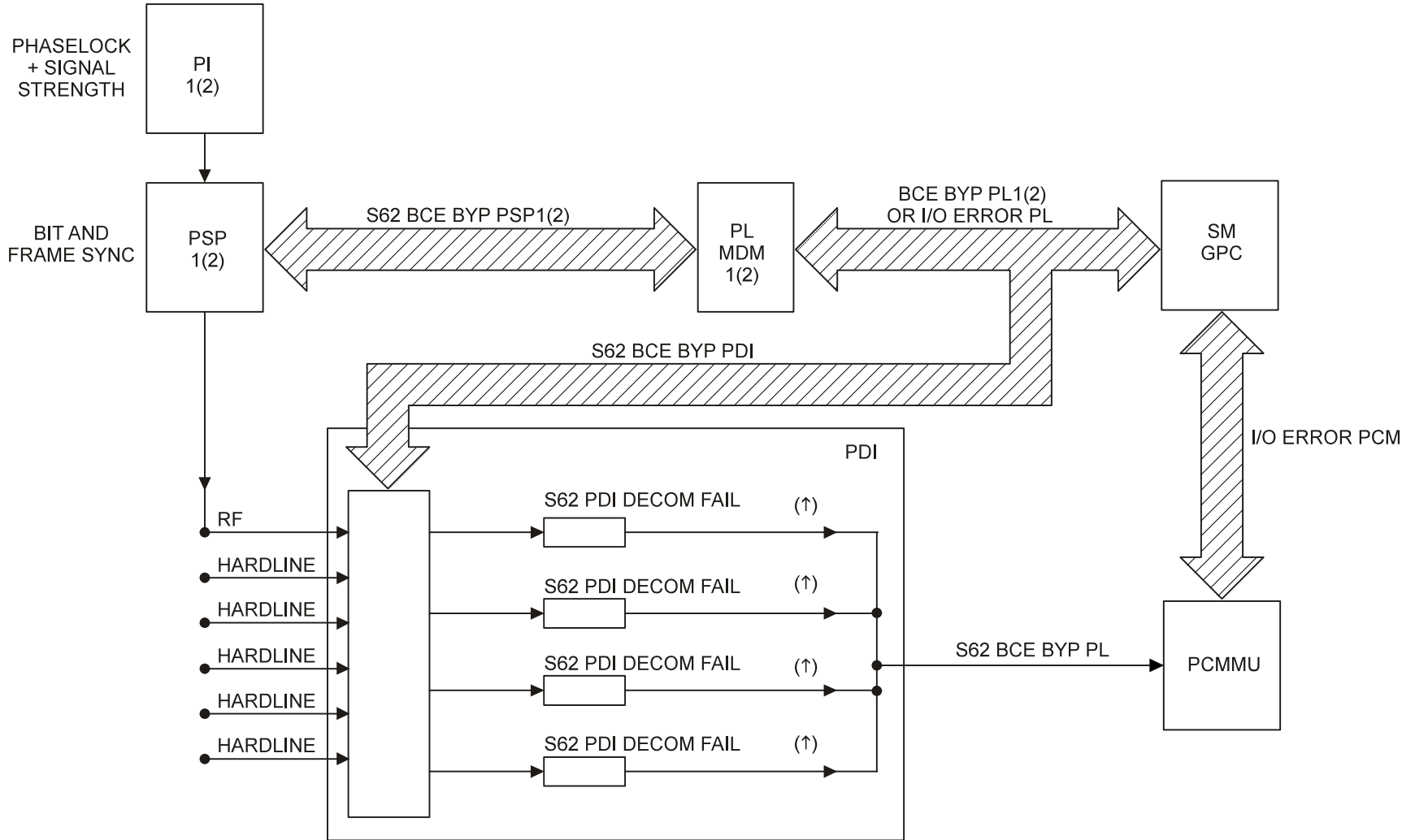
② Up to 30 sec may be reqd for MCC/site response

③ Example: PADM provides constant UHF key if ATU configured to T/R. Loss of UHF comm would result

④ This step will limit UHF XMIT range

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### PL COMM MALFUNCTION POINTS



02/06/07

2-18

MAL/ALL/GEN I

**COMM**

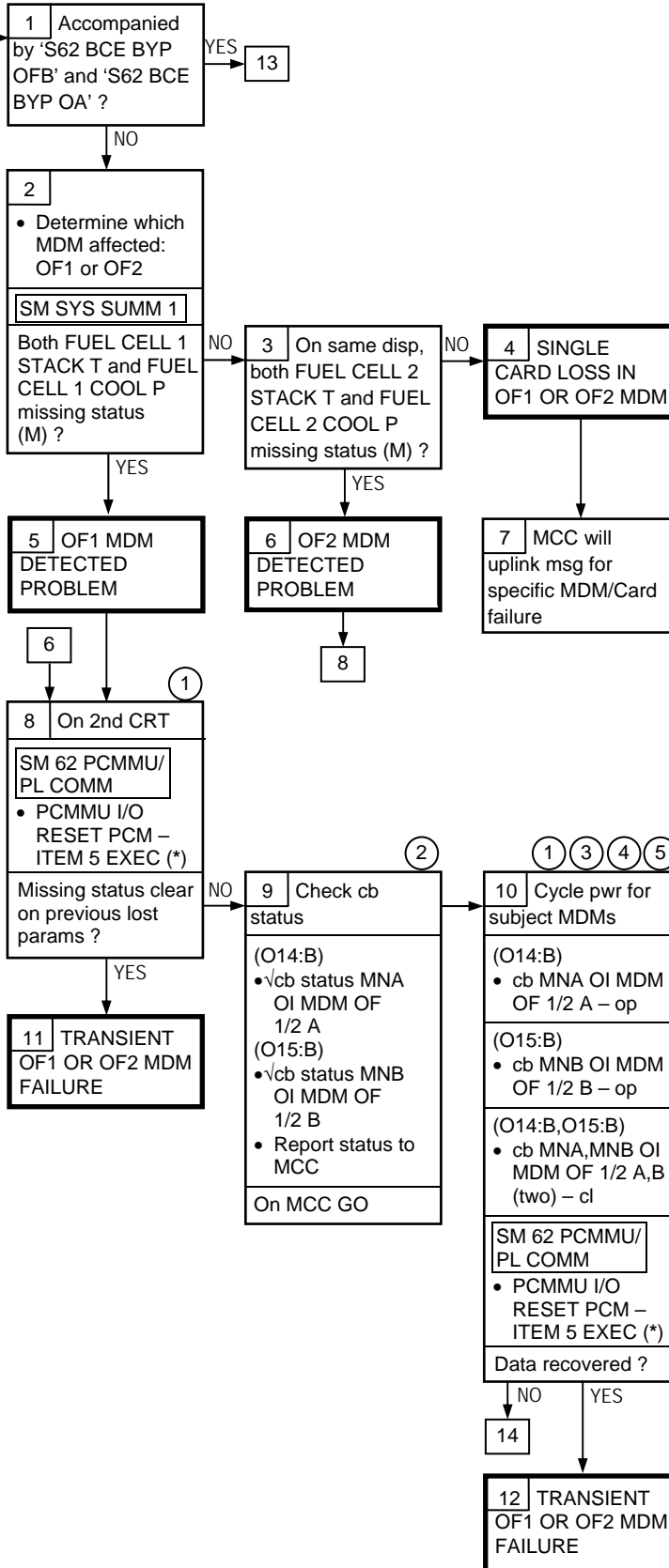
**2.4a 'S62 BCE BYP OFA'**

SM ALERT

S62 BCE BYP OFA

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



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

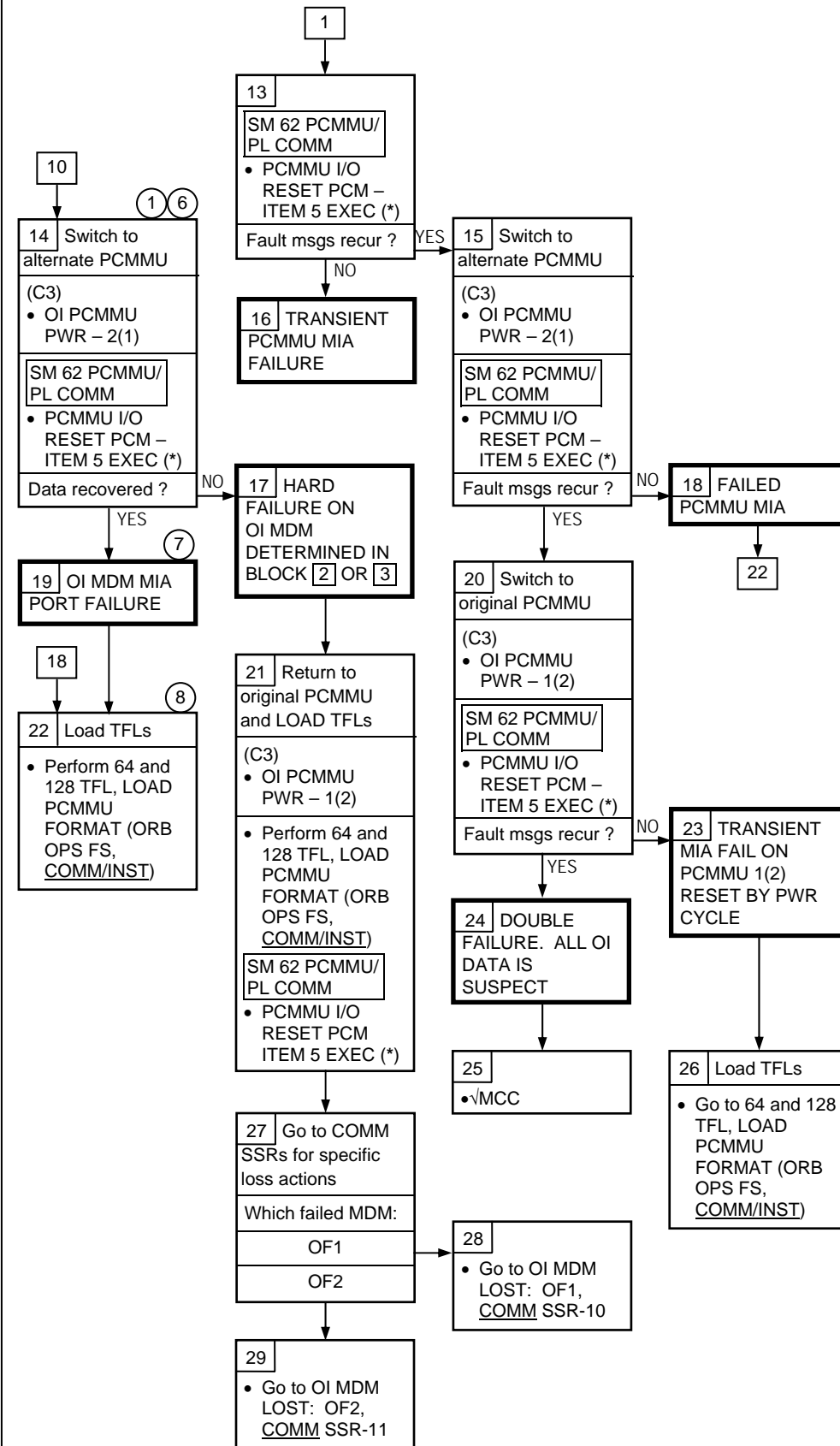
② Must obtain GO from MCC for cb cycle before proceeding to step 10

③ Additional SM alerts when power is removed

④ Do not close any cb found (reported) OPEN (tripped) without MCC consent

⑤ Both cbs must be open for 3 to 5 seconds to remove power from the MDM

**COMM 2.4a (Cont)**



- ① I/O RESET PCM may cause additional SM alerts if continuing problems with OI MDMs or PDI
- ⑥ Advise MCC of PCMMU switch
- ⑦ Full data recovered by PCMMU switch. Redundant path to OF1(2) MDM lost
- ⑧ Change WINDECOM connections (O5,MO30F) as reqd



**COMM**

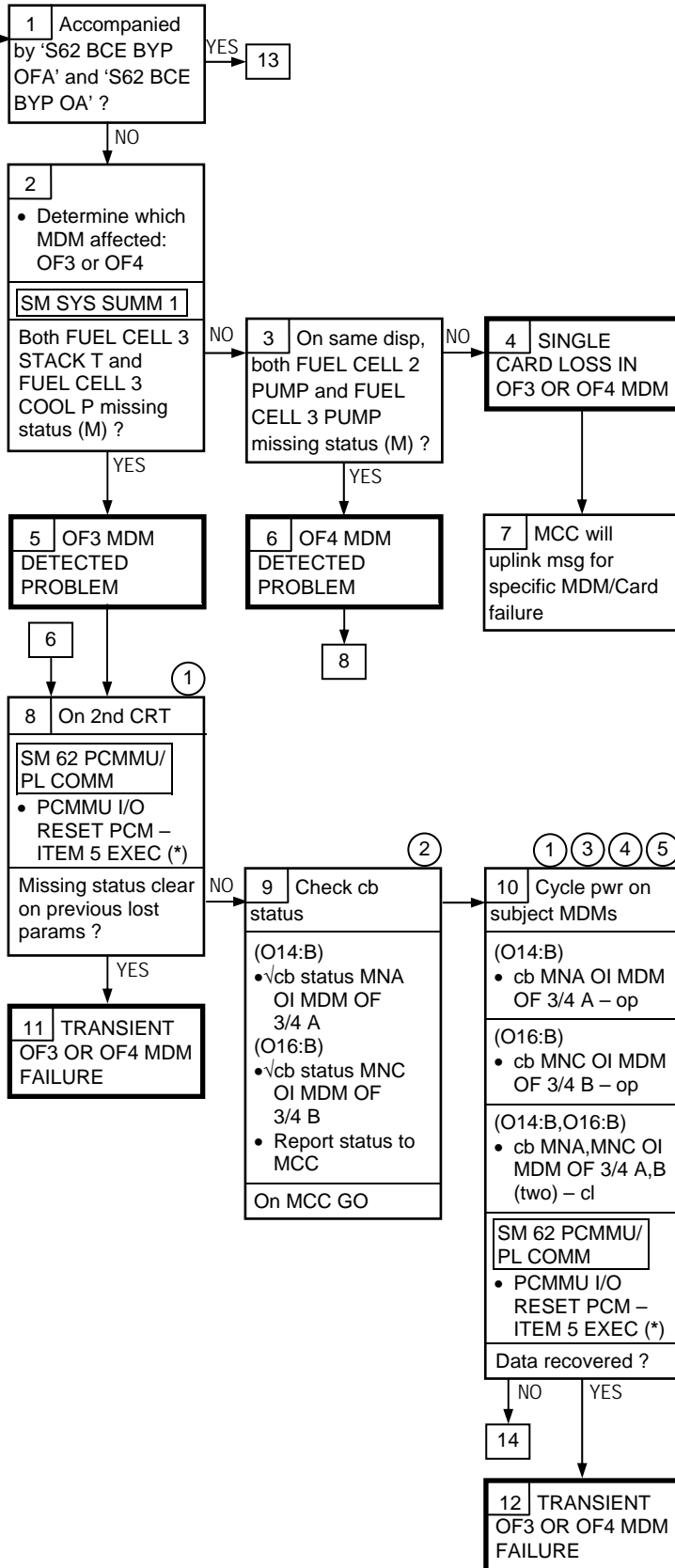
**2.4b 'S62 BCE BYP OFB'**

**SM ALERT**

S62 BCE BYP OFB

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,MNC OI MDM OF 3/4 A,B (two) – cl



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

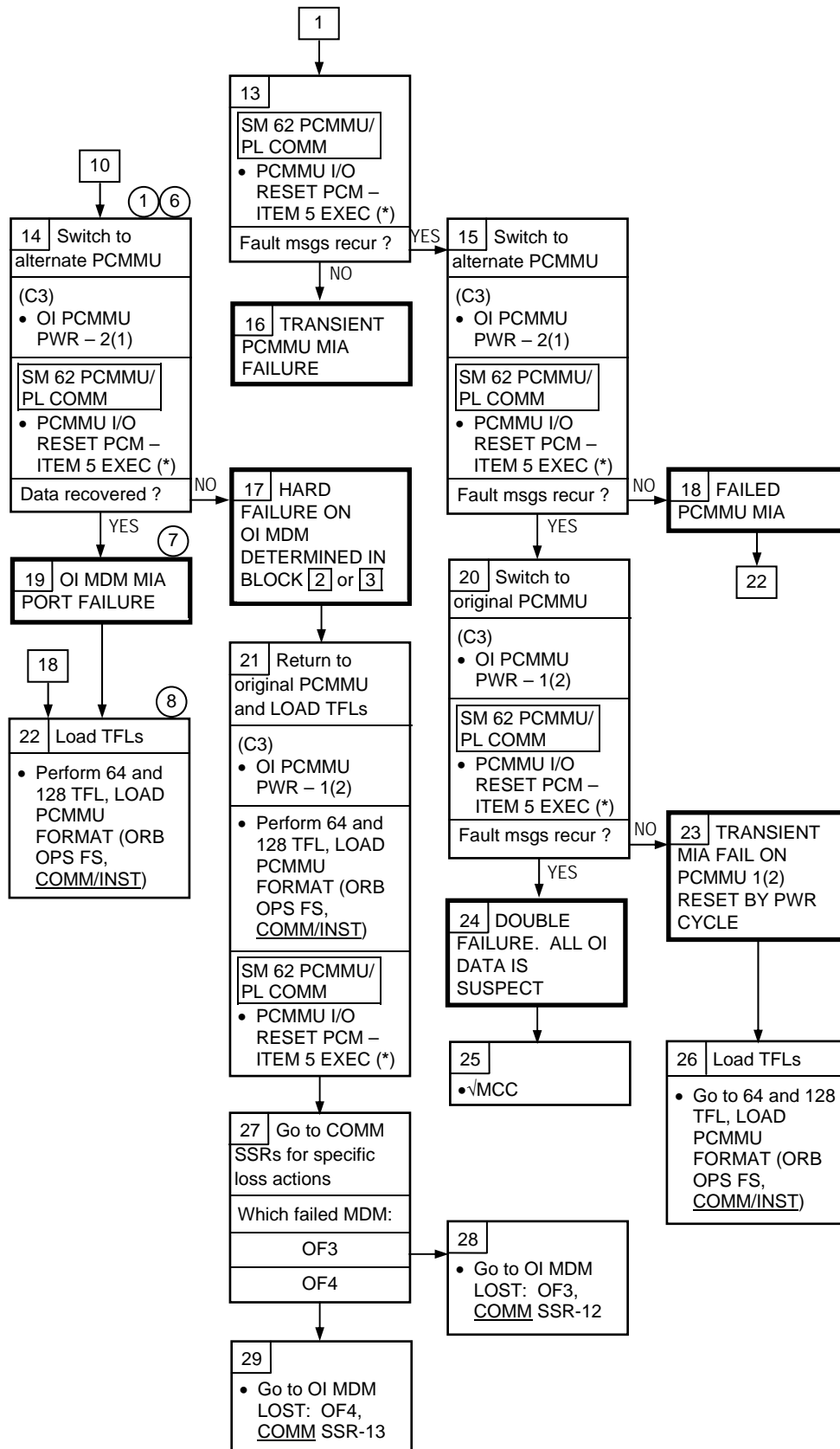
② Must obtain GO from MCC for cb cycle before proceeding to step 10

③ Additional SM alerts when power is removed

④ Do NOT close any cb found (reported) OPEN (tripped) without MCC consent

⑤ Both cbs must be open for 3 to 5 seconds to remove power from the MDM

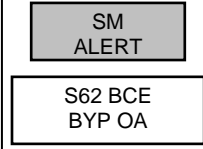
**COMM 2.4b (Cont)**



- ① I/O RESET  
PCM may cause  
additional SM alerts if  
continuing problems with  
OI MDMs or PDI
- ⑥ Advise MCC of  
PCMMU switch
- ⑦ Full data  
recovered by  
PCMMU switch.  
Redundant path to  
OF3(4) MDM lost
- ⑧ Change  
WINDECOM  
connections  
(O5,MO30F) as reqd

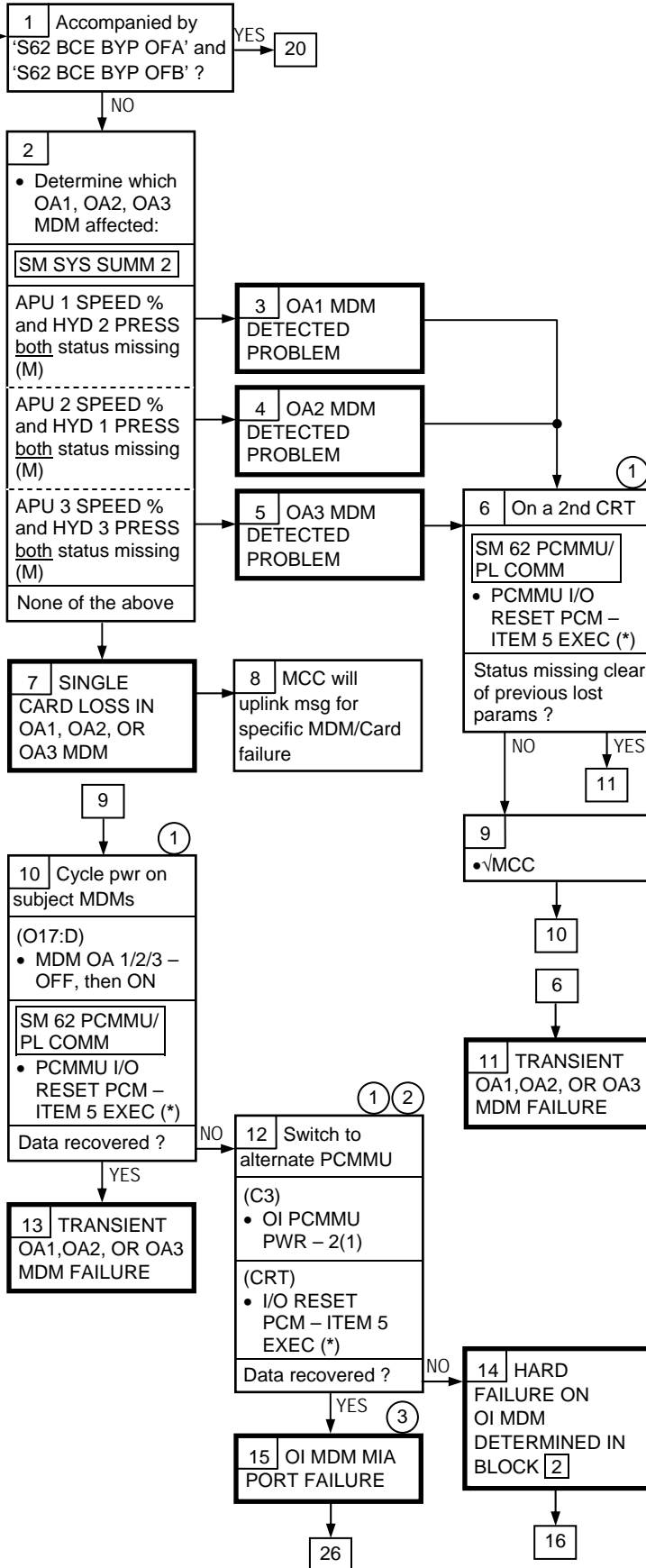
**COMM**

**2.4c 'S62 BCE BYP OA'**



If:  
 OA1 or OA2 or  
 OA3 MDM failure  
 or Card failure in  
 OA1(OA2,OA3)  
 or OA1/OA2/OA3  
 data path to  
 PCMMU failure

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



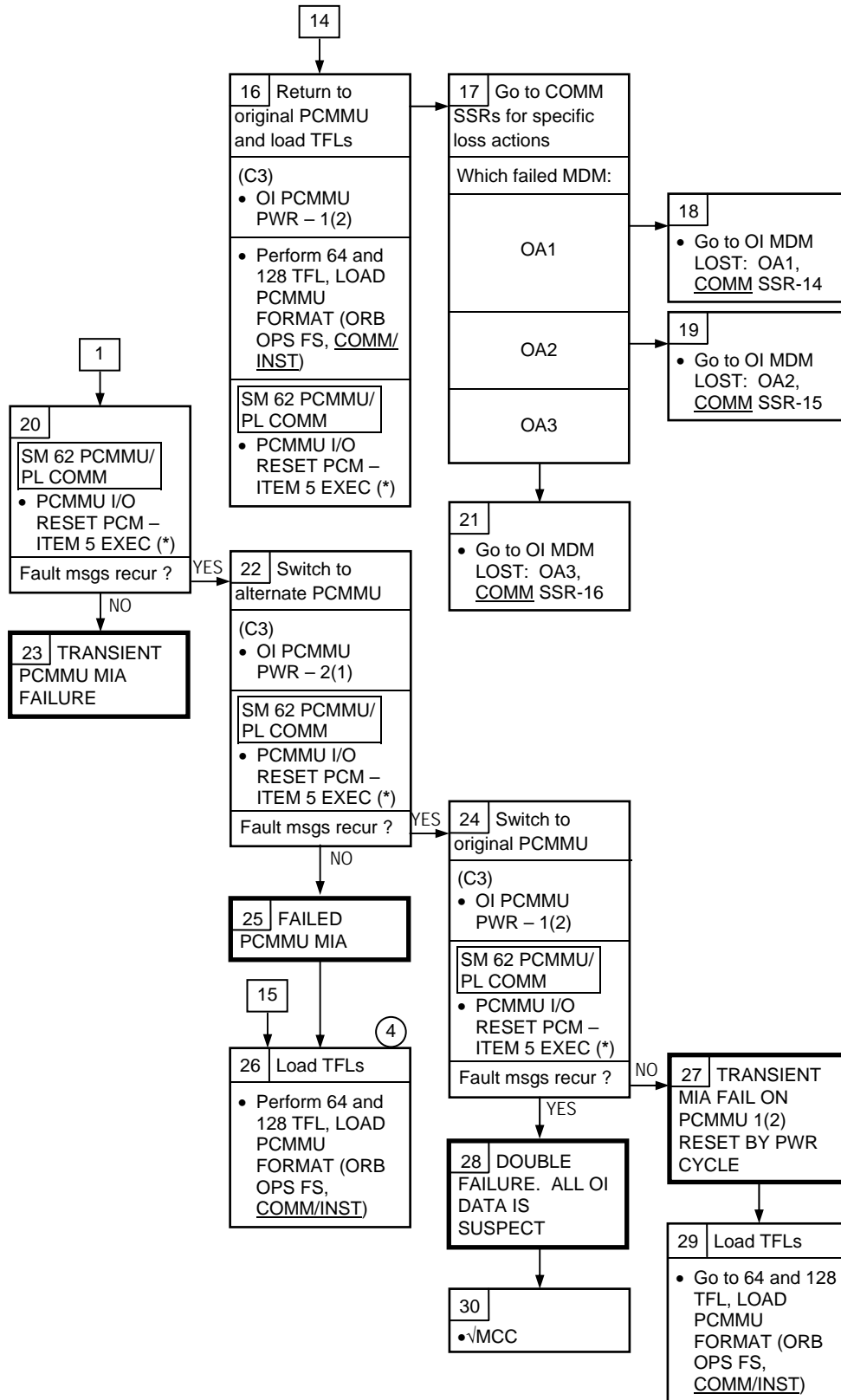
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwrd ON, PDI not receiving payload data which is FDAAd

② Advise MCC of PCMMU switch

③ Full data recovered by PCMMU switch. Redundant path to OA1(2,3) MDM lost

**COMM 2.4c (Cont)**

④ Change WINDECOM connections (O5,MO30F) as reqd



**COMM**

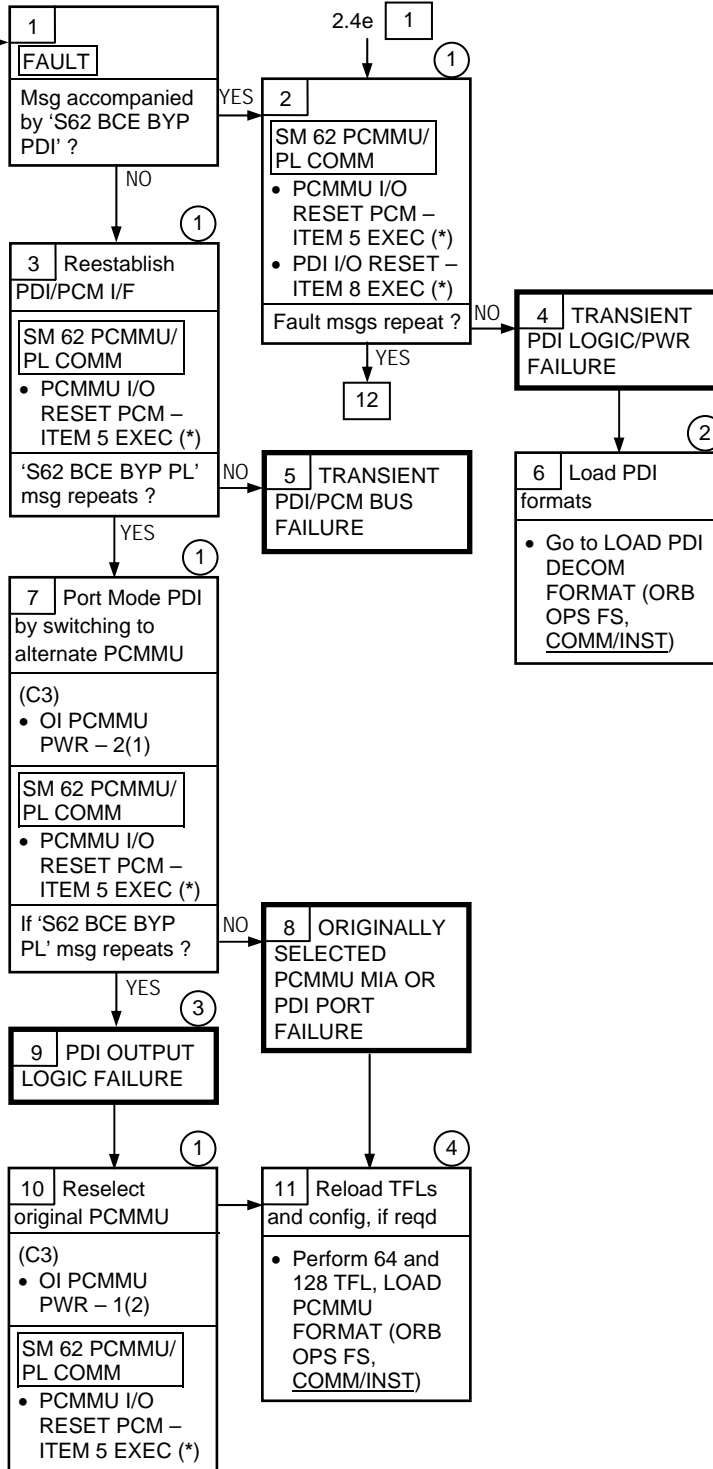
**2.4d 'S62 BCE BYP PL'**

SM  
ALERT

S62 BCE  
BYP PL

If:  
PDI port failure or  
PCMMU port  
failure or PDI to  
PCMMU data  
path failure

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



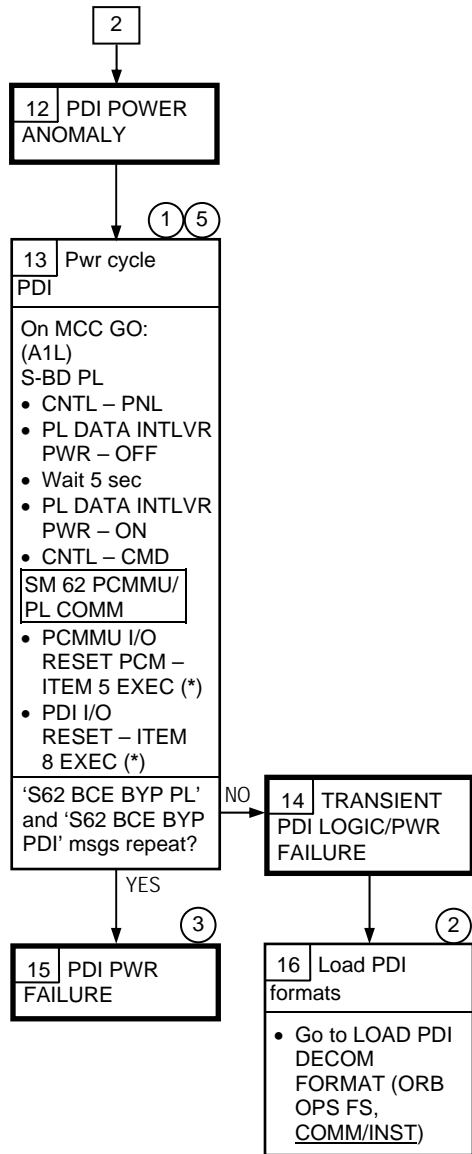
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwr ON, PDI not receiving payload data which is FDAd

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

**COMM 2.4d (Cont)**



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

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

③ IFM available whenever spare PDI is manifested

⑤ MCC has insight on power going to the PDI. MCC may desire not to cycle

**COMM**

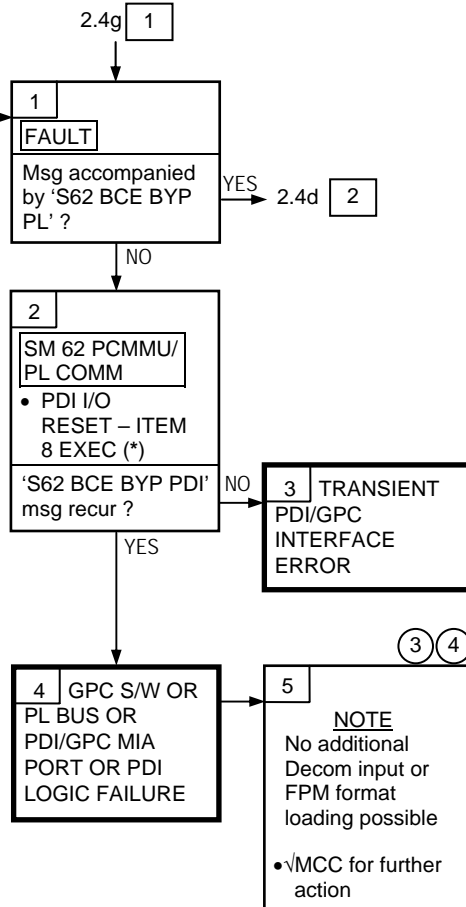
**2.4e 'S62 BCE BYP PDI'**

SM  
ALERT

(1) (2)  
S62 BCE  
BYP PDI

If:  
PDI PL Bus port  
failure or GPC  
port failure or PDI  
to GPC data path  
failure

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



(1) May occur prior to 'I/O ERROR PL1' msg, which requires Mal procedure for that error condition be performed

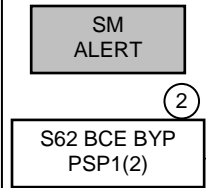
(2) Msg will occur if SM I/O RESET accomplished and PDI pwrd off

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

(4) May be possible to clear if GPC MIA or GPC S/W with an SM GPC switch. √MCC for further action

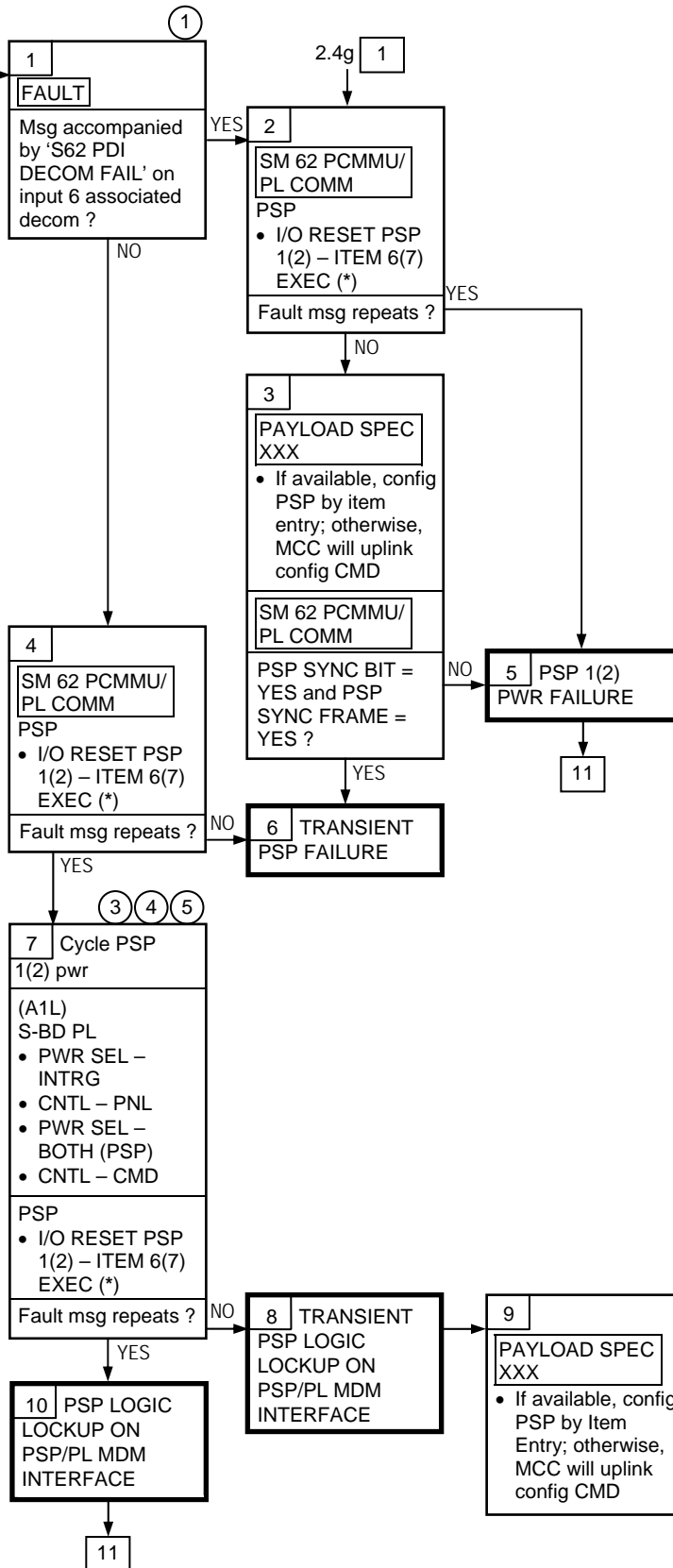
**COMM**

**2.4f 'S62 BCE BYP PSP 1(2)'**



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

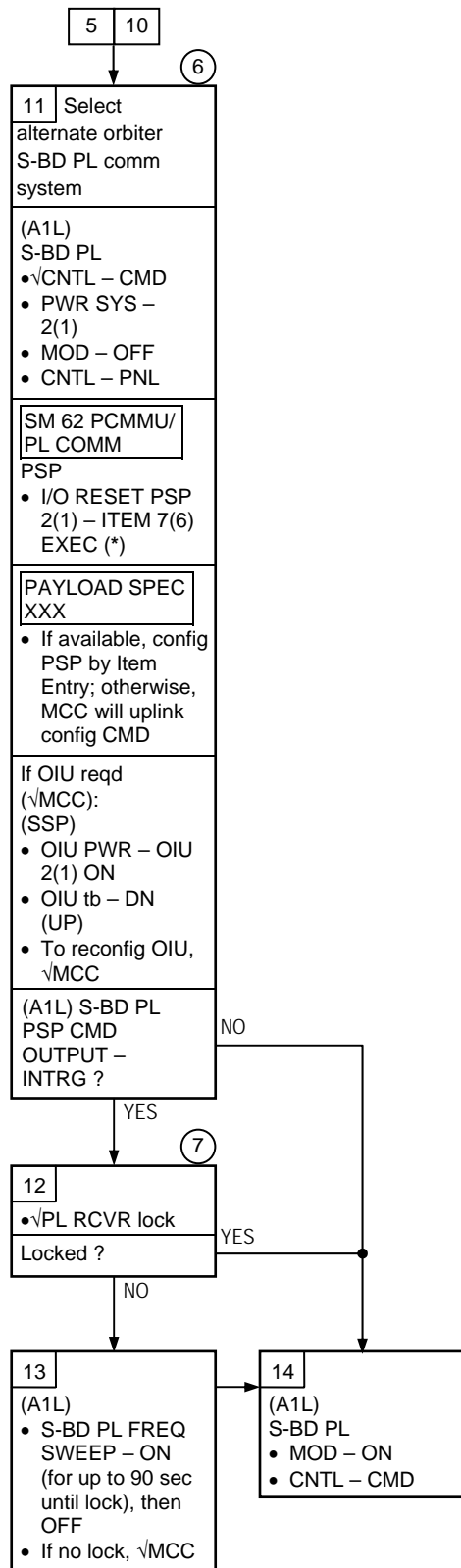
**Nominal Config:**  
(A1L)  
S-BD PL  
CNTL – CMD  
PWR SYS – 1  
PWR SEL – BOTH  
PSP CMD  
OUTPUT – PL UMB (INTRG)



- ① PDI DECOM FDA must be enabled to receive 'S62 PDI DECOM FAIL' and ↑
- ② Msg occurs if PSP pwrd 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



**COMM 2.4f (Cont)**

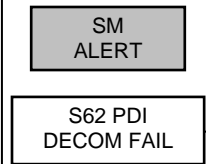


⑥ Selection of alternate S-BD PL sys will cause temporary loss of RF to PL

⑦ Indications of PL RCVR lock vary with flight

**COMM**

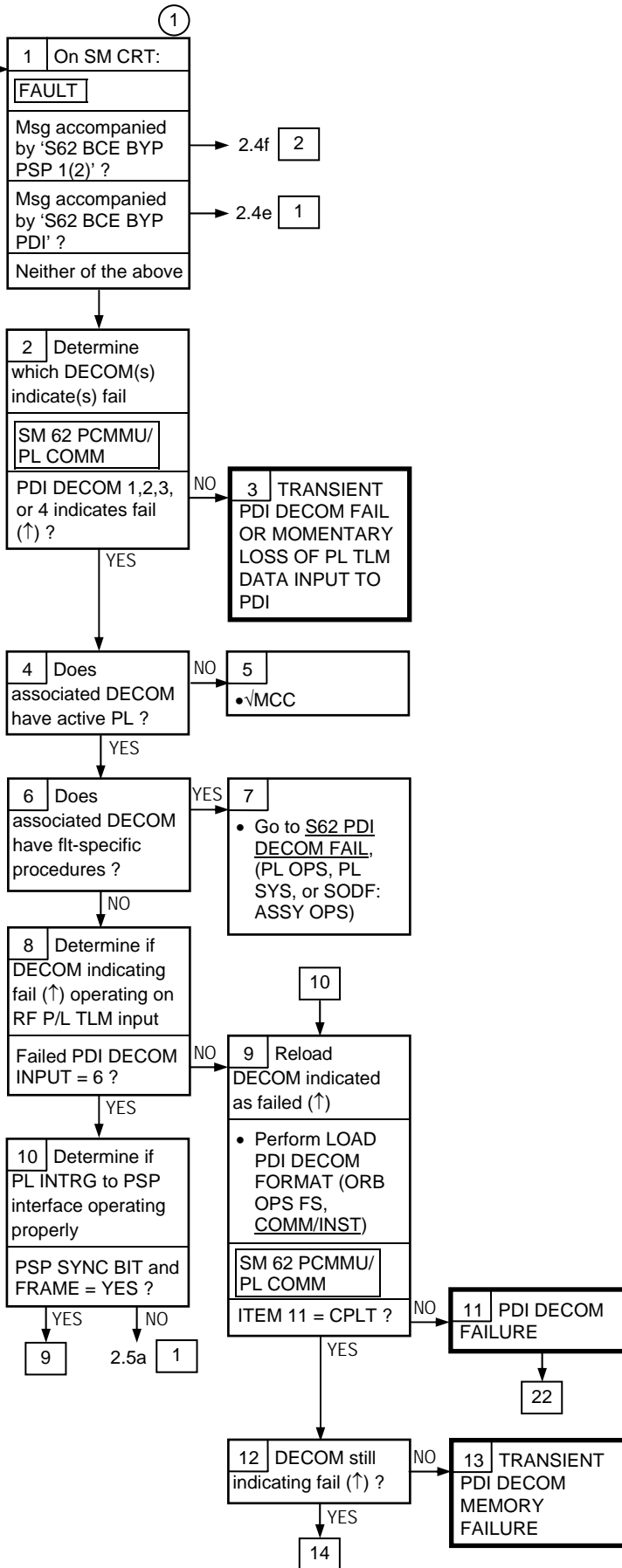
**2.4g 'S62 PDI DECOM FAIL'**



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

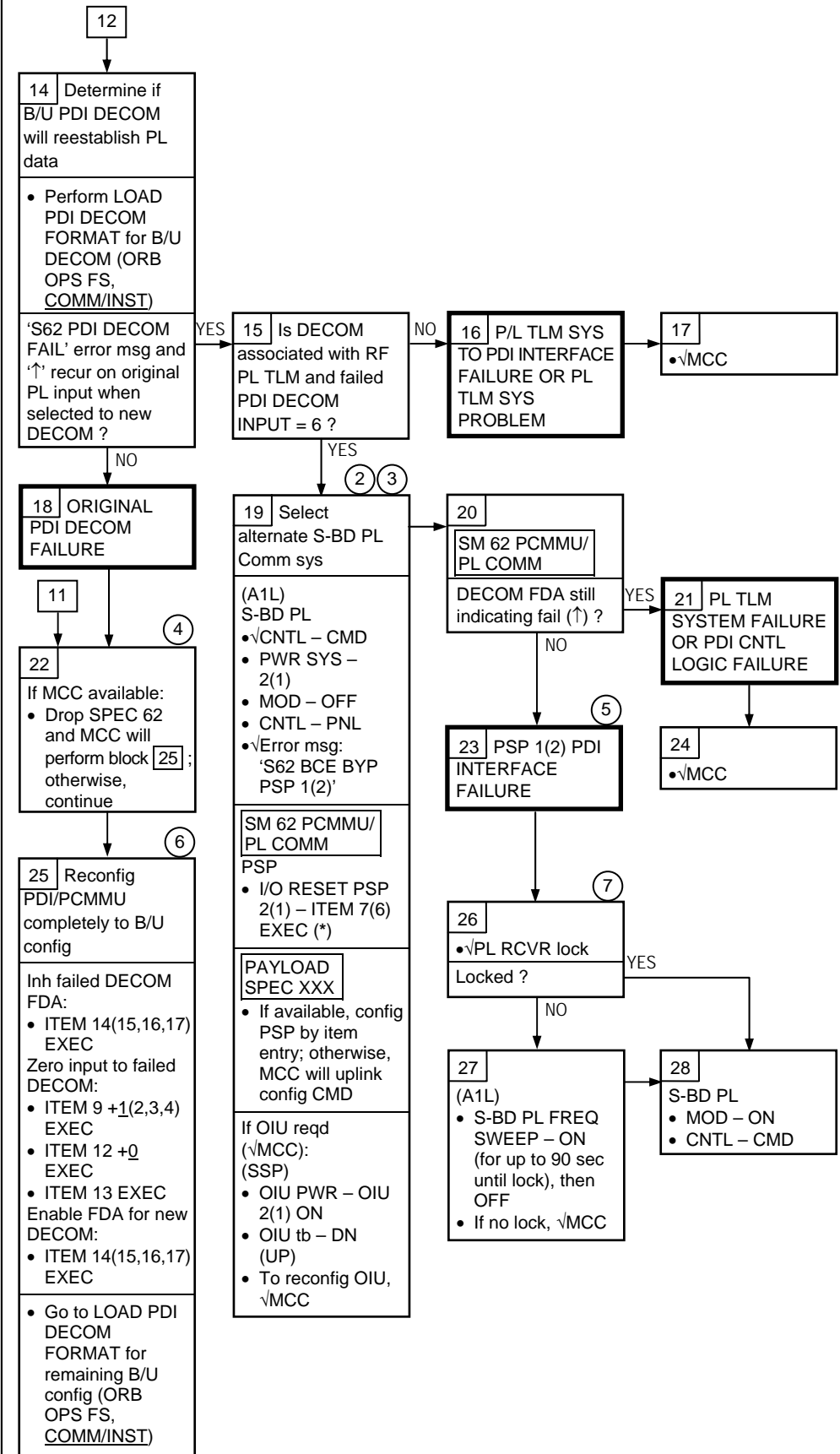
**Nominal Config:**  
 (A1L)  
 PL DATA INTLVR  
 PWR - ON  
 SM 62  
 PCMMU/PL  
 COMM

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)



① Data on display  
 driven by failed  
 DECOM may be  
 static

**COMM 2.4g (Cont)**



- ② Selection of alternate S-BD PL sys will cause temporary loss of RF to PL
- ③ Some payloads, on a flight-specific basis, may not be supported by PL comm string 2
- ④ MCC TFL/DFL loads cannot be performed with SPEC 62 active
- ⑤ Original orbiter S-BD PL TLM sys lost
- ⑥ B/U DECOM config requires a TFL change
- ⑦ PL RCVR lock indications vary with flight

PSP BIT

2.5

PSP BIT  
2.5

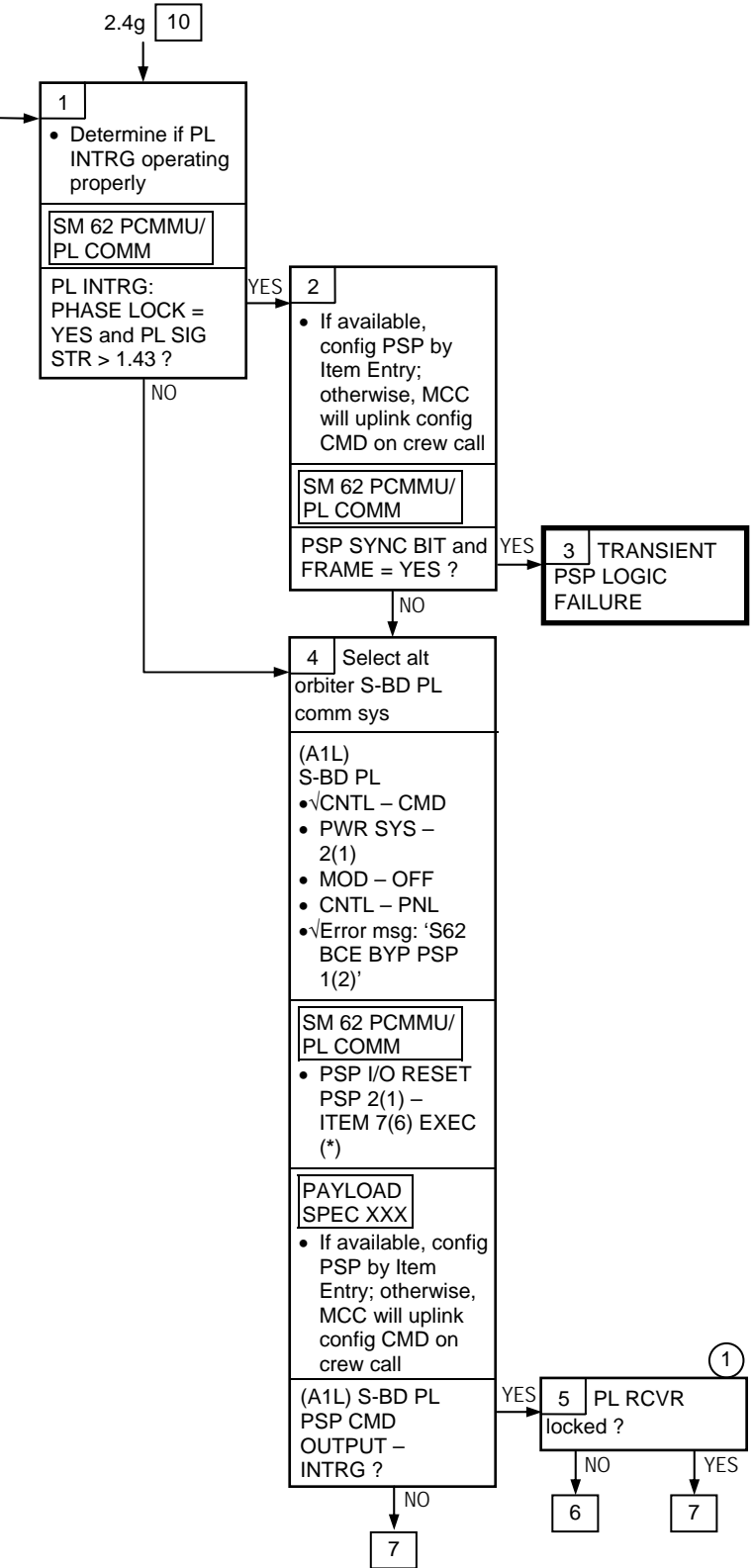
COMM

2.5a PSP BIT AND/OR FRAME SYNC LOCK FAIL

Unable to Obtain PSP Bit and/or Frame Sync Lock

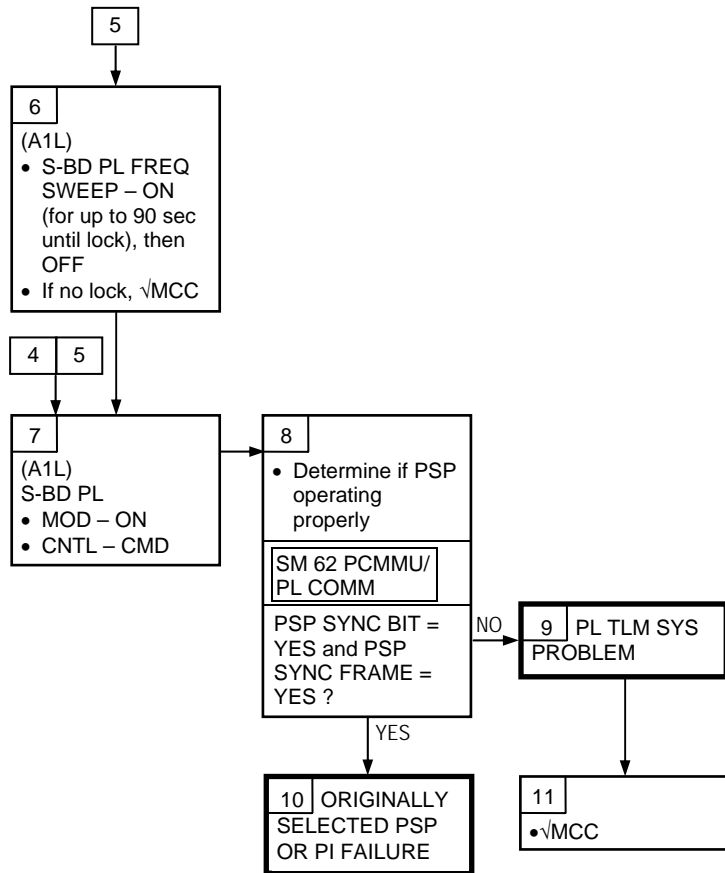
If:  
PL INTRG/PSP Interface failure or PSP Bit Frame Sync failure

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



① PL RCVR lock indications vary with flight

**COMM 2.5a (Cont)**



OIDSC

2.6

**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

①  
Multiple Params Indicate Off-Scale Low (Displaying 'L')

S69 FUEL CELL  
S69 FUEL CELL  
H2O  
S86 FU TK VLV 1(2,3)  
S86 RSVR/ACC P 1(2,3)  
S88 APU/FU PMP 1(2,3)

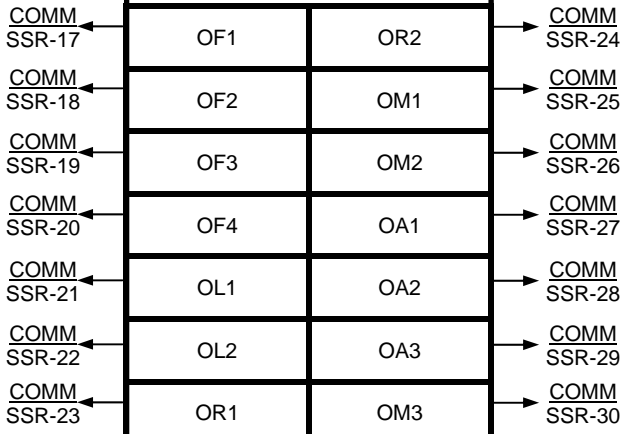
Simultaneous occurrence of these fault msgs indicates DSC OM3 problem

**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  
(O15:B)  
cb MNB OI SIG  
CONDR OF 2/3  
A - cl  
(O16:B)  
cb MNC OI SIG  
CONDR OF 2/3  
B - cl  
(O14:B)  
cb MNA OI SIG  
CONDR OM 1/2  
A - cl  
(O15:B)  
cb MNB OI SIG  
CONDR OM 1/2  
B - cl  
(O17:C)  
SIG CONDR  
OL 1/2 - ON  
OR 1/2 - ON  
(O17:D)  
SIG CONDR  
OA 1/2/3 - ON  
(O15:B)  
cb MNB OI SIG  
CONDR OM3  
A - cl  
(O16:B)  
cb MNC OI SIG  
CONDR OM3  
B - cl

1  
• Match param indicators on displays to determine failed DSC

2  
• Vcb(s) for particular DSC

3 DSC FAILURE	
OF1	OR2
OF2	OM1
OF3	OM2
OF4	OA1
OL1	OA2
OL2	OA3
OR1	OM3



XXXX / XXX / 078	SM SYS SUMM 1	XX X	DDD / HH : MM : SS
			DDD / HH : MM : SS
SMOKE 1 / A	2 / B	DC VOLTS 1 / A	2 / B 3 / C
CABIN OF1		FC OM1	OM2 OM2
L / R FD OF3	OF2	MAIN OM2	OM2 OM1
AV BAY 1 OF2	OF3	ESS OM2	OM2 OM1
	2 OF1 OF3		
	3 OF1 OF2	CNTL 1	X OF1 X OF2 X OF3 X
CABIN		2	X OF1 X OF2 X OF3 X
PRESS OF2		3	X OF1 X OF2 X OF3 X
dP / dT - EQ OF3	± X . XXXS A C		
O2 CONC XXX . XS		VOLT ΦA	OF1 OF2 OF3
PPO2 OF1 OF2		ΦB	OF1 OF2 OF3
FAN ΔP OF1		ΦC	OF1 OF2 OF3
HX OUT T OF1		AMPS ΦA	XX . XS XX . XS XX . XS
O2 FLOW OF1 OF2		ΦB	XX . XS XX . XS XX . XS
N2 FLOW OF1 OF2		ΦC	XX . XS XX . XS XX . XS
IMU FAN AXS BXS CXS	FUEL CELL		
ΔV FC1 FC2 FC3	AMPS	OM1	OM1 OM1
SS1 XXXS XXXS XXXS	REAC VLV	XXS	XXS XXS
SS2 XXXS XXXS XXXS	STACK T	OM1	OM2 OM2
SS3 XXXS XXXS XXXS	EXIT T	OM1	OM2 OM2
TOTAL AMPS XXXXS	COOL P	OM1	OM2 OM2
KW XXS	PUMP	XXS	XXS XXS
			( XX )

COMM

2.6a (Cont)

XXXX / XXX / 079 SM SYS SUMM 2 XXX DDD / HH : MM : SS									
DDD / HH : MM : SS									
CRYO TK		1	2	3	4	5			
H2 PRESS	XXXXS	XXXXS	XXXXS	XXXXS	XXXXS	XXXXS			
O2 PRESS	XXXXXS	XXXXXS	XXXXXS	XXXXXS	XXXXXS	XXXXXS			
HTR T1	OM1	OM1	OM1	OM2	OF2	OF2			
T2	OM2	OM2	OF3	OF3	OF3	OF3			
APU 1 2 3					HYD 1 2 3				
TEMP EGT	OA1	OA2	OA3	PRESS	OA2	OA1	OA3		
B / U EGT	OA2	OA3	OA1	RSVR T	OA1	OA2	OA3		
OIL IN	OA1	OA2	OA3	P	OA1	OA2	OA3		
OUT	OA2	OA3	OA1	QTY	OA1	OA2	OA3		
SPEED %	OA1	OA2	OA3	W / B					
FUEL QTY	XXXXS	XXXXS	XXXXS	H2O QTY	XXXXS	XXXXS	XXXXS		
PMP LK P	OM3	OM3	OM3	BYP VLV	XXXXS	XXXXS	XXXXS		
OIL OUT P	OA1	OA2	OA3	THERM CNTL	1	2			
AV BAY				H2O PUMP P	OF2	OF3			
TEMP	OF2	OF3	OF1	FREON FLOW	OF2	OF3			
FAN ΔP	X . XXS	X . XXS	X . XXS	EVAP OUT T	OA2	OA3			
( XX )									

XXXX / XXX / 089 PRPLT THERMAL XX X DDD / HH : MM : SS									
DDD / HH : MM : SS									
POD		L	R						
OMS TK	OX OL2	OR2							
	FU OL1	OR1							
ENG I / F	OX OL1	OR1							
	FU OL2	OR2							
	OX VLV OL1	OR1							
	FU INJ OL1	OR1							
WEB KEEL			1 OL2	OR2					
			2 OL2	OR2					
Y			OB OL2	OR2					
			UP OL1	OR1					
OX DRN PL			1 OL1	OR1					
			2 OL1	OR1					
ENG COVER			OM1	OM2					
SERV PNL			OL2	OR2					
GSE SERV PNL			OL2	OR2					
TEST HE / OX			1 OL1	OR1					
			2 OL2	OR2					
FWD RCS				FU	OX				
LINE T1				OF2	OF4				
				T2	OF4	OF2			
AFT RCS				L	R				
MANF 1				OX OL1	OR1				
DRN PNL				1 OL2	OR2				
				2 OL2	OR2				
VERN PNL				1 OL2	OR2				
				2 OL2	OR2				
( XX )									

COMM SSR

# 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

L12  
A1U

If still no COMM but CMD capability confirmed (ORB PKT, COMM, COMM LOST multi panels), MCC will attempt telecon via OCA

If Ku-Band not deployed/activated:

3. Perform KU-BD ANT DEPLOY and KU-BD ACTIVATION (ORB OPS, COMM/INST):
4. Configure for OCA telecon (ORB OPS, PGSC, VIDEO CONFERENCING) in low rate  
PDIP KU BD RATE – LOW  
KU SIG PROC LDR – PL DIGITAL  
HDR – TV  
√KU PWR – ON  
√KU MODE – COMM  
√KU – GPC  
KU CNTL – PNL

If no OCA capability (CMD OK) and voice still cannot be established:

5. Perform next day PLS
6. Use Scratch Pad line(s) to inform MCC of no voice and for other msgs (MCC monitors all Scratch Pad lines)

### NOTE

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

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

### Standard Responses

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

AA PAGE NUMBER

EX:

ITEM 01 +77 (02) +924 (03) +88  
'Reference Msg 924; Don't Understand – Please Clarify'

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

If still no Comm, and no CMD:

8. Minimize perturbations and deorbit  
Cease payload ops, which cause vehicle movement  
Do not perform any unnecessary attitude maneuvers, vents, dumps, or purges  
Perform reqd attitude maneuvers, vents, dumps, and purges as close to Deorbit Burn as possible  
MNVR(TRK) -ZLV, +XVV attitude until Deorbit Prep  
TG = 2, BV = 3, OM = 180

OPS 202 PRO

GNC XXXX MNVR YYYY

If PEG 7 Δ Vs = 0 and TIG in future, then Deorbit to PLS at TIG in target set >>

COMM SSR



## COMM SSR-1 (Cont)

Otherwise:

Perform GPS INCORPORATION (ORB OPS, GNC), then:

If GPS is functioning properly, Deorbit to next lighted CONUS opportunity or next CONUS if lighted doesn't exist (either current or next day PLS)

NOTE

Do not inhibit GPS for crew sleep

D/O, NOMINAL DEORBIT PREP PROCEDURES

Pen & Ink: Add "GPS INCORPORATION (EPCL, GNC)" at TIG-2:00 hr

If GPS is NOT functioning properly, Deorbit according to following priorities for altitude and available targets:

Current Altitude:

1. Deorbit within next 13 hr if  $H_p \geq 120$  nmi
2. Deorbit within next 9 hr if  $105 \leq H_p < 120$  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

**COMM SSR-10**  
**OI MDM LOST: OF1**

ACTIONS	MEASUREMENT LOSS	NOTES
If on PCS SYS 1: • Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	Most PCS 1 measurements	① If condensation in cabin, √MCC
(L1) • AV BAY 3 FAN B – OFF • A – ON	Av Bay 3 Fan ΔP Temp (MCC has limited insight) 1 Hum Sep A,B (two) Speed Snr Waste Qty 1	② Buses will be untied for entry. MCC will TMBU FC ΔAMPS 2 limits and notify crew. If loss of comm, reset limits to present value ± 40
If on IMU FAN A: • IMU FAN B(C) – ON • A – OFF • Monitor Cabin Fan flow by feel	IMU Fan ΔP A Speed Snr Cab Fan ΔP	③ WST TK will be dumped by time (≈2 %/min) to provide ullage to make EOM, MCC will provide the time
During sleep periods: • CAB FAN A,B (two) – ON • Maintain LiOH Canister(s) changeout schedule per cue card and FLIGHT PLAN	PPCO2 (MCC cannot assess)	④ This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line
(R1) 2 • MN BUS TIE B,C (two) – ON (tb-ON)	FC 1 pH Snr FC2 SS1 ΔV SS2 ΔV SS3 ΔV	⑤ Smoke Det H/W Alarm still available
(L1) If FLASH EVAP CNTLR PRI B enabled: • Perform FES RESTART <u>ECLS</u> SSR-5, using PRI A	Most FES Feedline A Htr measurements	⑥ Xdcrs on disp SM 87 HYD THERMAL will show 'M' for some parameters
(R14:C) • cb MNB KU ANT HTR – op	Ku Gyro temp monitoring	⑦ Visibility into Truss Flange temps lost
3 • √MCC about performing WASTE H2O DUMP	Waste Qty 1	⑧ One of two temps in each zone lost
4 (ML86B:A) • cb MNA, MNB H2O LINE HTR A, HTR B (two) – cl	Waste H2O Dump Line T	⑨ Vlv position is normally closed. Position can be verified during EMU recharge
(ML86B:C) • cb MNA, MNB EXT ARLK HTR STRUC (two) – cl • cb MNA, MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl	N2 Qty (two) 1,2 5 Smoke Det A Concn Av Bay 2 5 A Concn Av Bay 3 5 Concn Cabin	⑩ Freon Loop 2 Automatic Radiator Isolation capability is lost
(ML86B:C) • cb MNA, MNB EXT ARLK HTR STRUC (two) – cl • cb MNA, MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl	6 HYD sys temps External Airlock LCG EV 1 Supply Line press 7 External Airlock Fwd and Aft Truss Flange temps 8 External Airlock H2O Line Zone 1 Htr A temp External Airlock H2O Line Zone 2 Htr B temp 9 External Airlock H2O Shutoff Vlv position 10 Freon Loop 2 Accum Qty	⑪ Call MCC for MMU 1 action. If MMU 1 off, ITEM 4 EXEC
11 (O15:F) • MMU 2 – ON		

**COMM SSR-11**  
**OI MDM LOST: OF2**

ACTIONS	MEASUREMENT LOSS	NOTES
If on PCS SYS 2: • Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	Most PCS Sys 2 measurements	① Use interchanger flow to monitor H2O Loop 1 performance if reqd
(L1) • AV BAY 1 FAN B – OFF A – ON • √H2O PUMP LOOP 2 – ON • H2O PUMP LOOP 1 – OFF	Av Bay 1 Fan ΔP Temp (MCC has limited insight) 1 Most H2O Loop 1 measurements	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 ΔAMPS 3 limits and notify crew. If loss of comm, reset limits to present value ± 40
• Do not don Biomed Electrodes	ECG 1,2 Telemetry	
2 (R11L) • √PLY H2O TKC INLET, OUTLET (two) – OP (tb-OP)	Sply H2O Qty B Qty D	④ This action activates dual htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line
3 (R1) • MN BUS TIE C,A (two) – ON (tb-ON)	FC3 SS1 ΔV SS2 ΔV SS3 ΔV	⑤ Smoke det H/W Alarm still available
SM 66 ENVIRONMENT • Monitor AIRLK P and dP/dT for cabin integrity on-orbit	Cabin Press Snsr	⑥ Zone 1 temps verify proper switch config
	N2 Qty 2	⑦ Vestibule Temp 2 available
	FC2 pH Snsr	⑧ Structural temps verify proper switch config
4 (ML86B:A) • cb MNA, MNB H2O LINE HTR A, HTR B (two) – cl	Sply H2O Dump Line T	⑨ Vlvs still operational. Alternate vlvs available
	5 Smoke Det A Conc'n Av Bay 1 5 Smoke Det B Conc'n Av Bay 3 5 Smoke Det Conc'n Right Flt Deck	⑩ Freon Loop 1 Automatic Radiator Isolation capability is lost
	External Airlock LCG EV 2 Supply Line press 6 External Airlock H2O Line Zone 1 MNA,B,C Htr ON status 7 Vestibule Temp 1 8 EXT A/L Struc Htr MNA,B Htr ON status 9 Vestibule Isolation Vlv 1 and Depress Vlv 1 op/cl positions	
	10 Freon Loop 1 Accum Qty	

**COMM SSR-12**  
**OI MDM LOST: OF3**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>SM 66 ENVIRONMENT</b></p> <ul style="list-style-type: none"> <li>• Monitor Cabin Press for cabin leaks</li> </ul>	<p>Cabin dP/dT</p>	<p>① Use Interchanger flow to monitor H2O Loop 2 performance if reqd</p>
<p>(L1)</p>	<p>Av Bay 2 Fan ΔP Temp (MCC has limited insight)</p>	<p>② Raises H2O Loop 1 Pump Out P Limit</p>
<ul style="list-style-type: none"> <li>• H2O PUMP LOOP 1 – ON</li> <li>• H2O LOOP 1 BYP MODE – AUTO</li> <li>• H2O PUMP LOOP 2 – OFF</li> <li>• H2O LOOP 2 BYP MODE – MAN</li> </ul>	<p>1 Most H2O Loop 2 measurements</p>	<p>③ Lowers H2O Loop 2 Pump Out P Limit</p> <p>④ Causes loss of FC Auto purge capability</p>
<p>(R13U)</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 105</li> <li>• C/W LIMIT SET VALUE tw (three) – 1.50</li> <li>• C/W LIMIT SET LIMIT – LOWER</li> <li>• C/W LIMIT SET FUNC – SET</li> <li>• C/W PARAM SEL tw (three) – 115</li> <li>• C/W LIMIT SET VALUE tw (three) – 0.65</li> <li>• C/W LIMIT SET LIMIT – LOWER</li> <li>• C/W LIMIT SET FUNC – SET</li> <li>• C/W PARAM SEL tw – &gt; 119</li> </ul>		<p>⑤ Avoids nuisance alarms</p> <p>⑥ SM 76 COMM display S-BD PM mode static, SM GPC will continue selecting ANT for the mode shown</p> <p>⑦ Force TDRS antenna pointing</p>
<p>When reqd:</p> <ul style="list-style-type: none"> <li>• Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)</li> </ul>	<p>4 FC Purge Line temps FC3 pH Snsr</p>	<p>⑧ Xdcrs on disp SM 87 HYD THERMAL will show 'M' for some parameters</p>
<p><b>SM 60 SM TABLE MAINT</b></p> <p>5 Inhibit S-BD ANT QUAD Alert:</p> <ul style="list-style-type: none"> <li>• Param ID – ITEM 1 +0 9 2 1 0 4 9 EXEC</li> <li>• INH – ITEM 10(15) EXEC</li> </ul>	<p>Antenna Select feedbacks</p>	
<p>(L1)</p> <p>If FLASH EVAP CNTLR PRI A enabled:</p> <ul style="list-style-type: none"> <li>• Perform FES RESTART, ECLS SSR-5, using PRI B</li> </ul>	<p>Most FES Feedline B Htr measurements</p>	
<p><b>SM ANTENNA</b></p> <p>6 If TDRS:</p> <p>7 • GPC OVRD – ITEM 13 EXEC (*)</p>	<p>S-BD mode</p>	
	<p>N2 Qty (two) 1,2</p>	
	<p>8 HYD sys temps</p>	
<p>(Continued)</p>	<p>(Continued)</p>	

**COMM SSR-12 (Cont)**  
**OI MDM LOST: OF3**

ACTIONS	MEASUREMENT LOSS	NOTES
<ul style="list-style-type: none"> <li>• Terminate all SUPPLY H2O Dump operations through dump nozzle</li> <li>• If Supply H2O Dump reqd, perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)</li> </ul>	Supply H2O Noz T A,B (two)	⑨ For leak detection
<ul style="list-style-type: none"> <li>• Terminate all WASTE H2O Dump operations through dump nozzle</li> </ul>	Waste H2O Noz T A,B (two)	⑩ Smoke Det H/W Alarm still available
(R11L) 9 • SUPPLY H2O TKC INLET, OUTLET (two) – OP (tb-OP)	Supply H2O Qty C	⑪ F9 meter still available
	10 Smoke Det B Concn Av Bay 1 Bay 2	⑫ Zone 2 temps verify proper switch config
	10 Smoke Det Concn Left Flt Deck	⑬ Both htrs activated since only one Vestibule temp available
(ML86B:C) <ul style="list-style-type: none"> <li>• cb MNA,MNB EXT ARLK HTR VEST (two) – cl</li> <li>• cb MNA,MNB EXT ARLK HTR STRUC (two) – cl</li> <li>• cb MNA,MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl</li> </ul>	11 FC 1,2,3 Amps	⑭ Vestibule Temp 1 available
	12 External Airlock H2O Line Zone 2 MNA,B,C Htr ON status	⑮ Both htrs activated since visibility into temps lost
	13 External Airlock Vestibule MNA,B Htr ON status	⑯ Vlv still operational. Alternate vlvs available
	14 Vestibule Temp 2	
	15 External Airlock Lower Bulkhead temp External Airlock H2O Line Zone 1 and 2 LCG 2 temp External Airlock Line Zone 2 Temp A O2 Sply	
	16 Vestibule Isolation Vlv 2 op/cl positions	

**COMM SSR-13**  
**OI MDM LOST: OF4**

ACTIONS	MEASUREMENT LOSS	NOTES
When reqd: • Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)	FC Auto Purge Start discretess	① No SM alerts for CCTV overtemp
• During CCTV Camr ops, monitor CCTV Camr temps on Monitor	1 CCTV Camr overtemp discrete	② Xdcrs on disp SM 87 HYD THERM will show 'M' for some parameters
• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'M' Xdcrs on display SM 87 HYD THERMAL	2 HYD sys temps	③ Inhibits FES High Load duct alerts. Pre-condition steering could cause nuisance alarms unless params are inhibited
If Topping Evap enabled: (L1) • TOP EVAP HTR DUCT – A/B	Fwd,Aft Topping Duct Htr measurements	④ May get Antenna alerts when manually operating (C3) S-BD PM ANT sw (loss of position discrete to SM)
If High Load Evap enabled: (L1) • HI LOAD DUCT HTR – A/B	Hi Load Outbd Duct Htr measurements	⑤ Buses will be untied for entry. MCC will TMBU FC ΔAMPS 1 limits and notify crew. If loss of comm, reset limits to present value ± 40
3 If High Load Evap <u>not</u> enabled: SM 60 SM TABLE MAINT • ITEM 1 +0 6 3 1 8 2 0 • ITEM 10 EXEC • ITEM 1 +0 6 3 1 8 2 1 • ITEM 10 EXEC • ITEM 1 +0 6 3 1 8 9 0 • ITEM 10 EXEC		⑥ Vlv still operational. Alternate vlvs available
	4 S-BD Quad Ant Sel 1/2 – GPC	⑦ Freon Loop 1,2 Automatic Radiator Isolation capability is lost
(A12) • APU HTR TK/FU LINE/H2O/SYS 1A,1B, 3A,3B (four) – AUTO	APU H2O sys temps (Htr mon)	
(R1) 5 • MN BUS TIE A,B (two) – ON (tb-ON)	FC1 SS1 ΔV SS2 ΔV SS3 ΔV	
	6 Vestibule Vlv 2 op/cl position	
(L2) • FREON LOOP ISOL MODE – OFF	7 Radiator Isolation Auto Mode indication	

**COMM SSR-14**  
**OI MDM LOST: OA1**

ACTIONS	MEASUREMENT LOSS	NOTES
<ul style="list-style-type: none"> <li>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-1</u> for Circ Pump 1</li> <li>• Perform SIMULTANEOUS CIRC PUMP ON/GPC OPS, <u>APU/HYD SSR-2</u> for Circ Pump 1</li> </ul>	HYD sys 1 Circ Pump pressure	① GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 1  ② Loss of fuel injector temperature is no-go for non-critical on-orbit burns. The engine will be used for deorbit
<ul style="list-style-type: none"> <li>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-3</u>, for 'M' xdcrs on display SM 87 HYD THERMAL</li> </ul>	1 HYD sys temps HYD sys 1 Accumulator and Reservoir pressure	
	APU 1 Fuel Qty (MDU and CRT)	
If High Load Evap Enabled: (L1) <ul style="list-style-type: none"> <li>• HI LOAD DUCT HTR – A/B</li> </ul>	Hi Load Inbd Duct Htr measurement	
(A14) <ul style="list-style-type: none"> <li>• RCS/OMS HTR OMS CRSFD LINES (two) – AUTO</li> </ul>	Partial insight into OMS CRSFD Line Htr ops	
2 L OMS no-go for on-orbit burns	L OMS Fu Inj T	



**COMM SSR-15**  
**OI MDM LOST: OA2**

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

**COMM SSR-16**  
**OI MDM LOST: OA3**

ACTIONS	MEASUREMENT LOSS	NOTES
(A14) • RCS/OMS HTR OMS CRSFD LINES – A AUTO,B AUTO	OMS/RCS Htr monitoring temps	① GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 3
• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-1 for Circ Pump 3 • Perform SIMULTANEOUS CIRC PUMP ON/GPC OPS, <u>APU/HYD</u> SSR-2 for Circ Pump 3	HYD sys 3 Circ Pump pressure	
• Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-3, for 'M' xdcrs on display SM 87 HYD THERMAL	1 HYD sys temps HYD sys 3 Accumulator and Reservoir pressure	
	APU 3 Fuel Qty (MDU and CRT)	
	N2 Qty 1 (OV105)	

**COMM SSR-17**  
**OI DSC LOST: OF1**

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

**COMM SSR-18**  
**OI DSC LOST: OF2**

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

## COMM SSR-18 (Cont)

### OI DSC LOST: OF2

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

## COMM SSR-19

### OI DSC LOST: OF3

ACTIONS		MEASUREMENT LOSS	NOTES
	<b>SM 66 ENVIRONMENT</b> • Monitor CABIN PRESS for cabin leaks on-orbit	Cabin dP/dT	① C/W params 51,71,94 are also lost, but high limit-sensed only ② Smoke Det H/W Alarm still available ③ Fwd RCS PASS Fu qty degraded, BFS Fu qty lost ④ Both htrs activated since visibility into temps lost ⑤ Crossover vlv needs to be checked and TKC unisolated to equalize tks to provide leak protection ⑥ Use pnl F9 Meter for insight to AC volts ⑦ Use pnl A1U for S-Band PM Signal Strength
	(R13U) • C/W PARAM SEL tw (three) – 115 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 116 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119	1 H2O Pump P2  Freon Flow 2	
		2 Smoke Det B Concn Av Bay 1 2 Bay 2 2 Smoke Det Concn Left Flt Deck	
		3 Fwd RCS Fu Tk T	
	(ML86B:C) • cb MNA,MNB EXT ARLK HTR STRUC (two) – cl	4 If no internal airlock: External Airlock Lower Bulkhead temp External Airlock H2O Line Zone 1,2 LCG 2 temp External Airlock H2O Line Zone 2 QD Pnl temp	
5	(R11L) •√SPLY H2O TKC INLET, OUTLET (two) – OP (tb-OP)	Sply H2O Qty C	
		6 AC3 volts	
		7 Pnl F9 S-Band Signal Strength	

**COMM SSR-20**  
**OI DSC LOST: OF4**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b></p> <p>RCS FWD</p> <ul style="list-style-type: none"> <li>• ITEM 1 EXEC</li> </ul> <p>Reprioritize jets:</p> <p>DES INH on F1,2 JETS</p> <ul style="list-style-type: none"> <li>• F1L ITEM 8 EXEC (*)</li> <li>• F2R ITEM 12 EXEC (*)</li> <li>• F1U ITEM 16 EXEC (*)</li> <li>• F2U ITEM 20 EXEC (*)</li> <li>• F1D ITEM 22 EXEC (*)</li> <li>• F2D ITEM 26 EXEC (*)</li> <li>• F1F ITEM 30 EXEC (*)</li> <li>• F2F ITEM 34 EXEC (*)</li> <li>• Reselect auto deselected jets (2)</li> </ul> <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> <li>• ITEM 4+4 EXEC</li> </ul> <p>Override Manf vlv status to CL for F1,2 Manifolds:</p> <p>OVRD MANF VLVS</p> <ul style="list-style-type: none"> <li>• F1 ITEM 40 EXEC (CL)</li> <li>• F2 ITEM 41 EXEC (CL)</li> </ul>	<p>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<p>① Without F1F, F2F no low Z translation capability; -X only one jet (usually 2)</p> <p>② Auto overpressure protection lost for Fwd RCS Fuel Dual Reg failure</p> <p>③ (O3) FWD RCS Fuel He TK P and FWD RCS OXID PRPLT TK P ind on meter is lost</p>
<p><b>GNC SYS SUMM 2</b></p> <ul style="list-style-type: none"> <li>•√MCC for sleep config</li> </ul>	<p>2 Fwd RCS TK and Manf Press and Qty</p>	
<p>(R13U)</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 006</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>	<p>Fwd RCS OX Tk ULL P</p>	
	<p>External Airlock LCG EV 1 Supply Line press</p>	

**COMM SSR-21**  
**OI DSC LOST: OL1**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b></p> <p>RCS L</p> <ul style="list-style-type: none"> <li>• ITEM 2 EXEC</li> </ul> <p>Reprioritize jets:</p> <p>DES INH on L1,2 JETS</p> <ul style="list-style-type: none"> <li>• L2L ITEM 10 EXEC (*)</li> <li>• L1L ITEM 14 EXEC (*)</li> <li>• L2U ITEM 18 EXEC (*)</li> <li>• L1U ITEM 20 EXEC (*)</li> <li>• L2D ITEM 26 EXEC (*)</li> <li>• L1A ITEM 32 EXEC (*)</li> </ul> <ul style="list-style-type: none"> <li>• Reselect auto deselected jets (2)</li> </ul> <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> <li>• ITEM 4+3 EXEC</li> </ul> <p>Override Manf vlv status to CL for L1,2 Manifolds:</p> <p>OVRD MANF VLVS</p> <ol style="list-style-type: none"> <li>1 • L1 ITEM 40 EXEC (CL)</li> <li>• L2 ITEM 41 EXEC (CL)</li> </ol> <p>If I'CNCT config:</p> <ul style="list-style-type: none"> <li>• ITEM 48 EXEC (INH)</li> </ul>	<p>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<ol style="list-style-type: none"> <li>① Prior to deorbit, override L1 Manf vlv status to op</li> <li>② Auto overpressure protection lost for L RCS Oxidizer Dual Reg failure</li> <li>③ (O3) L RCS OXID He TK P, L RCS OXID PRPLT TK P, L OMS He P, and L OMS FU TK P ind on meter is lost. L RCS OXID PRPLT QTY ind on meter is invalid</li> <li>④ Loss of fuel injector temp is no-go for noncritical on-orbit burns. Engine will be used for deorbit</li> </ol>
<p>(O7)</p> <ul style="list-style-type: none"> <li>• AFT L RCS MANF ISOL 5 – CL (tb-CL), then GPC</li> </ul> <ul style="list-style-type: none"> <li>• Perform LOSS OF VERNIER RCS (ORB OPS, RCS)</li> </ul>	<p>Jet Injector temps (Jet leak RM detection)</p>	
<p><b>GNC SYS SUMM 2</b></p> <ol style="list-style-type: none"> <li>3 • Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC</li> <li>• √MCC for sleep config</li> </ol>	<ol style="list-style-type: none"> <li>2 Left RCS Tank and Manf Press and Qty (leak detection lost)</li> </ol>	
<p>(R13U)</p> <ol style="list-style-type: none"> <li>3 • C/W PARAM SEL tw (three) – 017</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 036</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 056</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ol>	<p>L OMS Fu Tk ULL pressure</p> <p>L RCS OX Tk ULL pressure</p> <p>L RCS leak</p>	
<ol style="list-style-type: none"> <li>4 L OMS no-go for on-orbit burns</li> </ol>	<p>L OMS Fu Inj T</p>	

**COMM SSR-22**  
**OI DSC LOST: OL2**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b></p> <p>RCS L</p> <ul style="list-style-type: none"> <li>• ITEM 2 EXEC</li> </ul> <p>Reprioritize jets</p> <p>DES INH on L3,4 jets:</p> <ul style="list-style-type: none"> <li>• L4L ITEM 8 EXEC (*)</li> <li>• L3L ITEM 12 EXEC (*)</li> <li>• L4U ITEM 16 EXEC (*)</li> <li>• L4D ITEM 24 EXEC (*)</li> <li>• L3D ITEM 28 EXEC (*)</li> <li>• L3A ITEM 30 EXEC (*)</li> </ul> <ul style="list-style-type: none"> <li>• Reselect auto deselected jets (2)</li> </ul> <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> <li>• ITEM 4+3 EXEC</li> </ul> <p>Override Manf vlv status to CL for L3,4 Manifolds:</p> <p>OVRD MANF VLVS</p> <p>1</p> <ul style="list-style-type: none"> <li>• L3 ITEM 42 EXEC (CL)</li> <li>• L4 ITEM 43 EXEC (CL)</li> </ul> <p>If I'CNCT config:</p> <ul style="list-style-type: none"> <li>• ITEM 48 EXEC (INH)</li> </ul>	<p>Jet PC, PC discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<p>① Prior to deorbit, override L3 Manf vlv status to OP</p> <p>② Auto overpressure protection lost for L RCS Fuel Dual Reg failure</p> <p>③ (O3) L RCS FUEL He TK P, L OMS OXID TK P, and (<u>O3/MPS</u>) L OMS N2 TK P, L OMS Pc are lost. (O3) L RCS FUEL PRPLT QTY ind on meter is invalid</p>
<p><b>GNC SYS SUMM 2</b></p> <p>3</p> <ul style="list-style-type: none"> <li>• Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC</li> <li>• √MCC for sleep config</li> <li>• P/I OMS Burn Monitor Cue Card to (1) Monitor GMBL Angles and BALL Vlv for left OMS performance (2)</li> <li>• Perform OMS Pc LOW for L OMS ↓</li> </ul>	<p>2 Left RCS TK and Manf Press and Qty (leak detection lost)</p> <p>L OMS PC</p>	
<p>(R13U)</p> <p>3</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 007</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 046</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 056</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 027</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>	<p>L OMS OX Tk ULL pressures</p> <p>L RCS Fu Tk ULL pressures</p> <p>L RCS leak</p> <p>L OMS PC</p>	



**COMM SSR-23**  
**OI DSC LOST: OR1**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b>  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  1 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)</p>	<p>Jet PC, PC discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<p>① Prior to deorbit, override R1 Manf vlv status to OP  ② (O3) R RCS OXID He TK P, R RCS OXID PRPLT TK P, R OMS FUEL TK P and (OMS/MPS) R OMS He P are lost. (O3) R RCS OXID PRPLT QTY ind on meter is invalid  ③ Auto overpressure protection lost for R RCS Oxidizer Dual Reg failure  ④ Loss of fuel injector temp is no-go for noncritical on-orbit burns. Engine will be used for deorbit</p>
<p>(O7)  • AFT R RCS MANF ISOL 5 – CL (tb-CL), then GPC  • Perform LOSS OF VERNIER (ORB OPS, RCS)</p>	<p>Jet Injection temps (Jet leak RM detection)</p>	
<p><b>GNC SYS SUMM 2</b>  2 • Monitor R RCS He ΔP for leaks. If R RCS leak suspected, secure sys and call MCC  • √MCC for sleep config</p>	<p>3 Right RCS Tk and Manf Press and Qty (leak detection lost)</p>	
<p>(R13U)  2 • 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) – &gt; 119</p>	<p>R RCS OX ULL pressure  R OMS Fu Tk ULL pressure  R RCS leak</p>	
<p>4 R OMS no-go for on-orbit burns</p>	<p>R OMS Fu Inj T</p>	

**COMM SSR-24**  
**OI DSC LOST: OR2**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b></p> <p>RCS R</p> <ul style="list-style-type: none"> <li>• ITEM 3 EXEC</li> </ul> <p>Reprioritize jets:</p> <p>DES INH on R3,R4 JETS</p> <ul style="list-style-type: none"> <li>• R4R ITEM 8 EXEC (*)</li> <li>• R3R ITEM 12 EXEC (*)</li> <li>• R4U ITEM 16 EXEC (*)</li> <li>• R4D ITEM 24 EXEC (*)</li> <li>• R3D ITEM 28 EXEC (*)</li> <li>• R3A ITEM 32 EXEC (*)</li> </ul> <p>• Reselect auto deselected jets (2)</p> <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> <li>• ITEM 4+3 EXEC</li> </ul> <p>Override Manf vlv status to CL for R3,4 Manifolds</p> <p>OVRD MANF VLVS</p> <p>1</p> <ul style="list-style-type: none"> <li>• R3 ITEM 42 EXEC (CL)</li> <li>• R4 ITEM 43 EXEC (CL)</li> </ul> <p>If I'CNCT config:</p> <ul style="list-style-type: none"> <li>• ITEM 48 EXEC (INH)</li> </ul>	<p>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<p>① Prior to deorbit, override R3 Manf vlv status to OP</p> <p>② Auto overpressure protection lost for R RCS Fuel Dual Reg failure</p> <p>③ (O3) R RCS FUEL He TK P, R RCS FUEL PRPLT TK P, R OMS OXID TK P and (OMS/MPS) R OMS N2 TK P, R OMS PC are lost. (O3) R RCS FUEL PRPLT QTY ind on meter is invalid</p>
<p><b>GNC SYS SUMM 2</b></p> <p>3</p> <ul style="list-style-type: none"> <li>• Monitor R RCS He ΔP for leaks. If R RCS leak suspected, secure sys and call MCC</li> <li>• √MCC for sleep config</li> <li>• P/I OMS Burn Monitor Cue Card to (1) Monitor GMBL Angles and BALL Vlvs for right OMS performance (2)</li> <li>• Perform OMS Pc LOW for R OMS '↓'</li> </ul>	<p>2 Right RCS Tank and Manf Press and Qty (leak detection lost)</p> <p>R OMS PC</p>	
<p>(R13U)</p> <p>3</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 037</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 076</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 086</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 057</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>	<p>R OMS OX Tk ULL pressure</p> <p>R RCS Fu ULL pressure</p> <p>R RCS leak</p> <p>R OMS PC</p>	

**COMM SSR-25**  
**OI DSC LOST: OM1**

ACTIONS	MEASUREMENT LOSS	NOTES
When reqd: • Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)	1 FC Purge O2 Vent Line temp FC Purge H2 Vent Line temp 2	① Causes loss of FC Auto purge capability ② C/W params 1,21,41 are lost also, but high limit-sensed only
(R13U) 2 • 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	FC1 Stack temp  MNC volts	③ Recoverable by TMBU ④ Use pnl F9 Meter for insight to FC AMPS, ESS 3AB, and FC1 volts
• Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-3 for 'L' xdcrs on display SM 87 HYD THERMAL	HYD sys temps	
If FLASH EVAP CNTLR PRI B enabled: • Perform FES RESTART, <u>ECLS</u> SSR-5, using PRI A	Most FES Feedline A Htr measurements	
• Perform ECLS COMPUTATION INHIBIT, <u>ECLS</u> SSR-14, TABLE D for faulty parameters: 925522 SYS 1 N2 TK2 T 925524 SYS 2 N2 TK2 T 925529 SYS 1 N2 PRESS	3 N2 Qty (two) 1,2	
	4 ESS 3AB volts 4 FC1 volts 4 FC 1,2,3 AMPS	

I

**COMM SSR-26**  
**OI DSC LOST: OM2**

ACTIONS	MEASUREMENT LOSS	NOTES
1 (R13U) • C/W PARAM SEL tw (three) – 072 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 082 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 003 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 013 • C/W PARAM – INH • C/W PARAM SEL tw (three) – >119	FC 2,3 Stack Temp     MNA,MNB volts	① C/W params 11,31,61,72,82 are lost also, but high limit-sensed only ② GPC capability to monitor HYD Accumulator pressure lost for 2,3 systems. HYD Reservoir pressure monitoring remains ③ Recoverable by TMBU ④ Use pnl F9 Meter for insight to ESS and FC volts
• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3 for 'L' xdcrs on display SM 87 HYD THERMAL	2 HYD sys temps HYD sys 2,3 Accumulator pressures	
If FLASH EVAP CNTLR PRI A enabled: • Perform FES RESTART, ECLS SSR-5, using PRI B	Most FES Feedline B Htr measurements	
If Topping Evap enabled: (L1) • TOP EVAP HTR DUCT – A/B	Fwd,Aft Topping Duct Htr measurements	
If High Load Evap enabled: (L1) • HI LOAD DUCT HTR – A/B	HI Load Outbd Duct Htr measurements	
• 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	3 N2 Qty (two) 1,2	
(A12) • APU HTR TK/FU LN/H2O SYS 1A,1B,3A,3B (four) – AUTO	APU H2O sys htr monitoring temps	
(ML86B:C) If Rendezvous or Docked • cb MNA,MNB EXT ARLK HTR VEST Z1/2/3 (two) – cl	External Airlock H2O Transfer Line press Vestibule Temps 1,2	
	4 FC 2,3 volts 4 ESS 1BC, 2CA volts	

**COMM SSR-27**  
**OI DSC LOST: OA1**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b></p> <p>If I'CNCT config:</p> <ul style="list-style-type: none"> <li>• ITEM 48 EXEC (INH) (A14)</li> <li>• RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO, B AUTO</li> </ul> <ul style="list-style-type: none"> <li>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-3</u> for 'L' xdcrs on display SM 87 HYD THERMAL</li> <li>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-1</u> for Circ Pump 1</li> </ul>	<p>OMS/RCS Htr monitoring temps</p> <p>HYD sys temps</p> <p>HYD Circ Pump 1 pressure</p> <p>APU 1 Fuel Qty (MDU and CRT)</p>	<p>① C/W param 109 is also lost, but is inhibited during post insertion</p>
<p>(R13U)</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 009</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – 039</li> <li>• C/W PARAM – INH</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>	<p>MPS He Tk P C</p> <p>MPS He REG P C</p>	
<p>If High Load Evap enabled: (L1)</p> <ul style="list-style-type: none"> <li>• HI LOAD DUCT HTR – A/B</li> </ul>	<p>Hi Load Inbd Duct Htr measurement</p>	

**COMM SSR-28**  
**OI DSC LOST: OA2**

ACTIONS	MEASUREMENT LOSS	NOTES
<p><b>GNC 23 RCS</b>                      If I'CNCT config:                      • ITEM 48 EXEC (INH) (A14)                      • RCS/OMS HTR OMS CRSFD LINES – A AUTO, B AUTO</p>	<p>OMS/RCS Htr monitoring temps</p>	<p>① Causes loss of FC Auto Purge capability                      ② C/W params 18,48,69 are lost also, but high limit-sensed only; C/W param 99 is also lost, but is inhibited during post insertion</p>
<p>When reqd:                      • Perform FUEL CELL PURGE – MANUAL (ORB OPS, <u>EPS</u>) (Cue Card) (Assume SM 2 not available when using Cue Card)</p>	<p>1 FC Purge H2 Vent Line temp 1</p>	
<p>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-3, for 'L' xdcrs on display SM 87 HYD THERMAL</p>	<p>HYD sys temps</p>	
<p>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-1 for Circ Pump 2</p>	<p>HYD Circ Pump 2 pressure</p>	
<p>• Perform APU FUEL TANK P XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-4 for APU 2                      • Perform APU FUEL TANK T XDCR FAILURE WORKAROUND, <u>APU/HYD</u> SSR-6 for APU 2</p>	<p>APU 2 FUEL TK P                       APU 2 FUEL T TK SURF</p>	
<p>(R13U)                      2 • C/W PARAM SEL tw (three) – 107                      • C/W PARAM – INH                      • C/W PARAM SEL tw (three) – 019                      • C/W PARAM – INH                      • C/W PARAM SEL tw (three) – 049                      • C/W PARAM – INH                      • C/W PARAM SEL tw (three) – &gt; 119</p>	<p>EVAP OUT T 1                       MPS He Tk P L                       MPS He REG P L</p>	
<p>(O7)                      • AFT R RCS MANF ISOL 5 – CL (tb-CL), then GPC</p>	<p>Jet Injector temps (Jet leak RM detection)</p>	
<p>• Go to LOSS OF VERNIER (ORB OPS, <u>RCS</u>)</p>		

**COMM SSR-29**  
**OI DSC LOST: OA3**

ACTIONS	MEASUREMENT LOSS	NOTES
(A14) • RCS/OMS HTR OMS CRSFD LINES – A AUTO, B AUTO	OMS/RCS Htr monitoring temps	① C/W params 28,58,59,117 lost also, but high limit-sensed only; C/W param 119 is also lost, but is inhibited during post insertion  ② Recoverable by TMBU
• Perform CIRC PUMP PRESS XDCC FAILURE WORKAROUND, <u>APU/HYD</u> SSR-1 for Circ Pump 3	HYD Circ Pump 3 pressure	
1 (R13U) • C/W PARAM SEL tw (three) – 029 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 059 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 117 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119	MPS He Tk P R  MPS He REG P R  EVAP OUT T 2	
• Perform CIRC PUMP XDCC FAILURE WORKAROUND, <u>APU/HYD</u> SSR-3 for 'L' xdccs on display SM 87 HYD THERMAL	HYD sys temps	
• Perform APU FUEL TANK P XDCC FAILURE WORKAROUND, <u>APU/HYD</u> SSR-4 for APU 3	APU 3 FUEL TK P	
• Perform APU FUEL TANK T XDCC FAILURE WORKAROUND, <u>APU/HYD</u> SSR-6 for APU 3	APU 3 FUEL T TK SURF	
• Go to ECLS COMPUTATION INHIBIT, <u>ECLS</u> SSR-14, TABLE D for faulty parameter: 925526 SYS 1 N2 TK4 T	2 N2 Qty 1 (OV105)	

**COMM SSR-30**  
**OI DSC LOST: OM3**

ACTIONS	MEASUREMENT LOSS	NOTES
<ul style="list-style-type: none"><li>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APUY/HYD SSR-3 for ACCUM P 1 xdcr</li></ul>	1 HYD sys 1 Accumulator pressure	① GPC capability to monitor HYD Accumulator pressure lost for system 1. HYD Reservoir pressure monitoring remains



RESERVED  
SECTION

**3** RESERVED

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C/W

<u>4.1</u>	<u>PRIMARY C/W</u>	
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
<u>4.2</u>	<u>OTHER C/W</u>	
4.2a	NONRESETTABLE BACKUP C/W ALARM LT.....	4-22
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4.2e	PRI C/W SYS FAILS TO ANNUNCIATE OUT-OF-LIMIT PARAM.....	4-30

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C/W

4

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**PRIMARY  
C/W**

**4.1**

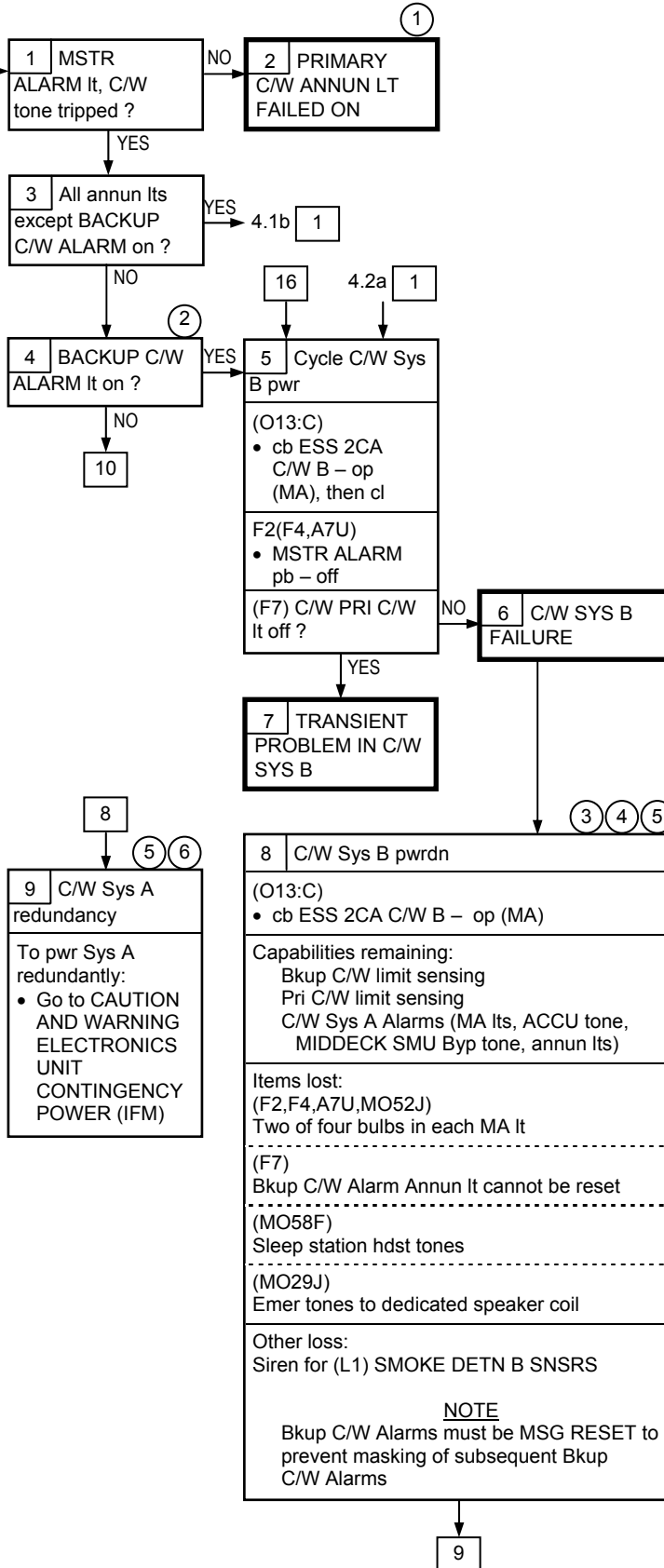
**C/W**

**4.1a PRIMARY C/W**

**PRIMARY C/W**  
(F7)

Light on if:  
CWE fails self-test  
C/W Sys A(B)  
timing failure  
C/W Sys A(B) pwr  
sply 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 Itg sys  
operational  
Smoke detn sys  
operational

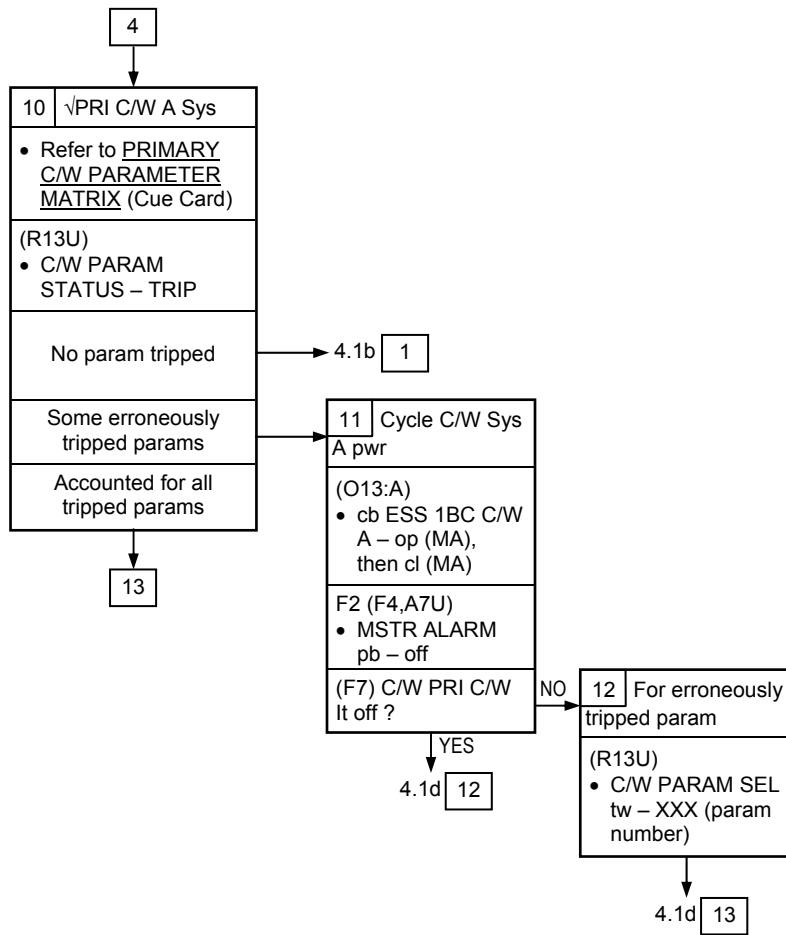


- ① To extinguish PRIMARY C/W It, remove bulbs or select (C3) C/W MODE – ACK
- ② BACKUP C/W ALARM It is not accompanied by fault msg and cannot be MSG RESET
- ③ All four bulbs in each MA It will illuminate during lamp test
- ④ To extinguish (F7) PRIMARY C/W and BACKUP C/W ALARM Its, remove bulbs or select (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

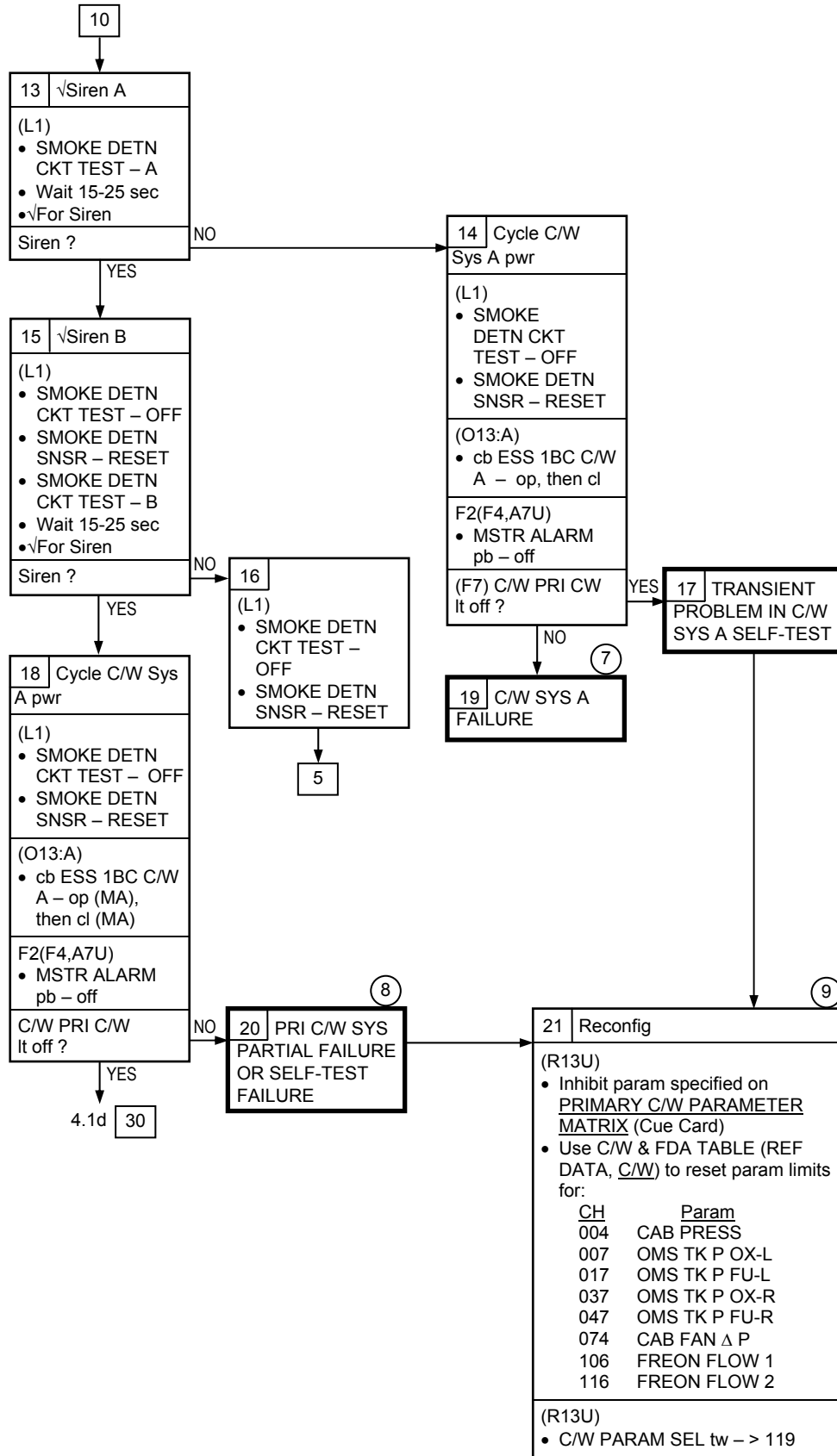
**PRIMARY C/W**

**4.1**

**C/W 4.1a (Cont)**



**C/W 4.1a (Cont)**



⑦ For any nuisance alarms that cannot be inhibited, use 4.1b 5 to pwrdn PRI C/W or use 4.1c 28 to disable tone

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

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



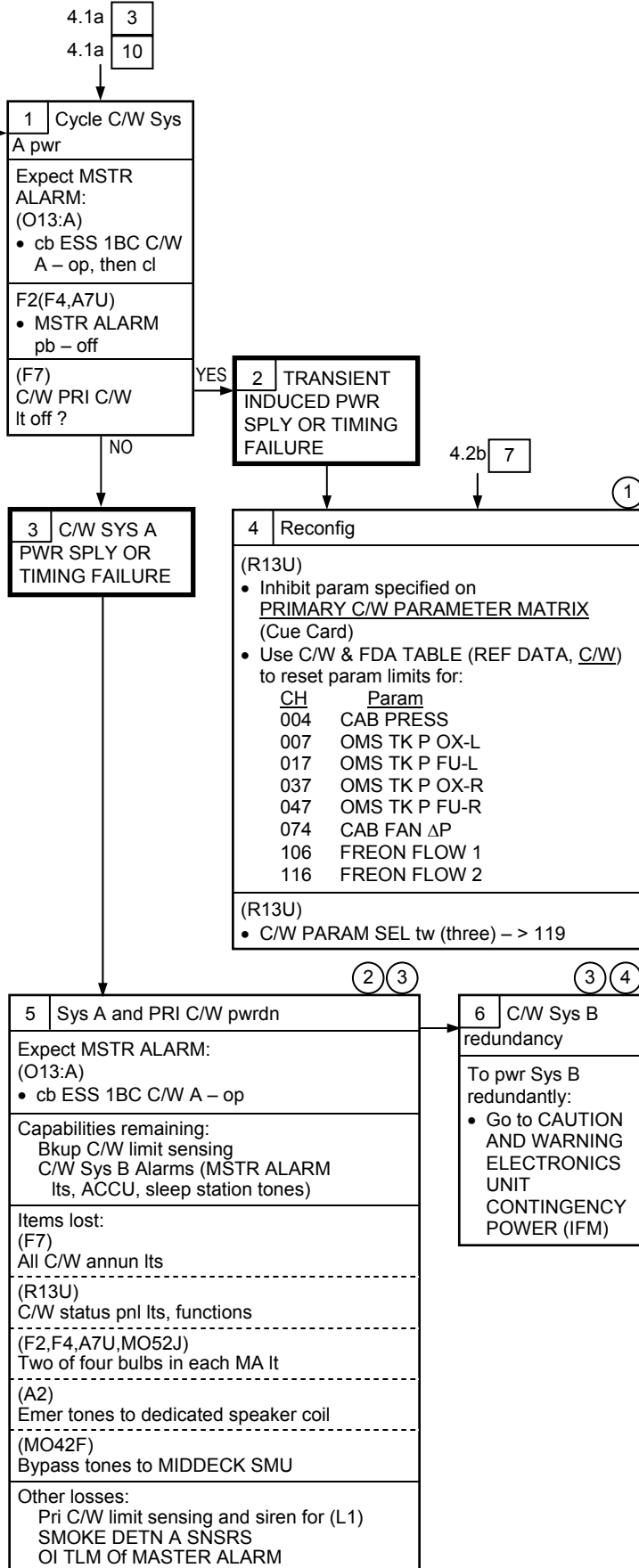
**C/W**

**4.1b ALL ANNUN LTS ON EXCEPT BACKUP C/W ALARM**

All Annun Lts On Except Backup C/W Alarm (F7)

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

② All four bulbs in each MA l't will illuminate during lamp test

③ Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

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

**C/W**

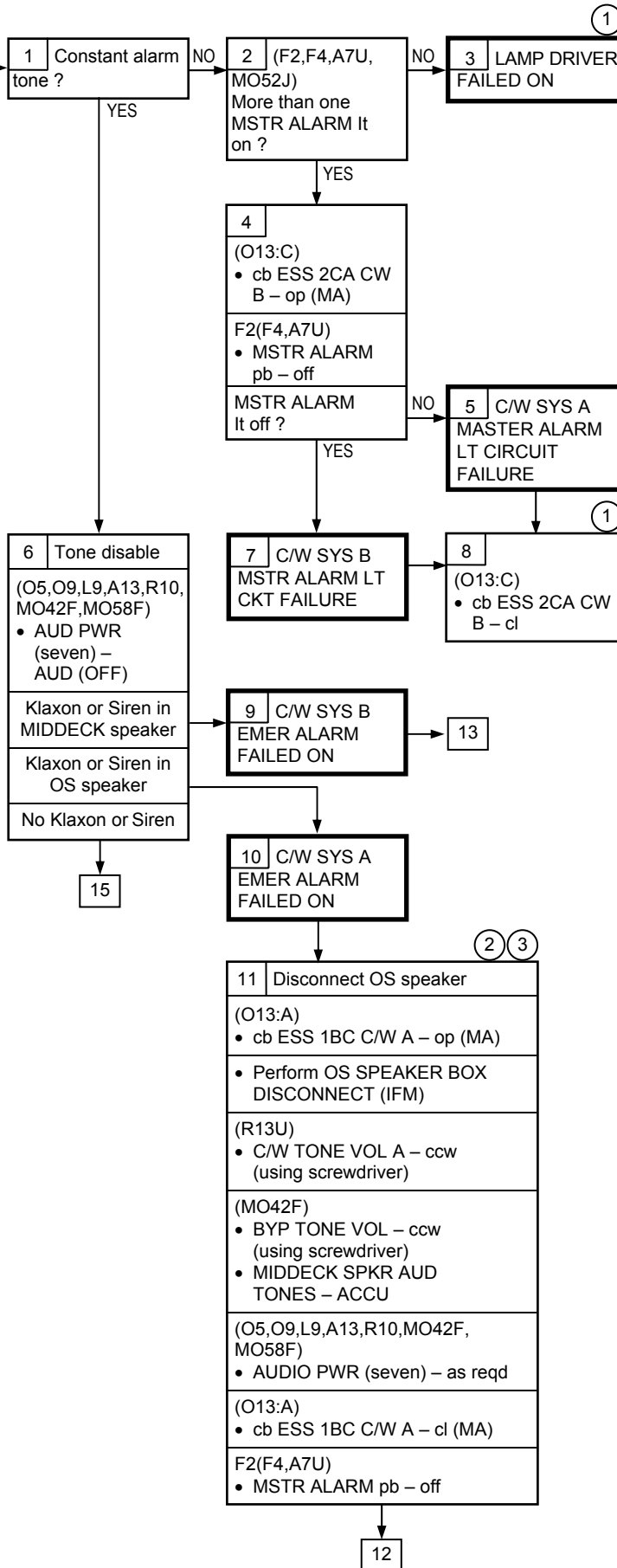
**4.1c NONRESETTABLE MA LT OR TONE**

**MSTR ALARM**

(Cannot be reset by depressing any MSTR ALARM pb)

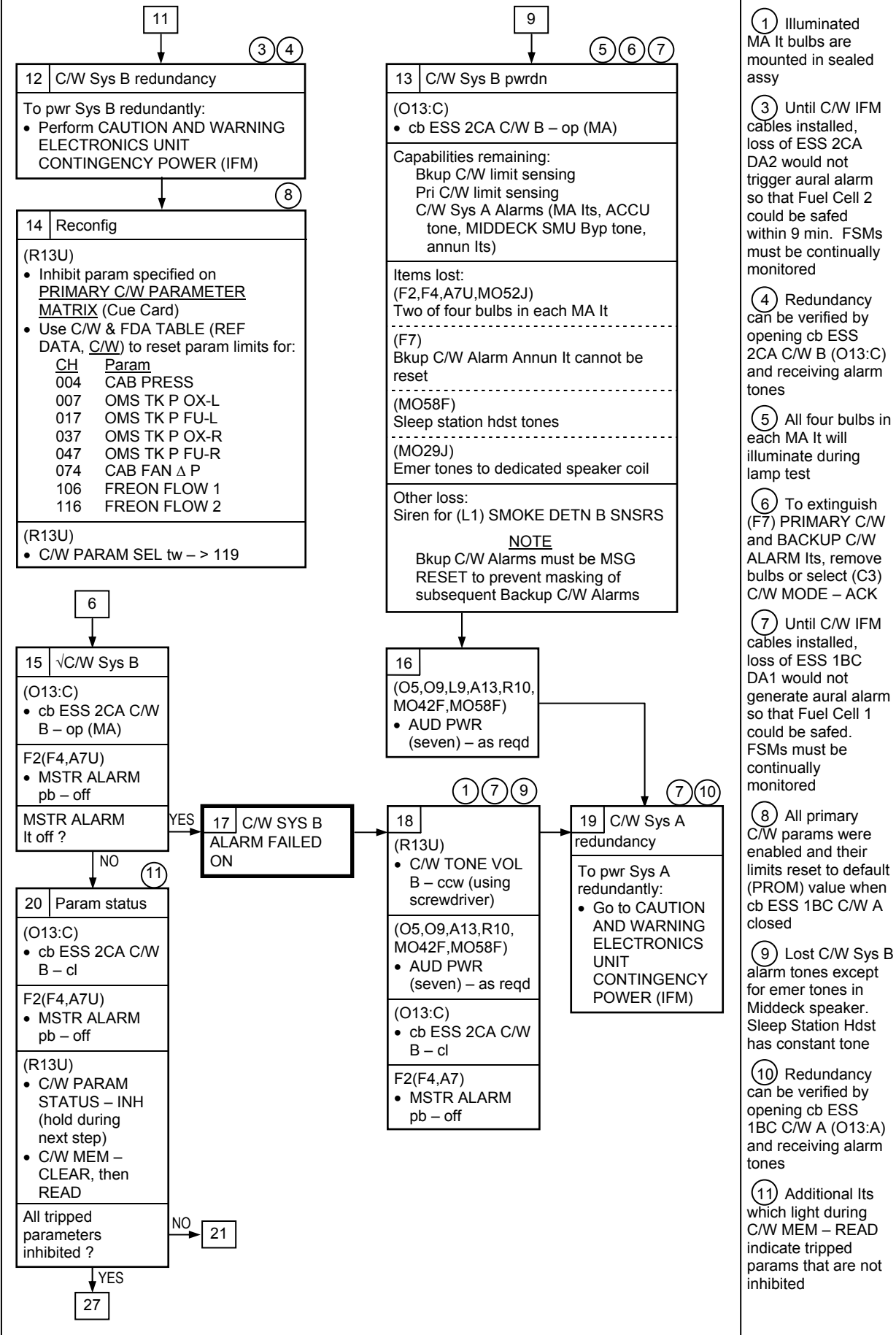
Caused by:  
Lamp driver failed on  
C/W Sys A(B) MA Signal failed on  
C/W Sys A(B) EMER, C/W, or SM alarm failed on  
Constant retriggering caused by PRI C/W trig mem or self-test failure

**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)  
Annum ltg sys operational  
Smoke detn sys operational

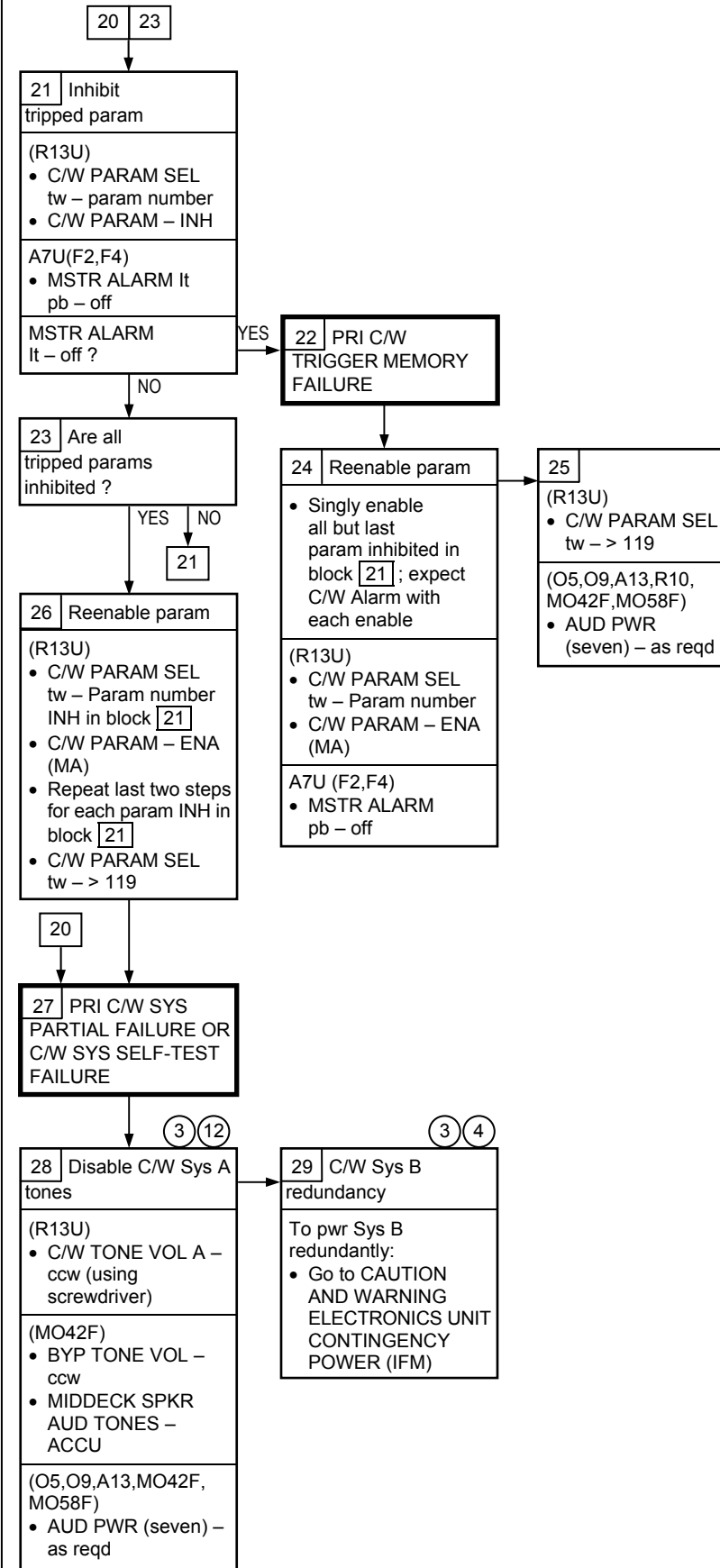


- ① Illuminated MA Lt bulbs are mounted in sealed assy
- ② PRI C/W limit sensing and (F7) annun will still be functional
- ③ Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

**C/W 4.1c (Cont)**



**C/W 4.1c (Cont)**



③ Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

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

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

**C/W**

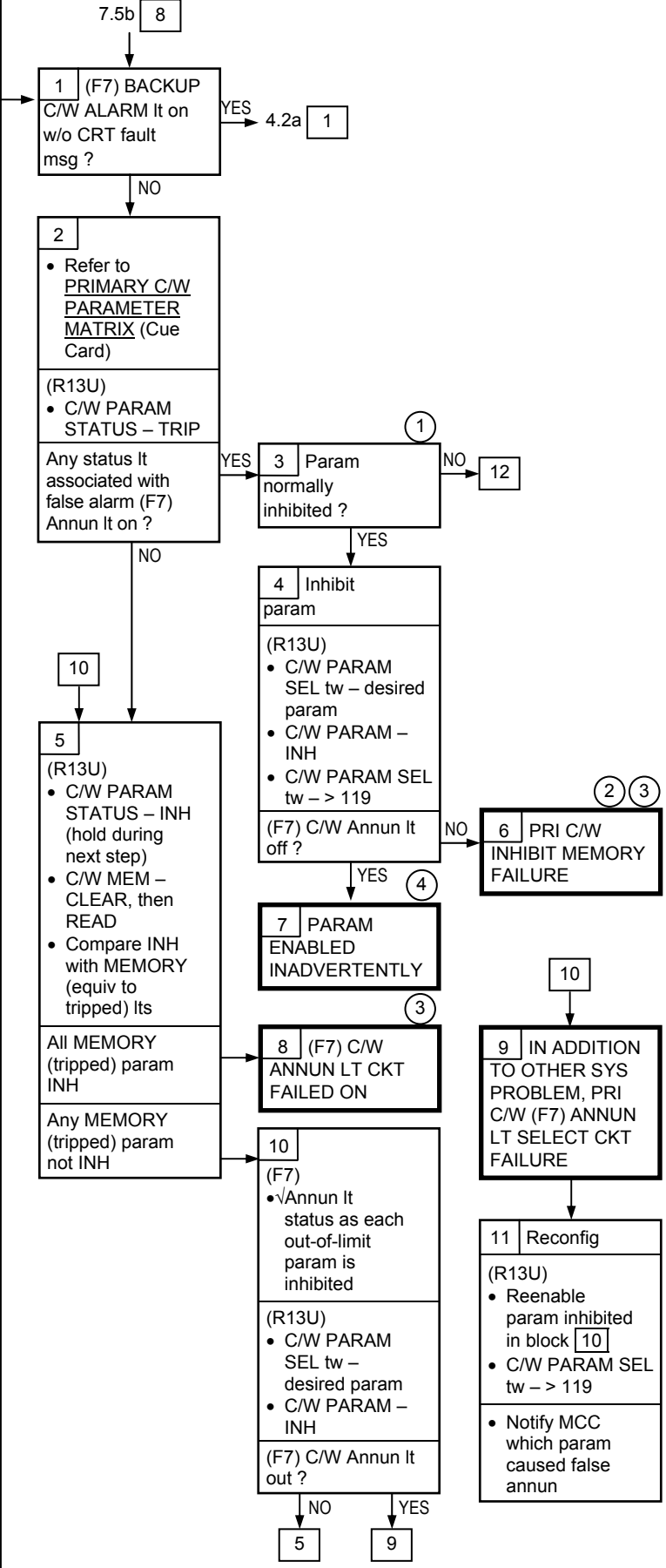
**4.1d PRI C/W SYS ANNUNCIATES FALSE ALARM**

PRI C/W Sys Annunciates False Alarm

(F7)  
Annun It on but indicated sys checks normal

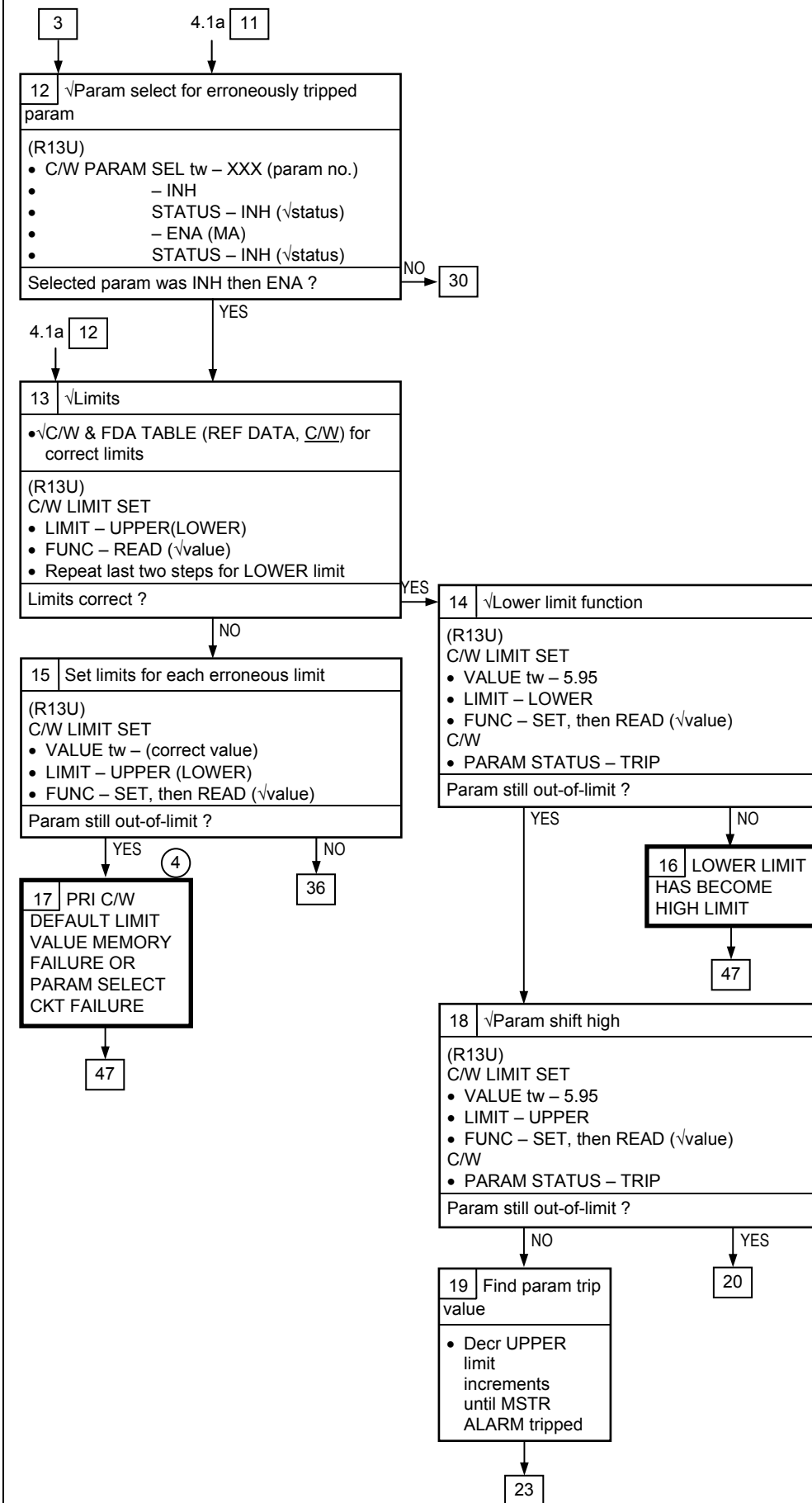
Caused by:  
Annun It failed on PRI C/W Sys  
Inhibit memory failure  
Limit value failure  
Limit sense failure  
Signal Conditioner failure  
Param Select or Multiplexer failure

**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 Itg sys operational  
Smoke detn sys operational



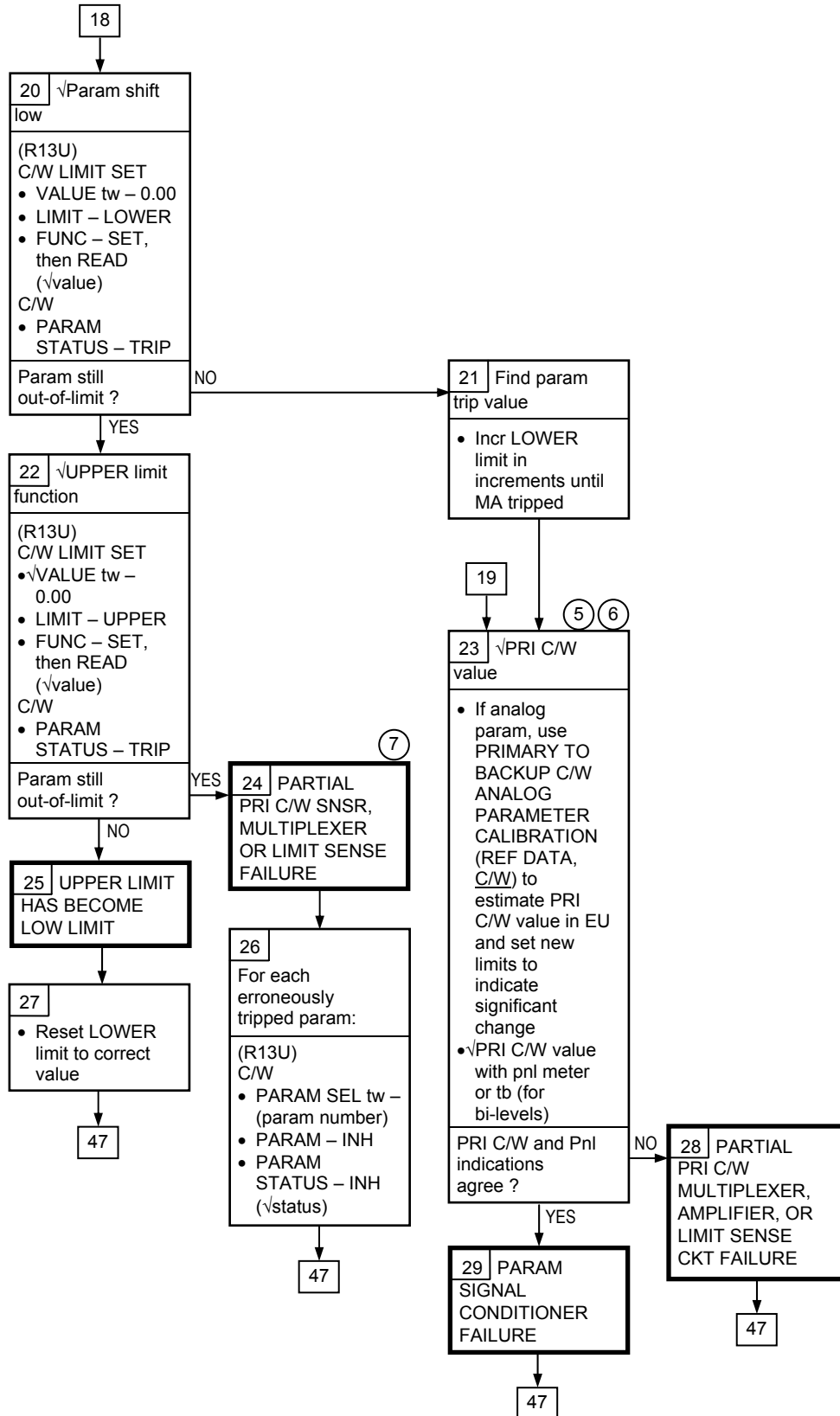
- ① Correct param inhibit status can be verified using PRIMARY C/W PARAMETER MATRIX Cue Card
- ② Depending on param value, It may be extinguished by changing limits
- ③ To disable lts, remove illuminated bulbs or select (C3) C/W MODE - ACK
- ④ Prior to changing any param limit value, √param select capability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

**C/W 4.1d (Cont)**



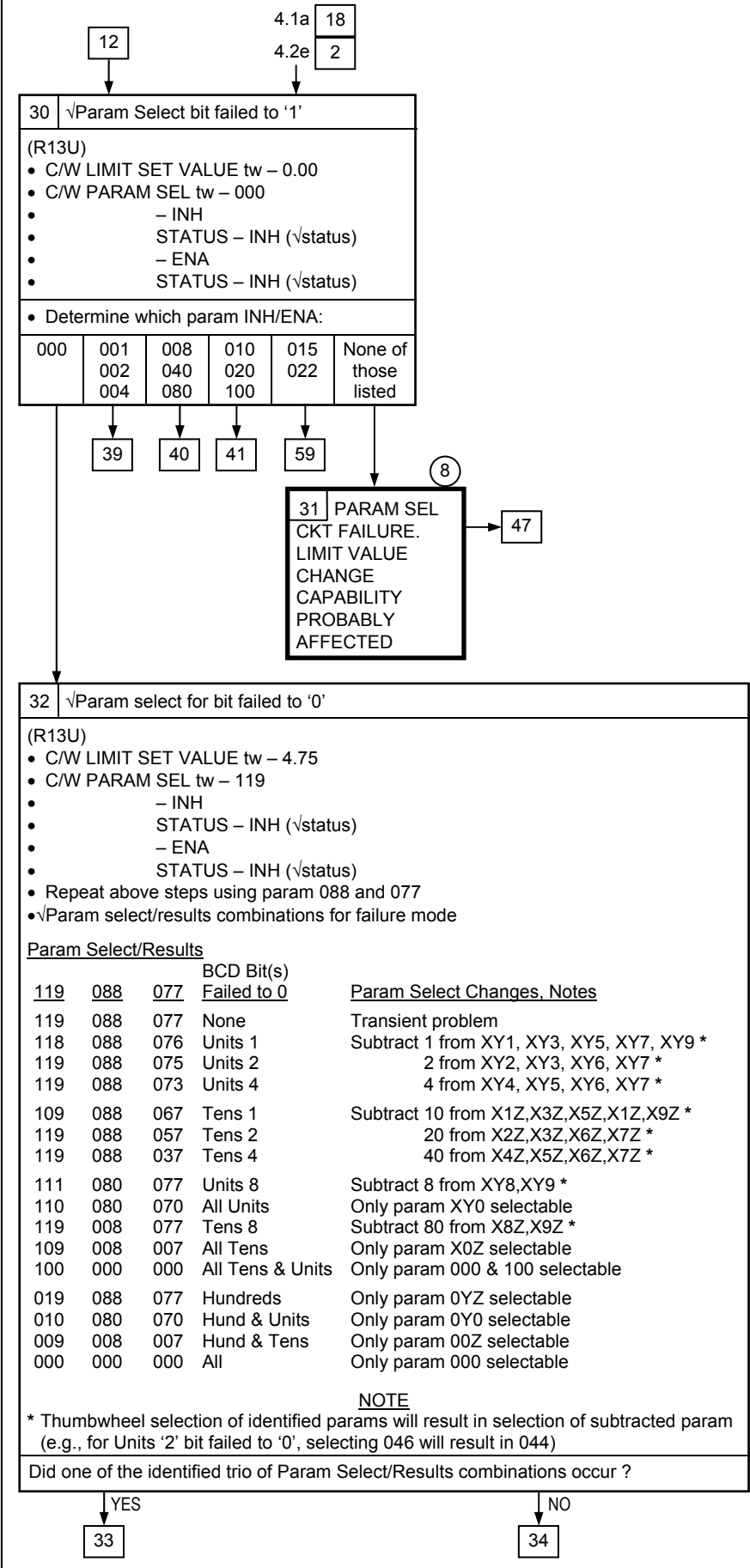
④ Prior to changing any param limit value, √param select capability with INH/ENA capability verification using procedure in block 12

**C/W 4.1d (Cont)**



- 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

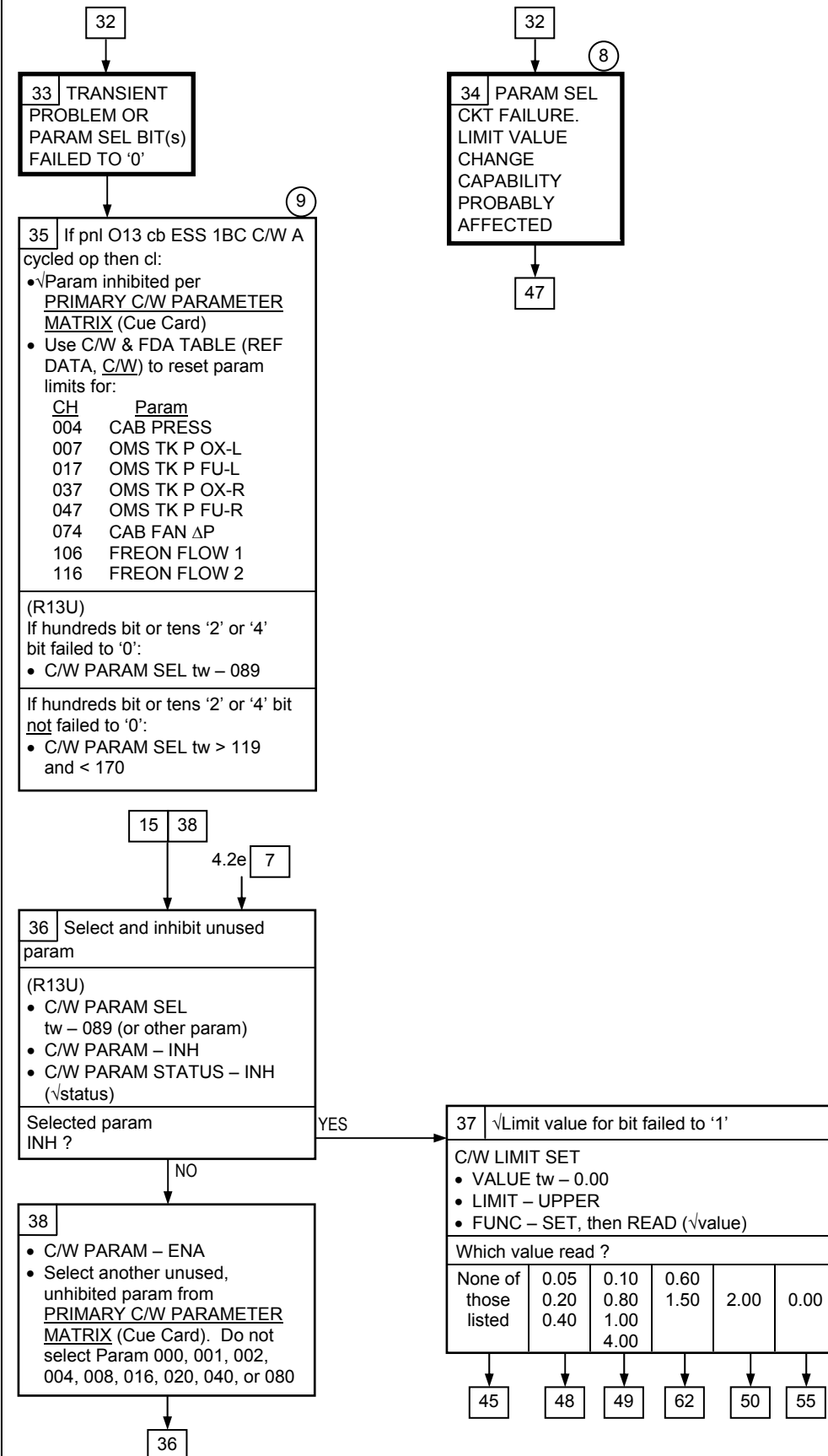
**C/W 4.1d (Cont)**



⑧ 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



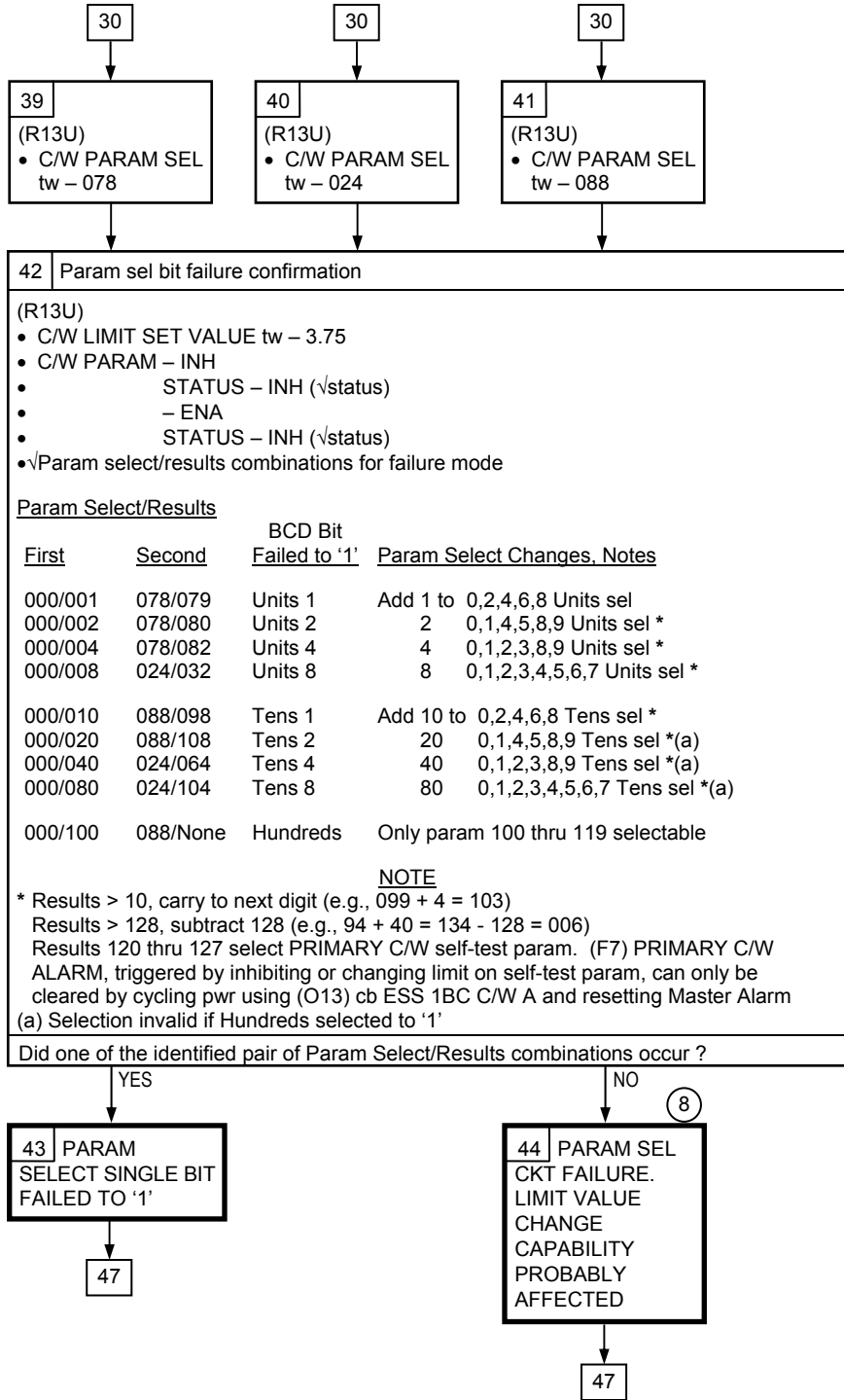
**C/W 4.1d (Cont)**



⑧ 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

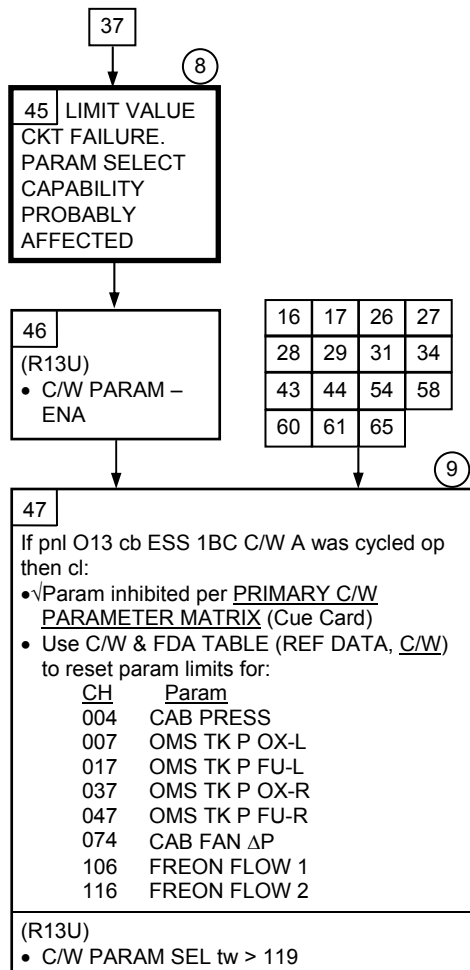
⑨ All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed

**C/W 4.1d (Cont)**



⑧ Prior to changing param limit,  $\sqrt{\text{that desired param}}$  and an unused param are selectable using two INH/ENA cycles (see procedure in block [12]), then  $\sqrt{\text{desired limit value change capability}}$  on unused param

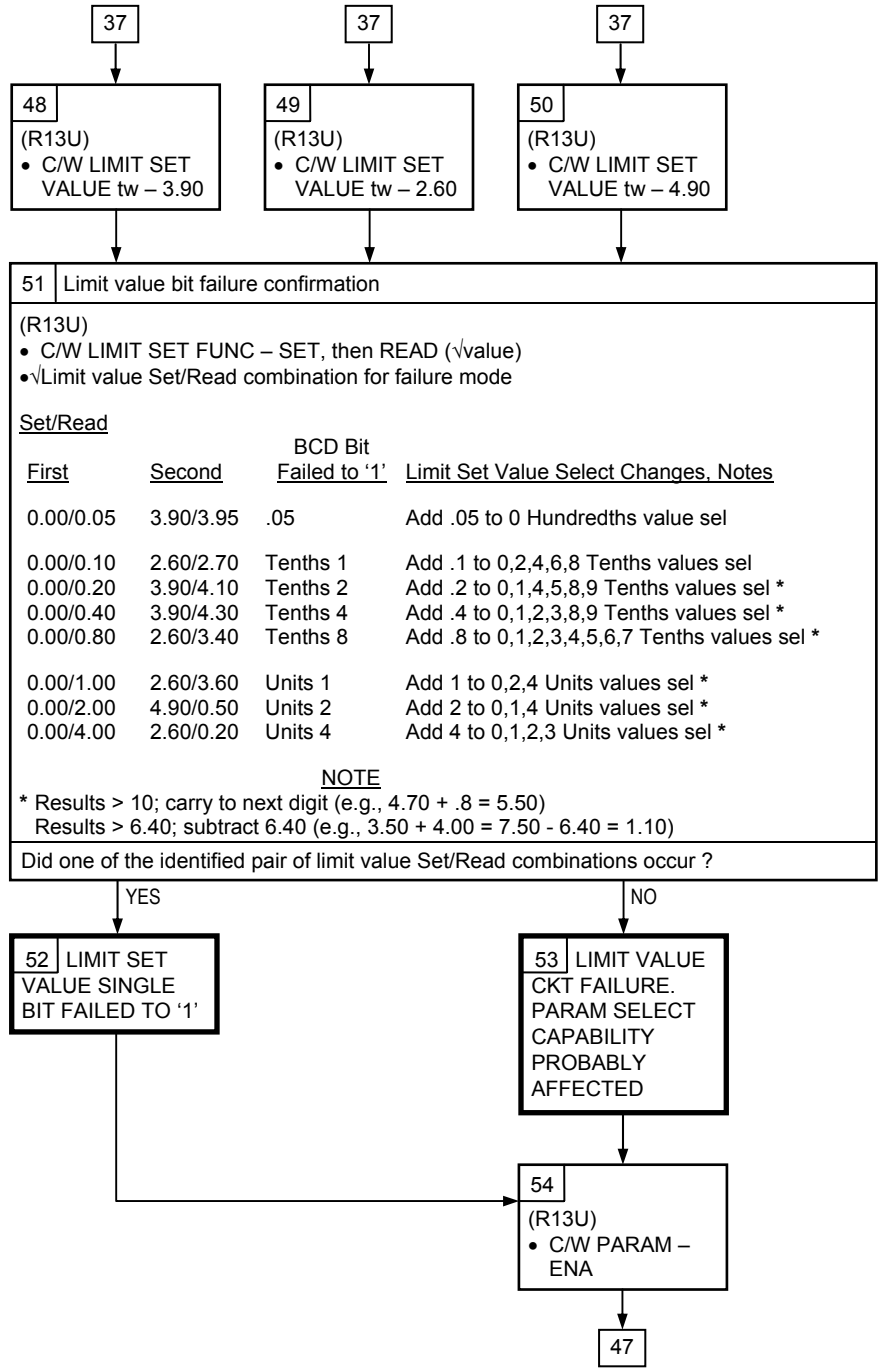
**C/W 4.1d (Cont)**



8 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

9 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 4.1d (Cont)**



37

55 | √Limit value for bit(s) failed to '0'

(R13U)

- C/W LIMIT SET VALUE tw – 3.65  
 FUNC – SET, then READ (√value)
- Repeat above steps using limit value of 5.95
- √Limit value Set/Read result combinations for failure mode

Value Results

3.65	5.95	BCD Bit(s) Failed to '0'	Limit Value Select Changes
3.65	5.95	None	Transient problem
3.60	5.90	.05	Subtract .05 from X.Y5 *
3.65	5.85	Tenths 1	Subtract .1 from X.1Z, X.3Z, X.5Z, X.7Z, X.9Z *
3.45	5.95	Tenths 2	.2 X.2Z, X.3Z, X.6Z, X.7Z *
3.25	5.95	Tenths 4	.4 X.4Z, X.5Z, X.6Z, X.7Z *
3.65	5.15	Tenths 8	.8 X.8Z, X.9Z *
3.05	5.05	All Tenths	Only X.0Z selectable
3.00	5.00	.05 & All Tenths	X.00 selectable
2.65	4.95	Units 1	Subtract 1 from 1.YZ, 3.YZ, 5.YZ *
1.65	4.95	Units 2	2 2.YZ, 3.YZ *
3.65	1.95	Units 4	4 4.YZ, 5.YZ *
0.65	0.95	All Units	Only 0.YZ selectable
0.05	0.05	Units & Tenths	Only 0.0Z selectable
0.60	0.90	Units & .05	Only 0.Y0 selectable
0.00	0.00	All	Only 0.00 selectable

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 ?

YES

56 | LIMIT SET  
VALUE BIT(S)  
FAILED TO '0'

NO

8

57 | LIMIT VALUE  
CKT FAILURE.  
PARAM SELECT  
CAPABILITY  
PROBABLY  
AFFECTED

58 | (R13U)  
• C/W PARAM –  
ENA

47

8 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

59 √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

000	099	055	tw Bit Shorted	Param Select Changes, Notes
015	099	055	Units 1	Param XY1, XY3, XY5, XY7, XY9 selectable *
015	105	065	Units 2	XY2, XY3, XY6, XY7 selectable *
015	105	055	Units 4	XY4, XY5, XY6, XY7 selectable *
015	099	065	Units 8	XY8, XY9 selectable *
022	099	055	Tens 1	Param X1Z, X3Z, X5Z, X7Z, X9Z selectable *
022	031	027	Tens 2	02Z, 03Z, 06Z, 07Z selectable *(a)
022	031	055	Tens 4	04Z, 05Z, 06Z, 07Z selectable *(a)
022	099	027	Tens 8	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 Tenths selection. For 'Tens' failure this would add 150 to the Hundreds and Units selection. If > 128, subtract 128 from resulting number to find param selected

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

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

YES

60 PARAM  
SELECT tw SIGNAL  
SHORTED

47

NO

4

61 PARAM  
SELECT CKT  
FAILURE

47

4 Prior to changing any param limit value, √param select capability with INH/ENA capability verification using procedure in block 12

37

62 √For limit value tw signal short

(R13U)

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

Value Result

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

NOTE

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

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

YES

63 LIMIT VALUE SELECT tw SIGNAL SHORTED TO STRUCTURE

NO

8

64 LIMIT VALUE CKT FAILURE PARAM SELECT CAPABILITY PROBABLY AFFECTED

65 (R13U)  
• C/W PARAM – ENA

47

8 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

**C/W**

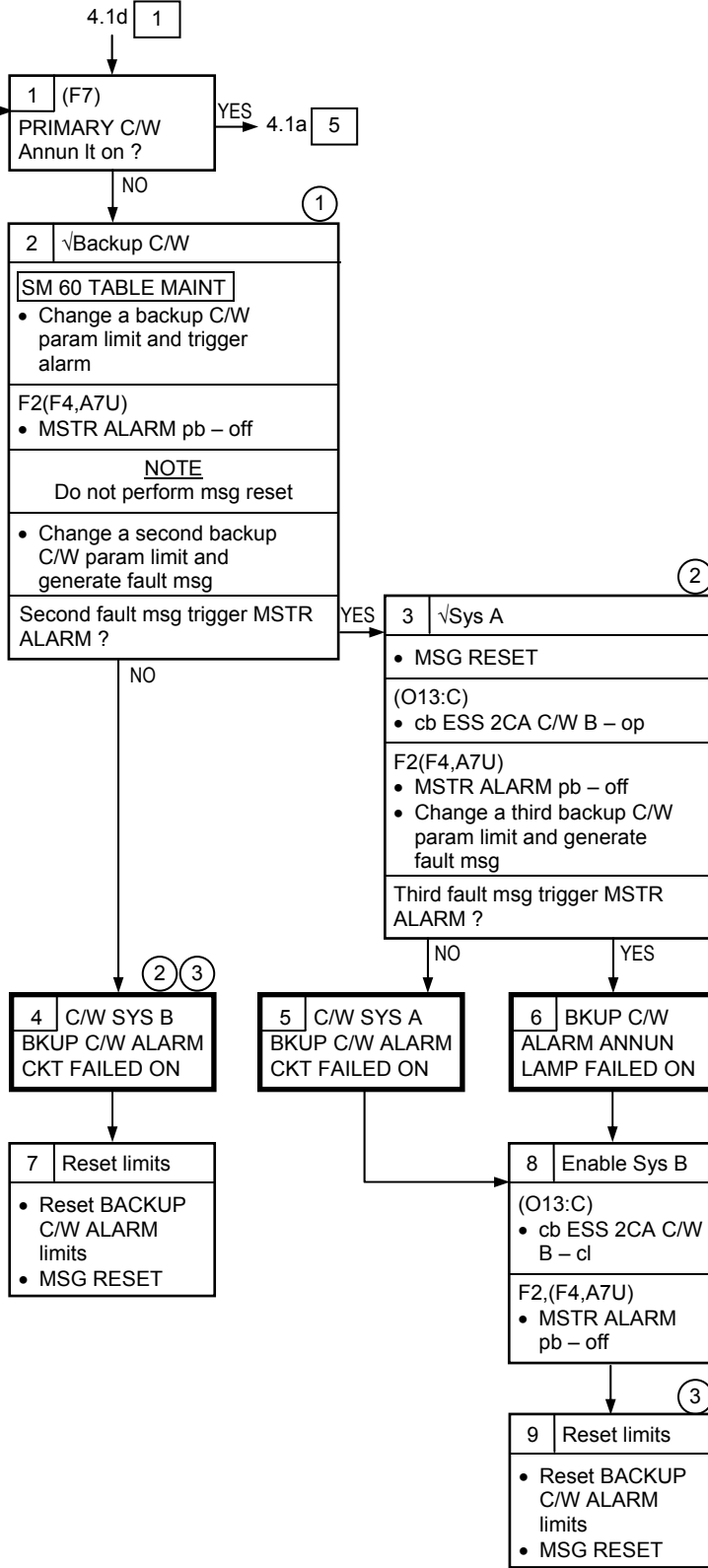
**4.2a NONRESETTABLE BACKUP C/W ALARM LT**

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

Light on but msg reset does not extinguish light

If:  
Annun It driver failed on C/W Sys A(B)  
Backup C/W Alarm ckt failed on C/W Sys B pwr sply 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 Itg sys operational  
Smoke detn sys operational



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



**C/W**

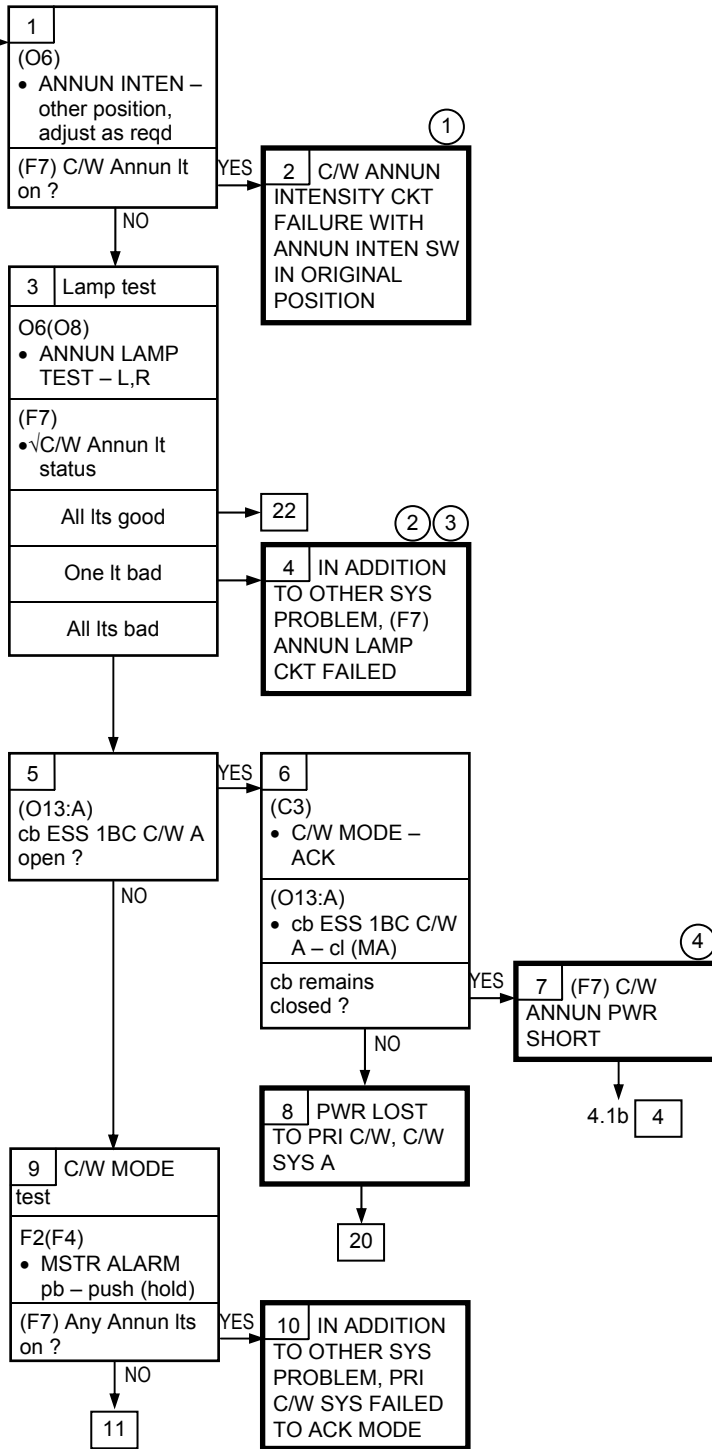
**4.2b MA LT & C/W TONE – NO ANNUN LT**

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

**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



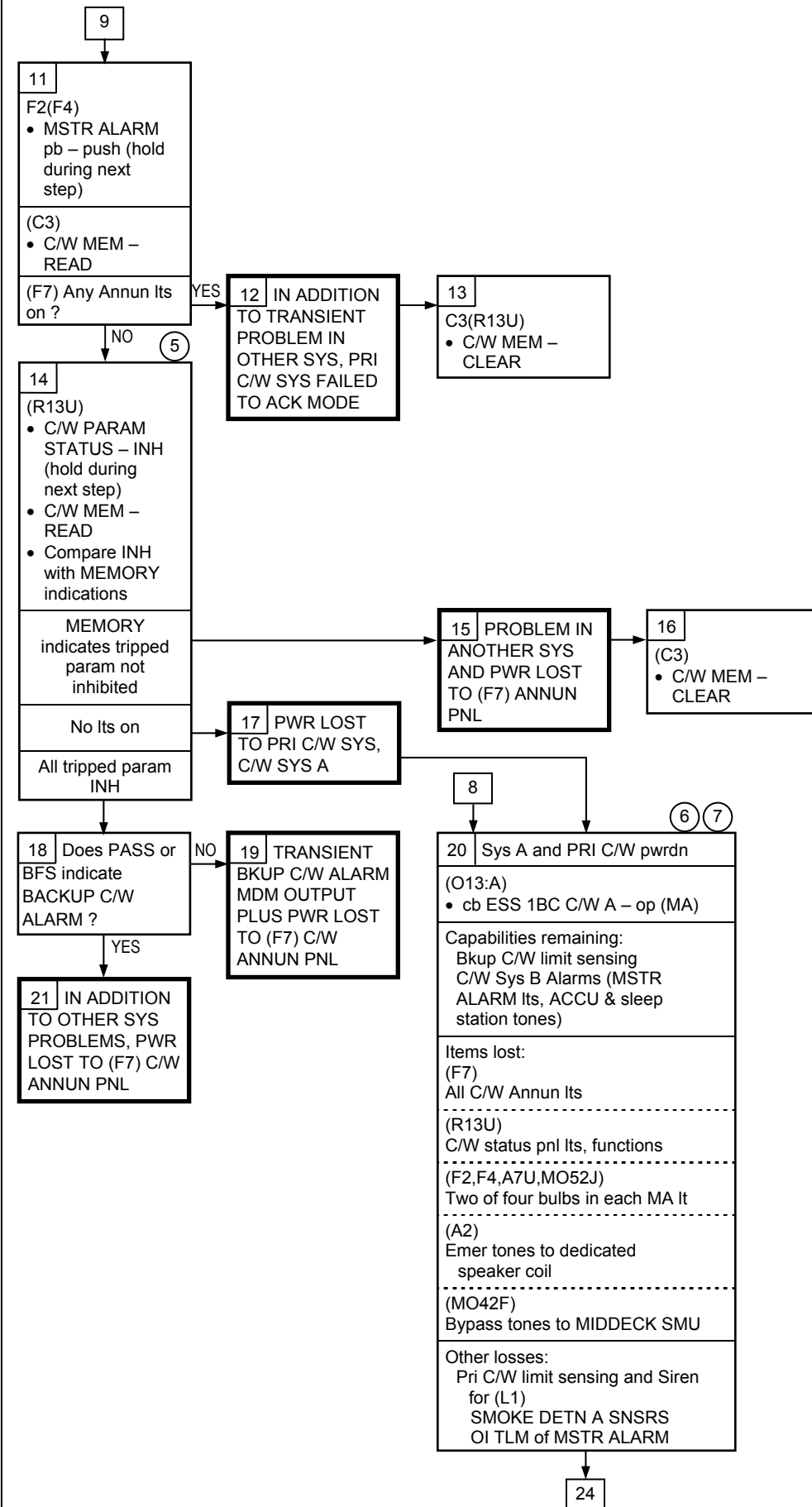
① ANNUN INTEN sw must be in non-failed position for normal (F7) C/W lts ops

② Verify lamp holder properly seated

③ If reqd, IFM LIGHTBULB CHANGEOUT procedure may be used to swap bulbs with spare annunciator

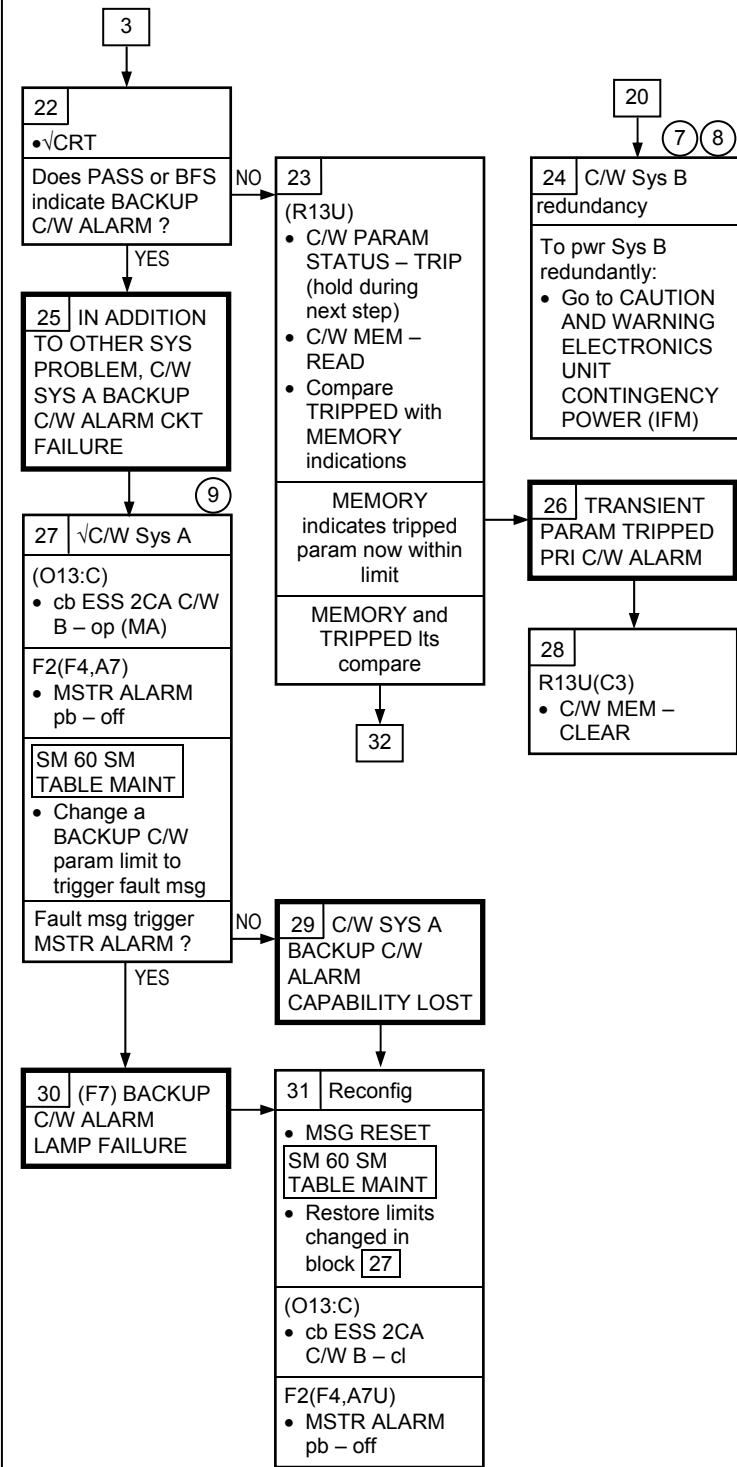
④ Use pnl A7U (MO52J) MSTR ALARM pb to reset alarms. If pnl F2(F4) pb must be used, pressing pb quickly may allow MA to reset without tripping cb. Pnl F7 annunciator lost

**C/W 4.2b (Cont)**



- ⑤ Additional Its which light during C/W MEM – READ indicate tripped params that are not inhibited
- ⑥ All four bulbs in each MA It will illuminate during lamp test
- ⑦ Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

**C/W 4.2b (Cont)**



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

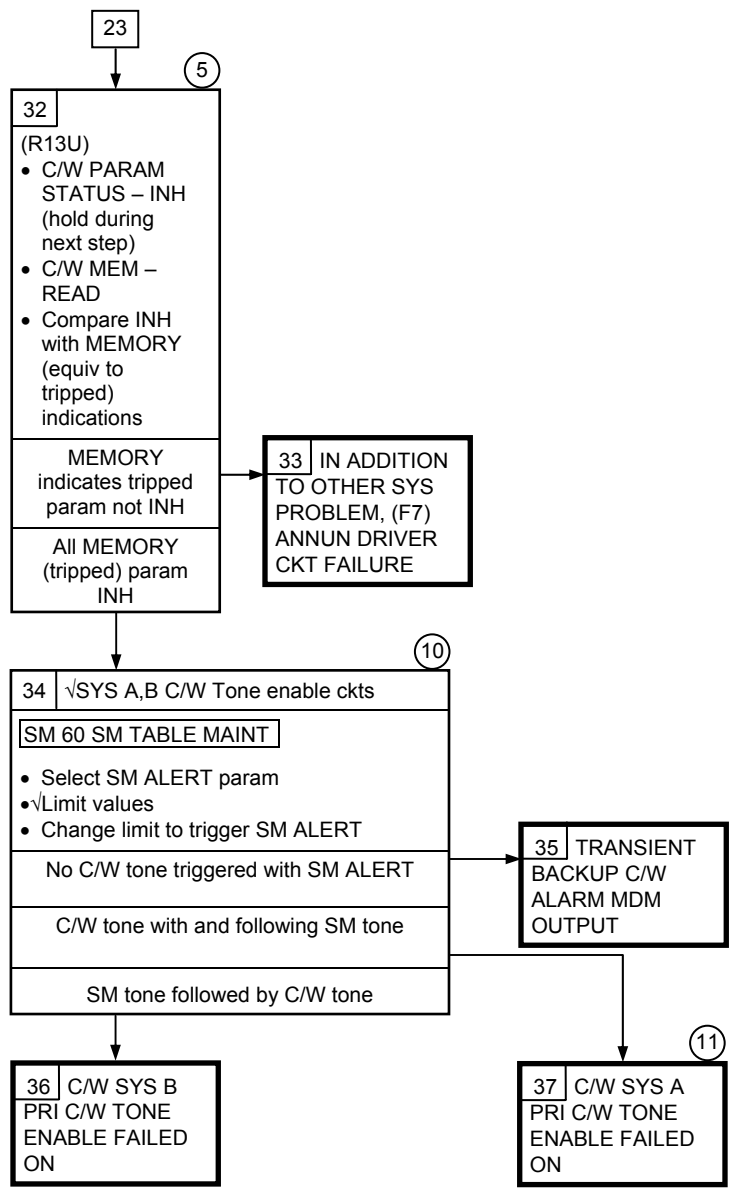
⑧ Redundancy can be verified by opening cb ESS 2CA C/W B (O13:C) and receiving alarm tones

⑨ 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

**C/W 4.2b (Cont)**



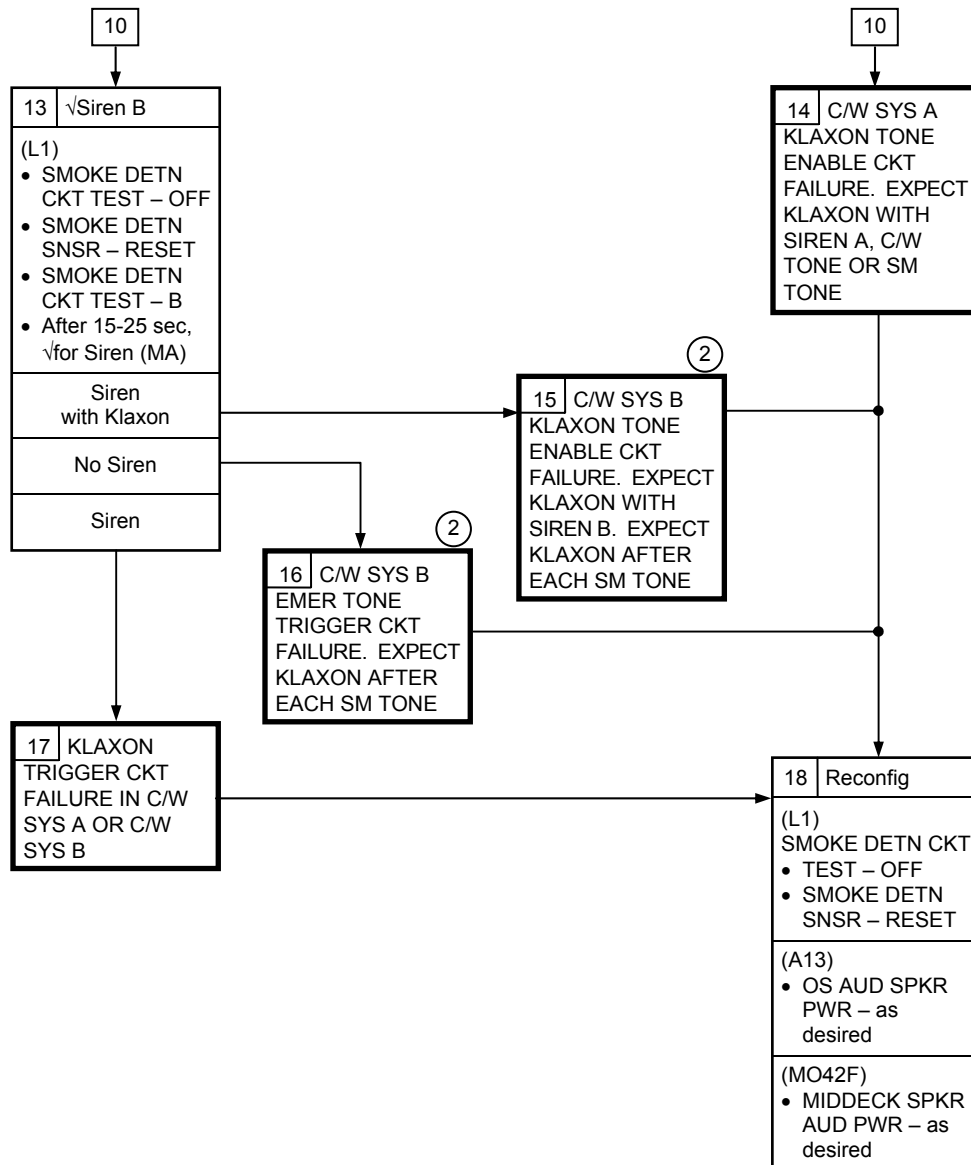
⑤ Additional lts which light during C/W MEM - READ indicate tripped params that are not inhibited

⑩ Usable SM ALERT params include:  
FC H2O LNT  
Sys 1 - 0450412  
Sys 2 - 0450281  
Sys 3 - 0450381  
FC H2O VLV T  
Sys 1 - 0450412  
Sys 2 - 0450422  
Sys 3 - 0450432

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



**C/W 4.2c (Cont)**



② 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



C/W

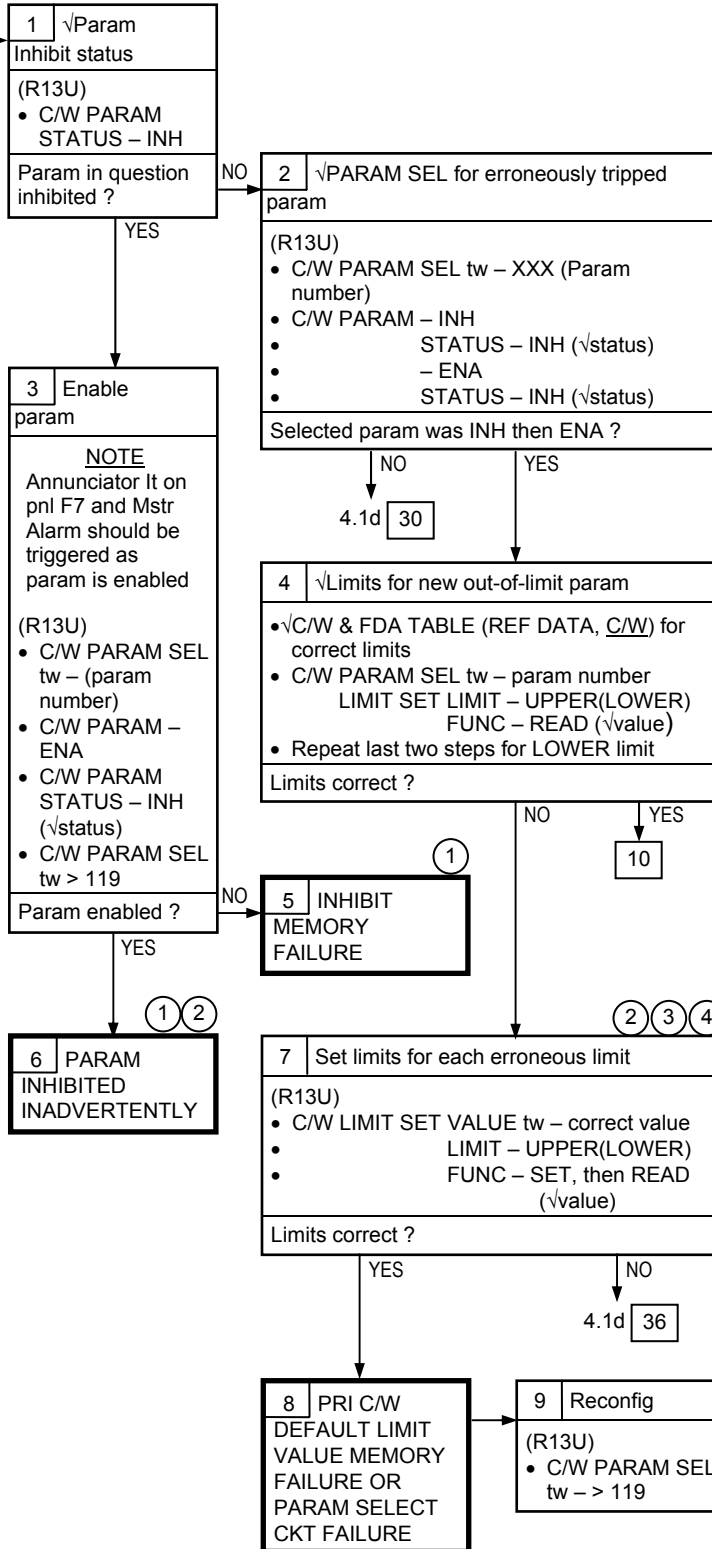
### 4.2e PRI C/W SYS FAILS TO ANNUNCIATE OUT-OF-LIMIT PARAM

PRI C/W Sys Fails to Annun Out-of-Limit Param

C/W Alarm triggered by Backup C/W Sys

If:  
Pri C/W Sys Snr Multiplexer  
Limit Value Limit Sense  
Inhibit Memory or Param Select 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 Itg sys operational  
Smoke detn sys operational



① Correct Param Inhibit status can be verified using PRIMARY C/W PARAMETER MATRIX (Cue Card)

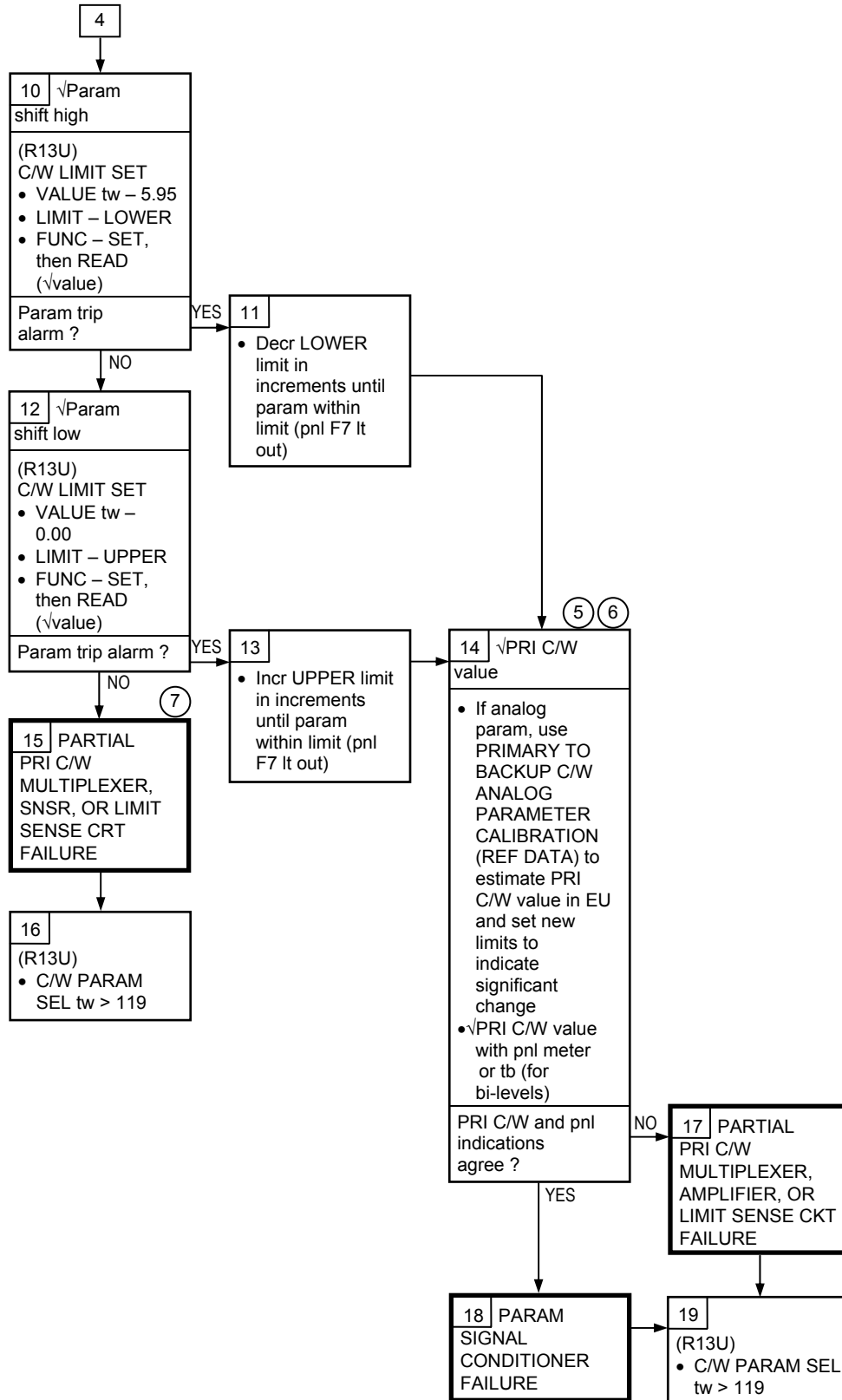
② Prior to changing any limit value,  $\sqrt$ PARAM SEL capability with an INH/ENA capability verification using procedure in block 2

③ If time permits,  $\sqrt$ all enabled param limits

④ Limits entered from pnl R13 use different memory than default limits



**C/W 4.2e (Cont)**



- ⑤ Notify MCC of change in PRI C/W param and limit values
- ⑥ Bi-level params are identified in NOTES column of C/W & FDA Table (REF DATA, C/W)
- ⑦ If pnl indication and primary C/W param values agree, Snsr or Signal Conditioner failed

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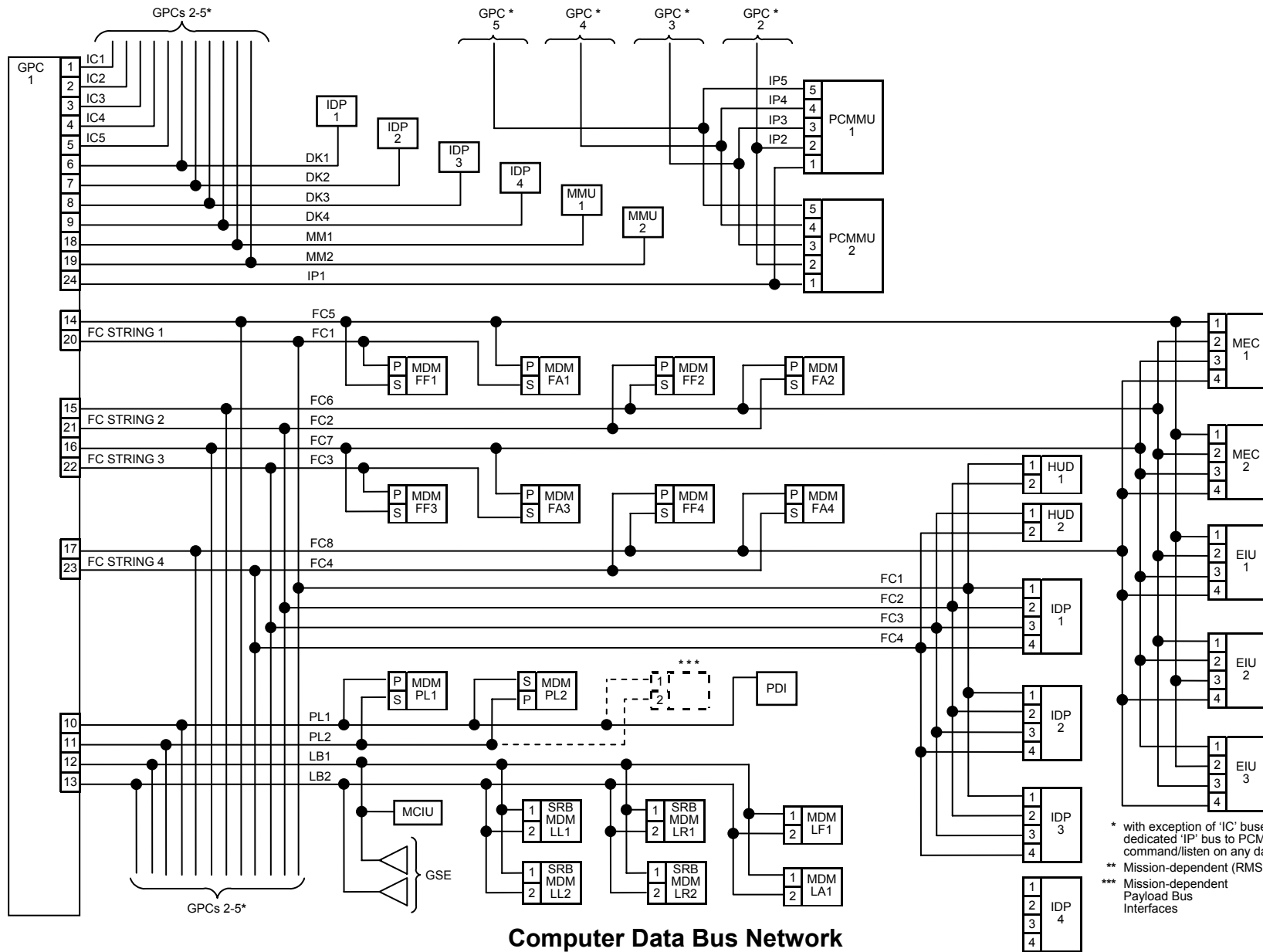
The following Fault Msgs have no corresponding MAL procedures in this book:

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



Computer Data Bus Network

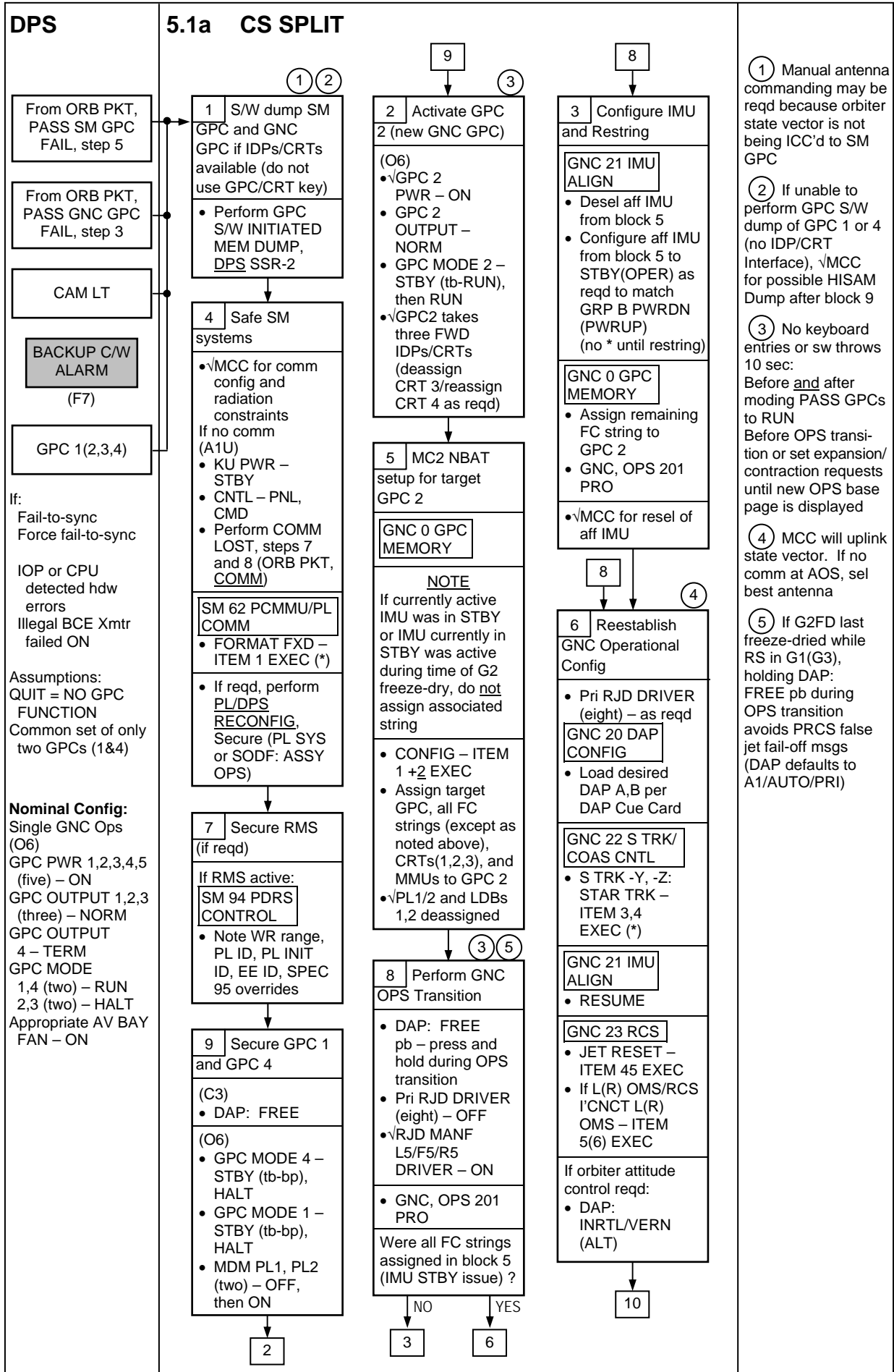
\* with exception of 'IC' buses between GPCs and dedicated 'IP' bus to PCMMUs, any GPC can command/listen on any data bus

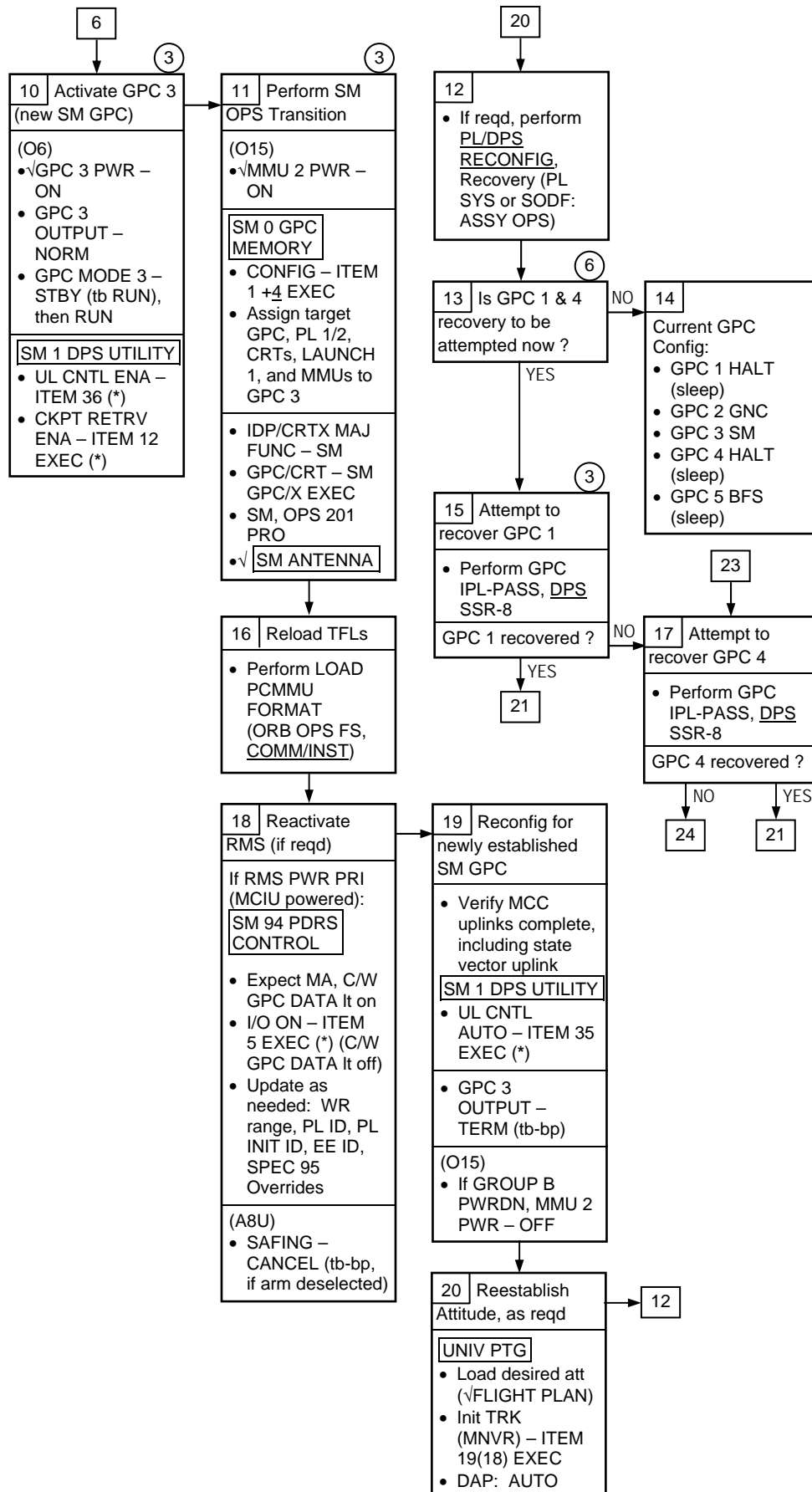
\*\* Mission-dependent (RMS reqd)

\*\*\* Mission-dependent Payload Bus Interfaces

( FLEX MDMs, FLEX PAIRS )

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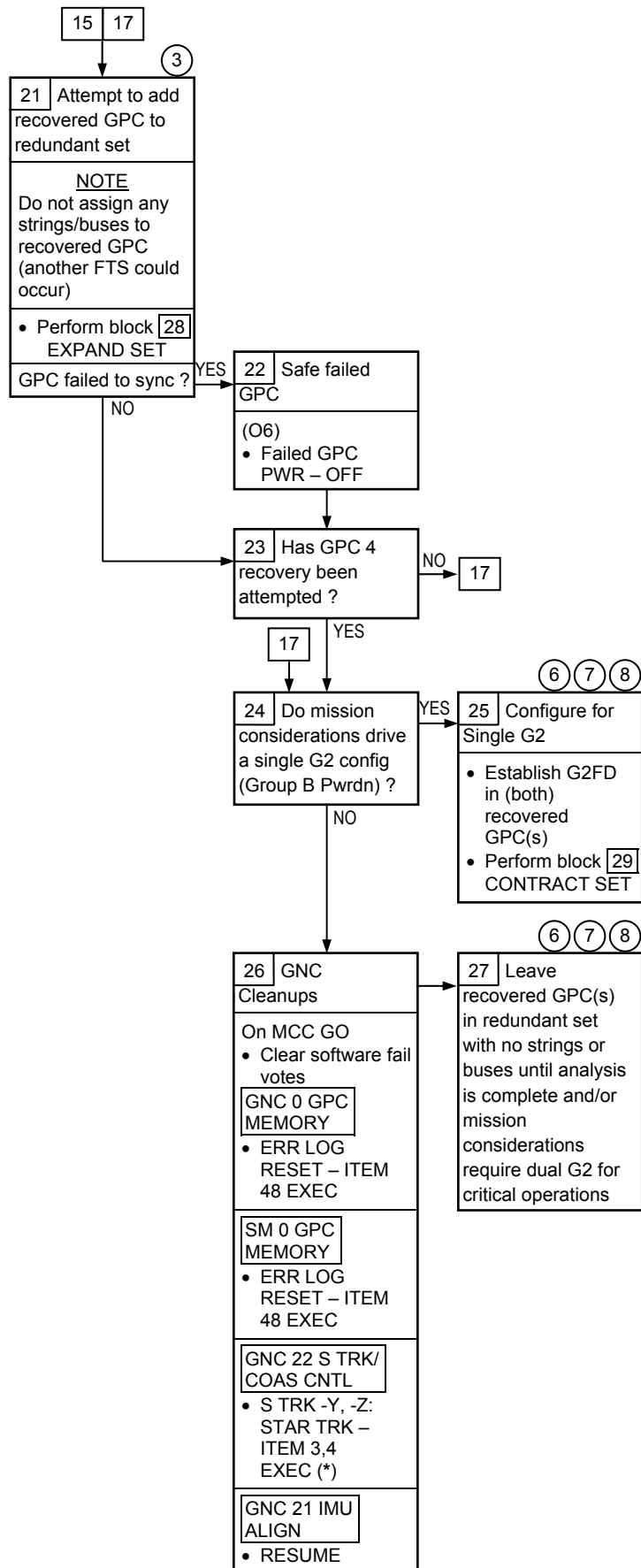


③ No keyboard entries or sw throws 10 sec:  
 Before and after moding PASS GPCs to RUN  
 Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

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



**DPS 5.1a (Cont)**



- ③ No keyboard entries or sw throws 10 sec:  
Before and after moding PASS GPCs to RUN  
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed
- ⑥ MCC will utilize GPC 1 and 4 dump data to help determine the cause of CS split. Data analysis may take 24 to 48 hr
- ⑦ Upon completion of procedure, MCC may request certain IDPs/CRTs to be pwr'd 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
- ⑧ Avoid using GPC-1 or GPC-4 for critical burns or PROX OPS until GPC dump analysis confirms the GPC is not considered transient

28 EXPAND SET

**NOTE**

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

CONFIGURE FOR SET EXPANSION

CRT

GNC 0 GPC MEMORY

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

C3(A6U)

- OPS MODE RECALL (11)
- DAP: FREE

CRT

- GNC, OPS 201 PRO
- Pause ≈ 30 sec  
 (DAP settling), then

C3(A6U)

- DAP: as reqd

If desired RS:	Dual G2 (1&2)	Dual G2 (2&4)	Triple G2 (1&2&4)
CONFIG GPC	2 12000	2 02040	2 12040
STR 1	↑	↑	↑
2			
3			
4			
PL 1/2			
CRT 1	DO NOT MODIFY NBAT	DO NOT MODIFY NBAT	DO NOT MODIFY NBAT
2			
3			
4			
L 1	↓	↓	↓
2			
MM 1			
2			

(9) (10)

(9) Whether expanding G2 set to Dual or Triple G2 config, modify only the GPC target set unless otherwise noted (don't assign strings or buses to target GPC)

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

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

29 CONTRACT SET

**NOTE**

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

CONFIGURE FOR SET CONTRACTION

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

If	Single G2
CONFIG GPC	2 02000
STR 1	2
2	2
3	2
4	2
PL 1/2	0
CRT 1	2
2	2
3	0
4	2
L 1	2
2	0
MM 1	2
2	2

- C3(A6U) OPS MODE RECALL (11)  
 • DAP: FREE  
 • VERN(ALT)

- CRT • GNC, OPS 201 PRO  
 • Pause ≈ 30 sec (DAP settling), then

- C3(A6U) • DAP: as reqd

- CRTX FREEZE DRY GPC  
 • CRTX MAJ FUNC – PL  
 GPC/CRT G2FD/X EXEC  
GNC 0 GPC MEMORY  
 • CONFIG – ITEM 45 +2 EXEC  
 • GPC – ITEM 46 +1(4) EXEC  
 • STORE – ITEM 47 EXEC  
 Store complete when MC = 02 (≈ 30 sec)  
 •√All IDPs/CRTs deassigned from FD GPC

- O6 • GPC MODE G2FD – STBY (tb-bp)  
 • – HALT (tb-bp)  
 • – STBY (tb-RUN)  
 • – HALT (tb-bp)  
 • If reqd, repeat Freeze Dry steps for 2nd GPC

CONFIG CLEANUP

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

CLEAR SOFTWARE FAIL VOTES (12)

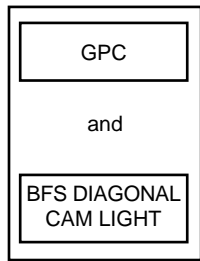
- GNC 0 GPC MEMORY  
 • ITEM 48 EXEC  
SM 0 GPC MEMORY  
 • ITEM 48 EXEC

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

(12) Crew GO for Error Log Resets without prior MCC concurrence

DPS

5.1b 'BFS GPC FAIL (BITE)' (ORBIT)

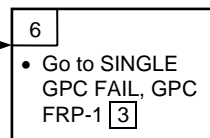
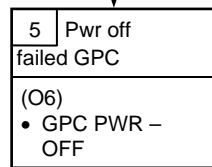
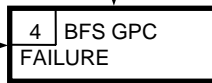
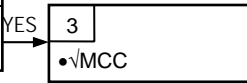
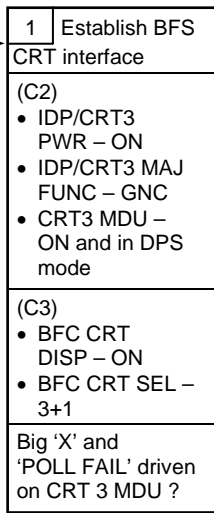


If:  
IOP watchdog Timer times out (~3.1 sec)  
or  
two restarts within consecutive major cycles

SM ALERT



If:  
BFS S/W initiates restart



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DPS

5.2a 'I/O ERROR MMU 1(2)'

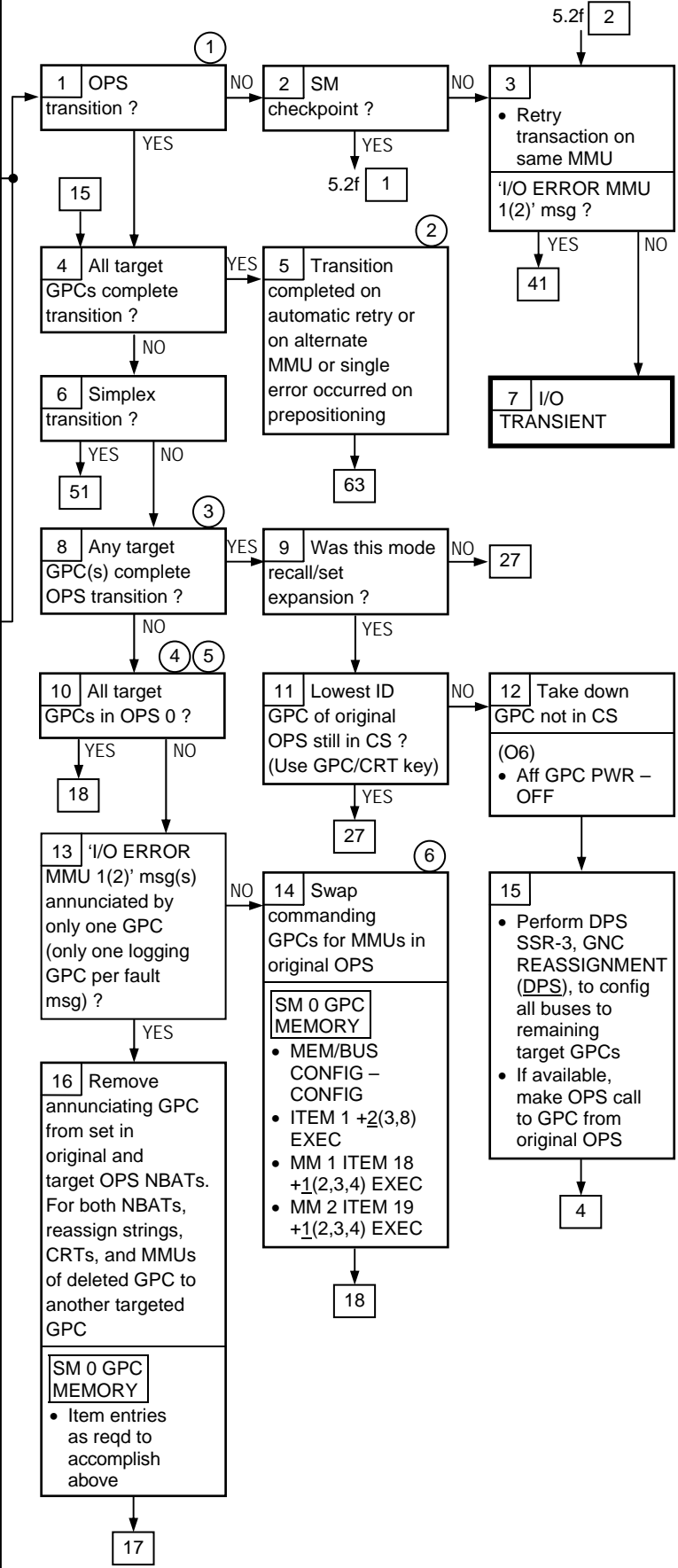
**SM ALERT**

**I/O ERROR MMU 1(2)**

If:  
 CHECKSUM, I/O transient, BCE failure, MMU failure, or source GPC failure  
 During:  
 Display roll-in, OPS transition  
 SM checkpoint  
 TFL/DFL  
 MM patch

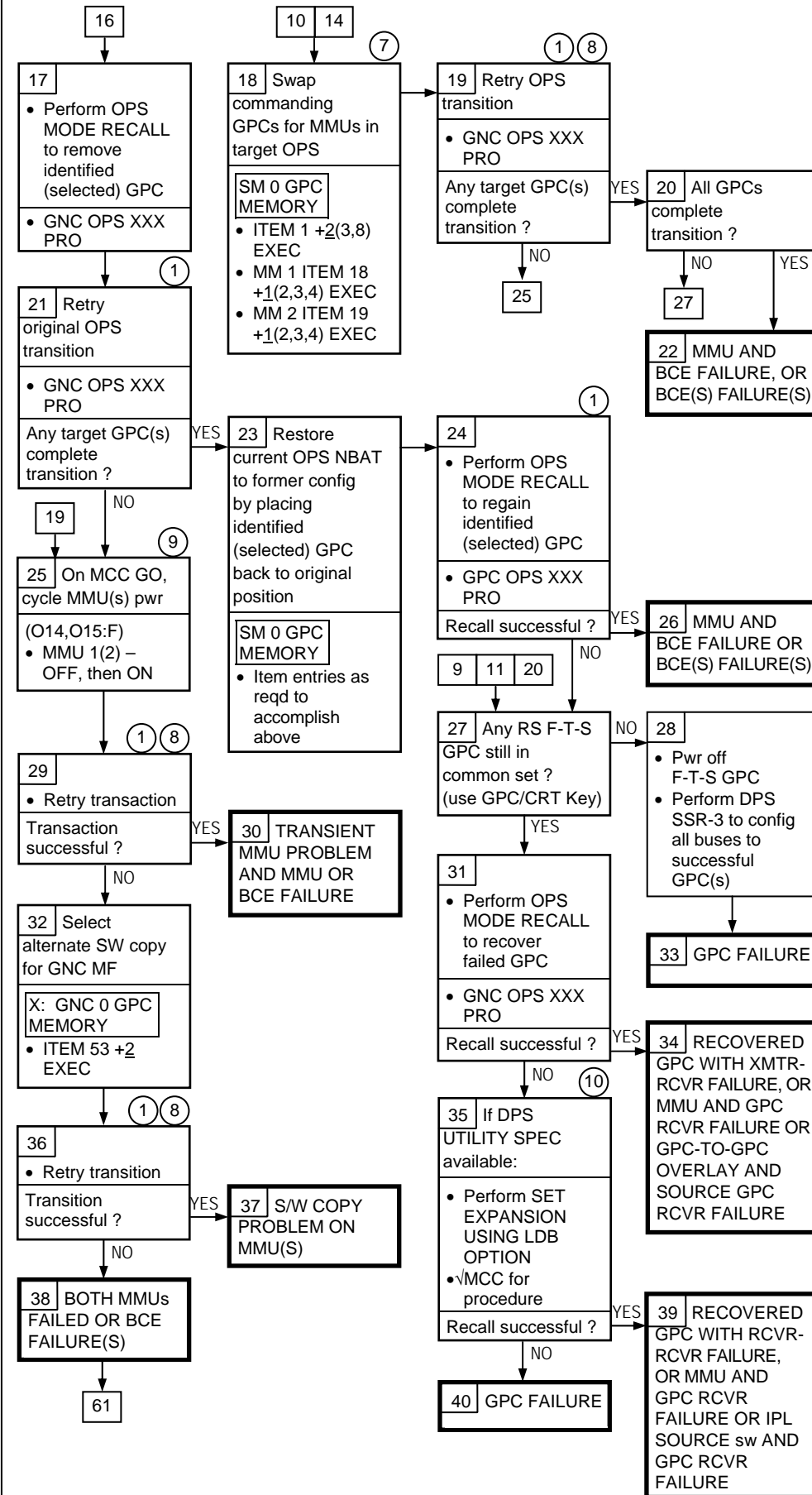
From ORB PKT, FD GPC ACTIVATE, step 1

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



- ① Any previously failed MMU should be prime selected for GNC prior to OPS transition
- ② Health of affected MMU can be verified by GNC OPS transition (with MCC concurrence), SM roll-in request, or IMU checkpoint read
- ③ 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
- ④ If GPC fail votes and fault msg(s) and 'OFF/BUSY MMU' msg(s) occur, then GPCs are in CS OPS 0. Transition unsuccessful because of MMU or commanding GPC Xmtr failure, and alt MMU OFF/BSY or selected for IPL. For two GPC RS, will get off-diagonal CAM lights. For three or more GPC RS, will get I-fail
- ⑤ For all RS GPCs in OPS 0, CRT assignments are determined by target NBAT
- ⑥ Software uses NBAT of original OPS to select GPC to command each MMU for prepositioning

**DPS 5.2a (Cont)**



① Any previously failed MMU should be prime selected for GNC prior to OPS transition

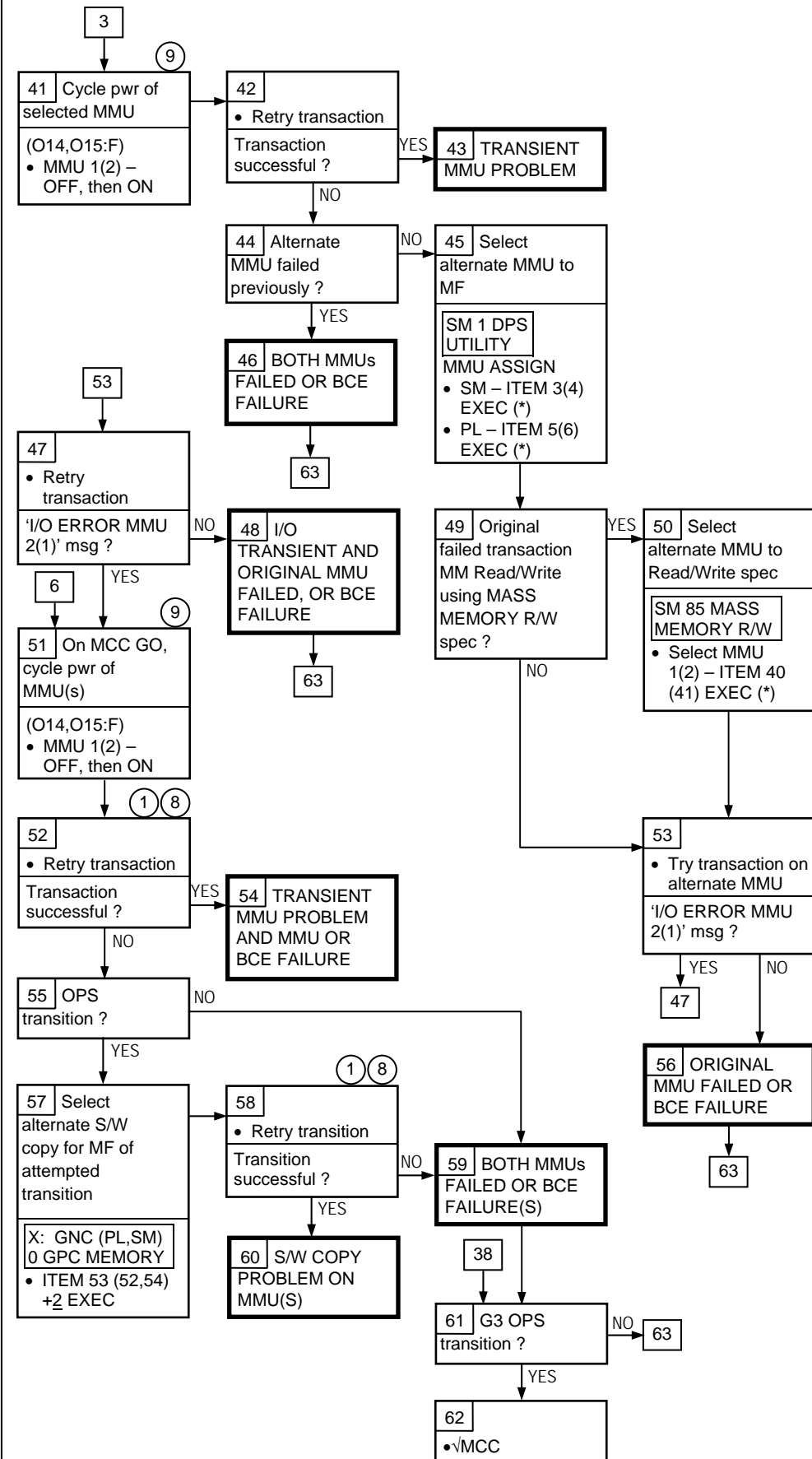
⑦ Software uses NBAT of target OPS to select GPC to command each MMU for the overlay reads

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

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

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

**DPS 5.2a (Cont)**



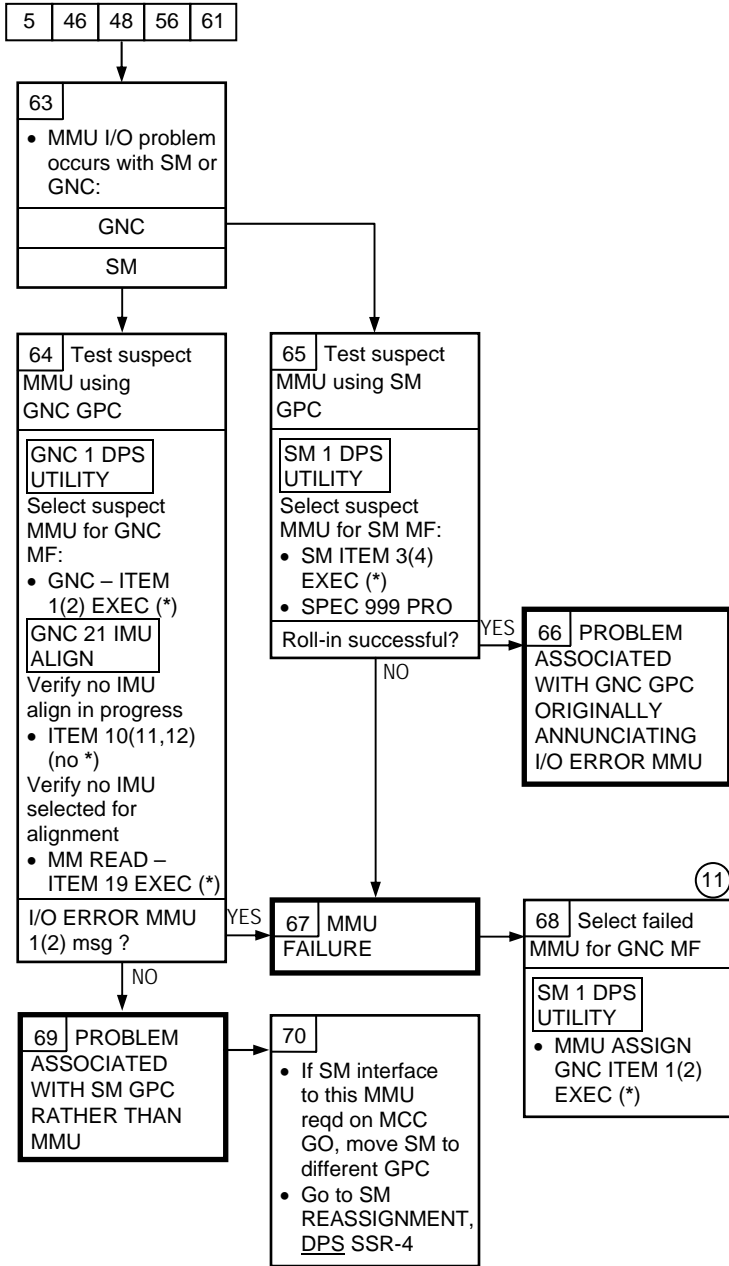
① Any previously failed MMU should be prime selected for GNC prior to OPS transition

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

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



**DPS 5.2a (Cont)**



⑪ Selecting failed MMU for GNC MF protects against GPC RCV failures occurring after OPS repositioning

**DPS**

**5.2b 'OFF/BUSY MMU 1(2)'**

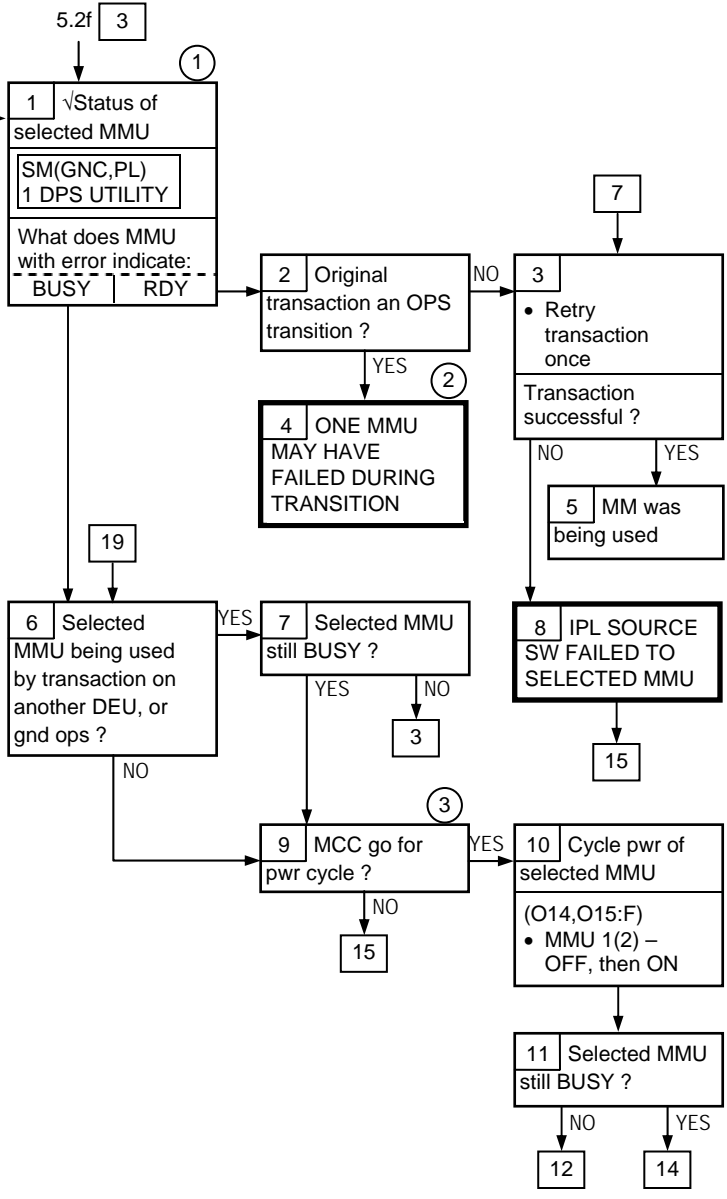
SM ALERT

OFF/BUSY MMU 1(2)

If:  
MMU OFF  
MMU selected for IPL on normal transaction  
MMU BUSY

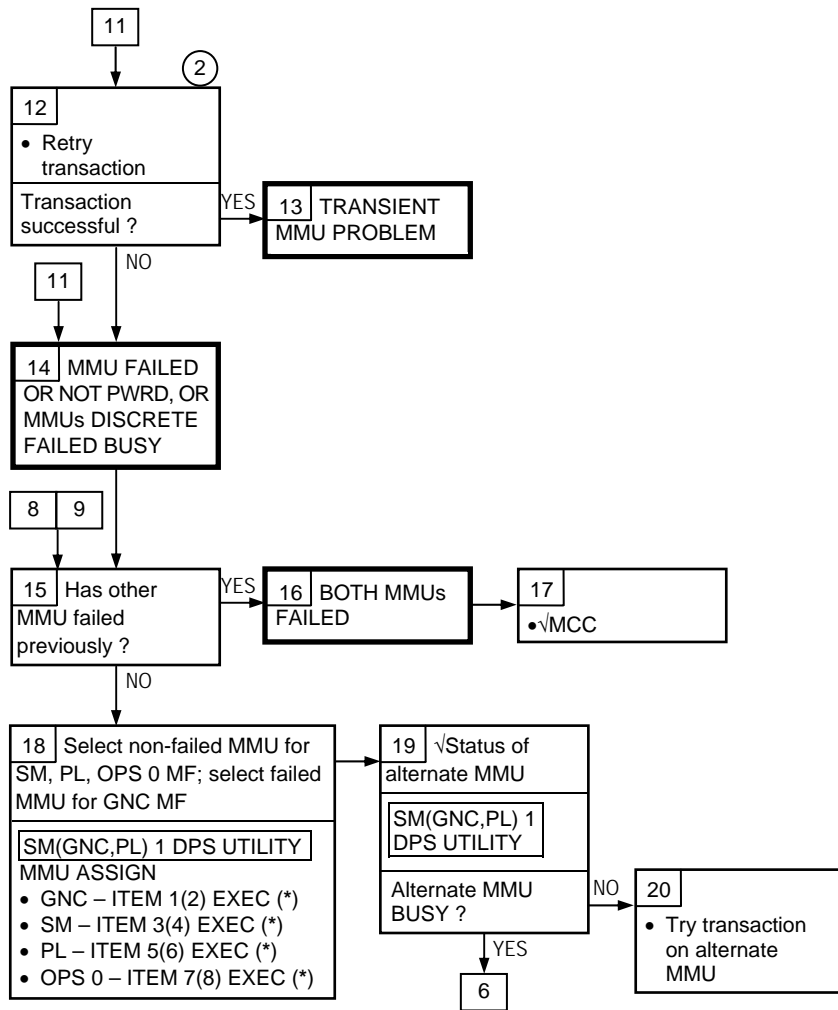
From ORB PKT, FD GPC ACTIVATE, step 1

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



- ① 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
- ② Health of affected MMU can be verified by GNC OPS XTION (with MCC concurrence) or SM roll-in request
- ③ Solid State MMU power cycle shuts down the associated solid state recorders. MCC commanding may be reqd

**DPS 5.2b (Cont)**



② Health of affected MMU can be verified by GNC OPERATION (with MCC concurrence) or SM roll-in request

**DPS**

**5.2d 'TIME MTU'**

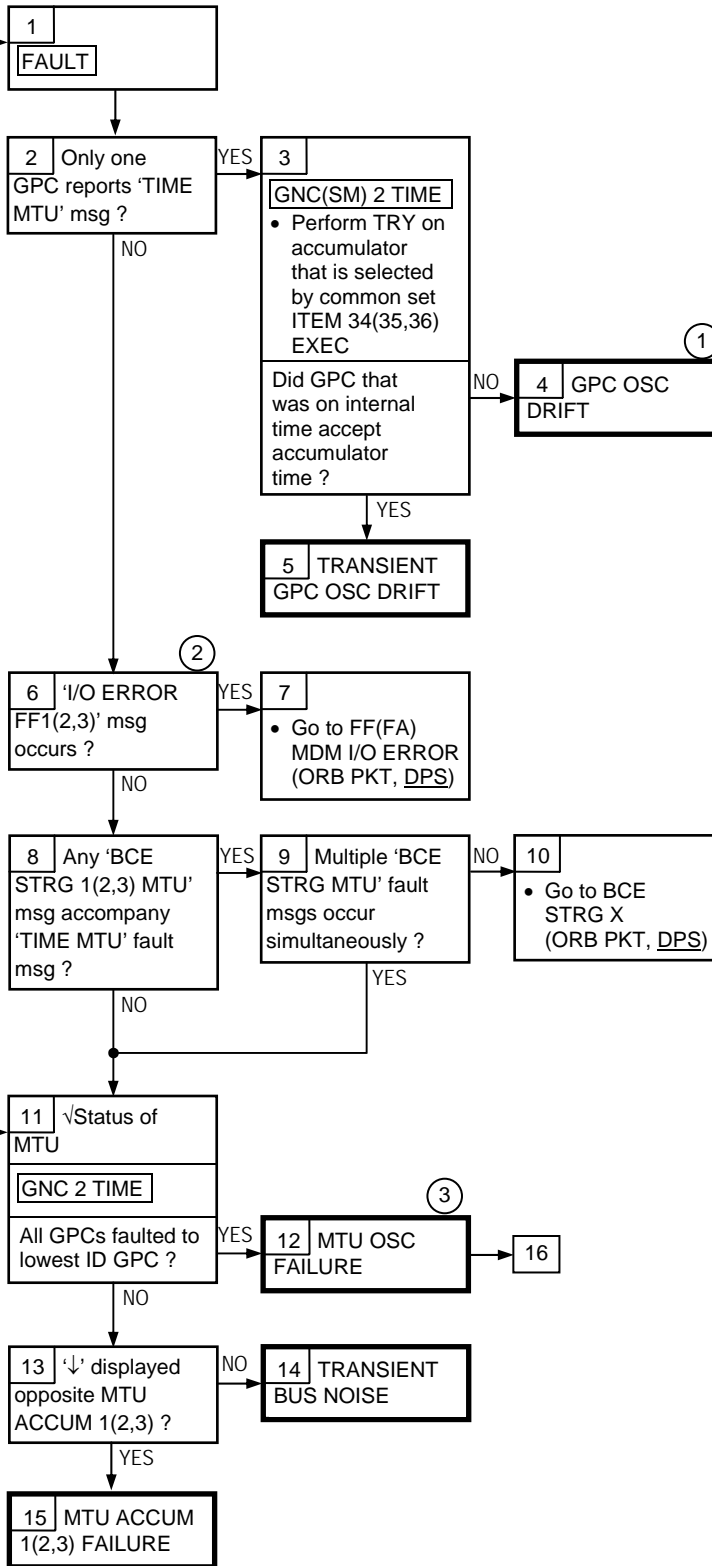
SM  
ALERT

TIME MTU

If:  
GPC GMT time  
source change

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

From ORB PKT,  
BCE STRG X,  
step 5

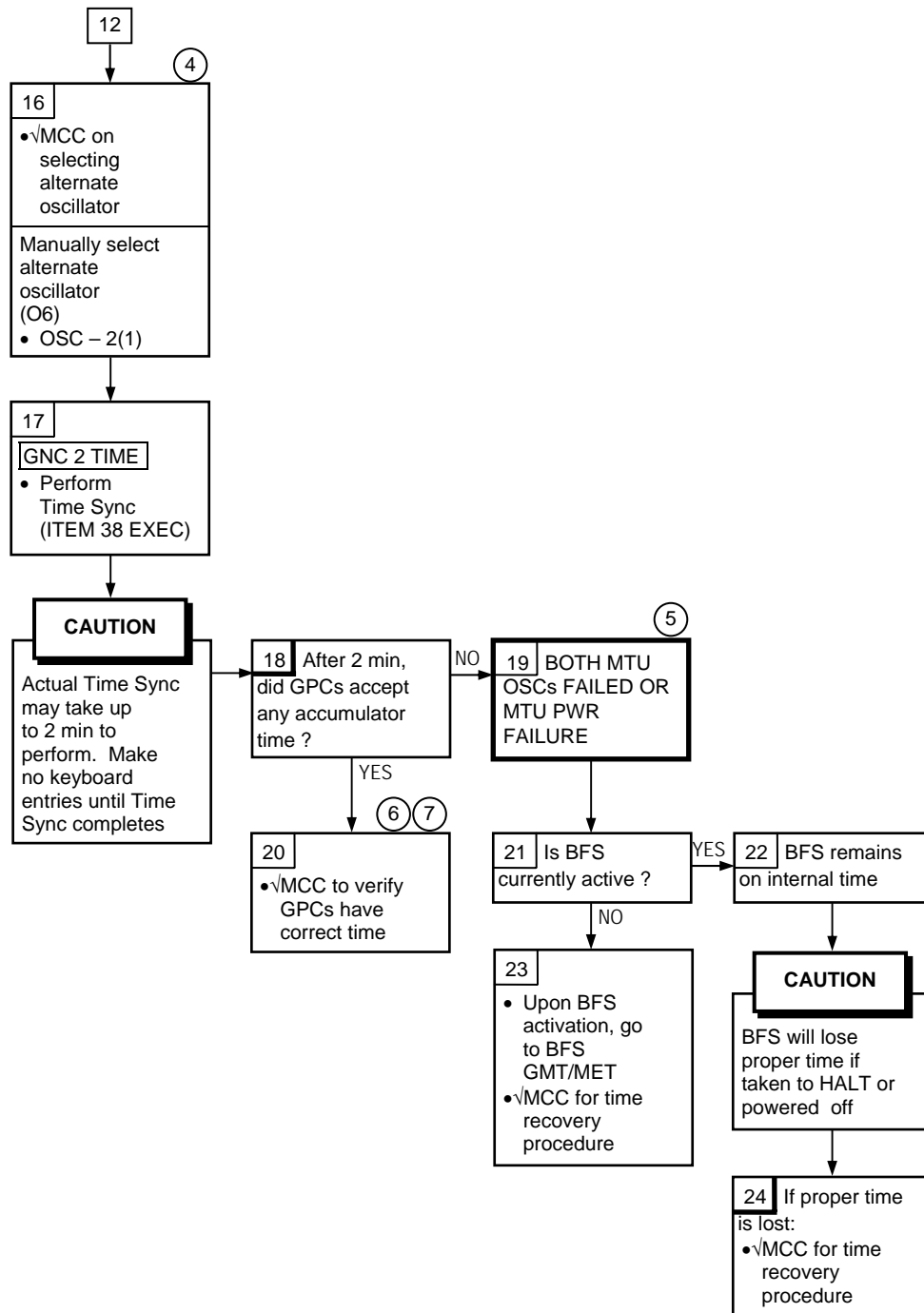


① If GPC is on its own internal time, loss-of-sync may occur

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

**DPS 5.2d (Cont)**



- (4) 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 It on D&C Timers and reenable MTU sync signals

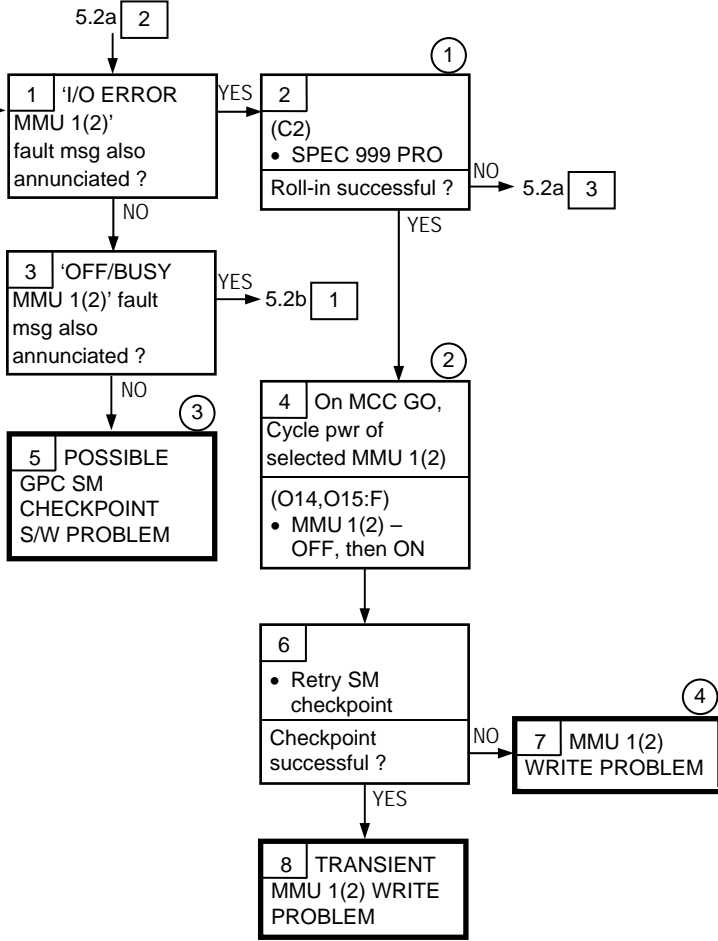
**DPS**

**5.2f CHECKPOINT FAIL**

S60  
CHECKPT  
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. √MCC for possible S/W dump of SM GPC
- ④ Affected MMU may be used for any read transaction including OPS transitions, TFL loads, and SM roll-in displays

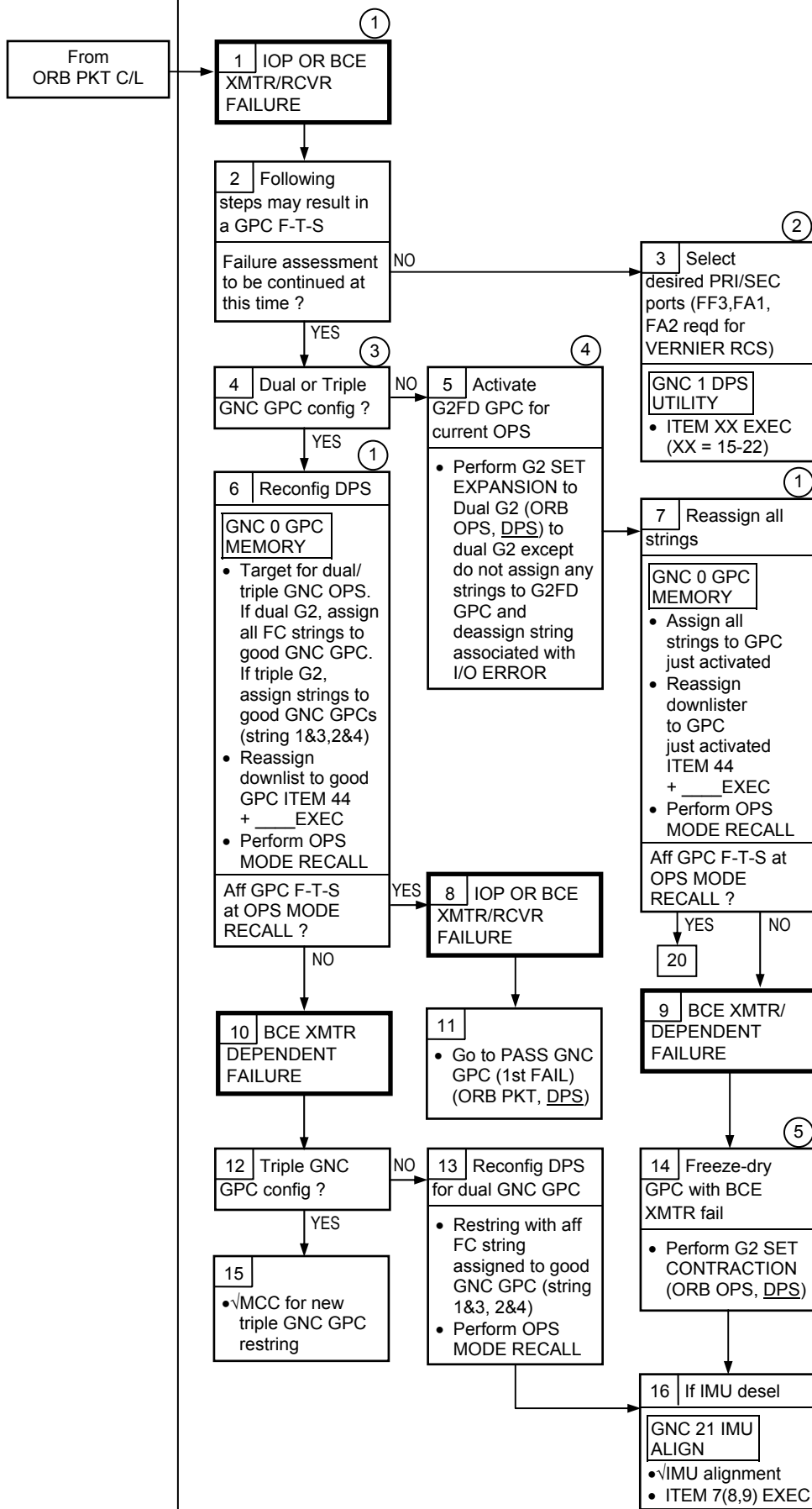
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**MDM**

**5.3**

DPS

5.3a 'I/O ERROR FF(FA)'



① Mult MDM or GPC failures indicated if 'I/O ERROR' msg reoccurs after restrung with no F-T-S at blocks 6 or 7. √MCC

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

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

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

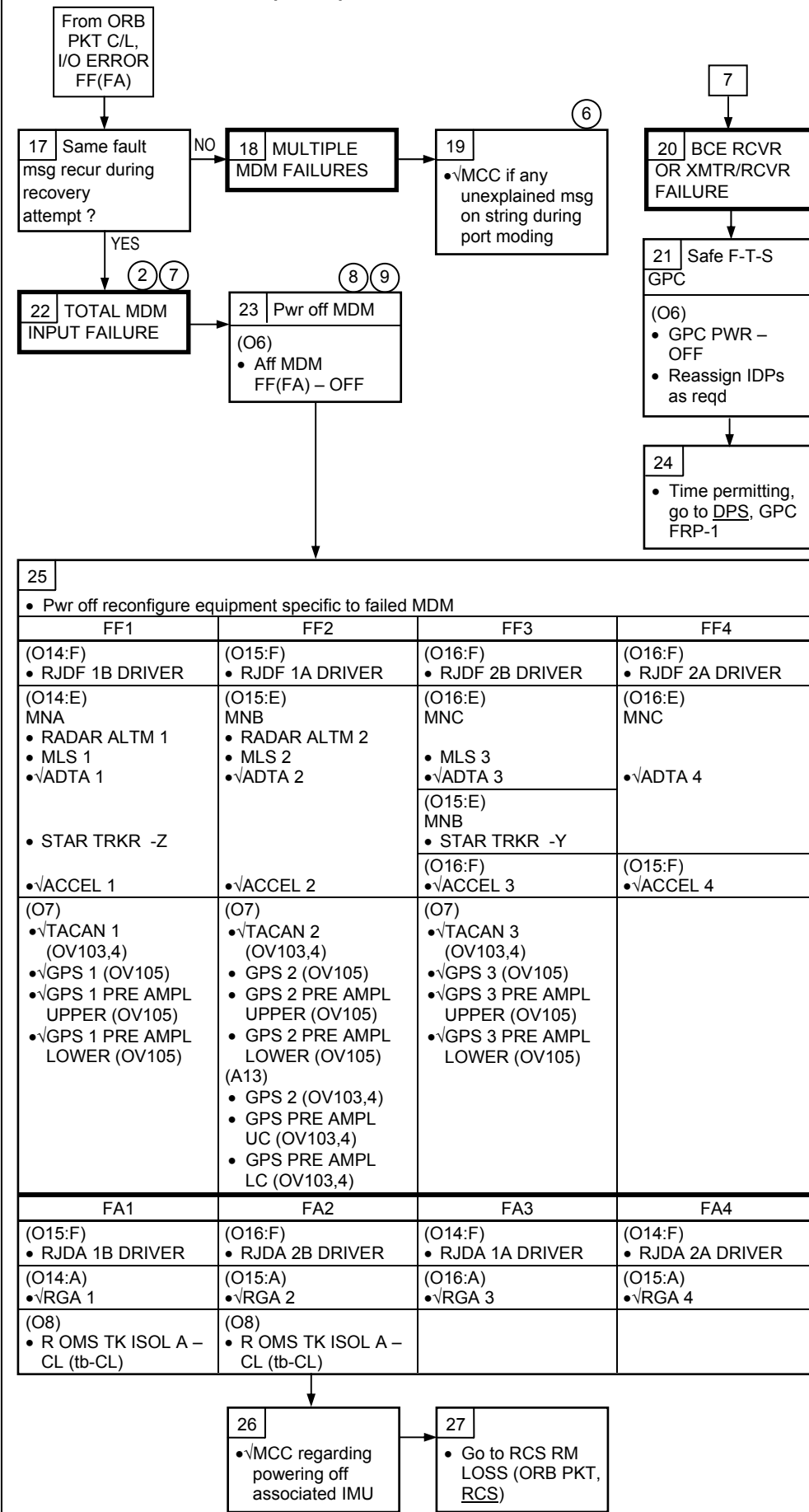
⑤ If G8 OPS, delay G2 freeze-dry activity until after transition back to G2

MDM

5.3



**DPS 5.3a (Cont)**



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

⑥ 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'

⑦ 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

⑧ 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

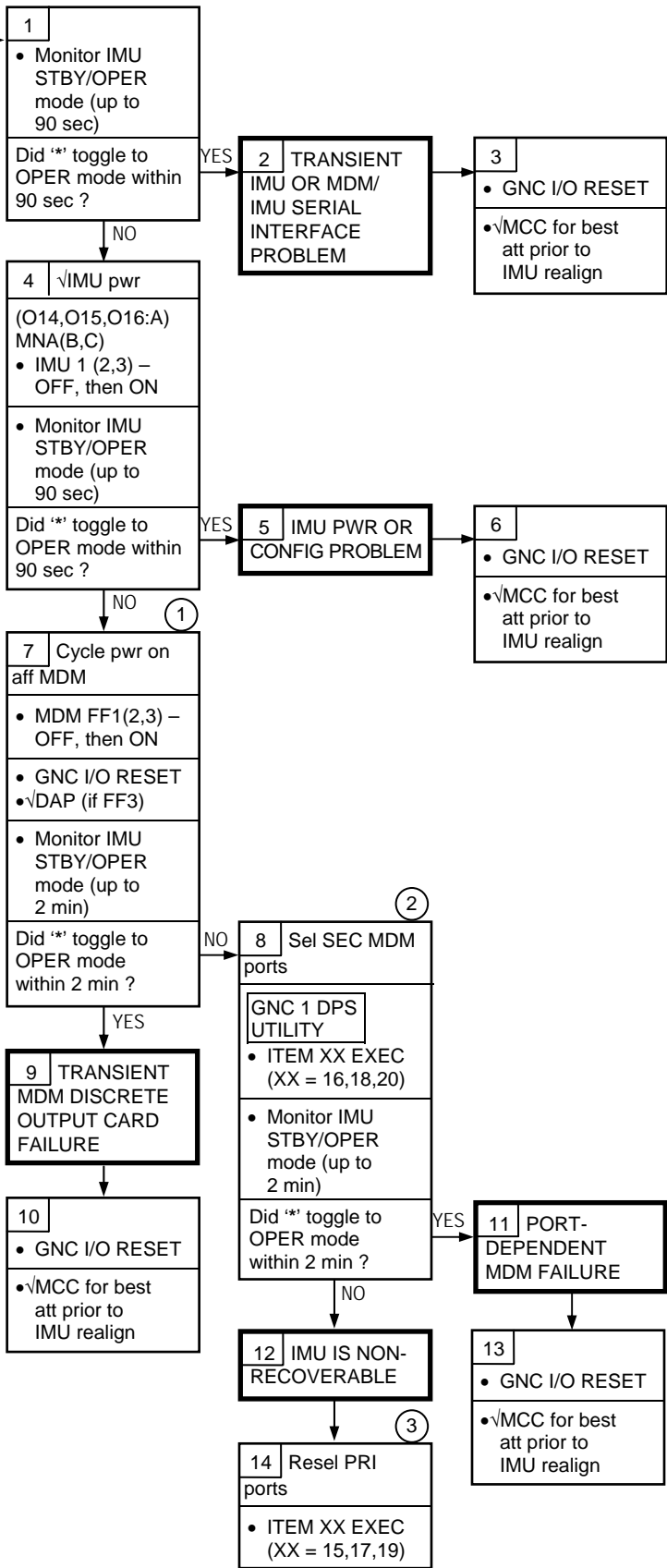
⑨ If failed MDM is FF1, FF2, or FF3, MDM may be candidate for MDM CHANGEOUT (IFM). √MCC

25			
• Pwr off reconfigure equipment specific to failed MDM			
FF1	FF2	FF3	FF4
(O14:F) • RJDF 1B DRIVER	(O15:F) • RJDF 1A DRIVER	(O16:F) • RJDF 2B DRIVER	(O16:F) • RJDF 2A DRIVER
(O14:E) MNA • RADAR ALTM 1 • MLS 1 • √ADTA 1  • STAR TRKR -Z  • √ACCEL 1	(O15:E) MNB • RADAR ALTM 2 • MLS 2 • √ADTA 2  • √ACCEL 2	(O16:E) MNC • MLS 3 • √ADTA 3 (O15:E) MNB • STAR TRKR -Y (O16:F) • √ACCEL 3	(O16:E) MNC  • √ADTA 4  (O15:F) • √ACCEL 4
(O7) • √TACAN 1 (OV103,4) • √GPS 1 (OV105) • √GPS 1 PRE AMPL UPPER (OV105) • √GPS 1 PRE AMPL LOWER (OV105)	(O7) • √TACAN 2 (OV103,4) • GPS 2 (OV105) • GPS 2 PRE AMPL UPPER (OV105) • GPS 2 PRE AMPL LOWER (OV105) (A13) • GPS 2 (OV103,4) • GPS PRE AMPL UC (OV103,4) • GPS PRE AMPL LC (OV103,4)	(O7) • √TACAN 3 (OV103,4) • √GPS 3 (OV105) • √GPS 3 PRE AMPL UPPER (OV105) • √GPS 3 PRE AMPL LOWER (OV105)	
FA1	FA2	FA3	FA4
(O15:F) • RJDA 1B DRIVER	(O16:F) • RJDA 2B DRIVER	(O14:F) • RJDA 1A DRIVER	(O14:F) • RJDA 2A DRIVER
(O14:A) • √RGA 1	(O15:A) • √RGA 2	(O16:A) • √RGA 3	(O15:A) • √RGA 4
(O8) • R OMS TK ISOL A - CL (tb-CL)	(O8) • R OMS TK ISOL A - CL (tb-CL)		

**DPS**

**5.3b 'BCE STRG X'**

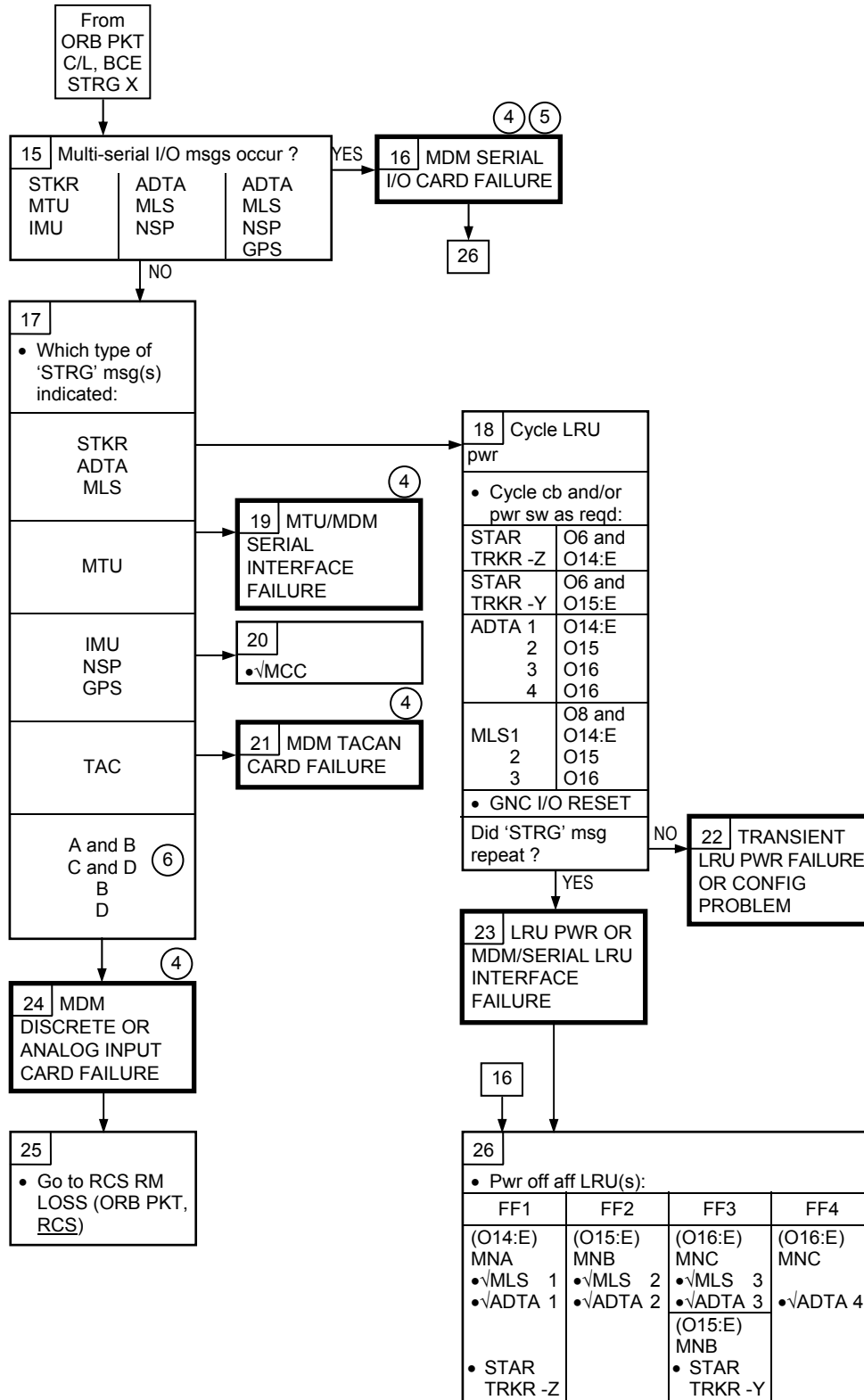
From ORB PKT C/L, BCE STRG X, step 4



① If VERNIER RCS sel and FF3 pwr cycled, DAP will downmode to free drift at MDM pwr cycle. Crew action reqd to resel DAP

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

③ √MCC regarding powering off associated IMU

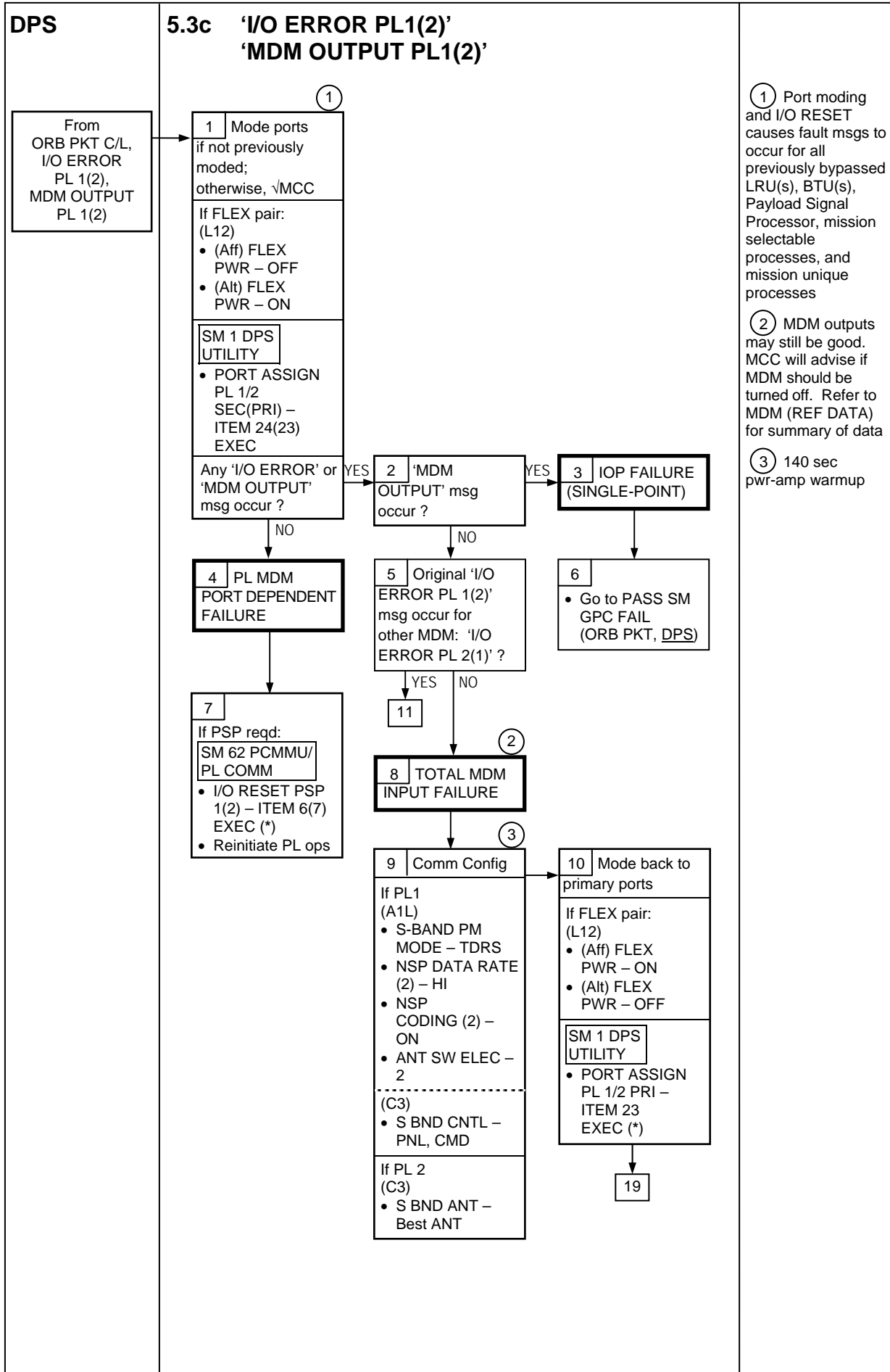


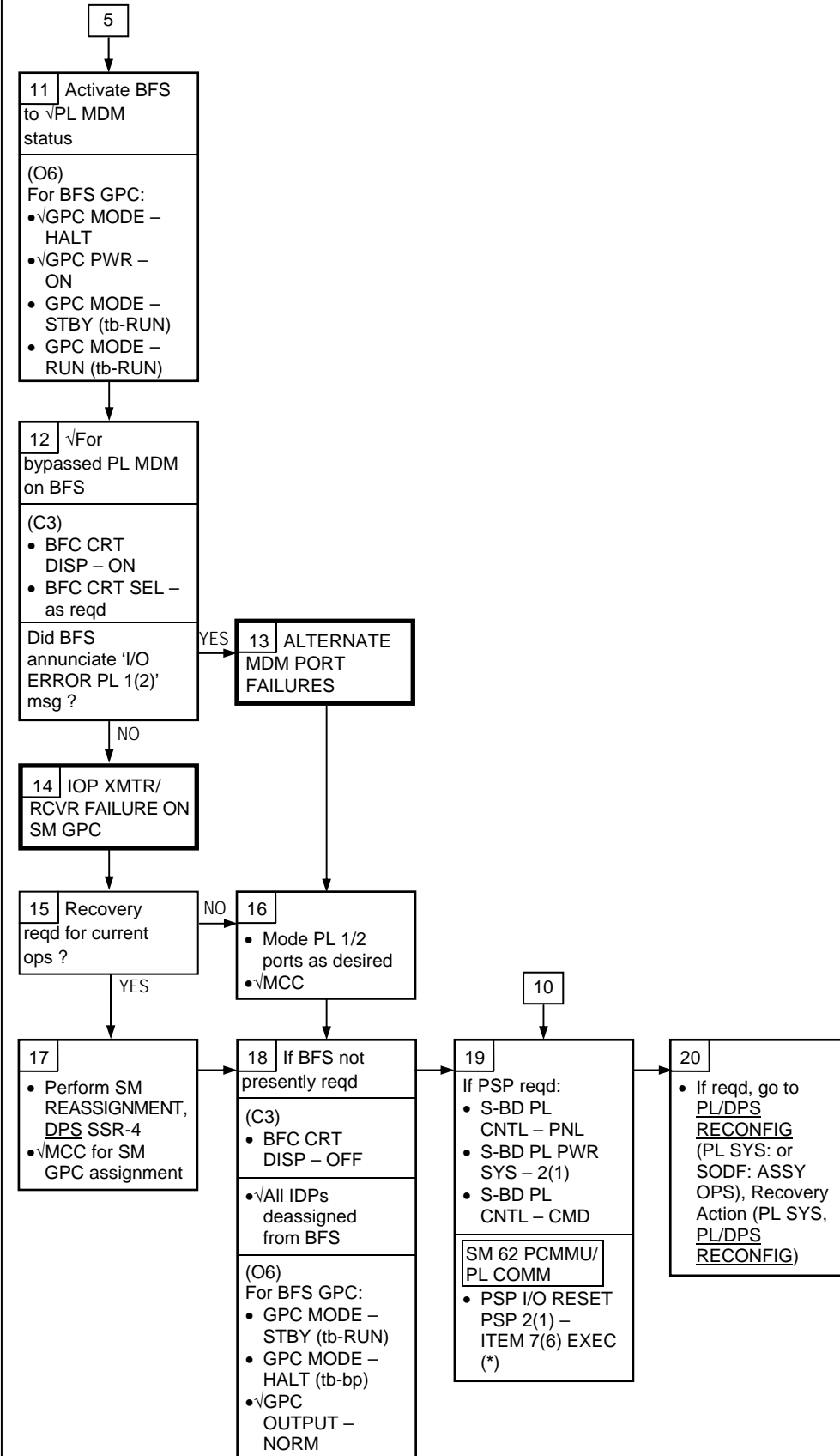
④ Go to MDM (REF) for summary of data lost on nonrecovered MDM

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

Card Adrs	G2	G8
03	IMU MTU STKR	IMU MTU STKR
11	NSP GPS	MLS ADTA NSP GPS

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





**DPS**

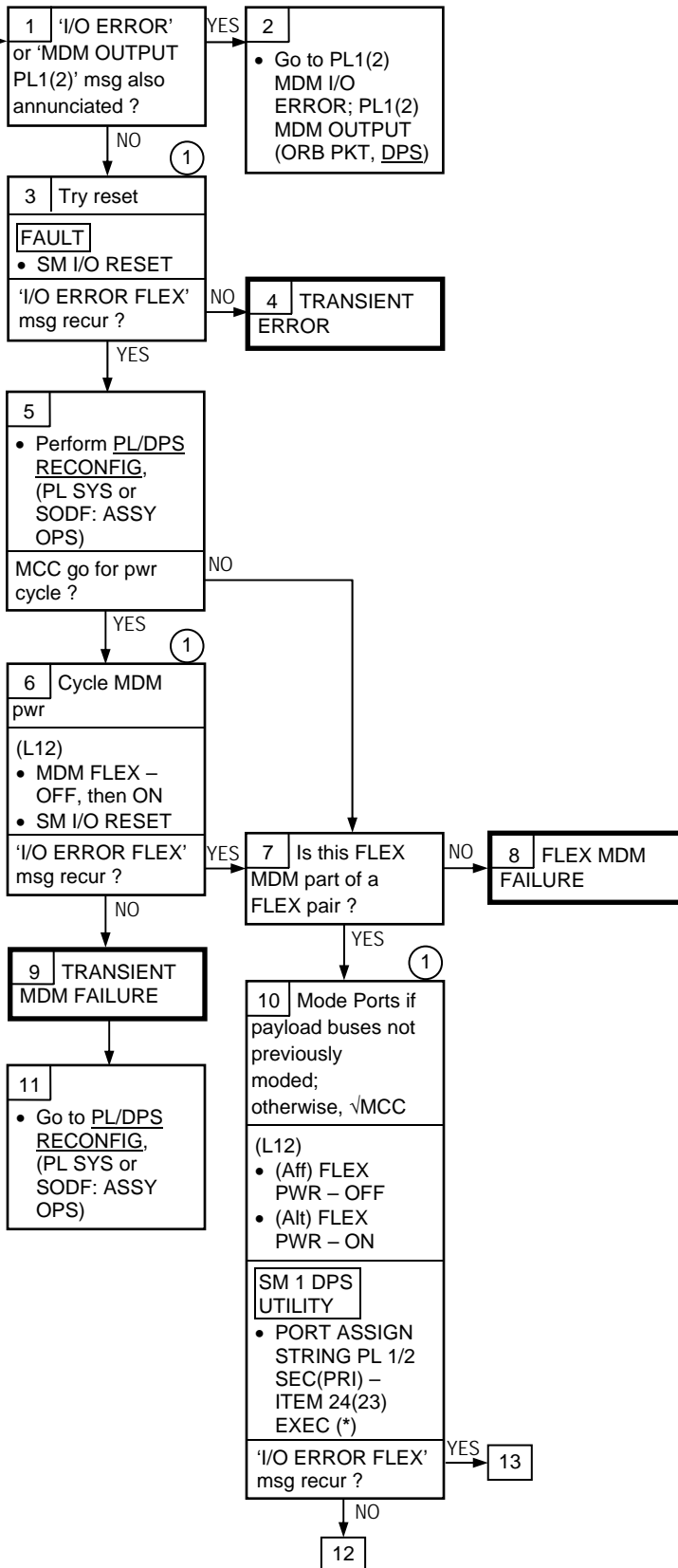
**5.3e 'I/O ERROR FLEX'**

SM  
ALERT

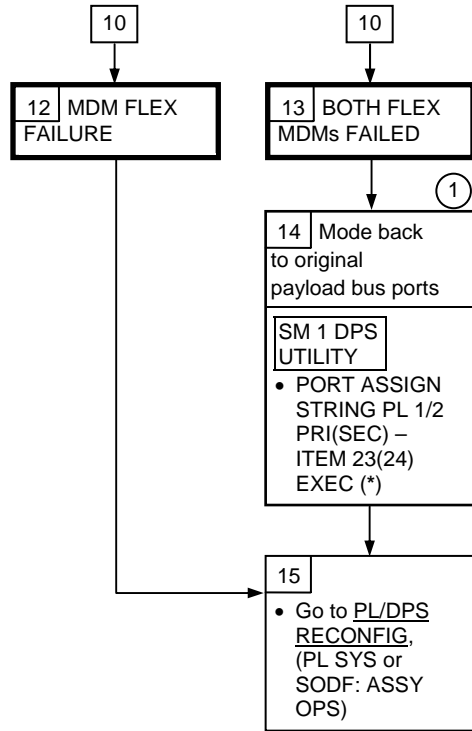
I/O ERROR  
FLEX

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

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



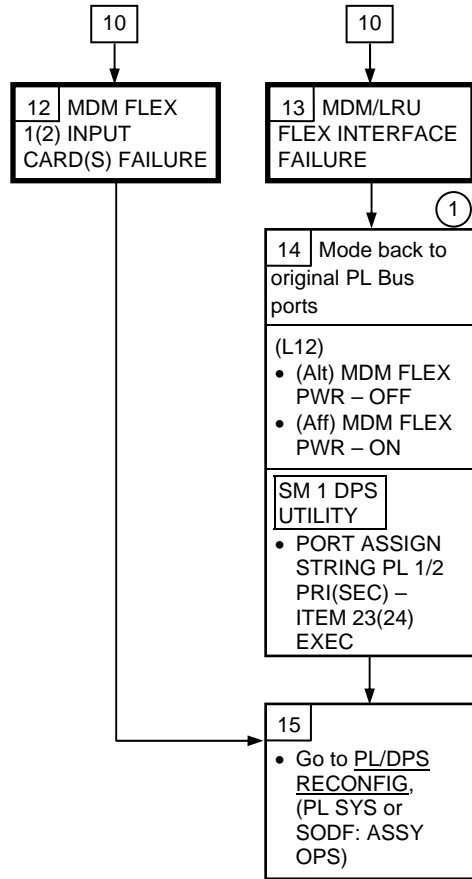
① Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes



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



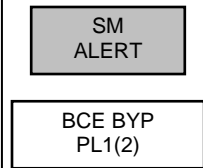




① Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes

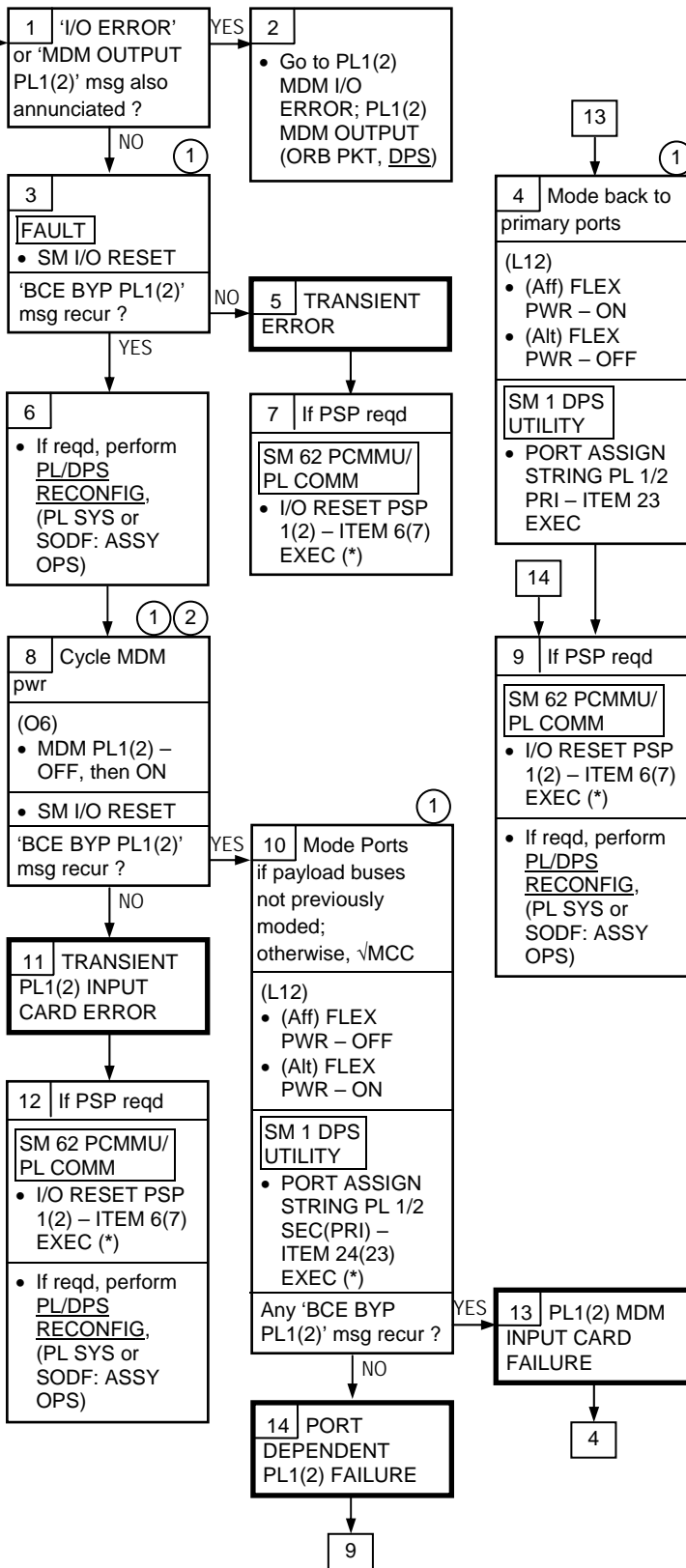
**DPS**

**5.3g 'BCE BYP PL1(2)'**



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

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



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

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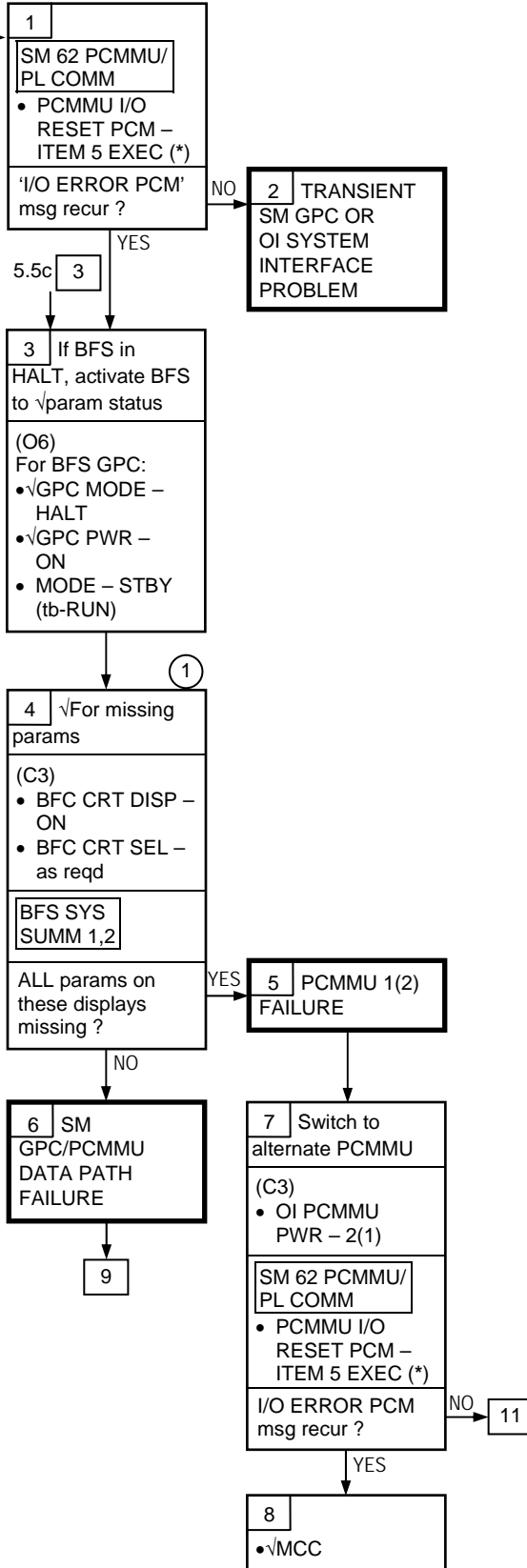
**DPS**

**5.5a 'I/O ERROR PCM' (SM)**

SM ALERT

I/O ERROR PCM  
 If data path fail from PCMMU to GPC:  
 SM BCE XMTR or RCVR fail  
 PCMMU MIA XMTR or RCVR fail  
 Total PCMMU fail

**Nominal Config:**  
 (C3)  
 OI PCMMU  
 PWR - 1  
 FORMAT - GPC

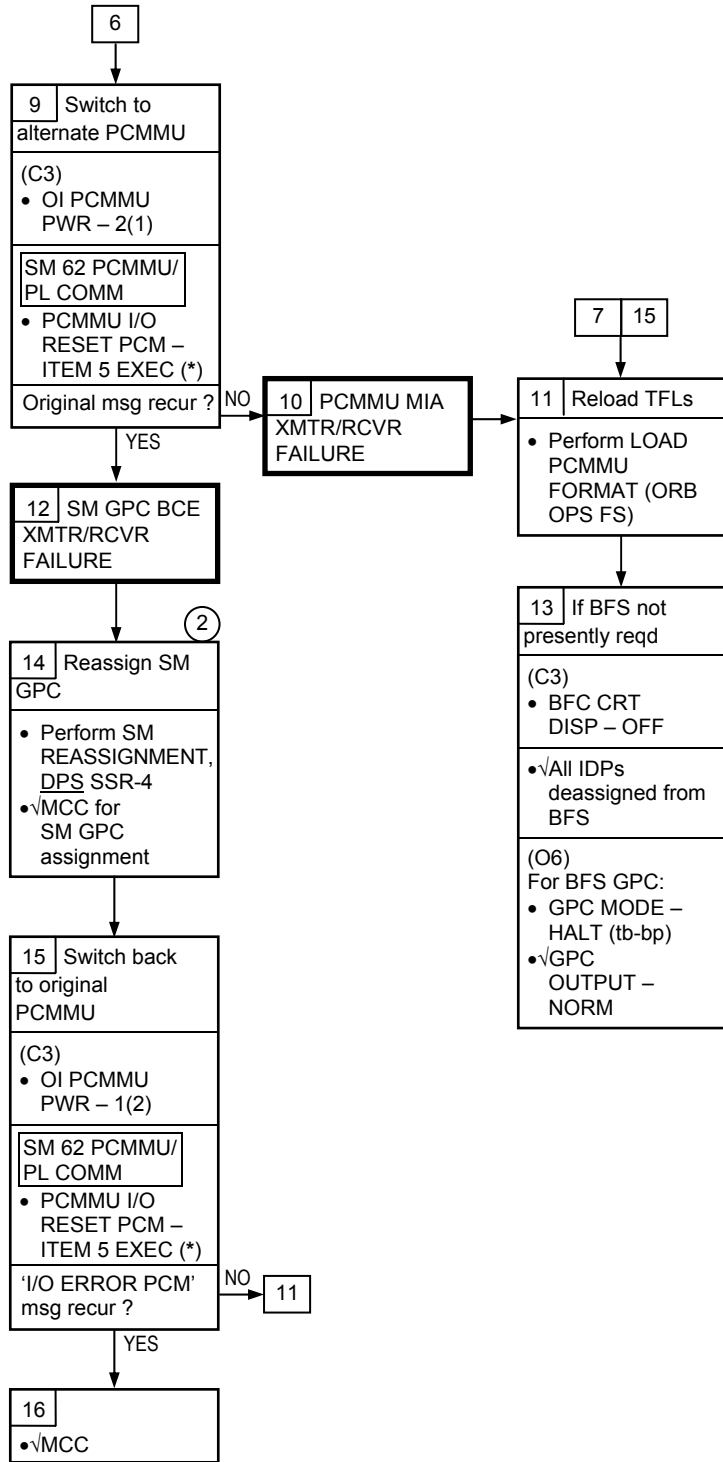


① Because of differences between PASS/BFS S/W implementation, ignore any BFS 'I/O ERROR PCM' fault msg

PCM I/F

5.5

**DPS 5.5a (Cont)**



② BFS fault disp may be utilized for SM monitoring until PASS SM GPC reassigned

**DPS**

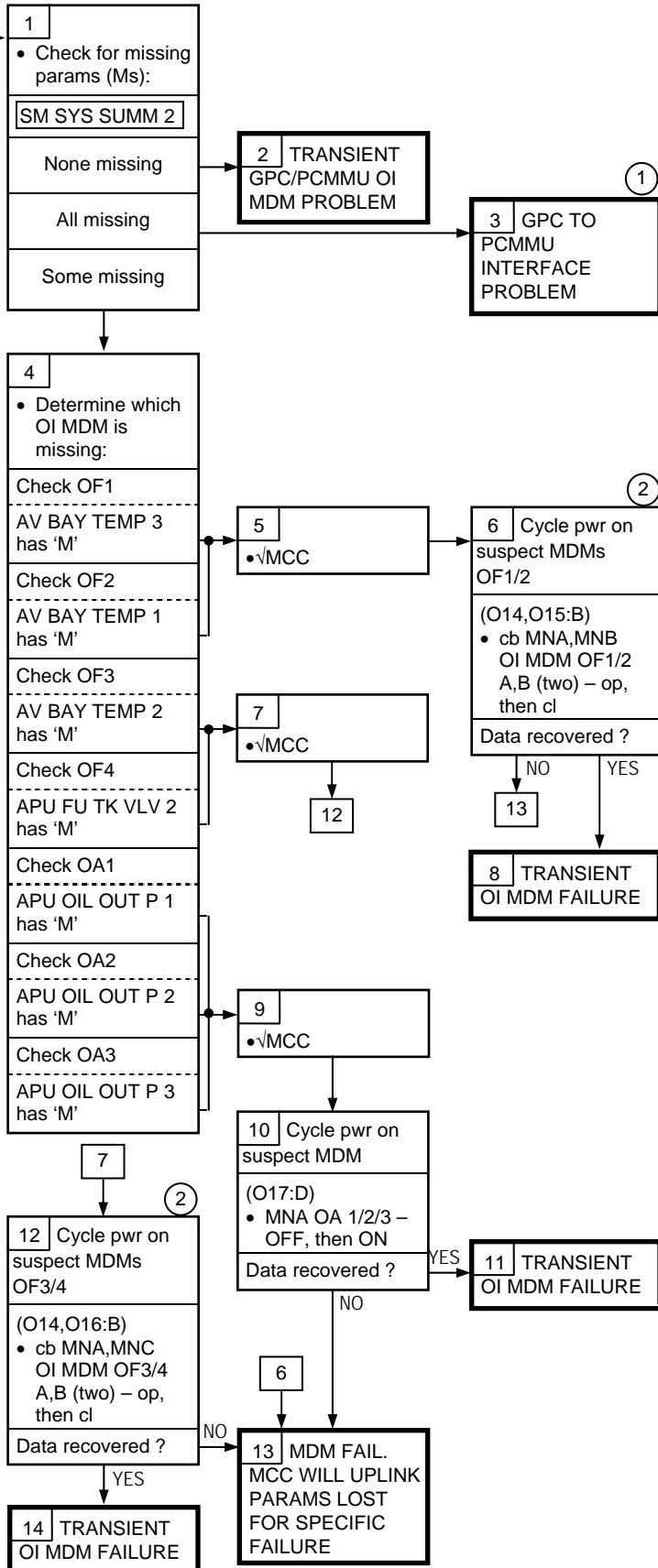
**5.5b 'I/O ERROR PCM' (BFS)**

SM ALERT

I/O ERROR PCM

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

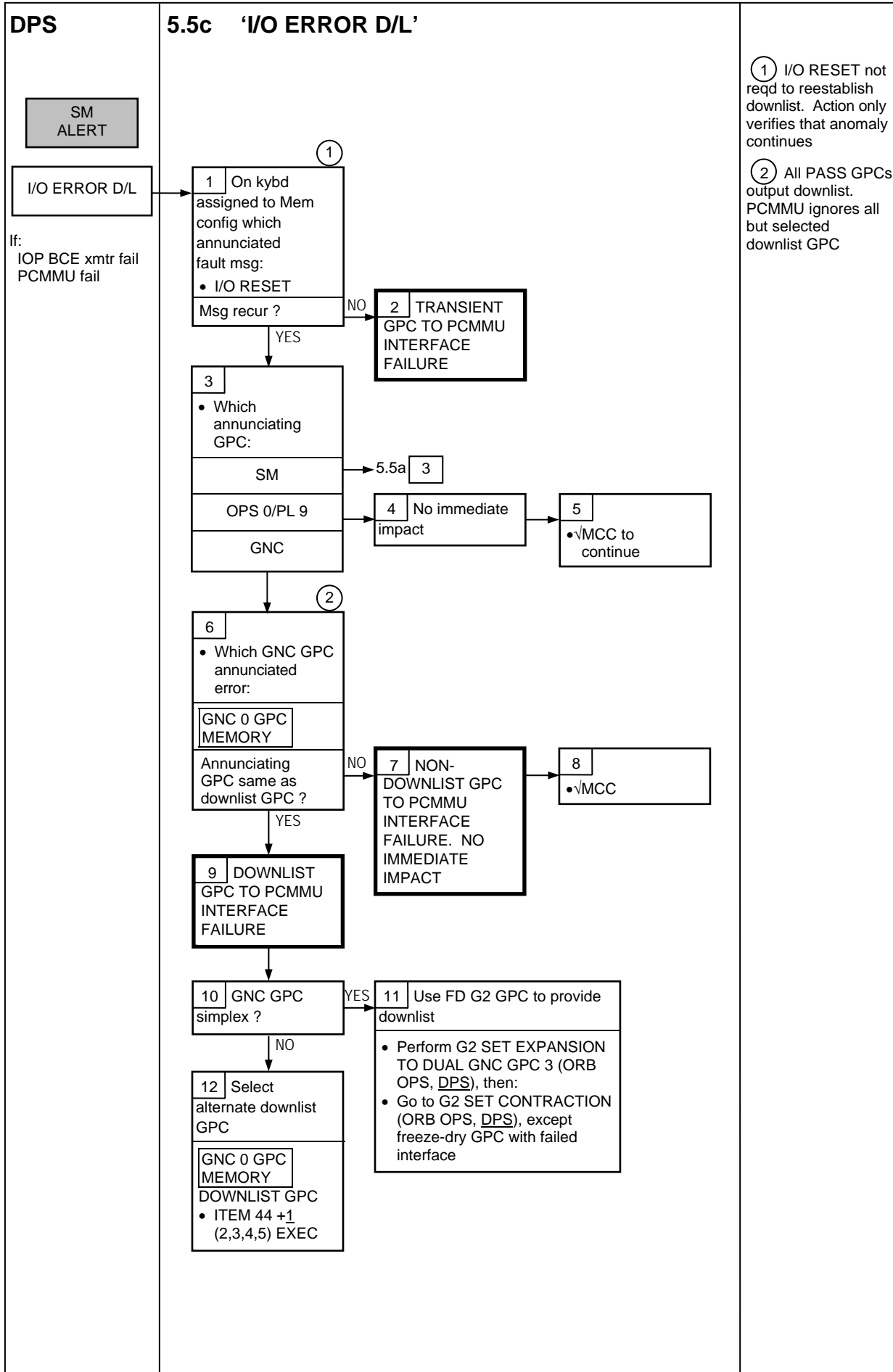
**Nominal Config:**  
(C3)  
OI PCMMU  
PWR - 1  
FORMAT - GPC  
(O14,O15:B)  
cb MNA,MNB OI MDM OF 1/2 A,B (two) - cl  
(O14,O16:B)  
cb MNA,MNC OI MDM OF 3/4 A,B (two) - cl  
(O17:D)  
MDM OA 1/2/3 - ON



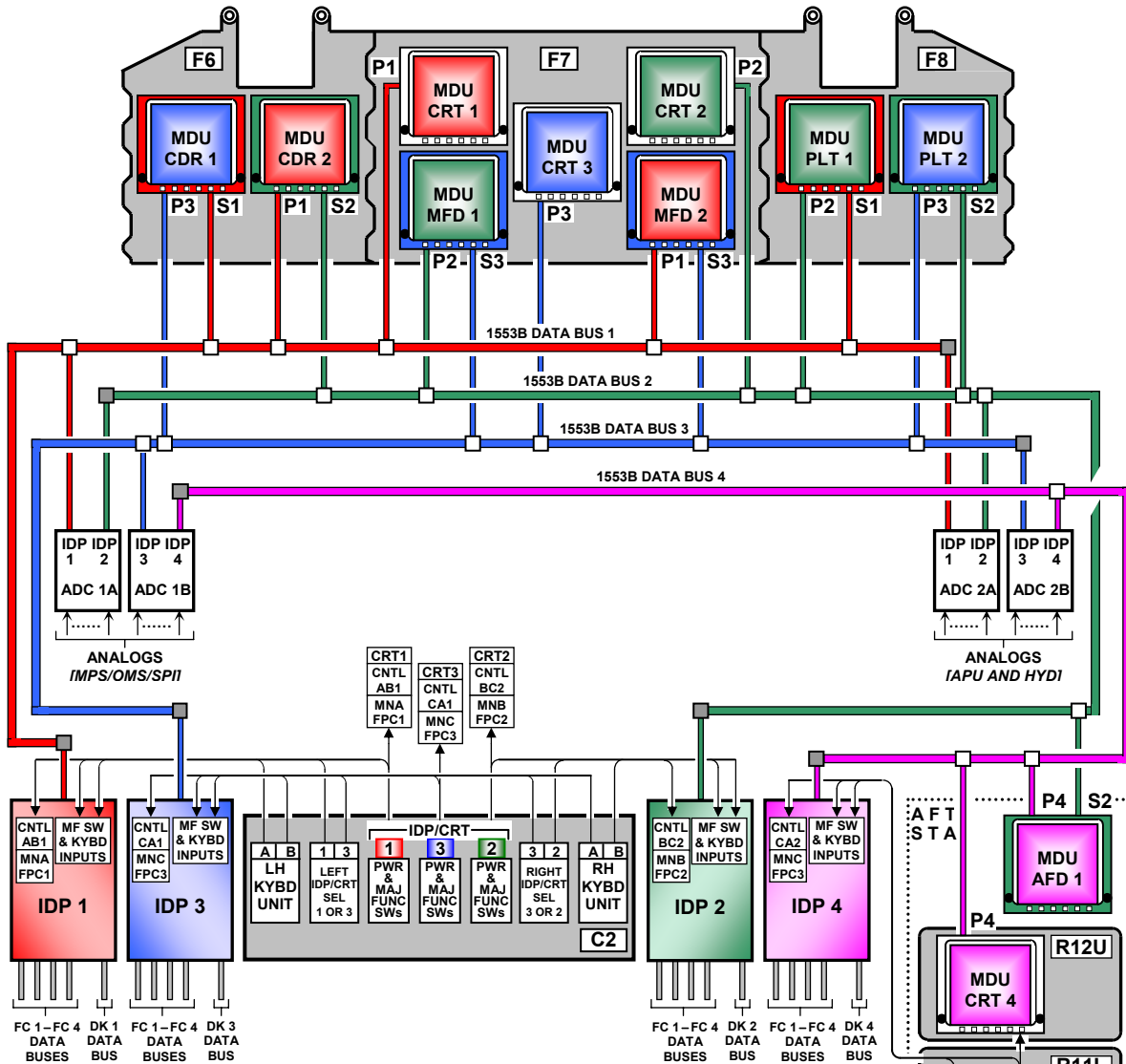
① √MCC regarding PCMMU switch. Selection of alternate PCMMU may preclude MCC viewing LDR telemetry

② Do not cycle open cb. √MCC

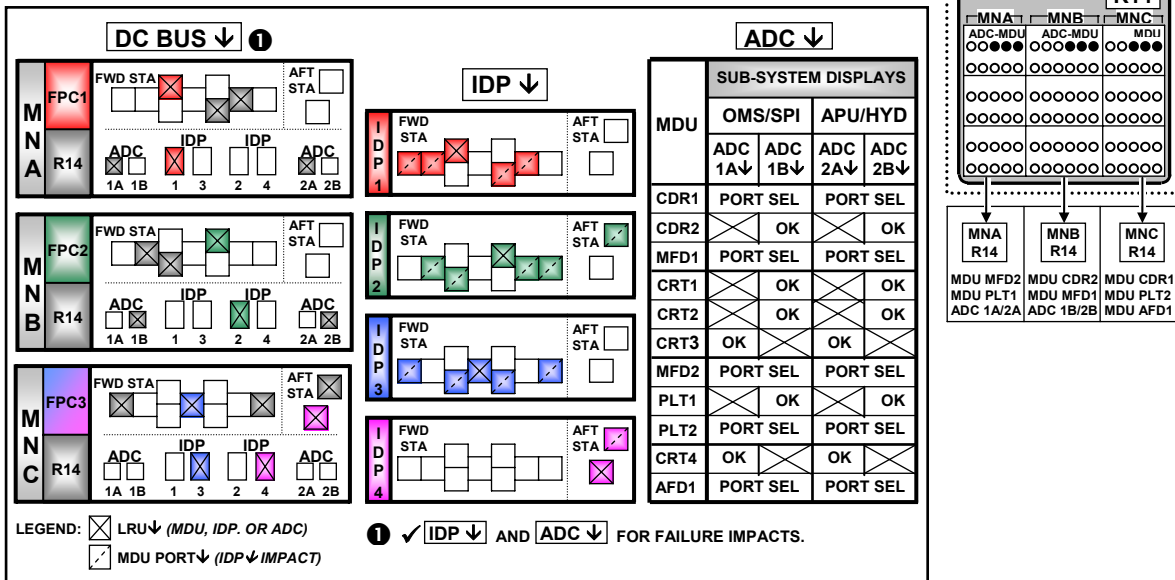


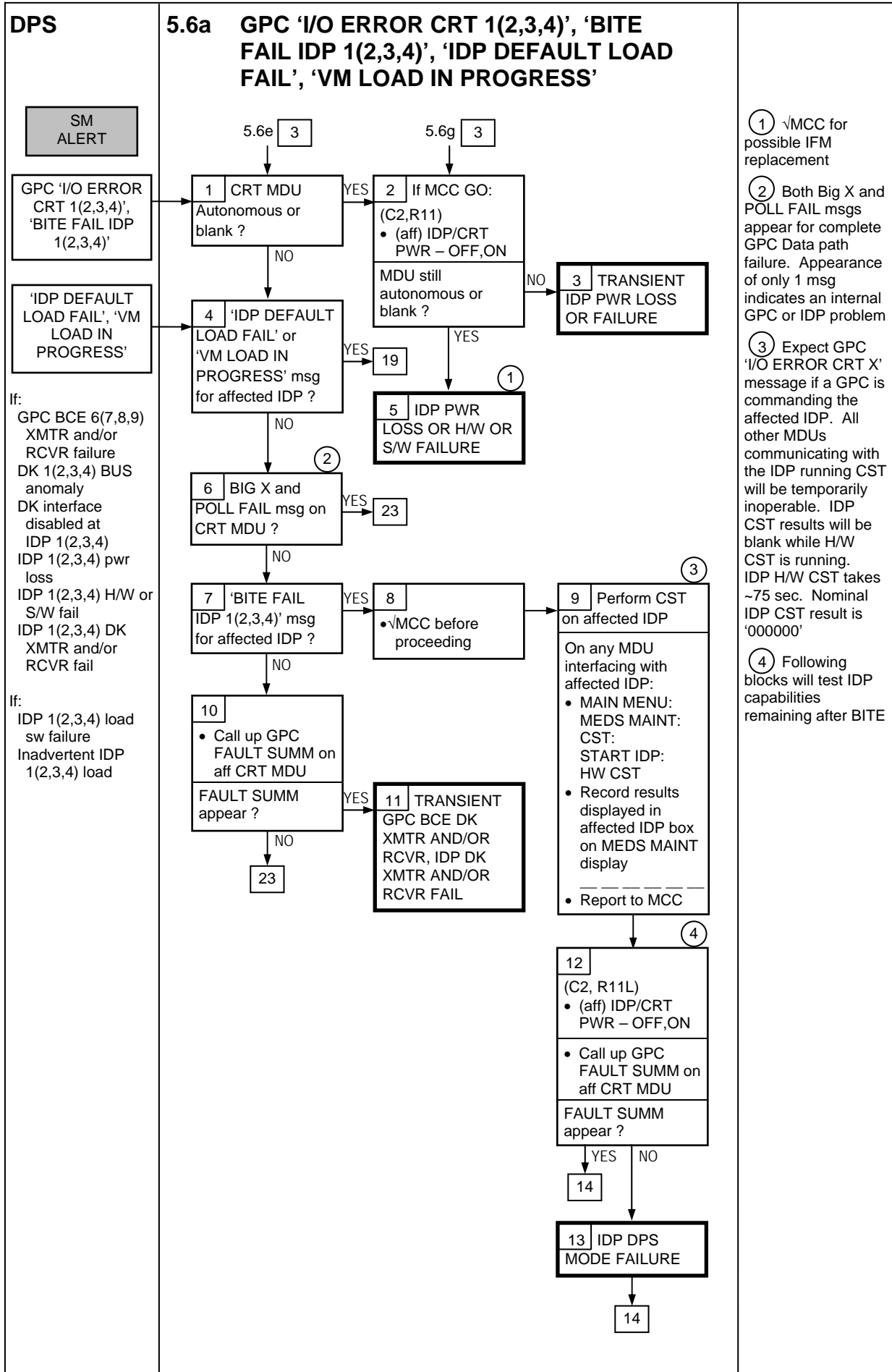


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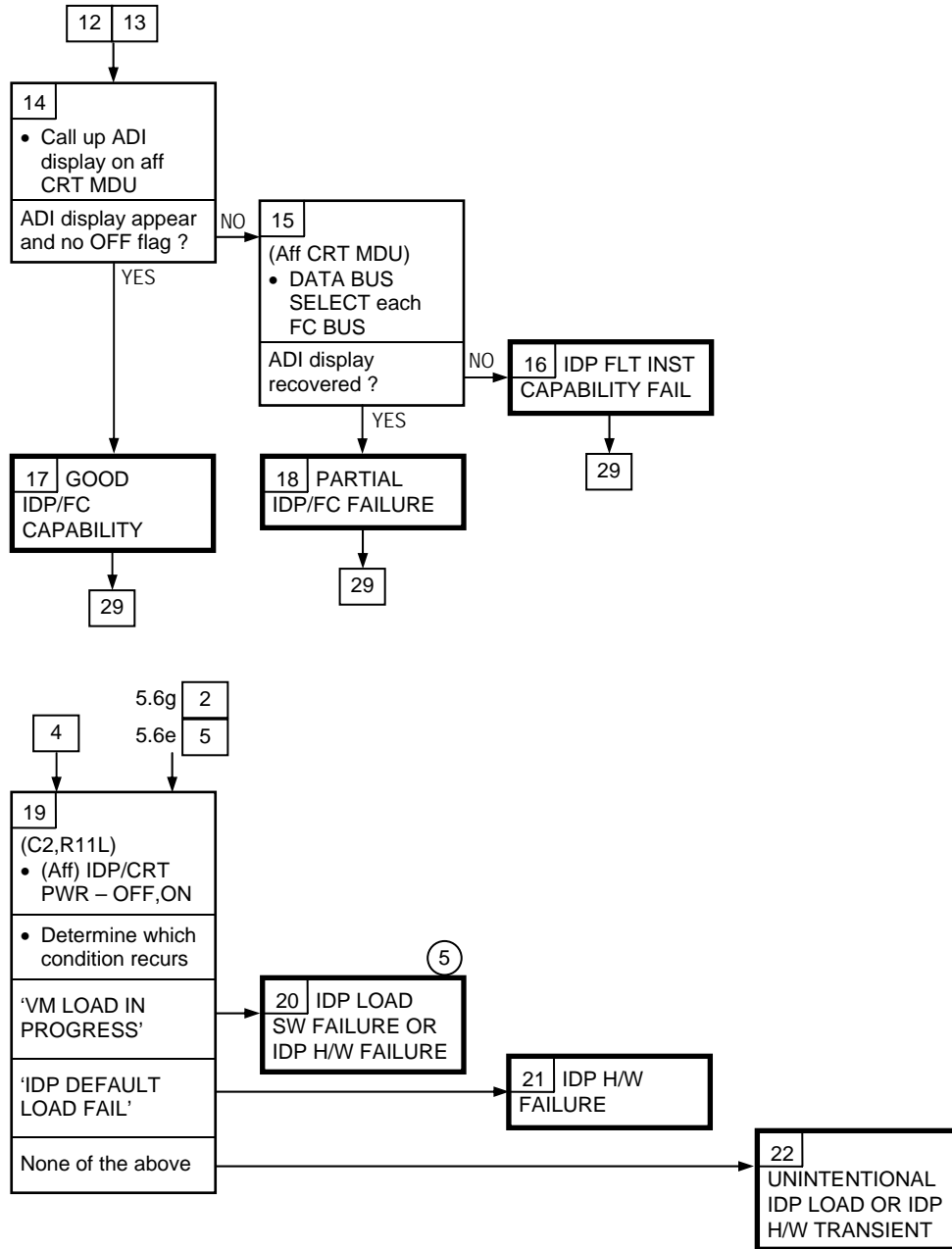
**MEDS OVERVIEW**  
[POWER AND INTERNAL 1553B DATA BUS CONFIGURATION]



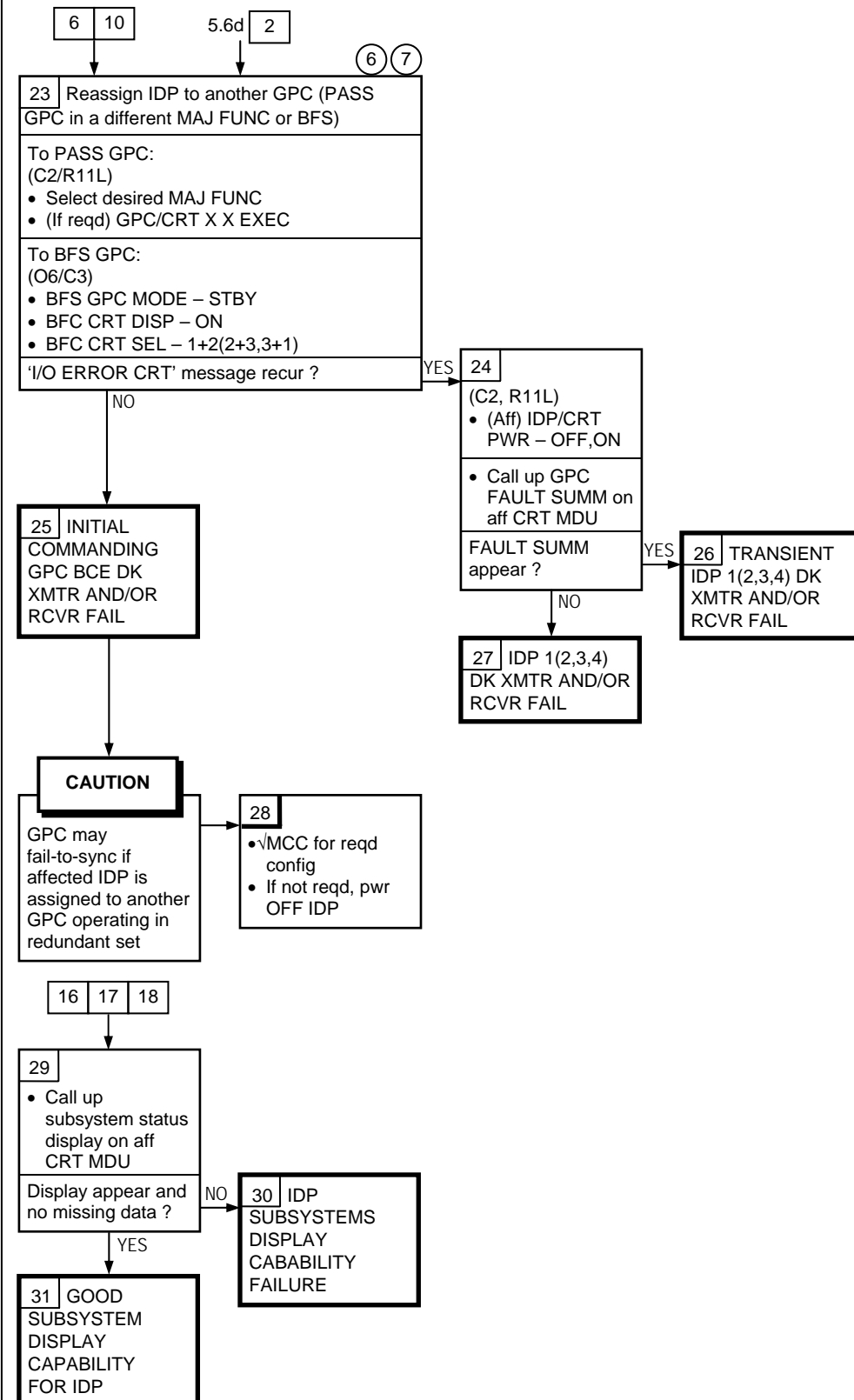


**DPS 5.6a (Cont)**

⑤ IDP cannot be used in DPS mode



**DPS 5.6a (Cont)**



⑥ Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/ two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink)

⑦ GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, always deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry

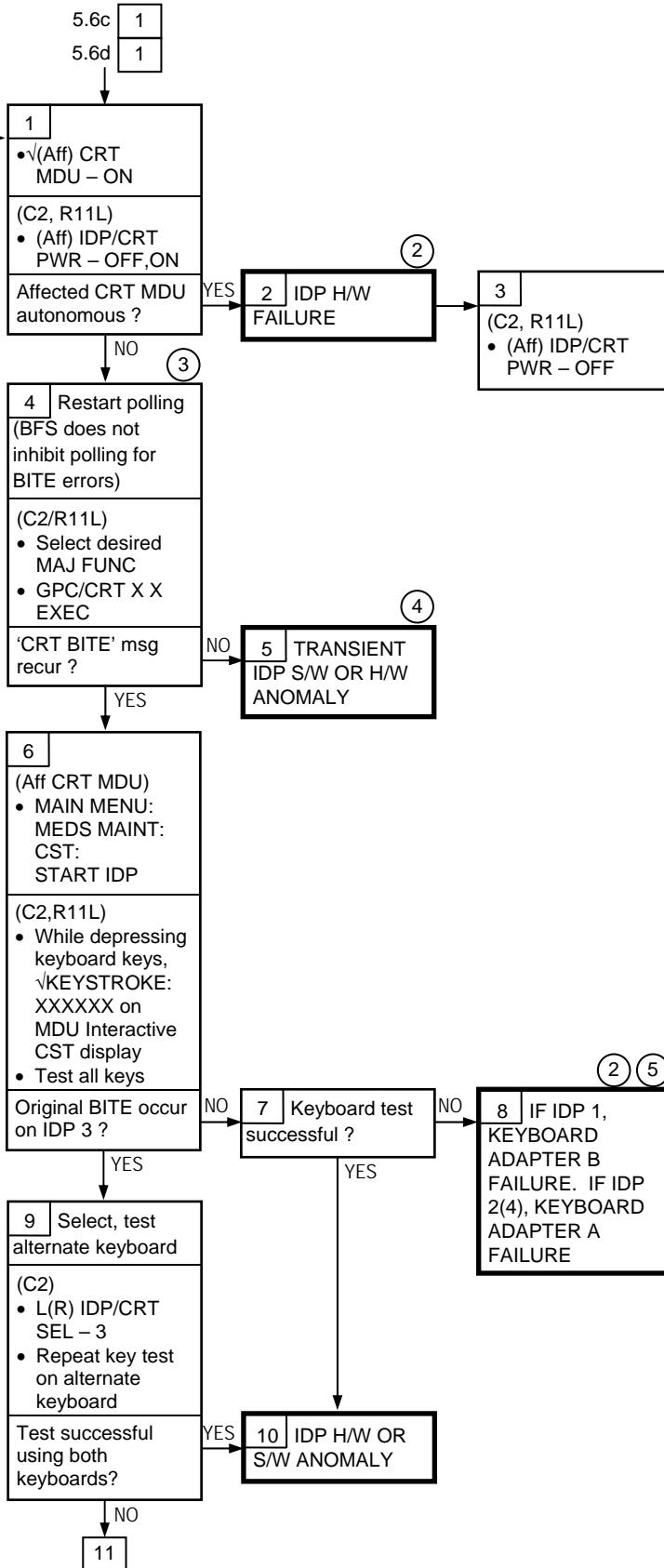
**DPS**

**5.6b 'CRT BITE 1(2,3,4)'**

SM ALERT

① 'CRT BITE 1(2,3,4)'

If:  
 IDP H/W or s/w failure  
 IDP pwr transient (BFS announced only)  
 Keyboard Adapter A and/or B failure



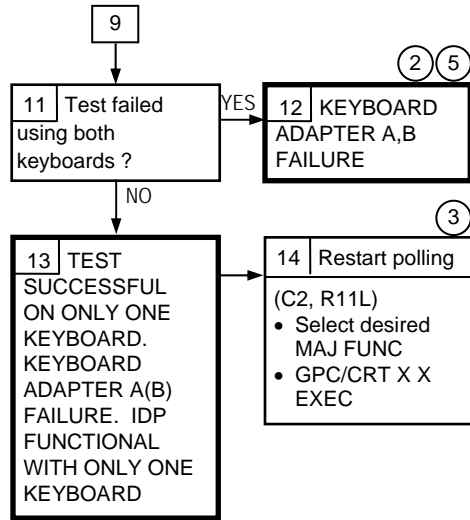
① 'POLL FAIL' msg should appear on affected MDU in DPS mode (PASS). BFS does not inhibit polling for BITE errors

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

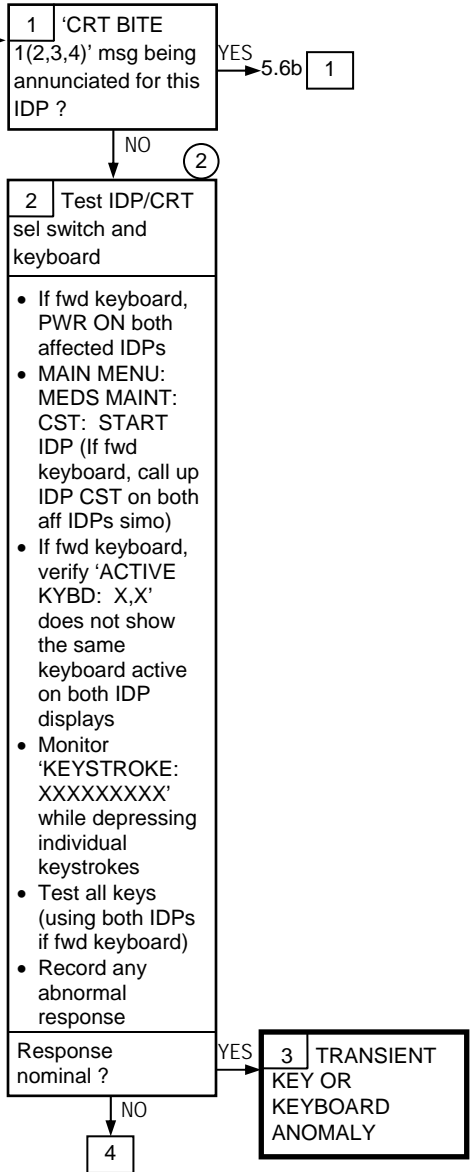


**DPS**

**5.6c ABNORMAL RESPONSE FROM KEYBOARD INPUT**

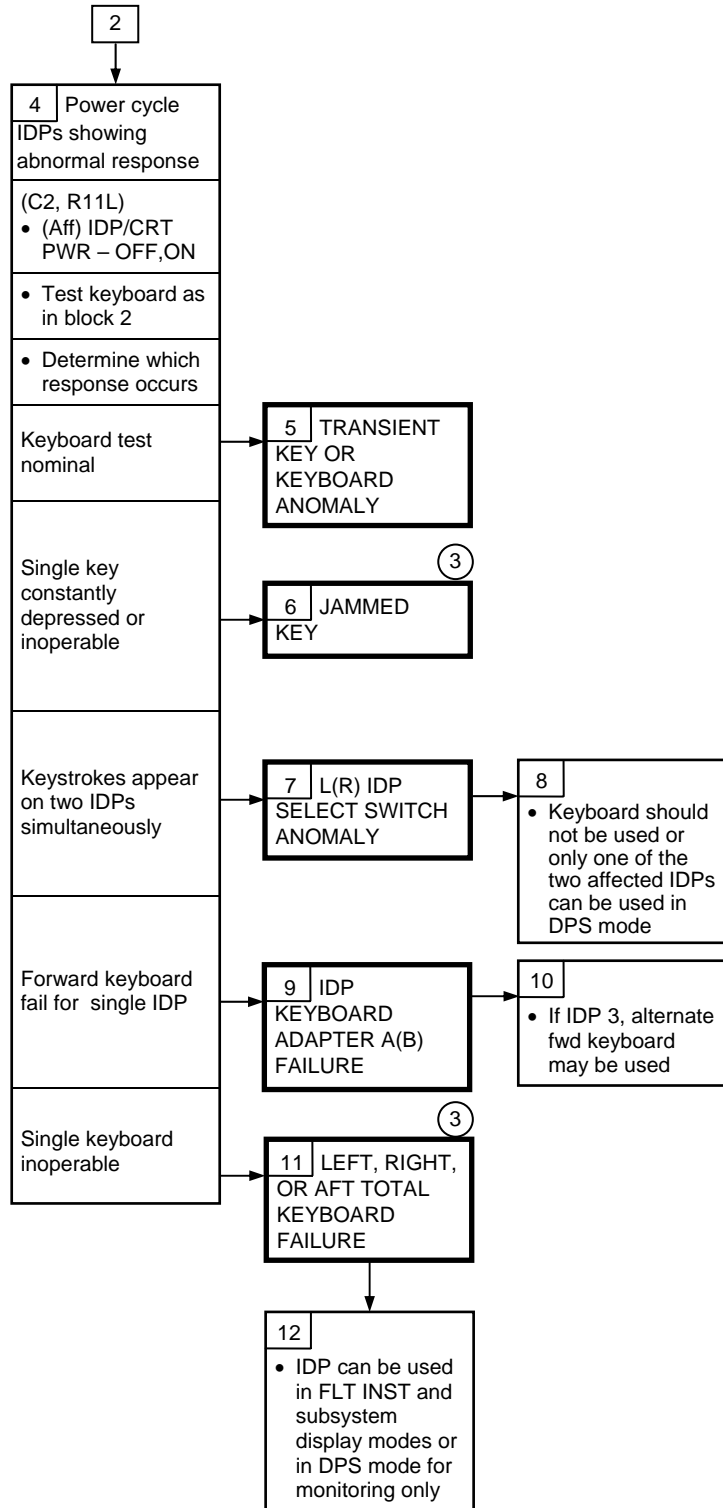
Abnormal Response from Keyboard Input <sup>①</sup>

If:  
Keyboard failure:  
Key jammed  
Key failed open circuit  
Key shorted to ground  
IDP Kybd Adapter A(B) mal  
L(R) IDP/CRT Sel switch mal



① Abnormal means keystroke does not appear on scratch pad line or wrong keystroke appears. User should always check IDP/CRT SEL sw position if applicable and repeat keystroke sequence prior to performing this procedure to eliminate user error and transients

② Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/ two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink)

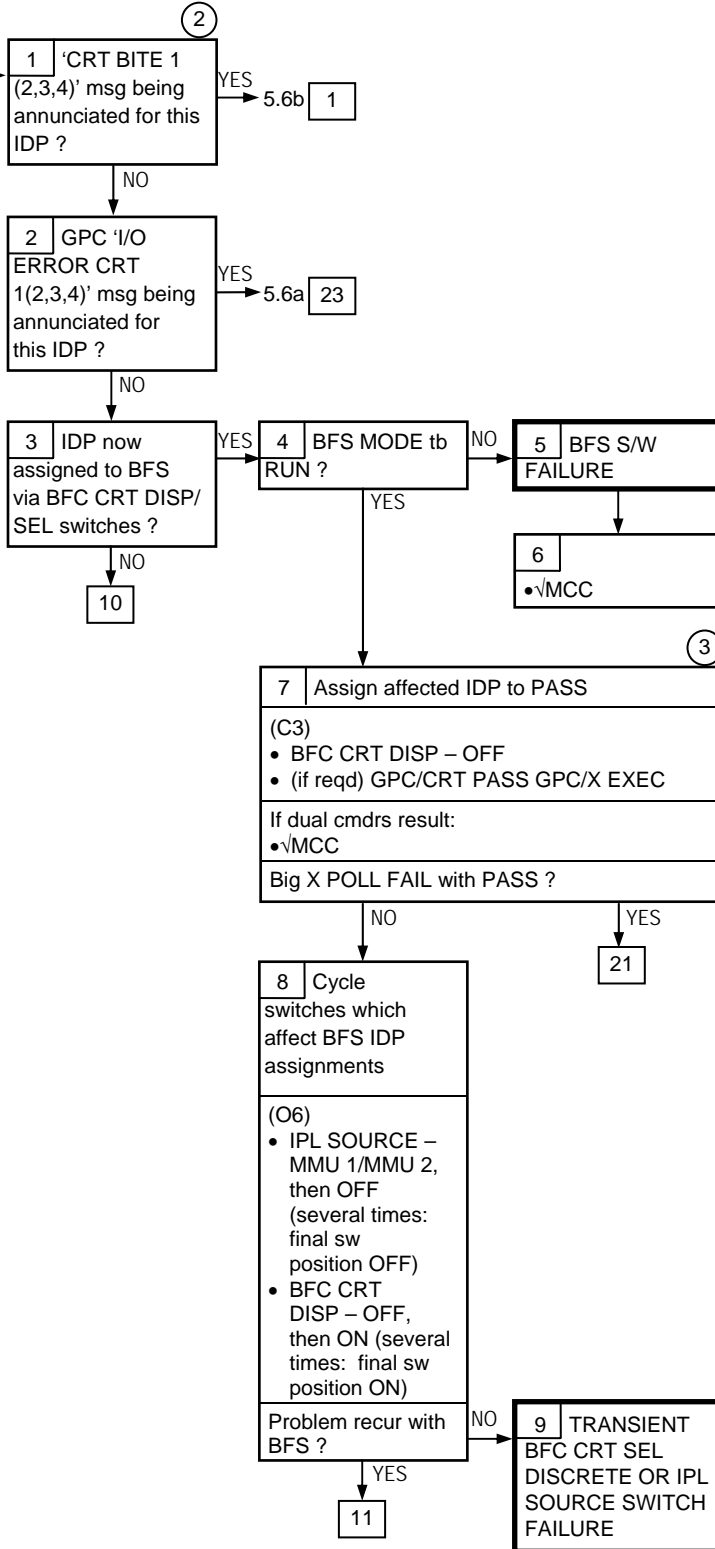


**DPS**

**5.6d BIG 'X' ACROSS MDU AND/OR 'POLL FAIL'**

① Big 'X' Across MDU and/or 'POLL FAIL'

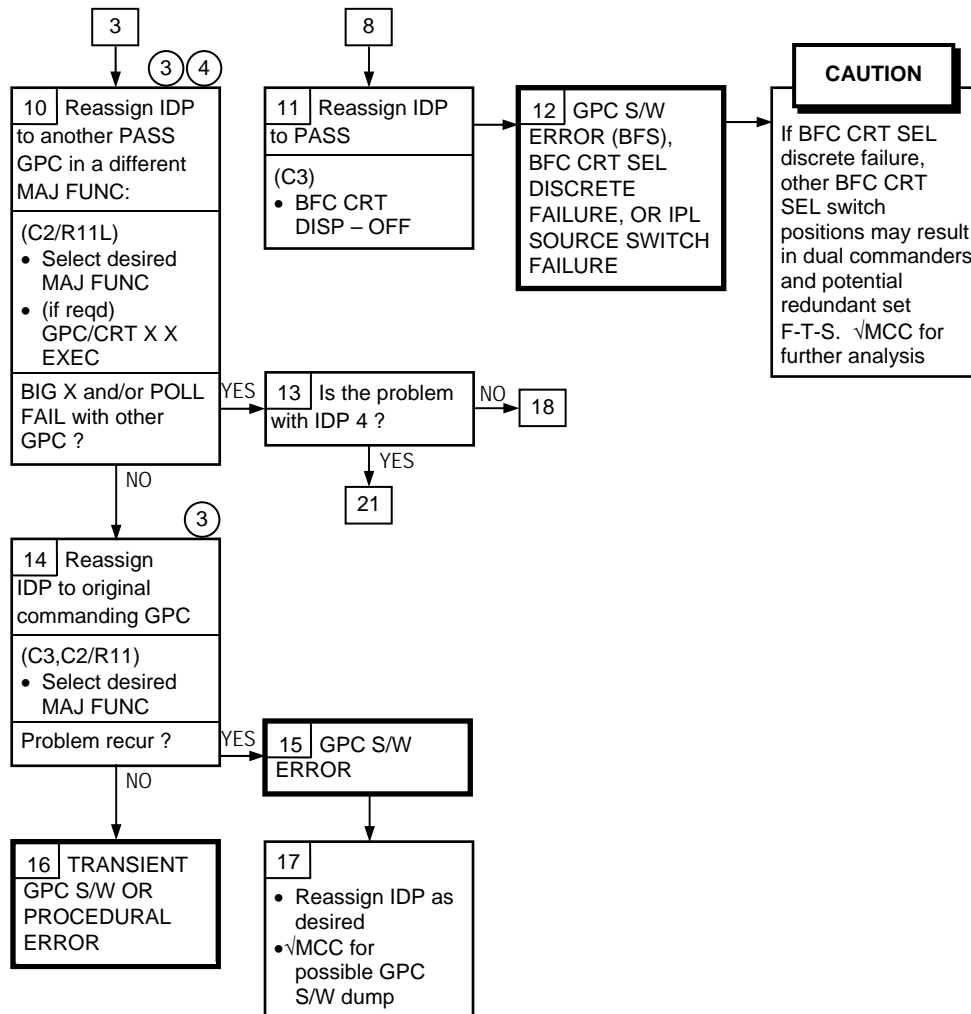
If:  
 IDP S/W error  
 IDP H/W error  
 GPC S/W error  
 BFS CRT SEL discrete failure  
 BFC CRT DISP sw failure  
 IPL SOURCE sw failure  
 Procedural error



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

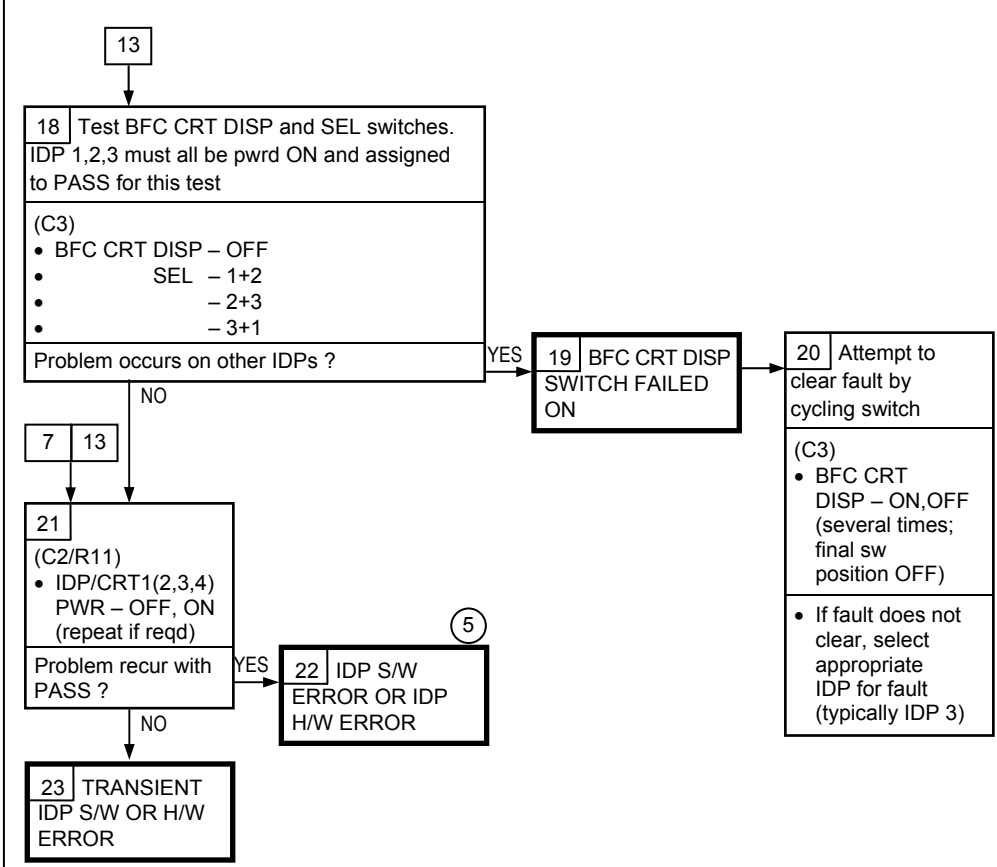
③ GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, always deassign IDP first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT keyboard entry



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

④ Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/ two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink)

**DPS 5.6d (Cont)**



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

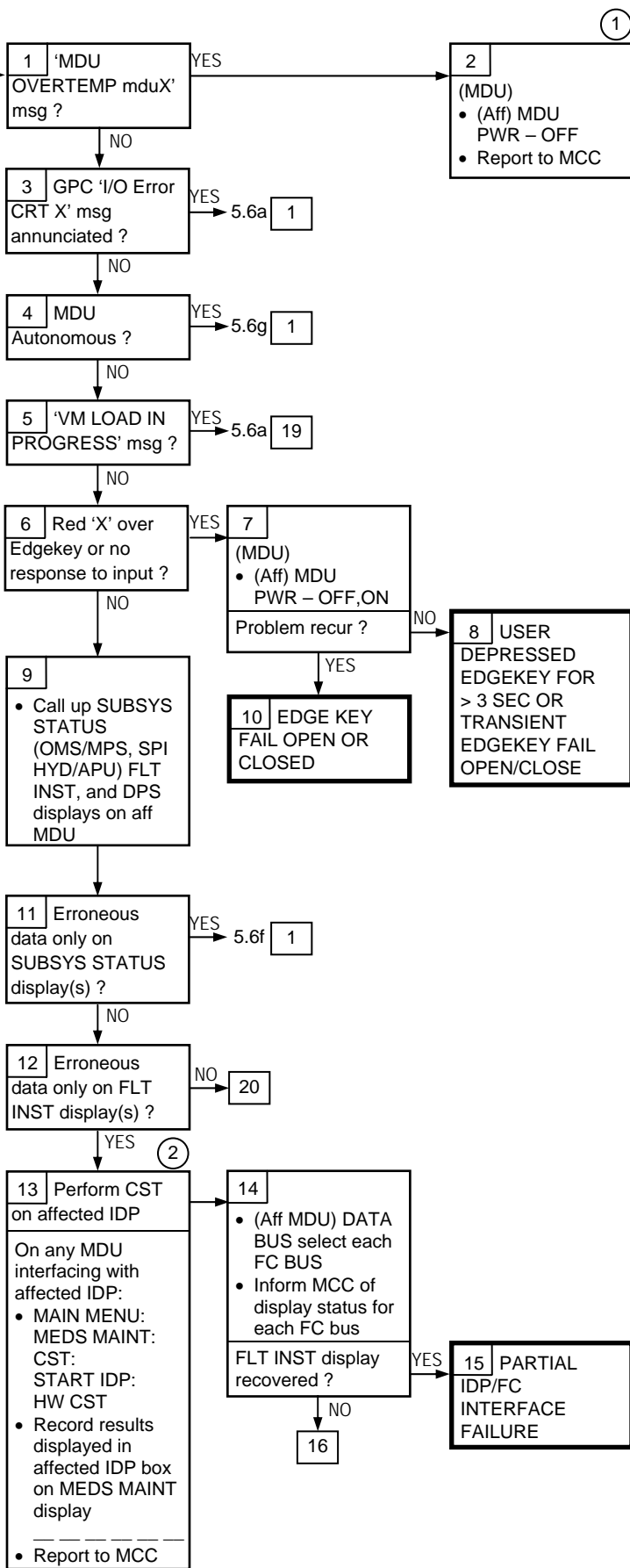
**DPS**

**5.6e MDU ANOMALY**

MDU Anomaly

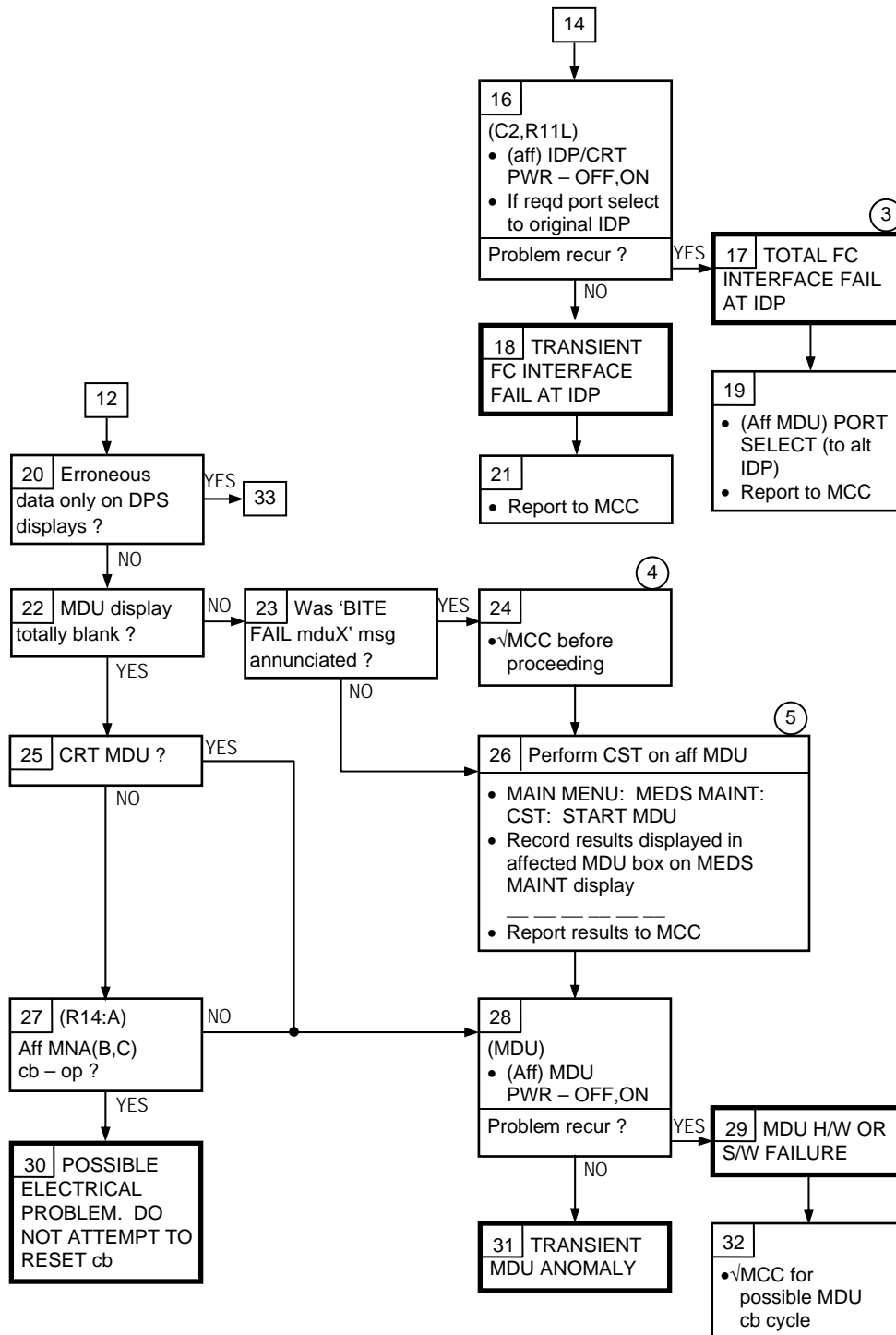
BLANK, UNREADABLE, ABNORMAL, 'BITE FAIL mduX', 'MEDS I/O ERROR mduX', 'MDU OVERTEMP mduX', 'PROCESSOR FAIL mduX' WHERE mduX = CDR1(2), PLT1(2), MFD1(2), CRT 1(2,3,4), AFD1

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



① Internal component has reached 212 degF. Do not repower unless asked by MCC

② Expect GPC 'I/O ERROR CRT X' message if GPC commanding the affected IDP. All other MDUs communicating with the IDP running CST will be temporarily inoperable. IDP CST results will be blank while H/W CST is running. IDP H/W CST takes ~75 sec. Nominal IDP CST result is '000000'

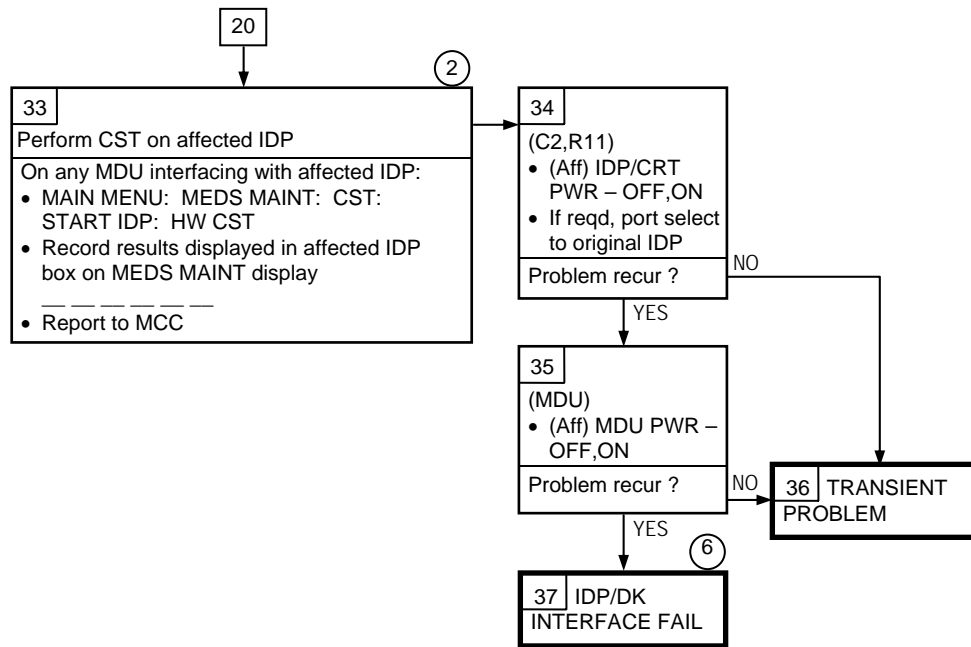


③ IDP cannot be used in FLT INST mode. May be usable in DPS and subsystem display modes

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'

**DPS 5.6e (Cont)**



② Expect GPC 'I/O ERROR CRT X' message if GPC commanding the affected IDP. All other MDUs communicating with the IDP running CST will be temporarily inoperable. IDP CST results will be blank while H/W CST is running. IDP H/W CST takes ~75 sec. Nominal IDP CST result is '000000'

⑥ IDP cannot be used in DPS mode. May be used in FLT INST and subsystem display modes



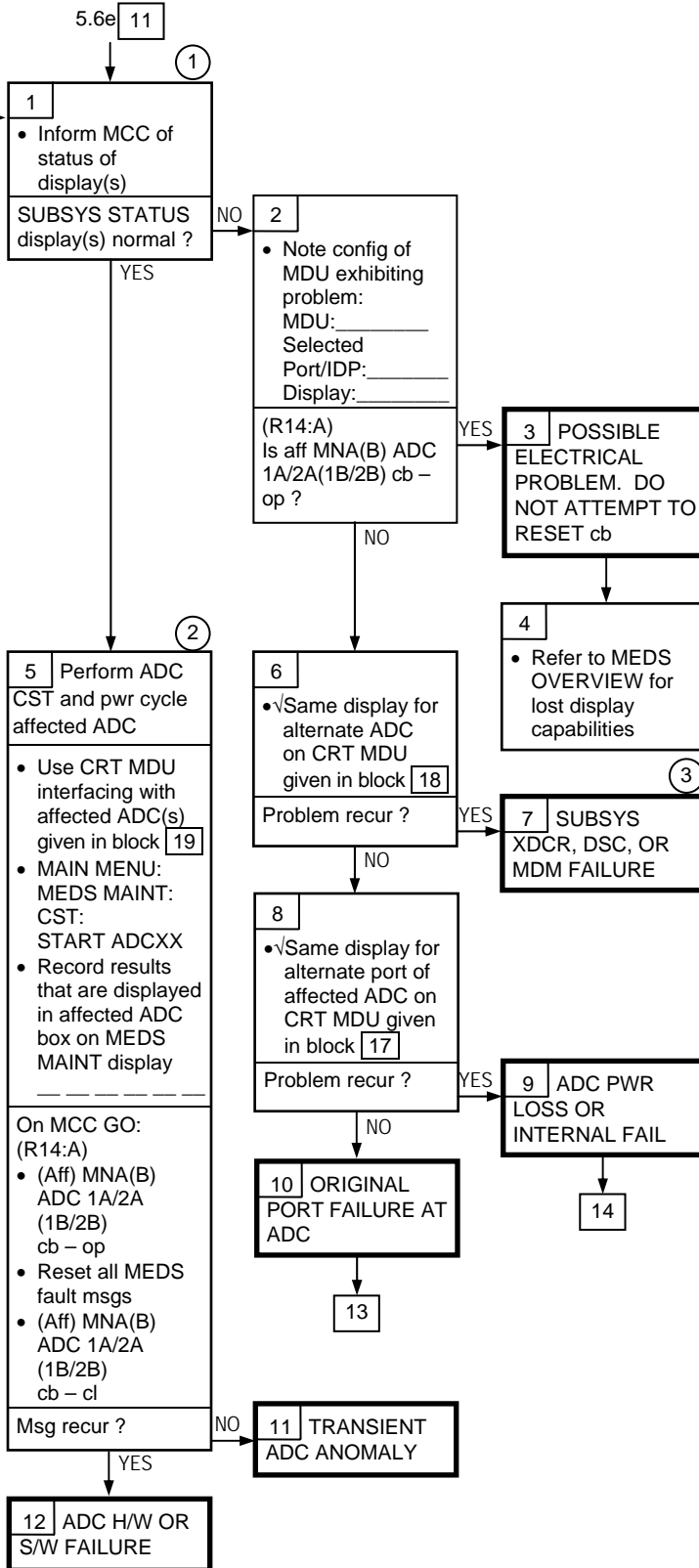
**DPS**

**5.6f ADC ANOMALY**

ADC Anomaly

'BITE FAIL ADCX',  
'PROCESSOR FAIL ADCX',  
'MEDS I/O ERROR ADCX',  
ABNORMAL SUBSYSTEM STATUS DISPLAY WHERE X = 1A, 1B, 2A, 2B

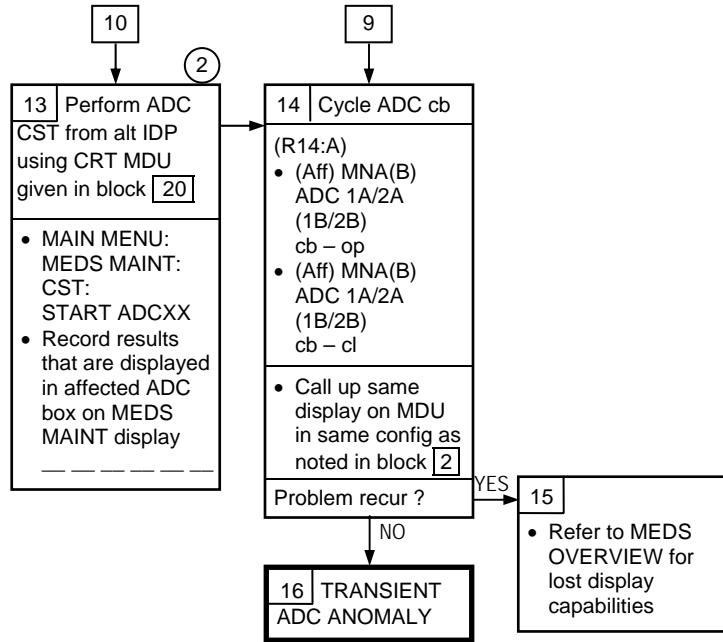
If:  
ADC Port failure  
ADC H/W failure  
ADC S/W failure  
ADC power loss/fail  
Subsystem XDCR, DSC or MDM fail



① If MEDS fault msg(s) annunciated, user may need to select OMS/MPS, SPI, and HYD/APU displays for annunciating IDP(s). ADC 1A and 1B provide OMS/MPS and SPI display data. ADC 2A and 2B provide HYD/APU display data. Reference MEDS overview

② ADC CST will be running while ADC CST result is blank. It will take 5 sec to complete CST. Nominal CST result is '000000'. Expect 'MEDS I/O ERROR ADCXX' msg

③ √MCC for other params possibly lost on same DSC or MDM card



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 on ADC associated with problem. CRT MDU is chosen since it will always be connected to that IDP

④

17 MDU with Subsys Display problem	Currently Selected Port (noted in block 2)	Use this CRT MDU
CDR1	Pri	CRT4
	Sec	CRT2
CDR2	Pri	CRT2
	Sec	CRT1
CRT1	-	CRT2
MFD1	Pri	CRT1
	Sec	CRT4
CRT3	-	CRT4
MFD2	Pri	CRT2
	Sec	CRT4
CRT2	-	CRT1
PLT1	Pri	CRT1
	Sec	CRT2
PLT2	Pri	CRT4
	Sec	CRT1
CRT4	-	CRT3
AFD1	Pri	CRT3
	Sec	CRT1

⑤

18	MDU with Subsys Disp Prob (noted in block [2])	Selected Port (noted in block [2])	Use this CRT MDU
CDR1		Pri	CRT1
		Sec	CRT4
CDR2		Pri	CRT4
		Sec	CRT4
CRT1		-	CRT4
MFD1		Pri	CRT4
		Sec	CRT1
CRT3		-	CRT1
MFD2		Pri	CRT4
		Sec	CRT1
CRT2		-	CRT4
PLT1		Pri	CRT4
		Sec	CRT4
PLT2		Pri	CRT1
		Sec	CRT4
CRT4		-	CRT1
AFD1		Pri	CRT1
		Sec	CRT4

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 aff 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

⑥

19	Perform CST for this ADC	Use this CRT MDU
ADC1A		CRT1 or CRT2
ADC1B		CRT4 or CRT3
ADC2A		CRT1 or CRT2
ADC2B		CRT4 or CRT3

⑦

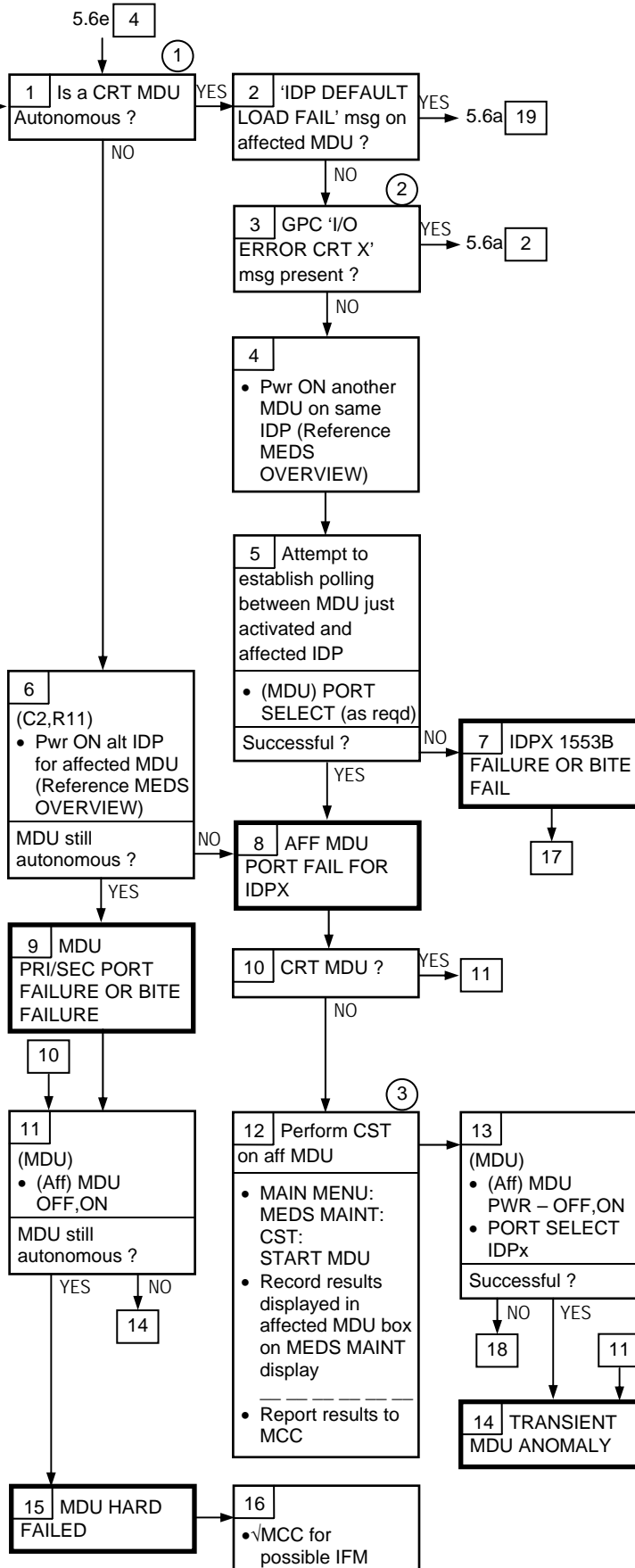
20	Affected Display (noted in block [2])	Selected IDP for Affected MDU (noted in block [2])	Perform CST for this ADC	Use this CRT MDU
OMS/MPS/SPI		IDP 1	ADC 1A	CRT2
		IDP 2	ADC 1A	CRT1
		IDP 3	ADC 1B	CRT4
		IDP 4	ADC 1B	CRT3
HYD/APU		IDP 1	ADC 2A	CRT2
		IDP 2	ADC 2A	CRT1
		IDP 3	ADC 2B	CRT4
		IDP 4	ADC 2B	CRT3

**DPS**

**5.6g MDU IS AUTONOMOUS**

**MDU Autonomous**

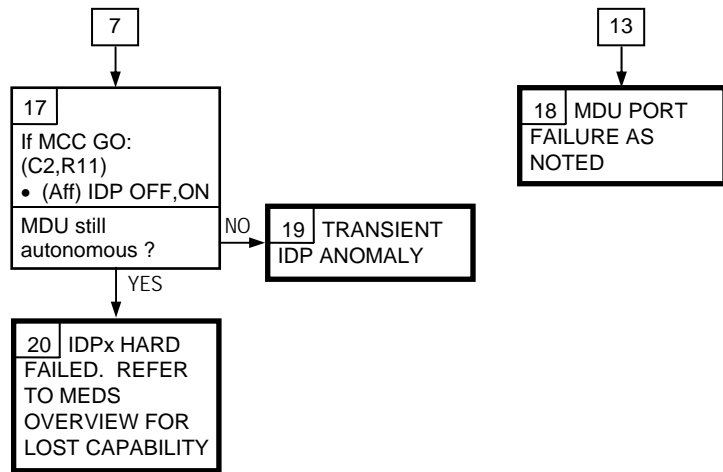
If:  
MDU dual port fail,  
CRT MDU port fail,  
MDU port fail & alt  
IDP OFF, 1553B fail  
for IDP



① If mult MDUs are autonomous, work MAL for CRT MDU

② User may have to establish alternate IDP interface to BFS or PASS or check with MCC as appropriate in order to observe fault msgs

③ Expect 'MEDS I/O ERROR MDU X' messages. MDU CST will take ~75 sec to reach the edgekey test. IDPs will not be able to communicate with MDU while it is executing its CST. Nominal MDU CST result is '0000FF'



## GPC FRP-1 SINGLE GPC FAIL

### SINGLE GPC FAIL OBJECTIVE

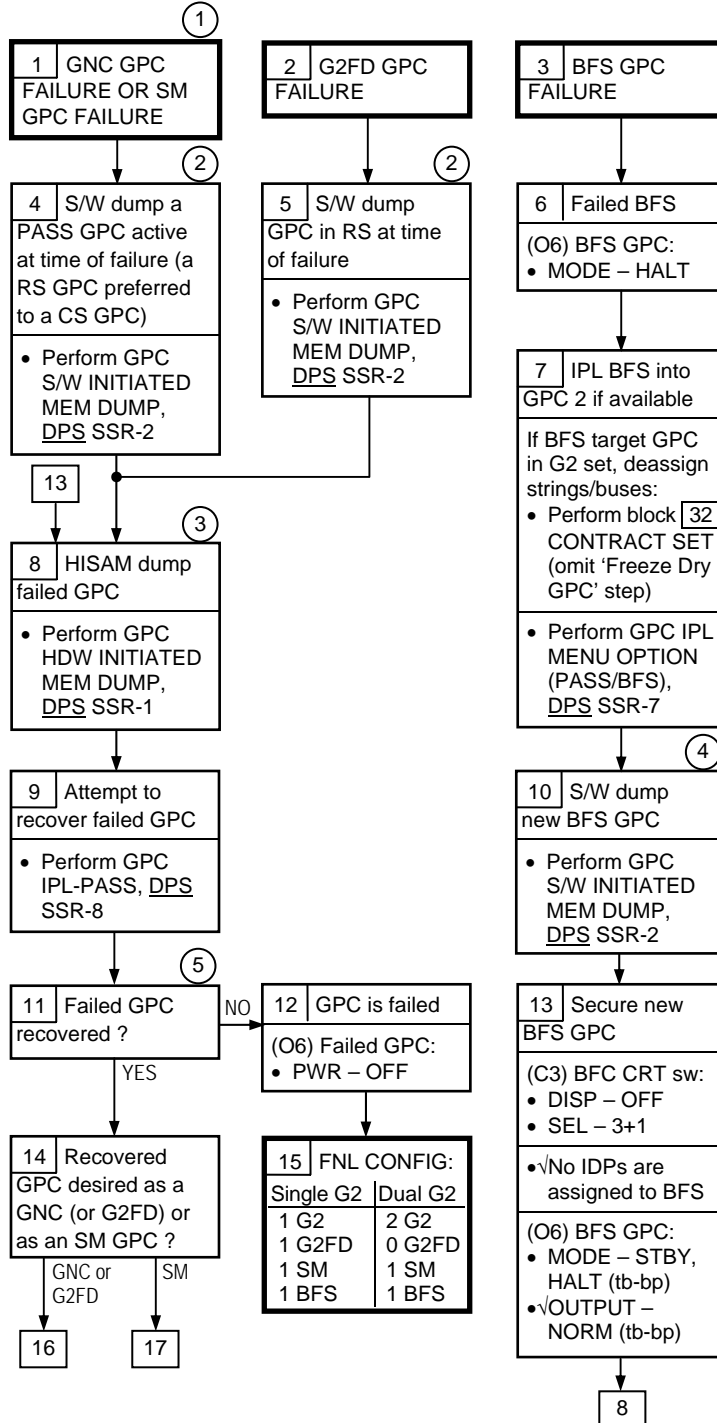
Attempt failed GPC recovery following on-orbit DPS reconfiguration via APCL, OPCL, MAL, or PI procedure. If recovered, target the 'transient' GPC as a redundant G2, G2FD, or SM based upon operational objectives. If RNDZ, EVA, or critical burn requires Dual G2 config, recovered GPC will be made G2FD

### SCOPE

Procedure designed to handle any single G2, SM, G2FD, or BFS GPC failure occurring during ascent or on-orbit prior to entry prep

### ASSUMPTIONS

If multiple G2 configuration is reqd shortly following the GPC recovery attempt, such DPS reconfiguration will be performed before or after GPC recovery and is not embedded part of this FRP



① If GPC FRP-1 following failure of 'GNC RECOVERY VIA G2FD' (OPCL), the following uplinks may be reqd upon a GPC recovery:

- state vector
- ADI quaternions
- IMU gyro bias
- IMU accel bias

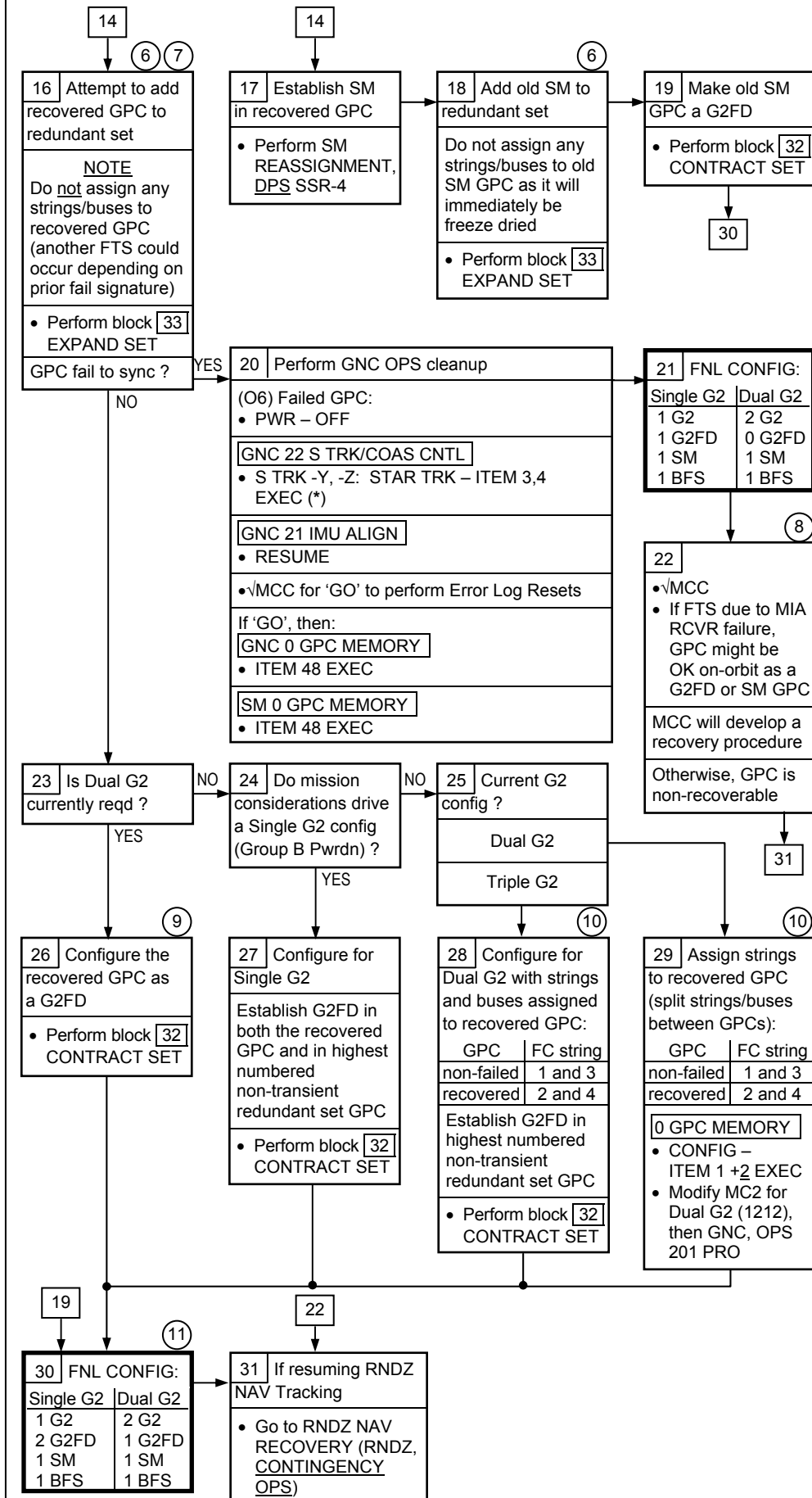
② S/W dump to capture GPC Sync Trace Log. MCC analysis of both S/W and H/W dumps may provide insight to the cause of a PASS GPC failure

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

# GPC FRP-1 (Cont)



- ⑥ 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
- ⑦ Action verifies no FC MIA receiver failure exists
- ⑧ '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

⑨ 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

⑩ MCC may correct NBAT if IMU config or other considerations drive alternate stringing [1221 or 1122 NBAT]

⑪ 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)

⑫ GNC downlist will default to lowest ID GPC in G2 set. MCC may request downlister change following OPS Mode Recall

⑬ Crew "GO" for Error Log resets without prior MCC concurrence

32	<b>CONTRACT SET</b>																																														
		<b>NOTE</b> No keyboard entries or sw throws 10 sec: Before <u>and</u> after moding PASS GPCs to RUN Before OPS transition or set expansion/contraction requests until new OPS base page is displayed																																													
		<ul style="list-style-type: none"> <li>If RNDZ NAV enabled: DAP: LVLH <span style="border: 1px solid black; padding: 2px;">GNC UNIV PTG</span> CNCL – ITEM 21 EXEC</li> </ul>																																													
	C3(A6U) CRT	<ul style="list-style-type: none"> <li><b>CONFIGURE FOR SET CONTRACTION</b> If MM202: GNC, OPS 201 PRO <span style="border: 1px solid black; padding: 2px;">GNC 0 GPC MEMORY</span> CONFIG – ITEM 1 +2 EXEC Assign MC2 per table →</li> </ul>																																													
		<table border="1" style="border-collapse: collapse; margin: auto;"> <thead> <tr> <th style="width: 10%;">If:</th> <th style="width: 15%;">Single G2</th> <th style="width: 15%;">Dual G2</th> </tr> </thead> <tbody> <tr> <td>CONFIG GPC</td> <td style="text-align: center;">2 10000</td> <td style="text-align: center;">2 12000</td> </tr> <tr> <td>STR 1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td>2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> <tr> <td>3</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td>4</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> <tr> <td>PL 1/2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>CRT 1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td>2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> <tr> <td>3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>4</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> <tr> <td>L 1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>MM 1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td>2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> </tbody> </table>	If:	Single G2	Dual G2	CONFIG GPC	2 10000	2 12000	STR 1	1	1	2	1	2	3	1	1	4	1	2	PL 1/2	0	0	CRT 1	1	1	2	1	2	3	0	0	4	1	2	L 1	0	0	2	0	0	MM 1	1	1	2	1	2
If:	Single G2	Dual G2																																													
CONFIG GPC	2 10000	2 12000																																													
STR 1	1	1																																													
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3	1	1																																													
4	1	2																																													
PL 1/2	0	0																																													
CRT 1	1	1																																													
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MM 1	1	1																																													
2	1	2																																													
	C3(A6U) CRT	<ul style="list-style-type: none"> <li><b>OPS MODE RECALL</b> ⑫ DAP: FREE VERN(ALT)</li> </ul>																																													
	C3(A6U) CRT	<ul style="list-style-type: none"> <li>GNC, OPS 201 PRO Pause ~30 sec (DAP setting), then DAP: as reqd</li> </ul>																																													
	C3(A6U) CRTX	<ul style="list-style-type: none"> <li><b>FREEZE DRY GPC</b> MAJ FUNC – PL GPC/CRT G2FD/X EXEC <span style="border: 1px solid black; padding: 2px;">X PL GPC MEMORY</span> CONFIG – ITEM 45 +2 EXEC GPC – ITEM 46 +2(3) EXEC STORE – ITEM 47 EXEC Store complete when MC = 02 (~30 sec) √All IDPs deassigned from FD GPC</li> </ul>																																													
	O6	<ul style="list-style-type: none"> <li>GPC MODE G2FD – STBY (tb-bp) – HALT (tb-bp) – STBY (tb-RUN) – HALT (tb-bp)</li> </ul>																																													
		<ul style="list-style-type: none"> <li><b>CONFIG FOR CLEANUP</b> <span style="border: 1px solid black; padding: 2px;">GNC 22 S TRK/COAS CNTL</span> S TRK -Y, -Z: STAR TRK – ITEM 3,4 EXEC (*) <span style="border: 1px solid black; padding: 2px;">GNC 21 IMU ALIGN</span> RESUME</li> </ul>																																													
		<ul style="list-style-type: none"> <li><b>CLEAR SOFTWARE FAIL VOTES</b> ⑬ <span style="border: 1px solid black; padding: 2px;">GNC 0 GPC MEMORY</span> ITEM 48 EXEC <span style="border: 1px solid black; padding: 2px;">SM 0 GPC MEMORY</span> ITEM 48 EXEC</li> </ul>																																													



## GPC FRP-1 (Cont)

**ASSUMPTIONS (Block 33):**

The crew will need to adjust the GPC Target Set in "Configure For Set Expansion" step below to accommodate the actual DPS configuration (√MCC if GPC target set or NBAT string/bus assignments unclear)

Procedure assumes target GPC (recovered GPC or former SM GPC) is up and in 'RUN', which is normally the case. If target GPC not in common set, perform step 2 "Config G2FD GPC(s) For Set Expansion" of G2 SET EXPANSION procedure (DPS, ORB OPS)

⑭ Whether expanding G2 set to a Dual or Triple G2 config, modify only the GPC target set unless otherwise noted (don't assign strings or buses to target GPC)

⑮ GPC downlist will default to lowest ID GPC in G2 set. MCC may request downlister change following OPS Mode Recall

**33 EXPAND SET**

NOTE

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

• If RNDZ NAV enabled:  
 C3(A6U) DAP: LVLH  
 CRT GNC UNIV PTG  
 CNCL – ITEM 21 EXEC

• CONFIGURE FOR SET EXPANSION  
 If MM202: GNC, OPS 201 PRO

GNC 0 GPC MEMORY ⑭  
 CONFIG – ITEM 1 +2 EXEC  
 Assign MC2 per table →

• OPS MODE RECALL ⑮  
 C3(A6U) DAP: FREE  
 CRT GNC, OPS 201 PRO  
 Pause ~30 sec  
 (DAP settling), then  
 C3(A6U) DAP: as reqd

If:	Dual G2	Triple G2
CONFIG GPC	2 12000	2 12300
STR 1	↑	↑
2		
3		
4		
PL 1/2	↓	↓
CRT 1		
2		
3		
4	↓	↓
L 1		
2	↓	↓
MM 1		
2		

# GPC FRP-3 BFS GPC FAIL RECOVERY (ENTRY)

**NOTE**

Procedure assumes config shown as established by BFS GPC FAIL (ENT PKT, DPS). The following BFS uplinks may be necessary after completion of FRP:

- Guidance targets
- ADI quaternions
- IMU gyro bias
- IMU accelerometer bias
- TMBU

Procedure assumes deorbit planned. If deorbit not planned, config for ORBIT and go to SINGLE GPC FAIL, GPC FRP-1 (DPS)

**NOTE**

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

Initial Config FRP-3					
GPC OPS	1	2	3	4	5
	G3	G3	G3	G3	-
POWER OUTPUT MODE	ON	ON	ON	ON	ON
	NORM	NORM	NORM	NORM	NORM
	RUN	RUN	RUN	RUN	HALT
CONFIG GPC	3				
	12340				
STR 1	1				
2	2				
3	3				
4	4				
PL 1/2	1				
CRT 1	1				
2	2				
3	3				
4	0				
L 1	0				
2	0				
MM 1	1				
2	2				

- a. Remove GPC2 from MC3

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

O6

GNC 50 HORIZ SIT – √PASS R/W sel

CONFIG GPC	3
	10340
STR 1	1
2	4
3	3
4	4
PL 1/2	1
CRT 1	1
2	4
3	3
4	0
L 1	0
2	0
MM 1	1
2	3

## GPC FRP-3 (Cont)

- c. Attempt recovery of failed GPC
- Perform GPC IPL-PASS..... DPS SSR-8
  - If GPC recovered, perform step d

Final Config for GPC 5 Not Recovered					
GPC OPS	1 G3	2 BFS3	3 G3	4 G3	5 -
POWER OUTPUT MODE	ON NORM RUN	ON BKUP RUN	ON NORM RUN	ON NORM RUN	OFF NORM HALT
CONFIG GPC	3 10340				
STR 1	1				
2	4				
3	3				
4	4				
PL 1/2	1				
CRT 1	1				
2	4				
3	3				
4	0				
L 1	0				
2	0				
MM 1	1				
2	3				

- d. GPC recovered, establish a four GPC redundant set

### 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

CONFIG GPC	3 10345
STR 1	1
2	4
3	3
4	5
PL 1/2	1
CRT 1	1
2	4
3	3
4	0
L 1	0
2	0
MM 1	1
2	3

Final Config for GPC 5 Recovered					
GPC OPS	1 G3	2 BFS3	3 G3	4 G3	5 G3
POWER OUTPUT MODE	ON NORM RUN	ON BKUP RUN	ON NORM RUN	ON NORM RUN	ON NORM RUN
CONFIG GPC	3 10345				
STR 1	1				
2	4				
3	3				
4	5				
PL 1/2	1				
CRT 1	1				
2	4				
3	3				
4	0				
L 1	0				
2	0				
MM 1	1				
2	3				

# 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)

NOTE

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

1. Config GPCs:
  - O6 a. PASS GNC GPCs MODE – HALT
  - b. BFS GPC MODE – RUN
  - c. If BFS not in 301:
    - C2 (BFS) GNC, OPS 301 PRO
2. If SM GPC currently active:
  - O6 a. If SM GPC OUTPUT – TERM:  
SM GPC OUTPUT – NORM  
BFS ENGAGE pb – push (reset engage discretetes)
  - O1 b. If SM GPC self-fail CAM It on:  
Perform PL/DPS RECONFIG (PL OPS or PL SYS or SODF: ASSY OPS):  

SM 1 DPS UTILITY

  
 CHECKPOINT RETRIEVE DISABLE:  
 CKPT RETRV ENA – ITEM 12 EXEC (no \*)  
 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:  

SM 2 TIME

  
 MISSION TIME MET – ITEM 2 EXEC  
 C2
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 for each failed GPC ..... DPS SSR-1
  - c. BFS ENGAGE pb – push (reset engage discretetes)
7. Attempt recovery of each dumped GPC:
  - a. Perform IPL:  
 Perform GPC IPL-PASS ..... DPS SSR-8  
 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			
		1	2	3	4
CONFIG	GPC	4(5) 10000	4(5) 02000	4(5) 00300	4(5) 00040
STR	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0
PL	1/2	1	2	3	4
CRT	1	1	2	3	4
	2	1	2	3	4
	3	1	2	3	4
	4	0	0	0	0
L	1	1	2	3	4
	2	0	0	0	0
MM	1	1	2	3	4
	2	1	2	3	4

		PASS GPC			
		1	2	3	4
CONFIG	GPC	3 10000	3 02000	3 00300	3 00040
STR	1	1	2	3	4
	2	1	2	3	4
	3	1	2	3	4
	4	1	2	3	4
PL	1/2	1	2	3	4
CRT	1	1	2	3	4
	2	1	2	3	4
	3	1	2	3	4
	4	0	0	0	0
L	1	0	0	0	0
	2	0	0	0	0
MM	1	1	2	3	4
	2	1	2	3	4

# GPC FRP-4 (Cont)

8. (Cont)

Final Config for GPC 1					
GPC OPS	1	2	3	4	5
	G3	-	-	-	BFS3
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	OFF NORM HALT	ON BKUP RUN
CONFIG GPC	3 10000				
STR 1	1				
2	1				
3	1				
4	1				
PL 1/2	1				
CRT 1	1				
2	1				
3	1				
4	0				
L 1	0				
2	0				
MM 1	1				
2	1				

Final Config for GPC 2					
GPC OPS	1	2	3	4	5
	-	G3	-	-	BFS3
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON BKUP RUN
CONFIG GPC	3 02000				
STR 1	2				
2	2				
3	2				
4	2				
PL 1/2	2				
CRT 1	2				
2	2				
3	2				
4	0				
L 1	0				
2	0				
MM 1	2				
2	2				

Final Config for GPC 3					
GPC OPS	1	2	3	4	5
	-	-	G3	-	BFS3
POWER OUTPUT MODE	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	ON BKUP RUN
CONFIG GPC	3 00300				
STR 1	3				
2	3				
3	3				
4	3				
PL 1/2	3				
CRT 1	3				
2	3				
3	3				
4	0				
L 1	0				
2	0				
MM 1	3				
2	3				

Final Config for GPC 4					
GPC OPS	1	2	3	4	5
	-	-	-	G3	BFS3
POWER OUTPUT MODE	OFF NORM HALT	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	ON BKUP RUN
CONFIG GPC	3 00040				
STR 1	4				
2	4				
3	4				
4	4				
PL 1/2	4				
CRT 1	4				
2	4				
3	4				
4	0				
L 1	0				
2	0				
MM 1	4				
2	4				

# GPC FRP-4 (Cont)

C3

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

PASS GPCs

1,2  
1,3 2,3  
1,4 2,4 3,4

CONFIG GPC	3 10000	3 02000	3 00300
STR 1	1	2	3
2	1	2	3
3	1	2	3
4	1	2	3
PL 1/2	0	0	0
CRT 1	1	2	3
2	1	2	3
3	1	2	3
4	0	0	0
L 1	0	0	0
2	0	0	0
MM 1	1	2	3
2	1	2	3

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 →

PASS GPCs

1,2 1,3 1,4 2,3 2,4 3,4

CONFIG GPC	3 12000	3 10300	3 10040	3 02300	3 02040	3 00340
STR 1	1	1	1	2	2	3
2	2	3	4	3	4	4
3	1	1	1	2	2	3
4	2	3	4	3	4	4
PL 1/2	1	1	1	2	2	3
CRT 1	1	1	1	2	2	3
2	2	3	4	3	4	4
3	1	1	1	2	2	3
4	0	0	0	0	0	0
L 1	0	0	0	0	0	0
2	0	0	0	0	0	0
MM 1	1	1	1	2	2	3
2	2	3	4	3	4	4

# GPC FRP-4 (Cont)

10. (Cont)

Final Config for Two PASS GPCs and Entry Desired											
GPCs 1,2						GPCs 1,3					
GPC OPS	1 G3	2 G3	3 -	4 -	5 BFS3	GPC OPS	1 G3	2 -	3 G3	4 -	5 BFS3
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON BKUP RUN	POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	ON BKUP RUN
CONFIG GPC	3 12000					CONFIG GPC	3 10300				
STR 1	1					STR 1	1				
2	2					2	3				
3	1					3	1				
4	2					4	3				
PL 1/2	1					PL 1/2	1				
CRT 1	1					CRT 1	1				
2	2					2	3				
3	1					3	1				
4	0					4	0				
L 1	0					L 1	0				
2	0					2	0				
MM 1	1					MM 1	1				
2	2					2	3				
GPCs 1,4						GPCs 2,3					
GPC OPS	1 G3	2 -	3 -	4 G3	5 BFS3	GPC OPS	1 -	2 G3	3 G3	4 -	5 BFS3
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	ON BKUP RUN	POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	ON NORM RUN	OFF NORM HALT	ON BKUP RUN
CONFIG GPC	3 10040					CONFIG GPC	3 02300				
STR 1	1					STR 1	2				
2	4					2	3				
3	1					3	2				
4	4					4	3				
PL 1/2	1					PL 1/2	2				
CRT 1	1					CRT 1	2				
2	4					2	3				
3	1					3	2				
4	0					4	0				
L 1	0					L 1	0				
2	0					2	0				
MM 1	1					MM 1	2				
2	4					2	3				

# GPC FRP-4 (Cont)

10. (Cont)

Final Config for Two PASS GPCs and Entry Desired											
GPCs 2,4						GPCs 3,4					
GPC OPS	1	2	3	4	5	GPC OPS	1	2	3	4	5
	-	G3	-	G3	BFS3		-	-	G3	G3	BFS3
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	ON NORM RUN	ON BKUP RUN	POWER OUTPUT MODE	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	ON NORM RUN	ON BKUP RUN
CONFIG GPC	3					CONFIG GPC	3				
	02040						00340				
STR 1	2					STR 1	3				
2	4					2	4				
3	2					3	3				
4	4					4	4				
PL 1/2	2					PL 1/2	3				
CRT 1	2					CRT 1	3				
2	4					2	4				
3	2					3	3				
4	0					4	0				
L 1	0					L 1	0				
2	0					2	0				
MM 1	2					MM 1	3				
2	4					2	4				

11. Orbit config desired, establish single G2:

- a. Secure BFS:
  - (BFS) GNC, OPS 000 PRO
  - BFC CRT DISP – OFF
  - SEL – 3+1
  - √All CRTs deassigned from BFS
  - 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
  - GPC/CRT 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)

PASS GPCs

1,2  
1,3 2,3  
1,4 2,4 3,4

CONFIG GPC	2	2	2
	10000	02000	00300
STR 1	1	2	3
2	1	2	3
3	1	2	3
4	1	2	3
PL 1/2	0	0	0
CRT 1	1	2	3
2	1	2	3
3	0	0	0
4	1	2	3
L 1	0	0	0
2	0	0	0
MM 1	1	2	3
2	1	2	3

**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



# GPC FRP-4 (Cont)

11. (Cont)

Final Config for Two PASS GPCs and Orbit Desired											
GPCs 1,2						GPCs 1,3					
GPC OPS	1 G2	2 SM	3 -	4 -	5 BFS	GPC OPS	1 G2	2 -	3 SM	4 -	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON TERM RUN	OFF NORM HALT	OFF NORM HALT	ON NORM HALT	POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	ON TERM RUN	OFF NORM HALT	ON NORM HALT
CONFIG GPC	2 10000	4(5) 02000				CONFIG GPC	2 10000	4(5) 00300			
STR 1	1	0				STR 1	1	0			
2	1	0				2	1	0			
3	1	0				3	1	0			
4	1	0				4	1	0			
PL 1/2	0	2				PL 1/2	1	3			
CRT 1	1	2				CRT 1	1	3			
2	1	2				2	1	3			
3	0	0				3	0	0			
4	1	2				4	1	3			
L 1	0	2				L 1	0	3			
2	0	0				2	0	0			
MM 1	1	2				MM 1	1	3			
2	1	2				2	1	3			
GPCs 1,4						GPCs 2,3					
GPC OPS	1 G2	2 -	3 -	4 SM	5 BFS	GPC OPS	1 -	2 G2	3 SM	4 -	5 BFS
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON TERM RUN	ON NORM HALT	POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	ON TERM RUN	OFF NORM HALT	ON NORM HALT
CONFIG GPC	2 10000	4(5) 00040				CONFIG GPC	2 02000	4(5) 00300			
STR 1	1	0				STR 1	2	0			
2	1	0				2	2	0			
3	1	0				3	2	0			
4	1	0				4	2	0			
PL 1/2	0	4				PL 1/2	0	3			
CRT 1	1	4				CRT 1	2	3			
2	1	4				2	2	3			
3	0	0				3	0	0			
4	1	4				4	2	3			
L 1	0	4				L 1	0	3			
2	0	0				2	0	0			
MM 1	1	4				MM 1	2	3			
2	1	4				2	2	3			

# GPC FRP-4 (Cont)

11. (Cont)

Final Config for Two PASS GPCs and Orbit Desired											
GPCs 2,4						GPCs 3,4					
GPC OPS	1	2	3	4	5	GPC OPS	1	2	3	4	5
	-	G2	-	SM	BFS		-	-	G2	SM	BFS
POWER OUTPUT MODE	OFF	ON	OFF	ON	ON	POWER OUTPUT MODE	OFF	OFF	ON	ON	ON
	NORM	NORM	NORM	TERM	NORM		NORM	NORM	NORM	TERM	NORM
	HALT	RUN	HALT	RUN	HALT		HALT	HALT	RUN	RUN	HALT
CONFIG GPC	2	4(5)				CONFIG GPC	2	4(5)			
	02000	00040					00300	00040			
STR 1	2	0				STR 1	3	0			
2	2	0				2	3	0			
3	2	0				3	3	0			
4	2	0				4	3	0			
PL 1/2	0	4				PL 1/2	0	4			
CRT 1	2	4				CRT 1	3	4			
2	2	4				2	3	4			
3	0	0				3	0	0			
4	2	4				4	3	4			
L 1	0	4				L 1	0	4			
2	0	0				2	0	0			
MM 1	2	4				MM 1	3	4			
2	2	4				2	3	4			

C3

12. Three PASS GPCs:

- OI PCMMU FORMAT – FXD
- Establish G3 redundant set:  
Perform GNC REASSIGNMENT (G3) ..... DPS SSR-3 →
- Perform step 19: PASS IMU attitude reference recovery, then:

CONFIG GPC	PASS GPCs			
	1,2,3	1,2,4	1,3,4	2,3,4
	3	3	3	
	12000	10300	02300	
STR 1	1	1	2	
2	2	3	3	
3	1	1	2	
4	2	3	3	
PL 1/2	0	0	0	
CRT 1	1	1	2	
2	2	3	3	
3	1	1	2	
4	0	0	0	
L 1	0	0	0	
2	0	0	0	
MM 1	1	1	2	
2	2	3	3	

# GPC FRP-4 (Cont)

## 13. Config for ORBIT:

- a. Secure BFS:
  - (BFS) GNC, OPS 000 PRO
  - 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
  - O6 DESIRED GPC/4 EXEC
  - f. SM GPC OUTPUT – TERM
  - g. Reselect MTU accumulator:
    - C2 SM(GNC) 2 TIME
    - MTU ACCUM 1(2,3) TRY – ITEM 34(35,36)

PASS GPCs

1,2,3  
1,2,4 1,3,4 2,3,4

CONFIG GPC	2 12000	2 10300	2 02300
STR 1	1	1	2
2	2	3	3
3	1	1	2
4	2	3	3
PL 1/2	0	0	0
CRT 1	1	1	2
2	2	3	3
3	0	0	0
4	2	3	3
L 1	0	0	0
2	0	0	0
MM 1	1	1	2
2	2	3	3

### 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 →

PASS GPCs

1,2,3  
1,2,4  
1,3,4 2,3,4

CONFIG GPC	2 10000	2 02000
STR 1	1	2
2	1	2
3	1	2
4	1	2
PL 1/2	0	0
CRT 1	1	2
2	1	2
3	0	0
4	1	2
L 1	0	0
2	0	0
MM 1	1	2
2	1	2

PASS GPCs

1,2,3 1,3,4  
1,2,4 2,3,4

- b. Perform FREEZE-DRY REASSIGNMENT (G3)..... DPS SSR-5 →

CONFIG GPC	3(FD) 0200	3(FD) 00300
STR 1	2	3
2	2	3
3	2	3
4	2	3
PL 1/2	0	0
CRT 1	2	3
2	2	3
3	2	3
4	0	0
L 1	0	0
2	0	0
MM 1	2	3
2	2	3

# GPC FRP-4 (Cont)

14. (Cont)

Final Config for GPCs 1,2,3					
GPC OPS	1 G2	2 G3FD	3 SM	4 -	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM HALT	ON TERM RUN	OFF NORM HALT	ON NORM HALT
CONFIG GPC	2 10000	4(5) 00300	3(FD) 02000		
STR 1	1	0	2		
2	1	0	2		
3	1	0	2		
4	1	0	2		
PL 1/2	0	3	0		
CRT 1	1	3	2		
2	1	3	2		
3	0	0	2		
4	1	3	0		
L 1	0	3	0		
2	0	0	0		
MM 1	1	3	2		
2	1	3	2		

Final Config for GPCs 1,2,4					
GPC OPS	1 G2	2 G3FD	3 -	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM HALT	OFF NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 10000	4(5) 00040	3(FD) 02000		
STR 1	1	0	2		
2	1	0	2		
3	1	0	2		
4	1	0	2		
PL 1/2	0	4	0		
CRT 1	1	4	2		
2	1	4	2		
3	0	0	2		
4	1	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	2		
2	1	4	2		

Final Config for GPCs 1,3,4					
GPC OPS	1 G2	2 -	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	ON NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 10000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
2	1	0	3		
3	1	0	3		
4	1	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
2	1	4	3		
3	0	0	3		
4	1	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	3		
2	1	4	3		

Final Config for GPCs 2,3,4					
GPC OPS	1 -	2 G2	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	ON NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 02000	4(5) 00040	3(FD) 00300		
STR 1	2	0	3		
2	2	0	3		
3	2	0	3		
4	2	0	3		
PL 1/2	0	4	0		
CRT 1	2	4	3		
2	2	4	3		
3	0	0	3		
4	2	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	2	4	3		
2	2	4	3		

## GPC FRP-4 (Cont)

- C3 15. Four PASS GPCs:  
 a. OI PCMMU FORMAT – FXD  
 b. Establish G3 redundant set:

Perform GNC REASSIGNMENT (G3) ..... DPS SSR-3 →

CONFIG GPC	3 12300
STR 1	1
2	2
3	3
4	3
PL 1/2	0
CRT 1	1
2	2
3	3
4	0
L 1	0
2	0
MM 1	1
2	2

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

16. Freeze-dry GPC:

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

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

b. Perform FREEZE-DRY REASSIGNMENT (G3)..... DPS SSR-5 →

CONFIG GPC	3(FD) 00300
STR 1	3
2	3
3	3
4	3
PL 1/2	0
CRT 1	3
2	3
3	3
4	0
L 1	0
2	0
MM 1	3
2	3

## GPC FRP-4 (Cont)

17. Config for ORBIT:
- a. Secure BFS:
    - (BFS) GNC, OPS 000 PRO
    - 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
    - O6 GPC/CRT DESIRED GPC/4 EXEC
    - f. SM GPC OUTPUT – TERM
    - g. Reselect MTU accumulator:
      - C2 SM(GNC) 2 TIME
      - MTU ACCUM 1(2,3) TRY – ITEM 34(35,36)

CONFIG GPC	2	12000
STR 1	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

- h. If single GNC GPC config desired, perform step 18

Final Config for GPCs 1,2,3,4 Dual GNC GPCs					
GPC OPS	1 G2	2 G2	3 G3FD	4 SM	5 BFS
POWER	ON	ON	ON	ON	ON
OUTPUT	NORM	NORM	NORM	TERM	NORM
MODE	RUN	RUN	HALT	RUN	HALT
CONFIG GPC	2 12000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
2	2	0	3		
3	1	0	3		
4	2	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
2	2	4	3		
3	0	0	3		
4	2	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	3		
2	2	4	3		

## GPC FRP-4 (Cont)

18. Establish single GNC GPC config:

a. Perform GNC REASSIGNMENT (G2)..... DPS SSR-3 →

CONFIG GPC	2 10000
STR 1	1
2	1
3	1
4	1
PL 1/2	0
CRT 1	1
2	1
3	0
4	1
L 1	0
2	0
MM 1	1
2	1

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

CONFIG GPC	2(FD) 02000
STR 1	2
2	2
3	2
4	2
PL 1/2	0
CRT 1	2
2	2
3	0
4	2
L 1	0
2	0
MM 1	2
2	2

Final Config for GPCs 1,3,4 Single GNC GPC					
GPC OPS	1 G2	2 G2FD	3 G3FD	4 SM	5 BFS
POWER	ON	ON	ON	ON	ON
OUTPUT	NORM	NORM	NORM	TERM	NORM
MODE	RUN	HALT	HALT	RUN	HALT
CONFIG GPC	2 10000	4(5) 00040	2(FD) 02000	3(FD) 00300	
STR 1	1	0	2	3	
2	1	0	2	3	
3	1	0	2	3	
4	1	0	2	3	
PL 1/2	0	4	0	0	
CRT 1	1	4	2	3	
2	1	4	2	3	
3	0	0	0	3	
4	1	4	2	0	
L 1	0	4	0	0	
2	0	0	0	0	
MM 1	1	4	2	3	
2	1	4	2	3	

## GPC FRP-4 (Cont)

19. PASS IMU attitude reference recovery:  
 O14:E,  
 O15:E  
 O6

- a.  $\sqrt{\text{cb STAR TRKR -Z,-Y}}$  (two) – cl  
 $\sqrt{\text{STAR TRKR PWR}}$  (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

$\sqrt{\text{BFC CRT DISP}}$  – ON  
 SEL – 3+1 (BFS commanding MDUs via IDPs 3 and 1)  
 $\sqrt{\text{PASS GNC GPC driving MDUs via IDP 2}}$

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

F6  
 C3

On MCC GO, perform BFS disengage:  
 BFC – DISENGAGE (repeat, as reqd)  
 DAP: INRTL

Verify BFS disengage

C3  
 O6

* If only PASS disengages:	*
* (BFS commanding MDUs via IDPs 1 and 3,	*
* GNC GPC(s) OUTPUT tb – gray (pnl O6),	*
* SPEC 6, GNC $\sqrt{\text{no 'd'}}$ 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:  
 $\sqrt{\text{MCC}}$  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



## GPC FRP-4 (Cont)

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 It flashing (pnl F2/F4)

C2

√BFC 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)

F6  
 C3

On MCC GO, perform BFS disengage:  
 BFC – DISENGAGE (repeat, as reqd)  
 DAP: INRTL

Verify BFS disengage

C3  
 O6

\* 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

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 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 TERMINATE 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

## GPC FRP-4 (Cont)

- C3 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 \*)
- C3 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 REFSMMAT 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:  
ALIGN 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 TRKR powered on in step a, configure STAR TRKR 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 (\*)
- O6
- CRT
- 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

# GPC FRP-7 DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT)

## NOTE

Procedure is designed to protect GPCs from overheating by moving G2, SM, BFS functions into cooled Av Bay GPCs (if not already there). G3FD and G2FD functions are placed into uncooled Av Bay GPCs and halted. If BFS is moved, new BFS GPC will be dumped to provide good BFS for Entry.

For Ascent, this FRP assumes LOSS OF AV BAY 1(2,3) COOLING/AV BAY 1(2,3) FIRE procedure (ASC PKT, PWRDN) has been accomplished

If Orbit Config is G8 (FCS C/O), substitute for G2 where appropriate. If Orbit Config is G3, go to LOSS OF AV BAY 1(2,3) COOLING (ENT PKT, PWRDN) >>

	Perform steps
ASCENT (G1)	a-h
ORBIT (G2,G8/S2)	i-q

## ASCENT

Initial ASCENT Config – Av Bay 1						Initial ASCENT Config – Av Bay 2					
GPC OPS	1	2	3	4	5	GPC OPS	1	2	3	4	5
	-	G1	G1	-	BFS		G1	-	G1	G1	BFS
POWER OUTPUT MODE	ON NORM	ON NORM	ON NORM	ON NORM	ON BKUP	POWER OUTPUT MODE	ON NORM	ON NORM	ON NORM	ON NORM	ON NORM
	HALT	RUN	RUN	HALT	RUN		RUN	HALT	RUN	RUN	HALT
CONFIG GPC	1 12340					CONFIG GPC	1 12340				
STR 1	3					STR 1	1				
2	2					2	4				
3	3					3	3				
4	2					4	4				
PL 1/2	2					PL 1/2	1				
CRT 1	2					CRT 1	1				
2	2					2	4				
3	3					3	3				
4	0					4	0				
L 1	1					L 1	1				
2	2					2	2				
MM 1	2					MM 1	1				
2	3					2	3				

Initial ASCENT Config – Av Bay 3					
GPC OPS	1	2	3	4	5
	G1	G1	-	G1	BFS
POWER OUTPUT MODE	ON NORM	ON NORM	ON NORM	ON NORM	ON BKUP
	RUN	RUN	HALT	RUN	RUN
CONFIG GPC	1 12340				
STR 1	1				
2	2				
3	4				
4	2				
PL 1/2	1				
CRT 1	1				
2	2				
3	4				
4	0				
L 1	1				
2	2				
MM 1	1				
2	2				

# GPC FRP-7 (Cont)

## NOTE

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

- a. Establish G2 freeze-dry GPC (Av Bay 1 – GPC 1; Av Bay 2 – GPC 2; Av Bay 3 – GPC 3)
  - Perform FREEZE-DRY REASSIGNMENT..... DPS SSR-5
- b. Secure BFS (Av Bay 1,3 only)
  - 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

- C2 c. Transition to GNC OPS 2
  - GNC OPS 0 GPC MEMORY
  - CONFIG ITEM 1+2 EXEC
  - Modify MC 2 per table →
  - GNC, OPS 201 PRO
  - GNC UNIV PTG

	Av Bay		
	1	2	3
CONFIG GPC	2	2	2
	02000	10000	12000
STR 1	2	1	1
2	2	1	2
3	2	1	1
4	2	1	2
PL 1/2	0	0	0
CRT 1	2	1	1
2	2	1	2
3	0	0	0
4	2	1	2
L 1	0	0	0
2	0	0	0
MM 1	2	1	1
2	2	1	2

- d. Transition to OPS 2
  - Perform SM REASSIGNMENT..... DPS SSR-4 →
- e. If Av Bay 2, reassign BFS to GPC 3:
  - Perform GPC IPL MENU OPTION (PASS/BFS)..... DPS SSR-7
  - Dump newly IPL'd BFS:
    - Perform GPC S/W INITIATED MEM DUMP GPC (3) (Target)..... DPS SSR-2
  - C3
    - BFC CRT DISP – OFF
    - √All IDPs deassigned from BFS
  - O6
    - GPC MODE 3 – STBY,HALT (tb-bp)
    - √OUTPUT 3 – NORM
  - Re-IPL GPC 5:
    - Perform GPC IPL – PASS..... DPS SSR-8
    - GPC MODE 5 – STBY (tb-bp),HALT
    - – STBY (tb-RUN)
    - – HALT (tb-bp)

	Av Bay	
	1	2,3
CONFIG GPC	4	4
	00300	00040
STR 1	0	0
2	0	0
3	0	0
4	0	0
PL 1/2	3	4
CRT 1	3	4
2	3	4
3	0	0
4	3	4
L 1	3	4
2	0	0
MM 1	3	4
2	3	4

# GPC FRP-7 (Cont)

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

g. Config LRU switches:

Av Bay 1

O14:A BRAKES MNA – OFF  
 :E cb MNA ADTA 1 – op  
 O16:A BRAKES MNC – OFF  
 :E cb MNC ADTA 3 – op  
 O7 TACAN 1 MODE – OFF (OV103,4)  
 GPS 1 – OFF (OV105)  
 GPS 1 PRE AMPL UPPER – OFF (OV105)  
 GPS 1 PRE AMPL LOWER – OFF (OV105)

Av Bay 2

O15:A BRAKES MNB – OFF  
 :E cb MNB ADTA 2 – op  
 O16:A BRAKES MNC – OFF  
 :E cb MNC ADTA 4 – op  
 O7 TACAN 2 MODE – OFF (OV103,4)  
 O8 MLS 2,3 (two) – OFF  
 L4:P cb AC2 ΦA LG SNSR 2 – op

Av Bay 3

O13:A cb ESS 1BC C/W A – op  
 O7 TACAN 3 MODE – OFF (OV103,4)  
 GPS 3 – OFF (OV105)  
 GPS 3 PRE AMPL UPPER – OFF (OV105)  
 GPS 3 PRE AMPL LOWER – OFF (OV105)

O8 MLS 1 – OFF  
 L4:P cb AC3 ΦA LG SNSR 1 – op

h. Config IDPs:

- GPC/CRT 03 EXEC
- GPC/CRT SM GPC/4 EXEC
- IDP/CRT3 PWR – OFF
- MDU PWR – OFF (as desired)

C2

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 →

CONFIG GPC	2	12000
STR 1	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	

j. Single G2 GPC ops

- Perform GNC REASSIGNMENT ..... DPS SSR-3 →

Av Bay 1			Av Bay 2		
CONFIG GPC	2	02000	CONFIG GPC	2	10000
STR 1	2		STR 1	1	
2	2		2	1	
3	2		3	1	
4	2		4	1	
PL 1/2	0		PL 1/2	0	
CRT 1	2		CRT 1	1	
2	2		2	1	
3	0		3	0	
4	2		4	1	
L 1	0		L 1	0	
2	0		2	0	
MM 1	2		MM 1	1	
2	2		2	1	

## 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

- O6 • Note WR range, PL ID, PL INIT ID, EE ID, SPEC 95 overrides
- SM GPC MODE – STBY (tb-bp), RUN (tb-RUN)
- C2 • GPC OUTPUT 4 – NORM
- IDP/CRT3 PWR – ON
- MDU PWR – ON (as desired)
- C3 • BFC CRT SEL – 3+1
- DISP – ON
- √BFS GPC PWR – ON
- MODE – RUN (during LOS for C/W tones)
- – STBY (during AOS for gnd comm mgmt)
- If no comm at next AOS, select best antenna

k. If time insufficient for complete reconfig:

#### Av Bay 1

GPC 1,4 MODE – STBY (tb-bp),HALT  
 – STBY (tb-RUN)  
 – HALT (tb-bp)

#### Av Bay 2

GPC 2 MODE – STBY (tb-bp),HALT  
 – STBY (tb-RUN)  
 – HALT (tb-bp)  
 √5 MODE – HALT (tb-bp)

- 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:

- C2 • Perform SM REASSIGNMENT ..... DPS SSR-4 →
- IDP/CRT3 PWR – OFF
- C3 • MDU PWR OFF as desired
- BFC CRT DISP – OFF
- √All IDPs deassigned from BFS
- O6 • 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

CONFIG	4
GPC	00300
STR 1	0
2	0
3	0
4	0
PL 1/2	3
CRT 1	3
2	3
3	0
4	3
L 1	3
2	0
MM 1	3
2	3

## 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

GNC OPS 0 GPC MEMORY

- 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

	Av Bay	
	1	2
CONFIG GPC	2 02040	2 10005
STR 1	2	1
2	2	1
3	2	1
4	2	1
PL 1/2	0	0
CRT 1	2	1
2	2	1
3	0	0
4	2	1
L 1	0	0
2	0	0
MM 1	2	1
2	2	1

o. If single G2FD config desired, halt GPCs in failed Av Bay

	<u>Av Bay 1</u>	<u>Av Bay 2</u>
O6	√GPC 1 MODE – HALT 4 MODE – STBY (tb-bp), HALT – STBY (tb-RUN) – HALT (tb-bp)	√GPC 2 MODE – HALT 5 MODE – STBY (tb-bp), HALT

p. Config LRU switches:

	<u>Av Bay 1</u>	<u>Av Bay 2</u>	<u>Av Bay 3</u>
	Perform <u>PL PWRDN</u> , then: (OV105)	Perform <u>PL PWRDN</u> , then: (OV105)	
O14:A	√BRAKES MNA – OFF	O15:A √BRAKES MNB – OFF	O13:A cb ESS 1BC C/W A – op
:E	√cb MNA ADTA 1 – op	:E √cb MNB ADTA 2 – op	O7 √TACAN 3 MODE – OFF
O16:A	√BRAKES MNC – OFF	O16:A √BRAKES MNC – OFF	(OV103,4)
:E	√cb MNC ADTA 3 – op	:E √cb MNC ADTA 4 – op	√GPS 3 – OFF (OV105)
O7	√TACAN 1 MODE – OFF (OV103,4)	O7 √TACAN 2 MODE – OFF (OV103,4)	√GPS 3 PRE AMPL UPPER – OFF (OV105)
	√GPS 1 – OFF (OV105)		√GPS 3 PRE AMPL LOWER – OFF (OV105)
	√GPS 1 PRE AMPL UPPER – OFF (OV105)		
	√GPS 1 PRE AMPL LOWER – OFF (OV105)		
O8	√MLS 1 – OFF	O8 √MLS 2,3 (two) – OFF	
L4:P	√cb AC3 ΦA LG SNSR 1 – op	L4:P √cb AC2 ΦA LG SNSR 2 – op	

# 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) ..... DPS SSR-2
  - BFC CRT DISP – OFF
  - √All IDPs deassigned from BFS
  - GPC MODE 3 – STBY,HALT (tb-bp)
  - √OUTPUT 3 – NORM
- At deorbit prep, go to LOSS OF AV BAY AIR COOLING (DEORB PREP, CONTINGENCY DELTAS)

C3  
O6

FINAL CONFIG  
(Ascent and Orbit with single G2FD GPC)

Av Bay 1						Av Bay 2					
GPC OPS	1 G2FD	2 G2	3 SM	4 -	5 BFS	GPC OPS	1 G2	2 G2FD	3 BFS	4 SM	5 *
POWER OUTPUT MODE	ON NORM HALT	ON NORM RUN	ON TERM RUN	ON NORM HALT	ON NORM HALT	POWER OUTPUT MODE	ON NORM RUN	ON NORM HALT	ON NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 02000	4 00300				CONFIG GPC	2 10000	4 00040			
STR 1	2	0				STR 1	1	0			
2	2	0				2	1	0			
3	2	0				3	1	0			
4	2	0				4	1	0			
PL 1/2	0	3				PL 1/2	0	4			
CRT 1	2	3				CRT 1	1	4			
2	2	3				2	1	4			
3	0	0				3	0	0			
4	2	3				4	1	4			
L 1	0	3				L 1	0	4			
2	0	0				2	0	0			
MM 1	2	3				MM 1	1	4			
2	2	3				2	1	4			

Av Bay 3					
GPC OPS	1 G2	2 G2	3 G2FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	ON NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 12000	4 00040			
STR 1	1	0			
2	2	0			
3	1	0			
4	2	0			
PL 1/2	0	4			
CRT 1	1	4			
2	2	4			
3	0	0			
4	2	4			
L 1	0	4			
2	0	0			
MM 1	1	4			
2	2	4			

\* BFS for orbit:  
PASS OPS 0 for Ascent



# GPC FRP-7 (Cont)

FINAL CONFIG  
(Orbit with multiple G2FD GPCs)

Av Bay 1						Av Bay 2					
GPC OPS	1 G2FD	2 G2	3 SM	4 G2FD	5 BFS	GPC OPS	1 G2	2 G2FD	3 BFS	4 SM	5 G2FD
POWER OUTPUT MODE	ON NORM HALT	ON NORM RUN	ON TERM RUN	ON NORM HALT	ON NORM HALT	POWER OUTPUT MODE	ON NORM RUN	ON NORM HALT	ON NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 02000	4 00300				CONFIG GPC	2 10000	4 00040			
STR 1	2	0				STR 1	1	0			
2	2	0				2	1	0			
3	2	0				3	1	0			
4	2	0				4	1	0			
PL 1/2	0	3				PL 1/2	0	4			
CRT 1	2	3				CRT 1	1	4			
2	2	3				2	1	4			
3	0	0				3	0	0			
4	2	3				4	1	4			
L 1	0	3				L 1	0	4			
2	0	0				2	0	0			
MM 1	2	3				MM 1	1	4			
2	2	3				2	1	4			

Av Bay 3					
GPC OPS	1 G2	2 G2FD	3 G2FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM HALT	ON NORM HALT	ON TERM RUN	ON NORM HALT
CONFIG GPC	2 10000	4 00040			
STR 1	1	0			
2	1	0			
3	1	0			
4	1	0			
PL 1/2	0	4			
CRT 1	1	4			
2	1	4			
3	0	0			
4	1	4			
L 1	0	4			
2	0	0			
MM 1	1	4			
2	1	4			

DPS SSR

# 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. **SM 62 PCMMU/PL COMM**  
If reqd, load dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
3. If PASS:  
Select failed GPC X as downlister (avoids downlist contention)  
**SM(GNC) 0 GPC MEMORY**  
DOWNLIST GPC – ITEM 44 +X EXEC
- O6 4. GPC MODE 1(2,3,4,5) – STBY (starts dump)  
Wait: Double dump of PASS GPC complete after 4 min; single dump of BFS complete after 8 min
- O6 GPC MODE 1(2,3,4,5) – HALT (stops dump)  
OUTPUT 1(2,3,4,5) – NORM
5. If PASS:  
Select lowest ID GNC GPC X as downlister  
**SM(GNC) 0 GPC MEMORY**  
DOWNLIST GPC – ITEM 44 +X EXEC
- MO42F 6. GPC MEM DUMP – OFF
7. **SM 62 PCMMU/PL COMM**  
If reqd, load post dump TFL:  
LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

DPS SSR



# DPS SSR-3

## GNC REASSIGNMENT

### NOTE

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

- L1  
 O6
1. If target GPC MODE – HALT:  
 √Appropriate AV BAY FAN – ON  
 √Target GPC PWR – ON  
 MODE – STBY (tb-RUN), RUN
  2. √Target GPC OUTPUT – NORM
  3. If SM GPC being deleted:  
 If reqd, perform PL/DPS RECONFIG, Secure (PL SYS or SODF: ASSY OPS), then:  
 Perform SM CHECKPOINT INITIATE (ORB OPS, DPS), then:  
SM(GNC) 1 DPS UTILITY  
 UL CNTL  
 ENA – ITEM 36 EXEC (\*)

### NOTE

Ku-Band system may be reqd to be taken to Standby to prevent exceeding  
 radiation constraints

- A1U
4. If AOS:  
 √MCC for comm config and radiation constraints  
 If no comm:  
 KU PWR – STBY  
 CNTL – PNL,CMD  
 Go to COMM LOST (ORB PKT, COMM) steps 7 and 8
  5. √All GPCs being added to current redundant set in OPS 0.  
 If new GPC is in simplex ops (SM or PL), select OPS 0 via OPS 000 PRO
- C2,R11L
6. IDP/CRT1(2,3,4) MAJ FUNC – GNC  
GNC 0 GPC MEMORY  
 CONFIG – ITEM 1 +X EXEC  
 X = 1 if G1, 2 if G2, 8 if G8, 3 if G3  
 Assign desired GPC(s), strings, PL 1/2 (if no SM GPC active), CRTs, and MMs  
 If SM GPC active, deassign PL 1/2
- O14,  
 O15,  
 O16  
 O8
7. If G3:  
 RGAs 1,2,3,4 – ON  
 √RJDA/RJDF (all) – ON  
 cb ADTA (four) – cl  
 MLS (three) – ON
- C2,R11L
8. Using display assigned to a current redundant set GNC GPC,  
IDP/CRT MAJ FUNC – GNC  
 C3 √BFC CRT DISP – OFF
9. GNC, OPS X X X PRO (√DAP)  
 XXX = 106 if G1, 201 if G2, 301 if G3, 801 if G8  
 √GNC (Major Mode Display)
  10. If PASS and BFS in G1(G3) and BFS not engaged, BFS I/O RESET
  11. √Appropriate DAP mode selected
  12. GNC 0 GPC MEMORY  
 DOWNLIST GPC – ITEM 44 +X EXEC  
 X = GNC GPC
  13. Go to PL/DPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)

# DPS SSR-4 SM REASSIGNMENT

## NOTE

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

- A1U 1. KU PWR – STBY  
CNTL – PNL,CMD  
If no comm, go to COMM LOST (ORB PKT, COMM) steps 7 and 8
- L1 2. If target GPC MODE – HALT:  
O6 √Appropriate AV BAY FAN – ON  
√Target GPC PWR – ON  
MODE – STBY (tb-RUN), RUN
3. √Target GPC OUTPUT – NORM
4. If target GPC not in OPS 0:  
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 (\*)  
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)

## DPS SSR-4 (Cont)

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 (\*)  
If reqd, go to PL/DPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)
14. Clear software fail votes On MCC GO:  
GNC 0 GPC MEMORY  
I/O ERR LOG RESET  
ITEM 48 EXEC  
SM 0 GPC MEMORY  
I/O ERR LOG RESET  
ITEM 48 EXEC

## DPS SSR-5 FREEZE-DRY REASSIGNMENT

### NOTE

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

- O6
1. √Target FD GPC PWR – ON, OUTPUT – NORM, and MODE – RUN
  2. If target GPC not in OPS 0:  
Reassign target GPC strings (if reqd):  
GNC 0 GPC MEMORY  
CONFIG – ITEM 1 +X EXEC (X = 1 if G1; 2 if G2; 8 if G8)  
Reassign strings, CRTS, and MMs  
GNC, OPS X X X PRO  
(Tgt) GPC MODE – STBY (tb-bp)  
– RUN (tb-RUN)
- C2
3. If IDP not assigned to target GPC:  
Desired IDP/CRT MAJ FUNC – PL  
GPC/CRT target GPC/desired IDP EXEC
  4. PL 0 GPC MEMORY  
DOWNLIST GPC – ITEM 44 +X EXEC ( X = active GNC GPC)  
STORE MC:  
CONFIG – ITEM 45 +2(3) EXEC  
GPC – ITEM 46 +X EXEC (X = target GPC)  
STORE – ITEM 47 EXEC  
Store complete when MC = 2(3)
  5. If G3FD, config NBAT for FD GPC:  
CONFIG – ITEM 1 +3 EXEC  
Assign FD GPC, all strings, CRTs 1,2,3, and MMs
- O6
6. (FD GPC) GPC MODE – STBY (tb-bp), HALT  
– STBY (tb-RUN)  
– HALT (tb-bp)

# DPS SSR-6

## CONTINGENCY/VARIABLE S/W INITIATED MEM DUMP

NOTE  
Perform AOS

1. **SM 62 PCMMU/PL COMM**  
If reqd, load TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
2. If PASS:
  - a. On display assigned to GPC to be dumped:  
**SM(GNC) 0 GPC MEMORY**  
If GNC GPC to be dumped, √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 EXEC  
NUMBER WDS – ITEM 41 +3 2 7 6 7 9 EXEC  
WDS/FRAME – ITEM 42 +X X X EXEC  
(128 If G1/G3, 112 if G2/G8, 48 if SM, 32 if OPS 0/PL9)
  - d. MEMORY DUMP (start):  
**GNC(SM,PL) 0 GPC MEMORY**  
DUMP START/STOP – ITEM 43 EXEC  
Item 40 (up), 41 (down) entries begin counting  
Dump complete when ITEMS 40,41 blank  
Dump time (in min):
 

MF/OPS	GNC	SM	OPS 0 (PL9)
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 4
3. 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 EXEC  
NUMBER WDS – ITEM 22 +2 6 2 1 4 4 EXEC  
WDS/FRAME – ITEM 23 +3 2 EXEC
  - b. MEMORY DUMP (start):  
**GNC 0 BFS MEMORY**  
DUMP START/STOP – ITEM 24 EXEC  
Item 21 (up), 22 (down) entries begin counting  
Dump complete when ITEMS 21,22 blank (after 8 min)
4. **SM 62 PCMMU/PL COMM**  
If reqd, load post-dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)



# DPS SSR-7

## GPC IPL MENU OPTION (PASS/BFS)

### NOTE

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

### NOTE

√MCC for reapplication of GMEMs as reqd

1. **SM 1 DPS UTILITY**  
 IPL SOURCE SW MASK – ITEM 38 EXEC (no \*)
- C2 2. IDP/CRT 3(1,2) PWR – ON
- C3 3. BFC CRT DISP – ON  
 SEL – 3+1(1+2, 2+3) (Expect big 'X', POLL FAIL on MDU in DPS mode)
- O6 4. IPL SOURCE – MMU 1(2)  
 GPC MODE 1(2,3,4,5) – HALT (tb-bp)  
 OUTPUT 1(2,3,4,5) – NORM (tb-bp)
5. GPC PWR 1(2,3,4,5) – OFF,ON
- F7 If BFS engaged:  
 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)
- O6 6. When tb – bp or 2 min:  
 IDP LOAD 3(1,2) – LOAD  
 GPC MODE 1(2,3,4,5) – STBY (Solid State MMU: tb remains bp, no CAM diagonal or Master Alarm expected)
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  

	<u>Nominal Codes</u>
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
  - 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
    - √OI PCMMU FORMAT – GPC
    - X: SM 62 PCMMU/PL COMM
    - PCMMU FMT SEL FXD – ITEM 1 EXEC (\*)
  - b. Load desired copy of BFS software from MM:  
ITEM 2(4) EXEC (\*)
  - c. If 'BSL XX.XX.X.XX.XX 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)
  - d. If 'BSL XX.X.XX.XX LOADED' appears (within 2 min),  
MSG RESET pb – push (repeat until 'MSGSTILL IN LIST' = 0)
  - e. Expect 'KSC XX.XX.X.XX.XX LOADED SET MMU SEL SW TO OFF'  
If 'KSC X.XX.X.XX.XX LOADED' appears,  
continue with procedure and notify MCC when convenient
  - f. IPL SOURCE – OFF  
MSG RESET pb – push (repeat until 'MSGSTILL 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 301 PRO  
BFS, GNC, OPS 000 PRO  
PASS, GNC, OPS 201 PRO
    - O14,O15 All RGAs – OFF
    - O16 cb ADTA (four) – op
    - O8 MLS (three) – OFF
    - GNC 22 S TRK/COAS CNTL
    - S TRK -Y,-Z: STAR TRK – ITEM 3,4 EXEC (\*)
    - GNC 21 IMU ALIGN; RESUME
    - Reconfig DAP and attitude per FLIGHT PLAN
    - If Group B(C) PWRDN:
      - √DAP: VERN
      - O14,O15,O16 Primary RJD LOGIC,DRIVER (sixteen) – OFF
      - O14 RJDA 1A L2/R2 MANF DRIVER – ON
  - j. Select program PCMMU FORMAT:
    - √OI 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 (\*)

# DPS SSR-8

## GPC IPL-PASS

### NOTE

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

### NOTE

√MCC for reapplication of GMEMs as reqd

1. SM 1 DPS UTILITY  
 IPL SOURCE SW MASK – ITEM 38 EXEC (no \*)
- C3 2. BFC CRT DISP – OFF (BFS will default to IDPs 1,2 if engaged)
- O6 3. IPL SOURCE – MMU 1(2)  
 GPC OUTPUT 1(2,3,4,5) – NORM (tb-bp)  
 MODE 1(2,3,4,5) – HALT (tb-bp)
- F7 4. GPC PWR 1(2,3,4,5) – OFF,ON  
 If BFS engaged:  
 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 (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 MODE 1(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:  
 GPC MODE 1(2,3,4,5) – HALT  
 If first IPL attempt:
  - O6 | IPL SOURCE – MMU 2(1)
  - C3 | BFS CRT DISP – OFF
  - | Go to step 4 and proceed (one time only)
  - If second IPL attempt:  
 GPC PWR 1(2,3,4,5) – OFF
- O6 9. IPL SOURCE – OFF
10. SM 1 DPS UTILITY  
 IPL SOURCE SW MASK – ITEM 38 EXEC (\*)

# DPS SSR-9

## DEU IPL-PASS/BFS

### 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	ENTRY TRAJ 1(2,3,4,5)	RCS
VERT SIT 1(2)	GPC MEMORY	
XXXXX MNVR YYYYY	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. ✓CRT1(2,3,4) PWR – ON  
           CRT1(2,3,4) MAJ FUNC – SM (use PL if loading from PL9, Post IPL OPS 0, or BFS GPC)
- C3 2. ✓DEU not assigned to BFS via BFC CRT DISP/SEL switches  
       On active PASS kybd,  
       GPC/CRT 0/1(2,3,4) EXEC  
       DEU 1(2,3,4) LOAD – LOAD (repeat if reqd)  
       ✓DEU LOAD msg appears on CRT
- C2/R11L O6 **IF NO RESPONSE**  
           | CRT1(2,3,4) PWR – OFF, then ON  
           | DEU 1(2,3,4) LOAD – LOAD (repeat if reqd)
- C2/R11L O6 3. When DEU LOAD msg appears on CRT, on active PASS/BFS kybd:  
           GPC/CRT SM OPS 2/4 (PL9, POST IPL OPS 0, BFS) GPC/1(2,3,4) EXEC  
  
           If 'CM BUF BSY CRT X' msg annunciated, wait for contending operation to complete,  
           then retry DEU IPL:  
           Go back to step 2 and proceed
- C2/R11L O6 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**  
           | CRT1(2,3,4) PWR – OFF, then ON  
           | DEU 1(2,3,4) LOAD – LOAD (repeat if reqd)
- C2/R11L 5. When active display appears,  
           CRT1(2,3,4) MAJ FUNC – GNC (SM,PL) (as desired)  
           If loading from BFS, CRT can be assigned to PASS via PASS GPC/CRT kybd  
           entry if desired. However, displays noted above will not be supported

ECLS

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NOTE A

The identified MAL represents a support procedure that is entered from other procedures or on MCC call

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

'S66 CAB HX OUT TEMP'	'S66 VAC VNT N2 TEMP'
'S78 CABIN O2 CONC'	'S66 CAB AIRLK PRESS'
'SM1 SMOKE CAB L FD'	'177 EXT A/L PRESS'
'SM1 SMOKE CAB R FD'	'177 A/L VEST DP'
'SM1 SMOKE CAB HX'	'177 AL H2O LCG P1(2)'
'SM1 SMOKE BAY 1(2,3) A(B)'	'177 AL H2O XFER P'

BFS FSM INDEX

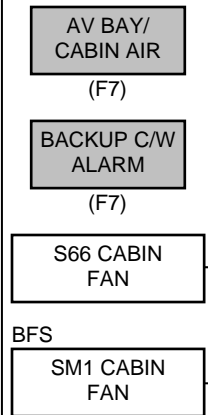
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**AV BAY/  
CABIN AIR**

The following Fault Msgs have no corresponding MAL procedures in this book:  
 SM1 CABIN HX T  
 SM2 TEMP

**6.1**

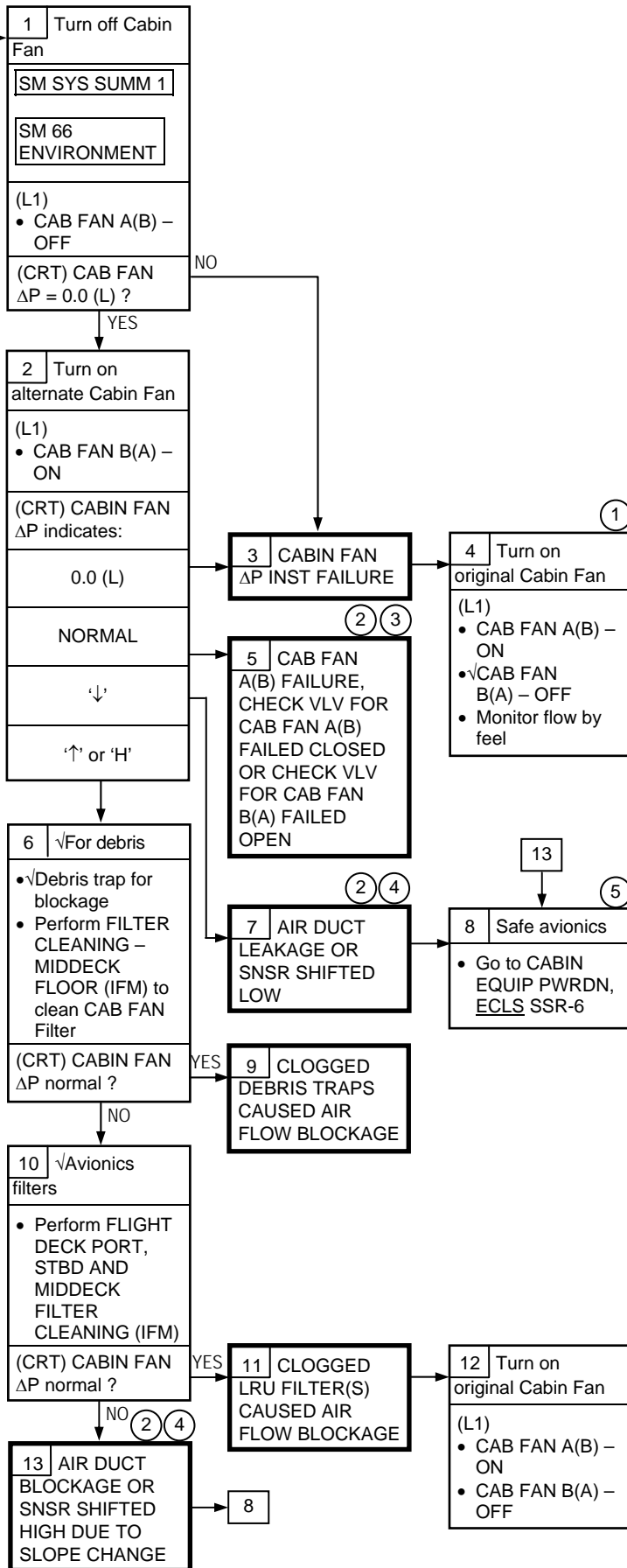
**ECLS**



If:  
CABIN FAN ΔP < 4.2 or > 6.8 (< 2.8 or > 4.88 if 10.2 ops)

**Nominal Config:**  
(L4:K)  
cb AC1 ΦB CAB AIR S/C – cl  
cb AC2 CAB FAN B (three) – cl  
cb AC3 CAB FAN A (three) – cl  
(L4:L)  
cb AC1 ΦA CAB T CNTLR 1 – cl  
cb AC2 ΦA CAB T CNTLR 2 – cl  
(L1)  
CAB FAN A(B) – ON  
CAB TEMP CNTLR – 1(2)  
CAB TEMP – as reqd

**6.1a CABIN FAN ΔP**

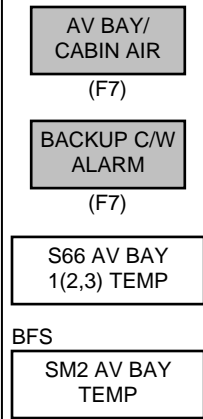


- ① Turn on both Cabin Fans for sleep
- ② √MCC to determine exact failure
- ③ If check vlv is failed open, fan currently selected is the only operational fan available
- ④ May be possible to find duct leakage or blockage by checking airflow at all inlets and outlets
- ⑤ This step prevents overtemping avionics while MCC is evaluating failure



**ECLS**

**6.1b AV BAY TEMP**



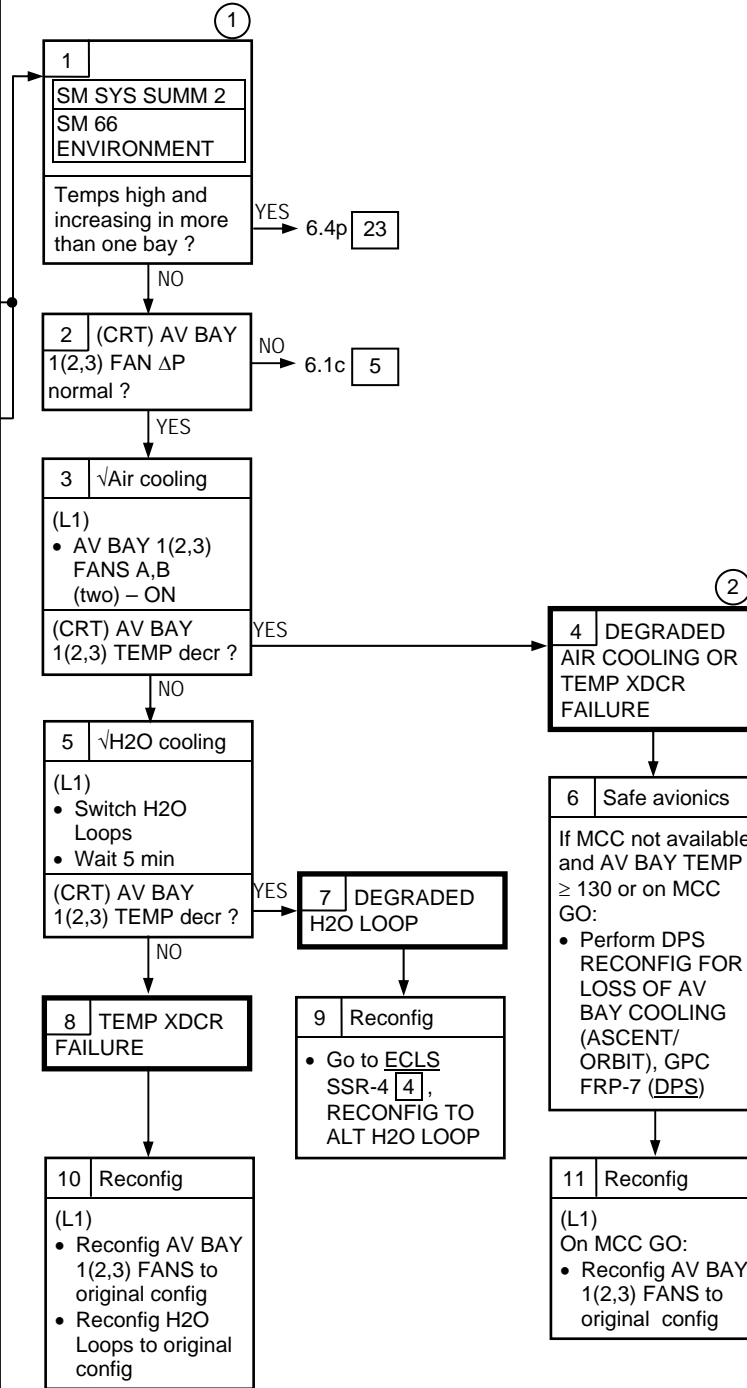
If:  
 AV BAY 1(2,3)  
 TEMP > 130 degF

**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  
 (L4:L)  
 cb AC1 ΦB AV BAY 2 S/C – cl  
 cb AC2 ΦB AV BAY 3 S/C – cl  
 cb AC3 ΦB AV BAY 1 S/C – cl  
 (L1)  
 AV BAY  
 1 FAN B(A) – ON  
 2 FAN A(B) – ON  
 3 FAN B(A) – ON

**H2O LOOP**

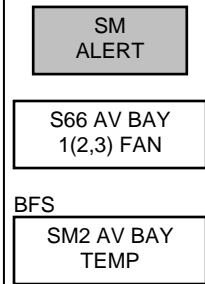
**Nominal Config:**  
 Refer to 6.4I



① Temps can be read from meter on pnl O1

② √MCC to determine exact failure

**ECLS**

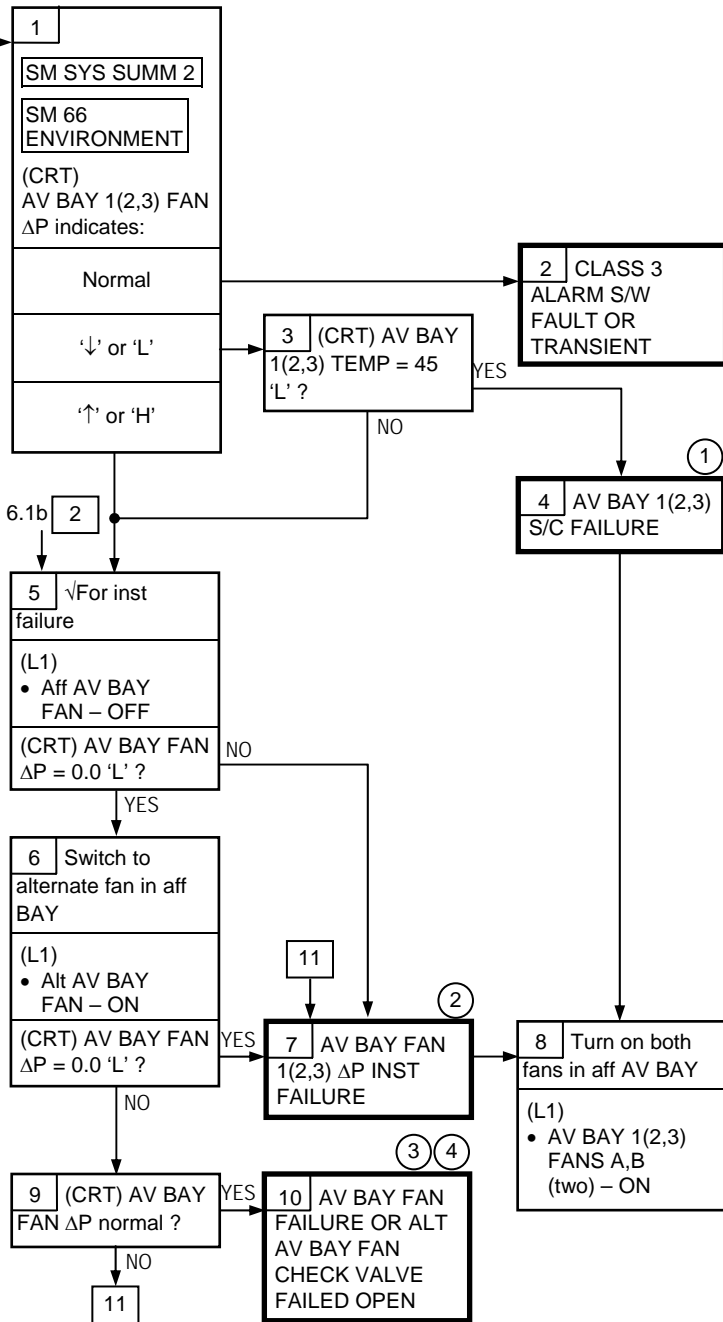


If:  
AV BAY 1(2,3) FAN  
 $\Delta P < 2.5$  or  $> 4.3$   
(3.3 if 10.2 ops)

If Upgraded AV BAY FAN:  
 $\Delta P < 4.5$  or  $> 7.8$   
(5.9 if 10.2 ops)

**Nominal Config:**  
(L4:G)  
cb AC1 AV BAY 1  
FAN A (three) – cl  
cb AC2 AV BAY 1  
FAN B (three) – cl  
cb AC3 AV BAY 3  
FAN A (three) – cl  
(L4:H)  
cb AC1 AV BAY 3  
FAN B (three) – cl  
cb AC2 AV BAY 2  
FAN A (three) – cl  
cb AC3 AV BAY 2  
FAN B (three) – cl  
(L4:L)  
cb AC1  $\Phi$ B AV BAY 2 S/C – cl  
cb AC2  $\Phi$ B AV BAY 3 S/C – cl  
cb AC3  $\Phi$ B 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

**6.1c AV BAY FAN  $\Delta P$**



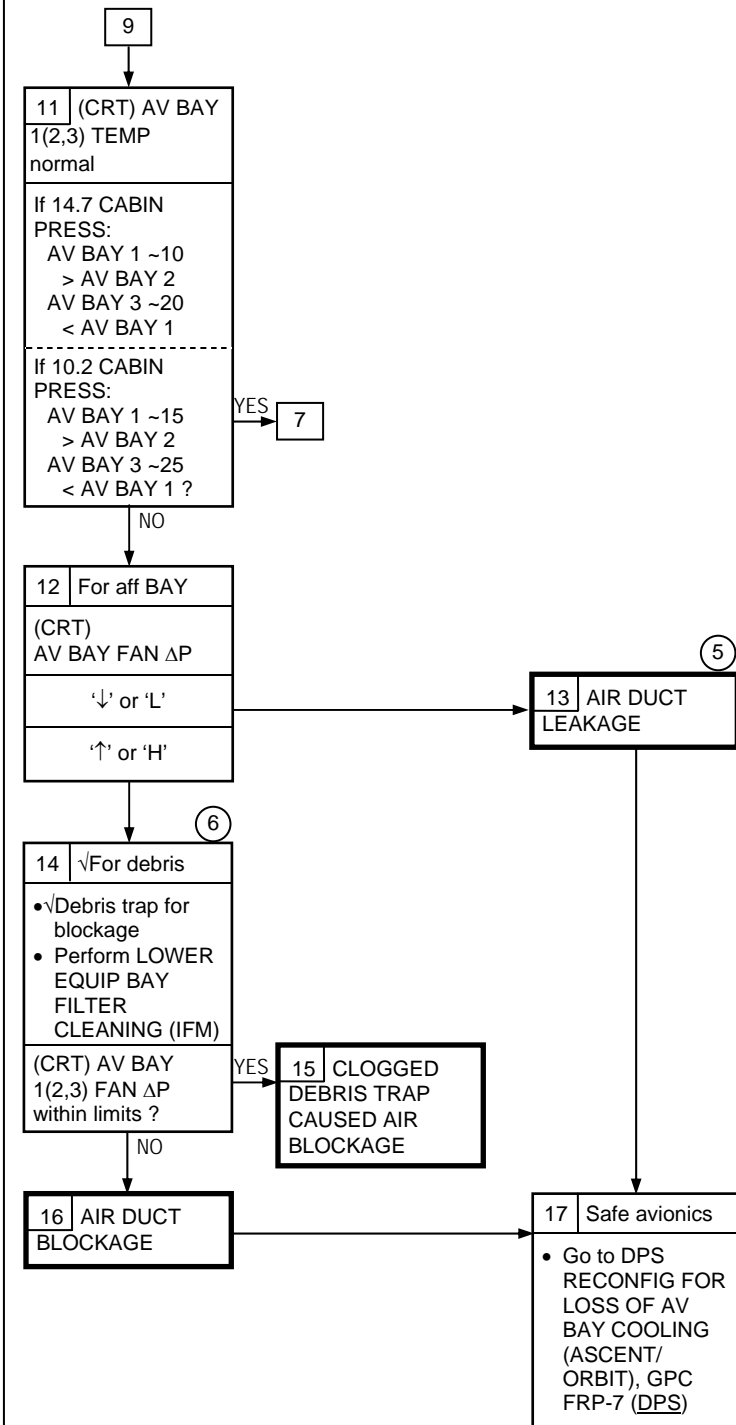
① If AV BAY 1(2,3) S/C cb is open, √MCC before attempting to reset cb

② With loss of  $\Delta P$ , monitor AV BAY TEMP. If  $> 130$  degF, there is AV BAY cooling problem. If AV BAY TEMP  $\sim$ 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

**ECLS 6.1c (Cont)**



- ⑤ √MCC about checking AV BAY duct integrity after completing next step
- ⑥ √MCC about performing pwrn of affected bay before performing AV BAY filter cleaning

**ECLS**

**6.1d CABIN IMU**

SM ALERT

S66 IMU FN SPD A(B,C)

IMU FAN Underspeed

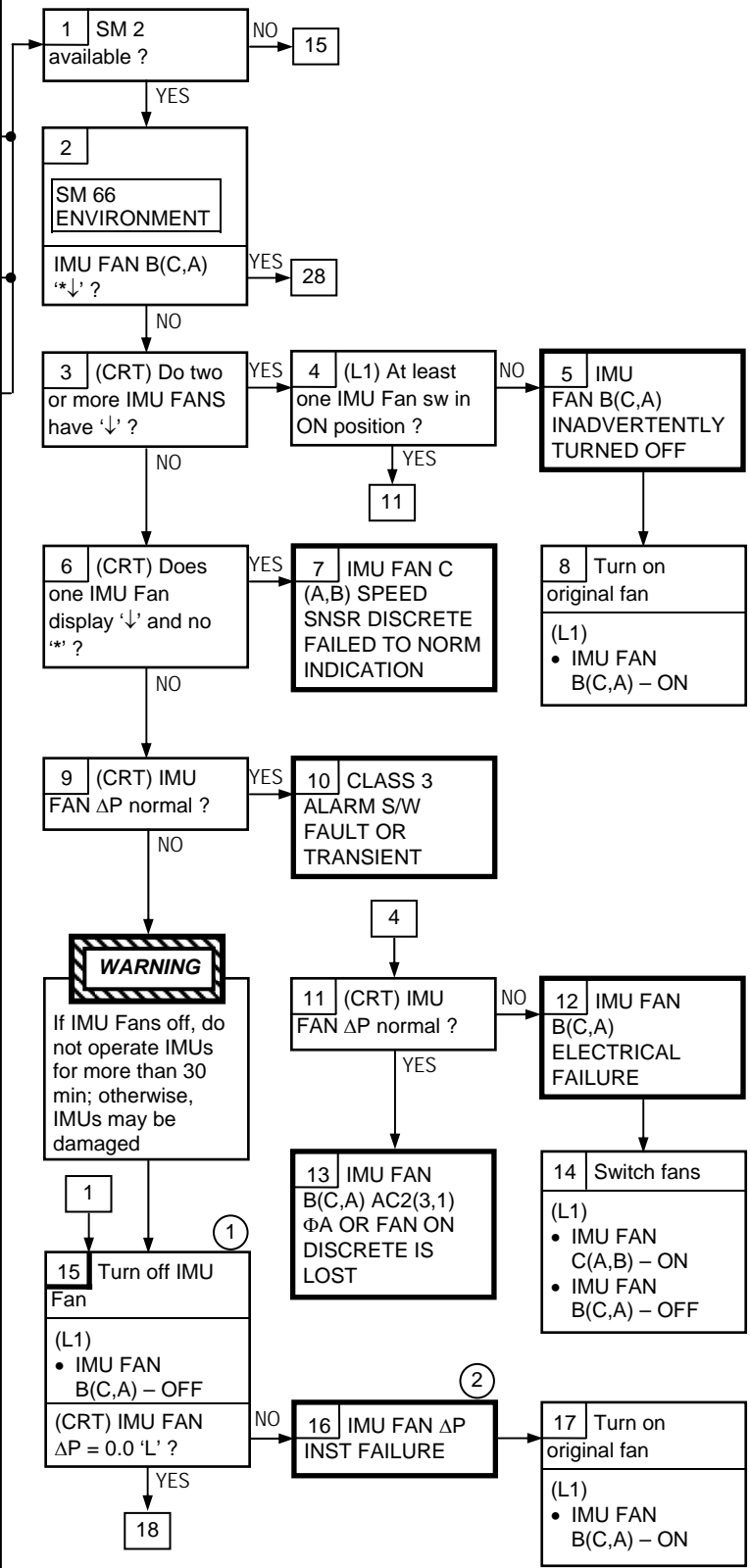
S66 IMU FAN DP

BFS

SM1 CABIN IMU

IMU FAN ΔP < 3.7 (3.0 if 10.2 ops) or > 4.95 (3.8 if 10.2 ops)

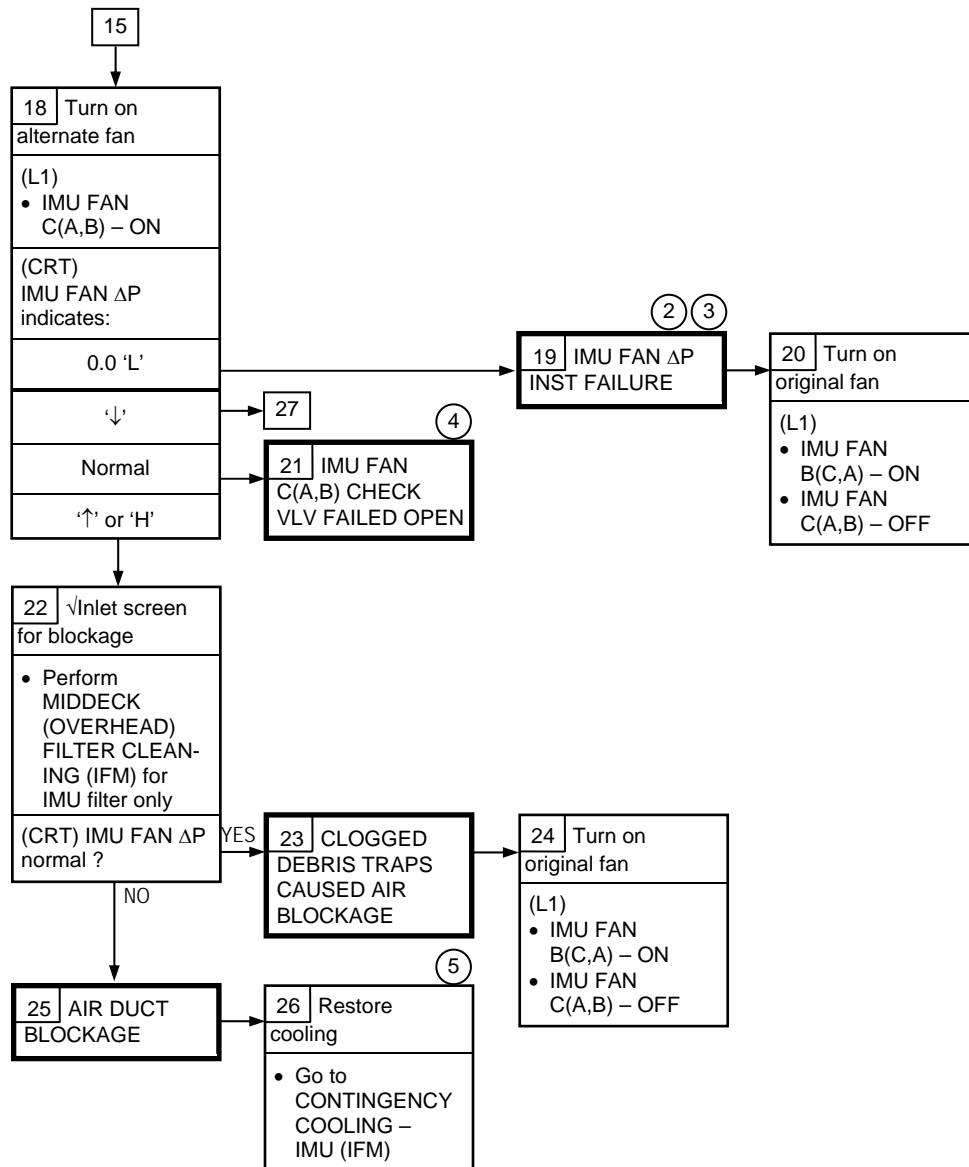
**Nominal Config:**  
(O14:B)  
cb MNA OI H2O  
BYP LOOP 1  
SNSR - cl  
(L4:I)  
cb AC1 IMU FAN A (three) - cl  
cb AC2 IMU FAN B (three) - cl  
cb AC3 IMU FAN C (three) - cl  
(L4:J)  
cb AC3 ΦB SIG CONDR IMU FAN - cl  
(L1)  
IMU FAN B(C,A) - ON



① If SM 2 not available, use BFS SYS SUMM 1 to monitor IMU FAN ΔP

② Monitor Speed Snsr ↓ for fan failure if IMU ΔP is lost

**ECLS 6.1d (Cont)**



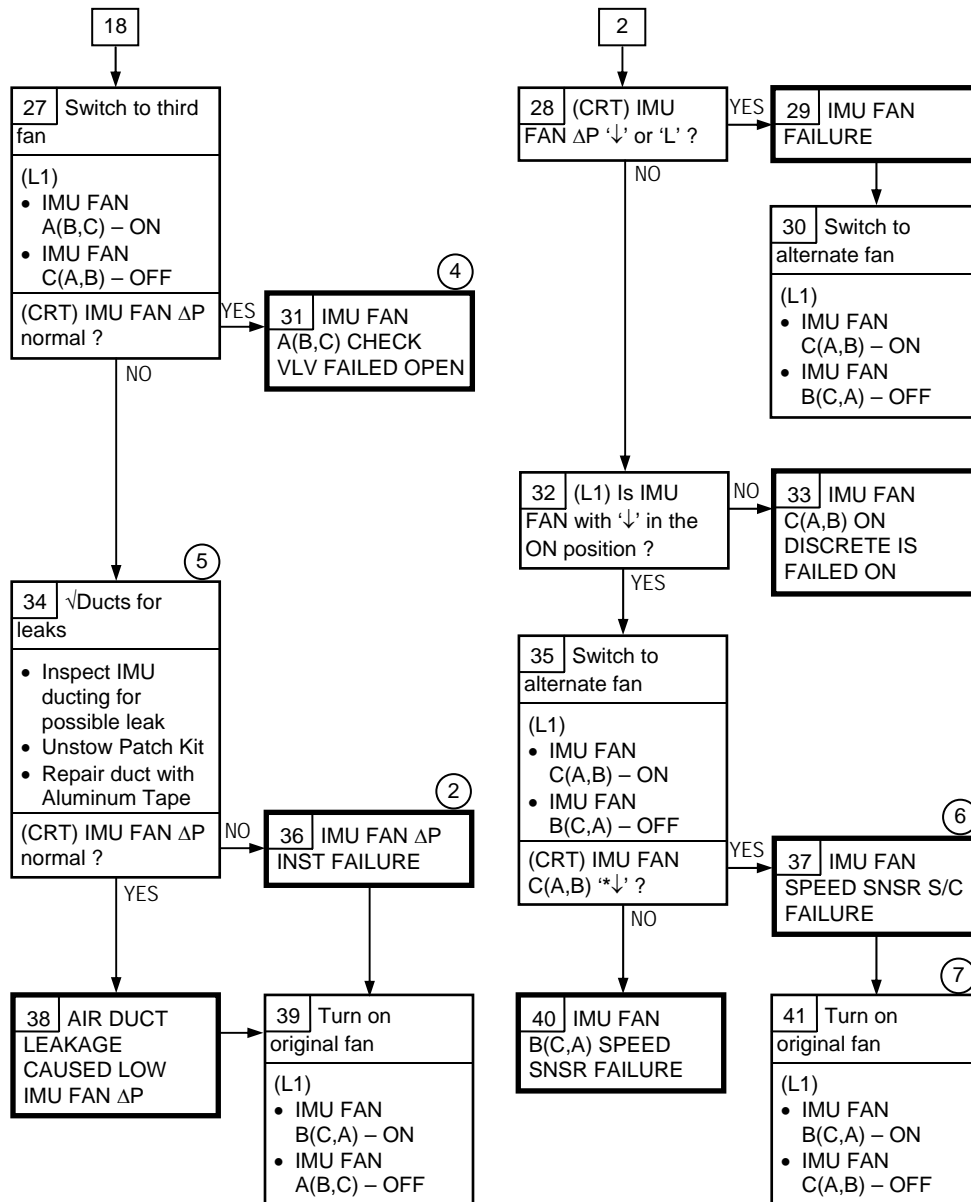
② Monitor Speed Snsr '↓' for fan failure if IMU ΔP is lost

③ If cb MNA OI H2O BYP LOOP 1 SNSR – op, √MCC before attempting to reset cb

④ Fan currently selected is the only operational fan available

⑤ √MCC for proper IMU config and ops

**ECLS 6.1d (Cont)**



② Monitor Speed Snsr '↓' for fan failure if IMU ΔP is lost

④ Fan currently selected is the only operational fan available

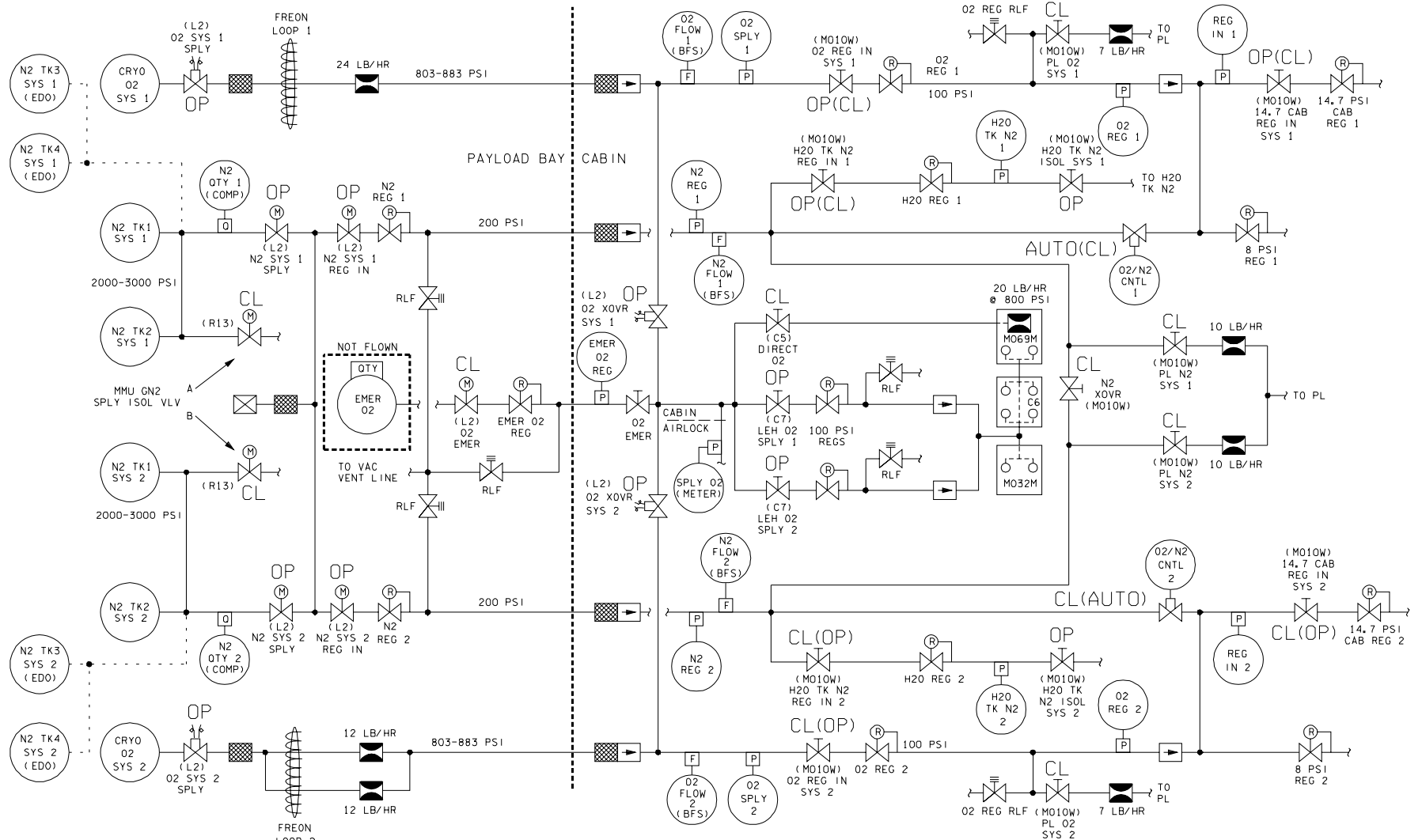
⑤ √MCC for proper IMU config and ops

⑥ If (pnl L4) cb AC3 ΦB SIG CONDR IMU FAN – op, √MCC before attempting to reset

⑦ Second 'S66 CABIN IMU' msg will be generated. This is expected as Speed Snsr S/C failure will affect each IMU Fan

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**PRESSURE CONTROL SYSTEM  
ORBIT**



(M010W) PP02 CNTLR SYS 1 - NORM

(M010W) PP02 CNTLR SYS 2 - NORM

(L2) PP02 SNSR VLV - NORM

NORM - CNTLR 1(2)  
CONTROLS PCS 1(2)  
REVERSE - CNTLR 1(2)  
CONTROLS PCS 2(1)

NORM = 3.2 ± 2.5 PSIA  
EMER = 2.2 ± 2.5 PSIA  
(NOT USED)

48027005\_117.SCH 1

02109/07

6-12

MAL/ALL/GEN I

DATE 08/11/06



# ECLS

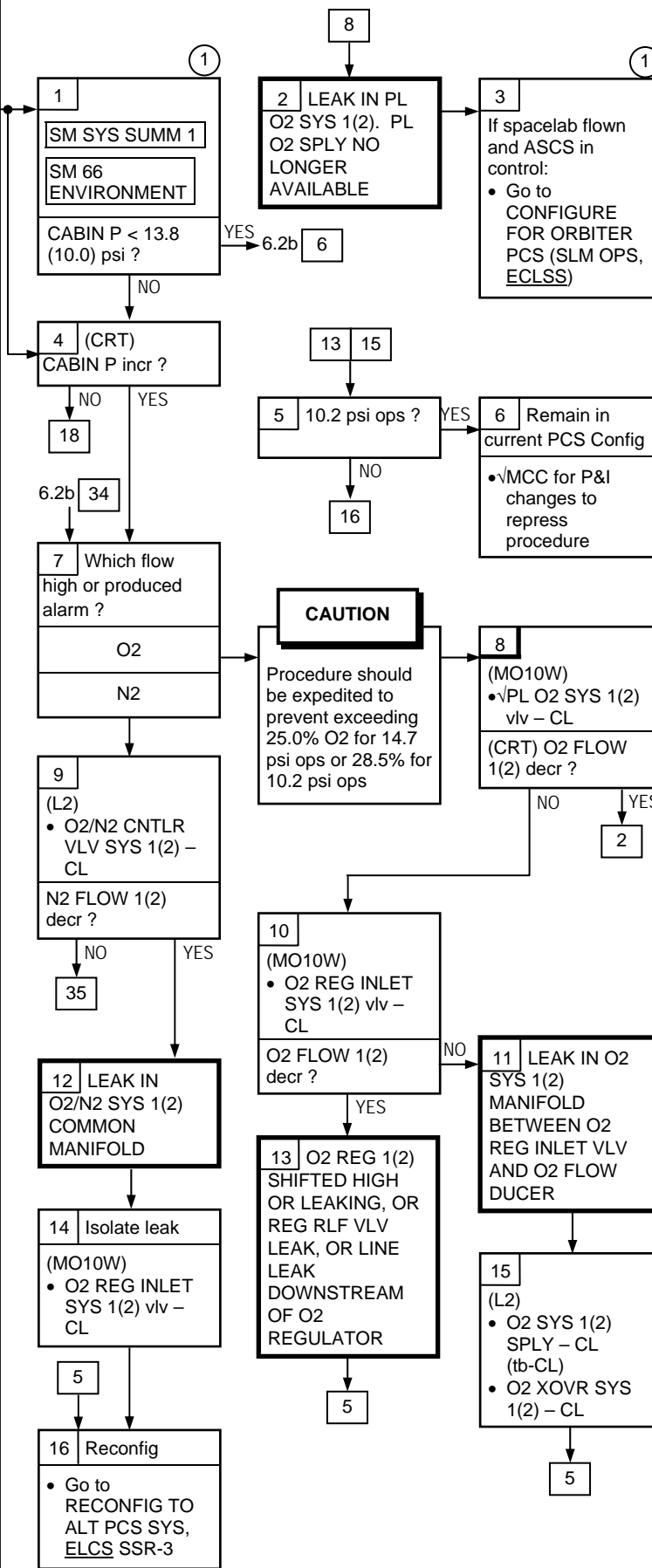
## 6.2a O2(N2) FLOW ↑

From ORB PKT,  
O2(N2) FLOW  
HIGH/CAB  
P LOW/dP/dT

O2(N2) FLOW  
> 4.9 lb/hr

### Nominal Config:

(ORBIT)  
(O15:D)  
cb MNB  
PPO2 C CAB  
dP/dT - cl  
(O14:D,O15:D)  
cb MNA,MNB  
N2 SPLY 1,2 - cl  
O2/N2 CNTLR  
1,2 - cl  
O2 XOVR 1,2 - cl  
N2 REG INLET  
1,2 - cl  
CAB VENT -  
op (O14 only)  
CAB VENT ISOL -  
op (O14 only)  
CAB RELIEF A -  
cl (O15 only)  
(O16:D)  
cb MNC  
H2O ALT PRESS -  
cl  
O2 EMER - op  
CAB RELIEF B -  
cl  
(ML86B:D)  
cb MNA,MNB MMU  
GN2 SPLY ISOL  
VLV A,B - op (if  
flown, - cl)  
(C5)  
DIRECT O2 vlv -  
CL  
(C6)  
LEH O2 1,2,3,4 vlv  
(four) - CL  
(C7)  
LEH O2 SPLY vlv  
(two) - OP  
(L1)  
H2O ALT PRESS -  
CL  
(L2)  
CAB RELIEF A,B -  
ENA (tb-ENA)  
CAB VENT ISOL -  
CL (tb-bp)  
CAB VENT - CL  
(tb-bp)  
O2 SYS 1,2 SPLY -  
OP (tb-OP)  
O2 EMER - CL  
(tb-bp)  
N2 SYS 1,2 SPLY -  
OP (tb-OP)  
N2 SYS 1,2 REG  
INLET - OP  
(tb-OP)  
O2 XOVR SYS 1,2 -  
OP  
O2/N2 CNTLR VLV  
SYS 1(2) - AUTO  
SYS 2(1) - CL  
If 10.2 psi ops,  
SYS 1 - OP  
SYS 2 - CL  
(Cont in notes  
column)



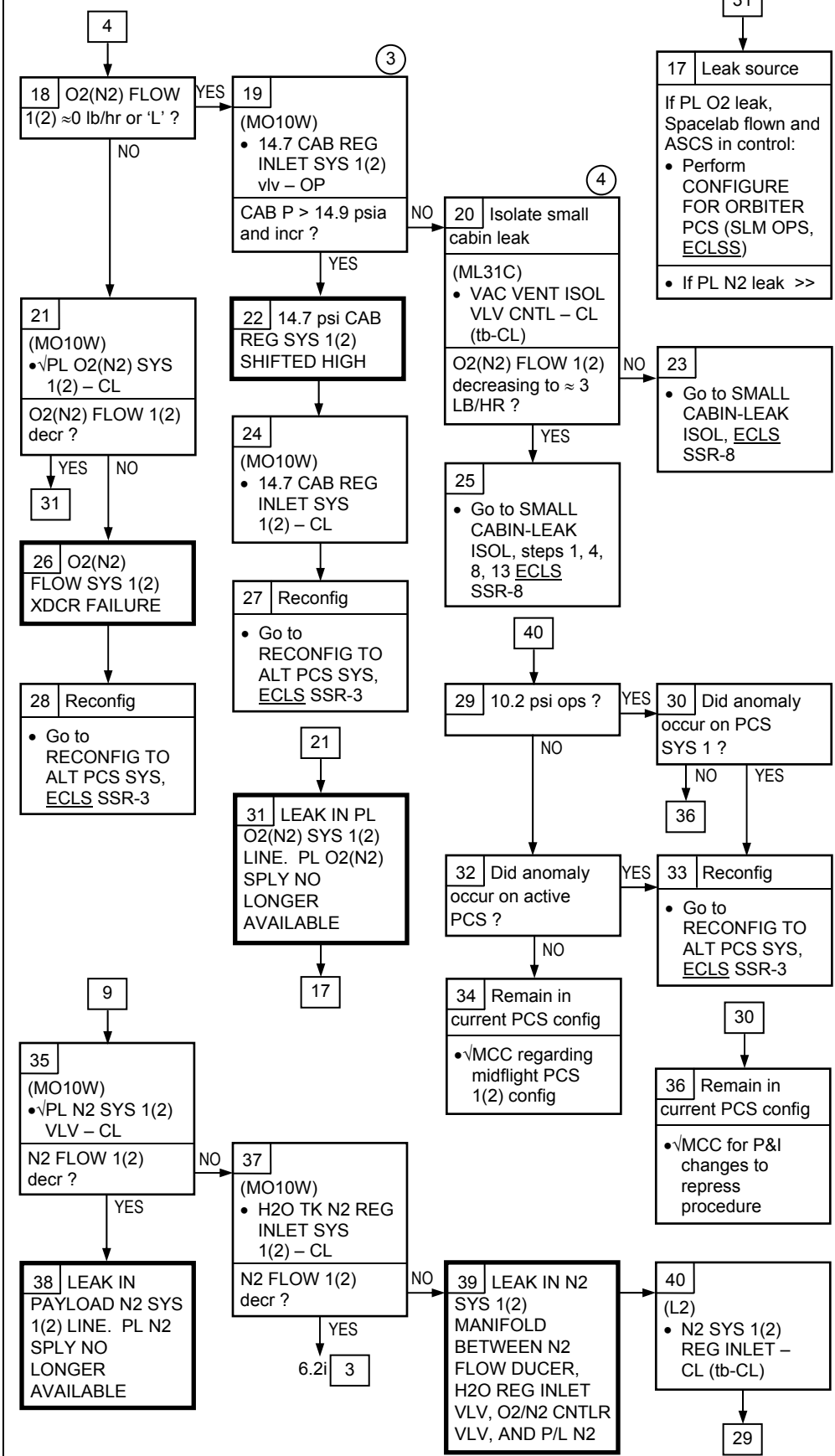
① Use numbers in parenthesis for 10.2 psi cabin ops

② PCS activated MET 3:00. Systems switched at mid flight

**Nominal Config:**  
(ORBIT Cont)  
PPO2 SNSR/VLV - NORM  
(R13L)  
MMU GN2 SPLY ISOL VLV A,B - CL (tb-CL)  
(MO10W)  
14.7 CAB REG INLET SYS 1 (SYS 2) - OP  
INLET SYS 2 (SYS 1) - CL  
If 10.2 psi ops, 14.7 CABIN REG INLET SYS 1,2 - CL  
O2 REG INLET SYS 1 (SYS 2) - OP(CL)  
PL O2 SYS 1,SYS 2 vlv - CL  
PL N2 SYS 1,SYS 2 vlv - CL  
O2 EMER vlv - CL  
H2O TK N2 REG INLET SYS 1(SYS 2) vlv - OP(CL)  
H2O TK N2 ISOL SYS 1, SYS 2 - OP  
N2 XOVR vlv - CL  
PPO2 CNTLR SYS 1, SYS 2 - NORM  
(ML31C)  
VAC VENT ISOL VLV BUS SEL - MNA  
VAC VENT ISOL VLV CNTL - OP (tb-OP)  
(Middeck FLR)  
EMU O2 ISOL VLV - CL  
CAB PURGE VLV - CL  
CAB PURGE ISOL VLV - CL  
(WCS)  
VAC VLV - OP

**SPACEHAB (if flown)**  
**Nominal Config:**  
SM 215 SH ECS  
PPRV ISOL VLV 1,2 (two) OP - \*  
(SSP)  
CAB DEPRESS VLV ARM tb - bp NOT CLOSED  
tb - bp  
(FWD BKHD)  
CAB DEPRESS VLV - cl  
NPRV covers (two) - cl  
(OVERHEAD)  
EXP VENT vlv - cl (if flown)  
NPRV covers (two) - cl (if flown)

# ECLS 6.2a (Cont)



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

# ECLS

CABIN ATM (F7)

BACKUP C/W ALARM (F7)

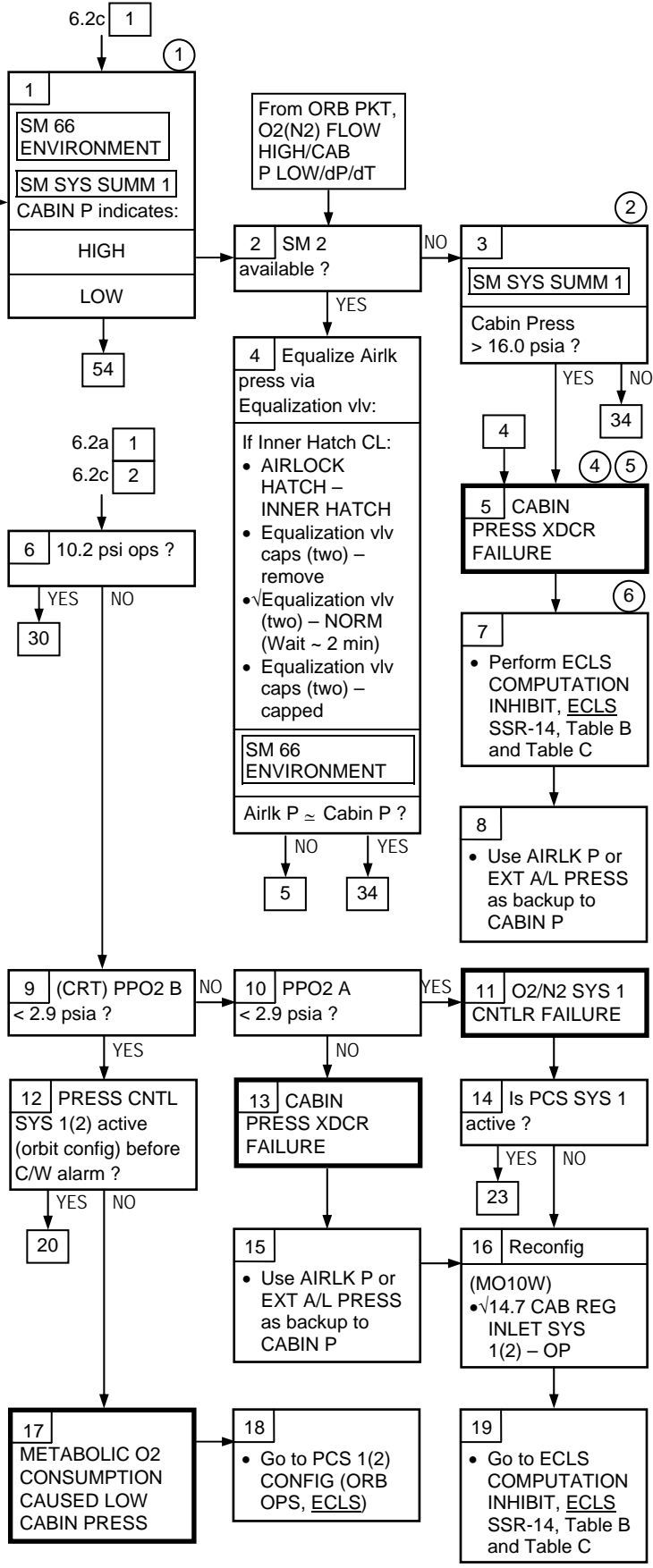
S66 CABIN PRES (BFS)

SM1 CABIN PRES

CABIN PRES (3)  
 < 13.8 (10.0) psia  
 > 15.2 (10.6) psia

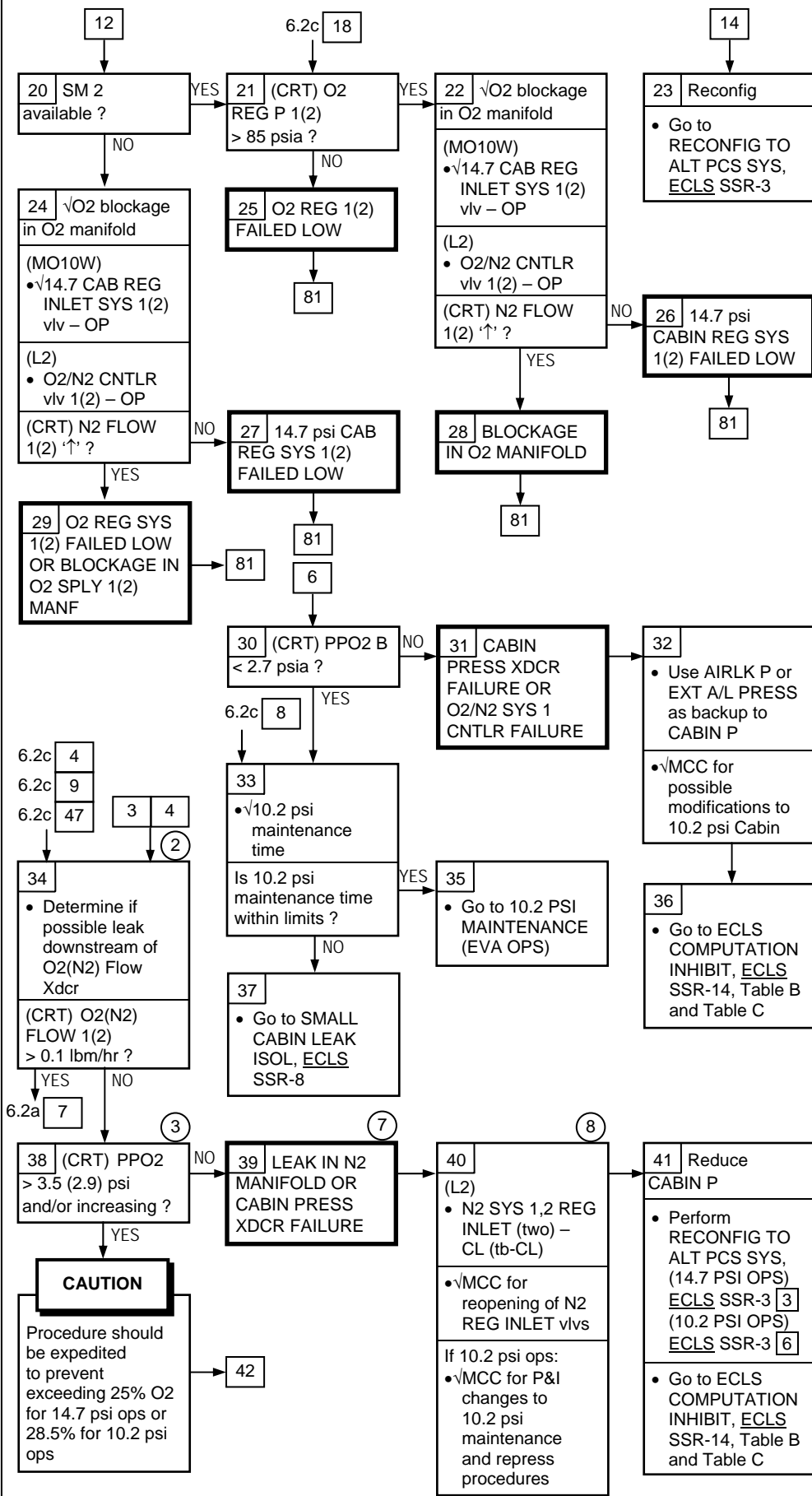
**Nominal Config: (ORBIT)**  
 Refer to 6.2a

## 6.2b CABIN PRES ↑↓



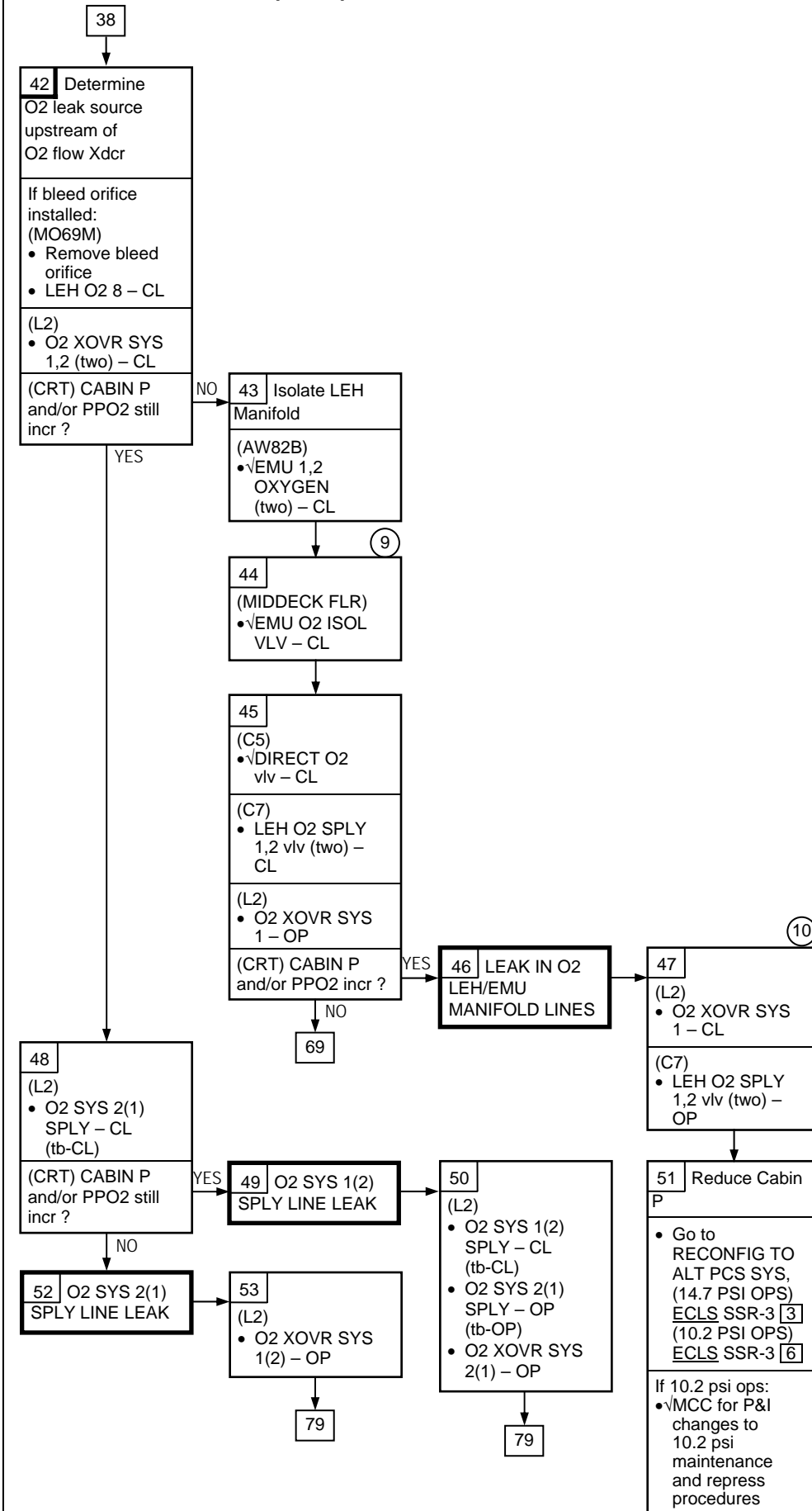
- ① This procedure should only be entered directly for CAB P ↑
- ② Cabin Press Relief vlvs crack at 15.5 psid. Full flow at 16.0 psid
- ③ Use number in parenthesis for 10.2 psia cabin ops
- ④ √MCC to determine exact failure. Suspect snsr yielding alarm
- ⑤ Unless failure is linear shift of Xdcr reading, loss of cabin pressure Xdcr causes loss of BFS BU dP/dT software computation
- ⑥ This step is accomplished after SM 2 becomes available

# ECLS 6.2b (Cont)



- ② Cabin Press Relief vlvs crack at 15.5 psid. Full flow at 16.0 psid
- ③ Use number in parenthesis for 10.2 psia cabin ops
- ⑦ If Airk P equaled Cabin P in block ④, then failure is leak in N2 Manf. If Airk P unavailable (no SM 2), N2 Manf leak must be assumed until confirmed by MCC
- ⑧ If N2 needed, opening N2 SYS 1,2 REG INLET could feed possible leak into cabin

# ECLS 6.2b (Cont)

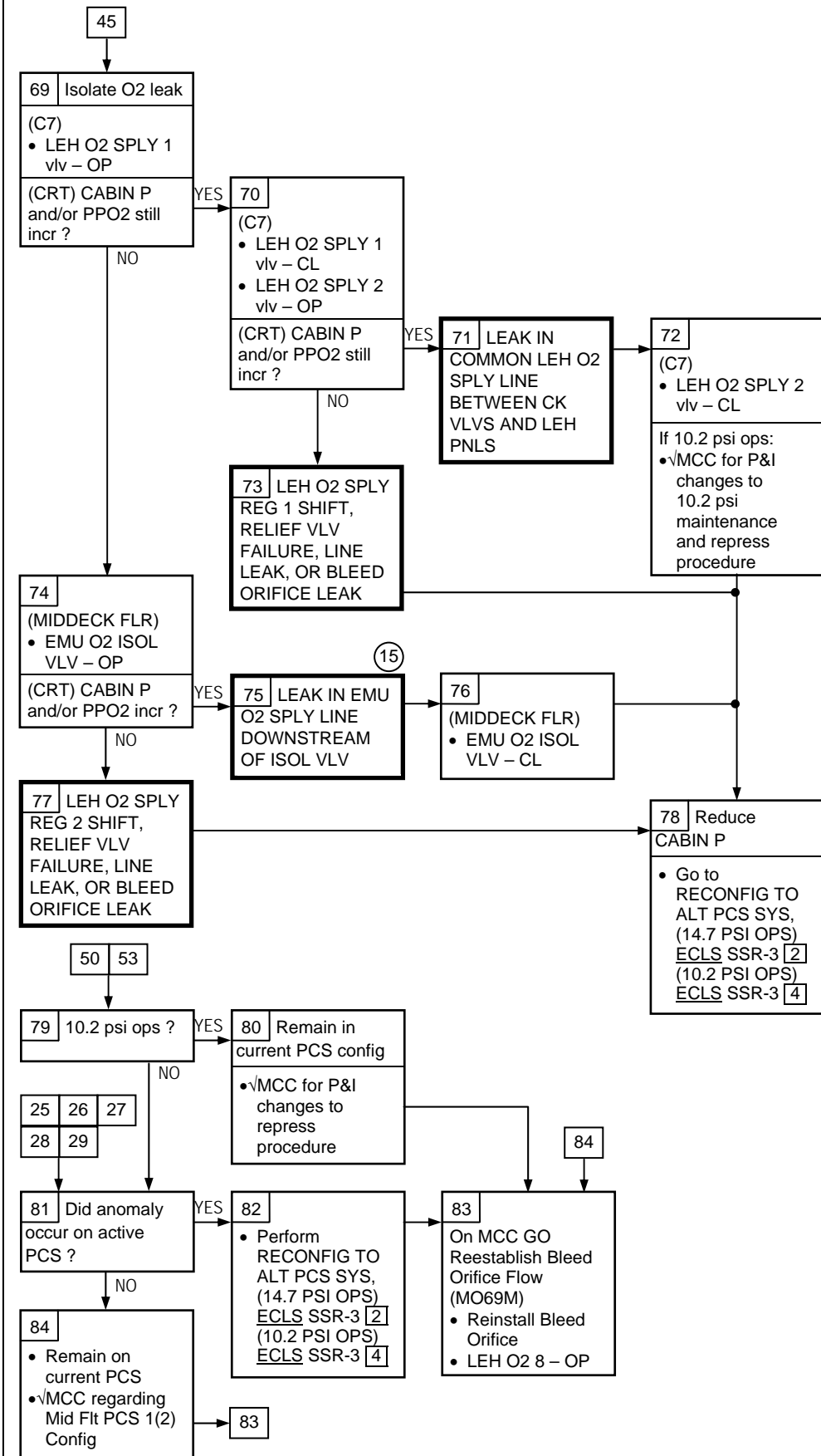


9 Vlv normally closed except from pre-EVA PREP/ POST-EVA PREP

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

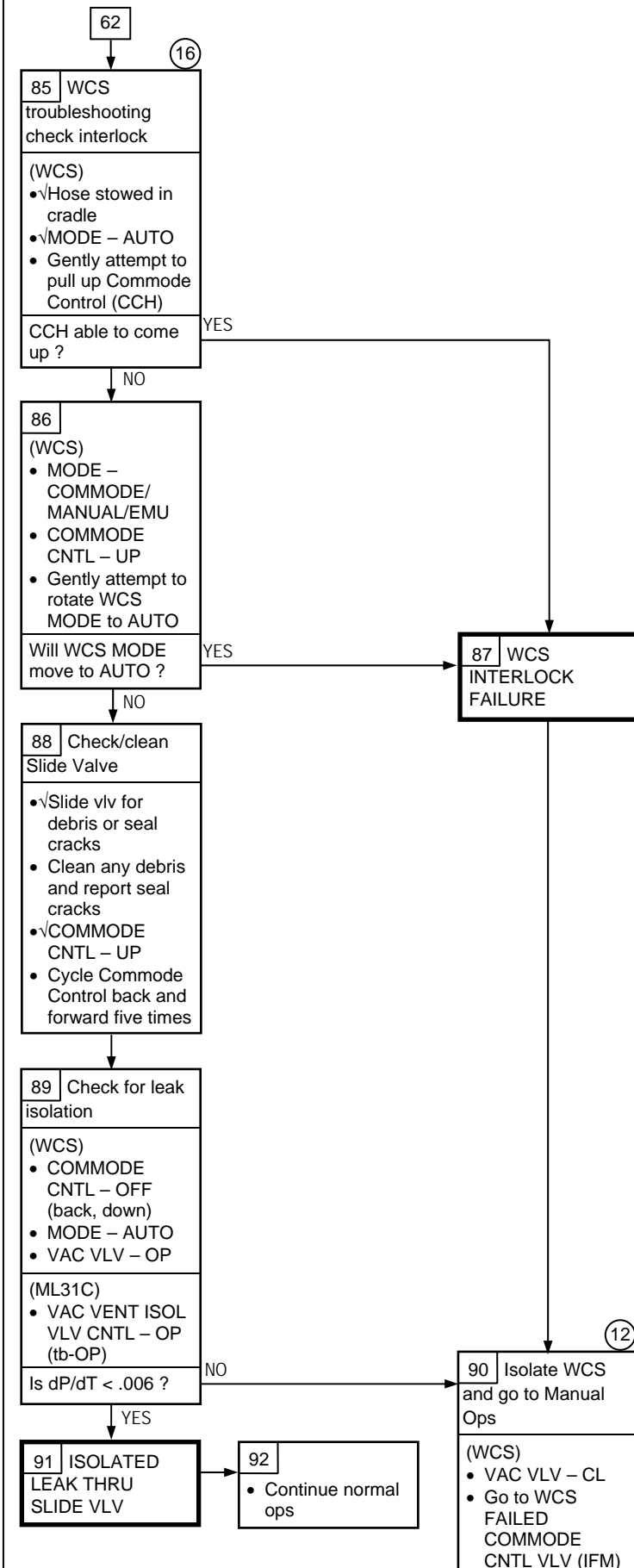


**ECLS 6.2b (Cont)**



⑮ 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

⑬ 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



**ECLS**

CABIN ATM (F7)

BACKUP C/W ALARM (F7)

S66 CABIN PPO2 A(B) (BFS)

SM1 CABIN PPO2

PPO2 A(B) (2)  
 < 2.70 (2.55) psia  
 > 3.60 (2.90) psia

**Nominal Config:**  
 (ORBIT)  
 Refer to 6.2a

**6.2c PPO2 ↑↓**

1 Cabin Press increasing in addition to PPO2 alarm ?  
 YES → 6.2b 1  
 NO → 2

2 Is CAB PRESS ↓, PPO2 A ↓, and PPO2 B normal ?  
 YES → 6.2b 6  
 NO → 3

3 SM SYS SUMM 1  
 SM 66 ENVIRONMENT (CRT or O1)  
 PPO2 A(B):  
 PPO2 A reading different than PPO2 B (> 0.15 psi) → 39  
 Both low → CAUTION  
 Both high → CAUTION

**CAUTION**  
 (CRT)  
 • Monitor lowest reading of PPO2 SNSR A,B. If either PPO2 A or B < 2.50, don QDM

4 10.2 psi ops ?  
 YES → 6.2b 34  
 NO → 5

5 SM 2 available ?  
 NO → 47  
 YES → 7

7 SM 66 ENVIRONMENT  
 (CRT) O2/N2 CNTL VLV 1(2) – N2 ?  
 YES → 9  
 NO → 10

6 10.2 psi ops ?  
 YES → 8  
 NO → 17

8 CAB P > 10.0 ?  
 NO → 6.2b 33  
 YES → 33

9 N2 REG 1(2) P > 180 ?  
 YES → 6.2b 34  
 NO → 11

12  
 • Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

10 Manually change vlv position (L2)  
 • O2/N2 CNTL VLV SYS 1(2) – OP  
 (CRT) O2/N2 CNTL VLV 1(2) – N2 ?  
 YES → 13  
 NO → 15

11 N2 REG 1(2) FAILURE

13 PPO2 CNTLR 1(2) FAILURE

14 Use same PCS with reverse PPO2 Cntl

15 O2/N2 CNTLR VLV SYS 1(2) FAILURE → 16  
 • Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

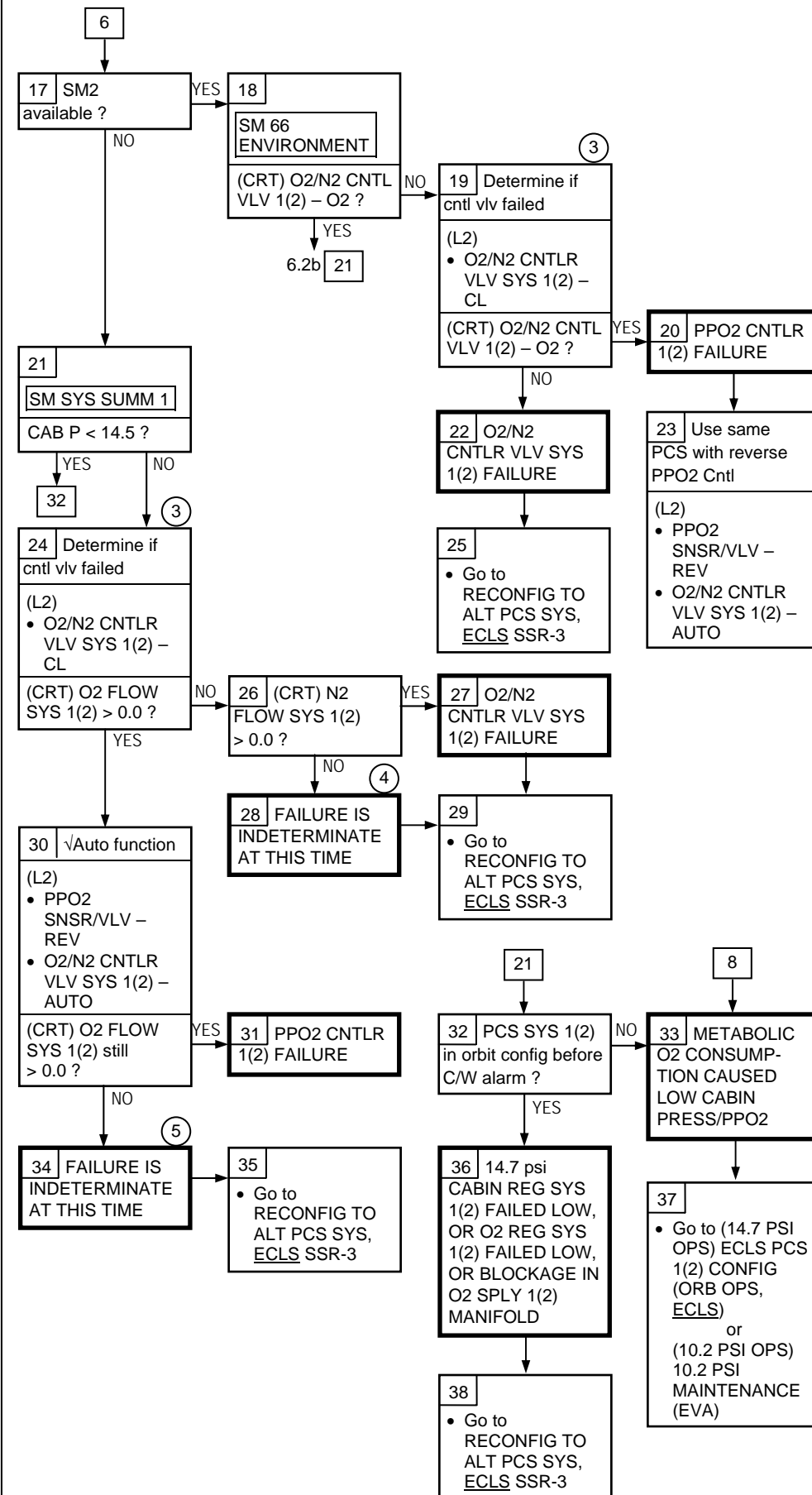
(L2)  
 • PPO2 SNSR/VLV – REV  
 • O2/N2 CNTLR VLV SYS 1(2) – AUTO

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

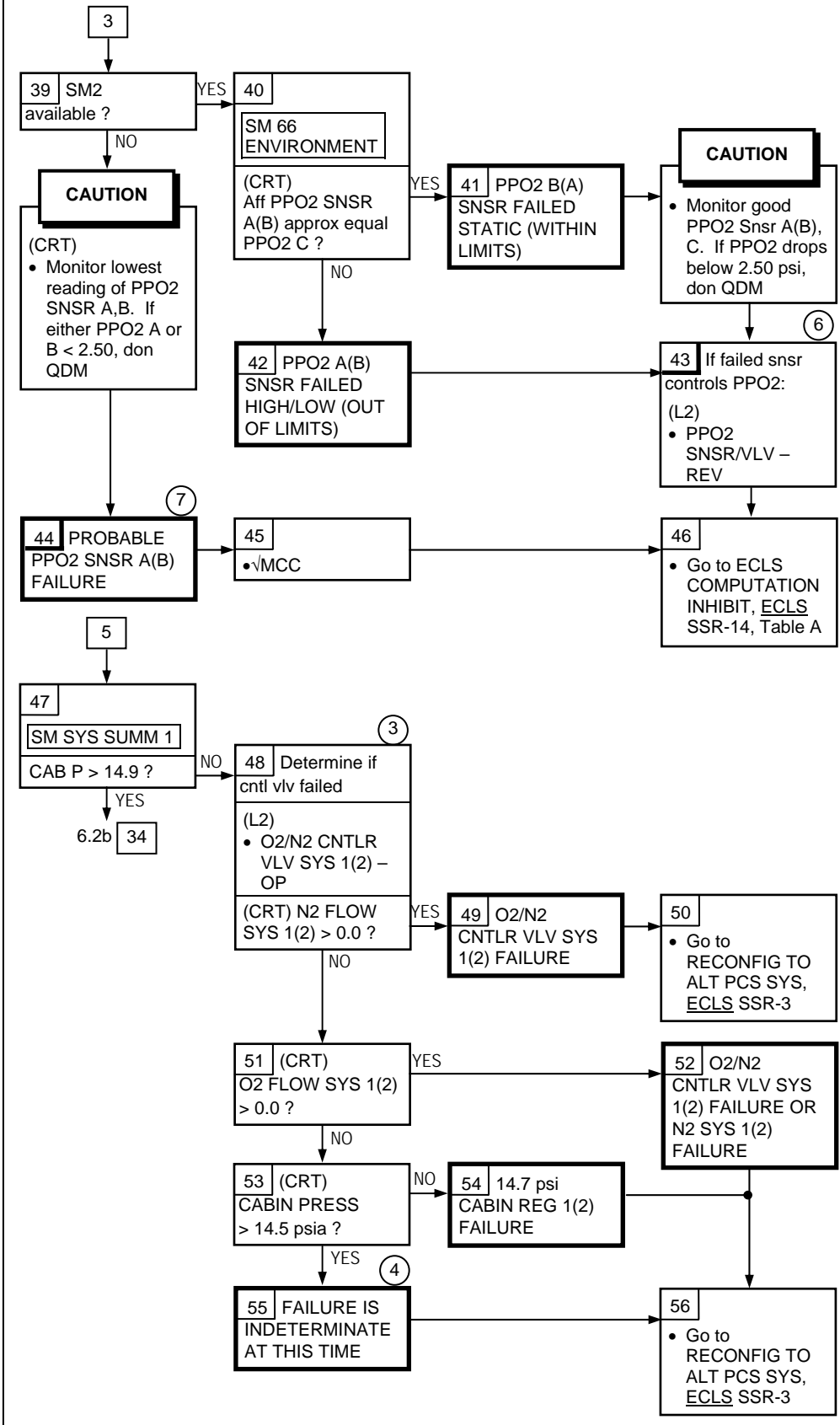
③ O2/N2 CNTLR VLV flows N2 in OP position, and O2 in CL position

**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
- ⑤ Either Cabin P is within no flow region on cabin regulator or lost AUTO function on O2/N2 CNTLR VLV. √MCC for further troubleshooting of that system

**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 snsr does not control PPO2 properly, √MCC regarding Manual Cabin ATM Management
- ⑦ Only MCC can determine exact failure. Suspect snsr yielding alarm. MCC will determine whether to go to REVERSE on PPO2 SNSR/VLV

**ECLS**

**6.2d N2 REG P ↑↓**

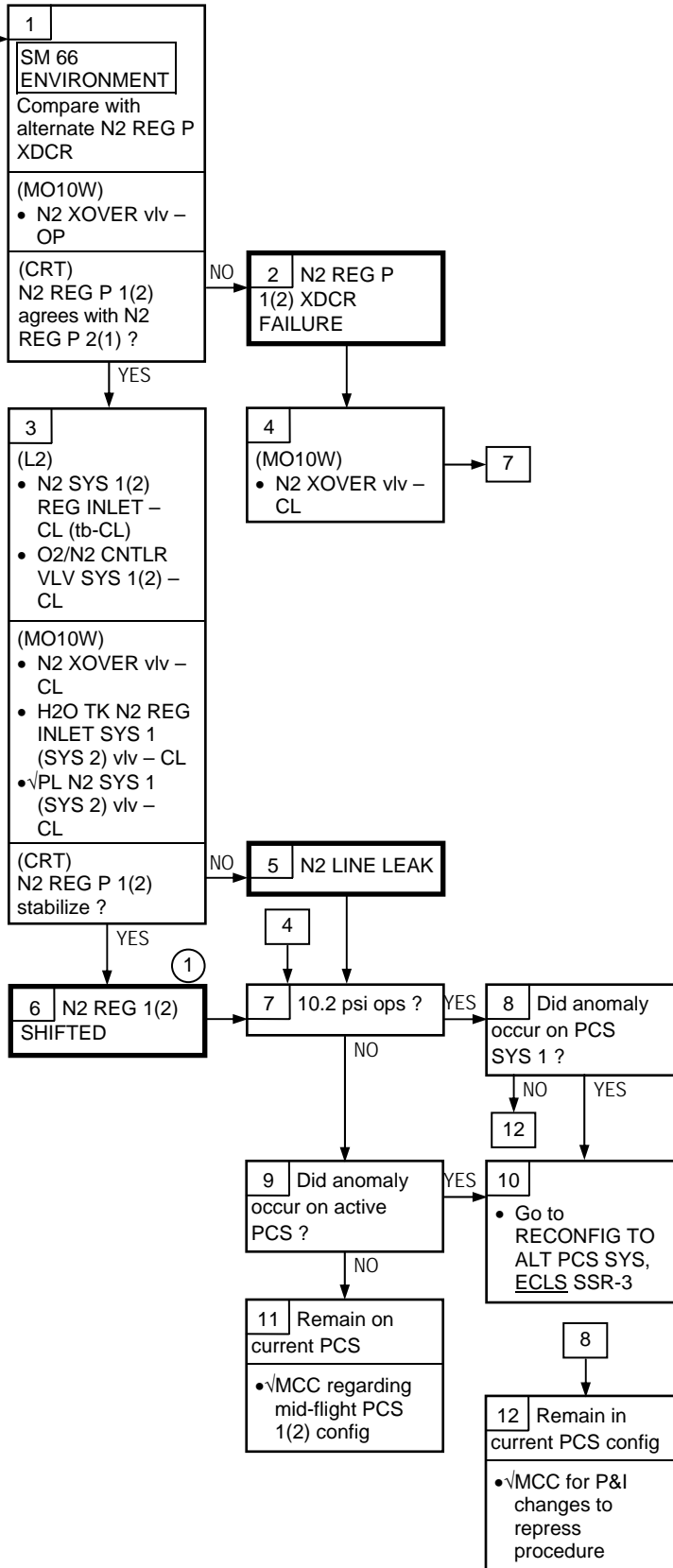
① If PL N2 line in use, √MCC for further isolation

SM ALERT

S66 CAB N2 REG P 1(2)

N2 REG P 1(2)  
> 260 psia  
< 150 psia

**Nominal Config:**  
(ORBIT)  
Refer to 6.2a



**ECLS**

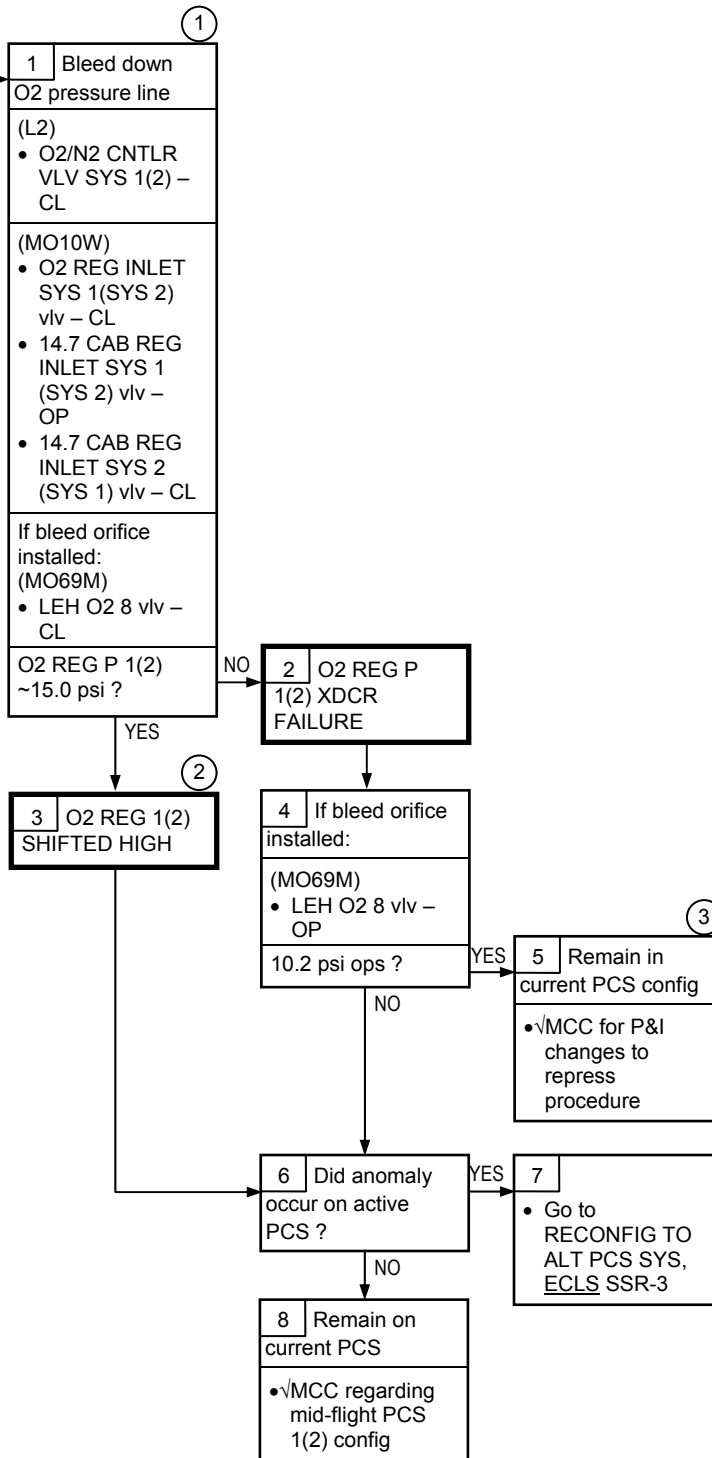
**6.2e O2 REG P ↑**

SM  
ALERT

S66 CAB O2  
REG P 1(2)

O2 REG P 1(2)  
> 145 psia

**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

# ECLS

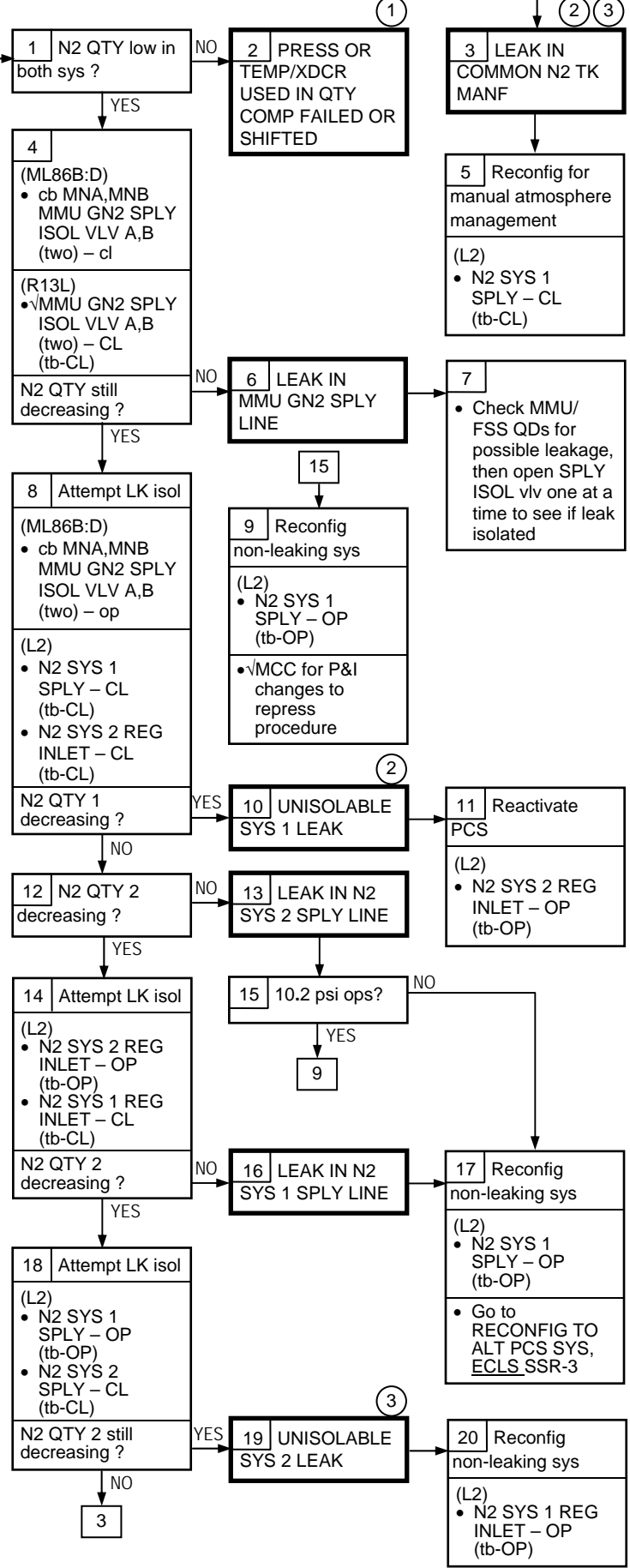
## 6.2g N2 QTY ↓

**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



- ① √MCC to determine exact failure
- ② Flight length will depend on remaining quantity
- ③ √MCC. If cabin press decreases because of N2 TK isolation, cabin repress may be attempted. Isolate tks after each repress attempt
- ④ 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

**ECLS**

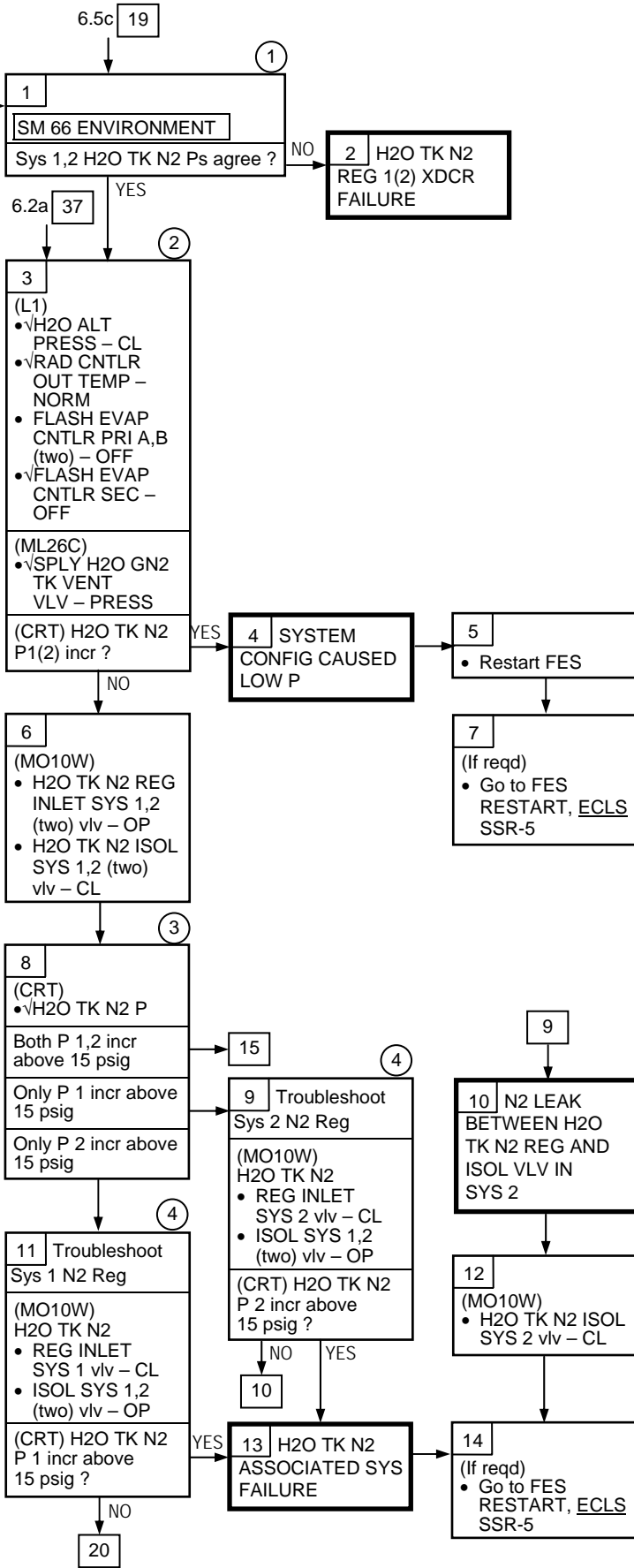
SM  
ALERT

S66 CAB H2O  
N2 P 1(2)

H2O TK N2 P 1(2)  
< 13.0 psig

**Nominal Config:**  
(ORBIT)  
Refer to 6.2a

**6.2i H2O TK N2 P ↓**



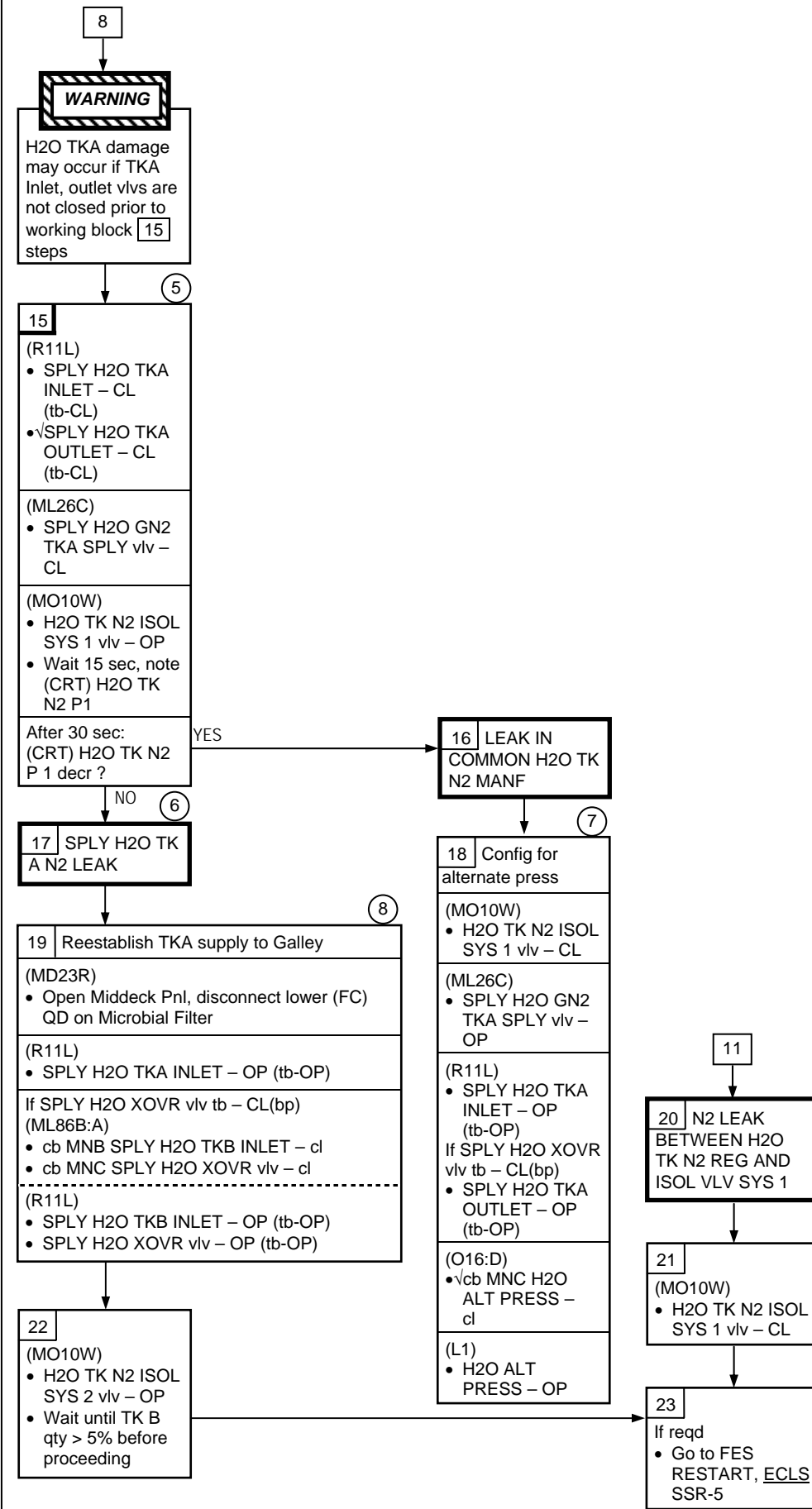
① CRT label 'H2O TK N2 P' is really H2O REG 1(2) P not actual 'TK N2 PRESS'

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

**ECLS 6.2i (Cont)**



⑤ 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

⑥ SPLY H2O dumps may need to be scheduled more frequently depending upon FLASH EVAP usage

⑦ 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

⑧ Allows utilization of TKA H2O. Only TKs B,C,D will fill FCP H2O. To fill TKA, QD must be remated



**ECLS**

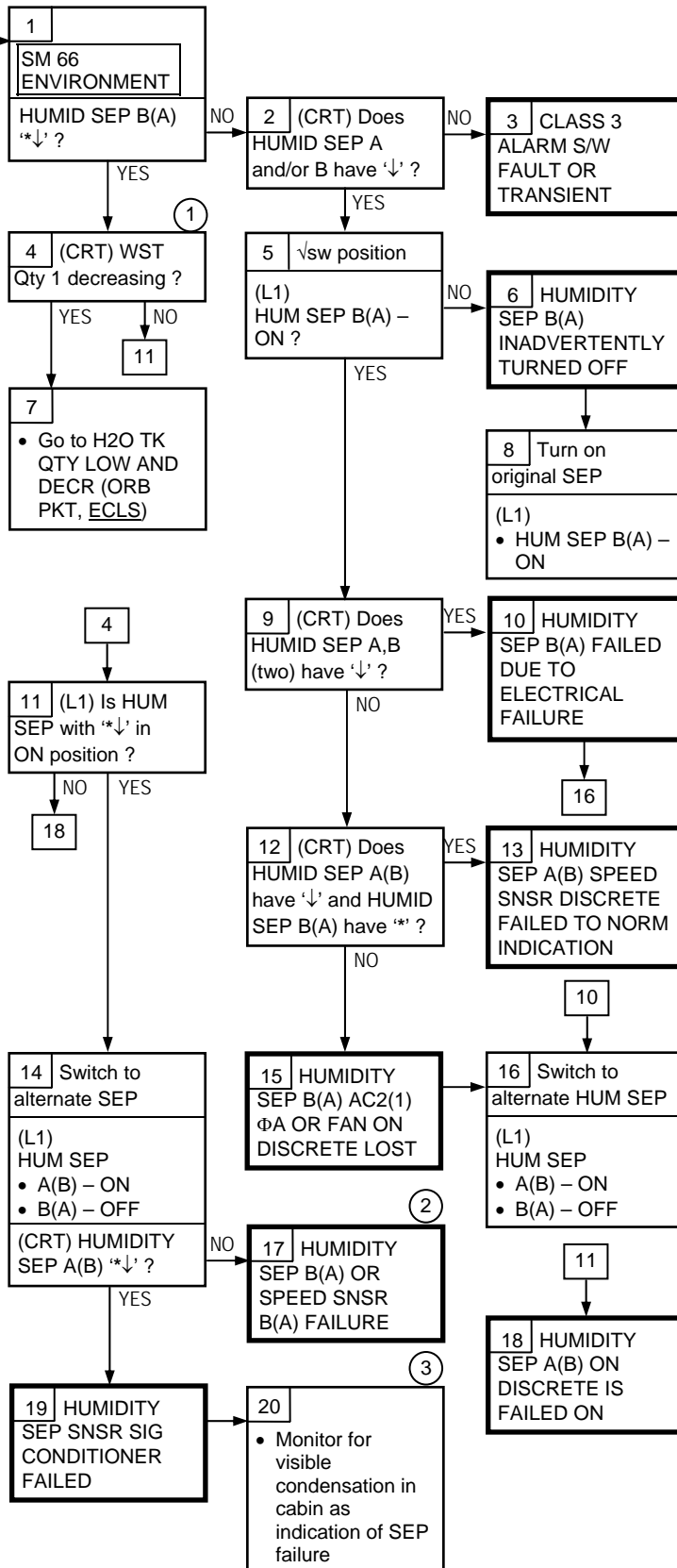
**6.2j HUMID SEP ↓**

SM ALERT

S66 HUMID SEP A(B)

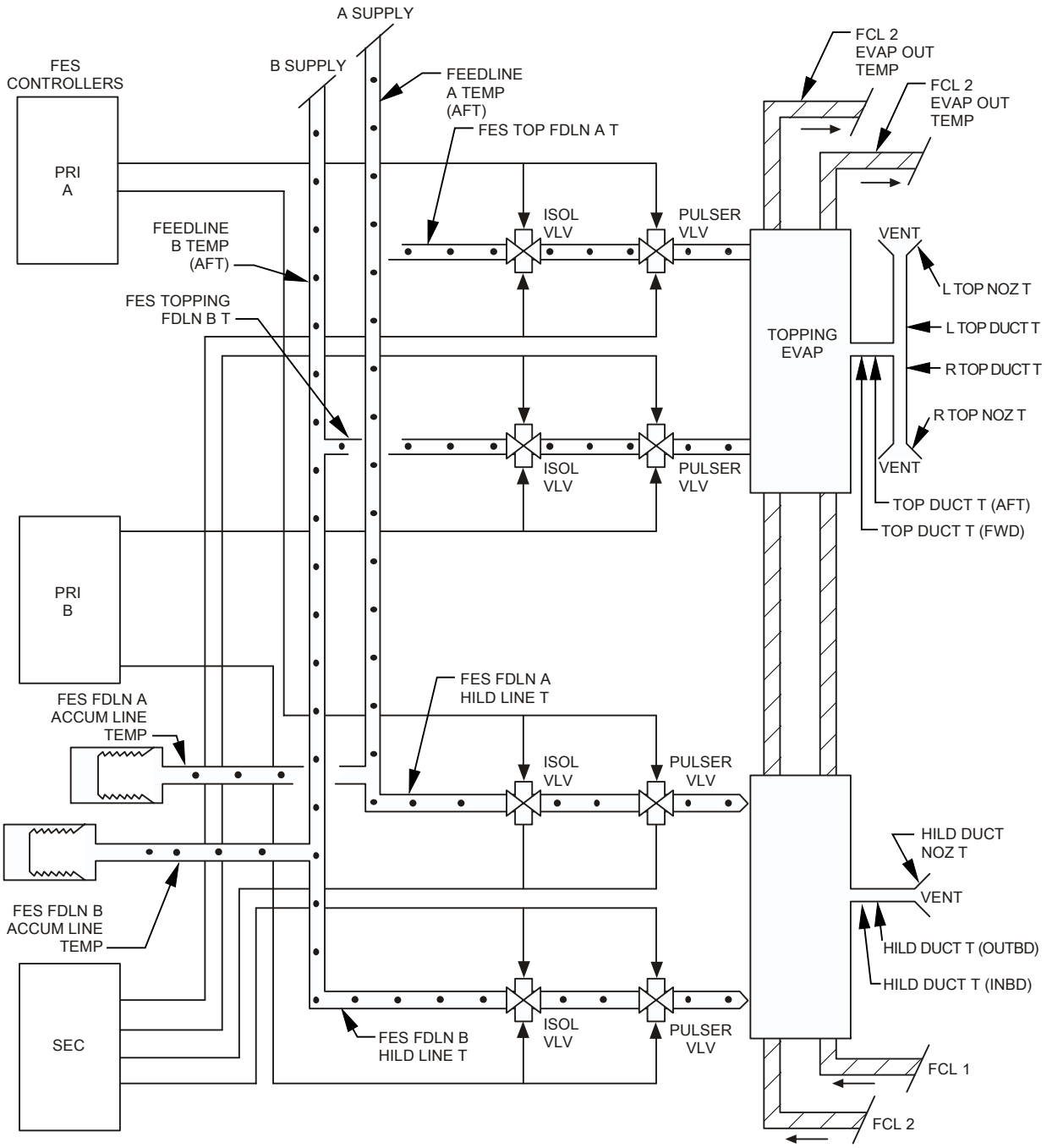
HUMIDITY SEP A(B) underspeed

**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

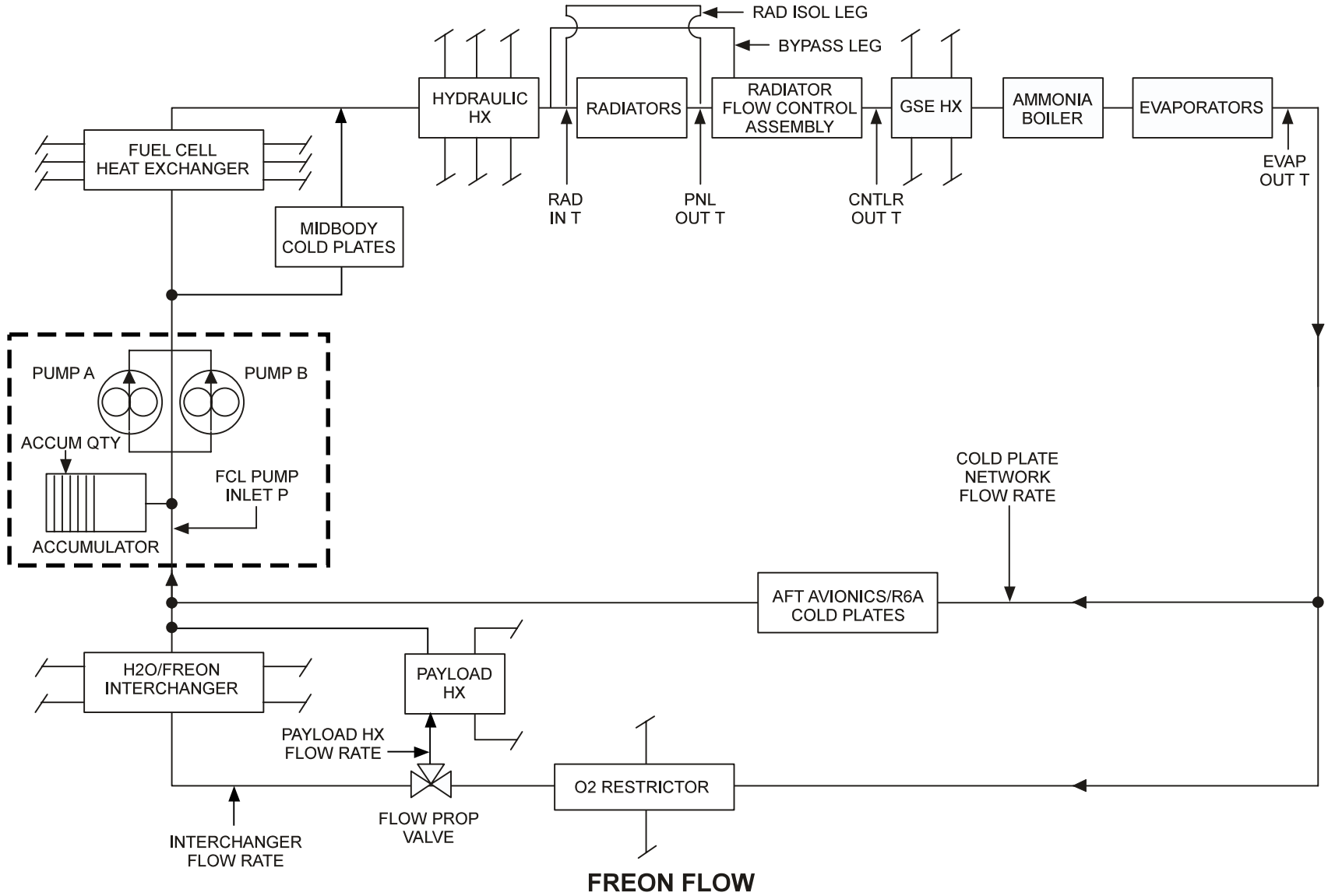


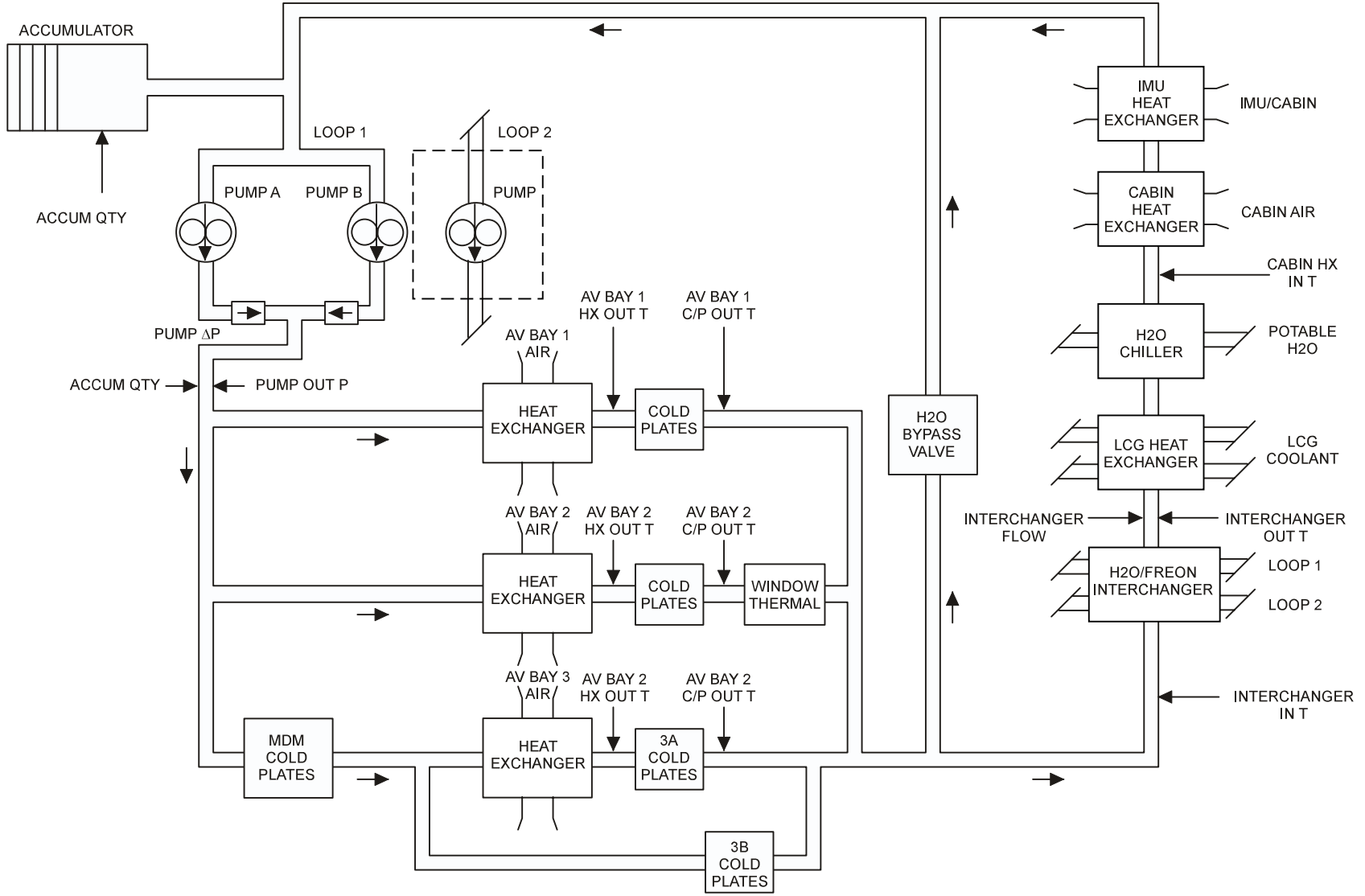
- ① Failed open ck vlvs downstream of each HUM SEP could allow WST TK to flood HUM SEP
- ② √MCC to determine exact failure
- ③ MCC has only indication of relative humidity

FREON/H2O LOOP 6.4



EVAPORATORS





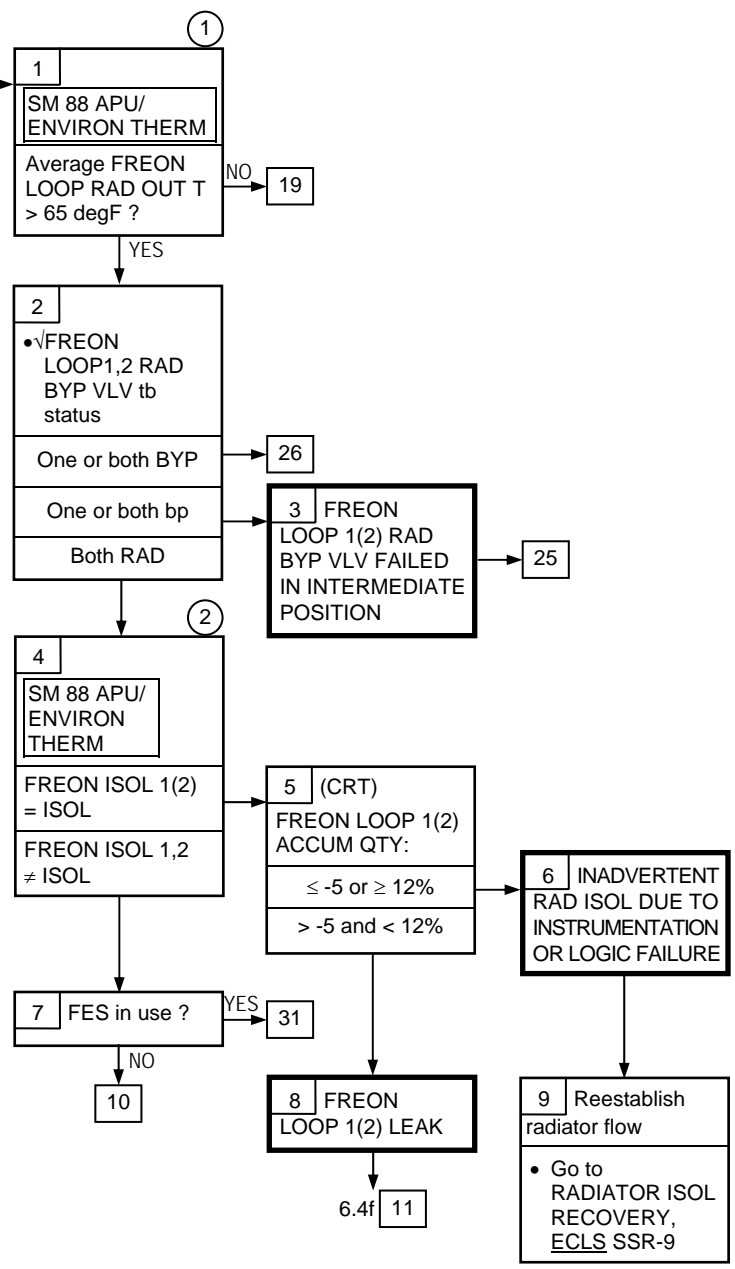
H2O LOOPS

# ECLS

## 6.4a EVAP OUT T $\uparrow\downarrow$

From ORB PKT, EVAP OUT T HIGH

**Nominal Config:**  
(L4:M,N)  
cb AC1,2,3  
ΦA,ΦB,ΦC FREON LOOP 1,2 PUMP A,B (twelve) – cl  
cb AC2,3 ΦB FREON SIG CONDR (two) – cl  
cb AC2,3 ΦA FREON FLOW PROP 1,2 (two) – cl  
(L4:N)  
cb AC2 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) – B(A)  
RAD CNTLR OUT TEMP – NORM  
LOOP 1,2 (two) – AUTO A(B)  
BYP VLV  
MAN SEL 1,2 (two) – ctr  
MODE 1,2 (two) – AUTO  
NH3 CNTLR A,B – OFF  
FLASH EVAP CNTLR  
PRI A(B) – ON  
B(A) – OFF  
SEC – A(B) SPLY OFF  
(Cont in notes column)



① If OPS 2 not available, use EVAP OUT T

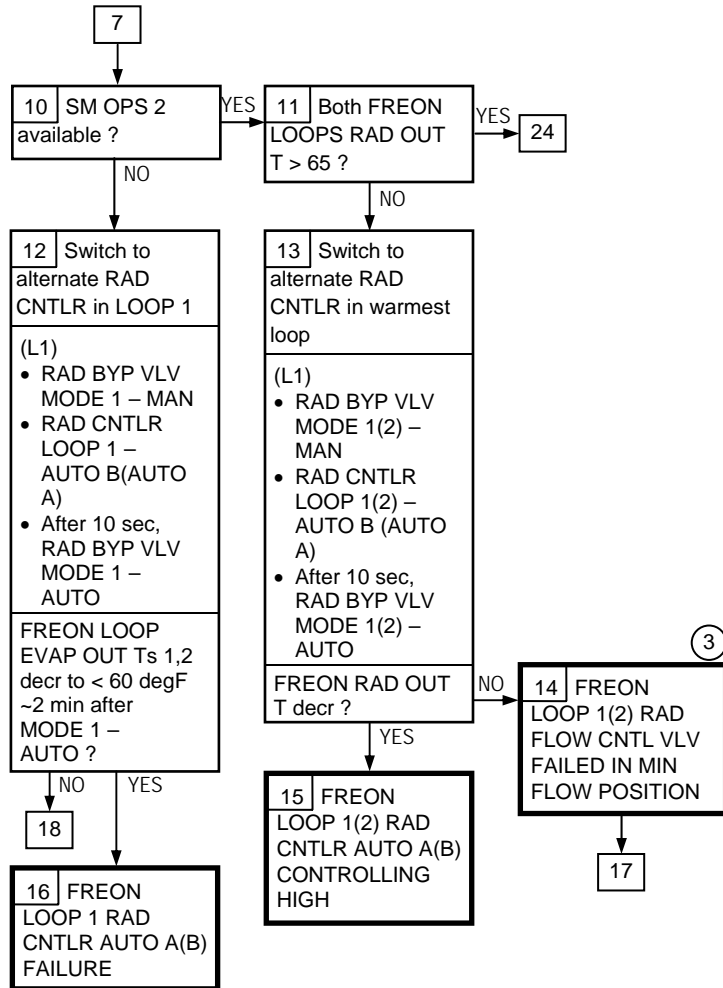
② If OPS 2 not available, continue with block 7

**Nominal Config:**  
(Cont):  
(L1)  
HI LOAD  
EVAP – OFF  
DUCT HTR – OFF  
TOP EVAP HTR  
DUCT – A(B)  
NOZ L,R – A(B)  
AUTO  
FLOW PROP VLV  
LOOP 1,2 – ICH

If payloads in use or crew comfort:  
FLOW PROP VLV  
LOOP 1,2 – PL  
(L2)  
FLASH EVAP FDLN  
HTR A,B SPLY – 1(2)  
FREON ISOL  
MODE – AUTO  
LOOP 1 – ctr  
LOOP 2 – ctr

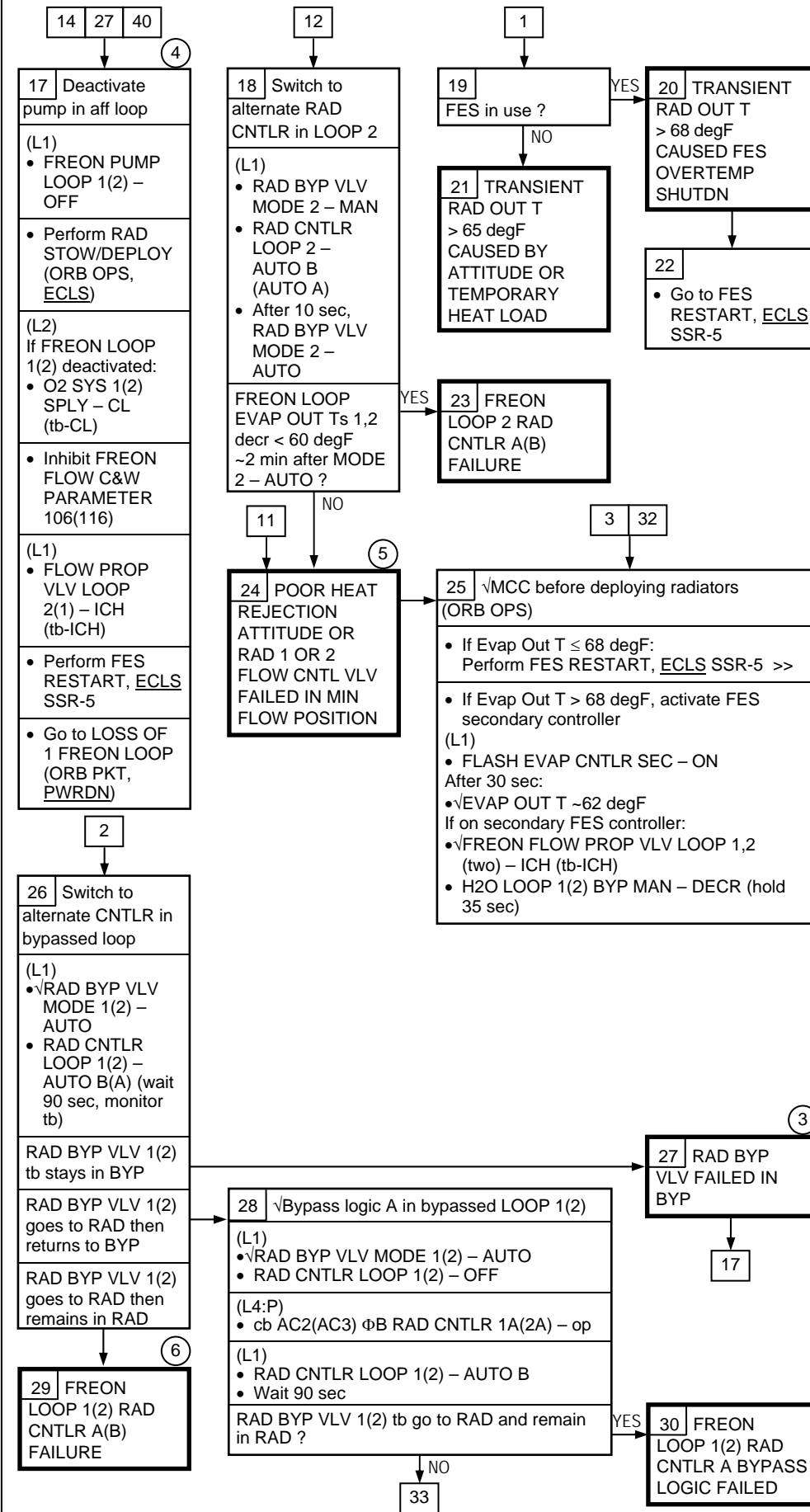
If RAD not in use:  
(L1)  
HI LOAD EVAP – ENA  
HI LOAD EVA – DUCT HTR – A(B)

**ECLS 6.4a (Cont)**



③ Loss of RFCA – Next PLS depending on H2O quantities

# ECLS 6.4a (Cont)



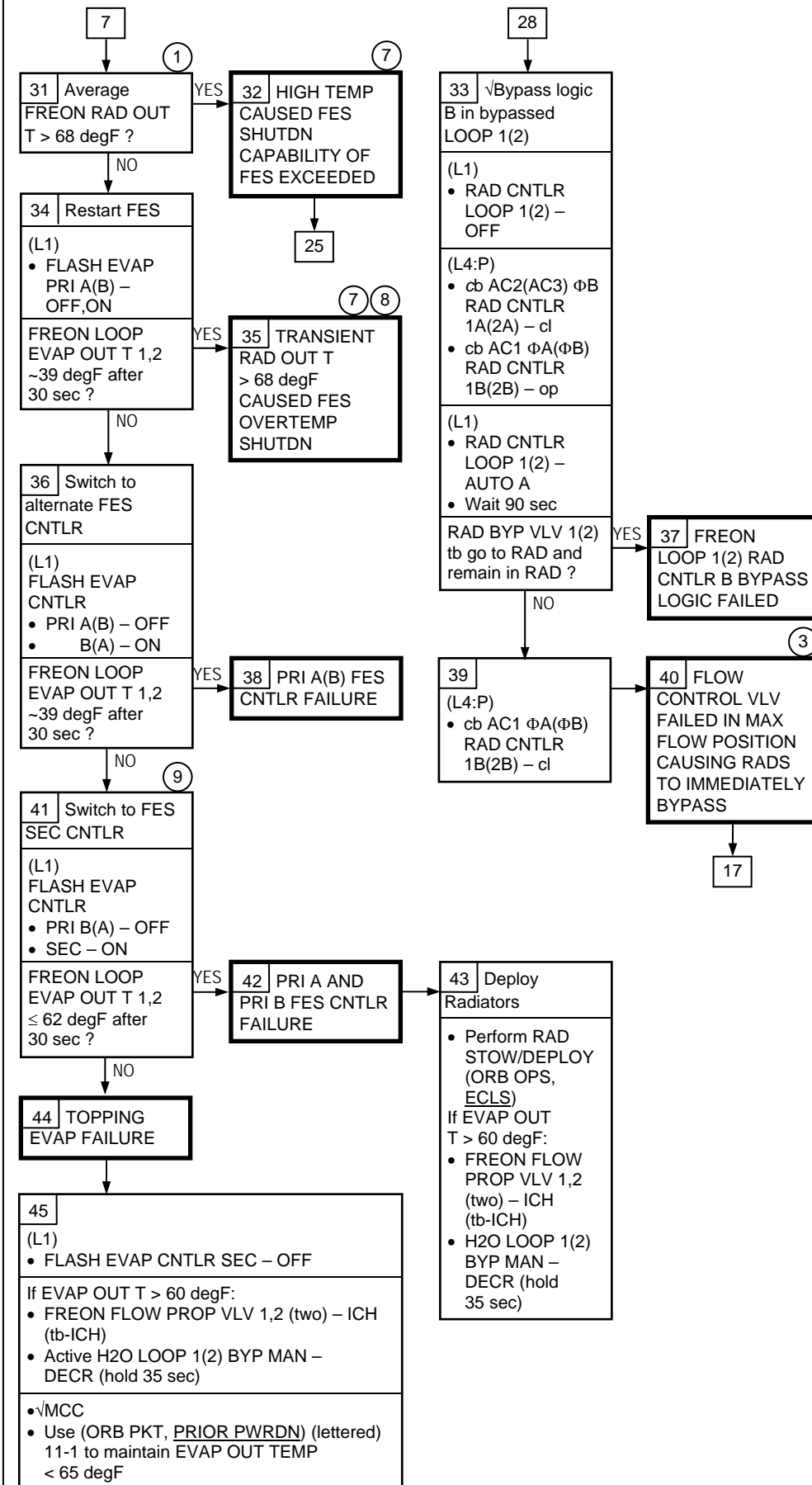
③ Loss of RFCA – Next PLS depending on H2O quantities

④ Loop will be reactivated for entry

⑤ √MCC to determine failure

⑥ Continue to monitor RAD BYP VLV tb position. Depending upon failure mode, RAD BYP VLV may not return to BYP immediately. If RAD BYP VLV tb returns to BYP, go to block 28

# ECLS 6.4a (Cont)



① If OPS 2 not available, use EVAP OUT T

③ Loss of RFCA – Next PLS depending on H2O quantities

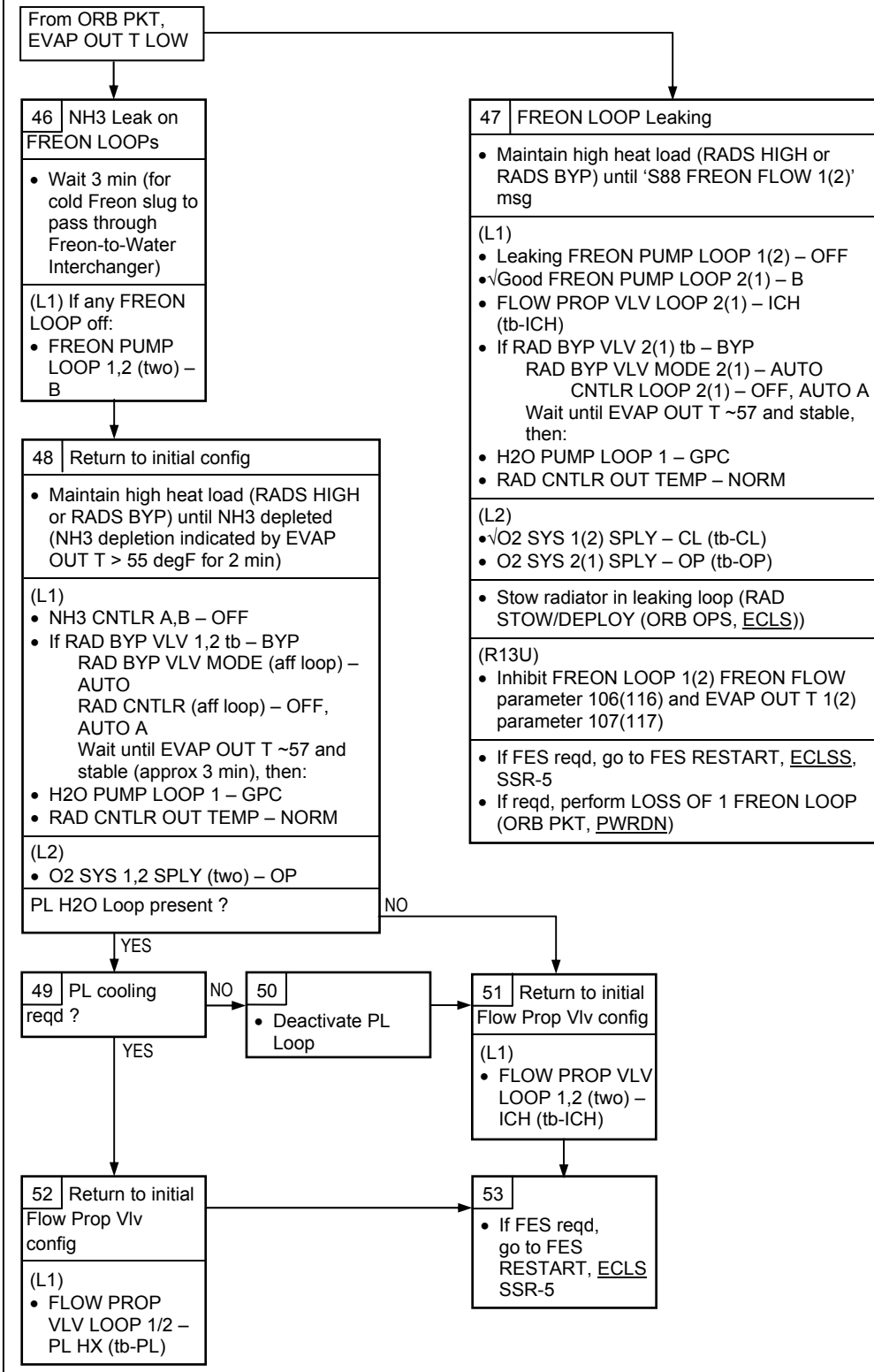
⑦ If RAD OUT T > 65 degF not explainable by attitude, troubleshoot radiators. Go to block 13

⑧ Expect same transient on next daylight pass if same attitude

⑨ SEC CNTLR controls at 62 degF. If EVAP OUT T < 62 degF, SEC CNTLR operation cannot be verified. Further troubleshooting reqd to determine complete failure



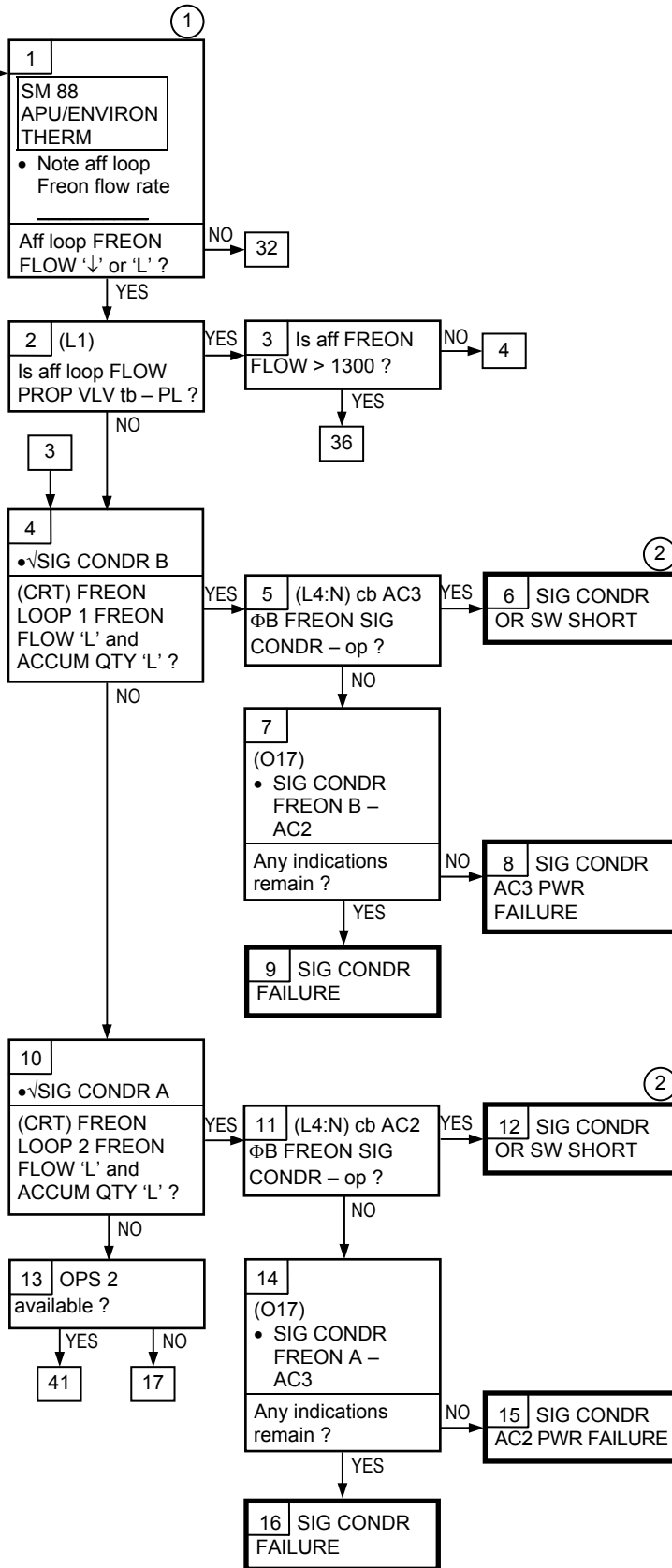
# ECLS 6.4a (Cont)



**ECLS**

**6.4b FREON FLOW LOW**

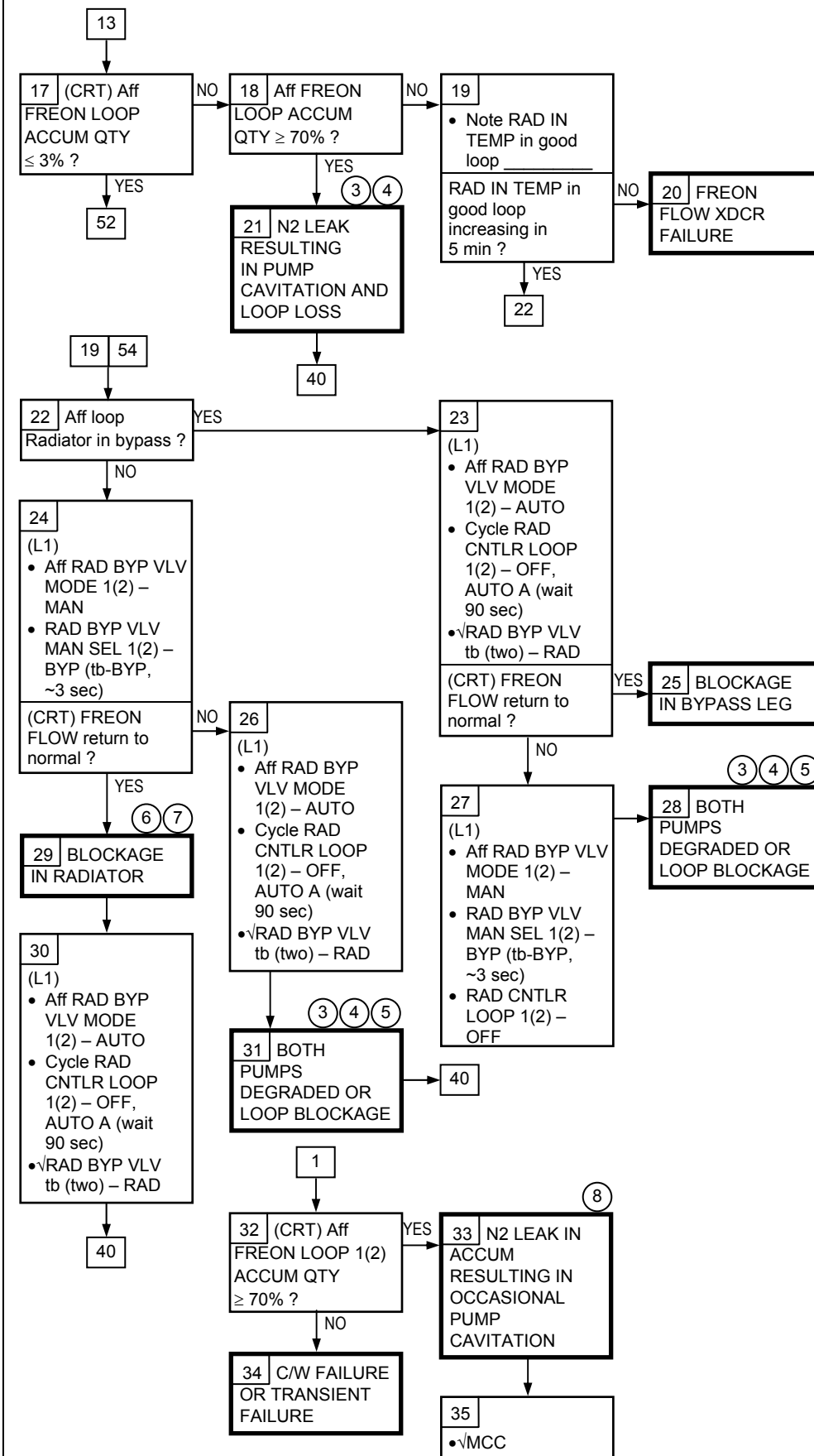
From ORB PKT,  
FREON FLOW  
LOW



① FREON FLOW meter on pnl O1 may be used as alternate

② Do not operate FREON SIG CONDR sw(s) on pnl O17 before √MCC

# ECLS 6.4b (Cont)



③ Pwrn of some equipment may be reqd depending on heat load

④ Loss of Freon Loop next PLS entry

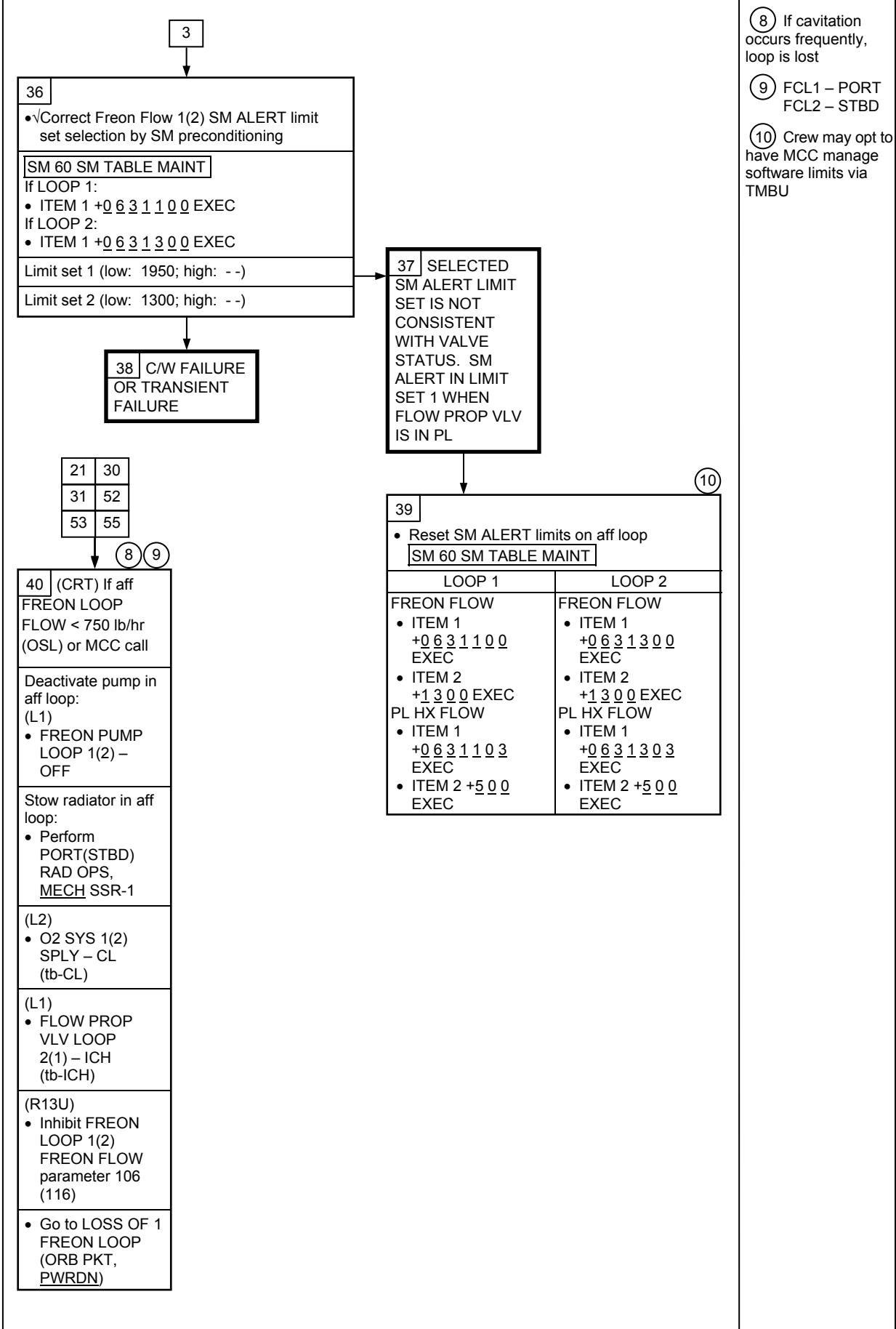
⑤ √MCC to determine failure

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

**ECLS 6.4b (Cont)**

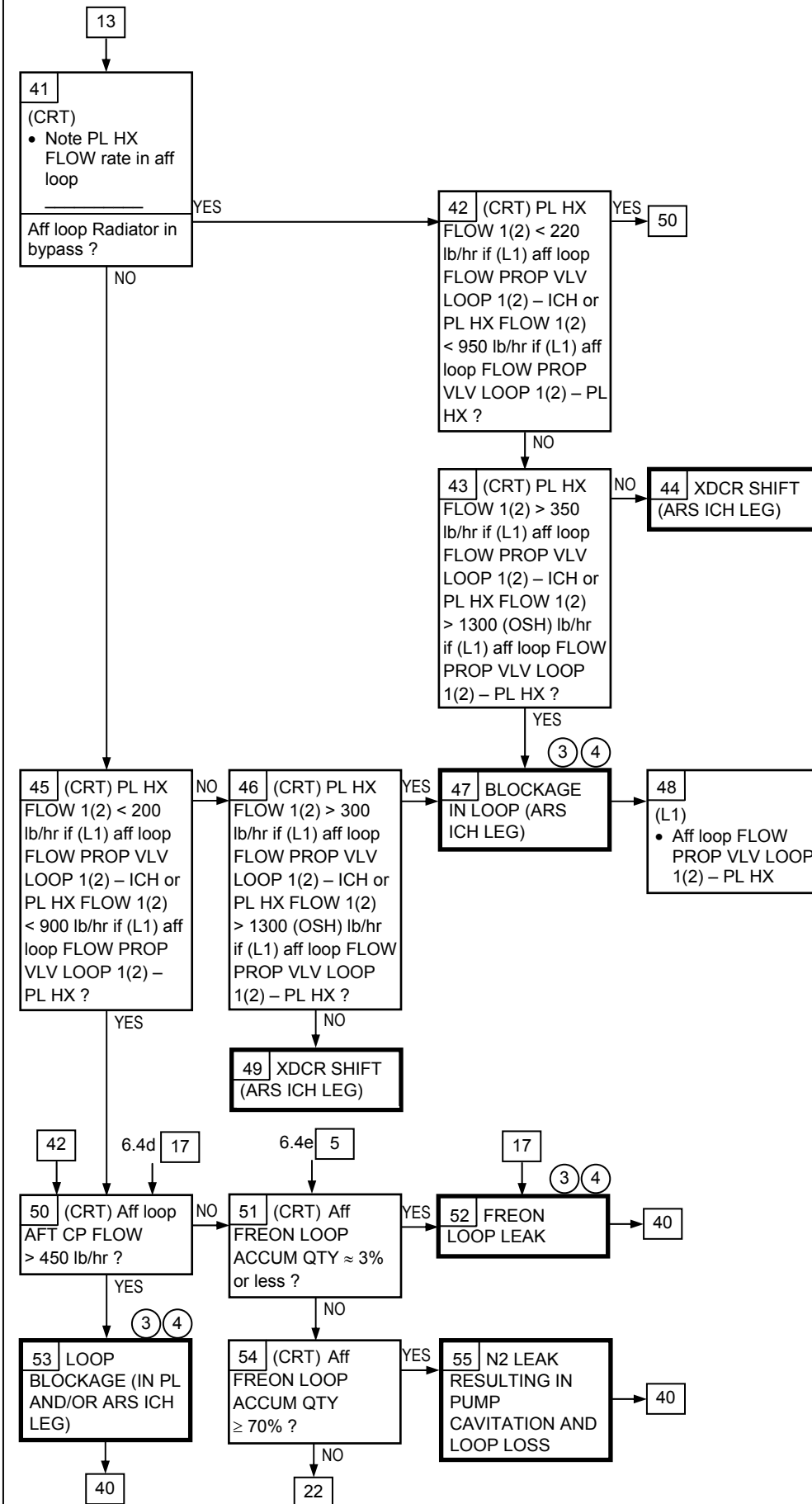


8 If cavitation occurs frequently, loop is lost

9 FCL1 – PORT FCL2 – STBD

10 Crew may opt to have MCC manage software limits via TMBU

**ECLS 6.4b (Cont)**



③ Pwrdn of some equipment may be reqd depending on heat load

④ Loss of Freon Loop next PLS entry

**ECLS**

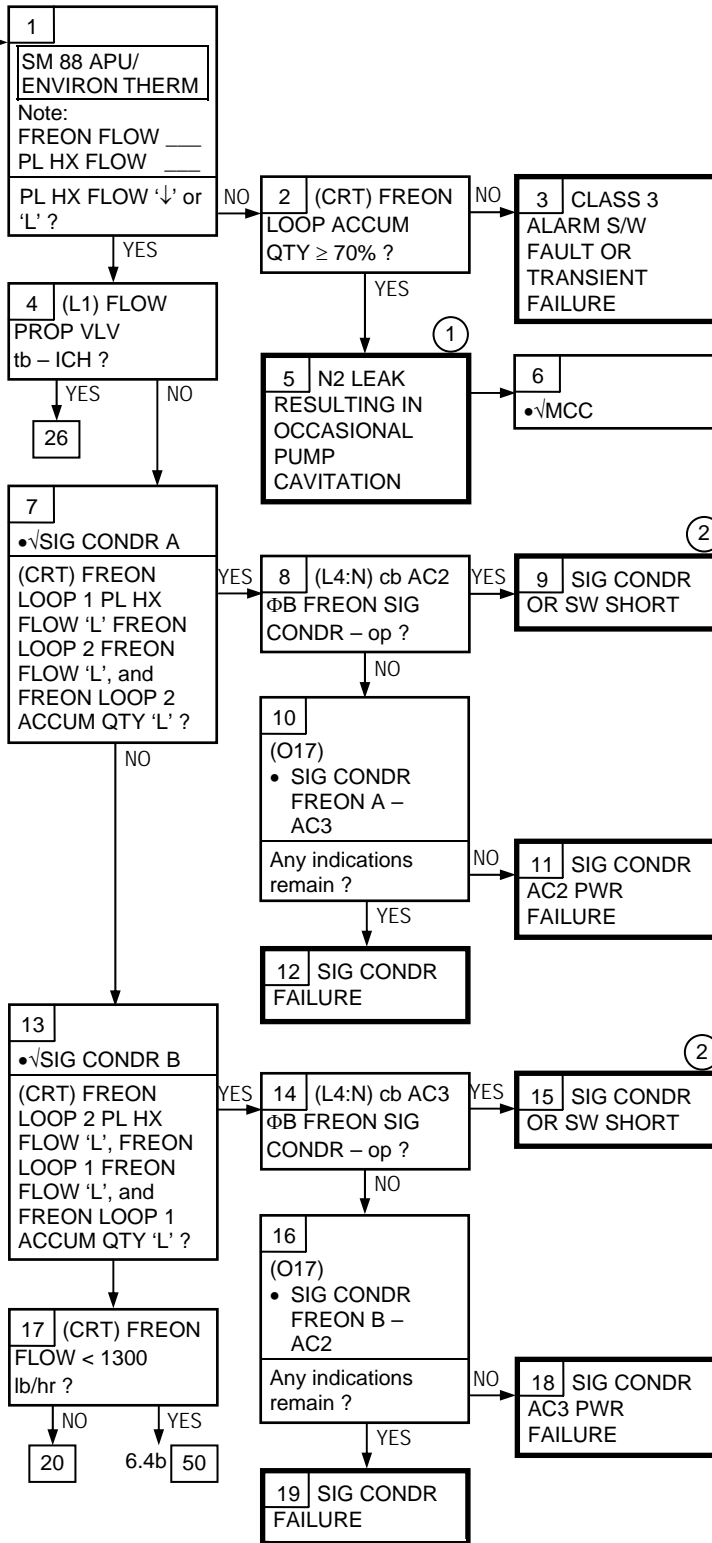
**6.4d FRN FLOW PROP VLV  
PL HX FLOW ↓**

**SM  
ALERT**

S88 FRN PL HX  
1(2)

If:  
(L1)  
FLOW PROP VLV  
LOOP 1(2) – PL  
HX  
PL HX FLOW  
< 500 lb/hr

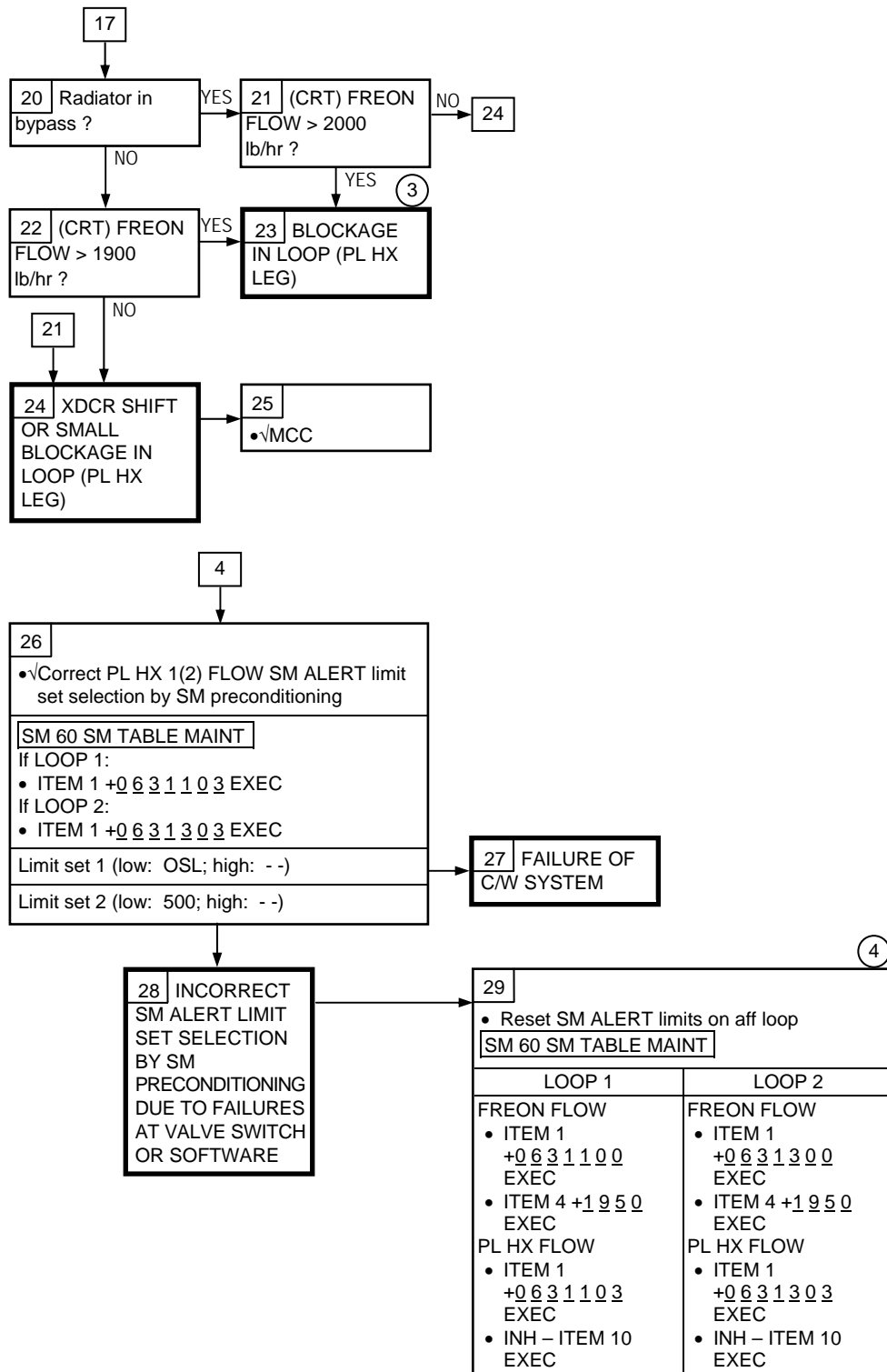
With FLOW PROP  
VLV – ICH  
PL HX FLOW is  
TMBU – OSL



① N2 leak across FCL accum bellows can cause cavitations of pump. Frequent cavitation = loop loss

② √MCC. With Sig Condr or sw short, do not operate FREON SIG CONDR sw(s) on pnl O17

**ECLS 6.4d (Cont)**



- ③ Pwrdn of some equipment may be reqd depending on heat load and amount of blockage
- ④ Crew may opt to have MCC manage software limits via TMBU

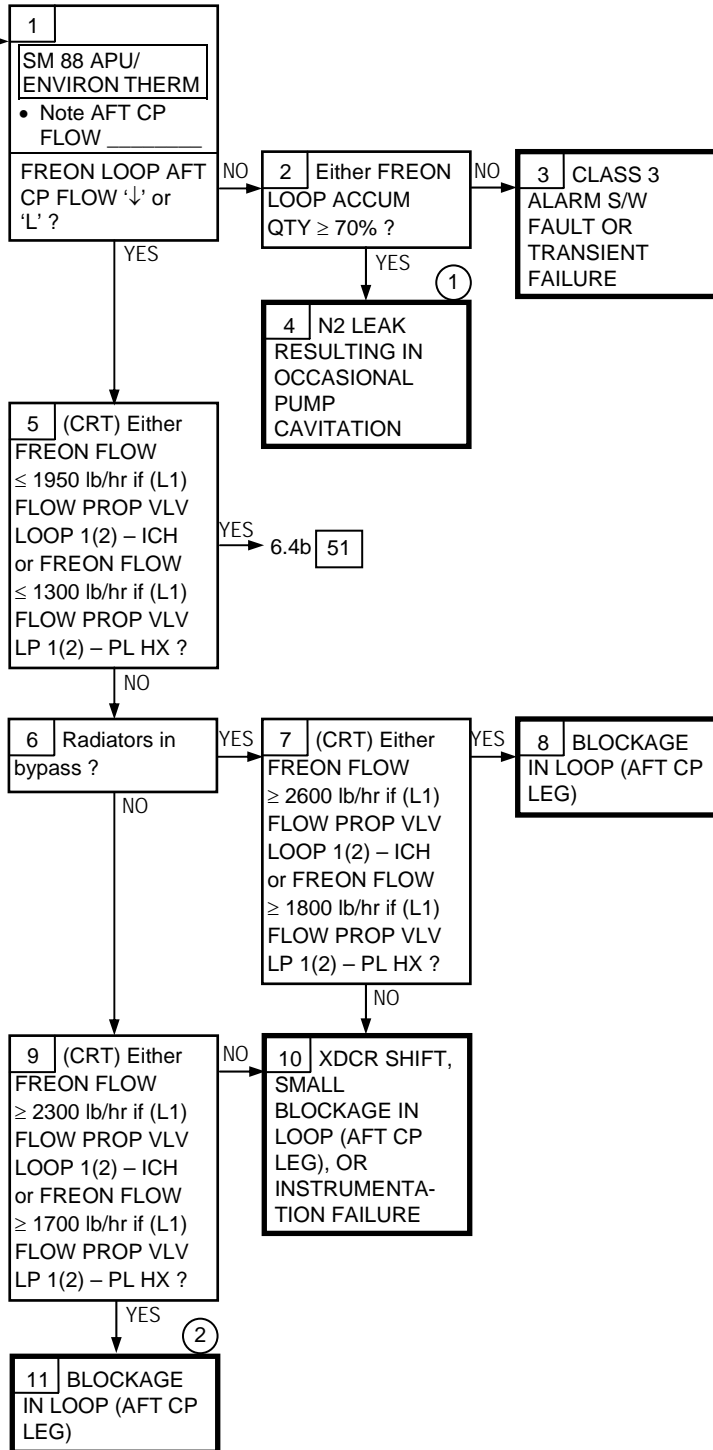
**ECLS**

**6.4e AFT COLDPLATE FLOW ↓**

SM ALERT

S88 FRN AFT CP 1(2)

AFT CP FLOW < 200 lb/hr



① N2 leak across FCL ACCUM bellows. Frequent cavitation = loop lost

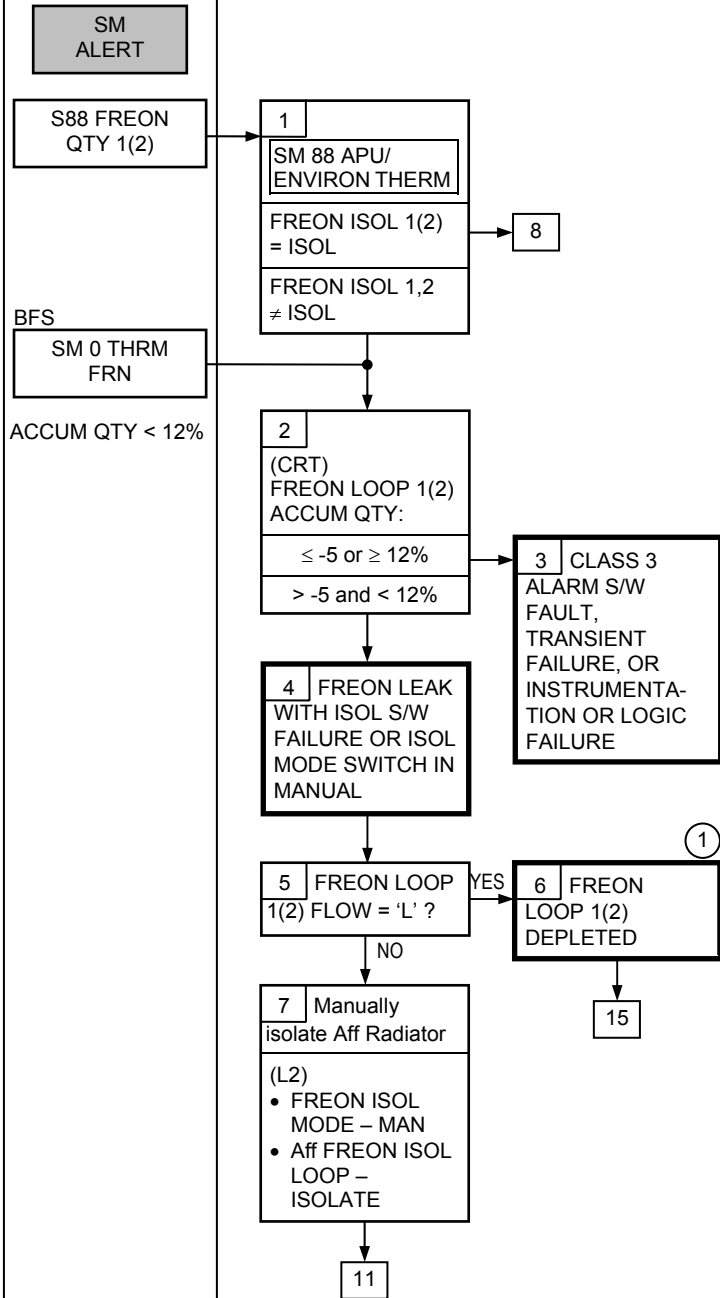
② Loss of FCL definition next PLS entry



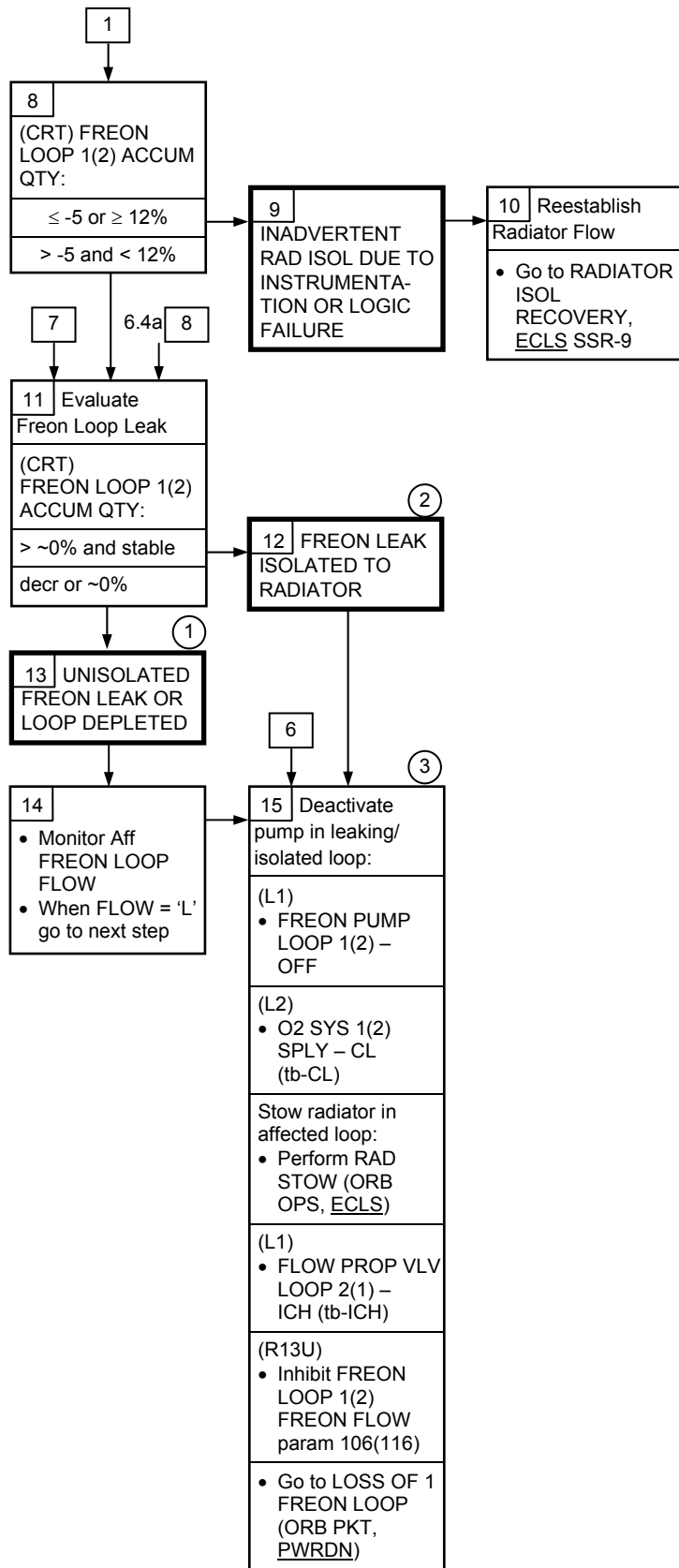
**ECLS**

**6.4f ACCUM QTY ↓**

① Loss of one FREON LOOP = next PLS Entry



**ECLS 6.4f (Cont)**



- 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

**ECLS**

**6.4g EVAP TEMP HI LOAD INBD (OUTBD) DUCT(NOZ) ↑↓**

**SM ALERT**

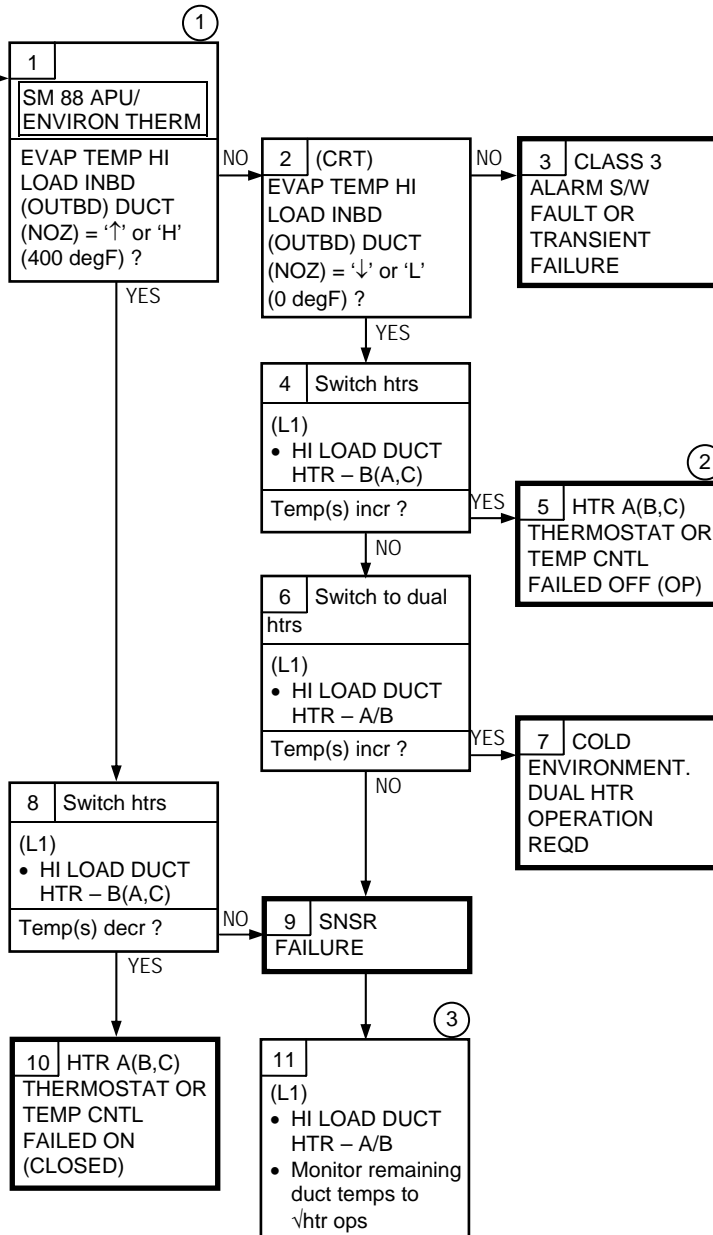
S88 EVAP HI LD TEMP

**BFS**

SM 0 THRM EVAP

If: HI LOAD

	degF
INBD	> 375
INBD	< 150
OUTBD	> 330
OUTBD	< 150
NOZ	> 350
NOZ	< 100



① Upon initial activation of heaters, FDA limits are not enabled until following time has elapsed:  
 INBD T 25 min  
 OUTBD T 16 min  
 NOZ T 40 min

② If noz htr failed, HI LOAD EVAP still operational. If inbd/outbd duct htr failed, HI LOAD EVAP lost

③ Loss of insight requires dual htr ops when htrs are activated

**ECLS**

**6.4h EVAP TOPPING DUCT T  
FWD(AFT), L(R) ↑↓**

**SM ALERT**

S88 EVAP TOP TEMP

**BFS**

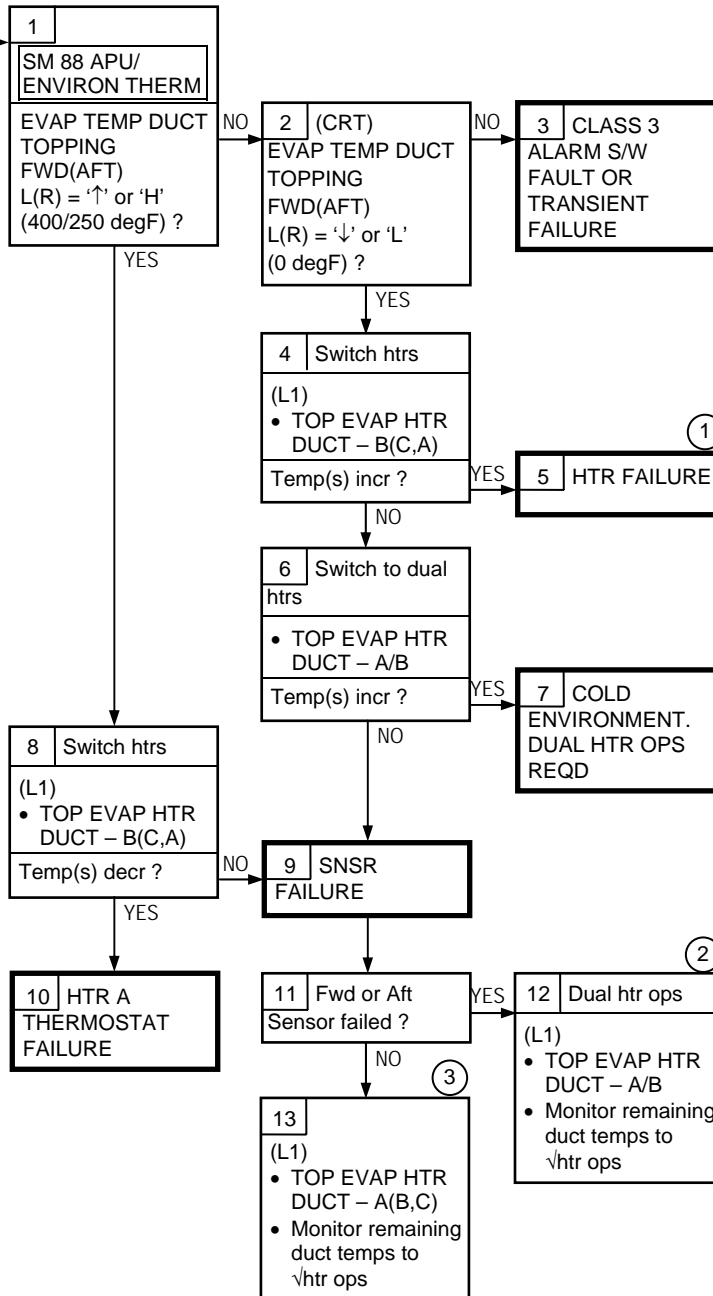
SM 0 THRM EVAP

If:  
S88/BFS SM 0

	degF
FWD	> 330
FWD	< 100
AFT	> 330
AFT	< 100

**S88 ONLY**

	degF
L	> 245
L	< 50
R	> 245
R	< 50



① Topping FES still operational if left, right htrs 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 htrs are considered mandatory

③ If instr loss is on either left or right duct, then only single htr ops is reqd

**ECLS**

**6.4i EVAP TOPPING L(R) NOZ ↑↓**

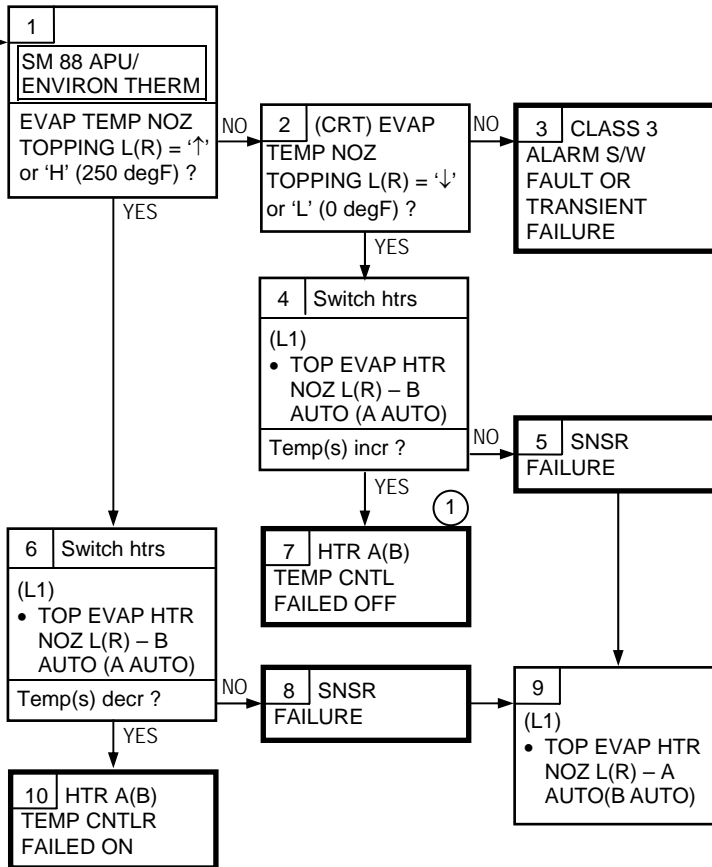
SM ALERT

S88 EVAP TOP TEMP

BFS

SM 0 THRM EVAP

L(R) NOZ  
> 245 degF  
< 40 degF



① Topping FES still operational with Noz Htr failed off as long as fwd and aft duct htrs are operational

**ECLS**

**6.4j EVAP FDLN TEMP FWD  
(MID,AFT, TOP, HI LOAD, ACCUM) ↑↓**

SM  
ALERT

S88 EVAP  
FDLN T A(B)

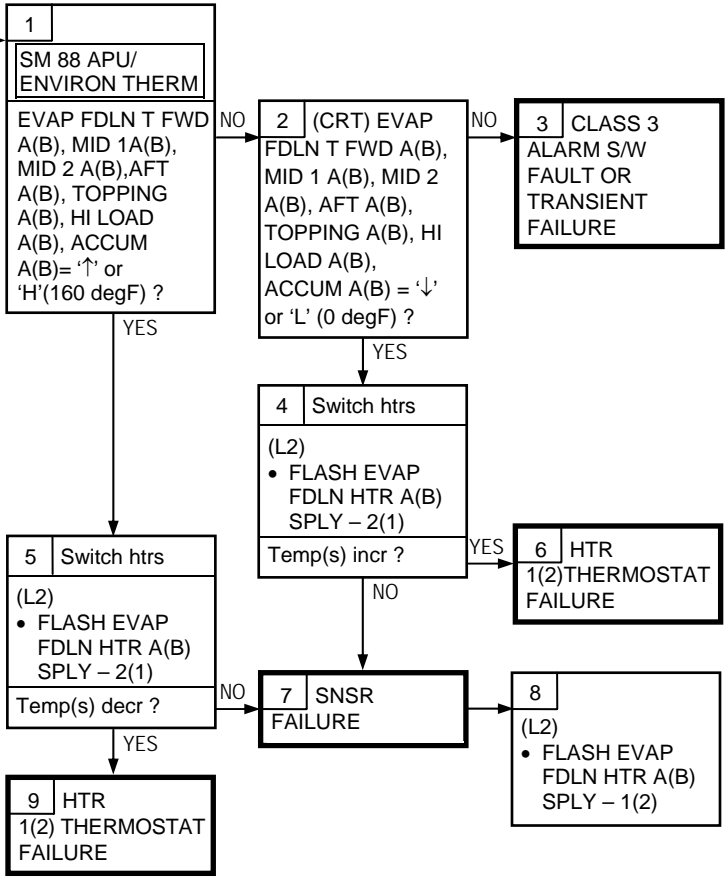
BFS  
SM 0 THRM  
EVAP

If:  
S88/BFS SM 0

	degF
FWD A(B)	> 140
FWD A(B)	< 50
MID 1 A(B)	> 140
MID 1 A(B)	< 50
MID 2 A(B)	> 140
MID 2 A(B)	< 50
AFT A(B)	> 140
AFT A(B)	< 50

S88 only

	degF
TOPPING A(B)	> 140
TOPPING A(B)	< 50
HI LOAD A(B)	OSH
HI LOAD A(B)	< 50
ACCUM A(B)	> 140
ACCUM A(B)	< 50



**ECLS**

**6.4I H2O PUMP P 1(2) ↑↓**

**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)**

**S88 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**

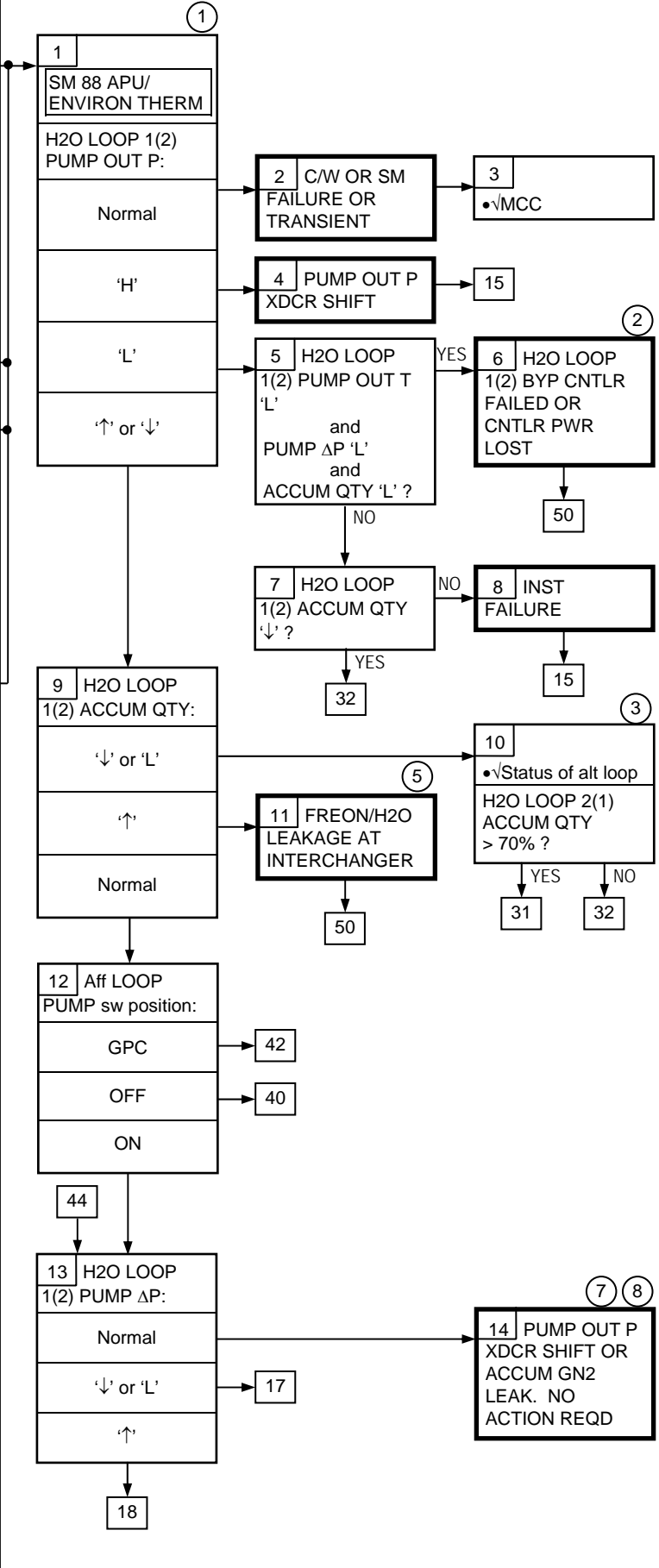
**S88 H2O PUMP P 1(2)**

Light on if:  
 H2O LOOP 1(2)  
 PUMP OUT P  
 < 50 psia (4)  
 > 75 psia  
 or  
 < 20 psia (6)  
 (inactive loop)

or, light on if:  
 H2O LOOP 1(2)  
 PUMP ΔP  
 < 33 psid (4)  
 > 46 psid  
 or  
 > 5 psid (6)  
 (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

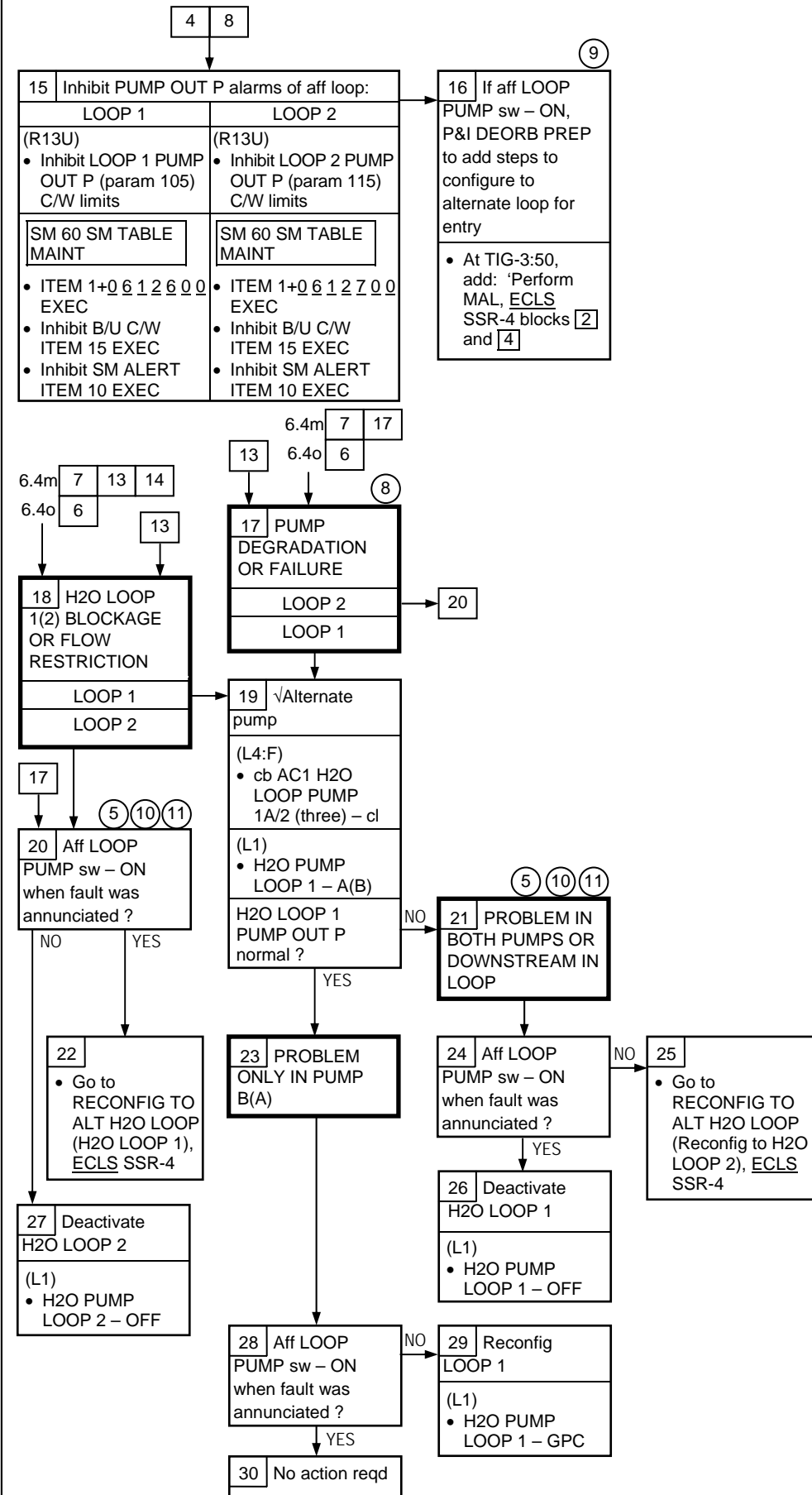
(Cont in notes column)



- 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  
 2(1) – ON  
 1(2) – GPC  
 1 – B(A)  
 H2O LOOP 1 BYP  
 MODE – MAN  
 H2O LOOP 2 BYP  
 MODE – AUTO

**ECLS 6.4I (Cont)**



⑤ Possible next PLS. √MCC

⑧ If repeated occurrence (same loop), √MCC for possibilities of ruptured bellows causing GN2 precharge and H2O to mix, or stuck bellows

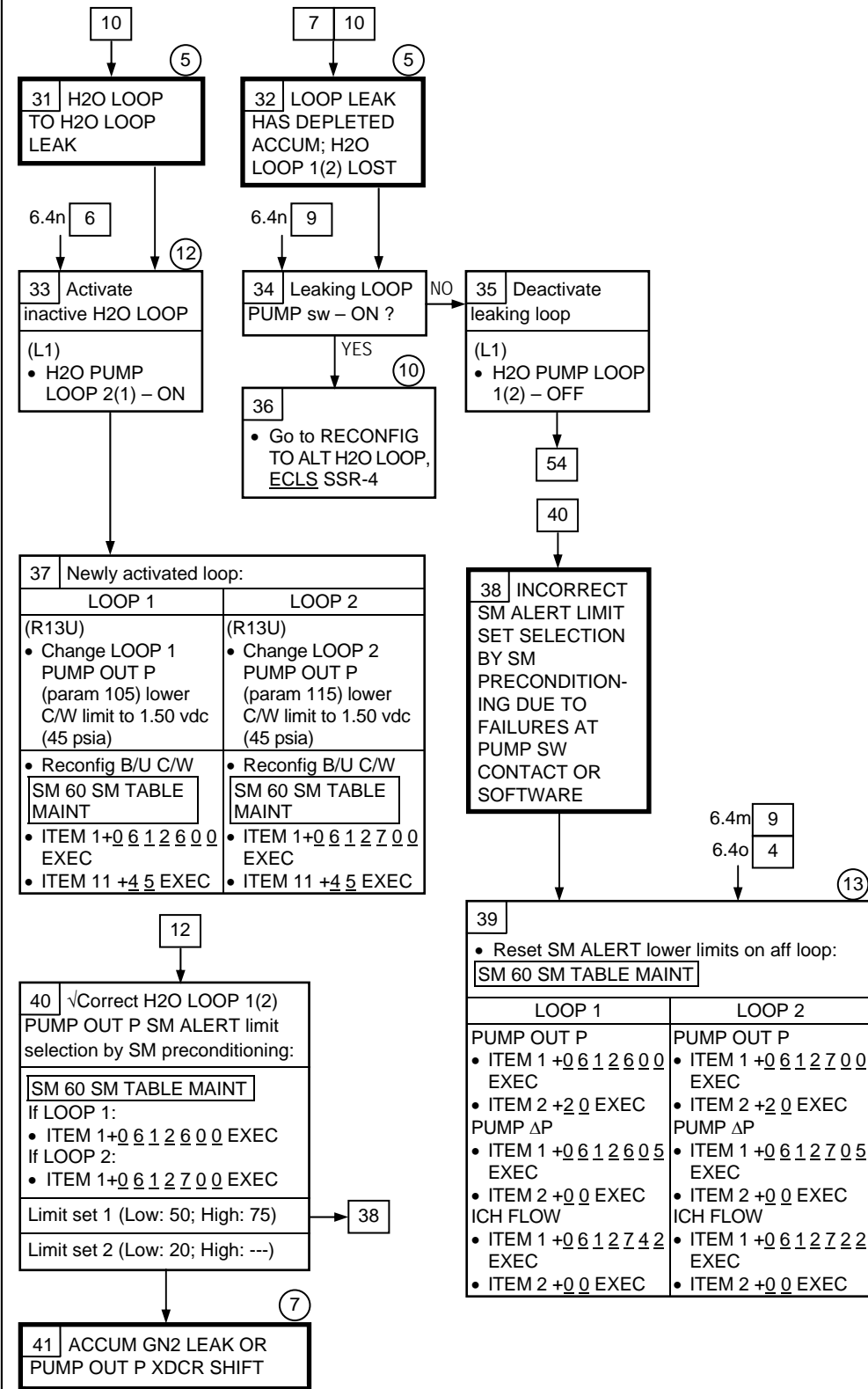
⑨ Only PUMP OUT P is available on board while in BFS

⑩ If both loops are failed:  
(L1)  
H2O PUMP LOOP 1,2 – OFF, then go to LOSS OF 2 H2O LOOPS (ORB PKT, PWRDN)

⑪ As pumps utilize H2O flow for active cooling, extreme or total blockage will result in overheating and failure of the pump within min

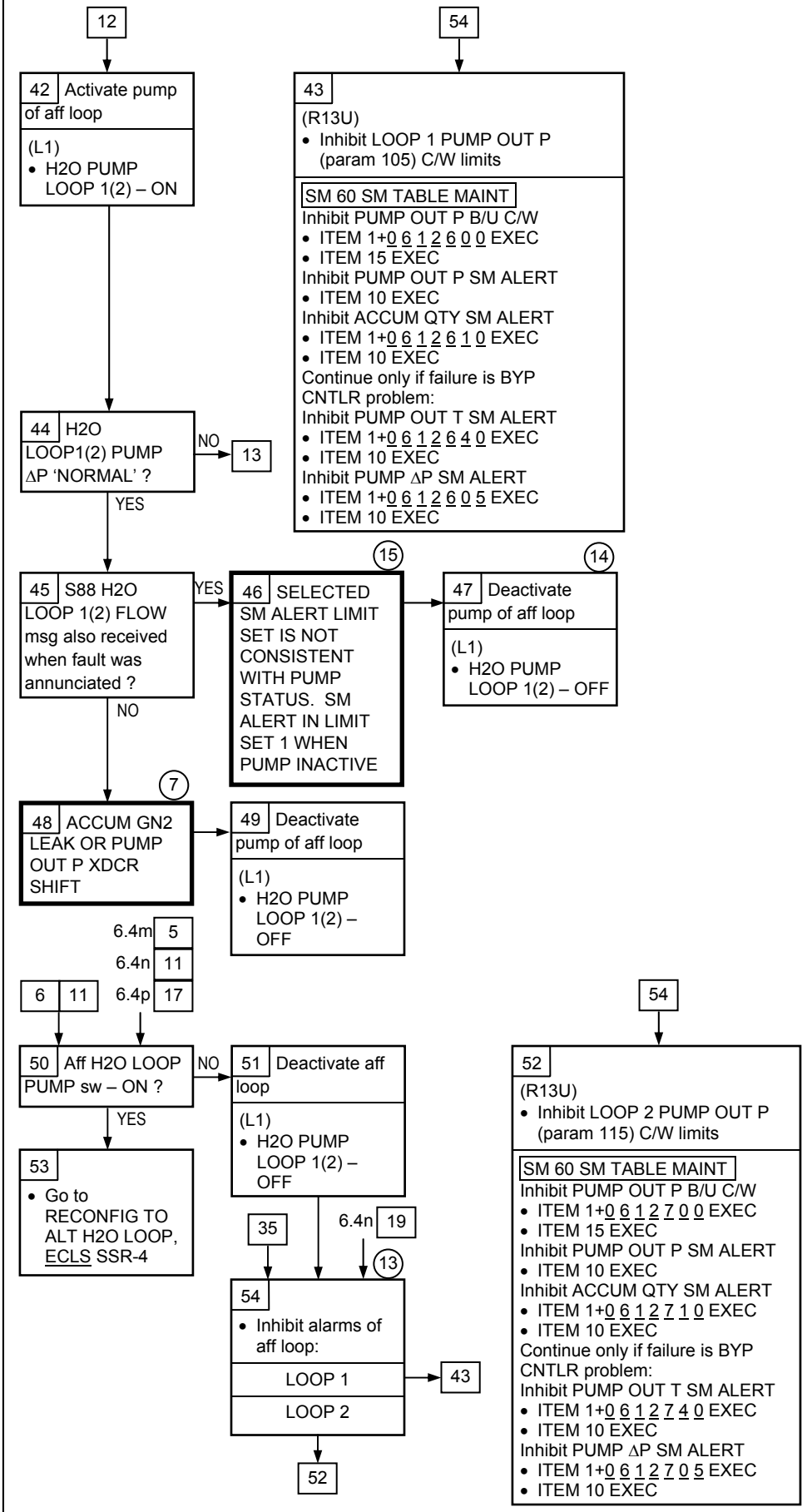


**ECLS 6.4I (Cont)**



- ⑤ Possible next PLS. √MCC
- 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
- ⑩ If both loops are failed:  
(L1)  
H2O PUMP LOOP 1,2 – OFF, then go to LOSS OF 2 H2O LOOPS (ORB PKT, PWRDN)
- ⑫ Operation of both H2O loops will prevent loss of H2O to alt loop
- ⑬ Crew may opt to have MCC manage software limits via TMBU

**ECLS 6.4I (Cont)**



**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

**13** Crew may opt to have MCC manage software limits via TMBU

**14** 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

**15** Pump function sw ON position still available with full cooling capability

**ECLS**

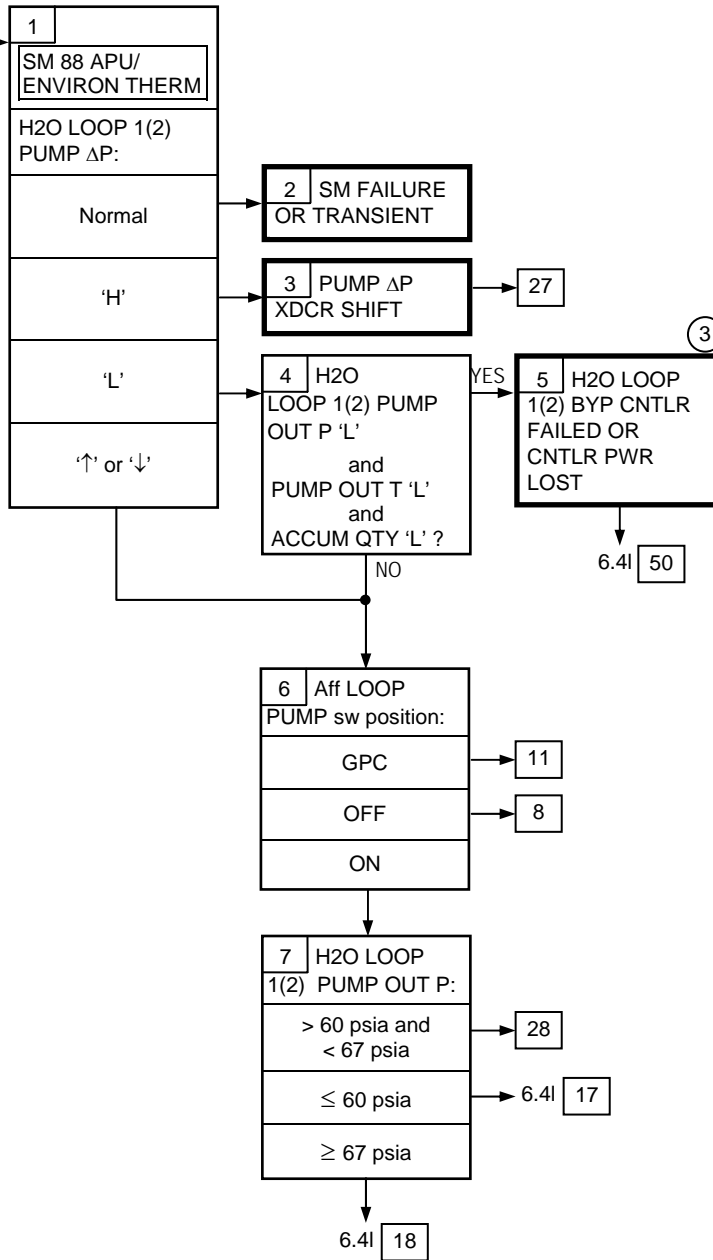
**6.4m H2O PUMP ΔP 1(2) ↑↓**

SM  
ALERT

S88 H2O  
PUMP P 1(2)

Light on if:  
H2O LOOP 1(2)  
PUMP ΔP  
< 33 psid (1)  
> 46 psid (2)  
or  
> 5 psid (2)  
(inactive loop)  
or, light on if:  
H2O LOOP 1(2)  
PUMP OUT P  
< 50 psia (1)  
> 75 psia (2)  
or  
< 20 psia (2)  
(inactive loop)

**Nominal Config:**  
Refer to 6.4I

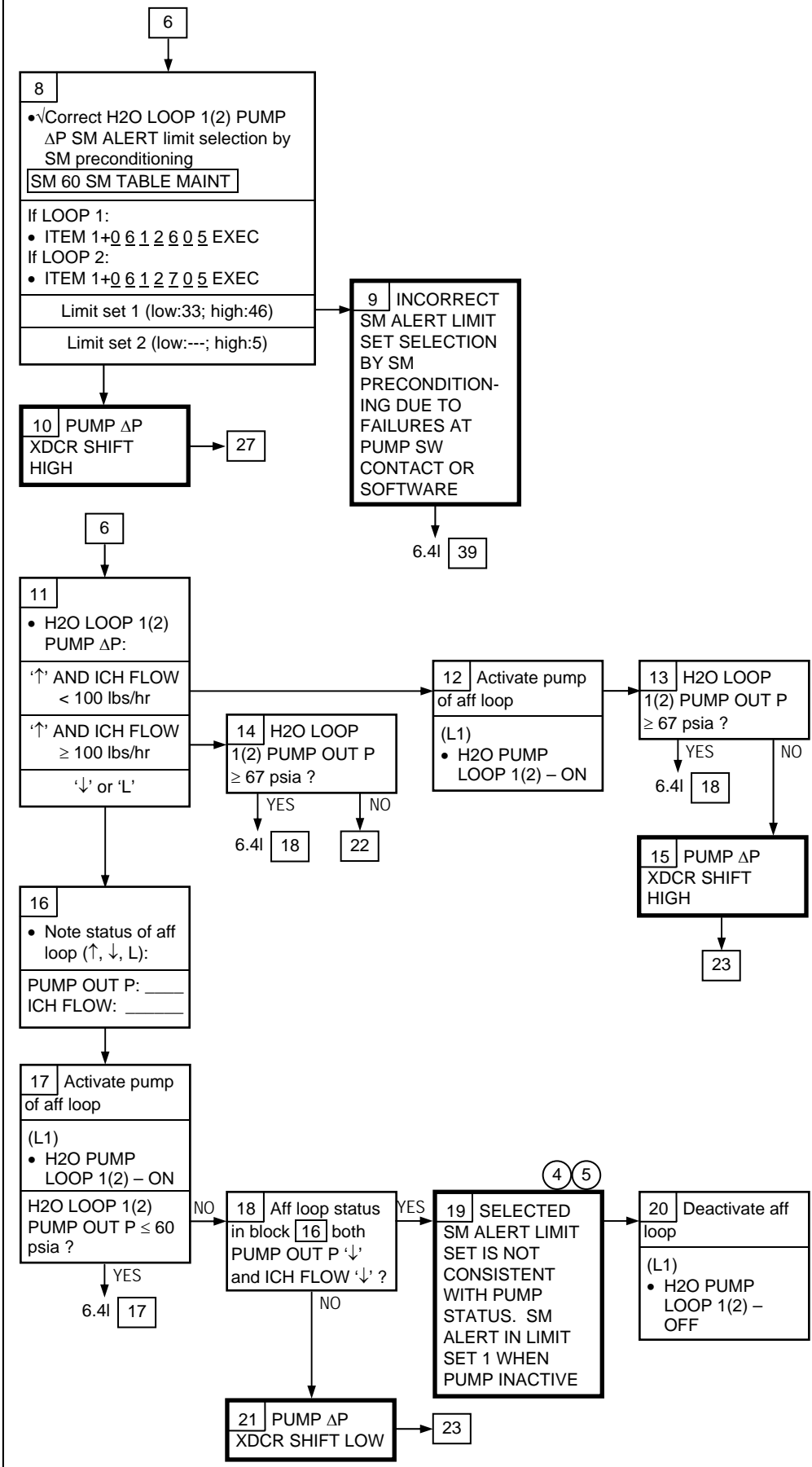


(1) Preconditioning will select this limit set if (L1) H2O PUMP LOOP 1(2) – ON, or H2O PUMP LOOP 1(2) – GPC and GPC – ON signal present

(2) Preconditioning will select this limit set if (L1) H2O PUMP LOOP 1(2) – OFF, or H2O PUMP LOOP 1(2) – GPC without presence of GPC – ON signal

(3) √MCC about reset cb

# ECLS 6.4m (Cont)



④ 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

⑤ Pump function sw ON position still available with full cooling capability



**ECLS**

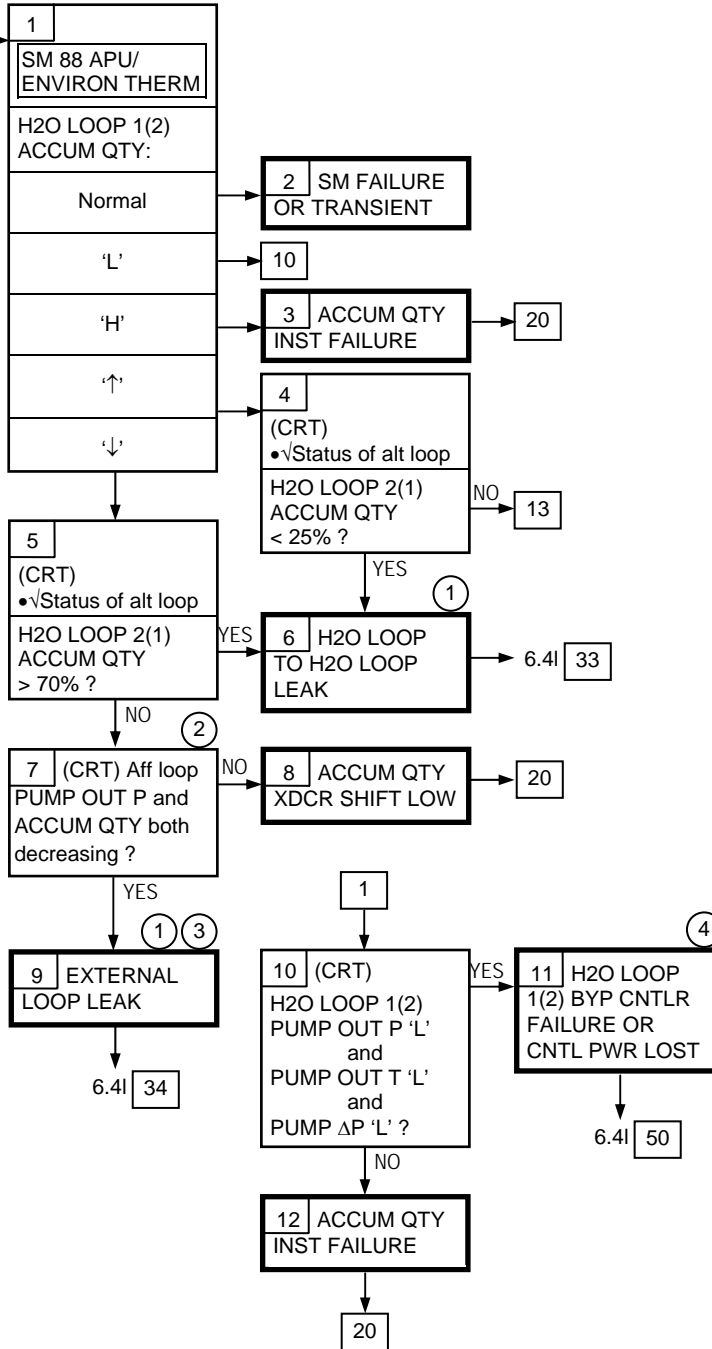
**6.4n H2O ACCUM QTY 1(2) ↑↓**

SM  
ALERT

S88 H2O  
LOOP 1(2) QTY

H2O LOOP 1(2)  
ACCUM QTY  
< 20%  
> 80%

**Nominal Config:**  
Refer to 6.4l



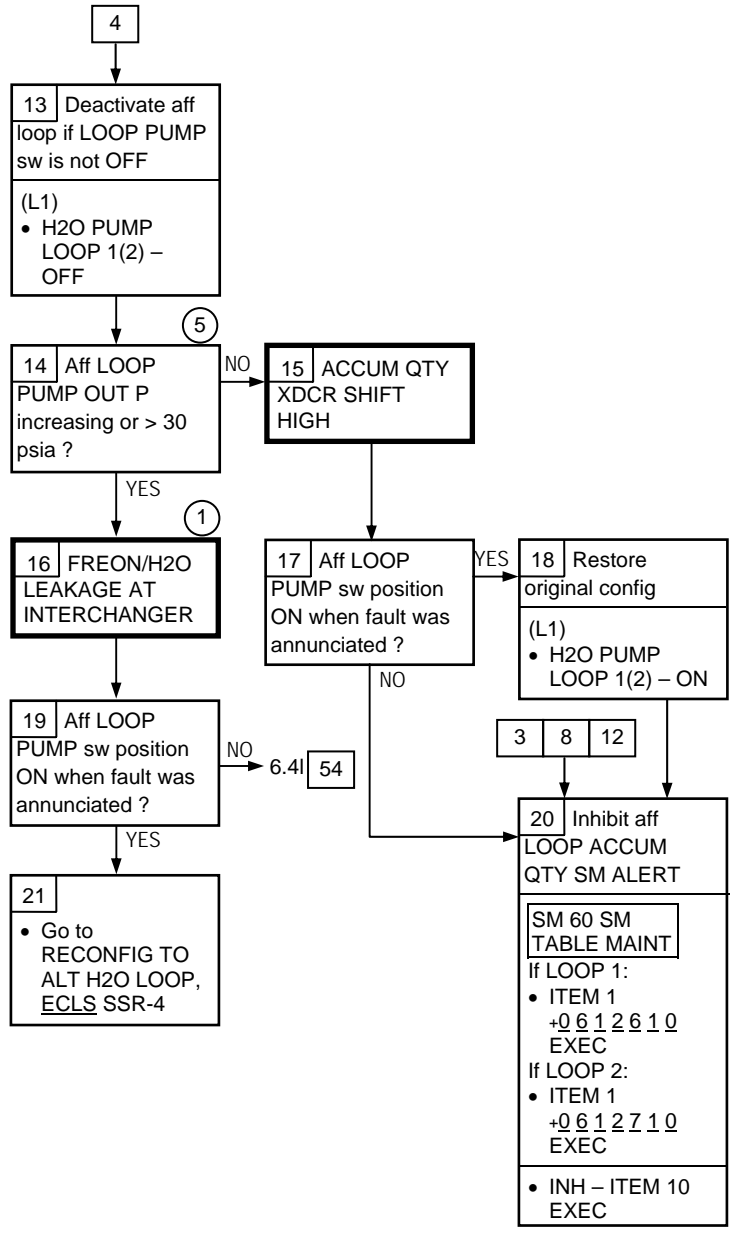
① Possible next PLS. √MCC

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 LOOP1,2 – 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 (Cont)**



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 psi normally

**ECLS**

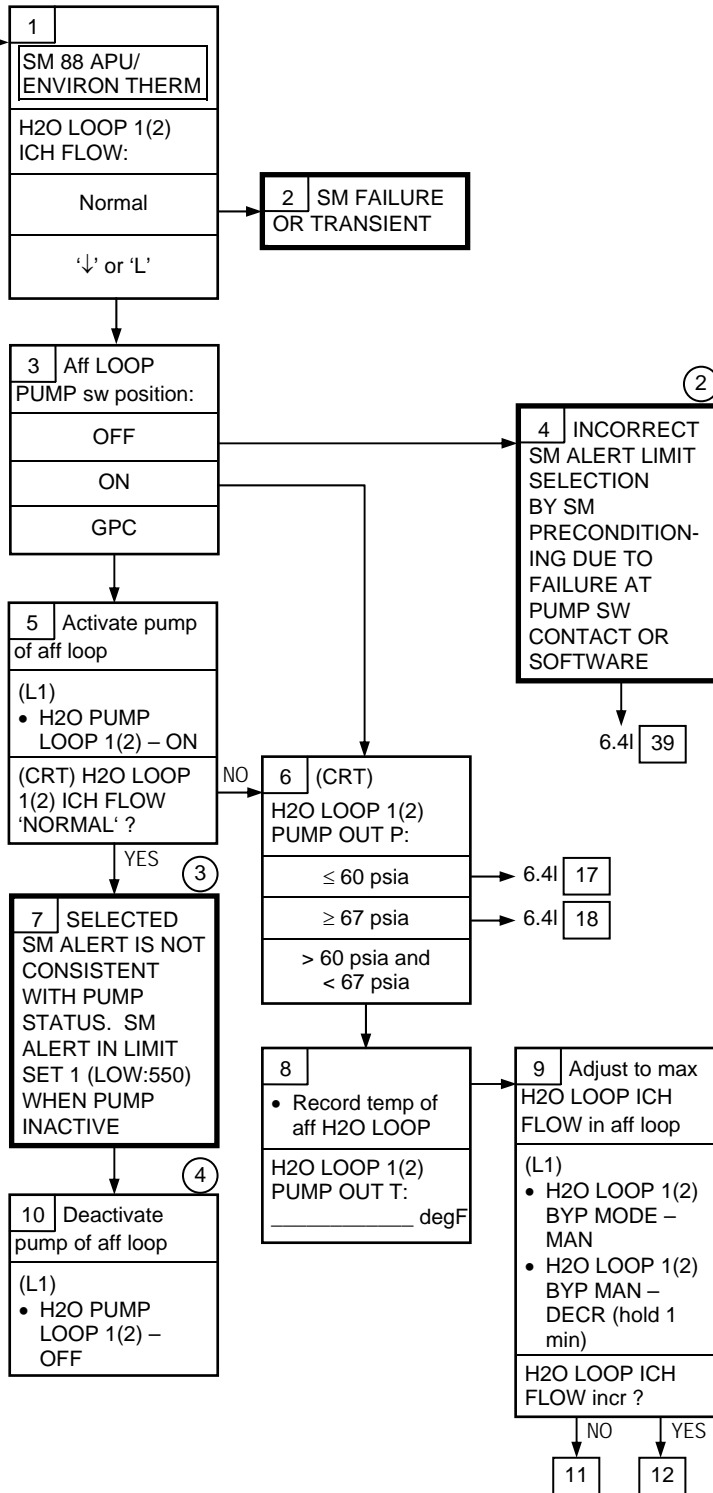
**6.4o H2O ICH FLOW 1(2) ↓**

**SM ALERT**

S88 H2O LOOP 1(2) FLOW

H2O LOOP 1(2) ICH FLOW < 550 lb/hr <sup>①</sup>

**Nominal Config:**  
Refer to 6.4l



① Preconditioning will select this limit set if H2O PUMP LOOP 1(2) – ON; or H2O PUMP LOOP 1(2) – GPC and GPC – ON signal present

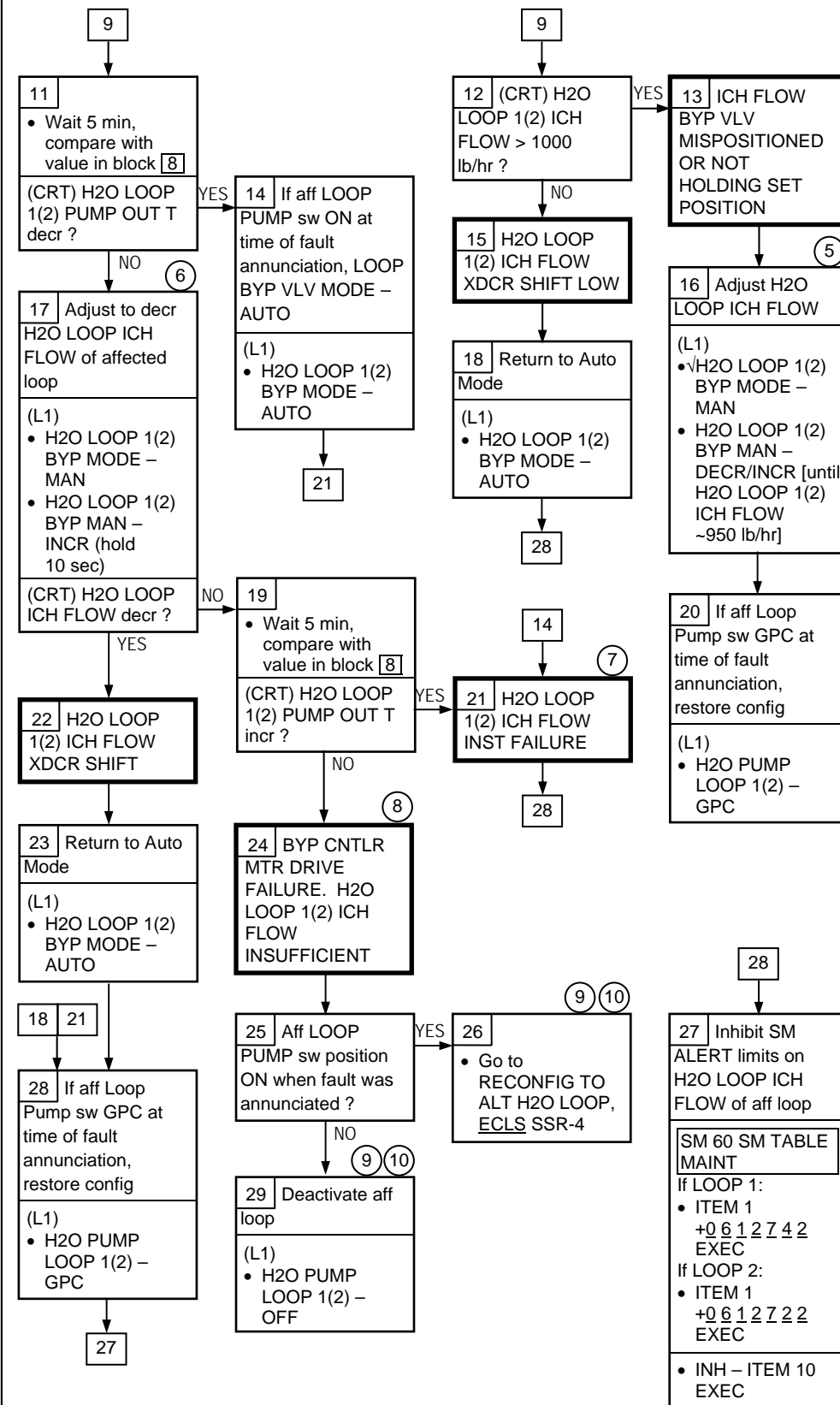
② Off-scale values are selected for FDA limits by SM preconditioning if H2O PUMP LOOP 1(2) – OFF; or H2O PUMP LOOP 1(2) – GPC without presence of GPC – ON signal

③ Possible causes: PL-MDM failure or pump switch GPC failure resulting in pump not receiving GPC PUMP – ON cmd; or SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM ALERT limits

④ Pump function sw ON position still available



**ECLS 6.4o (Cont)**



- ⑤ If problem recurs, reconfig to alternate H2O LOOP, ECLS SSR-4
- ⑥ ICH FLOW BYP VLV may be at full ICH flow position when fault annunciated
- ⑦ H2O LOOP 1: ECLSS SC11, MDM OF1  
H2O LOOP 2: ECLSS SC12, MDM OF2
- ⑧ Manual override adjustment may still be available. √MCC for possible IFM
- ⑨ Possible next PL. √MCC
- ⑩ If BYP vlv drive control on both loops failed, activate both H2O LOOPS

**ECLS**

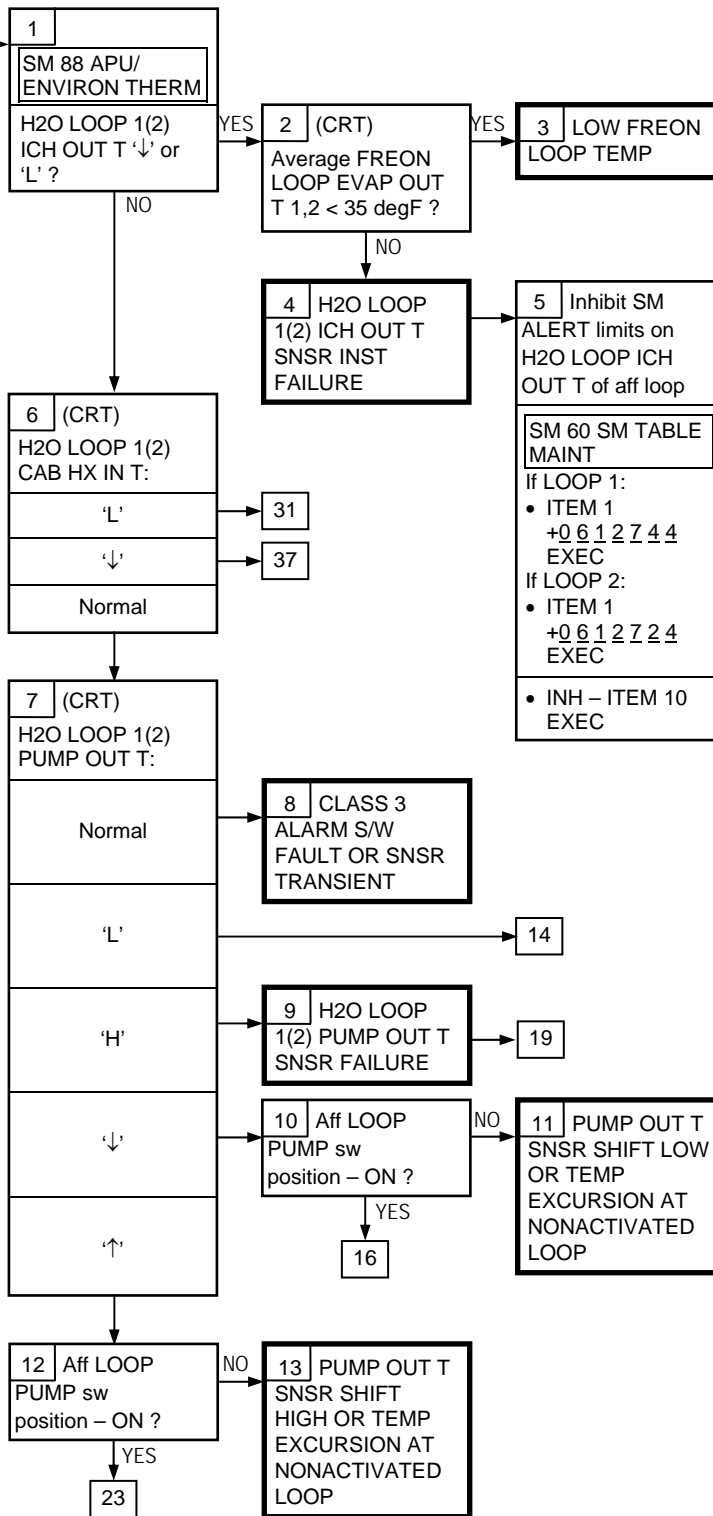
**6.4p H2O ICH OUT T 1(2) ↓  
CAB HX IN T 1(2) ↓  
PUMP OUT T 1(2) ↑↓**

SM ALERT

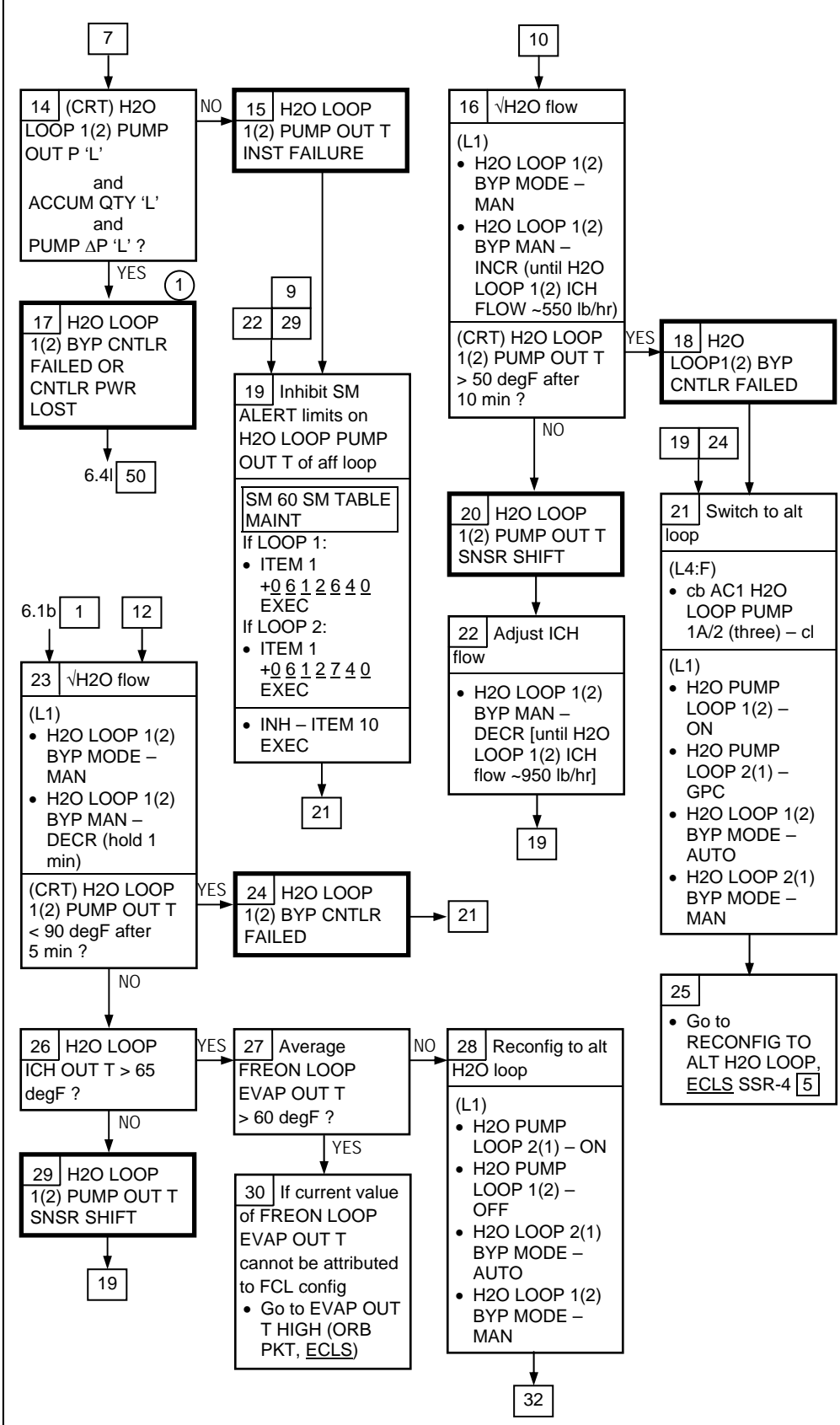
S88 H2O LOOP 1(2) TEMP

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

Nominal Config:  
Refer to 6.4l

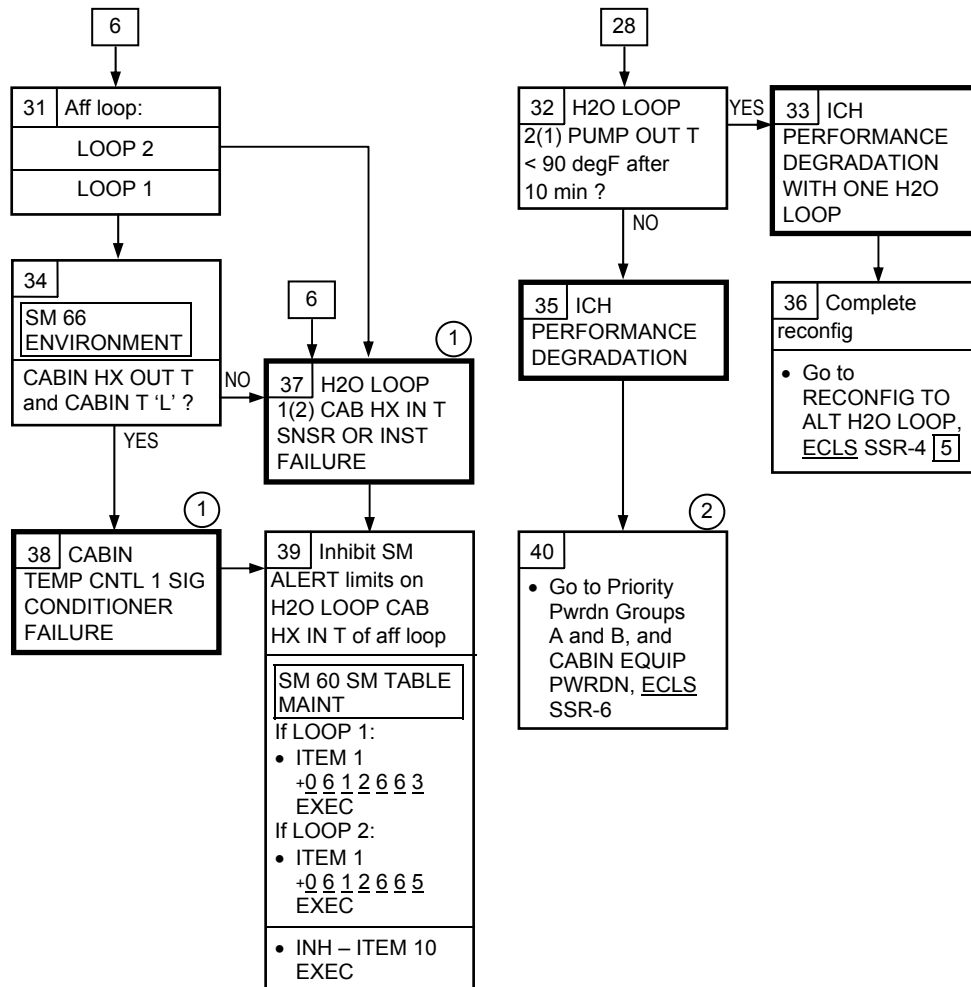


**ECLS 6.4p (Cont)**



① √MCC to reset cb (pnl L4)  
 LOOP 1:  
 cb AC3 ΦA H2O CNTLR 1  
 LOOP 2:  
 cb AC1 ΦA H2O CNTLR 2

**ECLS 6.4p (Cont)**



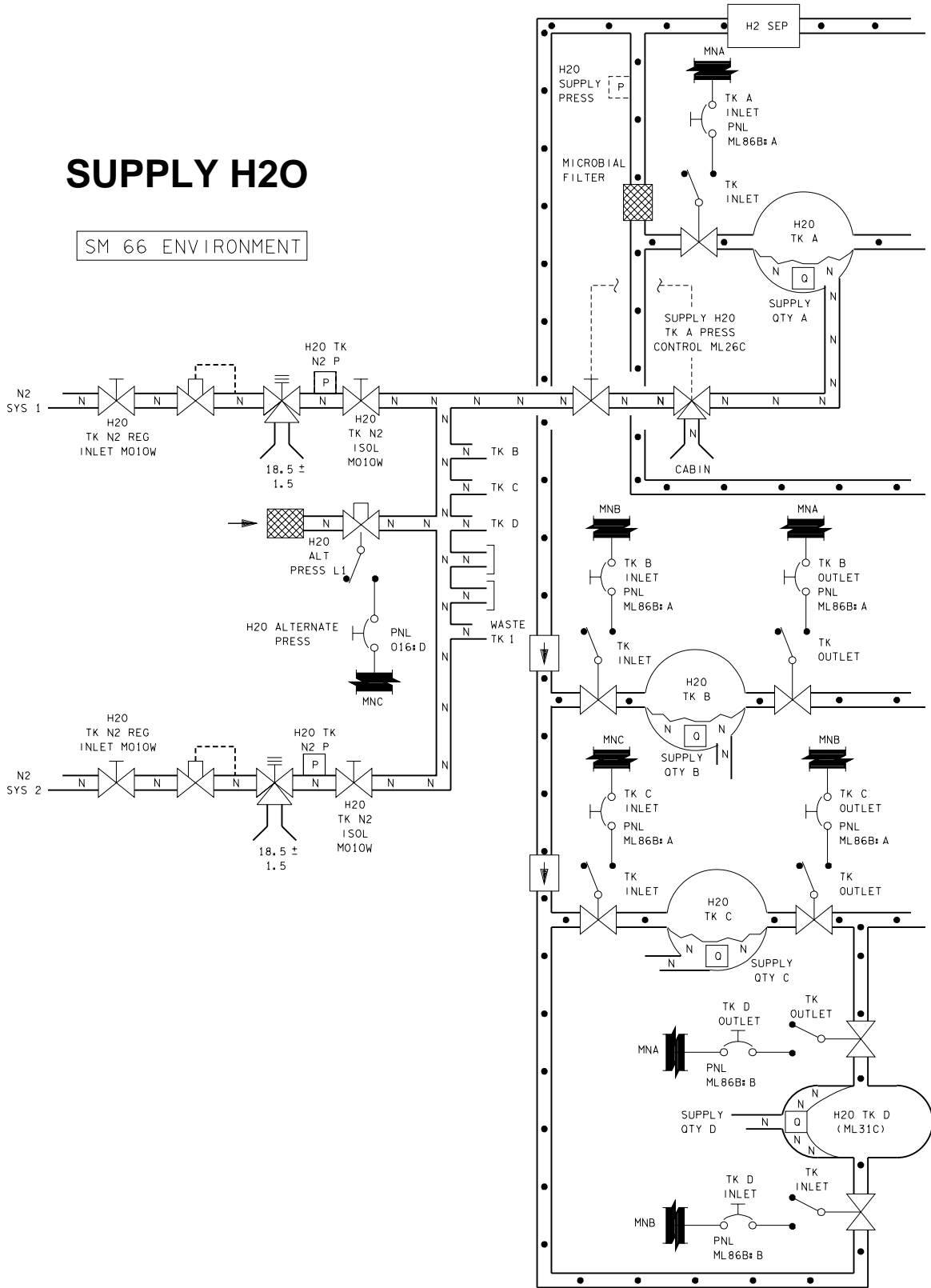
① √MCC to reset LOOP 1:  
(L4:L) cb AC2 ΦA  
CAB T CNTLR 1  
LOOP 2:  
(L4:L) cb AC1 ΦA  
CAB T CNTLR 2

② √MCC for further pwrtn reqd and H2O loop flowrate management

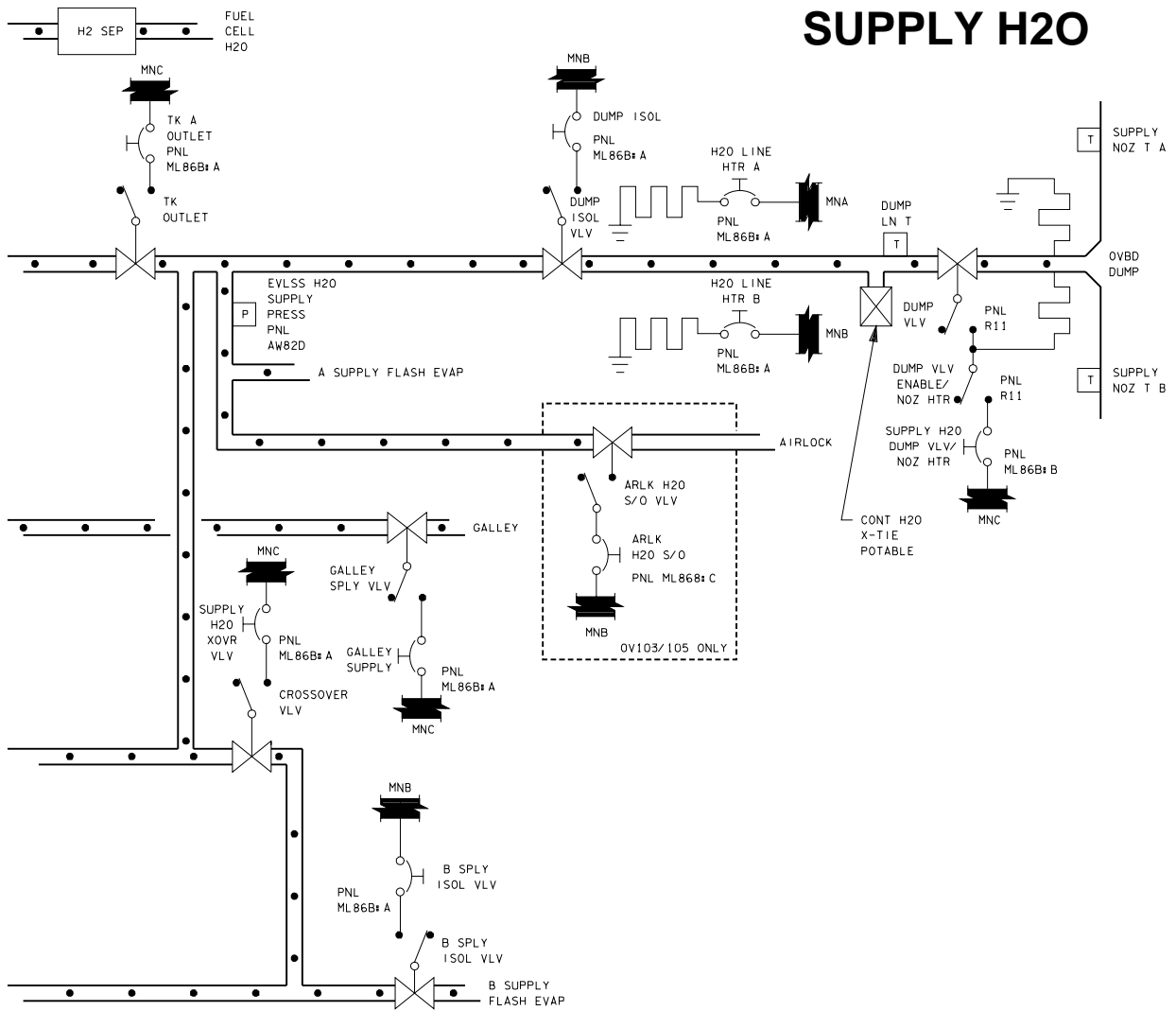
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# SUPPLY H2O

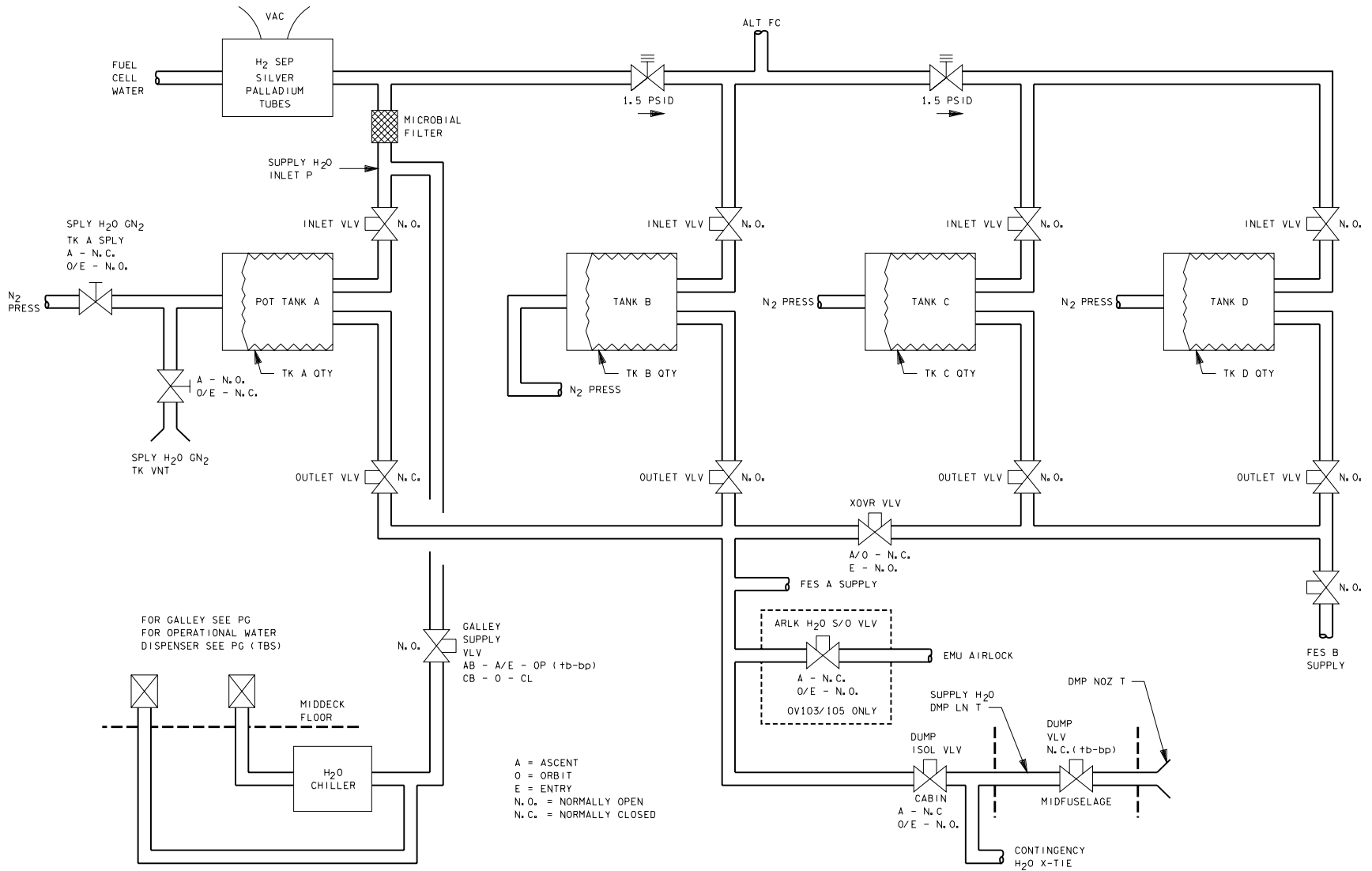
SM 66 ENVIRONMENT



48027003\_117. SCH 1

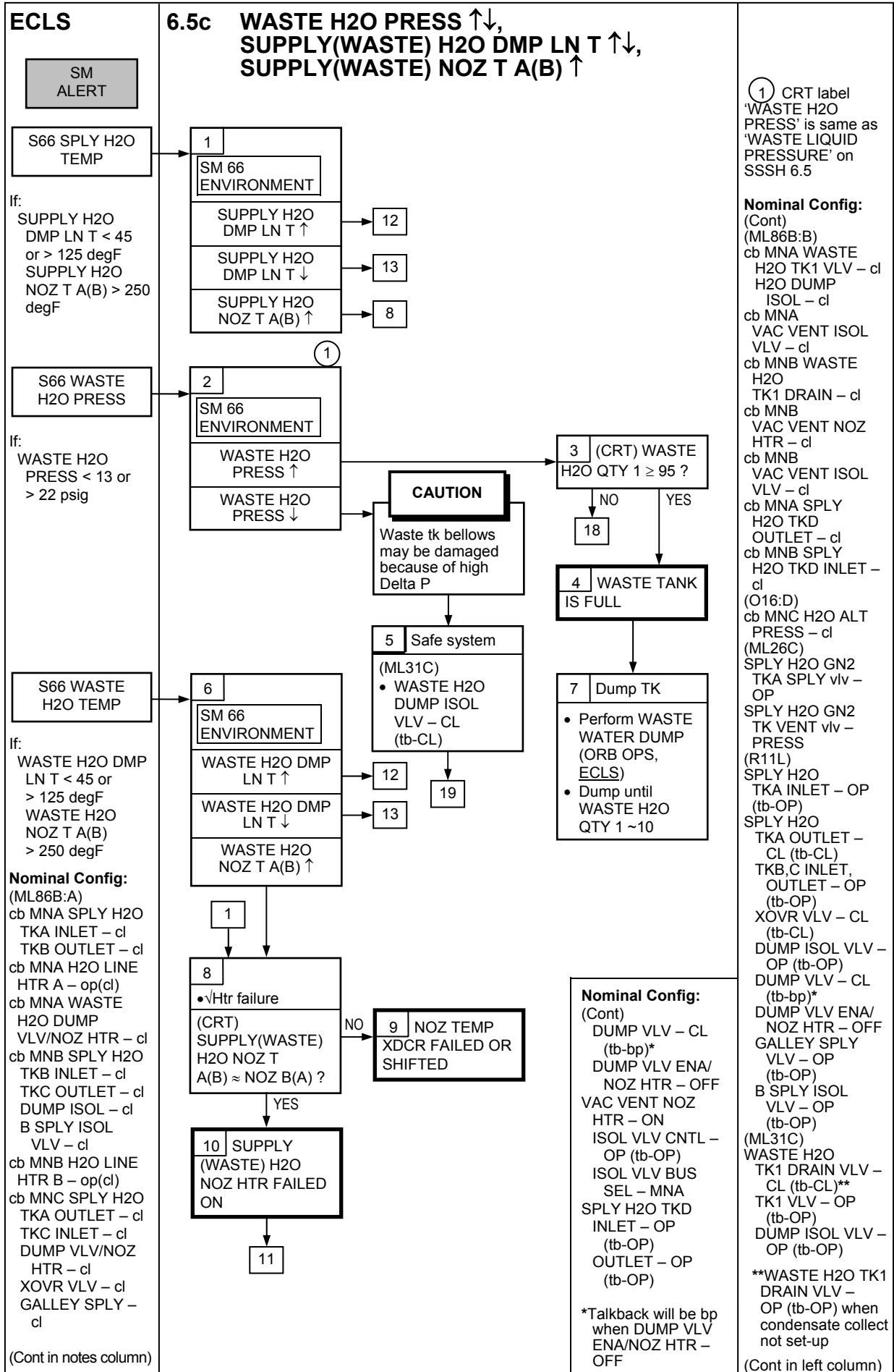


48027002\_117. SCH 1

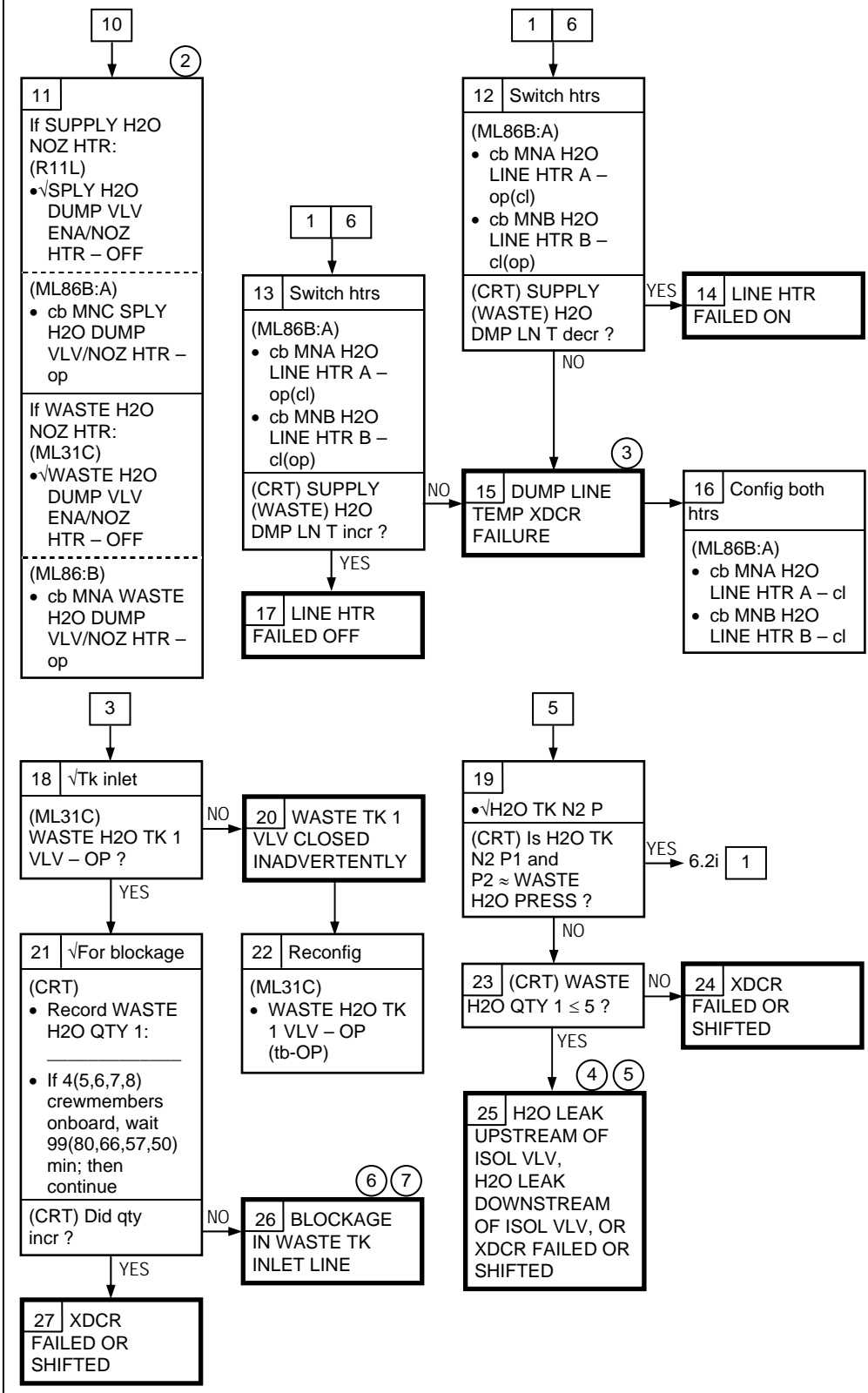


### SUPPLY H2O STORAGE





**ECLS 6.5c (Cont)**



- ② Dump system is not lost. MCC will update ORB OPS DUMP procedure
- ③ If temperature xdcr is OSH, √MCC before doing next step
- ④ √MCC about looking for H2O below middeck floor
- ⑤ MCC may be able to determine exact failure
- ⑥ √MCC on how to store condensate from humidity separator
- ⑦ √MCC about attempting waste water dump to remove object blocking waste tank inlet

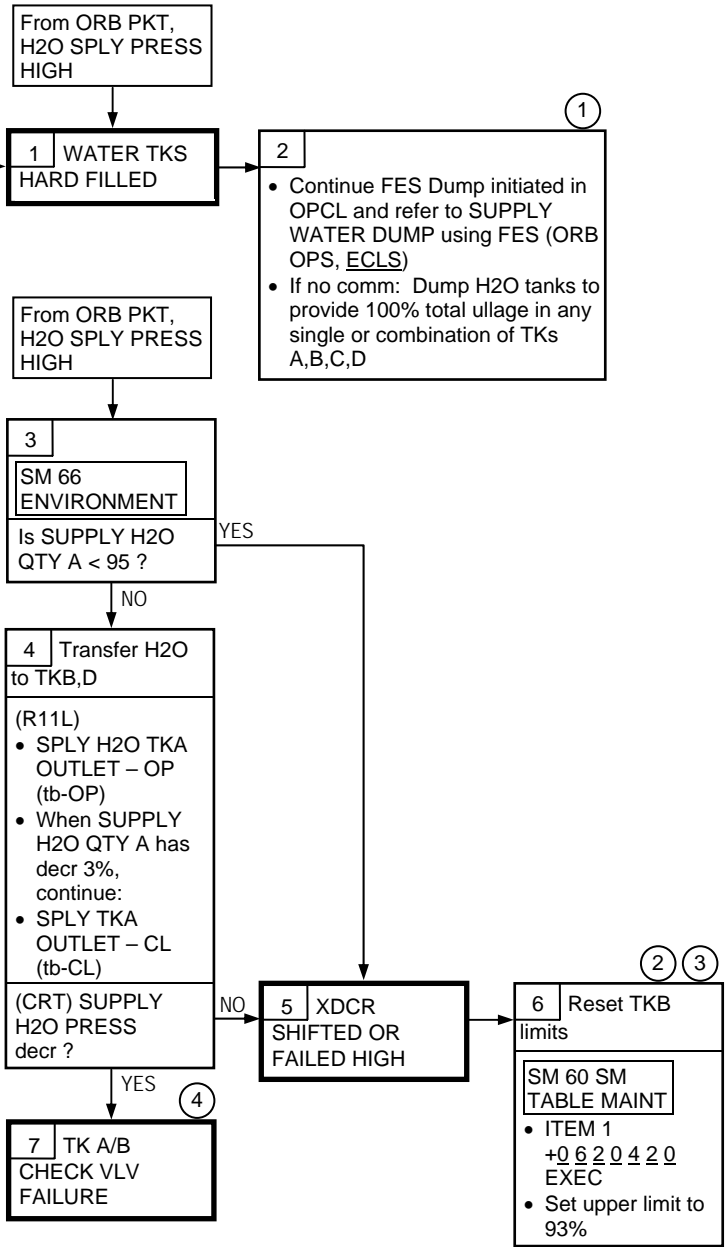
**ECLS**

**6.5d H2O SPLY PRESS ↓↑**

**SM ALERT**

**S66 SPLY H2O PRES**

If SUPPLY H2O PRESS > 40.0 psia



- ① 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

**EXT A/L**

**6.7**

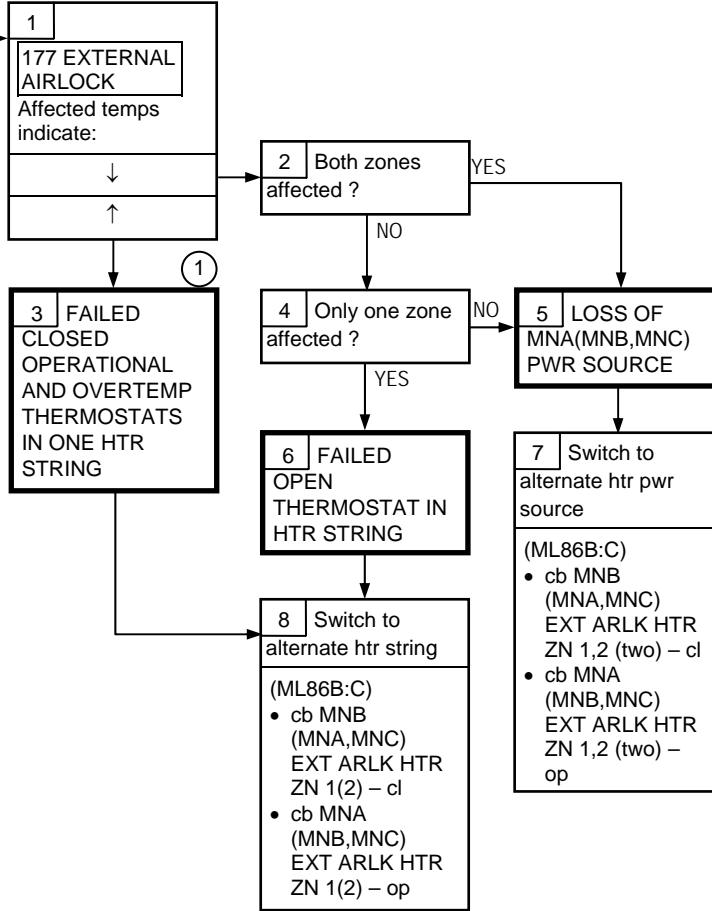
**ECLS**

**6.7a EXT A/L H2O LN T ↑↓**

177 A/L H2O LN T1(2)

H2O LINE TEMP:  
 H2O SPLY T ZN1 < 42  
 H2O SPLY T ZN1 > 130  
 LCG2 SPLY T ZN1 < 50  
 LCG2 SPLY T ZN1 > 130  
 QD PNL T ZN2 < 42  
 H2O SPLY T ZN2 < 42  
 H2O SPLY T ZN2 > 130

**Nominal Config:**  
 (ML86B:C)  
 cb MNA EXT ARLK HTR LINE ZN 1 – cl(op)  
 cb MNA EXT ARLK HTR LINE ZN 2 – cl(op)  
 cb MNB EXT ARLK HTR LINE ZN 1 – op(cl)  
 cb MNB EXT ARLK HTR LINE ZN 2 – op(cl)  
 cb MNC EXT ARLK HTR LINE ZN 1 – op(cl)  
 cb MNC EXT ARLK HTR LINE ZN 2 – op(cl)



① If both zone temps are indicating high, √MCC. Possible external heat load due to altitude is causing high temps

EXT A/L

6.7

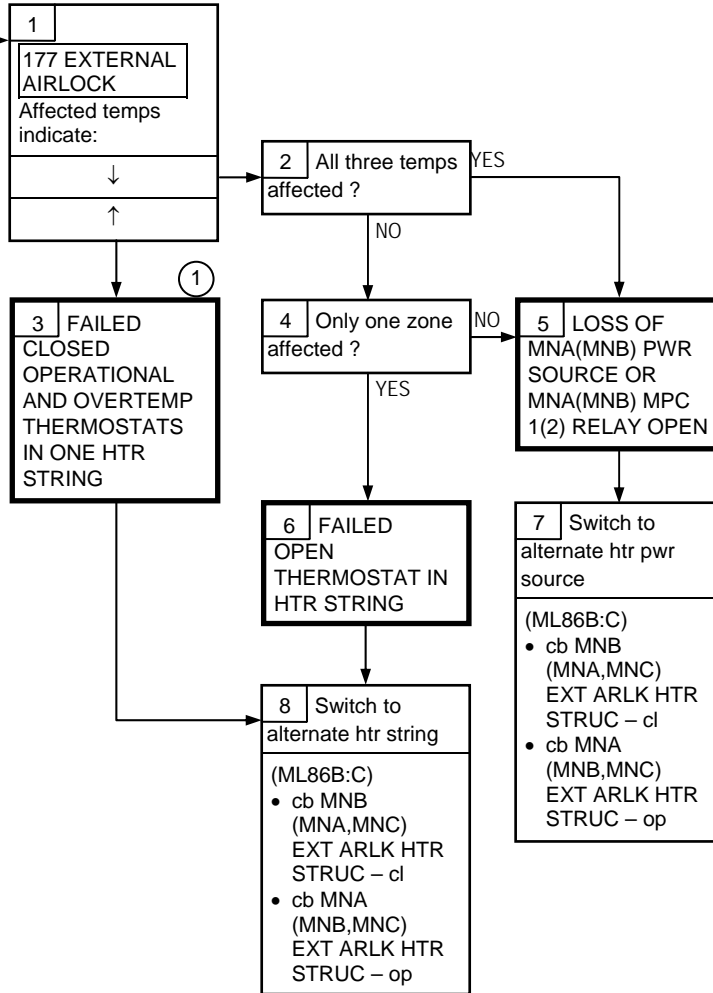
**ECLS**

**6.7b EXT A/L STRUCT ↑↓**

177 A/L  
STRUCT

INTERNAL TEMP:  
UPR (LWR) BKHD  
T < 40  
UPR (LWR) BKHD  
T > 113  
EXTERNAL TEMP:  
AFT STRUCT < 40  
AFT STRUCT  
> 113

**Nominal Config:**  
(ML86B:C)  
cb MNA EXT ARLK  
HTR STRUCT -  
cl(op)  
cb MNB EXT ARLK  
HTR STRUCT -  
op(cl)



① If two or more temps are indicating high, √MCC. Possible external heat load due to attitude is causing high temps

CO2

6.8

**ECLS**

**6.8a CO2 CNTLR 1(2) ↓**

SM  
ALERT

S66 CO2 RL  
SYS MALF

↓ will only illuminate for 6 sec  
CO2 RMVL SYS CNTLR 1(2) FAIL It – on(off)  
CO2 RMVL SYS CNTLR 1(2) OPER It – 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  
(MO51F)  
CO2 RMVL SYS CNTLR 1(2) MNA(C) – ON  
cb AC1(3) (three) – cl  
CNTLR 1(2) FAIL It – off  
CNTLR 1(2) OPER It – on  
(ML31C)  
VAC VENT ISOL VLV BUS SEL – MNA  
VAC VENT ISOL VLV CNTL – OP (tb-OP)

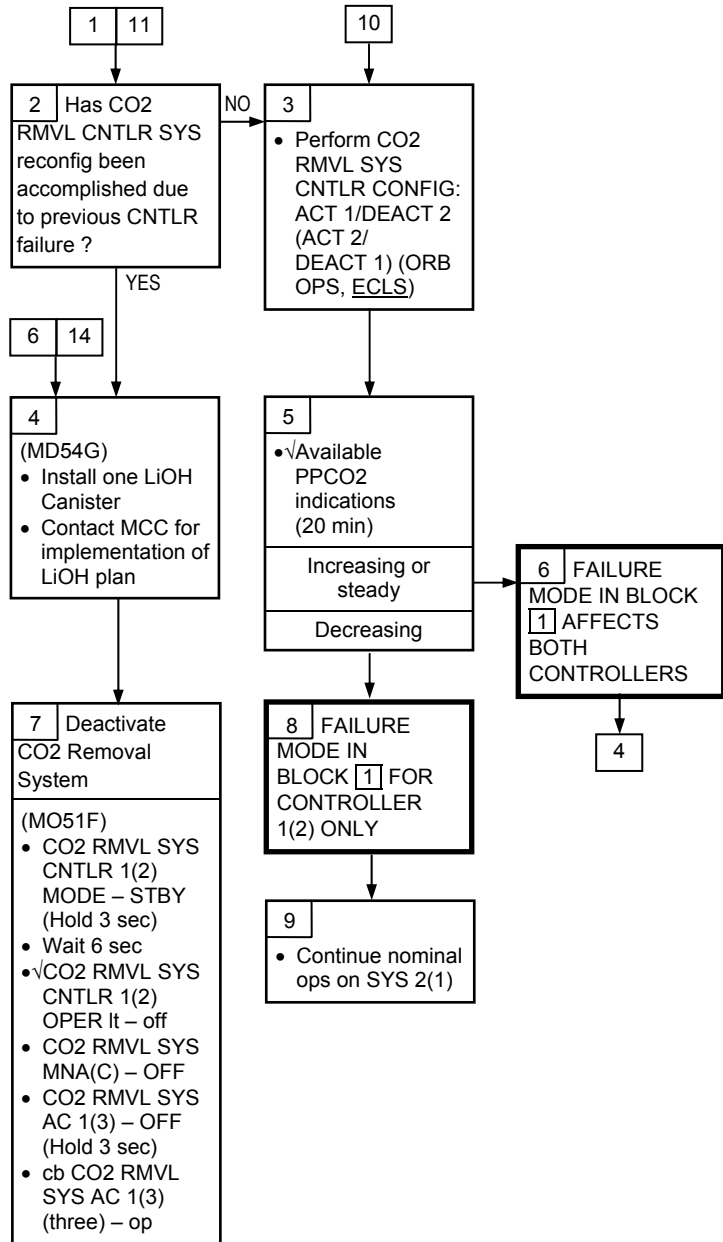
6.8b 3  
6.8b 9

1					
SM 66 ENVIRONMENT					
• Match indications in chart to determine failure					
FAILURE CASE	(MO51F) CO2 RMVL SYS 1(2) FAIL It	(MO51F) CO2 RMVL SYS 1(2) OPER It	(CRT) CO2 CNTLR 1(2) '*'	(CRT) S66 CO2 RMVL SYS MALF fault msg	FAILURE MODE (Assumes all sw in nominal config)
1	OFF	ON	'*'	NO	DEGRADED CO2 REMOVAL CAPABILITY → 11
2	OFF	OFF	BLANK	YES	LOSS OF MNA(C) PWR → 2
3	ON	OFF	BLANK	NO	LOSS OF AC 1(3) ΦA PWR → 2
4	ON	OFF	'*'	YES	CNTLR 1(2) FAULT SHUTDN → 10
5	ON	OFF	'*'	NO	CNTLR 1(2) COMMON BITE → 10
6	OFF	OFF	BLANK	NO	CNTLR 1(2) TOTAL PWR FAILURE → 2

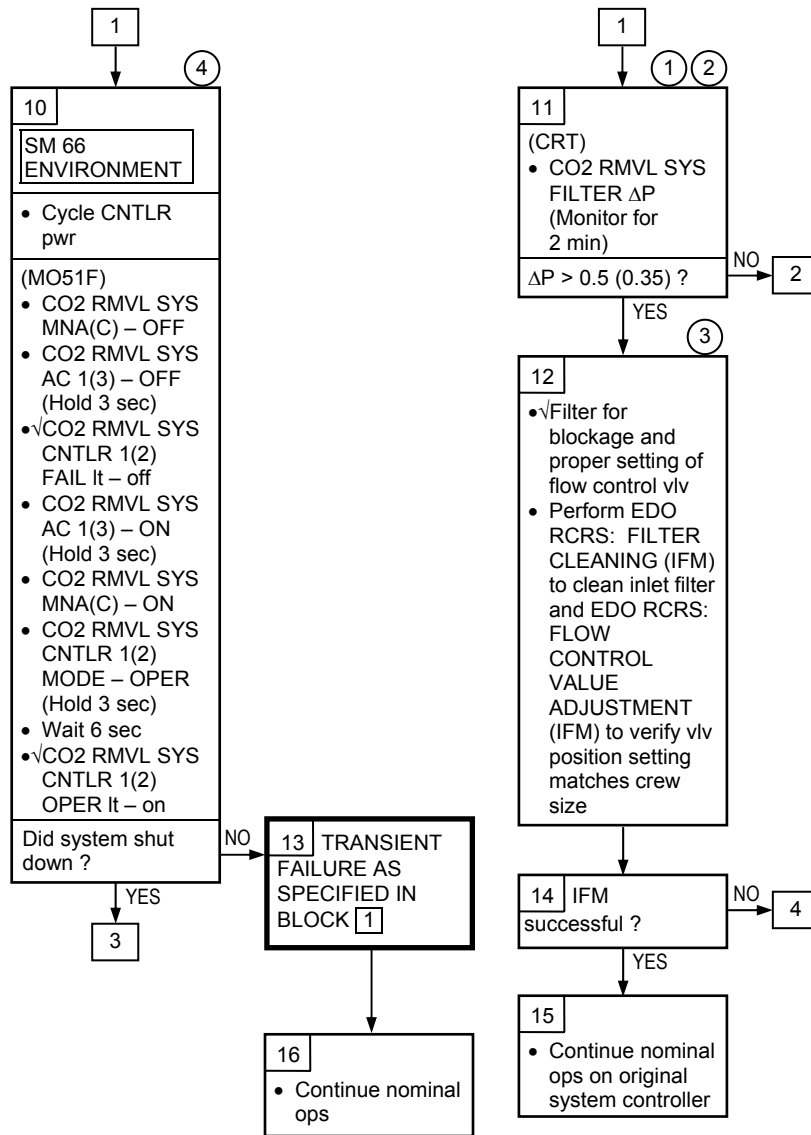
CO2

6.8

**ECLS 6.8a (Cont)**



**ECLS 6.8a (Cont)**



- ① System isolates beds for 2 min 6 sec out at every 11 min
- ② ΔP value in parenthesis corresponds to 10.2 psia cabin environment
- ③ √MCC before performing IFM
- ④ Allow 26 min for system cycle



**ECLS**

**6.8b PPCO2 ↑**

① Only MCC can determine exact failure. Suspect snsr yielding alarm

**SM ALERT**

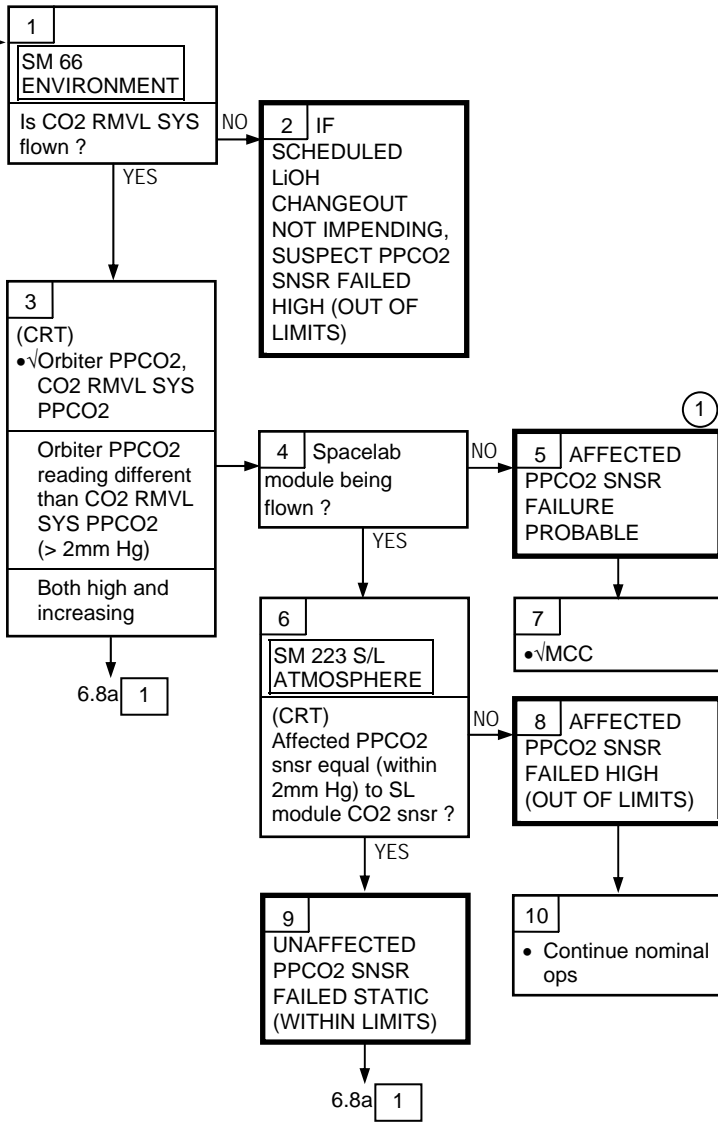
S66 CO2 RL SYS PCO2

If:  
CO2 RMVL SYS CO2 partial press > 7.6mm Hg

S66 CAB PPCO2

If:  
Orbiter CO2 partial press > 7.6mm Hg

**Nominal Config:**  
(ML86B:E)  
cb MNA CO2 SYS 1 CNTLR – cl  
cb MNB CO2 COM INSTR – cl  
cb MNC CO2 SYS 2 CNTLR – cl  
(MO51F)  
CO2 RMVL SYS:  
CNTLR 1(2) MNA(C) – ON  
cb AC1(3) (three) – cl  
cb AC3(1) (three) – op  
CNTLR 1(2) FAIL It – off  
CNTLR 1(2) OPER It – on  
(ML31C)  
VAC VENT ISOL VLV BUS SEL – MNA  
VAC VENT ISOL VLV CNTL – OP (tb-OP)



# ECLS SSR-2

## FES CORE FLUSH PROCEDURE

### NOTE

This procedure is used to deice or to remove contamination from topping or hi load FES core by flowing warm Freon through core. Bypassed radiators and the Secondary FES Controller are used for the flush. A successful flush will be indicated by EVAP OUT temps stable at ~62 degF when FLASH EVAP CNTLR SEC is activated. Secondary cue is a very rapid decrease in duct temps, followed by rapid increase

#### SM 88 APU/ENVIRON THERM

##### TOPPING CORE FLUSH (RADS ACTIVATED)

- L1 1. √FLASH EVAP CNTLR (three) – OFF  
 2. TOP EVAP HTR DUCT – A/B  
 3. √NOZ (two) – A AUTO(B AUTO)  
 CRT Proceed when TOP FWD(AFT) temps > 120 degF  
 4. RAD BYP VLV MODE (two) – MAN  
 5. CNTLR LOOP (two) – OFF, AUTO A  
 6. After 80 sec, RAD CNTLR LOOP (two) – OFF  
 CRT Proceed when EVAP OUT T > 90 degF for 2 min  
 L1 7. FLASH EVAP CNTLR SEC – ON (wait 30 sec)  
 8. – OFF (wait 30 sec)  
 9. Repeat steps 7 and 8 three times, then:  
 FLASH EVAP CNTLR SEC – ON  
 CRT 10. Proceed on MCC call, or if no comm, wait minimum 7 min, then proceed  
 when EVAP OUT T ~62 degF and TOP FWD(AFT) > 120 degF
- \* If TOP FWD(AFT) < 40 degF, then \*  
 \* immediately perform steps 11,12,13,14 \*
- L1 11. FLASH EVAP CNTLR SEC – OFF  
 12. RAD CNTLR LOOP (two) – AUTO A  
 13. After 10 sec, RAD BYP VLV MODE 1,2 (two) – AUTO  
 RAD CNTLR OUT TEMP – HI  
 14. After 5 min, RAD CNTLR OUT TEMP – NORM  
 If successful flush:  
 15. After 30 min, TOP EVAP HTR DUCT – A(B)  
 If FES reqd, go to FES RESTART, ECLS SSR-5

##### HI LOAD CORE FLUSH (RADS ACTIVATED)

- L1 1. √FLASH EVAP CNTLR (three) – OFF  
 2. HI LOAD DUCT HTR – A/B  
 CRT Proceed when HI LOAD INBD(OUTBD) Ts > 170 degF  
 L1 3. HI LOAD EVAP – ENA  
 4. RAD BYP VLV MODE (two) – MAN  
 5. CNTLR LOOP (two) – OFF, AUTO A  
 6. After 80 sec, RAD CNTLR LOOP (two) – OFF  
 CRT Proceed when EVAP OUT T > 90 degF for 2 min  
 L1 7. FLASH EVAP CNTLR SEC – ON (wait 30 sec)  
 8. – OFF (wait 30 sec)  
 9. Repeat steps 7 and 8 three times, then:  
 FLASH EVAP CNTLR SEC – ON  
 CRT 10. Proceed on MCC call, or if no comm, wait minimum 7 min, then proceed  
 when EVAP OUT T ~62 degF and HI LOAD INBD(OUTBD) > 170 degF
- \* If HI LOAD INBD(OUTBD) < 40 degF, then \*  
 \* immediately perform steps 11,12,13,14 \*
- L1 11. FLASH EVAP CNTLR SEC – OFF  
 12. RAD CNTLR LOOP (two) – AUTO A  
 13. After 10 sec, RAD BYP VLV MODE 1,2 (two) – AUTO  
 RAD CNTLR OUT TEMP – HI  
 14. After 5 min, RAD CNTLR OUT TEMP – NORM  
 If successful flush:  
 15. HI LOAD EVAP – OFF  
 16. After 30 min, HI LOAD EVAP DUCT HTR – OFF  
 If FES reqd, go to FES RESTART, ECLS SSR-5

ECLS SSR

## ECLS SSR-2 (Cont)

### SM 0 THERMAL

#### TOPPING CORE FLUSH (RADS NOT ACTIVATED)

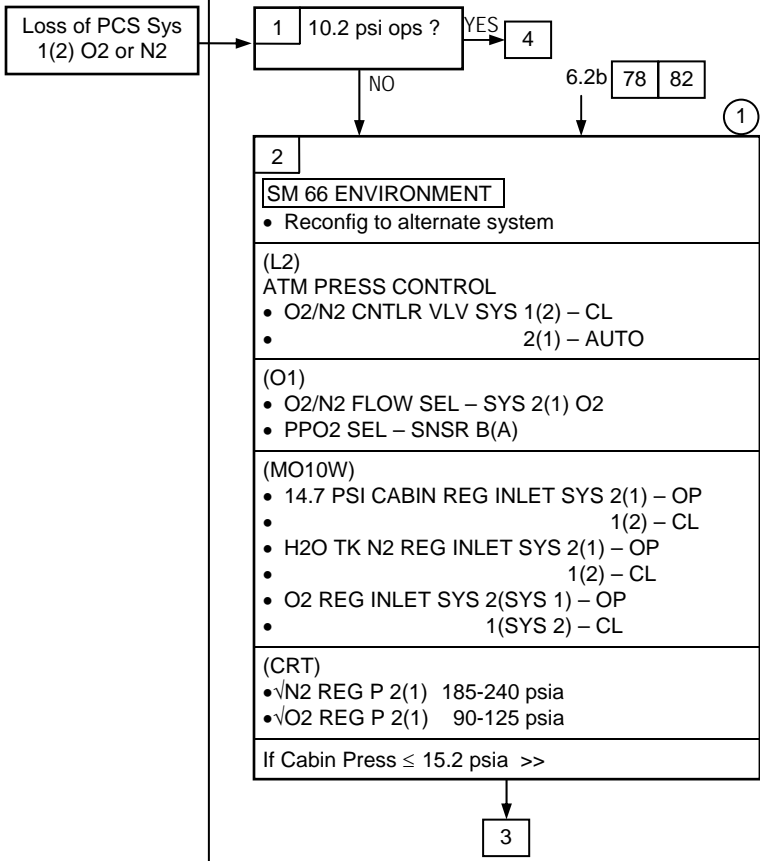
- L1 1. TOP EVAP HTR DUCT – A/B  
CRT Proceed when TOPPING DUCT temps within limits (no ↓; if PASS SM 88 available, TOP FWD(AFT) > 120 degF)  
L1 2. FLASH EVAP CNTLR SEC – OFF  
3. HI LOAD EVAP – OFF  
O1 Proceed when EVAP OUT T > 90 degF for 2 min  
L1 4. FLASH EVAP CNTLR SEC – ON (wait 30 sec)  
5. – OFF (wait 30 sec)  
6. Repeat steps 4 and 5 three times, then:  
FLASH EVAP CNTLR SEC – ON  
CRT 7. Proceed on MCC call, or, if no comm, wait minimum 7 min, then proceed  
when EVAP OUT T ~62 degF and TOP FWD(AFT) > 120 degF
- \* If TOP FWD(AFT) < 40 degF, then \*  
\* immediately perform steps 12,13,14,15 \*
- L1 8. FLASH EVAP CNTLR SEC – OFF  
9. HI LOAD EVAP – ENA  
O1 10. FLASH EVAP CNTLR PRI B – ON (wait 2 min)  
If EVAP OUT T ~39 degF (Topper recovered):  
L1 11. TOP EVAP HTR DUCT – A(B) >>  
12. FLASH EVAP CNTLR (three) – OFF (Topper not recovered)  
13. HI LOAD EVAP – ENA  
14. FLASH EVAP CNTLR SEC – ON  
15. √TOP EVAP HTR DUCT – A(B)

#### HI LOAD CORE FLUSH (RADS NOT ACTIVATED)

- L1 1. HI LOAD EVAP DUCT HTR – A/B  
CRT Proceed when HI LOAD DUCT temps within limits (no ↓; if PASS SM 88 available, when HI LOAD INBD(OUTBD) > 170 degF)  
L1 2. FLASH EVAP CNTLR SEC – OFF  
3. HI LOAD EVAP – ON  
4. FLASH EVAP CNTLR SEC – ON (wait 30 sec)  
5. – OFF (wait 30 sec)  
6. Repeat steps 4 and 5 three times, then:  
FLASH EVAP CNTLR SEC – ON  
CRT 7. Proceed on MCC call, or, if no comm, wait minimum 7 min, then proceed  
when EVAP OUT T ~62 degF and HI LOAD INBD(OUTBD) > 170 degF
- \* If HI LOAD INBD (OUTBD) < 40 degF, then \*  
\* immediately perform steps 12,13,14,15 \*
- L1 8. FLASH EVAP CNTLR SEC – OFF  
9. HI LOAD EVAP – ENA  
O1 10. FLASH EVAP CNTLR PRI B – ON (wait 2 min)  
If EVAP OUT T ~39 degF (HI LOAD recovered):  
L1 11. HI LOAD EVAP DUCT HTR – A >>  
12. FLASH EVAP CNTLR (three) – OFF (HI LOAD not recovered)  
13. HI LOAD EVAP – OFF  
14. FLASH EVAP CNTLR SEC – ON  
15. √HI LOAD EVAP DUCT HTR – A(B)

**ECLS**

**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

# ECLS SSR-3 (Cont)

6.2b 41 51 2

3

**SM 66 ENVIRONMENT**  
 If Cabin Press > 15.2 psia

(MO13Q)  
 • MIDDECK FLOODS AIRLK 2 – ON/OFF

(Inner Hatch)  
 • Equalization vlv caps (two) – remove, stow  
 • Equalization vlv (two) – OFF  
 • Open, stow HATCH  
 • Rotate vent duct into airlock

(O15:D)  
 • cb MNB PPO2 C CAB dP/dT – op

(AW82B)  
 • AIRLK DEPRESS vlv cap – vent, remove

• Depress Cabin to ops level

(AW82B)  
 • AIRLK DEPRESS vlv – 5  
   \* If 'S66 CABIN PPO2 A(B)' \*  
   \* AIRLK DEPRESS vlv – CL \*  
   \* (C5) \*  
   \* DIRECT O2 vlv – OP \*  
   \* When PPO2 = 3.45, \*  
   \* DIRECT O2 vlv – CL \*  
   \* Continue to depress Cabin and \*  
   \* add O2 as reqd \*  
 • When 'S66 CAB O2(N2) FLO 1(2)'  
   If PPO2 > 3.6, continue depress until  
   PPO2 < 3.6 psia  
   If PPO2 < 2.9, continue depress until  
   CABIN PRESS = 14.5 psi  
   AIRLK DEPRESS vlv – CL  
   Allow CABIN PRESS and PPO2 to incr  
   (~15 min). Repeat depress to CABIN  
   PRESS = 14.5 until PPO2 > 2.9 psia

5 Reconfig from Cabin Depress

(AW82B)  
 • AIRLK DEPRESS vlv – CL, capped

(O15:D)  
 • cb MNB PPO2 C CAB dP/dT – cl

(Inner Hatch)  
 • If reqd, rotate vent duct and stow on AIRLK wall  
 • If reqd, close HATCH  
 • EQUAL vlv – norm and capped

(MO13Q)  
 • MIDDECK FLOODS AIRLK 2 – OFF/ON

6.2b 78 82 1

4 10.2 psi reconfig

(L2)  
**ATM PRESS CONTROL**  
 • O2/N2 CNTLR VLV SYS 1 – CL (O2)  
   • 2 – OP (N2)

(MO10W)  
 • H2O TK N2 REG INLET SYS 1 – CL  
   • 2 – OP

(CRT)  
 • √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

If Cabin Press ≤ 10.6 psia >>

6

② Swap PCS feeding nitrogen. Oxygen fed via Direct O2

## ECLS SSR-3 (Cont)

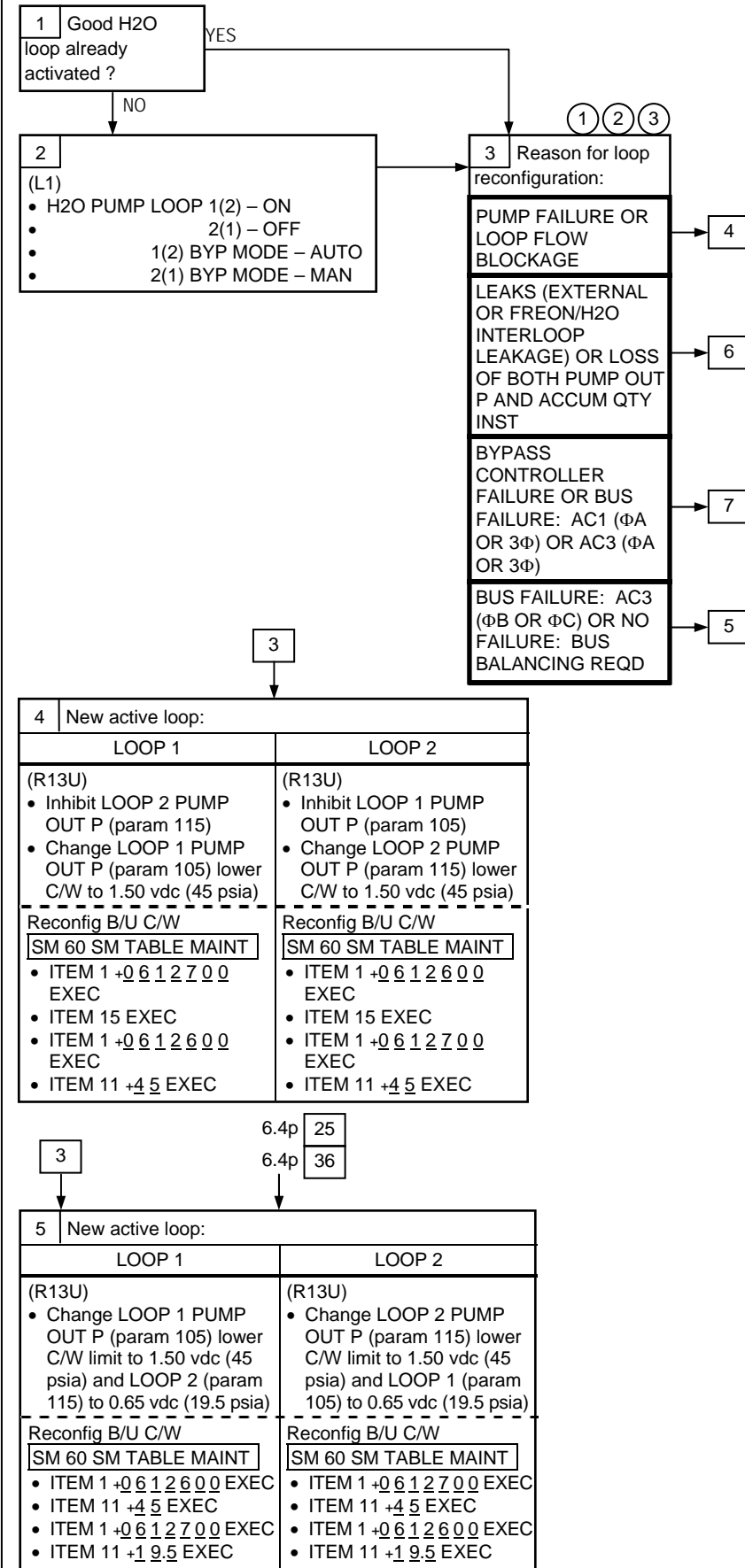
6.2b 41 51

4

6
<b>SM 66 ENVIRONMENT</b>
If Cabin Press > 10.6 psi
(O15:D) • cb MNB PPO2 C CAB dP/dT – op
(AW82B) • AIRLK DEPRESS vlv cap – vent, remove
• Depress Cabin to ops level
(AW82B) • AIRLK DEPRESS VLV – 5 <ul style="list-style-type: none"> <li>* If 'S66 CABIN PPO2' AIRLK *</li> <li>* DEPRESS vlv – CL *</li> <li>* (MO10W) *</li> <li>* 14.7 REG INLET SYS 2 – OP or *</li> <li>* open 14.7 REG INLET configured *</li> <li>* for O2 when PPO2 = 2.8 *</li> <li>* 14.7 REG INLET SYS 2 – CL *</li> <li>* Continue to depress *</li> <li>* Cabin and add O2 as reqd *</li> </ul>
If PPO2 > 2.8, continue depress until PPO2 ≤ 2.8 and Cabin P = 10.2 < X < 10.4
If PPO2 < 2.55
• AIRLOCK DEPRESS vlv – CL
• Open 14.7 psi CABIN REG INLET which is configured to flow O2 to allow cabin press and PPO2 to incr until PPO2 = 2.8. Repeat depress until Cabin P = 10.2 < X < 10.4 and PPO2 > 2.55

7	Reconfig from cabin depress
(AW82B) • AIRLK DEPRESS vlv – CL	
(O15:D) • cb MNB PPO2 C CAB dP/dT – cl	
• Go to 10.2 PSI MAINTENANCE (EVA) for subsequent cabin adjustments	

# ECLS SSR-4 RECONFIG TO ALT H2O LOOP



① 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

## ECLS SSR-4 (Cont)

3

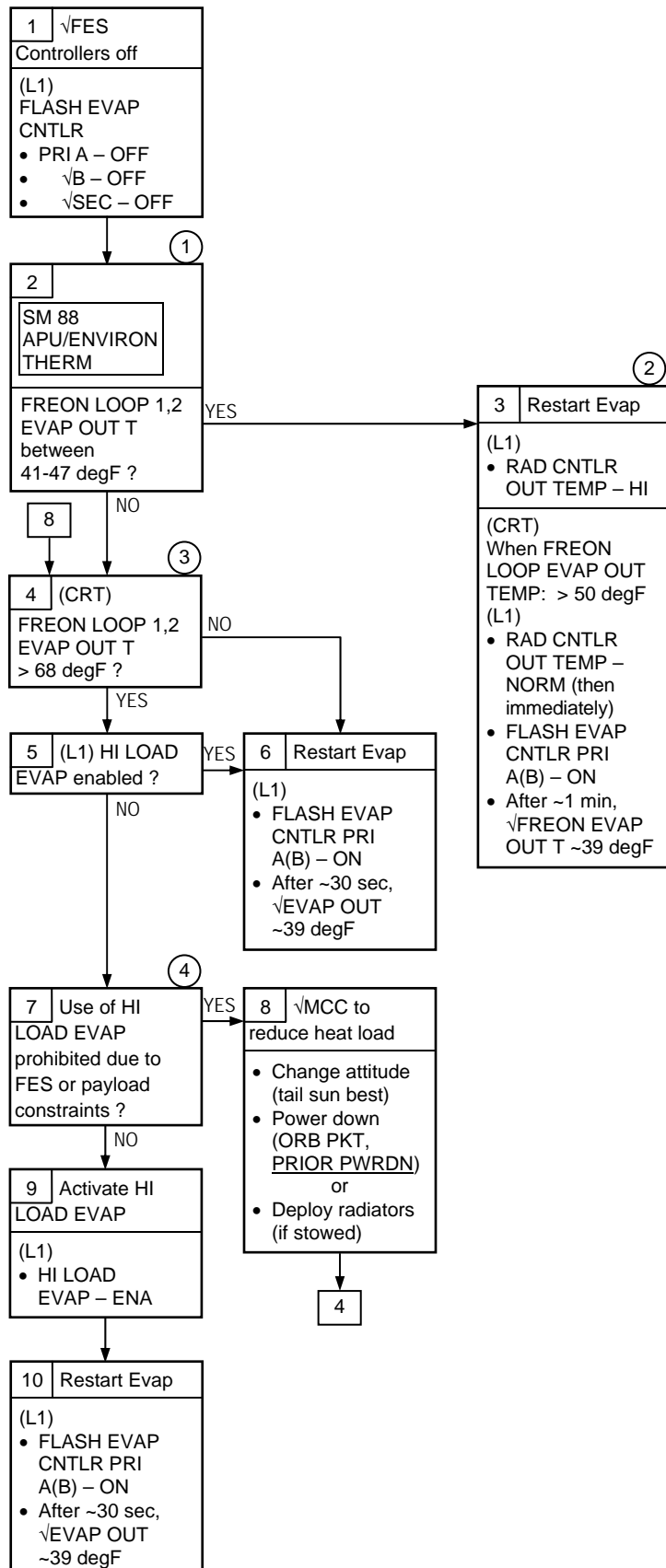
6   New active loop:	
LOOP 1	LOOP 2
(R13U) <ul style="list-style-type: none"> <li>Inhibit LOOP 2 PUMP OUT P (param 115)</li> <li>Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia)</li> </ul>	(R13U) <ul style="list-style-type: none"> <li>Inhibit LOOP 1 PUMP OUT P (param 105)</li> <li>Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)</li> </ul>
Reconfig B/U C/W <div style="border: 1px solid black; padding: 2px;">SM 60 SM TABLE MAINT</div> <ul style="list-style-type: none"> <li>ITEM 1 +0612600 EXEC</li> <li>ITEM 11 +45 EXEC</li> <li>ITEM 1 +0612700 EXEC</li> <li>ITEM 15 EXEC</li> </ul>	Reconfig B/U C/W <div style="border: 1px solid black; padding: 2px;">SM 60 SM TABLE MAINT</div> <ul style="list-style-type: none"> <li>ITEM 1 +0612700 EXEC</li> <li>ITEM 11 +45 EXEC</li> <li>ITEM 1 +0612600 EXEC</li> <li>ITEM 15 EXEC</li> </ul>
Inhibit LOOP 2 SM ALERTS <ul style="list-style-type: none"> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612710 EXEC</li> <li>ITEM 10 EXEC</li> </ul>	Inhibit LOOP 1 SM ALERTS <ul style="list-style-type: none"> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612610 EXEC</li> <li>ITEM 10 EXEC</li> </ul>

3

7   New active loop:	
LOOP 1	LOOP 2
(R13U) <ul style="list-style-type: none"> <li>Inhibit LOOP 2 PUMP OUT P (param 115)</li> <li>Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia)</li> </ul>	(R13U) <ul style="list-style-type: none"> <li>Inhibit LOOP 1 PUMP OUT P (param 105)</li> <li>Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)</li> </ul>
Reconfig B/U C/W <div style="border: 1px solid black; padding: 2px;">SM 60 SM TABLE MAINT</div> <ul style="list-style-type: none"> <li>ITEM 1 +0612600 EXEC</li> <li>ITEM 11 +45 EXEC</li> <li>ITEM 1 +0612700 EXEC</li> <li>ITEM 15 EXEC</li> </ul>	Reconfig B/U C/W <div style="border: 1px solid black; padding: 2px;">SM 60 SM TABLE MAINT</div> <ul style="list-style-type: none"> <li>ITEM 1 +0612700 EXEC</li> <li>ITEM 11 +45 EXEC</li> <li>ITEM 1 +0612600 EXEC</li> <li>ITEM 15 EXEC</li> </ul>
Inhibit LOOP 2 SM ALERTS <ul style="list-style-type: none"> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612710 EXEC</li> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612740 EXEC</li> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612705 EXEC</li> <li>ITEM 10 EXEC</li> </ul>	Inhibit LOOP 1 SM ALERTS <ul style="list-style-type: none"> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612610 EXEC</li> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612640 EXEC</li> <li>ITEM 10 EXEC</li> <li>ITEM 1 +0612605 EXEC</li> <li>ITEM 10 EXEC</li> </ul>



# ECLS SSR-5 FES RESTART



- ① Prior flight experience has demonstrated that FES shutdwns are most likely in this temp range
- ② To ensure positive FES restart, RADs are placed in HIGH to impose a load on FES
- ③ TOPPING EVAP will overtemp shutdn when inlet temp exceeds ~68 degF and HI LOAD not activated
- ④ Heat load beyond capability of topping evap

## ECLS SSR-6 CABIN EQUIP PWRDN

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 Itg
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

- L1 a. √Rad flow, PLBD opened  
 b. FLASH EVAP TOP DUCT HTR – A(B)  
     NOZ (two) – AUTO A(B)
- If HI LOAD EVAP to be activated:  
 FLASH EVAP HI LOAD DUCT HTR – A(B)  
 Wait ~45 min before activating HI LOAD
- L2 c. FLASH EVAP FDLN HTR A SPLY – 1(2)  
     B SPLY – 1(2)
- R11L d. √SPLY H2O TKB OUTLET – OP (tb-OP)  
     √B SPLY ISOL VLV – OP (tb-OP)
- ML31C √TKD OUTLET – OP (tb-OP)

### COMPONENT CHECKOUT 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
- c. SECONDARY CNTLR, HI LOAD FES, FEEDWATER A CHECKOUT
- L1 1. HI LOAD EVAP – ENA  
 FLASH EVAP CNTLR SEC – A SPLY
2. PRI A,B – OFF  
     SEC – ON
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN  
     MAN SEL (two) – BYP until tb – BYP
- CRT 4. After 2 min, √EVAP OUT T ~62 degF  
 L1 5. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO  
     CNTLR LOOP 1,2 (two) – OFF, then AUTO A(AUTO B)  
     After 90 sec, √tb – RAD (two)
6. Perform FES RESTART, ECLS SSR-5
7. HI LOAD EVAP – OFF  
     After 30 min,
8. FLASH EVAP HI LOAD DUCT HTR – OFF
- d. SECONDARY CONTROLLER, HI LOAD FES, FEEDWATER B CHECKOUT
- L1 1. HI LOAD EVAP – ENA  
 FLASH EVAP CNTLR SEC – B SPLY
2. PRI A,B – OFF  
     SEC – ON
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN  
     MAN SEL (two) – BYP until tb – BYP
- CRT 4. After 2 min, √EVAP OUT T ~62 degF  
 L1 5. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO  
     CNTLR LOOP 1,2 (two) – OFF, then AUTO A(AUTO B)  
     After 90 sec, √tb – RAD (two)
6. Perform FES RESTART, ECLS SSR-5
7. HI LOAD EVAP – OFF  
     After 30 min,
8. FLASH EVAP HI LOAD DUCT HTR – OFF
9. CNTLR SEC – A SPLY

## ECLS SSR-7 (Cont)

- e. PRIMARY CNTLR A,B, TOPPING and HI LOAD EVAP, A and B SPLY CHECKOUT
- |     |    |  |
|-----|----|--|
| L1  | 1. | HI LOAD EVAP – ENA<br>FLASH EVAP CNTLR SEC – A SPLY(B SPLY)                          |
|     | 2. | PRI A – OFF<br>B – OFF<br>SEC – OFF  |
|     | 3. | RAD BYP VLV LOOP 1,2 MODE (two) – MAN<br>MAN SEL (two) – BYP until tb – BYP          |
| CRT | 4. | When EVAP OUT T > 47 degF, FLASH EVAP CNTLR PRI A – ON                               |
|     | 5. | After 60 sec, √EVAP OUT T ~39 degF ± 1 degF  |
| L1  | 6. | FLASH EVAP CNTLR PRI A – OFF<br>B – ON   |
| CRT |    | After 60 sec, √EVAP OUT T ~39 degF ± 1 degF  |
| L1  | 7. | RAD BYP VLV LOOP 1,2 MODE (two) – AUTO<br>CNTLR LOOP 1,2 (two) – OFF, AUTO A(AUTO B) |
|     |    | After 90 sec, √tb (two) – RAD  |
|     | 8. | After 2 min, HI LOAD EVAP – OFF  |
- f. PRIMARY CNTLR A,B, TOPPING, STARTUP FROM STBY CHECKOUT
- |     |     |   |
|-----|-----|---|
|     | 1.  | Perform FES RESTART, <u>ECLS</u> SSR-5, using A CNTLR                         |
| CRT | 2.  | √RAD OUT T ~39 degF (FES to STBY)<br>Pwrn and/or change attitude if necessary |
| L1  | 3.  | RAD CNTLR OUT T – HIGH  |
| CRT | 4.  | After 2 min, √EVAP OUT T ~39 degF ± 1 degF                                    |
| L1  | 5.  | FLASH EVAP CNTLR PRI A – OFF<br>B – ON  |
| CRT | 6.  | After 60 sec, √EVAP OUT T ~39 degF ± 1 degF                                   |
| L1  | 7.  | RAD CNTLR OUT T – NORM, then immediately                                      |
|     | 8.  | FLASH EVAP CNTLR PRI B – OFF, ON  |
|     | 9.  | √RAD OUT T ~39 degF ± 1 degF  |
|     | 10. | CNTLR OUT T – HIGH  |
|     | 11. | After 2 min, √EVAP OUT T ~39 degF ± 1 degF                                    |
|     | 12. | RAD CNTLR OUT T – NORM  |
|     | 13. | FLASH EVAP CNTLR PRI B – OFF  |

# ECLS SSR-8 SMALL CABIN-LEAK ISOL

## NOTE

This procedure should only be performed On MCC call. MCC will call with specific steps to be performed. Steps may be sequentially performed in groups to expedite leak isolation. MCC will determine when leak has been isolated using cabin pressure decay

**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  
WCS 4. VAC VLV – CL
- Below  
SIDE  
HATCH  
L2 5. NEG PRESS RELIEF vlv covers (two) – cl (push firmly)
6. CAB RELIEF A – CL (tb-CL)
7. CAB RELIEF B – CL (tb-CL)
- 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 It – off  
√FAIL It – 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  
FLR √ISOL VLV – CL
- EXT A/L 10. EXT A/L DEPRESS vlv – CL  
NEG PRESS RELIEF vlv covers (two) – CL (push firmly)
- ML31C 11. VAC VENT ISOL VLV CNTL – CL (tb-CL)
- WCS 12. CRADLE – AUTO INHIBIT  
Remove urinal hose (at hose block), hose block, and filter  
Place Gray Tape over center tube (EMU drain)
- If SH HATCH open:  
13. Perform SH CABIN LEAK ISOLATION (Cue Card)
- MIDDECK 14. A/L HATCH – CL (per decal)  
Equal vlv (two) – OFF

## LEAK DETECTION AND SEALING

15. Go to LEAK DETECTION – ULTRASONIC (IFM, PROCEDURES G thru L)

If reqd (On MCC Go):

16. Go to LEAK SEALING – VACUUM (IFM, PROCEDURES G thru L)

## RECOVERY STEPS (On MCC call)

- L2 17. CAB RELIEF A – ENA (tb-ENA)
18. CAB RELIEF B – ENA (tb-ENA)

## ECLS SSR-8 (Cont)

- ML31C 19. VAC VENT ISOL VLV CNTL – OP (tb-OP)  
If flown, reactivate CO2 RMVL SYS:
- MO51F CO2 RMVL SYS MNA(MNC) – OFF  
AC1(AC3) – OFF (hold 3 sec)  
√CNTLR 1(2) FAIL It – 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 It – on
- WCS/  
EDO  
WCS 20. VAC VLV – OP
- PCS CONFIG (On MCC GO)  
21. √MCC for PCS config and TIG time (if necessary)

I

# ECLS SSR-9 RAD ISOL RECOVERY

## NOTE

Procedure reestablishes radiator flow after inadvertent isolation due to instrumentation or Freon isolation logic failure. Expect possible 'S88 EVAP OUT T 1(2)' msg

### SM 88 APU/ENVIRON THERM

- L1 1. FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
  - If Freon Loop 1 aff:
    - L2 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
    - L2 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
    - L2 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

# ECLS SSR-10

## H2O PUMP OPS VIA GPC

### NOTE

Provides continuous GPC commanding of the H2O loop pumps

1. Reset pump cycling constants (if comm available. MCC can TMBU if desired)

**SM 60 SM TABLE MAINT**

ITEM 16 +9 2 0 6 4 1 EXEC

17 +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  
L1

If Pump A reqd:

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

O1

8. H2O PUMP OUT PRESS – 1

If WCL 2 for continuous ops:

L4:F  
L1

9. cb AC1 H2O LOOP PUMP 1 A/2 (three) – cl

10. H2O PUMP LOOP 2 – GPC

√LOOP 2 BYP MODE – AUTO

√1 BYP MODE – MAN

O1

11. √H2O PUMP OUT PRESS – 2

### NOTE

Ops transition in steps 14 and 15 causes MCIU to lose I/O with the GPC. Coordinate ops transition with PDRS to avoid impacts to ongoing PDRS operations. Nominal PDRS ops are recovered in step 17, if required

12. SM OPS 000 PRO

13. SM OPS 201 PRO

**S88 APU/ENVIRON THERM**

L1

If H2O LOOP PUMP OUT P 1(2): 61-69

14. H2O PUMP LOOP 2(1) – OFF

If reqd:

15. **S94 PDRS CONTROL**

I/O ON – ITEM 5 EXEC(\*)

SAFING – CANCEL

16. **SM(GNC,PL) 1 DPS UTILITY**

CKPT RETRV ENA – ITEM 12 EXEC (\*)

UL CNTL AUTO – ITEM 35 EXEC (\*)

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

18. C/W update (if comm available, MCC can TMBU software limits if desired)

Loop 1 active	Loop 2 active
(R13U) • Change Loop 1 PUMP OUT P (param 105) lower C/W limit to 1.50 vdc (45 psia) and Loop 2 (param 115) to 0.65 vdc (19.5 psia)	(R13U) • Change Loop 2 PUMP OUT P (param 115) lower C/W limit to 1.50 vdc (45 psia) and Loop 1 (param 105) to 0.65 vdc (19.5 psia)
Reconfig B/U C/W <b>SM 60 SM TABLE MAINT</b> • ITEM 1 +0 6 1 2 6 0 0 EXEC • ITEM 11 +4 5 EXEC • ITEM 1 +0 6 1 2 7 0 0 EXEC • ITEM 11 +1 9 . 5 EXEC	Reconfig B/U C/W <b>SM 60 SM TABLE MAINT</b> • ITEM 1 +0 6 1 2 7 0 0 EXEC • ITEM 11 +4 5 EXEC • ITEM 1 +0 6 1 2 6 0 0 EXEC • ITEM 11 +1 9 . 5 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 pwrdrn. 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. TKA,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
  - XOVR VLV – CL (tb-CL)
  - DUMP ISOL VLV – CL (tb-CL)
- 13. TKB OUTLET – OP (tb-OP)
- L2 14. FLASH EVAP FDLN HTR B SPLY – OFF
- L1 15. FLASH EVAP FDLN HTR B SPLY – OFF
- 16. √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 17. SPLY H2O TKA,TKB OUTLET – CL (tb-CL)
  - √XOVR VLV – CL (tb-CL)
  - DUMP ISOL VLV – OP (tb-OP)
- L1 18. RAD CNTLR OUT TEMP – HI
- O1 19. When EVAP OUT T > 47 degF,
  - FLASH EVAP CNTLR PRI A – ON
- 20. When FES shuts down and EVAP OUT T again > 47 degF,
  - FLASH EVAP CNTLR PRI A – OFF, ON
- 21. Repeat step 20 until EVAP OUT T remains at ~57 degF, then FLASH EVAP CNTLR PRI A – OFF
- R11L 22. SPLY H2O DUMP ISOL VLV – CL (tb-CL)
- L2 23. FLASH EVAP FDLN HTR A SPLY – OFF
- L1 24. 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

- L1 25. Perform steps 6 thru 11, then:  
FLASH EVAP CNTLR PRI A – ON
- L2 26. Perform steps 20 thru 22, then:
- L1 27. FLASH EVAP FDLN HTR A,B SPLY (two) – OFF
- L1 28. TOP EVAP HTR DUCT – OFF  
NOZ L,R (two) – OFF
- WCS 29. RAD CNTLR OUT TEMP – NORM
- R11L 30. Remove Y/R QD Adapter from CONT H2O X-TIE POT QD  
SPLY H2O DUMP ISOL VLV – OP (tb-OP)
- 31. Stow Tools and Towel

### NOTE

√MCC for possible SPLY H2O DUMP after completion of procedure

# ECLS SSR-12

## AV BAY FIRE RECOVERY/RECONFIG

### 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:

Essential Equipment	Av Bay 1	Av Bay 2	Av Bay 3A	Av Bay 3B
ANTISKID	X	X		
AUD CTR	1,2			
BRAKES	X	X		
COMM			X	
C/W			X	
OI MDM	OF1	OF2	OF3	
OI DSC	OF1	OF2	OF3	
PL MDM	PL1	PL2		
Minimum Equip reqd for SFT	Av Bay 1	Av Bay 2	Av Bay 3A	Av Bay 3B
3 of 4 FF MDMs	FF1	FF2,FF4	FF3	
3 of 4 ADTAs	1,3	2,4		
3 of 4 AAs	1,4	2,3		
2 of 3 MLSS	1	2,3		
2 of 3 TACANs (OV103,4)	1	2	3	
2 of 3 GPSs (OV105)	1		3	2
2 of 3 FMCAs	1	2	3	
3 of 5 GPCs	1,4	2,5	3	

3. Perform with MCC coverage, if possible
4. Recovery steps A,B, and C are reqd to provide valid smoke concentrations
5. Perform recovery steps D thru M if smoke conc stable or decreasing
6. FRCS dump will be 2 jet dump only
7. If recovery of the associated AC Bus, FF MDM, or FMCA is unsuccessful, √MCC for vent door config. Certain failure combinations will cause multiple vent doors to remain open during entry

### CAUTION

Do **NOT** close any cb(s) found open at time of fire that is normally closed. Unpower recovered component if smoke concentration increases during recovery

#### A. OI MDM RECOVERY (IF REQD)

If Av Bay 1 or 2 affected:

- O14:B 1. cb MNA OI MDM OF 1/2 A – cl  
 If cb not reset then:  
 O15:B 2. cb MNB OI MDM OF 1/2 B – cl

If Av Bay 3A affected:

- O14:B 3. cb MNA OI MDM OF 3/4 A – cl  
 If cb not reset then:  
 O16:B 4. cb MNC OI MDM OF 3/4 B – cl

**SM 62 PCMMU/PL COMM**

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

#### B. OI DSC RECOVERY (IF REQD)

If Av Bay 1 affected:

- O14:B 1. cb MNA OI SIG CONDR OF 1/4 A – cl  
 If cb not reset, then:  
 O15:B 2. cb MNB OI SIG CONDR OF 1/4 B – cl

If Av Bay 2 or 3A affected:

- O15:B 3. cb MNB OI SIG CONDR OF 2/3 A – cl  
 If cb not reset, then:  
 O16:B 4. cb MNC OI SIG CONDR OF 2/3 B – cl

#### C. AV BAY FAN RECONFIG

### CAUTION

With Av Bay Fan activation, a momentary rise in smoke concentration may result. If smoke concentration continues to increase for > 1 min, unpower affected bay



# ECLS SSR-12 (Cont)

## F. IMU FAN RECONFIG

### SM 66 ENVIRONMENT

- If Av Bay 1 affected:
- L1 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(C) – 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:
 

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 Delta P
- 7. C/W MEM – CLEAR
- 8. C/W PARAM SEL tw (three) – >119

## H. AC BUS RECOVERY

Only perform on MCC GO or if critical need

- 1. Isolate 3Φ bus per table

### NOTE

3Φ AC UTIL PWR cbs are located on pnl L4:B

(L4,MA73C) cb – open all (3Φ,ΦA,ΦB,ΦC) on aff AC bus			
Number of cb to open:			
BUS	L4	MA73C	
AC1 3Φ	1	5	
	ΦA	16	5
	ΦB	16	4
	ΦC	13	5
AC2 3Φ	0	9	
	ΦA	15	5
	ΦB	16	4
AC3 3Φ	14	5	
	ΦA	1	7
	ΦB	15	3
ΦC	16	3	
	13	3	

### SM 67 ELECTRIC

- O13:A(C,E) 2. cb ESS 1BC (2CA,3AB) AC1(AC2,AC3) SNSR – cl

### NOTE

Expect S67 AC VOLTS msg and F7 AC VOLTAGE It

- R1 3. Aff AC BUS SNSR – AUTO TRIP

## 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  $\Phi$ A:

- CRT
4. cb aff AC CONTR  $\Phi$ A – 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 or F7 AC OVLD It received:
5. Aff INV/AC BUS – OFF (tb-OFF)  
INV PWR – OFF (tb-OFF)
  6. cb aff AC CONTR  $\Phi$ A – op
  7. Repeat steps 4 thru 6 for  $\Phi$ B, then  $\Phi$ C
- If no phases recovered:
- O13:A(C,E)
8. cb ESS 1BC(2CA,3AB) AC1(AC2,AC3) SNSR – op
- If only 1 or 2  $\Phi$ s recovered:
9. Inhibit aff AC VOLTAGE C/W Channel: 033 (043,053)
- If any phase recovered:
10. Aff AC BUS SNSR – OFF (1 sec)  
– AUTO TRIP
  11. √MCC for equipment recovery

### I. GPC RECOVERY

#### NOTE

Three of five GPCs reqd for single fault tolerance

If requirement not met:

Perform GNC REASSIGNMENT, DPS SSR-3  
If first GPC recovery fails, then try other GPC, if available

### J. FF MDM

#### NOTE

Three of four FF MDMs reqd for single fault tolerance. MDM  
FF2 reqd for FRCS dump

If requirements not met, reactivate MDM(s) in affected bay:

- O6  
CRT
- MDM FF1(FF2,FF3,FF4) – ON  
GNC I/O RESET

### K. PL MDM RECOVERY

- O6  
CRT
- MDM PL1(PL2) – ON  
SM I/O RESET

### L. ADTA, AA, MLS, TACAN, GPS

#### NOTE

Three of four ADTAs reqd for single fault tolerance.  
Three of four AAs reqd for single fault tolerance.  
Two of three MLSs reqd for single fault tolerance.  
Two of three TACANs reqd for single fault tolerance (OV103,4).  
Two of three GPSs reqd for single fault tolerance (OV105)

If requirement not met:

Perform FCS CHECKOUT, DISPLAY/DPS CONFIG and ON-ORBIT FCS CHECKOUT,  
PART 2 (ORB OPS, GNC) to verify equipment function in the affected Av Bay  
for single fault tolerance (as a minimum)

#### NOTE

Following FCS CHECKOUT, recovered equipment may be unpowered until deorb prep

### M. FMCA

#### NOTE

Two of three FMCAs reqd for single fault tolerance

If requirement not met (confirmed by MCC):

- MA73C:A
- MCA LOGIC MNA(MNB,MNC) FWD 1(2,3) – ON

# ECLS SSR-13

## ON-ORBIT RAD CNTLR SWITCH

### NOTE

Procedure switches Radiator Controllers in affected Freon Coolant Loop Radiator. 10-sec pause is necessary to prevent movement of bypass vlv, thus eliminating possibility of bypass vlv failing in bypass. Expect possible 'S88 EVAP OUT T 1(2)' msg

- 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
  
- O1 If FES reqd, wait 4 min, then:
  - L1 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

# ECLS SSR-14

## ECLS COMPUTATION INHIBIT

TABLE A

REMOVAL OF FAILED/DEGRADED PPO2 SNSR FROM O2 CONCENTRATION COMPUTATION

SM 60 SM TABLE MAINT

If PPO2 SNSR A failed/degraded	If PPO2 SNSR B failed/degraded	If PPO2 SNSR C failed/degraded
CONSTANT ID – ITEM 16 +9 2 2 1 3 1 EXEC √Update of CONSTANT ID CONSTANT VALUE – ITEM 17 +0 EXEC √Update of CONSTANT VALUE	CONSTANT ID – ITEM 16 +9 2 2 1 3 2 EXEC √Update of CONSTANT ID CONSTANT VALUE – ITEM 17 +0 EXEC √Update of CONSTANT VALUE	CONSTANT ID – ITEM 16 +9 2 2 1 3 3 EXEC √Update of CONSTANT ID CONSTANT VALUE – ITEM 17 +0 EXEC √Update of CONSTANT VALUE
<ul style="list-style-type: none"> <li>Notify MCC of disabled constant</li> </ul>		

TABLE B

O2 CONCENTRATION COMPUTATION INHIBIT

SM 60 SM TABLE MAINT

PARAM ID – ITEM 1 +9 2 2 1 0 4 EXEC √Update of PARAM ID INH – ITEM 10 EXEC
<ul style="list-style-type: none"> <li>Notify MCC of inhibited parameter</li> </ul>

TABLE C

EQUIVALENT dP/dT COMPUTATION INHIBIT

SM 60 SM TABLE MAINT

PARAM ID – ITEM 1 +9 2 4 9 3 5 EXEC √Update of PARAM ID INH – ITEM 10 EXEC
<ul style="list-style-type: none"> <li>Notify MCC of inhibited parameter</li> </ul>

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

SM 60 SM TABLE MAINT

Update CONSTANT ID:			
ITEM 16 +	_____ EXEC	(ID numbers below)	
ITEM 17 +	_____ EXEC	(1 = transducer is OK, 0 = transducer is faulty)	
CONSTANT ID	NAME	CONSTANT ID	NAME
925521	SYS 1 N2 TANK 1 TEMP FLAG	925526	SYS 1 N2 TANK 4 TEMP FLAG
925522	SYS 1 N2 TANK 2 TEMP FLAG	925527	SYS 2 N2 TANK 3 TEMP FLAG
925523	SYS 2 N2 TANK 1 TEMP FLAG	925528	SYS 2 N2 TANK 4 TEMP FLAG
925524	SYS 2 N2 TANK 2 TEMP FLAG	925529	SYS 1 N2 PRESS FLAG
925525	SYS 1 N2 TANK 3 TEMP FLAG	925530	SYS 2 N2 PRESS FLAG

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

SM 60 SM TABLE MAINT

Update CONSTANT ID:		
ITEM 16 +	_____ EXEC	(ID numbers below)
ITEM 17 +	_____ EXEC	(1 = tank active, 0 = tank inactive)
CONSTANT ID	NAME	VEHICLE CONFIG (ITEM 17)
925531	SYS 1 N2 TANK 1 FLAG	*
925532	SYS 1 N2 TANK 2 FLAG	*
925533	SYS 1 N2 TANK 3 FLAG	1
925534	SYS 1 N2 TANK 4 FLAG	1
925535	SYS 2 N2 TANK 1 FLAG	1
925536	SYS 2 N2 TANK 2 FLAG	1
925537	SYS 2 N2 TANK 3 FLAG	*
925538	SYS 2 N2 TANK 4 FLAG	*



# ECLS SSR-16

## 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)
- MO10W  
ML26C

## 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
- ML26C 2. SPLY H2O GN2 TK VENT vlv – PRESS  
√TKA SPLY vlv – OP
- MO10W 3. H2O TK N2 REG INLET SYS 1,SYS 2 vlv (two) – OP  
ISOL SYS 1,SYS 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 1,SYS 2 vlv (two) – CL
- ML26C 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

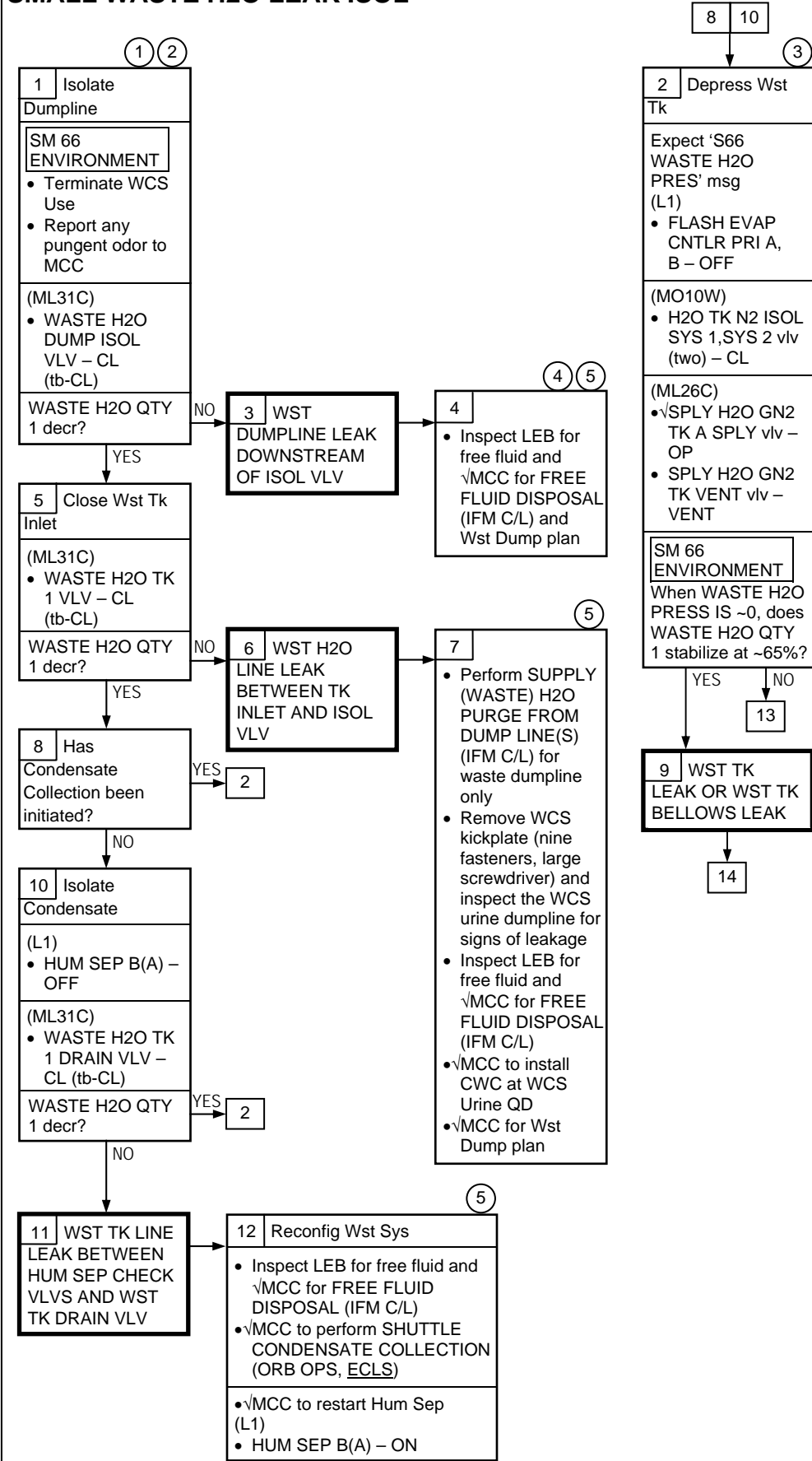
This procedure assumes that MCC is available for assistance and would inform crew of tank C leak (which is normally isolated) or dump line leak at nozzle. This procedure also assumes that tanks B, D are tied together and that tank C is isolated. Also note that Supply H2O tanks remain pressurized during 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 decr 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 decr or ~0:  
Perform steps 8,9,10,12 >>
- MO13Q ARLK H2O S/O VLV – OP (tb-OP)
- CRT 2. If SPLY H2O TK QTY D decr:  
ML31C SPLY H2O TK D INLET, OUTLET (two) – CL (tb-CL)  
CRT If SPLY H2O TK QTY D decr:  
Perform step 6  
Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK D on MCC call  
ML31C SPLY H2O TK D INLET, OUTLET (two) – CL (tb-CL)  
Perform steps 7-11 >>
- MCC,CRT If SPLY H2O TK QTY B decr or incr at a reduced rate:  
Perform steps 6, 8, 9, 11 >>
- MCC,CRT If no SPLY H2O TK QTY decr or incr 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 When SPLY H2O TK QTY A < 80% or MCC call:  
R11L SPLY H2O TK A OUTLET – CL (tb-CL)  
Go to step 4 or 5 based on H2O tank qty observation
- CRT 4. If SPLY H2O TK QTY B decr:  
R11L SPLY H2O TK B INLET,OUTLET (two) – CL (tb-CL)  
CRT If SPLY H2O TK QTY B decr:  
Perform step 6  
Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK B on MCC call  
R11L SPLY H2O TK B INLET,OUTLET (two) – CL (tb-CL)  
Perform steps 7-11 >>
- AW82B If PRESS H2O decr or ~0:  
Perform steps 9-11 using FES CNTRL PRI B on MCC call
- R11L SPLY H2O TK B INLET – OP (tb-OP) >>  
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 decr or incr at reduced rate:  
R11L SPLY H2O GALLEY SPLY VLV – CL (tb-CL)  
MCC,CRT If SPLY H2O TK QTY A decr 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 decr:  
Perform step 6  
Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK A on MCC call  
SPLY H2O TK A INLET, OUTLET (two) – CL (tb-CL)  
Perform steps 7-11 >>
- CRT If SUPPLY H2O PRESS ~15:  
Perform steps 8-11  
√MCC to restore Galley ops >>
- MD23R Open middeck pnl and reconnect lower (FC) QD on microbial filter  
R11L SPLY H2O GALLEY SPLY VLV – OP (tb-OP)  
MD80R Open middeck pnl and inspect for free H2O  
Perform steps 6, 8, 9, 11 on MCC call  
Perform steps 8-11 on MCC call  
√MCC to restore Galley ops >>

## ECLS SSR-18 (Cont)

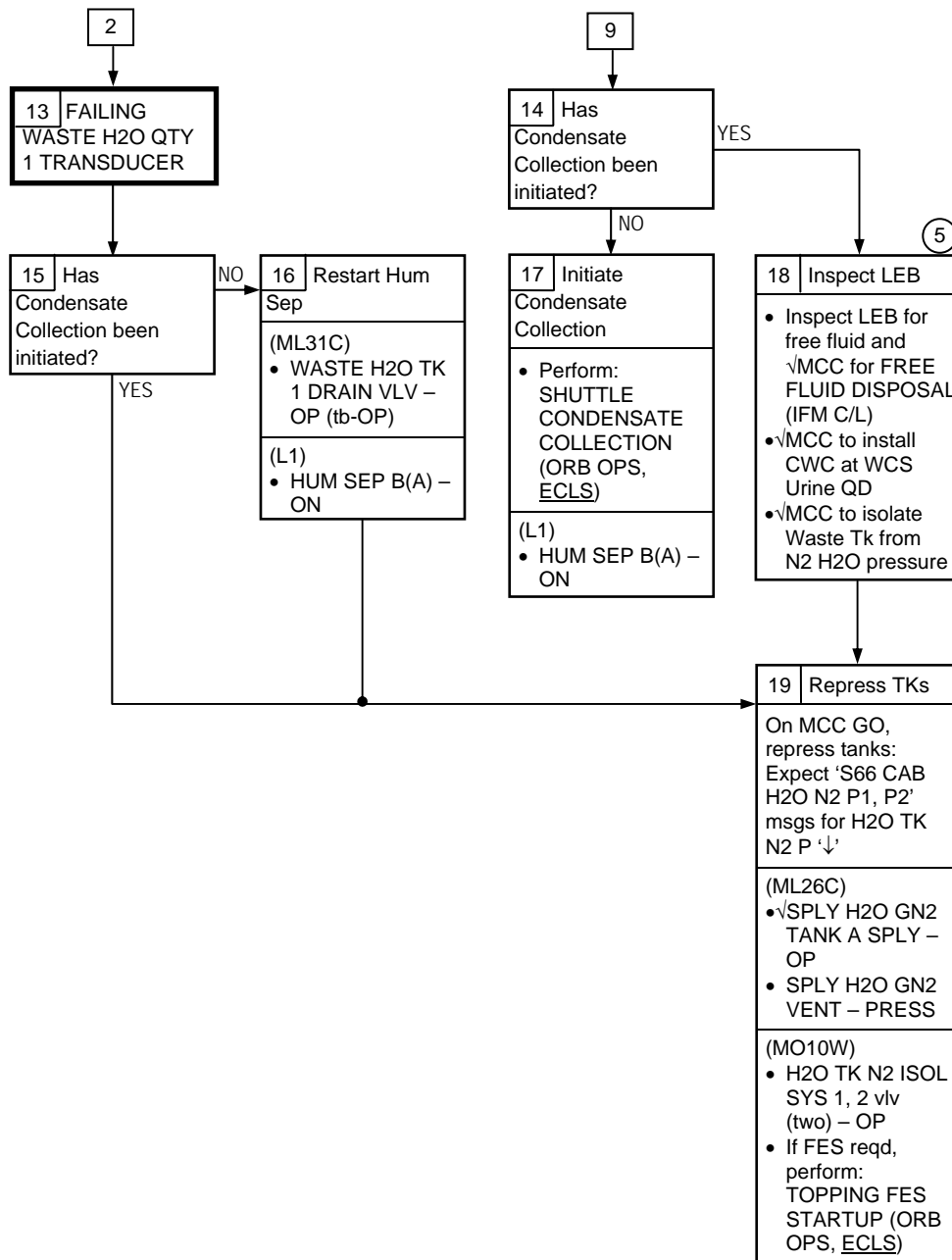
- MO10W 6. H2O TK N2 ISOL SYS 1,SYS 2 vlv – CL  
ML26C SPLY H2O GN2 TANK A SPLY – OP  
VENT – VENT  
Expect audible vent and 'S66 WASTE H2O PRES' alert for Waste Pres '↓'
- ML26C 7. SPLY H2O GN2 TANK A SPLY – OP  
VENT – PRESS
- MO10W H2O TK N2 ISOL SYS 1,SYS 2 vlv – OP  
Expect 'S66 CAB H2O N2 P1, P2' msgs for H2O TK N2 P '↓'
- R11L 8. SPLY H2O XOVR vlv – OP (tb-OP)  
9. B SPLY ISOL 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

# ECLSS SSR-19 SMALL WASTE H2O LEAK ISOL



- ① This procedure assumes that MCC is available for assistance
- ② This procedure has the waste tank pressurized for a portion of the troubleshooting
- ③ If the WASTE TANK QTY is less than 65% at the time of tank depress, S66 WASTE H2O QTY 1 can be expected to rise to stabilize at ~ 65% for a tank or bellows leak
- ④ Reference LIQH STOWAGE VOLUME REMOVAL (IFM C/L) to gain access to LEB
- ⑤ Prior to performing LEB inspection or any waste water IFM, don goggles and gloves

**ECLSS SSR-19 (Cont)**  
**SMALL WASTE H2O LEAK ISOL**



⑤ Prior to performing LEB inspection or any waste water IFM, don goggles and gloves

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# ECLS SSR-20

## SMALL SUPPLY H2O LEAK ISOL – WATER TRANSFER CONFIGURATION

### 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 CNTLR 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 TKs A,B (On MCC GO):

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% or on MCC GO:

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

#### B. DETERMINE IF EXTERNAL AIRLOCK FLOWN

#### SM 177 EXTERNAL AIRLOCK

MO13Q 4. ARLK H2O S/O VLV – CL (tb-CL)

MCC/CRT If H2O XFER P decr or ~0 (leak in External Airlock H2O Transfer Line):

5. Visually inspect middeck floor (water line closeout area) and Ext A/L
6. Perform step 54 using FES PRI B On MCC GO >>

#### SM 66 ENVIRONMENT

#### C. LEAK DETERMINATION A/B SIDE

MCC/CRT If 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 GO
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):

R11L 11. Perform steps 52-55 using FES PRI B On MCC GO >>

R11L 12. SPLY H2O TKA INLET – CL (tb-CL)

13. TKA,B OUTLET (two) – CL (tb-CL)

MCC/CRT If SPLY H2O QTY A decr (leak in TK A):

ML86B:A 14. cb MNB SPLY H2O TK B INLET – cl

R11L 15. SPLY H2O TKB INLET – OP (tb-OP)

16. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK A on MCC GO; dump TK A to ~0%, then:

17. √MCC to restore Galley ops

18. Perform steps 51-55 using FES PRI B On MCC GO >>

MCC/CRT If SPLY H2O QTY B decr (leak in TK B):

R11L 19. SPLY H2O TKA INLET – OP (tb-OP)

20. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK B on MCC GO; dump TK B to ~0%, then:

21. Perform steps 51-55 using FES PRI B On MCC GO >>

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 pnl 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 pnl on middeck floor and reconnect lower (FC) QD from Microbial Filter

26. Perform steps 48-53, 55 >>

ML86B:A If SPLY H2O QTY A,B not decr (leak in TK A/B Outlet Manifold):

R11L 27. cb MNB SPLY H2O TK B INLET – cl

28. SPLY H2O TKA,B INLET (two) – OP (tb-OP)

29. Open LEB access pnl on middeck floor and reconnect lower (FC) QD to Microbial Filter

30. Perform steps 54-55 using FES PRI B On MCC GO >>

Cont next page



## ECLS SSR-20 (Cont)

- D. LEAK DETERMINATION C/D SIDE
- MCC/CRT  
R11L If SPLY H2O QTY C,D decr:  
31. SPLY H2O B SPLY ISOL VLV – CL (tb-CL)
- MCC/CRT  
R11L If SPLY H2O QTY C,D const (leak in FES Feedline B):  
32. Perform step 54 using FES PRI A On MCC GO >>  
ML31C 33. SPLY H2O TKC INLET,OUTLET (two) – CL (tb-CL)  
34. TKD INLET,OUTLET (two) – CL (tb-CL)
- MCC/CRT  
R11L If SPLY H2O QTY C decr (leak in TK C):  
ML31C 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 GO; dump TK C to ~0% >>
- MCC/CRT  
R11L If SPLY H2O QTY D decr (leak in TK D):  
38. SPLY H2O B SPLY ISOL VLV – OP (tb-OP)  
39. TKC INLET – OP (tb-OP)  
40. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK D On MCC GO; dump TK D to ~0% >>
- MCC/CRT  
R11L If SPLY H2O QTY A,B,C,D filling at a nominal rate (leak in TK C/D Outlet Manifold):  
ML31C 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 GO >>
- MCC/CRT  
R11L If SPLY H2O QTY A,B decr or filling at a decr rate (leak in TK C/D Inlet Manifold; depress H2O Tanks):  
ML31C 44. SPLY H2O TKC OUTLET – OP (tb-OP)  
45. B SPLY ISOL VLV – 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  
51. DUMP ISOL – OP (tb-OP)  
52. GALLEY SPLY VLV – OP (tb-OP)
- MO13Q 53. ARLK H2O S/O VLV – OP (tb-OP)  
54. If FES reqd, perform TOPPING FES STARTUP (ORB OPS, ECLS), then:  
55. Visually inspect LEB and perform FREE FLUID DISPOSAL (IFM, PROCEDURES S THRU Z), as reqd



# ECLS FRP-2 POST-FIRE CABIN CLEANUP CONTINUATION

SM SYS SUMM 1

**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 from CSA-CP and CABIN O2 CONC from SYS SUMM 1
  - c. Report values to MCC
  - d. If HCN > 1.8 ppm replace one LiOH canister

SM SYS SUMM 1

CRT, CSA-CP	Time (MET)	CABIN O2 CONC	HCN	HCL	CO
1	: :				
2	: :				
3	: :				
4	: :				
5	: :				
6	: :				
7	: :				
8	: :				

If HCN > 1.8, HCL > 2.0, or CO > 18 ppm for any CSA-CP reading:

2. If ATCO canister not yet installed, CO > 18 and HCL < 5 ppm:  
Install ATCO (in place of one LiOH canister)
3. √CAB TEMP CNTLR – OFF  
√Pin Cab temp cntl act link – FULL COOL
4. √cb MNA,MNB WCS CNTLR (two) – cl  
√AC1,2 WSC FAN SEP 1,2 (six) – cl
- If Av Bay 1 Fire:
  5. √HOSE BLOCK to SEP 2
  6. √FAN SEP SEL sw – 2
  7. √MODE – COMMODE/MANUAL/EMU
  8. √COMMODE CNTL – PULL UP  
– √PUSH FWD
9. Continue to monitor the cabin atmosphere per step 1
10. When CO < 18 ppm, replace ATCO canister (if installed) with a LiOH canister

L1  
MD44F  
ML86B:B  
MA73C:E  
WCS

**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

11. Doff visors/QDMs and changeout LiOH canister(s) per preflight schedule on MCC call
  - \* If loss of communications, visors/QDMs down and continue \*
  - \* LiOH changeouts until all the following criteria are met: \*
  - \* No visible indication of smoke in cabin \*
  - \* Cabin smoke detector readings are < 1.2 \*
  - \* No symptoms of smoke inhalation \*
  - \* HCN < 4.0 (1.8) ppm, HCL < 2.0 (2.0) ppm, \*
  - \* CO < 20 (18) ppm if at 14.7 (8.0) psia \*
12. If symptoms experienced prior to donning QDM/visor, QDM/visor may be doffed only if all crewmembers are symptom free for > 10 min
13. If QDM/visor flow must continue and/or CABIN O2 CONC ≥ 25.9%, perform FIRE/HAZ SPILL O2 CONTROL, ECLS FRP-3

## ECLS FRP-2 (Cont)

I

### ON MCC CALL BACKOUT STEPS:

- WCS 14. COMMODE CNTL – OFF (BACK/DN)
- MD44F 15. Pin Cab temp cntl act link – PRI(SEC)
- L1 16. CAB TEMP CNTLR – 1(2)
- 17. SMOKE DETN SNSR – RESET
- 18. Report used LiOH cans to MCC

When Av Bay has been purged for 7 hr:

- 19. Disconnect Y/Y Hose from Vacuum Vent QD
- 20. Remove Free Fluid Nozzle from Av Bay fire port
- 21. Disconnect Free Fluid Nozzle from Y/Y hose
- 22. Stow in Cont Hose & Cable Kit:
  - Free Fluid Nozzle
  - 20-ft Y/Y Hose
  - Gray Tape

# ECLS FRP-3 FIRE/HAZ SPILL O2 CONTROL

SM SYS SUMM 1
SM 66 ENVIRONMENT

**NOTE**

For Av Bay fires, ensure avionics bay purge initiated before start of cabin depress

**TMAX DETERMINATION**

1. Determine TMAX from Tables 1 and 2

If ASC, use the following for N2 Qty:

- 4 N2 tanks: 260 lbs N2
- 5 N2 tanks: 325 lbs N2
- 6 N2 tanks: 390 lbs N2

- a. Time to 8 psi \_\_\_\_\_ hr  
(from Table 1 right)
- b. Time of purge at 8 + \_\_\_\_\_ hr  
(from Table 2 below)  
- 1:00 hr
- c. Latest TIG:  
TMAX = \_\_\_\_\_ hr

**TABLE 1.- TIME to 8 PSI (in HH:MM)**

	Time to 8 psi in hrs	
	From 14.7 psi	From 10.2
5 crew	03:06	01:24
6 crew	02:32	01:09
7 crew	02:07	00:58
8 crew	01:49	00:51

**TABLE 2.- TIME of PURGE at 8 PSIA (in HH:MM)**

N2 Quantity (lbm)	Time of Purge (HH:MM)			
	5 crew	6 crew	7 crew	8 crew
100	06:38	05:28	04:38	04:01
120	08:06	06:41	05:41	04:56
140	09:34	07:55	06:55	05:51
160	11:18	09:22	07:58	06:56
180	12:46	10:36	09:01	07:51
200	14:15	11:49	10:04	08:46
220	15:59	13:17	11:19	09:51
240	17:27	14:30	12:22	10:47
260	18:55	15:43	13:25	11:42
280	20:23	16:57	14:39	12:37
300	22:07	18:24	15:42	13:42
320	23:35	19:38	16:45	14:37
340	25:04	20:51	17:48	15:32
360	26:32	22:04	19:03	16:37
380	28:16	23:32	20:06	17:32
400	29:44	24:45	21:09	18:27

**NOTE**

When TIG < 3 hours, install ATCO if not already performed

## ECLS FRP-3 (Cont)

### CABIN DEPRESS AND PURGE SETUP

- MO69M 2. Remove O2 BLEED ORIFICE, if installed  
 MO10W 3. 14.7 CAB REG INLET SYS 1, SYS 2 vlv (two) – CL  
 4. O2 REG INLET SYS 1 vlv – OP  
     2 vlv – CL

### START CABIN DEPRESS TO 8 PSIA

#### WARNING

If SYS SUMM 1 O2 CONC  $\geq$  40% during cabin depress or 8 psia purge, increase the AIRLK DEPRESS vlv position so the EQ dP/dT is equal to the next larger crew size in table 3 below and recalculate TMAX per step 1

- AW82B 5. AIRLK DEPRESS vlv cap – vent, remove, stow  
 6. Throttle AIRLK DEPRESS vlv until desired EQ dP/dT is established as follows per Table 3 below; tape in place (dP/dT sensor response lags approx 1 min)

#### NOTE

The 5 position on the AIRLK DEPRESS vlv will produce a dP/dT of -0.286 psia/min at 14.7 psia and -0.198 psia/min at 10.2 psia

TABLE 3.- EQ dP/dT

	Starting from 14.7 psi	Starting from 10.2 psi
5 crew	-0.050	-0.047
6 crew	-0.062	-0.058
7 crew	-0.074	-0.070
8 crew	-0.087	-0.082

7. When Cab Press < 10.0 psia and if prior to OPS 3:  
 Perform LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN)

### O2 MANAGEMENT DURING 8 PSIA PURGE

When Cab Press = 8 psia:

- AW82B 8. AIRLK DEPRESS vlv – CL, reinstall cap  
 MDDK Floor 9. CAB PURGE vlv – dial to number of crew on QDMs/visors  
 Near Ladder ISOL VLV – 0  
 L2 10. O2 XOVR SYS 1 vlv – CL  
     2 vlv – OP  
 11. O2/N2 CNTLR VLV SYS 1 – OP (N2)  
     2 – CL (O2)

#### NOTE

Maintain PPO2 between 2.8 and 3.05 psia for the duration of purge

When PPO2  $\geq$  3.05:

12. O2/N2 CNTLR VLV SYS 1 – OP (N2)

When PPO2  $\leq$  2.8:

13. O2/N2 CNTLR VLV SYS 1 – CL (O2)

Continue O2 mgmt per steps 12 and 13

#### NOTE

~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

### TERMINATE 8 PSIA PURGE AND INITIATE CABIN REPRESS

√MCC to terminate 8 psia purge and repress

- L2 14. O2/N2 CNTLR VLV SYS 1 – AUTO  
     2 – OP (N2)  
 MDDK Floor 15. CAB PURGE vlv – 0  
 Near Ladder ISOL VLV – CL  
 MO10W 16. 14.7 CABIN REG INLET SYS 1, SYS 2 (two) – OP  
 17. If avionics bay purge setup, √MCC to terminate AV Bay purge  
 Disconnect, stow IFM hoses and free fluid nozzle

ON MCC Go:

18. Perform backout of LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN), then:  
 19. Perform PCS 1(2) CONFIG (ORB OPS, ECLS) >>

## ECLS FRP-3 (Cont)

### PREPARE FOR ENTRY AND CABIN REPRESS

Post D/O Burn √MCC for Purge Termination and Cabin Repress

At D/O Burn + 20 min:

MDDK Floor 20. CAB PURGE ISOL VLV – CL

Near Ladder

ML31C 21. VAC VENT ISOL VLV CNTL – CL (tb-CL)

At D/O Burn + 25 min:

L2 22. O2/N2 CNTLR VLV SYS 1, SYS 2 (two) – OP (N2)

23. O2 XOVR VLV SYS 1, SYS 2 (two) – OP

MO10W 24. 14.7 CAB REG INLET SYS 1, SYS 2 (two) – OP

# ECLS FRP-4 O2 LEAK CONTROL

SM SYS SUMM 1
SM 66 ENVIRONMENT

### TMAX DETERMINATION

1. Determine TMAX from Tables 1 and 2

If ASC, use the following for N2 Qty:

4 N2 tanks: 260 lbs N2

5 N2 tanks: 325 lbs N2

6 N2 tanks: 390 lbs N2

2. Calculate total time:

a. O2 Leak Size: = \_\_\_\_\_ lb/hr  
(from MCC)

b. Time to 8 psi \_\_\_\_\_ hr  
(from Table 1 right)

c. Time of purge: + \_\_\_\_\_ hr  
(from Table 2 below)

- 1:00 hr

d. Latest TIG:  
TMAX = \_\_\_\_\_ hr

TABLE 1.- TIME to 8 PSIA (in HH:MM)

O2 Leak Rate	Time to 8 psi in hrs	
	From 14.7 psi	From 10.2 psi
3 lbm/hr	12:12	06:00
6 lbm/hr	05:52	02:55
9 lbm/hr	03:42	01:50
12 lbm/hr	02:52	01:23
15 lbm/hr	02:16	01:07
18 lbm/hr	01:52	00:57
21 lbm/hr	01:34	00:49
24 lbm/hr	01:20	00:43

TABLE 2.- TIME of PURGE at 8 PSIA (in HH:MM)

N2 Quantity (lbm)	Time of Purge (HH:MM)							
	3 lb/hr	6 lb/hr	9 lb/hr	12 lb/hr	15 lb/hr	18 lb/hr	21 lb/hr	24 lb/hr
100	12:22	05:51	03:51	02:47	02:11	01:47	01:28	01:14
120	17:19	08:11	05:24	03:55	03:04	02:30	02:04	01:44
140	22:16	10:31	06:56	05:02	03:56	03:12	02:40	02:14
160	27:13	12:52	08:29	06:09	04:49	03:55	03:15	02:50
180	32:10	15:12	10:01	07:16	05:42	04:38	03:51	03:20
200	37:08	17:33	11:34	08:23	06:34	05:21	04:33	03:50
220	42:05	19:53	13:06	09:30	07:27	06:04	05:09	04:25
240	47:02	22:14	14:39	10:38	08:20	06:47	05:44	04:55
260	51:59	24:34	16:12	11:45	09:12	07:30	06:20	05:25
280	56:56	26:54	17:44	12:52	10:05	08:13	06:55	05:55
300	61:53	29:15	19:17	13:59	10:58	08:55	07:37	06:30
320	66:50	31:35	20:49	15:06	11:50	09:38	08:13	07:00
340	71:47	33:56	22:22	16:14	12:43	10:21	08:49	07:30
360	76:44	36:16	23:54	17:21	13:36	11:04	09:24	08:00
380	81:41	38:37	25:27	18:28	14:28	11:47	10:00	08:36
400	86:38	40:57	27:00	19:35	15:21	12:30	10:35	09:06



## ECLS FRP-4 (Cont)

### DEPRESS AND PURGE SETUP

- MO10W 3. 14.7 CAB REG INLET SYS 1, SYS 2 vlv (two) – CL  
 4. O2 REG INLET SYS 1 vlv – OP  
           2 vlv – CL

### START DEPRESS TO 8 PSIA

- AW82B 5. AIRLK DEPRESS vlv cap – vent, remove, stow  
 6. Throttle AIRLK DEPRESS vlv until desired EQ dP/dT is established as follows per table 3; tape in place (dP/dT sensor response lags approx 1 min)

### NOTE

The 5 position on the AIRLK DEPRESS vlv will produce a dP/dT of -0.286 psia/min at 14.7 psia and -0.198 psia/min at 10.2 psia

TABLE 3.- EQ dP/dT

O2 Leak	EQ dP/dT	
	From 14.7 psi	From 10.2 psi
3 lbm/hr	-0.014	-0.012
6 lbm/hr	-0.029	-0.025
9 lbm/hr	-0.046	-0.040
12 lbm/hr	-0.059	-0.051
15 lbm/hr	-0.076	-0.065
18 lbm/hr	-0.093	-0.078
21 lbm/hr	-0.110	-0.094
24 lbm/hr	-0.130	-0.108

### WARNING

If SYS SUMM 1 O2 CONC  $\geq$  40%, increase the AIRLK DEPRESS vlv position so the EQ dP/dT is equal to the next larger leak rate in table 3 above and recalculate TMAX per step 2

If prior to OPS 3, when Cab Press < 10.0 psia:

7. CM1 perform LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN), then:  
 CM2 continue with procedure

### O2 MANAGEMENT DURING 8 PSIA PURGE

When Cab press = 8 psia:

8. O2/N2 CNTLR VLV SYS 1 – OP (N2)  
           2 – CL (O2)

### NOTE

Maintain PPO2 between 2.8 and 3.05 psia for the duration of purge

When PPO2  $\geq$  3.05:

9. O2/N2 CNTLR VLV SYS 1 – OP (N2)

When PPO2  $\leq$  2.8:

10. O2/N2 CNTLR VLV SYS 1 – CL (O2)

Continue O2 mgmt per steps 9 and 10

### NOTE

~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

### TERMINATE 8 PSIA PURGE AND REPRESS

- L2  $\sqrt$ MCC to terminate 8 psia purge and repress  
 11. O2/N2 CNTLR VLV SYS 1 – AUTO  
           2 – OP(N2)

- AW82B 12. AIRLK DEPRESS vlv – CL, reinstall cap  
 MO10W 13. 14.7 CABIN REG INLET SYS 1, SYS 2 (two) – OP

On MCC GO:

14. Perform backout of LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN), then:  
 15. Go to PCS 1(2) CONFIG (ORB OPS, ECLS)

## ECLS FRP-4 (Cont)

### PREPARE FOR ENTRY AND REPRESS

#### NOTE

When closing the Inner Hatch for Entry, take both Inner Hatch Equalization Valves to EMER with the caps removed to support the 8 psia purge during Entry

- For O2 Leak  $\leq$  15 lb/hr, Post D/O Burn MCC for Cabin Repress
- AW82B At D/O Burn + 5 min:
16. AIRLK DEPRESS vlv – CL, reinstall cap
- L2 At D/O Burn + 10 min:
17. O2/N2 CNTLR VLV SYS 1, SYS 2 (two) – OP (N2)
- MO10W
18. O2 XOVR VLV SYS 1, SYS 2 (two) – OP
  19. 14.7 CAB REG INLET SYS 1, SYS 2 (two) – OP

# ECLS FRP-5 CABIN AMMONIA CONTAMINATION CLEANUP (ISS AMMONIA LEAK)

## NOTE

This proc is to be performed simo by two crewmembers

- CM1
- WCS
- L1
- MD44F
- LiOH  
Box
- L1
- EXT A/L
- INITIATE CABIN AIR SCRUBBING:
1. MODE – COMMODE/MANUAL/EMU
  2. COMMODE CNTL – PULL UP (wait 15 sec)  
– PUSH FWD
  3. H2O PUMP LOOP 1 – ON
  4. LOOP 2 BYPASS MODE – MAN
  5. 1,2 BYP MAN (two) – DECR (hold 30 sec each)
  6. CAB TEMP CNTLR – OFF  
Pin Cab temp cntl act link – FULL COOL
  7. Install ATCO and one fresh LiOH canister
  8. CAB FAN A, B (two) – ON
  9. Connect external A/L halo inlet flex duct to halo inlet with T-handle clamp
  10. As required, all crewmembers change into long pants and long sleeve shirts and don gloves
- 

- CM2
- IVA AMMONIA DETECTION KIT PREPARATION
11. Unstow IVA AMMONIA DETECTION KIT
  12. Remove both Draeger pumps and perform leak test, ensuring pump bellows do not expand while inlet ports are covered (~1 min)
  13. Reset stroke counter on pumps
  14. Stow one pump back inside kit. This pump will be used to verify the doffing criteria sample at the end of the procedure

## WARNING

Moisture droplets will produce a false low ppm if ingested into sample. Ensure Sample area is free from moisture droplets

## HI-RANGE (5a) DRAEGER TUBE SAMPLING

15. Obtain Hi-Range (5a) Draeger tube
16. Break off both ends of Draeger tube in Break Off Husk hole #2
17. Insert Draeger tube into Draeger pump inlet with arrow pointing towards pump
18. Compress Draeger pump; release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
19. Repeat for total of 10 strokes or until tube saturated, record results below and report result to MCC
20. Repeat Draeger tube sampling every 30 min or on MCC call

## NOTE

Pump counter should be used as a backup only. Draeger Tube will change from Yellow to Dark Blue in presence of Ammonia. Used tubes should be placed in kit disposal bag

## ECLS FRP-5 (Cont)

Sample #	1	2	3	4	5	6	7	8	9	10	11	12
MET	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
PPM after 10 strokes												
or												
Stroke # when tube saturated												

### SM SYS SUMM 1

CRT When 'S78 CABIN O2 CONC'  
 21. If QDM flow must continue and S78 CABIN O2 CONC  $\geq$  25.9%, perform FIRE/HAZ SPILL O2 CONTROL, ECLS FRP-3

22. When ppm  $\leq$  20, immediately obtain second HI-Range sample to verify result

23. If second reading  $>$  20, repeat step 20

24. If second reading  $\leq$  20, continue to step 25

### LO-RANGE (2a) DRAEGER TUBE SAMPLING

25. Wait 15 min from last Hi-Range reading then continue

26. Obtain Lo-Range (2a) Draeger tube

27. Break off both ends of Draeger tube in Break Off Husk hole #2

28. Insert Draeger tube into Draeger pump inlet with arrow pointing towards pump

29. Compress Draeger pump; release; Indicator light will change from black to clear to indicate end of stroke (~6 sec)

30. Repeat for total of 5 strokes or until tube saturated, record results below and report result to MCC

31. Repeat Draeger tube sampling every 30 min or on MCC call

Sample #	1	2	3	4	5	6	7	8	9	10
MET	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
PPM after 5 strokes										
or										
Stroke # when tube saturated										

32. If ppm  $>$  10, repeat step 31

33. When ppm  $\leq$  10, continue

### NOTE

~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

### TERMINATE O2 CONTROL AND REPRESS

√MCC to exit ECLS FRP-3; terminate O2 control and repress using the following:

AW82B 34. √AIRLK DEPRESS vlv – CL, √cap installed

L2 35. O2/N2 CNTLR VLV SYS 1 – AUTO  
 2 – OP (N2)

MDDK 36. CAB PURGE vlv – 0  
 Floor ISOL VLV – CL  
 Near  
 Ladder

MO10W 37. 14.7 CABIN REG INLET SYS 1, 2 (two) – OP

## ECLS FRP-5 (Cont)

### SM 66 ENVIRONMENT

- CRT    When CABIN PRESS > 14 psi
38. Obtain alternate Draeger pump from kit
  39. Repeat steps 26-30 with alternate Draeger pump
  40. If ppm > 10, repeat step 31
  41. If ppm ≤ 10, doff QDM's per CDR directed sequence

#### WARNING

If any crewmember exhibits adverse symptoms when QDMs doffed, have affected crewmember don QDM immediately. Symptoms could include the following:

Irritation of the eyes, nose, throat, skin

Anytime emergency exposure: 100ppm  
1 hour exposure: 30ppm  
24 hour exposure: 20ppm  
7 day exposure: 10ppm

#### ON MCC CALL BACKOUT STEPS:

- WCS    42. COMMODE CNTL – PULL BACK  
          – PUSH DOWN
- MD44F 43. Pin Cab temp cntl act link – PRI (SEC)
- L1      44. CAB TEMP CNTLR – 1(2)  
          SEL – as reqd
45. H2O PUMP LOOP 1 – GPC
46. H2O LOOP 2 BYPASS MODE – AUTO
- LiOH    47. Replace ATCO with a fresh LiOH canister
- Box
- L1      48. √CAB FAN A – ON  
          B – OFF

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The following msgs have support procedures in the ORB PKT, but not in this book:

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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)'
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FC REAC/  
PMP/STACK T  
7.1

**EPS**

**7.1b FC STACK T 1(2,3) ↑↓**

FUEL CELL STACK TEMP (F7)

BACKUP C/W ALARM (F7)

S69 FC STACK T 1(2,3) ↑↓

BFS

SM1 FC STACK T 1(2,3)

If FC operating and: STACK T > 243.7 or < 172.5 degF  
If FC shutdn and: STACK T > 243.7 or < 50.8

S69 FC STACK T 1(2,3)

BFS

SM1 FC STACK T 1(2,3)

If: FC LOAD (FC VOLTS X AMPS)/ STACK T

kW	STACK TEMP
< 3.5	< 180 or > 212
> 3.5	< 190 or > 222
> 7.5	< 198 or > 238
FC	< 50.8
SHTD	> 212

**Nominal Config:**  
(L4:C)  
cb AC1 ΦA,ΦB,ΦC  
FC1 PUMPS (three) – cl  
cb AC2 ΦA,ΦB,ΦC  
FC2 PUMPS (three) – cl  
cb AC3 ΦA,ΦB,ΦC  
FC3 PUMPS (three) – cl  
(O14)  
FC1 CNTLR – ON  
(O15)  
FC2 CNTLR – ON  
(O16)  
FC3 CNTLR – ON  
(Cont in notes column)

1 Is FC shutdn ? YES → 49  
NO ↓

2 SM 69 FUEL CELLS  
SM SYS SUMM 1

(O2) FC STACK TEMP ind:

Off-scale LOW or HIGH  
> 172 degF and < 243 degF  
< 172 degF  
> 243 degF

3 STACK T SNSR FAILURE (FC OK)

**WARNING**  
Ops < 172 degF may result in FC damage

4 CRT msg has "\*" in text ?  
NO → 25  
YES ↓

**WARNING**  
Ops at > 243 degF may result in catastrophic FC failure

5 Perform BUS TIE (Cue Card)

6 B/U C/W FAILURE OR TRANSIENT

7 (CRT) Any other FCs with COOL T > 140 degF ?  
NO → 11  
YES ↓

8 (R11U)  
• √FC STARTUP HTR – ENA

10 POSSIBLE FREON LOOP PROBLEM

9 (CRT)  
• Observe amps of aff FC and tied FC  
(R1)  
• FC1(FC2,FC3) – START (hold 5 sec)  
(CRT)  
Aff FC AMPS decr and tied FC AMPS incr ?  
NO → 16  
YES ↓

11 Perform BUS TIE (Cue Card)  
→ 15

12 FC THERMAL CONTROL AND SUSTAINER HTR FAILED OFF

13 (R1)  
• Maintain FC START sw in START

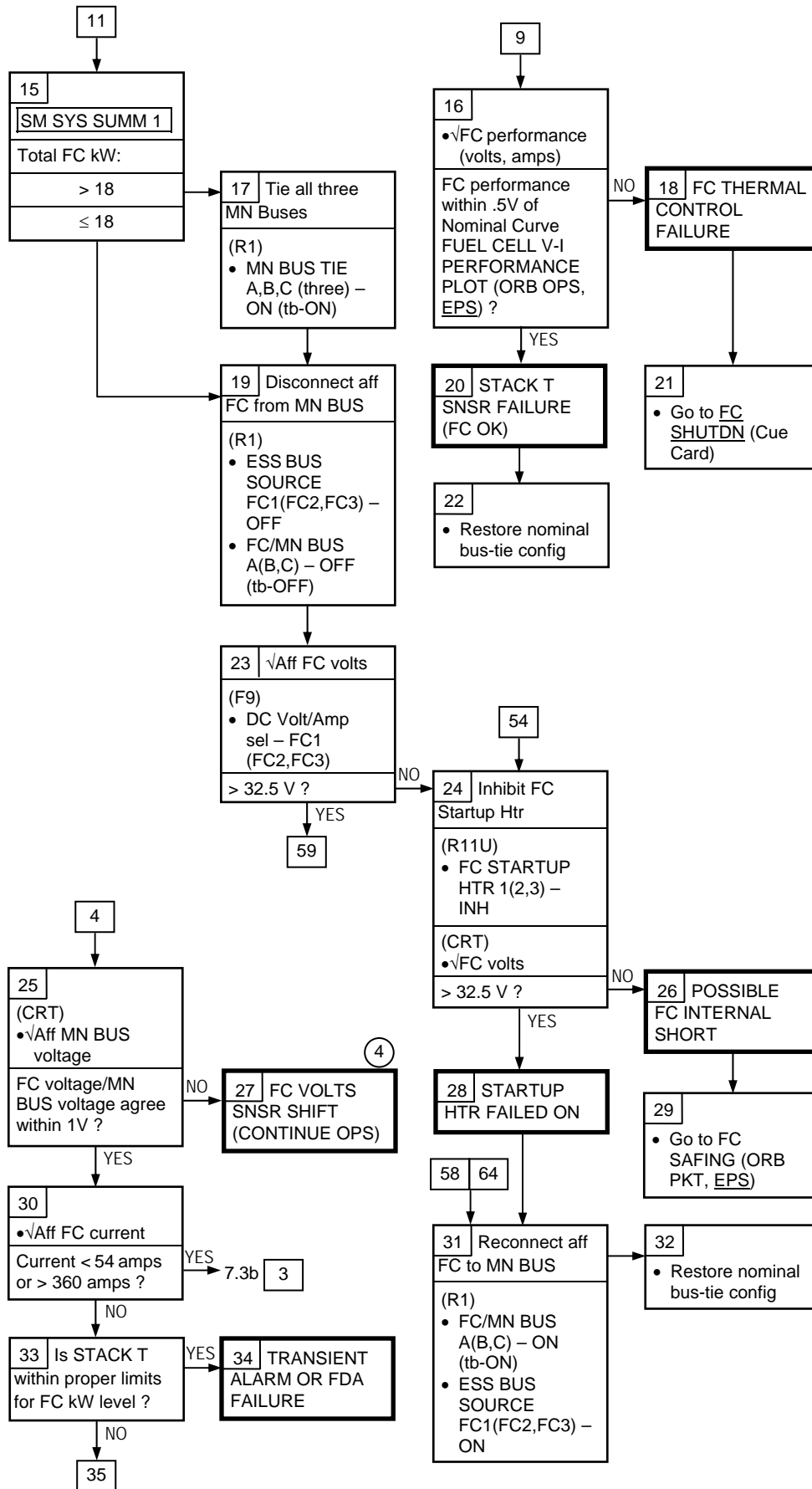
14 Restore nominal bus-tie config

- ① Confirming cue of STARTUP HTR activity is READY FOR LOAD tb – bp whenever htr cycles ON
- ② FC STARTUP HTR amps do not flow thru affected FC ammeter. Increased load will drop FC volts and shared load will be shifted to other FC
- ③ FC STARTUP HTR may be used to cntl STACK T to acceptable temp by holding or maintaining FC START sw in START

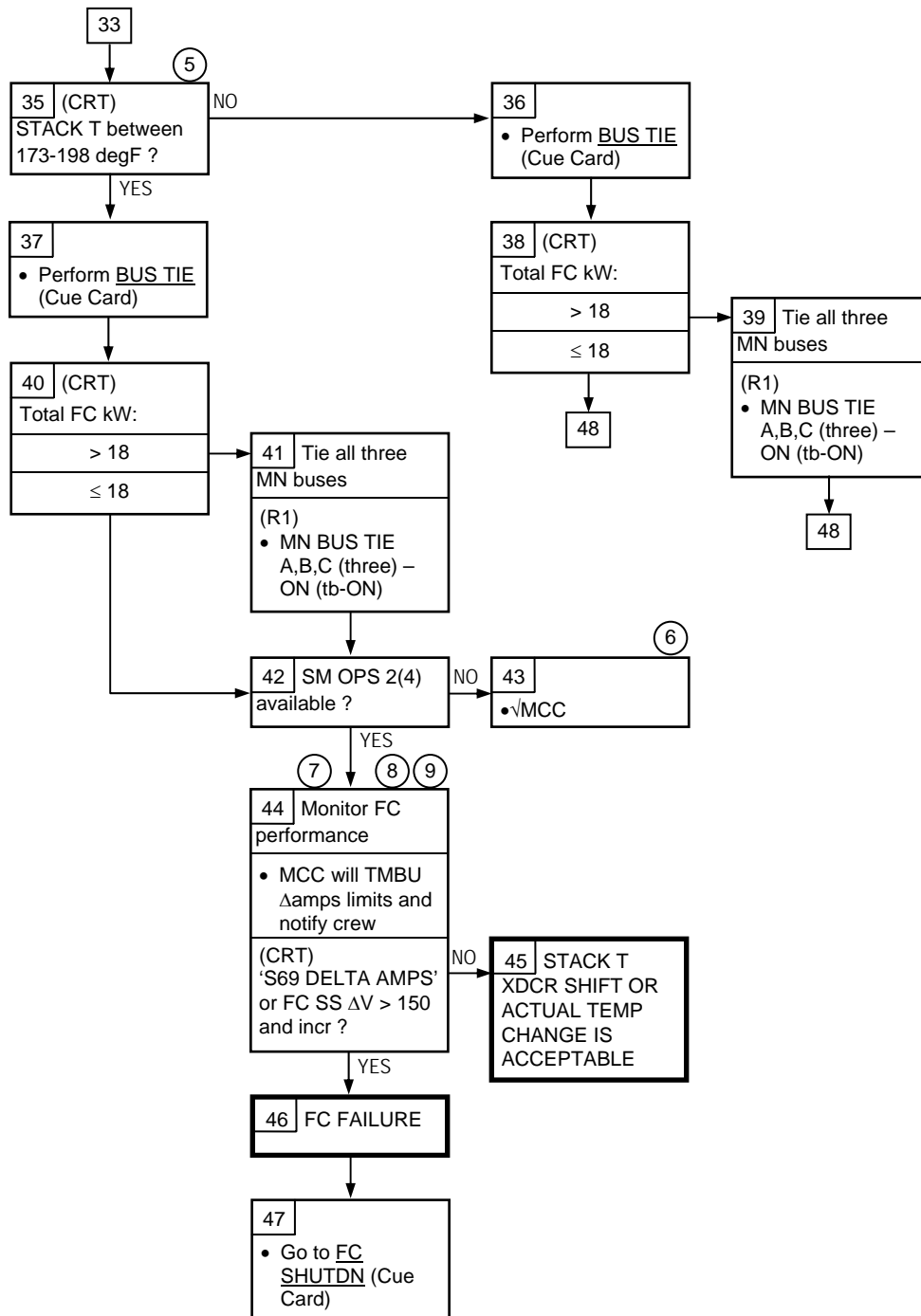
**Nominal Config:**  
(Cont)  
(R11U)  
FC STARTUP HTR 1,2,3 (three) – ENA  
If FC operating:  
(R1)  
FC RDY (three) tb – gray  
FC1(2,3) COOL PUMP ΔP tb (three) – gray  
If FC shutdn:  
Aff FC RDY tb – bp  
Aff FC COOL PUMP ΔP tb – bp

FC REAC/ PMP/STACK T 7.1

**EPS 7.1b (Cont)**



**EPS 7.1b (Cont)**



⑤ This is the temp range that could result in low stack temp SM ALERT

⑥ MCC will monitor FC performance by observing Δamps changes

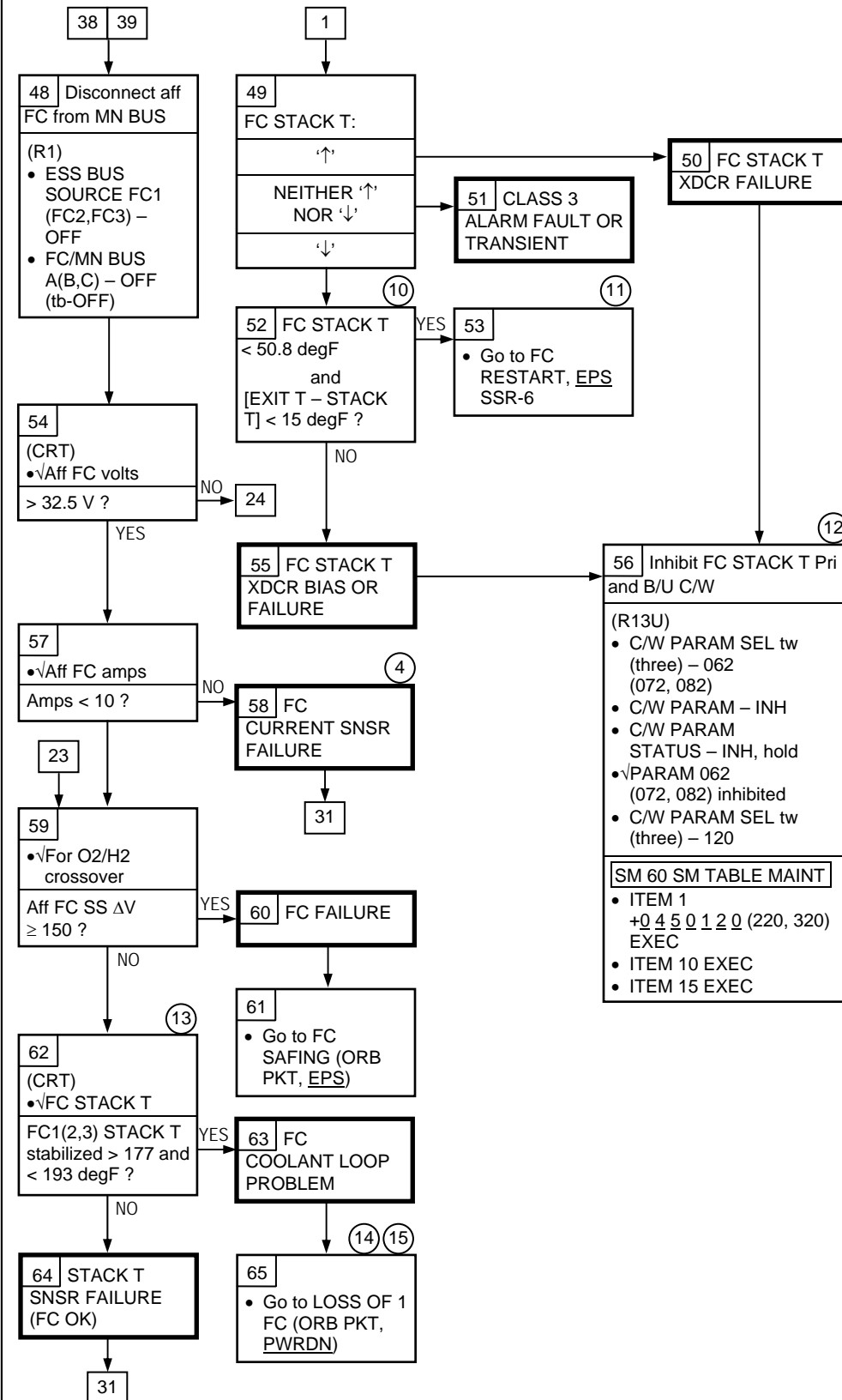
⑦ If loss of comm, reset Δamps limits to present value ± 40 (± 40 takes into account possible differences in FC V-I curves which would cause a Δamps change with a load change)

⑧ Depending on load, may take several hours for performance change. Do not purge this FC for 5 hr

⑨ 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



**EPS 7.1b (Cont)**



④ Loss of correct precondition check for STACK T FDA Class 3 limit set based on kW for this FC

⑩ Based upon STS-2, 51, 54, & 57 data, FC STACK T and EXIT T should remain within 15 degF of each other during cooldown

⑪ Lower limit on allowable temp for reusable FC is 48 degF (includes Xdcr error). FC must be restarted to maintain temp above 48 degF. 50.8 degF was selected due to being closest value to 48 degF in Primary C/W System

⑫ With loss of FC STACK T, FC temp may be obtained only from FC EXIT T

⑬ FC sustaining heater maintaining stack temp

⑭ After cooldown, FC may be usable on cyclic basis or with extensive vehicle pwrdn

⑮ Leave FC in STBY mode. MCC analysis may determine later need for FC shutdn

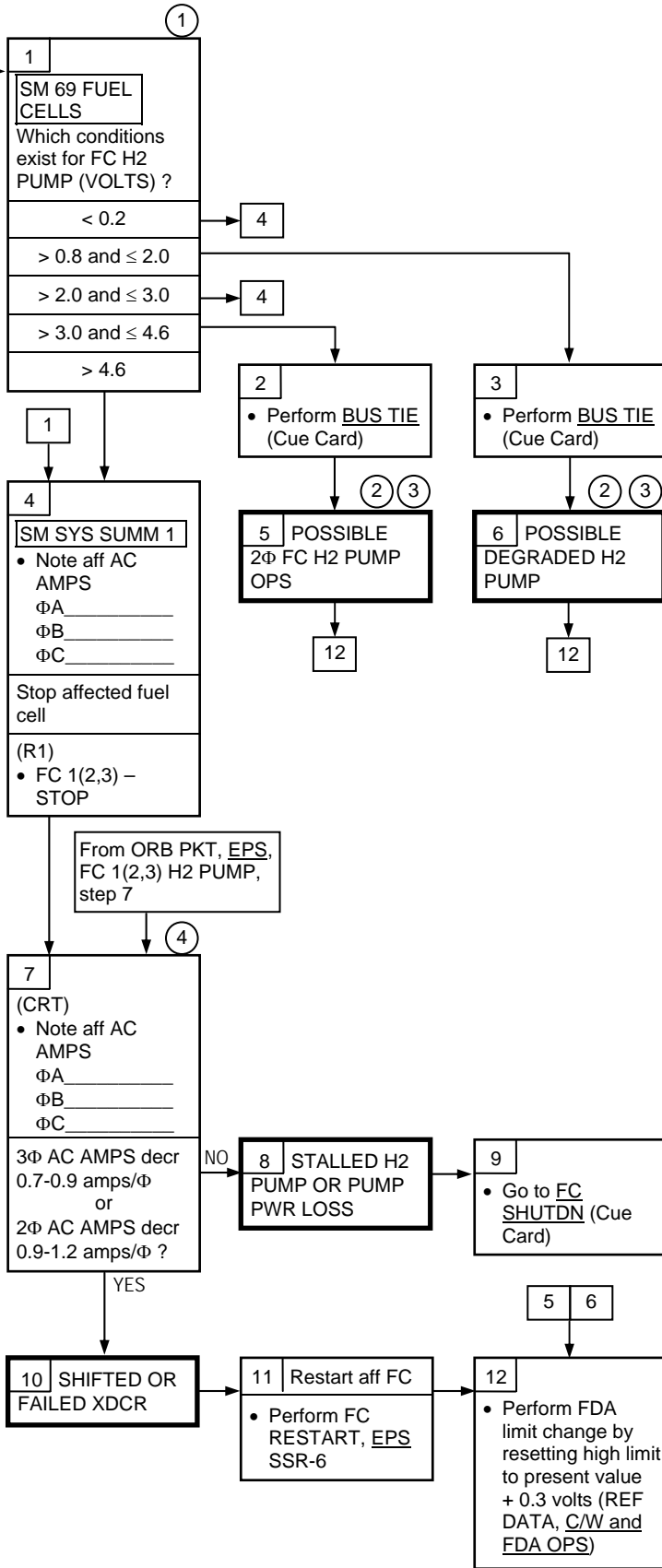
**EPS**

**7.1c H2 PUMP ↑↓**

From ORB PKT, EPS, FC 1(2,3) H2 PUMP, step 4

S69 FC H2 PUMP 1(2,3)

**Nominal Config:**  
 (L4:C)  
 cb AC1 ΦA,ΦB,ΦC  
 FC1 PUMPS  
 (three) – cl  
 cb AC2 ΦA,ΦB,ΦC  
 FC2 PUMPS  
 (three) – cl  
 cb AC3 ΦA,ΦB,ΦC  
 FC3 PUMPS  
 (three) – cl  
 (O14)  
 FC1 CNTLR – ON  
 (O15)  
 FC2 CNTLR – ON  
 (O16)  
 FC3 CNTLR – ON  
 (R1)  
 FC1,FC2,FC3 RDY  
 tb (three) – gray  
 FC1,FC2,FC3  
 COOL PUMP ΔP  
 tb (three) – gray



- ① Normal H2 Pump range 0.28-0.65 volt. See Table A
- ② If degradation of H2 pump worsens, FC should be shut down so that pump could be used during entry
- ③ Non-satisfactory H2 pump ops would eventually be reflected in FC amps (low) SSDV (erratic), exit temp, and FC pH (event)
- ④ H2 PUMP operates at .3A/Φ for 3-phase and .45A/Φ for 2-phase operation. Coolant pump operates at .5A/Φ for 3-phase and .62A/Φ for 2-phase operation

**Table A**

FC PUMP PACKAGE POWER RANGES

3-PHASE OPERATION

LOAD	COOLANT PUMP	H2 PUMP	
	AMPS/PHASE	AMPS/PHASE	VOLTS
NORMAL	0.51	0.3	0.28-0.65
OVERLOAD		0.5	> 0.8
STALL	1.0	1.2	2.2

2-PHASE OPERATION

LOAD	COOLANT PUMP	H2 PUMP	
	AMPS/PHASE	AMPS/PHASE	VOLTS
NORMAL (open motor winding)	0.62	0.45	3.15-3.5
NORMAL (1 $\Phi$ cb open)	0.62	0.45	4.15-4.5
STALL	1.0	1.3	4.8

**EPS**

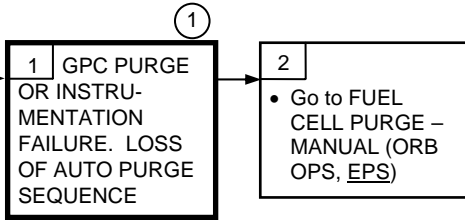
**7.2b FC PURGE TEMP**

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 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

FC PURGE

7.2

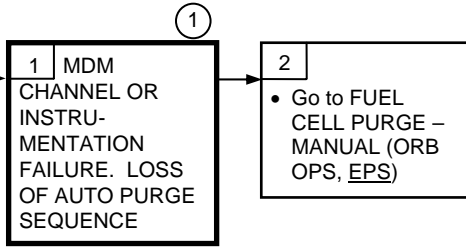
**EPS**

**7.2c FC PURGE SEQ**

FC PURGE SEQ

If:  
S/W detects AUTO PURGE SEQ, purge-line htrs ON-signal has been lost after GPC AUTO PURGE SEQ initiated

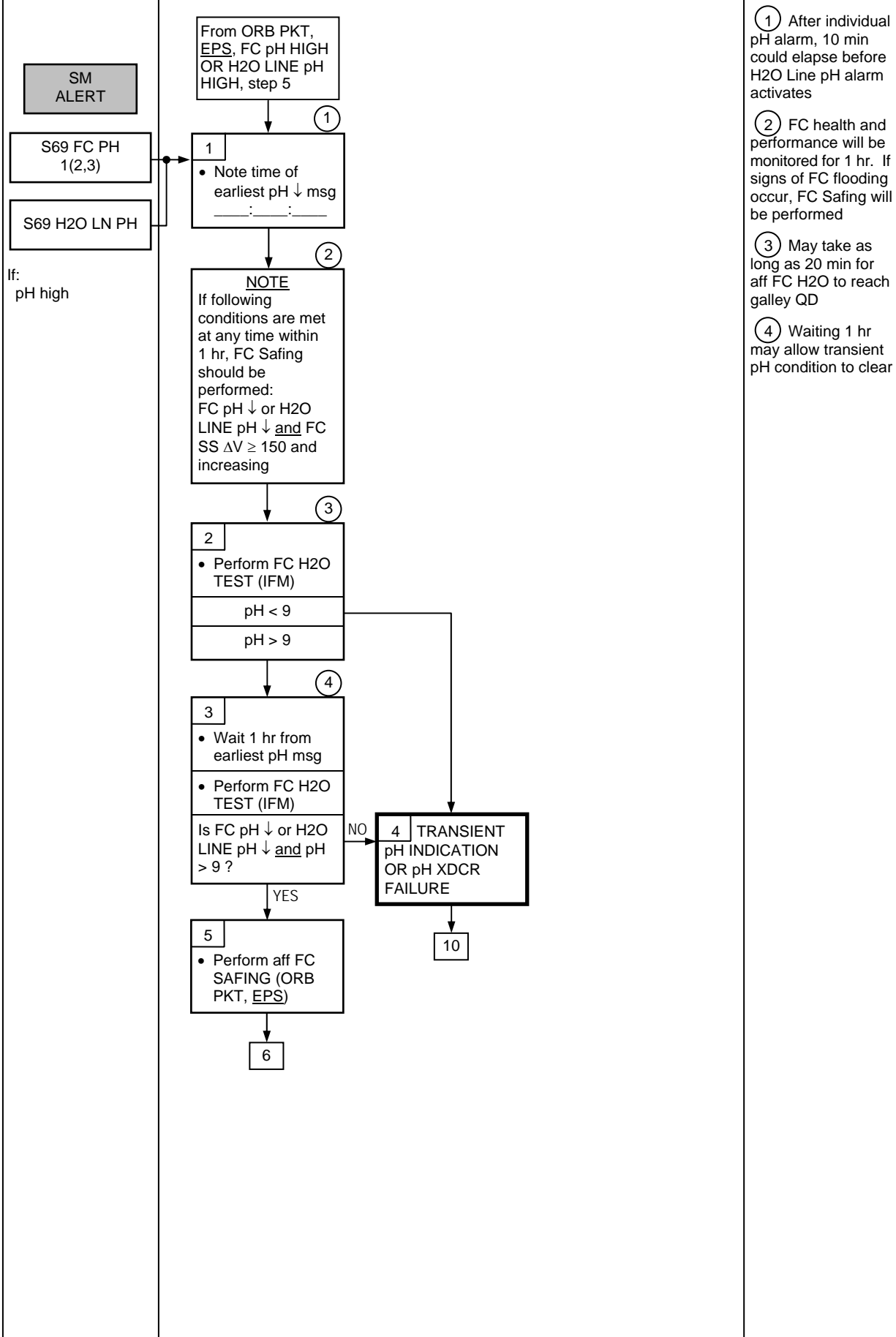
**Nominal Config:**  
(R11U)  
FC PURGE HTR – GPC



① 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

**EPS**

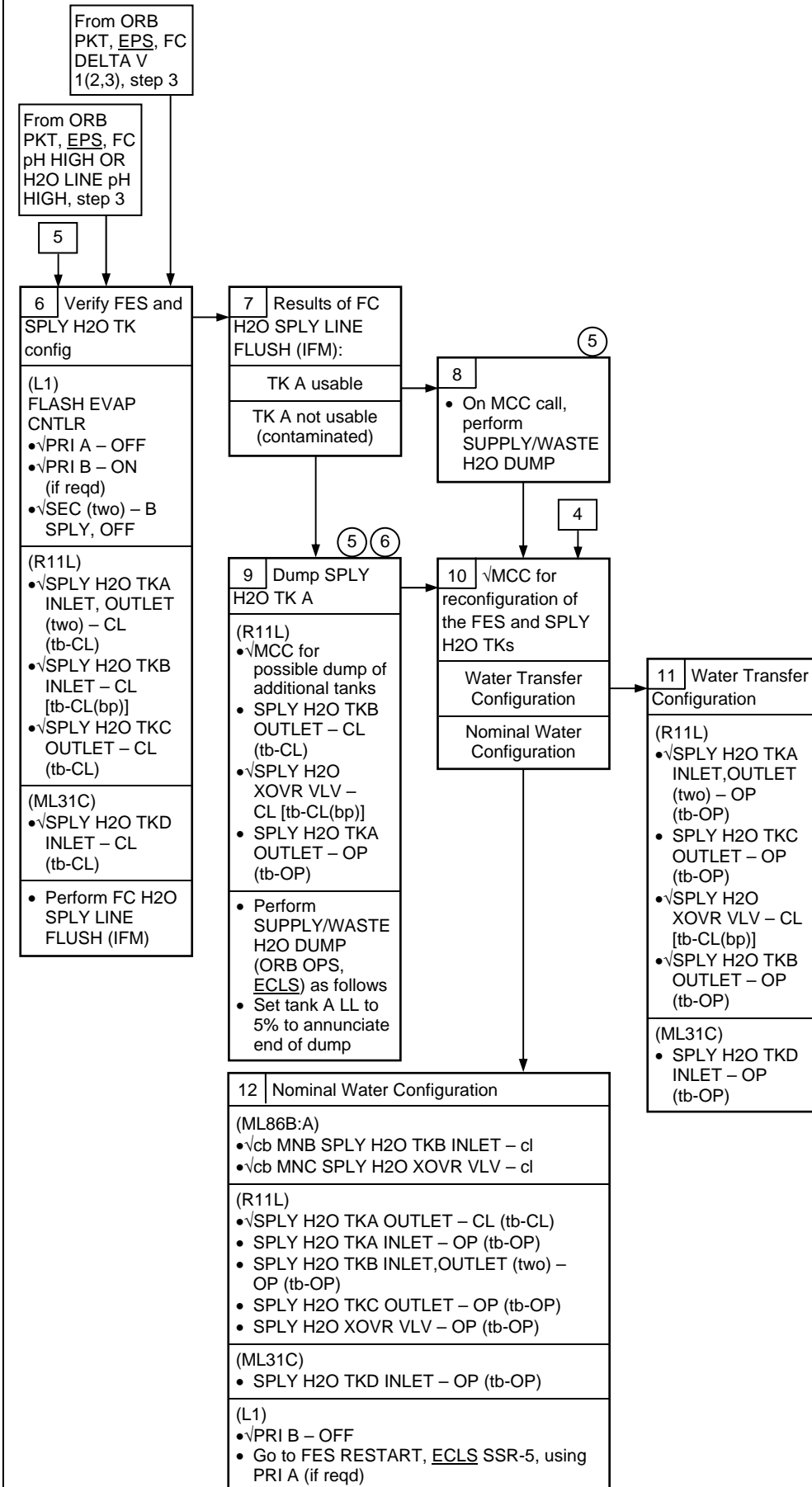
**7.3a FC/H2O LINE pH HIGH**



- ① After individual pH alarm, 10 min could elapse before H2O Line pH alarm activates
- ② FC health and performance will be monitored for 1 hr. If signs of FC flooding occur, FC Safing will be performed
- ③ May take as long as 20 min for aff FC H2O to reach galley QD
- ④ Waiting 1 hr may allow transient pH condition to clear

FUEL CELL 7.3

**EPS 7.3a (Cont)**



**5** SPLY TKC may be contaminated. TKC will be dumped and then flushed per nominal TKC management

**6** SPLY TKA will be dumped periodically to flush pH out of system

**EPS**

BACKUP C/W ALARM (F7)

SM ALERT

S67 MAIN BUS V A(B,C)

**BFS**

SM1 MAIN BUS V A(B,C)

If: MNA(B,C) BUS VOLTS < 27 vdc > 32 vdc

S69 FC VOLTS 1(2,3)

S69 FC AMPS 1(2,3)

If FC operating and FC AMPS: < 54 > 360

If FC shutdn and AMPS < current C/W FDA lower limit, > current C/W FDA upper limit

**BFS**

SM1 DC VOLT FC1(2,3)

If FC operating and: VOLTS < 27.5 vdc > 32.5 vdc

If FC shutdn and Volts < current C/W FDA lower limit, > current C/W FDA upper limit

**BFS**

SM1 FC AMPS 1(2,3)

If FC AMPS < 54 > 410

**Nominal Config:**

(O13:A)  
cb ESS 1BC MNA CONTR - cl  
(O13:C)  
cb ESS 2CA MNB CONTR - cl  
(O13:E)  
cb ESS 3AB MNC CONTR - cl

(Cont in notes column)

**7.3b FUEL CELL VOLTS ↑↓, FUEL CELL AMPS ↑↓, MAIN BUS V A(B,C) ↑↓**

From ORB PKT, EPS, MN BUS U/V FC VOLTS, step 22

1 Is FC shutdn ? YES

2 FC VOLTS msg → 48  
FC AMPS msg → 62

NO  
7.1b 30

3 SM 67 ELECTRIC

Following conditions met:

MN VOLTS	FC VOLTS	FC AMPS
		HIGH > 360 → 11
	LOW < 27.5	
LOW < 27		
HIGH > 32		
	HIGH > 32.5	
		LOW < 54 → 34
None of the above		

6 C/W FAULT OR TRANSIENT

7 VOLTS SNSR FAILED

8 FC/MN BUS LIGHTLY LOADED

9 (R13U)  
• Determine which param triggered C/W ALARM

11 SM 69 FUEL CELLS  
Does FC AMPS (± 50) = O2 FLOW x 47.5 or FC AMPS (± 68) = H2 FLOW x 377 ?

10 • Incr load to decr volts

12 FC AMP SNSR FAILURE

3

3

4

3

4

6

13 Aff Bus tied ?

14 Untie Buses

(R1)  
• MN BUS TIE A(B,C) - OFF (tb-OFF)  
• MN BUS TIE B(C,A) - OFF (tb-OFF)

15

15

15

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. Class 2 FDA still exists

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

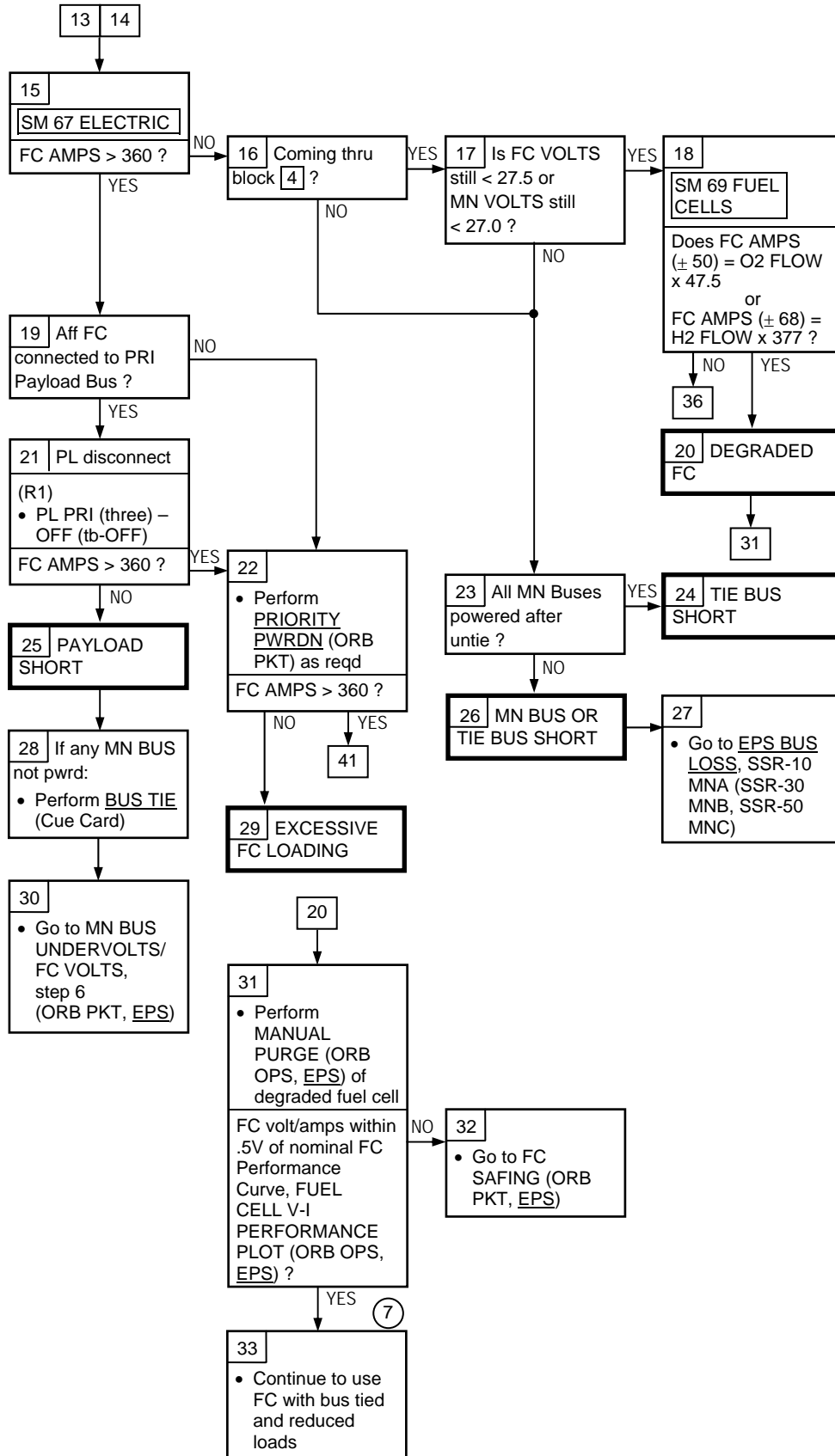
⑤ If SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:  
AMPS (± 50) = O2 FLOW x 47.5  
AMPS (± 68) = H2 FLOW x 377

⑥ FC AMPS up to 450 may be expected if FC pwr MN Bus plus PRI PL Bus or FC pwr two main buses

**Nominal Config:**  
(Cont)  
(O13:E)  
PL PRI FC3 - OFF (tb-OFF)  
PL PRI MNB - OFF (tb-OFF)  
PL PRI MNC - ON (tb-ON)  
If FC operating:  
(R1)  
FC/MAIN BUS A(B,C) - ON (tb-ON)  
FC1(2,3) REAC (six) - OP  
If FC shutdn:  
Aff FC/MN BUS - OFF (tb-OFF)  
Aff FC REAC (two) - CL

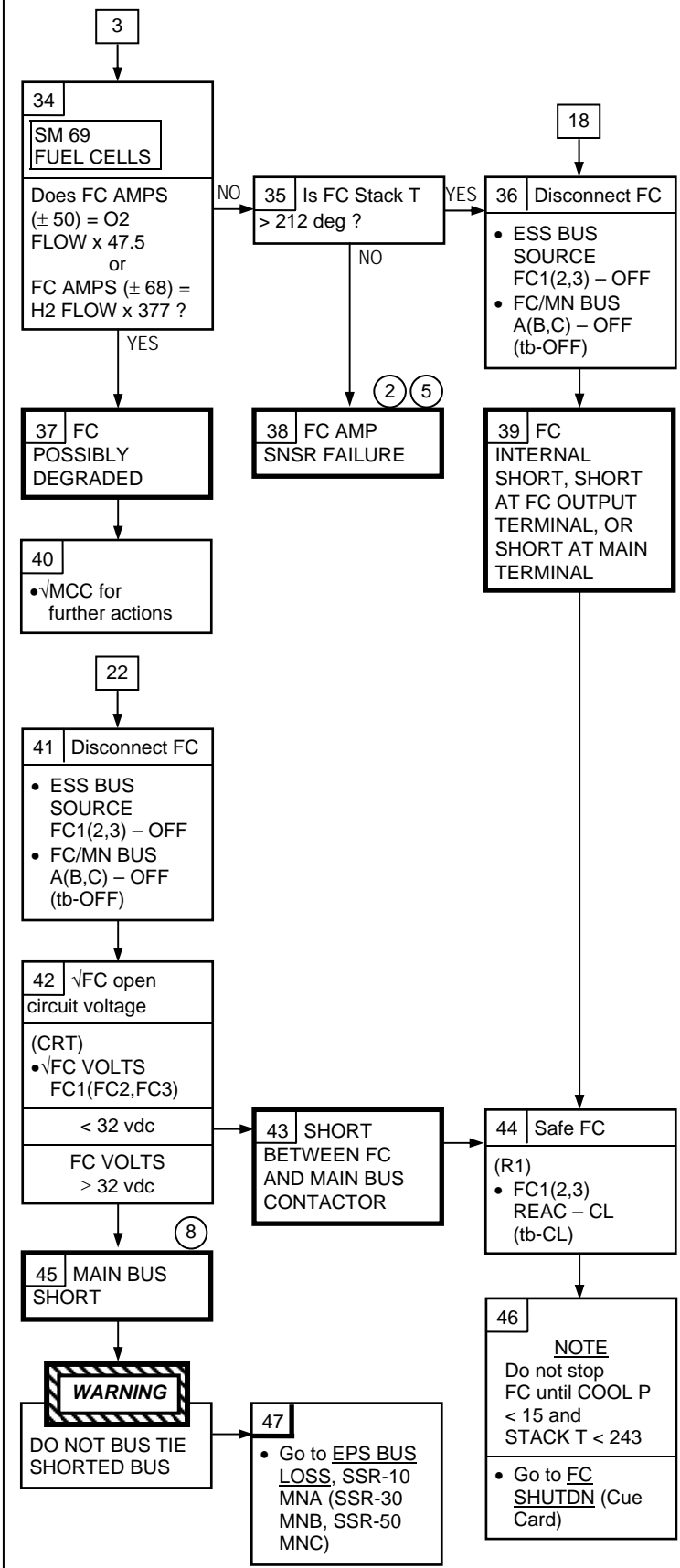


**EPS 7.3b (Cont)**



⑦ MCC analysis reqd before increasing loads on FC

**EPS 7.3b (Cont)**

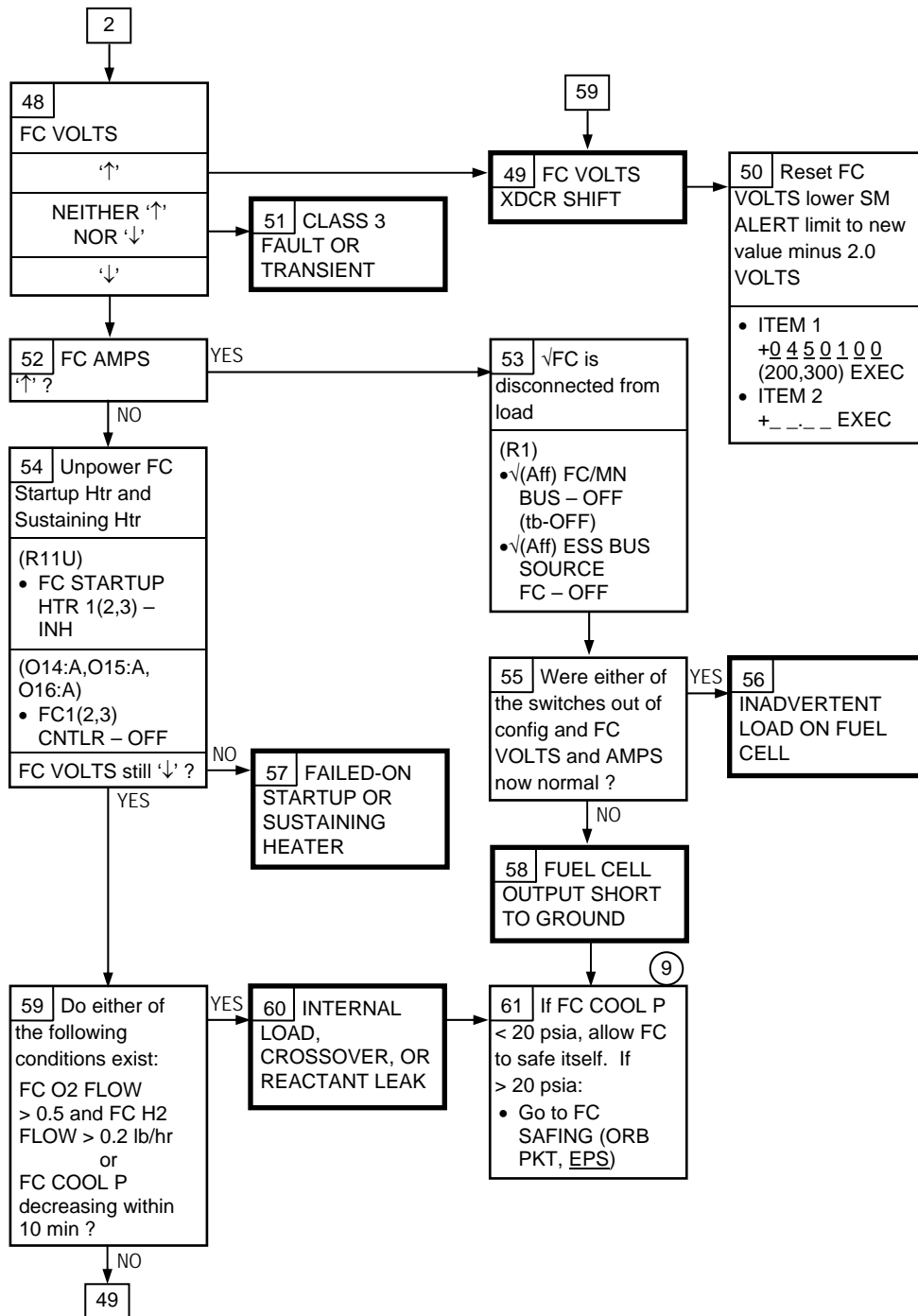


② FC Stack Temp Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU. Class 2 FDA still exists

⑤ If SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:  
 AMPS (± 50) = O2 FLOW x 47.5  
 AMPS (± 68) = H2 FLOW x 377

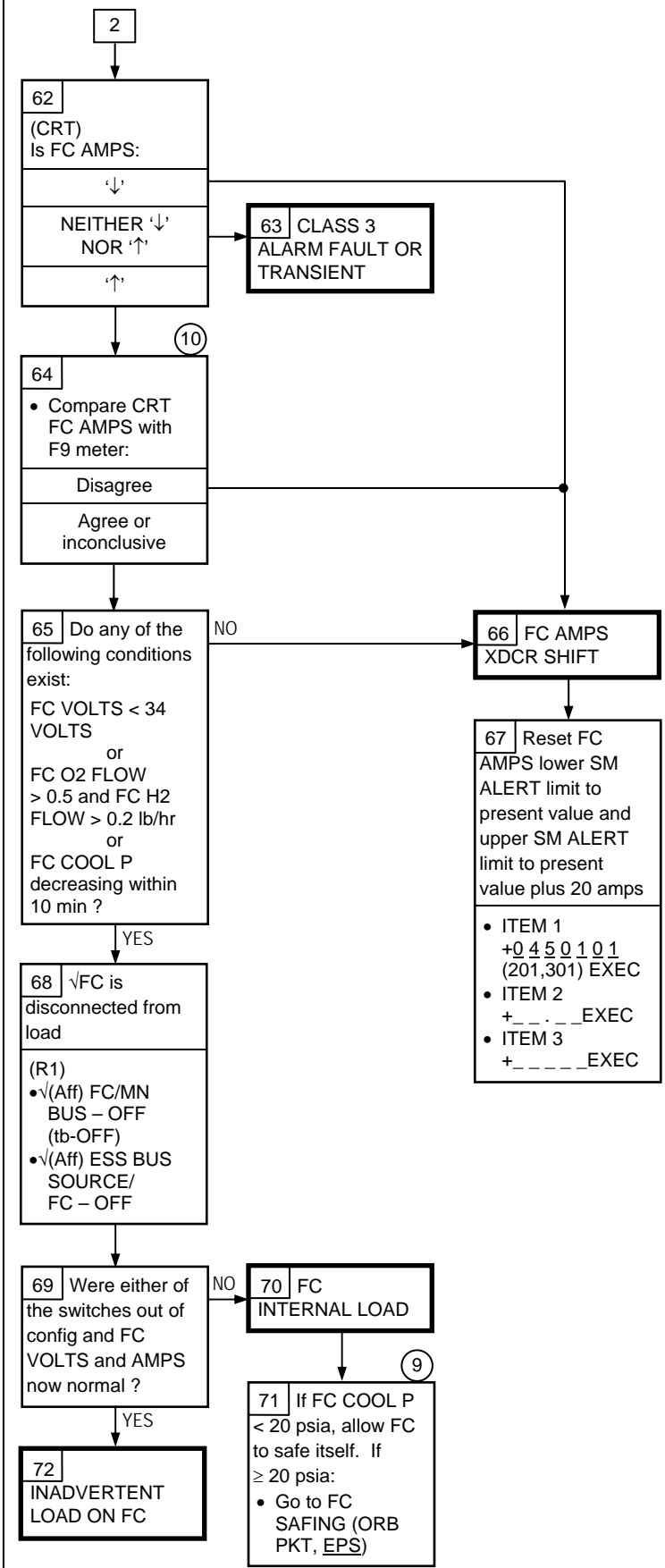
⑧ Short on MN BUS causes FC loss. For loss of MNC, FC3 pumps will be pwr'd with AC Transfer Cable and FC3 pwr will be supplied to MNB through PL pwr contactors

**EPS 7.3b (Cont)**



(9) At FC coolant pressure of less than 20 psia, electrolyte boiling may occur (i.e., KOH escaping from cell matrix); in addition, Dual Gas Regulator may not control O2/H2 relative pressures and crossover may result

**EPS 7.3b (Cont)**



⑨ At FC coolant pressure of less than 20 psia, electrolyte boiling may occur (i.e., KOH escaping from cell matrix); in addition, Dual Gas Regulator may not control O2/H2 relative pressures and crossover may result

⑩ Due to limited resolution of F9 meter, close comparison may be unobtainable

**EPS**

**7.3d FUEL CELL EXIT T ↑↓**

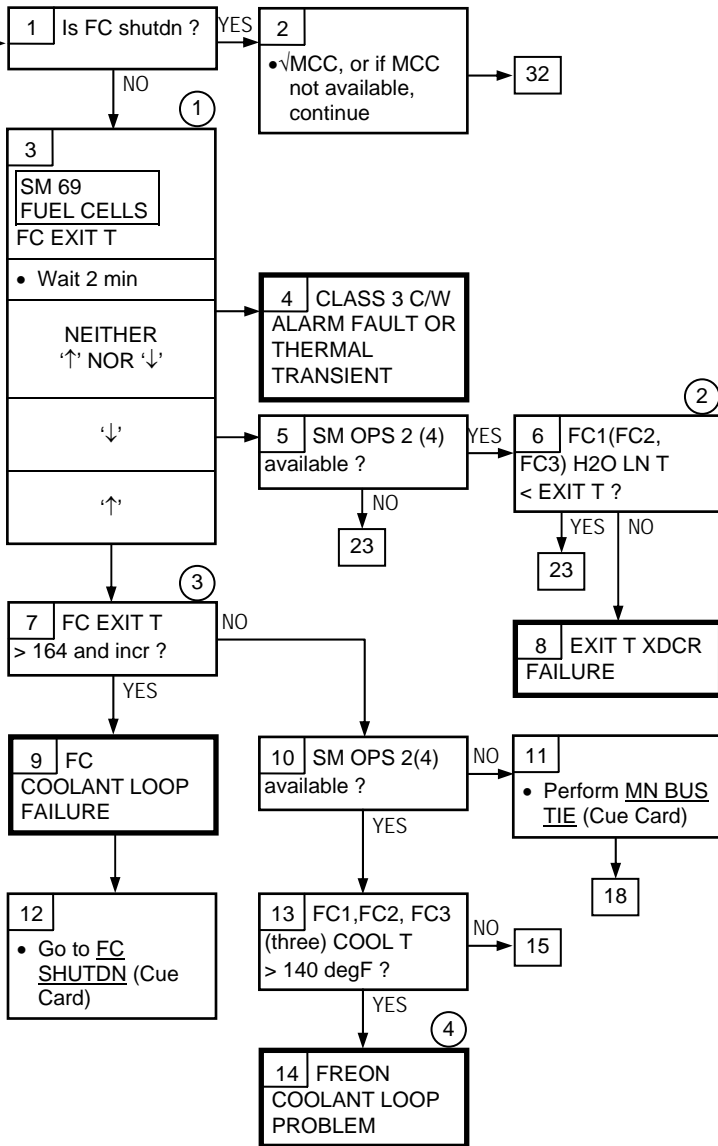
S69 FC  
EXIT T 1(2,3)

BFS  
SM1 FC EXIT T  
1(2,3)

If FC operating and  
Exit T(condenser)  
< 131 degF  
> 164 degF

If FC shutdn and  
Exit T > 164 degF  
or  
< 50.8 degF

**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



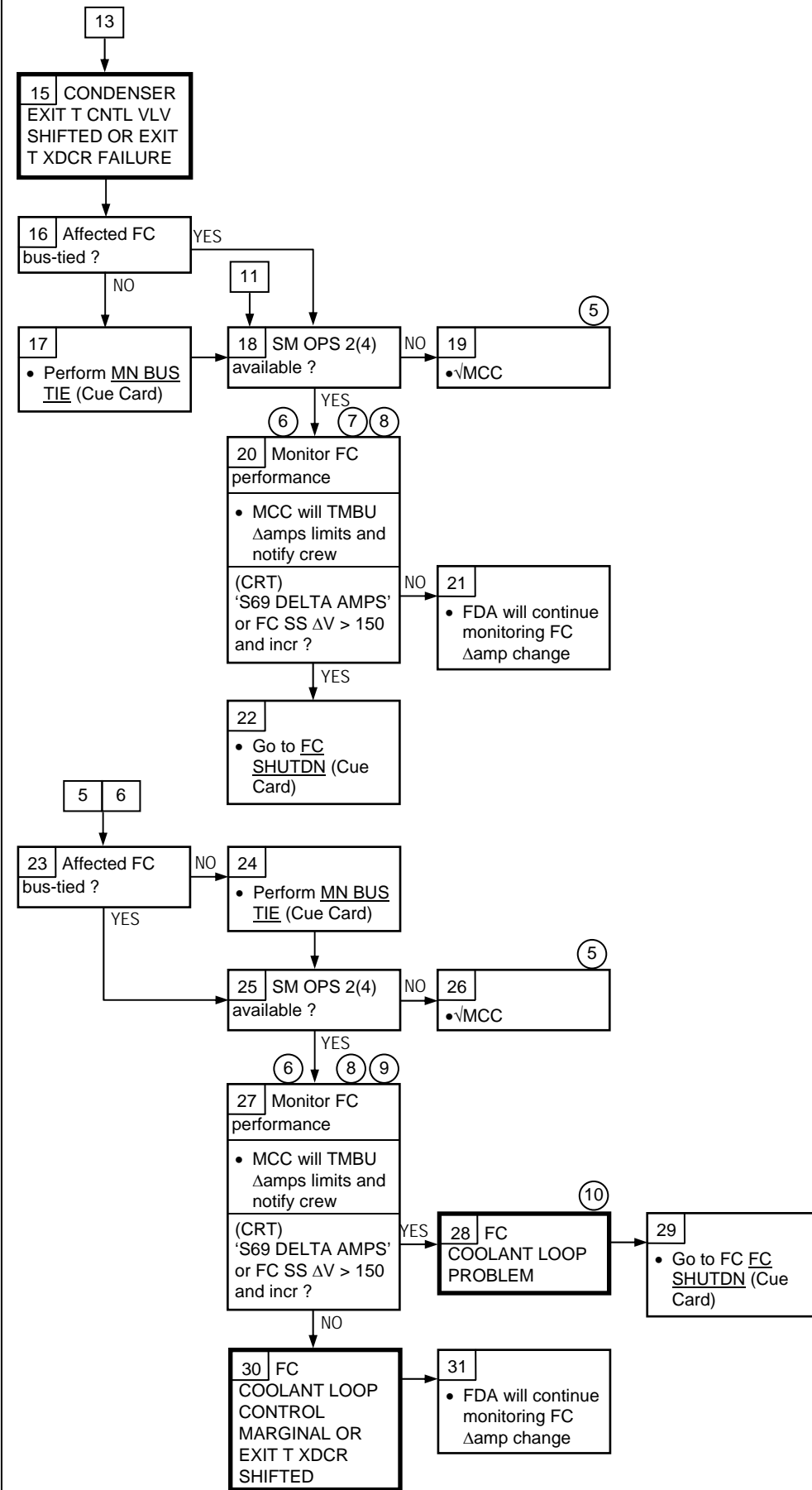
① Transient loads may cause EXIT T < LN T for up to 2 min

② Data indicates H2O LN T < EXIT T by up to 15 degF

③ FC EXIT T will quickly increase to FC STACK T if CONDENSER COOLANT FLOW is stopped while H2 PUMP is operational. FC should be quickly shutdn for possible Coolant Pump failure

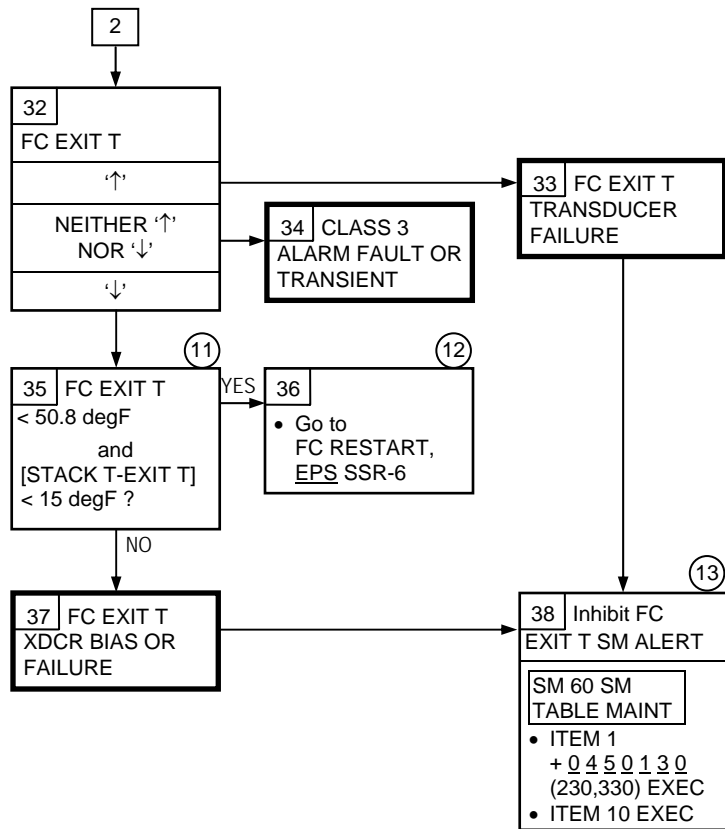
④ √MCC

**EPS 7.3d (Cont)**



- ⑤ MCC will monitor FC performance by observing Δamps change
- ⑥ If loss of comm, reset Δamps limits to present value ± 40 (± 40 takes into account possible differences in FC V-I curves which would cause a Δamps change with a load change)
- ⑦ 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 ΔV
- ⑧ 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
- ⑨ 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 ΔV. Uniform cell dryout would result in increased FC performance
- ⑩ Depending on extent of failure after cooldown, FC may be usable in cyclic mode

**EPS 7.3d (Cont)**



① Based upon STS-2 data, FC EXIT and STACK T should remain within 15 degF of each other during cooldown

② 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

③ With loss of FC EXIT T, FC temp may be obtained only from FC STACK T

**EPS**

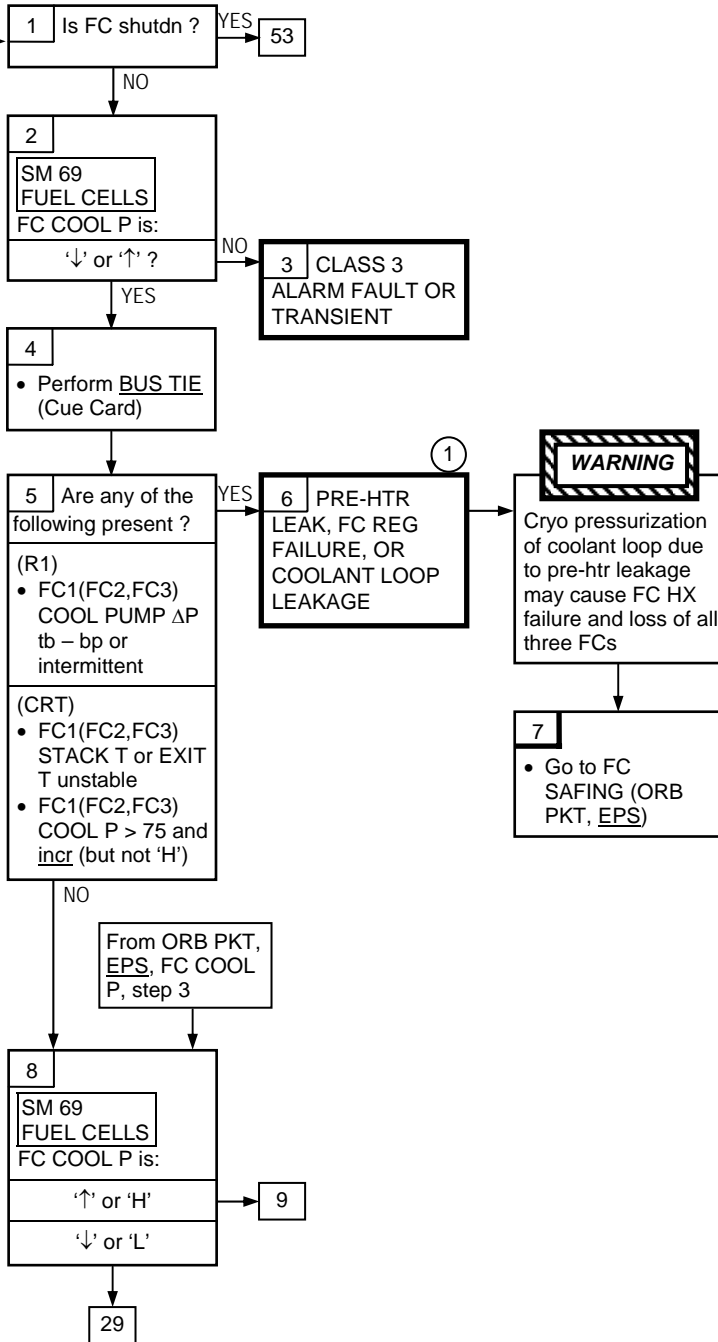
**7.3e FUEL CELL COOL P ↑↓**

S69 FC COOL P 1(2,3)

**BFS**

SM1 FC COOL P 1(2,3)

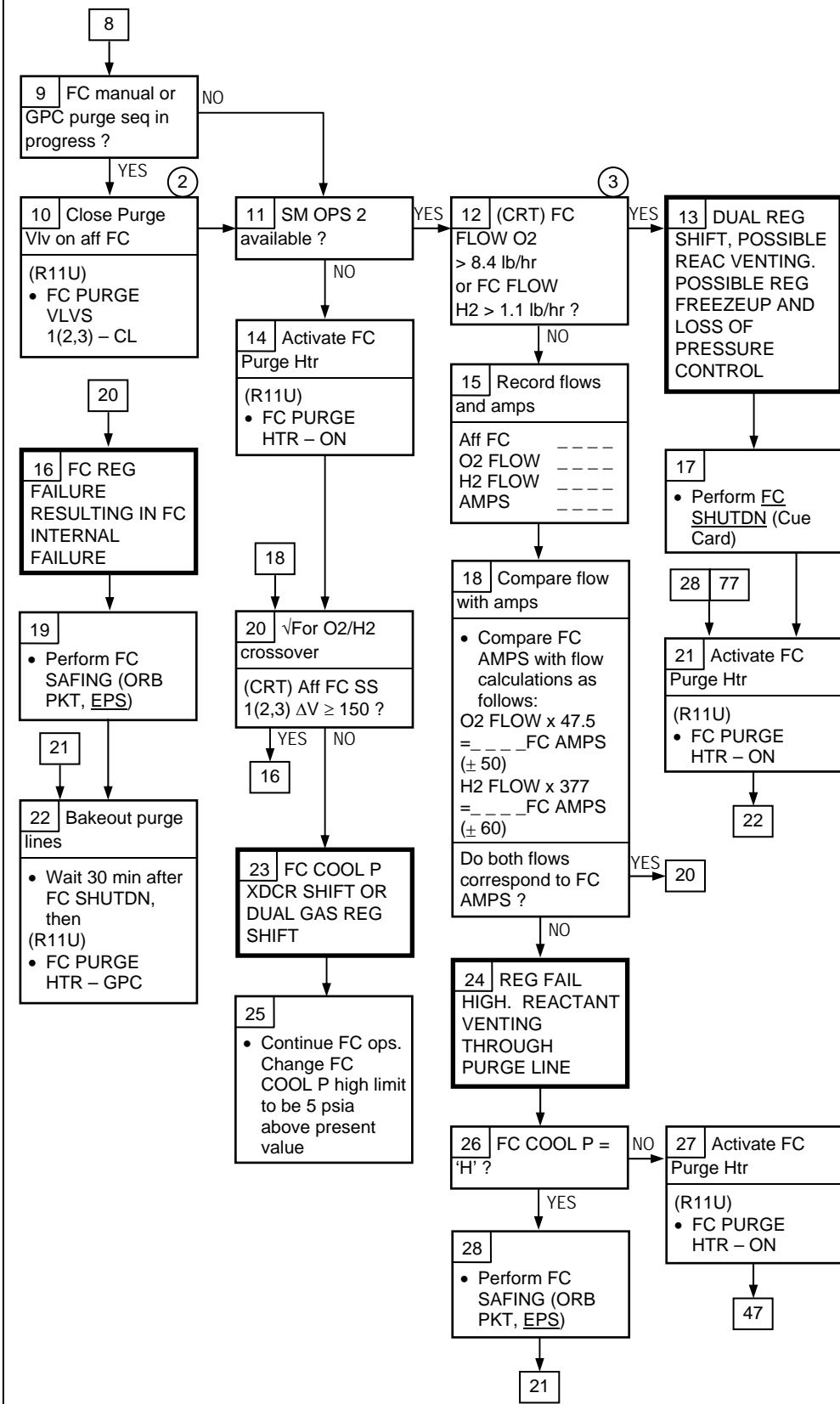
If FC operating and:  
COOL P < 50 psia  
> 75 psia  
If FC shutdn:  
COOL P < current C/W  
FDA lower limit  
> 75 psia



① Erratic FC COOL T on SM 69 display may also be indicative of pre-htr internal leak



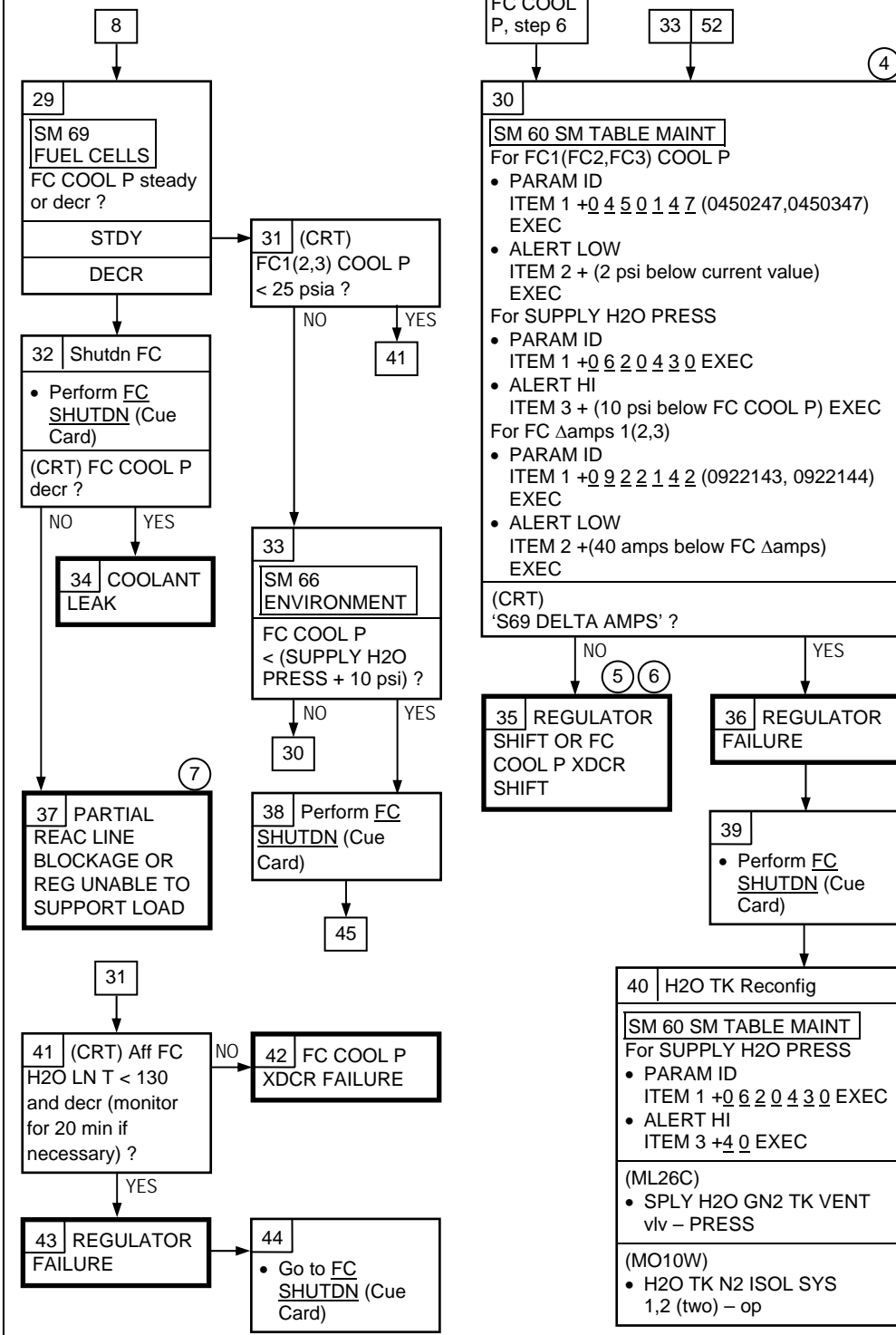
**EPS 7.3e (Cont)**



② 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

③ Flows correspond to 10 kW (~350 amps) load on FC plus flow sensor accuracy

**EPS 7.3e (Cont)**

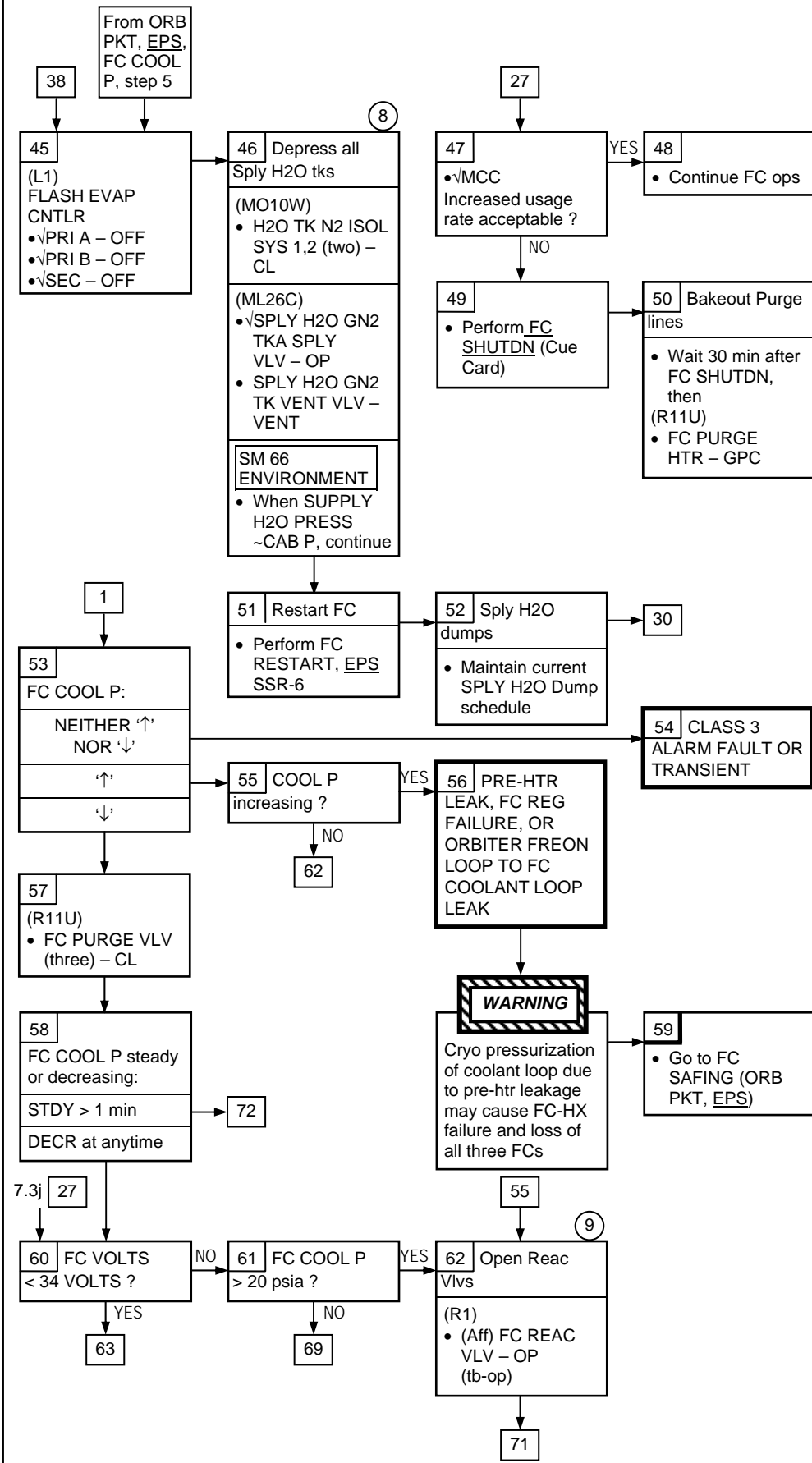


From ORB  
PKT, EPS,  
FC COOL  
P, step 6

33 52

- ④ Possible KOH in O2 sys. Do not purge suspect FC until nominal performance at this pressure demonstrated for at least 6 hr
- ⑤ 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
- ⑥ 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
- ⑦ FC may be usable if loads reduced to point where reactant demand can be met

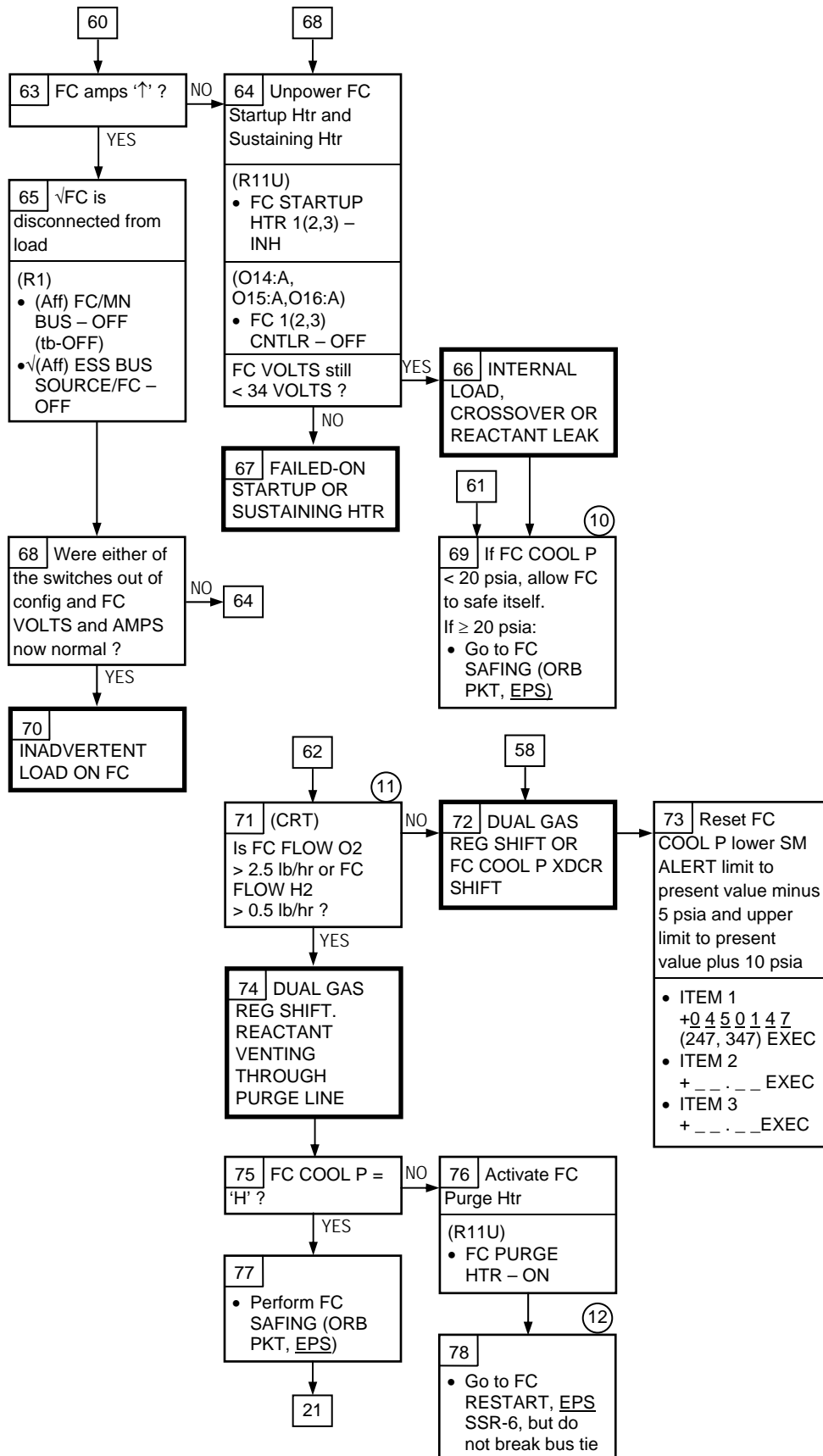
**EPS 7.3e (Cont)**



(8) For FES ops, SPLY H2O TKB, TKC, TKD may need to be repressurized. √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)

**EPS 7.3e (Cont)**



⑩ 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

⑪ Typical values for FC purges

⑫ With FC shutdn and no coolant flow, there exists no preheating capability of the incoming reactants. Continuous purge flow may freeze or damage regulator

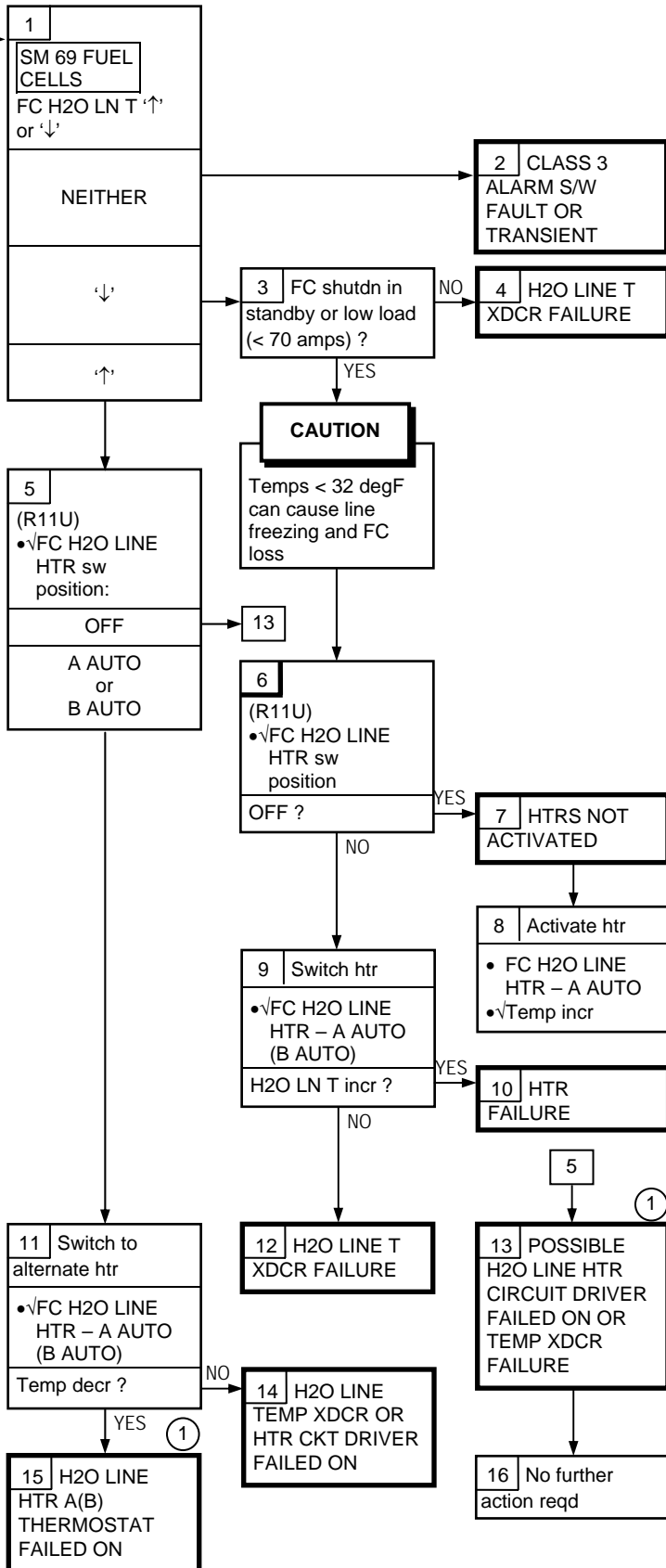
**EPS**

**7.3f FUEL CELL H2O LN T ↑↓**

S69 FC H2O  
PRI 1(2,3)

If:  
H2O LN T  
< 60 degF  
> 185 degF

**Nominal Config:**  
(R11U)  
FC H2O LINE  
HTR – A AUTO  
(B AUTO)



① Overtemp caused by driver or thermostat failure will only occur if FC shutdn in standby, or lightly loaded. Failure at normal loads not detectable

**EPS**

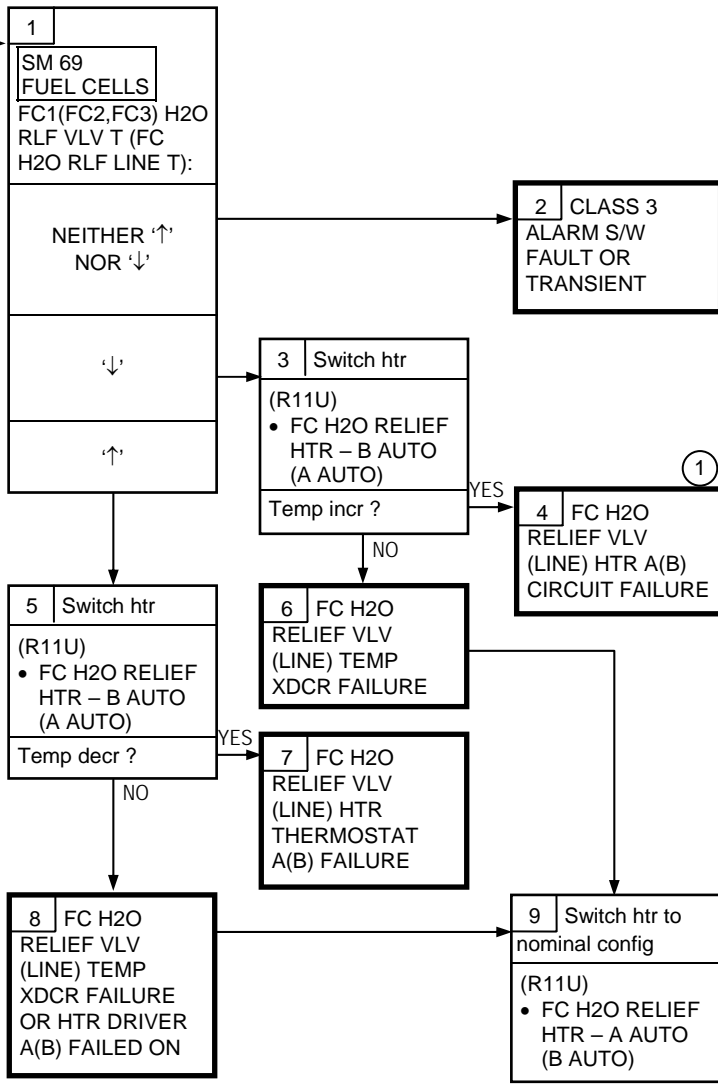
**7.3g FUEL CELL H2O RLF VLV T ↑↓  
FUEL CELL H2O RLF LINE T ↑↓**

① Switching htrs isolated failed circuit

S69 FC H2O RLF 1(2,3)  
If:  
FC H2O RLF VLV T < 60 degF > 185 degF

S69 FC H2O RLF LINE  
If:  
FC H2O RLF LINE T < 60 degF > 185 degF

**Nominal Config:**  
(R11U)  
FC H2O LINE HTR – A AUTO (B AUTO)



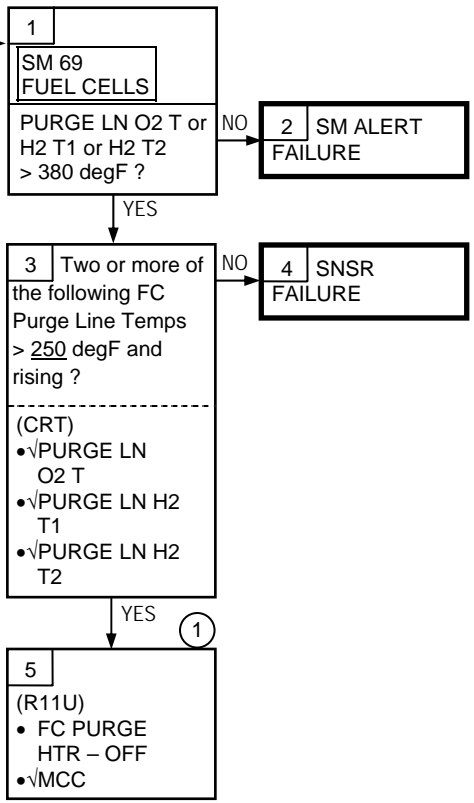
**EPS**

**7.3i FUEL CELL O2(H2) PURGE LN T ↑**

S69 FC PRG LN O2

S69 FC PRG LN H2

If:  
 FC PURGE LN O2  
 T > 380 degF  
 or  
 FC PURGE LN H2  
 T1 > 380 degF  
 or  
 FC PURGE LN H2  
 T2 > 380 degF



① If GPC Auto Purge in progress, expect FC PURGE SEQ msg

**EPS**

**7.3j FUEL CELL O2(H2) FLOW ↑**

S69 FC O2 FLOW 1(2,3)

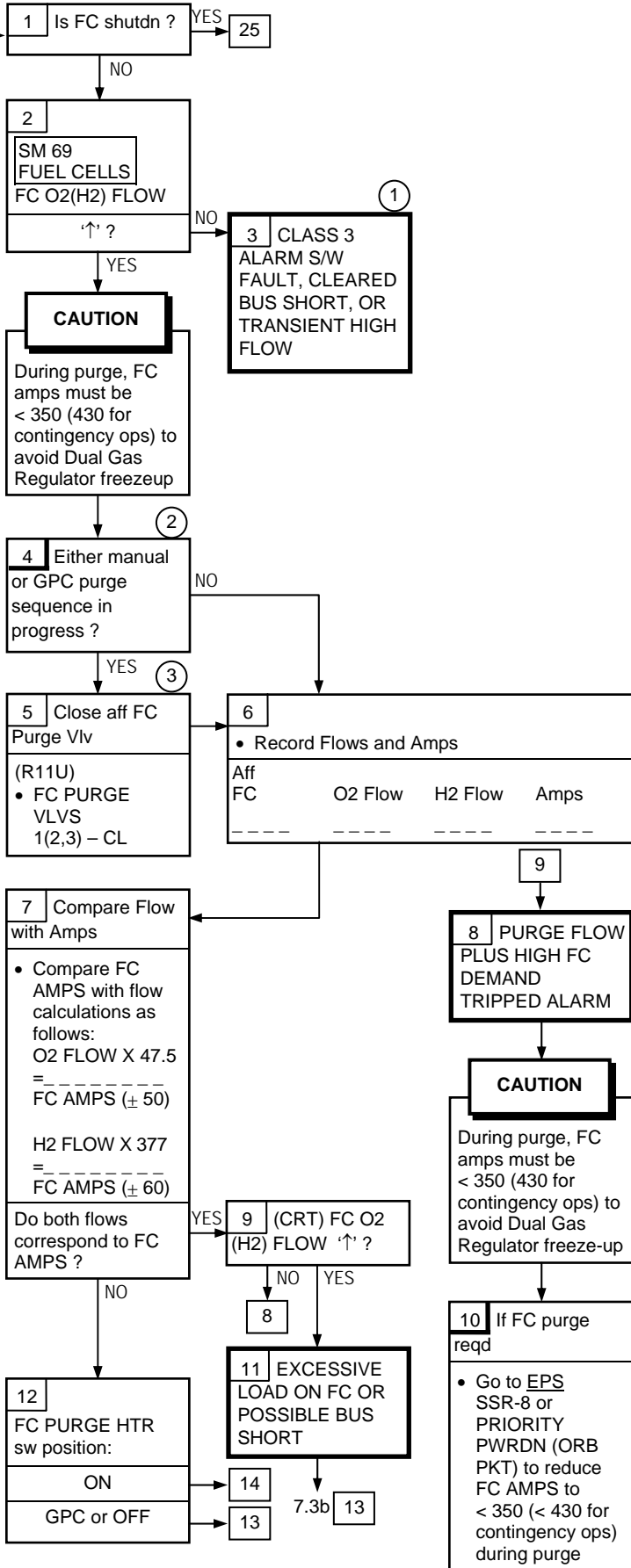
S69 FC H2 FLOW 1(2,3)

If FC operating and:  
O2 FLOW > 11.1 pph  
H2 FLOW > 1.6 pph

11.1 pph O2 FLOW corresponds to ~370 amps plus 3.3 pph purge flow

1.6 pph H2 FLOW corresponds to ~370 amps plus 0.6 pph purge flow

If FC shutdn and:  
O2 FLOW > current C/W FDA upper limit  
H2 FLOW > current C/W FDA upper limit



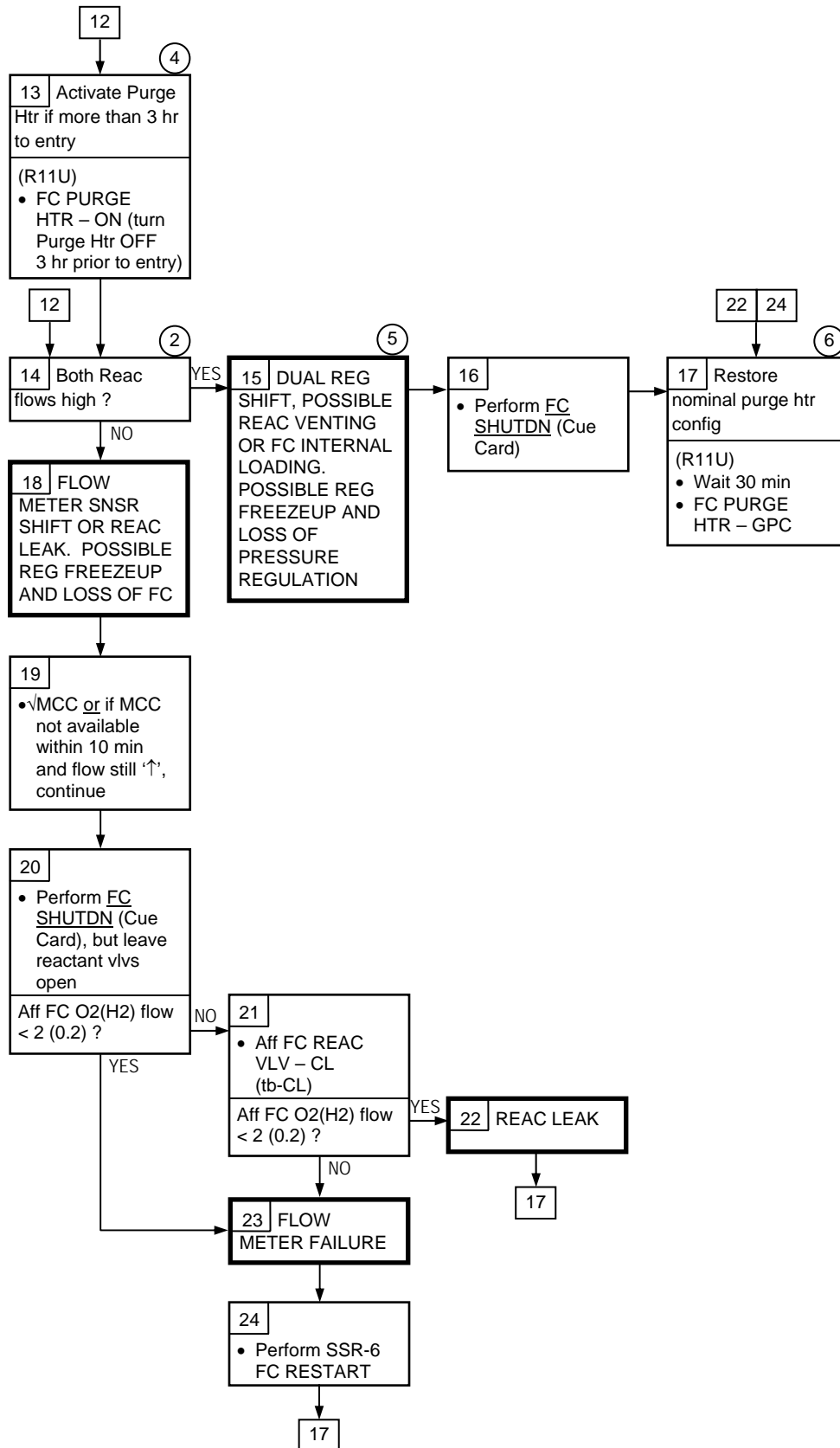
① If bus short caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications

② If FC purge in progress, alarm may have tripped because of normal load plus purge flow. If one flowmeter previously failed, assume both flows high

③ If GPC PURGE SEQ selected, manually closing Purge Vlv stops purge and GPC will proceed with purging next FC selected for GPC purge. GPC may or may not alert crew. 'S68 FC PURGE 1(2,3)' msg occurs depending on when purge vlvs were manually closed



**EPS 7.3j (Cont)**

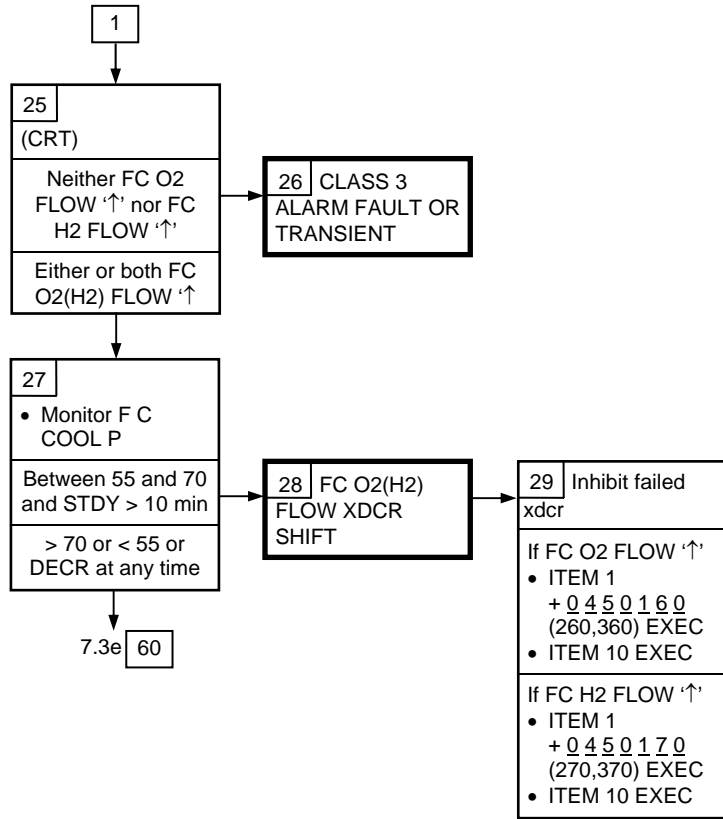


② If FC purge in progress, alarm may have tripped because of normal load plus purge flow. If one flowmeter previously failed, assume both flows high

④ Turning htrs off prevents excessive heat during entry and possible htr element damage

⑤ Reactant venting indication: Cool P ≥ 66 psia

⑥ Htrs must remain on for 30 min to bakeout purge vent lines



**EPS**

**7.3k FUEL CELL RELIEF HTR SW FAIL**

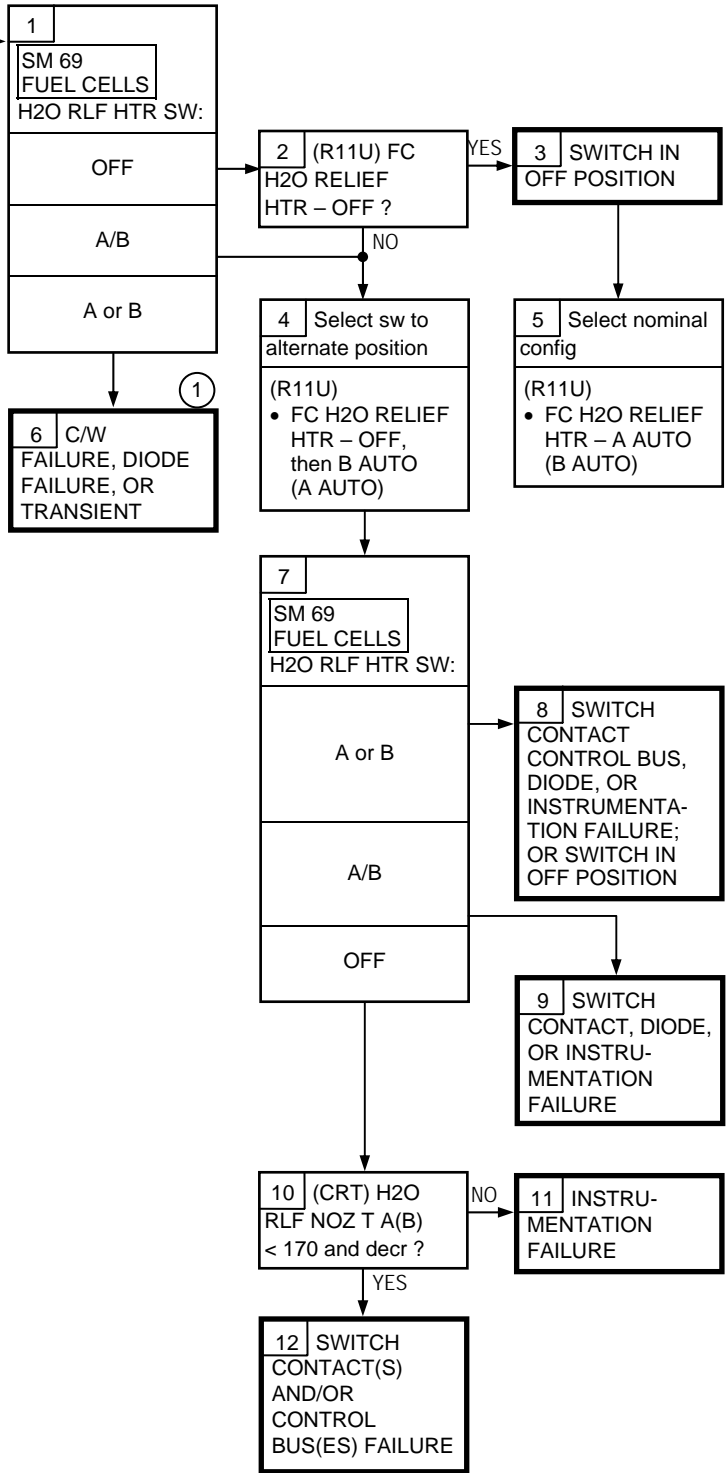
S69 FC H2O RLF HTR

If:

SM 69 FUEL CELLS  
H2O RLF HTR SW – OFF  
H2O RLF HTR SW – A/B

**Nominal Config:**  
(R11U)  
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

**EPS**

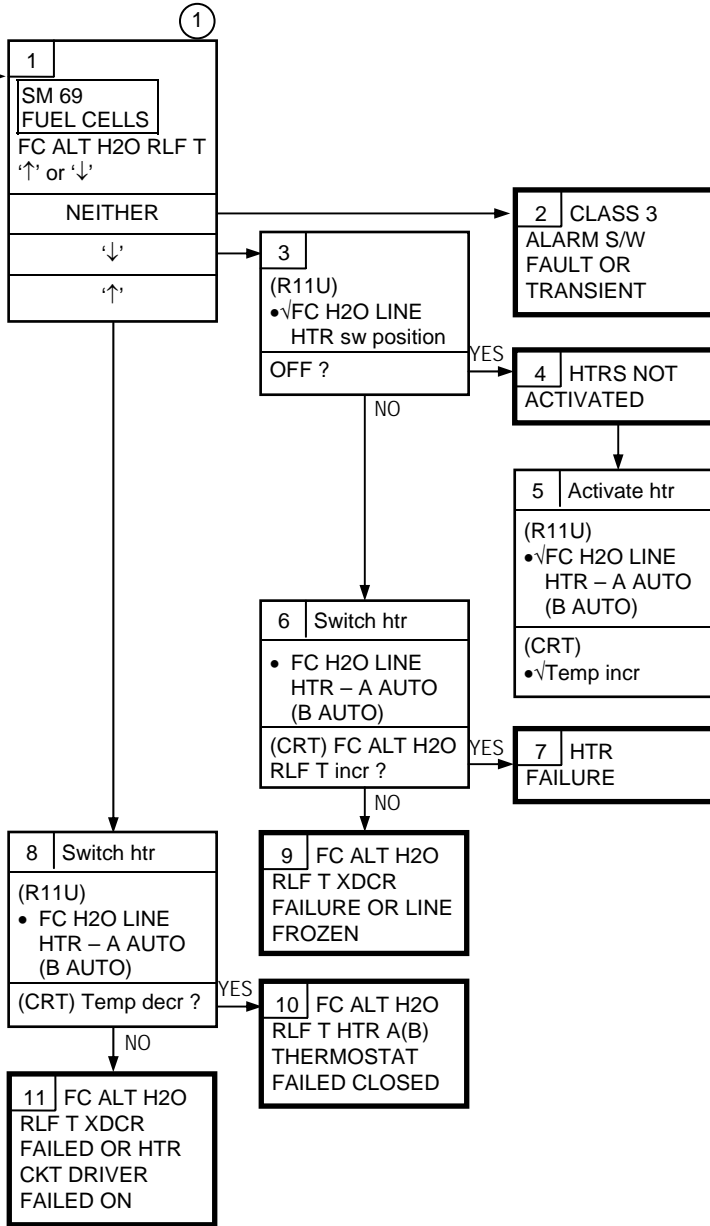
**7.31 FUEL CELL ALT H2O RLF T ↑↓**

① FC ALT H2O RLF LINE T normally controlled to 70-90 degF

S69 FC H2O ALT

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)

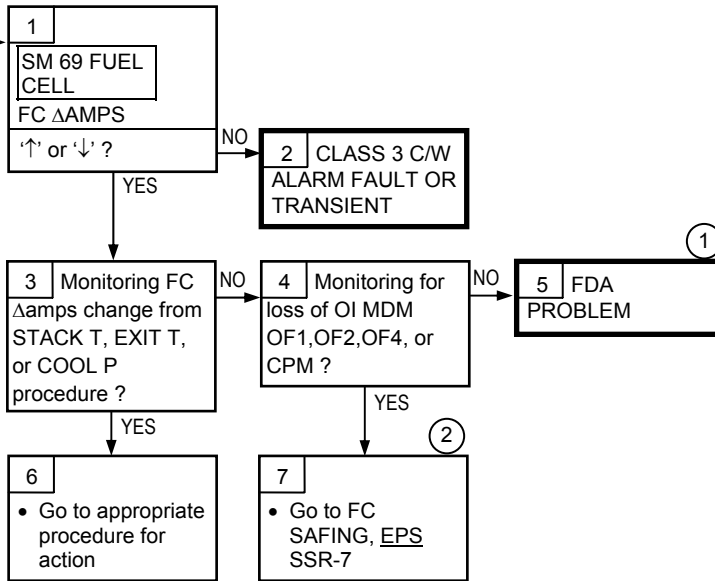


**EPS**

**7.3m FC DELTA AMPS ↑↓**

S69 DELTA AMPS  
1(2,3) ↑↓

If:  
SM 60 SM TABLE MAINT  
FC DELTA AMPS (0922142, 0922143, 0922144) out of limits set manually or via TMBU



① Default limits are OSL, OSH

② A ΔAMPS shift of 12 amps between two tied FCs is equivalent to an ~300 mV degradation in one of the 96 cells of the FC. This degree of performance change, which is not related to load changes, may indicate an internal cell problem and, if allowed to continue, could lead to a crossover condition

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AC VOLTAGE/  
OVLD

7.5

EPS

7.5a AC VOLTS 1(2,3) ↓↑

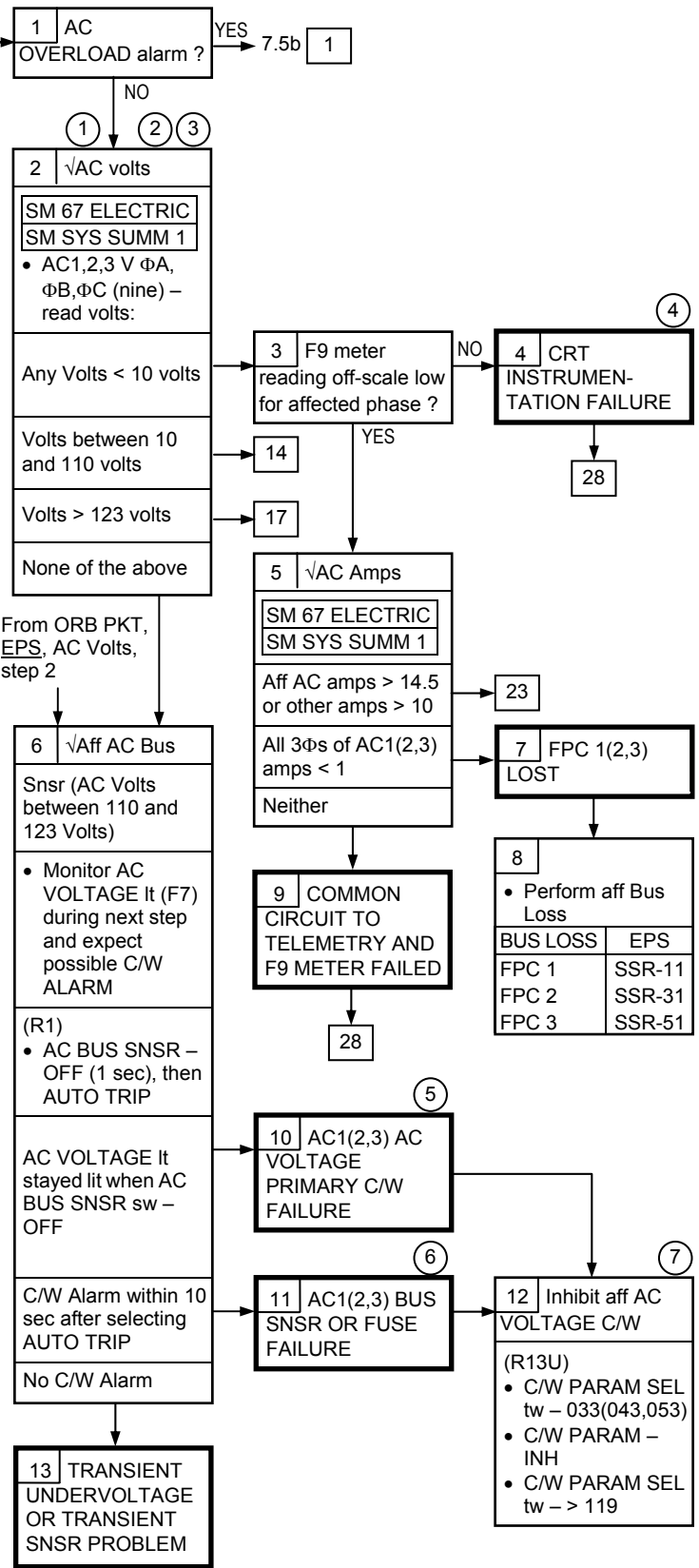
**AC VOLTAGE (F7)**  
AC Voltage Light on if:  
AC Bus Snsr detects AC  $\phi$  voltage < 102-108 vac for 6.5-8.5 sec or > 123-127 vac for 50-90 msec

**BACKUP C/W ALARM (F7)**  
Backup C/W Light on if:  
AC  $\phi$  voltage < 108 vac or > 123 vac

**S67 AC VOLTS 1(2,3)**

**BFS**  
SM1 AC VOLTS 1(2,3)

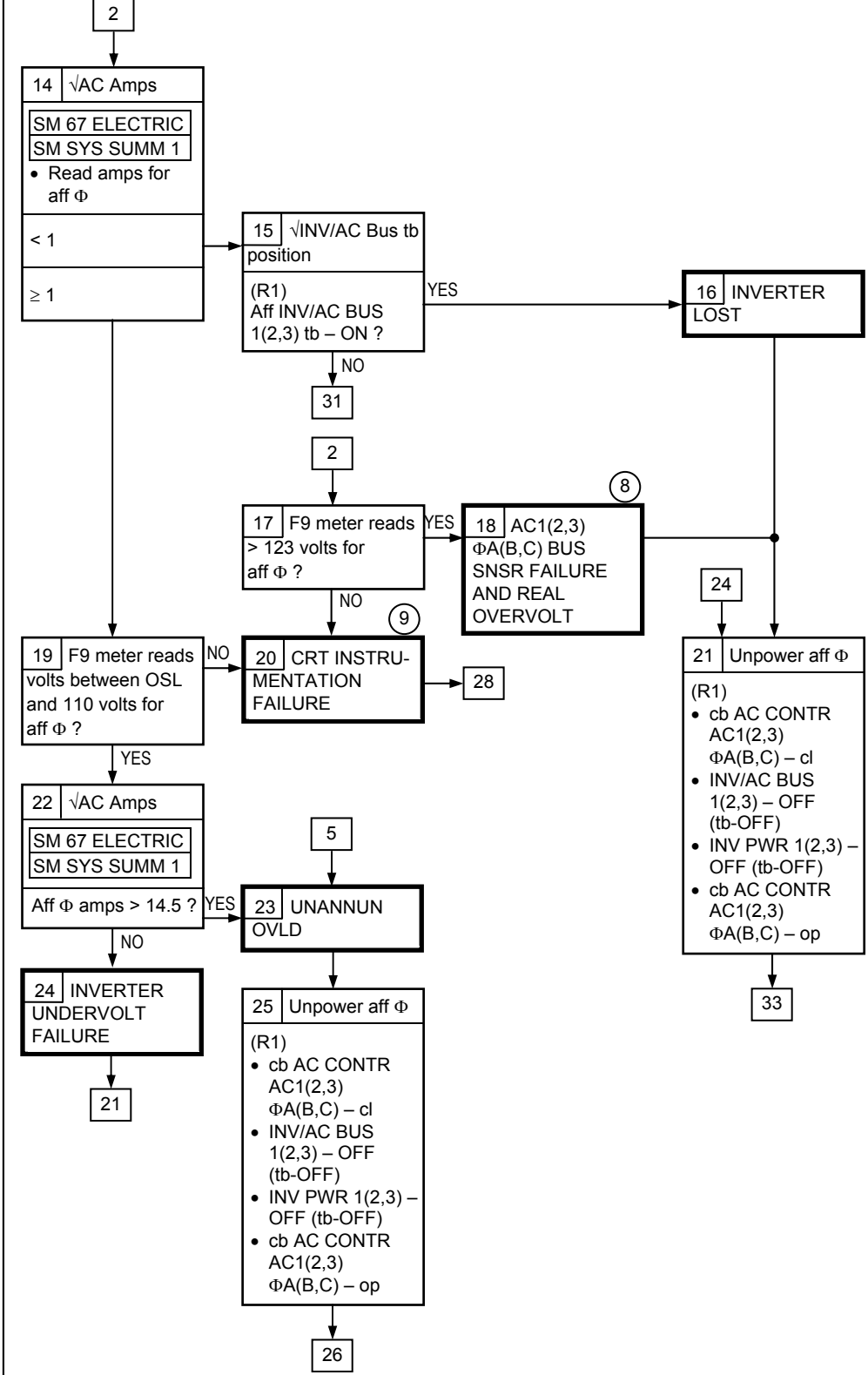
**Nominal Config:**  
(R1)  
cb AC CONTR AC1, 2,3  $\phi$ A, $\phi$ B, $\phi$ C (nine) – op  
AC BUS SNSR 1,2,3 (three) – AUTO TRIP  
(O13:A)  
cb ESS 1BC AC1 SNSR – cl  
(O13:C)  
cb ESS 2CA AC2 SNSR – cl  
(O13:E)  
cb ESS 3AB AC3 SNSR – cl



- ① AC bus voltage can be read on pnl F9
- ② Transformer action of 3 $\phi$  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)
- ④ Primary C/W AC VOLTAGE alarm capability remains. Backup C/W lost for affected phase. F9 Meter still available
- ⑤ AC1(2,3) AC VOLTAGE primary C/W alarm capability lost. AUTO TRIP capability and BACKUP C/W AC VOLTAGE sensing remain
- ⑥ O/V U/V Detector Input Fuse. AC1(2,3) VOLTAGE primary C/W alarm capability lost. OVLD AUTO TRIP and BACKUP C/W AC VOLTAGE sensing remain
- ⑦ If inhibit does not extinguish light, remove bulb if desired



**EPS 7.5a (Cont)**

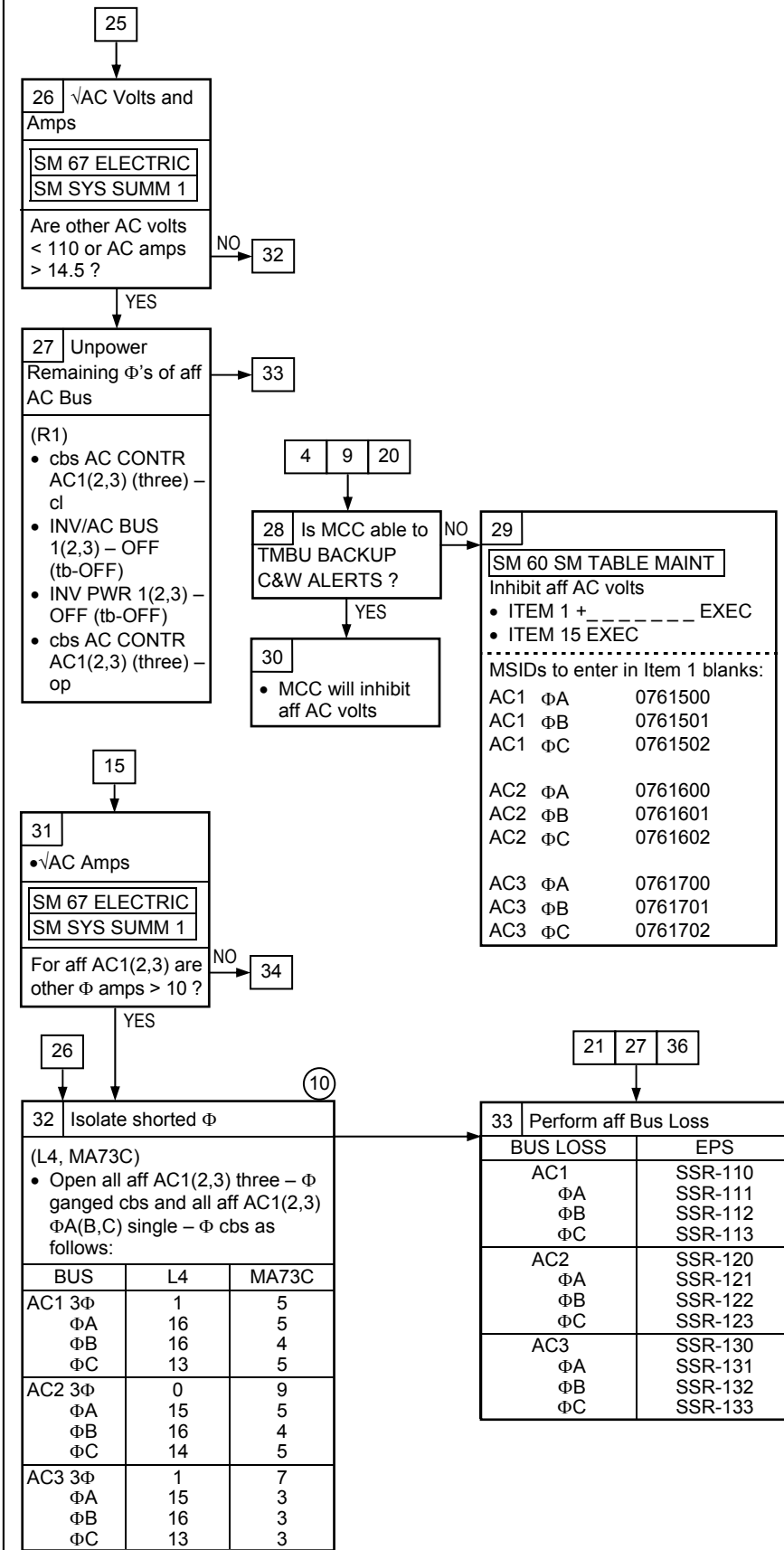


⑧ Backup C/W AC Voltage sensing exist. Auto Trip capability suspect

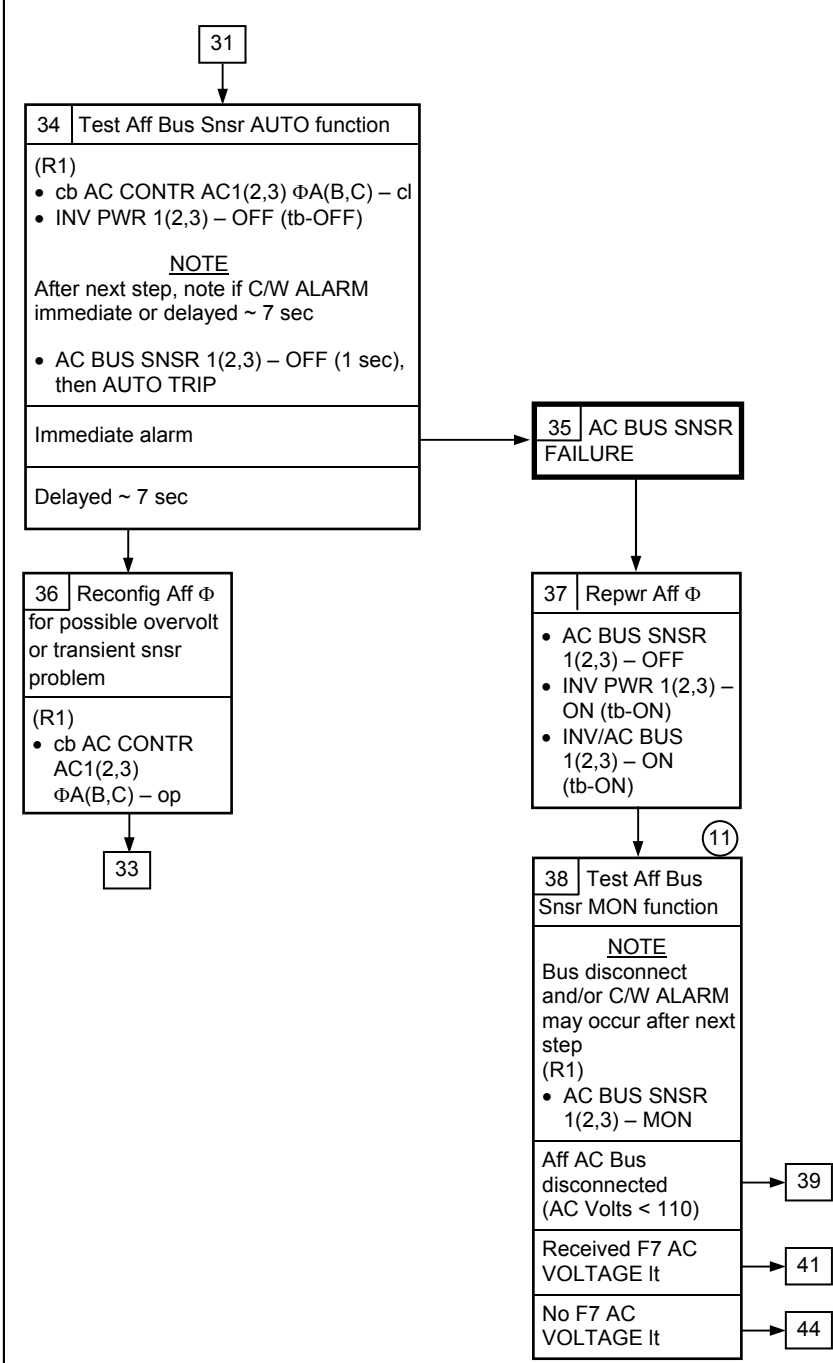
⑨ Still have primary C/W AC VOLTAGE alarm capability. Backup C/W lost for affected phase

**EPS 7.5a (Cont)**

⑩ Pnl L4 cbs  
UTILITY PWR are  
3Φ

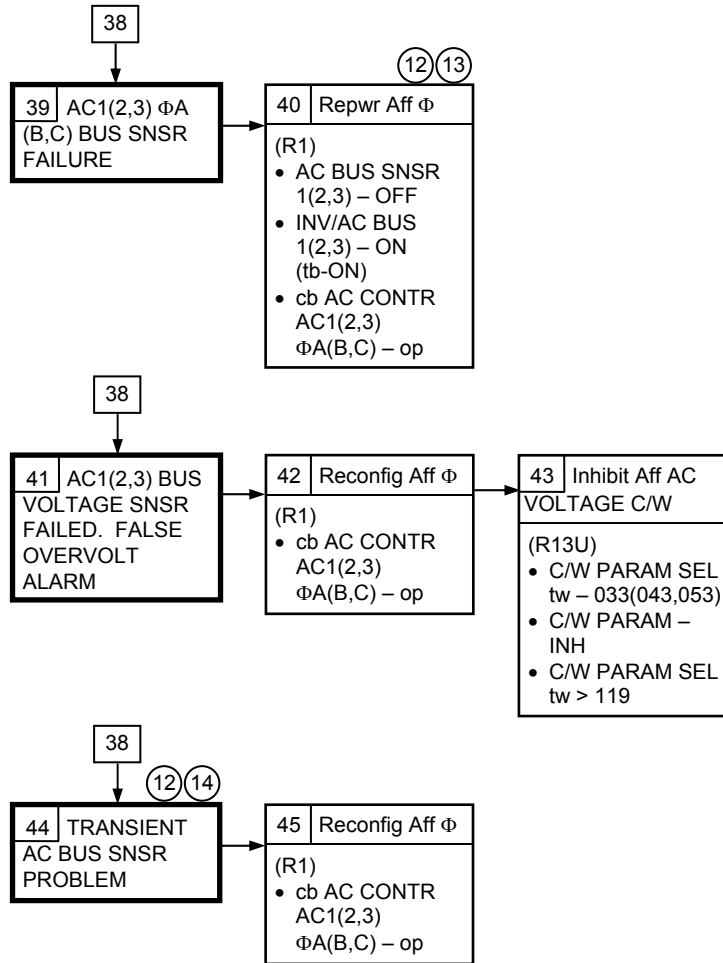


**EPS 7.5a (Cont)**



① AC bus voltage can be read on pnl F9

**EPS 7.5a (Cont)**



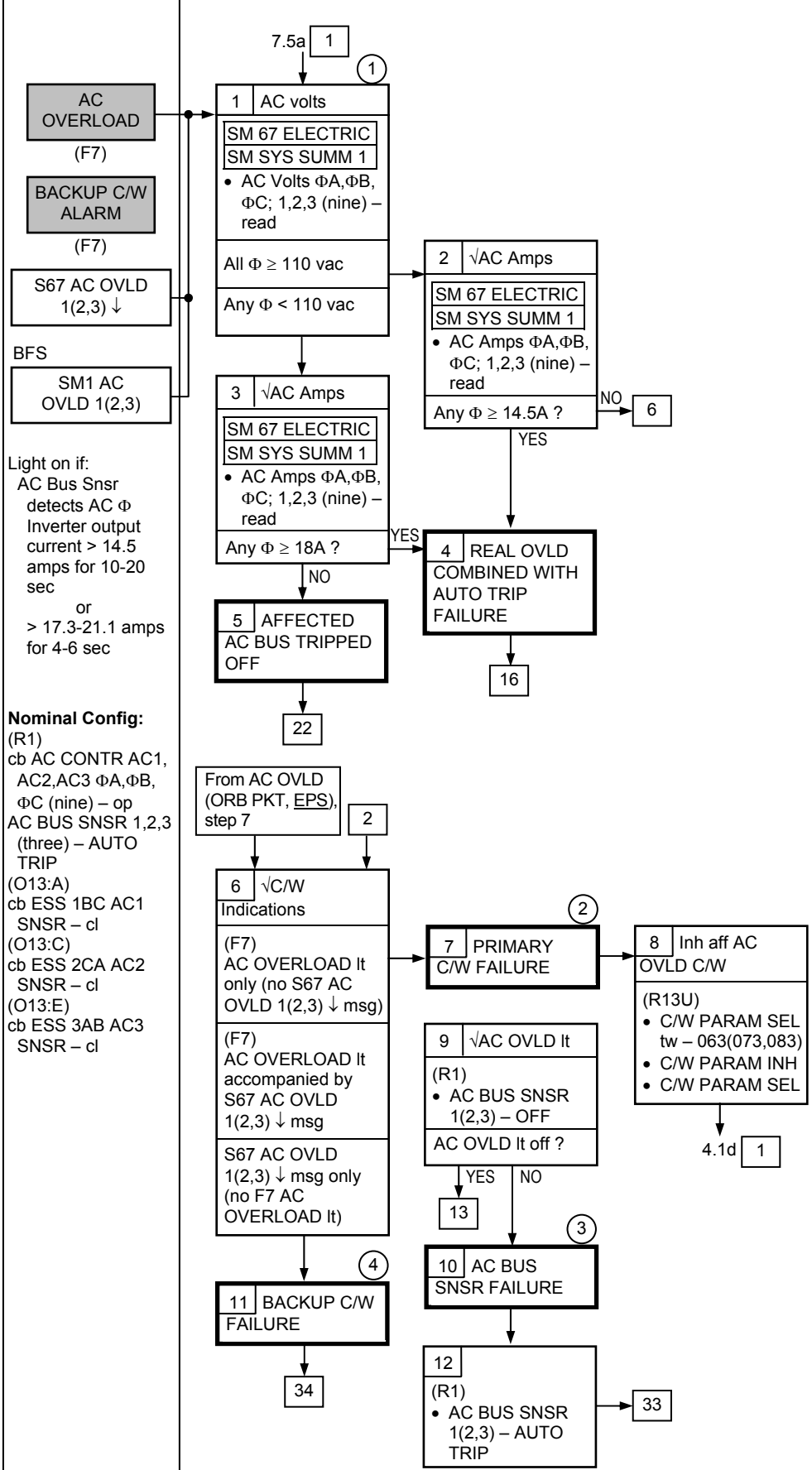
⑫ AC1(2,3) AC VOLTAGE primary C/W alarm and AUTO TRIP capability lost. Backup C/W AC VOLTAGE sensing remains

⑬ AC1(2,3) OVLD AUTO TRIP and C/W alarm capability lost

⑭ AC1(2,3) OVLD AUTO TRIP capability lost. AC OVLD primary C/W alarm remains

**EPS**

**7.5b AC OVLD 1(2,3) ↓**

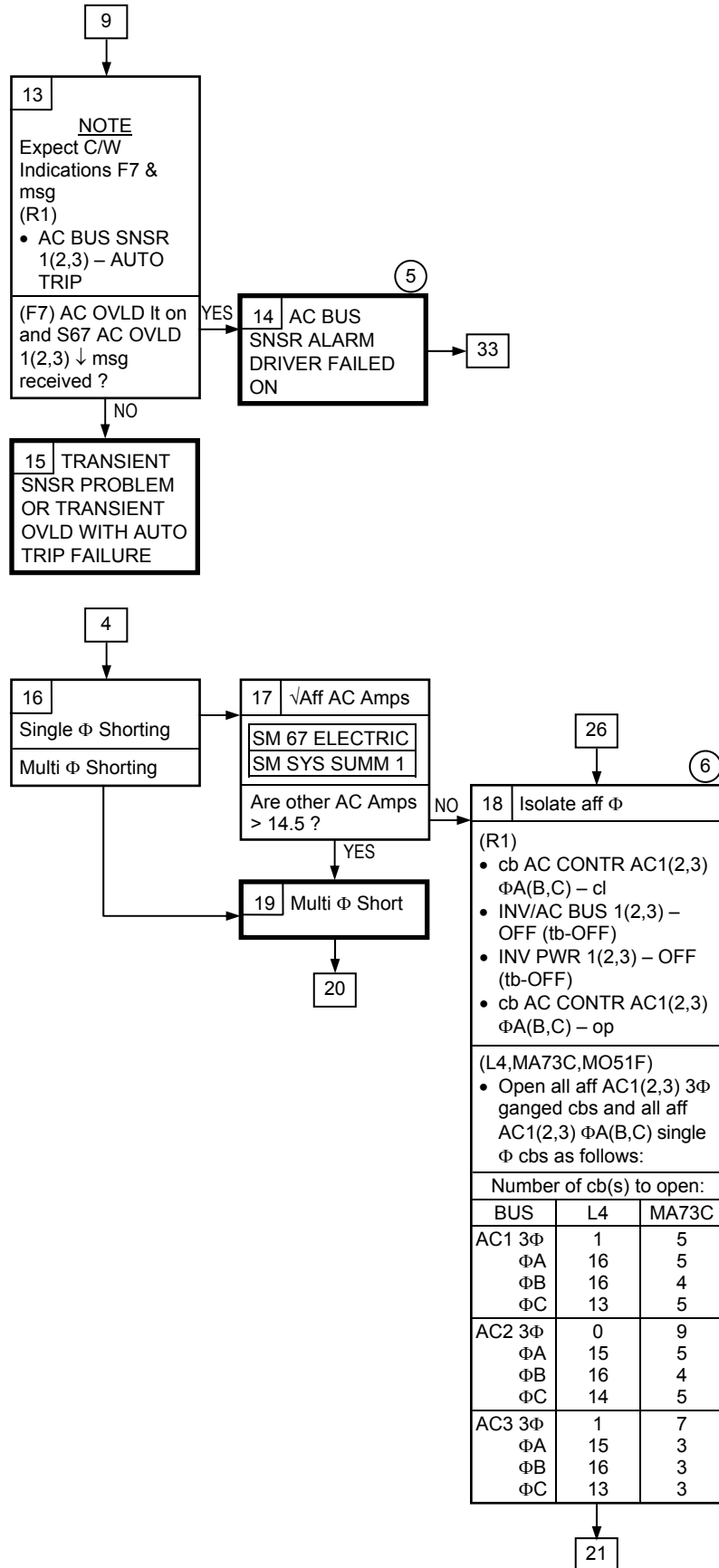


- ① AC volts can be read on pnl F9
- ② Lost AC1(2,3) Pri C/W OVLD alarm capability. B/U C/W alarm and Auto Trip capabilities remain
- ③ Lost AC1(2,3) Pri and B/U C/W OVLD alarm capability. Auto Trip capability remains
- ④ Lost AC1(2,3) B/U C/W OVLD alarm capability. Pri C/W alarm and Auto Trip capabilities remain

Light on if:  
AC Bus Snsr detects AC  $\Phi$   
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  $\Phi$ A,  $\Phi$ B,  
 $\Phi$ C (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

**EPS 7.5b (Cont)**

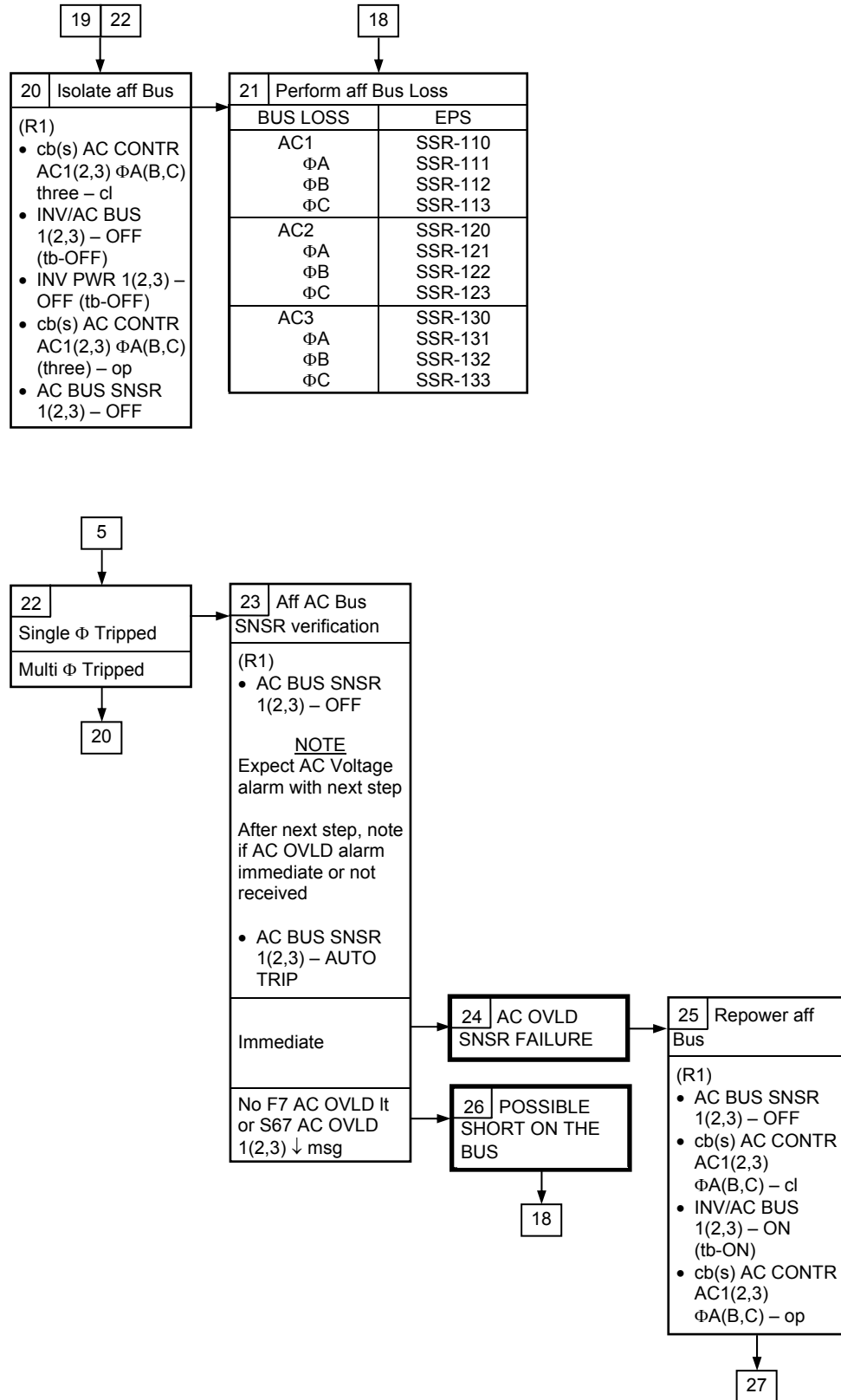


⑤ Lost AC1(2,3) Pri and B/U C/W OVLD alarm capability. Auto Trip capability remains

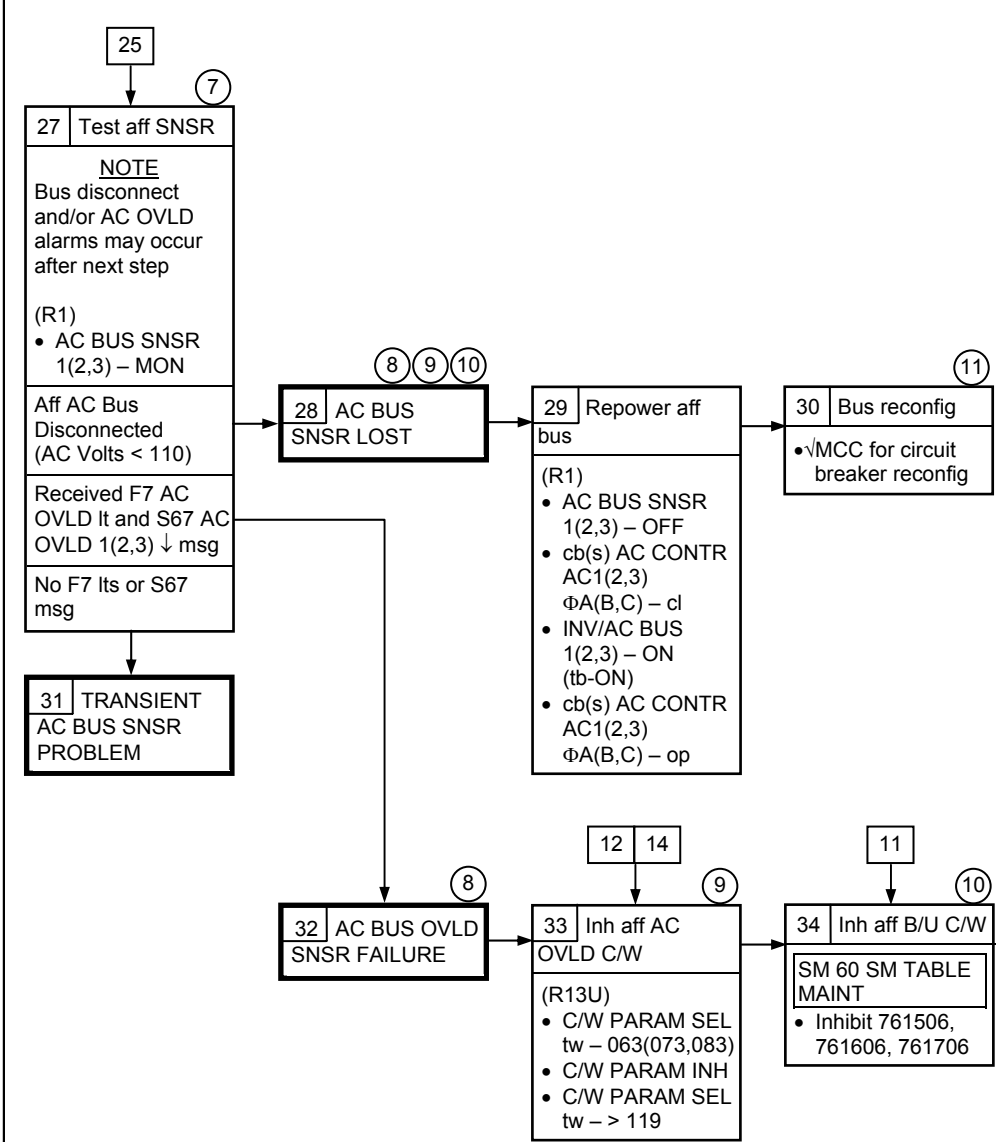
⑥ Pnl L4 cbs UTILITY PWR are 3Φ

EPS

7.5b (Cont)



**EPS 7.5b (Cont)**



- (7) AC Volts can be read on pnl F9
- (8) Lost AC1(2,3) Auto Trip capability
- (9) Lost AC1(2,3) Pri C/W OVLD alarm capability. S67 AC Volts and S67 AC Amps msgs remain
- (10) Lost AC1(2,3) B/U C/W OVLD alarm capability
- (11) Affected AC cbs could have been opened in the OPCL AC OVLD or AC Volts procedures, or any of the AC Bus Loss SSRs in the MAL



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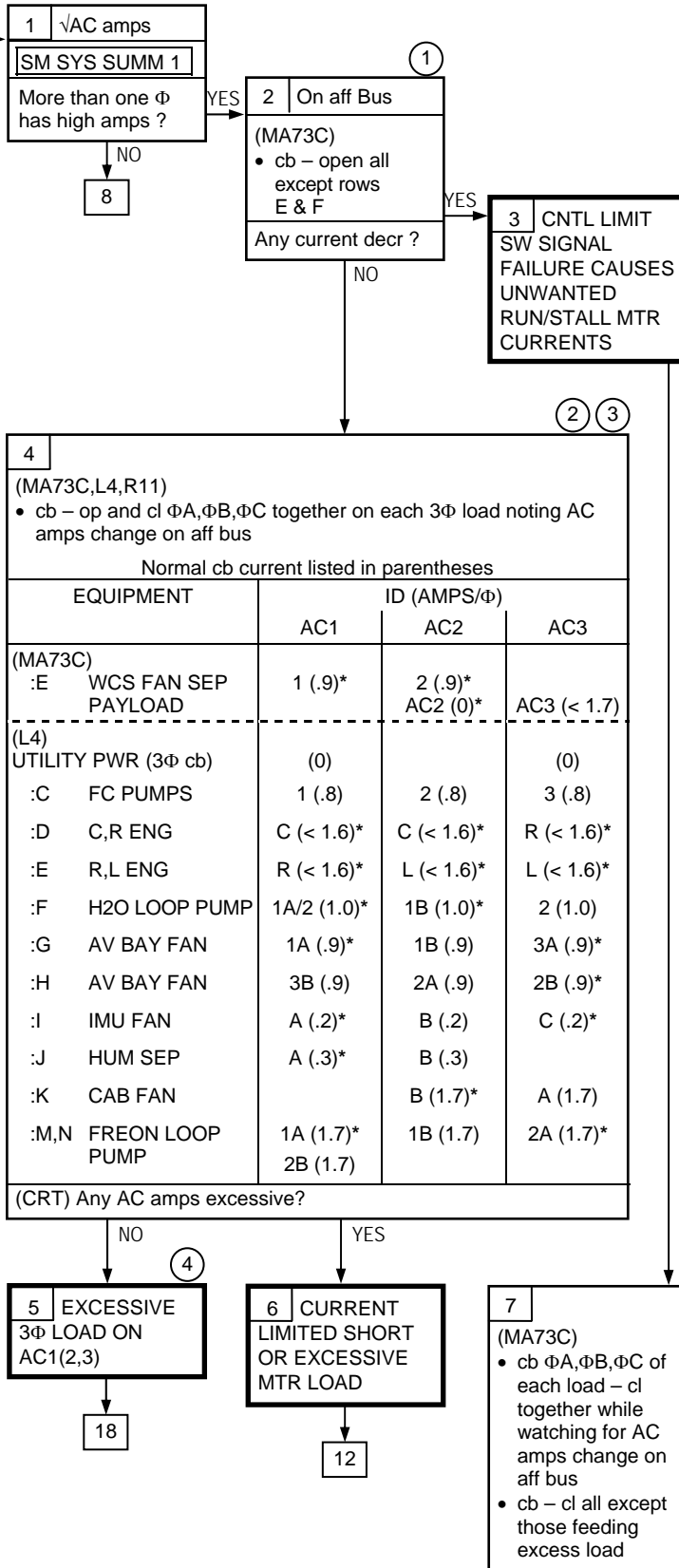
**EPS**

**7.5c AC BUS CURRENT HIGH**

SM ALERT

S67 AC AMPS 1(2,3)

If: AC AMPS 1(2,3) > 10 amps



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

# EPS 7.5c (Cont)

1

8	√Partial short								
(L4,R11,MA73C)									
<ul style="list-style-type: none"> <li>• cb – op and cl single <math>\Phi</math> load, one at a time</li> <li>• Monitor amps for proper change on aff <math>\Phi</math></li> </ul>									
Normal cb current (orbit & entry prep)									
Single $\Phi$ load AC amps									
Pnl & row	AC1			AC2			AC3		
	$\Phi$ A	$\Phi$ B	$\Phi$ C	$\Phi$ A	$\Phi$ B	$\Phi$ C	$\Phi$ A	$\Phi$ B	$\Phi$ C
(L4)									
:J	-	-	-	-	-	-	<.1	<.1	-
:K	<.1	<.1	-	-	-	-	-	-	-
:L	⑤	<.1	-	⑤	<.1	-	<.1	<.1	-
:N	-	-	-	⑥	<.1	-	⑥	<.1	-
:O	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
:P	⑦	⑦	-	<.1	⑦	-	<.1	⑦	-
:Q	<1.9	<1.8	<.2	<1.3	<1.3	<.2	<.2	<.2	<2.3
:R	<.5	<.2	-	-	<.3	-	-	<.6	-
(MA73C)									
:F	<1.3	-	<.1	<.5	-	<.2	-	-	-

(CRT) Any cb with excessive load ?

YES

9 SOFT SHORT IN LOAD

NO

10 √Current snsr

(R1)

- cb AC CONTR AC1(2,3)  $\Phi$ A( $\Phi$ B, $\Phi$ C) – cl
- INV/AC BUS 1(2,3) – OFF (tb-OFF)

(CRT)

- Read AC1(2,3)  $\Phi$ A( $\Phi$ B, $\Phi$ C) amps
- INV/AC BUS 1(2) – ON (tb-ON)

Amps > 1 with INV/AC BUS disconnected ?

NO

13 SOFT SHORT ON AC1(2,3)  $\Phi$ A( $\Phi$ B, $\Phi$ C) BUS

YES

14 CURRENT XDCR SHIFTED HIGH

16 Off-load Bus

(L4:P,Q,R)

- cb AC1(2,3)  $\Phi$ A( $\Phi$ B, $\Phi$ C) (three) – op

(CRT)  $\Phi$  amps < 8 ?

NO

20

19

- Monitor Bus for performance change

6

12 Which equip shows excessive current:

FC PUMPS

OTHER

11 (L4,MA73C)

- cb – op for load with soft short

⑧

15

- Monitor FC for performance change

17

- Select alternate system
- cb – op system with high amps

5

18

- Maintain AC BUS 1(2,3)  $\Phi$  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 3 $\Phi$

PL AC3 3 $\Phi$

⑤ < .1 amp steady state.  
< .2 amp with mtr vlv operating

⑥ Mtr vlv operating load of .3 amp

⑦ Mtr vlv operating load of .2 amp

⑧ Depending on subsystem, further short isolation sw ops may be available

⑨ Refer to block 4 for normal equipment config and bus loading

⑩ Some payload AC equip may be unprwd or configured to alternate pwr source

**EPS**

**7.5c (Cont)**

16

11

20   Isolate shorted $\Phi$		
(L4, MA73C)		
<ul style="list-style-type: none"> <li>cb – open all AC1(2,3) <math>\Phi</math>A(<math>\Phi</math>B,<math>\Phi</math>C) cbs (including 3<math>\Phi</math> ganged cbs) on failed bus</li> </ul>		
Number of cb to open:		
BUS	L4	MA73C
AC1 3 $\Phi$	1	5
$\Phi$ A	16	5
$\Phi$ B	16	4
$\Phi$ C	13	5
AC2 3 $\Phi$	0	9
$\Phi$ A	15	5
$\Phi$ B	16	4
$\Phi$ C	13	5
AC3 3 $\Phi$	1	7
$\Phi$ A	15	3
$\Phi$ B	16	3
$\Phi$ C	12	3
(R1)		
<ul style="list-style-type: none"> <li>cb AC CONTR AC1(2,3) <math>\Phi</math>A(<math>\Phi</math>B,<math>\Phi</math>C) – cl</li> </ul>		
<p><b>NOTE</b></p> <p>Expect C/W AC VOLTAGE alarm after next step</p>		
<ul style="list-style-type: none"> <li>INV/AC BUS 1(2,3) – OFF (tb-OFF)</li> <li>INV PWR 1(2,3) – OFF (tb-OFF)</li> <li>cb AC CONTR AC1(2,3) <math>\Phi</math>A(<math>\Phi</math>B,<math>\Phi</math>C) – op</li> </ul>		

↓

<u>BUS LOSS EPS</u>	
AC1 $\Phi$ A	SSR-111
$\Phi$ B	SSR-112
$\Phi$ C	SSR-113
AC2 $\Phi$ A	SSR-121
$\Phi$ B	SSR-122
$\Phi$ C	SSR-123
AC3 $\Phi$ A	SSR-131
$\Phi$ B	SSR-132
$\Phi$ C	SSR-133

11 If shorted bus is AC2(3), CABIN FAN B(A) will not start on remaining two phases

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CRYO

7.6

**CRYO TABLE A  
CRYO HEATER SWITCH PROCEDURAL NOMENCLATURE**

**OXYGEN**

HEATER SET		FIVE-TK SET		FIVE-TK SET + PALLET	
O2 TK 1	A	(R1)	O2 TK1 HTR A	(R1)	O2 TK1 HTR A
	B		O2 TK1 HTR B		O2 TK1 HTR B
O2 TK 2	A		O2 TK2 HTR A		O2 TK2 HTR A
	B		O2 TK2 HTR B		O2 TK2 HTR B
O2 TK 3	A		O2 TK3 HTR A		O2 TK3 HTR A
	B		O2 TK3 HTR B		O2 TK3 HTR B
O2 TK 4	A	(A11)	CRYO TK4 HTR O2 A	(A11)	CRYO TK4 HTR O2 A
	B		CRYO TK4 HTR O2 B		CRYO TK4 HTR O2 B
O2 TK 5	A	(A15)	CRYO TK5 HTR O2 A	(A15)	CRYO TK5 HTR O2 A
	B		CRYO TK5 HTR O2 B		CRYO TK5 HTR O2 B

**HYDROGEN**

HEATER SET		FIVE-TK SET		FIVE-TK SET + PALLET	
H2 TK 1	A	(R1)	H2 TK1 HTR A	(R1)	H2 TK1 HTR A
	B		H2 TK1 HTR B		H2 TK1 HTR B
H2 TK 2	A		H2 TK2 HTR A		H2 TK2 HTR A
	B		H2 TK2 HTR B		H2 TK2 HTR B
H2 TK 3	A		H2 TK3 HTR A		H2 TK3 HTR A
	B		H2 TK3 HTR B		H2 TK3 HTR B
H2 TK 4	A	(A11)	CRYO TK4 HTR H2 A	(A11)	CRYO TK4 HTR H2 A
	B		CRYO TK4 HTR H2 B		CRYO TK4 HTR H2 B
H2 TK 5	A	(A15)	CRYO TK5 HTR H2 A	(A15)	CRYO TK5 HTR H2 A
	B		CRYO TK5 HTR H2 B		CRYO TK5 HTR H2 B

CRYO

7.6

**EPS**

**7.6b CRYO O2(H2) PRES, TK P ↓↑**

O2(H2) PRESS  
 BACKUP C/W ALARM  
 (F7)

If:  
 O2(H2) CNTL (TK) P  
 > 985(293.8) psia  
 < 540(153) psia

S68 O2(H2)  
 CNTL P 1(2,3,4,5)

BFS

SM2 CRYO O2  
 (H2) PRES

SM  
 ALERT

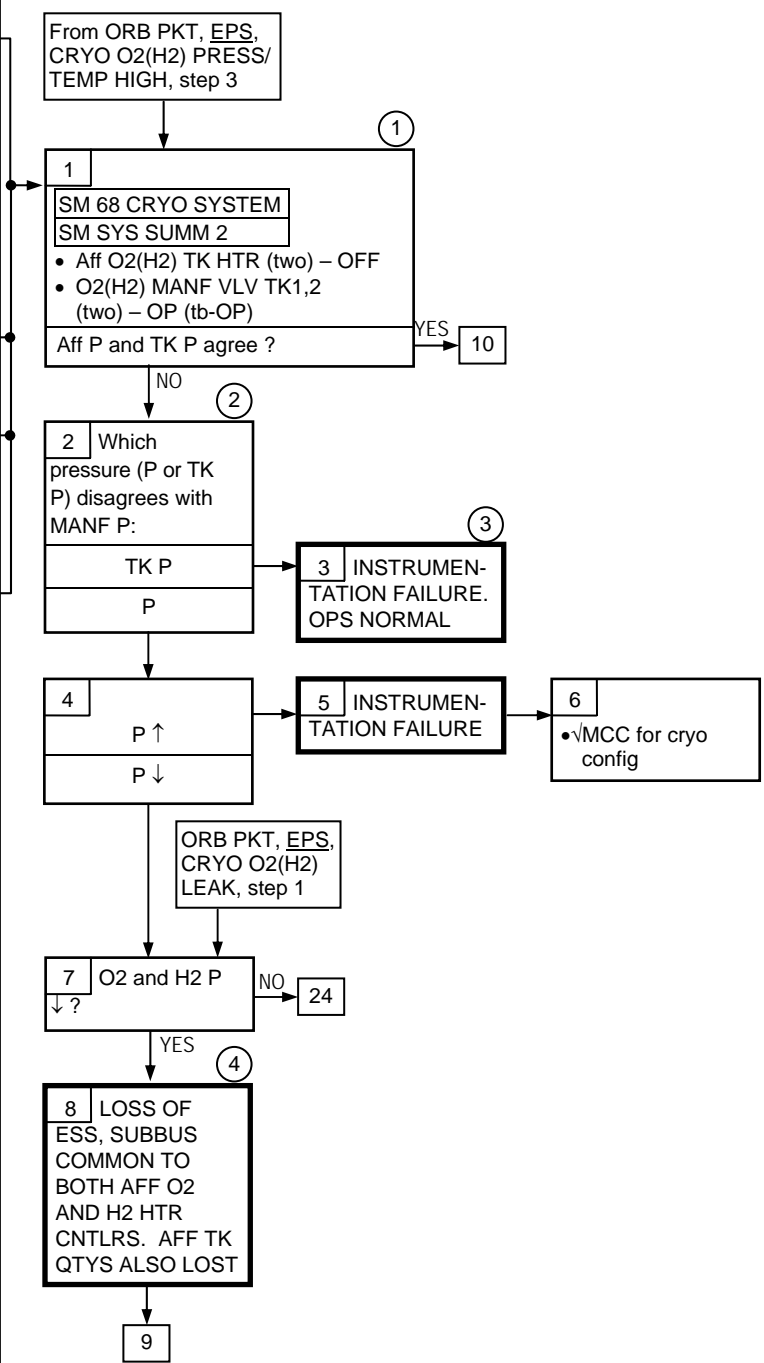
S68 O2(H2)  
 TK P 1(2,3,4,5)

If:  
 O2(H2) TK P:  
 > 960(283)  
 < 740(189.3) with  
 AUTO htrs  
 < 575(165) with htr  
 not in AUTO

If:  
 H2 TK P (CNTL P)  
 < 165.6 (153)

**Nominal Config:**  
 (O13)  
 cb ESS 2CA,1BC  
 CRYO CNTLR  
 O2,H2 TK1,2  
 (four) – cl  
 cb ESS 2CA,1BC  
 CRYO QTY O2,H2  
 TK1,2 (four) – cl  
 (ML86B:G)  
 cb ESS 3AB,1BC,  
 2CA CRYO  
 CNTLR O2,H2 TK3  
 (two) – cl  
 cb ESS 3AB,1BC,  
 2CA CRYO QTY  
 O2,H2 TK3  
 (two) – cl  
 (O14:C)  
 cb MNA CRYO O2  
 HTR TK1 SNSR  
 1 – cl

(Cont in notes  
 column)

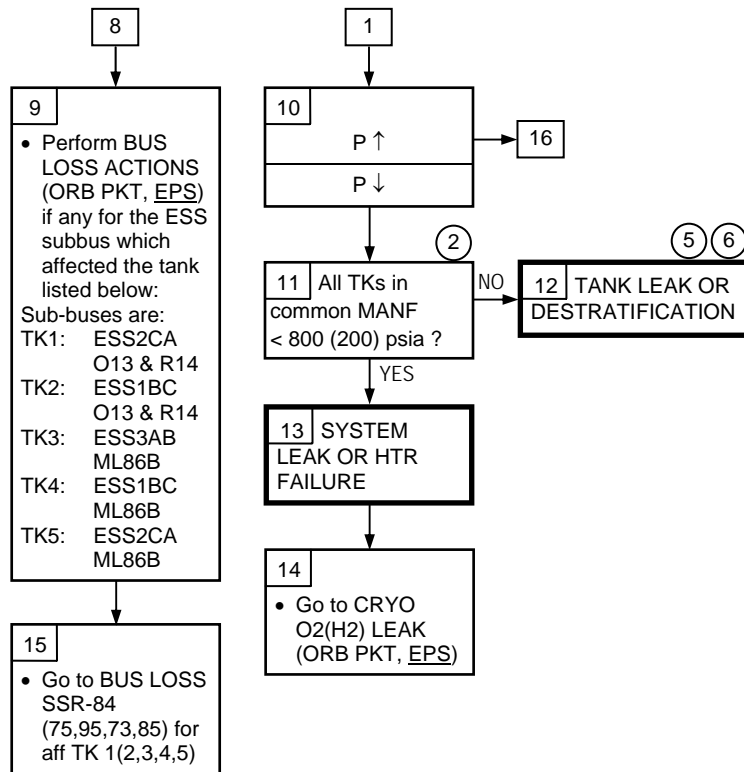


- ① Use pnl O2 meter for TK P if SM2 not available
- ② O2(H2) TK AUTO Control pressure ranges:  
 TK 1/2:  
 803-854 (200-226)  
 TK 3-5:  
 832-882 (217-243)
- ③ AUTO htr ops still available with failure of this Xdcr
- ④ Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low (O2: 515 psia, H2: 145 psia) and loss of AUTO capability

**Nominal Config:**  
 (Cont):  
 (O15:C)  
 cb MNB CRYO O2  
 HTR TK2 SNSR  
 2 – cl  
 (O16:C)  
 cb MNC CRYO  
 O2 HTR  
 TK1 SNSR 2 – cl  
 TK2 SNSR 1 – cl  
 (ML86B:F)  
 cb MNA,MNB,MNC  
 CRYO O2 HTR  
 TK3,4,5 SNSR 1,2  
 (six) – cl  
 (A15)  
 cb PALLET ESS  
 1BC,2CA TK7,8,9  
 CNTLR O2,H2  
 (eight) – cl  
 cb PALLET ESS  
 1BC,2CA TK7,8,9  
 QTY O2,H2  
 (eight) – cl  
 cb PALLET MNA  
 TK6-9  
 O2 SNSR 1  
 (four) – cl  
 cb PALLET MNB  
 TK6-9  
 O2 SNSR 2  
 (four) – cl  
 (R14:B)  
 cb MNA,MNB,MNC  
 PALLET DSC  
 1A/2B,1B,2C  
 (three) – cl

**EPS**

**7.6b (Cont)**

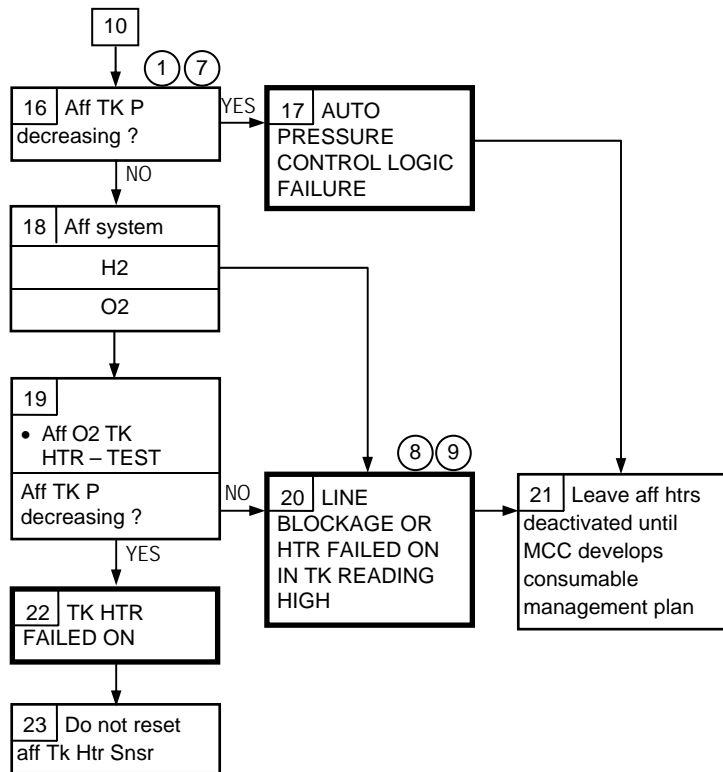


**2** O2(H2) TK AUTO Control pressure ranges: TK 1/2: 803-854 (200-226) TK 3-5: 832-882 (217-243)

**5** For destratified tk, natural heat leak into tk will eventually build pressure back up

**6** Operating hrs below critical pressure could be hazardous in presence of two-phase fluid. Therefore, hrs are left deactivated





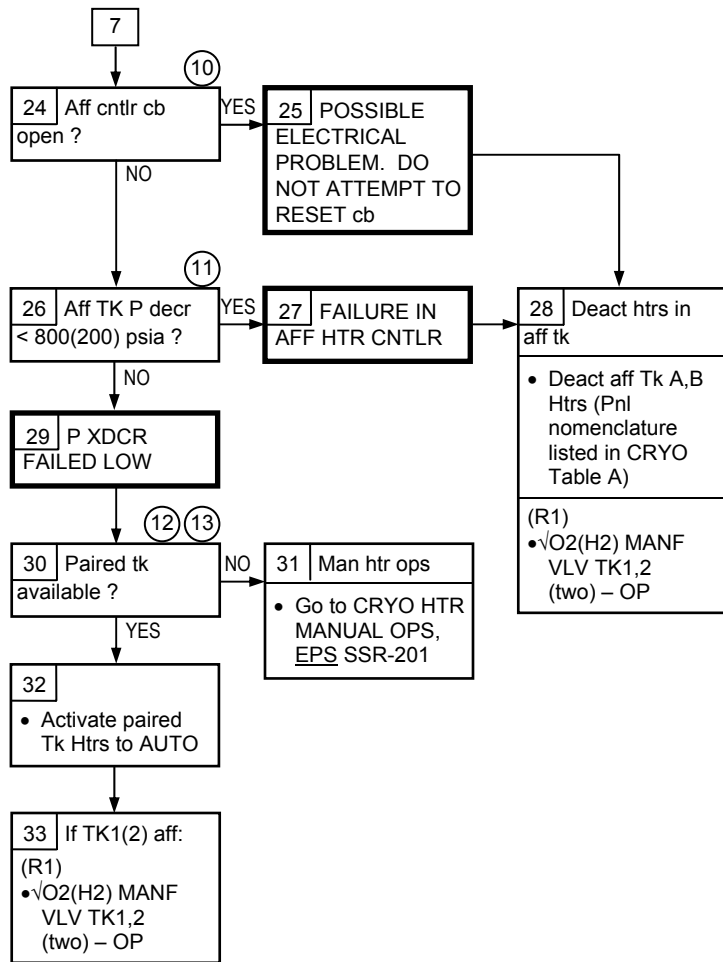
① Use pnl O2 meter for TK P if SM2 not available

⑦ Once htrs are deactivated in tk with high P, the P should decrease to normal value

⑧ Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack

⑨ Failed-on htr may require temporarily dropping a main bus until IFM 'CRYO TANK HEATER FUSE REMOVAL' can be performed. If pressure exceeds 1,000(300) psi, overboard relief vlv may open

**EPS 7.6b (Cont)**



⑩ Check nominal config column for cb location

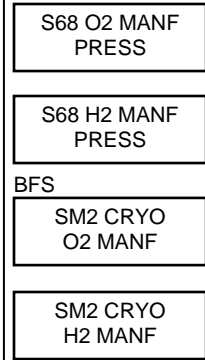
⑪ Could take 3 hr to bleed pressures down

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  
TK5 not paired

⑬ TKs 1,2 cannot be operated simultaneously if a manifold vlv is closed

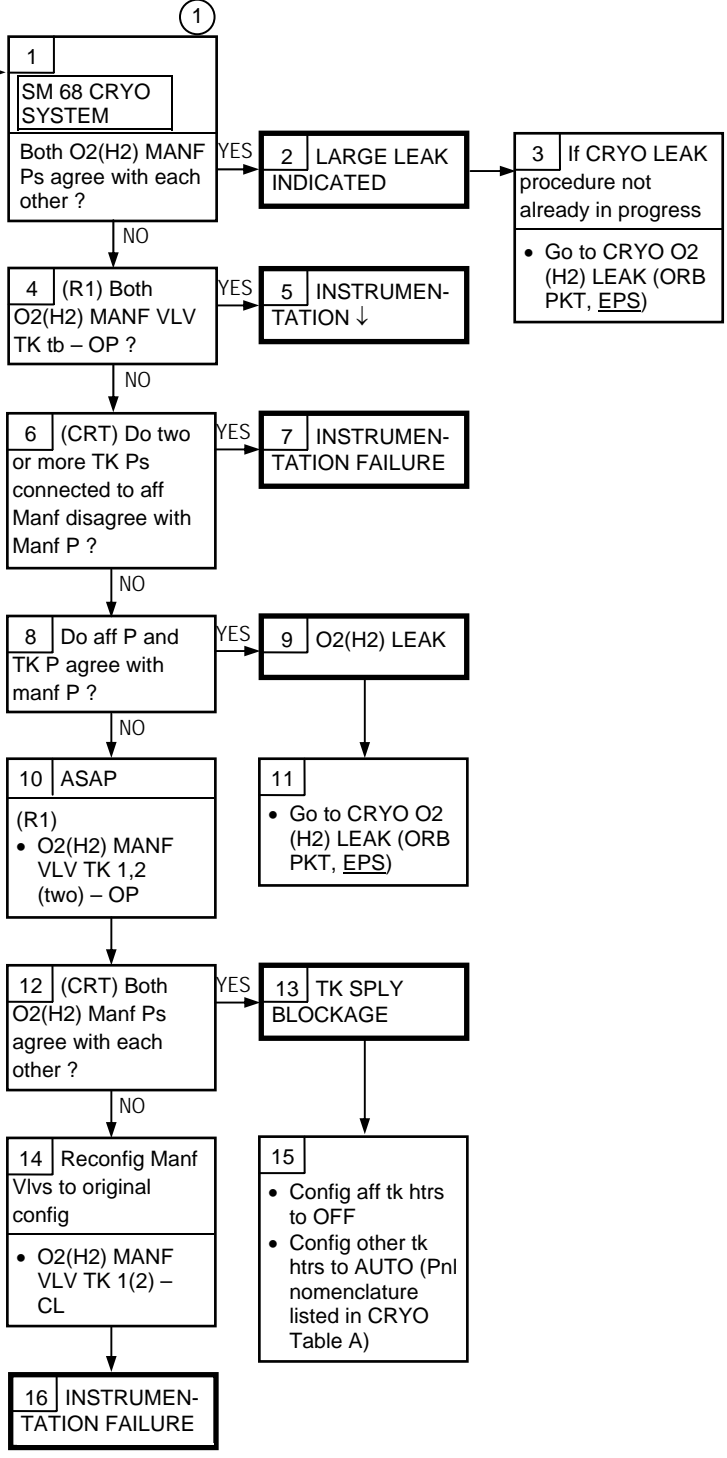
**EPS**

**7.6d O2(H2) MANF P ↓**



If:  
 O2 MANF P < 200 psia (740 psia for BFS)  
 H2 MANF P < 150 psia (189.9 psia for BFS)

**Nominal Config:**  
 Refer to 7.6b



① Assumes both Manf vlvs are open. If indicative of continuing system problem, there would have been previous alarms for P and TK P low

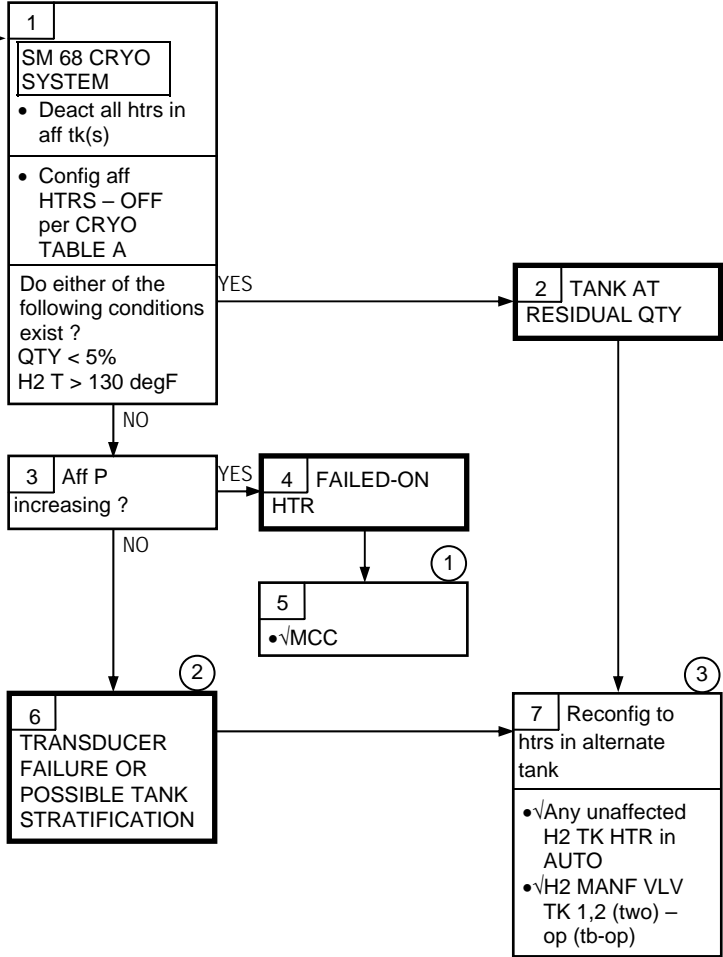
**EPS**

**7.6f H2 HTR T**

From ORB PKT,  
EPS, CRYO  
O2(H2) PRESS/  
TEMP HIGH,  
step 5

S68 H2 HTR T  
1(2,3,4,5)

If:  
H2 HTR T  
> 210 degF



- 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

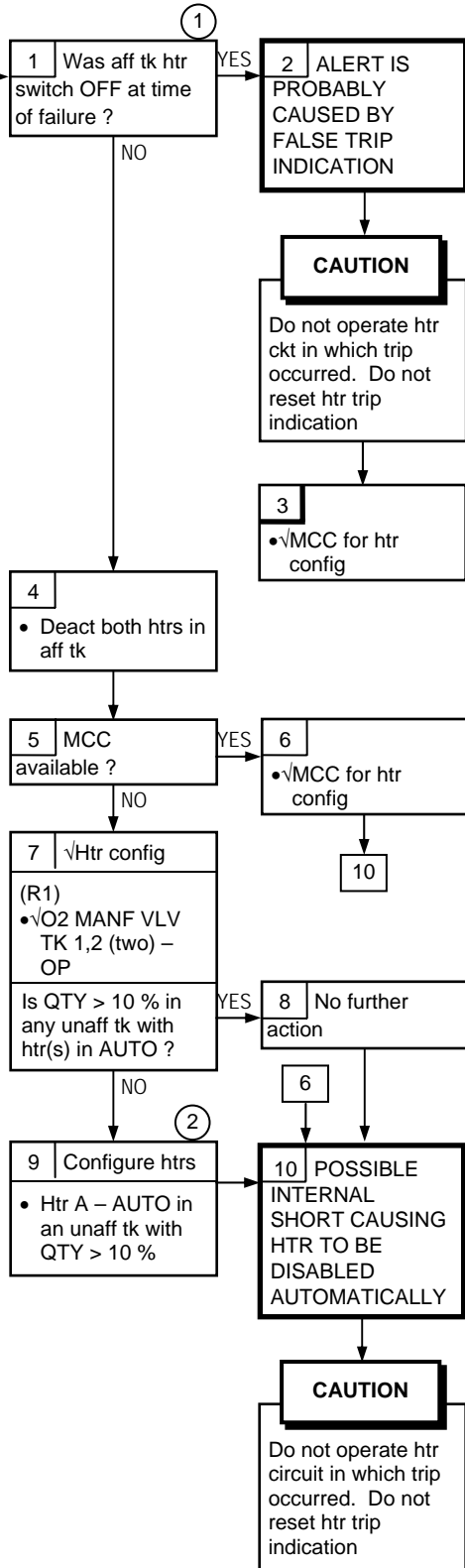
EPS

7.6k O2 HTR CUR SNSR = TRIP

SM  
ALERT

S68 O2 HTR  
TRP 1(2,3,4,5)

If:  
HTR CUR SNSR =  
↓ (tripped)

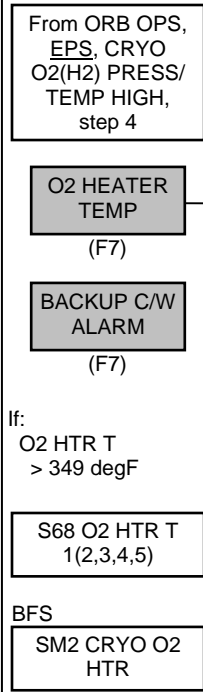


① Use CRYO Table A to determine switch nomenclature

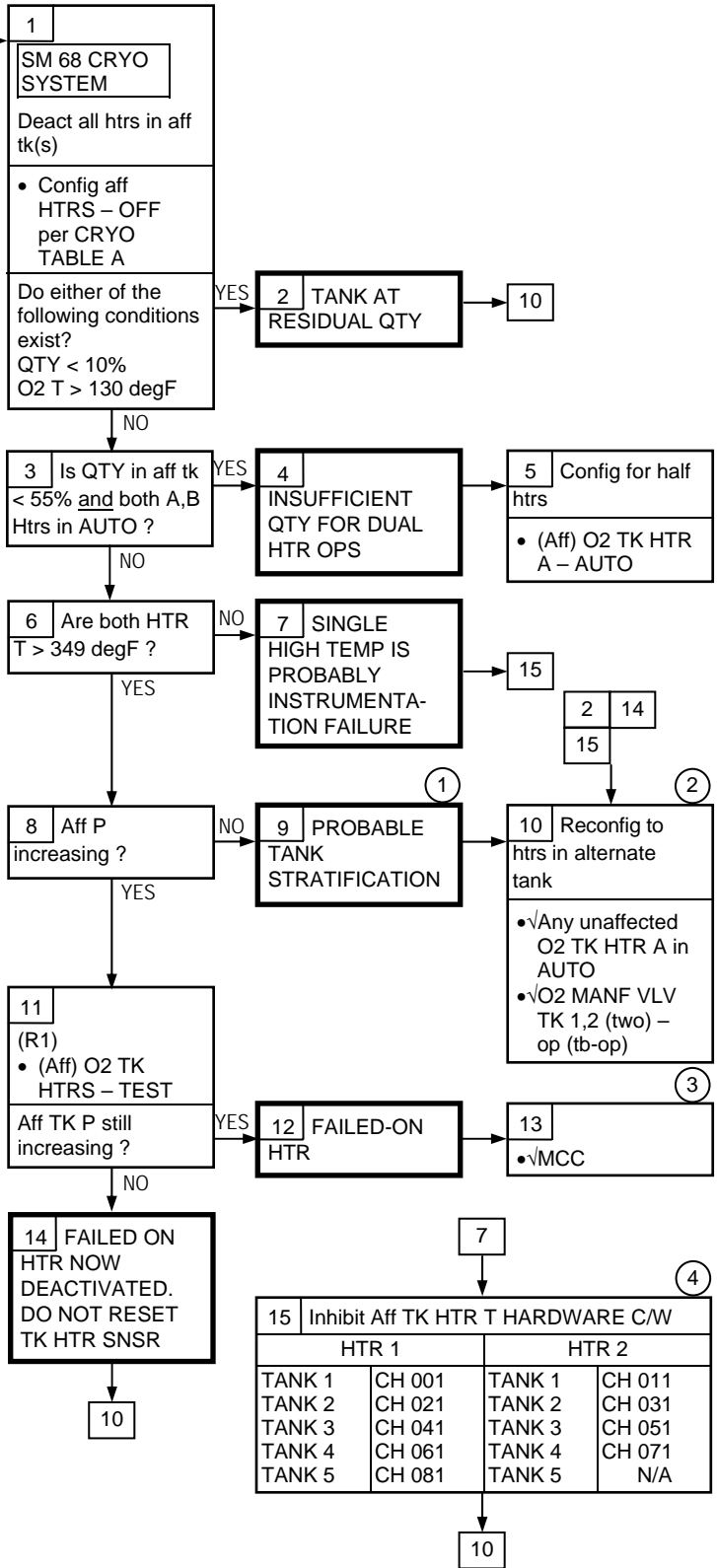
② A single htr in an undepleted tk should support vehicle power loads. If manifold pressures cannot be maintained, additional htrs may be required

**EPS**

**7.6I O2 HTR T**



**Nominal Config:**  
Refer to 7.6b



- 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 has no associated hardware C/W

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SSPTS PTU  
(OPCU, APCU)  
7.7

**EPS**

**7.7a OPCU CH AMPS ↑**

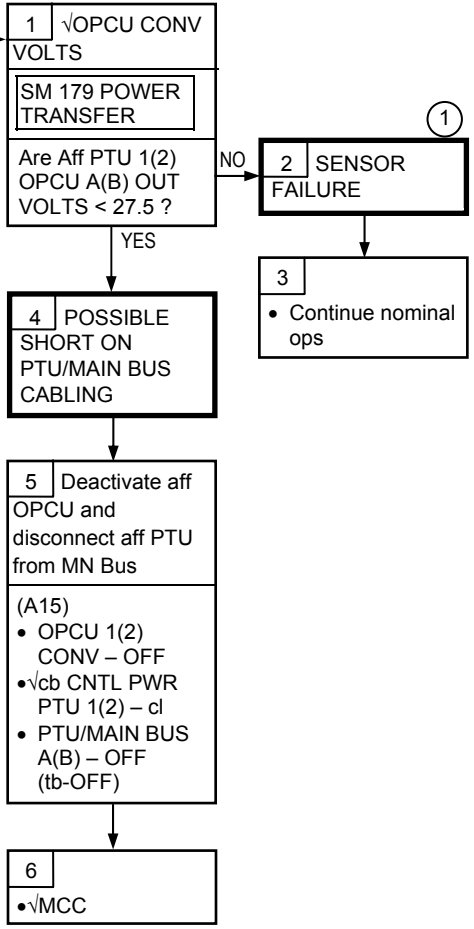
SM ALERT

S179  
OPCU 1(2)  
CH A(B) AMPS

If PTU 1(2) OPCU  
A(B) AMPS > 75

**Dual PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON

**Single PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON



① The OPCU output current should not be greater than 75 unless its output voltage is low (output power capability equals ~ 2kw per channel)

SSPTS PTU  
(OPCU, APCU)  
7.7



**EPS**

**7.7b OPCU CH OUTPUT VOLTS ↓**

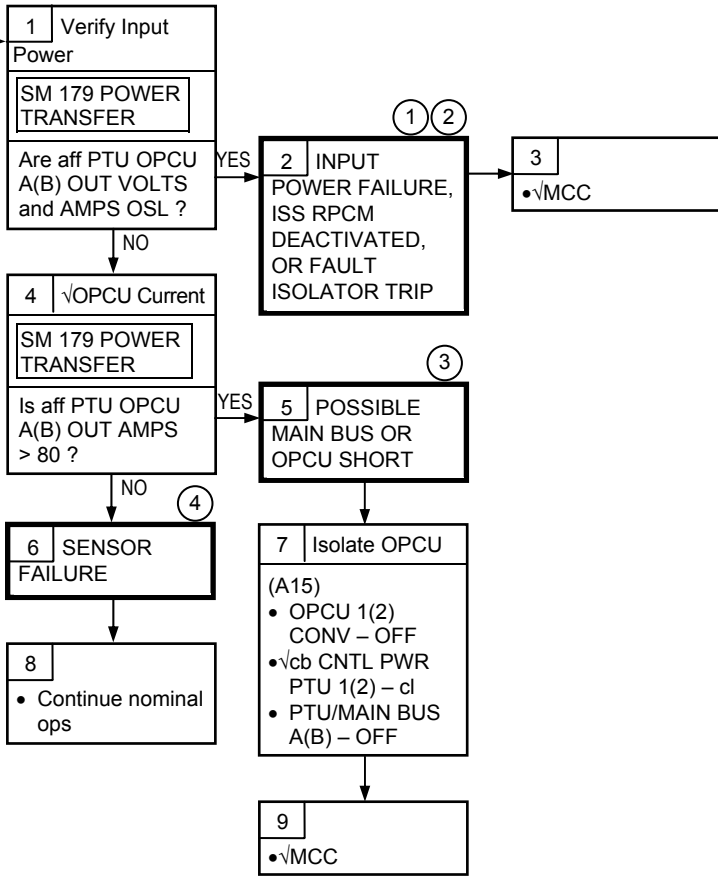
SM ALERT

S179  
OPCU 1(2)  
CH A(B) VOLT

If PTU 1(2) OPCU  
A(B) VOLT < 27.0

**Dual PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON

**Single PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON



① Telemetry for each OPCU Channel requires 120 V house keeping power. If ISS Input Power removed, Telemetry will read OSL ('L')

② For Fault Isolator trip, input power (ISS RPCMs) must be cycled to reset the Fault Isolator circuit

③ If PTU connected to Main Bus, possible Main Bus SHORT

④ OPCU VOLT Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU

**EPS**

**7.7c OPCU CH TEMP ↑  
APCU TEMP ↑**

SM ALERT

S179  
OPCU 1(2)  
CH A(B) TEMP

S179  
APCU 1(2)  
TEMP

If PTU 1(2) OPCU  
A(B) TEMP ↑

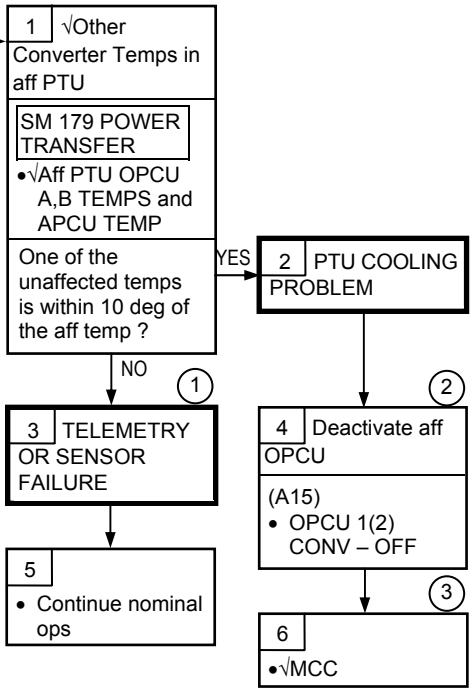
If PTU 1(2) APCU  
TEMP ↑

**Dual PTU Config:**

(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON  
APCU 1,2 CONV  
(two) – ON

**Single PTU Config:**

(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON  
APCU 1(2) CONV –  
ON



① The PTU box should not overheat with only 1 of its 3 converters (OPCU CH A, OPCU CH B, or APCU) activated

② OPCU is being deactivated in order to reduce over all heat load on PTU

③ MCC will determine how to reduce load on OPCU in order to reactivate it

**EPS**

**7.7d OPCU CH OUT OVER VOLT (O OV) TRIP**

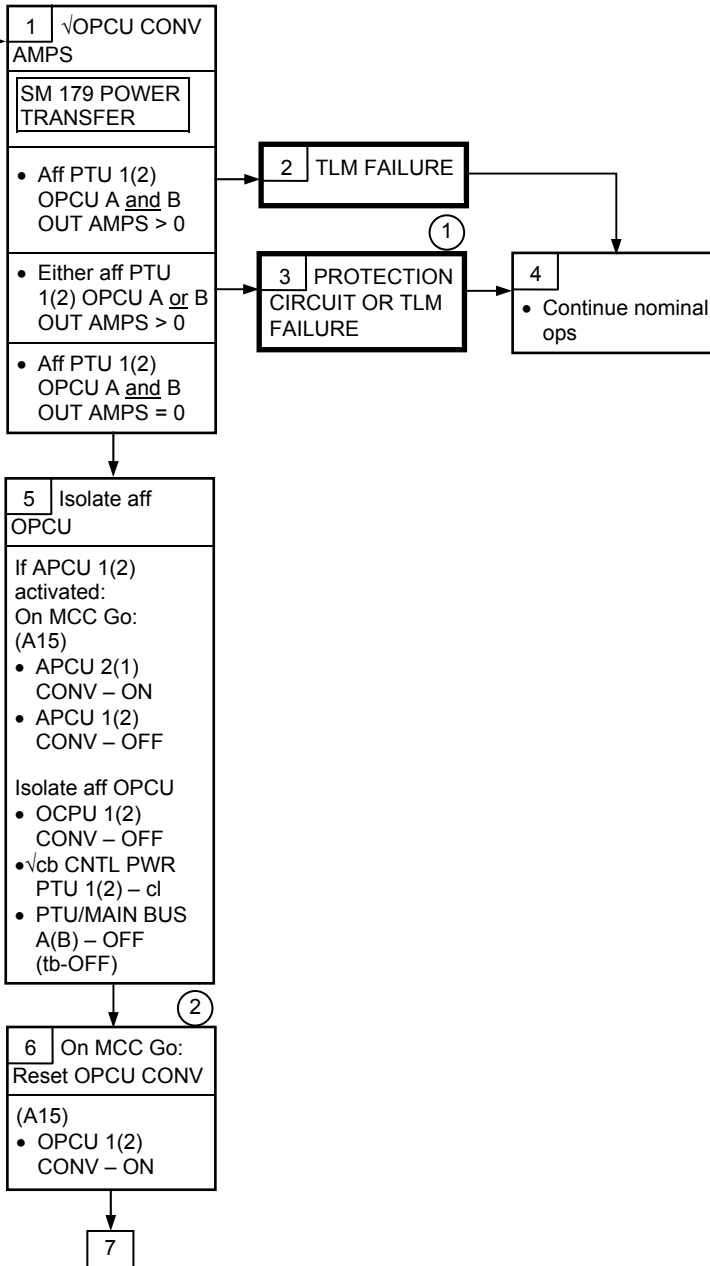
SM  
ALERT

S179  
OPCU 1(2)  
CH A(B) O OV

OPCU TRIP = OUT  
OV if Output Volts  
> 32 volts

**Dual PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON

**Single PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON

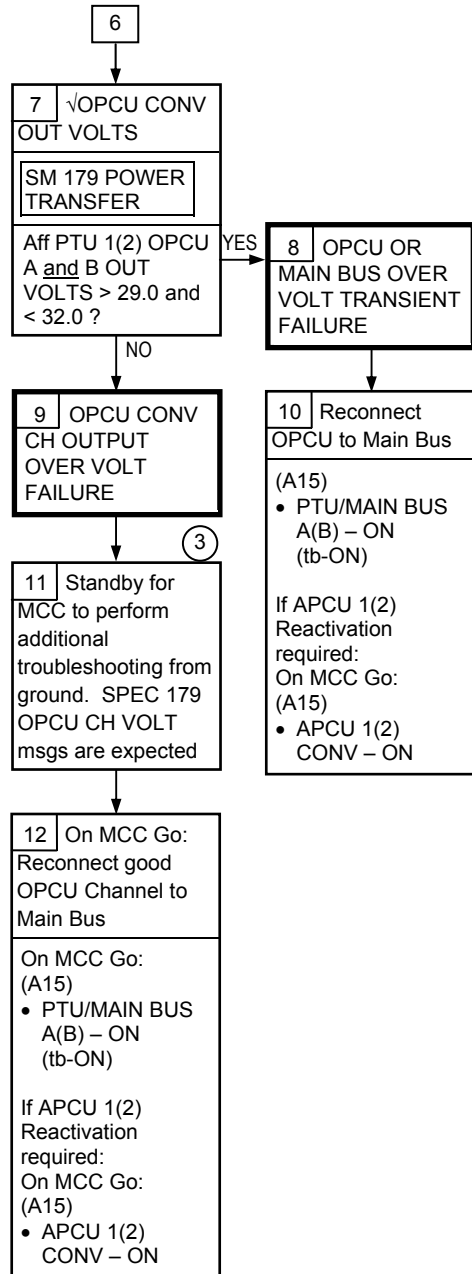


① An OPCU 'Output Over Voltage' will cause both OPCU channels A and B to trip. If single OPCU channel is failed power transfer can continue using other channel

② A SPEC 179 OPCU CH A(B) VOLT message will be received if 1 of the 2 channels is not activated (all associated TLM is OSL)

EPS

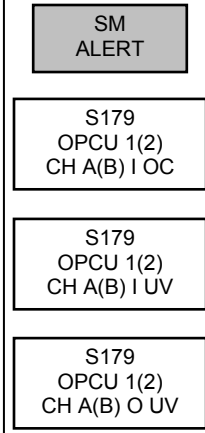
7.7d (Cont)



③ If both OPCU CH A and CH B converters are activated, MCC will command ISS RPC input power off one at a time to determine which OPCU converter (Channel A or B) is failed. If only one OPCU converter is activated, MCC will determine desired reconfiguration

**EPS**

**7.7e OPCU TRIP**



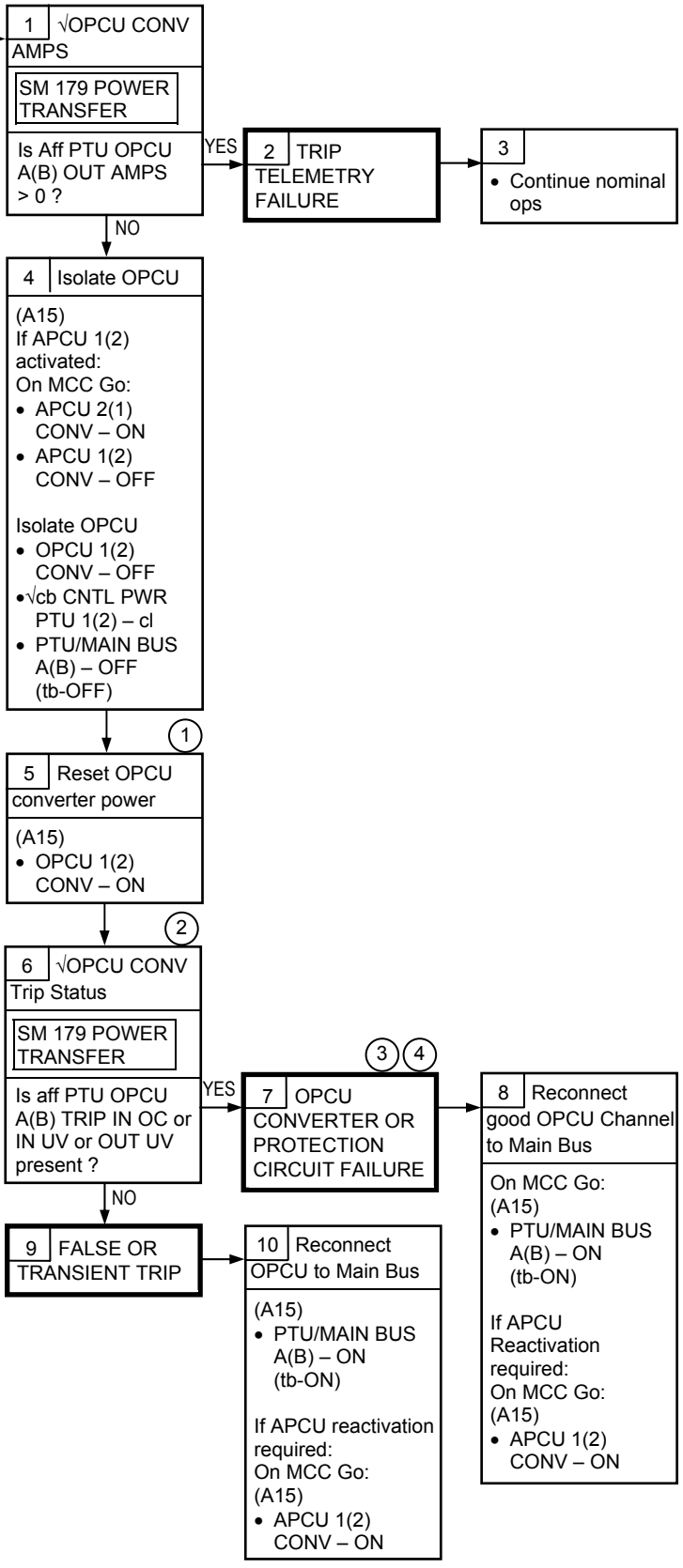
OPCU I OC  
(In Over Current)  
If Input Current > 22  
amps

OPCU I UV  
(In Under Volt)  
If Input Voltage  
< 119 volts

OPCU O UV  
(Out Under Volt)  
If Output Voltage  
< 10 volts (broken  
sense line)

**Dual PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON

**Single PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON



- ① A SPEC 179 OPCU CH A(B) VOLTS message will be received if 1 of the 2 channels is not activated (all associated TLM is OSL)
- ② An OUT UV Trip will not trip the OPCU converter OFF when the PTU is not connected to the Main Bus
- ③ MCC will command off ISS RPC input power to failed OPCU Channel Converter
- ④ For an OUT UV indication, one of three layers of output over voltage protection might be lost on the unaffected OPCU Channel converter

**EPS**

**7.7f APCU 1(2) OUT VOLTS  $\uparrow\downarrow$**

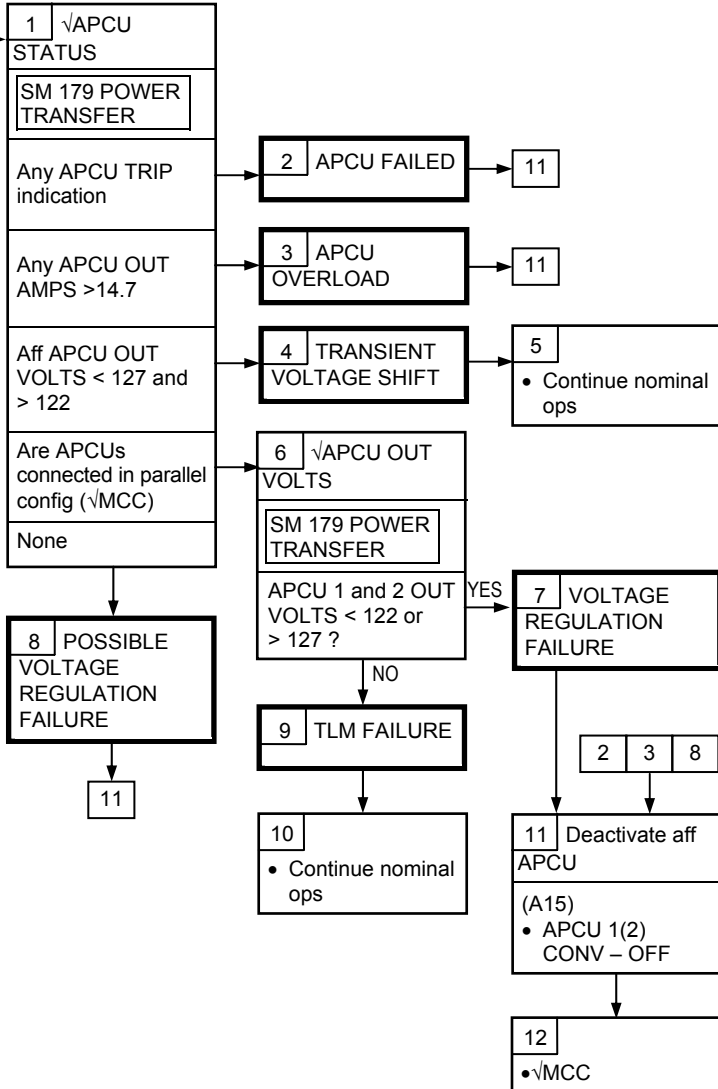
SM ALERT

SM 179  
APCU 1(2)  
OUT VOLT

If PTU 1(2) APCU  
OUT VOLTS  
> 127  $\uparrow$   
or  
< 122  $\downarrow$

**Dual PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON

**Single PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON



**EPS**

**7.7g APCU OUT AMPS ↑  
APCU IN AMPS ↑**

SM  
ALERT

SM 179  
APCU 1(2)  
OUT AMPS

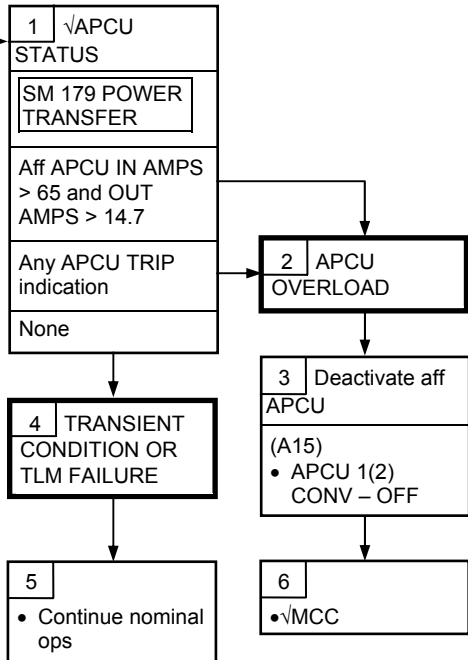
SM 179  
APCU 1(2) IN  
AMPS

If PTU 1(2) APCU  
OUT AMPS  
> 14.7 ↑

If PTU 1(2) APCU IN  
AMPS > 85 ↑

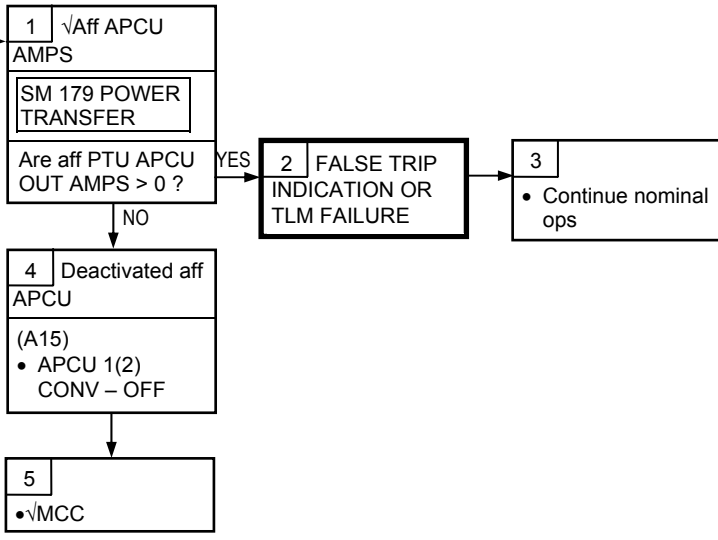
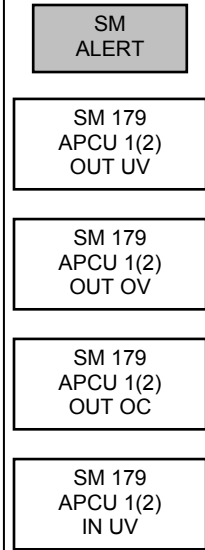
**Dual APCU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
APCU 1,2 CONV  
(two) – ON

**Single APCU  
Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
APCU 1(2) CONV –  
ON



**EPS**

**7.7h APCU TRIP**



APCU OUT UV  
(Out Under Volt)  
If Output Volts < 115 volts

APCU OUT OV  
(Out Over Volt)  
If Output Volts > 130.5 volts

APCU OUT OC  
(Out Over Current)  
If Output Amps > 14.8 amps

APCU IN UV  
(In Under Volt)  
If Input Volts < 23 volts

**Dual APCU Config:**  
(A15)  
cb CNTL PWR PTU 1,2 (two) – cl  
PTU/MAIN BUS A,B (two) – ON  
APCU 1,2 CONV (two) – ON

**Single APCU Config:**  
(A15)  
cb CNTL PWR PTU 1(2) – cl  
PTU/MAIN BUS A(B) – ON  
APCU 1(2) CONV – ON



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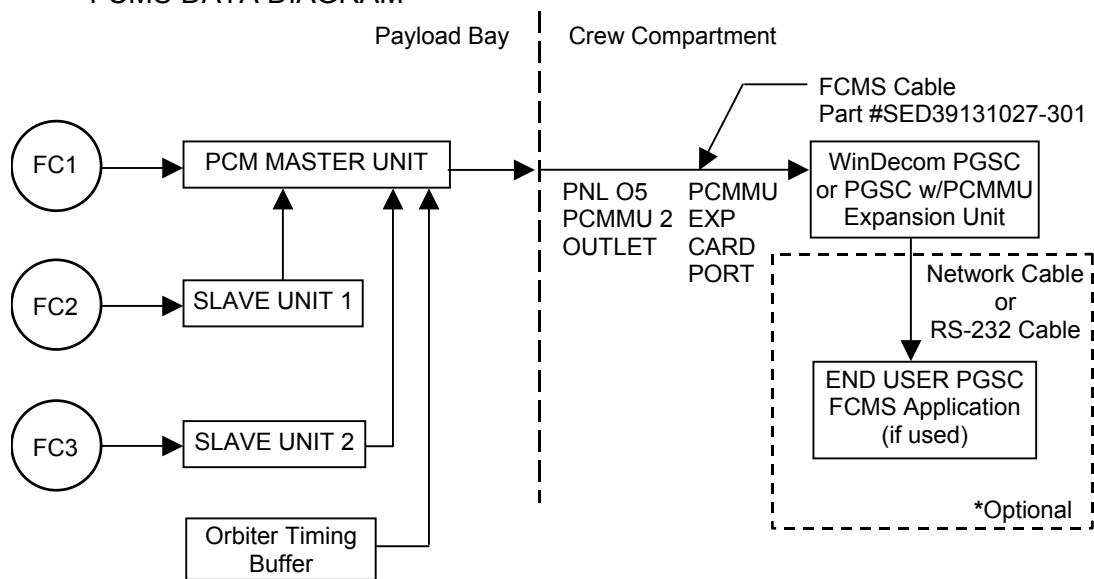
**EPS SSR-1  
FC MONITORING SYS (FCMS) OPS**

NOTE

The FCMS application has capability to display FC single cell voltages and also to record those cell voltages in ASCII data file. Primary mode of operation will be to connect WinDecom using the FCMS data cable, bring up the WinDecom-FCMS application. Start the FCMS application to record data, then downlink the data file to MCC via OCA for analysis.

The recorded data file names will have format fcDDHMM.fcv or fcDDHMM.ZIP where “DDHMM” references the GMT of the first data point of the file. Data files recorded will contain the single cell voltages from all three fuel cells. If recording a full rate data file, temporarily terminate all other applications on the same PGSC

**FCMS DATA DIAGRAM**



- \*The FCMS Application can be run on any one of the following PGSCs
- WinDecom PGSC or PGSC with PCMMU Expansion Unit
  - Any End User Networked PGSC using network cable
  - Any End User PGSC connected to WinDecom serial port (com 1) using RS232Y Cable

ACTIVATION

- On PGSC with PCMMU Expansion Unit to be used for FCMS operations, terminate all applications using Telemetry Server, and verify Telemetry Server not active (no green “GO,” yellow “TFL,” or red “STOP”) sign in lower right corner of PGSC display

If using WinDecom PGSC:

- Double-click ‘Shuttle Apps’ > ‘WinDecom’ > ‘WinDecom shutdown’
- Sel ‘OK’ to shutdown Telemetry System
- Disconnect PCMMU cable from PCMMU expansion card port on WinDecom PGSC

If reqd, disconnect PCMMU cable from pnl O5 PCMMU 2 outlet

NOTE

FCMS cable pin out is different than standard PCMMU data cable

## EPS SSR-1 (Cont)

5. Connect FCMS cable from pnl O5 PCMMU 2 outlet to PCMMU expansion card port on PGSC that will run WinDecom-FCMS
- ML86B:E 6. cb MNA FC PCM – cl

Start WinDecom-FCMS

7. At Startup Menu, sel PCMMU Expansion Unit config
8. Double-click 'Shuttle Apps' > 'Fuel Cell Monitoring' > 'WinDecom-FCMS'

### NOTE

After 30-45 sec, expect TLM Monitor, TLM Pkt-net, and TLM Pkt-com windows to appear (possibly minimized). Data should be incrementing in TLM Pkt-net window

FCMS Application

9. If reqd for End User PGSC, sel appropriate Expansion Unit config at startup menu
10. Double-click 'Shuttle Apps' > 'Fuel Cell Monitoring' > 'Fuel Cell Monitoring System'
11. Verify data being received on crew FCMS display (data updating and GMT incrementing on FCMS display, green "GO" sign in lower right hand corner of PGSC display)
12. Record full rate data file using record option unless otherwise specified by MCC (Data can be recorded at either full rate or one sample every X seconds for X hours)
13. When recording is complete, select Yes in popup window to copy data file (fcDDDDHHMM.ZIP) from C:\SPOCAPPS\FCMS directory to \*:\OCA\_DOWN directory on Proshare PGSC, notify MCC

If fuel cell open circuit voltage recording requested, following steps will be coordinated with MCC:

14. BUS TIE \_\_\_\_,\_\_(two) – ON (tb-ON)
15. ESS BUS SOURCE FC \_\_\_\_ – OFF
16. FC/MN BUS \_\_\_\_ – OFF
17. 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

18. FC/MN BUS \_\_\_\_ – ON
19. ESS BUS SOURCE FC \_\_\_\_ – ON
20. Bus Tie config per MCC

### DEACTIVATION

- ML86B:E 21. cb MNA FC PCM – op

FCMS Application

22. Close FCMS application
- If End User PGSC used
- Disconnect and stow RS232Y cable
- Shut down Windows – as reqd

WinDecom PGSC

23. To exit:
- Double-click 'Shuttle Apps' > 'Fuel Cell Monitoring' > 'WinDecom Shutdown'
24. Perform as reqd
- Disconnect, stow FCMS cable
- Shut down Windows
- Disconnect pwr cable
25. Reconfigure WinDecom PGSC as reqd (PGSC, WINDECOM OPS)

# EPS SSR-3 FC SHUTDN C&W LIMIT CHANGE

1 √FC H2O LN  
HTR and close aff  
FC PURGE VLV

(R11U)

- FC H2O LINE HTR – A AUTO (B AUTO)
- Aff FC PURGE VLV – CL
- Install guard on purge valve switch

2

Which FC is being shut down?

FC1	FC2	FC3
-----	-----	-----

3 Change FC1  
STACK T PRI C&W lower limit to 50.8 degF and inhibit FC1 O2,H2 REAC VLV and FC1 PUMP PRI C&W

(R13U)

- C/W PARAM SEL tw (three) – 062
- C/W LIMIT SET VALUE tw (three) – 1.70
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET, then READ, hold
- √STATUS lts – 1.70
- C/W PARAM SEL tw (three) – 002
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 012
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 092
- C/W PARAM – INH
- C/W PARAM STATUS – INH, hold
- √PARAM 002,012,092 inhibited
- C/W PARAM SEL tw (three) – 120

4 Change FC2  
STACK T PRI C&W lower limit to 50.8 degF and inhibit FC2 O2,H2 REAC VLV and FC2 PUMP PRI C&W

(R13U)

- C/W PARAM SEL tw (three) – 072
- C/W LIMIT SET VALUE tw (three) – 1.70
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET, then READ, hold
- √STATUS lts – 1.70
- C/W PARAM SEL tw (three) – 022
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 032
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 102
- C/W PARAM – INH
- C/W PARAM STATUS – INH, hold
- √PARAM 022,032,102 inhibited
- C/W PARAM SEL tw (three) – 120

5 Change FC3  
STACK T PRI C&W lower limit to 50.8 degF and inhibit FC3 O2,H2 REAC VLV and FC3 PUMP PRI C&W

(R13U)

- C/W PARAM SEL tw (three) – 082
- C/W LIMIT SET VALUE tw (three) – 1.70
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET, then READ, hold
- √STATUS lts – 1.70
- C/W PARAM SEL tw (three) – 042
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 052
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 112
- C/W PARAM – INH
- C/W PARAM STATUS – INH, hold
- √PARAM 042,052,112 inhibited
- C/W PARAM SEL tw (three) – 120

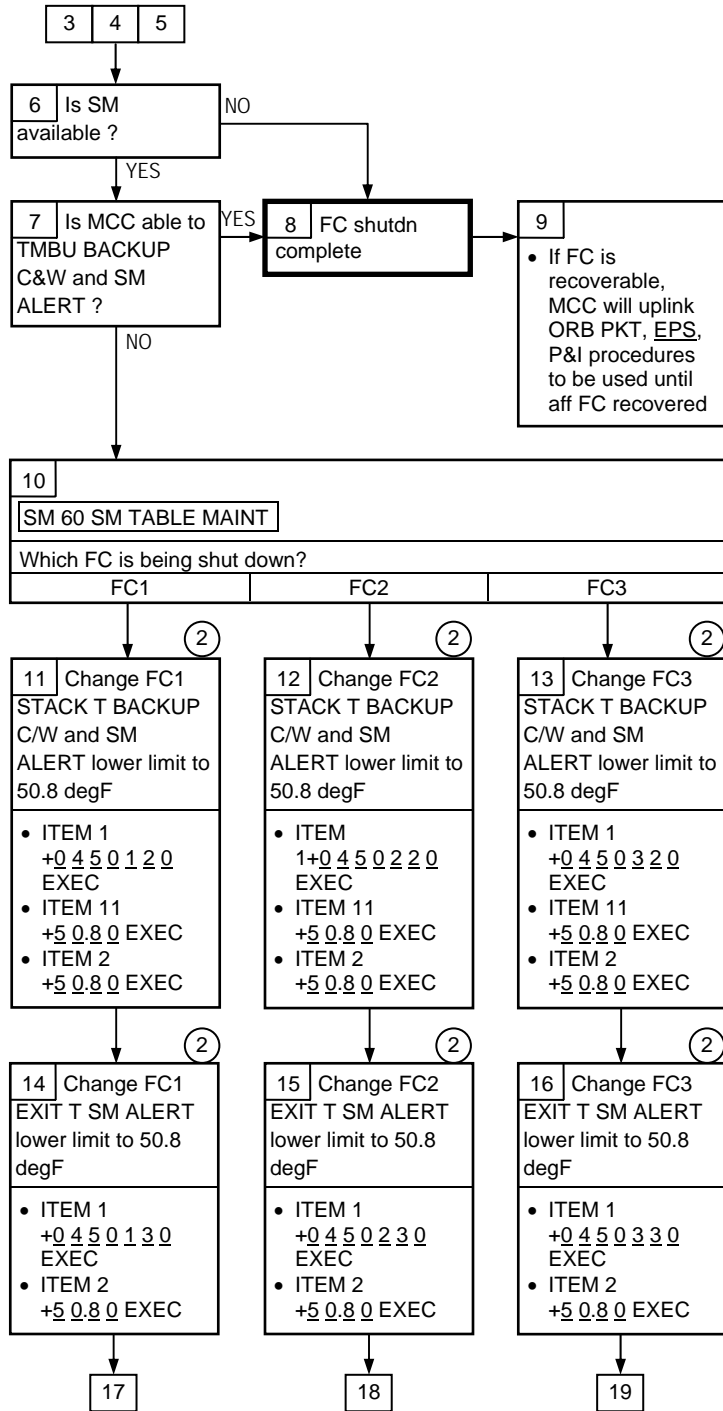
6

6

6

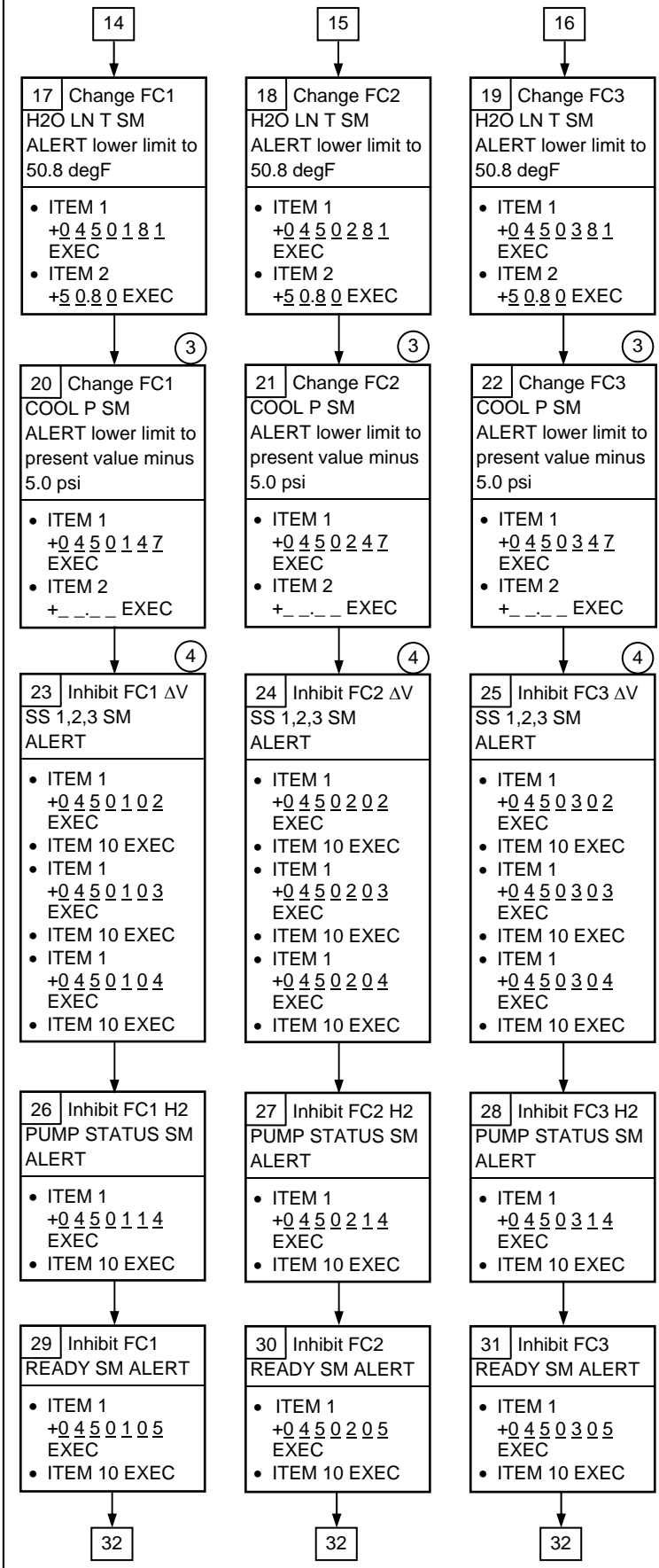
① Lower limit on FC temp during cooldown is 48 degF to protect from ice formation. Closest value > 48 degF that PRI C&W system can be set is 50.8 degF

# EPS SSR-3 (Cont)



② 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

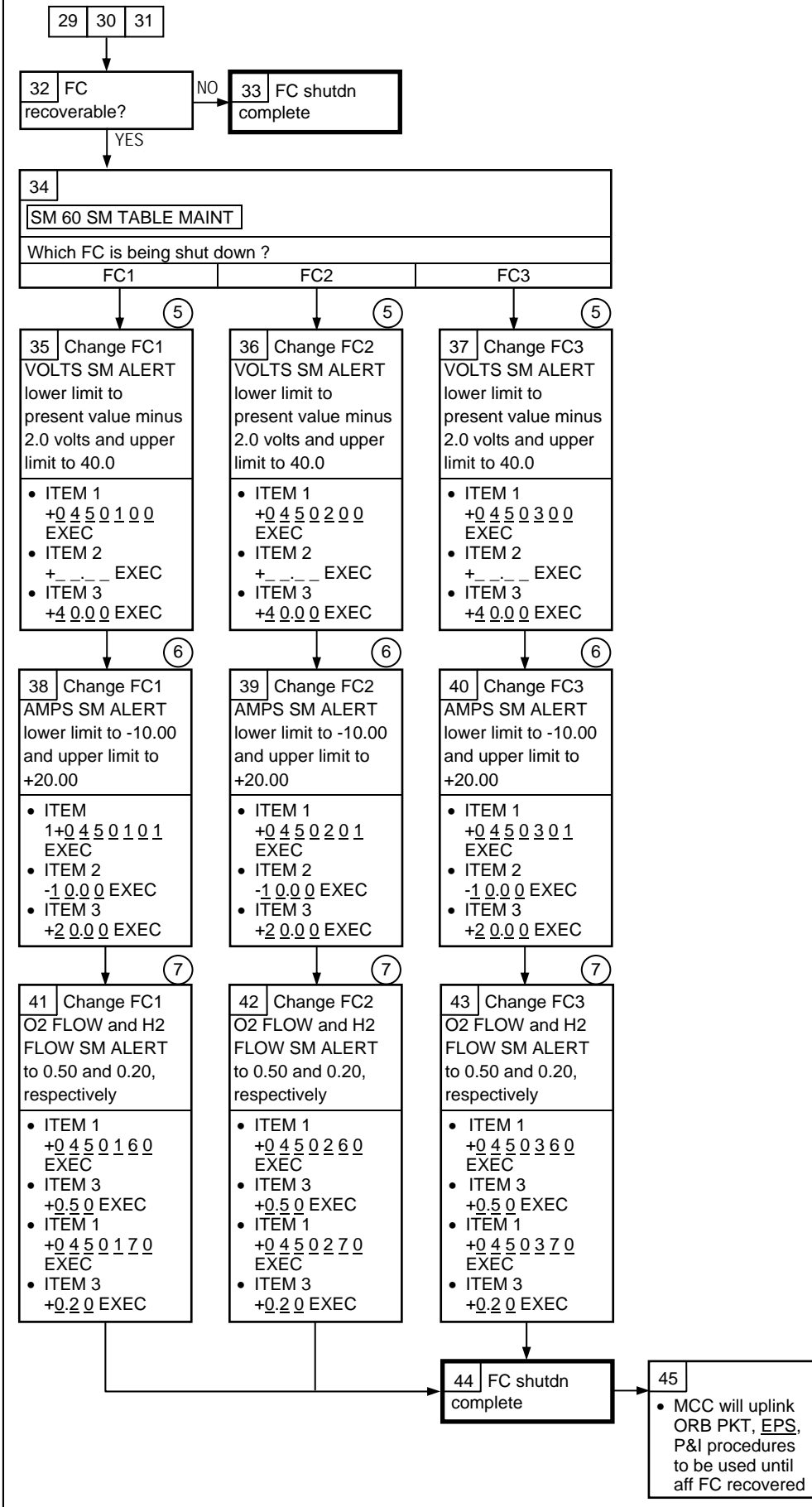
# EPS SSR-3 (Cont)



③ Decrease in FC COOL P with fuel cell shutdn and REAC vlvs closed may indicate internal leak, crossover, or reactant leak

④ FC SUBSTACK ΔVOLTS are not usable when fuel cell is shut down

# EPS SSR-3 (Cont)



⑤ Decrease in FC VOLTS while fuel cell is shut down may indicate internal load, crossover, or reactant leak

⑥ Increase in FC O<sub>2</sub>, H<sub>2</sub> FLOWS while fuel cell is shut down may indicate internal load or reactant leak

⑦ Increase in FC O<sub>2</sub>, H<sub>2</sub> 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: (R1)
- ESS BUS SOURCE FC1(2,3) – OFF
- FC/MN BUS A(B,C) – OFF (tb-OFF)
- √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 ?

YES → 15

NO ↓

2

SM 60 SM TABLE MAINT

Which FC to STANDBY ?

FC1	FC2	FC3
-----	-----	-----

3 Change FC1  
H2O LN T SM  
ALERT lower limit to 50.8 degF

- ITEM 1  
+0 4 5 0 1 8 1  
EXEC
- ITEM 2  
+5 0.8 0 EXEC

4 Change FC2  
H2O LN T SM  
ALERT lower limit to 50.8 degF

- ITEM 1  
+0 4 5 0 2 8 1  
EXEC
- ITEM 2  
+5 0.8 0 EXEC

5 Change FC3  
H2O LN T SM  
ALERT lower limit to 50.8 degF

- ITEM 1  
+0 4 5 0 3 8 1  
EXEC
- ITEM 2  
+5 0.8 0 EXEC

6 Change FC1  
VOLTS SM ALERT  
lower limit to 31.0  
volts and upper limit  
to +37.5

- ITEM 1  
+0 4 5 0 1 0 0  
EXEC
- ITEM 2  
+3 1.0 EXEC
- ITEM 3  
3 7.5 0 EXEC

7 Change FC2  
VOLTS SM ALERT  
lower limit to 31.0  
volts and upper limit  
to +37.5

- ITEM 1  
+0 4 5 0 2 0 0  
EXEC
- ITEM 2  
+3 1.0 EXEC
- ITEM 3  
3 7.5 0 EXEC

8 Change FC3  
VOLTS SM ALERT  
lower limit to 31.0  
volts and upper limit  
to +37.5

- ITEM 1  
+0 4 5 0 3 0 0  
EXEC
- ITEM 2  
+3 1.0 EXEC
- ITEM 3  
3 7.5 0 EXEC

9 Inhibit FC1 ΔV  
SS 1,2,3 SM  
ALERT

- ITEM 1  
+0 4 5 0 1 0 2  
EXEC
- ITEM 10 EXEC
- ITEM 1  
+0 4 5 0 1 0 3  
EXEC
- ITEM 10 EXEC
- ITEM 1  
+0 4 5 0 1 0 4  
EXEC
- ITEM 10 EXEC

10 Inhibit FC2 ΔV  
SS 1,2,3 SM  
ALERT

- ITEM 1  
+0 4 5 0 2 0 2  
EXEC
- ITEM 10 EXEC
- ITEM 1  
+0 4 5 0 2 0 3  
EXEC
- ITEM 10 EXEC
- ITEM 1  
+0 4 5 0 2 0 4  
EXEC
- ITEM 10 EXEC

11 Inhibit FC3 ΔV  
SS 1,2,3 SM  
ALERT

- ITEM 1  
+0 4 5 0 3 0 2  
EXEC
- ITEM 10 EXEC
- ITEM 1  
+0 4 5 0 3 0 3  
EXEC
- ITEM 10 EXEC
- ITEM 1  
+0 4 5 0 3 0 4  
EXEC
- ITEM 10 EXEC

12

13

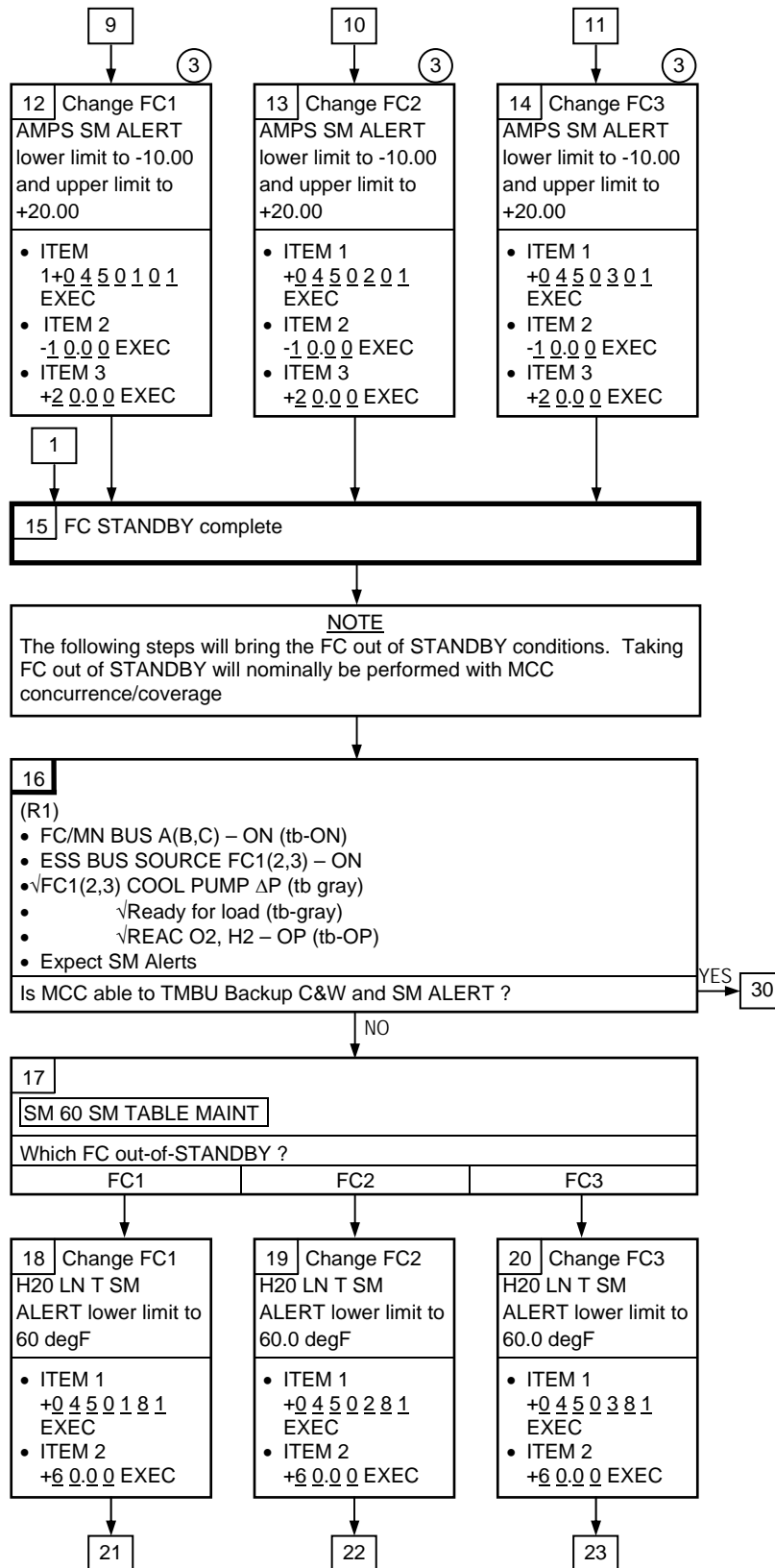
14

① Decrease in FC VOLTS beyond FDA limit while fuel cell is in STANDBY may indicate internal load, crossover, or reactant leak

② FC SUBSTACK ΔVOLTS are not usable when fuel cell is in STANDBY

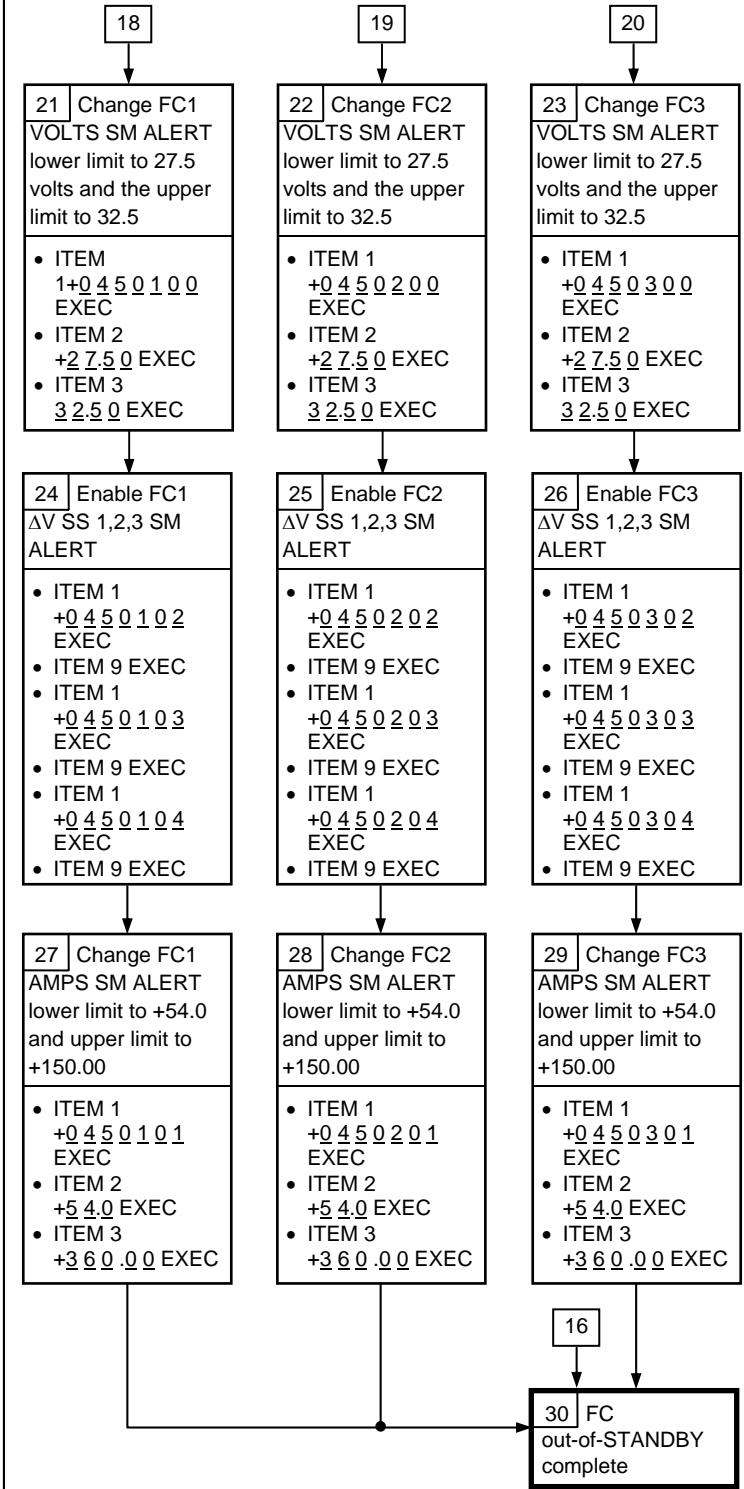


# EPS SSR-4 (Cont)

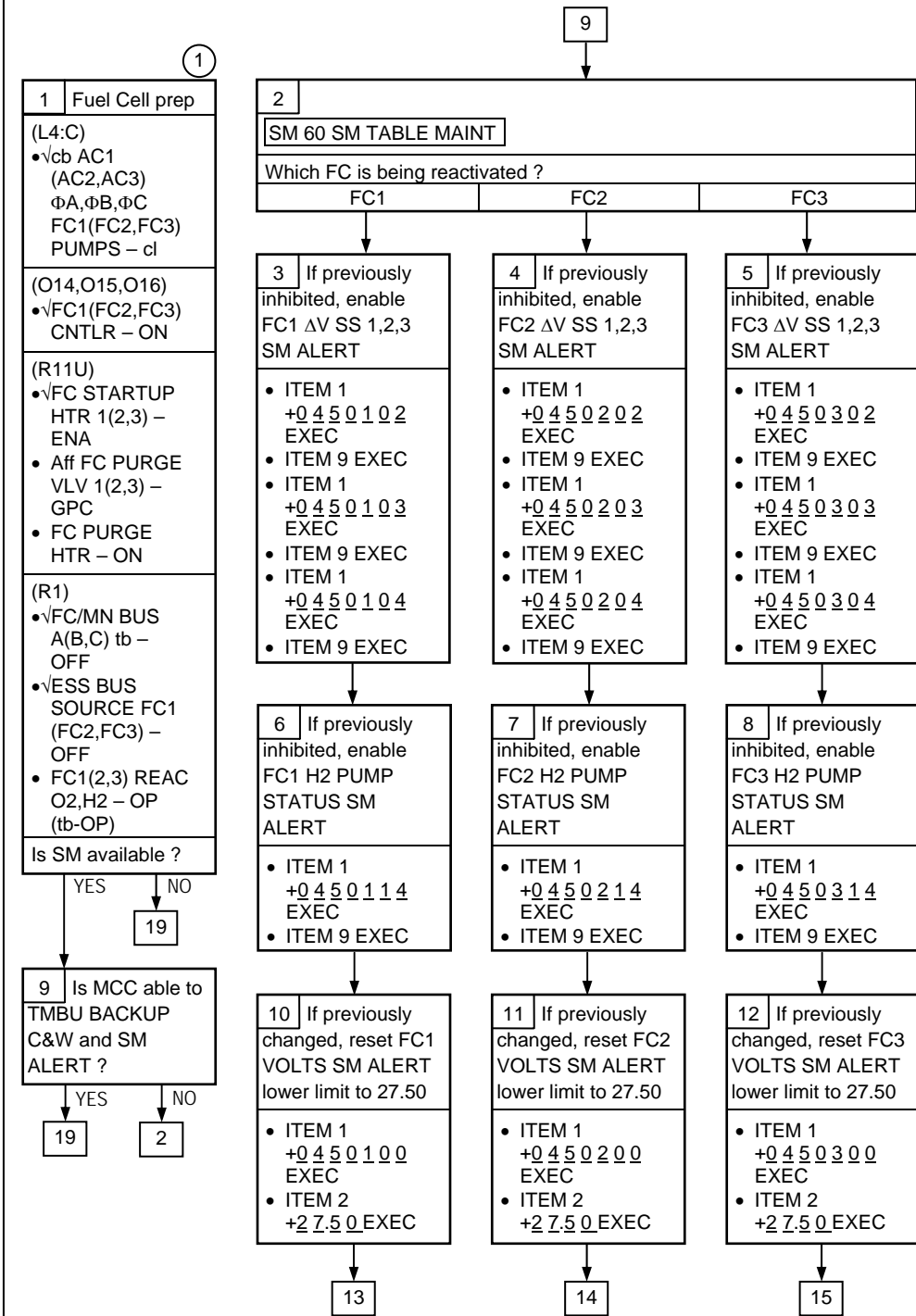


③ Increase in FC Amps beyond the FDA limit while fuel cell is in STANDBY may indicate external load on the fuel cell

# EPS SSR-4 (Cont)

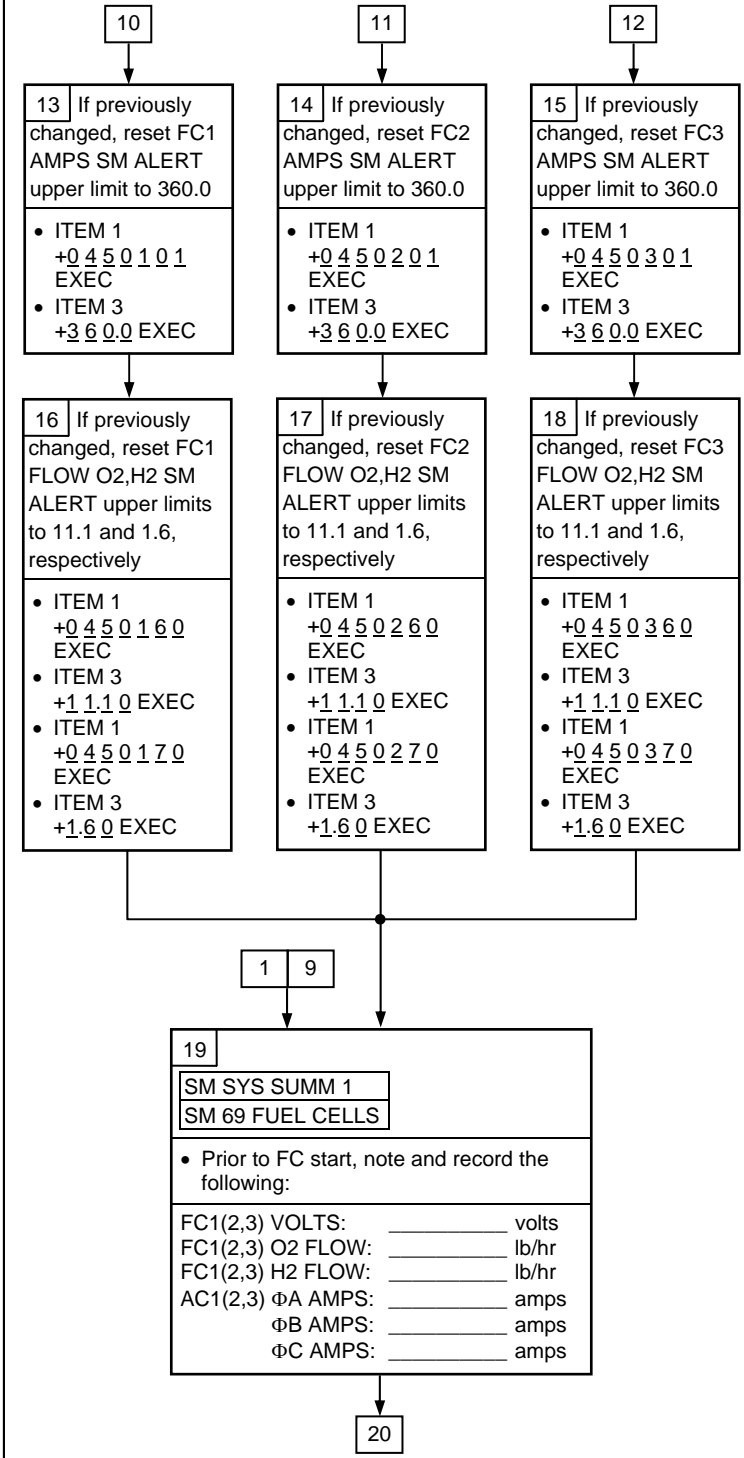


# EPS SSR-6 FC RESTART

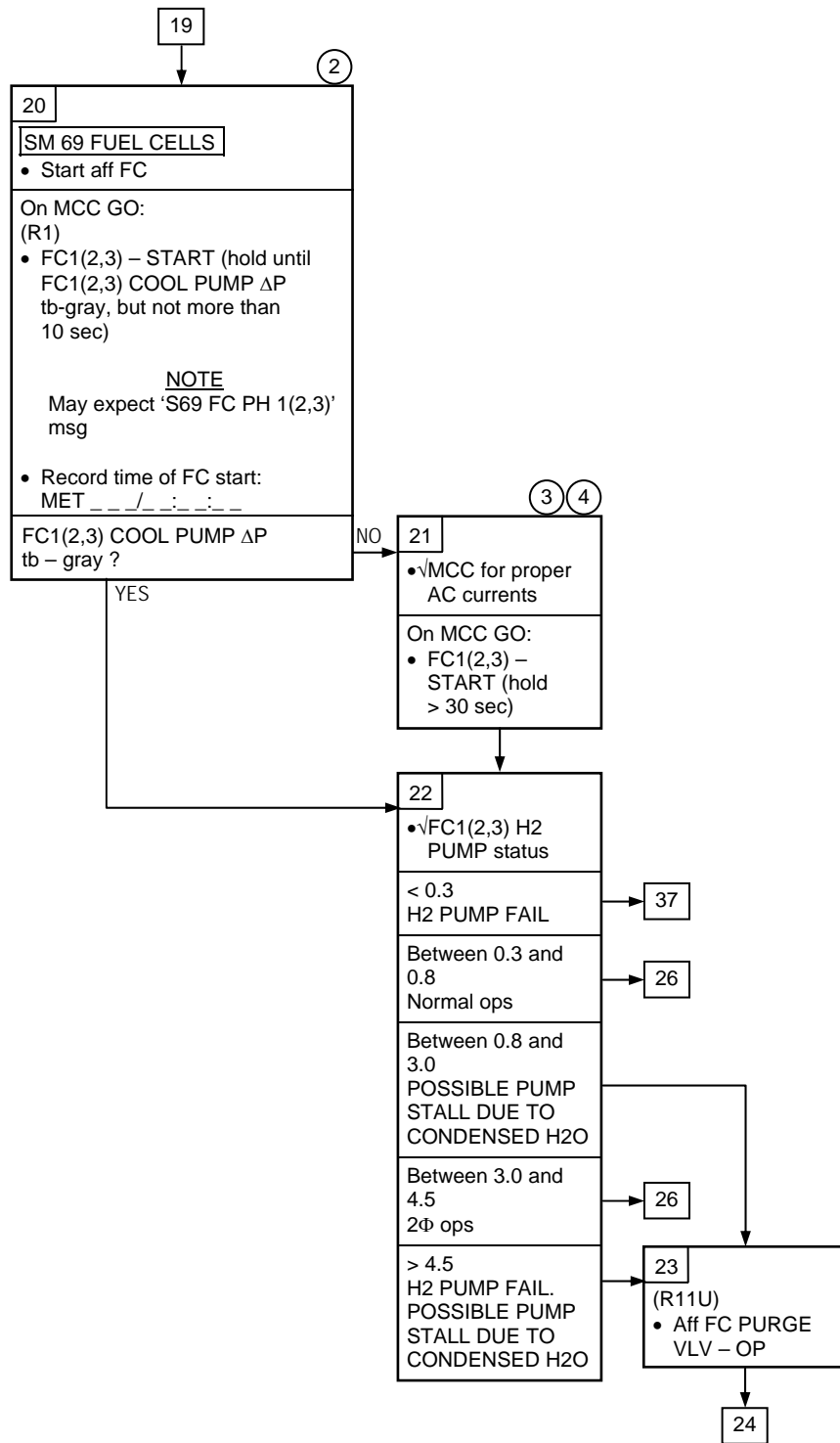


① FC may be restarted on two Φs. Loss of AC1(2,3) ΦA cb causes loss of FC1(2,3) pH sensing. Loss of AC2 ΦB cb causes loss of common pH sensing

# EPS SSR-6 (Cont)



# EPS SSR-6 (Cont)

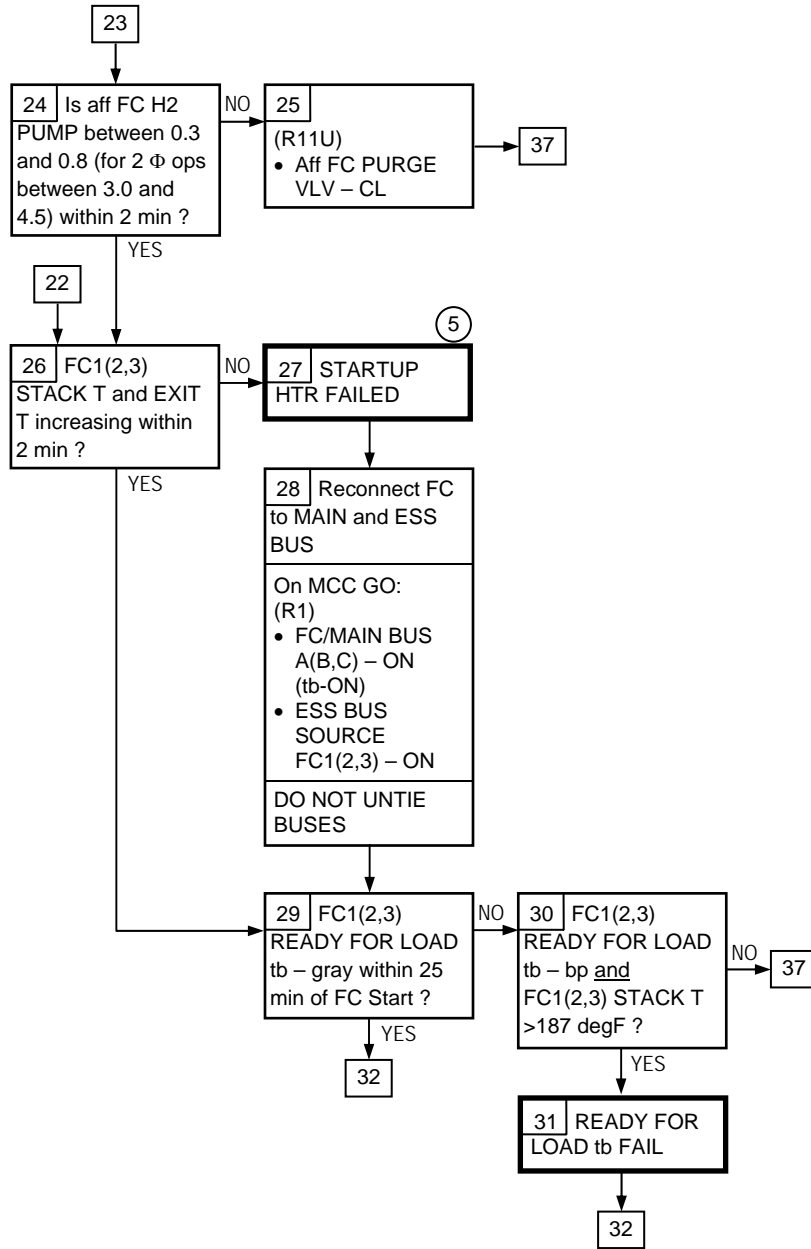


② May expect FC pH FSM when FC is started on some fuel cells due to addition of pH self-test capability

③ Expected AC currents are an increase of ~0.8 amps/Φ (0.55 amps/Φ for COOL PUMPS and 0.25 amps/Φ for H2 mtr)

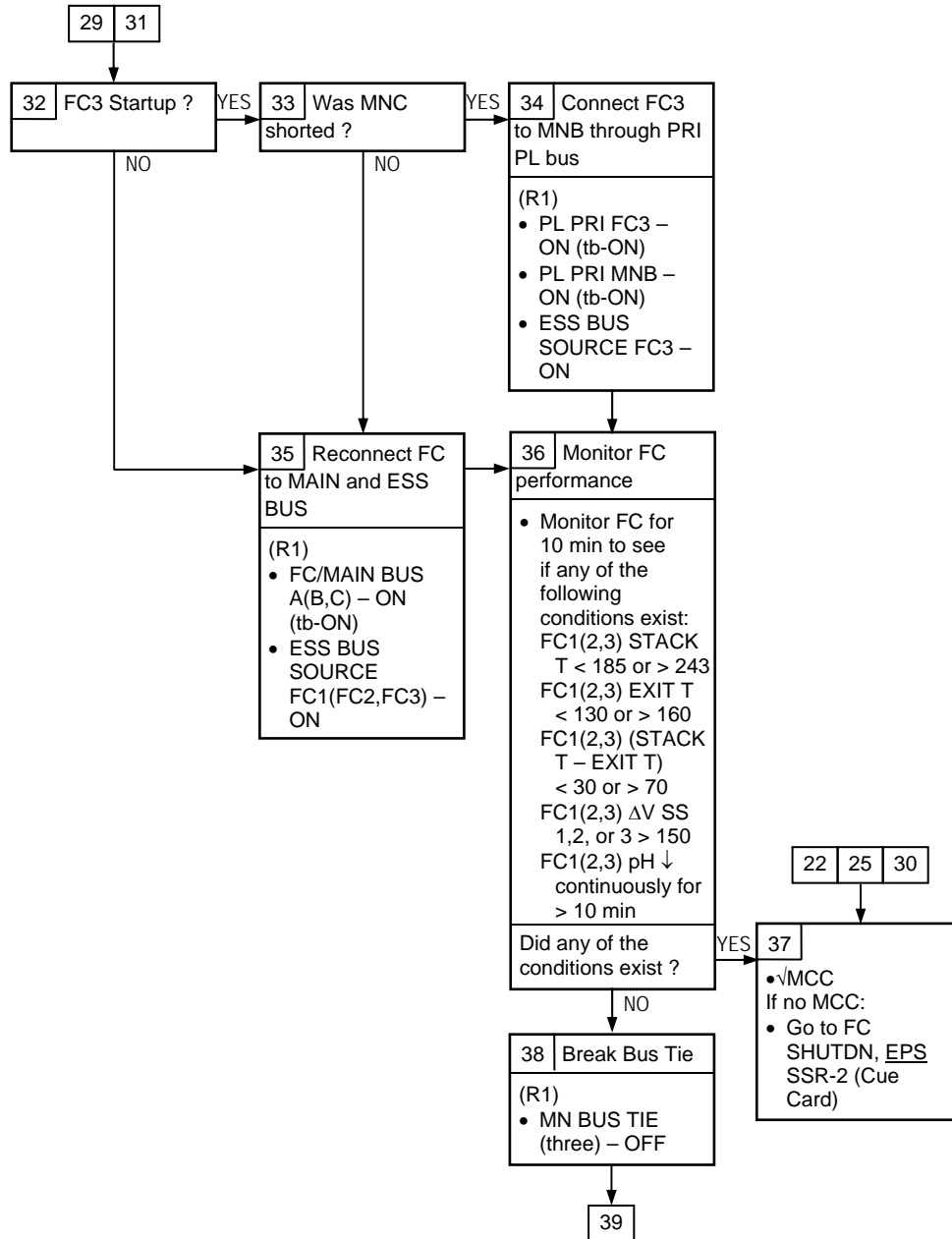
④ Failure of COOL PUMP ΔP tb will inhibit FC startup. Holding sw in START for > 30 sec will bypass Logic Timer and allow COOL PUMP and H2 mtr to run

# EPS SSR-6 (Cont)



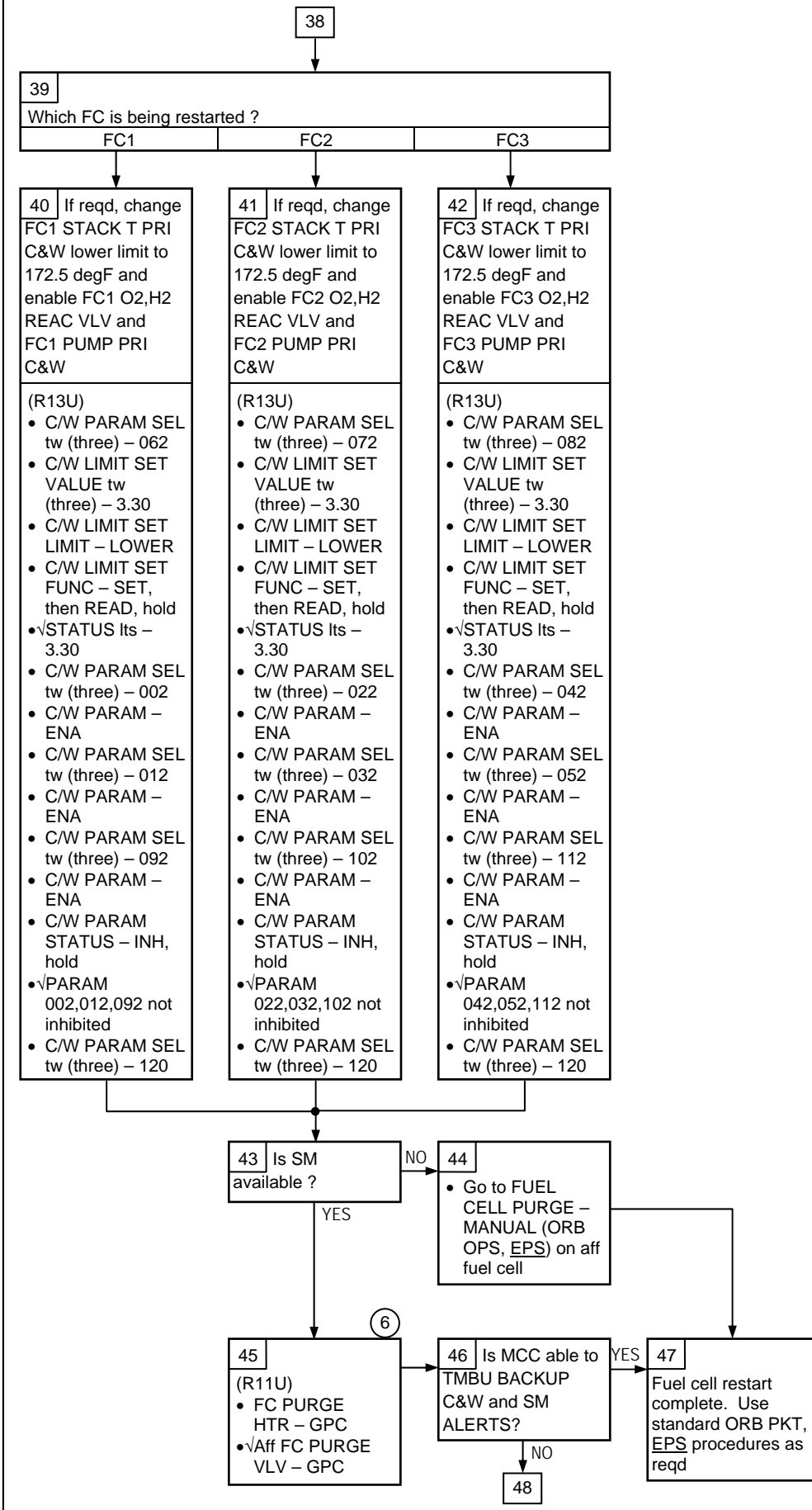
⑤ Expected indications of operating STARTUP HTR are:  
 FC VOLTS ~32V  
 FC O2 Flow ~1.4 lb/hr  
 FC H2 FLOW ~0.2 lb/hr  
 Placing FC on MAIN BUS will generate sufficient heat to raise FC temp to operating levels

# EPS SSR-6 (Cont)



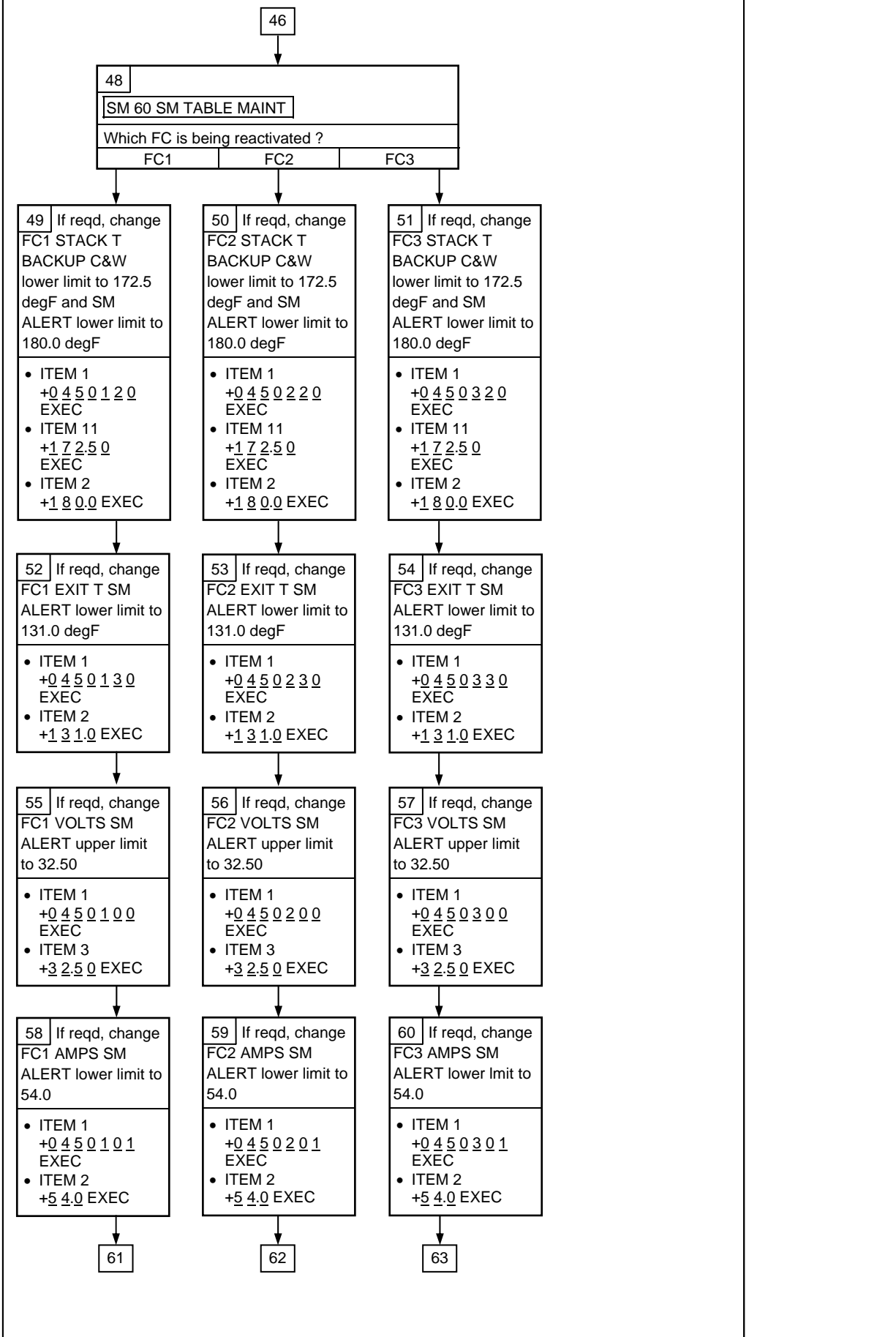
# EPS SSR-6 (Cont)

⑥ MCC will TMBU uplink post-restart FC purge

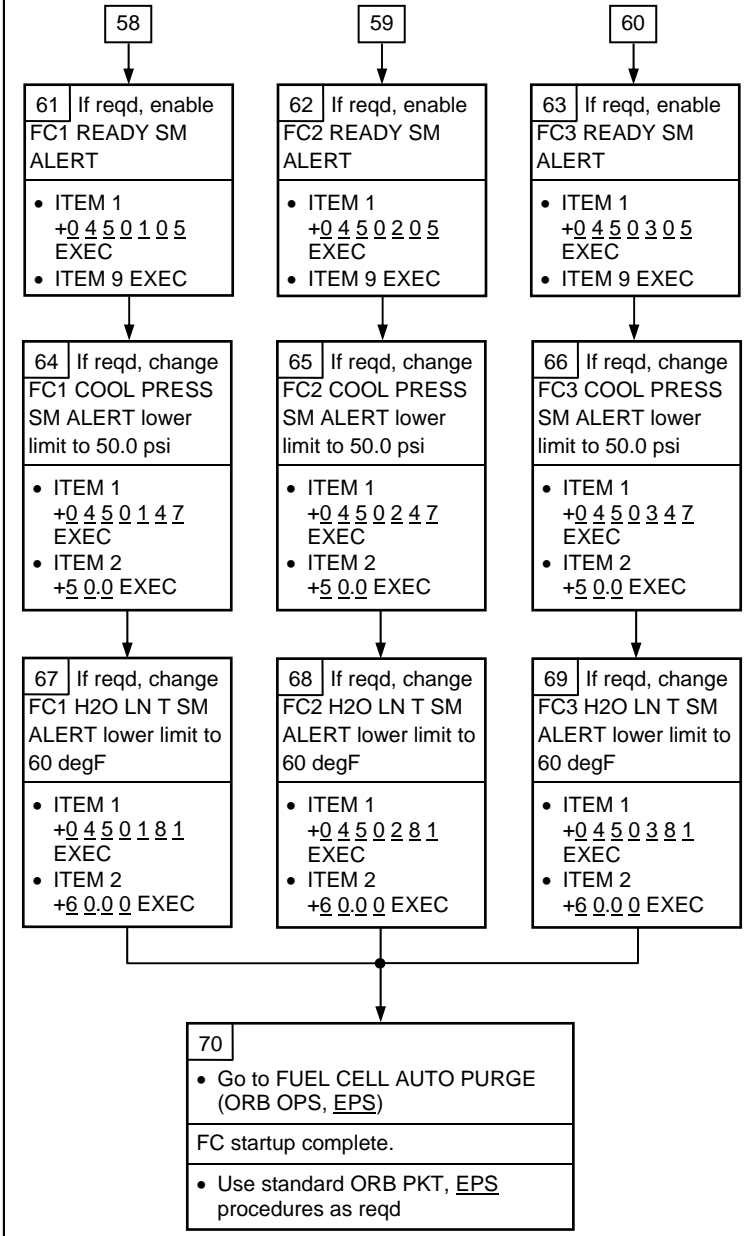




# EPS SSR-6 (Cont)



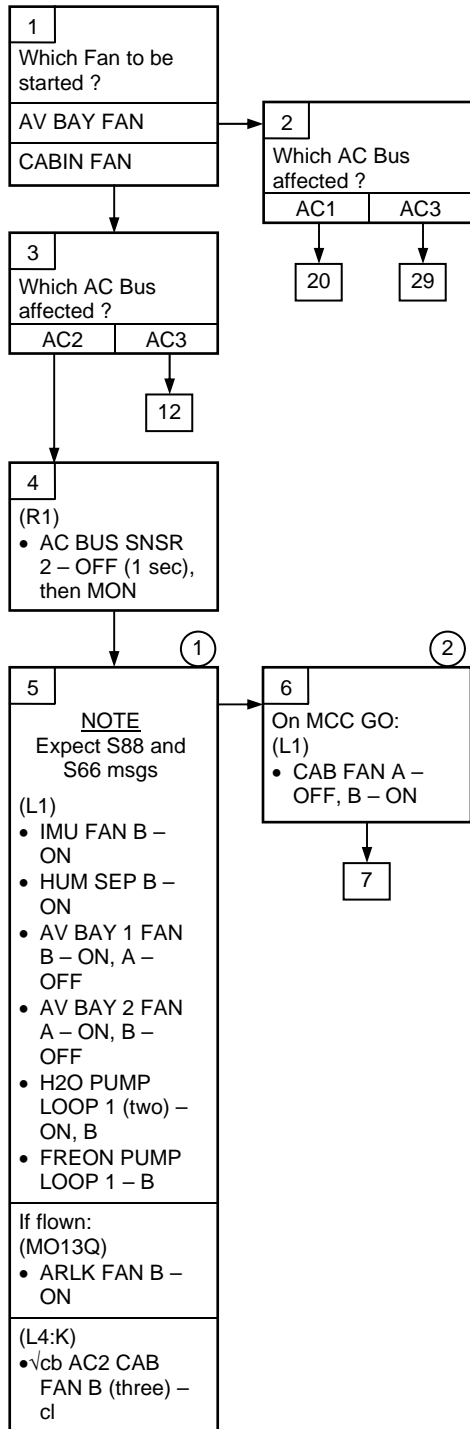
# EPS SSR-6 (Cont)



# EPS SSR-7 TWO-PHASE FAN START PROCEDURE

NOTE

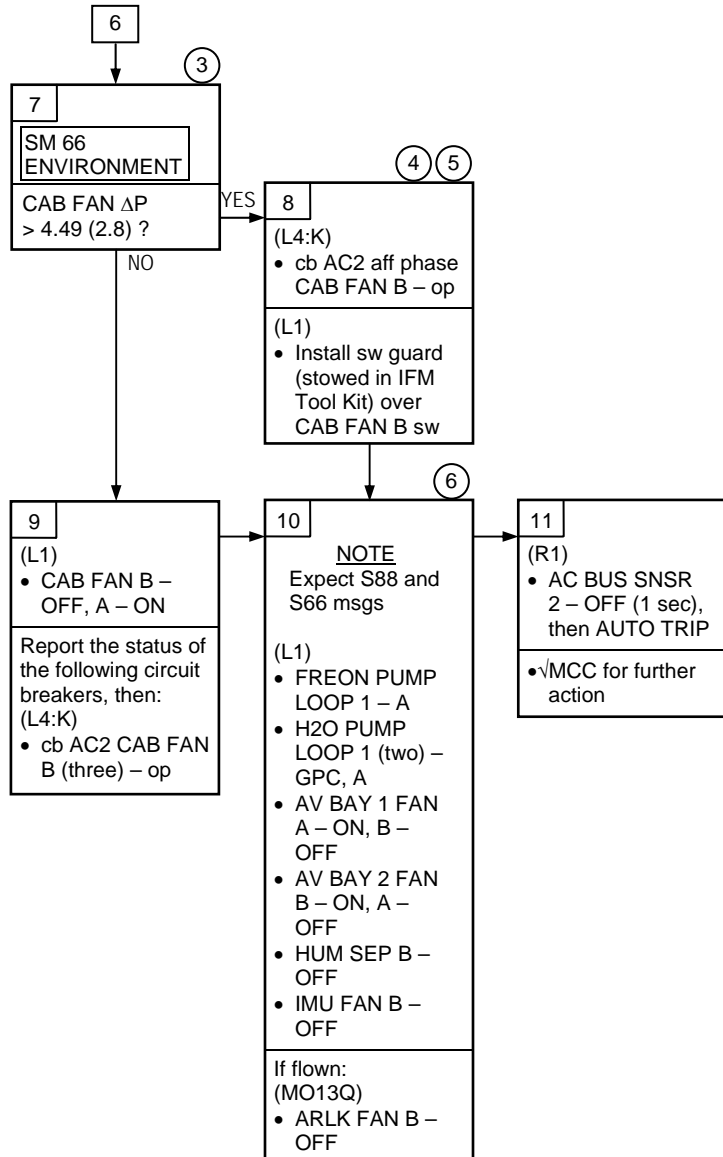
This procedure assumes the EPS MAL BUS LOSS SSR for the affected phase (not shorted) has already been completed. This procedure will be performed during MCC coverage



① 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

# EPS SSR-7 (Cont)



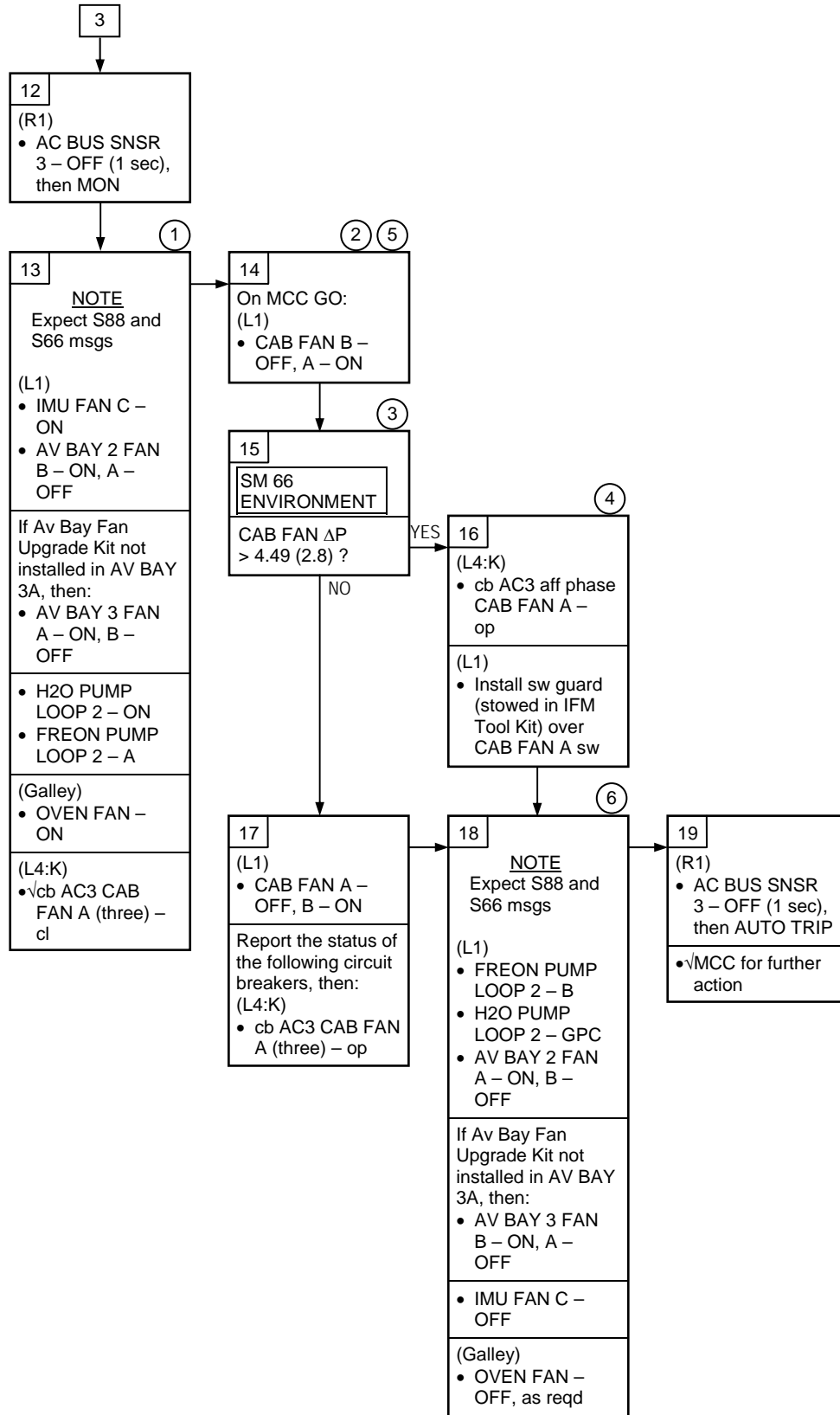
③ Value in ( ) is the ΔP when the Cabin Press is at 10.2 psi

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

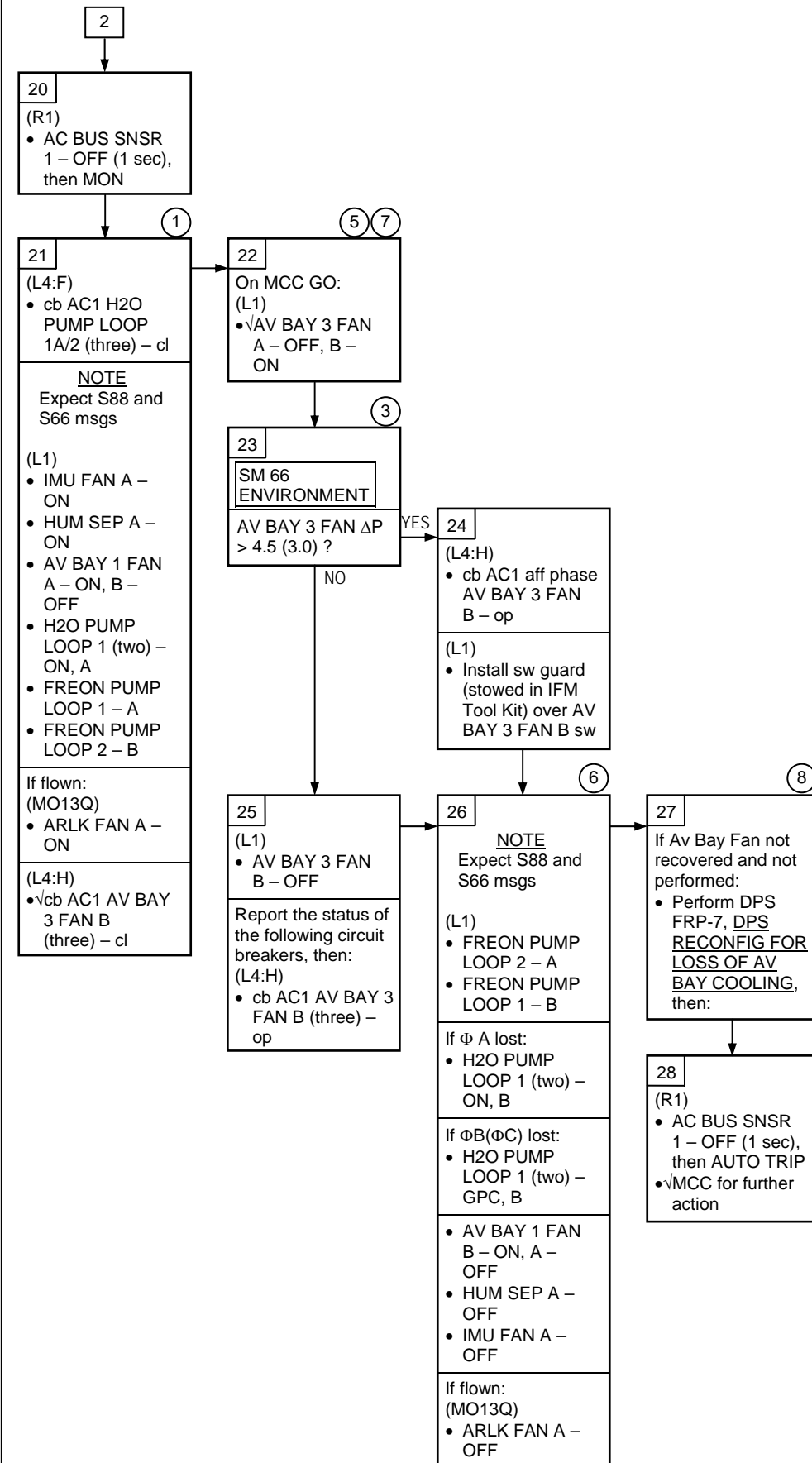
⑥ Reconfig back to alternate equipment

# EPS SSR-7 (Cont)



- 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

# EPS SSR-7 (Cont)



① Reconfig 3Φ AC equipment to bus with lost phase to create an induced voltage reqd to start large fan

③ Value in ( ) is the ΔP when the Cabin Press is at 10.2 psi

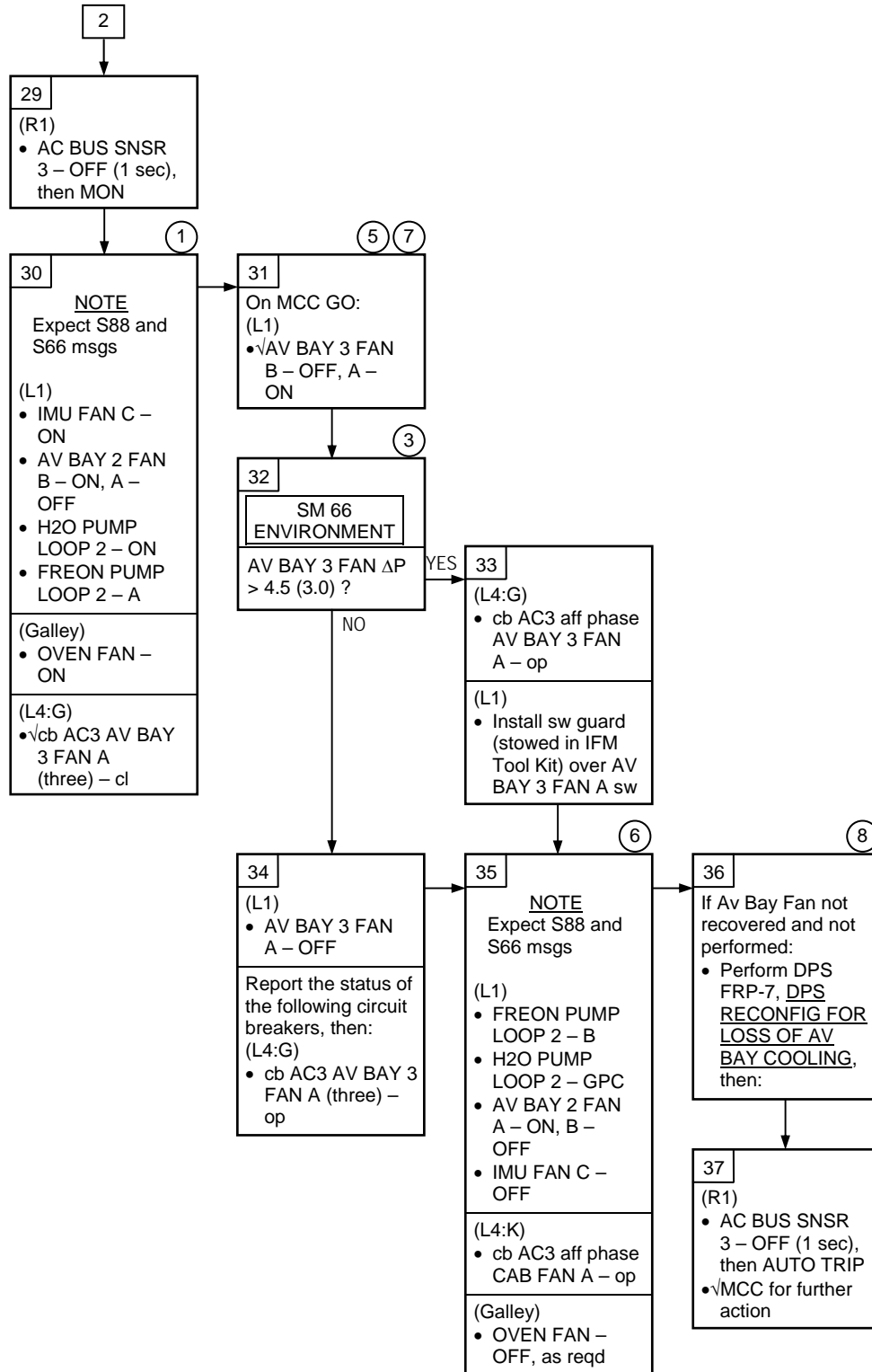
⑤ May receive 'S67 AC AMPS' msg

⑥ Reconfig back to alternate equipment

⑦ Off time not to exceed 26 min due to GPC cooling constraints. If GPC 3 Off, time not to exceed 1 hr due to Caution & Warning cooling constraints

⑧ The Av Bay air cooled equipment must be powered down due to loss of Av Bay Air Cooling

# EPS SSR-7 (Cont)



① Reconfig 3Φ AC equipment to bus with lost phase to create an induced voltage reqd to start large fan

③ Value in ( ) is the ΔP when the Cabin Press is at 10.2 psi

⑤ May receive 'S67 AC AMPS' msg

⑥ Reconfig back to alternate equipment

⑦ Off time not to exceed 26 min due to GPC cooling constraints. If GPC 3 Off, time not to exceed 1 hr due to Caution & Warning cooling constraints

⑧ The Av Bay air cooled equipment must be powered down due to loss of Av Bay Air Cooling

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# EPS SSR-8 BUS LOADING – LRU SELECT

1	To load MAIN A, select:
<u>NOTE</u>	
Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed	
(L1)	
1.	• TOP EVAP HTR DUCT – A
2.	• AV BAY 1 FAN A – ON • B – OFF
3.	• 3 FAN B – ON • A – OFF
4.	• FREON PUMP LOOP 1 – A
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)	
APU HTR	
9.	• GAS GEN/FUEL PUMP 1 – A AUTO
10.	• GAS GEN/FUEL PUMP 3 – B AUTO
11.	• LUBE OIL LN 1 – A AUTO
12.	• 3 – B AUTO
13.	• TK/FU LN/H2O SYS 1A,3B (two) – AUTO • TK/FU LN/H2O SYS 1B,3A (two) – OFF
HYD HTR	
14.	• RUD SPDBK A – AUTO • B – OFF
15.	• BDY FLP A – AUTO • B – OFF
16.	• ELEV A – AUTO • B – OFF
HYD	
17.	• CIRC PUMP 3 – MNA
(A14)	
RCS/OMS HTR	
18.	• FWD RCS – A AUTO
19.	• L POD A – A AUTO • B – OFF
20.	• R POD B – B AUTO • A – OFF
21.	• OMS CRSFD LINES – A AUTO

2	To load MAIN B, select:
<u>NOTE</u>	
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 • A – OFF
33.	• 2 FAN A – ON • B – OFF
34.	• FREON PUMP LOOP 1 – B
35.	• CABIN FAN B – ON • A – OFF
(L2)	
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
38.	• PL PRI MNB – ON (tb-ON) • MNC – OFF (tb-OFF) • FC3 – OFF (tb-OFF)
(A12)	
APU HTR	
39.	• GAS GEN/FUEL PUMP 1 – B AUTO
40.	• GAS GEN/FUEL PUMP 2 – A AUTO
41.	• LUBE OIL LN 1 – B AUTO
42.	• 2 – A AUTO
43.	• TK/FU LN/H2O SYS 1B,2A (two) – AUTO • TK/FU LN/H2O SYS 1A,2B (two) – OFF
HYD HTR	
44.	• RUD SPDBK B – AUTO • A – OFF
45.	• BDY FLP B – AUTO • A – OFF
46.	• ELEV B – AUTO • A – OFF
HYD	
47.	• CIRC PUMP 1 – MNB
(A14)	
RCS/OMS HTR	
48.	• FWD RCS – B AUTO
49.	• L POD B – B AUTO • A – OFF
50.	• R POD A – A AUTO • B – OFF
51.	• OMS CRSFD LINES – B AUTO

3	To load MAIN C, select:
<u>NOTE</u>	
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 • A – OFF
63.	• 3 FAN A – ON • B – OFF
64.	• FREON PUMP LOOP 2 – A
65.	• CABIN FAN A – ON • B – OFF
(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 4 HTR B (two) – OFF • CRYO O2,H2 TK 5 HTR B (two) – AUTO • CRYO O2,H2 TK 5 HTR A (two) – OFF
(A12)	
APU HTR	
68.	• GAS GEN/FUEL PUMP 2 – B AUTO
69.	• GAS GEN/FUEL PUMP 3 – A AUTO
70.	• LUBE OIL LN 2 – B AUTO
71.	• 3 – A AUTO
72.	• TK/FU LN/H2O SYS 2B,3A (two) – AUTO • TK/FU LN/H2O SYS 2A,3B (two) – OFF
HYD	
73.	• CIRC PUMP 2 – MNC
(A14)	
RCS/OMS HTR	
74.	• L POD B – B AUTO • A – OFF
75.	• R POD B – B AUTO • A – OFF

## EXPLANATORY NOTES FOR BUS LOSS SSRs

Bus Loss SSRs contain all the orbiter reconfig steps necessary following a bus loss for > 100 electrical power buses. SSRs also list all orbiter equipment lost and resultant onboard crew indications for each bus loss. If a bus powers one or more sub-buses, the sub-bus SSRs do not need to be utilized unless referenced in the SSR (i.e., each stands alone).

The ORB PKT BUS LOSS ACTIONS lists all the reconfig steps that need to be accomplished immediately following recognition of a bus loss. Following completion of the ORB PKT BUS LOSS ACTIONS, the action contained in the BUS LOSS SSR should be accomplished as soon as practical. The following buses are not included in the ORB PKT BUS LOSS ACTIONS listings as no loss of equipment requires quick reconfig:

MNA MMC1, MMC3, AMC1, O14&A8, R1A1, A6&A14, ML86B

MNB MMC1, MMC2, MMC3, MMC4, AMC2, R14, O15&A8, R1A1, A6&A14, ML86B

MNC MPC3, APC3, FMC3, MMC2, MMC4, AMC3, O16RJD, R1A1, A6&A14, ML86B

ESS1BC FP&LC1, ML86B

ESS2CA FP&LC2

ESS3AB FP&LC3, O13, ML86B

AC1 FMC1, MMC1, MMC3, AMC1

AC2 FMC2, MMC1, MMC2, MMC3, MMC4, AMC2

AC3 FMC3, MMC2, MMC4, AMC3

Entry into a BUS LOSS SSR may be from a MAL procedure, from the Bus Loss ID Tables in the PKT C/L, from a direct readout of bus power loss by crew or MCC, or from the PKT C/L BUS LOSS ACTION.

The following additional information refers to each column of SSR-10 thru SSR-148:

### 1. ACTIONS

The ACTIONS column lists, by panel, all the orbiter reconfig steps necessary following a bus loss. Reconfig performed prior to starting the ACTIONS, such as from PKT C/L BUS LOSS ACTIONS, is repeated in the ACTIONS column for completeness. No trouble-shooting steps are listed based on the assumption that the bus loss has been confirmed prior to starting the SSR. ACTIONS are config independent, making many of the switch position listings verification steps. Equipment or function loss that necessitates each reconfig step is listed adjacent to that step in the EQUIP/FUNCTION LOST column.

### 2. BUS ISOLATION

The BUS ISOLATION steps do not have to be performed following a bus loss since equipment being unpowered is already unpowered if the bus is dead. The BUS ISOLATION column can be used as a shopping list if power must be reduced on a particular bus for any reason. Any equipment loss resulting in each isolation step is listed adjacent to the step in the EQUIP/FUNCTION LOST column if the same equipment is not already listed adjacent to a reconfig ACTION step. Equipment isolation steps listed in the ACTIONS column are not repeated in the BUS ISOLATION column.

### 3. EQUIP/FUNCTION LOST

This column lists all equipment of the functions that are lost because of a bus loss. If reconfig action is necessary because of equipment loss, the equipment is listed adjacent to the appropriate ACTIONS column step(s). If no reconfig is necessary, but equipment may be isolated from bus, the equipment is listed adjacent to BUS ISOLATION STEP. Equipment lost for which there is no reconfig or isolation is listed separately. Equipment that is used only during ascent, such as the ET door system, is not included.

## EXPLANATORY NOTES FOR BUS LOSS SSRs (Cont)

### 4. CREW INDICATIONS

Onboard crew indications that occur when a bus fails are grouped according to the type of indication. C/W lights are listed together, as are Fault Summary Messages and lights lost. Dedicated displays and tbs are grouped by the panels on which they are located. Indications listed would occur immediately when bus failed; exceptions are explained by a note or preceded by a qualifier. Indications that are config dependent are preceded by a qualifier such as "If H2O Loop 2 Pump Action."

If a Fault Summary Message (FSM) is available in OPS 2 only, without a similar message in BFS or OPS 3, the FSM is followed by '(2)'. If FSM is available in OPS 3 only or BFS only, the FSM is followed by '(3)' or '(B)'. If FSM is available in OPS 3 and BFS, the FSM is followed by '(3,B)'. Nothing is listed for FSMs that are available in all mission phases (available in OPS 2 and OPS 3 or in OPS 2 and BFS). OPS 1 and 8 were not considered.

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**EPS SSR-10**  
**BUS LOSS: MNA DA1**

(Includes all MNA sub-buses and AC)

EPS MNA  
 SSR 10-29

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<ul style="list-style-type: none"> <li>Perform FC1 SHUTDN (FC SHUTDN Cue Card)</li> </ul>	FC1 PUMPS, pH Snr Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor AUX PL A Bus pwr MNA pwr to ESS2CA ESS3AB CNTLAB1,2,3 CNTLCA1,2,3	MASTER ALARM Light/ Tone – on SM ALERT Light/Tone – on (F7) MDU CRT 1 blanks (F1) MDU MFD 2 blanks (F8) MDU PLT 1 blanks (F7) C/W CABIN ATM It – on C/W FREON LOOP It – on C/W AV BAY/CAB AIR It – on C/W MN BUS UNDERVOLT It – on C/W AC VOLT It – on C/W FC PUMP It – on C/W RCS JET It – on C/W H2O LOOP It – on EVENT TIMER ind – blank	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 <div style="border: 1px dashed black; padding: 5px; text-align: center;">                         TIME                          * CRITICAL *                     </div> If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp ⑤ S86 WSB T1 if in BLR CNTLR/HTR 1B. S86 WSB T3 if in BLR CNTLR/HTR 3A
<ul style="list-style-type: none"> <li>Perform LOSS OF 1 FC (ORB PKT, PWRDN)</li> </ul>			
(R1) <ul style="list-style-type: none"> <li>PL CAB – MNB</li> <li>cb AC CONTR AC1 ΦA,ΦB,ΦC (three) – cl</li> <li>INV/AC BUS 1 – OFF (tb-OFF)</li> <li>INV PWR 1 – OFF (tb-OFF)</li> <li>cb AC CONTR AC1 ΦA, ΦB,ΦC, (three) – op</li> <li>AC1 BUS SNSR – OFF</li> <li>O2,H2 MANF VLV TK1,2 (four) – OP</li> </ul>	2 MNA pwr to CABPL 1,2,3 buses  AC1 ΦA,ΦB,ΦC Inverters	3	
(R1) If O2(H2) Tk1 in use: <ul style="list-style-type: none"> <li>O2(H2) TK1 HTR B – AUTO</li> <li>O2(H2) TK1 HTR A – OFF</li> </ul> If O2(H2) Tk3 in use: <ul style="list-style-type: none"> <li>O2(H2) TK3 HTR B – AUTO</li> <li>O2(H2) TK1 HTR A – OFF</li> </ul>	Cryo O2,H2 Tk1 Htrs A  Cryo O2,H2 Tk3 Htrs A		
(A15) If Tk5 in use: <ul style="list-style-type: none"> <li>O2(H2) TK5 HTR B – AUTO</li> <li>O2(H2) TK5 HTR A – OFF</li> </ul>	Cryo O2,H2 Tk5 Htrs A		
	Av Bay 3 Agent discharge capability		
If EMU(s) in battery charge mode: (AW18H) <ul style="list-style-type: none"> <li>PWR/BATT CHGR EMU 1(2) BUS SEL – MNB</li> </ul>	EMU 1,2 PWR/BATT Charger MNA pwr	(COMM LOST) MS,OS audio lost Xmit to gnd via UHF  (LIGHTS LOST) L Console Floodlt Pnl Its L/Ctr (pnls L1,L2,L4, C2,C3,F2,F6,F7) Pnl Its L/OH (pnls O5,O6, O7,O13,O14,O15) Numeric Its (pnls O3, F7) Instr Its R (pnls C2,F8,F9) PS Floodlt Orbit Sta Instr Its (pnls A1,A2) Middeck Floodlts 1,8 WMC Floodlt MO13Q pnl It 2 Airlock Floodlt 1 PLB Floodlts Aft Stbd,Fwd Port, Docking TA Floodlt 2	
		(F9) AC1 ΦA,ΦB,ΦC AC volts ind – < 90 DC VOLTS MNA ind – OSL	
(A12) APU HTR 4 GAS GEN/FUEL PUMP 1 – B AUTO 4 GAS GEN/FUEL PUMP 3 – A AUTO <ul style="list-style-type: none"> <li>LUBE OIL LN 1 – B AUTO</li> <li>3 – A AUTO</li> </ul> APU HTR TK/FU LN/H2O 4 SYS 1A – OFF 4 1B – AUTO 4 3A – AUTO 4 3B – OFF HYD HTR <ul style="list-style-type: none"> <li>RUD SPDBK A – OFF</li> <li>B – AUTO</li> <li>BDY FLP A – OFF</li> <li>B – AUTO</li> <li>ELEV A – OFF</li> <li>B – AUTO</li> </ul>	Brake Htrs A APU 1 GG/Fu Pump Htrs A  APU 3 GG/Fu Pump Htrs B  APU 1 Lube Oil Line Htrs A 3 Lube Oil Line Htrs B 1 Tk/Fu Ln Htrs A APU(1,2,3) GG Inj H2O Tk Htrs A APU 1,2 GG Inj H2O Ln Htrs A 3 GG Inj H2O Ln Htrs B 3 Tk/Fu Ln Htrs B Rud/Spd Brake Htr A  Body Flap Htr A  Elevon Actr Htrs A	5	
	If SSPTS: PTU 1 (OPCU 1 and APCU 1)	(FSMs) S86 HYD RSVR Q 1 SM2 HYD QTY 1 (B) S86 WSB T (2) SM0 THRM HYD (B) S66 AV BAY 3 FAN S66 AV BAY 2 FAN S66 CABIN FAN S66 CABIN POCO2 S66 IMU FAN DP S66 CABIN PPO2 A S66 CABIN PRESS SM1 CABN DP/DT BU (B) S67 AC VOLTS 1 S69 FC PUMP 1 S69 FC H2 PUMP 1 S88 FREON FLOW 2 S88 FRN AFT CP 2 S88 FRN PL HX 2 S88 H2O LOOP 1 FLOW S88 H2O LOOP 2 QTY S88 H2O LOOP 2 TEMP S88 H2O PUMP P 2 I/O ERROR CRT 1 S67 MAIN BUS V	
(Continued)	(Continued)	(Continued)	

**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A12) HYD CIRC • PUMP PWR 1 – MNB • 3 – MNC	Circ Pump 1 MNA pwr 3 MNA pwr	(FSMs) S88 THERMAL FRN (2) S88 THERMAL H2O (2) S67 FPC/FLC 1 S67 MPC 1 S67 APC/ALC A 3 L RCS D,L JET RM DLMA MANF	(3) Indications do not appear until jet commanded (6) After MET 3:30, tb already bp (7) Vlv holds position. N2 Sys 2 remains (8) Crew and ground have lost POCO2 XDCR if Cabin Air Sig Condr not recovered (9) B/U pwr remains for RMS ops (10) When the OBSS is grappled by the RMS, the OBSS uses the RMS Payload power feed for all OBSS subsystem heater and operational power, except LCS (11) All brakes ON and safing initiated (12) Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists (13) APU H2O QTY 1 if in BLR 1B. APU H2O QTY 3 if in BLR 3A (14) Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists (15) Vlv holds position (16) Vlv holds position. Man OP capability remains (17) Do not reconfig for reg switch or I'CNCT procedures (18) Vlv holds position. Man CL and full GPC cntl remains
If RAD CNTLR LOOP 1,2 – AUTO B: • Perform ON-ORBIT RAD CNTLR SWITCH, ECLS SSR-13 for Freon Loop 1,2 (L1) • FLASH EVAP CNTLR PRI B – OFF • If FES reqd, go to FES RESTART USING FES PRI A, ECLS SSR-5 • TOP EVAP HTR NOZ L – B AUTO • TOP EVAP HTR DUCT – B	Freon Loop 1 Rad Cntrl B 2 Rad Cntrl B  FES Pri B Cntrl  Top Evap L Noz Htr A  Top Evap Duct L,R,Fwd,Aft Htrs A  Hi Load Duct Outbd,Inbd Noz Htrs A	If ADTA 1, MLS 1, – STAR TRKR pwrd: 'BCE STRG 1 ADTA' (3,B) 'BCE STRG 1 MLS' (3) 'BCE STRG 1 STKR'  (L2) 6 CAB VENT ISOL tb – bp 6 CAB VENT tb – bp 7 O2 SYS 1 SPLY tb – CL 7 N2 SYS 1 SPLY tb – bp 7 N2 SYS 1 REG INLET tb – bp  (O1) AIR TEMP AV BAY 2 ind – 45 degF H2O PUMP OUT PRESS LOOP 2 ind – 0 psia O2/N2 FLOW SYS 1 ind – 0 pph CAB PRESS ind – 0 psia PPO2 SNSR A ind – 0 psia  (O3) RCS/OMS Prplt Qty Gage blanks Mission Timer blanks	
8 • Maintain LiOH Canister(s) changeout per cue card and FLIGHT PLAN		(O1) AIR TEMP AV BAY 2 ind – 45 degF H2O PUMP OUT PRESS LOOP 2 ind – 0 psia O2/N2 FLOW SYS 1 ind – 0 pph CAB PRESS ind – 0 psia PPO2 SNSR A ind – 0 psia  (O3) RCS/OMS Prplt Qty Gage blanks Mission Timer blanks	
(L2) FLASH EVAP FDLN • HTR A SPLY – 2 • B SPLY – 1 ----- • FREON ISOL MODE – OFF	FES H2O Fdln A Htrs 1 (all) B Htrs 2 (all)  Auto radiator isolation function	(O3) RCS/OMS Prplt Qty Gage blanks Mission Timer blanks	
(A8L) • PORT RMS HTR A – OFF • PORT RMS HTR B – AUTO  If OBSS berthed (A8L) • STBD RMS HTR A – OFF • STBD RMS HTR B – AUTO	9 Primary pwr 10 Port Payload pwr 11 MCIU 12 Port Mid MRL Mtr 1 12 Port Aft MRL Mtr 2 14 Stbd Fwd MRL Mtr 2 14 Stbd Aft MRL Mtr 1 Shldr Brace Rel Port Htr A Stbd Htr A 9 D&C Primary Itg	13 HYD/APU HYD QTY 1 ind – 0% APU H2O QTY ind – 0%  (R1) FC1 COOL PUMP ΔP tb – bp  (R4) 15 HYD BK ISOL VLV 1 tb – OP 15 LG EXTND ISO VLV tb – OP 15 HYD MPS/TVC ISOL VLV SYS 1 tb – CL	
(F6,F8) • HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 1 or (OV105) GPS 1 • RDR ALTM – 2	MLS 1 (OV103,4) TACAN 1 (OV105) GPS 1 Radar Altm 1	(O7) 16 AFT L,R RCS He PRESS A (two) tb – bp AFT L,R RCS TK ISOL 3/4/5 A tb – bp (if vlv in CL position)	
(O6) • ANNUN BUS SEL ACA 1 – MNB • UHF EVA STRING – 2  • For attitude control, LOSS OF VERNIER (ORB OPS, RCS)	ACA 1 MNA pwr  SSOR 1 RCS Manf L5 RJD pwr (L5L,L5D) RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)	(O8) 16 FWD RCS He PRESS A tb – bp 15 FWD RCS TK ISOL 3/4/5 tb – bp 15 FWD RCS MANF ISOL 1 tb – bp	
17 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 ----- (O8) • FWD RCS He PRESS A	16 L,R,F RCS He Pr Isol A GPC Cntl and man CL capability 18 Aft L RCS He Pr Isol B man OP capability	(R11L) 15 SPLY H2O TKA INLET tb – bp 15 SPLY H2O TKB OUTLET tb – bp  (R13L) RAD CNTL STBD,PORT (two) tb – bp	
(Continued)	(Continued)	(Continued)	

**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<b>GNC 23 RCS</b> <ul style="list-style-type: none"> <li>Reprioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</li> <li>Set aft pod(s) PRI JET FAIL LIMIT to 6</li> </ul>	Aft RCS L,R Jet 2 Htrs	15 (R13L) MMU GN2 SPLY ISOL VLV A tb – bp	(11) All brakes ON and safing initiated
(O8) • If Straight Feed config, Left OMS XFEED B – OP (tb-OP). Otherwise, √MCC	19 OMS Eng/Xfeed Vlv Redundancy	(A4) EVENT TIME ind – blank	(15) Vlv holds position
(C2) • L IDP/CRT SEL – 3 • GPC/CRT 01 EXEC	20 IDP 1 MDU CRT 1 MDU MFD 2 MDU PLT 1	11 (A8U) RMS D&C tb – bp except: Brakes tb – OFF RATE MIN tb – OFF RATE HOLD tb – OFF SOFT STOP tb – gray RATE SCALE tb – gray	(19) Maintains deorbit capability for MNB DA2 failure
(O16:D) cb MNC • (OV103) GPS PRE AMPL UC – cl • (OV103) GPS PRE AMPL LC – cl	21 ADC 1A/2 A	(A8L) Port RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L MID tb – bp	(20) Loss of redundant port to the following: MDU CDR 1 (S) MDU CDR 2 (P)
<b>SM 1 DPS UTILITY</b> (G2,G8,S2) MMU ASSIGN	MMU 1	STARBOARD RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp	(21) IDP 1, IDP 2 ADC data lost. MDU port select may be reqd
22 • GNC ITEM 1 EXEC • SM ITEM 4 EXEC • PL ITEM 6 EXEC		<b>SM 94 PDRS CONTROL</b> PORT RMS Indications lost: Mid MRL Mtr 1 LAT/REL/RDY Aft MRL Mtr 2 LAT/REL/RDY	(22) Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning
(R11U) • FC H2O LINE HTR – B AUTO • FC H2O RELIEF HTR – B AUTO	FC H2O Line Htrs A FC H2O Relief Htrs A	STBD RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY	(23) Listen only capability regained when headset used on MS CCU (from PS ATU) as FD speaker is also failed
23 (R11L) • MS AUD CNTL – PS	24 MS ATU, CCU & FD Spkr	If cooling by FES B only: 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'	(24) Loss of MS ATU causes loss of redundant path for ACCU config control bits, loss of xmit capability from CCU, and loss of FD Spkr
(L9) • √PS AUD PNL config for use		(ML31C) 15 WASTE H2O TK 1 VLV tb – bp	(25) Htr B remains
(A13) • (OV103) GPS PRE AMPL UC – MNC • (OV103) GPS PRE AMPL LC – MNC		15 WASTE H2O DUMP ISOL VLV tb – bp 15 WASTE H2O DUMP VLV tb – bp 15 SPLY H2O TKD OUTLET tb – bp	(26) Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge
(A14) RCS/OMS HTR • FWD RCS – B AUTO • L POD (two) – A OFF, B AUTO • R POD (two) – B OFF, A AUTO • OMS CRSFD LINES – A OFF, B AUTO	25 Fwd RCS A Htrs (all) 25 L Pod A Htrs (all) 27 R Pod B Htrs (partial) 25 OMS Crsfd Ln A Htrs (all)	26 (AW82D) EMU 2 H2O SPLY,WASTE tb (two) – CL	(27) Htr A remains
(ML86B:A) • cb MNB H2O LINE HTR B – cl	H2O Line Htrs A: Waste Dump Line Htr A Sply Dump Line Htr A Vac Vent Line Htr A	If OMS Gmbl Cmd Abs value > 2 deg: C/W OMS TVC It – on 'L OMS GMBL' (3,B)	
(ML86B:C) • cb MNB EXT ARLK HTR STRUC Z1/2/3 – cl • cb MNB EXT ARLK HTR LN ZN 1, ZN 2 (two) – cl	Ext Arlk Htrs A: Structural Htrs A Water Line Htrs A	<b>SM (BFS SM 63)</b> PL BAY DOORS	
If in Rendezvous or Docked: • cb MNB EXT ARLK HTR VEST Z1/2/3 – cl	Ext Arlk Vest Htrs A	If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	
(ML86B:D) cb MNB • MMU PORT,STBD HTR B (two) – cl	25 MMU Port,Stbd Htr A	During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left	
(Continued)	(Continued)	During Rad Dpy/Sto ops: (R13L) RAD LAT CNTL tbs (two) indicate single mtr ops	
		(Continued)	



**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For PLBD ops: • OP/CL Drs in man mode	PLBD: C/L Lat 1-4, 5-8, 9-12 Mtrs 1 Port,Stbd Fwd Bikhnd Mtrs 1 Port Aft Bikhnd Mtr 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw Stbd Door Mtr 1 OP Limit sw	If OMS Gmbl Cmd Abs value > 2 deg and Sec TVC selected: C/W OMS TVC It – on 'R OMS GMBL' (3,B)	(15) Vlv holds position (28) Lost TM: GNC SYS SUMM 2
28 Save L OMS for deorbit (If reqd for on-orbit burn, √MCC)	28 L OMS GN2 Press Vlv Op TM	If Hum Sep A ON: 'S66 HUMID SEP A'	L OMS N2 P VLV: If Eng – ARM/PRESS, assume vlv OP
28 Prior to using L(R) OMS: (O8)	29 L,R OMS He Pr Isol A GPC OP Cntl	If H2O Loop 1 Pump A active: 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' 'S88 H2O PUMP P 1'	L,R OMS ENG VLV 1: Assume Vlv 1 status same as Vlv 2
30 L(R) OMS He PRESS/VAP • ISOL A – OP • B – GPC	29 L,R OMS He Vap Isol 1 GPC OP Cntl	(O1) H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia	(29) Man Cntl remains. Redundant Isol remains
GNC XXXXX MNVR YYYYY (3,B)		(F7) If APUs active, and using BLR CNTLR/HTR 1B or 3A: C/W APU TEMP It – on after ~ 2 min	(30) Maintains He Isol redundancy
Sel L OMS SEC: • OMS L GMBL SEL – ITEM 30 EXEC Sel R OMS PRI: • OMS R GMBL PRI – ITEM 29 EXEC	L OMS Pri TVC  R OMS Sec TVC	If first AA failure and S/W Processing Accel data: RM FAIL ACC (3)	(31) Vlv fails closed. IFM or real-time flow test will be required. √MCC for additional direction
If Waste H2O Dump reqd: • Perform WASTE H2O SYS BACKUP DUMP (IFM)	15 Waste H2O: Dump Vlv Cntl Noz Htr	Impending: 'S66 CO2 RL SYS PCO2'	(32) O2/N2 Cntl Vlv 1 normally closed when unpowered
If on PCS1: • Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	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	CCTV Video and TV Annun Its lost if MNA selected for VCU CCTV Mon 1 lost	(33) PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig
	15 15 15 31 32	STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec	(34) Not yet active on all vehicles
	Cabin Press Snsr Emer dP/dT B/U Comp	L ADP deploy time incr from 15 to 30 sec	(35) Sys A Sec Cntlr man on capability remains
(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, <u>ECLS</u> )	33 CO2 Rmvl Sys Cntlr 1: Fan AC1 pwr Compressor AC1 pwr		
	34 FC3 Redundant Reac Vlv Cntl on pnl C3		
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR B – PRI/GPC	35 NH3 Sys A Pri Cntlr		
(ML31C) • VAC VENT ISOL VLV BUS SEL – MNB	Vac Vent Isol Vlv MNA Cntl		
(Continued)	(Continued)		

**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
If AC Pwr Transfer cable to be installed to regain AC: • Go to EPS SSR-200; otherwise, continue with Bus Loss Actions			
If Cab Temp Cntrl 2 active: (L1) • CAB TEMP CNTLR – OFF (MD44F) • Remove pin from SEC Actuator and BYP vlv linkage, connect linkage to PRI Actuator	36 Cabin Temp Cntrl 2 and Hx Byp Vlv Mtr 2		(36) Lose Auto Temp Cntl via Cntrl 2 and H2O Loop 2 Cabin Hx In Temp snsr. Hx Byp vlv holds position. May be repwr'd after AC Pwr Transfer Cable connected
(L1) • CAB TEMP CNTLR – 1			(37) Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, Cabin HX in T, H2O Loop 1 Ich Flow respectively
(R13U) H2O LOOP 2 OUT P • C/W PARAM SEL tw – 115 • PARAM – INH • C/W PARAM SEL tw – > 119			(38) H2O Loop 2 Byp vlv holds position
37 <b>SM 60 TABLE MAINT</b> • Inhibit 0612705, 0612700, 0612740, 0612710, 0612665, 0612742			(39) H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snsr's lost
(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	WCS Fan/Sep 1 Sep Fan 1 Mtr Relay		(40) May be repwr'd after AC Pwr Transfer Cable connected
(EDO WCS) • URINAL SEL – SEP 2 • WCS PWR SEL – OFF 1, AUTO 2 • URINE DIVERTER VLV – FAN SEP 2	Urine Fan 1 Urine Sep 1 Commode Fan 1 Controller MNA pwr Compactor MNA Cntl		(41) AV Bay 2 Fan ΔP, Air Out Temp snsr's lost
(R2) • BLR CNTLR/HTR 1 – A • 3 – B	Hyd H2O Blr Cntrl 1B 3A		
(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 • H2O LOOP 1 BYP MODE – AUTO • AV BAY 1 FAN A – OFF • √B – ON • AV BAY 2 FAN (two) – ON • AV BAY 3 FAN A – ON • B – OFF • FREON PUMP LOOP 1 – B • 2 – A	Humidity Sep A IMU Fan A 38 H2O Loop 2 Byp Cntrl, Sig 39 Cond'r H2O Loop 2 Byp Vlv pwr 2 Pump GPC Cntl 1 Pump A Av Bay 1 Fan A 40 Av Bay 2 Sig Cond'r, Xdcrs 41 (ECLS SC3) Av Bay 3 Fan B Freon Loop 1 Pump A 2 Pump B		(42) Use streamers (if flown) or monitor by feel during wake period if Cabin Air Sig Cond'r not recovered
42 During sleep periods: • CAB FAN (two) – ON	Cabin Air Sig Cond'r (ECLS SC6)		
(Continued)	(Continued)		

**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN A – OFF • B – ON	Arlk/Tnl Fan A		
<b>43 BUS ISOLATION</b>			
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	-Z Star Trkr Dr OP capability Tracker		
(O7) • (OV105) GPS 1 PWR – OFF • (OV105) GPS 1 PRE AMPL UPPER – OFF • (OV105) GPS 1 PRE AMPL LOWER – OFF	(OV105) GPS 1		
(O8) • RADAR ALTM 1 – OFF • MLS 1 – OFF			
<b>44</b>			
(O14:B) cb MNA			
<b>44</b>			
• OI SIG CONDR OF 1/4 A – op			
<b>44</b>			
• OI SIG CONDR OM 1/2 A – op			
<b>44</b>			
• OI MDM OF 1/2 A – op			
<b>44</b>			
• 3/4 A – op			
• OI H2O BYP LOOP 1 SNSR – op	<b>45</b> H2O Byp Loop 1 Snsr (ECLS SC11)		
• MNC CONTR – op	Fwd Mission Timer		
• MSN TIMER FWD – op	Aft Event Timer		
• EVENT TIMER AFT – op			
(O14:C) cb MNA			
<b>46</b>			
• (OV103,4) TACAN 1 – op	<b>46</b> Tacan 1		
• SMOKE DETN L/R FLT DK – op	L,R Flt Dk Smoke Detectors		
• SMOKE DETN BAY 2A/3B – op	Av Bay 2 Smoke Detector A		
• FIRE SUPPR BAY 3 – op	Av Bay 3A Smoke Detector B		
• UTIL PWR O19/MO52J – op	MNA Utility pwr		
• FLOOD L CNSL – op	L Console Floodit		
• ANNUN FWD ACA 1 – op			
<b>46</b>			
• cb MNA CRYO O2 HTR TK1 SNSR 1 – op	<b>47</b> Cryo O2 Tk1 Htr Current Snsr 1		
• cb RAD ISOL CONTR – op	Auto radiator isolation function		
(O14:D) cb MNA			
<b>48</b>			
• FREON RAD CNTLR 1 – op			
<b>48</b>			
• 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	Cabin Vent Vlv		
• VENT ISOL – op	Vent Isol		
• (OV105) GPS 1 PRE AMPL UPPER – op			
• (OV105) GPS 1 PRE AMPL LOWER – op			
• (OV103) GPS PRE AMPL UC – op			
• (OV103) GPS PRE AMPL LC – op			
(Continued)	(Continued)		

**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
44 (O14:E) cb MNA • RDR ALTM 1 – op • MLS 1 – op • ADTA 1 – op • S TRK -Z – op • ACCEL 1 – op 44 • DDU L – op • AFT – op 49 • NWS – op	ADTA 1  AA 1  NWS 1		④④ Redundant pwr source remains for equipment ④⑨ NWS 2 is still available ⑤⑩ Six vlvs fail to non-isolation position ⑤① Capability to xmit to grd from UHF degraded
(O14:F) • MMU 1 – OFF			⑤② GCIL also pwr'd via MNC cb
(R11U) • FC PURGE VLV 1 – CL • FC STARTUP HTR 1 – ENA	50 ATVC 2 Isol ME  FC1 Startup Htr Inh capability		⑤③ MNB pwr may be selected via TV pwr sw (pnl A7) or GCIL if reqd
(R14:A) • cb MNA AUD MS – op • ADC 1A/2A – op • MDU MFD 2 – op • PLT 1 – op	MS ATU FD Spkr		
44 (R14:B) cb MNA cb PALLET/DSC • 1A/2B – op (EDO) • 3A – op (EDO) • UHF – op • GCILC – op • CNTL BUS BC1/2/3 – op	51 UHF Splx Pwr Amp 52 GCIL MNA pwr MNA pwr for Cntl BC1,2,3 Buses		
(R14:C) • cb UHF EVA – op	SSOR EVA STRG 1		
(R14:D) cb MNA TV C CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op  cb MNA TV • CONTR UNIT – op • MON 1 – op	TV C Camr and Pan-Tilt TV C Aft Bay Camr Htr TV C Camr Pan-Tilt Htr and Illum  53 Video Cntl Unit MNA pwr CTVM 1		
(R14:E) • cb MNA PS FLOOD – op cb MNA D CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op	PS Floodlt  TV D Camr and PAN-TILT TV D Camr Htr TV D Camr PAN-TILT Htr and Illum		
(A7U) PL BAY • FLOOD AFT STBD – OFF • FWD PORT – OFF • DOCKING – OFF • PORT RMS LIGHT – OFF	PLB Aft Stbd Floodlt Fwd Port Floodlt Docking Floodlt Port RMS lt		
(A6L) IF DOCKING MISSION • cb ESS 1BC DEP SYS 1 VENT ISOL – op • cb MN A DEP SYS 1 VENT – op	Vest DEP Vlv Sys 1 Vent Vent Isol		
(Continued)	(Continued)		

**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			①5 Vlv holds position
(A6L) IF DOCKING MISSION cb MN A DOCK LT • TRUSS FWD – op • VEST PORT – op • SYS PWR MNA – OFF • PSU PWR MNA – OFF cb MNA • LOGIC 1 – op • 3 – op • PYRO PWR MNA – OFF LIGHTS • AIRLK 1/4 MNA – OFF	MNA A7  Fwd Truss Docking It Port Vestibule Docking It DSP SYS PWR MN A PSU PWR MN A 54  55 MNA pwr to DSP Logic buses 1,3 MNA Pyro System  External Airlock Its 1,4	DSP SYS PWR SYS 1 tb – OFF	②5 Htr B remains ⑤4 All docking mechanisms will have single mtr times ⑤5 Logic buses 1(3) remain pwr'd via MNB(MNC)
(A7L) MADS • STRAIN GAGE – OFF • W/B/ACIP PCM – OFF	MADS W/B FDM, WBSC, SGSC, ACIP PCM		
(MA73C:A,B) MCA LOGIC MNA • FWD 1 – OFF • AFT 1 – OFF • MID 1,3 (two) – OF	MNA FMC1 Bus pwr AMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr		
(ML86B:A) • cb MNA H2O LINE HTR A – op • cb MNA SUPPLY H2O TKA INLET – OP • cb MNA SUPPLY H2O TKB OUTLET – OP • cb MNA WASTE H2O DUMP VLV/NOZ HTR – OP	15 Sply H2O TKA Inlet Vlv Cntl 15 Sply H2O TKB Outlet Vlv Cntl		
(ML86B:B) • cb MNA WASTE H2O TK1 VLV – op • cb MNA SPLY H2O TKD OUTLET – op • cb MNA WASTE H2O DUMP ISOL – op • cb MNA VAC VENT ISOL VLV – op • cb MNA WCS CNTLR – op • cb MNA GALLEY OVEN – op	15 Waste H2O TK1 Inlet Vlv Cntl 15 Sply H2O TKD Outlet Vlv Cntl 15 Waste H2O Dump Isol Cntl		
(ML86B:C) • cb MNA EXT ARLK HTR STRUC Z1/2/3 – op • cb MNA EXT ARLK HTR LN ZN1, ZN2 (two) – op • cb MNA EXT ARLK HTR VEST Z1/2/3 – op	Ext Arlk Htrs A		
(ML86B:D) cb MNA MMU • PORT/STBD HTR A (two) – op • GN2 SPLY ISOL VLV A – op	25 MMU Port, Stbd Htr A 15 MMU GN2 Sply Isol Vlv A		
(ML86B:E) cb MNA EMU 2 H2O • SPLY – op • WASTE – op cb MNA FLOOD • TNL ADAPT 2 – op	TA Floodlt 2		
(Continued)	(Continued)		



**EPS SSR-10 (Cont)**  
**BUS LOSS: MNA DA1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>MPS:</p> <p>70 Ctr Eng He Intercon Outlet Vlv</p> <p>62 Ctr Eng He Isol A</p> <p>62 Pneu He Isol 1</p> <p>71 He Sply Blowdn Vlv 1,2</p> <p>72 Prplt F/D Inbd LH2 Vlv</p> <p>73 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1</p> <p>74 Ku-Bd Jettison Sys A</p> <p>74 Stbd RMS: Jett/Guil Sys A Deadface Relays</p> <p>75 Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs</p> <p>Ops Hyd Actr Instr</p>		<p>⑥2 Vlv fails closed. Redundant vlv remains</p> <p>⑦0 Vlv fails closed</p> <p>⑦1 Vlv fails closed. Aft compartment, OMS pods, ET umbilical cavity will not be purged during entry (MM304)</p> <p>⑦2 Vlv holds position. Loss of manual capability to inert LH2 Manf</p> <p>⑦3 Redundant mtrs remain</p> <p>⑦4 Sys B remains</p> <p>⑦5 Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains</p>

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# EPS SSR-11

## BUS LOSS: MNA FPC1

(Includes MNA FLC1, MNA FMC1, AC1)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 • Perform FC1 SHUTDN (FC SHUTDN Cue Card), pwrdrn not needed, then:</p> <p>(R1)</p> <ul style="list-style-type: none"> <li>• cb AC CONTR AC1 ΦA, ΦB, ΦC (three) – cl</li> <li>• INV/AC BUS 1 – OFF (tb-OFF)</li> <li>• INV PWR 1 – OFF (tb-OFF)</li> <li>• cb AC CONTR AC1 ΦA, ΦB, ΦC (three) – op</li> <li>• AC1 BUS SNSR – OFF</li> </ul>	<p>2 FC1 Pumps &amp; pH Snsr</p> <p>AC1 ΦA, ΦB, ΦC Inverters</p>	<p>MASTER ALARM Light/Tone – on CRT 1 blanks</p> <p>(F7) C/W FC PUMP It – on C/W AC VOLT It – on C/W FREON LOOP It – on C/W AV BAY/CAB AIR It – on C/W H2O LOOP It – on SM ALERT Light/Tone – on EVENT TIMER ind – blank</p>	<p>①</p> <p style="text-align: center;">* TIME * * CRITICAL *</p> <p>FC1 must be shutdn within 9 min to avoid potentially hazardous condition</p>
<p>3 • Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN</p> <p>Refer to OMS/RCS Slide Rule for vlv loss info</p>		<p>(F9) AC1 ΦA, ΦB, ΦC AC volts &lt; 90</p>	<p>② Will be repwrdr after AC Pwr Transfer Cable connected</p>
<p>4 Reconfig following vlv(s) only if leak isolation reqd: (O8)</p> <ul style="list-style-type: none"> <li>• FWD RCS He PRESS A</li> </ul>	<p>5 Fwd RCS He Press Isol A GPC Cntl and man CL capability RCS Manf F1 RJD Driver (F1F,F1L,F1U,F1D)</p>	<p>(LIGHTS LOST) Instr lts R (pnls C2, F8, F9) Pnl lts L/Ctr (pnls L1,L2,L4, C2,C3,F2,F6,F7) Pnl lts L/OH (pnls O5,O6, O7,O13,O14,O15) Numeric lts (pnls O3,F7) Orbit Sta Instr lts (pnls A1,A2)</p>	<p>③ Crew and gnd have lost PPO2 Xdcr if Cabin Air Sig Condr not recovered</p>
<p>(C2)</p> <ul style="list-style-type: none"> <li>• L IDP/CRT SEL – 3</li> <li>On MCC GO:</li> <li>• GPC/CRT 01 EXEC</li> </ul>	<p>6 IDP 1</p> <p>MDU CRT 1</p>	<p>(FSMs) S67 FPC/FLC 1 S67 AC VOLTS 1 S86 HYD RSVR Q SM2 HYD QTY 1 (B) S86 WSB T (2) SM0 THRM HYD (B) S66 AV BAY 2 FAN S66 AV BAY 3 FAN S66 CABIN FAN S69 FC PUMP 1 S69 FC H2 PUMP 1 S88 FREON FLOW 2 S88 FRN AFT CP 2 S88 FRN PL HX 2 S88 H2O LOOP 2 FLOW S88 H2O LOOP 2 QTY S88 H2O LOOP 2 TEMP S88 H2O PUMP P2 I/O ERROR CRT 1 RM DLMA MANF</p>	<p>④ Do not reconfig for reg switch or l'CNCT procedures</p>
<p>SM 1 DPS UTILITY (G2,G8,S2) MMU ASSIGN</p> <p>8 • GNC – ITEM 1 EXEC • SM – ITEM 4 EXEC • PL – ITEM 6 EXEC • OPS 0 – ITEM 8 EXEC</p>	<p>MMU 1</p> <p>Fwd RCS A Htrs (all)</p>	<p>7 S86 WSB T (2) SM0 THRM HYD (B) S66 AV BAY 2 FAN S66 AV BAY 3 FAN S66 CABIN FAN S69 FC PUMP 1 S69 FC H2 PUMP 1 S88 FREON FLOW 2 S88 FRN AFT CP 2 S88 FRN PL HX 2 S88 H2O LOOP 2 FLOW S88 H2O LOOP 2 QTY S88 H2O LOOP 2 TEMP S88 H2O PUMP P2 I/O ERROR CRT 1 RM DLMA MANF</p>	<p>⑤ Vlv holds position. Man OP capability remains. Isol B remains</p>
<p>(A14)</p> <ul style="list-style-type: none"> <li>• RCS/OMS HTR FWD</li> <li>RCS – B AUTO</li> </ul>	<p>EMU 1,2 Pwr/Batt Chgr MNA pwr</p>	<p>(R1) FC1 COOL PUMP ΔP tb – bp</p>	<p>⑥ Loss of redundant port to the following: MDU CDR 1 (S) MDU CDR 2 (P) MDU MFD 2(P) MDU PLT 1 (S)</p>
<p>If EMU(s) in battery charge mode: (AW 18M)</p> <ul style="list-style-type: none"> <li>• PWR/BATT CHGR EMU 1(2) BUS SEL – MNB</li> </ul>	<p>RMS: 10 MCIU 11 Port Mid MRL Mtr 1 11 Port Aft MRL Mtr 2 12 Stbd Fwd MRL Mtr 2 12 Stbd Aft MRL Mtr 1 14 Shldr Brace Release 14 D&amp;C Primary Ltg</p>	<p>(HYD/APU) HYD QTY 1 ind – 0% 13 APU H2O QTY ind – 0%</p>	<p>⑦ S86 WSB T1 if in BLR CNTLR/HTR 1B. S86 WSB T3 if in BLR CNTLR/HTR 3A</p>
<p>(A8L)</p> <ul style="list-style-type: none"> <li>• PORT RMS HTR A – AUTO</li> <li>• PORT RMS HTR B – AUTO</li> </ul> <p>If OBSS berthed: (A8L)</p> <ul style="list-style-type: none"> <li>• STBD RMS HTR A – AUTO</li> <li>• STBD RMS HTR B – AUTO</li> </ul>	<p>Av Bay 3 agent discharge capability</p>	<p>(O1) FREON FLOW LOOP 1 ind – 578 pph AIR TEMP AV BAY 2 ind – 45 degF H2O PUMP OUT PRESS LOOP 2 ind – 0 psia</p>	<p>⑧ Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning</p>
<p>Pre-seat ingress:</p> <ul style="list-style-type: none"> <li>• Discharge handheld fire ext into AV BAY 3</li> </ul>		<p>(O3) RCS/OMS PRPLT QTY Gage and MSN TIMER ind – blank</p>	<p>⑨ Temp sensing lost</p>
<p>If AC Pwr Transfer Cable to be installed to regain AC:</p> <ul style="list-style-type: none"> <li>• Go to EPS SSR-200; otherwise, continue with bus loss actions</li> </ul>		<p>(O8) FWD RCS He PRESS A tb – bp TK ISOL 3/4/5 tb – bp MANF ISOL 1 tb – bp</p>	<p>⑩ All brakes ON and safing initiated</p>
<p>(Continued)</p>	<p>(Continued)</p>	<p>5 L ADP deploy time incr from 15 to 30 sec</p> <p>(Continued)</p>	<p>⑪ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. May be repwrdr after AC Pwr Transfer Cable connected</p> <p>⑫ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists. May be repwrdr after AC Pwr Transfer Cable connected</p> <p>⑬ APU H2O QTY 1 if in BLR CNTLR/HTR 1B. APU H2O QTY 3 if in BLR CNTLR/HTR 3A</p> <p>⑭ May be repwrdr after AC Pwr Transfer Cable connected</p> <p>⑮ Vlv holds position</p>



**EPS SSR-11 (Cont)**  
**BUS LOSS: MNA FPC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(EDO WCS) • URINAL SEL – SEP 2 • WCS PWR SEL – OFF 1, AUTO 2 • URINE DIVERTER VLV – FAN SEP 2	Urine Sep 1 Urine Fan 1 Commode Fan 1		②③ PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig
• Perform LOSS OF 1 FC (ORB PKT, PWRDN)			②④ AC1 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNA FPC1 ACTIONS column. No additional bus isolation steps reqd
(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)	23 CO2 Rmvl Sys Cntrl 1		②⑤ Mtr 2 remains ②⑥ Htr Cntrl 2 remains
24 <b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
• MDU CRT 1 PWR – OFF			②⑦ 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
(C2) • IDP/CRT 1 PWR – OFF			②⑧ Buses remain pwr'd ②⑨ Redundant mtrs remain
(O7) • (OV105) GPS 1 PWR – OFF • (OV105) GPS 1 PRE AMPL UPPER – OFF • (OV105) GPS 1 PRE AMPL LOWER – OFF	(OV105) GPS 1		③⑩ Hyd Sys 2 still available for NWS ③⑪ Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains
(O14:C) • cb MNA FIRE SUPPR BAY 3 – op			
(O14:D) cb MNA • (OV105) GPS 1 PRE AMPL UPPER – op • (OV105) GPS 1 PRE AMPL LOWER – op			
(O14:F) • MMU 1 – OFF			
(MA73C:A) • MCA LOGIC MNA FWD 1 – OFF	MNA FMC1 Bus pwr		
(Continued)	CDR HUD -Y Star Trkr Dr Sys 1 OP/CL capability		
25	L ADP Dpy Mtr 1		
26	Htr Cntrl 1		
27	RH Vents 1,2,3,5,6 Mtrs 1 LH Vents 5,6,8,9 Mtrs 1		
28	LG Extend Vlv 1		
29	MNA pwr to Cntl Buses AB1, AB2, AB3, CA1, CA2, CA3		
30	ET Door Mtrs: C/L Lat Actr 1 Mtr 1 Actr 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1		
31	NWS Hyd Sys 1		
31	Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs		
(Continued)	(Continued)		

**EPS SSR-11 (Cont)**  
**BUS LOSS: MNA FPC1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	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		

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# EPS SSR-12

## BUS LOSS: MNA MPC1

(Includes MNA MMC1 & MNA MMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform MNA BUS TIE (BUS TIE Cue Card) • Monitor, record Δamps between FC1 and tied FC	1 FC1 Purge Vlv O2,H2 Flow Xdcrs SS ΔV Snrs	(L2) 2 O2 SYS 1 SPLY tb – CL	① Buses are tied due to:
(R1) • PL CAB – MNB	3 MNA pwr to CABPL1,2,3 buses	(R13L) RAD CNTL STBD,PORT tb (two) – bp (when stowed)	<u>Loss of FC1 Purge capability.</u>
(A8L) • PORT RMS HTR A – OFF • PORT RMS HTR B – AUTO  If OBSS berthed: (A8L) • STBD RMS HTR A – OFF • STBD RMS HTR B – AUTO	RMS: 4 Primary pwr 5 Port Payload Pwr 6 Port Mid MRL Mtr 1 6 Port Aft MRL Mtr 2 7 Stbd Fwd MRL Mtr 2 7 Stbd Aft MRL Mtr 1 Port Htr A Stbd Htr A	(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L MID tb – bp  STARBOARD RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp	As FC1 loses performance, tied FC will pick up load, slowing FC1 degradation. If degradation projection does not allow nominal EOM, FC1 will be shut dn.
(L1) • TOP EVAP HTR DUCT – B  If Hi Load Evap enabled: • HI LOAD DUCT HTR – B(C)	Top Evap Duct Fwd,Aft Htrs A  Hi Load Duct Outbd,Inbd Htrs A	SM 94 PDRS CONTROL PORT RMS Indications lost: Mid MRL Mtr 1 LAT/REL/RDY Aft MRL Mtr 2 LAT/REL/RDY	Loss of FC1 SS ΔV Snrs. Change in ΔAmps >12 amps indicates possible cell crossover problem. ΔAmps shift due to loss of FC1 Purge capability is indicated by change in ΔAmps between pre and post purge readings. MCC will aid in this determination
(L2) FLASH EVAP FDLN HTR • A SPLY – 2 • B SPLY – 1	FES H2O Fdln A Mid 2 Htr 1 B Mid 2 Htr 2	STBD RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY	② Vlv holds position. Sys 2 remains
(R11U) FC H2O • LINE HTR – B AUTO • RELIEF HTR – B AUTO	FC H2O Line Htrs A Relief Htrs A	PLB Floodlts lost: Fwd Port Aft Stbd Docking	③ Pwrs PL Timing Buffer and OIU 1. OIU 1 redundant pwr MNB MPC2 via CAB PL3
8 (MA73C:C,D) • cb MCA PWR AC1 3Φ MID 1,3 (two) – op	8 Port,Stbd Rad Lat 1-6,7-12 Mtrs 1 Limit sw 9 Port,Stbd Rad Dpy/Sto Mtrs 2 Limit sw Port,Stbd Rad Dpy/Sto Mtrs 1	SM (BFS,SM) 63 PL BAY DOORS  If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	④ B/U pwr remains for RMS ops. All brakes ON and safing initiated
10 (ML86B:C) • cb MNB EXT ARLK HTR STRUC – cl	10 Ext A/L Structural Htrs MNA pwr	During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left	⑤ When the OBSS is grappled by the RMS, the OBSS uses the RMS Payload power feed for all OBSS subsystem heater and operational power, except LCS
For PLBD ops: • OP/CL Drs in man mode	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  Hyd Bk Htr A		⑥ Single mtr time. One failure away from loss of two out of three MRLs. EVA or jettison capability exists
<b>BUS ISOLATION</b> ONLY ON MCC CALL, PERFORM			⑦ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
11 (R11U) • FC PURGE VLV 1 – CL • FC STARTUP HTR 1 – ENA	11 FC1 Startup Htr Inh capability		⑧ If AC1 MMC1 and MMC3 cbs not opened, Lat Mtrs 1 of actuators for Port and Stbd Rad Lat 1-6, 7-12 continue to run until Sys A Lat Cntl sw placed to OFF
(A7U) PL BAY FLOOD • AFT STBD – OFF • FWD PORT – OFF • DOCKING – OFF • PORT RMS LIGHT – OFF	PLB Aft Stbd Floodlt Fwd Port Floodlt Docking Floodlt Port RMS lt		⑨ Mtrs 2 will continue to drive until Sys A,B Cntl sw are taken to OFF
(A7L) IF DOCKING MISSION • cb DEP MNA SYS 1 VENT ISOL – op • cb DEP MNA SYS 1 VENT – op	Vest Dep Vlv Sys 1 Vent Vent Isol		⑩ MNB htrs remain ⑪ FC1 Startup Htr is disconnected
(Continued)	(Continued)		

**EPS SSR-12 (Cont)**

**BUS LOSS: MNA MPC1** (Includes MNA MMC1 & MNA MMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A7L) IF DOCKING MISSION cb DOCK LT MNA • TRUSS FWD – op • VEST PORT – op • SYS PWR SYS 1 MNA – OFF • PSU PWR MNA – OFF cb MNA • LOGIC 1 – op • 3 – op • PYRO PWR MNA – OFF LIGHTS • AIRLK 1/4 MNA – OFF	MNA A7  Fwd Truss Docking It Port Vestibule Docking It DSP SYS 1 Pwr 12 PSU MNA Pwr  13 MNA pwr to DSP Logic buses 1,3 MNA Pyro System  External Airlock Its 1,4	DSP SYS PWR SYS 1 tb – OFF	② Vlv holds position. Sys 2 remains ⑩ MNB htrs remain ⑫ All docking mechanisms will have single mtr times ⑬ Logic buses 1(3) remain pwr'd via MNB(MNC) ⑭ Buses remain pwr'd ⑮ Cntrlrs A,B Rad Byp Vlv mtrs auto cntl and Cntrl A Rad Byp Vlv mtr remain ⑯ Snrs 2 remains ⑰ Lost capability to observe and record FC single cell voltages
(A7L) MADS • STRAIN GAGE – OFF • WB/ACIP PCM – OFF	MADS W/B FDM, WBSC, SGSC, ACIP PCM		
(MA73C:A,B) • MCA LOGIC MNA MID 1,3 (two) – OFF	MNA MMC1 and MNA MMC3 Bus pwr		
	14 MNA pwr to ESS2CA and ESS3AB AUX PL A Bus pwr		
	15 Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs Man Cntl 2 ATM Press Cntl O2 Sys 1 Sply Vlv Cntl		
	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		
(A15:H,I,J,K) • cb MNA TK6-TK9 O2 HTR SNSR 1 – op	16 Cryo O2 Tk 6-9 Htr Current Snsr 1		
	FC3 Redundant Reac Vlv Close Cntl on pnl C3		
10 (ML86B:C) • cb MNA EXT ARLK HTR STRUC – op	10 Ext A/L Structural Htrs MNA pwr		
(ML86B:D) • cb MNA FC PCM – op	17 FCMS		

**EPS SSR-13  
BUS LOSS: MNA APC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)	2 RCS Manf L5 RJD pwr (L5L,L5D)	1 MASTER ALARM Light/Tone – on	① Indications do <u>not</u> appear until jet commanded
Refer to OMS/ RCS Slide Rule for vlv loss info (use APC 4 Slide for Aft RCS)	3 Aft L,R RCS He Pr Isol A GPC Cntl and Man CL capability	(F7) C/W RCS JET It – on	② Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jets commanded
<div style="border: 1px solid black; padding: 2px;">GNC 23 RCS</div> 4 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		(FSM) L RCS D(L) JET	③ Vlv holds position. Man OP capability remains
5 Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT L RCS He PRESS A,B • R RCS He PRESS A	6 Aft L RCS He Pr Isol B Man OP capability	If OMS GMBL cmd abs value > 2 deg: C/W OMS TVC It 'L OMS GMBL' (3,B)	④ Maintains control capability for APC6 failure
(A12) APU HTR TK/FU LN/H2O • SYS 1A – OFF • 1B – AUTO • 3A – AUTO • 3B – OFF HYD HTR • RUD SPDBK A – OFF • B – AUTO	7 APU 1 FU TK VLV A CL capability via APU 1 Auto Shutdn signal APU 1 GG Inj H2O Htrs A  APU 3 GG Inj H2O Htrs B  Rud Spd Bk Htr A	If OMS GMBL cmd abs value > 2 deg and Sec TVC selected: C/W OMS TVC It 'R OMS GMBL' (3,B)	⑤ Do not reconfig for reg switch or l'CNCT procedures
(A14) RCS/OMS HTRS • L POD (two) – A OFF, B AUTO • R POD (two) – B OFF, A AUTO • OMS CRSFD LINES (two) – A OFF, B AUTO	8 L Pod A Htrs (all)  9 R Pod B Htrs (partial)  8 OMS Crsfd Ln A Htrs (all)		⑥ Vlv holds position. Man CL and full GPC cntl remain
10 Prior to using L(R) OMS: (O8)	11 L,R OMS He Pr A GPC Cntl		⑦ In event of APU 1 auto shutdn, vlv remains OP until APU FU TK VLV – CL
12 L(R) OMS He PRESS/VAP • ISOL A – OP • B – GPC	11 L,R OMS He Vap Isol 1 GPC Cntl		⑧ Htr B remains ⑨ Htr A remains
<div style="border: 1px solid black; padding: 2px;">GNC XXXXX MNVR YYYYY (3,B)</div> Sel L OMS SEC TVC: • L OMS GMBL SEC – ITEM 30 EXEC Sel R OMS PRI TVC: • R OMS GMBL PRI – ITEM 29 EXEC	----- L OMS Pri TVC  R OMS Sec TVC		⑩ Lost TM: <div style="border: 1px solid black; padding: 2px;">GNC SYS SUMM 2</div> L,R OMS ENG BALL VLV 1: Assume Vlv 1 status same as Vlv 2
<b>BUS ISOLATION</b>			⑪ Vlv fails closed. Man cntl remains. Redundant Isols remain
ONLY ON MCC CALL, PERFORM			⑫ Maintains He Isol redundancy
NONE			



**EPS SSR-14**

**BUS LOSS: MNA APC4**

(Includes MNA APC1, MNA ALC1, MNA AMC1)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR GAS GEN/FUEL 2 • PUMP 1 – B AUTO 2 • 3 – A AUTO APU HTR • LUBE OIL LINE 1 – B AUTO • LUBE OIL LINE 3 – A AUTO APU HTR TK/FU LN/H2O 2 • SYS 1A – OFF 2 • 1B – AUTO 2 • 3A – AUTO 2 • 3B – OFF HYD HTR • RUD SPD BK A – OFF • BK B – AUTO • BDY FLP A – OFF • B – AUTO • ELEVON A – OFF • B – AUTO HYD CIRC PUMP • PWR 1 – MNB • 3 – MNC</p>	<p>APU 1 GG/Fu Pump Htrs A 3 GG/Fu Pump Htrs B  APU 1 Lube Oil Line Htr A  APU 3 Lube Oil Line Htr B  APU 1 Tk/Fu Ln Htrs A  APU 1 Inj H2O Htrs A 3 Tk/Fu Ln Htrs B  Rud/Spd Brake Htr A  Body Flap Htr A  Elevon Actr Htrs A  Circ Pump 1 MNA pwr 3 MNA pwr</p>	<p>1 MASTER ALARM Light/Tone – on  (F7) C/W RCS JET It – on SM ALERT Light/Tone – on  (FSMs) L RCS D(L) JET  (R4) 3 HYD BRAKE ISOL VLV 1 tb – OP 4 LG EXTEND ISOL VLV tb – OP 3 HYD MPS/TVC ISOL VLV SYS 1 tb – CL  (O7) AFT L RCS He PRESS A tb – bp 5 AFT R RCS He PRESS A tb – bp 6 AFT L,R RCS TK ISOL 3/4/5A tb – bp (if vlv in CL position)</p>	<p>① Indications do <u>not</u> appear until jet commanded  ②</p> <p style="text-align: center;">* TIME CRITICAL *</p> <p>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 Vlv holds position. Man OP capability remains ⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position ⑦ Manf status <u>not</u> 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 l'CNCT procedures ⑪ Vlv holds position. Man CL, full GPC Cntl remains</p>
<p>(L1) • FLASH EVAP CNTLR PRI A(SEC) – ON (if reqd) • TOP EVAP HTR NOZ L – B AUTO • TOP EVAP HTR DUCT – B If Hi Load Evap enabled: • HI LOAD DUCT HTR – B (C)</p>	<p>FES Pri B Cntr  Top Evap L Noz Htr A  Top Evap Duct L,R Htrs A  Hi Load Duct Noz Htr A</p>	<p>(F7) If APUs active, and using BLR CNTLR/HTR 1B or 3A: C/W APU TEMP It – on after ~2 min  If OMS GMBL cmd abs value &gt; 2 deg: C/W OMS TVC It L OMS GMBL (3,B)</p>	<p>⑤ Vlv holds position. Man OP capability remains ⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position ⑦ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p>
<p>(L2) FLASH EVAP FDLN • HTR A SPLY – 2 • B SPLY – 1</p>	<p>FES H2O Fdln A Htrs 1 (all except MID 2) FES H2O Fdln B Htrs 2 (all except MID 2)</p>	<p>If OMS GMBL cmd abs value &gt; 2 deg and TVC selected: C/W OMS TVC It R OMS GMBL (3,B)</p>	<p>⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position ⑦ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p>
<p>(R2) • BLR CNTLR/HTR 1 – A • 3 – B  • For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>Hyd H2O Blr 1 Cntr B 3 Cntr A</p>	<p>If cooling by FES B only: C/W FREON LOOP It 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'</p>	<p>⑦ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p>
<p>(A14) RCS/OMS HTR • L POD (two) – A OFF, B AUTO • R POD (two) – B OFF, A AUTO • OMS CRSFD LINES (two) – A OFF, B AUTO</p>	<p>7 RCS Manf L5 RJD pwr (L5L,L5D)</p>	<p>7 RCS Manf L5 RJD pwr (L5L,L5D)</p>	<p>⑧ Htr B remains ⑨ Htr A remains</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info 10 Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT L RCS He PRESS A,B • R RCS He PRESS A</p>	<p>8 L Pod A Htrs (all) 9 R Pod B Htrs (partial) 8 OMS Crsfd Ln A Htrs (all)</p>	<p>8 L Pod A Htrs (all) 9 R Pod B Htrs (partial) 8 OMS Crsfd Ln A Htrs (all)</p>	<p>⑩ Do not reconfig for reg switch or l'CNCT procedures ⑪ Vlv holds position. Man CL, full GPC Cntl remains</p>
<p>If ICNCT config: (O7) 6 • AFT L RCS TK ISOL 3/4/5 A – GPC (tb-bp) • AFT R RCS TK ISOL 3/4/5 A – GPC (tb-bp)</p>	<p>5 Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability 11 Aft L RCS He Pr Isol B man OP capability</p>	<p>5 Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability 11 Aft L RCS He Pr Isol B man OP capability</p>	<p>⑪ Vlv holds position. Man CL, full GPC Cntl remains</p>
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>

**EPS SSR-14 (Cont)**  
**BUS LOSS: MNA APC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p><b>GNC 23 RCS</b></p> <ul style="list-style-type: none"> <li>• Reprioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest, etc</li> </ul> <p>12 DES INH on L Manf 3 Jets:</p> <ul style="list-style-type: none"> <li>• ITEM 2 EXEC</li> <li>• L3L ITEM 12 EXEC (*)</li> <li>• L3D ITEM 28 EXEC (*)</li> <li>• L3A ITEM 30 EXEC (*)</li> <li>• Set aft pod(s) PRI JET FAIL LIMIT to 6</li> </ul>	<p>Aft RCS L,R Jet 2 Htrs</p>		<p>⑫ Maintains control capability for APC3 failure</p> <p>⑬ Lost TM:</p> <p><b>GNC SYS SUMM 2</b></p> <p>L OMS N2 P VLV: If Eng – ARM/PRESS, assume vlv OP</p> <p>L,R OMS ENG VLV 1: Assume Vlv 1 status same as Vlv 2</p>
<p>13 • Save L OMS eng for deorbit (If reqd for additional on-orbit burns, √MCC)</p>	<p>13 L OMS GN2 Press Vlv OP TM 14 Eng Pr Vlv Coil 1</p>		<p>⑭ Unable to confirm redundant coils</p>
<p>(O8)</p> <ul style="list-style-type: none"> <li>• If Straight feed config, L OMS Crossfeed B – OP (tb-OP). Otherwise, √MCC</li> </ul>	<p>15 OMS Eng/Crossfeed Vlv Redundancy</p>		<p>⑮ Maintains deorbit capability for MNB DA2 failure</p>
<p>Prior to using L(R) OMS: (O8)</p> <p>17 L(R) OMS He PRESS/VAP</p> <ul style="list-style-type: none"> <li>• ISOL A – OP</li> <li>• B – GPC</li> </ul>	<p>16 L,R OMS He Pr Isol A GPC Cntl 16 L,R OMS He Vap Isol 1 GPC Cntl 18 L OMS Eng Cntl Vlv 1,2 Coils 1 18 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2 19 L OMS Purge Vlv 1,2 20 OMS Qty Gage</p>		<p>⑯ Vlv fails closed. Man cntl remains. Redundant Isol remain</p> <p>⑰ Maintains He Isol redundancy</p> <p>⑱ Redundant coils remain</p>
<p>-----</p> <p><b>GNC XXXXX</b> <b>MNVR YYYYY</b> (3,B)</p> <p>Sel L OMS SEC TVC: • L OMS GMBL SEC – ITEM 30 EXEC</p> <p>Sel R OMS PRI TVC: • R OMS GMBL PRI – ITEM 29 EXEC</p>	<p>L OMS Pri TVC</p> <p>R OMS Sec TVC</p>		<p>⑲ <b>CAUTION</b></p> <p>No purge. Wait 10 min between burns</p> <p>⑳ √MCC for OMS Qtys. Disregard qtys on meter and</p> <p><b>GNC SYS SUMM 2</b></p>
<p>If reqd during entry (&lt; 120K ft): (L1)</p> <ul style="list-style-type: none"> <li>• NH3 CNTLR B – PRI/GPC</li> </ul> <p>If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</p> <ul style="list-style-type: none"> <li>• H2O PUMP LOOP 1,2 (two) – ON</li> <li>• √FLOW PROP VLV LOOP 1,2 (two) – ICH</li> <li>• Activate PL H2O LOOP(s) (if applicable)</li> </ul>	<p>21 NH3 Sys A Pri Cntrl and Auto Sw over to Sec Cntrl</p>		<p>㉑ Sys A Sec Cntrl man on capability remains</p> <p>㉒ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</p> <p>㉓ Vlv B remains</p> <p>㉔ Pwr Sply A remains. Turbine speed ind lost</p>
<p><b>BUS ISOLATION</b></p>			<p>㉕ Vlv A remains</p>
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:B)</p> <ul style="list-style-type: none"> <li>• MCA LOGIC MNA AFT 1 – OFF</li> </ul>	<p>MNA AMC1 Bus pwr LH Vent 8,9 Mtr 1</p>		
	<p>22 APU 1 Cntrl pwr Sply A 23 1 Fu Tk Vlv A 1 GBX GN2 Repress Vlv 24 3 Cntrl pwr Sply B 25 3 Fu Tk Vlv B</p>		
	<p>(Continued)</p>		



**EPS SSR-15  
BUS LOSS: MNA FLC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
2 Refer to OMS/RCS Slide Rule for vlv loss info 2 Reconfig following vlv(s) only if leak isolation reqd: (O8) • FWD RCS He PRESS A	1 Fwd RCS He Press Isol GPC CNTL and MAN CL capability	MASTER ALARM Light/Tone – on	① Vlv holds position. Man OP capability remains
4 <b>GNC 23 RCS</b> Override F1 Manf status to CL: • RCS FWD – ITEM 1 EXEC • MANF VLVS 1 OVRD – ITEM 40 EXEC	RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)	3 (F7) C/W RCS JET It – on	② Do not reconfig for reg switch or l'CNCT procedures
Pre-seat ingress for entry: • Discharge handheld fire ext into AV BAY 3	Av Bay 3 agent discharge capability	3 (FSM) F RCS D(F,L,U) JET	③ Indications do not appear until jet commanded
<b>BUS ISOLATION</b>		1 (O8) FWD RCS He PRESS A tb – bp	④ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur
<b>ONLY ON MCC CALL, PERFORM</b>			⑤ Htr Cntr 2 remains
(O14:C) • cb MNA FIRE SUPPR BAY 3 – op	5 L ADP Htr Cntr 1		

**EPS SSR-16  
BUS LOSS: MNA ALC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR</p> <p>2 • GAS GEN/FUEL PUMP 1 – B AUTO</p> <p>2 • GAS GEN/FUEL PUMP 3 – A AUTO</p> <p>• LUBE OIL LN 1 – B AUTO</p> <p>• LUBE OIL LN 3 – A AUTO</p> <p>APU HTR TK/FU LN/H2O</p> <p>2 • SYS 1A – OFF</p> <p>2 • 1B – AUTO</p> <p>2 • 3A – AUTO</p> <p>2 • 3B – OFF</p> <p>HYD HTR</p> <p>• BDY FLP A – OFF</p> <p>• B – AUTO</p> <p>• ELEV A – OFF</p> <p>• B – AUTO</p> <p>HYD CIRC PUMP</p> <p>• PWR 1 – MNB</p> <p>• 3 – MNC</p>	<p>APU 1 GG/Fu Pump Htrs A</p> <p>APU 3 GG/Fu Pump Htrs B</p> <p>APU 1 Lube Oil Line Htrs A</p> <p>APU 3 Lube Oil Line Htrs B</p> <p>APU 1 Tk/Fu Ln Htrs A</p> <p>3 Tk/Fu Ln Htrs B</p> <p>Body Flap Htr A</p> <p>Elevon Actr Htrs A</p> <p>Circ Pump 1 MNA pwr</p> <p>3 MNA pwr</p>	<p>1 MASTER ALARM Light/Tone – on</p> <p>(R4)</p> <p>3 HYD BRAKE ISOL VLV 1 tb – OP</p> <p>3 HYD MPS/TVC ISOL VLV SYS 1 tb – CL</p> <p>(O7)</p> <p>4 AFT L RCS He PRESS A tb – bp</p> <p>4 AFT R RCS He PRESS A tb – bp</p> <p>5 AFT L,R RCS TK ISOL 3/4/5A tb (two) – bp (if vlv in CL position)</p> <p>If cooling by FES only using PRI B CNTLR: C/W FREON LOOP It – on 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'</p>	<p>① Indications do <u>not</u> appear until jet commanded</p> <p>②</p> <p style="text-align: center;">* [ TIME ] * [ CRITICAL ]</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>③ Vlv holds position</p> <p>④ Vlv holds position. Man OP capability remains</p> <p>⑤ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position</p> <p>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</p>
<p>(L1)</p> <p>• FLASH EVAP CNTLR PRI A(SEC) – ON (if reqd)</p> <p>• TOP EVAP HTR NOZ L – B AUTO</p> <p>• TOP EVAP HTR DUCT – B</p> <p>If Hi Load Evap enabled</p> <p>• HI LOAD DUCT HTR – B(C)</p>	<p>FES Pri B Cntr</p> <p>Top Evap L Noz Htr A</p> <p>Top Evap Duct L,R Htrs A</p> <p>Hi Load Duct Noz Htr A</p>	<p>(F7) If APUs active and using BLR CNTLR/HTR 1B or 3A: C/W APU TEMP It – on after ~2 min</p>	<p>⑦ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p> <p>⑧ Do not reconfig for reg switch or I'CNCT procedures</p> <p>⑨ Vlv holds position. Man CL and full GPC Cntl remain</p>
<p>(L2)</p> <p>FLASH EVAP FDLN HTR</p> <p>• A SPLY – 2</p> <p>• B SPLY – 1</p>	<p>FES H2O Fdln A Htrs 1 (all except MID 2)</p> <p>FES H2O Fdln B Htrs 2 (all except MID 2)</p>	<p>(F7) 1 C/W RCS JET It</p> <p>(FSM) 1 L RCS D(L) JET</p>	
<p>(R2)</p> <p>• BLR CNTLR/HTR 1 – A</p> <p>• 3 – B</p>	<p>6 Hyd H2O Blr 1 Cntr B</p> <p>6 3 Cntr A</p>		
<p>For attitude control:</p> <p>• Perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>7 RCS Manf L5 RJD pwr (L5L,L5D)</p>		
<p>(A14)</p> <p>RCS/OMS HTR OMS</p> <p>• CRSFD LINES (two) – A OFF, B AUTO</p>	<p>OMS Crsfd Ln A Htrs (partial)</p>		
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>8 Reconfig following vlv(s) only if leak isolation reqd:</p>			
<p>(O7)</p> <p>• AFT L RCS He PRESS A,B</p> <p>• R RCS He PRESS A</p>	<p>4 Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability</p> <p>9 Aft L RCS He Pr Isol B man OP capability</p>		
<p><b>GNC 23 RCS</b></p> <p>• Reprioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest priority, etc</p> <p>• Set aft pod(s) PRI JET FAIL LIMIT to 6</p>	<p>Aft RCS L,R Jet 2 Htrs</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-16 (Cont)**  
**BUS LOSS: MNA ALC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
5 If ICNCT config: (O7) • AFT L RCS TK ISOL 3/4/5 A – GPC (tb-bp) • AFT R RCS TK ISOL 3/4/5 A – GPC (tb-bp)	AFT L,R RCS TK ISOL 3/4/5 A CL microswitch feedback	Ctr MPS He Reg A < 680 during entry (MM303)	③ Vlv holds position
10 Save L OMS eng for deorbit (If reqd for additional on-orbit burns, √MCC)	11 L OMS GN2 Press Vlv OP TM 12 L OMS Eng Pr Vlv Coil 1		⑤ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position ⑩ √MCC for OMS Qtys. Disregard Qtys on meter and <b>GNC SYS SUMM 2</b>
13 Prior to using OMS: (O8) L(R) OMS He PRESS/VAP • ISOL A – OP • B – GPC	14 L,R OMS He Pr Isol A GPC Cntl		⑪ Lost TM: <b>GNS SYS SUMM 2</b> L OMS N2 P VLV: If Eng – ARM/PRESS, assume vlv OP
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR B – PRI/GPC	15 NH3 Sys A Pri Cntrl & Auto sw over to Sec Cntrl		⑫ Unable to confirm redundant coils ⑬ Maintains He Isol redundancy ⑭ Vlv fails closed. Man cntl remains. Isol B remains ⑮ Sys A Sec Cntrl man on capability remains ⑯ Redundant coils remains
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)			⑰ <b>CAUTION</b> No purge. Wait 10 min between burns ⑱ Vlv fails closed ⑲ Vlv holds position. Loss of manual capability to inert LH2 Manf ⑳ Vlv fails closed. Redundant vlv remains ㉑ Vlv fails closed. Aft compartment, OMS pods, and ET umbilical cavity will not be purged during entry (MM304)
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE	16 L OMS Cntl Vlv 1,2 Coils 1 16 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2		
	10 OMS Qty gauging 17 L OMS GN2 Purge Vlv 1,2		
	18 APU 1 Fu Tk Vlv A 18 3 Fu Tk Vlv B		
	3 Hyd Brake Isol Vlv 1 Cntl 19 TVC Hyd Sys 1 Isol Cntl		
	MPS: 20 Pneu He Isol 1 20 Ctr Eng He Isol A 18 Ctr Eng He Intercon Outlet Vlv		
	21 He Sply Blowdn Vlv 1,2 19 Prplt F/D Inbd LH2 Vlv		

**EPS SSR-17  
BUS LOSS: MNA FMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) • H2O PUMP LOOP 1 – B Refer to OMS/RCS Slide Rule for vlv loss info	H2O Loop 1 Pump A	MASTER ALARM Light/ Tone – on	① Vlv holds position ② If this action taken, H2O Pump Loop 2 must be pwrd ③ Mtr 2 remains ④ Htr Cntr 2 remains
<b>GNC 23 RCS</b> Override F1 Manf status to OP: • RCS FWD ITEM 1 EXEC • MANF VLVS 1 OVRD ITEM 40 EXEC		(F7) SM ALERT Light/Tone – on	
		(FSM) RM DLMA MANF	
		(O8) FWD RCS 1 TK ISOL 3/4/5 tb – bp 1 MANF ISOL 1 tb – bp	
		L ADP deploy time incr from 15 to 30 sec	
		STAR TRKR DR POS -Y OP time incr from 8 to 16 sec	
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(L1) 2 • H2O PUMP LOOP 1 – OFF			
(MA73C:A) • MCA LOGIC MNA FWD 1 – OFF	MNA FMC 1 Bus pwr	If H2O PUMP LOOP 1,A active: C/W H2O LOOP It – on 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' 'S88 H2O PUMP P 1'	
	RH Vent 1,2 Mtr 1 3 L ADP Deploy Mtr 1 Disc 1 4 Htr Cntr 1 -Y Star Trkr Dr Sys 1 OP/CL capability	(O1) H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia	

**EPS SSR-18  
BUS LOSS: MNA MMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(MA73C:C) 1 • cb MCA PWR AC1 3Φ MID 1 – op	1 Port Rad Lat 1-6,7-12 Mtrs 1 Limit sw Port Rad Dpy/Sto Mtr 1 2 Stbd Rad Dpy/Sto Mtr 2 Limit sw	(R13L) RAD CNTL STBD tb – bp If PORT RAD pnl stowed: RAD CNTL PORT tb – bp	① 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 ② Mtr 2 will continue to drive until Sys A Cntl sw is taken to OFF ③ Mtr 2 will continue to drive closed until PL BAY DR – STOP ④ Mtr 1 will continue to drive open until PL BAY DR – STOP ⑤ Single mtr time ⑥ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
For PLBD ops: • OP/CL Drs in man mode	PLBD: C/L Lat 9-12 Mtr 1 Port,Stbd Fwd Blkhd Lat Mtrs 1 Stbd Door Mtr 1	<b>SM (BFS SM 63) PL BAY DOORS</b> If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	
	3 Port Door Mtr 2 CL Limit sw 4 Stbd Door Mtr 1 OP Limit sw	During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left	
		(A8L) PORT RMS: RETEN LAT tb – bp R-F-L MID tb – bp	
	MNA MMC1 Bus pwr RH Vents 3,5,6 Mtrs 1	STARBOARD RMS: DPY/STO tb – bp	
<b>BUS ISOLATION</b>		<b>SM 94 PDRS CONTROL</b>	
ONLY ON MCC CALL, PERFORM		PORT RMS Indications lost: Mid MRL Mtr 1 LAT/REL/RDY	
(MA73C:A) • MCA LOGIC MNA MID 1 – OFF	5 Port RMS Mid MRL Mtr 1 6 Stbd RMS Fwd MRL Mtr 2	STBD RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY	

**EPS SSR-19**  
**BUS LOSS: MNA MMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(MA73C:D) 1 • cb MCA LOGIC MCA PWR AC1 3Φ MID 3 – op  For PLBD ops: • OP/CL Drs in man mode	1 Stbd Rad Lats 1-6,7-12 Mtrs 1 Limit sw Stbd Rad Dpy/Sto Mtr 1 2 Port Rad Dpy/Sto Mtr 2 Limit sw  PLBD: C/L Lat 1-4,5-8 Mtr 1 Port Aft Blkhd Lats Mtr 1	(R13L) 1 RAD CNTL PORT tb – bp If STBD RAD pnl stowed: RAD CNTL STBD tb – bp  SM (BFS SM 63) PL BAY DOORS  If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	① If AC1 MM3 cb not opened, Lat Mtrs 1 of both Stbd Lat 1-6,7-12 Actuators continue to run until Sys A Lat Cntl sw placed to OFF
<b>BUS ISOLATION</b>			
<b>ONLY ON MCC CALL, PERFORM</b>			
(MA73C:B) • MCA LOGIC MNA MID 3 – OFF	MNA MMC3 Bus pwr LH Vents 5,6 Mtr 1	(A8L) STARBOARD RMS: RETEN LAT tb – bp R-F-L AFT tb – bp	② Mtr 2 will continue to drive until Sys B Cntl sw is taken to OFF
	3 Port RMS Aft MRL Mtr 2 4 Stbd RMS Aft MRL Mtr 1	SM 94 PDRS CONTROL PORT RMS Indication lost: Aft MRL Mtr 2 LAT/REL/RDY  STBD RMS Indications lost: Aft MRL Mtr 1 LAT/REL/RDY	③ Single mtr time ④ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists





**EPS SSR-21  
BUS LOSS: MNA R14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (R11L) • MS AUD CNTL – PS (L9) • √PS ATU PNL config for use (O6) • UHF EVA STRING – 2	2 MS ATU, CCU, FD Spkr    SSOR 1	PS Floodlt lost MS, OS CCTV Video lost if MNA selected for VCU CCTV Mon 1 lost (F7) MDU MFD 2 blanks (F8) MDU PLT 1 blanks	① Listen only capability regained when headset used on MS CCU (from PS ATU) as FD speaker is also failed ② Causes loss of redundant path for ACCU config control bits, loss of xmit capability via CCU, loss of FD spkr ③ Redundant pwr source remains for equipment ④ Possible loss of capability for xmitting to gnd via UHF ⑤ GCILC also pwr'd via MNC cb ⑥ Buses remain powered ⑦ MNB pwr may be selected via TV pwr sw (pnl A7) or GCILC, if reqd ⑧ IDP 1 and IDP 2 ADC data lost. MDU port select may be reqd
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(R14:A) • cb MNA AUD MS – op • ADC 1A/2A – op • MDU MFD 2 – op • MDU PLT 1 – op	MS ATU FD Spkr		
3 (R14:B) cb PALLET/DSC • 1A/2B – op (EDO) • 3A – op (EDO) cb MNA • UHF – op • GCILC – op • CNTL BUS BC 1/2/3 – op	4 UHF Splx Pwr Amp 5 GCILC MNA pwr 6 MNA pwr for Cntl BC 1,2,3 Buses		
(R14:C) • cb UHF EVA – op	SSOR EVA STRG 1		
(R14:D) cb MNA TV C CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op  cb MNA TV • CONTR UNIT – op • MON 1 – op	TV C Camr and Pan-Tilt TV C Camr Htr TV C Camr Pan-Tilt Htr and Illum  7 Video Cntl Unit MNA pwr CCTV Mon 1		
(R14:E) • cb MNA PS FLOOD – op cb MNA D CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op	PS Floodlt TV D STBD RMS: Camr and Pan-Tilt Camr Htr Pan-Tilt Htr		
• MDU MFD 2 PWR – OFF • MDU PLT 1 PWR – OFF	8 MDU MFD 2 MDU PLT 1 ADC 1A/2A		

**EPS SSR-22**  
**BUS LOSS: MNA O14&A8**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A8L)</p> <ul style="list-style-type: none"> <li>• PORT RMS HTR A – OFF</li> <li>• PORT RMS HTR B – AUTO</li> </ul> <p>If OBSS berthed:</p> <p>(A8L)</p> <ul style="list-style-type: none"> <li>• STBD RMS HTR A – OFF</li> <li>• STBD RMS HTR B – AUTO</li> </ul>	<p>RMS:</p> <p>1 Port Primary pwr            3 Port Payload pwr            2 MCIU            Port Htr A            Stbd Htr A</p>	<p>(A8U)</p> <p>2 RMS D&amp;C tb – bp except:            BRAKES tb – OFF            RATE MIN tb – OFF            RATE HOLD tb – OFF            SOFT STOP tb – gray            RATE SCALE tb – gray</p>	<p>① B/U drive capability remains. All brakes ON and safing initiated</p> <p>② All brakes ON and safing initiated</p> <p>③ When the OBSS is grappled by the RMS, the OBSS uses the RMS Payload power feed for all OBSS subsystem heater and operational power, except LCS</p> <p>④ If driver sw OFF when bus failed, F1 Manf Drivers lost</p>
<p><b>BUS ISOLATION</b></p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>NONE</p>	<p>4 ON control for RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)</p>		

**EPS SSR-23**  
**BUS LOSS: MNA O14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (R1) • MN BUS TIE C – ON (tb-ON)		MASTER ALARM Light/Tone – on	① FC3 only one failure away (loss of ESS3AB) from inability to bus tie
(L1) If RAD CNTLR LOOP 1,2 – AUTO B: • Perform ON-ORBIT RAD CNTLR SWITCH, <u>ECLS</u> SSR-13 for Freon Loop 1,2	Freon Loop 1,2 Rad Cntr B	(F7) C/W CAB ATM It – on SM ALERT Light/Tone – on	② H2O Loop 1 Intchgr flowrate and IMU fan ΔP snrs lost
(L2) • FREON ISOL MODE – OFF	Auto radiator isolation function	(FSMs) 2 S66 IMU FAN DP S66 CABIN PPO2 A S66 CABIN PRES 2 S88 H2O LOOP 1 FLOW SM0 TIRE PRESS S78 CABIN O2 CONC	③ ACA recovered by switching to alternate pwr
(F6,F8) • HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 1 or (OV105) GPS 1 • RDR ALTM – 2	MLS 1 (OV103,4) TACAN 1 (OV105) GPS 1 Radar Altm 1	If ADTA 1, MLS 1, -Z STAR TRKR pwrd: 'BCE STRG 1 ADTA' (3,B) 'BCE STRG 1 MLS' (3) 'BCE STRG 1 STKR'	④ After MET 3:30, tb already bp ⑤ Vlv holds position
(O6) • ANNUN BUS SEL ACA 1 – MNB	3 ACA 1 MNA pwr	(L2) 4 CAB VENT ISOL tb – bp 4 tb – bp	⑥ Vlv fails closed. IFM or real-time flow test will be required. √MCC for additional direction
If on PCS 1: • Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	5 O2/N2 Cntl Sys 1: 5 O2/N2 Sys 1 Flow Xdcrs 5 N2 Sply Vlv 1 Cntl 6 N2 Reg Inlet Vlv 1 Cntl 6 O2 Xovr Vlv 1 OP capability 7 O2/N2 Cntl Vlv 1 man Cntl PPO2 Snsr A Cabin Press Snsr Emer dP/dT B/U comp	4 CAB VENT ISOL tb – bp 4 tb – bp 5 N2 SYS 1 SPLY tb – bp 5 N2 SYS 1 REG INLET tb – bp	⑦ O2/N2 Cntl Vlv 1 normally closed when unpowered
SM 60 SM TABLE MAINT		(O1) O2/N2 FLOW SYS 1 ind – 0 pph CAB PRESS ind – 0 psia PPO2 SNSR A ind – 0 psia	⑧ Inhibits Cabin P, Cabin PPO2A, Cabin O2 Flow 1, Cabin N2 Flow 1, IMU Fan ΔP, and H2O Loop ICH Flow 1 respectively
8 • Inhibit 0612405, 0612511, 0612105, 0612553, 0612869, 0612742 • Perform ECLS COMPUTATION INHIBIT, <u>ECLS</u> SSR-14 Table B		(O3) MSN TIME ind – blank	⑨ Inhibits Primary C/W for Cabin P, Cabin PPO2A, Cabin O2 Flow 1 and Cabin N2 Flow 1 respectively
9 (R13 U) • C/W PARAM SEL tw (three) – 004, 034, 014, 054 • C/W PARAM – INH • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		(A4) EVENT TIME ind – blank	
• Pre-seat ingress for entry: discharge hand-held fire ext into AV BAY 3	Av Bay 3 agent discharge capability	If first AA failure and S/W processing accel data: 'RM FAIL ACC' (3)	
(O14:D) cb MNA • (OV105) GPS 1 PRE AMPL UPPER – op • (OV105) GPS 1 PRE AMPL LOWER – op		(LIGHTS LOST) L Console Floodlt 3 If ACA 1 – MNA, lights lost: (C3) DAP lights right three columns ALL (F2) PBIs except MA	
(A13) • (OV103) GPS PRE AMPL UC – MNC • (OV103) GPS PRE AMPL LC – MNC		If NWS 1 selected: (F3) NWS FAIL It – on	
(Continued)	(Continued)		

**EPS SSR-23 (Cont)**  
**BUS LOSS: MNA O14**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			② H2O Loop 1 Intchgr flowrate and IMU fan ΔP snsr lost
(O6) • S TRK PWR -Z - OFF	-Z Star Tracker Dr OP capability -Z Star Tracker		⑩ Redundant pwr source remains for equip
(O7) • (OV105) GPS 1 PWR - OFF • (OV105) GPS 1 PRE AMPL UPPER - OFF • (OV105) GPS 1 PRE AMPL LOWER - OFF	GPS 1 (OV105)		⑪ Redundant measurement remains. FDA Alarm - BFS only; OPS 3,6
(O8) • RDR ALTM 1 - OFF • MLS 1 - OFF			⑫ Cabin Smoke Detector remains
(O14:B) cb MNA OI SIG CONDR 10 • OF 1/4 A - op 10 • OM 1/2 A - op cb MNA OI MDM OF 10 • 1/2 A - op 10 • 3/4 A - op cb MNA OI H2O • BYP LOOP 1 SNSR - op cb MNA OI • TIRE PRESS - op cb MNA • MNC CONTR - op • MSN TIMER FWD - op • EVENT TIMER AFT - op	2 H2O Byp Loop 1 Snsr (ECLS SC11) 11 Tire Press Sig Cond A1,A2  Fwd Mission Timer Aft Event Timer		⑬ Current Snsr 2 remains ⑭ Cntrl A remains ⑮ NWS 2 still available
(O14:C) cb MNA 12 • (OV103,4) TACAN 1 - op 12 • SMOKE DETN L/R FLT DK - op • SMOKE DETN BAY 2A/3B - op • FIRE SUPPR BAY 3 - op  • UTIL PWR O19/MO52J - op • FLOOD L CNSL - op • ANNUN FWD ACA 1 - op 13 • cb MNA CRYO O2 HTR TK1 SNSR 1 - op • cb RAD ISOL CONTR - op	12 Tacan 1 L,R Flt Dk Smoke Detectors  Av Bay 2 Smoke Detector A 3A Smoke Detector B Av Bay 3 agent discharge capability MNA Utility pwr  L Console Floodlt 13 Cryo O2 Tk 1 Htr Current Snsr 1  Auto radiator isolation function		
(O14:D) 14 cb MNA • FREON RAD CNTLR 1,2 (two) - 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 • (OV105) GPS 1 PRE AMPL UPPER - op • (OV105) GPS 1 PRE AMPL LOWER - op	Cabin Vent Vlv Isol		
(O14:E) cb MNA • RDR ALTM 1 - op • MLS 1 - op • AFTA 1 - op • S TRK -Z - op • ACCEL 1 - op 10 • DDU L,AFT (two) - op 15 • NWS - op	ADTA 1  AA 1 10 L DDU MNA pwr 10 Aft DDU MNA pwr NWS 1		

**EPS SSR-24  
BUS LOSS: MNA R1A1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 MNA pwr to CNTL buses AB1,AB2,AB3,CA1,CA2, CA3 1 MNA pwr to ESS2CA, ESS3AB	NONE	① Buses remain pwr'd
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
NONE			

**EPS SSR-25  
BUS LOSS: MNA A6&A14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<div style="border: 1px solid black; padding: 2px;">GNC 23 RCS</div> <ul style="list-style-type: none"> <li>Reprioritize FRCS Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</li> <li>Set forward pod PRI JET FAIL LIMIT to 4</li> </ul>	Fwd RCS Jet 1 Htrs	(A6U) PL RETEN RDY tb – bp RETEN/LAT tb – bp (A6A1 – pnl overlay) RELAX tb – bp DEMATE tb – bp MATE tb – bp ELEC CONT tb – bp	① Single mtr time
BUS ISOLATION		<div style="border: 1px solid black; padding: 2px;">SM 97 PL RETENTION</div> Indication lost: RELAX DEMATE MATE	
ONLY ON MCC CALL, PERFORM			
NONE	PL Reten Sys A Rel/Lat Mtrs ROEU Logic Pwr Sys 1 1 Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) 1 ODA mtr 1 latch/release		

**EPS SSR-26**  
**BUS LOSS: MNA ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(ML86B:A) • cb MNB H2O LINE HTR B – cl	1 H2O Line Htrs A: Waste Dump Line Htr A Sply Dump Line Htr A Vac Vent Ln Htr A	(R11L) 2 SPLY H2O TKA INLET tb – bp 2 SPLY H2O TKB OUTLET tb – bp	① Htr B remains ② Vlv holds position
----- (ML86B:D) • cb MNB MMU • PORT,STBD HTR B (two) – cl	1 MMU Port,Stbd Htr A	(R13L) 2 MMU GN2 SPLY ISOL VLV A tb – bp	③ Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge
If Waste H2O Dump reqd: • Perform WASTE WATER SYS BACKUP DUMP (IFM)	2 Waste H2O: Dump Vlv Cntl Noz Htr	(ML31C) 2 WASTE H2O TK 1 VLV tb – bp 2 WASTE H2O DUMP ISOL VLV tb – bp 2 WASTE H2O DUMP VLV tb – bp 2 SPLY H2O TKD OUTLET tb – bp	④ Without circulation, H2O will lose heat with time and never reheat to nominal temp
(ML31C) • VAC VENT ISOL VLV BUS SEL – MNB	Vac Vent Isol MNA Cntl	(AW82D) 3 EMU 2 H2O SPLY, WASTE (two) tb – CL	⑤ PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig
(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	WCS Sep Fan 1 Mtr Relay	(LIGHTS LOST) Middeck Floodlts 1,8 WMC Floodlt MO13Q pnl It 2 Airlk Floodlt 1 TA Flood 2 (SL only)	⑥ MNB and MNC line htrs remain. MNB struc and vestibule htrs remain
(EDO WCS) • WCS PWR SEL – OFF 1, AUTO 2	Controller MNA pwr Compactor MNA Cntl	'S66 CO2 RL SYS MALF' Impending: 'S66 CO2 RL SYS PCO2' 'S66 CAB PPCO2'	
(GALLEY) • OVEN/RHS – OFF • √OVEN FAN: OFF • Config for backup H2O dispense per ECLS	Galley Electronics Assy Oven 4 One of six htr strips Galley Hot H2O Tk		
(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)	5 CO2 Rmvl Sys Cntrl 1		
(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	6 Ext A/L H2O and Structural Htrs MNA pwr		
<b>BUS ISOLATION</b>			
<b>ONLY ON MCC CALL, PERFORM</b>			
(ML86B:A) cb MNA H2O • LINE HTR A – op cb MNA SPLY H2O • TKA INLET – op • TKB OUTLET – op cb MNA WASTE H2O • DUMP VLV/NOZ HTR – op	2 Sply H2O TKA Inlet Vlv Cntl 2 Sply H2O TKB,D Outlet Vlv Cntl		
(Continued)	(Continued)		

**EPS SSR-26 (Cont)**  
**BUS LOSS: MNA ML86B**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
(ML86B:B) cb MNA WASTE H2O • TK1 VLV – op • DUMP ISOL – op cb MNA SPLY H2O • TKD OUTLET – op cb MNA VAC • VENT ISOL VLV – op cb MNA • WCS CNTLR – op • GALLEY OVEN – op	Waste H2O Dump Isol Cntl Tk1 Inlet Vlv Cntl  Galley Oven Electronics Assy		① Htr B remains ② Vlv holds position ③ Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/ recharge ⑥ MNB and MNC line htrs remain. MNB struc and vestibule htrs remain
(ML86B:F) 7 • cb MNA CRYO O2 HTR TK3 SNSR 1 – op • cb MNA CRYO O2 HTR TK5 SNSR 1 – op	7 Cryo O2 Tk 3 Htr Current Snsr 1 Cryo O2 Tk 5 Htr Current Snsr 1		⑦ Current Snsr 2 remains ⑧ Sys B remains ⑨ Lost capability to observe and record FC single cell voltages
(ML86B:D) cb MNA MMU • PORT,STBD HTR A (two) – op • GN2 SPLY ISOL VLV A – op cb MNA PYRO JETT SYS A • KU ANT – op • STBD RMS – op	1 MMU Port,Stbd Htr A 2 MMU GN2 Sply Isol Vlv A  8 Ku-Bd Jettison Sys A 8 Stbd RMS: Jett/Guil Sys A Deadface Relays		
(ML86B:E) cb MNA EMU 2 H2O • SPLY – op • WASTE – op cb MNA FLOOD • TNL ADAPT 2 – op cb MNA • CO2 SYS 1 CNTLR – op	TA Floodlt 2		
(ML86B:F) cb MNA FLOODS • MIDDECK 1/8 – op • WMC/MO13Q – op • AIRLK 1 – op	Middeck Floodlts 1,8 WMC Floodlt, MO13Q pnl lt 2 Airlk Floodlt 1		
	3 EMU 2 Sply H2O Vlv Cntl Waste H2O Vlv Cntl		
(ML86B:C) 6 • cb MNA EXT ARLK HTR LINE ZN1 – op 6 • cb MNA EXT ARLK HTR LINE ZN2 – op 6 • cb MNA EXT ARLK HTR STRUC – op 6 • cb MNA EXT ARLK HTR VEST Z1/2/3 – op	6 Ext A/L H2O and Structural Htrs MNA pwr		
(ML86B:D) • cb MNA FC PCM – op	9 FCMS		



**EPS SSR-29  
BUS LOSS: MNA A7**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		VEST DEP VLV SYS 1 VENT ISOL tb – bp VEST DEP VLV SYS 1 VENT tb – bp 1 DSP SYS PWR SYS 1 tb – OFF	① DSP SYS 1 PWR still available to all users except MNA A7
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(A6L) 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	Vestibule Depress Vlv Sys 1 Vent Isol Vestibule Depress Vlv Sys 1 Vent External Airlock Its 1,4 Fwd Truss Docking It		

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EPS MNB  
SSR 30-49c

**EPS SSR-30**  
**BUS LOSS: MNB DA2**

(Includes all MNB sub-buses and AC2)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<ul style="list-style-type: none"> <li>Perform FC2 SHUTDN (FC SHUTDN Cue Card)</li> </ul>	FC2 Pumps and pH Snr Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor AUX PL B Bus pwr MNB pwr to ESS1BC ESS3AB CNTLAB1,2,3 CNTLBC1,2,3	MASTER ALARM Light/ Tone – on SM ALERT Light/Tone – on (F6) MDU CDR 2 blanks (F7) MDU CRT 2 blanks MDU MFD 1 blanks C/W CABIN ATM It – on C/W MN BUS UNDERVOLT It – on C/W AC VOLT It – on C/W FC PUMP It – on C/W FREON LOOP It – on C/W RCS JET It – on	① Buses remain pwr ② Pwrs PL Timing Buffer, OIU 1, and OIU 2 (if flown). OIU 1 redundant pwr MNA MPC1 via CAB PL3 ③ Indications do not appear until jet commanded ④
(R1) <ul style="list-style-type: none"> <li>PL CAB – MNA</li> <li>cb AC CONTR AC2                φA, φB, φC (three) – cl</li> <li>INV/AC BUS 2 – OFF (tb-OFF)</li> <li>INV PWR 2 – OFF (tb-OFF)</li> <li>cb AC CONTR AC2                φA, φB, φC (three) – op</li> <li>AC2 BUS SNSR – OFF</li> </ul>	2 MNB pwr to CABPL 1,2,3 buses AC2 φA, φB, φC Inverters	(COMM LOST) All S-BD A/G voice lost if Sys 1 selected Middeck Spkr audio lost (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 Bunk Floodlts 2/4 PHS Floodlt Airlock Floodlt 3 PLB Fwd Blkhd Floodlt PLB Mid Port Floodlt PLB Fwd Stbd Floodlt TA Floodlt 3	* TIME CRITICAL * If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
<ul style="list-style-type: none"> <li>O2,H2 TK1 HTRS A – AUTO</li> <li>O2,H2 TK1 HTRS B – OFF</li> <li>O2,H2 MANF vlv TK1, TK2 – OP</li> </ul>	Cryo O2(H2) Tk2,3,4 Htrs A if in Auto Cryo O2,H2 Tk2,3,4 Htrs B	(F9) AC2 φA, φB, φC AC volts ind – < 90 DC VOLTS MNB ind – OSL	
<ul style="list-style-type: none"> <li>O2,H2 TK2,3 HTRS A,B (eight) – OFF</li> </ul>		(FSM) S67 AC VOLTS 2 S86 HYD RSVR Q SM2 HYD QTY (B) S86 WSB T SM0 THRM HYD (B) S66 AV BAY 1,2 FAN S66 AV BAY 3 FAN S78 CABIN DP/DT S66 CABIN PPO2 B,C S66 IMU FAN DP S66 IMU FN SPD B S69 FC PUMP 2 S69 FC H2 PUMP 2 S88 FREON FLOW 1 S88 FRN AFT CP 1 S88 FRN PL HX 1 S88 FREON QTY 2 S88 FREON FLOW 2	
(A11) <ul style="list-style-type: none"> <li>O2,H2 TK4 HTRS A,B (four) – OFF</li> </ul>		(F9) AC2 φA, φB, φC AC volts ind – < 90 DC VOLTS MNB ind – OSL	
(A15) If O2,H2 TK5 QTY > 10%: <ul style="list-style-type: none"> <li>O2,H2 TK5 HTR A (two) – AUTO</li> </ul>		(FSM) S67 AC VOLTS 2 S86 HYD RSVR Q SM2 HYD QTY (B) S86 WSB T SM0 THRM HYD (B) S66 AV BAY 1,2 FAN S66 AV BAY 3 FAN S78 CABIN DP/DT S66 CABIN PPO2 B,C S66 IMU FAN DP S66 IMU FN SPD B S69 FC PUMP 2 S69 FC H2 PUMP 2 S88 FREON FLOW 1 S88 FRN AFT CP 1 S88 FRN PL HX 1 S88 FREON QTY 2 S88 FREON FLOW 2	
(A12) APU HTR <ul style="list-style-type: none"> <li>GAS GEN/FUEL PUMP 1 – A AUTO</li> <li>GAS GEN/FUEL PUMP 2 – B AUTO</li> <li>LUBE OIL LN 1 – A AUTO</li> <li>2 – B AUTO</li> </ul> APU HTR TK/FU LN/H2O <ul style="list-style-type: none"> <li>SYS 1A – AUTO</li> <li>1B – OFF</li> <li>2A – OFF</li> <li>2B – AUTO</li> </ul> HYD HTR <ul style="list-style-type: none"> <li>RUD SPD BK A – AUTO</li> <li>B – OFF</li> <li>BDY FLP A – AUTO</li> <li>B – OFF</li> <li>ELEV A – AUTO</li> <li>B – OFF</li> <li>AFT FUS A – OFF</li> <li>B – AUTO</li> </ul> HYD CIRC <ul style="list-style-type: none"> <li>PUMP PWR 1 – MNA</li> <li>2 – MNC</li> </ul>	Av Bay 1 Agent discharge capability	(FSM) S67 AC VOLTS 2 S86 HYD RSVR Q SM2 HYD QTY (B) S86 WSB T SM0 THRM HYD (B) S66 AV BAY 1,2 FAN S66 AV BAY 3 FAN S78 CABIN DP/DT S66 CABIN PPO2 B,C S66 IMU FAN DP S66 IMU FN SPD B S69 FC PUMP 2 S69 FC H2 PUMP 2 S88 FREON FLOW 1 S88 FRN AFT CP 1 S88 FRN PL HX 1 S88 FREON QTY 2 S88 FREON FLOW 2	
(A12) APU HTR <ul style="list-style-type: none"> <li>GAS GEN/FUEL PUMP 1 – A AUTO</li> <li>GAS GEN/FUEL PUMP 2 – B AUTO</li> <li>LUBE OIL LN 1 – A AUTO</li> <li>2 – B AUTO</li> </ul> APU HTR TK/FU LN/H2O <ul style="list-style-type: none"> <li>SYS 1A – AUTO</li> <li>1B – OFF</li> <li>2A – OFF</li> <li>2B – AUTO</li> </ul> HYD HTR <ul style="list-style-type: none"> <li>RUD SPD BK A – AUTO</li> <li>B – OFF</li> <li>BDY FLP A – AUTO</li> <li>B – OFF</li> <li>ELEV A – AUTO</li> <li>B – OFF</li> <li>AFT FUS A – OFF</li> <li>B – AUTO</li> </ul> HYD CIRC <ul style="list-style-type: none"> <li>PUMP PWR 1 – MNA</li> <li>2 – MNC</li> </ul>	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 GG Inj H2O Tank Htrs B 1 GG Inj H2O Line Htrs B 2 GG Inj H2O Line Htrs B 1 Tk/Fu Line Htr B 2 Tk/Fu Line Htr A Rudder/Speed Brake Htr B Body Flap Htr B Elev Act Htr B Aft Fuselage Htrs A HYD BK HTR B Circ Pump 1 MNB pwr 2 MNB pwr	(FSM) S67 AC VOLTS 2 S86 HYD RSVR Q SM2 HYD QTY (B) S86 WSB T SM0 THRM HYD (B) S66 AV BAY 1,2 FAN S66 AV BAY 3 FAN S78 CABIN DP/DT S66 CABIN PPO2 B,C S66 IMU FAN DP S66 IMU FN SPD B S69 FC PUMP 2 S69 FC H2 PUMP 2 S88 FREON FLOW 1 S88 FRN AFT CP 1 S88 FRN PL HX 1 S88 FREON QTY 2 S88 FREON FLOW 2 3 R RCS D,R JET S67 MAIN BUS V B I/O ERROR CRT 2 S67 FPC/FLC 2	
If SSPTS: PTU 2(OPCU 2 and APCU 2)	If SSPTS: PTU 2(OPCU 2 and APCU 2)		
(Continued)	(Continued)	(Continued)	

EPS MNB  
SSR 30-49c

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A1L) S-BD PM • ANT SW ELEC – 2 • XPNDR – 2 • PWR AMPL OPER – 2 • STBY – 2 • PRE AMP – 2 NSP • PWR – 2	S-BD PM Sys 1: Xpndr 1 PreAmp 1 NSP 1 COM SEC 1 Pwr Amp 1 PM and FM Ant SW 1	(FSM) S67 MPC 2 S67 APC/ALC B RM DLMA MANF If ADTA 2, MLS 2, -Y STAR TRKR pwrld: 'BCE STRG 2 ADTA' (3,B) 'BCE STRG 2 MLS' (3) 'BCE STRG 3 STKR'	③ Indications do not appear until jet commanded ⑤ Vlv holds position ⑥ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures are found in payload or ISS specific books
(A1L) If PSP and/or INTRG reqd for PL or ISS ops: • S-BD PL PWR SYS – 2 • CNTL – PNL • – CMD 6 • Reconfig PSP 6 • Perform PL INTRG REACQ (if reqd)	S-BD PL Intrg 1 PSP 1 SW PL Ant capability to 2RH,2LH	(L2) 5 CAB RELIEF A tb – bp 5 O2 SYS 2 SPLY tb – CL 5 N2 SYS 2 SPLY tb – bp 5 N2 SYS 2 REG INLET tb – bp	⑦ OIU CABLE SWAP (IFM PROCEDURES, IFM) will be reqd to regain OIU cmd via OIU 1 and PSP 2
7 If OIU reqd, √MCC	3 OIU 2 OIU 1 MNB Pwr	SM 212 OIU OIU 2 TEMP ≥ 140 SM 62 PCMMU/PL COMM If OIU 2, active possible msg 'S62 PDI DECOM FAIL'	⑧ When gear deployed, tb does not indicate DN
(A1R) • S-BD FM PWR – 2	S-BD FM Sig Proc 1 Xmtr 1	(F6/F8) 8 LDG GEAR L, NOSE (two) tb – bp	⑨ Vlv holds position. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed
If no comm: (C3) • S-BD PM CNTL – PNL • – CMD		(F7) FWD EVENT TIME ind – blank	
(L1) • Perform ON-ORBIT RAD CNTLR SWITCH, ECLS SSR-13 for Freon Loop 1,2 • FLASH EVAP CNTLR PRI A(B) – ON (if reqd) • TOP EVAP HTR NOZ L – A AUTO • TOP EVAP HTR NOZ R – B AUTO • TOP EVAP HTR DUCT – A(C) If Hi Load Evap enabled: • HI LOAD DUCT HTR – A(C)	Freon Loop 1,2 Rad Cntr A  FES Sec Cntr  Top Evap L Noz Htr B  Top Evap L R Noz Htr A  Top Evap Duct R Fwd,Aft Htrs B  Hi Load Duct Inbd,Outbd Noz Htrs B	(R1) FC2 COOL PUMP ΔP tb – bp	⑩ May be repwrld after AC Pwr Transfer Cable connected
(L2) • FLASH EVAP FDLN HTR A SPLY – 1	FES H2O Fdln A Htrs 2 (all)	(R4) 5 HYD MPS/TVC ISOL VLV SYS 2 tb – CL 9 HYD BRAKE ISOL VLV 2 tb – OP	⑪ When the OBSS is grappled by the RMS, the Cabin Payload A or B power feeds are used to pass MPC1 or MPC2 power, respectively, to the Payload Cabin 3 power bus for distribution to all OBSS equipment, except for LCS
(L4:P) • cb AC3 ΦA LG SNSR 1 – cl	10 Prox Snsr Electronics Box 2	If Sys 1 pwrld: 'S62 BCE BYP PSP 1' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'	⑫ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
(A8L) • PORT RMS HTR B – OFF • PORT RMS HTR A – AUTO  If OBSS berthed: (A8L) • STBD RMS HTR B – OFF • STBD RMS HTR A – AUTO	RMS: B/U Pwr 11 Port Payload Cntl Pwr B 12 Port MPM Mtr 2 12 Stbd MPM Mtr 1 13 Port Fwd MRL Mtr 1 13 Port Mid MRL Mtr 2 14 Stbd Fwd MRL Mtr 1 14 Stbd Mid MRL Mtr 1 14 Stbd Aft MRL Mtr 2 D&C B/U edge Itg 10 Port Htr B 10 Stbd Htr B	(O7) 5 AFT R RCS He PRESS B tb – bp AFT L,R RCS TK ISOL 3/4/5B tb – bp (if vlv in CL position)	⑬ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
(F6) • HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 2 or (OV105) GPS 2	MLS 2 (OV103,4) TACAN 2 (OV105) GPS 2	(O8) FWD RCS 5 He Press B tb – bp 5 MANF ISOL 2 tb – bp	⑭ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(F6,F8) • RDR ALTM – 1	RA 2	(R11L) SPLY H2O 5 DUMP ISOL VLV tb – bp 5 TKB INLET tb – bp 5 TKC OUTLET tb – bp 5 B SPLY ISOL VLV tb – bp	
(Continued)	(Continued)	(R13L) 5 MMU GN2 SPLY ISOL VLV B tb – bp	
(Continued)	(Continued)	(Continued)	

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O6) ANNUN BUS • SEL ACA 1 – MNA • 2/3 – MNC	ACA 1 MNB pwr ACA 2/3 MNB pwr	(ML31C) 5 WASTE H2O TK1 DRAIN VLV tb – bp 5 SPLY H2O TKD INLET tb – bp	⑤ Vlv holds position ⑮ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded
• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)	15 RCS Manf R5 RJD pwr (R5R,R5D)	(O1) AIR TEMP AV BAY 3 ind – 45 degF FREON FLOW LOOP 2 ind – 443 pph CAB dP/dT ind – .45 O2/N2 FLOW SYS 2 ind – 0 pph PPO2 SNSR B,C ind – 0	⑯ Do not reconfig for reg switch or l'CNCT procedures ⑰ Man CL and GPC cntl remain. Vlv holds position
Refer to OMS/RCS Slide Rule for vlv loss info	RCS manf F2 RJD pwr (F2F,F2R,R2U,F2D)	(A4) MSN and EVENT TIME ind – blank	⑱ Man OP capability remains. Vlv holds position
16 Reconfig following vlvs only if leak isolation reqd: (O7) • AFT L RCS He PRESS A • R RCS He PRESS A,B	17 F,L,R RCS He Pr Isol A man OP capability 18 F,R RCS He Pr Isol B GPC Cntl, man CL capability	19 If Site AOS and using S-BD Ant Elect 1: 'ANTENNA' (2) If NSP 1 selected: 'BCE STRG 1 NSP' 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'	⑲ Antenna miscompare causes FSM ⑳ Loss of redundant port to the following: MDU PLT 1 (P) MDU PLT 2 (S) MDU AFD 1 (S) ㉑ IDP 3, IDP 4 ADC data lost. MDU port select may be reqd ㉒ Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning ㉓ Htr A remains ㉔ Htr B remains ㉕ O2/N2 Cntl Vlv 2 normally closed when unpowered ㉖ Vlv fails closed. IFM or real-time flow test will be required. √MCC for additional direction
(O8) • FWD RCS He PRESS A,B	-----		
(C2) • R IDP/CRT SEL – 3 • GPC/CRT O2 EXEC	20 IDP 2 MDU CRT 2 MDU CDR 2 MDU MFD 1 21 ADC 1B/2B		
<b>SM 1 DPS UTILITY</b> (G2,G8,S2) MMU ASSIGN	MMU 2		
22 • GNC – ITEM 2 EXEC • SM – ITEM 3 EXEC • PL – ITEM 5 EXEC			
(A6U) • ANNUN BUS SEL – MNC	ACA 4/5 MNB pwr		
(A14) RCS/OMS HTR • FWD RCS – A AUTO • L POD (two) – A AUTO, B OFF • R POD (two) – A OFF, B AUTO • OMS CRSFD LINES – A AUTO, B OFF	23 Fwd RCS Htrs B (all) L Pod B Htrs (partial) 24 R Pod A Htrs (all) 16 OMS Crsfd Ln Htrs B (all)		
(ML86B:A) • cb MNA H2O LINE HTR A – cl	H2O Line Htrs B: Waste Dump Line Htr Sply Dump Line Htr Vac Vent Line Htr		
(ML86B:C) • cb MNA EXT ARLK HTR STRUC Z1/2/3 – cl • cb MNA EXT ARLK HTR LN ZN 1, ZN 2 (two) – cl	Ext Arlk Htrs B: Structural Htrs B Water Line Htrs B		
If in Rendezvous or Docked: • cb MNA EXT ARLK HTR VEST Z1/2/3 – cl	Ext Arlk Vest Htrs B		
(ML86B:D) cb MNA MMU • PORT HTR A – cl • STBD HTR A – cl	23 MMU Port,Stbd Htr B		
• If on PCS 2: Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	5 O2/N2 Cntl Sys 2: 5 O2 Sply Vlv Cntl 5 N2 Sply Vlv 2 Cntl 25 Reg Inlet Vlv 2 Cntl 26 O2/N2 Cntl Vlv 2 Man Cntl O2 Xovr Vlv 2 OP capability O2/N2 Sys 2 Flow Xdcrs PPO2 Snsrs B,C		
	dP/dT Snsr		
(Continued)	(Continued)	(Continued)	

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For PLBD ops: • OP/CL Drs in man mode	PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Mtr 2 Port Door Mtr 2 Stbd Door Mtr 2 Port,Stbd Fwd Blkhd Mtrs 2 Port,Stbd Door Mtr 1 CL Limit sws	If Freon sig condn A(B) on pnl O17:C in AC2 position: 'S88 FREON FLOW 2(1)' 'S88 FRN PL HX 1(2)' 'S88 FREON QTY 2(1)' ----- (O1) FREON FLOW LOOP 2(1) ind - 443 pph	(5) Vlv holds position (27) Lost TM: [GNC SYS SUMM 2] L OMS ENG VLV 2: Assume VLV 2 status same as VLV 1
27 Prior to using L(R) OMS: (O8)	28 L OMS He Pr Isol B and Vap Isol 2 GPC Cntl	CCTV video TV Annun Its lost if MNB selected for VCU CCTV Mon 2 lost (VTR input lost)	(28) Man cntl remains. Vap Isol closes. Pr Isol normally closed
29 L OMS He PRESS/VAP ISOL • A - GPC • B - OP	30 R OMS He Pr Isol A, B man Cntl and Vap Isol 1,2 man A,B Cntl	(F7) If APUs active and using BLR CNTLR/HTR 1A or 2B: C/W APU TEMP It - on after ~2 min	(29) Maintains He Isol redundancy
31 R OMS He PRESS/VAP ISOL • A(B) - GPC • B(A) - CL		[SM (BFS,SM) 63] [PL BAY DOORS]	(30) GPC cntl remains. Vlv fails closed
(O8) • Right OMS TK ISOL A - CL (tb-CL)	32 OMS Eng/Xfeed Redundancy		(31) Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
If Supply H2O Dump reqd and DUMP ISOL VLV failed closed: • Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)	5 Supply H2O Dump Isol Cntl	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	(32) Maintains deorbit capability for CNTL AB1 failure
If EMU(s) in battery charge mode: (AW18H) • PWR/BATT CHGR EMU 1(2) BUS SEL - MNA	EMU 1,2 Pwr/Batt Chgr MNB pwr	If OMS Gmbl cmd abs value > 2 deg and Sec TVC selected: OMS TVC C/W It 'L OMS GMBL' (3,B)	(33) Not yet active on all vehicles
[GNC 23 RCS] • Reprioritize L,R Manf 1, F 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 • Set forward pod PRI JET FAIL LIMIT to 4	Aft RCS L,R Jet 1 Htrs Fwd RCS Jet 3 Htrs	If first AA failure and S/W Processing Accel data: 'RM FAIL ACC' (3)	(34) APU H2O QTY 1 ind - 0% if BLR CNTLR/HTR 1A selected. APU H2O QTY 2 ind - 0% if BLR CNTLR/HTR 2B selected
If CCTV reqd: (A7U) • TV PWR CONTR UNIT - MNA	Video Cntl Unit MNB pwr	If first RGA failure and rates sensed: 'RM FAIL RGA' (3)	(35) Sys B Pri Cntlr, auto switchover to Sec Cntlr remain
For SSME Hyd Reprss: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) - OP, wait 10 sec, then CL	33 FC1 Redundant Reac Vlv Cntl on pnl C3	Star Trkr Dr -Z OP/CL time and -Y CL time incr from 8 to 16 sec	
[GNC XXXXX] [MNVY YYYYY] Sel L OMS PRI GMBL • ITEM 28 EXEC	5 MPS/TVC Hyd Sys 2 Isol Cntl	L,R ADP deploy times incr from 15 to 30 sec	
(ML31C) • VAC VENT ISOL VLV BUS SEC - MNA	L OMS Sec TVC	[HYD/APU] APU H2O QTY 1 Ind - 0% 2 Ind - 0% HYD QTY 2 Ind - 0% APU 1 SPEED % Ind - 0	
If reqd during entry (< 120 K ft): (L1) • NH3 CNTLR A(B) - PRI/GPC	Vac Vent Isol MNB Cntl	34	
(Continued)	35 NH3 Sys B Sec Cntlr Man capability	(Continued)	

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
If AC Pwr Transfer Cable to be installed to regain AC: • Go to EPS SSR-200; otherwise, continue with Bus Loss Actions			(36) Av Bay 3 Fan ΔP, Air Out Temp Snsrs lost
(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			(37) Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost (38) Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost
(EDO WCS) • URINAL SEL – SEP 1 • WCS PWR SEL – AUTO 1, OFF 2 • URINE DIVERTER VLV FAN SEP 1	Urine Sep 2 Fan 2 Commode Fan 2 Controller MNB pwr Compactor MNB Cntl		(39) Lose Auto Temp Cntl 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
(R2) • BLR CNTLR/HTR 1 – B • 2 – A	Hyd H2O Blr 1 Cntlr A 2 Cntlr B		
(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	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) 36 Freon Loop 1 Pump B		
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN B – OFF • √A – ON	Arlk/Tnl Fan B		
(O17:C) • SIG CONDR FREON A – AC3 • SIG CONDR FREON B – AC3	37 Freon Sig Condr A AC2 pwr (ECLS SC 1A) 38 Freon Sig Condr B AC2 pwr (ECLS SC 1B)		
(CDRs SEAT) • SEAT PWR BUS SEL – AC3	CDR Seat Adj via AC2 pwr		
(PLTs SEAT) • SEAT PWR BUS SEL – AC3	PLT Seat Adj via AC2 pwr		
• If Cab Temp Cntlr 1 active: (L1) • CAB TEMP CNTLR – OFF	39 Cabin Temp Cntlr 1, Hx Byp Vlv Mtr 1		
(MD44F) • Remove pin from PRI Actuator BYP vlv linkage, connect linkage to SEC Actuator			
(L1) • CAB TEMP CNTLR – 2			
(Continued)	(Continued)		

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

	BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
40	ONLY ON MCC CALL, PERFORM			
41	(L1) • H2O PUMP LOOP 1 – OFF			④① AC2 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNB DA2 Actions column. No additional bus isolation steps reqd ④① If this action taken, activate H2O Pump Loop 2 ④② Motor B remains ④③ Redundant pwr source remains for equipment ④④ H2O Loop 2 ICH Flow Rate snsr lost ④⑤ Other detn in Av Bay remains ④⑥ Current Snsr 1 remains ④⑦ Cntrlr B remains
	(L4:N) • cb AC2 ΦC RAD ISOL A – op	42 Freon Loop 1,2 Rad Isol Motor A		
	• MDU CRT 2 PWR – OFF • MDU CDR 2 PWR – OFF • MDU MFD 1 PWR – OFF			
	(C2) • IDP/CRT 2 PWR – OFF			
	(C3) • MSTR MADS PWR – OFF			
	(O6) • STAR TRKR PWR -Y – OFF	-Y Star Tracker		
	(O7) • (OV105) GPS 2 PWR – OFF • (OV105) GPS 2 PRE AMPL UPPER – OFF • (OV105) GPS 2 PRE AMPL LOWER – OFF	GPS 2		
	(O8) • RADAR ALTM 2 – OFF • MLS 2 – OFF			
	(O15:A) • RGA 2 – OFF	RGA 2		
43	(O15:B) cb MNB OI SIG CONDR • OF 1/4 B – op			
43	• OF 2/3 A – op cb MNB			
43	• OM 1/2 B – op			
43	• OI MDM OF 1/2 B – op • OI SIG CONDR OM 3A – op			
43	• OI H2O BYP LOOP 2 SNSR – op	44 H2O Byp Loop 2 Snsr (ECLS SC12)		
	(O15:B) • cb MNA CONTR – op • MSN TIMER AFT – op • EVENT TIMER FWD – op	Aft Mission Timer Fwd Event Timer		
45	(O15:C) cb MNB • (OV103) TACAN 2 – op • SMOKE DETN BAY 1B/3A – op • FIRE SUPPR BAY 1 – op • UTIL PWR F1/MO13Q – op • FLOOD R CNSL – op • L CTR – 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 • (OV104,5) GPS 2 PRE AMPL UPPER – op	Tacan 2 Av Bay 1 Smoke Det B, Av Bay 3 Smoke Det A  MNB Utility pwr  R Console Floodlt L Seat/Ctr Console Floodlt		
	(A13) • (OV104) GPS 2 PWR - OFF • (OV104) GPS 2 PRE AMPL UPPER - OFF • (OV104) GPS 2 PRE AMPL LOWER - OFF	46 Cryo O2 Tk2 Htr Current Snsr 2		
	(A15:H,I,J,K) • cb MNB TK6-TK9 O2 HTR SNSR 2 – op	46 Cryo O2 Tk6-9 Htr Current Snsr 2		
47	(O15:D) cb MNB • FREON RAD CNTLR 1 – op			
47	• FREON RAD CNTLR 2 – op			
	(Continued)	(Continued)		

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			① Buses remain pwr'd
48 • PPO2 C CAB dP/dT – op • (OV104,5) GPS 2 PRE AMPL LOWER – op • N2 SPLY 2 – op • O2/N2 CNTLR – op • O2 XOVR 2 – op • N2 REG INLET 2 – op • CAB RELIEF A – op • NWS – op	Cabin Relief Vlv A Cntl NWS – 2		⑤ Vlv holds position ④③ Redundant pwr source remains for equipment ④⑧ NWS 1 still available ④⑨ CDR Arm remains
43 (O15:E) cb MNB • RDR ALTM 2 – op • MLS 2 – op • (OV104) TACAN 2 – op • ADTA 2 – op • STAR TRKR -Y – op • ACCEL 2 – op 43 • DDU L – op 43 • R – op • DRAG CHUTE SYS 2 – op	5 Tacan 2 5 ADTA 2  AA2  49 Drag Chute, PLT Arm		⑤⑩ Six vlvs fail to non-isolation position ⑤① KU-BAND ANTENNA: CONTINGENCY STOW – W/EVA ANT GIMBAL ALIGNMENT (IFM) req'd to stow Ku-Bd. Jettison req'd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope
(O15:F) • MMU 2 – OFF	50 ASA 4 Isol		
	50 ATVC 3 Isol ME 50 4 Isol ME		
(R1) • PL AFT MNB – OFF	Aft PL MNB pwr		
(R11U) • FC PURGE VLV 2 – CL • FC STARTUP HTR 2 – ENA	FC2 Startup Htr Inhibit capability		
(R14:A) • cb MNB AUD MIDDECK SPKR – op • ADC 1B/2B – op • MDU MFD 1 – op • MDU CDR 2 – op	Middeck ATU Middeck Spkr		
43 (R14:B) • cb MNB CNTL BUS CA 1/2/3 – op cb PALLET/DSC • 1B – op (EDO) • 4B – op (EDO)	1 MNB pwr for CNTL CA 1,2,3 Buses		
(R14:C) cb MNB KU • ELEC – op • ANT HTR – op • CABLE HTR – op	51 Ku-Bd sys (I/F and cont Unit, RDR) Sig Proc & Dpy Assy Deployed Assy Htrs		
(R14:D) cb MNB TV A CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op  cb MNB TV • CONTR UNIT – op • MON 2 – op	TV A Camr/Pan-Tilt TV A Camr Htr TV A Camr Pan-Tilt Htr and Illum  CCTV Mon 2		
(R14:E) • cb MNB OS FLOOD – op cb MNB RMS CAMR • CAMR/PTU – op • WRIST ILLUM/CAMR HTR – op • ELB ILLUM/PTU HTR – op	OS Floodlt  RMS Camr/Pan-Tilt RMS Camr Htr and Wrist Illum RMS Camr Pan-Tilt Htr and Elb Illum		
(Continued)	(Continued)		



**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM		DSP SYS PWR SYS 2 tb – OFF	⑤ Vlv holds position
(A7U) PL BAY FLOOD • FWD BHD – OFF • MID PORT – OFF • FWD STBD – OFF	PLB Fwd Blkhd Floodlt Mid Port Floodlt Fwd Stbd Floodlt		②③ Htr A remains ⑤② All docking mechanisms will have single mtr times
(A7L) IF DOCKING MISSION • cb DEP MNB SYS 2 VENT ISOL – op • cb DEP MNB SYS 2 VENT – op	Vest Dep Vlv Sys 2 Vent Vent Isol		⑤③ Logic buses 1(2) remain pwr'd via MNA(MNC)
(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	MNB A7  Aft Truss Docking It Stbd Vestibule Docking It DSP SYS 2 Pwr PSU MNB Pwr 52  53 MNB pwr to DSP Logic buses 1,2  External Airlock Its 2,3		⑤④ No redundancy ⑤⑤ One failure away from loss of jettison capability
(MA73C:A,B) MCA LOGIC MNB • FWD 2 – OFF • AFT 2 – OFF • MID 1,2,3,4 (four) – OFF	MNB FMC2 Bus pwr AMC2 Bus pwr MMC1,MMC2,MMC3, MMC4 Bus pwr		
(ML86B:A) cb MNB • H2O LINE HTR B – op • SUPPLY H2O TKB INLET – op • SUPPLY H2O TKC OUTLET – op • SUPPLY H2O DUMP ISOL – op • SUPPLY H2O B SPLY ISOL VLV – op	5 Sply H2O TKB Inlet Vlv Cntl  5 Sply H2O TKC Outlet Vlv Cntl  5 Sply H2O B Sply ISOL Vlv Cntl		
(ML86B:B) cb MNB • VAC VENT NOZ HTR – op • WASTE H2O TK1 DRAIN – op • SUPPLY H2O TKD INLET – op • VAC VENT ISOL VLV – op • WCS CNTLR – op • GALLEY H2O HTR – op	54 Waste H2O Vac Vent Noz Htr 5 Tk1 Drain Vlv Cntl  5 Sply H2O TKD Inlet Vlv Cntl  WCS Press Xdcr Galley H2O Htrs		
(ML86B:C) cb MNB • EXT ARLK HTR STRUC Z1/2/3 – op • EXT ARLK HTR LN ZN 1, ZN 2 (two) – op • EXT ARLK HTR VEST Z1/2/3 – op	Ext Arlk Struc Htrs B  Ext Arlk H2O Ln Htrs B  Ext Arlk Vest Htrs B		
(ML86B:D) cb MNB MMU • PORT,STBD HTR B – op • GN2 SPLY ISOL VLV B – op cb MNB PYRO JETT SYS A • PORT RMS – op	23 MMU Port,Stbd Htr B 5 GN2 Sply Isol Vlv B Port RMS: 55 Jett/Guil Sys A Deadface Relays		
(ML86B:E) cb MNB SEAT • L – op • R – op cb MNB FLOOD • TNL ADAPT 3 – op cb MNB • CO2 COM INSTR – op	CO2 Rmvl Sys Filter dP CO2 Rmvl Sys Vacuum Press CO2 Rmvl Sys POCO2 Snsr Inlet Temp TA Floodlt 3		
(Continued)	(Continued)		

**EPS SSR-30 (Cont)**  
**BUS LOSS: MNB DA2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(ML86B:F) cb MNB FLOODS • MIDDECK 2/6 – op • BUNK 2/4 – op ----- ONLY ON MCC CALL, PERFORM • PHS – op • AIRLK 3 – op cb MNB CRYO O2 46 • HTR TK3 SNSR 2 – op 56 • TK4 SNSR 1 – op	Middeck Floods 2,6 Bunk Floodlts 2/4 ----- PHS Floodlt Airk Flood 3 Cryo O2: 46 Tk 3 Htr Current Snsr 2 56 4 Htr Current Snsr 1 57 Port,Stbd Rad Mtrs 2 Dpy capability Port,Stbd Rad Lat 1-6 Mtrs 2 58 Fwd RCS Jet 2 Htrs L OMS ENG Press Vlv Coil 2, Cntl Vlv 1,2 Coil 2 59 OMS Qty Gauging for all L OMS single engine burns 9 Hyd Brake Isol Vlv 2 Cntl 60 APU 1 Cntr Pwr Sply B 61 1 Fuel Tk Vlv B 62 2 Cntr Pwr Sply A 2 Fuel Tk Vlv A APU 2 GBX GN2 Repress Vlv Hyd Rsvr 2 Qty Snsr 63 Freon Loop 2 Cntr A Rad Byp Vlv Mtr Man Cntl 64 Freon Loop 1 Cntr A Rad Byp Vlv Mtr 5 Freon Loop 1 Flow Prop Vlv Freon Loop 1 Cold Plate Flow Xdcr 65 L,R ADP Dpy Mtrs 2 66 Htr Cntr 2 RH Vents 1,2,6,8,9 Mtrs 2 LH Vents 1,2,3,5,8,9 Mtrs 2 NLG B/U Rel and Ext Sys 2 LMG, RMG B/U Rel Sys 2 -Y Star Trkr Dr OP and Sys 2 CL capability -Z Star Trkr Dr Sys 1 OP/CL capability PL Reten Sys B Rel/Lat Mtrs 67 Ku Ant Sto/Dpy Mtr 2 MPS: 68 L Eng He Intercon Outlet Vlv 63 L Eng He Isol A 63 Pneu He Isol 2 69 Prplt F/D Inbd LO2 Vlv 69 Outbd LH2 Vlv 70 Manf Repress LH2 Vlv 1,2 71 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 72 NWS Hyd Sys 2 9 LG Extend Vlv 2 73 Ops Hyd Actr Instr Hyd Main Pump 2 Depress Solenoid RPC A 73 Hyd Main Pump 1 Depress Solenoid RPC B	L MPS He reg A < 680 during entry (MM 303)	(5) Vlv holds position (9) Vlv holds position. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed (46) Current Snsr 1 remains (56) Current Snsr 2 remains (57) Mtrs 2 stow capability unaffected (58) Redundant coils remain (59) √MCC for OMS Qty (60) Pwr supply A remains. Turbine speed ind lost (61) Vlv fails closed. Redundant vlv remains (62) Pwr supply B remains. GG Bed T and GBX P lost when APU running (63) Cntrls A,B Rad Byp Vlv Mtrs Auto Cntl and Cntr B Rad Byp Vlv Mtr Man Cntl remain (64) Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains (65) Mtr 1 remains (66) Htr Cntr 1 remains (67) √MCC for stow reqmts (68) Vlv fails closed (69) Vlv holds position. Loss of manual capability to inert LO2 and LH2 Manf (70) Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304) (71) Redundant mtrs remains (72) Hyd Sys 1 still available for NWS (73) Redundant RPC remains

# EPS SSR-31

## BUS LOSS: MNB FPC2

(Includes MNB FLC2, MNB FMC2, AC2)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC2 SHUTDN (FC SHUTDN Cue Card), pwrdsn not needed, then:	2 FC2 Pumps and pH Snr	MASTER ALARM Light/Tone – on CRT 2 blanks	① <b>TIME CRITICAL</b>
(R1) • cb AC CONTR AC2 ΦA, ΦB, ΦC (three) – cl • INV/AC BUS 2 – OFF (tb-OFF) • INV PWR 2 – OFF (tb-OFF) • cb AC CONTR AC2 ΦA, ΦB, ΦC (three) – op • AC2 BUS SNSR – OFF	AC2 ΦA,ΦB,ΦC Inverters	(F7) C/W FC PUMP It – on C/W AC VOLT It – on C/W FREON LOOP It – on C/W AV BAY/CAB AIR SM ALERT Light/Tone – on	FC2 must be shutdn within 9 min to avoid potentially hazardous condition
(L4:P) • cb AC3 ΦA LG SNSR 1 – cl	2 Prox Snr Electronics Box 2	(F9) AC2 ΦA,ΦB,ΦC AC volts < 90	② Will be repwrdr after AC Pwr Transfer Cable connected
Refer to OMS/RCS Slide Rule for vlv loss info Reconfig following vlv only if leak isolation reqd: (O8)	3 Fwd RCS He Press Isol A man OP capability 4 Fwd RCS He Press Isol B man CL and full GPC Cntl RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)	(COMM LOST) All S-BD A/G voice lost if Sys 1 selected	③ Man CL and full GPC cntl remains. Vlv holds position
5 • FWD RCS He PRESS A,B		(LIGHTS LOST) Right Ovhd pnl (pnls O1, O2,O3,O8,O9,O16,O17) Right pnl (pnls F4,F8,F9, R1,R2,R4) Ovhd Instr (pnls O1,O2,O3) Orbit Sta Numeric lts (pnls A2,A4)	④ Man OP capability remains. Vlv holds position
(A1L) S-BD PM • ANT SW ELEC – 2 • XPNDR – 2 • PWR AMPL OPER – 2 • STBY – 2 • PRE AMPL – 2 NSP • PWR – 2	S-BD PM Sys 1: Xpndr 1 Pre-Amp 1 Pwr Amp 1 PM, FM Ant Sw 1 NSP 1/COMSEC 1	(FSMs) S67 FPC/FLC 2 S67 AC VOLTS 2 S86 HYD RSVR Q SM2 HYD QTY (B) S86 WSB T SM0 THRM HYD (B) S66 AV BAY 1,2 FAN S66 AV BAY 3 FAN S69 FC PUMP 2 S69 FC H2 PUMP 2 S88 FRN AFT CP 1 S88 FREON FLOW 1 S88 FRN PL HX 1 RM DLMA MANF S88 I/O ERROR CRT 2 S66 CABIN FAN S66 IMU FAN DP S66 IMU FN SPD B	⑤ Do not reconfig for reg switch or I'CNCT procedures
If simo loss of MNA & MNB: • NSP ENCRYPTION MODE – SEL • NSP ENCRYPTION SEL – BYP		(F6/F8) 7 LDG GEAR L,NOSE tb – bp	⑥ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books
If PSP and/or INTRG reqd for PL or ISS ops: • S-BD PL PWR SYS – 2 • CNTL – PNL • – CMD	S-BD PL Intrg 1 PSP 1	[HYD/APU]	⑦ When gear deployed, tb will not indicate DN
6 • Reconfig PSP 6 • Perform PL INTRG REACQ (if reqd)		8 APU H2O QTY 1 ind – 0% 2 ind – 0% HYD QTY 2 ind – 0%	⑧ APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A active. APU H2O QTY 2 ind – 0% if BLR CNTLR/HTR 2B active
(A1R) • S-BD FM PWR – 2	S-BD FM Sys 1	(R1) 4 FC2 COOL PUMP ΔP tb – bp	⑨ OIU 2 interfaces with PSP 2 for commanding
If no comm: (C3) • S-BD PM CNTL – PNL • – CMD		(O8) 10 FWD RCS He PRESS B tb – bp FWD RCS MANF ISOL 2 tb – bp	⑩ Vlv holds position
9 If OIU reqd: (SSP) • OIU PWR – OIU 2 ON • OIU tb – DN • √MCC, OIU reconfig		(O1) AIR TEMP AV BAY 3 ind – 45 degF AIR TEMP CAB HX OUT ind – 45 degF FREON FLOW LOOP 1 ind – 578 pph	⑪ 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)
(C2) • R IDP/CRT SEL – 3 On MCC GO: • GPC/CRT O2 EXEC	11 IDP 2 MDU CRT 2		(Continued)
(A14) • RCS/OMS HTR FWD RCS A AUTO	Fwd RCS Htrs B (all)		(Continued)
(Continued)	(Continued)	(Continued)	(Continued)

**EPS SSR-31 (Cont)**  
**BUS LOSS: MNB FPC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p><b>DPS UTILITY</b> (G2,G8,S2)</p> <p>MMU ASSIGN</p> <p>12 • GNC – ITEM 2 EXEC            • SM – ITEM 3 EXEC            • PL – ITEM 5 EXEC            • OPS 0 – ITEM 7 EXEC</p>	<p>MMU 2</p>	<p>(A4)            MSN and EVENT TIME ind – blank</p> <p>L,R ADP deploy times incr from 15 to 30 sec</p>	<p>12 Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning</p>
<p>If EMU(s) in battery charge mode:            (AW18H)            • PWR/BATT CHGR EMU 1(2) BUS SEL – MNA</p>	<p>EMU 1,2 Pwr/Batt Chgr MNB pwr</p>	<p>13 If site AOS and using S-BD Ant Elec 1: 'ANTENNA' (2)</p> <p>-Y,-Z Star Trkr Drs OP/CL time incr from 8 to 16 sec</p>	<p>13 FSM caused by antenna miscompare</p>
<p>Pre-seat ingress for Entry:            • Discharge handheld fire ext into AV BAY 1</p>	<p>Av Bay 1 agent discharge capability</p>	<p>If Sys 1 pwrd:            'S62 BCE BYP PSP1'            Loss of PL TLM and CMD</p>	<p>14 AV Bay 3 Fan ΔP Air Out Temp Snrs lost</p>
<p>If AC Pwr Cable to be installed to regain AC:            • Go to <u>EPS SSR-200</u>; otherwise, continue with Bus Loss Actions</p>		<p>If PDI FDA Enabled:            'S62 PDI DECOM FAIL'</p>	<p>15 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty Snrs lost</p>
<p>(R2)            • BLR CNTLR/HTR 1 – B            • 2 – A</p>	<p>Hyd H2O Blr 1 Cntrl A            2 Cntrl B            RSVR 2 Qty Snsr</p>	<p>If NSP 1 selected:            'BCE STRG 1 NSP'</p>	<p>16 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty Snrs lost</p>
<p>(L4:F)            • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</p>		<p>If Freon Loop 1 Pump B ON:            'S88 FREON FLOW 1'            'S88 FRN AFT CP 1'            'S88 FRN PL HX 1'</p>	
<p>(L1)            • HUM SEP B – OFF            • A – ON            • CAB FAN B – OFF            • A – ON            • IMU FAN B – OFF            • A(C) – ON            • H2O PUMP LOOP 1 – A            • 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            • 2 – A</p>	<p>Humidity Sep B</p> <p>Cabin Fan B</p> <p>IMU Fan B</p> <p>H2O Loop 1 Pump B            Av Bay 1 Fan B</p> <p>Av Bay 2 Fan A</p> <p>14 Av Bay 3 Sig Condr, Xdcrs (ECLS SC4)            Freon Loop 1 Pump B</p>	<p>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)'</p>	
<p>(MO13Q)            If Arlk/Tnl Fan active:            • ARLK FAN B – OFF            • √A – ON</p>	<p>Arlk/Tnl Fan B</p>	<p>(O1)            FREON FLOW LOOP 2(1) ind – 578 pph</p>	
<p>(O17:C)            • SIG CONDR FREON A – AC3            • SIG CONDR FREON B – AC3</p>	<p>15 Freon Sig Condr A AC2 pwr (ECLS SC1A)            16 Freon Sig Condr B AC2 pwr (ECLS SC1B)</p>	<p>If H2O Loop 1 Pump B ON:            C/W H2O LOOP It            'S88 H2O PUMP P 1'            'S88 H2O LOOP 1 FLOW'            'S88 H2O LOOP 1 TEMP'</p>	
<p>(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</p>	<p>WCS Fan/Sep 2</p>	<p>(O1)            H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia</p>	
<p>(Continued)</p>	<p>(Continued)</p>	<p>(F7)            If APUs active and using H2O Blr Cntrl 1A(2B):            C/W APU TEMP It after ~2 min</p>	
<p>(Continued)</p>		<p>During Rad Dpy/Sto ops:            (R13L)            RAD LAT CNTL tbs (two) indicate single mtr ops</p>	

**EPS SSR-31 (Cont)**  
**BUS LOSS: MNB FPC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(EDO WCS) URINAL SEL – SEP 1 • WCS PWR SEL – AUTO 1, OFF 2 • URINE DIVERTER VLV FAN SEP 1	Urine Sep 2 Fan 2 Commode Fan 2		⑩ Vlv holds position
(CDR's SEAT) • CDR SEAT PWR BUS SEL – AC3	CDR Seat Adj via AC2 pwr		⑪ Lost Auto Temp Cntl via Cntrl 1 and Cabin Temp. Cabin Hx Air Out Temp and H2O Loop Cabin Hx In Temp Snsrs Hx Byp Vlv holds position
(PLT's SEAT) • PLT SEAT PWR BUS SEL – AC3	PLT Seat Adj via AC2 pwr		⑫ Bypass vlv holds position and Cntrl B Rad Byp vlv mtr remains
If Cab Temp Cntrl 1 active: (L1) • CAB TEMP CNTLR – OFF	17 Cabin Temp Cntrl 1 and Hx Byp vlv Mtr 1		⑬ AC2 Bus isolation for AC Pwr Transfer Cable installation accomplished in MNB FPC2 Actions Column. No additional bus isolation steps reqd
(MD44F) • Remove pin from PRI Actuator and BYP vlv linkage • Connect linkage to SEC Actuator			⑭ Motor B remains
(L1) • CAB TEMP CNTLR – 2 • Perform LOSS OF 1 FC (ORB PKT, PWRDN)			
	18 Freon Loop 1 Cntrl A Rad Byp Vlv Mtr 10 Freon Loop 1 Flow Prop Vlv		
19 <b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(L1) • H2O PUMP LOOP 1 – OFF 2 – ON			
(L4:N) • cb AC2 ΦC RAD ISOL A – op • MDU CRT 2 PWR – OFF	20 Freon Loop 1,2 Rad Isol Motor A		
(C2) • IDP/CRT 2 PWR – OFF			
(O7) • (OV105) GPS 2 PWR – OFF • (OV105) GPS 2 PRE AMPL UPPER – OFF • (OV105) GPS 2 PRE AMPL LOWER – OFF	(OV105) GPS 2		
(O15:F) • MMU 2 – OFF			
(A7L) • MADS RCDR PWR – OFF	MADS Rcdr All MADS and ACIP data		
(A13) • (OV104) GPS 2 PWR – OFF • (OV104) GPS 2 PRE AMPL UPPER – OFF • (OV104) GPS 2 PRE AMPL LOWER – OFF	GPS 2		
(MA73C:A) • MCA LOGIC MNB FWD 2 – OFF	MNB FMC2 Bus pwr		
(Continued)	(Continued)		

**EPS SSR-31 (Cont)**  
**BUS LOSS: MNB FPC2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
(O15:C) cb MNB • FIRE SUPPR BAY 1 – op • (OV104,5) GPS 2 PRE AMPL UPPER – op	21 MNB Pwr to CNTL Buses AB1,AB2,AB3,BC1,BC2,BC3		② Will be repwr'd after AC Pwr Transfer Cable connected ②① Buses remain pwr'd ②② Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy, if failed closed ②③ Hyd Sys 1 still available for NWS ②④ Redundant mtrs remain ②⑤ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison. May be repwr'd after AC Pwr Transfer Cable connected ②⑥ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. May be repwr'd after AC Pwr Transfer Cable connected ②⑦ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists. May be repwr'd after AC Pwr Transfer Cable connected ②⑧ √MCC for stow reqmts
(O15:D) • (OV104,5) cb MNB GPS 2 PRE AMPL LOWER – op			
	NLG B/U Rel and Ext Sys 2 LMG,RMG B/U Rel Sys 2		
	22 LG Extend Vlv 2		
	23 NWS Hyd Sys 2		
	-Y Star Trkr Dr Sys 2 OP/CL capability -Z Star Trkr Dr Sys 1 OP/CL capability		
	L,R ADP Dpy Mtrs 2 Htr Cntrl 2 RH Vents 1,2,6,8,9 Mtrs 2 LH Vents 1,2,3,5,8,9 Mtrs 2		
	24 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		
	RMS:		
	25 Port MPM Mtr 2		
	25 Stbd MPM Mtr 1		
	26 Port Fwd MRL Mtr 1		
	26 Port Mid MRL Mtr 2		
	27 Stbd Mid MRL Mtr 1		
	27 Stbd Aft MRL Mtr 2		
	2 D&C B/U edge Itg		
	28 Ku Ant Sto/Dpy Mtr 2		
	PL Reten Sys B Rel/Lat Mtrs		
	Port,Stbd Rad Lat 1-6 Mtrs 2		

# EPS SSR-32

## BUS LOSS: MNB MPC2

(Includes MNB MMC1, MNB MMC2, MNB MMC3, MNB MMC4)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform MNB BUS TIE (BUS TIE Cue Card) • Monitor, record Δamps between FC2 and tied FC	1 FC2 Purge Vlv O2,H2 Flow Xdcrs SS ΔV Snrs	(L2) 2 O2 SYS 2 SPLY tb – CL	① Buses are tied due to:
(R1) • PL CAB – MNA	3 MNB pwr to CABPL1,2,3 Buses	(LIGHTS LOST) PLB Fwd Bikhnd Floodlt Mid Port Floodlt Fwd Stbd Floodlt	<u>Loss of FC2 Purge Capability.</u> 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
(A8L) • PORT RMS HTR B – OFF • PORT RMS HTR A – AUTO  If OBSS berthed: (A8L) • STBD RMS HTR B – OFF • STBD RMS HTR A – AUTO	RMS: B/U pwr 4 Port Payload Cntl Pwr B 5 Port MPM Mtr 2 5 Stbd MPM Mtr 1 6 Port Fwd MRL Mtr 1 6 Port Mid MRL Mtr 2 7 Stbd Fwd MRL Mtr 1 7 Stbd Mid MRL Mtr 1 7 Stbd Aft MRL Mtr 2 Port Htr B Stbd Htr B	(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L FWD tb – bp  STARBOARD RMS: RETEN LAT tb – bp R-F-L FWD tb – bp R-F-L MID tb – bp	<u>Loss of FC2 SSΔV Snrs.</u> Change in ΔAmps > 12 amps indicates possible cell crossover problem. The ΔAmps shift due to loss of FC2 purge capability is indicated by change in ΔAmps between pre- and post-purge readings. MCC will aid in this determination
(L1) • TOP EVAP HTR DUCT – A If Hi Load Evap enabled • HI LOAD DUCT HTR – A(C)	Top Evap Duct Fwd,Aft Htrs B HI Load Duct Inbd,Outbd Htrs B	SM 94 PDRS CONTROL PORT RMS Indications lost: MPM Mtr 2 STO/DPY Fwd MRL Mtr 1 LAT/REL/RDY Mid MRL Mtr 2 LAT/REL/RDY	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
(L2) • FLASH EVAP FDLN HTR A SPLY – 1	FES H2O Fdln A Mid 2 Htr 2	STBD RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 1 LAT/REL/RDY Mid MRL Mtr 1 LAT/REL/RDY Aft MRL Mtr 2 LAT/REL/RDY	④ When the OBSS is grappled by the RMS, the Cabin Payload A or B power feeds are used to pass MPC1 or MPC2 power, respectively, to the Payload Cabin 3 power bus for distribution to all OBSS equipment, except for LCS
(A12) • HYD HTR AFT FUS B – AUTO • HYD HTR AFT FUS A – OFF	Aft Fuselage Hyd Htrs A HYD BK HTR B	(R13L) During Rad Dpy ops: RAD CNTL tbs (two) indicate single mtr ops	⑤ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
(MA73C:C,D) 8 • cb MCA PWR AC2 3Φ MID 2 – op 8 • cb MCA PWR AC2 3Φ MID 4 – op	8 Stbd Rad Lat 1-6 Mtr 2 Limit sw 8 Port Rad Lat 1-6 Mtr 2 Limit sw	If in RDR/Comm Track, will break track (A1U) SIG STRENGTH – 0 SM 201 ANTENNA SIG STR – 0 Erratic antenna motion	⑥ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
For PLBD ops: • OP/CL Drs in man mode	PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Bikhnd Lat Mtr 2 Port Door Mtr 2 Port,Stbd Fwd Bikhnd Lat Mtr 2 Stbd Door Mtr 2 Port,Stbd Door Mtr 1 CL Limit sw	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	⑦ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(R14:C) cb MNB KU • ELEC – op • ANT HTR – op • CABLE HTR – op cb MNC KU • SIG PROC – op	9 Ext A/L Structural Htrs MNB pwr	S177 EXTERNAL AIRLOCK Indications lost: EXT A/L PRESS	⑧ If AC2 cbs not opened, Lat Mtrs 2 of actuators for Port and Stbd Rad Lat 1-6 continues to run until Sys B Lat Cntl sw placed to OFF
(ML86B:C) 9 • cb MNA EXT ARLK HTR STRUC – cl	3 OIU 2 OIU 1 MNB pwr	SM 212 OIU OIU 2 TEMP ≥ 140	⑨ MNA hrs remain
If OIU reqd, √MCC: (SSP 1) • OIU PWR – OIU 1 ON  (AIL) • S-BD PL PWR SYS – 1 • CNTL – PNL • – CMD		SM 62 PCMMU/PL COMM If OIU 2 active msg, 'S62 PDI DECOM FAIL'	
(Continued)	(Continued)		

**EPS SSR-32 (Cont)**  
**BUS LOSS: MNB MPC2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM		DSP SYS PWR SYS 2 tb – OFF	② Vlv holds position
(R11U) • FC PURGE VLV 2 – CL • FC STARTUP HTR 2 – ENA	FC2 Startup Htr Inhibit capability		⑨ MNA htrs remain
(A7U) PL BAY FLOOD • FWD BHD – OFF • MID PORT – OFF • FWD STBD – OFF	PLB Fwd Blkhd Floodlt Mid Port Floodlt Fwd Stbd Floodlt		⑩ All docking mechanisms will have single mtr times
(A7L) IF DOCKING MISSION • cb DEP MNB SYS 2 VENT ISOL – op • cb DEP MNB SYS 2 VENT – op	Vest Dep Vlv Sys 2 Vent Vent Is		⑪ Logic buses 1(2) remain pwrd via MNA(MNC)
(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	MNB A7  Aft Truss Docking It Stbd Vestibule Docking It 10 DSP SYS 2 pwr PSU MNB pwr  11 MNB pwr to DSP Logic buses 1,2  External Airlock Its 2,3		⑫ Cntrlrs, A,B Rad Byp Vlv Mtrs Auto Cntl and Cntl B Rad Byp Vlv Mtr Man Cntl remain
(A7L) • MADS PCM – OFF	MADS PCM		⑬ Mtr 2 stow capability remains
(MA73C:A,B) • MCA LOGIC MNB MID (four) – OFF	MNB MMC1,2,3,4 Bus pwr		⑭ Buses remain pwrd
	12 Freon Loop 2 Cntl A Rad Byp Vlv Mtr Man Cntl 2 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl  13 Port,Stbd Rad Mtrs 2 Dpy capability LH Vent 3,5 Mtrs 2 RH Vent 6 Mtrs 2  14 MNB pwr to ESS1BC, ESS3AB AUX PL B Bus pwr  15 Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw 16 Ku-Bd Sys Deployed Assy including Htr Ckts (Rdr & Comm) 17 Redundant Ku-Bd Xmit Enable 18 Redundant Ku-Bd Boom Stow Enable II Excitation Signal		⑮ With an inoperative limit sw, mtr will continue to run until DPY/STO sw placed to GND position
(A15:H,I,J,K) • cb MNB TK6-TK9 O2 HTR SNSR 2 – op	19 Cryo O2 Tk 6-9 Htr Current Snsr 2		⑯ KU-BAND ANTENNA: CONTINGENCY STOW – WEVA ANT GIMBAL ALIGNMENT (IFM) reqd to stow Ku-Bd. Jettison reqd if ant cannot be positioned within GO FOR PLBD CLOSURE envelope
	FC1 Redundant Reac Vlv Close Cntl on pnl C3		⑰ MNC MMC2 pwr for Ku-Bd Xmit Enable signal remains
9 (ML86B:C) • cb MNB EXT ARLK HTR STRUC – op	9 Ext A/L Structural Htrs MNB pwr		⑱ MNC MMC2 pwr remains to supply pwr to Boom stow Enable II signal for stow mtrs
			⑲ Snsr 1 remains



**EPS SSR-33**  
**BUS LOSS: MNB APC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>3 Reconfig following vlv(s) only if leak isolation reqd: (O7)</p> <ul style="list-style-type: none"> <li>• AFT R RCS He PRESS A,B</li> <li>• L RCS He PRESS A</li> </ul> <p>• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p> <p>(A12)            APU HTR TK/FU LINE/H2O</p> <ul style="list-style-type: none"> <li>• SYS 1A – AUTO</li> <li>• 1B – OFF</li> </ul>	<p>1 Aft L,R RCS He Pr Isol A man OP capability</p> <p>4 Aft R RCS He Pr Isol B GPC Cntl and man CL capability</p> <p>5 RCS Manf R5 RJD pwr (R5R,R5D)</p> <p>6 APU 1 GG Inj H2O Htrs B            APU 2 Fu TK Vlv A CL capability via APU 2 Auto Shutdn Signal</p>	<p>2 MASTER ALARM Light/ Tone – on</p> <p>If OMS GMBL cmd abs value &gt; 2 deg and Sec TVC selected:            C/W OMS TVC It – on            'L OMS GMBL' (3,B)</p> <p>(F7)            2 C/W RCS JET It – on</p> <p>(FSM)            2 R RCS D, R JET</p>	<p>① Man CL and full GPC cntl remains. Vlv holds position</p> <p>② Indications do not appear until jet commanded</p> <p>③ Do not reconfig for reg switch or l'CNCT procedures</p> <p>④ Man OP capability remains. Vlv holds position</p> <p>⑤ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p> <p>⑥ In event of APU 2 auto shutdn, vlv remains OP until pwr removed by APU FUEL TK VLV sw throw</p> <p>⑦ Lost TM:  <b>GNC SYS SUMM 2</b>            L OMS ENG VLV 2: assume VLV 2 status same as VLV 1</p> <p>⑧ Maintains He Isol redundancy</p> <p>⑨ Man cntl remains. Vap Isol closes. Pr Isol normally closed</p> <p>⑩ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</p> <p>⑪ GPC cntl remains. Vlv fail closed</p> <p>⑫ B Htrs remain</p> <p>⑬ A Htrs remain</p> <p>⑭ Six vlvs fail to non-isolation position</p>
<p>7 Prior to using L(R) OMS: (O8)</p> <p>8 L OMS He PRESS/VAP ISOL</p> <p>7</p> <ul style="list-style-type: none"> <li>• A – GPC</li> <li>• B – OP</li> </ul> <p>10 R OMS He PRESS/VAP ISOL</p> <ul style="list-style-type: none"> <li>• A(B) – GPC</li> <li>• B(A) – CL</li> </ul> <p>(A14)            RCS/OMS HTR</p> <ul style="list-style-type: none"> <li>• R POD (two) – A OFF, B AUTO</li> <li>• OMS CRSFD LINES – A AUTO, B OFF</li> <li>• L POD (two) – A AUTO, B OFF</li> </ul> <p>GNC XXXXX            MNVR YYYYY</p> <p>Sel L OMS PRI TVC:            • GMBL L PRI – ITEM 28 EXEC</p>	<p>9 Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl</p> <p>11 Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man A,B Cntl</p> <p>12 Right Pod A Htrs (all)</p> <p>13 Left Pod B Htrs (partial)</p> <p>13 OMS Crsfed Ln B Htrs (all)</p> <p>L OMS Sec TVC</p>		
<p><b>BUS ISOLATION</b></p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(R1)            • PL AFT MNB – OFF</p>	<p>Aft PL MNB pwr</p> <p>14 ASA 4 Isol            ATVC 4 Isol ME</p>		

**EPS SSR-34**

**BUS LOSS: MNB APC5**

(Includes MNB APC2, MNB ALC2, MNB AMC2)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR</p> <p>2 • GAS GEN/FUEL PUMP 1 – A AUTO</p> <p>2 • GAS GEN/FUEL PUMP 2 – B AUTO</p> <p>• LUBE OIL LINE 1 – A AUTO</p> <p>• LUBE OIL LINE 2 – B AUTO</p> <p>APU HTR TK/FU LINE/H2O</p> <p>2 • SYS 1A – AUTO</p> <p>2 • 1B – OFF</p> <p>2 • 2A – OFF</p> <p>2 • 2B – AUTO</p> <p>HYD HTR</p> <p>• RUD SPD BK A – AUTO</p> <p>• B – OFF</p> <p>• BDY FLP A – AUTO</p> <p>• B – OFF</p> <p>• ELEV A – AUTO</p> <p>• B – OFF</p> <p>HYD CIRC PUMP</p> <p>• PWR 1 – MNA</p> <p>• 2 – MNC</p>	<p>APU 1 GG/Fu Pump Htrs B</p> <p>APU 2 GG/Fu Pump Htrs A</p> <p>APU 1 Lube Oil Line Htrs B</p> <p>APU 2 Lube Oil Line Htrs A</p> <p>APU 1 Tk/Fu Line Htr B</p> <p>GG Inj H2O Htrs B</p> <p>2 Tk/Fu Line Htr A</p> <p>Body Flap Htr B</p> <p>Elev Act Htr B</p> <p>Rudder/Speed Brake Htr B</p> <p>Circ Pump 1 MNB pwr</p> <p>2 MNB pwr</p>	<p>1 MASTER ALARM Light/Tone – on</p> <p>(R4)</p> <p>3 HYD MPS/TVC ISOL VLV SYS 2 tb – CL</p> <p>4 HYD BRAKE ISOL VLV 2 tb – OP</p> <p>5 (O7) AFT R RCS He PRESS B tb – bp</p> <p>6 AFT L,R RCS TK ISOL 3/4/5 B tb – bp (if vlv in CL position)</p> <p>(F7) If APUs active and using BLR CNTLR/HTR 1A(2B): C/W APU TEMP It – on after ~ 2 min</p> <p>If OMS GMBL cmd abs valve &gt; 2 deg and Sec TVC selected: C/W OMS TVC It – on 'L OMS GMBL' (3,B)</p> <p>If first RGA failure and rates sensed: 'RM FAIL RGA' (3)</p> <p>(F7) C/W RCS JET It – on</p> <p>(FSM) 1 R RCS D,R JET</p> <p>HYD/APU</p> <p>7 APU H2O QTY 1 Ind – 0% 2 Ind – 0% 1 SPEED % Ind – 0</p>	<p>① Indications do not appear until jet commanded</p> <p>②</p> <p style="text-align: center;">* [ TIME ] *</p> <p style="text-align: center;">[ CRITICAL ]</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>③ Vlv holds position</p> <p>④ Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed</p> <p>⑤ Man OP capability remains. Vlv holds position</p> <p>⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position</p> <p>⑦ APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A selected. APU H2O QTY 2 ind – 0% if BLR CNTLR/HTR 2B selected</p> <p>⑧ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p> <p>⑨ Man CL and GPC cntl remains. Vlv holds position</p> <p>⑩ Do not reconfig for reg switch or l'CNCT procedures</p>
<p>(L1)</p> <p>• FLASH EVAP CNTLR PRI A(B) – ON (if reqd)</p> <p>• TOP EVAP HTR NOZ L – A AUTO</p> <p>• TOP EVAP HTR NOZ R – B AUTO</p> <p>• TOP EVAP HTR DUCT – A</p> <p>If Hi Load Evap enabled</p> <p>• HI LOAD DUCT HTR – A(C)</p>	<p>FES Sec Cntrl</p> <p>Top Evap L Noz Htr B</p> <p>Top Evap R Noz Htr A</p> <p>Top Evap Duct L,R Htrs B</p> <p>Hi Load Duct Noz Htr B</p>		
<p>(L2)</p> <p>• FLASH EVAP FDLN HTR A SPLY – 1</p>	<p>FES H2O Fdln A Htrs 2 (all except Mid 2)</p>		
<p>(R2)</p> <p>• BLR CNTLR/HTR 1 – B</p> <p>• 2 – A</p>	<p>Hyd H2O Blr 1 Cntrl A</p> <p>2 Cntrl B</p>		
<p>• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>8 RCS Manf R5 RJD pwr (R5R,R5D)</p>		
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>10 Reconfig following vlv(s) only if leak isolation reqd:</p> <p>(O7)</p> <p>• AFT R RCS He PRESS A,B</p> <p>• L RCS He PRESS A</p>	<p>9 Aft L RCS He Pr Isol A man OP capability</p> <p>9 Aft R RCS He Pr Isol A man OP capability</p> <p>5 Aft R RCS He Pr Isol B GPC Cntl and man Cl capability</p>		
<p>GNC 23 RCS</p> <p>• Reprioritize L,R Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</p> <p>• Set aft pod(s) PRI JET FAIL LIMIT to 3</p>	<p>Aft RCS L,R Jets 1 Htrs</p>		
<p>If ICNCT config:</p> <p>(O7)</p> <p>6 • AFT L RCS TK ISOL 3/4/5 B – GPC (tb-bp)</p> <p>• AFT R RCS TK ISOL 3/4/5 B – GPC (tb-bp)</p>	<p>AFT L,R RCS TK ISOL 3/4/5 B CL microswitch feedback</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-34 (Cont)**  
**BUS LOSS: MNB APC5**

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(A14) RCS/OMS HTR • R POD (two) – A OFF, B AUTO • L POD (two) – A AUTO, B OFF • CRSFD LINES A,B (two) – A AUTO, B OFF	11 R Pod A Htrs (all) 12 L Pod B Htrs (partial) 12 OMS Crsfd Ln Htrs B		③ Vlv holds position ⑪ B Htrs remain ⑫ A Htrs remain ⑬ Maintain deorbit capability for MNC DA3 failure ⑭ Maintains deorbit capability for CNTL AB1 failure ⑮ Maintains He Isol redundancy
14	(O8) • If Straight feed config, Right OMS Crossfeed A – OP (tb-OP). Otherwise, √MCC • Right OMS TK ISOL A – CL (tb-CL)	13 OMS Engine/Crossfeed Valve Redundancy OMS Eng/XFeed Redundancy		⑯ Man cntl remains. Vap Isol closes. Primary Isol normally closed ⑰ Lost TM: <b>GNC SYS SUMM 2</b>
15	Prior to using L(R) OMS: (O8) L OMS He PRESS/VAP ISOL	16 Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl		L OMS ENG VLV 2: Assume Vlv 2 status same as Vlv 1
17	• A – GPC • B – OP	18 Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man OP		⑱ GPC cntl remains. Vlv fails closed ⑲ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
19	R OMS He PRESS/VAP ISOL • A(B) – GPC • B(A) – CL			⑳ Sys B Pri Cntrl, auto switchover to Sec Cntrl remain ㉑ Six vlvs fail to nonisolation position ㉒ Redundant coils remain ㉓ √MCC for OMS QtyS ㉔ Hyd Sys 1 still available for NWS ㉕ Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed ㉖ Redundant RPC remains
	For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) – OP, wait 10 sec, then CL	3 MPS/TVC Hyd Sys 2 Isol Cntl		
	<b>GNC XXXXX</b> <b>MNVR YYYYY</b> Sel L OMS PRI TVC: • GMBL L PRI – ITEM 28 EXEC	L OMS Sec TVC		
	If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A(B) – PRC/GPC	20 NH3 Sys B Sec Cntrl man ON capability		
<b>BUS ISOLATION</b>				
ONLY ON MCC CALL, PERFORM				
	(R1) • PL AFT MNB – OFF	Aft PL MNB pwr		
	(O15:A) • RGA 2 – OFF	RGA 2		
	(MA73C:B) • MCA LOGIC MNB AFT 2 – OFF	21 ASA 4 Isol ATVC 3 Main Eng Isol 4 Main Eng Isol  MNB AMC 2 Bus pwr LH,RH Vents 8,9 Mtrs 2		
		22 L OMS Eng Press Vlv Coil 2, Cntl Vlv 1,2 Coil 2 23 OMS Qty Gaging for all L OMS Single engine burns		
		24 NWS Hyd Sys 2 25 Hyd Brake Isol Vlv 2 Cntl		
		26 Hyd Main Pump 1 Depress Solenoid RPC B 26 Hyd Main Pump 2 Depress Solenoid RPC A		
		(Continued)		

**EPS SSR-34 (Cont)**  
**BUS LOSS: MNB APC5**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>Freon Loop 1 Cold Plate Flow Xdcr</p> <p>27 APU 1 Cntr Pwr Sply B</p> <p>28 Fu Tk Vlv B</p> <p>29 2 Cntr Pwr Sply A</p> <p>30 Fu Tk Vlv A GBX GN2 Repress Vlv</p> <p>MPS:</p> <p>31 L Eng He Intercon Outlet Vlv</p> <p>32 L Eng He Isol A Pneu He Isol 2</p> <p>33 Prplt F/D Inbd LO2 Vlv</p> <p>33 Outbd LH2 Vlv</p> <p>34 Manf Repress LH2 Vlv 1,2</p> <p>35 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 L,R DR RTL Ind 3</p> <p>36 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</p>	<p>L MPS He Reg A &lt; 680 during entry (MM 303)</p>	<p>②⑦ Pwr Sply A remains. Turbine speed ind lost</p> <p>②⑧ Vlv A remains</p> <p>②⑨ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</p> <p>③⑩ Vlv B remains</p> <p>③① Vlv fails closed</p> <p>③② Vlv fails closed. Redundant vlv remains</p> <p>③③ Vlv holds position. Loss of manual capability to inert LO2 and LH2 manfs</p> <p>③④ Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</p> <p>③⑤ Redundant mtrs and m/s remain</p> <p>③⑥ Actuators continue to operate until Stow, Rel/Lat, or OP/CL sw is taken to OFF</p>

**EPS SSR-35  
BUS LOSS: MNB FLC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
Refer to OMS/RCS Slide Rule for valve loss info 3 Reconfig following vlv(s) only if leak isolation reqd: (O8) • FWD RCS He PRESS A,B	1 Fwd RCS He Press Isol A man OP capability 4 Fwd RCS He Press Isol B man CL and GPC Cntl	2 MASTER ALARM Light/Tone – on (F7) 2 C/W RCS JET It – on	① Man CL and full GPC cntl remains. Vlv holds position ② Indications do not appear until jet commanded
(A1L) S-BD PM • ANT SW ELEC – 2 • XPNDR – 2 • PWR AMPL OPER – 2 • STBY – 2 • PRE AMP – 2 • NSP PWR – 2	S-BD PM Sys 1: Xpnder 1 Pre Amp 1 Pwr Amp 1 FM, PM Auto sw 1	(COMM LOST) All S-BD A/G voice lost if Sys 1 selected (FSM) 2 'F RCS D(F,R,U) JET'	③ Do not reconfig for reg switch or l'CNCT procedures ④ Man OP capability remains. Vlv holds position
If PSP and/or INTRG reqd for PL or ISS ops: • S-BD PL PWR SYS – 2 • CNTL – PNL • – CMD 6 • Reconfig PSP 6 • Perform PL INTRG REACQ (if reqd)	NSP 1 ----- S-BD PL Intrg 1 PSP 1	If site AOS and using S-BD ANT ELEC 1: 5 'ANTENNA' (2) If sys 1 pwrd: 'S62 BCE BYP PSP1' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'	⑤ FSM caused by antenna miscompare ⑥ REACQ and PSP reconfig procedures are flight specific. If reqd, procedure can be found in payload or ISS specific books
If no comm: (C3) • S-BD PM CNTL – PNL • – CMD		If PDI 1 selected, 'BCE STRG 1 NSP'	⑦ When gear deployed, tb will not indicate DN
8 If OIU reqd: (SSP) • OIU PWR – OIU 2 ON • OIU tb – DN • √MCC, OIU reconfig		(F6/F8) 7 LDG GEAR L,NOSE tb – bp	⑧ OIU 2 interfaces with PSP 2 for commanding
(A1R) • S-BD FM PWR – 2	S-BD FM Sys 1	(O8) 4 FWD RCS He PRESS B tb – bp	⑨ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur
9 <b>GNC 23 RCS</b> Override F2 Manf status to CL: • RCS FWD – ITEM 1 EXEC • MANF VLVS 2 OVRD – ITEM 41 EXEC	RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)		⑩ Htr Cntrl 1 remains
Pre-seat ingress: • Discharge handheld fire ext into AV BAY 1	Av Bay 1 agent discharge capability		
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(O15:C) • cb MNB FIRE SUPPR BAY 1 – op	10 L,R ADP Htr Cntrl 2		
	LMG, NLG, B/U Rel 2 Fire 2, Arm		

**EPS SSR-36**  
**BUS LOSS: MNB ALC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR</p> <p>2 • GAS GEN/FUEL PUMP 1 – A AUTO</p> <p>2 • GAS GEN/FUEL PUMP 2 – B AUTO</p> <p>• LUBE OIL LINE 1 – A AUTO</p> <p>• LUBE OIL LINE 2 – B AUTO</p> <p>APU HTR TK/FU LINE/H2O</p> <p>2 • SYS 1A – AUTO</p> <p>• 1B – OFF</p> <p>• 2A – OFF</p> <p>2 • 2B – AUTO</p> <p>HYD HTR</p> <p>• RUD SPD BRK A – AUTO</p> <p>• B – OFF</p> <p>• BDY FLP A – AUTO</p> <p>• B – OFF</p> <p>• ELEV A – AUTO</p> <p>• B – OFF</p> <p>HYD CIRC PUMP</p> <p>• PWR 1 – MNA</p> <p>• 2 – MNC</p>	<p>APU 1 GG/Fu Pump Htrs B</p> <p>APU 2 GG/Fu Pump Htrs A</p> <p>APU 1 Lube Oil Line Htrs B</p> <p>APU 2 Lube Oil Line Htrs A</p> <p>APU 1 Tk/Fu Line Htr B</p> <p>APU 2 Tk/Fu Line Htr A</p> <p>Body Flap Htr B</p> <p>Elev Act Htr B</p> <p>Rud/Spd Brake Htr B</p> <p>Circ Pump 1 MNB pwr 2 MNB pwr</p>	<p>1 MASTER ALARM Light/Tone – on</p> <p>(R4)</p> <p>3 HYD BRAKE ISOL VLV 2 tb – OP</p> <p>4 HYD MPS/TVC ISOL VLV SYS 2 tb – CL</p> <p>(O7)</p> <p>5 AFT R RCS He PRESS B tb – bp</p> <p>6 AFT L,R RCS TK ISOL 3/4/5 B tb – bp (if vlv in CL position)</p> <p>(F7)</p> <p>If APUs active and using BLR CNTLR/HTR 1A or 2B: C/W APU TEMP It – on after ~2 min</p> <p>(F7)</p> <p>1 C/W RCS JET It – on</p> <p>(FSM)</p> <p>1 R RCS D,R JET</p> <p>[HYD/APU]</p> <p>7 APU H2O QTY 1 ind – 0% 2 ind – 0%</p>	<p>① Indications do <u>not</u> appear until jet commanded</p> <p>②</p> <p style="text-align: center;">* [ TIME ] * [ CRITICAL ] *</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>③ Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed</p> <p>④ Vlv holds position</p> <p>⑤ Man OP capability remains. Vlv holds position</p> <p>⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to Cl position</p> <p>⑦ APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A selected. APU H2O QTY 2 ind – 0% if BLR CNTLR/HTR 2B selected</p> <p>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</p> <p>⑨ Man CL and full GPC Cntl remains. Vlv holds position</p> <p>⑩ Do not reconfig for reg switch or l'CNCT procedures</p> <p>⑪ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p>
<p>(L1)</p> <p>• FLASH EVAP CNTLR PRI A(B) – ON (if reqd)</p> <p>TOP EVAP HTR</p> <p>• NOZ L – A AUTO</p> <p>• R – B AUTO</p> <p>• DUCT – A</p> <p>If Hi Load Evap enabled:</p> <p>• HI LOAD DUCT HTR – A(C)</p>	<p>FES Sec Cntrl</p> <p>Top Evap L Noz Htr B R Noz Htr A Duct L,R Htrs B</p> <p>HI Load Duct Noz Htr B</p>		
<p>(L2)</p> <p>• FLASH EVAP FDLN HTR A SPLY – 1</p>	<p>FES H2O Fdln A Htrs 2 (all except Mid 2)</p>		
<p>(R2)</p> <p>• BLR CNTLR/HTR 1 – B</p> <p>• 2 – A</p>	<p>8 Hyd H2O Blr 1 Cntrl A</p> <p>8 2 Cntrl B</p>		
<p>10 Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>Reconfig following vlv(s) only if leak isolation reqd:</p> <p>(O7)</p> <p>• AFT R RCS He PRESS A,B</p> <p>• L RCS He PRESS A</p>	<p>9 Aft L,R RCS He Pr Isol A man OP capability</p> <p>5 Aft R RCS He Pr Isol B GPC Cntl and man CL capability</p>		
<p>For attitude control:</p> <p>• Perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>11 RCS Manf R5 RJD pwr (R5R,R5D)</p>		
<p>[GNC 23 RCS]</p> <p>• Reprioritize L,R Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</p> <p>• Set aft pod(s) PRI JET FAIL LIMIT to 6</p>	<p>Aft L,R RCS Jet 1 Htrs</p>		
<p>(A14)</p> <p>• RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO, B OFF</p>	<p>OMS Crsfd Ln B Htrs (partial)</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-36 (Cont)**  
**BUS LOSS: MNB ALC2**

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
6	If ICNCT config: (O7)		L MPS He Reg A < 680 during entry (MM303)	③ Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed ④ Vlv holds position ⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to Cl position ⑫ Maintains deorbit capability for CNTL AB1 failure ⑬ To maintain He Isol redundancy ⑭ Man cntl remains ⑮ Sys B Pri Cntrl, auto switchover to Sec Cntrl remain ⑯ √MCC for OMS Qtys ⑰ Vlv fails closed. Redundant vlv remains ⑱ Hyd Sys 1 still available for NWS ⑲ Vlv fails closed ⑳ Vlv holds position. Loss of manual capability to inert LO2,LH2 Manfs ㉑ Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)
	• AFT L RCS TK ISOL 3/4/5 B – GPC (tb-bp) • AFT R RCS TK ISOL 3/4/5 B – GPC (tb-bp)	6 AFT L,R RCS TK ISOL 3/4/5 B CL microswitch feedback		
	(O8) • Right OMS TK ISOL A – CL (tb-CL)	12 OMS Eng/Xfeed Redundancy		
	Prior to using L OMS: (O8)			
13	L OMS He PRESS/VAP ISOL • A – GPC • B – OP	14 L OMS He Pr Isol B GPC Cntl		
	For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) – OP • Wait 10 sec, then CL	4 MPS/TVC Hyd Sys 2 Isol Cntl		
	If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A(B) – PRI/GPC	15 NH3 Sys B Sec Cntrl man ON capability		
<b>BUS ISOLATION</b>				
ONLY ON MCC CALL, PERFORM				
NONE				
		14 L OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2		
		16 OMS Qty gauging for all L OMS single engine burns		
		17 APU 1 Fu Tk Vlv B 17 2 Fu Tk Vlv A		
		4 TVC Hyd Sys 2 Isol Cntl		
		3 Hyd Brake Isol 2 Cnt		
		18 NWS Hyd Sys 2		
		MPS: 19 L Eng He Intercon Outlet Vlv		
		17 L Eng He Isol A		
		17 Pneu He Isol 2		
		20 Prplt F/D Inbd LO2 Vlv		
		20 Outbd LH2 Vlv		
		21 Manf Repress LH2 Vlv 1,2		

**EPS SSR-37  
BUS LOSS: MNB FMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L4:F)</p> <ul style="list-style-type: none"> <li>cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</li> </ul> <p>(L1)</p> <ul style="list-style-type: none"> <li>H2O PUMP LOOP 1 – A</li> </ul> <p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p><b>GNC 23 RCS</b></p> <p>Override F2 Manf status to OP</p> <ul style="list-style-type: none"> <li>RCS FWD ITEM 1 EXEC</li> <li>MANF VLVS 2 OVRD ITEM 41 EXEC</li> </ul>	<p>H2O Loop 1 Pump B</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7) SM ALERT Light/Tone – on</p> <p>(FSM) RM DLMA MANF</p> <p>(O8) FWD RCS MANF ISOL 2 tb – bp</p> <p>If H2O PUMP LOOP 1,B ON: C/W H2O LOOP It – on 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' 'S88 H2O PUMP P 1'</p> <p>(O1) H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia</p> <p>L,R ADP deploy time incr from 15 to 30 sec</p> <p>STAR TRKR DRS POS -Y,-Z OP/CL time incr from 8 to 16 sec</p>	<p>① Redundant mtr remains</p> <p>② Htr Cntr 1 remains</p>
<p><b>BUS ISOLATION</b></p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(MA73C:A)</p> <ul style="list-style-type: none"> <li>MCA LOGIC MNB FWD 2 – OFF</li> </ul>	<p>MNB FMC2 Bus pwr</p> <p>L,R Vents 1,2 Mtrs 2</p> <p>1 ADP Deploy Mtrs 2 Deploy Disc 2</p> <p>2 Htr Cntr 2</p> <p>1 -Y Star Trkr Dr Sys 2 OP/CL capability</p> <p>1 -Z Star Trkr Dr Sys 1 OP/CL capability</p>		

**EPS SSR-38  
BUS LOSS: MNB MMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>NONE</p>		<p>NONE</p>	
<p><b>BUS ISOLATION</b></p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(MA73C:A)</p> <ul style="list-style-type: none"> <li>MCA LOGIC MNB MID 1 – OFF</li> </ul>	<p>MNB MMC1 Bus pwr</p> <p>LH Vent 5 Mtr 2</p>		



**EPS SSR-39**  
**BUS LOSS: MNB MMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(MA73C:C)</p> <p>1 • cb MCA PWR AC2 3Φ MID 2 – op</p> <p>For PLBD ops:            • OP/CL Drs in man mode  <b>MANUAL PLBD CLOSING</b>            (DEORBIT PREP)</p>	<p>1 Stbd Rad Lat 1-6 Mtr 2 Limit sw</p> <p>2 Stbd Rad Mtr 2 Dpy capability</p> <p>PLBD:            C/L Lat 13-16 Mtr 2            Stbd Aft Blkhd Lat Mtr 2            Port Door Mtr 2            Stbd Door Mtr 1 CL Limit            sw</p>	<p><b>SM (BFS SM 63)</b>  <b>PL BAY DOORS</b></p> <p>If in <u>AUTO</u> OP/CL for PLBDs,            sequence terminates            immediately and msg '(S63)            PBD CONFIG'</p> <p>-----</p> <p>During <u>MAN</u> PLBD OP/CL,            single mtr run time noted on            actuators listed at left</p>	<p>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</p> <p>② Mtr 2 stow            capability remains</p>
<p><b>BUS ISOLATION</b></p>		<p>(A8L)            PORT RMS:            RETEN LAT tb – bp            R-F-L FWD tb – bp</p>	<p>③ Single mtr time.            One failure away from            EVA to stow MPM or            from RMS/OBSS            jettison</p>
<p><b>ONLY ON MCC CALL,            PERFORM</b></p>		<p><b>SM 94 PDRS CONTROL</b></p>	
<p>(MA73C:A)</p> <p>• MCA LOGIC MNB MID            2 – OFF</p>	<p>MNB MMC2 Bus pwr</p>	<p>PORT RMS Indications lost:            Fwd MRL Mtr 1            LAT/REL/RDY</p>	<p>④ Single mtr time.            One failure away from            loss of two out of three            MRLs. EVA or RMS            jettison capability exists</p>
	<p>RMS:            3 Port MPM Mtr 2            3 Stbd MPM Mtr 1            4 Port Fwd MRL Mtr 1            5 Stbd Aft MRL Mtr 2</p>	<p>STBD RMS Indications lost:            Aft MRL Mtr 2            LAT/REL/RDY</p>	
	<p>LH Vent 3 Mtr 2</p>	<p>(R13L)            During RAD Dpy ops:            RAD CNTL STBD tb            indicates single mtr ops</p>	<p>⑤ Single mtr time.            One failure away from            loss of MRL latching            capability. EVA or            OBSS jettison            capability exists</p>

**EPS SSR-40**  
**BUS LOSS: MNB MMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:B) • MCA LOGIC MNB MID 3 – OFF	MNB MMC3 Bus pwr		

**EPS SSR-41**  
**BUS LOSS: MNB MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES	
1 (MA73C:D) • cb MCA PWR AC2 3Φ MID 4 – op	1 Port Rad Lat 1-6 Mtr 2 Limit sw 2 Port Rad Mtr 2 Dpy capability	SM (BFS SM 63) PL BAY DOORS	<p>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</p> <p>② Mtr 2 stow capability remains</p> <p>③ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p> <p>④ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p> <p>⑤ With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed in GND position</p> <p>⑥ Redundant pwr (MNC) enables Ku-Band xmit</p> <p>⑦ MNC MMC2 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs</p>	
For PLBD ops: • OP/CL Drs in man mode MANUAL PLBD CLOSING (DEORBIT PREP)	PLBD: Port, Stbd Fwd Blkhd Lat Mtrs 2 Stbd Door Mtr 2 Port Door Mtr1 CL Limit sw	If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'		
<b>BUS ISOLATION</b>				
ONLY ON MCC CALL, PERFORM		During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left		
(MA73C:B) • MCA LOGIC MNB MID 4 – OFF	MNB MMC4 Bus pwr	(R13L) During Rad Dpy ops, RAD CNTL PORT tb indicates single mtr ops		
	RH Vent 6 Mtr 2	(A8L) STARBOARD RMS: RETEN LAT tb – bp R-F-L FWD tb – bp R-F-L MID tb – bp		
	RMS: 3 Port Mid MRL Mtr 2 4 Stbd Fwd MRL Mtr 1 4 Stbd Mid MRL Mtr 1	SM 94 PDRS CONTROL		
	5 Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw	PORT RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY		
	6 Redundant Ku-Band Xmit Enable	STBD RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 1 LAT/REL/RDY Mid MRL Mtr 1 LAT/REL/RDY		
	7 Redundant Boom Stow Enable II Excitation Signal			

**EPS SSR-42  
BUS LOSS: MNB AMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	MNB AMC2 Bus pwr LH,RH Vents 8,9 Mtrs 2	NONE	① Redundant mtrs and m/s remain
<b>BUS ISOLATION</b>			② Actuators continue to operate until the Stow, Rel/Lat, or OP/CL sw is taken to OFF
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 L,R DR RTL Ind 3		
	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**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A7U) If CCTV reqd: • TV PWR CONTR UNIT – MNA	Video Cntl Unit MNB pwr	CCTV Video and TV Annun Its lost if MNB selected for VCU CCTV Mon 2 lost	① IDP3, IDP4 ADC data lost. MDU port select may be reqd
(R14:C) • cb MNC KU SIG PROC – op	MDU CDR 2 MDU MFD 1 1 ADC 1B/2B	OS Floodlt lost	② MNA and MNC pwr sources remain
(R12) If VPU flown • VPU PWR – OFF	VPU OSVS OUT 2A video input to VPU	(FSM) 'BCE BYP KU' (2)	③ Redundant pwr source remains for equipment
<b>BUS ISOLATION</b>		(A2) Meters: X-PNTR will display 'OFF' flag Digital – display will blank	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
ONLY ON MCC CALL, PERFORM	Middeck ATU Middeck Spkr	(F6) MDU CDR 2 blanks	
• MDU CDR 2 PWR – OFF • MDU MFD 1 PWR – OFF		(F7) MDU MFD 1 blanks	
(R14:A) • cb MNB AUD MIDDECK SPKR – op • ADC 1B/2B – op • MDU MFD 1 – op • MDU CDR 2 – op		OSVS OUT 2A video to ISS is lost	
(R14:B) • cb MNB CNTL BUS CA1/2/3 – op 3 cb PALLET/DSC • 1B – op (EDO) • 4B – op (EDO)	2 MNB pwr for CNTL CA1,2,3 Buses		
(R14:C) cb MNB KU • ELEC – op • ANT HTR – op • CABLE HTR – op	4 Ku-Bd Sys Rdr & Comm I/F Cont Unit (EA-1), RDR Sig Proc, Deployed Assy and Deployed Assy Htrs		
(R14:D) cb MNB TV A CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op cb MNB TV • CONTR UNIT – op • MON 2 – op	TV A Camr and Pan-Tilt TV A Camr Htr TV A Camr Pan-Tilt Htr and Illum  CCTV Mon 2		
(R14:E) • cb MNB OS FLOOD – op cb MNB RMS CAMR • CAMR/PTU – op • WRIST ILLUM/CAMR HTR – op • ELB ILLUM/PTU HTR – op	OS Floodlt RMS: Camr/Pan-Tilt Camr Htr and Wrist Illum Camr Pan-Tilt Htr and Elb Illum		

**EPS SSR-44  
BUSS LOSS: MNB O15&A8**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A8L) • PORT RMS HTR B – OFF • PORT RMS HTR A – AUTO If OBSS berthed: (A8L) • STBD RMS HTR B – OFF • STBD RMS HTR A – AUTO	RMS: B/U pwr Port Htr B Stbd Htr B	NONE	① If Driver sw OFF when bus failed, F2 Manf Drivers lost
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(C3) • MSTR MADS PWR – OFF	All MADS equipment		
	1 RJDF 1A Drivers ON Cntl (Jets F2F, F2R, F2U, F2D)		

**EPS SSR-45  
BUS LOSS: MNB O15**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (R1) • BUS TIE MNA – ON (tb-ON)		MASTER ALARM Light/Tone – on	① FC1 only one failure away (loss of ESS1BC) from inability to bus tie
(L1) • Perform ON-ORBIT RAD CNTLR SWITCH, <u>ECLS</u> SSR-13 for Freon Loop 1,2	Freon Loop 1,2 Rad Cntr A	(F7) C/W CAB ATM It SM ALERT Light/Tone – on Fwd EVENT TIME ind blank	② ACAs recovered by switching to alternate pwr
(F6,F8) • HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 2 or (OV105) GPS 2	MLS 2 (OV103,4) TACAN 2 (OV105) GPS 2	(A4) MSN TIME ind blank	③ Vlv holds position
(F6,F8) • RADAR ALTM – 1	RA 2	(O1) CABIN dP/dT ind – .45 O2/N2 FLOW SNSR 1 ind – 0 pph PPO2 SNSR B,C ind – 0 psia	④ O2/N2 Cntl Vlv 2 normally closed when unpowered
(O6) ANNUN BUS SEL • ACA 1 – MNA • 2/3 – MNC	2 ACA 1 MNB pwr 2 2/3 MNB pwr	(FSMs) S66 CABIN PPO2 B,C S88 H2O LOOP 2 FLOW SM0 TIRE PRESS	⑤ Vlv fails closed. IFM or real-time flow test will be required. √MCC for additional direction
(A6U) • ANNUN BUS SEL – MNC	2 ACA 4/5 MNB pwr	If ADTA 2, MLS 2, -Y Star Trkr pwr: BCE STRG 2 ADTA (3,B) BCE STRG 2 MLS (3) BCE STRG 3 STKR (2,3)	⑥ Current Snsr 1 remains
If on PCS 2: • Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	3 O2/N2 Cntl Sys 2: N2 Sply Vlv 2 Cntl 3 N2 Reg Inlet Vlv 2 Cntl 4 O2/N2 Cntl Vlv 2 man Cntl 5 O2 Xover Vlv 2 OP capability O2/N2 Sys 2 Flow Xdcrs PPO2 Snsr B,C	(L2) 6 CABIN RELIEF A tb – bp 6 N2 SYS 2 SPLY tb – bp 6 N2 SYS 2 REG INLET tb – bp	⑦ Inhibits Cabin PPO2 B, Cabin O2 Flow 2, Cabin N2 Flow 2, and H2O Loop ICH Flow 2 respectively
	dP/dT Snsr	If first AA failure and S/W processing accel data: 'RM FAIL ACC' (3)	⑧ Inhibits Primary C/W for Cabin PPO2 B, Cabin O2 Flow 2, and Cabin N2 Flow 2 respectively
7 <u>SM 60 SM TABLE MAINT</u>			
• Inhibit 0612513, 0612205, 0612554, 0612722 • Perform ECLS COMPUTATION INHIBIT <u>ECLS</u> SSR-14 Table A		(LIGHTS LOST) L Seat/Ctr Cnsl Floodlt R Ovhd Cnsl Floodlt If ACA 1 – MNB, lights lost: (C3) DAP lights right three columns ALL (F2) PBLs except MA	
8 (R13 U) • C/W PARAM SEL tw (three) – 044, 024, 064 • C/W PARAM – INH • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		2 If ACA 2/3 – MNB, lights lost: (C3) DAP lights left three columns ALL (F6/F8) Landing Gear ARM/DOWN (L1) Smoke detection, fire suppression ALL MO29J MIC KEY	
• Prior to seat ingress for entry: discharge handheld ext into AV BAY 1	Av Bay 1 Agent discharge capability	2 If NWS 2 selected: (F3) NWS FAIL It – on	
		2 If ACA 4/5 – MNB, lights lost: (A6U) DAP lights ALL (A7U) Video input, output, Gamma, ALC A2 MIC KEY	
(Continued)	(Continued)		

**EPS SSR-45 (Cont)**  
**BUS LOSS: MNB O15**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			③ Vlv holds position
(O6) • STAR TRKR PWR -Y – OFF	-Y Star Trkr Dr OP capability Trkr		⑥ Current Snsr 1 remains
(O7) • (OV105) GPS 2 PWR – OFF • (OV105) GPS 2 PRE AMPL UPPER – OFF • (OV105) GPS 2 PRE AMPL LOWER – OFF	(OV105) GPS 2		⑨ Redundant pwr source remains ⑩ H2O Loop 2 ICH Flow Rate snsr lost
(O8) • RADAR ALTM 2 – OFF • MLS 2 – OFF			⑪ Redundant measurement remains. FDA Alarm BFS only; OPS 3,6
9 (O15:B) cb MNB • 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 MDM OF 1/2 B – op • OI SIG CONDR OM3 A – op • OI H2O BYP LOOP 2 SNSR – op • OI TIRE PRESS – op • MNA CONTR – op • MSN TIMER AFT – op • EVENT TIMER FWD – op	10 H2O Byp Loop 2 Snsr (ECLS SC12) 11 Tire Press Sig Condr A3,A4  Aft Mission Timer Fwd Event Timer		⑫ Cntrl B remains ⑬ NWS 1 still available
----- (O15:C) cb MNB • (OV103) TACAN 2 – op • SMOKE DETN BAY 1B/3A – op • FIRE SUPPR BAY 1 – op • UTIL PWR F1/MO13Q – op • FLOOD R CNSL – op • L CTR – op • ANNUN FWD ACA 1,2/3 (two) – op • ANNUN AFT ACA 4/5 – op • CRYO O2 HTR TK2 SNSR 2 – op • (OV104,5) GPS 2 PRE AMPL UPPER – op	Tacan 2 Av Bay 1 Smoke Det B 3 Smoke Det A  MNB Utility pwr R Ovhd Console Floodlt L Seat/Ctr Cnsl Floodlts  6 Cryo O2 Tk2 Htr Current Snsr 2		
12 (O15:D) cb MNB • 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 13 • NWS – op • (OV104,5) GPS 2 PRE AMPL LOWER – op	PPO2 Snsr C  3 Cabin Relief Vlv A Cntrl NWS 2		
(Continued)	(Continued)		

**EPS SSR-45 (Cont)**  
**BUS LOSS: MNB O15**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
(O15:E) cb MNB <ul style="list-style-type: none"> <li>• RADAR ALTM 2 – op</li> <li>• MLS 2 – op</li> <li>• (OV104) TACAN 2 – op</li> <li>• ADTA 2 – op</li> <li>• STAR TRKR -Y – op</li> <li>• ACCEL 2 – op</li> <li>• DDU L – op</li> <li>• R – op</li> <li>• DRAG CHUTE SYS 2 – op</li> </ul>	Tacan 2 ADTA 2  AA2 9 Left DDU MNB pwr 9 Right DDU MNB pwr 14 Drag Chute, PLT Arm		<p>⑨ Redundant pwr source remains</p> <p>⑭ CDR Arm remains</p>
(A13) <ul style="list-style-type: none"> <li>• (OV104) GPS 2 PWR – OFF</li> <li>• (OV104) GPS 2 PRE AMPL UPPER – OFF</li> <li>• (OV104) GPS 2 PRE AMPL LOWER – OFF</li> </ul>	GPS 2		

**EPS SSR-46**  
**BUS LOSS: MNB R1A1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 MNB pwr to CNTLAB 1,2,3 CNTLBC 1,2,3 ESS1BC ESS3AB	NONE	① Buses remain pwr
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
NONE			

**EPS SSR-47**  
**BUS LOSS: MNB A6&A14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p><b>GNC 23 RCS</b></p> <ul style="list-style-type: none"> <li>• Reprioritize Fwd Manf 2,3 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</li> <li>• Set forward pod PRI JET FAIL LIMIT to 4</li> </ul>	<p>Fwd RCS Jet 2,3 Htrs</p>	<p><b>SM 97 RETENTION</b></p> <p>Indication lost:  RELAX  DEMATE  MATE</p>	<p>① Single mtr time</p>
<p><b>BUS ISOLATION</b></p>			
<p>ONLY ON MCC CALL,  PERFORM</p>			
<p>(C3)  • MSTR MADS PWR – OFF</p>	<p>PL Reten Sys B Rel/Lat Mtrs  All MADS equipment</p>		
	<p>ROEU  Logic Pwr Sys 2  1 Orbiter arm drive mtr  (ODM mtr 2 – mate B,  demate B, relax B)  1 ODA mtr 2 latch/release</p>		



**EPS SSR-48**  
**BUS LOSS: MNB ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(ML86B:A) • cb MNA H2O LINE HTR A – cl	H2O Line Htr B: Waste Dump Line Sply Dump Line Vac Vent Line	(R11L) SPLY H2O 1 DUMP ISOL VLV tb – bp 1 TKB INLET tb – bp 1 TKC OUTLET tb – bp 1 B SPLY ISOL VLV tb – bp	① Vlv holds position ② Htr A remains ③ MNA,MNC line htrs remain. MNA struct htrs remain
(ML86B:D) cb MNA MMU • PORT,STBD HTR A (two) – cl	2 MMU Port,Stbd Htr B	(R13L) 1 MMU GN2 SPLY ISOL VLV B tb – bp	
(ML31C) • VAC VENT ISOL VLV BUS SEL – MNA	Vac Vent Isol Vlv MNB Cntl	(ML31C) 1 WASTE H2O TK1 DRAIN VLV tb – bp 1 SPLY H2O TKD INLET tb – bp	
(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	WCS Sep Fan 2 Mtr Relay	(LIGHTS LOST) Middeck Floodlts 2,6 Bunk Floodlts 2/4 PHS Floodlt Airlk Floodlt 3 TA Floodlt 3 (SL only)	
(EDO WCS) • WCS PWR SEL – AUTO 1, OFF 2	Controller MNB pwr WCS Compactor MNB Cntl	(MO13Q) 1 ARLK H2O S/O VLV – bp	
(CDR's SEAT) • CDR SEAT PWR BUS SEL – AC3 (dn)	CDR Seat Adj via AC2 pwr		
(PLT's SEAT) • PLT SEAT PWR BUS SEL – AC3 (dn)	PLT Seat Adj via AC2 pwr		
If Supply H2O Dump reqd and dump ISOL VLV is failed closed: • Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)	1 Sply H2O Dump Isol Vlv Cntl		
(ML86B:C) • cb MNA(MNC) EXT ARLK HTR LINE ZN1 – cl • cb MNA(MNC) EXT ARLK HTR LINE ZN2 – cl • cb MNA EXT ARLK HTR STRUC – cl	3 Ext A/L H2O and Structural Htrs MNB pwr		
(Continued)	(Continued)		

**EPS SSR-48 (Cont)**  
**BUS LOSS: MNB ML86B**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(ML86B:A) cb MNB  <ul style="list-style-type: none"> <li>• SPLY H2O TKB INLET – op</li> <li>• SPLY TKC OUTLET – op</li> <li>• DUMP ISOL – op</li> <li>• SPLY H2O B SPLY ISOL VLV – op</li> <li>• H2O LINE HTR B – op</li> </ul> </p>	<p>Sply H2O:            1 Tk B Inlet Vlv Cntl            1 Tk C Outlet Vlv Cntl            1 B Sply Isol Vlv Cntl</p>		<p>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 pwr'd by MNA ML86B still remains. Water will still heat, but at a very slow rate</p>
<p>(ML86B:B) cb MNB  <ul style="list-style-type: none"> <li>• VAC VENT NOZ HTR – op</li> <li>• WASTE H2O TK1 DRAIN – op</li> <li>• SPLY H2O TKD INLET – op</li> <li>• VAC VENT ISOL VLV – op</li> <li>• WCS CNTLR – op</li> <li>• GALLEY H2O HTR – op</li> </ul> </p>	<p>4 Waste H2O Vac Vent NozHtr            1 Tk 1 Drain Vlv Cntl            1 Sply H2O Tk D Inlet Vlv Cntl            WCS Press Xdcr            5 Galley Hot H2O Htr (Five of six htr strips lost)</p>		<p>⑥ One failure away from loss of jettison capability            ⑦ Current Snsr 1 remains            ⑧ Current Snsr 2 remains</p>
<p>(ML86B:D) cb MNB MMU  <ul style="list-style-type: none"> <li>• PORT HTR B – op</li> <li>• STBD HTR B – op</li> <li>• GN2 SPLY ISOL VLV B – op</li> </ul>           cb MNB PYRO JETT SYS A  <ul style="list-style-type: none"> <li>• PORT RMS – op</li> </ul> </p>	<p>2 MMU Port Htr B            2 Stbd Htr B            1 GN2 Sply Isol Vlv B            Port RMS:            6 Jett/Guil Sys A Deadface Relays</p>		
<p>(ML86B:E) cb MNB SEAT  <ul style="list-style-type: none"> <li>• LEFT – op</li> <li>• RIGHT – op</li> </ul>           cb MNB FLOOD  <ul style="list-style-type: none"> <li>• TNL ADAPT 3 – op</li> </ul>           cb MNB  <ul style="list-style-type: none"> <li>• CO2 COM INSTR – op</li> </ul> </p>	<p>CO2 Rmvl Sys Filter dP            CO2 Rmvl Sys Vacuum Press            CO2 Rmvl Sys PPCO2 Snsr Inlet Temp            TA Floodlt 3</p>		
<p>(ML86B:F) cb MNB FLOODS  <ul style="list-style-type: none"> <li>• MIDDECK 2/6 – op</li> <li>• BUNK 2/4 – op</li> <li>• PHS – op</li> <li>• AIRLK 3 – op</li> </ul>           cb MNB CRYO            7 • O2 HTR TK3 SNSR 2 – op            8 • O2 HTR TK4 SNSR 1 – op</p>	<p>Middeck Floodlts 2,6            Bunk Floodlts 2/4            PHS Floodlt            Airlk Floodlt 3            7 Cryo O2 Tk 3 Htr Current Snsr 2            8 Cryo O2 Tk 4 Htr Current Snsr 1</p>		
<p>(ML86B:C)  <ul style="list-style-type: none"> <li>• cb MNB EXT ARLK HTR LINE ZN1 – op</li> <li>• cb MNB EXT ARLK HTR LINE ZN2 – op</li> <li>• cb MNB EXT ARLK HTR STRUC – op</li> <li>• cb MNB EXT ARLK HTR S/O VLV – op</li> </ul> </p>	<p>3 Ext A/L H2O Line and Structural Htrs MNB pwr            1 A/L H2O Isol Vlv Cntl</p>		

**EPS SSR-49c  
BUS LOSS: MNB A7**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		VEST DEP VLV SYS 2 VENT ISOL tb – bp	① DSP SYS 2 pwr still available to all users except MNB A7
		VEST DEP VLV SYS 2 VENT tb – bp	
<b>BUS ISOLATION</b> ONLY ON MCC CALL, PERFORM		1 DSP SYS PWR SYS 2 tb – OFF	
(A6L) IF DOCKING MISSION • cb MNB DEP SYS 2 VENT – op • cb ESS 2CA DEP SYS 2 VENT ISOL – op • cb MNB DOCK LT AFT – op • LT TRUSS AFT – OFF	Vestibule Depress Vlv Sys 2 Vent Vestibule Depress Vlv Sys 2 Vent Isol Aft Truss Docking It		

EPS MNC  
SSR 50-66


**EPS SSR-50**  
**BUS LOSS: MNC DA3**

(Includes all MNC sub-buses & AC3)

EPS MNC  
SSR 50-66

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC3 SHUTDN (FC SHUTDN Cue Card)	2 FC3 Pumps and pH Snr Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor	SM ALERT Light/Tone – on MASTER ALARM Light/Tone – on	<p>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</p> <p>② May be repwrld after AC Pwr Transfer Cable connected</p> <p>③ Buses remain pwrld</p> <p>④ If Aud Ctr 2 selected, all intercomm, A/G, and recorded voice lost until AUD CTR 1 selected</p> <p>⑤ Loss of redundant port to the following: IDP 3 MDU MFD 1 (S) MDU MFD 2 (S)</p> <p>IDP 4 MDU MFD 1 (P)</p> <p>⑥ S86 WSB T 2 if in BLR CNTLR/HTR 2A. S86 WSB T 3 if in BLR CNTLR/HTR 3B</p> <p>⑦ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books</p> <p>⑧ OIU 1 interfaces with PSP 1 for commanding</p> <p>⑨</p> <div style="border: 1px dashed black; padding: 5px; text-align: center;"> <p>* TIME *</p> <p>CRITICAL</p> </div> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p>
2 • Perform LOSS OF 1 FC (ORB PKT, PWRDN)	3 MNC pwr to ESS1BC ESS2CA CNTLBC1,2,3 CNTLCA1,2,3	(F6) MDU CDR 1 blanks	
(R1) • cb AC CONTR AC3 ΦA,ΦB,ΦC (three) – cl • INV/AC BUS 3 – OFF (tb-off) • INV PWR 3 – OFF (tb-off) • cb AC CONTR AC3 ΦA,ΦB,ΦC (three) – op • AC3 BUS SNSR – OFF	AC3 ΦA,ΦB,ΦC Inverters	(F8) MDU PLT 2 blanks	
• O2,H2 MANF VLV TK1,2 (four) – OP • O2,H2 TK1 HTR A,B (four) – OFF • O2,H2 TK2 HTR B (two) – AUTO • O2,H2 TK2 HTR A (two) – OFF	Cryo O2,H2 Tk1 Htrs A if in Auto Cryo O2,H2 Tk1 Htrs B Tk2 Htrs A	(AFT) MDU AFD 1 blanks	
(A11) If Tk 4 in use: • O2,H2 TK4 HTR B (two) – AUTO • O2,H2 TK4 HTR A (two) – OFF	Cryo O2,H2 Tk4 Htrs A	(F7) C/W MN BUS UNDERVOLT It – on BACKUP C/W ALARM It – on C/W FREON LOOP It – on C/W FC PUMP It – on C/W AC VOLT It – on C/W H2O LOOP It – on MDU CRT 3,4 blank	
(A15) • O2,H2 TK5 HTR A,B (four) – OFF	Cryo O2,H2 Tk5 Htrs A in Auto Cryo O2,H2 Tk5 Htrs B	(COMM LOST) Comm via PS ATU & A/L 4 All S-BD A/G voice lost if Sys 2 selected	
(C2) • L IDP/CRT SEL – 1 • R IDP/CRT SEL – 2 • GPC/CRT 03 EXEC • 04 EXEC	5 IDP 3,4 MDU CRT 3,4 MDU CDR 1 MDU PLT 2 MDU AFD 1	(LIGHTS LOST) Inst Its L/Ctr (pnls C2,F6,F7) MS pnl Its (pnls R10,R12) OS pnl Its (pnls A1,A2,A6, A7,A8,A13,L9) PLB Floodlts Aft Port, Mid Stbd MS Floodlt R Seat/Ctr Cnsl Floodlts Middk Floodlts 3,4,5,7 MO13Q pnl It 1 Bunk Floodlts 1/3 Airlock Floodlt 4 TA Floodlt 4	
(A1L) S-BD PM • ANT SW ELEC – 1 • XPNDR – 1 • PWR AMPL OPER – 1 • STBY – 1 • PRE AMPL – 1 NSP • PWR – 1	S-BD PM Sys 2: Xpndr 2 Pre Amp 2 Pwr Amp 2 PM, FM Ant sw 2 NSP 2 COM SEC 2	(F9) AC3 ΦA,ΦB,ΦC AC volts ind – < 90 DC VOLTS MNC ind – OSL	
If PSP and/or INTRG reqd for PL or ISS ops: (A1L) • S-BD PL PWR SYS – 1 • CNTL – PNL • – CMD	S-BD PL Intrg 2 PSP 2	(FSMs) S67 CNTL RPC S67 AC VOLTS 3 S86 HYD RSVR Q 3 SM2 HYD QTY 3 (B) S86 WSB T (2) S66 AV BAY 1 FAN S66 CABIN FAN (2) S68 FC PUMP 3 S69 FC H2 PUMP 3 S88 H2O PUMP P2 S88 H2O LOOP 2 FLOW S88 H2O LOOP 2 TEMP S88 H2O PUMP P 1 S88 H2O LOOP 1 TEMP S88 H2O LOOP 1 QTY S67 MAIN BUS V C RCS PWR FAIL S88 FREON FLOW 1 S88 FRN PL HX 2 S88 FREON QTY 1	
7 • Reconfig PSP 7 • Perform PL INTRG REACQ (if reqd)		SM0 THRM/HYD (B) BCE STRG 3 ADTA (3,B) BCE STRG 4 ADTA (3,B) BCE STRG 3 MLS (3)	
8 If OIU reqd: (SSP) • OIU PWR – OIU 1 ON • OIU tb – UP • √MCC, OIU reconfig			
(A12) APU HTR 9 • GAS GEN/FUEL PUMP 2 – A AUTO 9 • GAS GEN/FUEL PUMP 3 – B AUTO • LUBE OIL LINE 2 – A AUTO • LUBE OIL LINE 3 – B AUTO (Continued)	APU 2 GG/Fu Pump Htrs B APU 3 GG/Fu Pump Htrs A  APU 2 Lube Oil Ln Htr B 3 Lube Oil Ln Htr A  (Continued)		

**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A12) APU HTR TK/FU LN/H2O SYS 9 • 2A – AUTO 9 • 2B – OFF 9 • 3A – OFF 9 • 3B – AUTO HYD HTR • AFT FUS A – AUTO • B – OFF	APU 2 Tk/Fu Ln Htr B 3 Tk/Fu Ln Htr A  APU 3 GG Inj H2O Htrs 3A, 23A  Aft Fuselage Hyd Htrs B	(FSMs) I/O ERROR CRT 3 I/O ERROR CRT 4 RM DLMA MANF S67 FPC/FLC3 S67 MPC 3 S67 APC/ALC C  If NSP 2 selected: BCE STRG 3 NSP If cooling by FES only: C/W FREON LOOP It – on 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'	⑨  If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp  ⑩ Vlv holds position  ⑪ Indicates DN when NLG down  ⑫ Will <u>not</u> indicate DN when RMG down  ⑬ APU H2O QTY 2 if in BLR CNTLR/HTR 2A. APU H2O QTY 3 if in BLR CNTLR/HTR 3B  ⑭ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison  ⑮ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists  ⑯ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists  ⑰ Do not reconfig for reg switch or l'CNCT procedures  ⑱ Man CL and GPC cntl remains  ⑲ If SPLY H2O DUMP VLV ENA/NOZ HTR – OFF, tb upward and already bp
(A1R) • S-BD FM PWR – 1	S-BD Fm Sig Proc 2, Xmtr 2	(L2) 10 O2 EMER tb – bp 10 CAB RELIEF B tb – bp	
If no comm: (C3) • S-BD PM CNTL – PNL • – CMD • AUD CTR – 1	Audio Ctr 2	(R1) FC3 COOL PUMP ΔP tb – bp	
(L1) • FLASH EVAP CNTLR PRI A – OFF • FLASH EVAP CNTLR PRI B(SEC) – ON (if reqd) • TOP EVAP HTR NOZ R – A AUTO • TOP EVAP HTR DUCT – A(B) If Hi Load Evap enabled: • HI LOAD DUCT HTR – A(B)	Flash Evap Cntlr Pri A  Topping Evap R Noz Htr B  Topping Evap Duct Fwd,Aft Htrs C  Hi Load Duct Inbd,Outbd, Noz Htrs C	(F6,F8) 11 NOSE LDG GEAR tb – bp 12 R LDG GEAR tb – bp	
(L2) • FLASH EVAP FDLN HTR B SPLY – 2	FES H2O Fdln B Htrs 1 (all)	<b>HYD/APU</b> 13 HYD QTY 3 ind – 0% APU H2O QTY ind – 0%	
	Prox Snr Electronics Box 1	If SYS 2 pwrd: 'S62 BCE BYP PSP2' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'	
	Av Bay 2 Agent discharge capability	(O1) H2O PUMP OUT PRESS LOOP 1 ind – 0 psia H2O PUMP OUT PRESS LOOP 2 ind – 20-25 psia	
	RMS: 14 Port MPM Mtr 1 14 Stbd MPM Mtr 2 15 Port Fwd MRL Mtr 2 15 Port Aft MRL Mtr 1 16 Stbd Mid MRL Mtr 2 16 Stbd Fwd MRL Mtr 1	(O3) RCS/OMS PRPLT QTY display is blank  R ADP deploy time incr from 15-30 sec	
• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)	RCS Manf F5 RJD pwr (F5L,F5R)	(O7) 10 AFT L RCS He PRESS B tb – bp 10 AFT L RCS MANF ISOL 5 tb – bp 10 AFT R RCS MANF ISOL 5 tb – bp	
	RCS Manf F4 RJD pwr (F4R,F4D)	(O8) 10 FWD RCS TK ISOL 1/2 tb – bp 10 FWD RCS MANF ISOL 4 tb – bp 10 FWD RCS MANF ISOL 5 tb – bp	
(F6,F8) • HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 3 or (OV105) GPS 3	MLS 3 (OV103,4) TACAN 3 (OV105) GPS 3	(R4) 10 HYD BK ISOL VLV 3 tb – OP 10 HYD MPS/TVC ISOL VLV SYS 3 tb – CL	
(O6) • ANNUN BUS SEL ACA 2/3 – MNB	ACA 2/3 MNC pwr	(R11L) 10 SPLY H2O TKA OUTLET tb – bp 19 SPLY H2O DUMP VLV tb – bp 10 SPLY H2O XOVR VLV tb – bp	
Refer to OMS/RCS Slide Rule for vlv loss info 17 Reconfig following vlv(s) only if leak isolation reqd:	10 Aft L RCS He Press Isol B GPC Cntl, man CL capability 18 F,R RCS He Press Isol B man OP capability		
(O7) • AFT L RCS He PRESS B • R RCS He PRESS B			
(Continued)	(Continued)	(Continued)	

**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O8) • FWD RCS He PRESS B		(R11L) 10 SPLY H2O GALLEY SPLY VLV tb – bp	(10) Vlv holds position
<b>GNC 23 RCS</b> • Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest priority, etc • Set aft pod(s) PRI JET FAIL LIMIT of 6	Aft RCS L,R Jet 3,4,5 Htrs Fwd RCS Jet 4,5 Htrs	10 SPLY H2O TKC INLET tb – bp	(20) Lost TM: <b>GNC SYS SUMM 2</b>
20 Save R OMS for deorbit (if reqd for additional on-orbit burns, √MCC)	20 R OMS GN2 Press Vlv Op TM 21 Eng Pr Vlv Coil 1	(R13L) RAD CNTL STBD,PORT (two) tb – bp	R OMS ENG VLV 2: Assume VLV 2 status same as Vlv 1
20 Prior to using L(R) OMS: (O8)		(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp STARBOARD RMS: DPY/STO tb – bp	R OMS N2 P VLV: If ENG – ARM/PRESS, assume vlv OP
22 R OMS He PRESS/VAP ISOL • A – GPC • B – OP	23 R OMS He Vap Isol 2 GPC Cntl 23 R OMS He Pr Isol B GPC Cntl	<b>SM 94 PDRS CONTROL</b> PORT RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	(21) Unable to confirm redundant coil (22) Maintains He Isol redundancy
24 L OMS He PRESS/VAP ISOL • A(B) – GPC • B(A) – CL	20 L OMS He Pr/Vap Isol A,B man Cntl	(AW82D) 10 EMU 1 H2O SPLY,WASTE tb – CL	(23) Vlv norm closed. Manual cntl remains
<b>GNC XXXXX</b> <b>MNVR VYYYY</b> (3,B) Sel R OMS SEC TVC: • OMS GMBL SEC R ITEM 31 EXEC	R OMS Pri TVC	STAR TRKR DR POS -Z OP/CL time incr from 8-16 sec	(24) Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
(A6U) • ANNUN BUS SEL – MNB	ACA 4/5 MNC pwr	If Cabin Fan A selected: C/W AV BAY/CAB AIR It – on 'S66 CABIN FAN'	(25) FSM caused by Antenna miscompare
(A12) HYD CIRC PUMP • PWR 2 – MNB • 3 – MNA	MNC Circ Pump 2 pwr 3 pwr	If site AOS and using S-BD ANT ELEC 2: 'ANTENNA' (2)	(26) During <b>MAN</b> PLBD OP/CL, single mtr run time noted on actuators
(A14) RCS/OMS HTR • L POD (two) – A AUTO, B OFF • R POD (two) – A AUTO, B OFF	L,R Pod Htrs B (partial)	If H2O Loop 2 Pump active: 'S88 H2O PUMP P2'	
(AW18D) • AIRLK AUD CNTL – MIDDECK	AL ATU,EMU CCU 1,2 PS ATU and CCU	If OMS GmbL cmd abs value > 2 deg: C/W OMS TVC It – on 'R OMS GMBL' (3,B)	
(R11U) • FC H2O LINE HTR – A AUTO • FC H2O RELIEF HTR – A AUTO	FC H2O Line Htrs B FC H2O Relief Htrs B Noz Htr	(F7) If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It – on after ~2 min	
For PLBD ops: • OP/CL Drs in man mode	26 PLBD: C/L Lat 13-16 Mtr 1 1-4,5-8,9-12 Mtrs 2 Stbd Aft Blkhd Mtr 1 Port Aft Blkhd Mtr 2 Port Door Mtr 1 Stbd Door Mtr 2 CL Limit sw	If first RGA failure and Rates sensed: 'RM FAIL RGA'	
If supply H2O dump reqd: For TK A and/or TK B • Perform SUPPLY H2O SYS BACKUP DUMP TK A,B (IFM) For TK C and/or TK D • Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) using FLASH EVAP CNTLR PRI B	10 Sply H2O Dump Vlv Cntl Noz Htr 10 Xovr Vlv Cntl	If ANNUN BUS SEL ACA 2/3 – MNC, L/R Event Seq Its lost	
		(L2) 10 O2 EMER tb – bp 10 CAB RELIEF B tb – bp	
(Continued)	(Continued)	(Continued)	

**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	10 MPS/TVC Hyd Sys 3 Isol Cntl	SM (BFS,SM) 63 PL BAY DOORS	(10) Vlv holds position
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A – PRI/GPC If reqd for Post Rollout: • NH3 CNTLR B – SEC/ON	27 NH3 Sys A Sec Cntrl man ON capability 28 NH3 Sys B Pri Cntrl	If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	(27) Sys A Pri Cntrl, auto switchover to Sec Cntrl remain (28) Sys B Sec Cntrl man On capability remains
If AC Pwr Transfer Cable to be installed to regain AC: • Go to EPS SSR-200; otherwise, continue with bus loss actions		(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL tb (two) indicate single mtr ops	(29) Not yet active on all vehicles
(R2) • BLR CNTLR/HTR 2 – B • 3 – A	APU/HYD Blr Cntrl/Htr 2A 3B	Impending: 'S66 CO2 RL SYS PCO2' 'S66 CAB PPCO2'	(30) PEVs, Actuators, Bed A P, Bed B P, Bed dP will be recovered after system reconfig
	29 FC2 Redundant Reac Vlv Cntl on pnl C3		(31) H2O Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snrs lost
(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)	30 CO2 Rmvl Sys Cntrl 2 Fan AC3 pwr Compressor AC3 pwr		(32) Av Bay 1 Fan ΔP, Air Out Temp snrs lost (33) Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrs lost
(L1) • IMU FAN B(A) – ON • C – OFF  • Perform SSR-10 (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS  • CAB FAN A – OFF • B – ON • AV BAY 1 FAN A,B (two) – ON • AV BAY 2 FAN A – ON • B – OFF • 3 FAN A – OFF • B – ON • FREON PUMP LOOP 2 – B	IMU Fan C  H2O Loop 2 Pump man ON capability 10 H2O Loop 1 Byp Cntrl, Sig 31 Cond  H2O Loop 1 Byp Vlv pwr  Cabin Fan A 32 Av Bay 1 Sig Cond, Xdcrs (ECLS SC2)  Av Bay 2 Fan B 3 Fan A  Freon Loop 2 Pump A		(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
(O17:C) • SIG CONDR FREON A – AC2 • SIG CONDR FREON B – AC2	33 Freon S/C A AC3 pwr (ECLS SC 1A) 34 Freon S/C B AC3 pwr (ECLS SC 1B)		
(CDR SEAT PNL) • CDR SEAT PWR BUS SEL – AC2 (up)	CDR Seat adj via AC3 pwr		
(PLT SEAT PNL) • PLT SEAT PWR BUS SEL – AC2 (up)	PLT Seat adj via AC3 pwr		
(O8) • Right OMS XFEED B – OP (tb-OP)	35 OMS Eng/Xfeed Vlv Redundancy		
(Continued)	(Continued)		

**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
36 SM 60 SM TABLE MAINT • Inhibit 0612605, 0612600, 0612640, 0612610			⑩ Vlv holds position ③⑥ Inhibits H2O Loop 1 Pump ΔP, Pump Out Temp, Accum Qty, respectively
37 <b>BUS ISOLATION</b> ONLY ON MCC CALL, PERFORM • MDU CRT 3 PWR – OFF • MDU CDR 1 PWR – OFF • MDU PLT 2 PWR – OFF (C2) • IDP/CRT 3 PWR – OFF (L4:N) • cb AC3 ΦC RAD ISOL B – op (R1) • PL AFT MNC – OFF (O7) • (OV105) GPS 3 PWR – OFF • (OV105) GPS 3 PRE AMPL UPPER – OFF • (OV105) GPS 3 PRE AMPL LOWER – OFF	38 Freon Loop 1,2 Rad Isol Motor B  Aft Payload C pwr  (OV105) GPS 3		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 ④⑩ Current Snsr 1 remains ④① Current Snsr 2 remains
39 (O8) • MLS 3 – OFF • R SEAT/CTR CNSL FLOOD – OFF (O16:A) • RGA 3 – OFF (O16:B) cb MNC • OI SIG CONDR OM3B – op • OI SIG CONDR OF 2/3 – op • OI MDM OF 3/4B – op • MNB CONTR – op • AUX TIMING BUFFER – op	R Seat/Ctr Cnsl Floodlts  RGA 3  Orbiter Timing Buffer Aft Mission Timer		④② If Emer O2 Mission Kit not flown, cb is open prelaunch
(O16:C) cb MNC • (OV103,4) TACAN 3 – op • SMOKE DETN CAB – op • SMOKE DETN BAY 1A/2B – op • FIRE SUPPR BAY 2 – op • UTIL PWR A11/A15/MO30F – op • FLOOD R CTR – op • ANNUN FWD ACA 2/3 – op • ANNUN AFT ACA 4/5 – op • cb MNC CRYO O2 HTR TK1 SNSR 2 – op • cb MNC CRYO O2 HTR TK2 SNSR 1 – op	Tacan 3 Cabin Smoke Detector Av Bay 1 Smoke Detector A 2 Smoke Detector B  MNC DC Utility pwr outlets at panels A11, A15, MO30F  40 Cryo O2 Tk1 Htr Current Snsr 2 41 Cryo O2 Tk2 Htr Current Snsr 1		
42 (O16:D) cb MNC • H2O ALT PRESS – op • O2 EMER – op • CAB RELIEF B – op • (OV105) GPS 3 PRE AMPL UPPER – op • (OV105) GPS 3 PRE AMPL LOWER – op • (OV103) GPS PRE AMPL UC – op • (OV103) GPS PRE AMPL LC – op	10 Emer O2 Sply Vlv Cntl 10 Cabin Relief Vlv B Cntl 10 H2O Alternate Press Vlv Cntl		
(Continued)	(Continued)		



**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
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	ADTA 3, 4 MLS 3  RCS/OMS Prplt Qty Gauge  43 Drag Chute, CDR Arm		④③ PLT Arm remains ④④ Six vlvs fail to non-isolation position ④⑤ Logic buses 2(3) remain pwr'd via MNB(MNA) ④⑥ Redundant pwr source remains for equipment
(A7U) PL BAY • FLOOD AFT PORT – OFF • MID STBD – OFF	44 ATVC 1 Isol ME  PLB Aft Port Floodlt Mid Stbd Floodlt		④⑦ Ku Comm and RDR function lost. KU-BAND CONT STOW – EA1
(A7L) IF DOCKING MISSION • PYRO PWR MNC – OFF cb MNC • LOGIC 2 – op • 3 – op	MNC Pyro system  45 MNC pwr to DSP Logic buses 2,3		ALTERNATE POWER IFM req'd to stow antenna. Jettison req'd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope
(A13) • (OV103) GPS – OFF • (OV103) GPS PRE AMPL UC – OFF • (OV103) GPS PRE AMPL LC – OFF	GPS 2		
(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	FC3 Start Up Htr Inhibit capability		
(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 MNC • UHF – op • GCILC – op • CNTL BUS AB1/2/3 – op	UHF redundant pwr GCILC redundant pwr MDM cmds to CCTV Sys MNC pwr for CNTLAB 1,2,3 Buses		
46 (R14:B) cb PALLET/DSC • 2A – op (EDO) • 3B/4A – op (EDO)			
(R14:C) • cb MNC KU SIG PROC – op  • cb UHF EVA – op	47 Ku-Bd Sys Rdr & Comm I/F Cont Unit (EA1), Ku Comm Sig Proc SSOR EVA STRG 2		
(R14:D) cb MNC TV B CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op  • cb MNC TV CAB – op	TV B Camr/Pan-Tilt TV B Camr Htr TV B Camr Pan/Tilt Htr and Illum Fit, Middeck TV Camrs and VFMs		
(R14:E) • cb MNC MS FLOOD – op	MS Floodlt		
(Continued)	(Continued)		

**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
(ML86B:F) cb MNC FLOODS • MIDDECK 5/7 – op • MIDDECK 3/4/MO13Q – op • BUNK 1/3 – op • AIRLK 4 – op	Middeck Floodlts 3,4,5,7 MO13Q Pnl Lt 1  Bunk Floodlts 1/3 Airlock Lt 4		⑩ Vlv holds position ④⑩ Current Snr 1 remains ④⑧ √MCC for Ku Ant stow reqmts ④⑨ Redundant mtr remains
(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	MNC FMC3 Bus pwr  MMC2 Bus pwr  MMC4 Bus pwr  AMC3 Bus pwr		⑤① Htr Cntl 2 remains ⑤① LG can still be deployed by redundant Pyro Bkup Rel Sys 2 and by Pri Hyd Sys. NLG extension pwr assist available from redundant sys. NLG can also be deployed by Hyd Sys 2
	48 Ku Ant Sto/Dpy Mtr 1		
	49 R HUD -Z Star Trkr Dr Sys 2 OP/CL capability		⑤② SYS A remains
	PL MNC Cur Sig Condr		
	Port,Stbd Rad Dpy/Sto Mtr 2 Port,Stbd Rad Lat 7-12 Mtrs 2 49 R ADP Dpy Mtr 1 50 Htr Cntrl 1 LH Vents 1,2,3 Mtrs 1 6 Mtrs 2 RH Vents 8,9 Mtrs 1 3,5 Mtrs 2 51 NLG,LMG,RMG Bkup Rel Sys 1		⑤③ One failure away from loss of jettison capability
(ML86B:A) • cb MNC SPLY H2O TKA OUTLET – op • cb MNC SPLY H2O TKC INLET – op • cb MNC DUMP VLV/NOZ HTR – op • cb MNC SPLY H2O XOVR VLV – op • cb MNC SPLY H2O GALLEY SPLY – op	10 Sply H2O TK A Out Vlv Cntl 10 C In Vlv Cntl  10 Galley H2O Sply Vlv Cntl		
(ML86B:D) cb PYRO JETT SYS B • KU ANT – op • PORT RMS – op • STBD RMS – op	52 Ku-Bd Jettison Sys A 53 RMS/OBSS Jett/Guil Sys B		
(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 MNC • CO2 SYS 2 CNTLR – op	10 EMU 1 Waste H2O Vlv Cntl 10 Sply H2O Vlv Cntl  TA Floodlt 4		
(ML86B:F) • cb MNC CRYO O2 HTR TK4 SNSR 2 – op • cb MNC CRYO O2 HTR TK5 SNSR 2 – op	40 Cryo O2 Tk4 Htr Current Snsr 2 Cryo O2 Tk5 Htr Current Snsr 2		
(Continued)	(Continued)		

**EPS SSR-50 (Cont)**  
**BUS LOSS: MNC DA3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(MO63P) cb CB2/J2,CB3/J3, CB4/J4,CB5/J5,CB6/J6, RLY PWR (six) – op	MO63P DC Utility Pwr panel	R MPS He reg A < 680 during entry MM303)	(10) Vlv holds position
	54 R OMS ENG Pr Vlv Coil 1 55 R OMS ENG Cntl Vlv 1,2 Coils 1 56 R OMS Purge Vlv 1,2 57 OMS QTY Gauging for all R OMS Single Engine burns Press Vlv Op Sig		(54) Unable to confirm redundant coils
	58 APU 2 Cntr Sply B pwr 59 3 Cntr Sply A pwr 60 2 Fu Tk Vlv B 60 3 Fu Tk Vlv A APU 3 GBX GN2 Repress Vlv		(55) Redundant coils remain
	10 HYD BK ISOL VLV 3 Cntl Hyd Rsvr 3 Qty Snsr		(56) Vlv fails closed
	10 EMU 1 Waste H2O Vlv Cntl 10 Sply H2O Vlv Cntl		<p style="text-align: center;"><b>CAUTION</b></p> <p>No purge. Wait 10 min between burns</p>
	61 Freon Loop 1 Cntr A Rad By Vlv Mtr man Cntl 62 Freon Loop 2 Cntr A Rad By Vlv Mtr		(57) √MCC for OMS Tot Qtys. Aft Qtys are found on
	10 Freon Loop 2 Flow Prop vlv Freon Loop 2 Cold Plate Flow Xdcr		<b>GNC SYS SUMM 2</b>
	MPS:		(58) Pwr Sply A remains. Turbine speed ind lost
	63 R Eng He Intercon Outlet Vlv		(59) Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
	63 L Eng He Xovr Vlv		(60) Vlv fails closed. Redundant vlv remains
	60 R Eng He Isol A		(61) Cntrls A,B Rad By Mtrs Auto Cntl and Cntr B Rad By Vlv Mtr remain
	64 Manf Repress LO2 Vlv 1,2		(62) Bypass vlv holds position and Cntr B Rad By Vlv Mtr remains
	65 Prplt F/D Outbd LO2 Vlv		(63) Vlv fails closed
	66 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		(64) Vlv fails closed. LO2 manf will not be pressured with He during entry (MM304)
	67 No WOW Relay K9,K11,K13		(65) Vlv holds position. Loss of manual capability to inert LO2 manf
	68 Hyd Main Pump 3 Depress Solenoid RPC A		(66) Redundant mtrs remain
	68 Hyd Main Pump 2 Depress Solenoid RPC B		(67) Brake/Skid Cntl Box A,B enabled before WOW
			(68) Redundant RPC remain

# EPS SSR-51

## BUS LOSS: MNC FPC3

(Includes MNC FLC3, MNC FMC3, AC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC3 SHUTDN (FC SHUTDN Cue Card), pwrdrn not needed, then:	2 FC3 Pumps and pH Snsr	MASTER ALARM Light/Tone – on CRT 3,4 blank	①
(R1) • cb AC CONTR AC3 ΦA, ΦB, ΦC (three) – cl • INV/AC BUS 3 – OFF (tb-OFF) • INV PWR 3 – OFF (tb-OFF) • cb AC CONTR AC3 ΦA, ΦB, ΦC (three) – op • AC3 BUS SNSR – OFF	AC3 ΦA,ΦB,ΦC Inverters	(F7) C/W FREON LOOP It – on C/W FC PUMP It – on C/W AC VOLT It – on C/W H2O LOOP It – on SM ALERT Light/Tone – on	* TIME * * CRITICAL * FC3 must be shutdn within 9 min to avoid potentially hazardous condition
(C2) • L IDP CRT SEL – 1 • R IDP CRT SEL – 2 On MCC GO: • GPC/CRT 03 EXEC • 04 EXEC	3 IDP 3,4 MDU CRT 3,4	(F9) AC3 ΦA,ΦB,ΦC AC volts < 90 (COMM LOST) All S-BD A/G voice lost if Sys 2 selected	② Will be repwrdr after AC Pwr Transfer Cable connected ③ Loss of redundant port to the following: IDP 3 MDU CDR 1 (P) MDU MFD 1 (S) MDU MFD 2 (S) MDU PLT 2 (P)
(A1L) S-BD PM • ANT SW ELEC – 1 • XPNDR – 1 • PWR AMPL OPER – 1 • STBY – 1 • PRE AMPL – 1 NSP • PWR – 1	S-BD PM Sys 2: Xpndr 2 Pre Amp 2 Pwr Amp 2 PM,FM Ant Sw 2	(LIGHTS LOST) Instr lts L/Ctr (pnls C2,F6,F7) MS pnl lts (pnls R10,R12) OS pnl lts (pnls A1,A2, A6, A7,A8,A13,L9)	IDP 4 MDU AFD 1 (P)
If PSP and/or INTRG reqd for PL or ISS ops: • S-BD PL PWR SYS – 1 • CNTL – PNL • – CMD	NSP 2/COM SEC 2	(FSMs) S67 FPC/FLC 3 S69 FC H2 PUMP 3 S66 AV BAY 1 FAN S66 CABIN FAN S66 IMU FN SPD B S67 AC VOLTS 3 S69 FC PUMP 3 S86 HYD RSVR Q 3 SM2 HYD QTY 3 (B) S86 WSB T (2) SM0 THRM HYD (B)	④ S86 WSB T 2 if in BLR CNTLR/HTR 2A. S86 WSB T 3 if in BLR CNTLR/HTR 3B
5 • Reconfig PSP 5 • Perform PL INTRG REACQ (if reqd)	S-BD PL Intrg 2 PSP 2	S88 FRN PL HX 2 S88 FREON QTY 1 S88 H2O PUMP P2 S88 H2O LOOP 2 FLOW S88 H2O LOOP 2 TEMP BCE BYP KU (2) S88 H2O PUMP P1 S88 H2O LOOP 1 TEMP S88 H2O LOOP 1 QTY	⑤ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books ⑥ OIU 1 interfaces with PSP 1 for commanding ⑦ Vlv holds position. Do not reconfig for reg switch or I'CNCT procedures
(A1R) • S-BD FM PWR – 1	S-BD FM Sys 2	I/O ERROR CRT 3 I/O ERROR CRT 4 RM DLMA MANF	⑧ Will indicate DN when NLG down
If no comm: (C3) • S-BD PM CNTL – PNL • – CMD		If CABIN FAN A selected: C/W AV BAY/CAB AIR It – on 'S66 CABIN FAN'	⑨ Will not indicate DN when RMG down
6 If OIU reqd: (SSP) • OIU PWR – OIU 1 ON • OIU tb – UP • √MCC, OIU reconfig		If SYS 2 pwrdr: 'S62 BCE BYP PSP 2' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'	⑩ KU-BAND CONT STOW – EA1 ALTERNATE POWER IFM reqd to stow Ku Ant. Jettison reqd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope
(L4:P) • cb AC2 ΦA LG SNSR 2 – cl	Prox Snsr Electronics Box 1	If NSP 2 selected: BCE STRG 3 NSP If site AOS and using S-BD Ant Elect 2: 'ANTENNA' (2)	⑪ Performing DIRECT STOW, MECH SSR-5, may be reqd. √MCC
Refer to OMS/RCS Slide Rule for vlv loss info Reconfig following vlv(s) only if leak isolation reqd: (O8) • FWD RCS He PRESS B • For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)	7 Fwd RCS He Press Isol B man OP capability RCS Manf F5 RJD pwr (F5L,F5R) RCS Manf F4 RJD pwr (F4R,F4D)	(R1) FC3 COOL PUMP ΔP tb – bp (F6,F8)	
		8 LDG GEAR NOSE tb – bp 9 LDG GEAR R tb – bp	
(R14:C) 11 • cb MNC KU SIG PROC – op	10 Ku-Bd Sys Rdr & Comm I/F Cont Unit (EA1)		
(Continued)	(Continued)	(Continued)	



**EPS SSR-51 (Cont)**  
**BUS LOSS: MNC FPC3**

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BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			(16) vlv holds position
• MDU CRT 3 PWR – OFF			(24) AC3 Bus Isolation
(L4:N) • cb AC3 ΦC RAD ISOL B – op	25 Freon Loop 1,2 Rad Isol Motor B		Cable installation accomplished in MNC FPC 3 ACTIONS column. No additional bus isolation steps reqd
(C2) • IDP/CRT 3 PWR – OFF			(25) Motor A remains
(O7) • (OV105) GPS 3 PWR – OFF • (OV105) GPS 3 PRE AMPL UPPER – OFF • (OV105) GPS 3 PRE AMPL LOWER – OFF	(OV105) GPS 3		(26) Mtr 2 remains
(O16:C) • cb MNC FIRE SUPPR BAY 2 – op			(27) Htr Cntr 2 remains
• MDU CRT 4 PWR – OFF			(28) 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
(R11L) • IDP/CRT 4 PWR – OFF			(29) Redundant mtrs remain
(MA73C:A) • MCA LOGIC MNC FWD 3 – OFF	MNC FMC 3 Bus pwr		(30) Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains
(R14:C) • cb MNB KU ELEC – op			(31) √MCC for Ku Ant stow reqmts
(A13) • (OV103) GPS PWR – OFF • (OV103) GPS PRE AMPL UC – OFF • (OV103) GPS PRE AMPL LC – OFF	(OV103) GPS 2		
	AC3 FMC3 Bus Pwr LH Vents 1,2,3 Mtr 1 6 Mtr 2 RH Vents 8,9 Mtr 1 3,5 Mtr 2 -Z Star Trkr Dr Sys 2 OP/CL capability		
	26 R ADP Dpy Mtr 1		
	PLT HUD		
	27 R ADP Htr Cntr 1		
	28 NLG Ext Sys 1		
	28 NLG, LMG, RMG Bkup Rel Sys 1		
	MNC Pwr to CNTL Buses BC1, BC2, BC3, CA1, CA2, CA3		
	29 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		
	30 Freon Loop 2 Cntr A Rad Byp Vlv Mtr		
	16 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 13-16 Mtr 1 1-4, 5-8, 9-12 Mtr 2 Stbd Aft Blkhd Mtr 1 Port Aft Blkhd Mtr 2 Door Mtr 1		
	31 Ku Ant Sto/Dpy Mtr 1		

**EPS SSR-52**

**BUS LOSS: MNC MPC3**

(Includes MNC MMC2 & MNC MMC4)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform MNC BUS TIE (BUS TIE Cue Card) 1 • Monitor, record Δamps between FC3 and tied FC	1 FC3 Purge Vlv O2,H2 Flow Xdcrs SS ΔV Snsrs	2 (R13L) RAD CNTL PORT,STBD (two) tb – bp	① Buses are tied due to: <u>Loss of FC3 Purge capability.</u> As FC3
(L2) • FLASH EVAP FDLN HTR B SPLY – 2	FES H2O Fdln B Mid 2 Htr 1	(Lights Lost) PLB Floodlts Aft Port, Mid Stbd	loses performance the tied FC will pick up load, slowing FC3 degradation. If degradation
(A12) • HYD HTR AFT FUS A – AUTO • HYD HTR AFT FUS B – OFF	Aft Fuselage Hyd Htrs B	If first RGA failure and rates sensed: 'RM FAIL RGA' (3)	projection does not allow for nominal EOM, Fuel Cell will be shut down. √MCC
(R11U) • FC H2O LINE HTR – A AUTO • FC H2O RELIEF HTR – A AUTO	FC H2O Line Htrs B Relief Htrs B Noz Htr	If FC H2O Rlf Htrs in B AUTO: SM ALERT Light/Tone – on 'S69 FUEL CELL'	and <u>Loss of FC3 SS ΔV Snsrs.</u> Change in
2 (MA73C:C,D) • cb MCA PWR AC3 3Φ MID 2 – op 2 • cb MCA PWR AC3 3Φ MID 4 – op	2 Port,Stbd Rad Lat 7-12 Mtr 2 Limit sw 3 Port,Stbd Rad Dpy/Sto Mtrs 1 Limit sw Port,Stbd Rad Dpy/Sto Mtrs 2	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	ΔAmps >12 amps indicates possible cell crossover problem. ΔAmps shift due to loss of FC3 purge capability is indicated by
For PLBD ops: • OP/CL Drs in man mode	PLBD: C/L Lat 13-16 Mtr 1 1-4,5-8,9-12 Mtr 2 Stbd Aft Blkhd Lat Mtr 1 Port Aft Blkhd Lat Mtr 2 Door Mtr 1 Stbd Door Mtr 2 CL Limit sw	(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp  STARBOARD RMS: DPY/STO tb – bp	change in ΔAmps between pre- and post-purge readings. MCC will aid in this determination
(L1) • TOP EVAP HTR DUCT – A(B) If Hi Load Evap enabled: • HI LOAD DUCT HTR – A(B)	Topping Evap Duct Fwd,Aft Htr C  Hi Load Duct Inbd,Outbd Htr C	(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp  STARBOARD RMS: DPY/STO tb – bp	② If AC3 MMC2 and MMC4 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 7-12 continues to run until Sys B Lat Cntl sw placed to OFF
<p align="center"><b>BUS ISOLATION</b></p>			
ONLY ON MCC CALL, PERFORM			
(A7U) PL BAY FLOOD • AFT PORT – OFF • MID STBD – OFF	PLB Aft Port Floodlt Mid Stbd Floodlt	(A8L) PORT RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY	③ Mtrs 1 will continue to drive until Sys A,B Cntl sw are taken to OFF
(A7L) IF DOCKING MISSION • PYRO PWR MNC – OFF cb MNC • LOGIC 2 – op • 3 – op	MNC Pyro system  4 MNC pwr to DSP Logic buses 2,3	STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	④ Logic buses 2(3) remain pwr'd via MNB(MNA)
(O16:A) • RGA 3 – OFF	RGA 3		⑤ Buses remain pwr'd
(R11U) • FC PURGE VLV 3 – CL • FC STARTUP HTR 3 – ENA	FC3 Startup Htr INH capability		⑥ Cntrlrs A,B Rad Byp Mtrs Auto Cntl and Cntrlr B Rad Byp Vlv Mtr Man Cntl remain
(MA73C:A,B) • MCA LOGIC MNC MID 2,4 (two) – OFF	MNC MMC2, MNC MMC4 Bus pwr		
	5 MNC pwr to ESS1BC,2CA		
	6 Freon Loop 1 Cntrl A Rad Byp Vlv Mtr man Cntl		
	(Continued)		

**EPS SSR-52 (Cont)**  
**BUS LOSS: MNC MPC3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>RMS:</p> <p>7 Port MPM Mtr 1</p> <p>7 Stbd MPM Mtr 2</p> <p>8 Port Fwd MRL Mtr 2</p> <p>8 Port Aft MRL Mtr 1</p> <p>9 Stbd Mid MRL Mtr 2</p> <hr/> <p>RH Vent 3 Mtr 2</p> <p>5 Mtr 2</p> <p>LH Vent 3 Mtr 1</p> <p>6 Mtr 2</p> <p>10 Ku Ant Dpy/Sto Mtr 1 Limit sw</p> <hr/> <p>11 Redundant Ku Band Xmit Enable</p> <p>12 Redundant Boom Stow Enable II Excitation Signal</p> <hr/> <p>FC2 Redundant Reac Vlv Close Cntl on pnl C3</p>		<p>⑦ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</p> <p>⑧ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p> <p>⑨ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p> <p>⑩ With an inop limit sw, mtr will continue to run until primary sw returned to GND</p> <p>⑪ Redundant sig (MNB) enables Ku Band Xmit</p> <p>⑫ MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs</p>



**EPS SSR-53**  
**BUS LOSS: MNC APC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p><b>GNC 23 RCS</b></p> <p>1 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</p>		<p>If OMS GMBL cmd abs value &gt; 2 deg:            C/W OMS TVC It – on            'R OMS GMBL' (3,B)</p>	<p>① Maintains control capability for APC4 failure</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info (use APC6 Slide for Aft RCS)</p> <p>3 Reconfig following vlv(s) only if leak isolation reqd: (O7)            • AFT L RCS He PRESS B            • R RCS He PRESS B</p>	<p>2 Aft L RCS He Press Isol B GPC Cntl, man CL capability            4 Aft R RCS He Press Isol B man OP capability            2 Aft L,R RCS Manf Isol 5 Cntl</p>		<p>② Vlv holds position            ③ Do not reconfig for reg switch or I'CNCT procedures            ④ Man CL and GPC cntl remains            ⑤ Lost TM:</p>
<p>(A12)            APU HTR TK/FU LN/H2O            • SYS 3B – AUTO            • SYS 3A – OFF</p>	<p>APU 3 GG Inj H2O Htrs 3A,23A</p>		<p><b>GNC SYS SUMM 2</b>            R OMS Eng Vlv 2:            Assume Vlv 2 status same as Vlv 1</p>
<p>(A14)            RCS/OMS HTR            • L POD (two) – A AUTO, B OFF            • R POD (two) – A AUTO, B OFF</p>	<p>L,R Pod Htrs B (partial)</p>		<p>⑥ Maintains He Isol redundancy            ⑦ Vlv normally closed. Man cntl remains            ⑧ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</p>
<p>5 Prior to using L,R OMS: (O8)</p>			<p>⑨ Vlv normally closed. GPC cntl remains</p>
<p>6 R OMS He PRESS/VAP ISOL            • A – GPC            • B – OP</p>	<p>7 R OMS He Vap Isol 2 GPC Cntl            7 R OMS He Pr Isol B GPC Cntl</p>		<p>⑩ Vlv fails closed. Redundant vlv remains</p>
<p>8 L OMS He PRESS/VAP ISOL            • A(B) – GPC            • B(A) – CL</p>	<p>9 L OMS He Pr/Vap Isol A,B man Cntl</p>		
<p><b>GNC XXXXX</b>  <b>MNVR YYYYY</b> (3,B)</p> <p>Sel R OMS SEC TVC:            • GMBL SEC R – ITEM 31 EXEC</p>	<p>R OMS Pri TVC</p>		
<p><b>BUS ISOLATION</b></p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(R1)            • PL AFT MNC – OFF</p>	<p>Aft Payload C pwr</p>		
	<p>10 R OMS BPV 2 OP sig            APU 2 Fu Tk Vlv B</p>		

**EPS SSR-54**

**BUS LOSS: MNC APC6**

(Includes MNC APC3, MNC ALC3, MNC AMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> <li>FLASH EVAP CNTLR PRI A – OFF</li> <li>FLASH EVAP CNTLR PRI B(SEC) – ON (if reqd)</li> <li>TOP EVAP HTR NOZ R – A AUTO</li> </ul> <p>If HI LOAD EVAP enabled:</p> <ul style="list-style-type: none"> <li>HI LOAD DUCT HTR – A(B)</li> </ul>	<p>Flash Evap Cntrl Pri A</p> <p>Topping Evap R Noz Htr B Hi Load Duct Noz Htr C</p>	<p>(R4)</p> <p>1 HYD BK ISOL VLV 3 tb – OP</p> <p>1 HYD MPS/TVC ISOL VLV SYS 3 tb – CL</p>	<p>① Vlv holds position</p> <p>② Do not reconfig for reg switch or l'CNCT procedures</p> <p>③ Man CL and GPC cntl remains</p> <p>④ Maintains control capability for APC1 failure</p> <p>⑤</p>
<p>(L2)</p> <ul style="list-style-type: none"> <li>FLASH EVAP FDLN HTR B SPLY – 2</li> </ul>	<p>FES H2O Fdln B Htrs 1 (all except Mid 2)</p>	<p>(O7)</p> <p>1 AFT L RCS He PRESS B tb – bp</p> <p>1 AFT L,R RCS MANF ISOL 5 (two) tb – bp</p>	<p>* <b>TIME CRITICAL</b> *</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>2 Reconfig following vlv(s) only if leak isolation reqd:</p> <p>(O7)</p> <ul style="list-style-type: none"> <li>AFT L RCS He PRESS B</li> <li>R RCS He PRESS B</li> </ul>	<p>1 Aft L RCS He Press Isol B GPC Cntl and man CL capability</p> <p>3 Aft R RCS He Press Isol B man OP capability</p>	<p>(FSMs)</p> <p>S88 FRN AFT CP 2 RCS PWR FAIL</p> <p>If cooling by FES only: C/W FREON LOOP It – on 'S88 EVAP OUT T 1' 'S88 EVAP OUT T 2'</p>	
<p><b>GNC 23 RCS</b></p> <ul style="list-style-type: none"> <li>Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</li> </ul> <p>4 DES INH on L Manf 3 Jets:</p> <ul style="list-style-type: none"> <li>ITEM 2 EXEC</li> <li>L3L ITEM 12 EXEC (*)</li> <li>L3D ITEM 28 EXEC (*)</li> <li>L3A ITEM 30 EXEC (*)</li> <li>Set aft pod(s) PRI JET FAIL LIMIT to 6</li> </ul>	<p>Aft RCS L,R Jets 3,4 Htrs</p>	<p>(F7)</p> <p>If APUs active and using BLR CNTLR/HTR 2A or 3B, C/W APU TEMP It – on after ~2 min</p>	
<p>(R2)</p> <ul style="list-style-type: none"> <li>BLR CNTLR/HTR 2 – B</li> <li>3 – A</li> </ul>	<p>APU/HYD Blr Cntrl/Htr 2A 3B</p>	<p>If OMS Gmbl cmd abs value &gt; 2 deg: C/W OMS TVC It – on 'R OMS GMBL' (3,B)</p>	
<p>(A12)</p> <p>5 APU HTR TK/FU LN/H2O</p> <ul style="list-style-type: none"> <li>SYS 2A – AUTO</li> <li>2B – OFF</li> </ul> <p>5</p> <ul style="list-style-type: none"> <li>SYS 3A – OFF</li> <li>3B – AUTO</li> </ul>	<p>APU 2 TK/FU Ln Htr B</p> <p>3 TK/FU Ln Htr A 3 GG Inj H2O Htrs 3A,23A</p>	<p>No R MPS He usage during entry (MM304)</p>	
<p>5 APU HTR GAS GEN/FUEL</p> <ul style="list-style-type: none"> <li>PUMP 2 – A AUTO</li> <li>3 – B AUTO</li> </ul> <p>5</p> <p>APU HTR</p> <ul style="list-style-type: none"> <li>LUBE OIL LINE 2 – A AUTO</li> <li>LUBE OIL LINE 3 – B AUTO</li> </ul> <p>HYD CIRC</p> <ul style="list-style-type: none"> <li>PUMP PWR 2 – MNB</li> <li>3 – MNA</li> </ul>	<p>APU 2 GG/FU Pump Htr B 3 GG/FU Pump Htr A</p> <p>APU 2 Lube Oil Ln Htr B</p> <p>APU 3 Lube Oil Ln Htr A</p> <p>Circ Pmp 2 MNC pwr 3 MNC pwr</p>		
<p>(A14)</p> <p>RCS/OMS HTR</p> <ul style="list-style-type: none"> <li>L POD (two) – A AUTO, B OFF</li> <li>R POD (two) – A AUTO, B OFF</li> </ul>	<p>L,R Pod Htrs B (partial)</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-54 (Cont)**  
**BUS LOSS: MNC APC6**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
6 Save R OMS Eng for deorbit (If reqd for additional on-orbit burns, √MCC)	6 R OMS GN2 Press Vlv OP TM 7 R OMS Eng Pr Vlv Coil 1		① Vlv holds position ⑥ Lost TM:
Prior to using L(R) OMS: (O8)			<b>GNC SYS SUMM 2</b>
8 R OMS He PRESS/VAP ISOL • A – GPC • B – OP	9 R OMS He Vap Isol 2 GPC Cntl		R OMS N2 P VLV If Eng – ARM/PRESS assume vlv OP
10 L OMS He PRESS/VAP ISOL • A(B) – GPC • B(A) – CL	9 R OMS He Pr Isol B GPC Cntl 11 L OMS He Pr/Vap Isol A,B man Cntl		R OMS ENG Vlv 2: assume Vlv 2 status same as Vlv 1
GNC XXXXX MNV R YYYYY (3,B) Sel R OMS SEC TVC: • GMBL SEC R – ITEM 31 EXEC	R OMS Pri TVC		⑦ Unable to confirm redundant coils ⑧ Maintains He Isol redundancy
For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,2 (two) – OP, wait 10 sec, then CL	1 MPS/TVC Hyd Sys 3 Isol Cntl		⑨ Vlv normally closed. Man cntl remains
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A – PRI/GPC If reqd for Post Rollout: • NH3 CNTLR B – SEC/ON	12 NH3 Sys A Sec Cntrl Man ON capability 13 NH3 Sys B Pri Cntrl and Auto switchover to Sec Cntrl		⑩ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk ⑪ Vlv normally closed. GPC cntl remains
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)			⑫ Sys A Pri Cntrl, auto switchover to Sec Cntrl remain ⑬ Sys B Sec Cntrl man On capability remains
<b>BUS ISOLATION</b>			⑭ Six vlvs fail in non-isolation position
ONLY ON MCC CALL, PERFORM			⑮ Pwr Sply A remains. Turbine Speed ind lost
(R1) • PL AFT MNC – OFF	Aft Payload C pwr PL MNC Cur Sig Condr		⑯ Vlv fails closed. Redundant vlv remains
	14 ATVC 1 Isol ME		⑰ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
(MA73C:B) • MCA LOGIC MNC AFT 3 – OFF	MNC AMC3 Bus pwr RH Vents 8,9 Mtr 1		⑱ Redundant RPC remains
	Freon Loop 2 Cold Plate Flow Xdcr 15 APU 2 Cntrl Pwr Sply B 16 Fu Tk Vlv B 17 APU 3 Cntrl Pwr Sply A 16 Fu Tk Vlv A GBX GN2 Repress Vlv 18 Hyd Main Pump 3 Depress Solenoid RPC A 18 Hyd Main Pump 2 Depress Solenoid RPC B		
	(Continued)		

**EPS SSR-54 (Cont)**  
**BUS LOSS: MNC APC6**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>1 Hyd Brake Isol 3 Cntl</p> <p>19 R OMS Cntl Vlv 1,2 Coils 1</p> <p>20 OMS Qty Gauging for all R OMS single engine burns</p> <p>21 R OMS Purge Vlv 1,2 Aft RCS L,R Jet 5 Htr</p> <p>MPS:</p> <p>22 R Eng He Intercon Outlet Vlv</p> <p>23 R Eng He Isol A</p> <p>22 L Eng He Xovr Vlv</p> <p>24 Manf Repress LO2 Vlv 1,2</p> <p>25 Prplt F/D Outbd LO2 Vlv</p> <p>26 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</p> <p>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</p>	<p>R MPS He reg A &lt; 680 during entry (MM303)</p>	<p>① Vlv holds position</p> <p>⑱ Redundant coils remain</p> <p>⑳ √MCC for OMS Qty</p> <p>㉑</p> <div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;"> <p><b>CAUTION</b></p> </div> <p>No purge. Wait 10 min between burns</p> <p>㉒ Vlv fails closed</p> <p>㉓ Vlv fails closed. Redundant vlv remains</p> <p>㉔ Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)</p> <p>㉕ Vlv holds position. Loss of manual capability to inert LO2 manf</p> <p>㉖ Redundant mtrs remain</p>

**EPS SSR-55**  
**BUS LOSS: MNC FLC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A1L)  S-BD PM  • ANT SW ELEC – 1  • XPNDR – 1  • PWR AMPL OPER – 1  • PWR AMPL STBY – 1  • PRE AMP – 1  NSP  • PWR – 1</p> <hr/> <p>If PSP and/or INTRG reqd for PL or ISS ops:  • S-BD PL PWR SYS – 1  • CNTL – PNL  – CMD</p> <p>5 • Reconfig PSP  5 • Perform PL INTRG REACQ (if reqd)</p>	<p>S-BD PM Sys 2:  FM, PM Ant Sw 2  Xpndr 2  Pwr Ampl 2</p> <p>Pre Amp 2</p> <p>NSP 2</p> <hr/> <p>S-BD PL Intrg 2  PSP 2</p>	<p>(COMM LOST)  All S-BD A/G voice lost if Sys 2 selected</p> <p>(F7)  1 C/W RCS JET It – on</p> <p>(F6,F8)  2 LDG GEAR R tb – bp  3 LDG GEAR NOSE tb – bp</p> <p>(O8)  4 FWD RCS MANF ISOL 5 tb – bp</p> <p>(FSMs)  1 F RCS D(R) JET  RM DLMA MANF</p>	<p>① Indications do not appear until jets commanded</p> <p>② Does not indicate DN when RMG down</p> <p>③ Indicates DN when Nose Gear down</p> <p>④ Vlv holds position</p> <p>⑤ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books</p>
<p>(A1R)  • S-BD FM PWR – 1</p> <p>If no comm:  (C3)  • S-BD PM CNTL – PNL  – CMD</p>	<p>S-BD FM Sys 2</p>	<p>If NSP 2 selected:  ‘BCE STRG 3 NSP’  If site AOS and using S-BD ANT Elec 2:  ‘ANTENNA (2)</p>	<p>⑥ FSM caused by Antenna miscompare</p> <p>⑦ OIU 1 interfaces with PSP 1 for commanding</p>
<p>7 If OIU reqd:  (SSP)  • OIU PWR – OIU 1 ON  • OIU tb – UP  • √MCC, OIU reconfig</p> <p>• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>RCS Manf F5 RJD pwr (F5L,F5R)</p>	<p>If Sys 2 pwrd:  ‘S62 BCE BYP PSP2’  Loss of PL TLM and CMD  If PDI FDA enabled:  ‘S62 PDI DECOM FAIL’</p>	<p>⑧ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur when commanded</p>
<p><b>GNC 23 RCS</b></p> <p>8 Override F4 Manf status to CL:  • RCS FWD – ITEM 1 EXEC  • MANF VLVS 4 OVRD – ITEM 43 EXEC</p>	<p>RCS Manf F4 RJD pwr (F4R,F4D)</p>		<p>⑨ Do not reconfig for reg switch or l’CNCT procedures</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>9 Reconfig following vlv only if leak isolation reqd:  (O8)  • FWD RCS He PRESS B</p> <p>• Pre-seat ingress for Entry, discharge hand-held fire ext into AV BAY 2</p>	<p>4 Fwd RCS He Press Isol B man OP capability</p> <p>Av Bay 2 agent discharge capability</p>		<p>⑩ Htr Cntrl 2 remains</p>
<p><b>BUS ISOLATION</b></p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(O16:C)  • cb MNC FIRE SUPPR BAY 2 – op</p>			
	<p>10 R ADP Htr Cntrl 1  NWS fail indication (pnl F2)</p> <p>NLG, RMG B/U Rel 1 Fire 2, Arm</p>		

**EPS SSR-56**  
**BUS LOSS: MNC ALC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> <li>FLASH EVAP CNTLR PRI A – OFF</li> <li>FLASH EVAP CNTLR PRI B(SEC) – ON (If reqd)</li> <li>TOP EVAP HTR NOZ R – A AUTO</li> </ul> <p>If HI LOAD EVAP enabled:</p> <ul style="list-style-type: none"> <li>HI LOAD DUCT HTR – A(B)</li> </ul>	<p>FES Cntr Pri A</p> <p>Topping Evap R Noz Htr B Hi Load Duct Noz Htr C</p>	<p>(R4)</p> <p>1 HYD BK ISOL VLV 3 tb – OP</p> <p>1 HYD MPS/TVC ISOL VLV SYS 3 tb – CL</p>	<p>① Vlv holds position</p> <p>② Do not reconfig for reg switch or l'CNCT procedures</p>
<p>(L2)</p> <ul style="list-style-type: none"> <li>FLASH EVAP FDLN HTR B SPLY – 2</li> </ul>	<p>FES H2O Fdln B Htrs 1 (all except Mid 2)</p>	<p>(O7)</p> <p>1 AFT L RCS He PRESS B tb – bp</p> <p>1 AFT L,R RCS MANF ISOL 5 (two) tb – bp</p>	<p>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</p>
<p>Refer to OMS/RCS Slide Rule for bus loss info</p> <p>2 Reconfig following vlv(s) only if leak isolation reqd:</p> <p>(O7)</p> <ul style="list-style-type: none"> <li>AFT R RCS He PRESS B</li> <li>L RCS He PRESS B</li> </ul>	<p>Aft R RCS He Pr Isol B man OP capability</p> <p>1 Aft L RCS He Press Isol B GPC Cntl, man CL capability</p>	<p>(FSMs)</p> <p>RCS PWR FAIL</p> <p>If cooling by FES only: C/W FREON LOOP It – on 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'</p>	<p>④</p> <p style="text-align: center;">* TIME CRITICAL *</p>
<p><b>GNC 23 RCS</b></p> <ul style="list-style-type: none"> <li>Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</li> <li>Set aft pod(s) PRI JET FAIL LIMIT to 6</li> </ul>	<p>Aft RCS L,R Jet 3,4 Htrs</p>	<p>(F7)</p> <p>If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It – on after ~2 min</p>	<p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p>
<p>(R2)</p> <ul style="list-style-type: none"> <li>BLR CNTLR/HTR 2 – B</li> <li>3 – A</li> </ul>	<p>3 APU/HYD Blr Cntrl/Htr 2A</p> <p>3 3B</p>		<p>⑤ Lost TM:</p> <p><b>GNC SYS SUMM 2</b></p> <p>R OMS N2 P VLV If Eng – ARM/PRESS, assume vlv OP</p>
<p>(A12)</p> <p>APU HTR TK/FU LN/H2O</p> <p>4 • SYS 2A – AUTO</p> <ul style="list-style-type: none"> <li>2B – OFF</li> <li>3A – OFF</li> <li>3B – AUTO</li> </ul> <p>APU HTR GAS GEN/FUEL</p> <p>4 • PUMP 2 – A AUTO</p> <p>4 • 3 – B AUTO</p> <p>APU HTR LUBE OIL</p> <ul style="list-style-type: none"> <li>LINE 2 – A AUTO</li> <li>3 – B AUTO</li> </ul> <p>HYD CIRC</p> <ul style="list-style-type: none"> <li>PUMP PWR 2 – MNB</li> <li>3 – MNA</li> </ul>	<p>APU 2 Tk/Fu Ln Htr B</p> <p>APU 3 Tk/Fu Ln Htr A</p> <p>APU 2 GG/FU Pump Htr B 3 GG/FU Pump Htr A</p> <p>APU 2 Lube Oil Ln Htr B 3 Lube Oil Ln Htr A</p> <p>Circ Pump 2 MNC pwr 3 MNC pwr</p>		<p>⑥ Unable to confirm redundant coils</p> <p>⑦ Maintains He Isol redundancy</p> <p>⑧ Vlv normally closed. Man cntl remains</p>
<p>5 Save R OMS eng for deorbit (If reqd for additional on-orbit burns, √MCC)</p>	<p>5 R OMS GN2 Press Vlv OP TM</p> <p>6 R OMS Eng Pr Vlv Coil 1</p>		
<p>Prior to using R OMS: (O8)</p> <p>7 R OMS He PRESS/VAP ISOL</p> <ul style="list-style-type: none"> <li>A – GPC</li> <li>B – OP</li> </ul>	<p>8 R OMS He Pr Isol B GPC Cntl</p>		
<p>1 MPS/TVC Hyd Sys 3 Isol Cntl</p>	<p>1 MPS/TVC Hyd Sys 3 Isol Cntl</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-56 (Cont)**  
**BUS LOSS: MNC ALC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If reqd during entry (&lt; 120K ft): (L1)</p> <ul style="list-style-type: none"> <li>• NH3 CNTLR A – PRI/GPC</li> </ul> <p>If reqd for Post Rollout:</p> <ul style="list-style-type: none"> <li>• NH3 CNTLR B – SEC/ON</li> </ul> <hr/> <p>If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</p> <ul style="list-style-type: none"> <li>• H2O PUMP LOOP 1,2 (two) – ON</li> <li>• √FLOW PROP VLV LOOP 1,2 (two) – ICH</li> </ul> <p>If applicable:</p> <ul style="list-style-type: none"> <li>• Activate PL H2O LOOP(s)</li> </ul>	<p>9 NH3 Sys A Sec Cntrl man ON capability</p> <p>10 NH3 Sys B Pri Cntrl and Auto sw over to Sec Cntrl</p>	<p>R MPS He reg A &lt; 680 during entry (MM303)</p>	<p>① Vlv holds position</p> <p>⑨ Sys A Pri Cntrl, auto switchover to Sec Cntrl remain</p> <p>⑩ Sys B Sec Cntrl man On capability remains</p> <p>⑪ Redundant coils remain</p> <p>⑫ √MCC for OMS Qty</p> <p>⑬</p>
<b>BUS ISOLATION</b>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>NONE</p>	<p>11 R OMS Eng Cntl Vlv 1,2 Coils 1</p> <p>12 OMS Qty Gauging for all R OMS Single Engine burns</p> <p>13 R OMS Purge Vlv 1,2 Aft RCS L,R Jet 5 Htr</p> <p>1 Hyd Brake Isol 3 Cntl</p> <p>14 APU 2 Fu Tk Vlv B</p> <p>14 3 Fu Tk Vlv A</p> <p>MPS:</p> <p>15 R Eng He Intercon Outlet Vlv</p> <p>14 R Eng He Isol A</p> <p>15 L Eng He Xovr Vlv</p> <p>16 Manf Repress LO2 Vlv 1,2</p> <p>17 Prplt F/D Outbd LO2 Vlv</p>		<p>No purge. Wait 10 min between burns</p> <p>⑭ Vlv fails closed. Redundant vlv remains</p> <p>⑮ Vlv fails closed</p> <p>⑯ Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)</p> <p>⑰ Vlv holds position. Loss of manual capability to inert LO2 manf</p>

**CAUTION**

No purge. Wait 10 min between burns

**EPS SSR-57**  
**BUS LOSS: MNC FMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<ul style="list-style-type: none"> <li>Refer to OMS/RCS Slide Rule for vlv loss info</li> </ul> <p><b>GNC 23 RCS</b></p> <p>Override F4 Manf status to OP</p> <ul style="list-style-type: none"> <li>RCS FWD – ITEM 1 EXEC</li> <li>MANF VLVS 4 OVRD – ITEM 43 EXEC</li> </ul>		(FSM) RM DLMA MANF (O8) 1 FWD RCS TK ISOL 1/2 tb – bp 1 FWD RCS MANF ISOL 4 tb – bp R ADP deploy time incr from 15 to 30 sec STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec	<ol style="list-style-type: none"> <li>Vlv holds position</li> <li>Mtr 2 remains</li> <li>Htr Cntrl 2 remains</li> </ol>
<p><b>BUS ISOLATION</b></p> <p><u>ONLY ON MCC CALL, PERFORM</u></p>			
(MA73C:A) <ul style="list-style-type: none"> <li>MCA LOGIC MNC FWD 3 – OFF</li> </ul>	-Z Star Trkr Dr Sys 2 OP/CL capability 2 R ADP Deploy Mtr 1 Disc 1 MNC FMC3 Bus pwr 3 R ADP Htr Cntrl 1 LH Vent 1,2 Mtr 1		

**EPS SSR-58**  
**BUS LOSS: MNC MMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (MA73C:C) <ul style="list-style-type: none"> <li>cb MCA PWR AC3 3Φ MID 2 – op</li> </ul> <p>For PLBD Ops:</p> <ul style="list-style-type: none"> <li>OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP)</li> </ul>	1 Stbd Rad Lat 7-12 Mtr 2 Limit sw 2 Port Rad Dpy/Sto Mtr 1 Limit sw Stbd Rad Dpy/Sto Mtr 2 PLBD: C/L Lat 1-4 Mtr 2 5-8 Mtr 2 Port Aft Blkhd Lat Mtr 2 MNC MMC2 Bus pwr LH Vents 3 Mtr 1 6 Mtr 2 3 Ku Ant Dpy/Sto Mtr 1 limit sw 4 Redundant Ku-Band Xmit Enable 5 Redundant Boom Stow Enable II Excitation Signal RMS: 6 Port Aft MRL Mtr 1 7 Stbd Mid MRL Mtr 2	1 (R13L) RAD CNTL PORT tb – bp If STBD RAD pnl deployed: RAD CNTL STBD tb – bp SM (BFS SM 63) PL BAY DOORS If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG' During <u>MAN</u> 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 SM 94 PDRS CONTROL PORT RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	<ol style="list-style-type: none"> <li>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</li> <li>Mtr 1 will continue to drive until Sys B Cntl sw is taken to OFF</li> <li>With an inoperative limit switch, mtr will continue to run until stow sw returned to gnd</li> <li>Redundant sig (MNB) enables Ku-Band Xmit</li> <li>MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II Signal for Stow mtrs</li> <li>Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</li> <li>Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</li> </ol>
<p><b>BUS ISOLATION</b></p> <p><u>ONLY ON MCC CALL, PERFORM</u></p>			
(MA73C:A) <ul style="list-style-type: none"> <li>MCA LOGIC MNC MID 2 – OFF</li> </ul>			



**EPS SSR-59**  
**BUS LOSS: MNC MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(MA73C:D)</p> <p>1 • cb MCA PWR AC3 3Φ MID 4 – op</p> <p>For PLBD ops:</p> <ul style="list-style-type: none"> <li>• OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP)</li> </ul>	<p>1 Port Rad Lat 7-12 Mtr 2 Limit sw Port Rad Dpy/Sto Mtr 2</p> <p>2 Stbd Rad Dpy/Sto Mtr 1 Limit sw</p> <p>PLBD:</p> <p>C/L Lat 9-12 Mtr 2 13-16 Mtr 1 Stbd Aft Bkhd Lat Mtr 1 Port Door Mtr 1 Stbd Door Mtr 2 CL Limit sw</p>	<p>(R13L)</p> <p>RAD CNTL STBD tb – bp</p> <p>If PORT RAD pnl deployed: RAD CNTL PORT tb – bp</p> <p><b>SM (BFS SM 63) PL BAY DOORS</b></p> <p>If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'</p> <p>During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	<p>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</p> <p>② Mtr 1 will continue to drive until Sys A Cntl sw is taken to OFF</p> <p>③ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</p>
<p><b>BUS ISOLATION</b></p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:B)</p> <ul style="list-style-type: none"> <li>• MCA LOGIC MNC MID 4 – OFF</li> </ul>	<p>MNC MMC 4 Bus pwr</p>	<p>(A8L)</p> <p>STARBOARD RMS: DPY/STO tb – bp</p> <p><b>SM 94 PDRS CONTROL</b></p>	<p>④ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
	<p>RH Vent 5 Mtr 2 3 Mtr 2</p>	<p>PORT RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY</p>	
	<p>RMS:</p> <p>3 Port MPM Mtr 1 3 Stbd MPM Mtr 2 4 Port Fwd MRL Mtr 2</p>		

**EPS SSR-60**  
**BUS LOSS: MNC AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	RH Vents 8,9 Mtr 1	NONE	
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:B) • MCA LOGIC MNC AFT 3 – OFF	MNC AMC3 Bus pwr		
	1 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 GPC Cntl L Dr Closure Mtr 2 GPC CL capability R Dr Closure Mtr 1 GPC CL capability R Dr Uplock Lat Mtr 1 GPC Lat capability ----- AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 2 Mtr 2 L Dr closure Mtr 2 R Dr closure Mtr 1 Uplock Mtr 1		① Redundant mtrs remain

**EPS SSR-61  
BUS LOSS: MNC R14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (C3) • AUD CTR – 1 (AW18D) • AIRLK AUD CNTL – MIDDECK	1 Audio Center 2 A/L ATU, EMU CCU 1,2 PS ATU, CCU	MS Floodlt lost Comm via PS ATU lost 1 If Aud Ctr 2 selected, all comm lost	① If AUD CTR 2 selected, all intercom, A/G, recorded voice lost until AUD CTR 1 selected
<b>BUS ISOLATION</b> <b>ONLY ON MCC CALL, PERFORM</b>		2 If operating Ku-Band comm, no U/L voice	② Ku comm function lost. RDR function OK
(R14:A) cb MNC • AUD AUD CTR 2 – op • PS/AIRLK – op • MDU CDR 1 – op • MDU PLT 2 – op • MDU AFD 1 – op	MDU CDR 1 MDU PLT 2 MDU AFD 1	(F6) MDU CDR 1 blanks	③ Redundant pwr source remains for equipment
(R14:B) cb MNC • UHF – op • GCILC – op • CNTL BUS AB1/2/3 – op	UHF redundant pwr GCIL redundant pwr MDM cmds to CCTV Sys MNC pwr for CNTL AB1,AB2 AB3	(F8) MDU PLT 2 blanks	
3 cb PALLET/DSC • 2A – op (EDO) • 3B/4A – op (EDO)	2 Ku Comm Sig Proc SSOR EVA STRG 2	(AFT) MDU AFD 1 blanks	
(R14:C) • cb MNC KU SIG PROC – op • cb UHF EVA – op	Fit, Middeck TV Camrs, VFMs TV B Camr/Pan-Tilt TV B Camr Htr TV B Pan-Tilt Htr and Illum		
(R14:D) • cb MNC TV CAB – op cb MNC TV B CAMR • CAMR/PTU – op • CAMR HTR – op • ILLUM/PTU HTR – op	MS Floodlt		
(R14:E) • cb MNC MS FLOOD – op • MDU CDR 1 PWR – OFF • MDU PLT 2 PWR – OFF • MDU AFD 1 PWR – OFF			

**EPS SSR-62  
BUS LOSS: MNC O16RJD**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 ON Cntl of RCS F4 Manf Drivers (F4D,F4R)		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
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE			

**EPS SSR-63  
BUS LOSS: MNC O16**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (R1) • BUS TIE MNB – ON (tb-ON)		(FSMs) BCE STRG 3 ADTA (3,B) 4 ADTA (3,B) 3 MLS (3)	① FC2 only one failure away (loss of ESS2CA) from inability to bus tie
(O6) • ANNUN BUS SEL ACA 2/3 – MNB	2 ACA 2/3 MNC pwr	(O3) RCS/OMS Prplt Qty Gauge blanks	
(F6,F8) • HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 3 or (OV105) GPS 3	MLS 3 (OV103,4) TACAN 3 (OV105) GPS 3	(L2) 3 O2 EMER tb – bp CAB RELIEF B tb – bp	③ If EMER O2 Mission Kit not flown, cb is opened prelaunch
(A6U) • ANNUN BUS SEL – MNB	2 ACA 4/5 MNC pwr	Time stops updating	
(O14:D) cb MNA • (OV103) GPS PRE AMPL UC – cl • (OV103) GPS PRE AMPL LC – cl		(LIGHTS LOST) R Seat/Ctr Cnsl Floodlts If ACA 2/3 – MNC, lights lost: (C3) DAP lights left three columns ALL (F6/F8)	
(A13) • (OV103) GPS PRE AMPL UC – MNA • (OV103) GPS PRE AMPL LC – MNA		2 Landing Gear ARM/DOWN (F3) NWS FAIL It (L1) Smoke detection fire suppression ALL MO29J MIC KEY	
		If ACA 4/5 – MNC, lights lost: (A6U) 2 DAP lights ALL (A7U) Video input, output, Gamma, ALC A2 MIC KEY	

**EPS SSR-63 (Cont)**  
**BUS LOSS: MNC O16**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
Pre-seat ingress for entry, • Discharge handheld fire ext into AV BAY 2	Av Bay 2 Agent discharge capability		③ If EMER O2 Mission Kit not flown, cb is opened prelaunch
<b>BUS ISOLATION</b>			④ Redundant pwr remains
<b>ONLY ON MCC CALL, PERFORM</b>			⑤ L,R L+ DK smoke detectors remain
(O8) • MLS 3 – OFF • R SEAT/CTR CNSL FLOOD – OFF	R Seat/Ctr Cnsl Floodlts		⑥ Current Snsr 1 remains ⑦ Current Snsr 2 remains
(O16:B) cb MNC 4 • OI SIG CONDR OM3 B – op • OI SIG CONDR OF 2/3 B – op • OI MDM OF 3/4 B – op • MNB CONTR – op • AUX TIMING BUFF – op	Orbiter Timing Buffer		⑧ Vlv remains closed ⑨ Vlv holds position
(O16:C) cb MNC • (OV103,4) 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	Tacan 3 5 Cabin Smoke Detector Av Bay 1 Smoke Detector A 2 Smoke Detector B MNC Utility pwr	6 Cryo O2 Tk1 Htr Current 7 Snsr 2 Cryo O2 Tk2 Htr Current Snsr 1	⑩ √MCC for total OMS Qty. Aft Qty are found on <u>GNC SYS SUMM 2</u>
(O16:D) cb MNC 3 • H2O ALT PRESS – op • O2 EMER – op • CAB RELIEF B – op • (OV105) GPS 3 PRE AMPL UPPER – op • (OV105) GPS 3 PRE AMPL LOWER – op • (OV103) GPS PRE AMPL UC – op • (OV103) GPS PRE AMPL LC – op		8 H2O Alternate Press Vlv 9 Emer O2 Sply Vlv 9 Cabin Relief Vlv B	⑪ PLT Arm remains
(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	ADTA 3,4 4 R,Aft DDU MNC pwr 10 RCS/OMS Prplt Qty Gauge 11 Drag Chute, CDR Arm		

**EPS SSR-64**  
**BUS LOSS: MNC R1A1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 MNC pwr to CNTLBC1,2,3 and CNTLCA1,2,3 2 MNC pwr to ESS1BC, ESS2CA		① Cntl Buses remain pwrd ② ESS1BC and ESS2CA remain pwrd
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE			

**EPS SSR-65**  
**BUS LOSS: MNC A14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
GNC 23 RCS • Reprioritize Fwd Manf 4 jets to first priority: Des INH twice all other jets, highest priority first, then next highest priority, etc	Fwd RCS Jet 4,5 Htrs		
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE			

**EPS SSR-66**  
**BUS LOSS: MNC ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(PLT SEAT PNL) • PLT SEAT PWR BUS SEL – AC2 (up)	CDR Seat Adj via AC3 pwr	(AW82D) 1 EMU 1 H2O SPLY tb – CL 1 WASTE tb – CL	① Vlv holds position ② If SPLY H2O DUMP VLV ENA/NOZ HTR – OFF, tb unpwr and already bp
(CDR SEAT PNL) • CDR SEAT PWR BUS SEL – AC2 (up)	PLT Seat Adj via AC3 pwr	(R11L) SPLY H2O 1 TKA OUTLET tb – bp 2 DUMP VLV tb – bp 1 XOVV VLV tb – bp 1 GALLEY SPLY VLV tb – bp 1 TKC INLET tb – bp	③ PEVs, Actuators, Bed A P, Bed B P, Bed dP will be recovered after system reconfig
If Supply H2O Dump reqd: For TK A and/or TK B • Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS), using FLASH EVAP CNTLR PRI A For TK C and/or TK D • Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS), using FLASH EVAP CNTLR PRI B	Supply H2O: 1 Dump Vlv Cntl Noz Htr 1 Xovr Vlv Cntl	(LIGHTS LOST) Middeck Floodlts 3,4,5,7 Bunk Floodlts 1/3 Airlock Floodlt 4 MO13Q Pnl It 1 TA Floodlt 4	④ MNA,MNB line htrs remain
(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)	3 CO2 Rmvl Sys Cntrl 2	'S66 CO2 RL SYS MALF'	
(ML86B:C) • cb MNA(MNB) EXT ARLK HTR LINE ZN1 – cl • cb MNA(MNB) EXT ARLK HTR LINE ZN2 – cl	4 Ext A/L H2O Line Htrs MNC pwr		

**EPS SSR-66 (Cont)**  
**BUS LOSS: MNC ML86B**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(ML86B:A) cb SPLY H2O • GALLEY SPLY – op • XOVV VLV – op • TK C INLET – op • TKA OUTLET – op • DUMP VLV/NOZ HTR – op</p>	<p>1 Galley H2O Sply Vlv Cntl 1 Sply H2O Tk C In Vlv Cntl Tk A Out Vlv Cntl Dump Noz Htr</p>		<p>① Vlv holds position ④ MNA,MNB line htrs remain ⑤ Sys A remains ⑥ One failure away from loss of jettison capability ⑦ Current Snsr 1 remains</p>
<p>(ML86B:D) cb MNC PYRO JETT SYS B • KU ANT – op • PORT RMS – op • STBD RMS – op</p>	<p>5 Ku-BD Jettison Sys B 6 RMS/OBSS Jett/Guil Sys B</p>		
<p>(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</p>	<p>1 EMU 1 Waste H2O Vlv Cntl 1 Sply H2O Vlv Cntl  TA Floodlt 4</p>		
<p>(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 • O2 HTR TK5 SNSR 2 – op</p>	<p>Middeck Floodlts 3,4,5,7 MO13Q Pnl It 1 Bunk Floodlts 1/3 Airlk Floodlt 4  7 Cryo O2 Tk4 Current Snsr 2 Cryo O2 Tk5 Current Snsr 2</p>		
<p>(ML86B:C) • cb MNC EXT ARLK HTR LINE ZN1 – op • cb MNC EXT ARLK HTR LINE ZN2 – op</p>	<p>4 Ext A/L H2O Line Htrs MNC pwr</p>		

# EPS SSR-70

## BUS LOSS: ESS1BC DA1

(Includes all ESS1BC sub-buses)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC1 SHUTDN (FC SHUTDN Cue Card), then: (R1) • PL CAB – MNB	1 FC1 Controller and Pumps 4 FC1 Reac Vlv Cntl via pnl R1 sw	2 MASTER ALARM Light/Tone – on	<p>①</p> <p style="text-align: center;">* TIME * * CRITICAL *</p> <p>FC1 must be shut down within 9 min to avoid potentially hazardous condition</p> <p>② No intercom, A/G, or recorded voice from CDR ATU. When L AUD CNTL switched to RIGHT, only listen capability restored</p> <p>③ FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost</p> <p>④ Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains</p> <p>⑤ Pwrs PL Timing Buffer, VTR, and one string of OBSS power while attached to SRMS</p> <p>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 It</p> <p>⑦ Switch works but tb lost</p> <p>⑧ Flood Its available via EMER LTG (C3,ML18F)</p> <p>⑨ AC1 remains pwr'd, but tb lost. INV/AC BUS 1 sw inop. INV PWR 1 sw also inop</p> <p>⑩ Vlv holds position, but tb and sw lost</p> <p>⑪ FC1 Coolant Pump ΔP tb lost</p> <p>⑫ Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwr off GPCs 1 or 4 since they must be transitioned thru HALT to force RUN state</p>
2 (O5) • L AUD CNTL – R	2 L Audio pwr	L Audio lost L Glrshld Floodlt lost	
(O6) • MTU – OSC 2	5 MNA pwr to CABPL 1,2,3 buses	(F7) 6 No C/W Its Two of four bulbs in MA Its not lit SM ALERT Light/Tone – on	
If add'l lgt req'd: (C3) • EMER LTG – ON/OFF	8 L Glareshield Floodlts via pnl O6 sw	(R1) 7 FC/MN BUS A tb – OFF 7 MN BUS TIE A tb – OFF 9 INV/AC BUS 1 tb – OFF 4 O2 MANF VLV TK1 tb – CL 4 H2 MANF VLV TK1 tb – CL 4 FC1 REAC (two) tb – CL	
(R1) • O2,H2 TK2 HTRS A,B (four) – OFF • O2,H2 TK1,3 HTRS A (four) – AUTO • O2,H2 MAN VLV TK2 (two) – OP	10 Cryo O2,H2 Tk1 Manf Vlv Cntl Cryo Tk1 O2,H2 Htrs Auto ops if O2,H2 Tk2 Htrs A(B) in Auto Cryo Tk2 O2,H2 Htrs Auto ops	11 FC1 RDY tb – bp FC1 COOL PUMP ΔP tb – bp	
(A11) • O2,H2 TK4 HTRS A,B (four) – OFF (refer to EPS, 7.6 CRYO TABLE A for nomenclature)	Cryo Tk3 Htrs in Auto ops if Tk4 in Auto Cryo Tk4 Htrs Auto ops	(FSMs) S67 ESS BUS V 1BC S69 FC PUMP 1 S69 FC REAC 1 S68 O2 MANF VLV S68 H2 MANF VLV S68 O2 CNTL P 2,4 S68 H2 CNTL P 2,4 S69 FC H2 PUMP 1	
	Cryo Tk3 O2,H2 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in AUTO Cryo Tk4 O2,H2 Htrs Auto ops	7 If SSPTS: (A15) PTU 1 tb – OFF	
12 If GPC 1 or 4 dump req'd, attempt S/W dump in RUN	12 GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6) 12 GPC Output sw Terminate capability for GPCs 1,4	(Continued)	
13 To release crewmember from constant monitoring requirement:			
14 • Perform C&W EU CONTINGENCY POWER (IFM)			
Once C&W EU CONTINGENCY POWER (IFM) is completed (R13U)			
15 • C/W PARAM SEL tw (three) – 010, 030, 060, 080 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119			
When req'd: • For FC1, perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)	16 FC1 Auto purge capability		
	17 If SSPTS: OPCU 1 Voltage Adjust Capability via switch		
(Continued)	(Continued)	<p>NOTES (Cont)</p> <p>⑬ Until IFM cables installed: a) Loss of ESS2CA DA2 would not generate aural alarm so that Fuel Cell 2 could be safed within 9 min. FSM should be closely monitored. b) Loss of C/W B system would not be annunciated and subsequent orbiter problems would not trigger aural alarm</p> <p>⑭ IFM procedure recovers C/W A system by providing pwr source, which bypasses failed ESS1BC DA1 bus</p> <p>⑮ Inhibits Primary C/W for O2 and H2 Tk 2 and 4 Control Pressure</p> <p>⑯ Caused by loss of purge vlv sw position TM</p> <p>⑰ OPCU 1 Voltage Adjust Capability still exists via MCC CMDs</p>	

EPS ESS  
SSR 70-95



**EPS SSR-70 (Cont)**  
**BUS LOSS: ESS1BC DA1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>		<p>(F9) ESS 1BC DC VOLTS – OSL</p>	<p>③ FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost</p>
<p>(O13:A) cb ESS 1BC 6 • C/W A – op • AC1 SNSR – op • MTU A – op</p>	<p>6 Pri C/W Sys, Annun pnl F7 18 AC1 Bus Snsr</p>	<p>SM 67 ELECTRIC ESS 1BC VOLTS &lt; 20</p>	<p>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 It</p>
<p>(O13:B) cb ESS 1BC • CRYO CNTLR O2,H2 TK2 (two) – op • CRYO QTY O2,H2 TK2 (two) – op</p>	<p>Cryo O2,H2 Tk2 Htrs Auto ops Cryo O2,H2 Tk2 Qty Xdcrs</p>	<p>(O2) CRYO O2,H2 TK2,4 QTY METER (four) – 0%</p>	
<p>(R14:F) cb ESS 1BC • FLOOD L GLRSHLD – op • AUD L – op</p>		<p>Airlock Floodlt 2 lost Tnl Adapt Floodlt 1 lost</p>	
<p>(ML86B:G) cb ESS 1BC • FLOOD AIRLK 2 – op • FLOOD TNL ADAPT 1 – op • CRYO CNTLR O2,H2 TK4 (two) – op • CRYO QTY O2,H2 TK4 (two) – op</p>	<p>Airlock Floodlt 2 Tnl Adapt Floodlt 1  Cryo O2,H2 Tk4 Htrs Auto ops Cryo O2,H2 Tk4 Qty Xdcrs</p>		<p>⑱ Disables AC1 AUTO TRIP. AC1 Voltage and OVLD c/w lost</p>
	<p>Cryo Tk2,Tk4 Htr Snsr Test/ Reset sw  19 AC1 Inverters: Input DC pwr Cntl INV/AC Bus Cntl 3 ESS pwr to FC1 MN BUS A and MN BUS TIE A pwr contactor cntl Capability to switch to MADS Rcdr Trk Seq 2 AUX PL A BUS LG Arm/Dn Reset capability (OV103,4) TACAN 1 Auto Self-Test</p>		<p>⑲ AC1 inverters and buses remain pwr'd, but sws and tb lost. INV/AC BUS 1 sw inop. INV PWR 1 sw also inop</p>
<p>(O7) • (OV105) GPS 1 PWR – OFF • (OV105) GPS 1 PRE AMPL UPPER – OFF • (OV105) GPS 1 PRE AMPL LOWER – OFF</p>	<p>20 APU 1 Fu Tk Vlv A  (OV105) GPS 1</p>		<p>⑳ Vlv closes. Redundant vlv B remains</p>
<p>(O14:D) cb MNA • (OV105) GPS 1 PRE AMPL UPPER – op • (OV105) GPS 1 PRE AMPL LOWER – op</p>			

**EPS SSR-71  
BUS LOSS: ESS1BC FP&LC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 AC1 Inverters Input DC pwr Cntl	(R1) 1 INV PWR 1 tb – OFF	① Inverters remain pwr'd, but tb and sw lost
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE	Capability to switch to MADS Rcdr Trk Seq 2		

**EPS SSR-72  
BUS LOSS: ESS1BC MPC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC1 SHUTDN 2 (FC SHUTDN Cue Card)	1 FC1 Controller and Pumps 2 FC1 Reac Vlv Cntl via pnl R1 sw	MASTER ALARM Light/Tone – on	①
<b>BUS ISOLATION</b>		(F7) 2 C/W FC REAC It C/W FC PUMP It SM ALERT Light/Tone	* TIME * * CRITICAL *
ONLY ON MCC CALL, PERFORM		(R1) 2 O2 MANF VLV TK1 tb – CL 2 H2 MANF VLV TK1 tb – CL 2 FC1 REAC (two) tb – CL FC1 RDY tb – bp 3 FC1 COOL PUMP ΔP tb – bp	FC1 must be shut down within 9 min to avoid potentially hazardous condition
NONE	2 Cryo O2,H2 Tk1 Manf Vlv Cntl	(FSMs) S68 H2 MANF VLV S68 O2 MANF VLV S69 FC PUMP 1 2 S69 FC REAC 1 S69 FC H2 PUMP 1	② Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains
			③ FC1 Coolant Pump ΔP tb lost

**EPS SSR-73**  
**BUS LOSS: ESS1BC ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A11) • CRYO TK4 HTR O2,H2 A,B (four) – OFF	Cryo Tk3 O2,H2 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in Auto Cryo Tk4 O2,H2 Htrs Auto ops	MASTER ALARM Light/Tone – on	① Inhibits Primary C/W for O2 and H2 Tk 4 Control Pressure
(R13U) 1 • C/W PARAM SEL tw (three) – 030, 080 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		(F7) C/W O2 PRESS It C/W H2 PRESS It	
<b>BUS ISOLATION</b>		(FSMs) S68 H2 CNTL P 4 S68 O2 CNTL P 4	
ONLY ON MCC CALL, PERFORM		(O2) CRYO O2,H2 QTY TK4 meters (two) = 0%	
(ML86B:G) cb ESS 1BC • FLOOD AIRLK 2 – op • FLOOD TNL ADAPT 1 – op • CRYO CNTLR O2,H2 TK4 (two) – op • CRYO QTY O2,H2 TK4 (two) – op	Airk Floodlt 2 TA Floodlt 1	Airk Floodlt 2 lost TA Floodlt 1	
	Cryo O2,H2 Tk4 Qty Xdcrs		

**EPS SSR-74**  
**BUS LOSS: ESS1BC FD**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC1 SHUTDN (FC SHUTDN Cue Card), then:	1 FC1 Controller and Pumps	MASTER ALARM Light/Tone – on	①
(R1) • PL CAB – MNB	2 MNA pwr to CABPL 1,2,3 Buses	(F7) C/W FC PUMP It	* TIME * * CRITICAL *
3 If GPC 1 or 4 dump reqd, attempt S/W dump in RUN	3 GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6)	(R1) FC1 RDY tb – bp	FC1 must be shut down within 9 min to avoid potentially hazardous condition
When reqd: • For FC1, perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)	3 GPC Output sw Terminate capability for GPCs 1,4 (pnl O6)	4 FC1 COOL PUMP ΔP tb – bp	② Pwrs PL Timing Buffer and OIU 1 (if flown). OIU 1 redundant pwr MNB MPC2 via CAB PL3
(R1) • O2,H2 TK3 HTR A (two) – AUTO	5 FC1 Auto purge capability	(FSMs) S69 FC H2 PUMP 1 S69 FC PUMP 1	③ 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
<b>BUS ISOLATION</b>	6 OIU 1 MNA pwr	(F9) ESS 1BC DC VOLTS – OSL	④ FC1 Coolant Pump ΔP tb lost
ONLY ON MCC CALL, PERFORM	7 AUX PL A Bus pwr AC1 Inverters: Input DC Pwr Cntl Inv/AC Bus Cntl Cryo O2 Tk2,4 Htr Snsr Test/Reset sw	SM 67 ELECTRIC	⑤ Caused by loss of purge vlv sw position TM
NONE	(OV103,4) TACAN 1 Auto Self-Test	ESS1BC Volts 25-32V	⑥ OIU 1 redundant pwr MNB MPC2 via CAB PL3
	8 If SSPTS: OPCU 1 Voltage Adjust Capability via switch		⑦ AC1 inverters and buses remain pwr'd. INV PWR 1 and INV/AC BUS 1 switches and INV PWR 1 tb lost
			⑧ OPCU 1 Voltage Adjust Capability still exists via MCC CMDs

**EPS SSR-75**  
**BUS LOSS: ESS1BC O13&R14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (O5) • L AUD CNTL – R	1 L Audio pwr	1 MASTER ALARM Light/Tone – on	① No intercom, A/G, or recorded voice from CDR ATU. When L AUD CNTL switched to RIGHT, only listen capability is restored
(O6) • MTU – OSC 2	MTU Pwr Sply A/Osc 1	L Audio lost L Glrshld Floodlit lost	
(R1) • O2,H2 TK1,3 HTRS A (four) – AUTO • O2,H2 TK2 HTRS A,B (four) – OFF • O2,H2 MANF VLV TK2 (two) – OP	Cryo Tk1 O2,H2 Htrs Auto ops if O2,H2 Tk2 Htrs A(B) in Auto Cryo Tk2 O2,H2 Htrs Auto ops	2 (F7) No C/W lts Two of four bulbs in MA lts not ON SM ALERT Light/Tone – on	② Retain BACKUP C/W thru Sys B. Ref C/W MAL 4.1b for C/W capabilities lost. Only two of four bulbs lit in MA lts
If add'l ltg reqd: (C3) • EMER LTG – ON/OFF	3 L Glareshield Floodlts via pnl O6 sw	(FSMs) S68 H2 CNTL P 2 S68 O2 CNTL P 2	
5 To release crewmember from constant monitoring requirement:		(R1) 4 INV/AC BUS 1 tb – OFF	③ Floodlts available via EMER LTG (C3, ML18F)
6 • Perform C&W EU CONTINGENCY POWER (IFM)		(O2) CRYO O2,H2 QTY TK2 METER (two) ind – 0%	④ AC1 bus remains pwr. INV/AC BUS 1 sw works, but tb lost
7 Once C&W EU CONTINGENCY POWER (IFM) is completed (R13U) • C/W PARAM SEL tw (three) – 010, 060 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119			⑤ Until IFM cables installed: a) Loss of ESS2CA DA2 would not generate aural alarm so that Fuel Cell 2 could be safed within 9 min. FSM should be closely monitored. b) Loss of C/W B system would not be annunciated and subsequent orbiter problems would not trigger aural alarm
(Continued)	(Continued)		⑥ IFM procedure recovers C/W A system by providing pwr source, which bypasses failed ESS1BC O13&R14 bus ⑦ Inhibits Primary C/W for O2 and H2 Tk 2 Control Pressure

**EPS SSR-75 (Cont)**  
**BUS LOSS: ESS1BC O13&R14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(O13:A) cb ESS1BC • C/W A – op • AC1 SNSR – op • MTU A – op</p>	<p>2 Pri C/W Sys, Annun Pnl F7 8 AC1 Bus Snsr</p>		<p>② Retain BACKUP C/W thru Sys B. Ref C/W MAL 4.1b for C/W capabilities lost. Only two of four bulbs lit in MA Its</p>
<p>(O13:B) cb ESS1BC • CRYO CNTLR O2,H2 TK2 (two) – op • CRYO QTY O2,H2 TK2 (two) – op</p>	<p>Cryo O2,H2 Tk2 Htrs Auto ops Cryo O2,H2 Tk2 Qty Xdcrs</p>		<p>⑧ Disables AC1 Auto Trip. AC1 Voltage and OVLD C/W lost</p>
<p>(R14:F) cb ESS1BC • FLOOD L GLRSHLD – op • AUD L – op</p>			<p>⑨ Switches and tbs still operate</p>
	<p>LG ARM/DN Reset capability</p>		
	<p>9 ESS pwr to FC/MN BUS A and MN BUS TIE A Pwr Contactor Cntl</p>		

**EPS SSR-80**

**BUS LOSS: ESS2CA DA2**

(Includes all ESS2CA sub-buses)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC2 SHUTDN (FC SHUTDN Cue Card), then: 3 4	1 FC2 Controller and Pumps 4 FC2 Reac Vlv Cntl via pnl R1 sw	2 All comm lost via AUD CTR 1 2 R AUDIO lost R Glareshield Floodlt lost	① * TIME * * CRITICAL *
(R1) • PL CAB – MNA	5 MNB pwr to CABPL 1,2,3 Buses	MASTER ALARM Light/Tone – on	FC2 must be shut down within 9 min to avoid potentially hazardous condition
(C3) 2 • AUD CTR – 2	2 Audio Center 1	(F7) C/W O2 PRESS It – on C/W H2 PRESS It – on	② If Aud Ctr 1 active, all intercom, A/G, and recorded voice lost until Aud Ctr 2 selected. No intercom A/G, or recorded voice from PLT ATU. When R AUD CNTL switched to LEFT, only listen capability restored
(O9) 2 • R AUD CNTL – L	2 R Audio pwr	4 C/W FC REAC It – on C/W FC PUMP It – on	③ FC/MN BUS B and MN BUS TIE B SWS work, but tbs lost
(O6) • MTU – OSC 1	MTU Pwr Sply B/Osc 2	6 C/W PRI C/W It – on C/W BACKUP C/W ALARM It – on	④ Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains
If add'l Itg reqd: (C3) • EMER LTG – ON/OFF	7 R Glareshield Floodlts via pnl O8 sw	Two of four bulbs in MA lts – inoperative SM ALERT It/Tone – on	⑤ Pwrs PL Timing Buffer, VTR, and one string of OBSS power while attached to SRMS
(R1) • O2,H2 MANF VLV TK1 (two) – OP • O2,H2 TK1 HTRS A,B (four) – OFF • O2,H2 TK2,3 HTRS A (four) – AUTO • O2,H2 TK 2,3 HTRS B (four) – OFF	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	(FSMs) S69 FC PUMP 2 S69 FC REAC 2 S67 ESS BUS V 2CA S68 O2 CNTL P1,5 S68 H2 CNTL P1,5 S68 H2 MANF VLV S68 O2 MANF VLV S69 FC H2 PUMP 2	⑥ Retain C/W Sys A Alarm tones (Pri & B/U) Ref C/W MAL 4.1a [8] for capabilities lost. Only two of four bulbs lit in MA It. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable
(A15) • O2,H2 TK5 HTR A,B (four) – OFF	Cryo Tk5 O2, H2 Htrs Auto ops	If SSPTS: (A15) PTU 2 tb – OFF	⑦ Floodlts available via EMER LTG (C3, ML18F)
When reqd: • Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)	9 All FC Auto Purge capability		⑧ Vlv holds position, but tb and sw lost
10 If GPC 2 or 5 dump reqd, attempt S/W dump in RUN	10 GPC Mode sw Halt Contacts for GPCs 2,5 (pnl O6) 10 GPC Output sw Terminate capability for GPCs 2,5 (pnl O6)		⑨ Caused by loss of FC Purge Htr – GPC sw position TM pwr
(R13U) 11 • C/W PARAM SEL tw (three) – 000, 040, 050, 090 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119	12 If SSPTS: OPCU 2 Voltage Adjust Capability via switch		⑩ 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
(Continued)	(Continued)	(Continued)	⑪ Inhibits Primary C/W for O2 and H2 Tk 1 and 5 Control Pressure ⑫ OPCU 2 Voltage Adjust Capability still avail via MCC CMDs

**EPS SSR-80 (Cont)**  
**BUS LOSS: ESS2CA DA2**

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
13	To release crewmember from constant monitoring requirement:		(R1) 3 FC/MN BUS B tb – OFF	<p>③ FC/MN BUS B and MN BUS TIE B sws work, but tbs lost</p> <p>⑧ Vlv holds position, but tb and sw lost</p> <p>⑬ 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</p> <p>⑭ IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS 2CA DA2 bus</p> <p>⑮ AC2 Inverters and buses remain pwr'd, but switches and tbs lost</p> <p>⑯ FC2 Coolant Pump ΔP tb lost</p> <p>⑰ Retain C/W Sys A Alarm tones (Pri &amp; B/U) Ref C/W MAL 4.1a ⑧ for capabilities lost. Only lower two of four bulbs lit in MA It. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable</p> <p>⑱ Disables AC2 AUTO Trip. AC2 Voltage and OVLD C/W lost</p> <p>⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected</p> <p>⑳ Vlv closes. Redundant vlv B remains</p>
14	• Perform C&W EU CONTINGENCY POWER (IFM)		3 MN BUS TIE B tb – OFF 3 PL PRI MNB tb – OFF 15 INV/AC BUS 2 tb – OFF 8 O2 MANF VLV TK2 tb – CL 8 H2 MANF VLV TK2 tb – CL 8 FC2 REAC (two) tb – CL FC2 RDY tb – bp 16 FC2 COOL PUMP ΔP tb – bp	
<b>BUS ISOLATION</b>			(F9) ESS2CA DC VOLTS – OSL	
ONLY ON MCC CALL, PERFORM			<b>SM 67 ELECTRIC</b> ESS2CA Volts < 20	
(O13:C) cb ESS 2CA			(O2) CRYO O2,H2 QTY TK1 meters (two) ind – 0%	
17	• C/W B – op	17 C/W Sys B Alarm Tones		
18	• AC2 SNSR – op	18 AC2 Bus Snsr		
• MTU B – op				
(O13:D) cb ESS 2CA • CRYO CNTLR O2,H2 TK1 (two) – op • CRYO QTY O2,H2 TK1 (two) – op		Cryo O2,H2 Tk1 Htrs Auto ops Cryo O2,H2 Tk1 Qty Xdcrs		
(R14:F) cb ESS 2CA • FLOOD R GLRSHLD – op • AUD R – op • CTR 1 – op				
(ML86B:G) cb ESS 2CA • CRYO CNTLR O2,H2 TK5 (two) – OP				
• CRYO QTY O2,H2 TK5 (two) – OP		Cryo O2,H2 Tk5 Qty Xdcr		
		Cryo O2 Tk1 Htr Snsr Test/ Reset sw		
		Cryo O2 Tk5 Htr Snsr Test/ Reset sw		
		AUX PL B BUS		
		15 AC2 Inverters: Input DC Pwr Cntl INV/AC BUS Cntl ESS pwr to FC/MN BUS B and MN BUS TIE B Pwr Contactor Cntl		
		19 MNB/PRIPL and MNC/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal		
		(OV103,4) TACAN 2 Auto Self-Test		
		20 APU 2 Fu Tk Vlv A		
(O7) • (OV105) GPS 2 PWR – OFF • (OV105) GPS 2 PRE AMPL UPPER – OFF • (OV105) GPS 2 PRE AMPL LOWER – OFF		(OV105) GPS 2		
(O15:C) • (OV105) cb MNB GPS 2 PRE AMPL UPPER – op				
(O15:D) • (OV105) cb MNB GPS 2 PRE AMPL LOWER – op				



**EPS SSR-81**  
**BUS LOSS: ESS2CA FP&LC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 AC2 Inverters Input DC Pwr Cntl	(R1) 1 INV PWR 2 tb – OFF	① Loss of tb and sw. Inverters remain pwr'd
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE			

**EPS SSR-82**  
**BUS LOSS: ESS2CA MPC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC2 SHUTDN (FC SHUTDN Cue Card)	1 FC2 Controller and Pumps 2 FC2 Reac Vlv Cntl via pnl R1 sw	MASTER ALARM Light/Tone – on	①
<b>BUS ISOLATION</b>		(F7) 2 C/W FC REAC It C/W FC PUMP It SM ALERT Light/Tone	* TIME * * CRITICAL *
ONLY ON MCC CALL, PERFORM		(R1) 2 O2 MANF VLV TK2 tb – CL 2 H2 MANF VLV TK2 tb – CL 2 FC2 REAC (two) tb – CL RDY tb – bp	FC2 must be shut down within 9 min to avoid potentially hazardous condition
NONE	3 Cryo O2,H2 Tk2 Manf Vlv Cntl 4 MNB/PRIPL and MNC/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal	5 FC2 COOL PUMP ΔP tb – bp	② Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains
		(FSMs) S69 FC PUMP 2 S69 FC REAC 2 S69 FC H2 PUMP 2 S68 H2 MANF VLV S68 O2 MANF VLV	③ Vlv holds position, but tb and sw lost
			④ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected
			⑤ FC2 Coolant Pump ΔP tb lost

**EPS SSR-83**  
**BUS LOSS: ESS2CA FD**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC2 SHUTDN (FC SHUTDN Cue Card)	1 FC2 Controller and Pumps	MASTER ALARM Light/Tone – on	①
(R1) • PL CAB – MNA	2 MNB pwr to CABPL 1,2,3 Buses	(F7) C/W FC PUMP It	* TIME CRITICAL *
When reqd: • Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)	3 All FC Auto Purge capability	(R1) FC2 RDY tb – bp 4 FC2 COOL PUMP ΔP tb – bp	FC2 must be shut down within 9 min to avoid potentially hazardous condition
5 If GPC 2 or 5 dump reqd, attempt S/W dump in RUN	5 GPC Mode sw Halt Contacts for GPCs 2,5 (Pnl O6) 5 GPC Output sw Terminate capability for GPCs 2,5 (pnl O6)	(FSMs) S69 FC PUMP 2 S69 FUEL CELL	② Pwrs PL Timing Buffer, OIU 1, and OIU 2 (if flown). OIU 1 redundant pwr MNA MPC1 via CAB PL3
(R1) • O2,H2 TK3 HTR A (two) – AUTO • O2,H2 TK3 HTR B (two) – OFF		(F9) ESS2CA DC VOLTS – OSL SM 67 ELECTRIC ESS2CA Volts 25-32V	③ Caused by loss of FC Purge Htr – GPC sw position TM pwr
If OIU reqd: (SSP 1) • OIU PWR – OIU 1 ON	2 OIU 2 OIU 1 MNB pwr	SM 62 PCMMU 'S62 PDI DECOM FAIL' S 212 OIU OIU 2 TEMP ≥ 140	④ FC 2 Coolant Pump ΔP tb lost
(AIL) • S-BD PL PWR SYS – 1 • CNTL – PNL • – CMD			⑤ 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
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
NONE			
	6 AUX PL B Bus pwr AC2 Inverters: Input DC Pwr Cntl Inv/AC Bus Cntl		⑥ AC2 inverters and buses remain pwrd. INV PWR 2 and INV/AC BUS 2 switches lost and INV PWR 2 tb lost
	(OV103,4) TACAN 2 Auto Self-Test		
	Cryo O2 Tk1 Htr Snsr Test/Reset sw		
	Cryo O2 Tk5 Htr Snsr Test/Reset sw		
	7 If SSPTS: OPCU 2 Voltage Adjust Capability via switch		⑦ OPCU 2 Voltage Adjust Capability still avail via MCC CMDs

**EPS SSR-84**  
**BUS LOSS: ESS2CA O13&R14**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	(C3) • AUD CTR – 2	1	Audio Center 1	1	All Comm lost via AUD CTR 1 selected	<p>① If Audio Ctr 1 active, all intercom, A/G, and recorded voice lost until Audio Ctr 2 selected</p> <p>② No intercom, A/G, or recorded voice from PLT ATU until R AUD CNTL switched to LEFT which then restores only listen capability</p> <p>③ Floodlt available via EMER LTG (C3, ML18F)</p> <p>④ Retain C/W Sys A alarm 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 It. PRIMARY C/W, BACKUP C/W ALARM Its are not resettable</p> <p>⑤ Until IFM cables installed:  a) Loss of ESS1BC DA1 would not generate aural alarm so that Fuel Cell 1 could be safed within 9 min. FSM should be closely monitored.  b) Loss of C/W A system would not be annunciated and subsequent orbiter problems would not trigger aural alarm</p> <p>⑥ AC2 bus remains pwr'd. INV/AC BUS 2 sw works, but tb lost</p> <p>⑦ IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS2CA O13&amp;R14 bus</p> <p>⑧ Inhibits Primary C/W for O2 and H2 Tk 1 Control Pressure</p> <p>⑨ Disables AC2 Auto Trip. AC2 Voltage and OVLD C/W lost</p> <p>⑩ Switches and tbs still operate</p>	
2	(O9) • R AUD CNTL – L	2	R Audio pwr	2	R Audio lost		
	(O6) • MTU – OSC 1		MTU Pwr Sply B/OSC 2	3	R Glareshield Floodlt lost		
	(R1) • O2,H2 TK1 HTRS A,B (four) – OFF • O2,H2 TK2,3 HTRS A (four) – AUTO • O2,H2 MANF VLV TK1 (two) – OP		Cryo Tk2 O2,H2 Htrs Auto ops if O2,H2 Tk1 Htrs A(B) in Auto Cryo Tk1 O2,H2 Htrs Auto ops		MASTER ALARM Light/Tone – on		
	If add'l Itg reqd: (C3) • EMER LTG – ON/OFF	3	R Glareshield Floodlts via pnl O8 sw	4	(F7) C/W O2 PRESS It – on C/W H2 PRESS It – on C/W PRI C/W It – on C/W BACKUP C/W ALARM It – on Two of four bulbs in MA Its – inoperative		
5	To release crewmember from constant monitoring requirement:				(FSMs) S68 H2 CNTL P 1 S68 O2 CNTL P 1		
7	• Perform C&W EU CONTINGENCY POWER (IFM)			6	(R1) INV/AC BUS 2 tb – OFF		
8	(R13U) • C/W PARAM SEL tw (three) – 000, 050 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119				(O2) CRYO O2,H2 QTY TK1 METER (two) – 0%		
<b>BUS ISOLATION</b>							
ONLY ON MCC CALL, PERFORM							
4	(O13:C) cb ESS 2CA • C/W B – op	4	C/W Sys B Alarm Tones				
9	• AC2 SNSR – op • MTU B – op	9	AC2 Bus Snsr				
	(O13:D) cb ESS 2CA • CRYO CNTLR O2,H2 TK1 (two) – op • CRYO QTY O2,H2 TK1 (two) – op		Cryo O2,H2 Tk1 Htrs Auto ops Cryo O2,H2 Tk1 Qty Xdcrcs				
	(R14:F) cb ESS 2CA • FLOOD R GLRSHLD – op • AUD R – op • CTR 1 – op						
		10	ESS pwr to FC/MN BUS B and MN BUS TIE B Pwr Contactor Cntl				
(Continued)		(Continued)					

**EPS SSR-85**  
**BUS LOSS: ESS2CA ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If Tk5 in use:  (R1)  • O2,H2 TK3 HTR A – AUTO  • O2,H2 TK3 HTR B – OFF</p> <p>(A15)  • O2,H2 TK5 HTR A,B (four) – OFF</p> <p>(R13U)  1 • C/W PARAM SEL tw (three) – 040, 090  • C/W PARAM – INH MEM – CLEAR  • C/W PARAM SEL tw (three) – &gt; 119</p>	<p>Cryo Tk5 O2,H2 Htrs if in Auto</p>	<p>MASTER ALARM  Light/Tone – on</p> <p>(F7)  C/W O2 PRESS It  C/W H2 PRESS It</p> <p>(FSMs)  S68 O2 CNTL P 5  S68 H2 CNTL P 5</p> <p>(O2)  CRYO O2,H2 QTY Tk5 = 0%</p>	<p>① Inhibits Primary C/W for O2 and H2 Tk 5 Control Pressure</p>
<p><b>BUS ISOLATION</b></p> <p>(ML86B:G)  cb ESS 2CA  • CRYO CNTLR O2,H2 TK5 (two) – op  • CRYO QTY O2,H2 TK5 (two) – op</p>	<p>Cryo O2,H2 Tk5 Qty Xdcrs</p>		



**EPS SSR-90 (Cont)**  
**BUS LOSS: ESS3AB DA3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	12 Lost BFS select and BF engage capability to all GPCs 13 FC3/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal (OV103,4) TACAN 3 Auto Self-Test 2 ESS pwr to FC/MN BUS C and MN BUS TIE C Pwr Contactor Cntl 14 APU 3 Fu Tk Vlv A		② FC/MN BUS C and MN BUS TIE C switches work, but tbs are lost ⑫ Pressing Engage button will cause all PASS GNC GPCs to go to software halt ⑬ MNB/PRIPL and MNC/PRIPL pwr-off capability of SL not affected. FC3/PRIPL sw, pnl R1 not affected ⑭ Vlv closes. Redundant vlv B remains

**EPS SSR-91**  
**BUS LOSS: ESS3AB FP&LC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 AC3 Inverters Input DC Pwr Cntl 2 Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glareshield Floodlts, OS Floodlt)	(R1) 1 INV PWR 3 tb – OFF	① Inverters remain pwr'd, but tb and sw lost ② Ltg pwr remains via individual lt switches
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(C3)			
2 • EMER LTG – OFF/ON			
(ML18F)			
2 • EMER LTG – ON/OFF			

**EPS SSR-92**  
**BUS LOSS: ESS3AB MPC3**

ACTIONS	
1	• Perform FC3 SHUTDN
2	(FC SHUTDN Cue Card)

BUS ISOLATION	
ONLY ON MCC CALL, PERFORM	

NONE	
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EQUIP/FUNCTION LOST	
1	FC3 Controller and Pumps
2	FC3 Reac Vlv Cntl via pnl R1 sw
3	FC3/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal

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CREW INDICATIONS	
MASTER ALARM Light/Tone – on	
(F7)	2 C/W FC REAC It – on C/W FC PUMP It – on
(R1)	2 FC3 REAC (two) tb – CL FC3 RDY tb – bp 4 FC3 COOL PUMP ΔP tb – bp
(FSMs)	S69 FC PUMP 3 2 S69 FC REAC 3 S69 FC H2 PUMP 3

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NOTES	
①	<p style="text-align: center;">* TIME *</p> <p style="text-align: center;">* CRITICAL *</p> <p>FC3 must be shut down within 9 min to avoid potentially hazardous condition</p> <p>② Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains</p> <p>③ MNB/PRIPL and MNC/PRIPL pwr-off capability of SL not affected. FC3/PRIPL sw pnl R1 not affected</p> <p>④ FC3 Coolant Pump ΔP tb lost</p>

**EPS SSR-93**  
**BUS LOSS: ESS3AB FD**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 • Perform FC3 SHUTDN (FC SHUTDN Cue Card)</p> <p>3 • If GPC 3 dump reqd, attempt S/W dump in RUN</p>	<p>1 FC3 Controller and Pumps</p> <p>2 FC GPC Purge Seq Start sw</p> <p>3 GPC Mode sw Halt Contact for GPC 3 (pnl O6)</p> <p>3 GPC Output sw Terminate capability for GPC 3 (pnl O6)</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7) C/W FC PUMP It</p> <p>(R1) FC3 RDY tb – bp</p> <p>4 FC3 COOL PUMP ΔP tb – bp</p> <p>(FSMs) S69 FC PUMP 3 S69 FC H2 PUMP 3</p> <p>(F9) ESS3AB DC VOLTS – OSL</p> <p><b>SM 67 ELECTRIC</b> ESS3AB Volts 25-32V</p>	<p>①</p> <p style="text-align: center;">* TIME * * CRITICAL *</p> <p>FC3 must be shut down within 9 min to avoid potentially hazardous condition</p> <p>② GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU</p> <p>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</p> <p>④ FC3 Coolant Pump ΔP tbs lost</p> <p>⑤ Ltg pwr remains via individual It sws</p> <p>⑥ Pressing the engage button will cause all PASS GNC GPCs to go to software halt</p> <p>⑦ AC3 Inverters and Buses remain pwr'd. INV PWR 3 and INV/AC BUS 3 switches lost and INV PWR 3 tb lost</p>
<p><b>BUS ISOLATION</b></p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(C3)</p> <p>5 • EMER LTG – OFF/ON</p>	<p>5 Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glrshld Floodlts OS Floodlt)</p>		
<p>(ML18F)</p> <p>5 • EMER LTG – ON/OFF</p>			
	<p>6 Lost BFS select and BFS engage capability to all GPCs</p> <p>7 AC3 Inverters: Input DC Pwr Cntl INV/AC Bus Cntl</p> <p>Cryo O2 Tk3 Htr Snsr Test/Reset sw</p> <p>(OV103,4) TACAN 3 Auto Self-Test</p>		



**EPS SSR-94**  
**BUS LOSS: ESS3AB O13**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 ESS pwr to FC/MN BUS C and MN BUS TIE C pwr Contractor Cntl	(R1) 2 INV/AC BUS 3 tb – OFF	① Switches and tbs still operate ② AC1 Bus remains pwr. INV/AC BUS 3 sw works but tb lost ③ Disables AC3 Auto Trip. AC3 Voltage and OVLD C/W lost
<b>BUS ISOLATION</b>		(O1) GPC status lts lost	
ONLY ON MCC CALL, PERFORM (O13:E) cb ESS 3AB 2 AC3 SNSR – op GPC STAT – op	3 AC3 Bus Snsr Computer Status Matrix (pnl O1) and CICU		

**EPS SSR-95**  
**BUS LOSS: ESS3AB ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R1) • O2,H2 TK1,2 HTRS A (four) – AUTO • O2,H2 TK1,2 HTRS B (four) – OFF • O2,H2 MANF VLV TK 1,2 (four) – OP • O2,H2 TK3 HTR A,B (four) – OFF	Cryo Tk3 O2,H2 Htrs Auto ops Cryo O2,H2 Tk4 Htr Auto ops if O2,H2 Tk3 Htrs A(B) in Auto	MASTER ALARM Light/Tone – on	① Inhibits Primary C/W for O2 and H2 Tk 3 Control Pressure
(R13U) 1 C/W PARAM SEL tw (three) – 020, 070 C/W PARAM – INH MEM – CLEAR C/W PARAM SEL tw (three) – > 119		(F7) C/W O2 PRESS lt C/W H2 PRESS lt	
<b>BUS ISOLATION</b>		(FSMs) S68 H2 CNTL P 3 S68 O2 CNTL P 3	
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	(O2) CRYO O2,H2 QTY TK3 METER (two) ind – 0%	



**EPS SSR-100 (Cont)**  
**BUS LOSS: CNTLAB1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(C2) • L IDP/CRT SEL – 3 On MCC GO: • GPC/CRT 01 EXEC	(C2A2) MDU CRT 1 9 IDP 1		⑦ Vlv normally closed ⑨ Loss of redundant port to the following: MDU CDR 1 (S) MDU CDR 2 (P) MDU MFD 2 (P) MDU PLT 1 (S)
10 <b>SM 1 DPS UTILITY</b> (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		⑩ Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning
(R11U) • FC H2O RELIEF HTR – B AUTO • FC H2O LINE HTR – B AUTO	11 (R11U) FC H2O Relief: Vlv Htrs A Vent Line Htrs A Barrel Htrs A Noz Htrs A H2O Line Htrs A		⑪ Noz Htr A not wired; Noz Htr B still operates in A AUTO position. Other A Relief Htrs lost
When reqd: • For FC1, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)	7 (R11U) FC1 Purge Vlv man Cntl		⑫ Right Trim and Body Flap cntl remains. Left Trim and Body Flap cntl function is regained after the lost contacts have been deselected in OPS-8 (3,B)
During OPS 8: <b>GNC 43 CONTROLLERS</b> 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	12 (F6A7) L Trim RHC INH capability 12 Pnl ON capability (L2A1) 12 L Bdy Flp UP/DN capability		⑬ B Htrs remain ⑭ Sys A Pri Cntrl, Auto switchover to Sec Cntrl remains
(A14) RCS/OMS HTR • FWD RCS – B AUTO • L POD (two) – A OFF, B AUTO	13 (A14) Fwd RCS A Htrs (all) 13 L Pod A Htrs (all)		⑮ When SM not available, use NSP block to inhibit UL cmds. 'BCE STRG 1(3) NSP' annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS
<b>GNC 23 RCS</b> • Reprioritize L, R Manf 2 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 3	(A14) Aft RCS L,R Jet 2 Htrs		
	COMSEC 1 & 2 Pwr Redundancy		
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A(B) – PRI/GPC	14 (L1A2) NH3 Sys A Sec Cntrl man ON capability		
15 If AB1,2,3 unpwr'd at same time: (AIL) • NSP ENCRYPTION MODE – SEL • NSP ENCRYPTION SEL – BYP	If AB1,2,3 unpwr'd at same time: (A1A2) COMSEC 1,2 Key		
No SM GPC and LOS: (C3) • UPLK – NSP BLK			
(Continued)	(Continued)		

**EPS SSR-100 (Cont)**  
**BUS LOSS: CNTLAB1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
If CCTV reqd: (A7U) • TV PWR CONTR UNIT – MNB			⑥ Vlv holds position ⑬ Loss of manual capability to inert LH2 Manf
<b>BUS ISOLATION</b>			⑰ Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
<b>ONLY ON MCC CALL, PERFORM</b>			⑱ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
• MDU CRT 1 PWR – OFF			⑲ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(C2) • IDP/CRT1 PWR – OFF			⑳ Single mtr time
(O14:F) • MMU 1 – OFF			㉑ Vlv holds position. FC1 Redundant Reac Vlv Close Cntl on pnl C3 remains
(F3) • TRIM RHC PNL – ENA • PNL – OFF			㉒ Vlv holds position. Sys 2 remains
(R4) • MPS FILL/DRAIN LH2 INBD – GND	16 (R4) Prplt F/D Inbd LH2 Vlv Man OP capability		㉓ Cntrlrs A,B Rad Byp Vlv Mtrs Auto Cntl and Cntrl A Rad Byp Vlv Mtr Man Cntl remain
(R14D) • cb MNA TV CONTR UNIT – op	(A7A1) Video Cntl Unit MNA pwr		
(A7U) PL BAY • FLOOD AFT STBD – OFF • FLOOD FWD PORT – OFF • FLOOD FWD BHD – OFF	(A7A1) PLB Floodlts: Aft Stbd Fwd Port Blkhd		
	17 (R1A2) Man ON Cntl of Cryo O2,H2 Tk1 Htrs B, Tk3 Htrs A 6 Cryo O2,H2 Tk1 Manf Vlv Cntl		
	(A8L) Port RMS: 18 Fwd MRL Mtr 1 18 Mid MRL Mtr 1 18 Aft MRL Mtr 2		
	STBD RMS: 19 Fwd MRL Mtr 2 19 Mid MRL Mtr 1 19 Aft MRL Mtr 1		
	ROEU AC1 PBM MMC 1 pwr to: 20 Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) 20 ODA mtr 1 latch/release		
	21 (R1A2) FC1 Reac Vlv Cntl via pnl R1 sw FC1 STOP capability via START/STOP sw (pnl R1)		
	(R2) Ctr MPS He Isol A Man Cntl		
	(C3) FC3 Redundant Reac Vlv Close Cntl		
	22 (L2A1) Atm Press Cntl O2 Sys 1 Sply Vlv Cntl		
	23 (L1A2) Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs Man Cntl		
	(Continued)		

**EPS SSR-100 (Cont)**  
**BUS LOSS: CNTLAB1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>(O14) 24 RJDF 1B F1 Manf Logic sw pwr (F1F,F1L,F1U,F1D)</p> <p>(F6A1) L ADI Att Ref Set capability</p> <p>(R13A2) 26 Rad Cntl Sys: Port Lat 7-12 Mtr 1 Dpy/Sto Mtr 1 Stbd Lat 1-6 Mtr 1 Dpy/Sto Mtr 2</p> <p>(R2) 27 APU 1 Fu Tk Vlv A 28 Cntrl Pwr Sply A APU 1 GBX GN2 Repress Vlv 29 Hyd Main Pump 1 Depress Solenoid RPC A 29 Hyd Main Pump 3 Depress Solenoid RPC B</p> <p>(R4) 6 TVC Hyd Sys 1 Isol man Cntl 30 Hyd Brake Isol 1 man Cntl (F6A6,F8A5) NLG Backup Rel and Extension Sys 2 31 LMG, RMG Backup Rel Sys 2 32 LG Extend Vlv 2 32 NWS Hyd Sys 2</p> <p>(FPC1/AW18H) 33 EMU 1,2 Pwr/Batt chgr MNA pwr</p> <p>(O6) -Y Star Trkr Dr Sys 1 OP/CL capability</p> <p>(C3A5) 34 L ADP Dpy Mtr 1 35 Htr Cntrl 1</p> <p>(A6A1) PL Reten Sys A Rel/Lat Mtrs</p> <p>(R2) 26 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</p> <p>(A14) 6 Ku-Band Temp Meas PA, Rcvr, A&amp;B Gimbal, Rate Snsr, Ant Feed</p> <p>(C3A1) 36 L OMS Arm 1, Arm/Press 1 sw Contacts 37 L OMS Eng Pr Vlv Coil 1, Cntl Vlv 1,2 Coils 1</p>	<p>(F3) 25 NWS fail lt (for actuator pressure sw)</p>	<p>⑥ Vlv holds position</p> <p>②④</p> <div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;"> <p><b>WARNING</b></p> </div> <p>Driver pwr to F1 jets lost if RJDF 1B Driver sw OFF (O14:F)</p> <p>②⑤ NWS fail light still driven by miscompare logic feedback on rollout</p> <p>②⑥ Redundant mtrs remain</p> <p>②⑦ Vlv closes. Redundant vlv remains</p> <p>②⑧ Redundant pwr sply remains. GG Bed T and GBX P ind lost when APU running</p> <p>②⑨ Redundant RPC remains</p> <p>③⑩ Vlv holds position. GPC OP capability remains during entry</p> <p>③① Loss of redundant hyd NLG deploy and NWS redundancy</p> <p>③② Hyd Sys 1 still available for NWS</p> <p>③③ MNB pwr select capability remains</p> <p>③④ Mtr 2 remains</p> <p>③⑤ Htr Cntrl 2 remains</p> <p>③⑥ L OMS auto shutdown if Pc &lt; 80% and '↓' on MNVR EXEC display</p> <div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;"> <p><b>CAUTION</b></p> </div> <p>No purge. Wait 10 min between burns</p> <p>③⑦ Redundant coils remain</p>

**EPS SSR-101  
BUS LOSS: CNTLAB2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR 2 • GAS GEN/FUEL PUMP 1 – B AUTO APU HTR TK/FU LINE/H2O/ 2 • SYS 1A – OFF 2 • 1B – AUTO 2 • 3A – AUTO 2 • 3B – OFF HYD HTR • RUD SPD BK A – OFF • B – AUTO • CIRC PUMP PWR 1 – MNB</p>	<p>(A12) APU 1 GG/Fu Pump Htrs A  APU 1 TK/Fu Ln Htrs A APU GG Inj H2O Tank Htrs 1A,2A APU 3 Tk/Fu Ln Htrs B  Rud/Spd Brk Htr A (R2) Circ Pump 1 MNA pwr</p>	<p>(F7) 1 C/W RCS JET It – on SM ALERT Light/Tone – on  (FSMs) S86 APU/HYD W/B SM0 THRM HYD (B) S67 CNTL BUS V S67 DISPLAY SW L 1 F RCS D(F,L,U) JET S68 H2 MANF VLV S68 O2 MANF VLV  <b>SM 67 ELECTRIC</b> CNTL AB2 Volts &lt; 20</p>	<p>① Indications do not appear until jet commanded  ② * TIME * * CRITICAL *  If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp  ③ Pri B GPC Sel capability remains. Pri A and Sec Cntrs remain  ④ In OPS 2, FES GPC cmd is not present, but one may be sent if reqd  ⑤ Vlv holds position. Isol B remains  ⑥ Do not reconfig for reg switch or I'CNCT procedures  ⑦ Vlv holds position  ⑧ Pwr to MCA Drivers lost through ENABLE sw  ⑨ Vlv holds position. GPC OP capability remains during entry</p>
<p>(L1) • H2O PUMP LOOP 1 – B  • FLASH EVAP CNTLR PRI A – ON (if reqd) • TOP EVAP HTR NOZ L – A AUTO • TOP EVAP HTR DUCT – B  If Hi Load Evap enabled • HI LOAD DUCT HTR – B(C)</p>	<p>(L1A2) H2O Loop 1 Pump A man ON capability 3 Flash Evap Cntrl Pri B man 4 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</p>	<p>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 It – 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</p>	
<p>(L2) • FLASH EVAP FDLN HTR A SPLY – 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</p>	<p>(L2A1) FES H2O Fdln A Htrs 1 (all)    (F6A1) Air Data Source Sel capability L ADI Att, Err, Rate Sel capability (F6A5) L HSI Mode, Source Sel capability</p>	<p>STAR TRKR DR POS -Y CL time incr from 8 to 16 sec  (F7) If APUs active and using H2O BLR CNTLR/HTR 1B: C/W APU TEMP It – on after ~2 min  <b>SM (BFS,SM) 63 PL BAY DOORS</b></p>	
<p>(F7) • RADAR ALTM – 2  Refer to OMS/RCS Slide Rule for vlv loss info 6 Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT R RCS He PRESS A • L, R RCS XFEED 3/4/5</p>	<p>(F6A7) L Radar Altm Sel capability  (O7) 5 Aft L RCS He Pr Isol A man Cntl and GPC CL capability 5 Aft R RCS He Pr Isol A man CL capability 7 Aft L,R RCS Xfeed Vlv 3/4/5 man CL capability</p>	<p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	
<p>(O8) • L OMS XFEED A • R OMS XFEED A</p>	<p>(O8) 5 L,R OMS Tk Isol A man CL cap 5 L,R OMS Xfeed Vlv A man CL cap 5 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</p>		
	<p>(R13A2) 8 PLBD: C/L Lat 1-4, 5-8 Mtrs 1 Port Aft Bikh Mtr 1</p>		
	<p>9 (R4) LG Extend Isol Vlv man Cntl</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-101 (Cont)**  
**BUS LOSS: CNTLAB2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R1) If TK1 in use: O2,H2 TK1 • HTR A (two) – AUTO • B (two) – OFF If TK3 in use: O2,H2 TK3 HTR • HTR A (two) – OFF • B (two) – AUTO	(R1A2) 7 Cryo O2,H2 Tk1 Manf Vlv Cntl Cryo O2,H2 Tk1 Htrs B  Cryo O2,H2 Tk3 Htrs A		⑦ Vlv holds position ⑩ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur ⑪ Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning ⑫ RM sw downmodes to 2-level for -X position 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
(R2) • BLR CNTLR/HTR 1 – A	(R2) Hyd H2O Blr 1 Cntrl B		
<b>GNC 23 RCS</b> Override F1 Manf status to CL: • RCS FWD – ITEM 1 EXEC • MANF VLVS 1 OVRD – ITEM 40 EXEC	(O14) RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)		
<b>SM 1 DPS UTILITY</b> (G2,G8,S2) MMU ASSIGN • GNC – ITEM 2 EXEC • SM – ITEM 3 EXEC • PL – ITEM 5 EXEC • OPS 0 – ITEM 7 EXEC	(O15) MMU 2		
10 11 12 If Network Sig Proc Encryption Select – Bypass (A1L) and no SM GPC: (C3) • UPLK – NSP BLK	(C3A5) 13 Uplink switch GPC block of UL Cmds capability		
When reqd: • Perform FC1 purges in AUTO mode (ORB OPS)	(R11U) 14 FC1 Purge Vlv man Cntl		
	(C3) FC3 Redundant Reac Vlv Close Cntl		
(A14) RCS/OMS HTR • FWD RCS – B AUTO • L POD (two) – A OFF, B AUTO	15 Fwd RCS A Htrs (all) L Pod A Htrs (partial)		
If SENSE – -Z: (A6U) • SENSE – -X • Wait at least 1 sec, then reposition as desired	(A6A1) 12 3-level sw RM for -X Sense		
If AB1,2,3 unpwr'd at same time: (A1L) • NSP ENCRYPTION MODE – SEL • NSP ENCRYPTION SEL – BYP	If AB1,2,3 unpwr'd at same time: (A1A2) COMSEC 1,2 Key		
(Continued)	(Continued)		

**EPS SSR-101 (Cont)**  
**BUS LOSS: CNTLAB2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A(B) – PRI/GPC	(L1A2) 16 NH3 Sys B Sec Cntrl man ON capability		(7) Vlv holds position (16) Sys B Pri Cntrl, Auto switchover to Sec Cntrl remain
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(R2) • MPS He I'CONNECT CTR – GPC	(R2) Ctr MPS He Intercom Vlvs man Cntl		(17) Loss of manual capability to inert LH2 Manf (18) Six vlvs fail to non-isolation position
(R4) • MPS FILL/DRAIN LH2 INBD – GND	(R4) 17 Prplt F/D LH2 Inbd Vlv man Cntl		(19) Vlv holds positions. FC1 Redundant Reac Vlv Close Cntl on pnl C3 remains
(O15:F) • MMU 2 – OFF			(20) FC1 can be stopped via FC1 CNTLR sw (O14:A)
If SSPTS: (A15) OPCU 1 CONV – OFF OPCU 1 V-ADJ – OFF APCU 1 CONV – OFF	If SSPTS: (A15) PTU 1 (OPCU 1 and APCU 1) Ability to change state of APCU 1's OUTPUT relay		(21) Vlv holds position. Sys 2 remains
	(O17) 18 ATVC 2 Isol ME		(22) Redundant mtrs remain
	(R1A2) 19 FC1 Reac Vlv Cntl via pnl R1 sw		(23) Mtr 2 remains
	20 FC1 STOP capability via START/STOP sw (pnl R1)		(24) Htr Cntrl 2 remains
	(L2A1) 21 Atm Press Cntl O2 Sys 1 Sply Vlv Cntl		(25)
	(F6) L HUD		
	(F6A1) L ADI Att Ref Set capability		<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>WARNING</b> </div> Driver pwr to L5 jets lost if L5/F5/R5 Driver sw OFF (O16:F)
	(R4) 7 TVC Hyd Sys 1 Isol man Cntl		
	(O6) 22 -Y Star Trkr Dr Sys 1 CL capability		
	(C3A5) 23 L ADP Deploy Mtr 1		
	24 Htr Cntrl 1		
	(R2) L MPS He Isol B man Cntl		
	(R13A2) 22 Rad Cntl Sys		
	Port Lat 1-6 Mtr 1 Dpy/Sto Mtr 1 Stbd Lat 7-12 Mtr 1 Dpy/Sto Mtr 2		
	(O15) 25 RJDA L Vernier Logic pwr (L5L)		
	(Continued)		



**EPS SSR-101 (Cont)**  
**BUS LOSS: CNTLAB2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(R2) 22 ET Door Mtrs C/L Lat Actr 1 Mtr 2 man Stow capability C/L Lat Actr 2 Mtr 2 man Stow capability L Dr Uplock Lat Mtr 2 man Cntl R Dr Closure Mtr 2 man Cntl R Dr Uplock Lat Mtr 2 man Cntl		(22) Redundant mtrs remain (26) L OMS auto shutdown if Pc < 80% and '↓' on MNVR EXEC display <div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;"> <b>CAUTION</b> </div> No purge. Wait 10 min between burns (27) Redundant coils remain (28) Vlv closes. Redundant vlv remains (29) Redundant RPC remains
	(C3A1) 26 L OMS ARM 2, ARM/PRESS 2 sw Contacts		
	27 L OMS Eng Pr Vlv Coil 2, Cntl Vlv 1,2 Coils 2		
	(R2) 28 APU 2 Fu TK Vlv B		
	29 Hyd Main Pump 1 Depress Solenoid RPC A		
	29 Hyd Main Pump 3 Depress Solenoid RPC B		

# EPS SSR-102

## BUS LOSS: CNTLAB3

(Includes MNA FMC1, MNA MMC1, MNA MMC3, MNA AMC1)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR</p> <p>1 • GAS GEN/FUEL PUMP 1 – A AUTO</p> <p>• LUBE OIL LINE 1 – A AUTO</p> <p>APU HTR TK/FU LINE/H2O/</p> <p>1 • SYS 1A – OFF</p> <p>1 • 1B – AUTO</p> <p>1 • 3A – AUTO</p> <p>1 • 3B – OFF</p> <p>HYD HTR</p> <p>• BDY FLP A – OFF</p> <p>• B – AUTO</p> <p>• CIRC PUMP PWR 1 – MNA</p>	<p>(A12) APU 1 GG/Fu Pump Htrs B 1 Lube Oil Line Htrs B 1 Tk/Fu Ln Htrs A</p> <p>APU 3 Tk/Fu Ln Htrs B</p> <p>APU 3 GG Inj H2O Htrs 3B, 23B</p> <p>Body Flap Htr A</p> <p>Circ Pump 1 MNB pwr</p>	<p>SM ALERT Light/Tone – on 'S67 CNTL/ESS V' 'S88 THERMAL FRN' (2)</p> <p>(FSM) RM DLMA MANF</p> <p>(L1) 2 FLOW PROP VLV LOOP 1 tb – bp</p> <p>(O8) 3 FWD RCS 3 TK ISOL 3/4/5 tb – bp 3 MANF ISOL 1 tb – bp</p> <p>(R13L) 4 RAD CNTL STBD tb – bp 4 PORT tb – bp</p>	<p>①</p> <p style="text-align: center;">* TIME * * CRITICAL *</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p>
<p>(R2) • BLR CNTLR/HTR 1,3 (two) – B</p>	<p>(R2) Hyd H2O BLR 1,3 Cntrl A</p>	<p>SM 67 ELECTRIC CNTL AB3 Volts &lt; 20</p>	<p>② Freon Loop 1 Flow Prop Vlv operation not affected</p>
<p>(A14) RCS/OMS HTR</p> <p>• OMS CRSFD LINES – A OFF, B AUTO</p>	<p>(A14) OMS Crsfd Ln Htrs A</p>	<p>LADP deploy time incr from 15 to 30 sec</p>	<p>③ Vlv holds position</p>
<p>(L1) • H2O PUMP LOOP 1 – B</p> <p>• TOP EVAP HTR DUCT – B</p> <p>If Hi Load Evap enabled: • HI LOAD DUCT HTR – B(C)</p>	<p>(L1A2) H2O Loop 1 Pump A Top Evap Duct Fwd,Aft Htrs A</p> <p>Hi Load Duct Outbd,Inbd Noz Htrs A</p>	<p>(F7) If APUs active and using H2O BLR CNTLR/HTR 1A or 3A: C/W APU TEMP It – on after ~2 min</p>	<p>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 Cntl sw placed to OFF. Other equip pwr'd by AC1 MMC1 and AC1 MMC3 are lost because MNA MMC1 and MNA MMC3 lost</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p>	<p>5 Aft R RCS He Press Isol A man Cntl, GPC CL capability</p>	<p>SM (BFS,SM) 63 PL BAY DOORS</p>	<p>⑤ Vlv holds position. GPC OP capability remains. Isol B remains. Auto Overpress protection lost on R RCS A reg</p>
<p>(MA73C:C,D) 4 • cb MCA PWR AC1 3Φ MID 1,3 (two) – op</p>	<p>4 (MA73C) Port,Stbd Rad Lat 1-6,7-12 Mtrs 1 Limit sw</p>	<p>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'</p>	
<p>For PLBD ops: • OP/CL Drs in man mode</p>	<p>(MA73C) PLBD: C/L Lat 1-4,5-8,9-12 Mtrs 1 Port,Stbd Fwd Blkhd Mtrs 1 Port Aft Blkhd Mtr 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw</p>	<p>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	
<p>Do not perform if AB1,2,3 unpwr'd at same time: GNC 23 RCS</p> <p>Override F1 Manf status to OP: • RCS FWD – ITEM 1 EXEC • MANF VLVS 1 OVRD – ITEM 40 EXEC</p>	<p>(F6) CDR BFS no eng capability GPC 1,2,4 no eng capability</p>		
<p>• PLT RHC pb – push, if BFS engage reqd</p>	<p>COMSEC 1 &amp; 2 Pwr Redundancy</p>		
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	



**EPS SSR-102 (Cont)**  
**BUS LOSS: CNTLAB3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(MA73C) AC pwr removal capability via Limit sw for ET Door Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1  Port RMS: 16 Mid MRL Mtr 1 16 Aft MRL Mtr 2  STBD RMS: 17 Fwd MRL Mtr 2 17 Aft MRL Mtr 1		(16) Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists  (17) Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists

**EPS SSR-103**  
**BUS LOSS: CNTLBC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)            APU HTR            1 • GAS GEN/FUEL PUMP 1 – A AUTO            1 • GAS GEN/FUEL PUMP 2 – B AUTO            • LUBE OIL LINE 2 – B AUTO            APU HTR TK/FU LINE/H2O/            1 • SYS 1A – AUTO            1 • 1B – OFF            1 • 2A – OFF            1 • 2B – AUTO            HYD HTR            • BDY FLP A – AUTO            • B – OFF            • CIRC PUMP PWR 1 – MNA            • CIRC PUMP PWR 2 – MNC</p>	<p>(A12)            APU 1 GG/Fu Pump Htrs B            APU 2 GG/Fu Pump Htrs A            APU 2 Lube Oil Line Htrs A            APU 1 Tk/Fu Ln Htr B            APU 1,2 GG Inj H2O Htrs 4B,5B            APU 2 Tk/Fu Line Htr A            Body Flap Htr B            MNB Circ Pump 1 pwr            MNB Circ Pump 2 pwr</p>	<p>MASTER ALARM            Light/Tone – on            (F7)            SM ALERT Light/Tone – on            [SM 67 ELECTRIC]            CNTL BC1 Volts &lt; 20            2 C/W RCS JET It – on            (FSMs)            S69 FC H2O RLF HTR            S67 CNTL BUS V            3 S86 APU/HYD W/B            SM0 THRM HYD (B)            2 F,L,R RCS L,R,D JET            (COMM LOST)            All S-BD A/G voice lost if Sys 1 selected            (L1)            4 RAD BYP VLV 2 tb – bp            If Site AOS and using S-BD Ant Elec 1: 'ANTENNA'            5 If NSP 1 selected: 'BCE STRG 1 NSP'            During Rad Dpy/Sto: (R13L)            RAD CNTL STBD tb indicates single mtr ops            RAD LAT CNTL tbs (two) indicate single mtr ops            L,R ADP deploy time incr from 15 to 30 sec            STAR TRKR DR POS -Y CL time incr from 8 to 16 sec            STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec            If SYS 1 pwrd: 'S62 BCE BYP PSP 1'            Loss of PL TLM and CMD            If PDI FDA enabled: 'S62 PDI DECOM FAIL'            If first RGA failure and rates sensed: 'RM FAIL RGA' (3)            (F7)            If APUs active and using BLR CNTLR/HTR 2B: C/W APU TEMP It – on after ~2 min            [SM (BFS,SM) 86 APU/HYD]            APU 1 SPEED % Ind – 0            CCTV Video and Annun is lost if MNB selected for VCU            PLB FloodIts lost: Fwd Stbd Mid Port            [SM (BFS,SM) 63 PL BAY DOORS]            During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	<p>①            * TIME *            * CRITICAL *            If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp            ② Indications do <u>not</u> appear until jet commanded            ③ Msg occurs only if B AUTO (pnl R12U) selected for FC H2O Relief Htr            ④ Vlv still functional            ⑤ FSM caused by antenna miscompare            ⑥ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books            ⑦ OIU 2 interfaces with PSP 2 for commanding            ⑧ Pwr to MCA Drivers lost through ENABLE sw</p>
<p>(A1L)            S-BD PM            • ANT SW ELEC – 2            • XPNDR – 2            • PWR AMPL OPER – 2            • STBY – 2            • PRE AMP – 2            NSP            • PWR – 2            If PSP and/or INTRG reqd for PL or ISS ops:            • S-BD PL PWR SYS – 2            • CNTL – PNL            • – CMD            6 • Reconfig PSP            6 • Perform PL INTRG REACQ (if reqd)</p>	<p>(A1A2)            S-BD PM Sys 1:            Xpndr 1            Pre-Amp 1            Pwr Amp 1            PM Ant Sw 1            FM Ant Sw 1            NSP 1/COMSEC 1            S-BD PL INTRG 1            PSP 1</p>		
<p>(A1R)            • S-BD FM PWR – 2            If no comm:            (C3)            • S-BD PM CNTL – PNL            • – CMD            7 If OIU reqd:            (SSP)            • OIU PWR – OIU 2 ON            • OIU tb – DN            • √MCC, OIU reconfig</p>	<p>(A1A3)            S-BD FM Sys 1</p>		
<p>(L1)            • TOP EVAP HTR NOZ L – B AUTO            • TOP EVAP HTR DUCT – A            If Hi Load Evap enabled:            • HI LOAD DUCT HTR – A (C)</p>	<p>(L1A2)            Top Evap L Noz Htr A            Top Evap Duct Fwd,Aft Htrs B            Hi Load Duct Outbd,Inbd Noz Htrs B</p>		
<p>(R2)            • BLR CNTLR/HTR 2 – A</p>	<p>(R2)            Hyd H2O Blr 2 Cntr B</p>		
	<p>(R13A2)            8 PLBD:            C/L Lat 13-16 Mtr 2            Stbd Aft Blkhd Mtr 2            Port Drive Mtr 2</p>		
(Continued)	(Continued)		

**EPS SSR-103 (Cont)**  
**BUS LOSS: CNTLBC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O8) • If Straight feed config, Right OMS Crossfeed A – OP (tb-OP). Otherwise, √MCC	9 OMS Eng/Xfeed Vlv Redundancy		⑨ Maintains deorbit capability for MNC DA3 failure
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 B	(O8) 10 F,R,RCS He Press Isol B man CL capability		⑩ Vlv holds position. Man OP and full GPC cntl remains ⑪ Do not reconfig for reg switch or l'CNCT procedures
(O8) • L OMS XFEED B • R OMS XFEED B • FWD RCS He PRESS B	(O8) 10 L OMS Tk Isol B man CL capability 10 L,R OMS Xfeed Vlv B man CL capability		⑫ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded
If BC1,2,3 unpwrd at same time: GNC 23 RCS Override F2 Manf status to CL: • RCS FWD – ITEM 1 EXEC • MANF VLVS 2 OVRD – ITEM 41 EXEC			⑬ NOZ Htr A not wired ⑭ Vlv normally closed. GPC cntl remains. Man override of GPC OP CMD is lost
For attitude control, perform RCS, LOSS OF VERNIERS (ORB OPS)	(O16) 12 RCS Manf F5,L5,R5 RJD pwr (F5L,F5R,L5L,L5D,R5R,R5D)		
GNC 23 RCS • Reprioritize L,R Manf 1 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 3	(A14) Aft RCS L,R Jet 1 Htrs		
(A14) RCS/OMS HTR • FWD RCS – A AUTO • L POD (two) – A AUTO, B OFF • R POD (two) – A OFF, B AUTO	(A14) Fwd RCS Htrs B (all) L Pod Htrs B (all) R Pod Htrs A (all)		
(R11U) FC H2O • LINE HTR – A AUTO • RELIEF HTR – A AUTO	(R11U) FC H2O Line Htrs B Relief Htrs B Vent Line Htrs B Barrel Htrs B Rlf Noz Htrs B		
When reqd: • For FC2, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)	(R11U) 14 FC2 Purge Vlv man Cntl		
Prior to using L(R) OMS: (O8) L, R OMS He PRESS/VAP • ISOL A (two) – OP, then • – GPC • B (two) – GPC	(O8) 14 L,R OMS He Press Isol B man Cntl and VAP ISOL 1,2 Man B Cntl		
If CCTV reqd: (A7U) • TV PWR CONTR UNIT – MNA	(A7A1) Video Cntl Unit MNB pwr		
(Continued)	(Continued)		

**EPS SSR-103 (Cont)**  
**BUS LOSS: CNTLBC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
If EMU(s) in battery charge mode: (AW18H) • PWR/BATT CHGR EMU 1(2) BUS SEL – MNA	(FPC2/AW18H) EMU 1,2 Pwr/Batt Chgr MNB pwr		(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)
During OPS 8: <b>GNC 43 CONTROLLERS</b> Deselect L Pnl Trim L2: • DES PNL TRIM L2 – ITEM 37 EXEC Deselect L Bdy Flp UP/DN L2: • DES BDY FLP L2 – ITEM 20 EXEC	(F6A7) 15 L Trim RHC – INH capability 15 Pnl – ON capability  (L2A1) 15 L Bdy Flp Cntl		(16) Vlv holds position (17) Vlv holds position. Loss of manual capability to inert LO2 and LH2 Manfs
For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) – OP • Wait 10 sec, then CL	(R4) 16 MPS/TVC Hyd Sys 2 Isol man Cntl		(18) Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
<b>BUS ISOLATION</b>			
<b>ONLY ON MCC CALL, PERFORM</b>			
(F3) • TRIM RHC – ENA • PNL – OFF			(19) Vlv holds position. FC2 Redundant Reac Vlv Close Cntl on pnl C3 remains
(R4) MPS • FILL/DRAIN LO2 INBD – GND • FILL/DRAIN LH2 OUTBD – GND	(R4) 17 Prplt F/D Inbd LO2 Vlv man OP capability 17 Prplt F/D Outbd LH2 Vlv man Cntl		(20) FC2 can be stopped via FC2 CNTLR sw on pnl O15:A
(O15:A) • RGA 2 – OFF	(O15) RGA 2		(21) Cntlrs A, B Rad Byp Vlv Mtrs Auto Cntl and Cntlr B Rad Byp Vlv Mtr Man Cntl remain
(R14:D) cb MNB • TV CONTR UNIT – op			
(A13) • (OV103,4) GPS PWR – OFF • (OV103,4) GPS PRE AMPL UPPER – OFF • (OV103,4) GPS PRE AMPL LOWER – OFF	(OV103,4) GPS 2		
(A7U) PL BAY FLOOD • MID PORT – OFF • FWD STBD – OFF	(A7A1) PLB Mid Port Floodlt Fwd Stbd Floodlt		
	(R1A2) 18 Cryo O2,H2 Tk2,4 Htrs A man On Cntl		
	16 Cryo O2,H2 Tk2 Manf Vlv Cntl		
	(R2) R MPS He isol B man Cntl		
	(A15) Cryo O2,H2 Tk5 Htr B man On Cntl		
	(R1A2) 19 FC2 Reac Vlv Cntl via pnl R1 sw		
	20 FC2 Stop capability via START/STOP sw (pnl R1)		
	(C3) FC1 Redundant Reac Vlv Cntl		
	(L1A2) 21 Freon Loop 1 Cntlr A Rad Byp Vlv Mtr man Cntl		
	(Continued)		

**EPS SSR-103 (Cont)**  
**BUS LOSS: CNTLBC1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>(L2A1)                      22 Atm Press Cntl O2 Sys 2                      Sply Vlv Cntl</p>		<p>②② Vlv holds position. Sys 1 remains</p>
	<p>(F8)                      R HUD                      Rt ADI Aft Ref Set capability (C3A5)                      L,R ADP Dpy Mtrs 2                      Probe Htr Cntrl 2</p>		<p>②③ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</p>
	<p>(A8L)                      Port RMS:                      23 MPM Mtr 2                      24 Fwd MRL Mtr 1                      24 Mid MRL Mtr 2</p>		<p>②④ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p>
	<p>STBD RMS:                      23 MPM Mtr 1                      25 Mid MRL Mtr 1                      25 Aft MRL Mtr 2</p>		<p>②⑤ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
	<p>ROEU                      AC2 pwr to:                      24 Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B)                      24 ODA mtr 2 latch/release</p>		<p>②⑥</p> <div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <p><b>WARNING</b></p> </div> <p>Driver pwr to F2 jets lost if RJDF 1A Driver sw OFF (pnl O15:F)</p>
	<p>(O6)                      -Y Star Trkr Dr Sys 2 CL capability                      -Z Star Trkr Dr Sys 1 OP/CL capability</p>		
	<p>(O15)                      26 RJDF 1A F2 Manf Logic pwr (F2F,F2R,F2U,F2D)</p>		<p>②⑦ Redundant pwr sply remains. Turbine speed ind lost</p>
	<p>(R2)                      27 APU 1 Cntrl Pwr Sply B                      28 Hyd Main Pump 2 Depress Solenoid RPC A                      28 Hyd Main Pump 1 Depress Solenoid RPC B                      29 APU 1 Fu Tk Vlv B</p>		<p>②⑧ Redundant RPC remains</p> <p>②⑨ Vlv closes. Redundant vlv A remains</p>
	<p>(F6A5,F8A5)                      NLG Ext 2 Fire 1, Fire 2                      NLG,LMG,RMG Bkup Rel 2                      Fire 1                      30 LG Extend Vlv 2                      31 NWS Hyd Sys 2</p>		<p>③⑩ Loss of redundant hyd NLG deploy and NWS redundancy</p> <p>③⑪ Hyd Sys 1 still available for NWS</p>
	<p>(R4)                      32 Hyd Brake Isol 2 Man Cntl</p>		<p>③⑫ Vlv holds position. GPC cntl remains. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed</p>
	<p>(R13A2)                      Rad Cntl sys:                      Stbd Rad Lat 1-6 Mtr 2                      Dpy/Sto Mtr 1                      Port Rad Lat 1-6 Mtr 2</p>		
	<p>(R13A2)                      PL Reten Sys B Rad/Lat Mtrs                      33 Ku Ant Sto/Dpy Mtr 2                      Direct Stow Mtr 2                      34 Redundant Stow Initiate Signal to Ku-Band</p>		<p>③⑬ Mtr 1 remains</p> <p>③⑭ Redundant stow initiate sig (CNTL CA1) to Ku-Band remains</p>
	<p>(F2,F3)                      35 CDR Dpy Fire 2                      35 Jett Fire 2</p>		<p>③⑮ Plt Dpy/Jett remains</p>



**EPS SSR-104**  
**BUS LOSS: CNTLBC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A1L) S-BD PM</p> <p>1 • ANT SW ELEC – 1</p> <p>1 • XPNDR – 1</p> <p>• PWR AMP OPER – 1</p> <p>• STBY – 1</p> <p>• PRE AMP – 1</p> <p>1 NSP</p> <p>1 PWR – 1</p> <p>If PSP and/or INTRG reqd for PL or ISS ops:</p> <p>• S-BD PL PWR SYS – 1</p> <p>• CNTL – PNL – CMD</p> <p>3 • Reconfig PSP</p> <p>3 • Perform PL INTRG REACQ (if reqd)</p> <hr/> <p>(A1R)</p> <p>• S-BD FM PWR – 1</p> <hr/> <p>If no comm:</p> <p>(C3)</p> <p>• S-BD PM CNTL – PNL – CMD</p> <p>5 If OIU reqd: (SSP)</p> <p>• OIU PWR – OIU 1 ON</p> <p>• OIU tb – UP</p> <p>• √MCC, OIU reconfig</p>	<p>(A1A2)</p> <p>S-BD PM Sys 2:</p> <p>Xpndr 2</p> <p>Pre Amp 2, Pwr Amp 2</p> <p>PM and FM Ant sw 2</p> <p>NSP 2/COM SEC 2</p> <p>S-BD PL Intrg 2</p> <p>PSP 2</p> <hr/> <p>(A1A3)</p> <p>S-BD FM Sys 2</p> <hr/> <p>(A12)</p> <p>APU 2 GG/Fu Pump Htrs A</p> <p>1 Tk/Fu Line Htrs B</p> <p>APU GG Inj H2O Tank Htrs B</p> <p>APU 2 Tk/Fu Line Htrs A</p> <p>Elevon Actr Htrs B</p> <p>(R2)</p> <p>Circ Pump 2 MNB pwr</p> <hr/> <p>(L1A2)</p> <p>H2O Loop 1 Pump B man ON capability</p> <p>7 FES Sec Cntr GPC Sel capability</p> <p>Top Evap Duct Fwd,Aft Htrs B</p> <p>Hi Load Duct Outbd,Inbd Noz Htrs B</p> <hr/> <p>(L2A1)</p> <p>FES H2O Fdln A Htrs 2 (all)</p> <p>ROEU</p> <p>AC2 pwr to:</p> <p>8 Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B)</p> <p>8 ODA mtr 2 latch/release</p> <hr/> <p>(R13A2)</p> <p>9 PLBD:</p> <p>Port,Stbd Fwd Blkhd Mtrs 2</p> <p>Stbd Door Mtr 2</p>	<p>All S-BD A/G voice lost if sys 2 selected</p> <p>CRT 2 blanks</p> <p>(F7)</p> <p>2 RCS JET C/W It – on</p> <p>SM ALERT Light/Tone – on</p> <p>(FSMs)</p> <p>S86 APU/HYD W/B</p> <p>SM0 THRM HYD (B)</p> <p>BCE STRG 3 NSP (if using NSP 2)</p> <p>S67 CNTL/ESS V</p> <p>DISPLAY SW R</p> <p>2 F,L,R RCS(F,R,L,U,D) JET I/O ERROR CRT2</p> <p><b>SM 67 ELECTRIC</b></p> <p>CNTL BC2 Volts &lt; 20</p> <p>4 If site AOS and using S-BD Ant Elec 2: 'ANTENNA' (2)</p> <p>(L1)</p> <p>If H2O PUMP LOOP 1,B active:</p> <p>C/W H2O LOOP It</p> <p>'S88 H2O PUMP P1'</p> <p>'S88 H2O LOOP 1 FLOW'</p> <p>'S88 H2O LOOP 1 TEMP'</p> <hr/> <p>(O1)</p> <p>H2O PUMP OUT PRESS LOOP 1 – 20-25 psia</p> <p>During Rad Dpy/Sto: (R13L)</p> <p>RAD LAT CNTL tbs (two) indicate single mtr ops</p> <p>RAD CNTL STBD tb indicates single mtr ops</p> <p>STAR TRKR DR POS -Y</p> <p>OP/CL time incr from 8 to 16 sec</p> <p>STAR TRKR DR POS -Z CL</p> <p>time incr from 8 to 16 sec</p> <p>(F7)</p> <p>If APUs active and using H2O BLR CNTLR/HTR 2B:</p> <p>C/W APU TEMP It – on after ~2 min</p> <p>If sys pwrd:</p> <p>'S62 BCE BYP PSP 2'</p> <p>Loss of PL TLM and CMD</p> <p>If PDI FDA enabled:</p> <p>'S62 PDI DECOM FAIL'</p> <p><b>SM (BFS SM 63) PL BAY DOORS</b></p> <p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	<p>① If S-BD PM Sys 2 being used at time of bus failure, A/G comm capabilities lost until Sys 1 selected</p> <p>② Indications do not appear until jets commanded</p> <p>③ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books</p> <p>④ Indication appears only during site AOS for antenna miscompares</p> <p>⑤ OIU 1 interfaces with PSP 1 for commanding</p> <p>⑥</p> <p style="text-align: center;">* [ TIME ] *</p> <p style="text-align: center;">* [ CRITICAL ] *</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>⑦ Sec Cntr Man ON Sel capability remains. Pri A,B Cntrls remain</p> <p>⑧ Single mtr time</p> <p>⑨ Pwr to MCA Drivers lost through ENABLE sw</p>
(Continued)	(Continued)		

**EPS SSR-104 (Cont)**  
**BUS LOSS: CNTLBC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
11 Refer to OMS/RCS Slide Rule for vlv loss info Reconfig following vlv(s) only if leak isolation reqd: (O8) • L OMS XFEED B • R OMS XFEED B	(O8) 10 F,R RCS He Pr Isol B man Cntl, GPC CL capability 12 L OMS Tk Isol B man CL capability 12 L,R OMS Xfeed Vlv B man CL capability		(10) Vlv holds position. GPC OP capability remains. Isol A remains (11) Do not reconfig for reg switch or l'CNCT procedures
14 (R1) If Tk2 in use: O2,H2 TK2 • HTR A (two) – OFF • B (two) – AUTO	(R1A2) 13 Cryo O2,H2 Tk2 Manf Vlv Cntl Cryo O2,H2 Tk2 Htrs A		(12) Vlv holds position. Man OP and full GPC Cntl remains (13) Vlv holds position
14 (A11) If Tk4 in use: O2,H2 TK4 • HTR A (two) – OFF • B (two) – AUTO	(A11) Cryo O2,H2 Tk4 Htrs A		(14) Refer to <u>EPS 7.6</u> CRYO TABLE A for switch nomenclature
14			(15) 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)
(R2) • BLR CNTLR/HTR 2 – A			
(C2) • R IDP/CRT SEL – 3 On MCC GO: • GPC/CRT O2 EXEC			(16) Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur
16 <b>GNC 23 RCS</b> Override F2 Manf status to CL: • ITEM 1,41 EXEC • For attitude control, perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u> )	(R2) Hyd H2O Blr 2 Cntr B (C2A2) MDU CRT 2 15 IDP 2 (C3) FC1 Redundant Reac Vlv Close Cntl		(17) 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
17 If Network Sig Proc Encryption Select – Bypass (A1L) and no SM GPC: (C3) • UPLK – NSP BLK	(O15) RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)		
Place PLT disp sws (eight) to green dot position: (F8) • AIR DATA – NAV • ADI ATT – LVLH • ERR – MED • RATE – MED • HSI SEL MODE – ENTRY • HSI SEL SOURCE (two) – NAV 3 • RADAR ALTM – 1	16 (O16) RCS Manf F5/R5/L5 RJD pwr (F5L,F5R,L5L,L5D,R5R,R5D) 17 (C3A5) Uplink switch GPC Block of UL Cmd capability		
(Continued)	(F8) Air Data Source Sel capability R ADI Att, Err, Rate Sel capability R HSI Mode, Source Sel capability R Radar ALTM Sel capability (Continued)		

**EPS SSR-104 (Cont)**  
**BUS LOSS: CNTLBC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
When reqd: • For FC2, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)	(R11U) 18 FC2 Purge Vlv man Cntl		⑬ Vlv holds position ⑱ Vlv normally closed
(A6U) if SENSE – -Z: • SENSE – -X • Wait 1 sec, reposition as desired	(A6A1) 19 3-Level sw RM for -X Sense		⑲ RM sw downmodes to 2-level for -X position ⑳ 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)
During OPS 8: GNC 43 CONTROLLER Desel R Pnl Trim R2: • DES PNL TRIM R2 ITEM 39 EXEC Desel R Bdy Flp up/dn R2: • DES BDY FLP UP/DN R2 ITEM 22 EXEC	(F8) 20 R Trim RHC INH capability 20 R Trim Pnl ON capability (C3A1) 20 R Bdy Flp UP/DN capability		㉑ Sys B Sec Cntl man ON capability remains ㉒ A Htrs remain ㉓ B Htrs remain ㉔ Vlv holds position. Loss of manual capability to inert LO2 Manf
For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 – OP, wait 10 sec, then CL	(R4) 13 MPS/TVC Hyd Sys 2 Isol man Cntl		
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A – PRI/GPC If reqd for Post Rollout: (L1) • NH3 CNTLR B – SEC/ON	(L1A2) 21 NH3 SYS B Pri Cntlr and Auto Swover to Sec Cntl		
If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1) H2O PUMP • LOOP 1 (two) – ON, A(B) • LOOP 2 – ON • √FLOW PROP VLV LOOP (two) – ICH • Activate PL H2O loop(s) (if applicable)			
(A14) RCS/OMS HTR • FWD RCS – A AUTO • L POD (two) – A AUTO, B OFF • R POD (two) – A OFF, B AUTO	(A14) 22 Fwd RCS B Htrs (all) 22 L Pod B Htrs (partial) 23 R Pod A Htrs (partial)		
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
• MDU CRT 2 PWR – OFF			
(C2) • IDP/CRT2 PWR – OFF			
(F3) • R TRIM RHC/PNL – ENA • PNL – OFF			
(R2) • MPS He I'CONNECT L – GPC		(R2) L MPS He Intercon Vlv man Cntl	
(R4) • MPS FILL/DRAIN LO2 INBD – GND		(R4) 24 MPS Prplt F/D Inbd LO2 Vlv man OP capability	

(Continued)

**EPS SSR-104 (Cont)**  
**BUS LOSS: CNTLBC2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(O16) 25 ASA 4 Isol Driver pwr		⑬ Vlv holds position
	(L2A1) 13 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl		⑮ Six vlvs fail to non-isolation position
	(R1A2) 26 FC2 Reac Vlv Cntl via pnl R1 sw		⑯ Vlv holds position. FC2 Redundant Reac Vlv Close Cntl on pnl C3 remains
	27 FC2 STOP capability via START/STOP sw (pnl R1)		⑰ Able to stop FC2 via FC2 CNTLR sw (pnl O15:A)
	(R2) C MPS He Isol B man Cntl		⑱ Use Fwd pnl C3 pbs
	(A6A1) 28 R ADI Att Ref set capability		⑲ Redundant mtrs remain
	28 Aft Pnl Trans X,Y Norm and Pulse Sel capability		⑳ Htr Cntrlrs 1 remain
	28 Aft Pnl Trans Z High,Norm, and Pulse Sel capability		㉑ Sys 1 remains
	28 Aft Pnl Trans Low Z Sel capability		㉒ Hyd Sys 1 still available for NWS
	28 Aft Pnl Rot Roll,Pitch,Yaw Disc Rate, and Pulse Sel capability		㉓ Loss of redundant hyd NLG deploy and NWS redundancy
	28 Aft Pnl PRI,ALT,VERN Sel capability		㉔ Mtr 1 remains
	28 Aft Pnl PCT Exec capability		㉕ Redundant pwr sply remains. GG Bed T and GBX P ind lost when APU running
	(R13A2) 29 Rad Cntl Sys: Port,Stbd Lat 1-6 Mtr 2 Stbd Dpy/Sto Mtr 1		㉖ Redundant RPC remains
	(C3A5) 29 L,R ADP Dpy Mtrs 2		㉗ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
	30 Htr Cntrlrs 2		㉘ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
	(O6) 29 -Y Star Trkr Dr Sys 2 OP/CL capability		㉙ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	29 -Z Star Trkr Dr Sys 1 CL capability		
	(F6A5, F8A5) 31 NLG Bkup Release,Extension Sys 2		
	31 LMG, RMG Bkup Release Sys 2		
	32 NWS Hyd Sys 2		
	33 LG Extend Vlv 2		
	(R13A2) PL Reten Sys B Rel/Lat Mtrs		
	(R13A2) 34 Ku Ant Sto/Dpy Mtr 2 Direct Sto Mtr 2		
	(R2) 35 APU 2 Cntr pwr Sply A APU 2 GBX GN2 Repress Vlv		
	36 Hyd Main Pump 2 Depress Solenoid RPC A		
	36 Hyd Main Pump 1 Depress Solenoid RPC B		
	(A8L) Port RMS: 37 MPM Mtr 2		
	38 Fwd MRL Mtr 1		
	38 Mid MRL Mtr 2		
	STBD RMS: 37 MPM Mtr 1		
	39 Mid MRL Mtr 1		
	39 Aft MRL Mtr 2		
	(Continued)		

**EPS SSR-104 (Cont)**  
**BUS LOSS: CNTLBC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(O17) Freon Loop 1 Cold Plate Flow Xdcr Aft PL MNB current Xdcr (R2) 40 APU 2 Fu Tk Vlv B (F2,F3) 41 CDR Dpy Fire 1 41 Jett Fire 1		(40) Vlv closes. Redundant Vlv A remains (41) PLT Dpy/Jett remains

**EPS SSR-105**

**BUS LOSS: CNTLBC3** (Includes MNB FMC2, MNB MMC1, MNB MMC2, MNB MMC3, MNB MMC4, MNB AMC2)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR</p> <p>1 • GAS GEN/FUEL PUMP 2 – A AUTO</p> <p>1 • LUBE OIL LINE 2 – A AUTO</p> <p>APU HTR TK/FU LINE/H2O</p> <p>1 • SYS 1A – AUTO</p> <p>1 • 1B – OFF</p> <p>1 • 2A – OFF</p> <p>1 • 2B – AUTO</p> <p>HYD HTR</p> <p>• RUD SPD BK A – AUTO</p> <p>• B – OFF</p> <p>HYD</p> <p>• CIRC PUMP PWR 2 – MNB</p>	<p>(A12)</p> <p>APU 2 GG/Fu Pump Htr B</p> <p>2 Lube Oil Line Htrs B</p> <p>1 Tk/Fu Line Htr B</p> <p>APU 2 Tk/Fu Line Htr A</p> <p>Rud/Spd Bk Htr B</p> <p>Circ Pump 2 MNC pwr</p>	<p>SM ALERT Light/Tone – on S67 CNTL/ESS V</p> <p><b>SM 67 ELECTRIC</b></p> <p>CNTL BC3 Volts &lt; 20</p> <p>(FSM)</p> <p>RM DLMA MANF</p> <p>(O8)</p> <p>2 FWD RCS MANF ISOL 2 tb – bp</p> <p>If H2O PUMP LOOP 1,B – ON:</p> <p>C/W H2O LOOP It – on</p> <p>'S88 H2O PUMP P 1'</p> <p>'S88 H2O LOOP 1 FLOW'</p> <p>'S88 H2O LOOP 1 TEMP'</p> <p>-----</p> <p>(O1)</p> <p>H2O PUMP OUT PRESS LOOP 1 meter ind – 20-25 psia</p>	<p>①</p> <p>* TIME * * CRITICAL *</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>② Vlv holds position</p> <p>③ In OPS 2, FES GPC cmd is not present, but one may be sent if reqd</p> <p>④ Sec Cntrl On sel capability remains. Pri A,B Cntrls remain</p> <p>⑤ If AC2 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 1-6 continue to run until Sys B Lat Cntl sw placed to OFF. Other equip pwr'd by AC2 MMC2 and AC2 MMC4 lost because of MNB MMC2 and MNB MMC4 loss</p> <p>⑥ Sys A Sec Cntrl man On capability remains</p>
<p>(A14)</p> <p>• RCS/OMS HTR OMS CRSFD LINES – A AUTO, B OFF</p>	<p>(A14)</p> <p>OMS Crsfd Ln Htrs B (all)</p>	<p>(F7)</p> <p>If APUs active and using H2O BLR CNTLR/HTR 1A or 2A:</p> <p>C/W APU TEMP It on after ~2 min</p>	
<p>(L4:F)</p> <p>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</p>		<p>(R13L)</p> <p>During Rad Dpy ops:</p> <p>RAD CNTLR tbs (two) indicate single mtr ops</p>	
<p>(L1)</p> <p>3 • H2O PUMP LOOP 1 – A</p> <p>• FLASH EVAP CNTLR SEC – GPC (if using Sec Cntrl)</p> <p>• TOP EVAP HTR NOZ R – B AUTO</p> <p>• TOP EVAP HTR DUCT – A(C)</p> <p>If HI LOAD EVAP enabled:</p> <p>• HI LOAD DUCT HTR – A(C)</p>	<p>(L1A2)</p> <p>H2O Loop 1 Pump B</p> <p>4 FES Sec Cntrl man On Sel capability</p> <p>Top Evap R Noz Htr A</p> <p>Top Evap Duct Fwd,Aft L,R Htrs B</p> <p>Hi Load Duct Outbd,Inbd Htrs B</p>	<p>L,R ADP deploy time incr from 15 to 30 sec</p>	
<p>(R2)</p> <p>• BLR CNTLR/HTR 1,2 (two) – B</p>	<p>(R2)</p> <p>Hyd H2O Blr 1,2 Cntrl A</p>	<p>STAR TRKR DR POS (two) OP/CL time incr from 8 to 16 sec</p>	
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>Do not perform if BC1,2,3 unpwrd at same time:</p> <p><b>GNC 23 RCS</b></p> <p>Override F2 Manf status to OP:</p> <p>• RCS FWD – ITEM 1 EXEC</p> <p>• MANF VLVS 2 OVRD – ITEM 41 EXEC</p>		<p><b>SM (BFS SM 63) PL BAY DOORS</b></p> <p>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'</p> <p>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	
<p>(MA73C:C,D)</p> <p>5 • cb MCA PWR AC2 3φ MID 2,4 (two) – op</p>	<p>(MA73C)</p> <p>5 Stbd,Port Rad Lat 1-6 Mtr 2 Limit sw</p>	<p>(A8L)</p> <p>Port RMS:</p> <p>DPY/STO tb – bp</p> <p>RETEN LAT tb – bp</p> <p>R-F-L FWD tb – bp</p> <p>STARBOARD RMS:</p> <p>RETEN LAT tb – bp</p> <p>R-F-L FWD tb – bp</p> <p>R-F-L MID tb – bp</p>	
<p>For PLBD ops:</p> <p>• OP/CL Drs in man mode</p>	<p>(MA73C)</p> <p>PLBD:</p> <p>C/L Lat 13-16 Mtr 2</p> <p>Stbd Aft Blkhd Mtr 2</p> <p>Port Drive Mtr 2</p> <p>Port,Stbd Fwd Blkhd Mtr 2</p> <p>Stbd Door Mtr 2</p> <p>Port,Stbd Door Mtr 1 CL</p> <p>Limit sw</p>	<p><b>SM 94 PDRS CONTROL</b></p> <p>PORT RMS Indications lost:</p> <p>MPM Mtr 2 STO/DPY</p> <p>Fwd MRL Mtr 1</p> <p>LAT/REL/RDY</p> <p>Mid MRL Mtr 2</p> <p>LAT/REL/RDY</p> <p>STBD RMS Indications lost:</p> <p>MPM Mtr 1 STO/DPY</p> <p>Fwd MRL Mtr 1</p> <p>LAT/REL/RDY</p> <p>Mid MRL Mtr 1</p> <p>LAT/REL/RDY</p> <p>Aft MRL Mtr 2</p> <p>LAT/REL/RDY</p>	
<p>If reqd during entry (&lt; 120K ft):</p> <p>(L1)</p> <p>• NH3 CNTLR B – PRI/GPC</p>	<p>(L1A2)</p> <p>6 NH3 Sys A Pri Cntrl and Auto Swover to Sec Cntrl</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-105 (Cont)**  
**BUS LOSS: CNTLBC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If NH3 CNTLR A(B) – SEC/ON reqd, then:            (L1)            H2O PUMP            • LOOP 1 (two) – ON, A(B)            • LOOP 2 – ON            • √FLOW PROP VLV LOOP (two) – ICH            If applicable:            • Activate PL H2O LOOP(s)</p> <p>(A15)            If Tk 5 in use:            • O2,H2 Tk5 Htr A (two) – AUTO            • O2,H2 Tk5 Htr B (two) – OFF</p>	<p>Port RMS:            7 MPM Mtr 2            8 Fwd MRL Mtr 1            8 Mid MRL Mtr 2            STBD RMS:            7 MPM Mtr 1            9 Fwd MRL Mtr 1            9 Mid MRL Mtr 1            9 Aft MRL Mtr 2</p> <p>Cryo O2, H2 Tk5 Htr B</p>		<p>⑦ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</p> <p>⑧ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p> <p>⑨ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p> <p>⑩</p> <div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <p><b>WARNING</b></p> </div> <p>Driver pwr to F4/F5 Jets lost only if both RJDF 2B and L5/F5/R5 Driver sws (pnl O16:F) OFF simultaneously</p>
<p><b>BUS ISOLATION</b></p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(L1)            • SMOKE DETN CKT TEST – OFF</p>	<p>(L1A1)            Smoke Detn Test capability (all dets)</p>		
	<p>(O16)            10 RJDF 2B F4/F5 Manf Logic pwr (F4R,F4D,F5L,F5R)</p> <p>(O17)            11 TVC 3 Isol ME            11 4 Isol ME</p> <p>(R1A2)            12 Man ON Cntl of Cryo O2,H2 Tk 2,4 Htrs B</p> <p>(MA73C)            L Vents 1,2,3,5,8,9 Mtrs 2            R Vents 1,2,6,8,9 Mtrs 2</p> <p>(C3A6)            13 Fwd Pnl Trans X,Y Norm, Pulse, Fwd Pnl Rot Roll, Pitch,Yaw Disc Rate, Pulse Sel capability            13 Fwd Pnl Trans Low Z Sel capability            13 Fwd Pnl Trans Z High, Norm, Pulse Sel capability            13 Fwd Pnl PRI,ALT,VERN Sel capability            13 Fwd Pnl PCT Exec capability</p> <p>(R2)            Pneu He Isol 2 man Cntl            L MPS He Isol A man Cntl (F6A5, F8A5)            NLG, LMG, RMG Bkup Rel Sys 1, NLG Pyro Extension Sys 1</p> <p>(MA73C)            14 Port,Stbd Rad Mtrs 2 Dpy capability            -Y Star Trkr Dr Sys 2 OP/CL capability            -Z Star Trkr Dr Sys 1 OP/CL capability            L,R ADP Htr Cntrl 2            Deploy Mtrs 2            Deploy Disc 2</p> <p>(Continued)</p>		<p>⑪ Six vlvs fail to non-isolation position</p> <p>⑫ Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired</p> <p>⑬ Use pb on AFT pnl A6</p> <p>⑭ Stow capability remains</p>

**EPS SSR-105 (Cont)**  
**BUS LOSS: CNTLBC3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>(MA73C)            15 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</p> <p>(MA73C)            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</p> <p>(MA73C)            16 Ku Ant Sto/Dpy Mtr 2 Sto and            Dpy Limit sw            17 Redundant Ku-Bd Xmit            Enable Signal            18 Redundant Ku-Bd Boom            Stow Enable II Excitation            Signal</p> <p>(R2)            19 APU 3 Fu Tk Vlv B</p>		<p>⑮ Redundant mtrs remain</p> <p>⑯ With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed to GND position</p> <p>⑰ MNC MMC2 pwr for Ku-Bd Xmit Enable signal remains</p> <p>⑱ MNC MMC2 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs</p> <p>⑲ Vlv closes. Redundant Vlv A remains</p>





**EPS SSR-106  
BUS LOSS: CNTLCA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR 1 • GAS GEN/FUEL PUMP 2 – A AUTO 1 • GAS GEN/FUEL PUMP 3 – B AUTO • LUBE OIL LINE 3 – B AUTO APU HTR TK/FU LN/H2O 1 • SYS 2A – AUTO 1 • 2B – OFF 1 • 3A – OFF 1 • 3B – AUTO HYD HTR • AFT FUS A – AUTO • B – OFF HYD CIRC PUMP PWR • 2 – MNB • 3 – MNA</p>	<p>(A12) APU 2 GG/Fu Pump Htr B  APU 3 GG/Fu Pump Htr A 3 Lube Oil Ln Htr A 2 Tk/Fu Ln Htr B  APU 3 Tk/Fu Ln Htr A  Aft Fuselage Htrs B  Circ Pump 2 MNC pwr 3 MNC pwr</p>	<p>(F7) SM ALERT Light/Tone – on CRT 3 blanks  (FSMs) S69 FC REAC S67 CNTL BUS V I/O ERROR CRT3  <b>SM 67 ELECTRIC</b> CNTL CA1 &lt; 20 V  During Rad Dpy/Sto ops: (R13L) 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</p>	<p>① <b>TIME CRITICAL</b> If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp ② Pri A man On Sel capability remains. Pri B and Sec Cntrlr remain ③ Wrong FDA limit set is selected by SM preconditioning software due to loss of H2O Loop 2 pump On switch scan</p>
<p>(L1) • H2O PUMP LOOP 2 – ON • H2O PUMP LOOP 1 – GPC • FLASH EVAP CNTLR PRI A – ON (if using A Cntrlr) • TOP EVAP HTR NOZ R – A AUTO If HI LOAD EVAP enabled: • HI LOAD DUCT HTR – A(B)</p>	<p>(L1A2) H2O Loop 2 Pump GPC Cntl  2 FES Cntrlr Pri A GPC Sel capability Topping Evap R Noz Htr B Topping Evap Duct L,R Fwd, Aft Htr C Hi Load Duct Inbd,Outbd Htrs C</p>	<p>PLB Floodlts lost: Mid Stbd Aft Port Docking  (F7) If APUs active and using BLR CNTLR/HTR 3B: C/W APU TEMP It – on after ~2 min</p>	<p>④ 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)</p>
<p>(L2) • FLASH EVAP FDLN HTR B SPLY – 1</p>	<p>(L2A1) FES H2O Fdln B Htrs 2 (all)</p>	<p>③ <b>SM 88 APU/ENVIRON THERM</b> H2O LOOP 2 PUMP ΔP↑</p>	<p>⑤ Do not reconfig for reg switch or I'CNCT procedures</p>
<p>(C2) • L IDP/CRT SEL – 1 • R IDP/CRT SEL – 2 On MCC GO: • GPC/CRT 03 EXEC</p>	<p>(C2A2) MDU CRT 3  4 IDP 3</p>		
<p>(R2) • BLR CNTLR/HTR 3 – A  • If BFS in GPC 3 or 5, move BFS • If BFS in GPC 1, 2, or 4; and if engage reqd, use pb CDR RHC</p>	<p>(R2) APU/HYD Blr Cntrlr/Htr 3B  (F6A5) GPC 3,5 engage capability PLT BFS engage capability</p>		
<p>If CA1,2,3 unpwr'd at same time: <b>GNC 23 RCS</b> Override F3 Manf status to CL: • RCS FWD – ITEM 1 EXEC • MANF VLVS 3 OVRD – ITEM 42 EXEC</p>	<p>(O16) RCS Manf F3 RJD pwr (F3F, F3L,F3U,F3D)</p>		
<p>(A14) • RCS/OMS HTR R POD (two) – A AUTO, B OFF</p>	<p>(A14) R Pod Htrs B (all)</p>		
<p>Refer to OMS/RCS Slide Rule for vlv loss info 5 Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT L RCS He PRESS B TK 1/2 • XFEED 1/2 • R RCS TK 1/2 • XFEED 1/2</p>	<p>(O7) Aft L RCS He Press Isol B man CL capability Aft L,R RCS Tk Isol 1/2 man CL capability Aft L,R RCS Xfeed Vlv 1/2 man CL capability</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-106 (Cont)**  
**BUS LOSS: CNTLCA1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O8) • R OMS TK ISOL B	(O8) R OMS Tk Isol B man CL capability		⑥ Vlv normally closed
<div style="border: 1px solid black; padding: 2px; width: fit-content;">GNC 23 RCS</div> <ul style="list-style-type: none"> <li>Reprioritize L,R Manf 3 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest, etc</li> <li>Set aft pod(s) PRI JET FAIL LIMIT to 3</li> </ul>	(A14) Aft RCS L,R Jet 3 Htrs		⑦ Sys B Pri Cntrl, auto switchover to Sec Cntrl remain
When reqd: • For FC3, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)	6 (R11U) FC3 Purge Vlv man Cntl		⑧ Loss of manual capability to inert LO2 Manf
Prior to using L OMS: (O8) L OMS He PRESS/VAP ISOL • A – GPC • B – OP	(O8) L OMS He Press Isol A man Cntl, He Vap Isol 1,2 man A Cntl		⑨ Six vlvs fail to non-isolation position
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A(B) – PRI/GPC	7 (R4) MPS/TVC Hyd Sys 3 Isol man Cntl  (L1A2) NH3 Sys B Sec Cntrl man On capability		⑩ Redundant mtr remains
<b>BUS ISOLATION</b>			⑪ Htr Cntrl 2 remains
ONLY ON MCC CALL, PERFORM			⑫ Vlv holds position. FC3 Redundant Reac Vlv Close Cntl on pnl C3 remains
• MDU CRT 3 PWR – OFF			⑬ FC3 can be stopped via FC3 CNTLR sw (O16:A)
(C2) • IDP/CRT3 PWR – OFF			
(R2) • MPS He I'CONNECT R – GPC	(R2) R Eng He Intercon Vlv man Cntl		
(R4) • MPS FILL/DRAIN LO2 OUTBD – GND	8 (R4) Prplt F/D Outbd LO2 Vlv man Cntl		
(O16:A) • RGA 3 – OFF	(O16) RGA 3		
(A7U) PL BAY • FLOOD AFT PORT – OFF • MID STBD – OFF • DOCKING – OFF • PORT RMS LIGHT – OFF	9 (O17) ATVC 1 Isol ME  (A7A1) PLB Floodlts Aft Port Mid Stbd Docking Port RMS Lt		
If SSPTS: (A15) OPCU 2 CONV – OFF OPCU 2 V-ADJ – OFF APCU 2 CONV – OFF	If SSPTS: (A15) PTU 2 (OPCU 2 and APCU 2) Ability to change state of APCU 2's OUTPUT relay		
10 R ADP Dpy Mtr 1	11 Htr Cntrl 1		
12 FC3 Reac Vlv Cntl via pnl R1 sw	13 FC3 STOP capability via START/STOP sw		
(Continued)	(Continued)		

**EPS SSR-106 (Cont)**  
**BUS LOSS: CNTLCA1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(C3) FC2 Redundant Reac Vlv Close Cntl		(10) Redundant mtr remains
	(R1A2) 14 Cryo O2,H2 Tk1 Htrs A man On and Tk3 Htrs B man On Cntl		(14) Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
	(R2) L MPS He Isol B man Cntl		(15) During PLBD OP/CL, single mtr run time noted on actuators
	14 Cryo O2,H2 Tk5 Htr A man On Cntl		(16) Pwr to MCA Drivers lost through ENABLE sw
	15 (R13A2) 16 PLBD: C/L Lat 1-4, 5-8 Mtrs 2 Port Aft Blkhd Mtr 2		(17) Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
	(A8L) Port RMS: 17 Fwd MRL Mtr 2 17 Mid MRL Mtr 2 17 Aft MRL Mtr 1 STBD RMS: 18 Fwd MRL Mtr 1 18 Mid MRL Mtr 2 18 Aft MRL Mtr 2		(18) Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	(L1A2) 19 Freon Loop 2 Cntr A Rad By Vlv Mtr man Cntl		(19) Cntrls A,B Rad By Vlv Mtrs Auto Cntl and Cntr B Rad By Vlv Mtr Man Cntl remain
	(A6A1) Aft ADI Att ref set capability		(20)
	(O16) 20 R,JDF 2A F3 Manf Logic pwr (F3L,F3D,F3U,F3F)		 Driver pwr to F3 Jets lost if R,JDF 2A Driver sw OFF (O16:F)
	(C3A1) 21 R OMS Eng Pr Vlv Coil 1 and Cntl Vlv 1,2 Coils 1		(21) Redundant coils remain
	22 R OMS Arm 1, Arm/Press 1 sw contacts		(22) R OMS auto shdn if Pc < 80% and '↓' on MNVR EXEC display
	(R4) 23 HYD BK ISOL VLV 3 man Cntl (F6A5,F8A5)		 No purge. Wait 10 min between burns
	24 LG Extend Vlv 1		(23) Vlv holds position. GPC capability remains
	25 NWS Hyd Sys 1		(24) Lost Hyd deploy capability for all Ldg Gr. Pyro Backup Release Sys will deploy Ldg Grs. NLG can also be deployed by Hyd Sys 2
	(O6) 10 -Z Star Trkr Dr Sys 2 OP/CL capability		(25) Hyd Sys 2 still available for NWS
	(R13A2) Rad Cntl Sys: Stbd Rad Lat 7-12 Mtr 2 Port Rad Dpy/Sto Mtr 2		
	(R2) 10 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 man Sto capability C/L Lat Actr 2 Mtr 1 man Sto capability L Dr Closure Mtr 2 man Cntl L Dr Uplock Lat Mtr 1 man Cntl R Dr Uplock Lat Mtr 1 man Cntl		
	(Continued)		

**EPS SSR-106 (Cont)**  
**BUS LOSS: CNTLCA1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	26 (R13A2) Ku Ant Sto/Dpy Mtr 1 Direct Sto Mtr 1		②⑥ Mtr 2 remains
	27 (R13A2) Redundant Sto Initiate Signal to Ku-Band		②⑦ Redundant stow initiate sig (CNTL BC1) to Ku-Band remains
	(O17) Freon Loop 2 Cold Plate Flow Xdcr		②⑧ Vlv fails closed. Redundant vlv remains
	(R2) 28 APU 1 Fu Tk Vlv B		②⑨ Redundant RPC remains
	29 Hyd Main Pump 3 Depress Solenoid RPC A		③⑩ CDR Dpy/Jett remains
	29 Hyd Main Pump 2 Depress Solenoid RPC B		
	(O17) Aft PL MNC current Xdcr		
	(F3,F4) 30 PLT Dpy Fire 2		
	30 Jett Fire 2		



**EPS SSR-107 (Cont)**  
**BUS LOSS: CNTLCA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
Refer to OMS/RCS Slide Rule for vlv loss info 7 Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT L,R RCS TK 1/2 • XFEED 1/2	(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 Ovrld of GPC CL capability		⑦ Do not reconfig for reg switch or I'CNCT procedures ⑧ Vlv normally closed ⑨ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur ⑩ RM sw downmodes to 2-level for -X position
When reqd: • Perform FC3 purges in AUTO mode (ORB OPS)	(R11U) 8 FC3 Purge Vlv man Cntl		
(A6U) • ADI ATT – LVLH • ERR – MED • RATE – MED	(A6A1) Aft ADI capability: Att Sel Error Scale Sel Rate Scale Sel Att ref set		
(A14) RCS/OMS HTR • R POD (two) – A AUTO, B OFF	(A14) R Pod B Htrs (partial)		
9 <b>GNC 23 RCS</b> Override F3 Manf status to CL: • RCS FWD – ITEM 1 EXEC • OVRD MANF VLVS STAT 3 – ITEM 42 EXEC	(O16) RCS Manf F3 RJD pwr (F3L,F3D,F3U,F3F)		
(A6U) If SENSE -Z: • SENSE – -X • Wait at least 1 sec, then reposition as desired	(A6A1) 10 3-level sw RM for -X Sense		
9 <b>GNC 23 RCS</b> • 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	(A14) Aft RCS L,R Jet 4 Htr		
(Continued)	(Continued)		

**EPS SSR-107 (Cont)**  
**BUS LOSS: CNTLCA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
During OPS 8: <b>GNC 43 CONTROLLERS</b> Deselect R Pnl Trim R1: • DES PNL TRIM R1 – ITEM 38 EXEC Deselect R BDY FLP UP/DN R1: • DES BDY FLP R1 – ITEM 21 EXEC  If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A(B) – PRI/GPC	(F8A7) 11 R Trim RHC – INH capability 11 PNL – ON capability  (C3A1) 11 R Bdy Flp – UP/DN capability  (R4) MPS/TVC Hyd Sys 3 Isol man Cntl  (L1A2) 12 NH3 Sys A Sec Cntrl man On capability		(11) 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) (12) Sys A Pri Cntrl, auto switchover to Sec Cntrl remain (13) Redundant mtrs remain (14) Vlv holds position. FC3 Redundant Reac Vlv Close Cntl on pnl C3 remains (15) FC3 can be stopped via FC3 CNTLR sw (pnl O16:A) (16) Htr Cntrl 2 remains (17) Use pbs at pnl C3 (18) Redundant coils remain (19) R OMS auto shtdn if Pc < 80% and ↓ on MNVR EXEC display
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(F3) • TRIM RHC – ENA • PNL – OFF	13 (O6) -Z Star Trkr Dr Sys 2 CL capability		
(R11L) • IDP/CRT4 PWR – OFF	14 (R1A2) FC3 Reac Vlv Cntl via pnl R1 sw		
• MDU CRT 4 PWR – OFF	15 FC3 STOP capability via START/STOP sw		
	13 (C3A5) R ADP Dpy Mtr 1 16 Htr Cntrl 1  17 (A6A1) Aft Panel Trans X,Y, Norm, Pulse, Rot Roll, Pitch, Yaw Disc Rate, and Pulse Sel capability 17 Aft Pnl Trans Z High, Norm Pulse Sel capability 17 Aft Pnl Trans Low Z Sel capability 17 Aft Pnl PRI,ALT,VERN Sel capability 17 Aft Pnl PCT Exec capability  18 (C3A1) R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coil 2 19 R OMS Arm 2, Arm/Press 2 sw contacts  (F6A5,F8A5) NLG Ext Sys 1 NLG,LMG,RMG Bkup Rel Sys 1  (R2) R MPS He Isol A man Cntl  (R13A2) Rad Cntl Sys: Port RAD Lat 7-12 Mtr 2 Dpy/Sto Mtr 2		<div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;"> <b>CAUTION</b> </div> <p>No purge. Wait 10 min between burns</p>
	(Continued)		

**EPS SSR-107 (Cont)**  
**BUS LOSS: CNTLCA2**

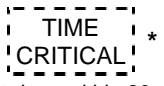
BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(A8L) 20 Port RMS MPM Mtr 1 20 Stbd RMS MPM Mtr 2		⑬ Redundant mtrs remain
	(R2) 13 ET Door Mtrs: C/L Lat Actr 1 Mtr 2 man Stow capability C/L Lat Actr 2 Mtr 2 man Stow capability L Dr Uplock Lat Mtr 1 man R Dr Closure Mtr 1 man Cntl R Dr Uplock Lat Mtr 1 man Cntl		⑳ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison ㉑ Mtr 2 remains ㉒ Vlv closed. Redundant vlv remains
	(R13A2) 21 Ku Ant Sto/Dpy Mtr 1 Direct Sto Mtr 1		㉓ Redundant pwr sply remains. Turbine speed ind lost
	(R2) 22 APU 2 Fu Tk Vlv A 23 Cntr Pwr Sply B 24 Hyd Main Pump 3 Depress Solenoid RPC A 24 Hyd Main Pump 2 Depress Solenoid RPC B		㉔ Redundant RPC remains ㉕ During PLBD OP/CL, single mtr times noted on actuators
	(R13A2) 25 PLBD: 26 C/L Lat 9-12 Mtr 2 13-16 Mtr 1 Stbd Aft Blkhd Mtr 1 Port Door Mtr 1		㉖ Pwr to MCA Drivers lost through ENABLE sw
	(F3,F4) 27 PLT Dpy Fire 1 27 Jett Fire 1		㉗ CDR Dpy/Jett remains



**EPS SSR-108**

**BUS LOSS: CNTLCA3**

(Includes MNC FMC3, MNC MMC2, MNC MMC4, MNC AMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (A12) APU HTR • GAS GEN/FUEL PUMP 3 – A AUTO • LUBE OIL LINE 3 – A AUTO APU HTR TK/FU LN/H2O 1 • SYS 2A – AUTO 1 • 2B – OFF 1 • 3A – OFF 1 • 3B – AUTO HYD CIRC • PUMP PWR 3 – MNC	(A12) APU 3 GG/Fu Pump Htrs B  APU 3 Lube Oil Ln Htr B  APU 2 Tk/Fu Ln Htr B  APU 3 Tk/Fu Ln Htr A  Hyd Circ Pump 3 MNA pwr	MASTER ALARM Light/Tone – on  (F7) SM ALERT Light/Tone – on  (FSM) S67 CNTL BUS V RM DLMA MANF  SM 67 ELECTRIC CNTL CA3 Volts < 20	①  If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
(R1) If Tk2 in use: 4 O2, H2 TK2 • HTR A (two) – AUTO • HTR B (two) – OFF	(R1A2) Cryo O2,H2 Tk2 Htrs B	(O8) 2 FWD RCS TK ISOL 1/2 tb – bp 2 FWD RCS MANF ISOL 3,4 tb – bp	② Vlv holds position ③ Vlv ops not affected
(A11) If TK4 in use: 4 O2, H2 TK4 • HTR A (two) – AUTO • HTR B (two) – OFF	(A11) Cryo O2,H2 TK4 Htrs B	(L1) 3 RAD BYP VLV 1 tb – bp 3 FLOW PROP VLV LOOP 2 tb – bp	④ Refer to EPS 7.6 CRYO TABLE A for switch nomenclature
(R2) • BLR CNTLR/HTR 2 – B • 3 – B	(R2) APU/HYD Blr Cntrlr/Htr 2A 3A	(R13L) 5 RAD CNTL (two) tb – bp	⑤ If AC3 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 7-12 would continue to run until Sys B Lat Cntl sw placed to OFF. Other equip pwr'd by AC3 MMC2 and AC3 MMC4 is lost because of MNC MMC2 and MNC MMC4 loss
Refer to OMS/RCS Slide Rule for vlv loss info		R ADP deploy time incr from 15 to 30 sec  STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec	⑥ Manf 4 status automatically declared closed
	(O16) 6 RCS Manf F4 RJD pwr (F4R,F4D)	(F7) If APUs active, using BLR CNTLR/HTR 2A or 3A: C/W APU TEMP It – on after ~2 min	
5 (MA73C:C,D) • cb MCA PWR AC3 MID 2,4 (two) – op	5 (MA73C) Stbd,Port Rad Lat 7-12 Mtr 2 Limit sw		
(Continued)	(Continued)		

**EPS SSR-108 (Cont)**  
**BUS LOSS: CNTLCA3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For PLBD ops: • OP/CL Drs in man mode	(MA73C) Port, Stbd Rad Dpy/Sto Mtrs 2 PLBD: C/L Lat 1-4,5-8,9-12 Mtrs 2 13-16 Mtr 1 Port Aft Blkhd Mtr 2 Stbd Aft Blkhd Mtr 1 Port Door Mtr 1 Stbd Door Mtr 2 CL Limit sw	<div style="border: 1px solid black; padding: 2px;">SM (BFS, SM) 63 PL BAY DOORS</div> If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	⑦ Mtr 2 remains ⑧ Htr Cntr 2 remains ⑨ Redundant mtrs remain
(L1) • TOP EVAP HTR DUCT – A(B) If HI LOAD EVAP enabled: • HI LOAD DUCT HTR – A(B)	(L1A2) Topping Evap Duct Fwd, Aft Htrs C Hi Load Duct Outbd, Inbd Noz Htrs C	During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left	⑩ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
<b>BUS ISOLATION</b>		(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp	⑪ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
ONLY ON MCC CALL, PERFORM	(A14) Aft RCS L, R Jet 5 Htrs	STARBOARD RMS: DPY/STO tb – bp	⑫ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	(R2) C MPS He Isol B man Cntl	<div style="border: 1px solid black; padding: 2px;">SM 94 PDRS CONTROL</div>	PORT RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY
7 8	(MA73C) -Z Star Trkr Dr Sys 2 OP/CL capability R ADP Deploy Mtr 1 Deploy Dsc 1 Htr Cntr 1	STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	
9	(MA73C) LH Vents 1,2,3 Mtrs 1 Vent 6 Mtr 2 RH Vents 8,9 Mtrs 1 Vent 3 Mtr 2 Vent 5 Mtr 2		
9	(MA73C) ET Door Mtrs: C/L Lat Actr 2 Mtr 2 GPC Cntl L Dr Closure Mtr 2 GPC CL capability R Dr Closure Mtr 1 GPC CL capability R Dr Uplock Lat Mtr 1 GPC Lat capability	(MA73C) AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1	
10 11 11	(A8L) Port RMS: MPM Mtr 1 Fwd MRL Mtr 2 Aft MRL Mtr 1		
10 12	STBD RMS: MPM Mtr 2 Mid MRL Mtr 2		
	(Continued)		

**EPS SSR-108 (Cont)**  
**BUS LOSS: CNTLCA3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(MA73C) 13 Ku Ant Sto/Dpy Mtr 1 Limit sw (MA73C) 14 Redundant Ku-Bd Xmit Enable Signal 15 Redundant Boom Stow Enable II Excitation Signal (R2) 16 APU 3 FU Tk Vlv A 17 Cntr pwr Sply A GBX GN2 Repress Vlv		⑬ With an inop limit sw, mtr will continue to run until primary sw returned to GND ⑭ MNB MMC4 pwr for Ku-Bd Xmit Enable Signal remains ⑮ MNB MMC4 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs ⑯ Vlv closed. Redundant vlv remains ⑰ Redundant pwr sply remains

**EPS SSR-109  
CONTROL BUS – PANEL WIRING MATRIX**

PANEL \ CNTL BUS	CNTL BUS								
	AB1	AB2	AB3	BC1	BC2	BC3	CA1	CA2	CA3
O6	X	X	X	X	X	X	X	X	X
O14	X	X					X	X	X
L2A1	X	X		X	X		X		
L1A2	X	X	X	X	X	X	X	X	X
L1A1						X			
F6	X	X	X	X	X	X	X	X	X
C3A7	X			X			X		
C3A1	X	X	X	X	X	X	X	X	X
C3A5	X	X	X	X	X		X	X	X
C3A6			X			X			X
C2A2	X			X	X		X		
F8	X	X	X	X	X	X	X	X	X
O7	X	X	X	X	X		X	X	X
O15	X	X		X	X	X	X		X
R1A2	X	X		X	X	X	X	X	X
R2	X	X	X	X	X	X	X	X	X
R4	X	X	X	X	X	X	X	X	X
O16				X	X	X	X	X	X
O8	X	X		X	X		X	X	
O17	X	X	X	X	X	X	X	X	X
R12A1	X	X		X	X		X	X	
R12A2								X	
R13A2	X	X	X	X	X		X	X	X
A1A2	X		X	X	X		X		
A1A3	X	X		X	X		X	X	
A11A1				X	X	X			X
A12	X	X	X	X	X	X	X	X	X
A6A1	X	X		X	X		X	X	
A7A1	X			X			X		
A8A2	X	X		X			X	X	X
A13	X			X			X	X	
A14	X	X	X	X	X	X	X	X	X
MA73C	X	X	X	X	X	X	X	X	X

**NOTE**

This table shows control bus and "daisy-chained" panels that make up that particular control bus

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**EPS SSR-110  
BUS LOSS: AC1**

(Includes all AC1 sub-buses)

EPS AC  
SSR 110-148

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 • Perform FC1 SHUTDN FC SHUTDN (Cue Card)</p> <p>(R1) • AC1 BUS SNSR – OFF</p> <p>(R2) • BLR CNTLR/HTR 1 – A 3 – B</p> <p>(L1) • HUM SEP A – OFF √B – ON • IMU FAN A – OFF B(C) – ON • H2O PUMP LOOP 1 (two) – ON, B • H2O LOOP 1 BYP MODE – AUTO • H2O PUMP LOOP 2 – OFF</p> <p>• AV BAY 1 FAN A – OFF √B – ON • AV BAY 2 FAN (two) – ON</p> <p>• AV BAY 3 FAN A – ON B – OFF</p> <p>• FREON PUMP LOOP 1 – B • FREON PUMP LOOP 2 – A</p> <p>(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN A – OFF B – ON</p>	<p>FC1 Pumps and pH Snsr</p> <p>Hyd H2O Blr 1 Cntrl B 3 Cntrl A</p> <p>Humidity Sep A</p> <p>IMU Fan A</p> <p>2 H2O Loop 2 Byp Cntrl, Sig Condr</p> <p>3 H2O Loop 2 Byp Vlv pwr 2 Pump GPC Cntl 1 Pump A Av Bay 1 Fan A</p> <p>4 Av Bay 2 Sig Condr, Xdcrs (ECLS SC3) Av Bay 3 Fan B</p> <p>Freon Loop 1 Pump A 2 Pump B</p> <p>Arlk/Tnl Fan A</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7) EVENT TIME ind blank C/W FC PUMP It – on C/W AC VOLT It – on C/W FREON LOOP It – on C/W AV BAY/CAB AIR It – on C/W H2O LOOP It – on SM ALERT Light/Tone – on</p> <p>(F9) AC1 ΦA,ΦB,ΦC AC volts &lt; 90</p> <p>(LIGHTS LOST) Instr lts R (pnls C2,F8,F9) Pnl lts L/Ctr (pnls L1,L2,L4, C2,C3,F2,F6,F7) Pnl lts L/OH (pnls O5,O6, O7,O13,O14,O15) Numeric lts (pnls O3,F7) Orbit Sta Instr lts (pnls A1, A2)</p> <p>(FSMs) S67 AC VOLTS 1 S86 HYD RSVR Q S86 WSB T SM2 HYD QTY (B) SM0 THRM HYD (B) S66 AV BAY 3 FAN S66 AV BAY 2 FAN S69 FC PUMP 1 S69 FC H2 PUMP 1 S88 FREON FLOW 2 S88 FRN AFT CP 2 S88 FRN PL HX 2 S88 H2O PUMP P 2 S88 H2O LOOP 2 QTY S88 H2O LOOP 2 TEMP</p> <p>(R1) FC1 COOL PUMP ΔP tb – bp</p> <p>HYD/APU HYD QTY 1 ind – 0% APU H2O QTY 3 ind – 0%</p> <p>(O1) AIR TEMP AV BAY 2 ind – 45 degF H2O PUMP OUT PRESS LOOP 2 ind – 0 psia FREON FLOW LOOP 1 ind – 578 pph</p> <p>(O3) RCS/OMS PRPLT QTY Gage and MSN TIME ind blank</p> <p>(L1) If H2O LOOP 1 PUMP A active: 'S88 H2O PUMP P 1' 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP'</p> <p>(O1) H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia</p> <p>If HUM SEP A ON: 'S66 HUMID SEP A'</p>	<p>①</p> <p>* TIME * * CRITICAL *</p> <p>FC1 must be shutdn within 9 min to avoid potentially hazardous condition</p> <p>② H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</p> <p>③ H2O Loop 2 Byp vlv holds position</p> <p>④ Av Bay 2 Fan ΔP, Air Out Temp snrs lost</p> <p>⑤ Crew and gnd have lost POCO2 Xdcr</p> <p>⑥ Use streamers (if flown) or monitor by feel during wake period</p> <p>⑦ CO2 partial Press and Cabin Fan ΔP snrs lost</p> <p>⑧ Inhibits Primary C/W for CAB Fan ΔP, H2O Loop 2 Pump P, FC1 stack Temp, FC1 Cool Pump ΔP</p> <p>⑨ Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, and Cabin HX In Temp respectively</p>
<p>5 • Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN During sleep periods: (L1)</p> <p>6 • CAB FAN (two) – ON</p> <p>(R13U) • C/W PARAM SEL tw (three) – 115, 074, 092, 062</p> <p>8 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – &gt; 119</p> <p>9 <b>SM 60 SM TABLE MAINT</b> • Inhibits 0612705, 0612700, 0612740, 0612710, 0612665</p> <p>(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</p> <p>(EDO WCS) • URINAL SEL – SEP 2 • URINE DIVERTER VLV – FAN SEP 2</p>	<p>7 Cabin Air S/C (ECLS SC6)</p> <p>WCS Fan/Sep 1</p> <p>Urine Sep 1 Fan 1 Commode Fan 1</p>	<p>(Continued)</p>	<p>(Continued)</p>
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>

**EPS SSR-110 (Cont)**  
**BUS LOSS: AC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If 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 ----- (L1) • CAB TEMP CNTLR – 1</p>	<p>10 Cabin Temp Cntrlr 2, Hx Byp Vlv Mtr 2</p>	<p>(MO51F) CO2 RMVL SYS CNTLR 1 FAIL It on Impending: 'S66 CO2 RL SYS PCO2'</p>	<p>⑩ Lose Auto Temp Cntl via Cntrlr 2 and H2O Loop 2 Cabin Hx In Temp Snsr. Hx Byp Vlv holds position</p>
<p>(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) Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS and FMC1 Slide for Fwd RCS)</p>	<p>11 CO2 Rmvl Sys: Cntrlr 1 Fan AC1 pwr Compressor AC1 pwr</p>	<p>If IMU FAN A ON: 'S66 IMU FN SPD A' 'S66 IMU FAN DP'</p> <p>If APUs active and using H2O BLR CNTLR/HTR 1B or 3A, then C/W APU TEMP It on after ~2 min</p>	<p>⑪ PEVs, Actuators, Bed A P, Bed B P, Bed dP will be recovered after system reconfig</p>
<b>BUS ISOLATION</b>		<p>STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec</p>	<p>⑫ Redundant mtr remains</p>
<p>ONLY ON MCC CALL, PERFORM</p>		<p>L ADP deploy time incr from 15 to 30 sec</p>	<p>⑬ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p>
<p>(MA73C:C) cb MCA PWR • AC1 3Φ FWD 1 – op • MID 1 – op</p>	<p>12 AC1 FMC1 Bus pwr RH Vent 1,2 Mtr 1 -Y Star Trkr Dr Sys 1 OP/CL capability</p>	<p>If Freon Loop 2 Pump B on: 'S88 FREON FLOW 2' 'S88 FRN AFT CP 2' 'S88 FRN PL HX 2'</p>	<p>⑭ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
<p>(MA73C:D) cb MCA PWR • AC1 3Φ MID 3 – op • AFT 1 – op</p>	<p>12 L ADP Dpy Mtr 1 AC1 MMC1 Bus pwr RH Vents 3,5,6 Mtrs 1 PL Reten Sys A Rel/Lat Mtrs Port Rad Lat 1-6, 7-12 Mtrs 1 Port Rad Dpy/Sto Mtr 1 PLBD: C/L Lat 9-12 Mtr 1 Port, Stbd Fwd Blkhd Mtrs 1 Stbd Door Mtr 1</p>	<p>(O1) FREON FLOW LOOP 2 ind – 578 pph</p>	
<p>(MA73C:E) • cb AC1 WCS FAN SEP 1 (three) – op</p>	<p>PLBD: C/L Lat 1-4, 5-8 Mtrs 1 Port, Aft Blkhd Mtr 1 AC1 MMC3 Bus pwr AMC1 Bus pwr LH Vent 8,9 Mtr 1</p>	<p>SM (BFS SM 63) PL BAY DOORS</p>	<p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>
<p>(MA73C:F) cb AC1 • RMS PRI ΦA – op  • MAR 3Φ – op  • OPS INST HYD ACTR ΦC – op</p>	<p>13 Port Mid MRL Mtr 1 13 Port Aft MRL Mtr 2 14 Stbd Fwd MRL Mtr 2 14 Stbd Aft MRL Mtr 1 D&amp;C Primary Itg Shldr Brace release AC1 Middeck Utility Pnl (MUP) Ops Hyd Actr Instr</p>	<p>During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops</p>	
<p>(MA73C:G) IF DOCKING MISSION • cb AC1 ARLK/TNL FAN A (three) – op</p>	<p>Ark/Tnl Fan A</p>		
(Continued)	(Continued)		

**EPS SSR-110 (Cont)**  
**BUS LOSS: AC1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:H,I)  <ul style="list-style-type: none"> <li>• cb AC1 FWD RCS VLV (three) – op</li> <li>• cb AC1 AFT POD VLV GP 1 (three) – op</li> </ul> </p>			<p>⑮ Bypass vlvs hold position and Cntr A Rad Byp Vlv Mtrs remain</p>
<p>(L4:A-E)  <ul style="list-style-type: none"> <li>• cb UTIL PWR F1/MO52J</li> <li>• AC1 – op</li> </ul> </p>	<p>AC1 Util pwr (F1/MO52J)</p>		
<p>cb AC1  <ul style="list-style-type: none"> <li>• FC1 PUMPS (three) – op</li> <li>• CTR ENG (three) – op</li> <li>• R ENG (three) – op</li> </ul> </p>			
<p>(L4:F-J)            cb AC1  <ul style="list-style-type: none"> <li>• √H2O LOOP PUMP 1A/2 (three) – op</li> <li>• AV BAY 1 FAN A (three) – op</li> <li>• AV BAY 3 FAN B (three) – op</li> <li>• IMU FAN A (three) – op</li> <li>• HUM SEP A (three) – op</li> </ul> </p>			
<p>(L4:K)            cb AC1  <ul style="list-style-type: none"> <li>• ΦA H2O CNTLR 2 – op</li> <li>• ΦB CAB AIR S/C – op</li> </ul> </p>			
<p>(L4:L)            cb AC1  <ul style="list-style-type: none"> <li>• ΦA CAB T CNTLR 2 – op</li> <li>• ΦB AV BAY 2 S/C – op</li> </ul> </p>			
<p>(L4:M,N)            cb AC1 ΦA,ΦB,ΦC  <ul style="list-style-type: none"> <li>• FREON LOOP 1 PUMP A (three) – op</li> <li>• FREON LOOP 2 PUMP B (three) – op</li> </ul> </p>			
<p>(L4:O)            cb AC1  <ul style="list-style-type: none"> <li>• ΦA BLR HYD BYP 1B – op</li> <li>• ΦB HYD QTY 1 – op</li> <li>• ΦC BLR HYD BYP 3A – op</li> </ul> </p>	<p>Hyd Rsvr 1 Qty Snsr</p>		
<p>(L4:P)            cb AC1  <ul style="list-style-type: none"> <li>• ΦA RAD CNTLR 1B – op</li> <li>• ΦB RAD CNTLR 2B – op</li> </ul> </p>	<p>15 Freon Loop 1 Cntr B Rad Byp Vlv Mtr            Freon Loop 2 Cntr B Rad Byp Vlv Mtr</p>		
<p>(L4:Q)            cb AC1  <ul style="list-style-type: none"> <li>• ΦA LTG PNL L/CTR – op</li> <li>• ΦB LTG PNL L OVHD – op</li> <li>• ΦC LTG INST OS – op</li> </ul> </p>	<p>Pnl Its L/Ctr            Pnl Its L/OH (pnls O5,O6,O7, O13,O14,O15)            Orbit Sta Instr Its</p>		
<p>(Continued)</p>	<p>(Continued)</p>		



**EPS SSR-110 (Cont)**  
**BUS LOSS: AC1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL,            PERFORM</p>			
<p>(L4:R)            cb AC1            • ΦA LG INST R – op            • ΦB NUMERIC FWD – op</p>	<p>Inst Its R            Numeric Its (pnls O3,F7)            16 (RCS/OMS Prplt Qty,            Gauge, Mission and Event            Timers)</p>		<p>⑫ Redundant mtr            remains            ⑮ √MCC for total            OMS Qtys. Aft Qtys            are found on            GNC SYS SUMM 2</p>
	<p>LH Vents 5,6 Mtrs 1            Stbd Rad 1 Lat 1-6,7-12            Mtrs 1            Stbd Rad Dpy/Sto Mtr 1</p>		
	<p>12 ET Door Mtrs:            C/L Lat Actr 1,2 Mtr 1            L Dr Closure Mtr 1            Uplock Lat Mtr 1</p>		

**EPS SSR-111**  
**BUS LOSS: AC1 ΦA**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> <li>• √HUM SEP A – OFF</li> <li style="padding-left: 20px;">• √B – ON</li> <li>• √IMU FAN A – OFF</li> <li style="padding-left: 20px;">• √B(C) – ON</li> <li>• H2O PUMP LOOP 1 (two) – ON, B</li> <li>• H2O LOOP 1 BYP MODE – AUTO</li> <li>• H2O PUMP LOOP 2 – OFF</li> <li>• √FREON PUMP LOOP 1 – B</li> <li>• √FREON PUMP LOOP 2 – A</li> <li>• √AV BAY 1 FAN A – OFF</li> <li style="padding-left: 20px;">• √B – ON</li> <li style="padding-left: 40px;">• 3 FAN A – ON</li> <li style="padding-left: 20px;">• B – OFF</li> </ul>	<p>1Φ of Hum Sep A</p> <p>1Φ of IMU Fan A</p> <p>1 H2O Loop 2 Byp Cntrl, Sig Condr, Byp Vlv pwr</p> <p>1Φ of H2O Loop 2 Pump GPC Cntrl pwr</p> <p>1Φ of H2O Loop 1 Pump A Freon Loop 1 Pump A 2 Pump B</p> <p>1Φ of AV Bay 1 Fan A</p> <p>1Φ of AV Bay 3 Fan B</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7) C/W AC VOLT It – on C/W H2O LOOP It – on SM ALERT Light/Tone – on</p> <p>(F9) AC1 ΦA AC volts &lt; 90</p> <p>(LIGHTS LOST) Instr Its R (pnls C2,F8,F9) Pnl Its L/Ctr (pnls L1,L2,L4,C2,C3,F2,F6,F7)</p> <p>(FSMs) S67 AC VOLTS 1 S69 FC H2 PUMP 1 S86 WSB T SM0 THRM HYD (B) S88 H2O PUMP P 2 S88 H2O LOOP 2 QTY S88 H2O LOOP 2 TEMP</p>	<p>① H2O Loop 2 Byp Vlv holds position and H2O Loop 2 Pump Out Press, Pump ΔP Accum Qty, Pump Out Temp snrs lost</p> <p>② Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, and Cabin HX In Temp respectively</p> <p>③ If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</p>
<p>(MO13Q) If Arlk/Tnl Fan active:</p> <ul style="list-style-type: none"> <li>• ARLK FAN A – OFF</li> <li>• B – ON</li> </ul>	<p>1Φ of Arlk/Tnl Fan A</p>	<p>(O1) H2O PUMP OUT PRESS LOOP 2 ind – 0 psia</p>	<p>④ Lose Auto Temp Cntl via Cntrl 2 and H2O Loop 2 Cabin Hx In Temp snsr. Hx Byp vlv holds position</p>
<p>(R2) • BLR CNTLR/HTR 1 – A</p>	<p>Hyd H2O Blr 1 Cntrl B</p>	<p>If H2O PUMP LOOP 1, A active: 'S88 H2O PUMP P 1'</p>	<p>⑤ Inhibits Primary C/W for AC1 voltage and H2O Loop 2 Pump P</p>
<p>2 <b>SM 60 SM TABLE MAINT</b></p> <ul style="list-style-type: none"> <li>• Inhibits 0612705, 0612700, 0612740, 0612710, 0612665</li> <li>• Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value +0.3 volts</li> </ul>	<p>1Φ of FC1 H2 Pump</p> <p>1Φ of FC1 Coolant Pump</p>	<p>3 (O1) H2O PUMP OUT PRESS LOOP 1 ind – 40-45 psia</p>	<p>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 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, Seps are unusable for urine collection or EMU drain</p>
<p>If CAB TEMP CNTLR 2 active:</p> <p>(L1)</p> <ul style="list-style-type: none"> <li>• CAB TEMP CNTLR – OFF</li> </ul>	<p>4 Cabin Temp Cntrl 2, Hx Byp Vlv Mtr 2</p>	<p>If IMU FAN A ON: 'S66 IMU FN SPD A' 'S66 IMU FAN DP'</p> <p>If HUM SEP A ON: 'S66 HUMID SEP A'</p>	<p>If APUs active, and using BLR CNTLR/HTR 1B: C/W APU TEMP It – on after ~2 min</p>
<p>(MD44F)</p> <ul style="list-style-type: none"> <li>• Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR</li> </ul>			
<p>(L1)</p> <ul style="list-style-type: none"> <li>• CAB TEMP CNTLR – 1</li> </ul>			
<p>5 (R13U)</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 033,115</li> <li>• C/W PARAM – INH</li> <li>• MEM – CLEAR</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>			
<p>(R1)</p> <ul style="list-style-type: none"> <li>• AC1 BUS SNSR – OFF (1 sec)</li> <li>• AC1 BUS SNSR – AUTO TRIP</li> </ul>			
<p>(WCS)</p> <ul style="list-style-type: none"> <li>• √MODE – AUTO</li> <li>• √CRADLE – AUTO</li> <li>• √Hose stowed in cradle</li> <li>• √WCS ON It – OFF</li> <li>• FAN SEP SEL sw – OFF</li> <li>• HOSE BLOCK – SEP 2</li> <li>• In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete.</li> <li>• FAN SEP SEL sw – 2</li> </ul>	<p>6 1Φ of WCS Fan/Sep 1</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-111 (Cont)**  
**BUS LOSS: AC1  $\Phi$ A**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(EDO WCS) • URINAL SEL – SEP 2 • URINE DIVERTER VLV – FAN SEP 2	6 Urine Sep 1 Fan 1 1 $\Phi$ of Commode Fan 1	(MO51F) CO2 RMVL SYS CNTLR 1 FAIL It – on Impending: 'S66 CO2 RL SYS PCO2' 'S66 CAB PPCO2'	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 $\Phi$ down; however, crew actions will pwr fans through alternate pwr source, with full 3 $\Phi$ pwr. For WCS, 2 $\Phi$ ops will result in degraded airflow. Urine Fan, Seps are unusable for urine collection or EMU drain  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 $\Phi$ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases  ⑪ Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains
8 If bus shorted: • Open all AC1 $\Phi$ A cbs that pwr 3 $\Phi$ loads on pnls L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs) • Open all AC1 3 $\Phi$ ganged cbs on pnls L4: B (1 cb), MA73C: C,D,F (5 cbs)	7 1 $\Phi$ of AC Utility Power Outlets at F1 and MO52J  8 AC1 FMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr AMC1 Bus pwr		
(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)	9 CO2 Rmvl Sys Cntrl 1 1 $\Phi$ of CO2 Rmvl Sys: Fan AC1 pwr Compressor AC1 pwr		
10 If bus not shorted: • Perform the following BUS ISOLATION steps			
10 <b>BUS ISOLATION</b>			
IF BUS NOT SHORTED, PERFORM			
(L4:K) • cb AC1 $\Phi$ A H2O CNTLR 2 – op			
(L4:L) • cb AC1 $\Phi$ A CAB T CNTLR 2 – op			
(L4:O) • cb AC1 $\Phi$ A BLR HYD BYP 1B – op			
(L4:P) • cb AC1 $\Phi$ A RAD CNTLR 1B – op	11 Freon Loop 1 Cntrl B Rad Byp Vlv Mtr		
(L4:Q) • cb AC1 $\Phi$ A LTG PNL L/CTR – op	Pnl Its L/Ctr (pnls L1,L2,L4, C2,C3,F2,F6,F7)		
(L4:R) • cb AC1 $\Phi$ A INST R – op	Instr Its R (pnls C2,F8,F9)		
(MA73C:F) • cb AC1 RMS PRI $\Phi$ A – op	RMS: 1 $\Phi$ of Port Mid MRL Mtr 1 Port Aft MRL Mtr 2 Stbd Fwd MRL Mtr 2 Stbd Aft MRL Mtr 1 D&C Primary Ltg Shldr Brace Release		
	FC1 pH Snsr		

**EPS SSR-112**  
**BUS LOSS: AC1 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> <li>•√HUM SEP A – OFF <ul style="list-style-type: none"> <li>• √B – ON</li> </ul> </li> <li>•√IMU FAN A – OFF <ul style="list-style-type: none"> <li>• √B(C) – ON</li> </ul> </li> <li>• H2O PUMP LOOP 2 – ON</li> <li>• H2O PUMP LOOP 1 (two) – GPC, B</li> <li>• AV BAY 2 FAN (two) – ON</li> <li>• FREON PUMP LOOP 1 – B</li> <li>• FREON PUMP LOOP 2 – A</li> <li>•√AV BAY 1 FAN A – OFF <ul style="list-style-type: none"> <li>• √B – ON</li> </ul> </li> <li>• 3 FAN A – ON</li> <li>• B – OFF</li> </ul>	<p>1Φ of Hum Sep A</p> <p>1Φ of IMU Fan A</p> <p>1Φ of H2O Loop 2 Pump GPC Cntrl pwr</p> <p>1 1Φ of H2O Loop 1 Pump A</p> <p>2 Av Bay 2 Sig Condr, Xdcrs (ECLS SC3)</p> <p>1Φ Freon Loop 1 Pump A 2 Pump B</p> <p>1Φ of AV Bay 1 Fan A</p> <p>1Φ of AV Bay 3 Fan B</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7) C/W AC VOLT It – on C/W AV BAY/CAB AIR It – on SM ALERT Light/Tone – on</p> <p>(F7) EVENT TIME ind blank</p> <p>(F9) AC1 ΦB volts &lt; 90</p> <p>(LIGHTS LOST) Pnl Its L/OH (pnls O5,O6, O7,O13,O14,O15) Numeric Its (pnls O3,F7)</p> <p>(FSMs) S67 AC VOLTS 1 S69 FC H2 PUMP 1 S86 HYD RSVR Q SM2 HYD QTY (B) S66 AV BAY 2 FAN S66 CAB PPCO2 S66 CABIN FAN S88 H2O LOOP 2 TEMP</p> <p>HYD/APU HYD QTY 1 – 0%</p> <p>(O1) AIR TEMP AV BAY 2 – 45 degF</p> <p>(O3) RCS/OMS PRPLT QTY Gage and MSN TIME ind blank</p> <p>1 If H2O PUMP LOOP 1,A active: H2O LOOP C/W It 'S88 H2O PUMP P 1' (O1) 1 H2O PUMP OUT PRESS LOOP 1 – 40-45 psia</p>	<p>① If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</p> <p>② Av Bay 2 Fan ΔP, Air Out Temp snrs lost</p> <p>③ Crew and gnd have lost PPCO2 Xdcr</p> <p>④ Use streamers (if flown) or monitor by feel during wake period</p> <p>⑤ CO2 partial Press and Cabin Fan ΔP snrs lost</p> <p>⑥ Inhibits Primary C/W for AC1 voltage and Cabin Fan ΔP</p> <p>⑦ 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, Seps are unusable for urine collection or EMU drain</p> <p>⑧ MCC will provide equipment reconfig info if reqd</p>
<p>(MO13Q) If Arlk/Tnl Fan active:</p> <ul style="list-style-type: none"> <li>• ARLK FAN A – OFF</li> <li>• B – ON</li> </ul> <p>3 • Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN During sleep periods:</p> <p>(L1)</p> <p>4 • CAB FAN (two) – ON</p>	<p>1Φ of Arlk/Tnl Fan A</p> <p>4 Cab Air Sig Cond 5 (ECLS SC6)</p>		
<p>(R13U)</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 033, 074</li> <li>• C/W PARAM – INH MEM – CLEAR</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>			
<p>(R1)</p> <ul style="list-style-type: none"> <li>• AC1 BUS SNSR – OFF (1 sec)</li> <li>• AC1 BUS SNSR – AUTO TRIP</li> </ul>			
<p>(WCS)</p> <ul style="list-style-type: none"> <li>•√MODE – AUTO</li> <li>•√CRADLE – AUTO</li> <li>•√Hose stowed in cradle</li> <li>•√WCS ON It – OFF</li> <li>• FAN SEP SEL sw – OFF</li> <li>• HOSE BLOCK – SEP 2</li> <li>• In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete.</li> <li>• FAN SEP SEL sw – 2</li> </ul>	<p>7 1Φ of WCS Fan/Sep 1</p>		
<p>(EDO WCS)</p> <ul style="list-style-type: none"> <li>• URINAL SEL – SEP 2</li> <li>• URINE DIVERTER VLV – FAN SEP 2</li> </ul>	<p>7 Urine Fan 1 Sep 1 1Φ of Commode Fan 1</p>		
<p>SM 60 SM TABLE MAINT</p> <ul style="list-style-type: none"> <li>• Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts</li> </ul>	<p>1Φ of FC1 H2 Pump</p> <p>1Φ of FC1 Coolant Pump</p>		
<p>(MO51F) If CO2 RMVL SYS flown and if CO2 RMVL SYS CNTLR 1 selected:</p> <ul style="list-style-type: none"> <li>• Perform CO2 REMOVAL SYSTEM CNTLR 1(2) CONFIG (ORB OPS, ECLS)</li> </ul>	<p>1Φ of CO2 Rmvl Sys: Fan AC1 pwr Compressor AC1 pwr</p>		
	<p>8 1Φ of AC Utility Power Outlets at F1 and MO52J</p>		
(Continued)	(Continued)		

**EPS SSR-112 (Cont)**  
**BUS LOSS: AC1 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>9 If bus shorted:</p> <ul style="list-style-type: none"> <li>Open all AC1 ΦB cbs that pwr 3Φ loads on pnls L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs)</li> <li>Open all AC1 3Φ ganged cbs on pnls L4:B (1 cb), MA73C: C,D,F (5 cbs)</li> </ul>	<p>9 AC1 FMC1 Bus pwr  MMC1 Bus pwr  MMC3 Bus pwr  AMC1 Bus pwr</p>		<p>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</p> <p>⑩ For unshorted bus, perform single Φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases</p> <p>⑪ Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains</p> <p>⑫ √MCC for total OMS Qty. Aft Qty are found on <b>GNC SYS SUMM 2</b></p>
<p>10 If bus not shorted:</p> <ul style="list-style-type: none"> <li>Perform the following BUS ISOLATION steps</li> </ul>			
<b>BUS ISOLATION</b>			
IF BUS NOT SHORTED, PERFORM			
	RMS: 1Φ of Port Mid MRL Mtr 1 Port Aft MRL Mtr 2 Stbd Fwd MRL Mtr 2 Stbd Aft MRL Mtr 1		
(L4:K) • cb AC1 ΦB CAB AIR S/C – op			
(L4:L) • cb AC1 ΦB AV BAY 2 S/C – op			
(L4:O) • cb AC1 ΦB HYD QTY 1 – op	Hyd Rsvr 1 Qty Snsr		
(L4:P) • cb AC1 ΦB RAD CNTLR 2B – op	11 Freon Loop 2 Cntrl B Rad Byp Vlv Mtr		
(L4:Q) • cb AC1 ΦB LTG PNL L OVHD – op	Pnl Its L/OH (pnls O5,O6,O7, O13,O14,O15)		
(L4:R) • cb AC1 ΦB NUMERIC FWD – op	12 Numeric Its (pnls O3,F7) (RCS/OMS Prplt Qty Gage, Mission, and Event Timers)		

**EPS SSR-113**  
**BUS LOSS: AC1 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R2) • BLR CNTLR/HTR 3 – B	Hyd H2O Blr 3 Cntrl A	MASTER ALARM Light/Tone – on	<p>① For unshorted bus, perform single Φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases</p>
(L1) • √HUM SEP A – OFF • √B – ON • √IMU FAN A – OFF • √B(C) – ON • H2O PUMP LOOP 2 – ON	1Φ of Hum Sep A 1 1Φ of IMU Fan A	(F7) C/W AC VOLT It – on SM ALERT Light/Tone – on	
• H2O PUMP LOOP 1 (two) – GPC, B • FREON PUMP LOOP 1 – B • 2 – A	2 1Φ of H2O Loop 2 Pump GPC Cntrl pwr 1Φ of H2O Loop 1 Pump A	(F9) AC1 ΦC AC volts < 90	<p>② If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</p>
• √AV BAY 1 FAN A – OFF • √B – ON • 3 FAN A – ON • B – OFF	1Φ Freon Loop 1 Pump A 2 Pump B 1Φ of AV Bay 1 Fan A 1Φ of AV Bay 3 Fan A	(LIGHTS LOST) Orbit Sta Instr Its (pnls A1,A2)	
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN A – OFF • B – ON	1Φ of Arlk/Tnl Fan A	(FSMs) S67 AC VOLTS 1 S69 FC H2 PUMP 1 S86 WSB T SM0 THRM HYD (B)	
		<b>HYD/APU</b> APU H2O QTY 3 – 0%	
(Continued)	(Continued)	(Continued)	

**EPS SSR-113 (Cont)**  
**BUS LOSS: AC1  $\Phi$ C**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R13U) • C/W PARAM SEL tw (three) – 033 (AC1 voltage) • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		2 If H2O PUMP LOOP 1, A active: C/W H2O LOOP It – on 'S88 H2O PUMP P 1' (O1) 2 H2O PUMP OUT PRESS LOOP 1 – 40-45 psia	② If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W 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 1 $\Phi$ down; however, crew actions will pwr fans through alternate pwr source with full 3 $\Phi$ pwr. For WCS, 2 $\Phi$ ops will result in degraded airflow. Urine Fan, Seps are unusable for urine collection or EMU drain
(R1) • AC1 BUS SNSR – OFF (1 sec) • AC1 BUS SNSR – AUTO TRIP		If APUs active and using H2O BLR CNTLR/HTR 3A: C/W APU TEMP It – on after ~2 min	
(WCS) • $\sqrt$ MODE – AUTO • $\sqrt$ CRADLE – AUTO • $\sqrt$ Hose stowed in cradle • $\sqrt$ 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	3 1 $\Phi$ of WCS Fan/Sep 1		
(EDO WCS) • URINAL SEL – SEP 2 • URINE DIVERTER VLV – FAN SEP 2	Urine Sep 1 Fan 1 3 1 $\Phi$ of Commode Fan 1		
<b>SM 60 SM TABLE MAINT</b> • Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts	1 $\Phi$ of FC1 H2 Pump 1 $\Phi$ of FC1 Coolant Pump		
5 If bus shorted: • Open all AC1 $\Phi$ C cbs that pwr 3 $\Phi$ loads on pnls L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs) • Open all AC1 3 $\Phi$ ganged cbs on pnls L4:B (1 cb), MA73C: C,D,F (5 cbs)	4 1 $\Phi$ of AC Utility Power Outlets at F1 and MO52J		
If bus not shorted: • Perform the following BUS ISOLATION steps	5 AC1 FMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr AMC1 Bus pwr		④ MCC will provide equipment reconfig info if reqd ⑤ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpowering sub-buses: SSR-114, SSR-115, SSR-116, SSR-117
(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, <u>ECLS</u> )	1 $\Phi$ of CO2 Rmvl Sys: Fan AC1 pwr Compressor AC1 pwr		⑥ For unshorted bus, perform single isolation steps to prevent powering single phase loads with coupled energy from remaining two phases
<b>BUS ISOLATION</b>			
IF BUS NOT SHORTED, PERFORM			
(L4:O) • cb AC1 $\Phi$ C BLR HYD BYP 3A – op			
(L4:Q) • cb AC1 $\Phi$ C LTG INST OS – op	Orbit Sta Instr Its (Pnls A1,A2)		
(Continued)	(Continued)		

**EPS SSR-113 (Cont)**  
**BUS LOSS: AC1 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(MA73C:F) • cb AC1 OPS INST HYD ACTR ΦC – op	Ops Hyd Actr Instr		
	RMS: 1Φ of Port Mid MRL Mtr 1 Port Aft MRL Mtr 2 Stbd Fwd MRL Mtr 2 Stbd Aft MRL Mtr 1		

**EPS SSR-114  
BUS LOSS: AC1 FMC1**

ACTION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		L ADP deploy time incr from 15 to 30 sec	① Redundant mtr remains
		-Y Star Trkr OP/CL time incr from 8 to 16 sec	
<b>BUS ISOLATION</b>			
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 1 L ADP Dpy Mtr 1 1 -Y Star Trkr Dr Sys 1 OP/CL capability		

**EPS SSR-115  
BUS LOSS: AC1 MMC1**

ACTION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE			
<b>BUS ISOLATION</b>			
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  RMS: 1 Port Mid MRL Mtr 1 2 Stbd Fwd MRL Mtr 2  ROEU 3 Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) 3 ODA mtr 1 latch/release	SM (BFS SM 63) PL BAY DOORS  During PLBD OP/CL, single mtr run time noted on actuators listed at left  During Rad Dpy/Sto ops: (R13L) RAD CNTL PORT tb (two) indicates single mtr ops	① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists  ② Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists  ③ Single mtr time

**EPS SSR-116  
BUS LOSS: AC1 MMC3**

ACTION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE			
<b>BUS ISOLATION</b>			
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  RMS: 1 Port Aft MRL Mtr 2 2 Stbd Aft MRL Mtr 1	SM (BFS SM 63) PL BAY DOORS  During PLBD OP/CL, single mtr run time noted on actuators listed at left  During Rad Dpy/Sto ops: (R13L) RAD CNTL STBD tb (two) indicates single mtr ops	① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists  ② Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists



**EPS SSR-117**  
**BUS LOSS: AC1 AMC1**

ACTION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	① Redundant mtrs remain
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:D) • cb MCA PWR AC1 3Φ AFT 1 – op	AC1 AMC1 Bus pwr LH Vent 8,9 Mtr 1		
	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)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC2 SHUTDN (FC SHUTDOWN Cue Card)	FC2 Pumps and pH Snsr	MASTER ALARM Light/Tone – on	①
(R1) • AC2 BUS SNSR – OFF		(F7) C/W FC PUMP It – on C/W AC VOLT It – on C/W FREON LOOP It – on SM ALERT Light/Tone – on C/W AV BAY/CABIN AIR It	* TIME * CRITICAL
(R2) • BLR CNTLR/HTR 1 – B 2 – A	Hyd H2O Blr 1 Cntrl A 2 Cntrl B	(F9) AC2 ΦA,ΦB,ΦC AC volts < 90	FC2 must be shut down within 9 min to avoid potentially hazardous condition
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl		(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) Orbit Sta Numeric (pnls A2,A4)	② Av Bay 3 Fan ΔP, Air Out Temp sntrs lost
(L1) • HUM SEP B – OFF A – ON • CAB FAN B – OFF A – ON • IMU FAN B – OFF A(C) – ON • H2O PUMP LOOP 1 (two) – GPC, A • H2O PUMP LOOP 2 – ON • AV BAY 1 FAN B – OFF A – ON 2 FAN A – OFF B – ON • AV BAY 3 FAN (two) – ON 3 • FREON PUMP LOOP 1,2 (two) – A	Humidity Sep B Cabin Fan B IMU Fan B H2O Loop 1 Pump B Av Bay 1 Fan B Av Bay 2 Fan A 2 Av Bay 3 Sig Condr, Xdcrcs (ECLS SC4) Freon Loop 1 Pump B	(FSMs) S67 AC VOLTS 2 S86 HYD RSVR Q SM2 HYD QTY (B) S86 WSB T SM0 THRM HYD (B) S66 AV BAY 1,2,3 FAN S69 FC PUMP 2 S69 FC H2 PUMP 2 S88 FREON FLOW 1 S88 FRN AFT CP 1 S88 FRN PL HX 1 S88 FREON QTY 2 S88 FREON FLOW 2 S88 H2O LOOP 1 TEMP S66 IMU FN SPD B S66 IMU FAN DP	③ Freon Loop 2 pump switched to avoid having both loops powered by AC 1
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN B – OFF √A – ON	Arlk/Tnl Fan B	(F6,F8) 7 LDG GEAR L,NOSE tb – bp	④ Brake/Skid Cntl Box A,B enabled before WOW
(L4:P) • cb AC3 ΦA LG SNSR 1 – cl	4 Prox Snsr Elec Box 2	HYD/APU	⑤ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty sntrs lost
(O17:C) • SIG CONDR FREON A – AC3 • SIG CONDR FREON B – AC3	5 Freon Sig Condr A AC2 pwr (ECLS SC1A) 6 Freon Sig Condr B AC2 pwr (ECLS SC1B)	8 APU H2O QTY 1 ind – 0% APU H2O QTY 2 ind – 0% HYD QTY 2 ind – 0%	⑥ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty sntrs lost
(CDR SEAT PNL) • CDR SEAT PWR BUS SEL – AC3 (dn)	CDR Seat Adj via AC2 pwr		⑦ When gear deployed, tb will not indicate DN
(Continued)	(Continued)	(Continued)	⑧ APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A active. APU H2O QTY 2 ind – 0% if BLR CNTLR/HTR 2B active

# EPS SSR-120 (Cont)

## BUS LOSS: AC2

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(PLT SEAT PNL) • PLT SEAT PWR BUS SEL – AC3 (dn)  (R13U) • C/W PARAM SEL tw (three) – 072,102 • C/W PARAM – INH MEM – CLEAR 9 • C/W PARAM SEL tw (three) – > 119	PLT Seat Adj via AC2 pwr	(R1) FC2 COOL PUMP ΔP tb – bp  (O1) AIR TEMP AV BAY 3 – 45 degF FREON FLOW LOOP 2 – 578 pph AIR TEMP CAB HX OUT – 45 degF	⑨ Inhibits Primary C/W for FC2 Stack Temp, and Pump ΔP ⑩ Inhibit Loop 1 Cabin HX In Temp ⑪ Lose Auto Temp Cntl via Cntrl 1 and Cabin Temp, Cabin Hx Air Out Temp and H2O Loop 1 Cabin Hx In Temp snrsr. Hx Byp Vlv holds position
10 <b>SM 60 SM TABLE MAINT</b> • Inhibit 0612663		(A4) Mission and Event Timers blank	
(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	WCS Fan/Sep 2	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 It – on after ~2 min  If H2O Loop 1 Pump B active: H2O LOOP C/W It 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' 'S88 H2O PUMP P1'	⑫ Redundant mtr remains
(EDO WCS) • URINAL SEL – SEP 1 • URINE DIVERTER VLV – FAN SEP 1	Urine Sep 2 Fan 2 Commode Fan 2	(O1) H2O PUMP OUT PRESS LOOP 1 – 20-25 psia	
If CAB TEMP CNTLR 1 active: (L1) • CAB TEMP CNTLR – OFF	11 Cabin Temp Cntrl 1 and Hx Byp Vlv Mtr 1	L,R ADP deploy times incr from 15 to 30 sec	
(MD44F) • Remove pin from PRI ACTUATOR and BYP Vlv linkage, connect linkage to SEC ACTUATOR		<b>SM (BFS SM 63) PL BAY DOORS</b>  During PLBD OP/CL, single mtr run time noted on actuators listed at left	
(L1) • CAB TEMP CNTLR – 2		(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL tbs (two) indicate single mtr ops	
Refer to OMS/RCS Slide Rule for vlv loss info (use FPC2 Slide for Aft RCS and FMC2 for Fwd RCS)			
<b>BUS ISOLATION</b>			
<b>ONLY ON MCC CALL, PERFORM</b>			
(MA73C:C) cb MCA PWR • AC2 3Φ FWD 2 – op  • AC2 3Φ MID 1 – op  • AC2 3Φ MID 2 – op	12 AC2 FMC2 Bus pwr 12 L,R Vents 1,2 Mtrs 2 12 ADP Deploy Mtrs 2 12 -Y Star Trkr Dr Sys 2 OP/CL capability 12 -Z Star Trkr Dr Sys 1 OP/CL capability AC2 MNC1 Bus pwr LH Vent 5 Mtr 2 AC2 MMC2 Bus pwr PLBD C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Mtr 2 Port Door Mtr 2 Stbd Rad Lat 1-6 Mtr 2 LH Vent 3 Mtr 2		
(Continued)	(Continued)		

**EPS SSR-120 (Cont)**  
**BUS LOSS: AC2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
(MA73C:D) cb MCA PWR • AC2 3Φ AFT 2 – op  • AC2 3Φ MID 3 – op  • AC2 3Φ MID 4 – op	13 Ku Ant Sto/Dpy Mtr 2 AC2 AMC2 Bus pwr LH,RH Vents 8,9 Mtr 2 AC2 MMC3 Bus pwr PL Reten Sys B Rel/Lat Mtrs AC2 MMC4 Bus pwr PLBD Port,Stbd Fwd Blkhd Mtrs 2 PLBD Stbd Door Mtr 2 Port Rad Lat 1-6 Mtr 2 RH Vent 6 Mtr 2		⑬ √MCC for Ku Ant stow reqmts ⑭ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison ⑮ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
(MA73C:E) • cb AC2 WCS FAN SEP 2 (three) – op • cb AC2 PAYLOAD 3Φ – op	AC2 pwr to MS,PS Patch pnl		⑯ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(MA73C:F) cb AC2 • RMS B/U ΦA – op • OPS INST HYD ACTR ΦC – op	RMS: 14 Port MPM Mtr 2 14 Stbd MPM Mtr 1 15 Port Fwd MRL Mtr 1 15 Port Mid MRL Mtr 2 16 Stbd Mid MRL Mtr 1 16 Stbd Aft MRL Mtr 2 D&C B/U edge Itg Ops Hyd Actr Inst		
(MA73C:G) IF DOCKING MISSION • cb AC2 ARLK/TNL FAN B (three) – op	Ark/Tnl Fan B		
(MA73C:H,I) cb AC2 • FWD RCS VLV (three) – op • AFT POD VLV GP 2 (three) – op			
(L4:C-E) cb AC2 • FC2 PUMPS (three) – op • CTR ENG (three) – op • L ENG (three) – op			
(L4:F-I) cb AC2 • H2O LOOP PUMP 1B (three) – op • AV BAY 1 FAN B (three) – op • AV BAY 2 FAN A (three) – op • IMU FAN B (three) – op			
(L4:J-K) cb AC2 • HUM SEP B (three) – op • CAB FAN B (three) – op			
(L4:L) cb AC2 • ΦA CAB T CNTLR 1 – op • ΦB AV BAY 3 S/C – op			
(L4:M) cb AC2 • FREON LOOP 1 PUMP B (three) – op			
(Continued)	(Continued)		

**EPS SSR-120 (Cont)**  
**BUS LOSS: AC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(L4:N) cb AC2 • ΦA FREON FLOW PROP 1 – op • ΦB FREON SIG CONDR – op</p>	<p>17 Freon Loop 1 Flow Prop Vlv</p>		<p>⑫ Redundant mtr remains ⑬ Flow prop vlv holds position ⑭ Motor B remains</p>
<p>• cb AC2 ΦC RAD ISOL A – op</p>	<p>18 Freon Loop 1,2 Rad Isol Motor A</p>		<p>⑮ Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains</p>
<p>(L4:O) cb AC2 • ΦA BLR HYD BYP 1A – op • ΦB HYD QTY 2 – op • ΦC BLR HYD BYP 2B – op</p>	<p>Hyd Rsvr 2 Qty Snsr</p>		<p>⑯ √MCC for Reconfig</p>
<p>(L4:P) cb AC2 • ΦA LG SNSR 2 – op • ΦB RAD CNTLR 1A – op</p>	<p>19 Freon Loop 1 Cntr A Rad Byp Vlv Mtr</p>		
<p>(L4:Q) cb AC2 • ΦA LTG PNL R OVHD – op • ΦB LTG PNL R – op • ΦC LTG NUMERIC OS – op</p>	<p>R Ovhd Pnl Its R Pnl Its OS Numeric Its</p>		
<p>(L4:R) • cb AC2 ΦB LTG INST OVHD – op</p>	<p>Ovhd Inst Its</p>		
	<p>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</p>		
	<p>NLG, LMG B/U Rel 2 Fire 2, Arm</p>		
	<p>20 DTV Vertical Interval Processor (VIP)</p>		

**EPS SSR-121**  
**BUS LOSS: AC2 ΦA**

ACTIONS
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl
(L1) • HUM SEP A – ON • B – OFF • IMU FAN A(C) – ON • B – OFF • H2O PUMP LOOP 1 (two) – GPC,A • H2O PUMP LOOP 2 – ON 2 • FREON PUMP LOOP 1,2 (two) – A • AV BAY 1 FAN A – ON • B – OFF • 2 FAN A – OFF • B – ON
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN B – OFF • √A – ON
(L4:P) • 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 Cntrl 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
(Continued)

EQUIP/FUNCTION LOST
1Φ of Hum Sep B
1Φ of IMU Fan B
1 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 Arlk/Tnl Fan B
1Φ of Cabin Fan B
5 Prox Snsr Elec Box 2
Hyd H2O Blr 1 Cntrl A
6 1Φ of WCS Fan/Sep 2
Urine Sep 2 Fan 2
6 1Φ of Commode Fan 2
7 Cabin Temp Cntrl 1, Hx Byp Vlv Mtr 1
(Continued)

CREW INDICATIONS
MASTER ALARM Light/Tone – on
(F7) C/W AC VOLT It – on SM ALERT Light/Tone – on
(F9) AC2 ΦA AC volts < 90
(LIGHTS LOST) R Ovhd pnl lts (pnls O1,O2, O3,O8,O9,O16,O17)
(F6/F8) 3 LDG GEAR L,NOSE tb – bp
[HYD/APU]
4 APU H2O QTY 1 ind – 0%
(FSMs) S67 AC VOLTS 2 S69 FC H2 PUMP 2 S86 WSB T SM0 THRM HYD (B)
S66 IMU FAN DP S66 IMU FN SPD B S88 H2O LOOP 1 TEMP
(O1) AIR TEMP CAB HX OUT ind – 45 degF
1 If H2O PUMP LOOP 1,B active: C/W H2O LOOP It – on 'S88 H2O PUMP P 1'
(O1) 1 H2O PUMP OUT PRESS LOOP 1 ind – 40-45 psia
If IMU FAN B ON: 'S66 IMU FAN DP' 'S66 IMU FN SPD B'
If HUM SEP B ON: 'S66 HUMID SEP B'
If APUs active and using BLR CNTLR/HTR 1A: C/W APU TEMP It – on after ~2 min
(Continued)

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 APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A active
⑤ Brake/Skid Cntl Box A,B enabled before WOW
⑥ For EDO WCS, Urine Fans and Seeps 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, Seeps are unusable for urine collection or EMU drain
⑦ Lose Auto Temp Cntl via Cntrl 1 and Cabin Temp, Cabin Hx A Out Temp and H2O Loop 1 Cabin Hx In Temp snsrs Hx Byp Vlv hold position

**EPS SSR-121 (Cont)**  
**BUS LOSS: AC2 ΦA**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R13U) • C/W PARAM SEL tw (three) – 043 (AC2 voltage) • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119			⑧ Inhibit Loop 1 Cabin HX In Temp
(R1) • AC2 BUS SNSR – OFF (1 sec) • AC2 BUS SNSR – AUTO TRIP			⑨ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from two phases into short
SM 60 SM TABLE MAINT • Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts 8 • Inhibit 0612663	1Φ of FC2 H2 Pump 1Φ of FC2 Coolant Pump		⑩ 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 unprwring sub-buses: SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129
10 If bus shorted: • 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) • Open all AC2 3Φ ganged cbs on pnl MA73C: C-G (9 cbs)	9 If bus shorted: AC2 payload 3Φ Bus pwr (pwrs MS, PS Patch panel) 10 AC2 FMC2 Bus pwr MMC1 Bus pwr MMC2 Bus pwr MMC3 Bus pwr MMC4 Bus pwr AMC2 Bus pwr		⑪ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases
11 If bus not shorted: • Perform the following BUS ISOLATION steps			⑫ √MCC for Reconfig
	12 DTV Vertical Interval Processor (VIP)		⑬ Flow prop vlv holds position
11 <b>BUS ISOLATION</b>			
IF BUS <u>NOT</u> SHORTED, PERFORM			
(L4:L) • cb AC2 ΦA CAB T CNTLR 1 – op			
(L4:N) • cb AC2 ΦA FREON FLOW PROP 1 – op	13 Freon Loop 1 Flow Prop Vlv		
(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 OVHD – op	R Ovhd pnl lts (pnls O1,O2, O3,O8,O9,O16,O17)		
(MA73C:F) • cb AC2 RMS B/U ΦA – op	RMS: 1Φ of Port MPM Mtr 2 Stbd MPM Mtr 1 Port Fwd MRL Mtr 1 Port Mid MRL Mtr 2 Stbd Mid MRL Mtr 1 Stbd Aft MRL Mtr 2 D&C B/U edge Itg		
	NLG, LMG B/U Rel 2 Fire 2, Arm		
	FC2 pH Snsr		

**EPS SSR-122**  
**BUS LOSS: AC2 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl		MASTER ALARM Light/Tone – on	① If H2O Loop 1 Pump B active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W
3 (L1) • HUM SEP A – ON • B – OFF • IMU FAN A(C) – ON • B – OFF • H2O PUMP LOOP 1 (two) – GPC,A • H2O PUMP LOOP 2 – ON • AV BAY 3 FAN (two) – ON • FREON PUMP LOOP 1,2 (two) – A • AV BAY 1 FAN A – ON • B – OFF • 2 FAN A – OFF • B – ON	1Φ of Hum Sep B  1Φ of IMU Fan B  1 1Φ of H2O Loop 1 Pump B  2 AV Bay 3 Sig Condr,Xdcrs (ECLS SC4)  1Φ of Freon Loop 1 Pump B AV Bay 1 Fan B  1Φ of AV Bay 2 Fan A	(F7) C/W AC VOLT It C/W FREON LOOP It SM ALERT Light/Tone  (F9) AC2 ΦB AC volts < 90  (LIGHTS LOST) Ovhd Instr (pnls O1,O2,O3) R pnl (pnls F4,F8,F9,R1, R2,R4)  (FSMs) S67 AC VOLTS 2 S69 FC H2 PUMP 2 S86 HYD RSVR Q SM2 HYD QTY (B) S66 AV BAY 3 TEMP S66 AV BAY 3 FAN S88 FREON FLOW 2 S88 FRN PL HX 1 S88 FREON QTY 2	② Av Bay 3 Fan ΔP, Air Out Temp snrs lost  ③ Freon Loop 2 pump switched to avoid having both Freon loops powered by AC1  ④ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrs lost
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN B – OFF • √A – ON	1Φ of Arlk/Tnl Fan B	(A4) Mission and Event Timers blank	⑤ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
(O17:C) • SIG CONDR FREON A – AC3 • SIG CONDR FREON B – AC3	4 Freon Sig Condr A AC2 pwr (ECLS SC1A) 5 Freon Sig Condr B AC2 pwr (ECLS SC1B)	[HYD/APU] HYD QTY 2 – 0%	⑥ 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
(R13U) • C/W PARAM SEL tw (three) – 043 (AC2 voltage) • C/W PARAM – INH • MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		1 (O1) AIR TEMP AV BAY 3 – 45 degF FREON FLOW LOOP 2 – 578 pph  1 If H2O Loop 1 Pump active: C/W H2O LOOP It 'S88 H2O PUMP P1'	
(R1) • AC2 BUS SNSR – OFF (1 sec) • AC2 BUS SNSR – AUTO TRIP		1 (O1) H2O PUMP OUT PRESS LOOP 1 – 40-45 psia	
[SM 60 SM TABLE MAINT] • Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts	1Φ of FC2 H2 Pump 1Φ of FC2 Coolant Pump		
(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	6 1Φ of WCS Fan/Sep 2		
(Continued)	(Continued)		

**EPS SSR-122 (Cont)**  
**BUS LOSS: AC2 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(EDO WCS) • URINAL SEL – SEP 1 • URINE DIVERTER VLV – FAN SEP 1	6 Urine Sep 2 Fan 2 1Φ of Commode Fan 2		
7 If bus shorted: • Open all AC2 ΦB cbs that pwr 3Φ loads on pnl L4: C-K,M (10 cbs), pnl MA73C: E,G,H,I (4 cbs) • Open all AC2 3Φ ganged cbs on pnl MA73C: C-G (9 cbs)	8 If bus shorted: AC2 payload 3Φ Bus pwr (pwrs MS, PS Patch panel)  7 AC2 FMC2 Bus pwr MMC1 Bus pwr MMC2 Bus pwr MMC3 Bus pwr MMC4 Bus pwr AMC2 Bus pwr		
9 If bus not shorted: • Perform the following BUS ISOLATION steps			
9 <b>BUS ISOLATION</b>			
IF BUS NOT SHORTED, PERFORM			
(L4:L) • cb AC2 ΦB AV BAY 3 S/C – OP			
(L4:N) • cb AC2 ΦB FREON SIG CONDR – op			
(L4:O) • cb AC2 ΦB HYD QTY 2 – op	Hyd Rdvr 2 Qty Snsr		
(L4:P) • cb AC2 ΦB RAD CNTLR 1A – op	10 Freon Loop 1 Cntrl A Rad Byp Vlv Mtr		
(L4:Q) • cb AC2 ΦB LTG PNL R – op	H2O Ln pH Snsr  R pnl Itg (pnls F4,F8,F9,R1,R2,R4)		
(L4:R) • cb AC2 ΦB INST OVHD – op	Ovhd Instr Itg (pnls O1,O2,O3)		
	RMS: 1Φ of Port MPM Mtr 2 Stbd MPM Mtr 1 Port Fwd MRL Mtr 1 Port Mid MRL Mtr 2 Stbd Mid MRL Mtr 1 Stbd Aft MRL Mtr 2		
	1Φ of AC2 payload  3Φ Bus pwr (pwrs MS, PS Patch pnl)		
			⑥ 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  ⑦ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses: SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129  ⑧ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short  ⑨ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases  ⑩ Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains



**EPS SSR-123**  
**BUS LOSS: AC2 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl		MASTER ALARM Light/Tone – on	① If H2O Loop 1 Pump B active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W
2 (L1) • HUM SEP A – ON • B – OFF • IMU FAN A(C) – ON • B – OFF • H2O PUMP LOOP 1 (two) – GPC,A • H2O PUMP LOOP 2 – ON • FREON PUMP LOOP 1,2 (two) – A • AV BAY 1 FAN A – ON • B – OFF • 2 FAN A – OFF • B – ON	1Φ of Hum Sep B  1Φ of IMU Fan B  1 1Φ of H2O Loop 1 Pump B  1Φ of Freon Loop 1 Pump B AV Bay 1 Fan B  1Φ of AV Bay 2 Fan A	(F7) C/W AC VOLT It SM ALERT Light/Tone	
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN B – OFF • √A – ON	1Φ of Arlk/Tnl Fan B	(LIGHTS LOST) Orbit Sta Numeric (pnls A2,A4)	② Freon Loop 2 pump switched to avoid having both loops powered by AC1
(R2) • BLR CNTRL/HTR 2 – A	1Φ of Cabin Fan B  HYD H2O Blr 2 Cntrl B	1 (FSM) S67 AC VOLTS 2 S69 FC H2 PUMP 2 S86 WSB T SM0 THRM HYD (B)	
(R13U) • C/W PARAM SEL tw (three) – 043 (AC2 voltage) • C/W PARAM – INH • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		1 If H2O Loop 1 Pump B active: C/W H2O LOOP It 'S88 H2O PUMP P 1'	③ APU H2O QTY 2 ind – 0% if in BLR CNTRLR/HTR 2B
(R1) • AC2 BUS SNSR – OFF (1 sec) • AC2 BUS SNSR – AUTO TRIP		(O1) H2O PUMP OUT PRESS LOOP 1 = 40-45 psia	④ 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
SM 60 SM TABLE MAINT • Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts	1Φ of FC2 H2 Pump 1Φ of FC2 Coolant Pump	HYD/APU If APUs active and using H2O BLR CNTRLR 2B: C/W APU TEMP It after ~2 min 3 APU H2O QTY 2 ind – 0%	
(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	4 1Φ of WCS Fan/Sep 2		
(EDO WCS) • URINAL SEL – SEP 1 • URINE DIVERTER VLV – FAN SEP 1	4 Urine Sep 2 Fan 2 1Φ of Commode Fan 2		
(Continued)	(Continued)		

**EPS SSR-123 (Cont)**  
**BUS LOSS: AC2 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>5 If bus shorted:</p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• Open all AC2 3Φ ganged cbs on pnl MA73C: C-G (9 cbs)</li> </ul>	<p>6 If bus shorted: AC2 payload 3Φ Bus pwr (pwrs MS, PS Patch panel)</p> <p>5 AC2 FMC2 Bus pwr MMC1 Bus pwr MMC2 Bus pwr MMC3 Bus pwr MMC4 Bus pwr AMC2 Bus pwr</p>		<p>⑤ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses: SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129</p>
<p>7 If bus not shorted:</p> <ul style="list-style-type: none"> <li>• Perform the following BUS ISOLATION steps</li> </ul>			
<p>7 <b>BUS ISOLATION</b></p> <p>IF BUS <u>NOT</u> SHORTED, PERFORM</p> <p>(L4:N) • cb AC2 ΦC RAD ISOL A – op</p> <p>----- (L4:O) • cb AC2 ΦC BLR HYD BYP 2B – op</p> <p>----- (L4:Q) • cb AC2 ΦC LTG NUMERIC OS – op</p> <p>(MA73C:F) • cb AC2 OPS INST HYD ACTR ΦC – op</p>	<p>8 Freon Loop 1,2 Rad Isol Motor A</p> <p>-----</p> <p>Orbit Sta Numeric Ltg (pnls A2,A4)</p> <p>-----</p> <p>Ops Hyd Act Inst</p>		<p>⑥ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short</p> <p>⑦ For unshorted bus, perform single isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases</p>
	<p>RMS: 1Φ of Port MPM Mtr 2 Stbd MPM Mtr 1 Port Fwd MRL Mtr 1 Port Mid MRL Mtr 2 Stbd Mid MRL Mtr 1 Stbd Aft MRL Mtr 2</p> <p>1Φ of AC2 payload 3Φ Bus pwr (pwrs MS, PS Patch pnl)</p>		<p>⑧ Motor B remains</p>

**EPS SSR-124**  
**BUS LOSS: AC2 FMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		L,R ADP deploy times incr from 15 to 30 sec	① Redundant mtr remains
		-Y,-Z Star Trkr OP/CL time incr from 8 to 16 sec	
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:C) • cb MCA LOGIC MCA PWR AC2 3Φ FWD 2 – op	AC2 FMC2 Bus pwr 1 L,R Vents 1,2 Mtrs 2 1 ADP Dpy Mtrs 2 1 -Y Star Trkr Dr Sys 2 OP/CL capability 1 -Z Star Trkr Dr Sys 1 OP/CL capability		

**EPS SSR-125**  
**BUS LOSS: AC2 MMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
<b>BUS ISOLATION</b>			
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**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	RMS: 1 Port MPM Mtr 2 1 Stbd MPM Mtr 1 2 Port Fwd MRL Mtr 1 3 Stbd Aft MRL Mtr 2	SM (BFS SM 63) PL BAY DOORS During PLBD OP/CL, single mtr run time noted on actuators listed at left	① Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
<b>BUS ISOLATION</b>		(R13) During Rad Dpy/Sto ops, RAD LAT CNTL STBD tb indicates single mtr ops	
ONLY ON MCC CALL, PERFORM			② Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
(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		
			③ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists

**EPS SSR-127**  
**BUS LOSS: AC2 MMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	① Single mtr time
<b>BUS ISOLATION</b>			
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 1 Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B) 1 ODA mtr 2 latch/release		

**EPS SSR-128**  
**BUS LOSS: AC2 MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		SM (BFS SM 63) PL BAY DOORS	① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
<b>BUS ISOLATION</b>		During PLBD OP/CL, single mtr run time noted on actuators listed at left	
ONLY ON MCC CALL, PERFORM		(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL PORT tb indicates single mtr ops	② Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(MA73C:D) • cb MCA LOGIC MCA PWR AC2 3Φ MID 4 – op	AC2 MMC4 Bus pwr PLBD Port,Stbd Fwd Bkhd Mtrs 2 PLBD Stbd Door Mtr 2 Port Rad Lat 1-6 Mtr 2 RH Vent 6 Mtr 2 RMS: 1 Port Mid MRL Mtr 2 2 Stbd Mid MRL Mtr 1 3 Ku Ant Sto/Dpy Mtr 2		③ √MCC for Ku Ant stow reqmts

**EPS SSR-129**  
**BUS LOSS: AC2 AMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	① Redundant mtrs remain
<b>BUS ISOLATION</b>			
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 1 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		

# EPS SSR-130

## BUS LOSS: AC3 (Includes all AC3 sub-buses)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC3 SHUTDN (FC SHUTDN Cue Card) then: (R1) • AC3 BUS SNSR – OFF (R2) • BLR CNTLR/HTR 2 – B • 3 – A (L1) • IMU FAN B(A) – ON • C – OFF  • Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS SSR-10  • CAB FAN A – OFF • 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 (L4:P) • cb AC2 ΦA LG SNSR 2 – cl (O17:C) • SIG CONDR FREON A – AC2 • SIG CONDR FREON B – AC2 (CDR SEAT PNL) • CDR SEAT PWR BUS SEL – AC2 (up) (PLT SEAT PNL) • SEAT PWR BUS SEL – AC2 (up) <b>SM 60 SM TABLE MAINT</b> 11 • Inhibit 0612605, 0612600, 0612640, 0612610 12 (R13U) • C/W PARAM SEL tw (three) – 082, 112, 105 • C/W PARAM – INH • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119  Refer to OMS/ RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS, and FMC3 for Fwd RCS)	FC3 Pumps and pH Snsr   Hyd H2O Blr 2 Cntr A 3 Cntr B  IMU Fan C H2O Loop 2 Pump man ON capability H2O Loop 1 Byp Cntr, Sig Condr 2 H2O Loop 1 Byp Vlv pwr Cabin Fan A 3 Av Bay 1 Sig Condr, Xdcrs (ECLS SC2) Av Bay 2 Fan B  Av Bay 3 Fan A  Freon Loop 2 Pump A  5 Prox Snsr Elec box 1 6 Freon Sig Condr A AC3 pwr (ECLS SC1A) 7 Freon Sig Condr B AC3 pwr (ECLS SC1B)  CDR Seat Adj via AC3 pwr  PLT Seat Adj via AC3 pwr   NLG, RMG B/U Rel 1 Fire 2, Arm	MASTER ALARM Light/Tone – on (F7) C/W FREON LOOP It – on C/W FC PUMP It – on C/W AC VOLT It – on C/W H2O LOOP It – on SM ALERT Light/Tone – on (F9) AC ΦA,ΦB,ΦC AC volts < 90 (LIGHTS LOST) Instr Its L/Ctr (pnls C2,F6, F7) MS pnl Its (pnls R10, R12) OS pnl Its (pnls A1,A2,A6, A7,A8,A13,L9) (FSMs) S67 AC VOLTS 3 S86 HYD RSVR Q 3 S86 WSB T (2) S66 AV BAY 1 FAN S66 CABIN FAN (2) S66 IMU FN SPD B S69 FC PUMP 3 S69 FC H2 PUMP 3 S88 FREON FLOW 1 S88 FREON QTY 1 S88 FRN PL HX 2 S88 H2O PUMP P1 S88 H2O PUMP P2 SM0 THRM HYD (B) SM2 HYD QTY (B) (R1) FC3 COOL PUMP ΔP tb – bp (F6,F8) 8 LDG GEAR NOSE, 9 R tb – bp <b>HYD/APU</b> HYD QTY 3 ind – 0% 10 APU H2O QTY ind – 0% (O1) H2O PUMP OUT PRESS LOOP 1 meter ind: 0 psia H2O PUMP OUT PRESS LOOP 2 ind: 20-25 psia If CABIN FAN A selected: C/W AV BAY/CAB AIR It – on 'S66 CABIN AIR'  If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It – on after ~2 min STAR TRKR DR POS -Z – OP/CL time incr from 8 to 16 sec (MO51F) CO2 RMVL SYS CNTLR 2 FAIL It – on Impending: 'S66 CO2 RL SYS PCO2' 'S66 CAB PPCO2'	① * TIME * * CRITICAL * FC3 must be shut down within 9 min to avoid potentially hazardous condition ② Vlv holds position ③ Av Bay 1 Fan ΔP, Air Out Temp sntrs lost ④ S86 WSB T 2 if in BLR/CNTLR 2A. S86 WSB T 3 if in BLR/CNTLR 3B ⑤ Brake/Skid Cntl Box A,B enabled before WOW ⑥ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty sntrs lost ⑦ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty sntrs lost ⑧ Indicates DN when NLG down ⑨ Will <u>not</u> indicate DN when RMG down ⑩ APU H2O QTY 2 if in BLR/CNTLR 2A. APU H2O QTY 3 if in BLR/CNTLR 3B ⑪ Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively ⑫ Inhibits Primary C/W for FC3 Stack Temp and Pump ΔP, H2O Loop 1,2 Pump P
(Continued)	(Continued)	(Continued)	

**EPS SSR-130 (Cont)**  
**BUS LOSS: AC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM		R ADP deploy time incr from 15 to 30 sec	
(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)	13 CO2 Rmvl Sys: Cntlr 2 Fan AC3 pwr Compressor AC3 pwr	SM (BFS SM 63) PL BAY DOORS	⑬ PEVs, Actuators, Bed A P, Bed B P, and Bed dP will be recovered after system reconfig
(MA73C:C) cb MCA LOGIC MCA PWR • AC3 3Φ FWD 3 – op  • AC3 3Φ MID 2 – op	14 KU ANT Sto/Dpy Mtr 1 AC3 FMC3 Bus pwr 15 R ADP Dpy Mtr 1 15 -Z Star Trkr Dr Sys 2 OP/CL capability LH Vents 1,2 Mtr 1 AC3 MMC2 Bus pwr PLBD C/L Lat 1-4 Mtr 2 5-8 Mtr 2 Port Aft Blkhd Mtr 2 Stbd Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2 LH Vent 6 Mtr 2 3 Mtr 1	During PLBD OP/CL, single mtr run time noted on actuators listed at left	⑭ √MCC for Ku Ant stow reqmts
(MA73C:D) cb MCA LOGIC MCA PWR • AC3 3Φ AFT 3 – op • MID 4 – op	AC3 AMC3 Bus pwr RH Vents 8,9 Mtr 1 AC3 MMC4 Bus pwr PLBD C/L Lat 9-12 Mtr 2 13-16 Mtr 1 Stbd Aft Blkhd Mtr 1 Port Door Mtr 1 Port Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2 RH Vents 3,5 Mtrs 2	During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops	⑮ Redundant mtrs remain
(MA73C:E) • cb AC3 PAYLOAD 3Φ – op	AC3 pwr to MS, PS Patch pnls		⑯ Hum Sep A,B Speed Norm Snsrs lost
(MA73C:G) • cb AC3 GALLEY FAN (three) – op	Galley Fan		⑰ IMU Fan A,B,C Speed Norm Snsrs lost
(MA73C:H,I) • cb AC3 FWD RCS VLV (three) – op • cb AC3 AFT POD VLV GP 3 (three) – op			
(L4:A) • cb UTIL PWR A15/MO13Q AC3 – op	AC3 Utility pwr (A15/MO13Q)		
(L4:C-E) cb AC3 • FC3 PUMPS (three) – op • R ENG (three) – op • L ENG (three) – op			
(L4:F-H) cb AC3 • H2O LOOP PUMP 2 (three) – op • AV BAY 3 FAN A (three) – op • AV BAY 2 FAN B (three) – op			
(L4:I,J) cb AC3 • IMU FAN C (three) – op • ΦA SIG/CONDR HUM SEP – op • ΦB SIG/CONDR IMU FAN – op	16 Hum Sep Sig Condr (ECLS SC5) 17 IMU Fan Sig Condr (ECLS SC7)		
(Continued)	(Continued)		

**EPS SSR-130 (Cont)**  
**BUS LOSS: AC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(L4:K,L) cb AC3 • CABIN FAN A (three) – op • ΦA H2O CNTLR 1 – op • ΦB AV BAY 1 S/C – op</p>			<p>② Vlv holds position ⑮ Redundant mtrs remain ⑱ Motor A remains</p>
<p>(L4:M,N) cb AC3 • FREON LOOP 2 PUMP A (three) – op • ΦA FREON FLOW PROP 2 – op • ΦB FREON SIG/CONDR – op</p>	<p>2 Freon Loop 2 Flow Prop Vlv</p>		<p>⑲ Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains ⑳ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</p>
<p>(L4:N) • cb AC3 ΦC RAD ISOL B – op</p>	<p>18 Freon Loop 1,2 Rad Isol Motor B</p>		<p>㉑ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p>
<p>(L4:O) cb AC3 • ΦA BLR HYD BYP 2A – op • ΦB HYD QTY 3 – op • ΦC BLR HYD BYP 3B – op</p>	<p>Hyd Rsvr 3 Qty Snsr</p>		<p>㉒ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
<p>(L4:P) cb AC3 • ΦA LG SNSR 1 – op • ΦB RAD CNTLR 2A – op</p>	<p>19 Freon Loop 2 Cntr A Rad Byp Vlv Mtr</p>		
<p>(L4:Q) cb AC3 • ΦA LTG COAS – op • ΦB LTG PNL MS – op • ΦC LTG PNL OS – op</p>	<p>Sta 1,2 COAS Itg pwr MS pnl Its (pnls R10,R12) OS pnl Its (pnls A1,A2,A6,A7,A8,A13,L9)</p>		
<p>(L4:R) • cb AC3 ΦB INST L/CTR – op</p>	<p>L/Ctr Inst Its (pnls C2,F6,F7)</p>		
	<p>15 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1</p>		
	<p>RMS: 20 Port MPM Mtr 1 20 Stbd MPM Mtr 2 21 Port Fwd MRL Mtr 2 21 Port Aft MRL Mtr 1 22 Stbd Mid MRL Mtr 2 22 Stbd Fwd MRL Mtr 1</p>		

**EPS SSR-131**  
**BUS LOSS: AC3  $\Phi$ A**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> <li>√IMU FAN B – ON</li> <li>• √C – OFF</li> <li>• H2O PUMP LOOP 1 (two) – ON, B</li> </ul> <p>• Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, <u>ECLS</u> SSR-10</p> <ul style="list-style-type: none"> <li>• FREON PUMP LOOP 2 – B</li> <li>• √AV BAY 2 FAN A – ON</li> <li>• √B – OFF</li> <li>• √3 FAN A – OFF</li> <li>• √B – ON</li> </ul>	<p>1 <math>\Phi</math> of IMU Fan C</p> <p>1 1<math>\Phi</math> of H2O Loop 2 Pump man ON</p> <p>2 H2O Loop 1 Byp Cntr, Sig Condr</p> <p>3 H2O Loop 1 Byp vlv pwr</p> <p>1<math>\Phi</math> of Freon Loop 2 Pump A</p> <p>1<math>\Phi</math> of AV Bay 2 Fan B</p> <p>1<math>\Phi</math> of AV Bay 3 Fan A</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7) C/W AC VOLT It – on C/W H2O LOOP It – on</p> <p>(F9) AC3 <math>\Phi</math>A AC volts &lt; 90</p> <p>(F6/F8) 4 LDG GEAR NOSE, 5 R tb – bp</p> <p>(O1) H2O PUMP OUT PRESS LOOP 1 meter ind – 0 psia</p> <p>(FSMs) S67 AC VOLTS 3 S69 FC H2 PUMP 3 S86 WSB T 2 (2) S66 HUMID SEP B S88 H2O PUMP P 1 S88 H2O LOOP TEMP S88 H2O LOOP 1 QTY SM0 THRM HYD (B)</p>	<p>① If H2O Loop 2 Pump active, Loop 2 Pump Out Press must drop below 45 psia to trigger C/W</p> <p>② H2O Loop 1 Pump Out Press, Pump <math>\Delta</math>P, Accum Qty, Pump Out Temp snrs lost</p> <p>③ H2O Loop 1 Byp Vlv holds position</p> <p>④ Indicates DN when NLG down</p> <p>⑤ Will <u>not</u> indicate DN when RMG down</p> <p>⑥ Switch guard installed to prevent Cab Fan A from being turned off during LiOH can changeout and cabin fan filter cleaning</p>
<p>6 Verify Cabin Fan A operation. If running, then;</p> <p>(L1)</p> <ul style="list-style-type: none"> <li>• Install sw guard (stowed in IFM tool kit) over Cab Fan A sw in the ON position</li> </ul>	<p>1<math>\Phi</math> of Cabin Fan A</p>	<p>HYD/APU APU H2O QTY 2 ind – 0%</p> <p>If H2O PUMP LOOP 2 active: 'S88 H2O PUMP P 2' (O1) H2O PUMP OUT PRESS LOOP 2 ind – 40-45 psia</p>	<p>⑦ Brake/Skid Cntl Box A,B enabled before WOW</p> <p>⑧ Inhibits H2O Loop 1 Pump <math>\Delta</math>P, Pump Out Press, Pump Out Temp, Accum Qty, respectively</p>
<p>(L4:P)</p> <ul style="list-style-type: none"> <li>• cb AC2 <math>\Phi</math>A LG SNSR 2 – cl</li> </ul>	<p>7 Prox Snr Electronics Box 1</p>	<p>If APU active and using BLR CNTLR/HTR 2A: C/W APU TEMP It – on after ~2 min</p>	<p>⑨ Inhibits Primary C/W for H2O Loop 1,2 Pump P and AC3 voltage</p>
<p><b>SM 60 SM TABLE MAINT</b></p> <p>8</p> <ul style="list-style-type: none"> <li>• Inhibit 0612605, 0612600, 0612640, 0612610</li> <li>• Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value +0.3 volts</li> </ul>	<p>1<math>\Phi</math> of FC3 H2 Pump</p> <p>1<math>\Phi</math> of FC3 Coolant Pump</p>	<p>If IMU FAN C ON: S66 IMU FAN DP S66 IMU FN SPD C</p>	<p>⑩ 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 unpwrng sub-buses: SSR-134, SSR-135, SSR-136, SSR-137</p>
<p>(R2)</p> <ul style="list-style-type: none"> <li>• BLR CNTLR/HTR 2 – B</li> </ul>	<p>APY/HYD Blr Cntr/Htr 2A</p>	<p>If CO2 Removal Sys Cntr 2 selected: (MO51F) CO2 RMVL SYS CNTLR 2 FAIL It – on</p>	<p>⑪ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short</p>
<p>(R13U)</p> <ul style="list-style-type: none"> <li>• C/W PARAM SEL tw (three) – 105, 053</li> <li>• C/W PARAM – INH</li> <li>• C/W MEM – CLEAR</li> <li>• C/W PARAM SEL tw (three) – &gt; 119</li> </ul>	<p>10 AC3 FMC3 Bus pwr MMC2 Bus pwr MMC4 Bus pwr AMC3 Bus pwr</p>	<p>(R1)</p> <ul style="list-style-type: none"> <li>• AC3 BUS SNSR – OFF (1 sec)</li> <li>• AC3 BUS SNSR – AUTO TRIP</li> </ul>	<p>⑫ MCC will provide equipment reconfig info if reqd</p>
<p>10 If bus shorted:</p> <ul style="list-style-type: none"> <li>• Open all AC3 <math>\Phi</math>A cbs that pwr 3<math>\Phi</math> loads on pnl L4: C-I,K,M (9 cbs), MA73C: G-I (3 cbs)</li> <li>• Open all AC3 3<math>\Phi</math> ganged cbs on pnl L4:B (1 cb), MA73C: C-G (7 cbs)</li> </ul>	<p>11 If bus shorted: AC3 payload 3<math>\Phi</math> Bus pwr (pwrs MS, PS Patch panel)</p>		
<p>12 1<math>\Phi</math> of AC Utility Power Outlets at A15 and MO13Q</p>	<p>12 1<math>\Phi</math> of AC Utility Power Outlets at A15 and MO13Q</p>		
<p>(Continued)</p>	<p>(Continued)</p>		



**EPS SSR-131 (Cont)**  
**BUS LOSS: AC3  $\Phi$ A**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(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, <u>ECLS</u> )	13 CO2 Rmvl Sys Cntrlr 2 1 $\Phi$ of CO2 Rmvl Sys: Fan AC3 pwr Compressor AC3 pwr	(M051F) CO2 RMVL SYS CNTLR 2 FAIL It – on Impending: 'S66 CO2 RL SYS PCO2' 'S66 CAB PPCO2'	(13) PEVs, Actuators, Bed A dP, Bed B dP, and Fan dP will be recovered after system recovered
<b>14 BUS ISOLATION</b>			
IF BUS <u>NOT</u> SHORTED, PERFORM			
(L4:J) • cb AC3 $\Phi$ A SIG CONDR HUM SEP – op	15 Hum Sep Sig Condr (ECLS SC 5)		(14) For unshorted bus, perform single $\Phi$ isolation steps to prevent pwrng single phase loads with coupled energy from remaining two phases
(L4:L) • cb AC3 $\Phi$ A H2O CNTLR 1 – op			(15) Hum Sep A,B Speed Norm snrs lost
(L4:N) • cb AC3 $\Phi$ A FREON FLOW PROP 2 – op	16 Freon Loop 2 Flow Prop Vlv		(16) Vlv holds position
(L4:O) • cb AC3 $\Phi$ A BLR HYD BYP 2A – op			
(L4:P) • cb AC3 $\Phi$ A LG SNSR 1 – op			
(L4:Q) • cb AC3 $\Phi$ A LTG COAS – op	Sta 1,2 COAS pwr		
	NLG,RMG Backup Rel 1 Fire 2, Arm FC 3 pH Snsr		
	RMS: 1 $\Phi$ of Port MPM Mtr 1 Stbd MPM Mtr 2 Port Fwd MRL Mtr 2 Port Aft MRL Mtr 1 Stbd Fwd MRL Mtr 1 Stbd Mid MRL Mtr 2		
	1 $\Phi$ of AC3 payload 3 $\Phi$ Bus pwr (pwrs MS, PS Patch pnl)		

**EPS SSR-132**  
**BUS LOSS: AC3 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl		MASTER ALARM Light/Tone – on	<p>① If H2O Loop 2 Pump active, Loop 2 Pump Out Press must drop below 45 psia to trigger C/W</p> <p>② Av Bay 1 Fan ΔP, Air Out Temp snrsrs lost</p> <p>③ Switch guard installed to prevent Cab Fan A from being turned off during LiOH can changeout and cabin fan filter cleaning</p> <p>④ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrsrs lost</p> <p>⑤ Freon Loop 2 P/L Hx Flow Rate Freon Loop 1 ICH Flow Rate, and Accum Qty snrsrs lost</p> <p>⑥ Inhibits Primary C/W for AC3 Voltage</p> <p>⑦ Sets H2O Loop 1 Pump P low limit to 45 psia and H2O Loop 2 Pump P low limit to 19.5 psia</p>
(L1) • √IMU FAN B – ON • √C – OFF • H2O PUMP LOOP 1 (two) – ON,B • H2O PUMP LOOP 2 – GPC • H2O PUMP LOOP 1 BYP MODE – AUTO • H2O PUMP LOOP 2 BYP MODE – MAN • AV BAY 1 FAN (two) – ON • FREON PUMP LOOP 2 – B • √AV BAY 2 FAN A – ON • √B – OFF • √3 FAN A – OFF • √B – ON	1Φ of IMU Fan C  1 1Φ of H2O Loop 2 Pump man ON capability   2 Av Bay 1 Sig Condr, Xdcrs (ECLS SC2) 1Φ of Freon Loop 2 Pump A  1Φ of AV Bay 2 Fan B  1Φ of AV Bay 3 Fan A	(F7) C/W AC VOLT It C/W FREON LOOP It SM ALERT It C/W H2O PUMP It  (F9) AC3 ΦB AC volts < 90  (FSMs) S67 AC VOLTS 3 S69 FC H2 PUMP 3 S86 HYD RSVR Q 3 SM2 HYD QTY 3 (B) S66 AV BAY 1 FAN S66 IMU FN SPD B S88 FREON FLOW 1 S88 FRN PL HX 2 S88 FREON QTY 1 S88 H2O PUMP P 2	
3 Verify Cabin Fan A operation. If running, then (L1) • Install sw guard (stowed in IFM tool kit) over Cab Fan A sw in the ON position		HYD/APU HYD QTY 3 – 0%  (LIGHTS LOST) L/Ctr Instr Its (pnls C2,F6,F7) MS pnl Its (pnls R10,R12)	
(O17:C) • SIG CONDR FREON A – AC2 • SIG CONDR FREON B – AC2	1Φ of Cabin Fan A	(O1) 1 H2O PUMP OUT PRESS LOOP 2 – 40-45 psia FREON FLOW 1 – 578 pph AV Bay 1 Air Out – 45 degF	
(R13U) 6 • C/W PARAM SEL tw (three) – 053 • C/W PARAM – INH 7 • Change PRI C/W PARAM 105 low limit to 1.50 7 • Change PRI C/W PARAM 115 low limit to 0.65 • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119	4 Freon Sig Condr A AC3 pwr (ECLS SC1A) 5 Freon Sig Condr B AC3 pwr (ECLS SC1B)		
(R1) • AC3 BUS SNSR – OFF (1 sec) • AC3 BUS SNSR – AUTO TRIP			
SM 60 SM TABLE MAINT • Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value + 0.3 volts	1Φ of FC3 H2 Pump 1Φ of FC3 Coolant Pump		
7 Reconfig B/U C/W • ITEM 1 +0 6 1 2 6 0 0 EXEC • ITEM 11 +4 5 EXEC • ITEM 1 +0 6 1 2 7 0 0 EXEC • ITEM 11 +1 9 5 EXEC			
(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)	1Φ of CO2 Rmvl Sys: Fan AC3 pwr Compressor AC3 pwr		
(Continued)	(Continued)		

**EPS SSR-132 (Cont)**  
**BUS LOSS: AC3 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>8 If bus shorted:</p> <ul style="list-style-type: none"> <li>• Open all AC3 ΦB cbs that pwr 3Φ loads on pnls L4: C-I, K, M (9 cbs), MA73C: G-I (3 cbs)</li> <li>• Open all AC3 3Φganged cbs on pnls L4:B (1 cb), MA73C: C-G (7 cbs)</li> </ul>	<p>9 If bus shorted:</p> <ul style="list-style-type: none"> <li>AC3 payload 3Φ</li> <li>Bus pwr (pwrs MS, PS Patch panel)</li> </ul> <p>8 AC3 FMC3 Bus pwr  MMC2 Bus pwr  MMC4 Bus pwr  AMC3 Bus pwr</p> <p>10 1Φ of AC Utility Power  Outlets at A15 and MO13Q</p>		<p>⑧ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses: SSR-134, SSR-135, SSR-136, SSR-137</p>
<p>11 <b>BUS ISOLATION</b></p> <p>IF BUS NOT SHORTED, PERFORM</p> <p>(L4:J)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB SIG CONDR IMU FAN – op</li> </ul> <p>(L4:L)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB AV BAY 1 S/C – op</li> </ul> <p>(L4:N)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB FREON SIG CONDR – op</li> </ul> <p>(L4:O)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB HYD QTY 3 – op</li> </ul> <p>(L4:P)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB RAD CNTLR 2A – op</li> </ul> <p>(L4:Q)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB LTG PNL MS – op</li> </ul> <p>(L4:R)</p> <ul style="list-style-type: none"> <li>• cb AC3 ΦB INST L/CTR – op</li> </ul>	<p>12 IMU Fan Sig Condr (ECLS SC7)</p> <hr/> <p>Hyd Rsvr 3 Qty Snsr</p> <hr/> <p>13 Freon Loop 2 Cntrlr A Rad Byp Vlv Mtr</p> <hr/> <p>MS pnl lts (pnl R10, R12)</p> <hr/> <p>L/Ctr Inst lts (pnl C2, F6, F7)</p> <hr/> <p>RMS:</p> <ul style="list-style-type: none"> <li>1Φ of Port MPM Mtr 1</li> <li>Stbd MPM Mtr 2</li> <li>Port Fwd MRL Mtr 2</li> <li>Port Aft MRL Mtr 1</li> <li>Stbd Fwd MRL Mtr 1</li> <li>Stbd Mid MRL Mtr 2</li> </ul> <hr/> <p>1Φ of AC3 payload  3Φ Bus pwr (pwrs MS, PS Patch pnl)</p>		<p>⑨ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts</p> <p>⑩ MCC will provide equipment reconfig info if reqd</p> <p>⑪ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases</p> <p>⑫ IMU Fan A, B, C Speed Norm snsr lost</p> <p>⑬ Bypass vlv holds position and Cntrlr B Rad Byp Vlv Mtr remains</p>

**EPS SSR-133**  
**BUS LOSS: AC3 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl		MASTER ALARM Light/Tone – on	<p>① H2O Loop 2 Pump Out Press must drop below 45 psia to trigger C/W</p> <p>② Switch guard installed to prevent Cab Fan A from being turned off during LiOH can changeout and cabin fan filter cleaning</p> <p>③ Inhibits Primary C/W for AC3 Voltage</p> <p>④ Sets H2O Loop 1 Pump P low limit to 45 psia, and H2O Loop 2 Pump P low limit to 19.5 psia</p> <p>⑤ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts</p> <p>⑥ 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 unpwrng subbuses: SSR-134, SSR-135, SSR-136, SSR-137</p>
(L1) • √IMU FAN B – ON • √C – OFF • H2O PUMP LOOP 1 (two) – ON,B • H2O PUMP LOOP 2 – GPC • H2O PUMP LOOP 1 BYP MODE – AUTO • H2O PUMP LOOP 2 BYP MODE – MAN • √FREON PUMP LOOP 2 – B • √AV BAY 2 FAN A – ON • √B – OFF • √3 FAN A – OFF • √B – ON	1Φ of IMU Fan C  1 1Φ of H2O Loop 2 Pump man ON capability   1Φ of Freon Loop 2 Pump A  1Φ of AV Bay 2 Fan B 1Φ of AV Bay 3 Fan A	(F7) C/W AC VOLT It – on C/W FREON LOOP It – on SM ALERT It – on C/W H2O PUMP It – on  (F9) AC3 ΦC AC volts < 90  (LIGHTS LOST) OS pnl Its (pnls A1,A2,A6, A7,A8,A13,L9)  (FSMs) S69 FC H2 PUMP 3 S86 WSB T 3 (2) SM0 THRM HYD (B) S88 H2O PUMP P 2  1 (O1) H2O PUMP OUT PRESS LOOP 2 ind – 40-45 psia	
2 Verify Cabin Fan A operation. If running, then: (L1) • Install sw guard (stowed in IFM tool kit) over Cab Fan A sw in the ON position		If APUs active and using BLR CNTLR/HTR 3B: C/W APU TEMP It – on after ~2 min	
	1Φ of Cabin Fan A		
(R2) • BLR CNTLR/HTR 3 – A	APU/HYD Blr Cntrlr/Htr 3B		
(R13U) • C/W PARAM SEL tw (three) – 053 3 • C/W PARAM – INH 4 • Change PRI C/W PARAM 105 low limit to 1.50 4 • Change PRI C/W PARAM 115 low limit to 0.65 • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119			
(R1) • AC3 BUS SNSR – OFF (1 sec) • AC3 BUS SNSR – AUTO TRIP			
<b>SM 60 SM TABLE MAINT</b> • Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value + 0.3 volts	1Φ of FC3 H2 Pump 1Φ of FC3 Coolant Pump		
4 Reconfig B/U C/W • ITEM 1 +0 6 1 2 6 0 0 EXEC • ITEM 11 +4 5 EXEC • ITEM 1 +0 6 1 2 7 0 0 EXEC • ITEM 11 +1 9 5 EXEC			
(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)	1 Φ of CO2 Rmvl Sys: Fan AC3 pwr Compressor AC3 pwr		
6 If bus shorted: • Open all AC3 ΦC cbs that pwr 3Φ loads on pnls L4: C-I,K,M (9 cbs), MA73C: G-1 (3 cbs) • Open all AC3 3Φ ganged cbs on pnls L4:B (1 cb), MA73C: C-G (7 cbs)	5 If bus shorted: AC3 payload 3Φ Bus pwr (pwr MS, PS Patch panel) 6 AC3 FMC3 Bus Pwr MMC2 Bus Pwr MMC4 Bus Pwr AMC3 Bus Pwr		
(Continued)	(Continued)		

**EPS SSR-133 (Cont)**  
**BUS LOSS: AC3 ΦC**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
7 IF BUS NOT SHORTED, PERFORM			
	8 1Φ of AC Utility Power Outlets at A15 and MO13Q		
(L4:N) • cb AC3 ΦC RAD ISOL B – op	9 Freon Loop 1,2 Rad Isol Motor B		⑦ For unshorted bus, perform single Φ isolation steps to prevent pwrng single phase loads with coupled energy from remaining two phases
(L4:O) • cb AC3 ΦC BLR HYD BYP 3B – op			⑧ MCC will provide equipment reconfig info if reqd
(L4:P)			⑨ Motor A remains
(L4:Q) • cb AC3 ΦC LTG PNL OS – op	OS pnl lts (pnls A1,A2,A6, A7,A8,A13,L9)		
	RMS: 1Φ of Port MPM Mtr 1 Stbd MPM Mtr 2 Port Fwd MRL Mtr 2 Port Aft MRL Mtr 1 Stbd Fwd MRL Mtr 1 Stbd Mid MRL Mtr 2		
	1Φ of AC3 payload 3Φ Bus pwr (pwrs MS, PS Patch pnl)		

**EPS SSR-134  
BUS LOSS: AC3 FMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		-Z Star Trkr Dr OP/CL time incr from 8 to 16 sec	① Redundant mtr remains
<b>BUS ISOLATION</b> ONLY ON MCC CALL, PERFORM (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ FWD 3 – op		R ADP deploy time incr from 15 to 30 sec	
	AC3 FMC3 Bus pwr LH Vent 1,2 Mtr 1 1 R ADP Dpy Mtr 1 1 -Z Star Trkr Dr Sys 2 OP/CL capability		

**EPS SSR-135  
BUS LOSS: AC3 MMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		SM (BFS SM 63) PL BAY DOORS	① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
<b>BUS ISOLATION</b> ONLY ON MCC CALL, PERFORM (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ MID 2 – op		During PLBD OP/CL, single mtr run time noted on actuators listed at left	
	AC3 MMC2 Bus pwr PLBD C/L Lat 1-4 Mtr 2 5-8 Mtr 2 Port Aft Bkhd Mtr 2 Stbd Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2 LH Vent 6 Mtr 2 3 Mtr 1	(R13L) During Rad Dpy/Sto ops, RAD CNTL STBD tb (two) indicates single mtr ops	② Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	RMS: 1 Port Aft MRL Mtr 1 2 Stbd Mid MRL Mtr 2 3 KU ANT Dpy/Sto Mtr 1		③ √MCC for Ku Ant stow reqmts

**EPS SSR-136  
BUS LOSS: AC3 MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	RMS: 1 Port MPM Mtr 1 1 Stbd MPM Mtr 2 2 Port Fwd MRL Mtr 2 3 Stbd Fwd MRL Mtr 1	SM (BFS SM 63) PL BAY DOORS During PLBD OP/CL, single mtr run time noted on actuators listed at left	① Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
<b>BUS ISOLATION</b>		(R13L) During Rad Dpy/Sto ops, RAD CNTL PORT tb (two) indicates single mtr ops	② Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
ONLY ON MCC CALL, PERFORM			③ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(MA73C:D) • cb MCA LOGIC MCA PWR AC3 3Φ MID 4 – op	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		

**EPS SSR-137  
BUS LOSS: AC3 AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:D) • cb MCA LOGIC MCA PWR AC3 3Φ AFT 3 – op	AC3 AMC3 Bus pwr RH Vents 8,9 Mtr 1	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	① Redundant mtrs remain

**EPS SSR-140**  
**BUS LOSS: AC1 RCS/FMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
Refer to OMS/RCS Slide Rule for vlv loss info (Use FMC1 Slide for Fwd RCS)		1 The following tb indications do not change position in response to cmds: (08) FWD RCS TK ISOL 3/4/5 MANF ISOL 1	① Vlv remains in tb indicated position
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:H) • cb AC1 FWD RCS VLV (three) – op			

**EPS SSR-141**  
**BUS LOSS: AC2 RCS/FMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
Refer to OMS/RCS Slide Rule for vlv loss info (Use FMC2 Slide for Fwd RCS)		1 The following tb indication does not change position in response to cmds: (08) FWD RCS MANF ISOL 2	① Vlv remains in tb indicated position
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:H) • cb AC2 FWD RCS VLV (three) – op			

**EPS SSR-142**  
**BUS LOSS: AC3 RCS/FMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
Refer to OMS/RCS Slide Rule for vlv loss info (Use FMC3 Slide for Fwd RCS)		1 The following tb indications do not change position in response to cmds: (08) FWD RCS TK ISOL 1/2 MANF ISOL 3 4	① Vlv remains in tb indicated position
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:H) • cb AC3 FWD RCS VLV (three) – op			



**EPS SSR-143**  
**BUS LOSS: AC1 POD/AMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS)			① Vlv remains in tb indicated position
<b>BUS ISOLATION</b>			
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**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC2 Slide for Aft RCS)			① Vlv remains in tb indicated position
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:I) • cb AC2 AFT POD VLV GP 2 (three) – op			

**EPS SSR-145**  
**BUS LOSS: AC3 POD/AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS)			① Vlv remains in tb indicated position
<b>BUS ISOLATION</b>			
ONLY ON MCC CALL, PERFORM			
(MA73C:I) • cb AC3 AFT POD VLV GP 3 (three) – op			

**EPS SSR-146**  
**BUS LOSS: MNA/B POD/AMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS)		1 (O8) L,R OMS TK ISOL A tb – bp L OMS XFEED A tb – bp	① Vlv remains in last commanded position
<b>BUS ISOLATION</b>		1 (O7) AFT L,R RCS TK ISOL 3/4/5 A tb – bp MANF ISOL 2 tb – bp XFEED 3/4/5 tb – bp	② √MCC for impacts to OMS Gauging
ONLY ON MCC CALL, PERFORM		(FSMs) RCS PWR FAIL	
(MA73C:I) • AFT POD VLV LOGIC GP 1/3, 1/2 (two) – OFF	2 OMS Qty Gauging Degraded		

**EPS SSR-147**  
**BUS LOSS: MNB/C POD/AMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC2 Slide for Aft RCS)		1 (O8) L,R OMS XFEED B tb – bp	① Vlv remains in last commanded position
<b>BUS ISOLATION</b>		(O7) AFT L,R RCS TK ISOL 3/4/5 B tb – bp MANF ISOL 1 tb – bp	② √MCC for impacts to OMS Gauging
ONLY ON MCC CALL, PERFORM		(FSMs) RCS PWR FAIL	
(MA73C:I) • AFT POD VLV LOGIC GP 1/2, 2/3 (two) – OFF	2 OMS Qty Gauging Degraded		

**EPS SSR-148**  
**BUS LOSS: MNC/A POD/AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS)		(O8) L,R OMS TK ISOL B tb – bp R OMS XFEED A tb – bp	① Vlv remains in last commanded position
<b>BUS ISOLATION</b>		(O7) AFT L,R RCS TK ISOL 1/2 tb – bp MANF ISOL 3,4 tb – bp XFEED 1/2 tb – bp	② √MCC for impacts to OMS Gauging
ONLY ON MCC CALL, PERFORM		(FSMs) RCS PWR FAIL	
(MA73C:I) • AFT POD VLV LOGIC GP 1/3, 2/3 (two) – OFF	2 OMS Qty Gauging Degraded		

## EPS SSR-150 ALTERNATE PRIMARY PAYLOAD PWR

1.1

Attempt MNC/PRIPL connection again:

- O13:E 1. √cb ESS 3AB MNC CONTR – cl
- O14:B 2. √cb MNA MNC CONTR – cl
- R1 3. PL PRI MNC – OFF, ON (tb-ON)

If MNC/PRIPL connection failed, attempt FC3/PRIPL connection:

- R1 4. PL PRI MNC – OFF (tb-OFF)
- 5. FC3 – ON (tb-ON)

If FC3/PRIPL connection failed, attempt MNB/PRIPL connection:

- O13:C 6. √cb ESS 2CA MNB CONTR – cl
- O16:B 7. √cb MNC MNB CONTR – cl
- R1 8. PL PRI FC3 – OFF (tb-OFF)
- 9. MNB – ON (tb-ON)

EPS  
SSR 150-202

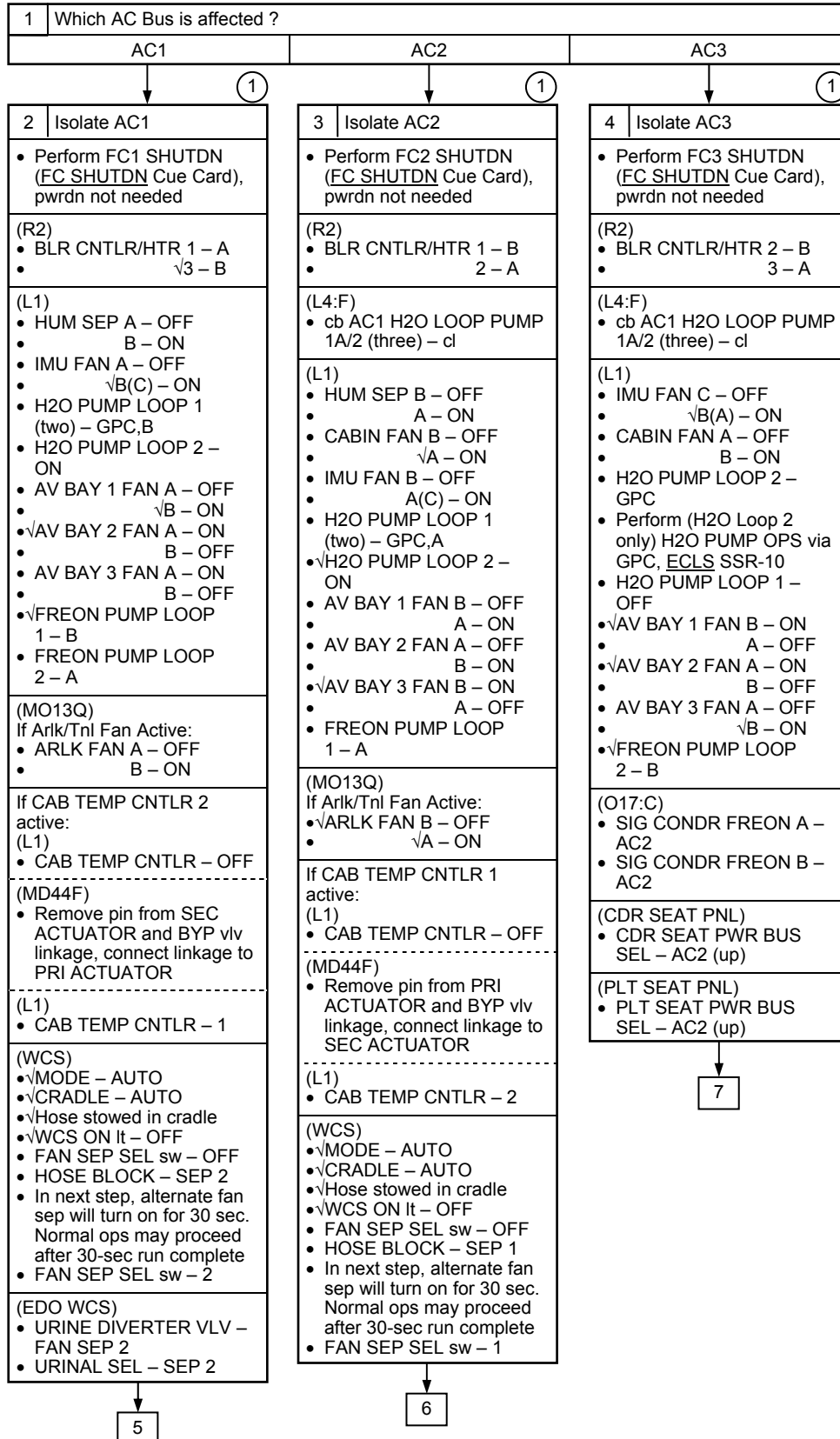
# EPS SSR-200 AC PWR TRANSFER CABLE

## NOTE

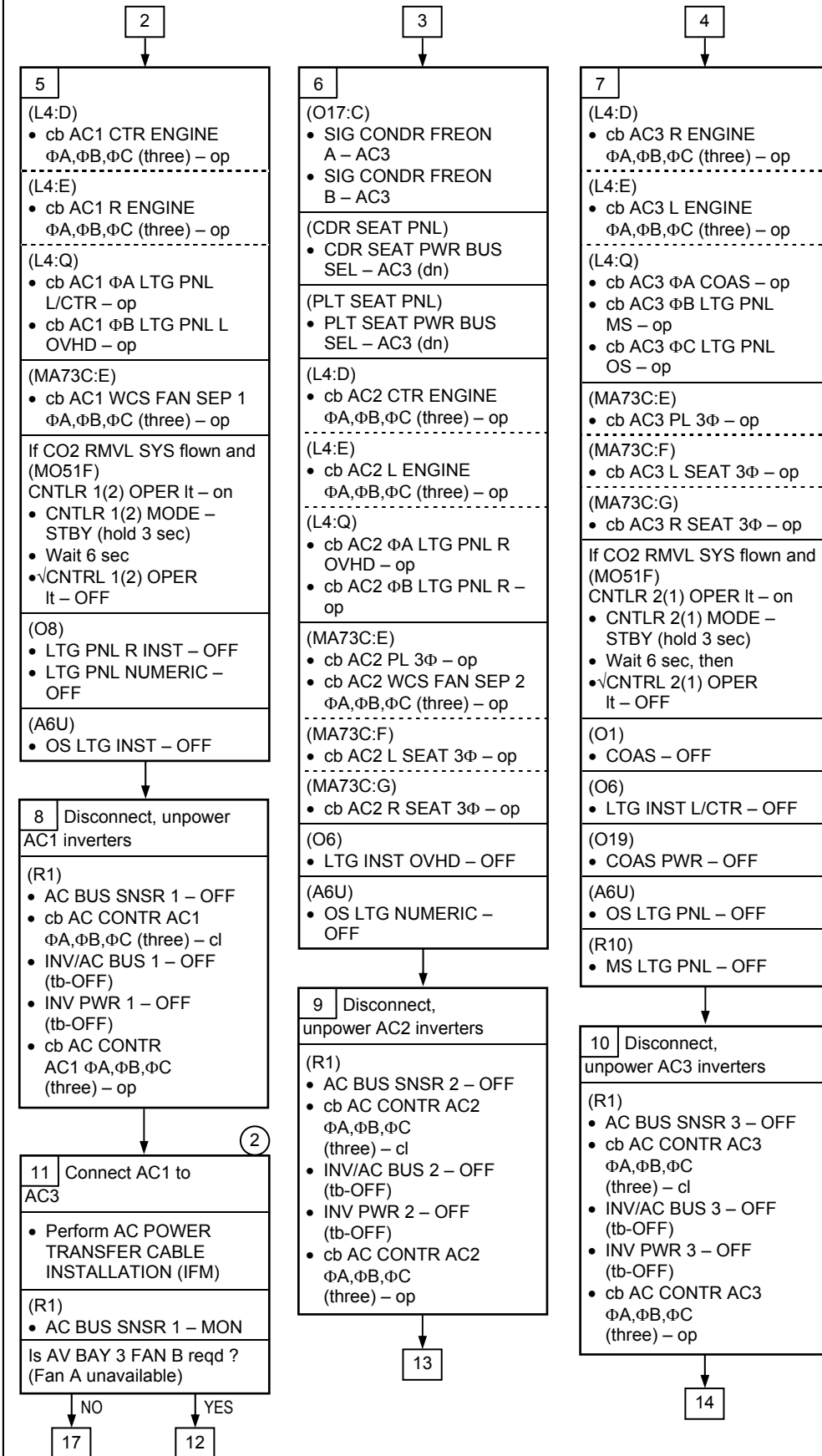
This procedure is designed to be a standalone procedure with all necessary Bus Loss Actions included. The procedure also may be entered from the MN bus or FPC Bus Loss Actions (MAL or ENT PKT)

① TIME CRITICAL

FC must be shut down within 9 min to avoid potentially hazardous condition

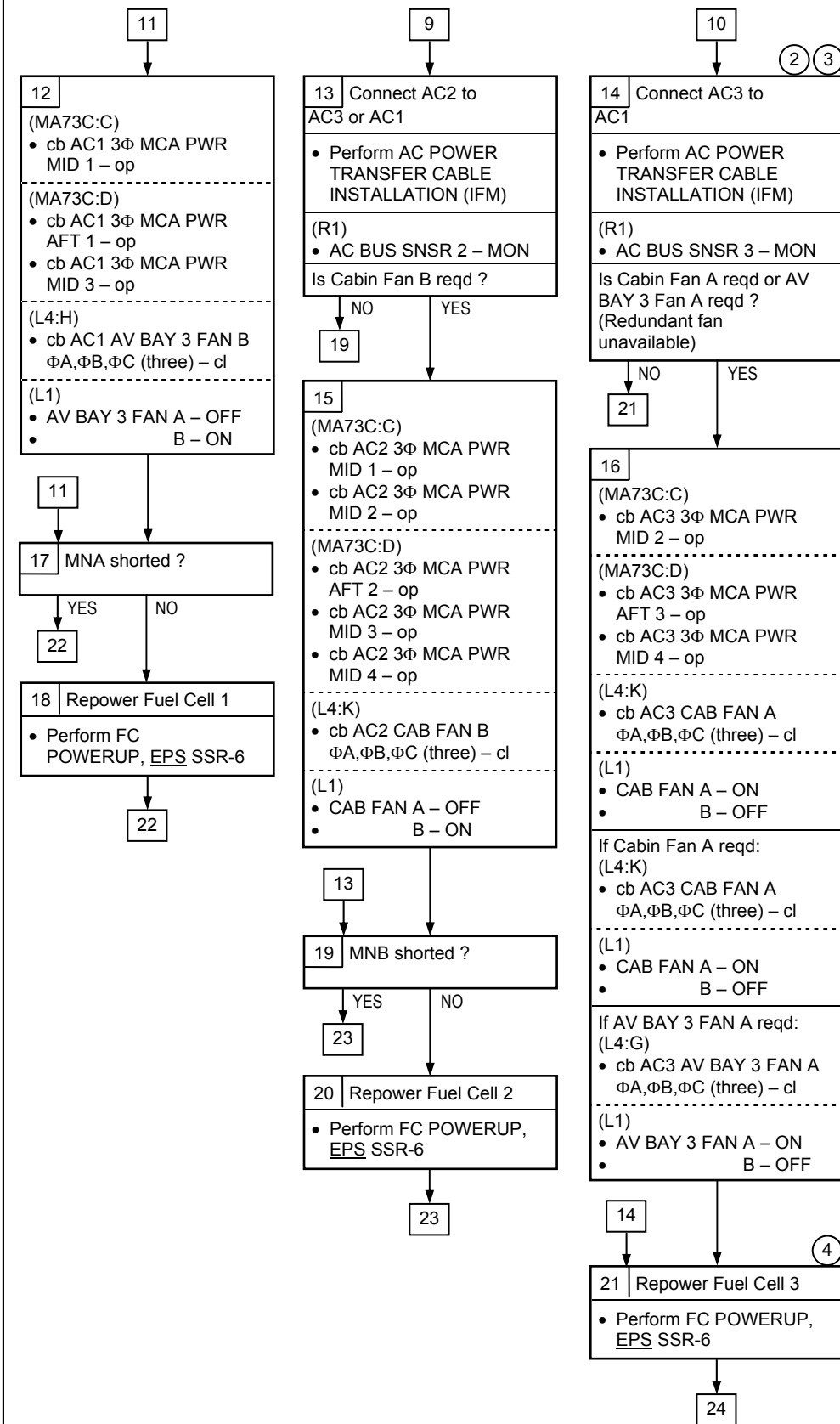


# EPS SSR-200 (Cont)



② 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)

# EPS SSR-200 (Cont)



② 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)

③ 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

④ For MNC short, SSR-6 ties FC3 to MNB through the PL PRI BUS

# EPS SSR-200 (Cont)

17 18

AC1 LOAD REFERENCE TABLE

22 CONTINUOUS EQUIPMENT		AC CURRENT (amps/phase)	AC1 CURRENT AFTER CABLE INSTALLED		
After cable installation, the following equipment will be powered CONTINUOUSLY:			ΦA	ΦB	ΦC
(R1) FUEL CELL 1 PUMPS	(6)	.81	.81	.81	.81
(L4:K) AC1 ΦA H2O CNTLR 2 (S/C)		.06	.06		
ΦB CAB AIR S/C		.04		.04	
(L4:L) ΦB AV BAY 2 S/C		.02		.02	
(L4:O) ΦB HYD QTY 1		.02		.02	
ΦA BLR HYD BYP SENSOR 1B		.07	.07		
ΦC BLR HYD BYP SENSOR 3A		.07			.07
(L4:L) ΦA CABIN TEMP CNTLR 2 (EL)		.04	.04		
(MA73C:F) ΦC OPS HYD ACTR INST	(7)	.06			.06
(8) SUBTOTAL AMPS/PHASE			.98	.89	.94
INTERMITTENT EQUIPMENT		AC CURRENT (amps/phase)	AC1 CURRENT		
After cable installation, the following equipment will be available for INTERMITTENT operation:			ΦA	ΦB	ΦC
(L4:K) AC1 ΦA H2O CNTLR 2 (BYP VLV)	(9)	.14			
(L4:O) ΦA BLR HYD BYP VLV 1B		.21			
ΦC BLR HYD BYP VLV 3A		.21			
(L4:P) ΦA RAD CNTLR 1B (FREON LOOP 1 CNTLR B RAD BYP VLV MTR)	(9) (10)	.17			
ΦB RAD CNTLR 2B (FREON LOOP 2 CNTLR B RAD BYP VLV MTR)	(9) (10)	.17			
(MA73C:C) AC1 3Φ FWD 1 RH VENTS 1/2 MTR 1		OP - .28 CL - .21			
-Y STAR TRKR DR SYS 1 OP/CL	(9)	.14			
L ADP DPY MTR 1	(9)	.14			
AC1 3Φ MID 1 RH VENT 3 MTR 1		OP - .59 CL - .29			
5 MTR 1		OP - .59 CL - .29			
6 MTR 1		OP - .57 CL - .27			
PL RETEN LAT MTR 1		.41			
PORT RAD LAT 1-6, 7-12 MTRS 1 (2 ea)		.26			
PORT RAD DPY/STO MTR 1		.26			
PLBD C/L LAT 9-12 MTR 1		.72			
PORT,STBD FWD BLKHD MTRS 1		.87			
PLBD STBD DOOR MTR 1		1.64			
PORT RMS MID RETN LAT MTR 1		.25			
(Cont)					

(5) 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

(6) If MNA shorted, FC pumps will not be restarted

(7) Includes RUD/SPDBRK and ELVN SW VLV Xdcrs

(8) AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at ~4.5 amps/phase for 1 sec for dual mtr ops, peaks for 6 sec for single mtr ops. The cb should not trip if steady-state loads less than 3 amps/phase for dual mtr ops or less than 1 amp/phase for single mtr ops on all associated vent doors

(9) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

(10) 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)

INTERMITTENT EQUIPMENT (Cont)	AC CURRENT (amps/phase)	AC1 CURRENT AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(MA73C:D) AC1 3Φ MID 3 PLBD LAT 1-4, 5-8 MTR 1 (2 ea)	.72			
L AFT BLKHD MTR 1	.87			
LH VENTS 5 MTR 1	OP – .59 CL – .27			
6 MTR 1	OP – .57 CL – .27			
STBD RAT LAT 1-6, 7-12 MTRS 1 (2 ea)	.26			
STBD RAD DPY/STO MTR 1	.26			
PORT RMS AFT RETN LAT MTR 2	.25			
AC1 3Φ AFT 1 LH VENT 8/9 MTR 1	OP – .67 CL – .39			
ET DOORS L DRIVE MTR 1	1.06			
L LAT MTR 1	1.28			
C/L LAT 1 MTR 1	.41			
C/L LAT 2 MTR 1	.41			
(MA73C:F) ΦA RMS PRIMARY	.93			
(MA73C:H) FWD RCS VLV (3 ea) ⑨	.42			
(MA73C:I) AFT POD VLV GP 1 AFT RCS ISOL L MANF 2 FU VLV ⑨	.42			
L MANF 2 OX VLV	.42			
R MANF 2 FU VLV	.42			
R MANF 2 OX VLV	.42			
L TK 3/4/5A FU VLV	.42			
L TK 3/4/5A OX VLV	.42			
R TK 3/4/5A FU VLV	.42			
R TK 3/4/5A OX VLV	.42			
RCS XFEED R MANF 3/4/5 FU VLV	.42			
R MANF 3/4/5 OX VLV	.42			
L MANF 3/4/5 FU VLV	.42			
L MANF 3/4/5 OX VLV	.42			
L OMS XFEED 3/4/5 FU VLV	.42			
3/4/5 OX VLV	.42			
OMS ISOL L FU VLV A	.42			
L OX VLV A	.42			
R FU VLV A	.42			
R OX VLV A	.42			
(Cont)				

⑨ 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)

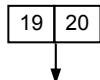
CONTINGENCY EQUIPMENT	After cable installation, the following AC1 continuous equipment will be powered off but available for CONTINGENCY use only. Minimize loading to prevent exceeding 3 amps/phase	AC CURRENT (amps/phase)	AC1 CURRENT AFTER CABLE INSTALLED		
			ΦA	ΦB	ΦC
(L4:J) HUM SEP A	(9)	.28			
(L4:I) IMU FAN A	(9)	.17			
(L4:F) H2O LOOP PUMP 1A	(9)	1.01			
(L4:F) H2O LOOP PUMP 2	(9) (11)	1.03			
(L4:G) AV BAY 1 FAN A	(9)	.69			
(L4:H) AV BAY 3 FAN B (upgraded)	(9)	1.66			
(L4:H) AV BAY 3 FAN B	(9)	.73			
(L4:M) FREON LOOP 1 PUMP A		1.68			
(L4:N) FREON LOOP 2 PUMP B	(9)	1.68			
(L4:L) AC1 ΦA CABIN TEMP CNTLR 2		.15			
(L4:Q) AC1 ΦA LTG PNL L/CTR	(12)	2.85			
ΦB LTG PNL L/OVHD	(12)	1.94			
(L4:R) ΦA LTG R INST		.31			
ΦB LTG NUMERIC		.16			
(L4:Q) ΦC OS LTG INST		.13			
(MA73C:E) WCS FAN SEP 1		.86			
(MA73C:G) AIRLOCK TUNNEL FAN A	(9)	.80			
(F1/MO52J) AC1 UTILITY POWER					
VACUUM CLEANER		1.44			
(MO51F) CO2 RMVL SYS 1(2)	(9)	.91			
		TOTAL AMPS/PHASE			

(9) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

(11) H2O LOOP 2 PUMP GPC position pwr'd by AC1

(12) cb opened to prevent powering lights inadvertently

# EPS SSR-200 (Cont)



AC2 LOAD REFERENCE TABLE

5

23 CONTINUOUS EQUIPMENT		AC CURRENT (amps/phase)	AC2 CURRENT AFTER CABLE INSTALLED		
After cable installation, the following AC2 equipment will be powered CONTINUOUSLY:			ΦA	ΦB	ΦC
(R1) FUEL CELL 2 PUMPS	13	.81	.81	.81	.81
(L4:L) AC2 ΦB AV BAY 3 S/C		.02		.02	
(L4:O) ΦB HYD QTY 2		.02		.02	
(L4:L) ΦA CABIN TEMP CNTLR 1 (EL)		.04	.04		
(L4:O) ΦA BLR HYD CNTL SENSOR 1A		.07	.07		
ΦC BLR HYD CNTL SENSOR 2B		.06			.06
(L4:P) ΦA LG PROX SNSR 2		.07	.07		
(MA73C:F) ΦC OPS INST HYD ACTR	14	.13			.13
	15	SUBTOTAL AMPS/PHASE	.99	.85	1.00
INTERMITTENT EQUIPMENT		AC CURRENT (amps/phase)	AC2 CURRENT		
After cable installation, the following equipment will be available for INTERMITTENT operation:			ΦA	ΦB	ΦC
(L4:O) AC2 ΦA BLR HYD BYPASS VLV 1A		.22			
ΦC BLR HYD BYPASS VLV 2B		.21			
(L4:P) ΦB RAD CNTLR 1A (FREON LOOP 1 CNTLR A RAD BYP VLV MTR)	9, 16	.17			
(L4:N) ΦA FREON FLOW PROP 1 (VLV)	9	.30			
(MA73C:C) AC2 3Φ FWD 2 LH VENTS 1/2 MTR 2		OP - .28 CL - .15			
RH VENTS 1/2 MTR 2		OP - .28 CL - .15			
L,R ADP DPY MTR 2	9	.14			
-Y STR TRKR DR SYS 2 MTR CNTL	9	.14			
-Z STR TRKR DR SYS 1 MTR CNTL	9	.14			
AC2 3 Φ MID 1 LH VENT 5 MTR 2		OP - .65 CL - .33			
AC2 3 Φ MID 2 LH VENT 3 MTR 2		OP - .65 CL - .33			
PLBD PORT DOOR MTR 2		1.64			
STBD AFT BLKHD LAT MTR 2		.87			
C/L LATCH 13-16 MTR 2		.72			
KU BAND ANT DPLY MTR 2		.82			
STBD RAD LAT 1-6 MTR 2		.26			
PORT RMS DPLY MTR 2		.29			
PORT RMS FWD RETN LAT MTR 1		.25			

5 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

9 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

13 If MNB lost, FC2 pumps will not be restarted

14 Includes ELIVN PS2 and ME TVC SW VLV Xdcrs

15 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

16 If MNB DA2 is not regained, this mtr (auto cntl) will not be operational

# EPS SSR-200 (Cont)

AC2 LOAD REFERENCE TABLE (Cont)

INTERMITTENT EQUIPMENT (Cont)	AC CURRENT (amps/phase)	AC2 CURRENT		
		ΦA	ΦB	ΦC
(MA73C:C) (Cont) AC2 3 Φ AFT 2 RH VENTS 8/9 MTR 2	OP - .73 CL - .35			
LH VENTS 8/9 MTR 2	OP - .67 CL - .38			
ET DOORS L LAT MTR 2	1.28			
C/L LAT 1 MTR 2	.41			
ET DOORS R DRIVE MTR 2	1.06			
R LAT MTR 2	1.28			
AC2 3 Φ MID 3				
PL RET LAT MTR 2	.41			
AC2 3 Φ MID 4				
RH VENT 6 MTR 2	OP - .59 CL - .29			
PLBD STBD DOOR MTR 2	1.64			
PORT FWD BLKHD LAT MTR 2	.87			
STBD FWD BLKHD LAT MTR 2	.87			
PORT RAD LAT 1-6 MTR 2	.26			
DPLY MTR 2	.26			
PORT RMS MID RETN LAT MTR 2	.25			
(MA73C:F) PAYLOAD				
AC2 ΦA RMS BACKUP	.07			
LEFT SEAT (9)	.99			
AC2 ΦA PORT RMS SHLD BRACE ACTR	.25			
(MA73C:G) OMS KIT VLV				
(MA73C:H) FWD RCS VLV (3 ea) (9)	.42			
(MA73C:I) AFT POD VLV GP 2 (9) AFT RCS ISOL L MANF 1 FU VLV	.42			
L MANF 1 OX VLV	.42			
R MANF 1 FU VLV	.42			
R MANF 1 OX VLV	.42			
L TK 3/4/5B FU VLV	.42			
L TK 3/5/5B OX VLV	.42			
R TK 3/4/5B FU VLV	.42			
R TK 3/4/5B OX VLV	.42			
OMS XFEED L FU VLV B	.42			
L OX VLV B	.42			
R FU VLV B	.42			
R OX VLV B	.42			
(Cont)				

(9) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

# EPS SSR-200 (Cont)

AC2 LOAD REFERENCE TABLE (Cont)

CONTINGENCY EQUIPMENT	AC CURRENT (amps/phase)	AC2 CURRENT AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(L4:F) H2O LOOP PUMP 1B (9)	1.02			
(L4:G) AV BAY 1 FAN B (9)	.69			
(L4:H) AV BAY 2 FAN A (9)	.70			
(L4:I) IMU FAN B (9)	.18			
(L4:J) HUM SEP B (9)	.28			
(L4:K) CABIN FAN B	1.67			
(L4:M) FREON LOOP 1 PUMP B (9)	1.68			
(L4:L) AC2 ΦA CABIN TEMP CNTLR 1	.15			
(L4:R) AC2 ΦB LTG INST OVHD	.26			
(L4:Q) AC2 ΦB OS LTG NUMERIC	.20			
(L4:Q) AC2 ΦA LTG PNL R OVHD (12)	1.34			
AC2 ΦB LTG PNL R (12)	1.51			
(L4:N) AC2 ΦB FREON SIG CONDR	.05			
(MA73C:E) WCS FAN SEP 2 (9)	.86			
(MA73C:G) AIRLOCK TUNNEL FAN B	.80			
	TOTAL AMPS/PHASE			

(9) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

(12) cb opened to prevent powering lights inadvertently

# EPS SSR-200 (Cont)

21 AC3 LOAD REFERENCE TABLE

5

24 CONTINUOUS EQUIPMENT		AC CURRENT (amps/phase)	AC3 CURRENT AFTER CABLE INSTALLED		
After cable installation, the following AC3 equipment will be powered CONTINUOUSLY:			ΦA	ΦB	ΦC
(R1) FUEL CELL 3 PUMPS		.81	.81	.81	.81
(L4:J) AC3 ΦA HUM SEP S/C		.02	.02		
(L4:J) AC3 ΦB IMU FAN S/C		.02		.02	
(L4:L) AC3 ΦA H2O CNTLR 1 (S/C)		.06	.06		
AC3 ΦB AV BAY 1 S/C		.02		.02	
(L4:O) AC3 ΦB HYD QTY 3		.02		.02	
AC3 ΦA BLR HYD BYP SENSOR 2A		.07	.07		
AC3 ΦC BLR HYD BYP SENSOR 3B		.07			.07
(L4:P) AC3 ΦA LG PROX SNSR 1		.07	.07		
	15 SUBTOTAL AMPS/PHASE		1.03	.87	.87
INTERMITTENT EQUIPMENT		AC CURRENT (amps/phase)	AC3 CURRENT		
After cable installation, the following AC3 equipment will be available for INTERMITTENT operation:			ΦA	ΦB	ΦC
(L4:L) AC3 ΦA H2O CNTLR 1 (BYP VLV)	9	.14			
(L4:N) AC3 ΦA FREON FLOW PROP 2 (VLV)	9	.30			
(L4:O) AC3 ΦA BLR HYD BYP VLV 2A		.21			
AC3 ΦC BLR HYD BYP VLV 3B		.21			
(L4:P) AC3 ΦB RAD CNTLR 2A (FREON LOOP 2 CNTLR A RAD BYP VLV MTR)	9	.17			
(MA73C:C) AC3 3Φ FWD 3 FWD RCS ISOL TK 1/2 FU VLV	9	.42			
TK 1/2 OX VLV	9	.42			
MANF 3 FU VLV	9	.42			
OX VLV	9	.42			
4 FU VLV	9	.42			
OX VLV	9	.42			
LH VENTS 1/2 MTR 1		OP - .29 CL - .21			
R ADP MTR 1, 18		.14			
-Z STAR TRKR SYS 2 MTR CNTRL	9	.14			
AC3 3Φ MID 2					
LH VENT 3 MTR 1		OP - .59 CL - .29			
LH VENT 6 MTR 2		OP - .59 CL - .29			
PLBD PORT AFT BLKHD LAT MTR 2		.87			
(Cont)					

5 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

9 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

15 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

# EPS SSR-200 (Cont)

AC3 LOAD REFERENCE TABLE (Cont)

INTERMITTENT EQUIPMENT (Cont)	AC CURRENT (amps/phase)	AC3 CURRENT AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(MA73C:C) (Cont) AC3 3Φ PLBD C/L 1-4 LAT MTR 2	.72			
C/L 5-8 LAT MTR 2	.72			
KU BAND ANT DPLY MTR 1	.82			
STBD RAD DPY/STD MTR 2	.26			
LAT 7-12 MTR 2	.26			
AC3 3Φ MID 2 PORT RMS AFT SYS RETN LCH MTR 1	.25			
(MA73C:D) AC3 3Φ AFT 3 RH VENTS 8/9 MTR 1	OP – .68 CL – .34			
ET DOORS L DRIVE MTR 2	1.06			
C/L LAT 2 MTR 2	.41			
R DRIVE MTR 1	1.06			
R LAT MTR 1	1.28			
AC3 3Φ MID 4 RH VENT 3 MTR 2	OP – .65 CL – .32			
5 MTR 2	OP – .65 CL – .32			
PLBD PORT DOOR MTR 1	1.64			
STBD AFT BLKHD LAT MTR 1	.87			
C/L 9-12 LAT MTR 2	.72			
C/L 13-16 LAT MTR 1	.72			
KU BAND ANT DPY MTR 1	.82			
PORT RAD DPY MTR 2	.26			
7-12 LAT MTR 2	.26			
PORT RMS DPY MTR 1	.29			
FWD RETN LAT MTR 2	.25			
(MA73C:E) PAYLOAD				
(MA73C:G) GALLEY FAN (9)	.37			
RIGHT SEAT (9)	.99			
(MA73C:H) FWD RCS VLV (3 ea) (9)	.42			
(MA73C:I) AFT POD VLV GP 3 (9) AFT RCS ISOL L TK 1/2 FU VLV	.42			
L TK 1/2 OX VLV	.42			
R TK 1/2 FU VLV	.42			
R TK 1/2 OX VLV	.42			
L MANF 3 FU VLV	.42			
L MANF 3 OX VLV	.42			
(Cont)				

(9) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

# EPS SSR-200 (Cont)

AC3 LOAD REFERENCE TABLE (Cont)

INTERMITTENT EQUIPMENT (Cont)	AC CURRENT (amps/phase)	AC3 CURRENT AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(MA73C:I) (Cont)				
AFT RCS ISOL R MANF 3 FU VLV	.42			
R MANF 3 OX VLV	.42			
L MANF 4 FU VLV	.42			
L MANF 4 OX VLV	.42			
(MA73C:I) AFT POD VLV GP 3 <span style="float:right">⑨</span>				
R MANF 4 FU VLV	.42			
R MANF 4 OX VLV	.42			
AFT RCS XFEED L MANF 1/2 FU VLV	.42			
L MANF 1/2 OX VLV	.42			
R MANF 1/2 FU VLV	.42			
R MANF 1/2 OX VLV	.42			
OMS XFEED R FU VLV A	.42			
R OX VLV A	.42			
OMS ISOL L FU VLV B	.42			
L OX VLV B	.42			
R FU VLV B	.42			
R OX VLV B	.42			
<b>CONTINGENCY EQUIPMENT</b>				
<b>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</b>				
(L4:F) H2O LOOP PUMP 2 <span style="float:right">⑨ ⑰</span>	1.03			
(L4:G) AV BAY 3 FAN A (upgraded) <span style="float:right">⑨</span>	1.66			
(L4:G) AV BAY 3 FAN A <span style="float:right">⑨</span>	.75			
(L4:H) AV BAY 2 FAN B <span style="float:right">⑨</span>	.75			
(L4:I) IMU FAN C <span style="float:right">⑨</span>	.18			
(L4:K) CABIN FAN A	1.66			
(L4:M) FREON LOOP 2 PUMP A <span style="float:right">⑨</span>	1.68			
(L4:R) AC3 ΦB LTG INST L/CTR	.31			
(L4:N) AC3 ΦB FREON SIG CONDR	.05			
(L4:Q) AC3 ΦA LIGHTING COAS	.11			
(R10) AC3 ΦB MS LTG PNL	.31			
AC3 ΦC LIGHTING PANEL OS <span style="float:right">⑫</span>	2.66			
(MO51F) CO2 RMVL SYS 2(1) <span style="float:right">⑨</span>	.91			
(A15,MO13Q) AC3 UTILITY POWER				
VACUUM CLEANER	1.44			
	TOTAL AMPS/PHASE			

⑨ Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

⑫ cb opened to prevent powering lights inadvertently

⑰ H2O LOOP 2 PUMP Man ON pwr'd by AC3



# EPS SSR-201 CRYO HTR MANUAL OPS

①

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				
TANK #	SM ALERT (TANK P)		B/U C/W (CNTLR P)	
	O2	H2	O2	H2
1	0451100	0452100	0451110	0452110
2	0451200	0452200	0451210	0452210
3	0451300	0452300	0451310	0452310
4	0451400	0452400	0451410	0452410
5	0451500	0452500	0451510	0452510

② ③

2   Define alert limits		
Define upper and lower limits to be used for tank which requires manual heater operations		
CRYOGENIC	LOWER LIMIT	UPPER LIMIT
O2	780	920
H2	200	260

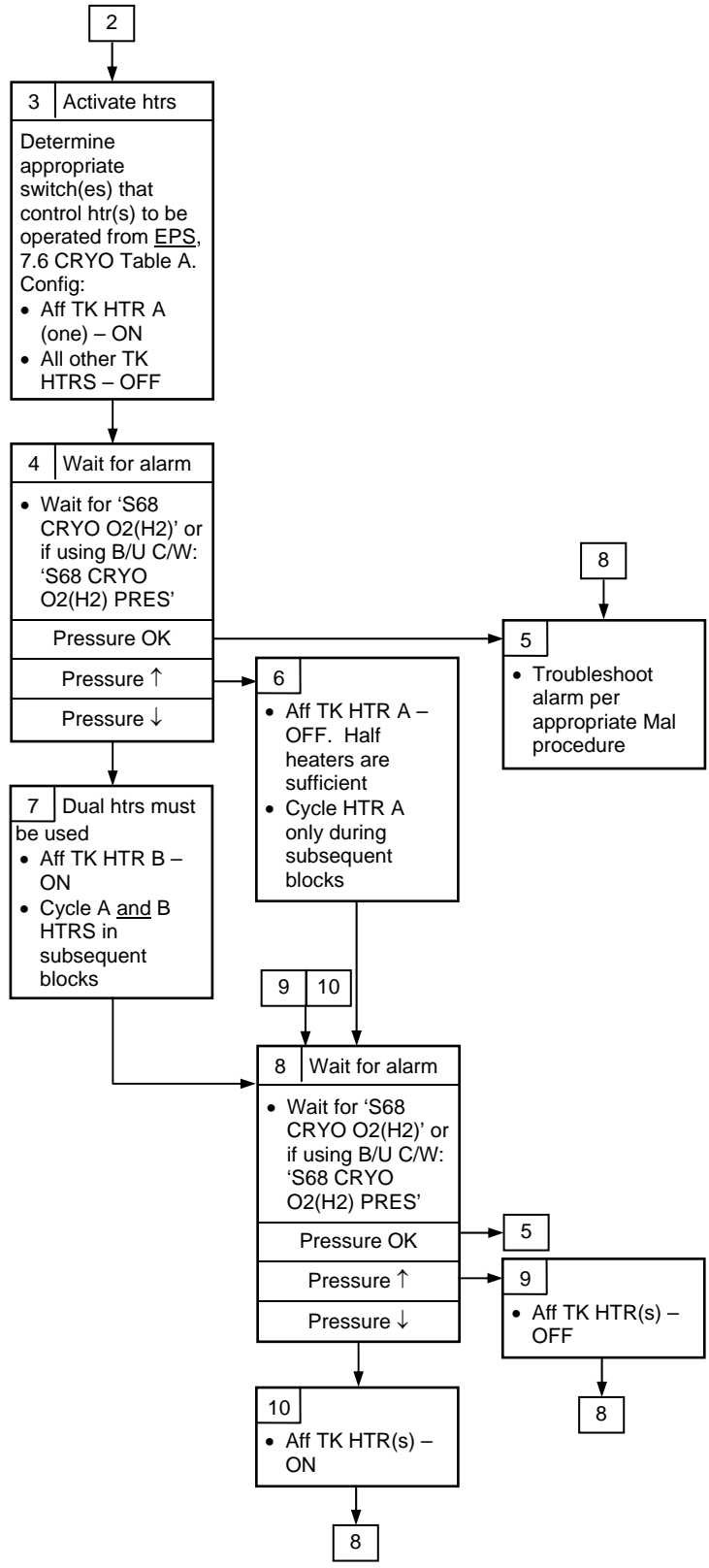
3

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

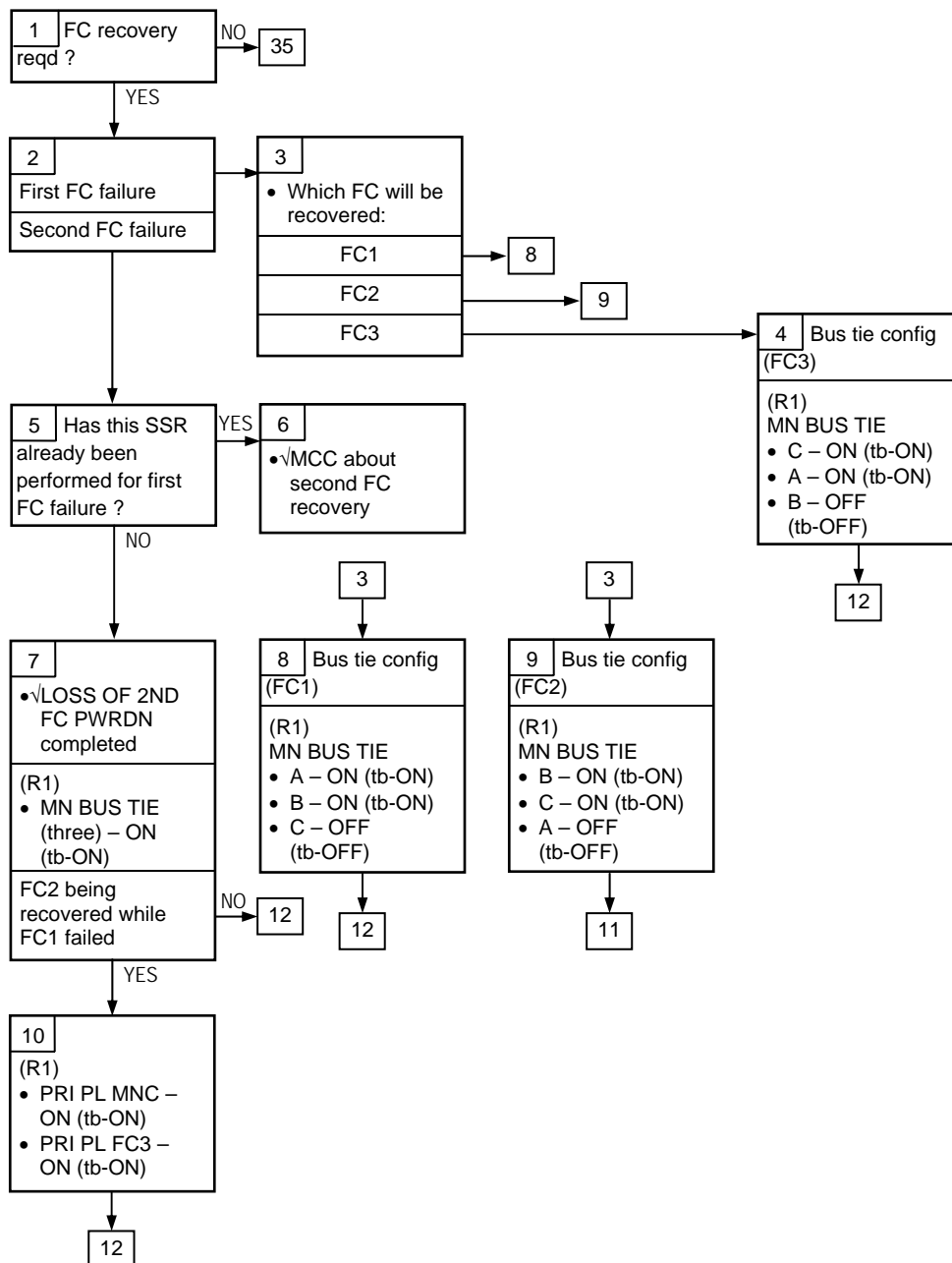
# EPS SSR-201 (Cont)



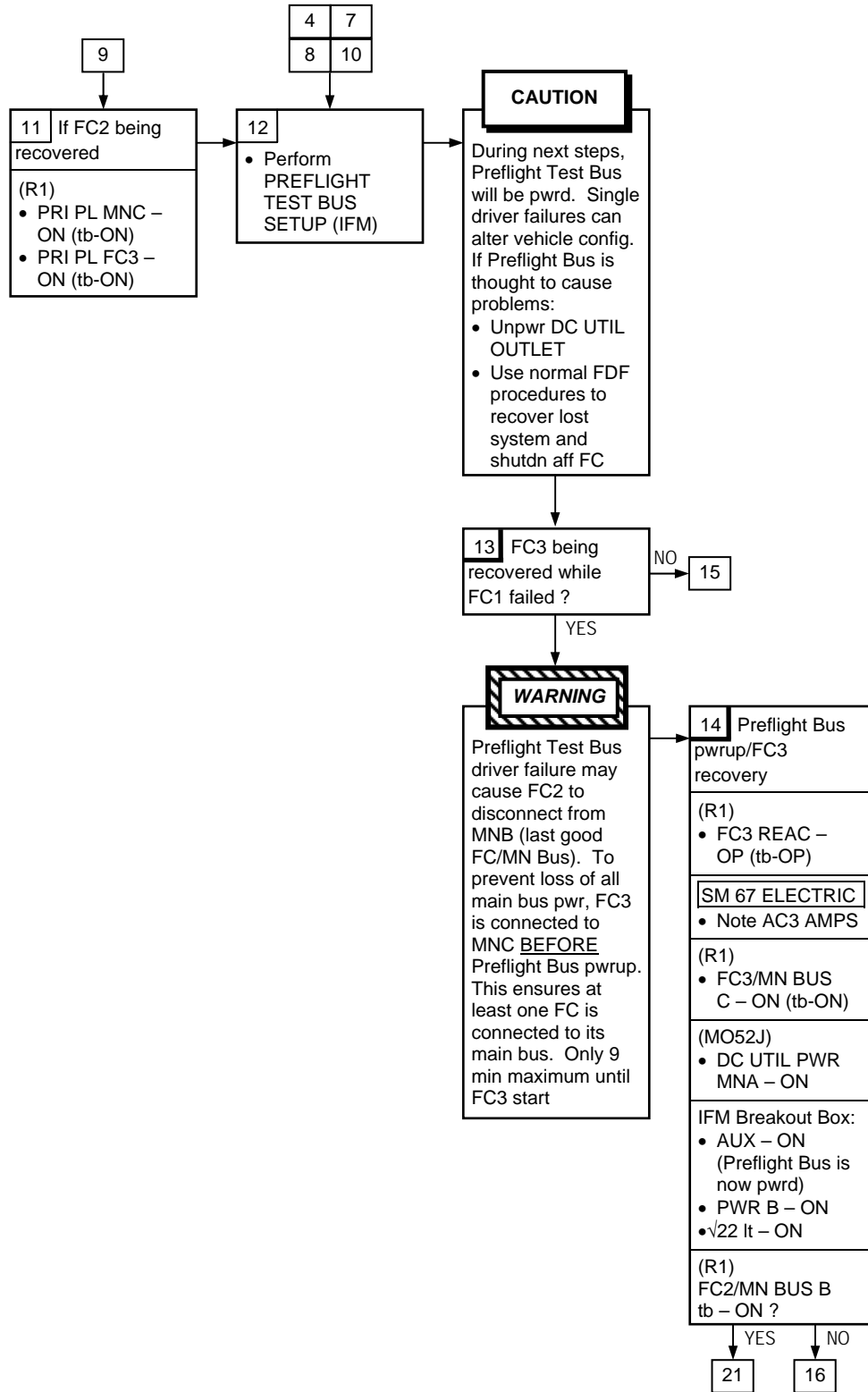
# EPS SSR-202 PREFLIGHT TEST BUS USE

## NOTE

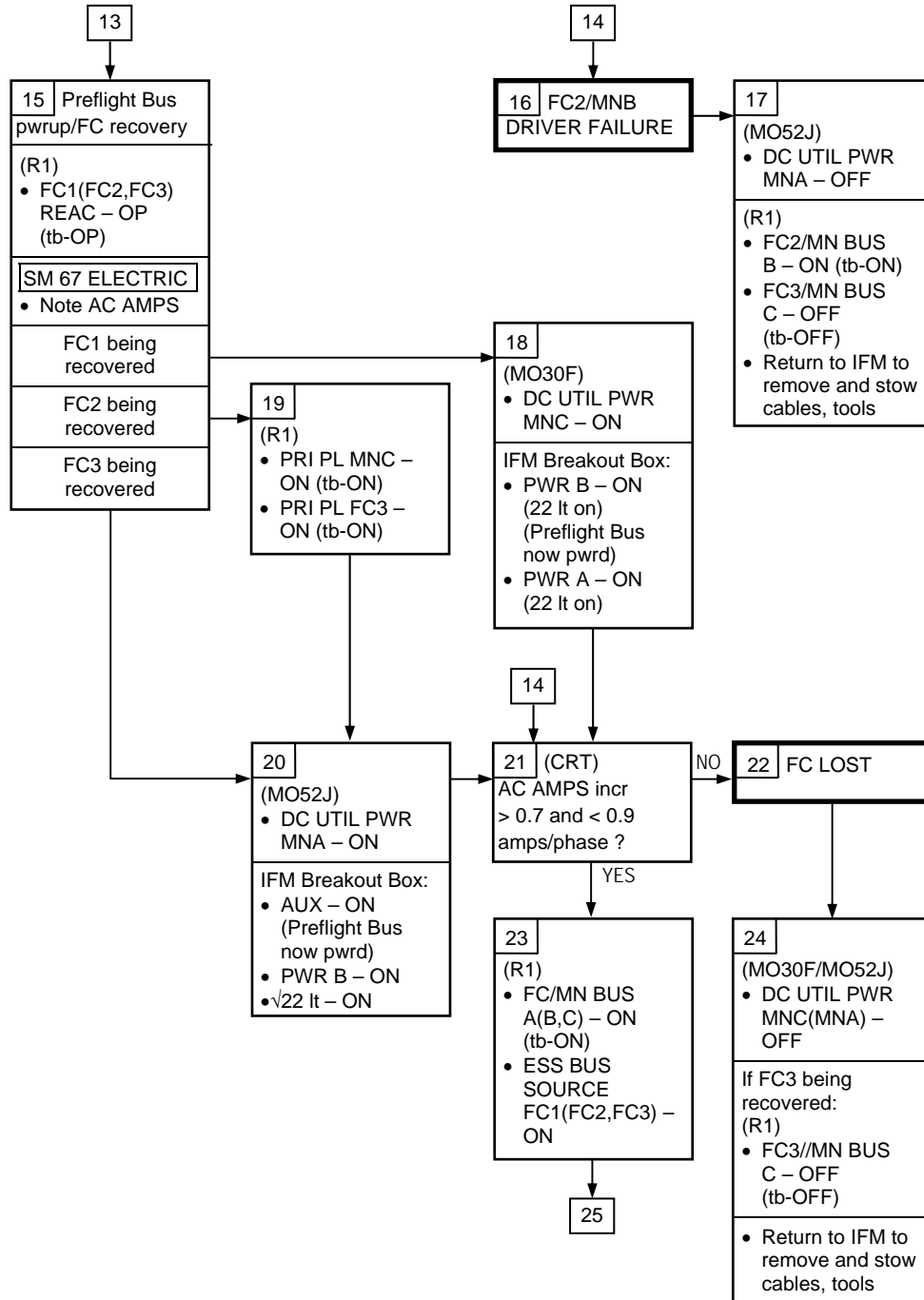
Powering Preflight Test Bus enables single string circuits that use launch MDMs and data bus normally used to operate many orbiter systems during ground turnaround. Due to design, a single driver failure could cause equipment to be inadvertently commanded whenever Preflight Test Bus is powered. See Table 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



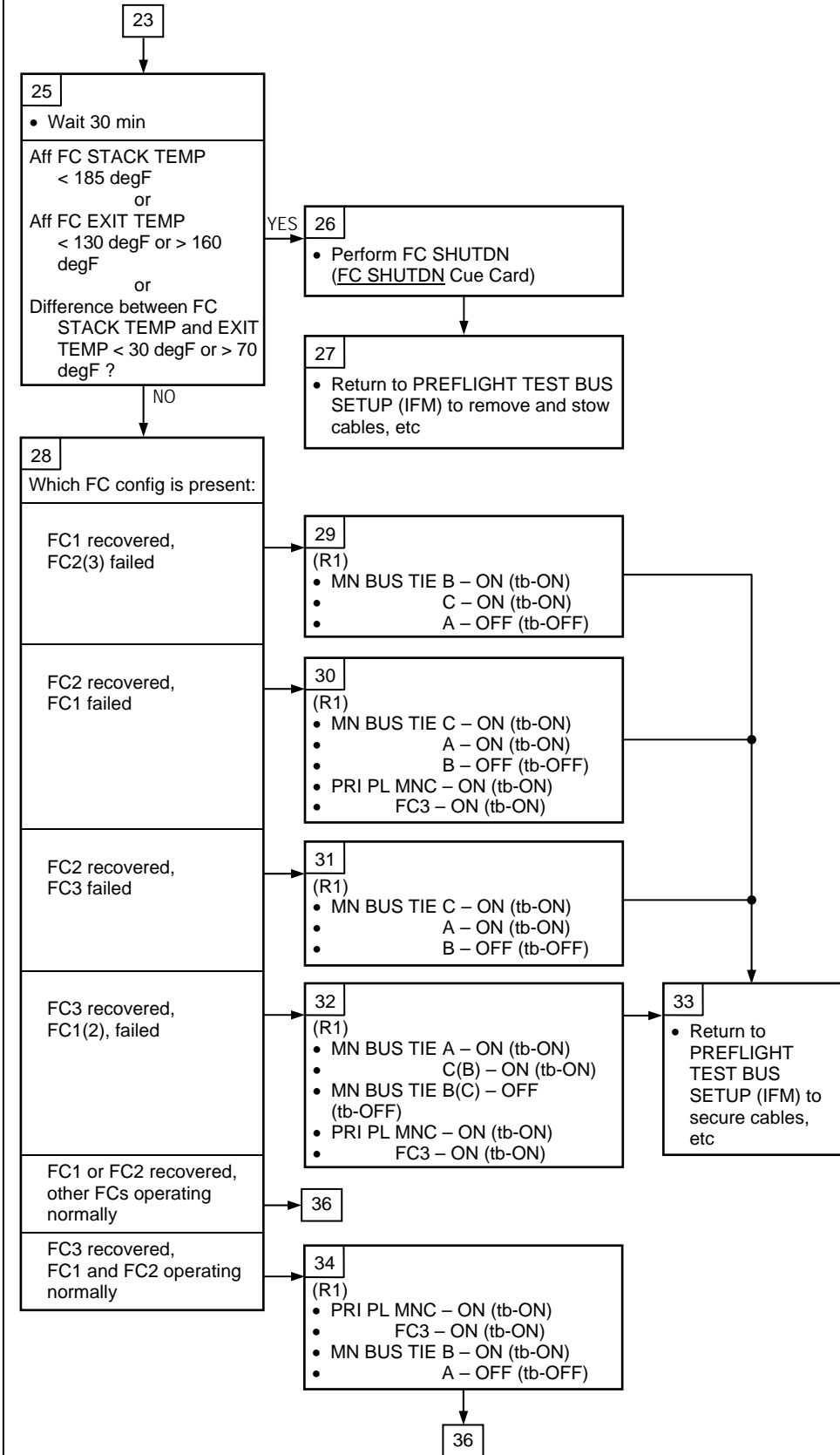
# EPS SSR-202 (Cont)



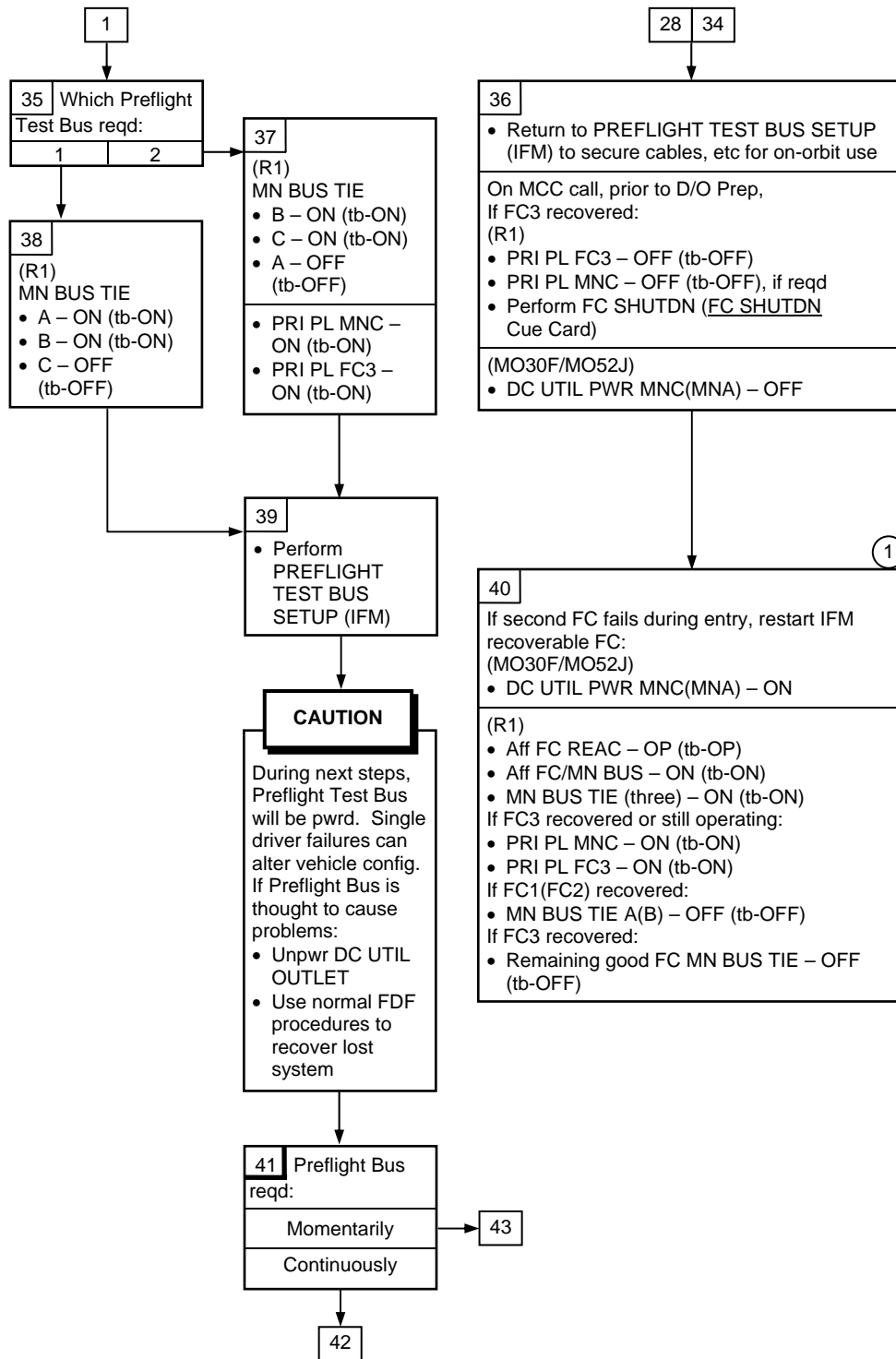
# EPS SSR-202 (Cont)



# EPS SSR-202 (Cont)

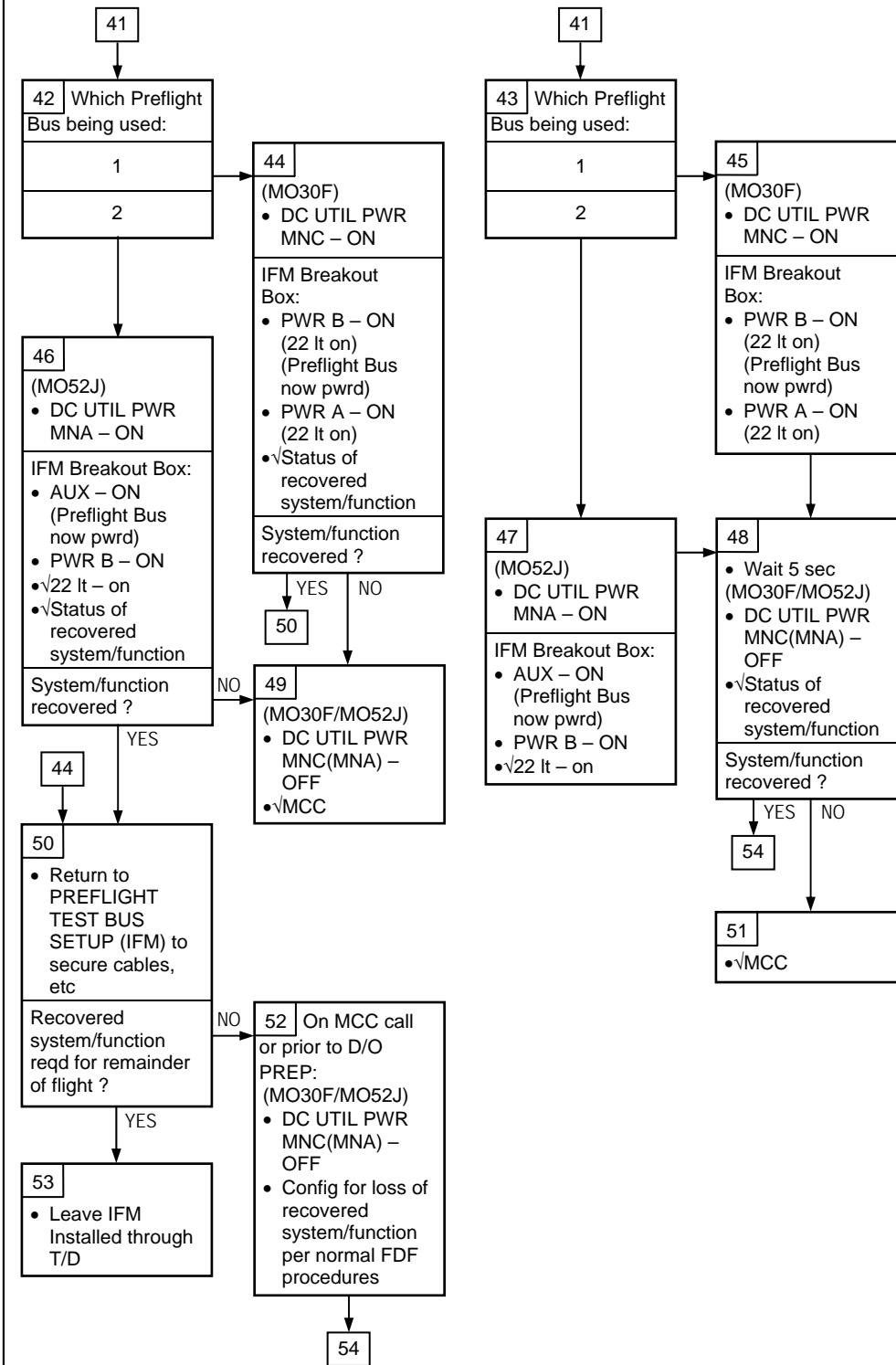


# EPS SSR-202 (Cont)



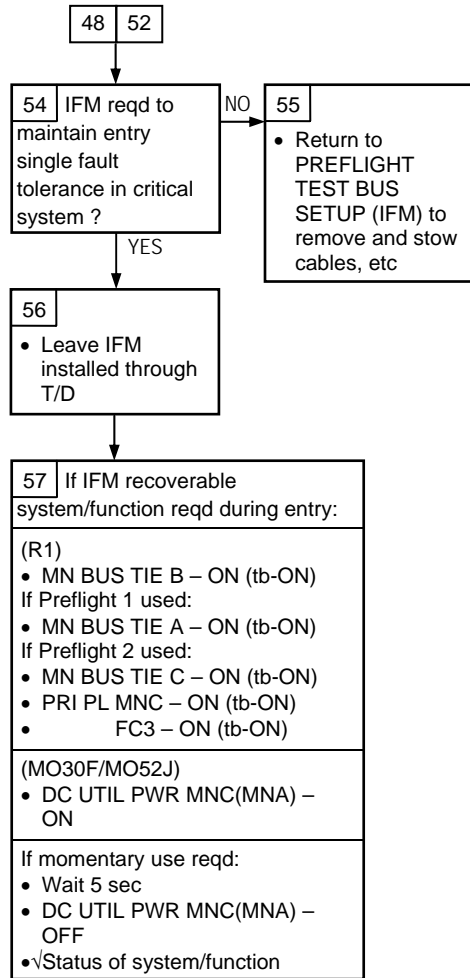
① Crewmember must be able to reach DC UTIL PWR switch while secured in seat

# EPS SSR-202 (Cont)





# EPS SSR-202 (Cont)



**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

Preflight Test Bus 1

FC1 PUMP POWER  
AV BAY 3 FIRE SUPP INH  
FC1 TO MNA ON/OFF  
MNA BUS TIE ON/OFF  
AC1 INV PWR ON/OFF  
AC1 INV TO BUS ON/OFF  
APU 1 FU VLV 1 OP (NC)  
APU 1 FU VLV 2 CL (NO)  
FCL PUMP 1A ON  
SMOKE DETN H/W ALERT INH

Preflight Test Bus 2

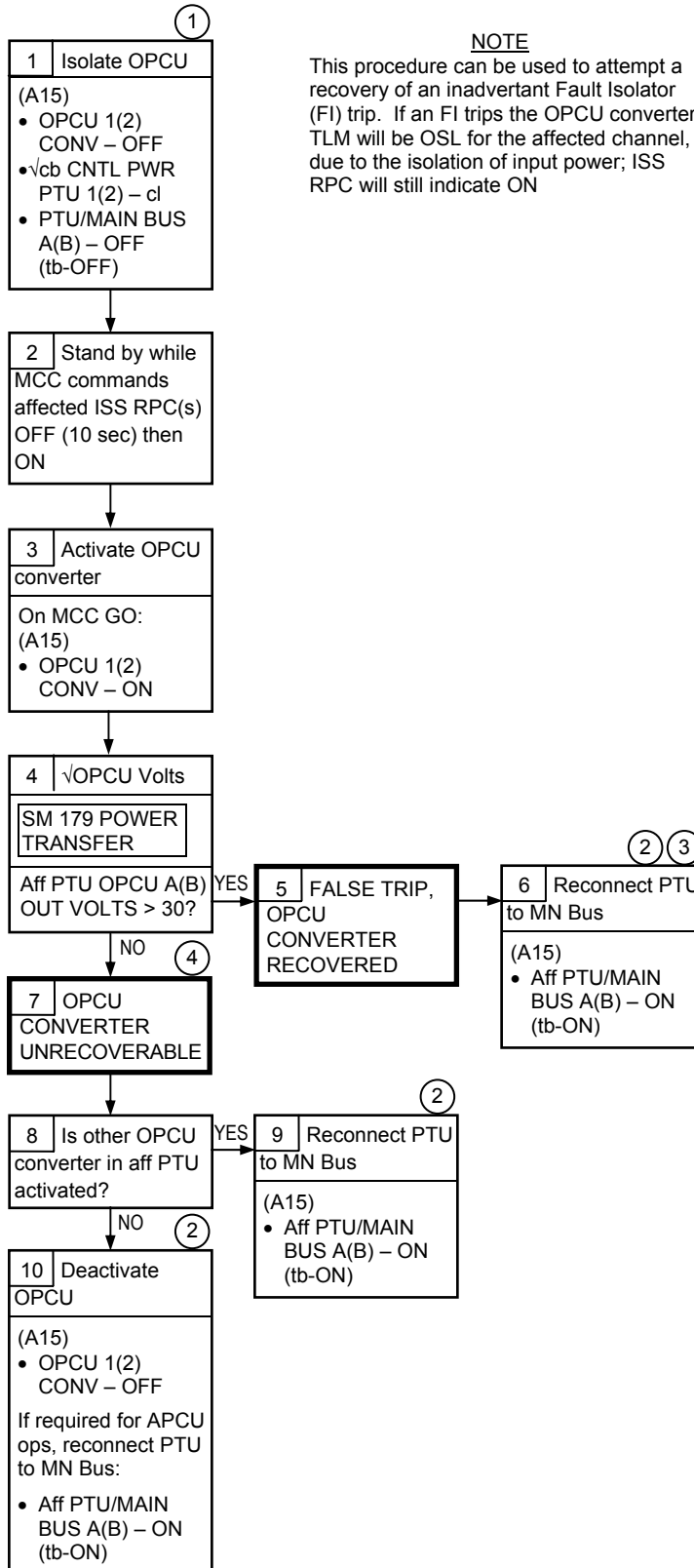
FC2(3) PUMP POWER  
AV BAY 1(2) FIRE SUPP INH  
FC2(3) TO MNB(C) ON/OFF  
MNB(C) BUS TIE ON/OFF  
AC2(3) INV PWR ON/OFF  
AC2(3) INV TO BUS ON/OFF  
APU 2(3) FU VLV 1 OP (NC)  
APU 2(3) FU VLV 2 CL (NO)  
FCL PUMP 2A ON  
CAB FAN A(B) ON  
IMU FAN A(B,C) ON



# EPS SSR-204 OPCU FAULT ISOLATOR TRIP RECOVERY

**Dual PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1,2 (two) – cl  
PTU/MAIN BUS A,B  
(two) – ON  
OPCU 1,2 CONV  
(two) – ON

**Single PTU Config:**  
(A15)  
cb CNTL PWR PTU  
1(2) – cl  
PTU/MAIN BUS  
A(B) – ON  
OPCU 1(2) CONV –  
ON



**NOTE**

This procedure can be used to attempt a recovery of an inadvertent Fault Isolator (FI) trip. If an FI trips the OPCU converter TLM will be OSL for the affected channel, due to the isolation of input power; ISS RPC will still indicate ON

- ① Associated APCU should be deactivated before procedure is started
- ② If required, APCU can be reactivated
- ③ Voltage will need to be adjusted on aff OPCU converter to desired setpoint
- ④ ISS will command off affected RPC. Other OPCU converter in affected PTU may be available

GNC

GNC FRP

GNC FRP-1	IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D.....	8-4
FRP-2	RECOVERY .....	8-5
FRP-3	IMU RECOVERY WITH AT LEAST ONE IMU AS GOOD REFERENCE .....	8-6

GNC SSR

GNC SSR-1	ACTIVATE IMU(s) .....	8-8
SSR-2	MATRIX (STAR) ALIGN USING HUD STAR DATA .....	A8-8
SSR-2	(TORQUE) ALIGN USING HUD STAR DATA .....	B8-8
SSR-3	ALIGN USING STR TRKR STAR DATA.....	8-10
SSR-4	RESERVED .....	not used
SSR-5	RESERVED .....	not used
SSR-6	RESERVED .....	not used
SSR-7	RESERVED .....	not used
SSR-8	POSITION OMS THROUGH CG.....	8-11
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	

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GNC FRP

# 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 TRKR 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



# GNC FRP-2 IMU REFERENCE RECOVERY

## NOTE

If GNC GPCs IPL'd, use GNC FRP-1 for Reference Recovery.  
Preferable to accomplish this procedure in OPS 2; however, it  
is also valid for MM301

- O6            1. Apply pwr to both STAR TRKRs  
                  √STAR TRKR PWR -Y,-Z – ON
- O14:A,       2. Ensure pwr applied to all IMUs  
O15:A,       IMU 1,2,3 – ON  
O16:A
- 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 (\*)

- O14:A, 2. Ensure pwr applied to all IMUs  
O15:A, If not, ACTIVATE IMU(s) . . . . . **GNC SSR-1**  
O16:A

## NOTE

If ITEMS 4, 5, or 6 executed, wait for asterisks to appear (~90 sec)

3. Ensure all IMUs in OPERATE mode

**GNC 21 IMU ALIGN**

√IMUs: OPER – ITEM 4,5,6 EXEC (\*)

## NOTE

Possible erroneous IMU BITE/T 1(2,3) msg  
after GNC I/O RESET. Ignore msg unless  
MCC advises otherwise, or if no comm

4. Enable serial data link  
GNC I/O RESET

## NOTE

Both nonreference IMUs should be aligned to preclude possibility  
of IMU RM FAIL (RM threshold reset following any align)

5. Reestablish skew between IMUs. Choose IMU with good reference and align  
other two IMUs with IMU to IMU ALIGN. Use good IMU as reference for  
align – IMU to IMU ALIGNMENT (ORB OPS, **GNC**)
6. Reselect IMUs previously deselected

**GNC 21 IMU ALIGN**

DES – ITEM 7(8,9) EXEC (no \*)

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## GNC SSR-1 ACTIVATE IMU(s)

O6           √MDM FF 1(2,3) – ON  
O14:A,       IMU 1(2,3) – ON  
O15:A,  
O16:A  
L1           √IMU FAN A(B,C) – ON (if avail)

**GNC 21 IMU ALIGN**

### 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

F3           Remove L(R) HUD Cover  
F6U(F8U)   L(R) HUD PWR – ON  
                  MODE – TEST  
              Wait ~15 sec for final symbology of test mode  
              L(R) HUD BRT – MAN NIGHT  
              MAN BRT – as reqd

O14:E,       √cb DDU L(R) (two) – cl  
O15:E,  
O16:E  
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  $> 35^\circ$  and  $< 145^\circ$  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  $1 \geq 35 \text{ deg}, \leq 145 \text{ deg}$   
ERR  $1 \leq .2$

√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  $\Delta X, \Delta Y, \Delta Z$ :  $< = .80$   
Rcd ANG    1                    2                    3  
  
 $\Delta X$     ( ) \_\_\_ . \_\_\_    ( ) \_\_\_ . \_\_\_    ( ) \_\_\_ . \_\_\_  
 $\Delta Y$     ( ) \_\_\_ . \_\_\_    ( ) \_\_\_ . \_\_\_    ( ) \_\_\_ . \_\_\_  
 $\Delta Z$     ( ) \_\_\_ . \_\_\_    ( ) \_\_\_ . \_\_\_    ( ) \_\_\_ . \_\_\_

**CAUTION**  
If ANG  $\Delta X, \Delta Y, \Delta Z > .80$  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, Rcd \_\_\_ . \_\_\_  
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 \*)

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GNC SSR

## GNC SSR-1 ACTIVATE IMU(s)

O6           √MDM FF 1(2,3) – ON  
O14:A,       IMU 1(2,3) – ON  
O15:A,  
O16:A  
L1           √IMU FAN A(B,C) – ON (if avail)

**GNC 21 IMU ALIGN**

### NOTE

IMU 1(2,3) TEMP – LO indication may be displayed. Proceed

CRT           √IMU 1(2,3): DES – ITEM 7(8,9) EXEC (\*)  
                  OPER – ITEM 4(5,6) EXEC (\*)

### NOTE

If ITEMS 4,5, or 6 executed, wait for asterisks to appear (~90 sec)

GNC I/O RESET

## GNC SSR-2 MATRIX (TORQUE) ALIGN USING HUD STAR DATA

### CAUTION

If RMS/payload unberthed, either enable Aft PRCS only or berth payload before proceeding

### NOTE

In OPS 201, if Verniers not available, use FREE mode

F3           Remove L(R) HUD Cover  
F6U(F8U)   L(R) HUD PWR – ON  
                  MODE – TEST  
                  Wait ~15 sec for final symbology of test mode  
                  L(R) HUD BRT – MAN NIGHT  
                  MAN BRT – as reqd

O14:E,       √cb DDU L(R) (two) – cl  
O15:E,  
O16:E  
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

√REF STAR, ITEM 13 – (\*)  
 TYPE, ITEM 15 EXEC (MATRIX)  
 DAP: INRTL  
 DAP ROT: PULSE/PULSE/PULSE  
 CRT EXEC – ITEM 16 EXEC (\*), Rcd MET \_\_\_ : \_\_\_ : \_\_\_  
 √EXEC – ITEM 16 (no \*)  
 DAP: as reqd

If Torque Align

√REF STAR, ITEM 13 – (\*)  
 √TYPE, ITEM 15 – TORQUE  
 √ANG 1,2,3 ΔX,ΔY,ΔZ: ≤ .80  
 Rcd ANG    1                    2                    3  
 ΔX    ( ) \_\_\_ . \_\_\_ ( ) \_\_\_ . \_\_\_ ( ) \_\_\_ . \_\_\_  
 ΔY    ( ) \_\_\_ . \_\_\_ ( ) \_\_\_ . \_\_\_ ( ) \_\_\_ . \_\_\_  
 ΔZ    ( ) \_\_\_ . \_\_\_ ( ) \_\_\_ . \_\_\_ ( ) \_\_\_ . \_\_\_

**CAUTION**  
 If ANG ΔX,ΔY,ΔZ > .80 for two or more IMUs:  
 DO NOT TORQUE PLATFORMS  
 EXCEPT UNDER MCC INSTRUCTIONS

CRT EXEC – ITEM 16 EXEC (\*), Rcd MET \_\_\_ : \_\_\_ : \_\_\_  
 √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, Rcd \_\_\_ . \_\_\_  
SEL – ITEM 17,18 (\*)

### GNC 21 IMU ALIGN

√IMU 1(2,3) STAT – (blank)  
√REF STAR, ITEM 13 – (\*)  
TYPE, ITEM 15 EXEC (MATRIX)  
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (\*)  
EXEC – ITEM 16 EXEC (\*), Rcd MET \_\_\_ : \_\_\_ : \_\_\_  
√EXEC – ITEM 16 (no \*)

# GNC SSR-8 POSITION OMS THROUGH CG

## NOTE

This procedure sets up a dummy single engine L(R) OMS burn to position L(R) OMS Thrust Vector through CG. Actual burn will not be executed. When procedure completed, L(R) OMS will be protected from loss due to PRI(SEC) GMBL pwr or data path failures

GNC, OPS 202(302) PRO

GNC XXXXX MNVR YYYYY

If L OMS to be positioned:

| L OMS PRI(SEC) SEL – ITEM 28(30) EXEC

If R OMS to be positioned:

R OMS PRI(SEC) – ITEM 29(31) EXEC

C3  
CRT

√OMS ENG (two) – OFF

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:

| GNC, OPS 201 PRO

If in OPS 3, and at burn attitude:

Reload Burn Pad

## NOTE

Displayed GMBL position is not updated when GMBL OFF.

If in OPS 2, on transition to OPS 3 (prior to deorbit) P/Y positions will read 1.0 deg and GMBL fail will be annunciated

# GNC SSR-9

## RM DESELECTION OF FAILED OPEN THC CONTACT

### NOTE

This procedure will allow RM to deselect failed open THC contact in OPS 2. Use this SSR only under direction from MCC. Procedure will cause primary RCS jet firings which must be coordinated with MCC. Assumes two good channels exist in axis/direction with failed open contact

#### 1. CONFIG DAP FOR MINIMUM TRANS PULSE

GNC 20 DAP CONFIG

C3

DAP A(B) TRANS PLS – ITEM 17(37) +0.0 1 EXEC  
DAP TRANS: PULSE/PULSE/PULSE/LOW Z

#### 2. RESELECT FAILED OPEN CONTACT

GNC 25 RM ORBIT

SEL FAILED CONTACT – ITEM X EXEC

Verify no '↓'s on affected row  
√SW RM INH – ITEM 16 (no \*)

#### 3. DEFLECT THC

O14:E,  
O15:E,  
O16:E  
F7(A6U)

√cb DDU L(A) (two) – cl

L(A) FLT CNTLR PWR – ON

L(A) THC – deflect in aff axis for 1 sec

### NOTE

This step will cause PRCS jets to fire for 80-320 msec.  
Expect SBTC/THC Fault Summary msg

Verify '↓' for failed contact

#### 4. RECONFIG DAP

GNC 20 DAP CONFIG

F7(A6U)  
O14:E,  
O15:E,  
O16:E

Reload DAP A(B) as reqd  
DAP TRANS: as reqd  
L(A) FLT CNTLR PWR – OFF  
cb DDU L(A) (two) – as reqd

MECH

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## RADIATOR POWER CONFIGURATION

ACTUATOR	MTR	MICROSW POWER	AC POWER			MCA LOGIC			
						LAT/RAD CNTL		LOGIC PWR	
			BUS	MECH PWR 1	MECH PWR 2	SYS A	SYS B	REL/DPLY	LAT/STOW
STBD 1-6	1	MNA MMC3 (MPC1)	AC1 MMC3		AB1, CA1 AND AB2, CA2	AB1		AB1	AB1
	2	MNB MMC2 (MPC2)	AC2 MMC2	BC1 AND BC2			BC1	BC1	BC1
STBD 7-12	1	MNA MMC3 (MPC1)	AC1 MMC3		AB1, CA1 AND AB2, CA2	AB2		AB2	AB2
	2	MNC MMC2 (MPC3)	AC3 MMC2	AB1, CA1 AND AB2, CA2			CA1	CA1	CA1
STBD DRIVE	1	MNC MMC4 (MPC3)	AC1 MMC3		AB1, CA1 AND AB2, CA2		BC1 AND BC2	BC1 AND BC2	MNA MMC3 AND BC1
	2	MNA MMC1 (MPC1)	AC3 MMC2	AB1, CA1 AND AB2, CA2		AB1 AND AB2		AB1 AND AB2	MNC MMC2 AND AB2
PORT 1-6	1	MNA MMC1 (MPC1)	AC1 MMC1	AB1, CA1 AND AB2, CA2		AB2		AB2	AB2
	2	MNB MMC4 (MPC2)	AC2 MMC4		BC1 AND BC2		BC2	BC2	BC2
PORT 7-12	1	MNA MMC1 (MPC1)	AC1 MMC1	AB1, CA1 AND AB2, CA2		AB1		AB1	AB1
	2	MNC MMC4 (MPC3)	AC3 MMC4		AB1, CA1 AND AB2, CA2		CA2	CA2	CA2
PORT DRIVE	1	MNC MMC2 (MPC3)	AC1 MMC1	AB1, CA1 AND AB2, CA2		AB1 AND AB2		AB1 AND AB2	MNA MMC1 AND AB1
	2	MNA MMC3 (MPC1)	AC3 MMC4		AB1, CA1 AND AB2, CA2		CA1 AND CA2	CA1 AND CA2	MNC MMC4 AND CA2

9-2

MAL/ALL/GEN I

### PLBD POWER/MDM CONFIGURATION

FUNCTION	PLBD CONTROL								PLBD DISPLAY PL MDM											
	Ref: MA73C: C&D for MCA (cb)																			
	MTR 1				MTR 2				C	C	O	O	C	R	R	R	O			
	AC/MCA	CNTL	MDM	SYS	AC/MCA	CNTL	MDM	SYS	A	B	A	B	A	B	C					
LATCH																				
5-8	1/MID3	AB3/AB2	PL1	2	3/MID2	CA3/CA1	PL2	1	1	2	1	2								
9-12	1/MID1	AB3/AB1	PL1	1	3/MID4	CA3/CA2	PL2	2	1	2	1	2								
1-4	1/MID3	AB3/AB2	PL1	2	3/MID2	CA3/CA1	PL2	1	1	2	1	2								
13-16	3/MID4	CA3/CA2	PL2	2	2/MID2	BC3/BC1	PL1	1	2	1	2	1								
S FWD	1/MID1	AB3/AB1	PL1	1	2/MID4	BC3/BC2	PL2	2	1	2	1	2								
S AFT	3/MID4	CA3/CA2	PL2	2	2/MID2	BC3/BC1	PL1	1	2	1	2	1								
S DOOR	1/MID1	AB3/AB1	PL1	1	2/MID4	BC3/BC2	PL2	2								1	1	2	2	1
																2	1	2	2	2
P FWD	1/MID1	AB3/AB1	PL1	1	2/MID4	BC3/BC2	PL2	2	1	2	1	2								
P AFT	1/MID3	AB3/AB2	PL1	2	3/MID2	CA3/CA1	PL2	1	1	2	1	2								
P DOOR	3/MID4	CA3/CA2	PL2	2	2/MID2	BC3/BC1	PL1	1								2	1	1	2	2
																1	1	1	2	1

**MECH**

①

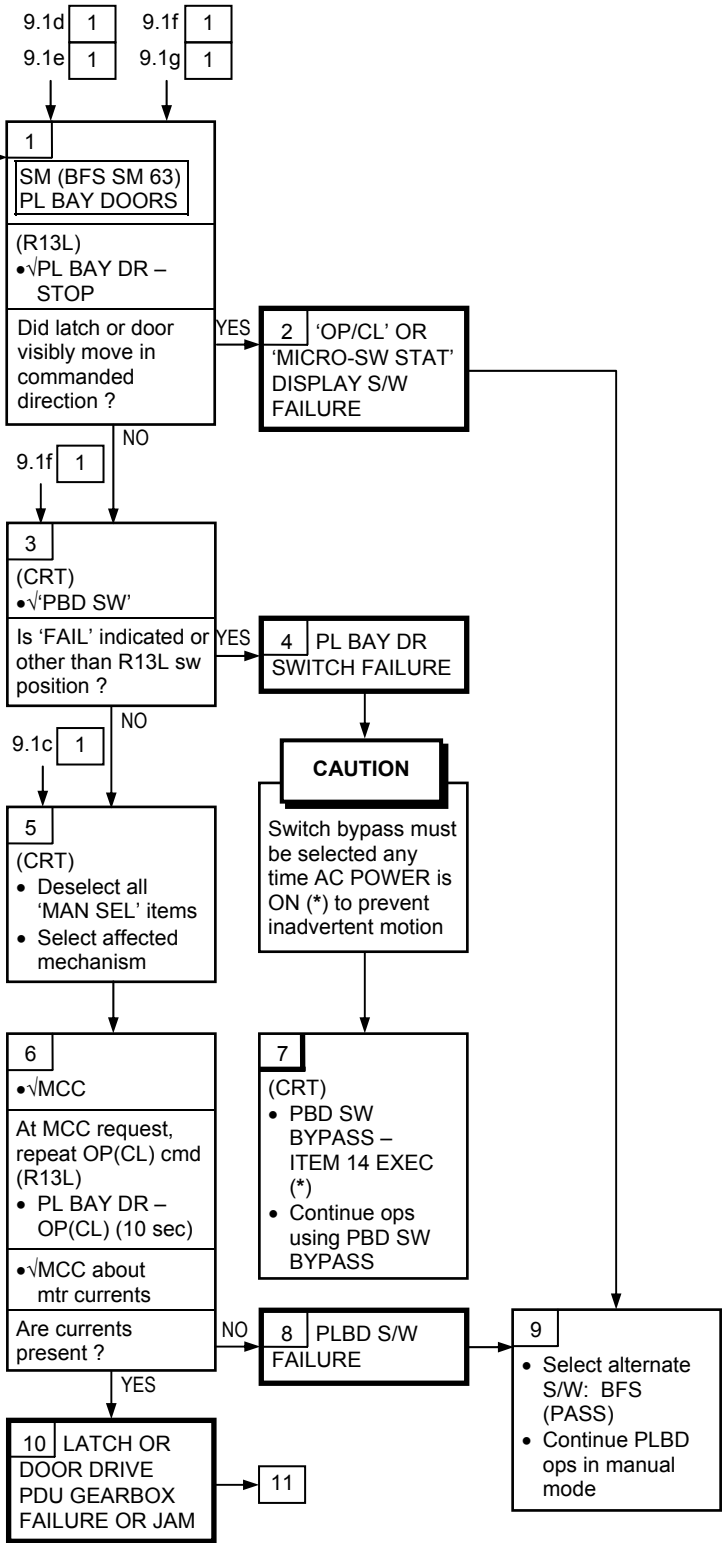
No Motion after Drive Initiation  
~10 sec

'OP/CL' Status Not Blank after Drive Initiation  
~10 sec

All 'O' or 'C'/R' 'MICRO-SW STAT' = 1 after Drive Initiation  
~10 sec

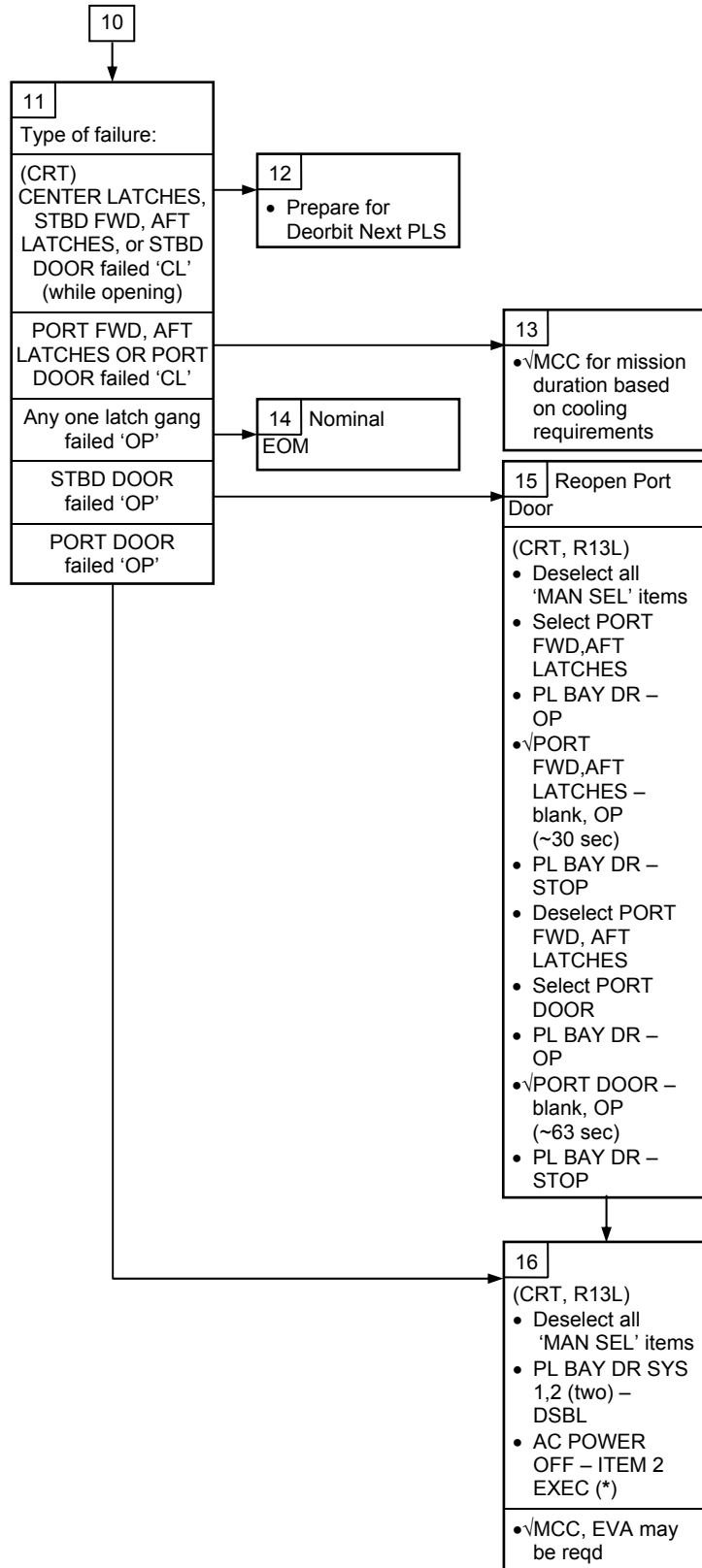
**Nominal Config:**  
 (R13L)  
 PL BAY DR  
 SYS 1,2 (two) – ENA  
 (MA73C)  
 MCA LOGIC  
 MNA MID 1,3 (two) – ON  
 MNB MID 2,4 (two) – ON  
 MNC MID 2,4 (two) – ON  
 cb MCA PWR  
 AC1 3Φ MID 1,3 (two) – cl  
 AC2 3Φ MID 2,4 (two) – cl  
 AC3 3Φ MID 2,4 (two) – cl  
 (CRT)  
 AC POWER ON, ITEM 1 – \*

**9.1a NO MOTION/'OP/CL' NOT BLANK/'O' OR 'C'/R' MICROSW = 1 AFTER DRIVE INITIATION**



① Ops Times  
 CENTER LATCHES  
 2 mtrs ~20 sec  
 1 mtr ~40 sec  
 FWD,AFT LATCHES  
 2 mtrs ~30 sec  
 1 mtr ~60 sec  
 DOOR  
 2 mtrs ~63 sec  
 1 mtr ~126 sec





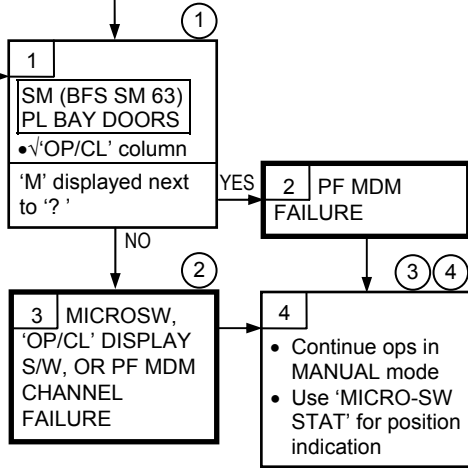
**MECH**

**9.1b '?' DISPLAYED IN 'OP/CL' COLUMN**

'?' Displayed in 'OP/CL' column

**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 – \*

- 9.1c 2
- 9.1d 1
- 9.1e 1
- 9.1f 1
- 9.1g 1
- 9.1h 5



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 or  
 two 'C' and not (two of three) FWD and AFT 'R': microsws or  
 two 'O' and (two of three) FWD or AFT 'R' microsws

② Failed-on door CL microsw can be bypassed to regain mtr function (refer to MECH SSR-6)

③ In most cases, AUTO mode will not work with '?' indicated

④ One microsw attained in commanded direction within single mtr time is sufficient verification of position if visual cues not available

**MECH**

**9.1c PBD SEQ FAIL**

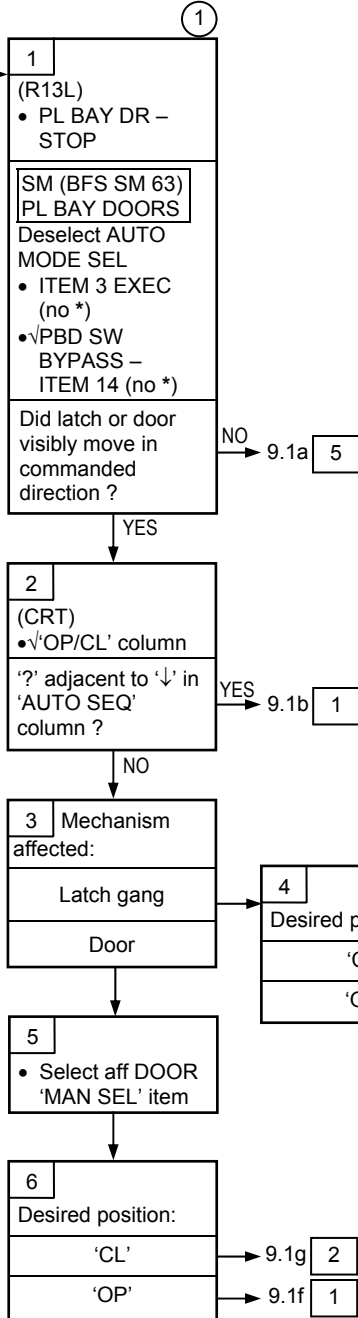
PBD SEQ FAIL

SM (BFS SM 63) PL BAY DOORS

If:  
 ↓ in 'AUTO SEQ' column adjacent to timed-out PLBD mechanism

BFS:  
 S63 PBD SEQ FAIL

**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 – \*



① Although PBD SEQ FAIL will terminate AUTO MODE, ITEM 3 (AUTO MODE SEL) remains selected (\*). To reselect AUTO MODE, ITEM 3 must be deselected (no \*), then reselected (\*)

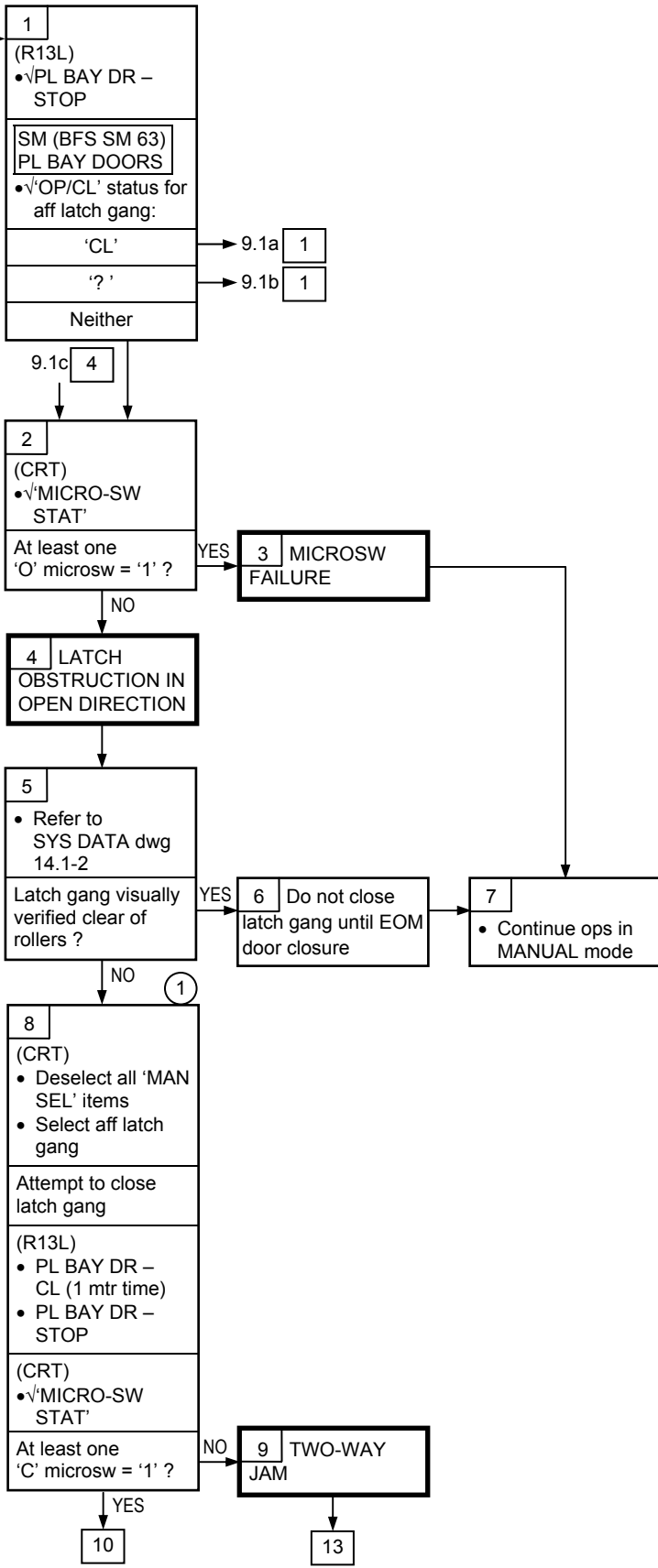
**MECH**

**9.1d LATCH GANG NOT 'OP' IN SINGLE MTR TIME**

① Latch Gang Does Not Indicate 'OP' in Single Mtr Drive Time

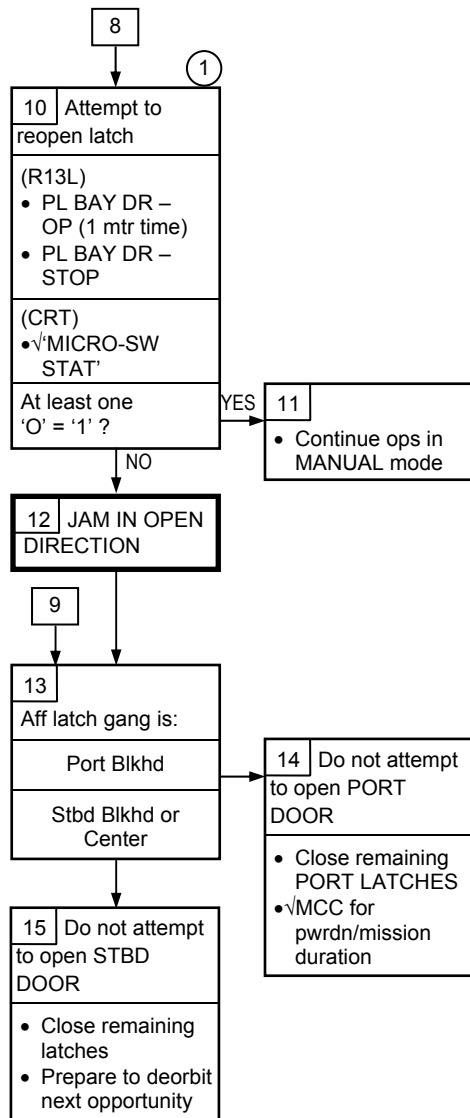
**Nominal Config:**

- (R13L)
- PL BAY DR
- SYS 1,2 (two) – ENA
- (MA73C)
- MCA LOGIC
- MNA MID 1,3 (two) – ON
- MNB MID 2,4 (two) – ON
- MNC MID 2,4 (two) – ON
- cb MCA PWR
- AC1 3Φ MID 1,3 (two) – cl
- AC2 3Φ MID 2,4 (two) – cl
- AC3 3Φ MID 2,4 (two) – cl
- (CRT)
- AC POWER ON, ITEM 1 – \*



- ① Ops Times
- CENTER LATCHES
  - 2 mtrs ~20 sec
  - 1 mtr ~40 sec
  - FWD,AFT LATCHES
  - 2 mtrs ~30 sec
  - 1 mtr ~60 sec
  - DOORS
  - 2 mtrs ~63 sec
  - 1 mtr ~126 sec

**MECH 9.1d (Cont)**



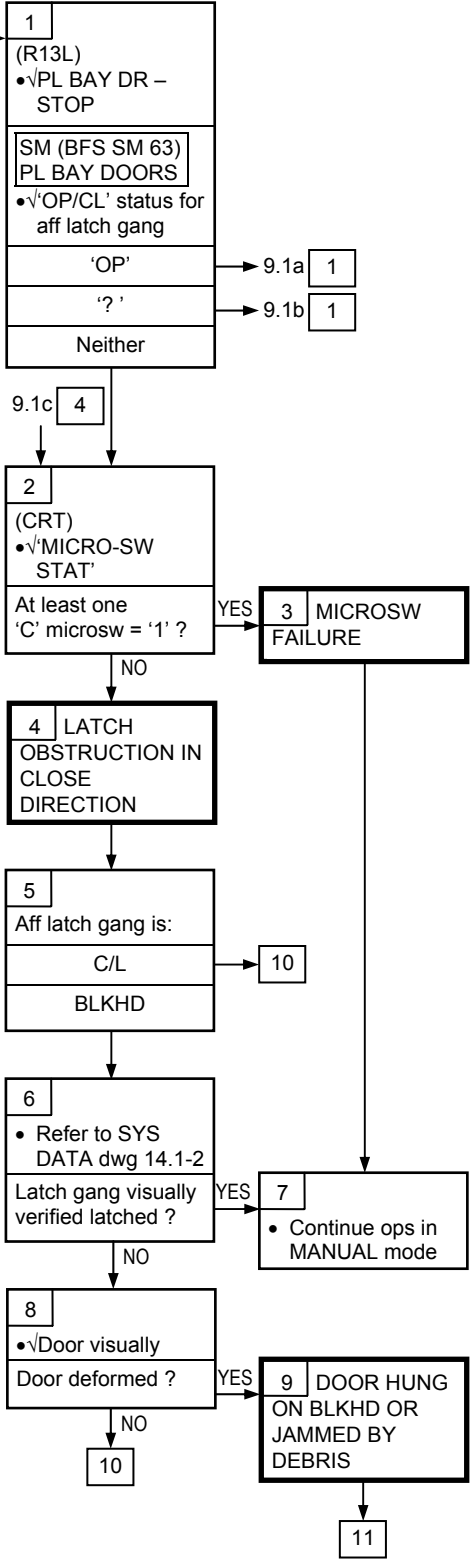
- ① Ops Times  
 CENTER LATCHES  
 2 mtrs ~20 sec  
 1 mtr ~40 sec  
 FWD,AFT  
 LATCHES  
 2 mtrs ~30 sec  
 1 mtr ~60 sec  
 DOORS  
 2 mtrs ~63 sec  
 1 mtr ~126 sec

**MECH**

**9.1e LATCH GANG NOT 'CL' IN SINGLE MTR TIME**

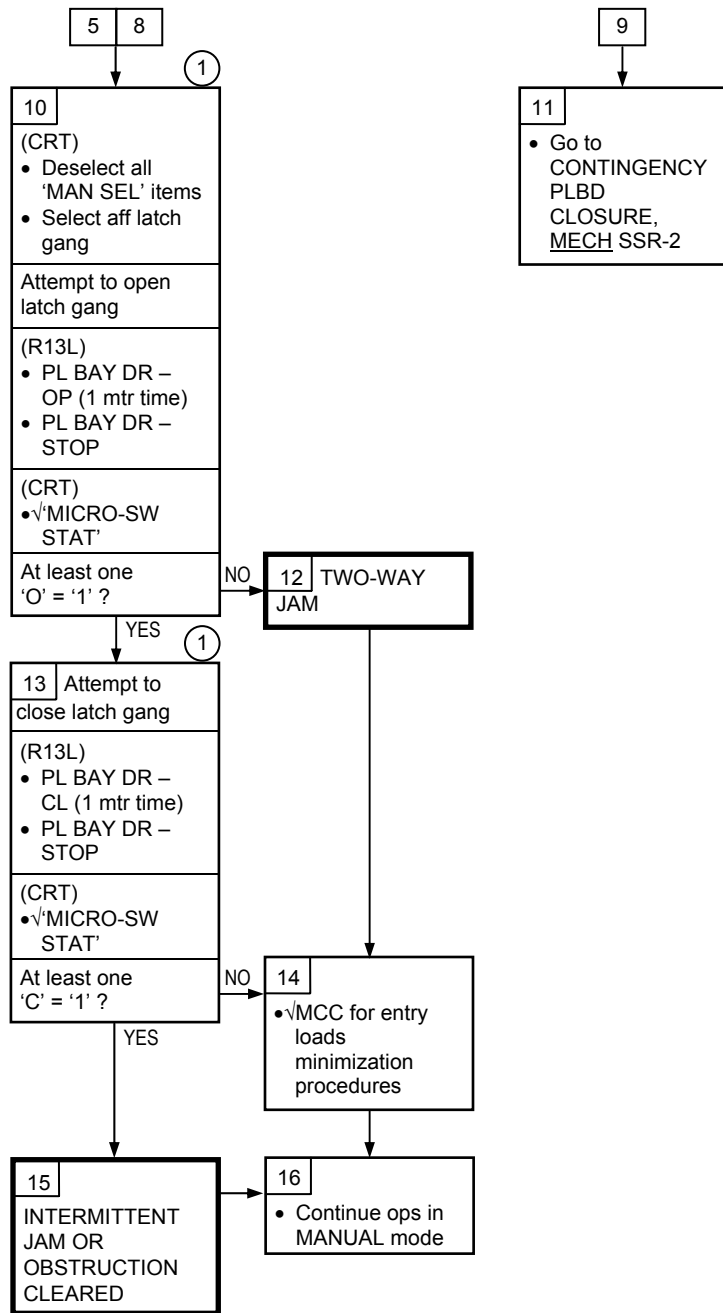
① Latch Gang Does Not Indicate 'CL' in Single Mtr Drive Time

**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  
 (CRT)  
 AC POWER ON, ITEM 1 – \*



① Ops Times  
 CENTER LATCHES  
 2 mtrs ~20 sec  
 1 mtr ~40 sec  
 FWD,AFT LATCHES  
 2 mtrs ~30 sec  
 1 mtr ~60 sec  
 DOOR  
 2 mtrs ~63 sec  
 1 mtr ~126 sec

**MECH 9.1e (Cont)**



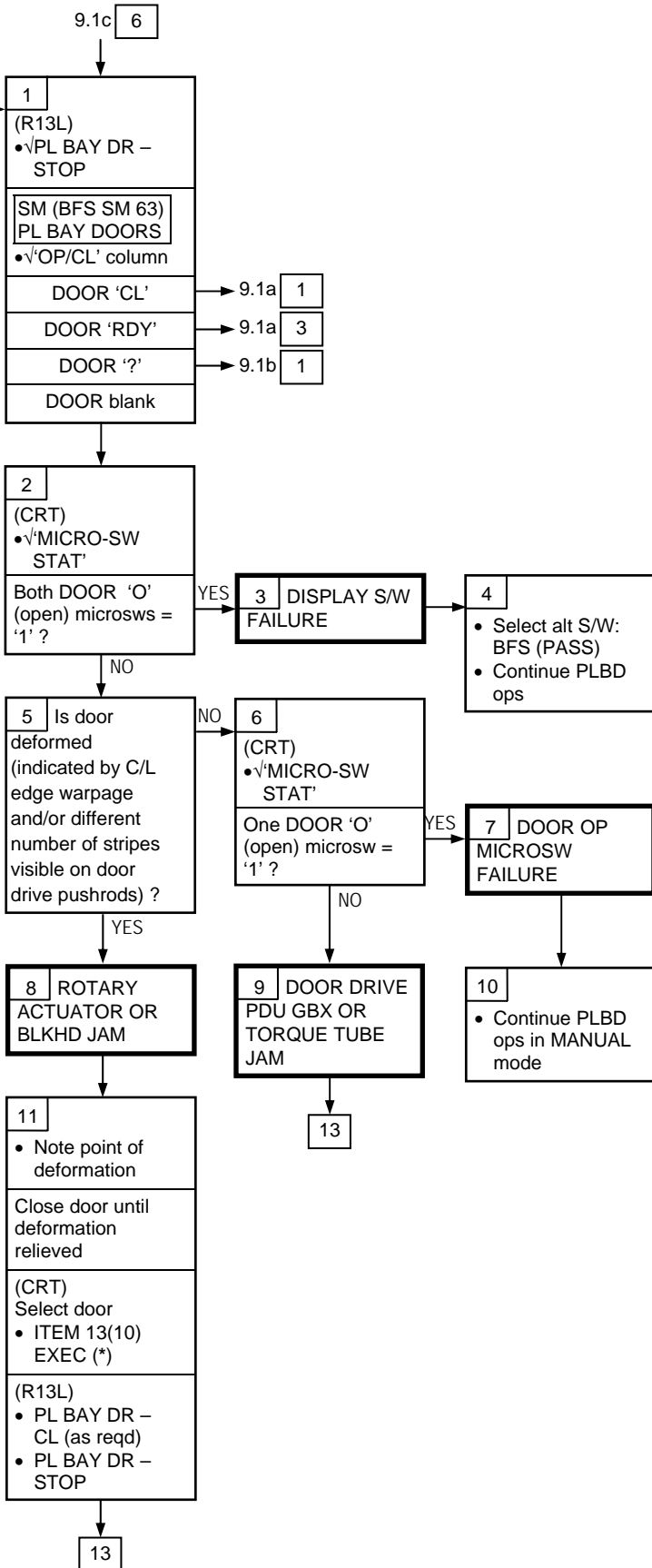
- ① Ops Times  
 CENTER LATCHES  
 2 mtrs ~20 sec  
 1 mtr ~40 sec  
 FWD, AFT LATCHES  
 2 mtrs ~30 sec  
 1 mtr ~60 sec  
 DOOR  
 2 mtrs ~63 sec  
 1 mtr ~126 sec

**MECH**

**9.1f DOOR NOT 'OP' IN SINGLE MTR TIME**

① Door Does Not Indicate 'OP' in Single Mtr Time

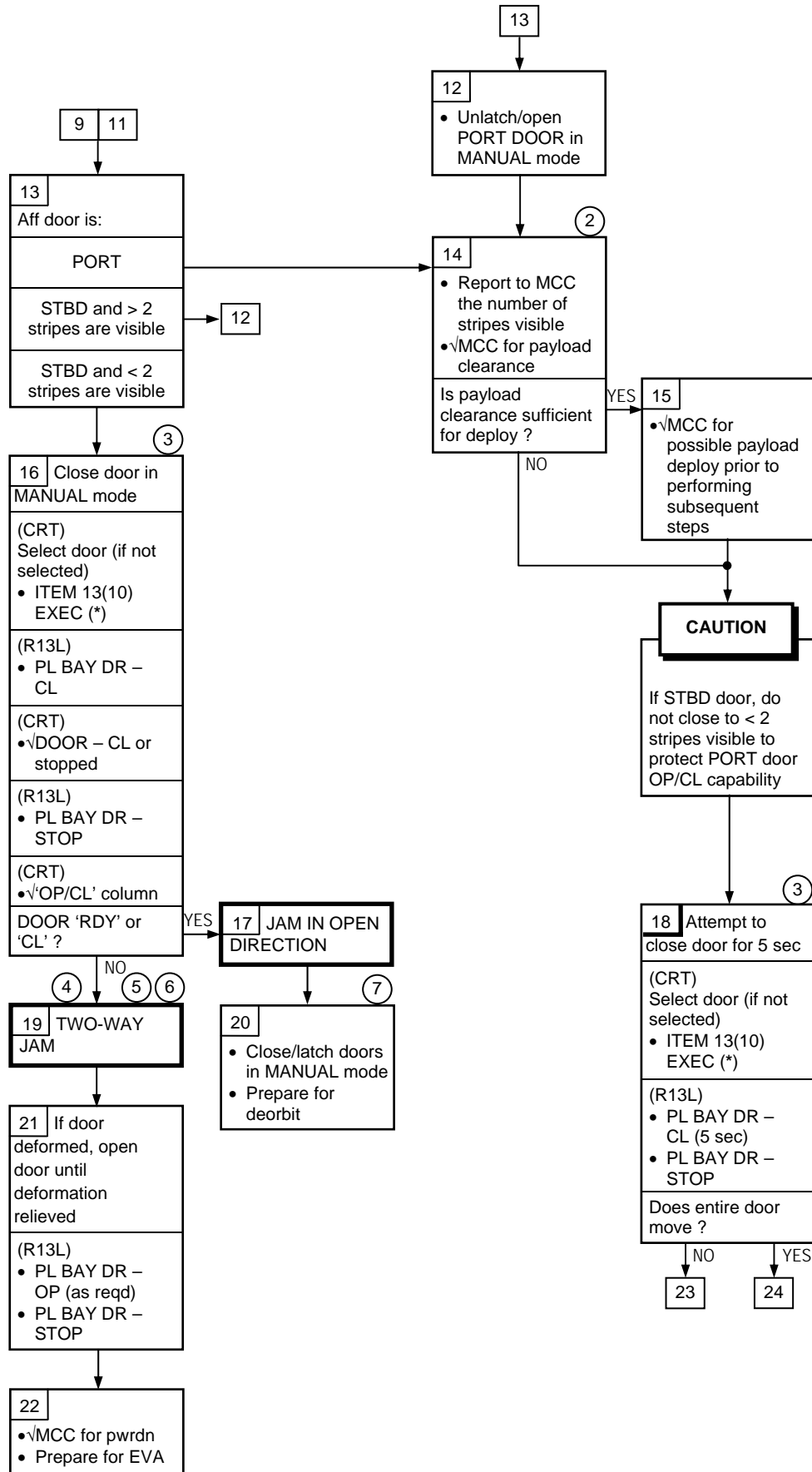
**Nominal Config:**  
 (R13L)  
 PL BAY DR  
 SYS 1,2 (two) – ENA  
 (MA73C)  
 MCA LOGIC  
 MNA MID 1,3 (two) – ON  
 MNB MID 2,4 (two) – ON  
 MNC MID 2,4 (two) – ON  
 cb MCA PWR  
 AC1 3Φ MID 1,3 (two) – cl  
 AC2 3Φ MID 2,4 (two) – cl  
 AC3 3Φ MID 2,4 (two) – cl  
 (CRT)  
 AC POWER – ON  
 (ITEM 1 – \*)



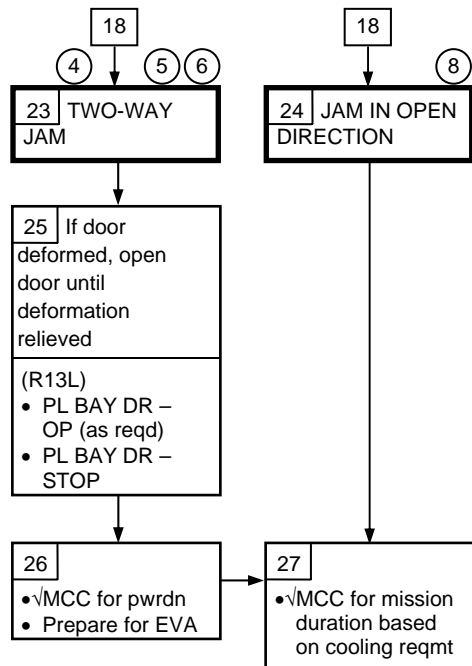
① Drive Times  
 CENTER LATCHES  
 2 mtrs ~20 sec  
 1 mtr ~40 sec  
 FWD,AFT LATCHES  
 2 mtrs ~30 sec  
 1 mtr ~60 sec  
 DOORS  
 2 mtrs ~63 sec  
 1 mtr ~126 sec



**MECH 9.1f (Cont)**



- ② Door may interfere with payload deploy
- ③ Cmd door to close to see if EVA necessary to CL
- ④ For rotary actuator jam, EVA reqd to cut door drive linkage(s) closest to point of deformation
- ⑤ For door drive PDU gearbox jam, EVA reqd to disconnect PDU
- ⑥ For door drive torque tube jam, EVA reqd to remove obstruction or cut door drive linkage(s)
- ⑦ If door reopen were attempted, two-way jam could occur causing day-1 EVA



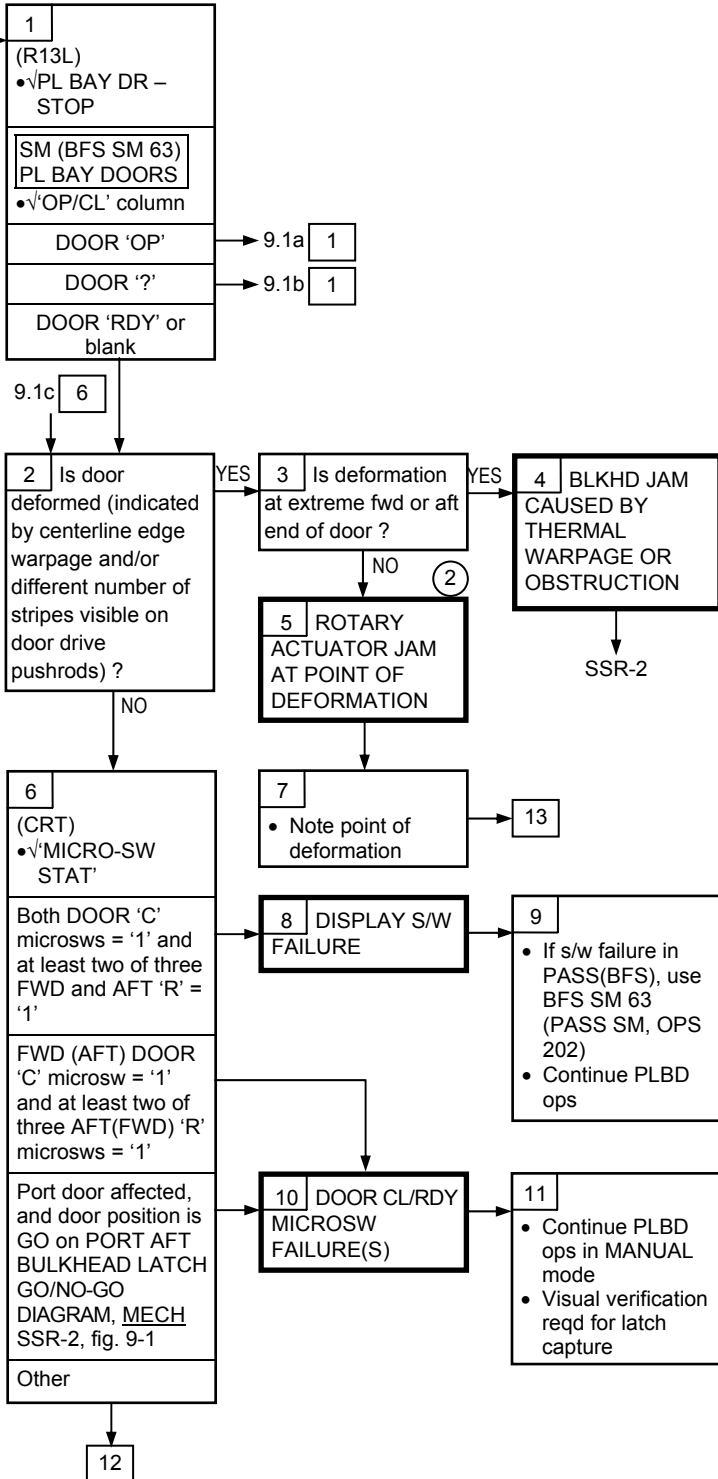
- ④ For rotary actuator jam, EVA reqd to cut door drive linkage(s) closest to point of deformation
- ⑤ For door drive PDU gearbox jam, EVA reqd to disconnect PDU
- ⑥ For door drive torque tube jam, EVA reqd to remove obstruction or cut door drive linkage(s)
- ⑧ No EVA reqd to close door

**MECH**

**9.1g DOOR NOT 'CL' IN SINGLE MTR TIME**

① DOOR Does Not indicate 'CL' in Single Mtr Drive Time

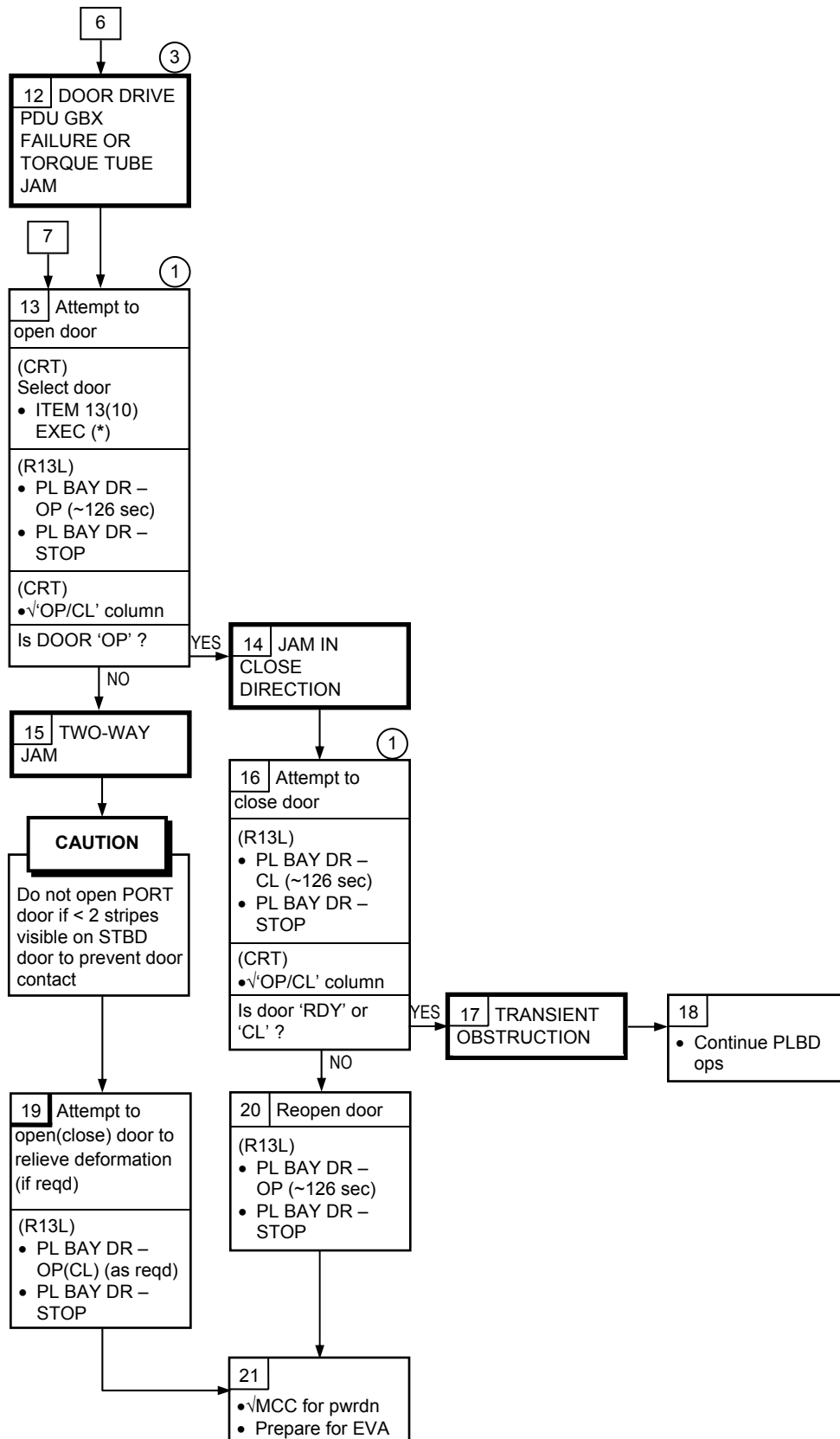
**Nominal Config:**  
 (R13L)  
 PL BAY DR  
 SYS 1,2 (two) – ENA  
 (MA73C)  
 MCA LOGIC  
 MNA MID 1,3 (two) – ON  
 MNB MID 2,4 (two) – ON  
 MNC MID 2,4 (two) – ON  
 cb MCA PWR  
 AC1 3Φ MID 1,3 (two) – cl  
 AC2 3Φ MID 2,4 (two) – cl  
 AC3 3Φ MID 2,4 (two) – cl  
 (CRT)  
 AC POWER ON, ITEM 1 – \*



① Drive Times  
 CENTER LATCHES  
 2 mtrs ~20 sec  
 1 mtr ~40 sec  
 FWD,AFT LATCHES  
 2 mtrs ~30 sec  
 1 mtr ~60 sec  
 DOORS  
 2 mtrs ~63 sec  
 1 mtr ~126 sec

② EVA reqd to cut PLB door drive linkage for at least one rotary actuator (i.e., one nearest point of deformation)

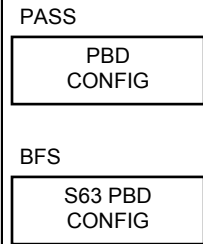
**MECH 9.1g (Cont)**



- ① Drive Times  
CENTER LATCHES  
2 mtrs ~20 sec  
1 mtr ~40 sec  
FWD,AFT  
LATCHES  
2 mtrs ~30 sec  
1 mtr ~60 sec  
DOORS  
2 mtrs ~63 sec  
1 mtr ~126 sec
- ③ EVA reqd to disconnect PDU

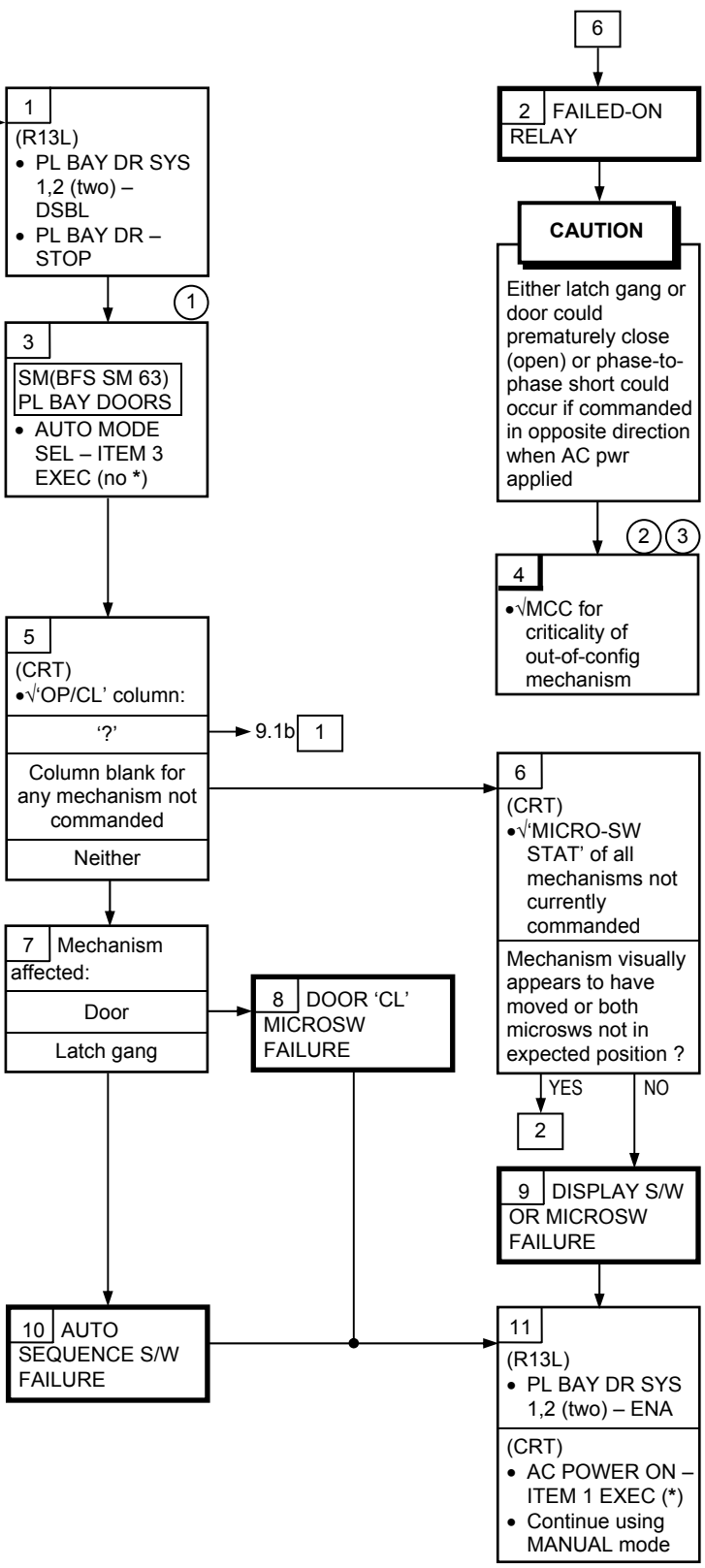
**MECH**

**9.1h PBD CONFIG**



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 – \*



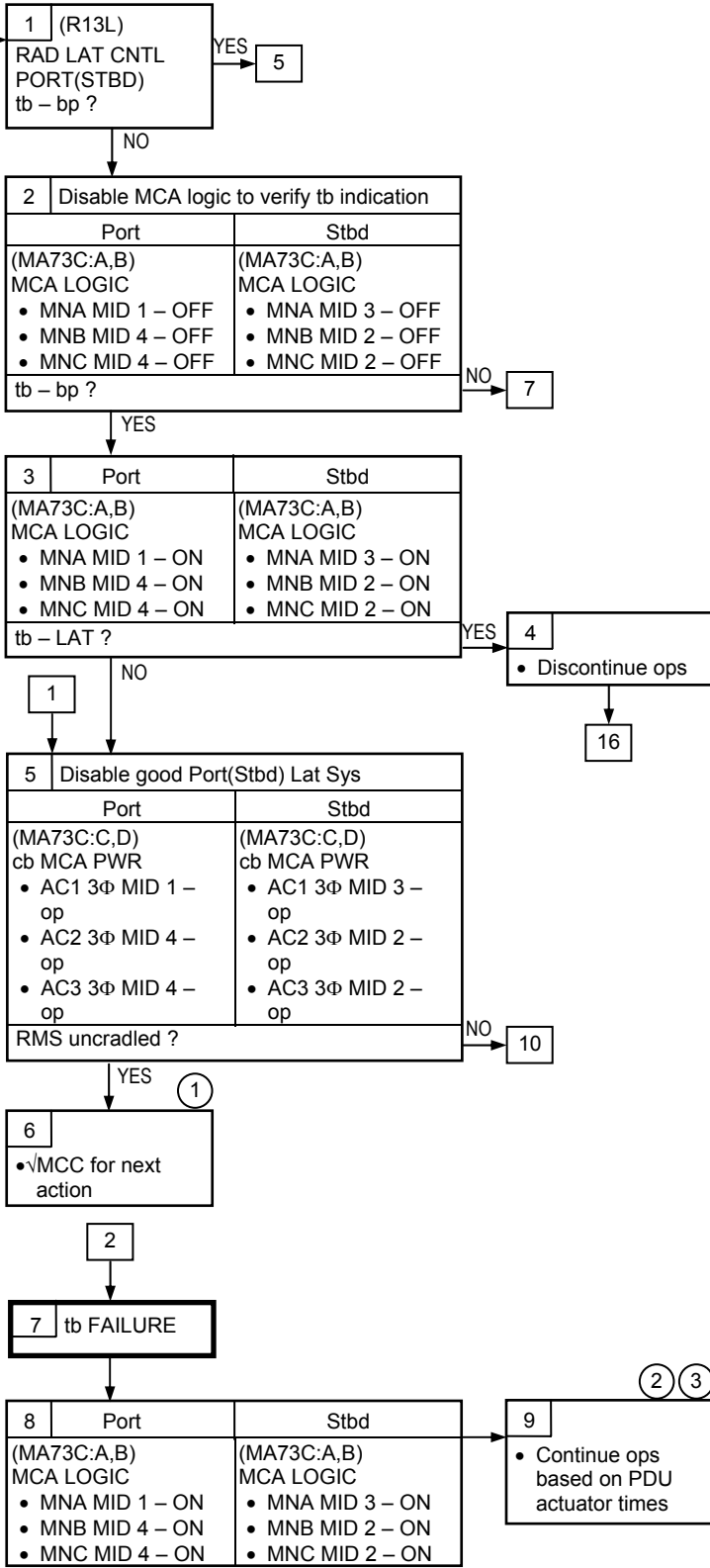
- ① When PBD CONFIG message annunciated, AC POWER ON, ITEM 1 – (no \*) will automatically be deselected and any active commands are disabled
- ② MCC to recommend removal of pwr and/or repositioning affected mechanism
- ③ Use manual mode for all subsequent PLBD ops

**MECH**

**9.2a RAD LAT CNTL PORT(STBD) tb NOT LAT IN 60 SEC OR REL IN 30 SEC**

RAD LAT CNTL PORT(STBD) tb Not LAT in 60 Sec or REL in 30 Sec

**Nominal Config:**  
 (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  
 (R13L)  
 PL BAY MECH PWR SYS 1,2 (two) – ON  
 RAD LAT CNTL SYS (two) – OFF  
 RAD CNTL SYS (two) – OFF  
 If RMS uncradled: (MA73C)  
 cb MCA PWR  
 AC2 3φ MID 2 – op  
 AC3 3φ MID 4 – op

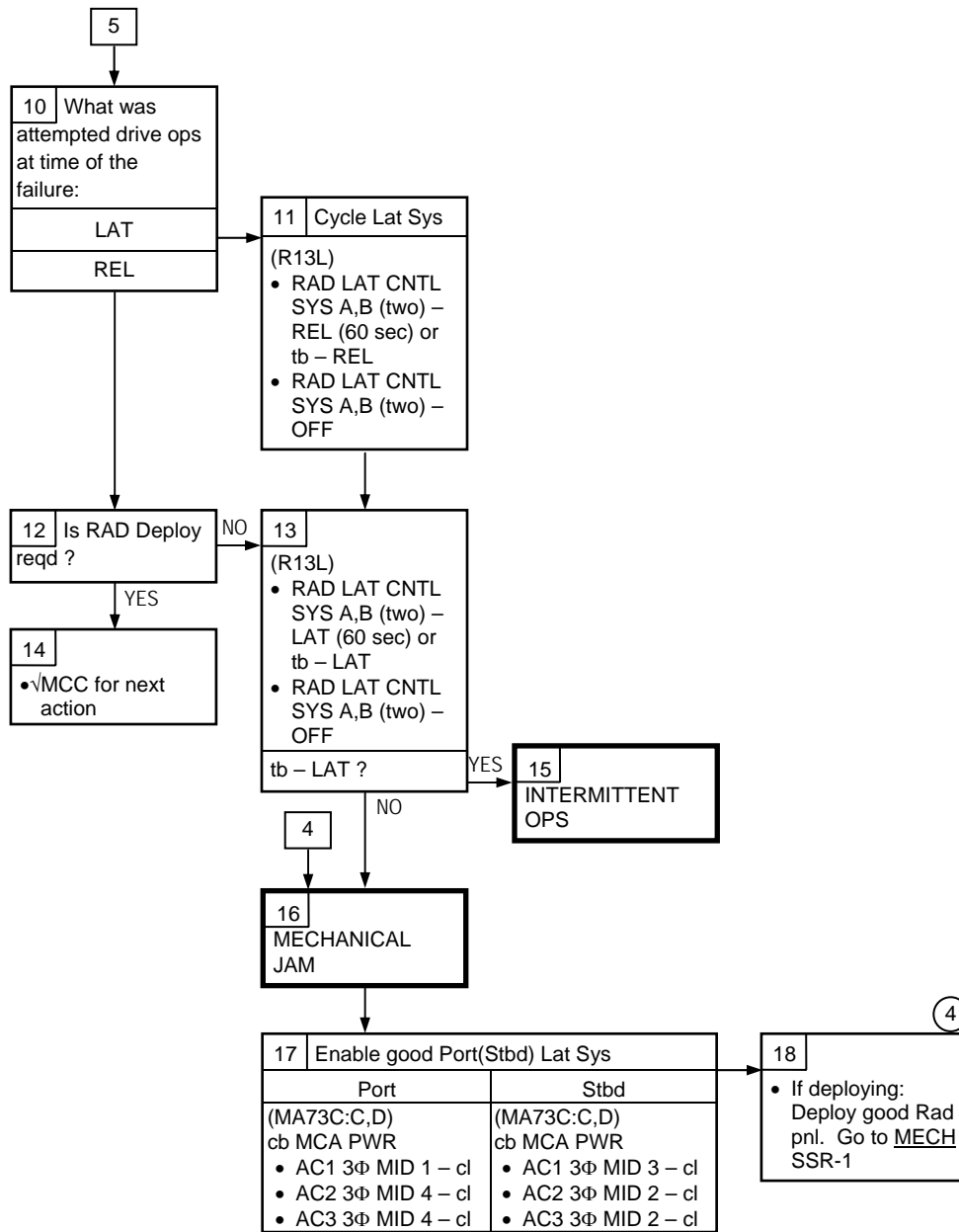


① Opened MCA cbs (for RMS uncradled) prevent verification of dual motor ops during RAD troubleshooting

② PDU Actuator Times  
 NORMAL  
 Lat – 30 sec  
 Rad – 50 sec  
 SINGLE MTR  
 Lat – 60 sec  
 Rad – 100 sec

③ Need MCC verification of microsw status for failed tb

**MECH 9.2a (Cont)**



④ √MCC to determine pwrdn reqd, if any

**MECH**

**9.2b RAD CNTL PORT(STBD) tb NOT DPY OR STO WITHIN 50 SEC AND NO MOTION**

RAD PORT(STBD)  
tb not bp after  
10 Sec and  
No Motion

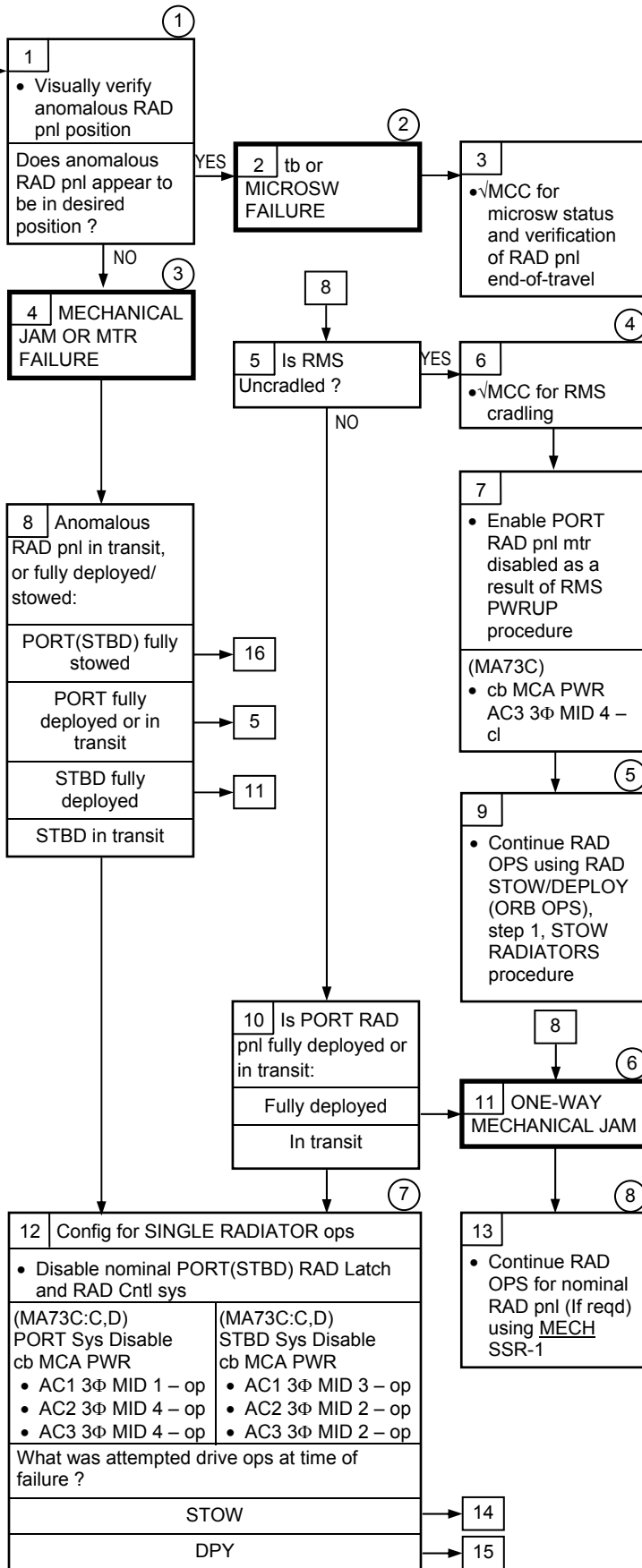
RAD PORT(STBD)  
Pnl(s) in Transit  
and No Motion

RAD CNTL  
PORT(STBD) tb  
Not DPY/STO  
within 50 Sec

**Nominal Config:**

(MA73C)  
MCA LOGIC  
MNA MID 1,3  
(two) – ON  
MNB MID 2,4  
(two) – ON  
cb MCA PWR  
AC1 3Φ MID 1,3  
(two) – cl  
AC2 3Φ MID 2,4  
(two) – cl  
AC3 3Φ MID 2,4  
(two) – cl  
(R13L)  
PL BAY MECH PWR  
SYS 1,2 (two) –  
ON  
RAD LAT CNTL SYS  
(two) – OFF  
RAD CNTL SYS  
(two) – OFF

If RMS uncradled:  
(MA73C)  
cb MCA PWR  
AC2 3Φ MID 2 –  
op  
AC3 3Φ MID 4 –  
op



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

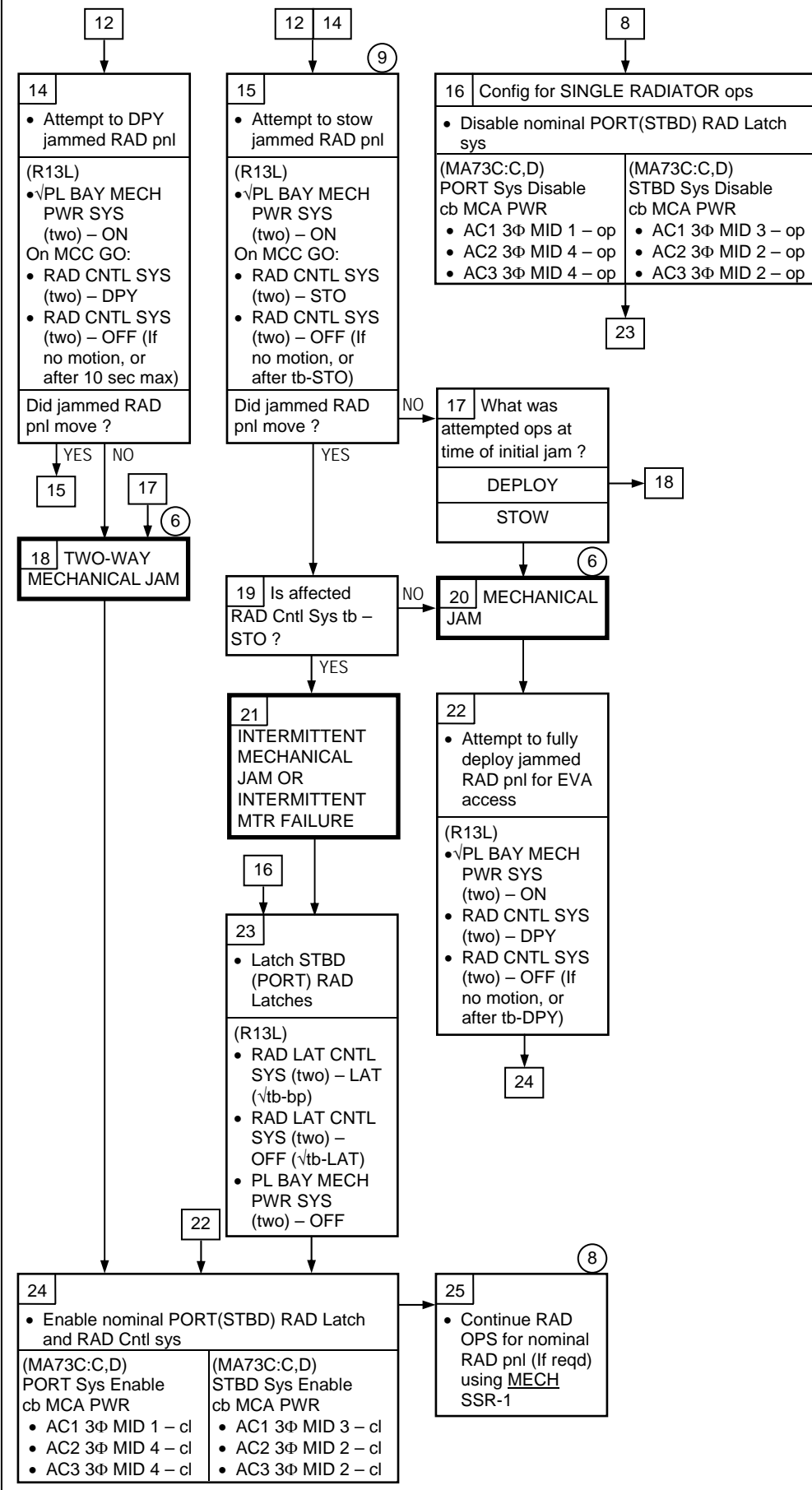
⑥ EVA reqd to stow jammed Rad pnl

⑦ If RMS uncradled, expect single mtr drive time for PORT RAD

⑧ √MCC to determine if pwrdrn is reqd



**MECH 9.2b (Cont)**



- ⑥ EVA reqd to stow jammed Rad pnl
- ⑧ √MCC to determine if pwrdrn is reqd
- ⑨ PDU Actuator Times  
Dual Mtr  
Lat – 30 sec  
Rad – 50 sec  
Single Mtr  
Lat – 60 sec  
Rad – 100 sec

KU ANT

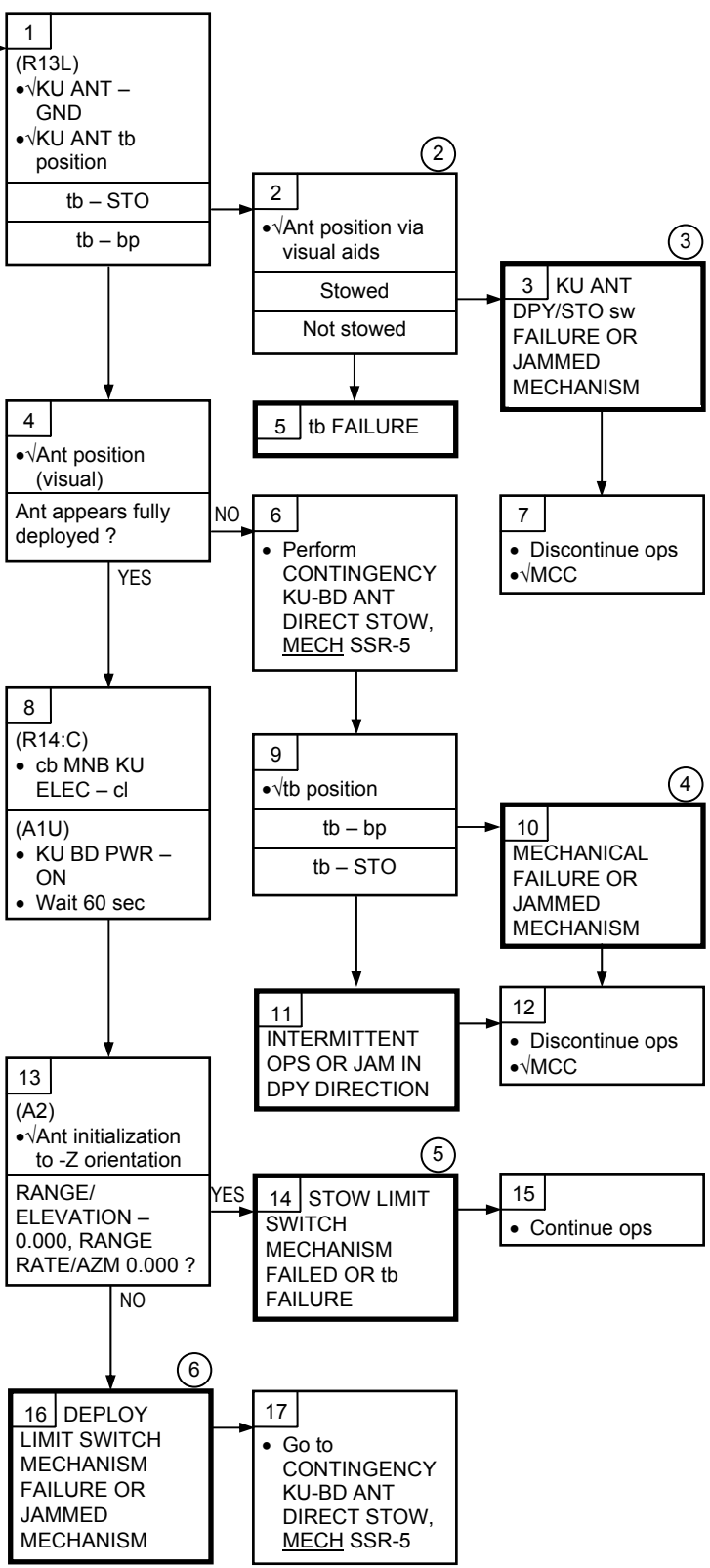
9.3

**MECH**

**9.3a KU ANT tb NOT DPY IN 46 SEC**

① KU ANT tb Not DPY in 46 Sec

**Nominal Config:**  
 (MA73C:A) MCA LOGIC MNC MID 2 – ON  
 (MA73C:B) MCA LOGIC MNB MID 4 – ON  
 (MA73C:C) cb MCA PWR AC3 3Φ MID 2 – cl  
 (MA73C:D) cb MCA PWR AC2 3Φ MID 4 – cl  
 (R13L) PL BAY MECH PWR SYS (two) – ON  
 KU ANT – GND (A1U) KU PWR – OFF (A2)  
 DIGI-DIS SEL – EL/AZ (R14:C) cb MNB KU ELEC – op



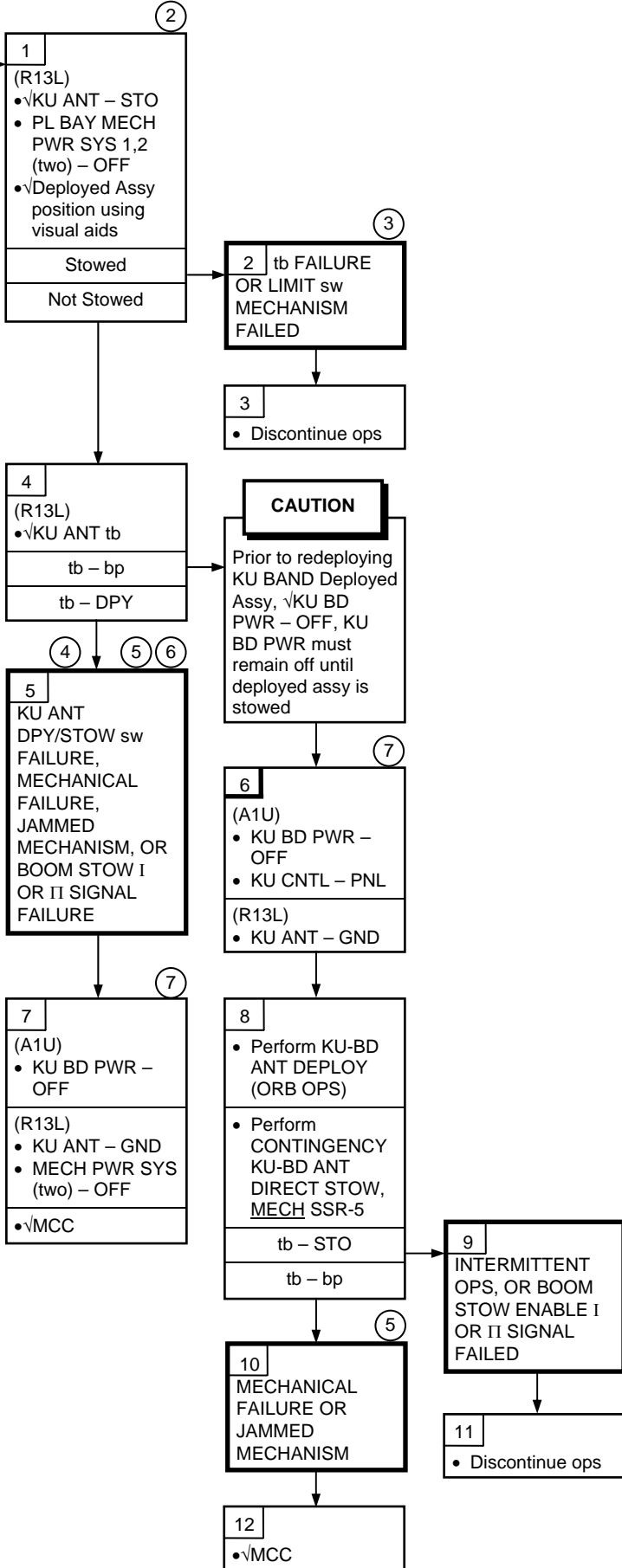
- ① Drive Time  
Single mtr – 46 sec  
Dual mtr – 23 sec
- ② KU-BD CCTV overlay located in Middeck Transparency Kit
- ③ KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW FAILED DEPLOY STOW SWITCH (IFM) may be reqd
- ④ Possible Ant jettison reqd
- ⑤ If limit sw mechanism failed in stow position, MECH SSR-7 reqd for stow ops
- ⑥ If limit sw mechanism failed to transfer deploy signal, failure results in loss of Ku-Bd comm and radar ops

**MECH**

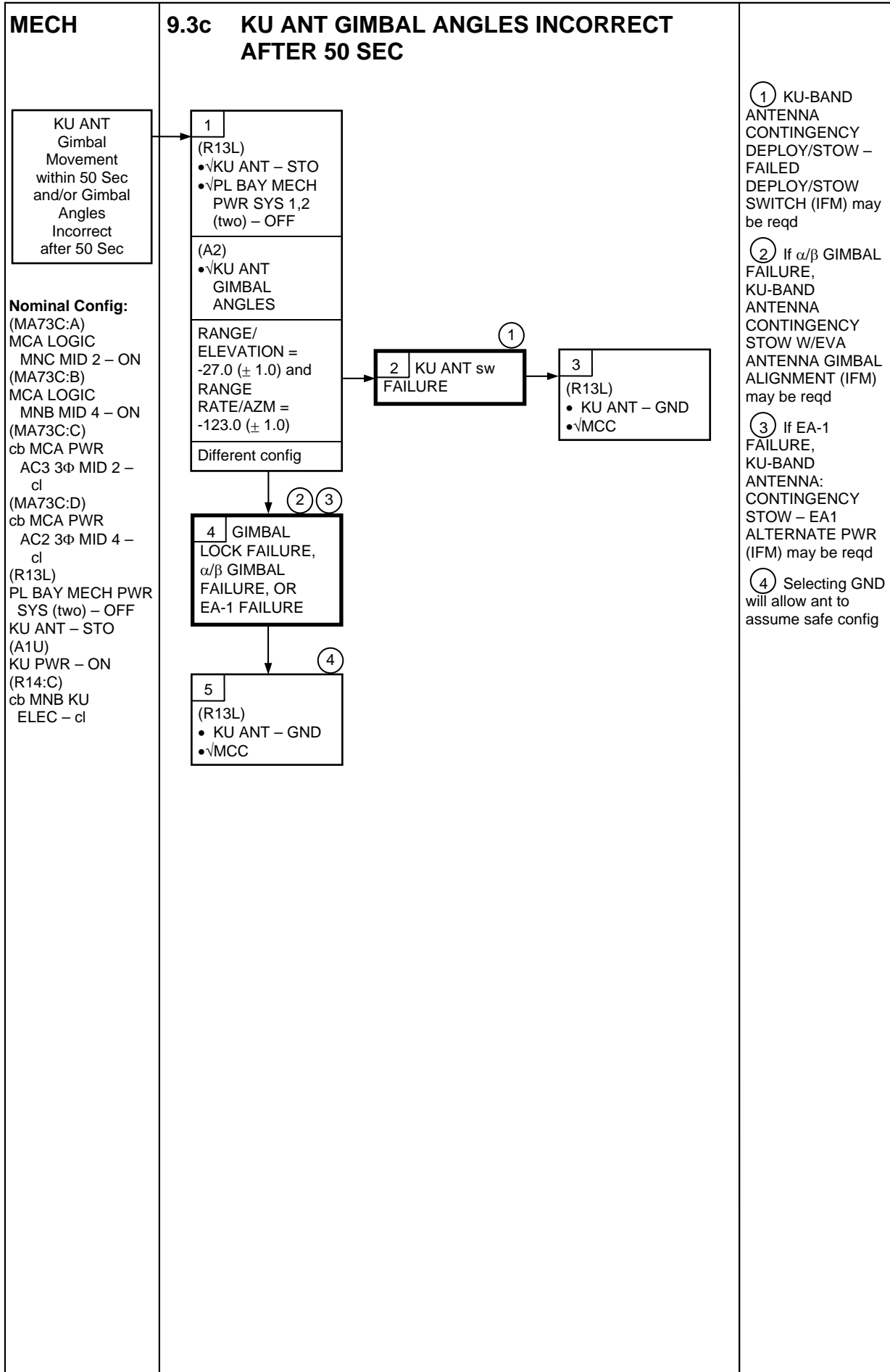
**9.3b KU ANT tb NOT STO IN 46 SEC**

①  
 KU ANT  
 tb Not  
 STO in 46 Sec

**Nominal Config:**  
 (MA73C:A)  
 MCA LOGIC  
 MNC MID 2 – ON  
 (MA73C:B)  
 MCA LOGIC  
 MNB MID 4 – ON  
 (MA73C:C)  
 cb MCA PWR  
 AC3 3Φ MID 2 –  
 cl  
 (MA73C:D)  
 cb MCA PWR  
 AC2 3Φ MID 4 –  
 cl  
 (R13L)  
 PL BAY MECH PWR  
 SYS (two) – ON  
 KU ANT – STO  
 (A1U)  
 KU BD PWR – ON  
 (R14:C)  
 cb MNB KU  
 ELEC – cl



- ① Drive Time  
 Single mtr – 46 sec  
 Dual mtr – 23 sec
- ② KU-BAND CCTV overlay located in Middeck Transparency Kit
- ③ If limit sw mechanism failed in deploy position, MECH SSR-7 reqd for subsequent deploy ops
- ④ If Boom Stow Enable signal failure, MECH SSR-5 reqd for stow ops
- ⑤ Antenna jettison may be reqd; KU-BD ANT JETTISON (ORB OPS)
- ⑥ KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW - FAILED DEPLOY/STOW SW (IFM) may be reqd
- ⑦ KU BD PWR must be turned off prior to taking KU ANT – GND to prevent gimbal locking pins from retracting



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**MEC  
ROEU**

**9.4**

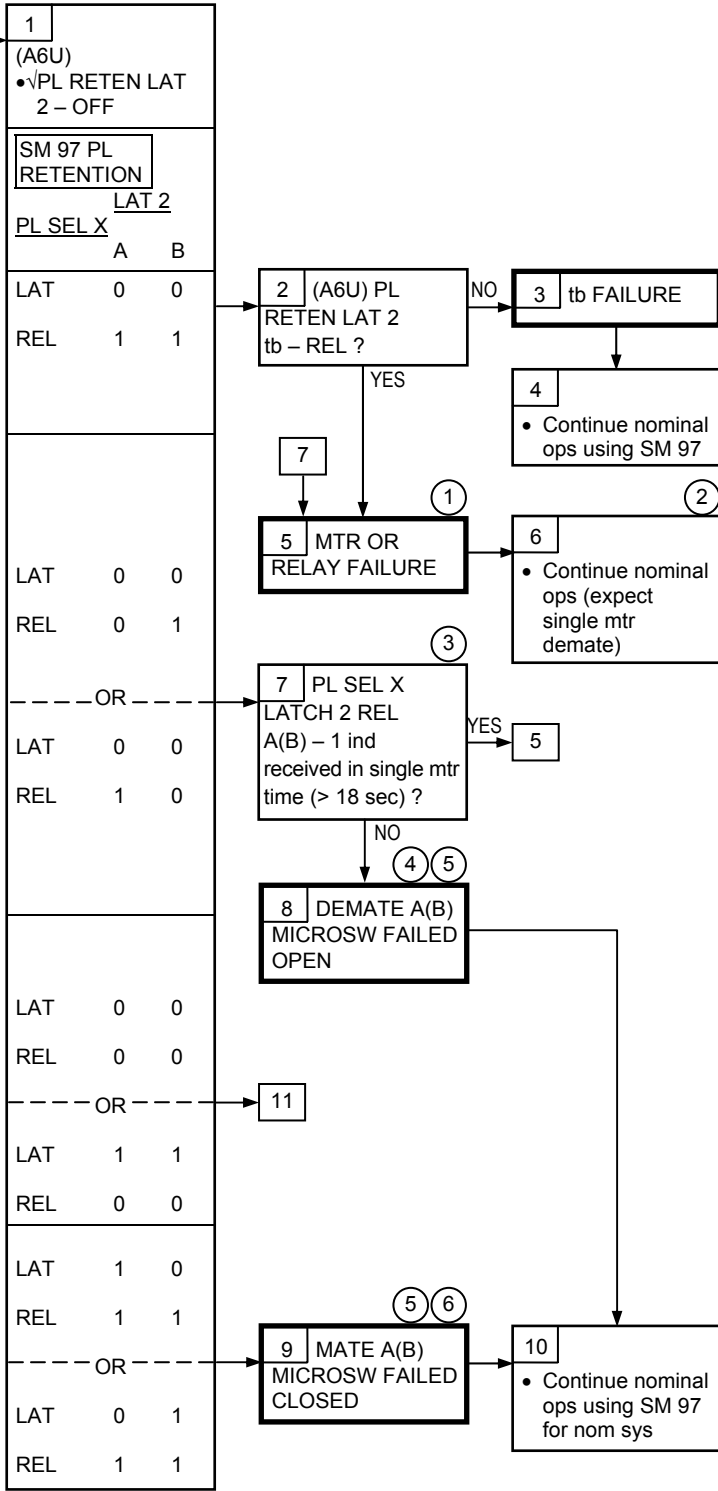
**MECH**

**9.4a ROEU DEMATE – tb NOT REL, MICROSW IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

Demate tb  
Not Rel  
or  
SM 97 PL  
RETENTION

Microsw  
LAT/REL Ind  
Not Nominal  
or  
Single Mtr  
Drive Time  
> 18 sec

**Nominal Config:**  
(R13L)  
PL BAY MECH PWR  
(two) – ON  
(A6U)  
PL RETEN  
LOGIC PWR  
(two) – ON  
PL SEL 3(1,2)  
(MA73C:C)  
cb MCA PWR AC1  
3Φ MID 1 – cl  
(MA73C:D)  
cb MCA PWR AC2  
3Φ MID 3 – cl  
ROEU released

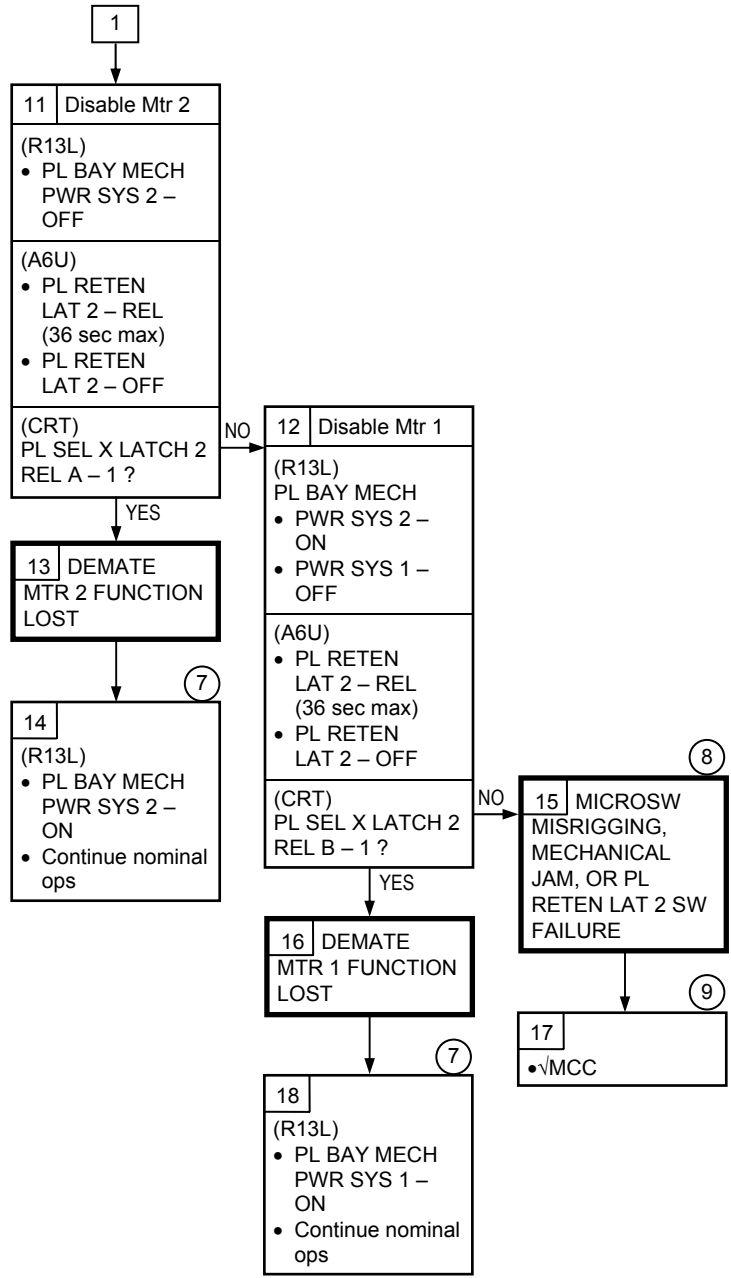


- ① MCC can determine which condition exists
- ② Expect single mtr mate/demate/relax for mtr failure
- ③ If PL SEL X LATCH 2 REL A(B) – 1 ind received in single mtr time, microsw misrigged
- ④ One mtr will continue to drive while demating until PL RETEN LAT 2 sw turned OFF
- ⑤ If SYS A Microsw failed, tb will be inaccurate
- ⑥ Expect single mtr drive time for mate

**MECH  
ROEU**

**9.4**

**MECH 9.4a (Cont)**



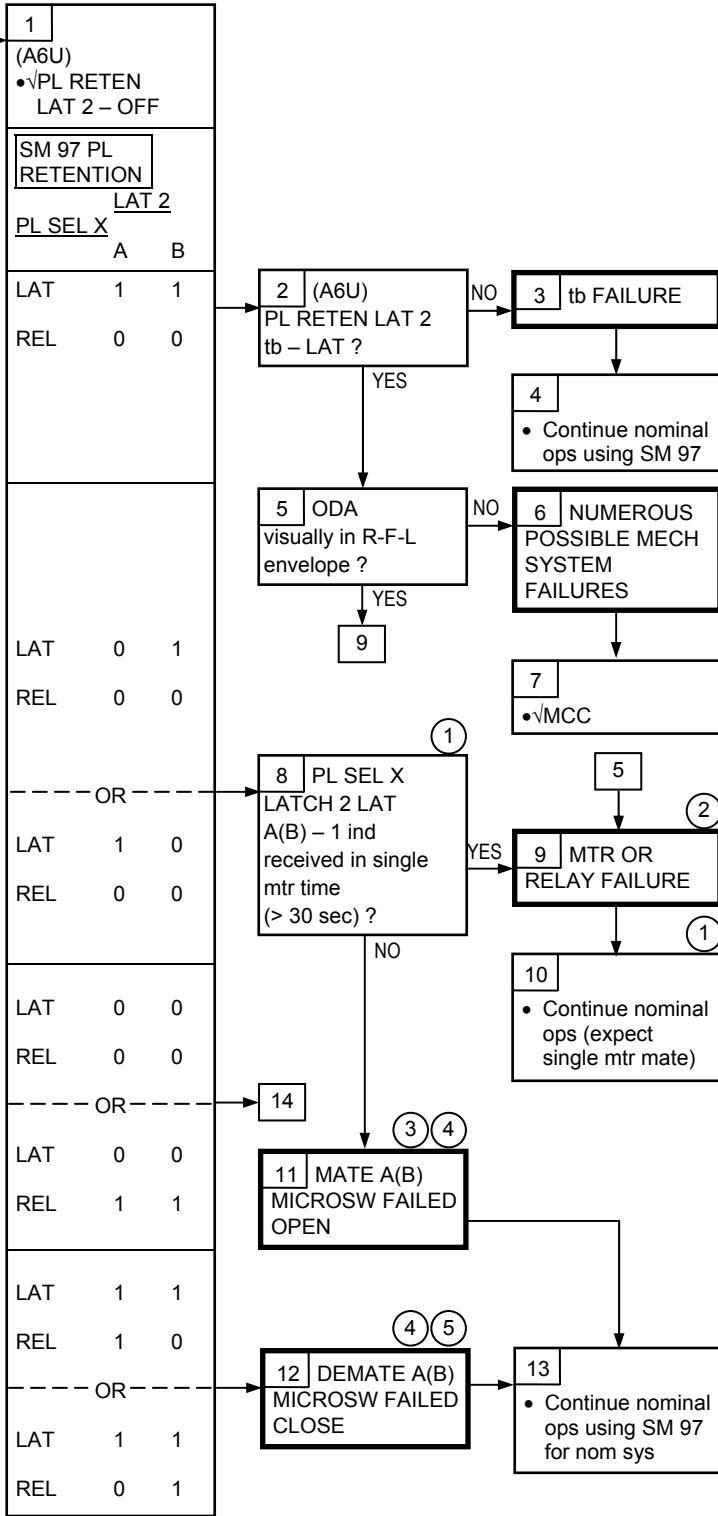
- ⑦ One mtr  $\Phi$  lost. Good mtr will backdrive failed mtr. Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system
- ⑧ EVA capability exists to perform ROEU demate
- ⑨ MCC can determine if switch is failed

**MECH**

**9.4b ROEU MATE – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

Mate tb Not Lat  
or  
SM 97 PL RETENTION  
Microsw LAT/REL Ind Not Nominal  
or  
Single Mtr Drive Time > 30 sec  
or  
Not Visually R-F-L

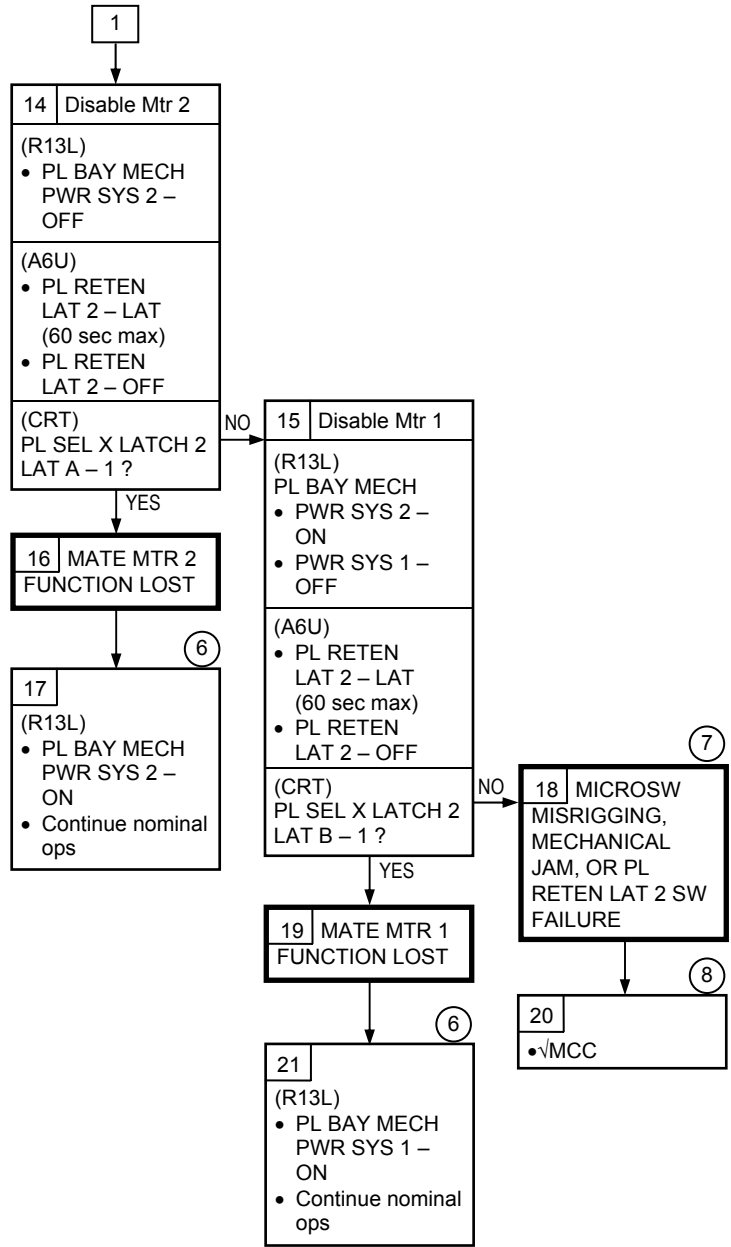
**Nominal Config:**  
(R13L)  
PL BAY MECH PWR (two) – ON (A6U)  
PL RETEN LOGIC PWR (two) – ON  
PL SEL 3(1,2) (MA73C:C)  
cb MCA PWR AC1 3Φ MID 1 – cl (MA73C:D)  
cb MCA PWR AC2 3Φ MID 3 – cl



- ① If PL SEL X LATCH 2 LAT A(B) – 1 ind received in single mtr time, microsw misrigged
- ② MCC can determine which condition exists
- ③ One mtr will continue to drive while mating until PL RETEN LAT 2 sw turned OFF
- ④ If SYS A Microsw failed, tb will be inaccurate
- ⑤ Expect single mtr drive time for demate



**MECH 9.4b (Cont)**



⑥ One mtr  $\Phi$  lost. Good mtr will backdrive failed mtr. Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system

⑦ EVA capability exists to perform ROEU demate

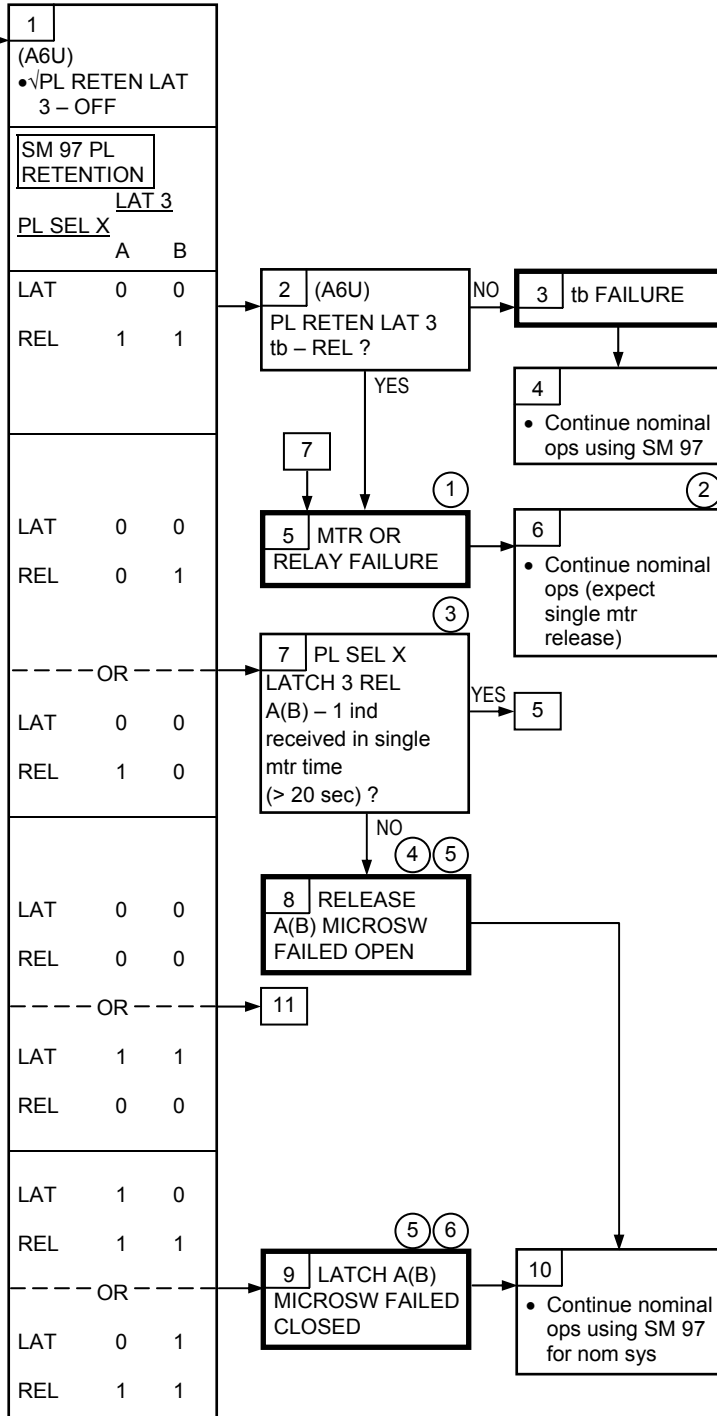
⑧ MCC can determine if switch is failed

**MECH**

**9.4c ROEU RELEASE – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

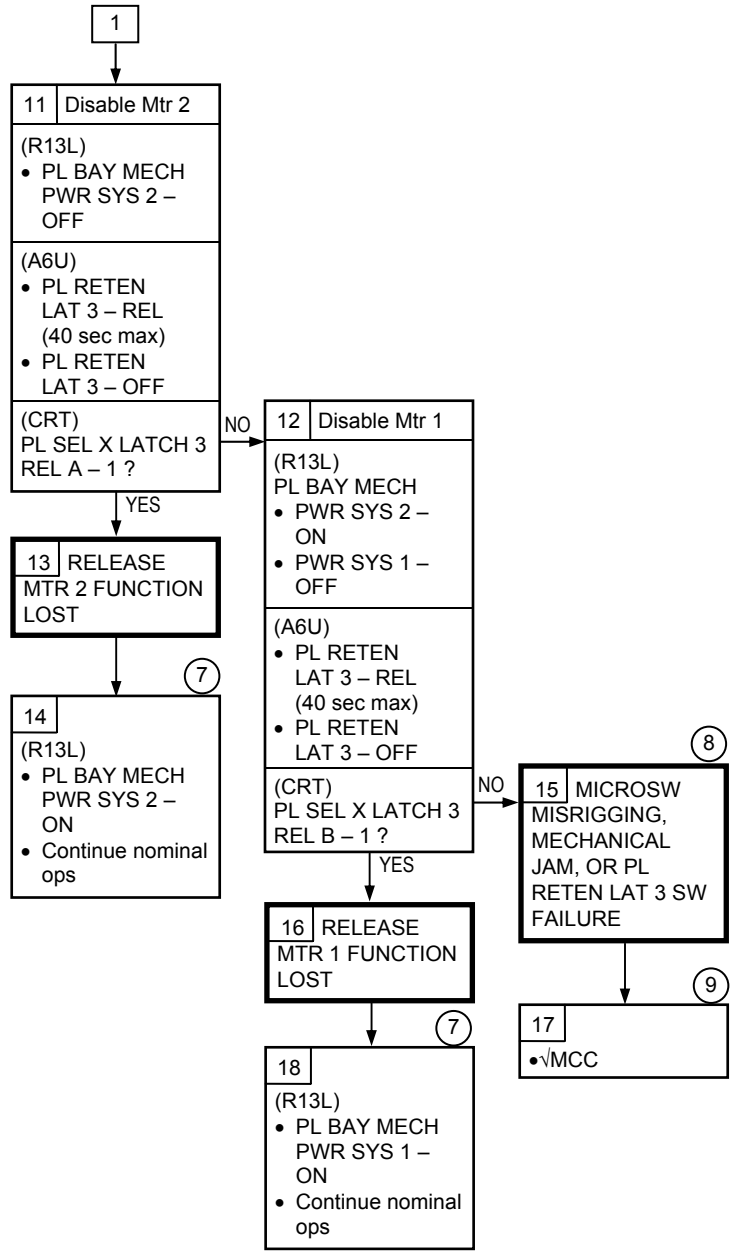
Release tb Not Rel  
or  
SM 97 PL RETENTION  
Microsw LAT/REL Ind Not Nominal  
or  
Single Mtr Drive Time > 20 sec

**Nominal Config:**  
(R13L)  
PL BAY MECH PWR (two) – ON (A6U)  
PL RETEN LOGIC PWR (two) – ON PL SEL 3(1,2) (MA73C:C)  
cb MCA PWR AC1 3Φ MID 1 – cl (MA73C:D)  
cb MCA PWR AC2 3Φ MID 3 – cl



- ① MCC can determine which condition exists
- ② Expect single mtr latch/release for mtr failure
- ③ If PL SEL X LATCH 3 REL A(B) – 1 ind received in single mtr time, microsw misrigged
- ④ One mtr will continue to drive while releasing until PL RETEN LAT 3 sw turned OFF
- ⑤ If SYS A Microsw failed, tb will be inaccurate
- ⑥ Expect single mtr drive time for latch

**MECH 9.4c (Cont)**



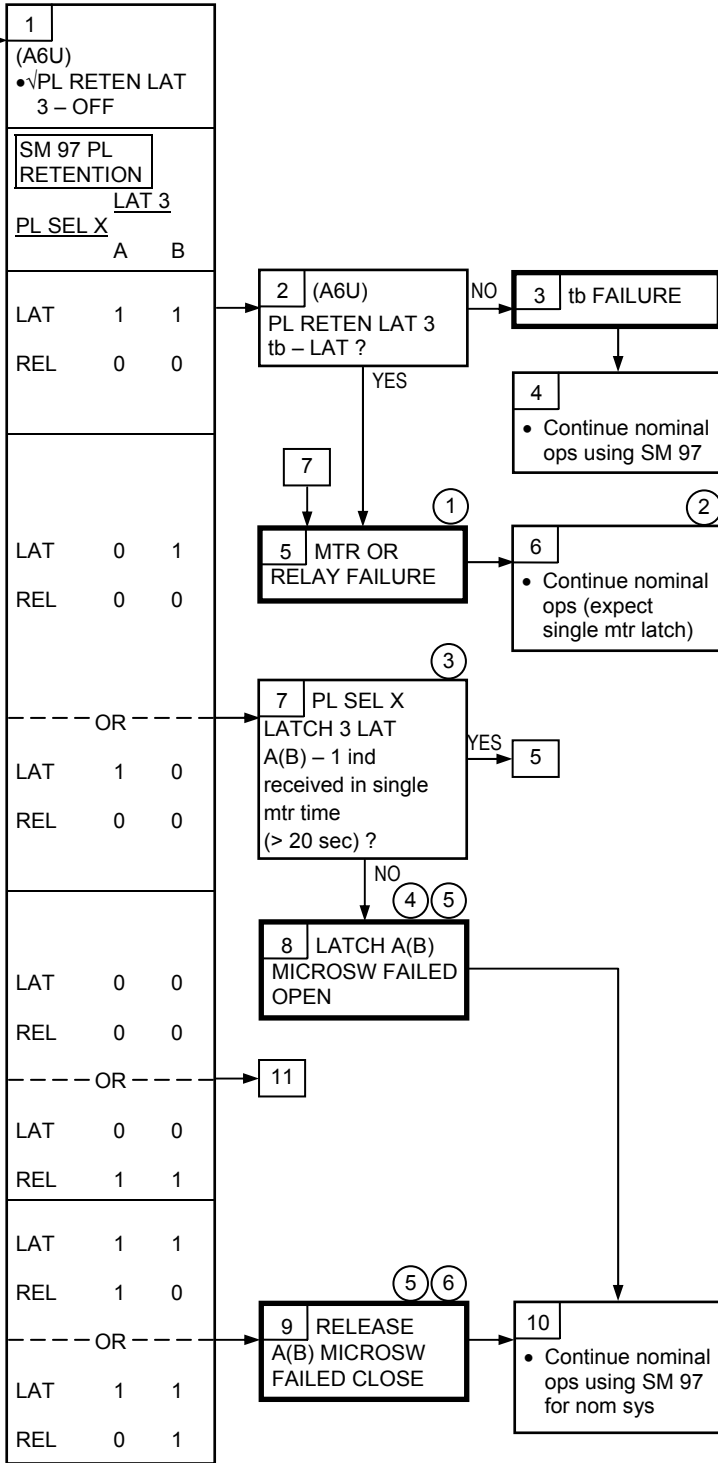
- ⑦ One mtr  $\Phi$  lost. Good mtr will backdrive failed mtr. Subsequent release and latch ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system
- ⑧ EVA capability exists to perform ROEU releaseE
- ⑨ MCC can determine if switch is failed

**MECH**

**9.4d ROEU LATCH – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

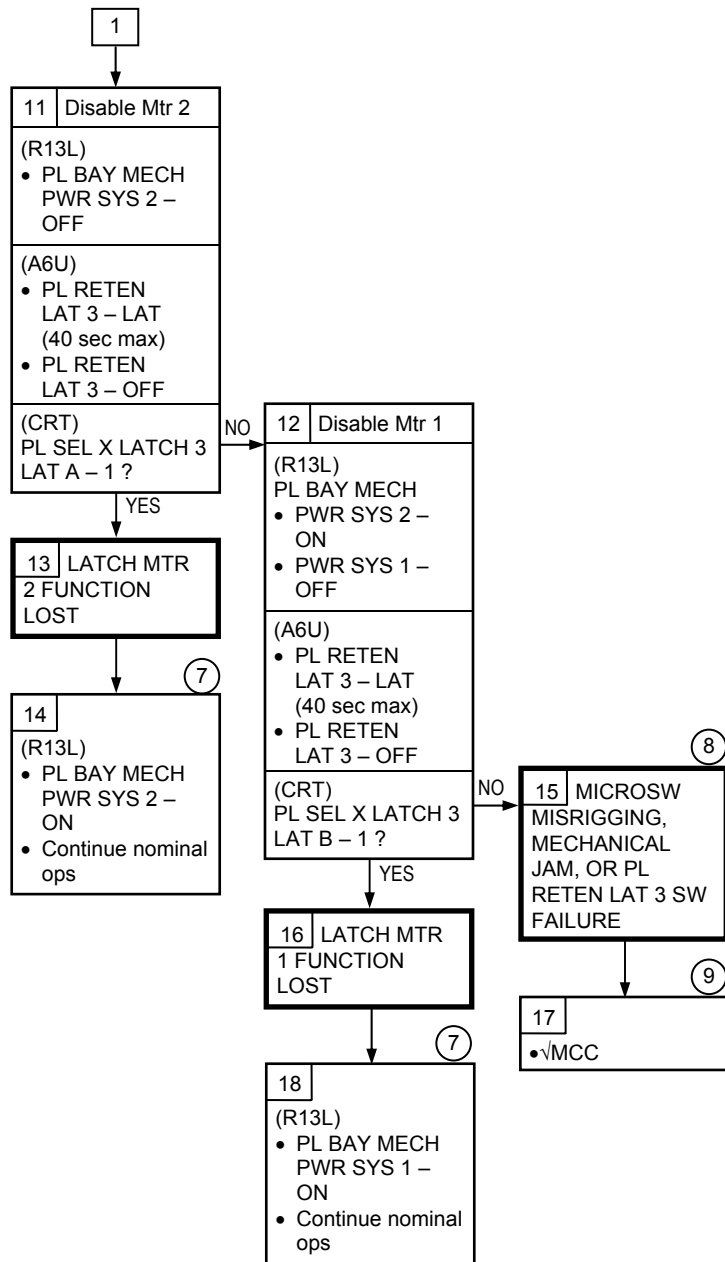
Latch tb Not Lat  
or  
SM 97 PL RETENTION  
Microsw LAT/REL Ind Not Nominal  
or  
Single Mtr Drive Time > 20 sec

**Nominal Config:**  
(R13L)  
PL BAY MECH PWR (two) – ON (A6U)  
PL RETEN LOGIC PWR (two) – ON  
PL SEL – 3 (1,2) (MA73C:C)  
cb MCA PWR AC1 3Φ MID 1 – cl (MA73C:D)  
cb MCA PWR AC2 3Φ MID 3 – cl



- ① MCC can determine which condition exists
- ② Expect single mtr latch/release for mtr failure
- ③ If PL SEL X LATCH 3 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

**MECH 9.4d (Cont)**



- ⑦ 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
- ⑧ EVA capability exists to perform ROEU latch
- ⑨ MCC can determine if switch is failed

**MECH**

**9.4e ROEU RELAX – tb NOT NOMINAL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

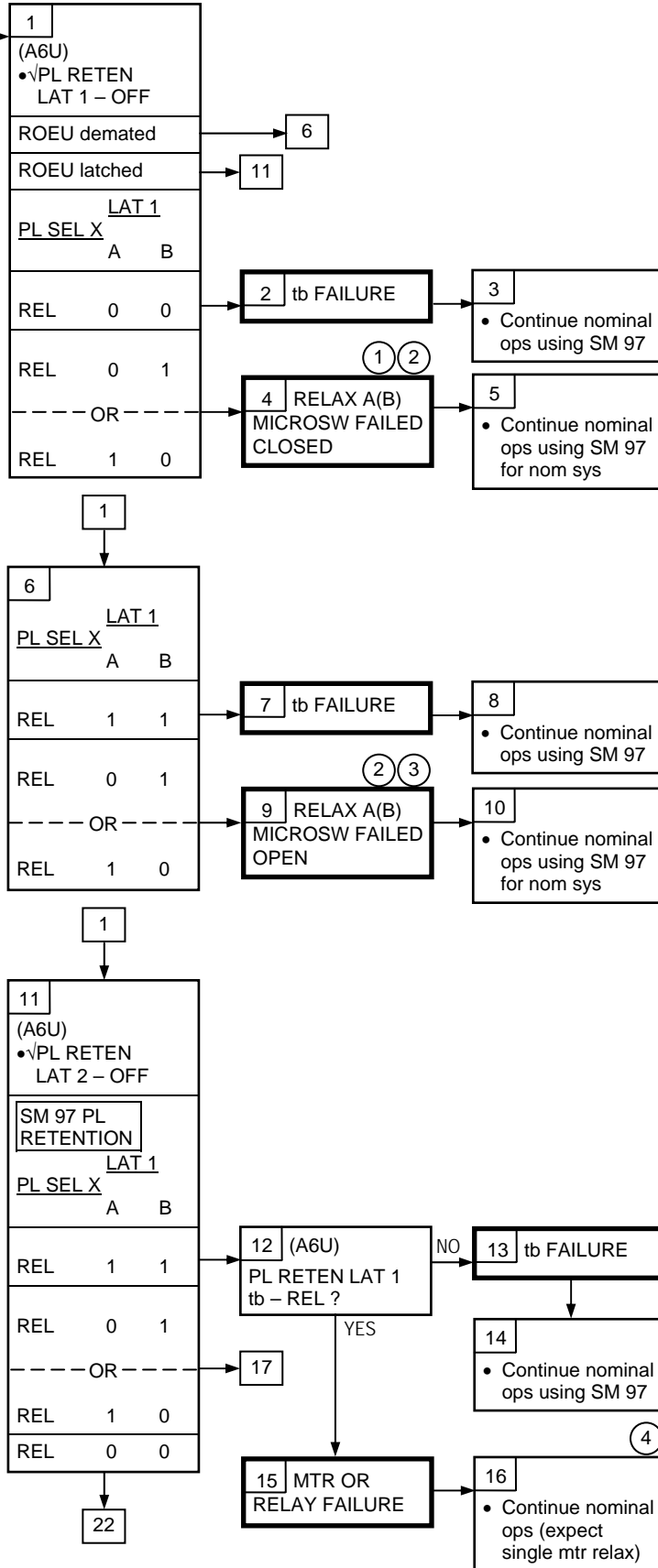
RELAX tb Not Nominal  
or  
**SM 97 PL RETENTION**  
Microsw REL Ind Not Nominal or Single Mtr Drive Time > 12 sec

**Nominal Config:**  
(R13L)  
PL BAY MECH PWR (two) – ON  
(A6U)  
PL RETEN LOGIC PWR (two) – ON  
PL SEL – 3(1,2) (MA73C:C)  
cb MCA PWR AC1 3Φ MID 1 – cl (MA73C:D)  
cb MCA PWR AC2 3Φ MID 3 – cl

**If DEMATED**  
(A6U)  
PL RETEN LAT 1 tb – REL  
**SM 97 PL RETENTION**  
PL SEL X LATCH 1 REL A,B – 1

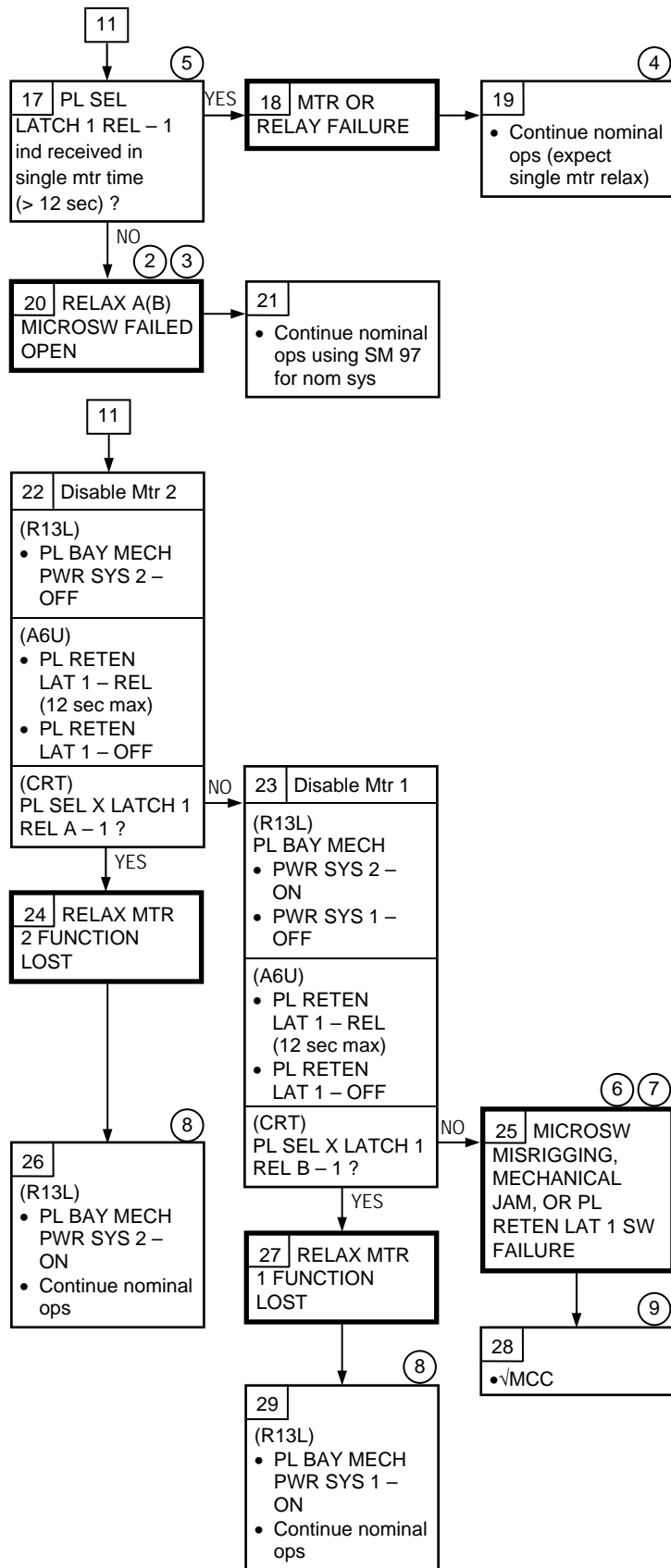
**If MATED and RELAXED**  
(A6U)  
PL RETEN LAT 1 tb – REL  
**SM 97 PL RETENTION**  
PL SEL X LATCH 1 REL A,B – 1

**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

**MECH 9.4e (Cont)**



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

**MECH**

**9.4f ROEU ELEC CONT – tb NOT NOMINAL OR IND NOT NOMINAL**

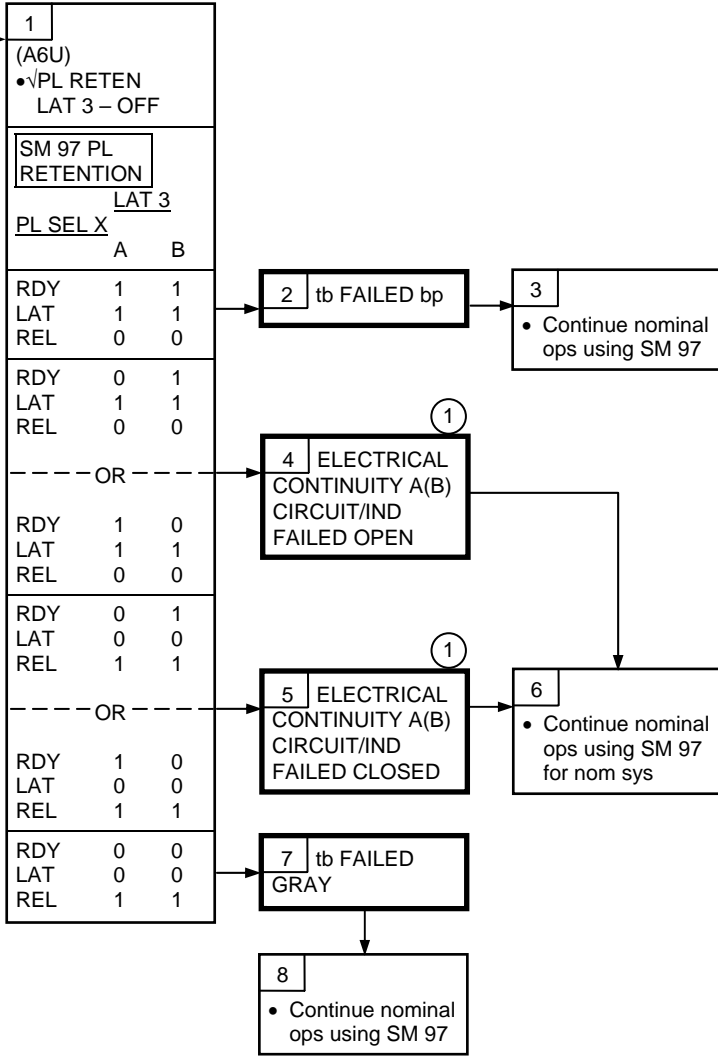
① If SYS A Microsw failed, tb will be inaccurate

ELEC CONT tb Not Nominal or SM 97 PL RETENTION RDY Ind Not Nominal

**Nominal Config:**  
 (R13L)  
 PL BAY MECH PWR (two) – ON  
 (A6U)  
 PL RETEN LOGIC PWR (two) – ON  
 PL SEL – 3(1,2)  
 (MA73C:C)  
 cb MCA PWR AC1 3Φ MID 1 – cl  
 (MA73C:D)  
 cb MCA PWR AC2 3Φ MID 3 – cl

If LATCHED  
 (A6U)  
 PL RETEN RDY 1 tb – gray  
 SM 97 PL RETENTION  
 PL SEL X LATCH 3 RDY A,B – 1

If UNLATCHED  
 (A6U)  
 PL RETEN RDY 1 tb – bp  
 SM 97 PL RETENTION  
 PL SEL X LATCH 3 RDY A,B – 0





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MECH SSR

# MECH SSR-1 PORT(STBD) RAD OPS



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	
<ul style="list-style-type: none"> <li>• AC1 3Φ MID 3 – op</li> <li>• AC2 3Φ MID 2 – op</li> <li>• AC3 3Φ MID 2 – op</li> </ul>	
PORT Panel Disable (MA73C:C,D) cb MCA PWR	
<ul style="list-style-type: none"> <li>• AC1 3Φ MID 1 – op</li> <li>• AC2 3Φ MID 4 – op</li> <li>• AC3 3Φ MID 4 – op</li> </ul>	

2	PORT(STBD) ops reqd:
STO	
DPY	

3	Stow,latch PORT(STBD)
(R13L)	
<ul style="list-style-type: none"> <li>• PL BAY MECH PWR SYS 1,2 – ON</li> <li>• RAD CNTL SYS A,B – STO</li> <li>• PORT(STBD) tb – STO</li> <li>• SYS A,B – OFF</li> <li>• LAT CNTL SYS A,B – LAT</li> <li>• RAD LAT CNTL PORT(STBD) tb – LAT</li> <li>• RAD LAT CNTL SYS A,B – OFF</li> <li>• PL BAY MECH PWR SYS 1,2 – OFF</li> </ul>	

4	Release,deploy PORT(STBD) RAD
(R13L)	
<ul style="list-style-type: none"> <li>• PL BAY MECH PWR SYS 1,2 – ON</li> <li>• RAD LAT CNTL SYS A,B – REL</li> <li>• RAD LAT CNTL PORT(STBD) tb – REL</li> <li>• RAD LAT CNTL SYS A,B – OFF</li> <li>• RAD CNTL SYS A,B – DPY</li> <li>• RAD CNTL PORT(STBD) tb – DPY</li> <li>• RAD CNTL SYS A,B – OFF</li> <li>• PL BAY MECH PWR SYS 1,2 – OFF</li> </ul>	

5	Enable STBD(PORT) RAD sys
STBD (MA73C:D,C) cb MCA PWR	
<ul style="list-style-type: none"> <li>• AC1 3Φ MID 3 – cl</li> <li>• AC2 3Φ MID 2 – cl</li> <li>• AC3 3Φ MID 2 – cl</li> </ul>	
PORT (MA73C:C,D) cb MCA PWR	
<ul style="list-style-type: none"> <li>• AC1 3Φ MID 1 – cl</li> <li>• AC2 3Φ MID 4 – cl</li> <li>• AC3 3Φ MID 4 – cl</li> </ul>	

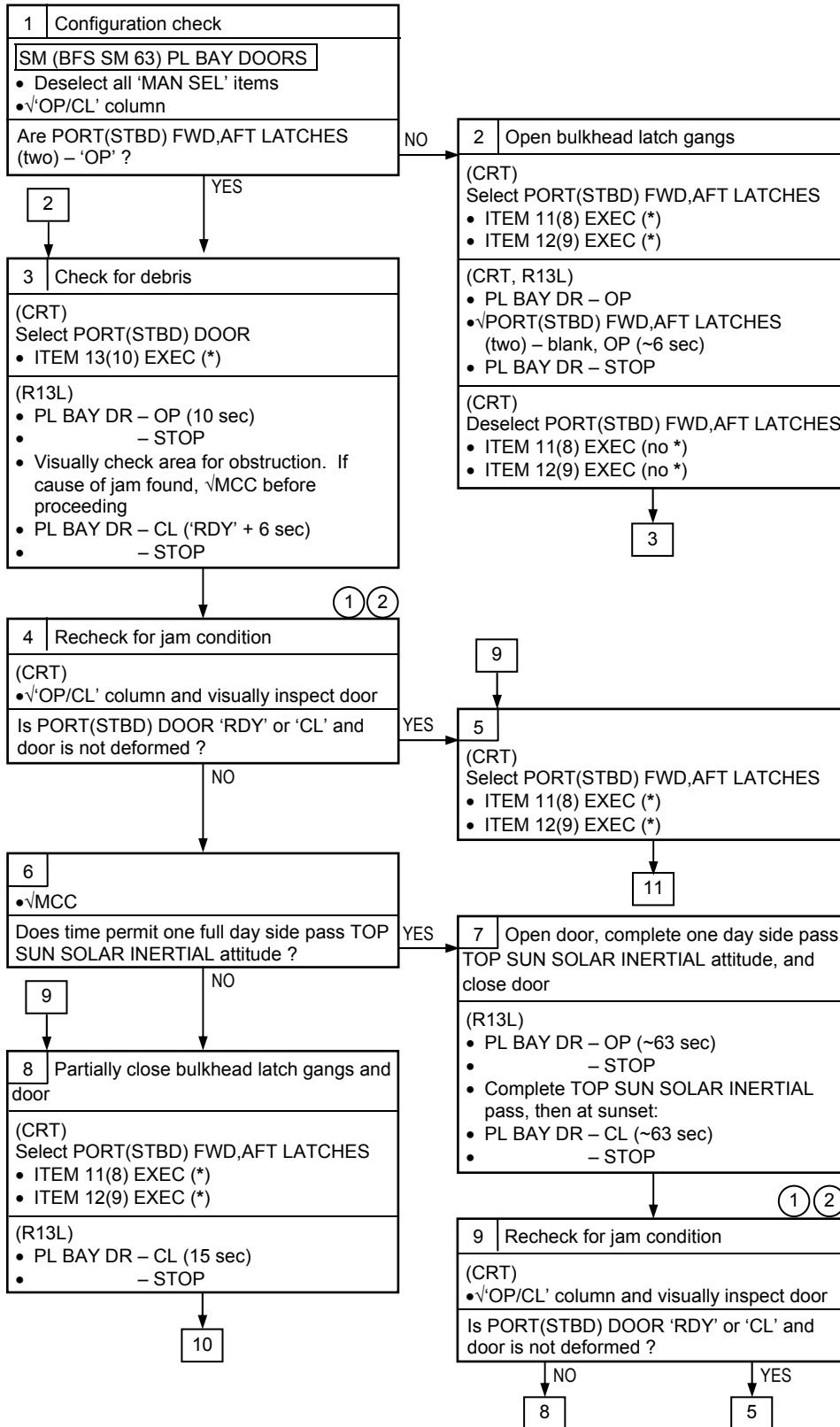
- ① PDU Actuator  
Times Normal (2 mtr)
- Lat – 30 sec
- Rad – 50 sec
- Single Mtr
- Lat – 60 sec
- Rad – 100 sec

MECH SSR

# MECH SSR-2 CONTINGENCY PLBD CLOSURE

**NOTE**

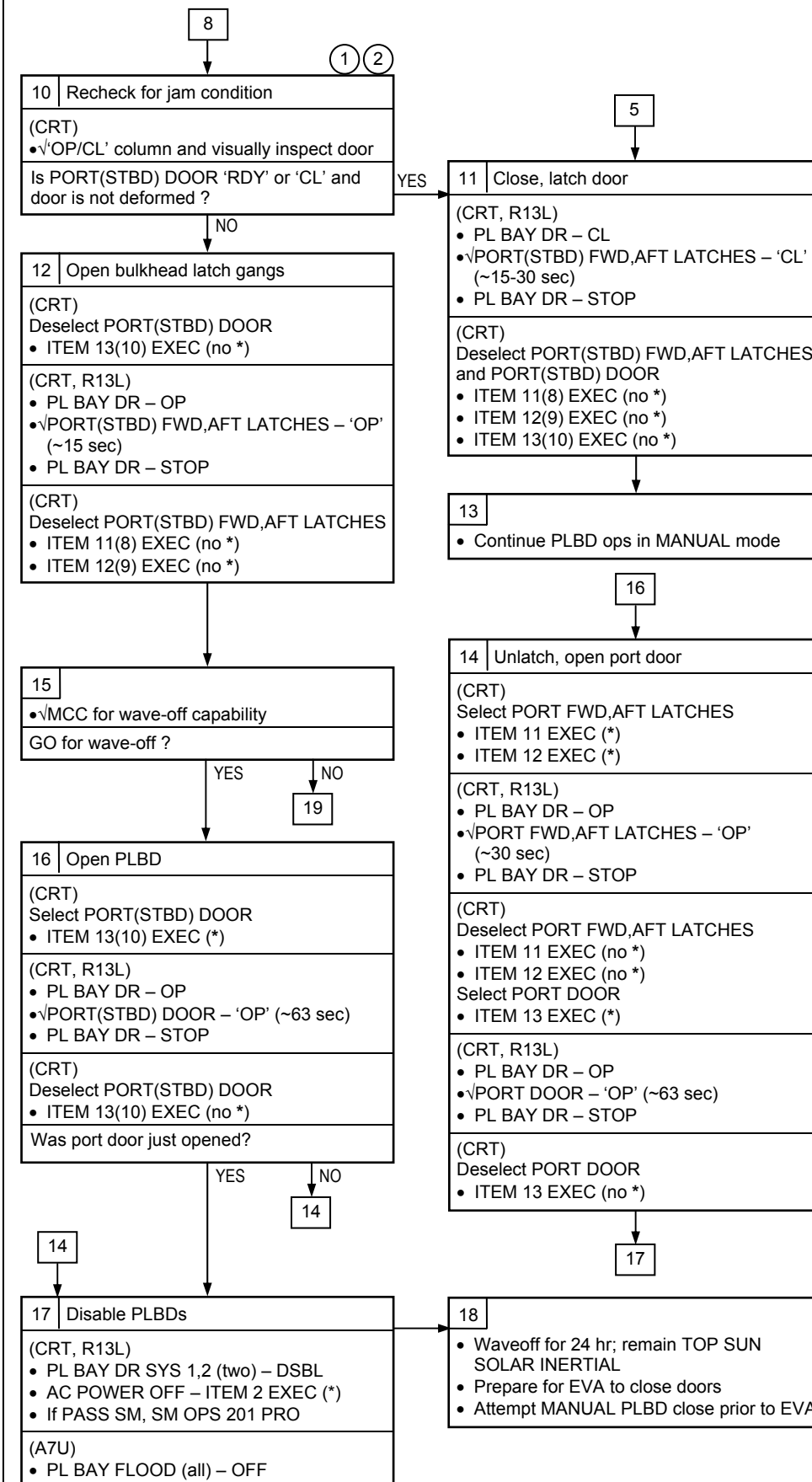
This procedure assumes that the door has jammed from orbiter thermal warpage or debris



① Aft bulkhead target line can be used to verify port aft door configuration (See Fig. 9-1, PORT AFT BULKHEAD LATCH GO/NO-GO DIAGRAM)

② Observe aft centerline for deflection (See Fig. 9-2, PORT AFT CENTERLINE VIEWED BY CAMERA C)

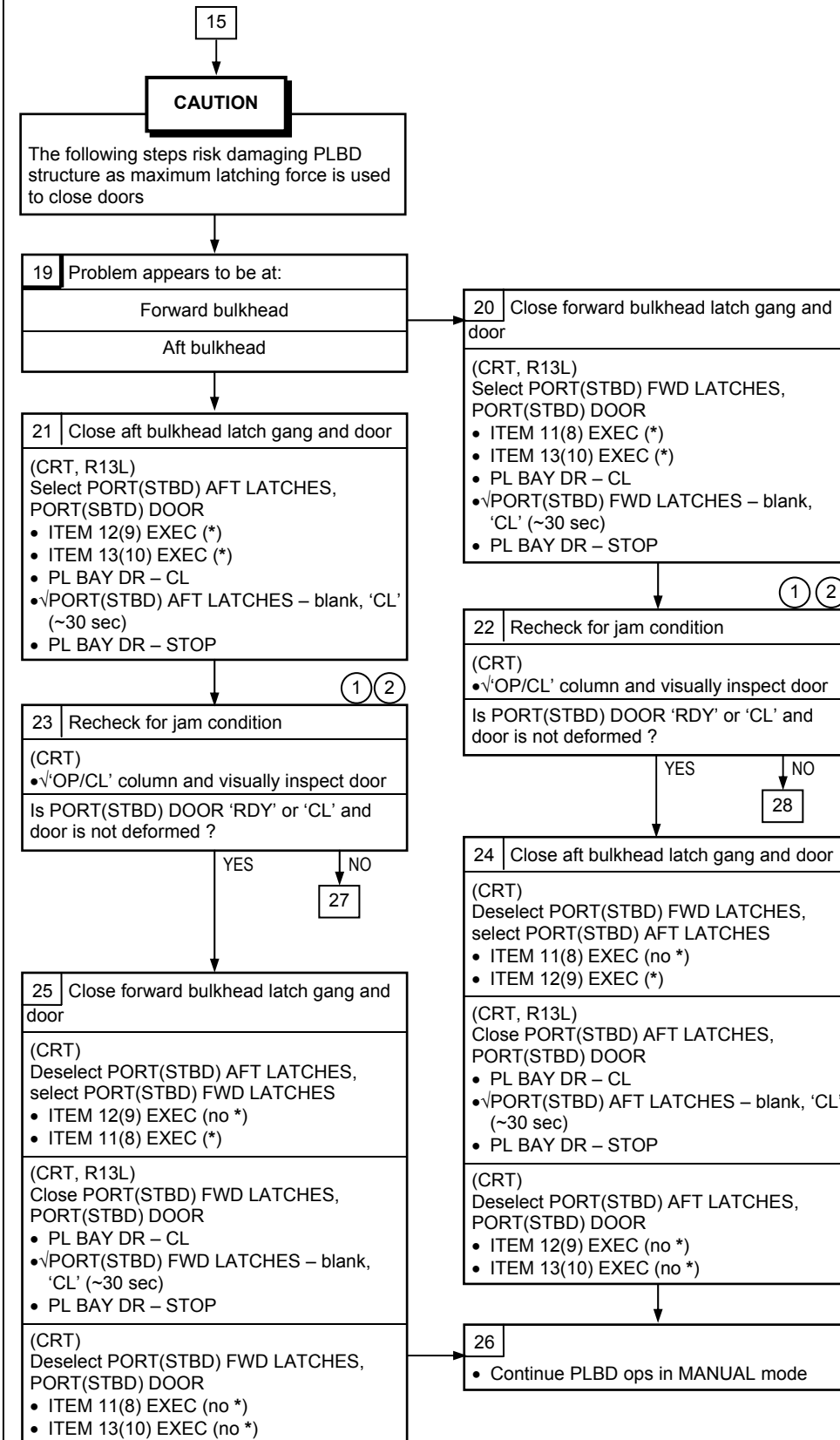
# MECH SSR-2 (Cont)



① Aft bulkhead target line can be used to verify port aft door configuration (See Fig. 9-1, PORT AFT BULKHEAD LATCH GO/NO-GO DIAGRAM)

② Observe aft centerline for deflection (See Fig. 9-2, PORT AFT CENTERLINE VIEWED BY CAMERA C)

# MECH SSR-2 (Cont)



① Aft bulkhead target line can be used to verify port aft door configuration (See Fig. 9-1, PORT AFT BULKHEAD LATCH GO/NO-GO DIAGRAM)

② Observe aft centerline for deflection (See Fig. 9-2, PORT AFT CENTERLINE VIEWED BY CAMERA C)

# MECH SSR-2 (Cont)

23

27 | Open aft bulkhead latch gang, close forward bulkhead latch gang and door

(CRT, R13L)  
Deselect PORT(STBD) DOOR, open PORT(STBD) AFT LATCHES

- ITEM 13(10) EXEC (no \*)
- PL BAY DR – OP
- √PORT(STBD) AFT LATCHES – blank, 'OP' (~30 sec)
- PL BAY DR – STOP

(CRT)  
Deselect PORT(STBD) AFT LATCHES; select PORT(STBD) FWD LATCHES, PORT(STBD) DOOR

- ITEM 12(19) EXEC (no \*)
- ITEM 11(8) EXEC (\*)
- ITEM 13(10) EXEC (\*)

(CRT, R13L)  
Close PORT(STBD) FWD LATCHES, PORT(STBD) DOOR

- PL BAY DR – CL
- √PORT(STBD) FWD LATCHES – blank, 'CL' (~30 sec)
- PL BAY DR – STOP

(CRT)  
Deselect PORT(STBD) DOOR, PORT(STBD) FWD LATCHES

- ITEM 13(10) EXEC (no \*)
- ITEM 11(8) EXEC (no \*)

29 | Is STBD door open?

YES NO

37

31 | Close STBD door and STBD forward bulkhead latch gang

(CRT)  
Select STBD DOOR

- ITEM 10 EXEC (\*)

(CRT, R13L)

- PL BAY DR – CL
- √STBD DOOR – 'RDY' (~63 sec)
- PL BAY DR – STOP

(CRT, R13L)  
Select STBD FWD LATCHES

- ITEM 8 EXEC (\*)
- PL BAY DR – CL
- √STBD FWD LATCHES – blank, 'CL' (~30 sec)
- PL BAY DR – STOP

(CRT)  
Deselect STBD DOOR, STBD FWD LATCHES

- ITEM 8 EXEC (no \*)
- ITEM 10 EXEC (no \*)

33

22

28 | Open forward bulkhead latch gang, close aft bulkhead latch gang and door

(CRT, R13L)  
Deselect PORT(STBD) DOOR, open PORT(STBD) FWD LATCHES

- ITEM 13(10) EXEC (no \*)
- PL BAY DR – OP
- √PORT(STBD) FWD LATCHES – blank, 'OP' (~30 sec)
- PL BAY DR – STOP

(CRT)  
Deselect PORT(STBD) FWD LATCHES; select PORT(STBD) AFT LATCHES, PORT(STBD) DOOR

- ITEM 11(8) EXEC (no \*)
- ITEM 12(9) EXEC (\*)
- ITEM 13(10) EXEC (\*)

(CRT, R13L)  
Close PORT(STBD) AFT LATCHES, PORT(STBD) DOOR

- PL BAY DR – CL
- √PORT(STBD) AFT LATCHES – blank, 'CL' (~30 sec)
- PL BAY DR – STOP

(CRT)  
Deselect PORT(STBD) DOOR, PORT(STBD) AFT LATCHES

- ITEM 13(10) EXEC (no \*)
- ITEM 12(9) EXEC (no \*)

30 | Is STBD door open?

YES NO

38

32 | Close STBD door and STBD aft bulkhead latch gang

(CRT)  
Select STBD DOOR

- ITEM 10 EXEC (\*)

(CRT, R13L)

- PL BAY DR – CL
- √STBD DOOR – 'RDY' (~63 sec)
- PL BAY DR – STOP

(CRT, R13L)  
Select STBD AFT LATCHES

- ITEM 9 EXEC (\*)
- PL BAY DR – CL
- √STBD AFT LATCHES – blank, 'CL' (~30 sec)
- PL BAY DR – STOP

(CRT)  
Deselect STBD DOOR, STBD AFT LATCHES

- ITEM 9 EXEC (no \*)
- ITEM 10 EXEC (no \*)

34

## MECH SSR-2 (Cont)

31

33	Close centerline latch gangs forward to aft and both doors
(CRT)	Select PORT, STBD DOOR, CENTER LATCHES 1-4 <ul style="list-style-type: none"> <li>• ITEM 13 EXEC (*)</li> <li>• ITEM 10 EXEC (*)</li> <li>• ITEM 6 EXEC (*)</li> </ul>
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> <li>•√CENTER LATCHES 1-4 – blank, 'CL' (~20 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect CENTER LATCHES 1-4 <ul style="list-style-type: none"> <li>• ITEM 6 EXEC (no *)</li> <li>• Repeat closure for CENTER LATCHES 5-8, 9-12, 13-16 in order</li> </ul>



35	Close aft bulkhead latch gangs and doors
(CRT)	Select PORT, STBD AFT LATCHES <ul style="list-style-type: none"> <li>• ITEM 12 EXEC (*)</li> <li>• ITEM 9 EXEC (*)</li> </ul>
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> <li>•√PORT, STBD AFT LATCHES – blank, 'CL' (~30 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect PORT, STBD AFT LATCHES, PORT, STBD DOOR <ul style="list-style-type: none"> <li>• ITEM 12 EXEC (no *)</li> <li>• ITEM 9 EXEC (no *)</li> <li>• ITEM 13 EXEC (no *)</li> <li>• ITEM 10 EXEC (no *)</li> </ul>

41

32

34	Close centerline latch gangs aft to forward and both doors
(CRT, R13L)	Select PORT, STBD DOOR, CENTER LATCHES 13-16 <ul style="list-style-type: none"> <li>• ITEM 13 EXEC (*)</li> <li>• ITEM 10 EXEC (*)</li> <li>• ITEM 7 EXEC (*)</li> </ul>
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> <li>•√CENTER LATCHES 13-16 – blank, 'CL' (~20 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect CENTER LATCHES 13-16 <ul style="list-style-type: none"> <li>• ITEM 7 EXEC (no *)</li> <li>• Repeat closure for CENTER LATCHES 9-12, 5-8, 1-4 in order</li> </ul>



36	Close forward bulkhead latch gangs and doors
(CRT)	Select PORT, STBD FWD LATCHES <ul style="list-style-type: none"> <li>• ITEM 11 EXEC (*)</li> <li>• ITEM 8 EXEC (*)</li> </ul>
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> <li>•√PORT, STBD FWD LATCHES – blank, 'CL' (~30 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect PORT, STBD FWD LATCHES, PORT, STBD DOOR <ul style="list-style-type: none"> <li>• ITEM 11 EXEC (no *)</li> <li>• ITEM 8 EXEC (no *)</li> <li>• ITEM 13(10) EXEC (no *)</li> <li>• ITEM 10 EXEC (no *)</li> </ul>

41

# MECH SSR-2 (Cont)

29

37	Close centerline latch gangs forward to aft and door
(CRT)	Select STBD DOOR, CENTER LATCHES 1-4 <ul style="list-style-type: none"> <li>• ITEM 10 EXEC (*)</li> <li>• ITEM 6 EXEC (*)</li> </ul>
(CRT, R13L)	<ul style="list-style-type: none"> <li>• PL BAY DR – CL</li> <li>• ✓CENTER LATCHES 1-4 – blank, 'CL' (~20 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect CENTER LATCHES 1-4 <ul style="list-style-type: none"> <li>• ITEM 6 EXEC (no *)</li> <li>• Repeat closure for CENTER LATCHES 5-8, 9-12, 13-16 in order</li> </ul>

30

38	Close centerline latch gangs aft to forward and door
(CRT)	Select STBD DOOR, CENTER LATCHES 13-16 <ul style="list-style-type: none"> <li>• ITEM 10 EXEC (*)</li> <li>• ITEM 7 EXEC (*)</li> </ul>
(CRT, R13L)	<ul style="list-style-type: none"> <li>• PL BAY DR – CL</li> <li>• ✓CENTER LATCHES 13-16 – blank, 'CL' (~20 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect CENTER LATCHES 13-16 <ul style="list-style-type: none"> <li>• ITEM 7 EXEC (no *)</li> <li>• Repeat closure for CENTER LATCHES 9-12, 5-8, 1-4 in order</li> </ul>

39	Close aft bulkhead latch gang and door
(CRT)	Select STBD AFT LATCHES <ul style="list-style-type: none"> <li>• ITEM 9 EXEC (*)</li> </ul>
(CRT, R13L)	<ul style="list-style-type: none"> <li>• PL BAY DR – CL</li> <li>• ✓STBD AFT LATCHES – blank, 'CL' (~30 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect STBD AFT LATCHES, STBD DOOR <ul style="list-style-type: none"> <li>• ITEM 9 EXEC (no *)</li> <li>• ITEM 10 EXEC (no *)</li> </ul>

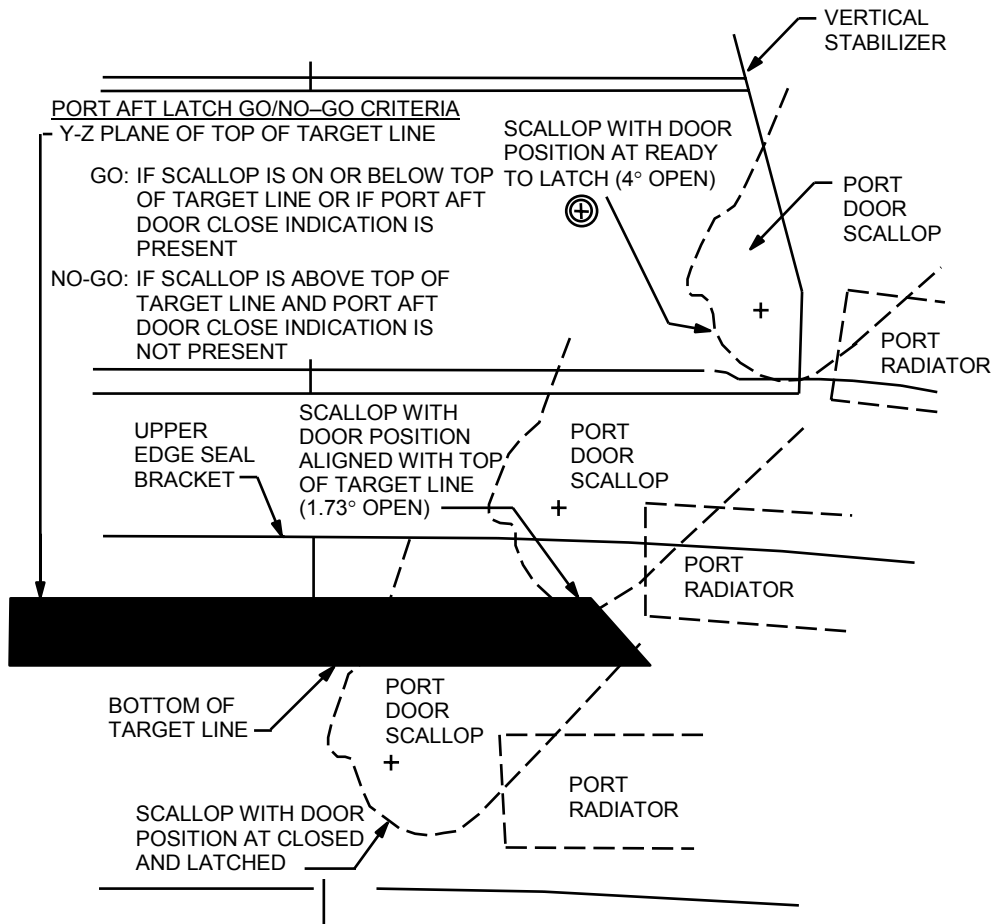
40	Close forward bulkhead latch gang and door
(CRT)	Select STBD FWD LATCHES <ul style="list-style-type: none"> <li>• ITEM 8 EXEC (*)</li> </ul>
(CRT, R13L)	<ul style="list-style-type: none"> <li>• PL BAY DR – CL</li> <li>• ✓STBD FWD LATCHES – blank, 'CL' (~30 sec)</li> <li>• PL BAY DR – STOP</li> </ul>
(CRT)	Deselect STBD FWD LATCHES, STBD DOOR <ul style="list-style-type: none"> <li>• ITEM 8 EXEC (no *)</li> <li>• ITEM 10 EXEC (no *)</li> </ul>

35 36

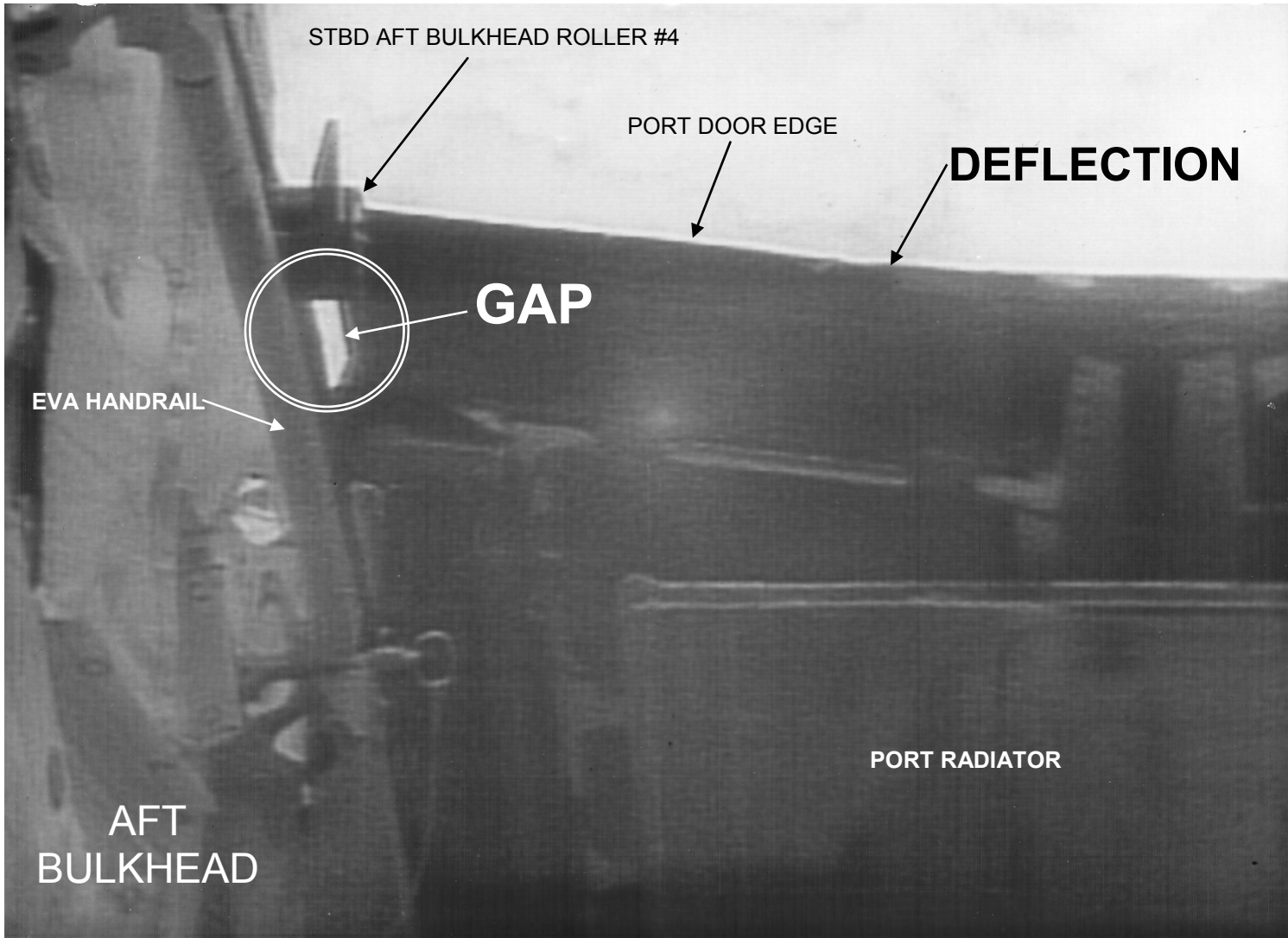
41	Disable PLBDs
(CRT, R13L)	<ul style="list-style-type: none"> <li>• PL BAY DR SYS 1,2 (two) – DSBL</li> <li>• AC POWER OFF – ITEM 2 EXEC (*)</li> <li>• If PASS SM, SM OPS 201 PRO</li> </ul>
(A7U)	<ul style="list-style-type: none"> <li>• PL BAY FLOOD (all) – OFF</li> </ul>



**MECH SSR-2 (Cont)**



**Figure 9-1.- Port aft bulkhead latch GO/NO-GO diagram.**



Shows worst case upwards deflection of PLBD seen on STS-4

Figure 9-2.- Port aft centerline viewed by camera C.

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## MECH SSR-3 SIMULTANEOUS PLBD CL

Excessive C/L  
Overlap  
Noted  
with PORT  
DOOR  
Closed and  
Latched Entry  
Reqd Next  
Opportunity

STBD DOOR  
extended guide  
roller trajectory  
is above point D on  
Fig. 9-3 C/L  
LATCH  
EXTENDED  
GUIDE ROLLER  
TRAJECTORY  
NO-GO DIAGRAM

1 Disable one  
mtr in each actuator  
(R13L)  
• PL BAY DR SYS  
1 – DSBL

4  
SM (BFS SM 63)  
PL BAY DOORS  
Deselect 'AUTO  
MODE SEL'  
• ITEM 3 EXEC  
(no \*)  
• √'MAN SEL'  
(ten) – (no \*)

5 Open STBD  
DOOR 2-3 stripes

(CRT)  
• √STBD FWD,  
AFT LATCHES  
(two) – 'OP'

Select STBD  
DOOR  
• ITEM 10 EXEC  
(\*)

(CRT, R13L)  
• PL BAY DR –  
OP (~25 sec)  
• √STBD DOOR –  
'RDY', blank  
• PL BAY DR –  
STOP

(CRT)  
Deselect STBD  
DOOR:  
• ITEM 10 EXEC  
(no \*)

9 Partially Open  
PORT BLKHDs

(CRT)  
Select PORT FWD,  
AFT LATCHES  
• ITEM 11 EXEC  
(\*)  
• ITEM 12 EXEC  
(\*)

(CRT, R13L)  
• PL BAY DR –  
OP (19 sec)  
• √PORT FWD, AFT  
LATCHES –  
blank  
• PL BAY DR –  
STOP

(CRT)  
Deselect PORT  
FWD, AFT  
LATCHES  
• ITEM 11 EXEC  
(no \*)  
• ITEM 12 EXEC  
(no \*)

2 Close STBD  
DOOR until just  
before contact with  
PORT DOOR

(CRT)  
Select STBD  
DOOR  
• ITEM 10 EXEC  
(\*)

(CRT, R13L)  
• PL BAY DR –  
CL  
• √STBD DOOR –  
blank, 'RDY'  
• PL BAY DR –  
STOP

(CRT)  
Deselect STBD  
DOOR  
• ITEM 10 EXEC  
(no \*)

6  
• √C/L LATCH  
EXTENDED  
GUIDE ROLLER  
TRAJECTORY  
NO-GO  
DIAGRAM,  
fig. 9-3  
NO-GO for PLBD  
closing ?

NO

8 Open STBD  
DOOR 2-3 stripes

(CRT)  
Select STBD  
DOOR  
• ITEM 10 EXEC  
(\*)

(CRT, R13L)  
• PL BAY DR –  
OP (~25 sec)  
• √STBD DOOR –  
'RDY', blank  
• PL BAY DR –  
STOP

(CRT)  
Deselect STBD DR  
• ITEM 10 EXEC  
(no \*)

3

3 Open PORT  
BLKHDs to 'OP'

(CRT)  
Select PORT FWD,  
AFT LATCHES  
• ITEM 11 EXEC  
(\*)  
• ITEM 12 EXEC  
(\*)

(CRT, R13L)  
• PL BAY DR –  
OP  
• √PORT FWD,  
AFT LATCHES  
(two) – blank,  
'OP' (~41 sec)  
• PL BAY DR –  
STOP

(CRT)  
Deselect PORT  
FWD, AFT  
LATCHES  
• ITEM 11 EXEC  
(no \*)  
• ITEM 12 EXEC  
(no \*)

7 Close STBD  
DOOR until just  
before contact 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 \*)  
• √C/L LATCH  
EXTENDED  
GUIDE ROLLER  
TRAJECTORY  
NO-GO  
DIAGRAM,  
fig. 9-3

NO-GO for PLBD  
closing ?

YES

10

1

NO

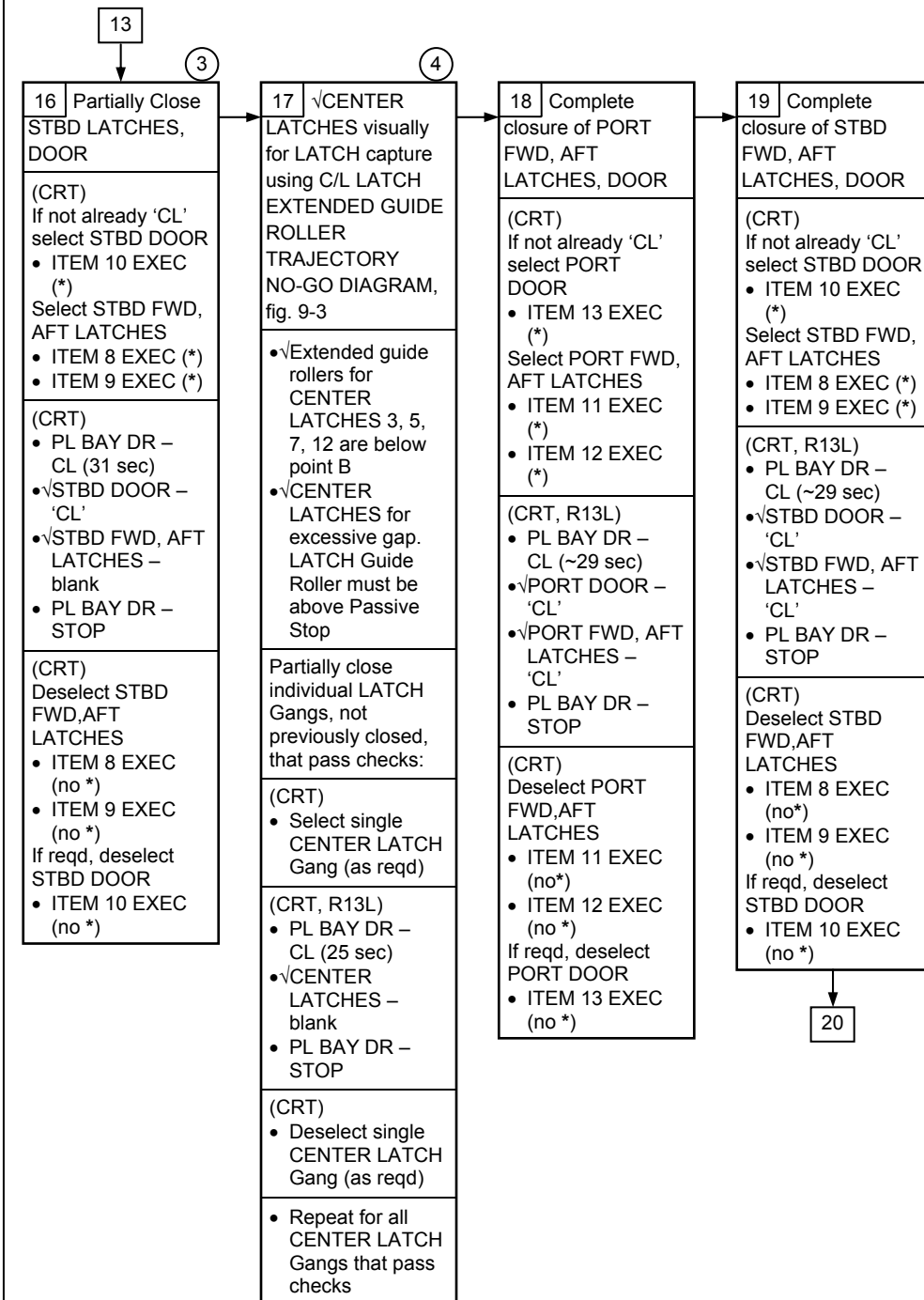
12

1 Depending on  
the position of the  
port door, STBD  
DOOR may show  
'RDY' instead of  
blank

2 Allows  
LATCHES to  
unlatch partially  
while remaining  
captured



# MECH SSR-3 (Cont)



③ Allows LATCHES to latch partially

④ The latch hangers on CENTER LATCHES 3, 5, 7, 9, and 12 are the only ones that have stripes. The stripes on 9 may not be visible due to obstruction by the passive shear roller

## MECH SSR-3 (Cont)

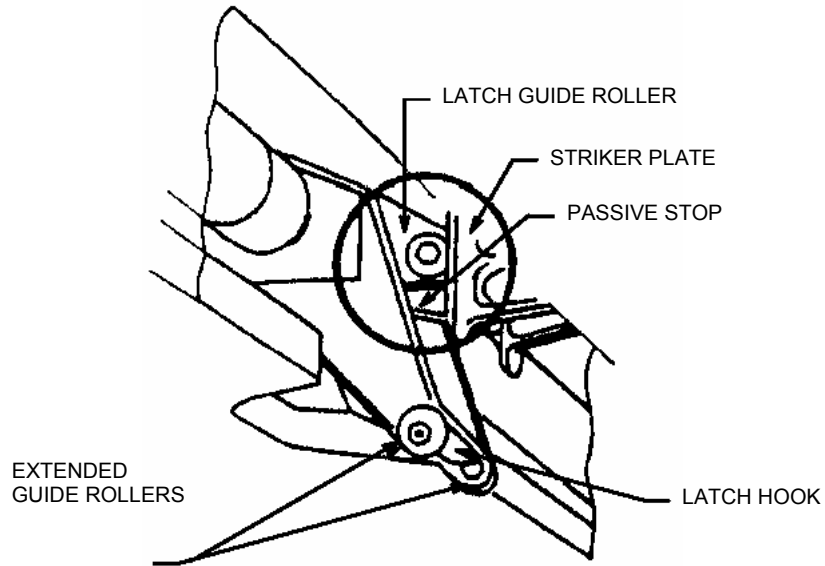
19

20	Complete CENTER LATCH closure in the following order: 1-4 (ITEM 6) 13-16 (ITEM 7) 5-8 (ITEM 4) 9-12 (ITEM 5)
	(CRT) • Select single CENTER LATCH Gang
	(R13L) • PL BAY DR – CL (~15 sec for partially closed, ~40 sec for open LATCH) • PL BAY DR – STOP
	(CRT) • Deselect single CENTER LATCH Gang
	• Repeat for all remaining CENTER LATCH Gangs

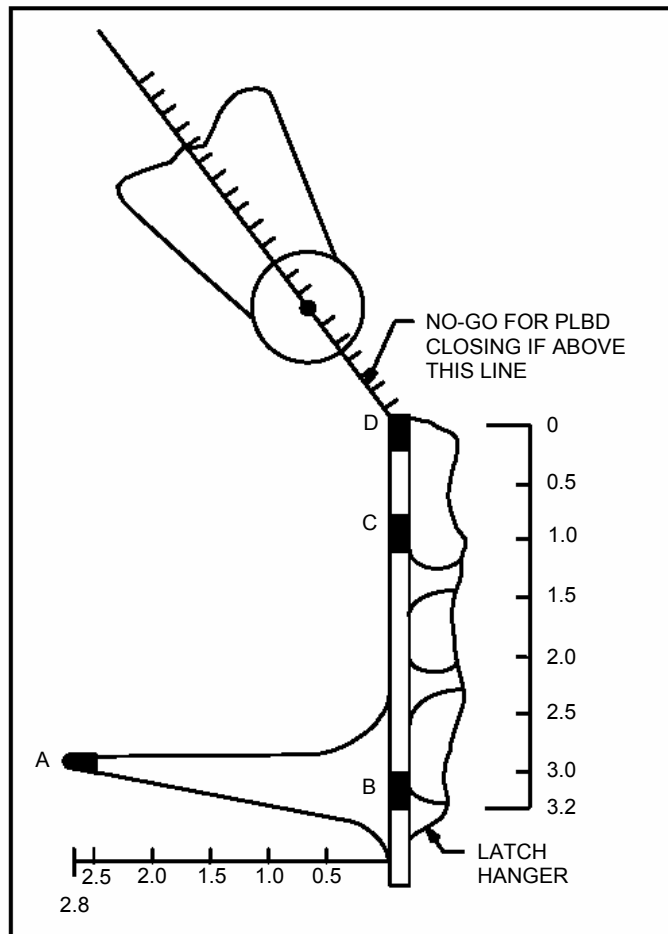
21	(CRT) • AC POWER OFF – ITEM 2 EXEC (*)
	(R13L) • PL BAY DR SYS 2 – DSBL

**MECH SSR-3 (Cont)**

NO. 1 LATCH AREA TO CHECK FOR EXCESSIVE GAP



VIEW OF NO. 1 C/L LATCH FROM PORT AFT WINDOW



**Figure 9-3.- C/L Latch Extended Guide Roller Trajectory NO-GO Diagram**



# MECH SSR-4

## PLBD CHECKOUT AFTER MDM CHANGEOUT

- R13L 1. √PL BAY DR – STOP
- √PL BAY DR SYS (two) – DSBL
- CRT4 2. SM, OPS 202 PRO or BFS, SM 63 PL BAY DOORS
- 4: SM PL BAY DOORS
- √AC POWER OFF, ITEM 2 EXEC (\*)
- √MAN SEL (ten) – (no \*)
- √PBD SW BYPASS, ITEM 14 EXEC (no \*)
- √OP/CL STATUS (ten) – OP

NOTE

Perform remaining steps during AOS only

- R13L 3. Select CENTER LATCHES 5-8, 9-12, 1-4, 13-16 – ITEM 4, 5, 6, 7 EXEC (\*)
- R13L 4. PL BAY DR – CL
- On MCC GO:
- PL BAY DR – STOP
- CRT4 5. Deselect CENTER LATCHES 5-8, 9-12, 1-4, 13-16 – ITEM 4, 5, 6, 7 EXEC (no \*)
- 6. Select STBD FWD, AFT LATCHES & DOOR – ITEM 8, 9, 10 EXEC (\*)
- R13L 7. PL BAY DR – CL
- On MCC GO:
- PL BAY DR – STOP
- CRT4 8. Deselect STBD FWD, AFT LATCHES & DOOR – ITEM 8, 9, 10 EXEC (no \*)
- 9. Select PORT FWD, AFT LATCHES & DOOR – ITEM 11, 12, 13 EXEC (\*)
- R13L 10. PL BAY DR – CL
- On MCC GO:
- PL BAY DR – STOP
- CRT4 11. Deselect PORT FWD, AFT LATCHES & DOOR – ITEM 11, 12, 13 EXEC (no \*)

CAUTION

Driving PLBD mechanisms out of sequence may create a condition that could prevent PLBD closure

- \* If any OP/CL STATUS changes or any PLBD \*
- \* mechanism is observed to be moving: \*
- R13L \* PL BAY DR SYS (two) – DSBL \*
- CRT4 12. AC POWER ON – ITEM 1 EXEC (\*)
- R13L 13. PL BAY DR SYS (two) – ENA
- On MCC GO:
- PL BAY DR SYS (two) – DSBL
- CRT4 14. AC POWER OFF – ITEM 2 EXEC (\*)

# MECH SSR-5

## CONTINGENCY KU-BD ANT DIRECT STOW

**CAUTION**

√MCC to verify Gimbals are locked  
before applying this procedure

Config CCTVs to monitor KU Ant motion  
Point CCTV as reqd  
Record all motion on VTR

R13L √PL BAY MECH PWR SYS (two) – OFF  
A1U KU BD PWR – OFF  
CNTL – PNL  
R13L ANT – GND

**CAUTION**

Ku Ant switch must be in GND position prior  
to use of Direct Stow sw to prevent  
phase-to-phase short of STO/DPY mtrs

KU ANT DIRECT STO – ON  
PL BAY MECH PWR SYS (two) – ON  
√KU ANT tb – bp

When KU ANT tb – STO (~23-46 sec),  
KU ANT DIRECT STO – OFF  
PL BAY MECH PWR SYS (two) – OFF

√KU-BD is within STO envelope

**NOTE**

KU-BD CCTV overlay is located in  
Middeck Transparency Kit

# MECH SSR-6 PLBD CL MICROSW FAILURE WORKAROUND

## NOTE

This procedure regains door close capability for door-closed microsw failed-on (closed) (Mtr 1 or Mtr 2 inhibited from running). Procedure will not work for opening or closing latches, or opening doors

1	Check config
SM (BFS SM 63) PL BAY DOORS	
<ul style="list-style-type: none"> <li>•√AC POWER ON – (*)</li> <li>•√AUTO MODE SEL – (no *)</li> <li>•√MAN SEL (ten) – (no *)</li> </ul>	
(R13L)	
<ul style="list-style-type: none"> <li>•√PL BAY DR SYS (two) – ENA</li> <li>•√DR – STOP</li> </ul>	

2	Aff DOOR:
STBD	
PORT	

3	<ul style="list-style-type: none"> <li>• Close,latch PORT DOOR in MANUAL mode</li> </ul>
---	--

4	Disable pwr to microsw failed in closed state	① ②
TO ENABLE:		
MTR 1 (FWD 'C' MICRO-SW STAT – '1') (MA73C:B)	MTR 2 (AFT 'C' MICRO-SW STAT – '1') (MA73C:A)	
<ul style="list-style-type: none"> <li>• MCA LOGIC MNB MID 4 – OFF</li> </ul>	<ul style="list-style-type: none"> <li>• MCA LOGIC MNA MID 1 – OFF</li> </ul>	
(CRT)	(CRT)	
<ul style="list-style-type: none"> <li>•√PORT DOOR FWD 'C' MICRO-SW STAT – '0'</li> </ul>	<ul style="list-style-type: none"> <li>•√PORT DOOR AFT 'C' MICRO-SW STAT – '0'</li> </ul>	

5	Disable pwr to microsw failed in closed state	③ ④
TO ENABLE:		
MTR 1 (FWD 'C' MICRO-SW STAT – '1') (MA73C:A)	MTR 2 (AFT 'C' MICRO-SW STAT – '1') (MA73C:B)	
<ul style="list-style-type: none"> <li>• MCA LOGIC MNB MID 2 – OFF</li> </ul>	<ul style="list-style-type: none"> <li>• MCA LOGIC MNC MID 4 – OFF</li> </ul>	
(CRT)	(CRT)	
<ul style="list-style-type: none"> <li>•√STBD DOOR FWD 'C' MICRO-SW STAT – '0'</li> </ul>	<ul style="list-style-type: none"> <li>•√STBD DOOR AFT 'C' MICRO-SW STAT – '0'</li> </ul>	

6	Close PORT DOOR
(CRT)	
Select PORT DOOR	
<ul style="list-style-type: none"> <li>• ITEM 13 EXEC (*)</li> </ul>	
(R13L)	
<ul style="list-style-type: none"> <li>• PL BAY DR – CL</li> </ul>	
(CRT)	
<ul style="list-style-type: none"> <li>•√'OP/CL', 'MICRO-SW STAT' columns</li> </ul>	
After PORT DOOR 'RDY' and one DOOR 'C' = '1', or ~126 sec:	
(R13L)	
<ul style="list-style-type: none"> <li>• PL BAY DR – STOP</li> </ul>	
(CRT)	
Deselect PORT DOOR	
<ul style="list-style-type: none"> <li>• ITEM 13 EXEC (no *)</li> </ul>	

7	PLBD fit check
(CRT)	
Select STBD DOOR	
<ul style="list-style-type: none"> <li>• ITEM 10 EXEC (*)</li> </ul>	
(R13L)	
<ul style="list-style-type: none"> <li>• PL BAY DR – CL</li> </ul>	
When STBD DOOR as close as possible to PORT DOOR before contact:	
(R13L)	
<ul style="list-style-type: none"> <li>• PL BAY DR – STOP</li> <li>• Determine C/L Latch Clearance on C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY NO-GO DIAGRAM, <u>MECH SSR-3, fig. 9-3:</u></li> </ul>	
GO	NO-GO

8	Reenable MCA LOGIC pwr
MTR 1 (MA73C:B)	MTR 2 (MA73C:A)
<ul style="list-style-type: none"> <li>• MCA LOGIC MNB MID 4 – ON</li> </ul>	<ul style="list-style-type: none"> <li>• MCA LOGIC MNA MID 1 – ON</li> </ul>

11

9

12

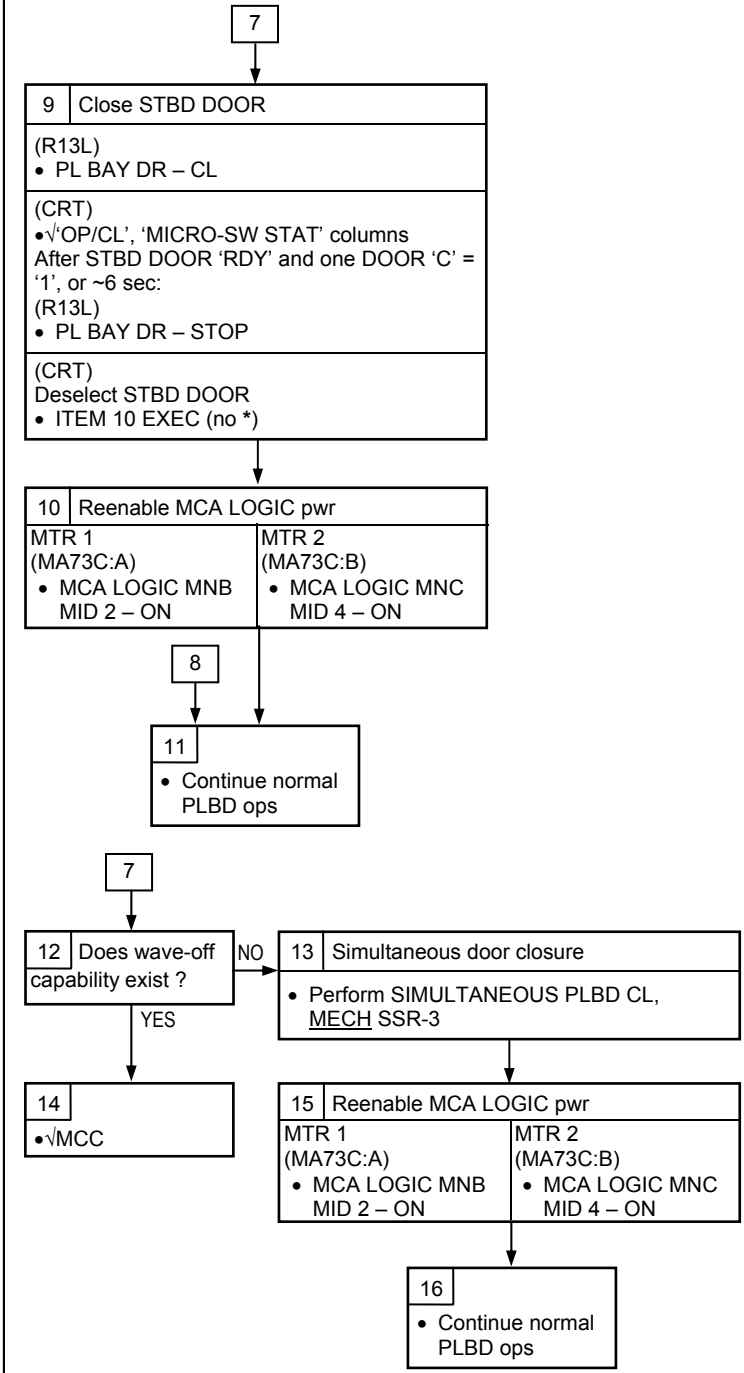
① To enable mtr 1, this step also disables pwr to:  
PORT FWD BLKHD MTR 2  
STBD DOOR MTR 2  
STBD FWD BLKHD MTR 2

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  
C/L 9-12 MTR 1

③ To enable mtr 1, this step also disables pwr to:  
PORT DOOR MTR 2  
STBD AFT BLKHD MTR 2  
C/L 13-16 MTR 2

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 2  
C/L 13-16 MTR 1

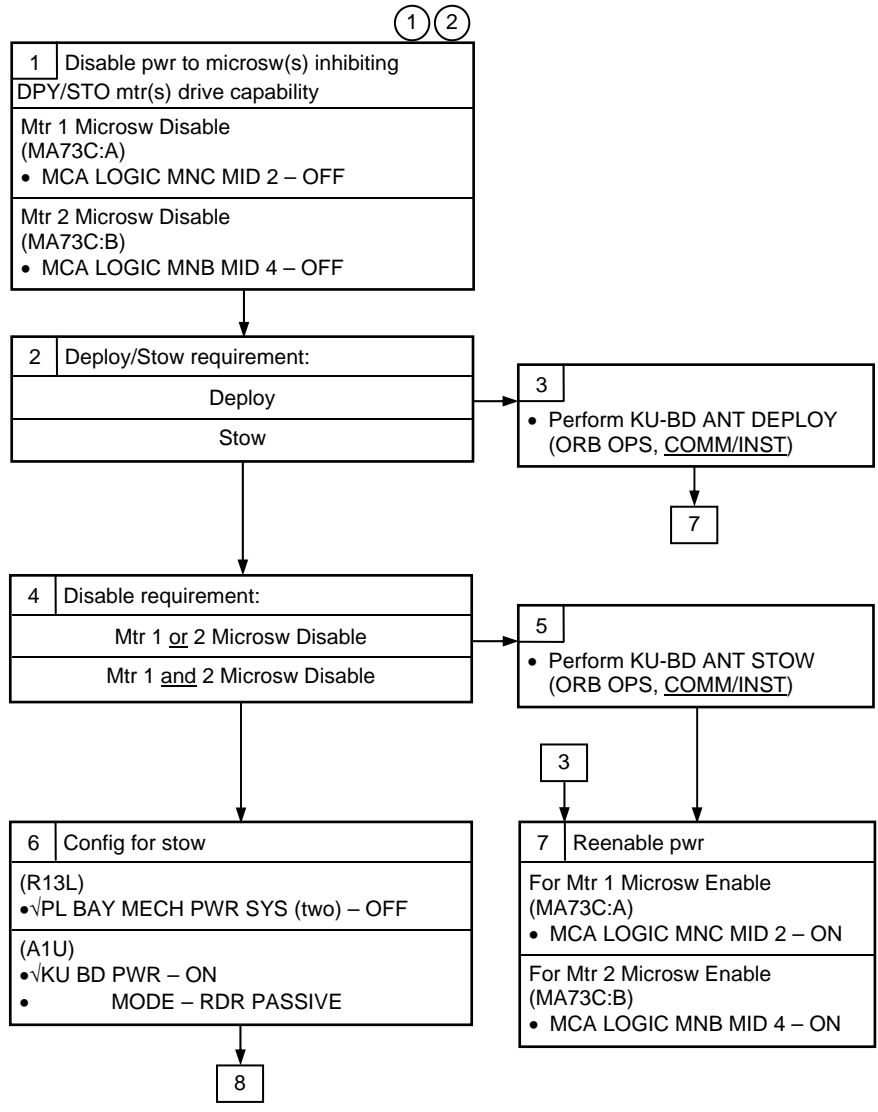
# MECH SSR-6 (Cont)



# 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 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

## MECH SSR-7 (Cont)

6

8	Lock Gimbals
	<ul style="list-style-type: none"> <li>DAP: VERN(FREE)</li> </ul>
(A1U)	<ul style="list-style-type: none"> <li>SLEW RATE – as reqd</li> <li>ELEV – as reqd</li> </ul>
(A2)	<ul style="list-style-type: none"> <li>R/EL ind: <math>-27.0 (\pm 1^\circ)</math></li> </ul>
(A1U)	<ul style="list-style-type: none"> <li>SLEW AZM – as reqd</li> </ul>
(A2)	<ul style="list-style-type: none"> <li>R/AZM ind: <math>-123.0 (\pm 1^\circ)</math></li> </ul>
(R13L)	<ul style="list-style-type: none"> <li>KU ANT – STOW</li> </ul>

### CAUTION

KU ANT sw must remain in STOW until after KU BD PWR sw is in OFF

9

After 50 sec:

(A2)

- R/EL ind:  $-29.0 (\pm 1^\circ)$
- R/AZM ind:  $-125.0 (\pm 1^\circ)$

(A1U)

- KU BD PWR – OFF
- CNTL – PNL

(R14C)

- cb MNB KU ELEC – op
- MNC KU SIG PROC – op

(R13L)

- KU ANT – GND

- DAP: as reqd

② ③

10 Stow deployed assy

(R13L)

- KU ANT DIRECT STO – ON
- PL BAY MECH PWR SYS (two) – ON

After 23 sec max:

- PL BAY MECH PWR SYS (two) – OFF
- KU ANT DIRECT STO – OFF

- KU-BD deployed assy is within GO FOR PLBD CLOSURE envelope

11 Reenable pwr

For Mtr 1 Microsw Enable

(MA73C:A)

- MCA LOGIC MNC MID 2 – ON

For Mtr 2 Microsw Enable

(MA73C:B)

- MCA LOGIC MNB MID 4 – ON

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-8 RAD DPY/STO MICROSWS FAILURE WORKAROUND

**NOTE**

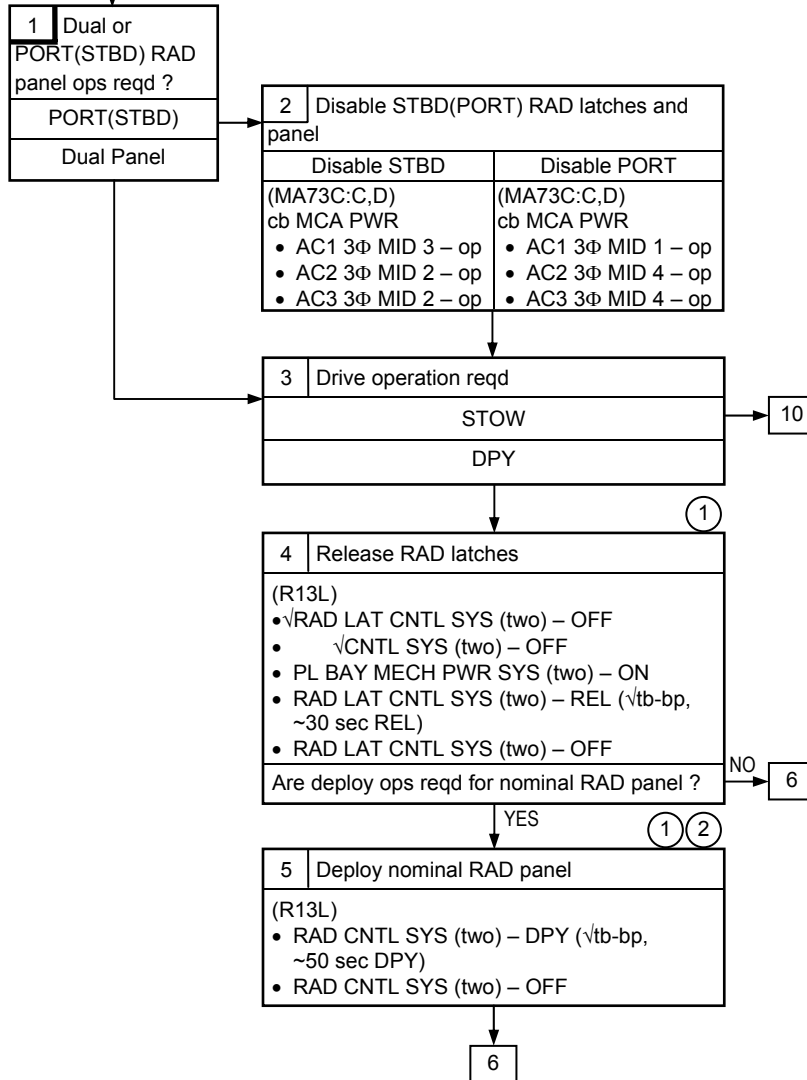
This procedure regains radiator panel deploy or stow capability if DPY/STO microsw(s) is (are) failed on, inhibiting deploy/stow motor ops. This procedure accommodates PORT(STBD) and/or dual panel ops

**WARNING**

To preclude failures causing inadvertent MPM cycling, the RMS (if flown) must be cradled if PORT RAD deploy ops are required. This procedure assumes that the RMS is cradled

- ① Drive Times  
(Dual Motor)  
Lat – 30 sec  
Panel – 50 sec  
(Single Motor)  
Lat – 60 sec  
Panel – 100 sec

- ② For either a dual microsw or microsw/motor failure, failed panel will be inhibited from driving



# MECH SSR-8 (Cont)

4 5

6	Disable pwr to failed-on microsw(s)	
	PORT	STBD
	(MA73C:A) Motor 1 Microsw Disable • MCA LOGIC MNC MID 2 – OFF	(MA73C:B) Motor 1 Microsw Disable • MCA LOGIC MNC MID 4 – OFF
	(MA73C:B) Motor 2 Microsw Disable • MCA LOGIC MNA MID 3 – OFF	(MA73C:B) Motor 2 Microsw Disable • MCA LOGIC MNA MID 1 – OFF

1 3 4

7	DPY RAD panel with failed-on microsw(s)
	(R13L) On MCC GO: • RAD CNTL SYS (two) – DPY • RAD CNTL SYS (two) – OFF (after 50 sec max) • Visually verify RAD panel is deployed • MCC to confirm RAD panel is deployed • PL BAY MECH PWR SYS (two) – OFF

8	Enable pwr to failed-on microsw(s)	
	PORT	STBD
	(MA73C:A) Motor 1 Microsw Enable • MCA LOGIC MNC MID 2 – ON	(MA73C:B) Motor 1 Microsw Enable • MCA LOGIC MNC MID 4 – ON
	(MA73C:B) Motor 2 Microsw Enable • MCA LOGIC MNA MID 3 – ON	(MA73C:B) Motor 2 Microsw Enable • MCA LOGIC MNA MID 1 – ON

9	Enable STBD(PORT) RAD sys (if reqd)	
	Enable STBD	Enable PORT
	(MA73C:C,D) cb MCA PWR • AC1 3Φ MID 3 – cl • AC2 3Φ MID 2 – cl • AC3 3Φ MID 2 – cl	(MA73C:C,D) cb MCA PWR • AC1 3Φ MID 1 – cl • AC2 3Φ MID 4 – cl • AC3 3Φ MID 4 – cl

1 Drive Times

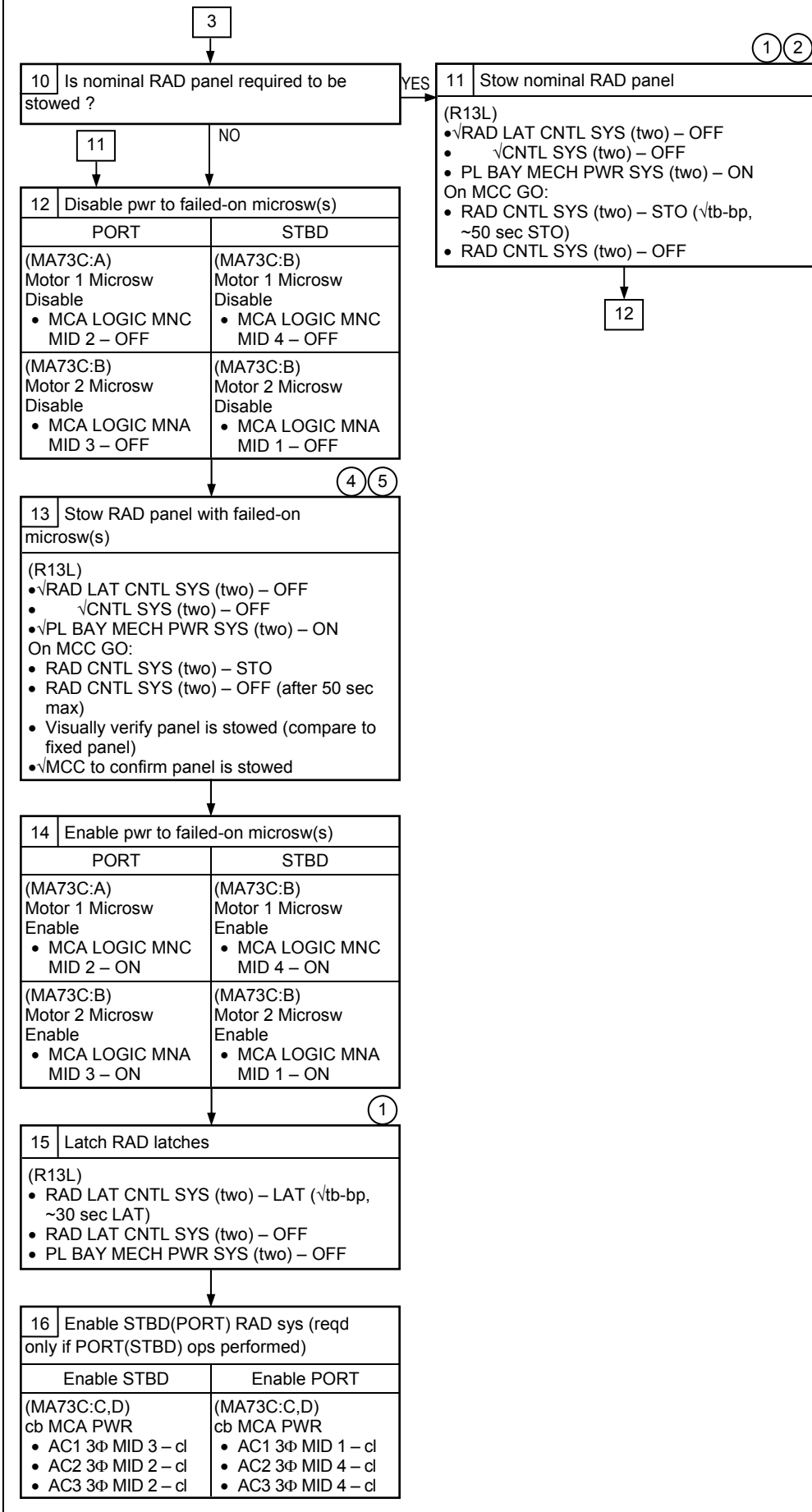
(Dual Motor)  
Lat – 30 sec  
Panel – 50 sec  
(Single Motor)  
Lat – 60 sec  
Panel – 100 sec

3 Only nominal RAD panel tb will be operational. MCC verification of AC bus slip currents will verify mechanism end-of-travel

4 For dual microsw failure expect dual motor drive time. For microsw and motor failure expect single motor drive time (drive for 100 sec)



# MECH SSR-8 (Cont)



① Drive Times

(Dual Motor)  
 Lat – 30 sec  
 Panel – 50 sec  
 (Single Motor)  
 Lat – 60 sec  
 Panel – 100 sec

② For either a dual microsw or motor failure, failed panel will be inhibited from driving

④ For dual microsw failure, expect dual motor drive time. For microsw and motor failure, expect single motor drive time (drive for 100 sec)

⑤ RAD panel tb is not operational. MCC verification of AC bus slip currents will verify mechanism end-of-travel

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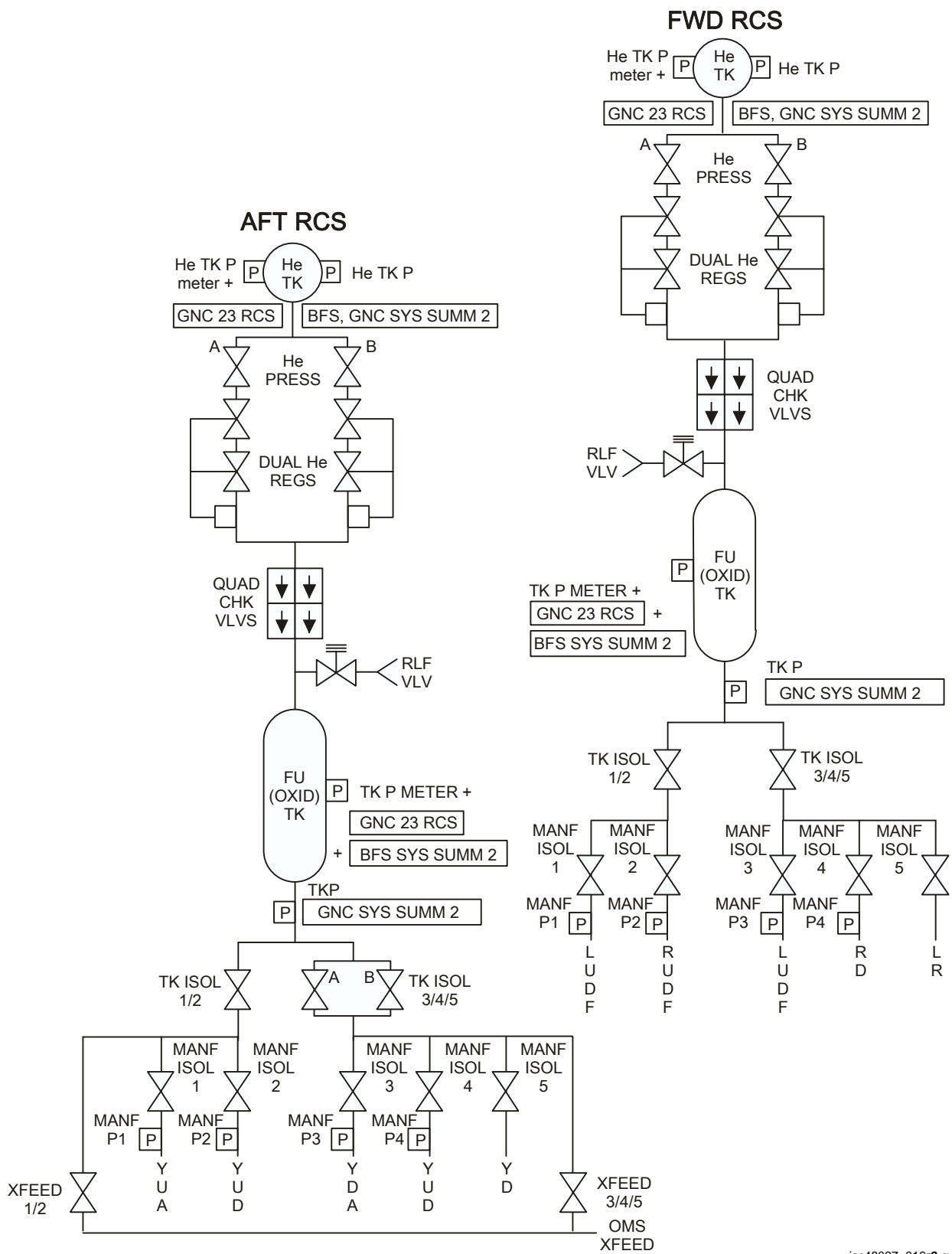
RCS

RCS SCHEMATIC .....	10-3
<u>10.1</u> <u>RCS JET/DLMA/PWR</u>	
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
<u>10.2</u> <u>RCS VLV MISCOMP</u>	
10.2a RCS VLV tb – bp .....	10-12
10.2b            tb AND sw POSITION DISAGREE .....	10-15
<u>10.3</u> <u>RCS PRPLT THERM/SYS</u>	
10.3a 'S89 PRPLT THRM RCS' .....	10-16
10.3b 'G23 RCS SYSTEM F(L,R)' .....	10-17
<u>RCS SSR</u>	
RCS SSR-1    RCS MIXED XFEED MEM READ/WRITE .....	10-20
SSR-2    HOT FIRE RCS.....	10-22
SSR-3    AFT RCS MANF/LEG PRESS, READ/WRITE.....	10-25
SSR-4    STAGED, MANF REPRESS.....	10-27
SSR-5    LEAKING RCS PRPLT/He BURN.....	10-28

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

- ET SEP AUTO (INH,MAN)
- F(L,R) RCS PVT
- F(L,R) RCS He P
- G23 OMS/RCS QTY
- RCS XFEED L(R)

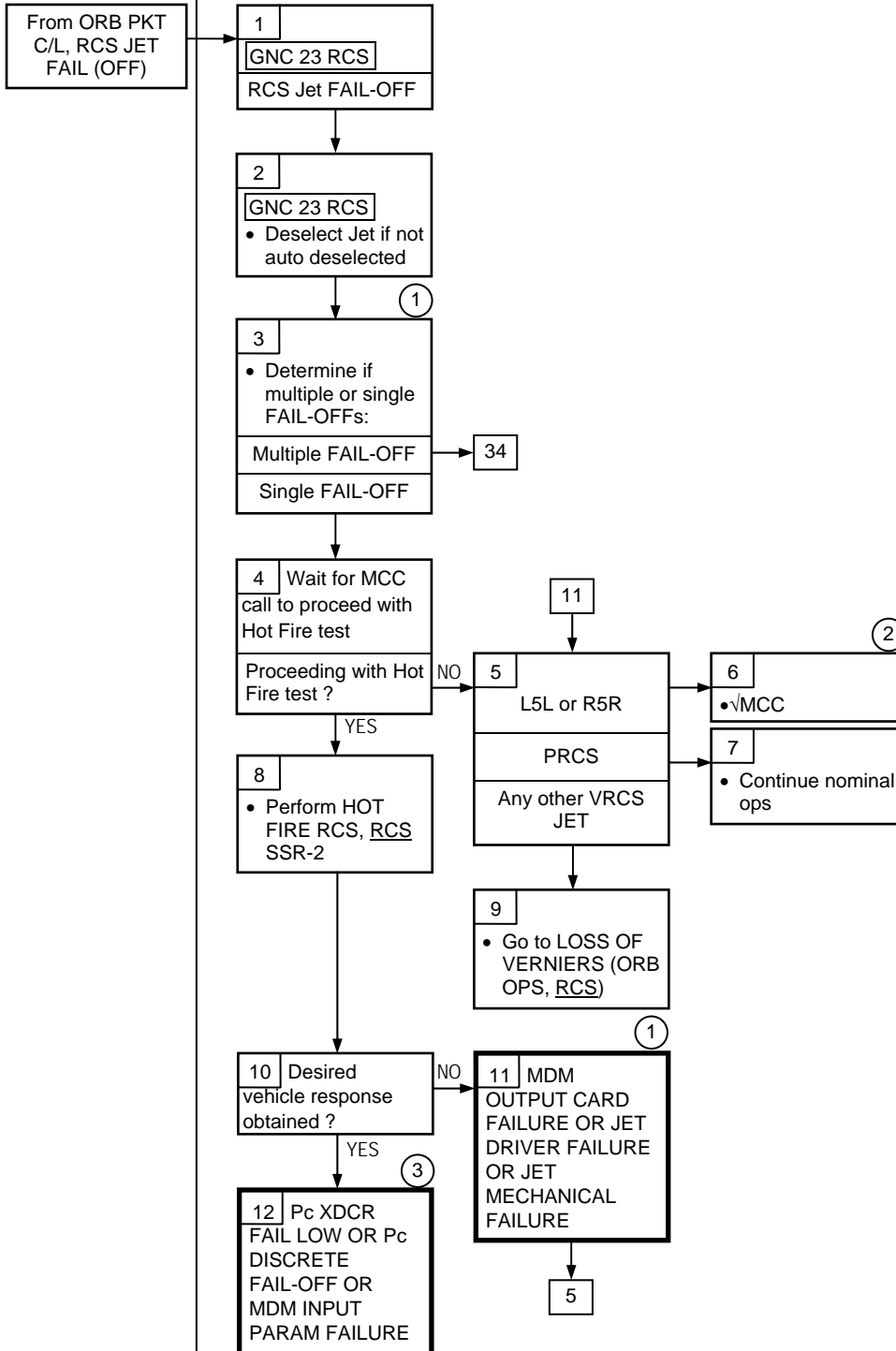
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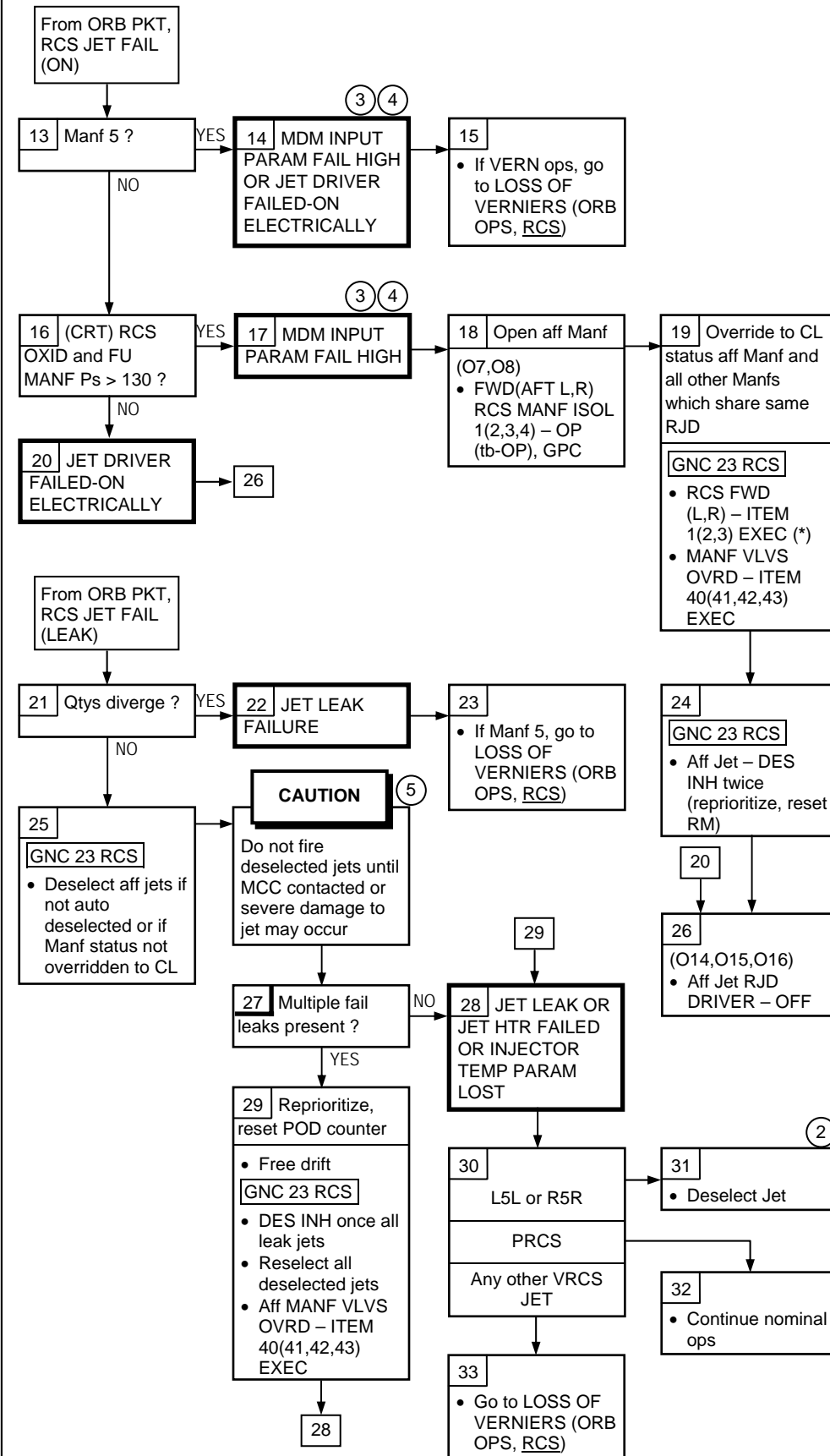
RCS

10.1a 'L(R,F) RCS (L,U,D,R,A,F) JET'  
'F(L,R) RCS TK P'  
'F(L,R) RCS LEAK'



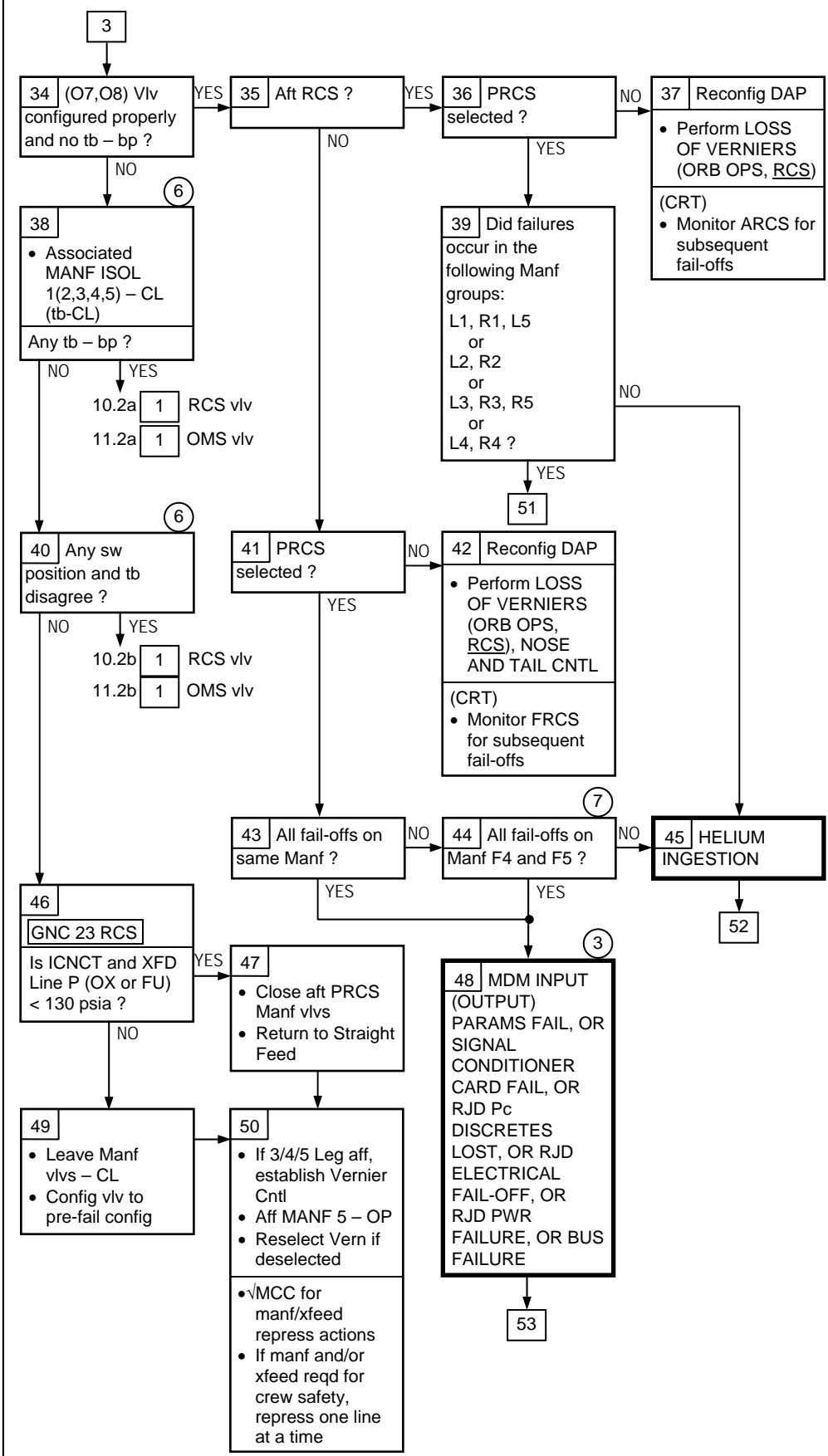
- ① To determine if multiple fail-off jets occurred, both Aft pods
- ② If L5L or R5R failed, vernier control available except during certain loaded PDRS ops
- ③ MCC for other params possibly lost

**RCS 10.1a (Cont)**



- ② If L5L or R5R failed, vernier control available except during certain loaded PDRS ops
- ③ √MCC for other params possibly lost
- ④ Fail-on protection lost for affected jet
- ⑤ MCC call based on jet injector temps

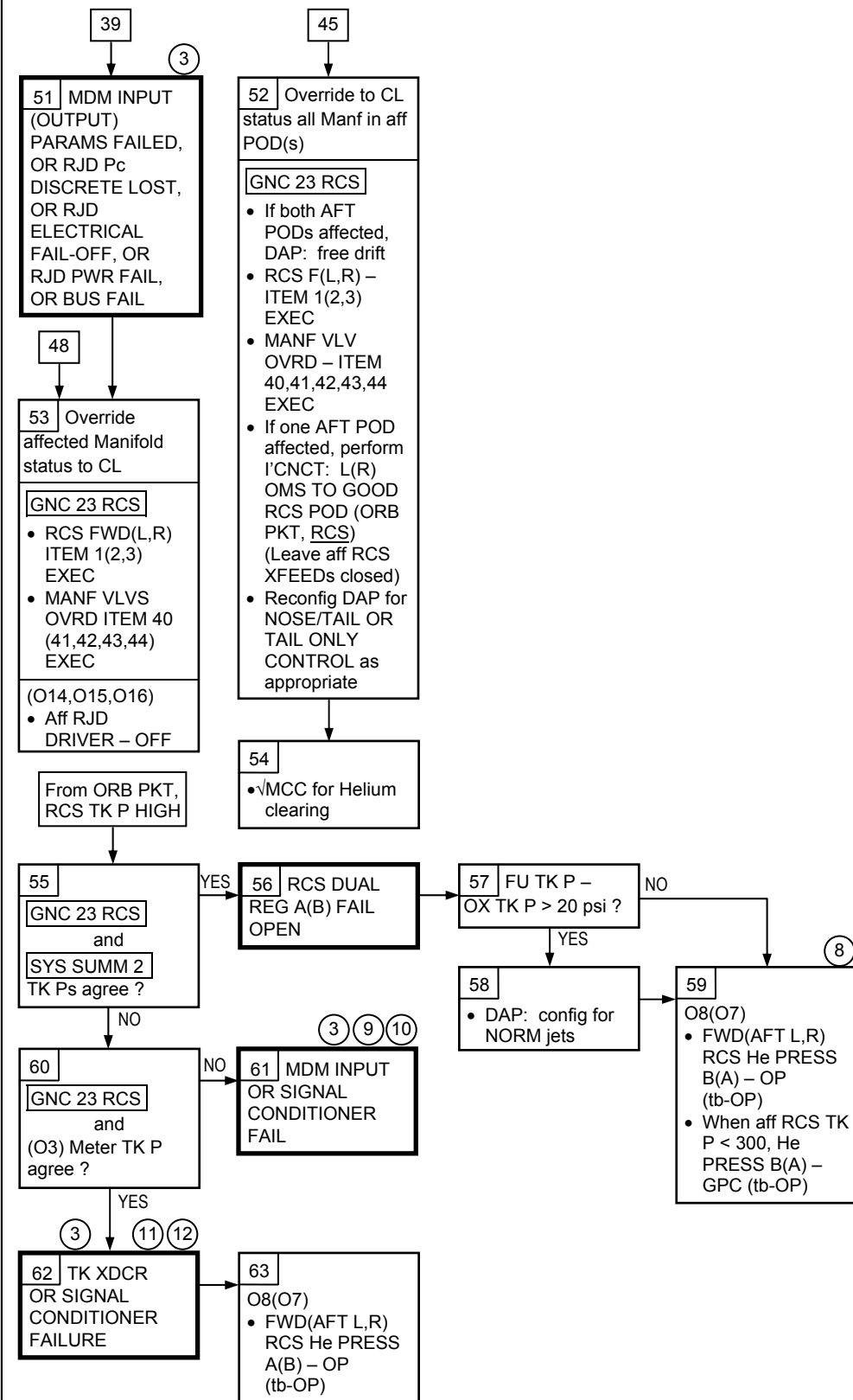
# RCS 10.1a (Cont)



- ③ √MCC for other params possibly lost
- ⑥ Evacuated Manfs need to be repressed. √MCC for config and repress procedure
- ⑦ Both F4,F5 commanded by FF3 and return telemetry by DSC OF2



**RCS 10.1a (Cont)**



(3) √MCC for other params possibly lost

(8) Vern jets can be used when FU TK P – OX TK P ≤ 20 psi

(9) H/W C&W remains

(10) TK P can be monitored using

SYS SUMM

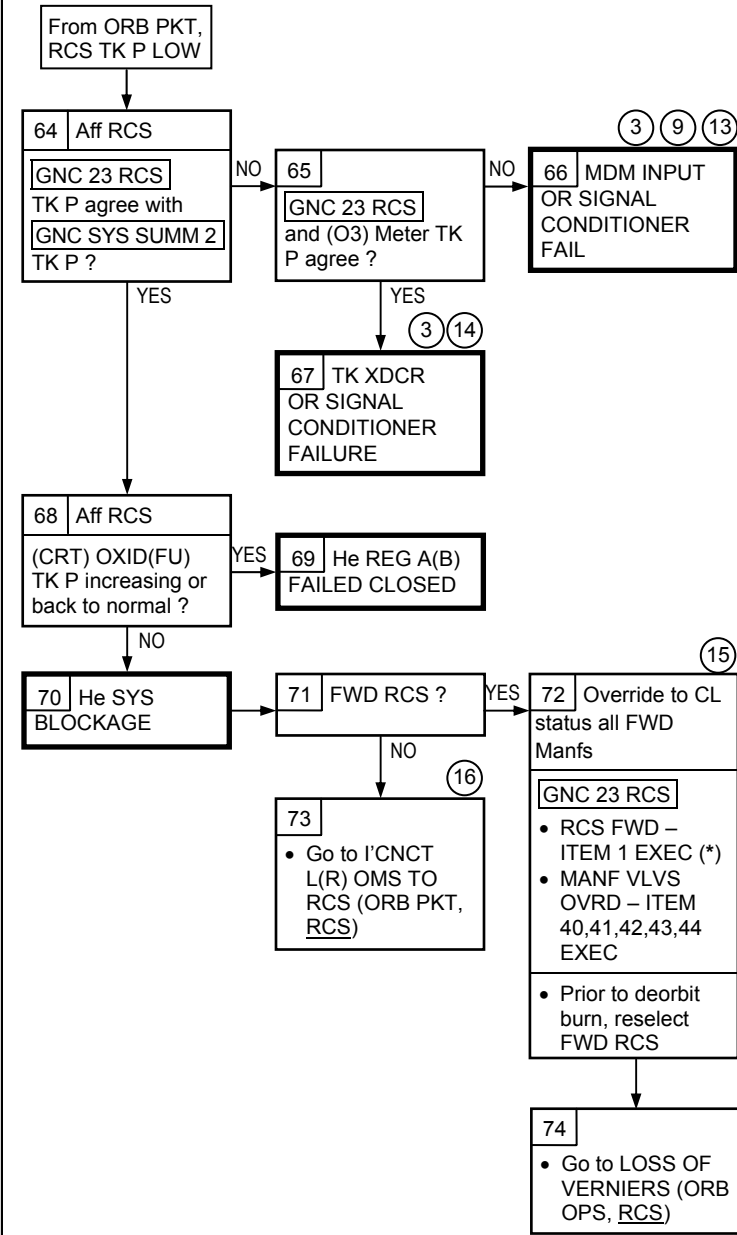
or (O3) Meter

(11) Aff POD FU(OX) can be used for qty

(12) TK P can only be monitored in

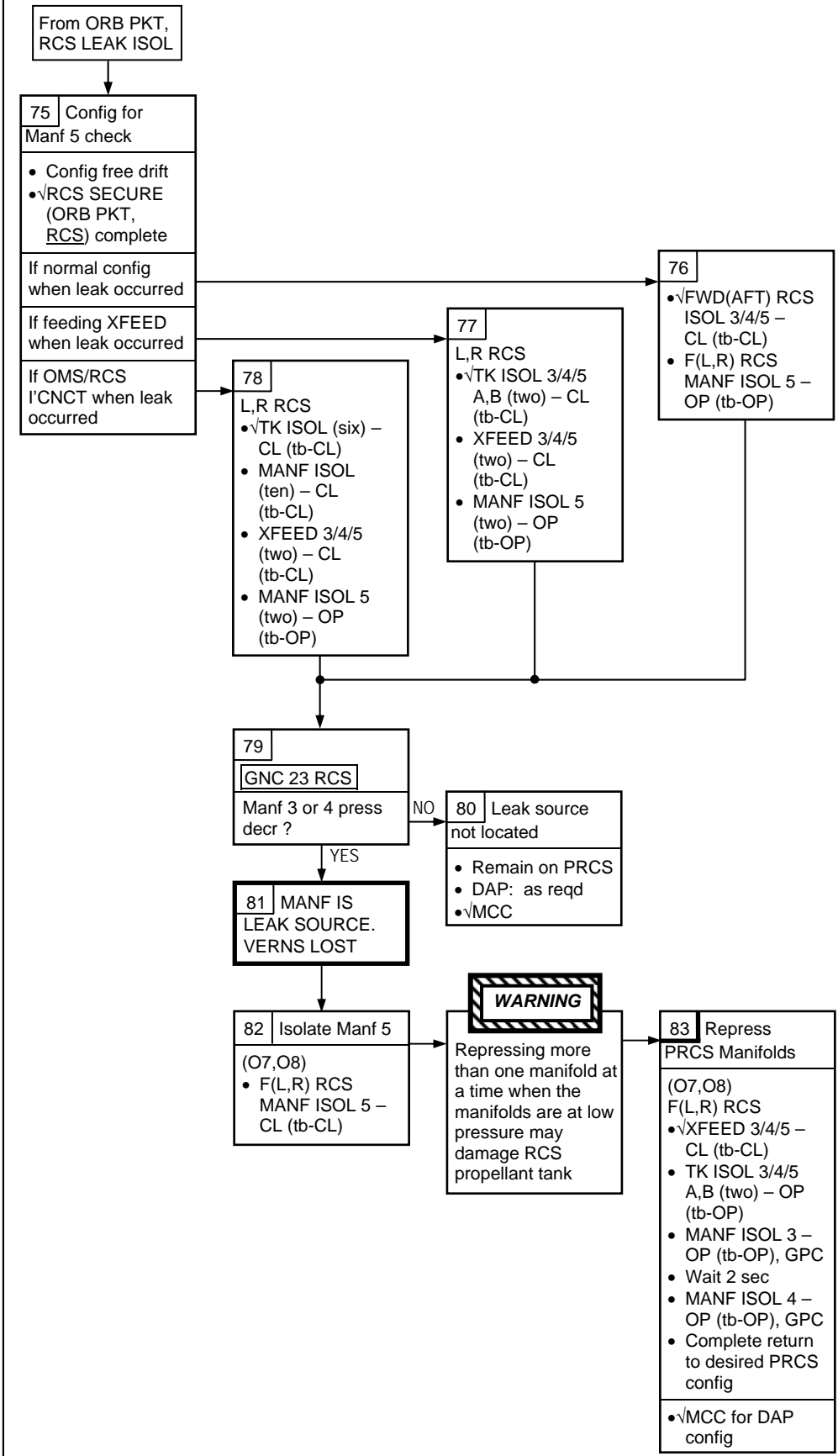
SYS SUMM

**RCS 10.1a (Cont)**



- ③ √MCC for other params possibly lost
- ⑨ H/W C&W remains
- ⑬ Use **SYS SUMM 2** or (O3) meter TK P only (O3) Meter
- ⑭ RCS PVT for aff OX(FU) may be in error. Use aff pod FU(OX) for qty
- ⑮ Prior to deorbit burn, reselect FWD RCS. Secure FWD RCS when TK P < 190
- ⑯ Xfeed from good RCS prior to deorbit. Propellant with He blockage available until TK P < 190 psi if reqd

# RCS 10.1a (Cont)



**RCS**

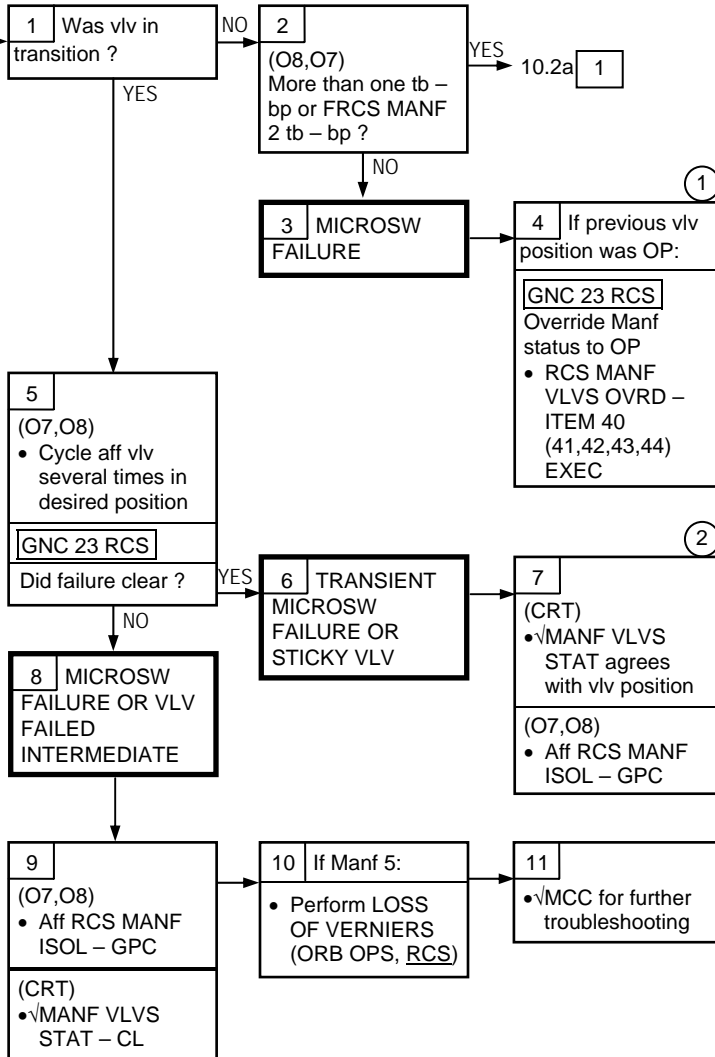
**10.1b 'RM DLMA MANF'**

SM  
ALERT

From ORB PKT,  
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



① If position discretes are intermediate, MANF ISOL STAT will be evaluated at each change of state. It may be necessary to repeat RCS MANF VLVS OVRD later

② Prevent continuous pwr if microsw fails again

**RCS**

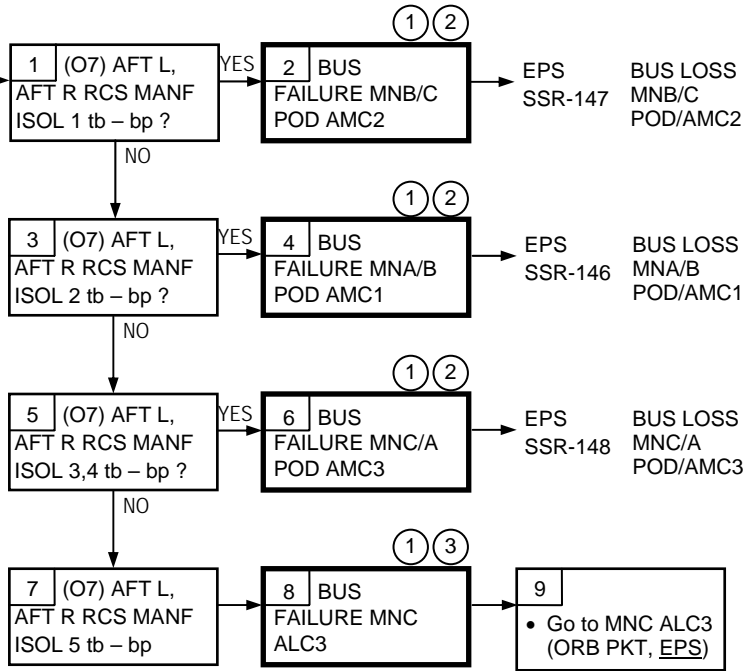
**10.1c 'RCS PWR FAIL'**

SM  
ALERT

RCS PWR  
FAIL

If loss of vlv logic  
pwr to:  
(O7)  
AFT L, AFT R  
RCS MANF  
ISOL 1  
or  
ISOL 2  
or  
ISOL 3,4  
or  
ISOL 5

**Nominal Config:**  
(MA73C:A)  
MCA LOGIC  
MNC FWD 3 – ON  
(MA73C:I)  
AFT POD VLV  
LOGIC GP 1/3 –  
ON  
LOGIC GP 1/2 –  
ON  
LOGIC GP 2/3 –  
ON



① If subsequent leak on affected manf:  
**GNC 23 RCS**  
ITEM 2(3) EXEC (as reqd). √Manf status: If OP, override to CL with ITEM 40-43. To isolate leak, close TK ISOL vlv. Affected RCS MANF ISOL vlv cannot be moved from current status

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

**RCS VLV  
MISCOMP**

**10.2**

**RCS**

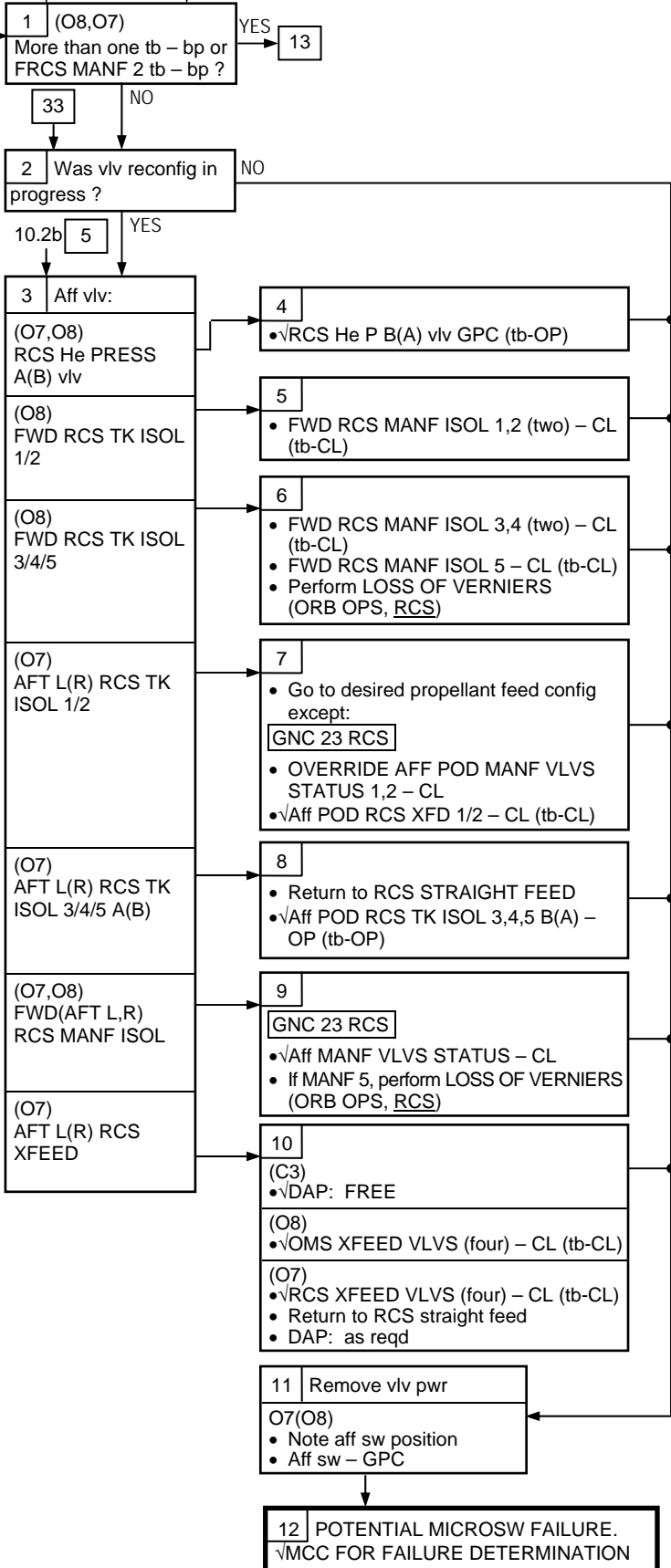
**10.2a RCS VLV tb – bp**

RCS Vlv tb – bp

If tb – bp:  
 O8(O7)  
 FWD(AFT L,R)  
 RCS  
 He PRESS A(B)  
 TK ISOL 1/2  
 TK ISOL 3/4/5 A(B)  
 MANF ISOL  
 1(2,3,4,5)  
 AFT L,R RCS  
 XFEED  
 1/2(3/4/5)

**Nominal Config:**  
 (MA73C:A)  
 MCA LOGIC  
 MNA FWD 1 – ON  
 MNB FWD 2 – ON  
 MNC FWD 3 – ON  
 (MA73C:I)  
 AFT POD VLV  
 LOGIC GP  
 1/3 – ON  
 1/2 – ON  
 2/3 – ON  
 (MA73C:H)  
 cb AC1,AC2,AC3  
 FWD RCS VLV  
 φA,φB,φC  
 (nine) – cl  
 (MA73C:I)  
 cb AC1,AC2,AC3  
 AFT POD VLV GP  
 1,2,3 φA,φB,φC  
 (nine) – cl  
 (R14:C)  
 cb MNC MANF ISOL  
 L5,R5,F5 ENA  
 (three) – cl

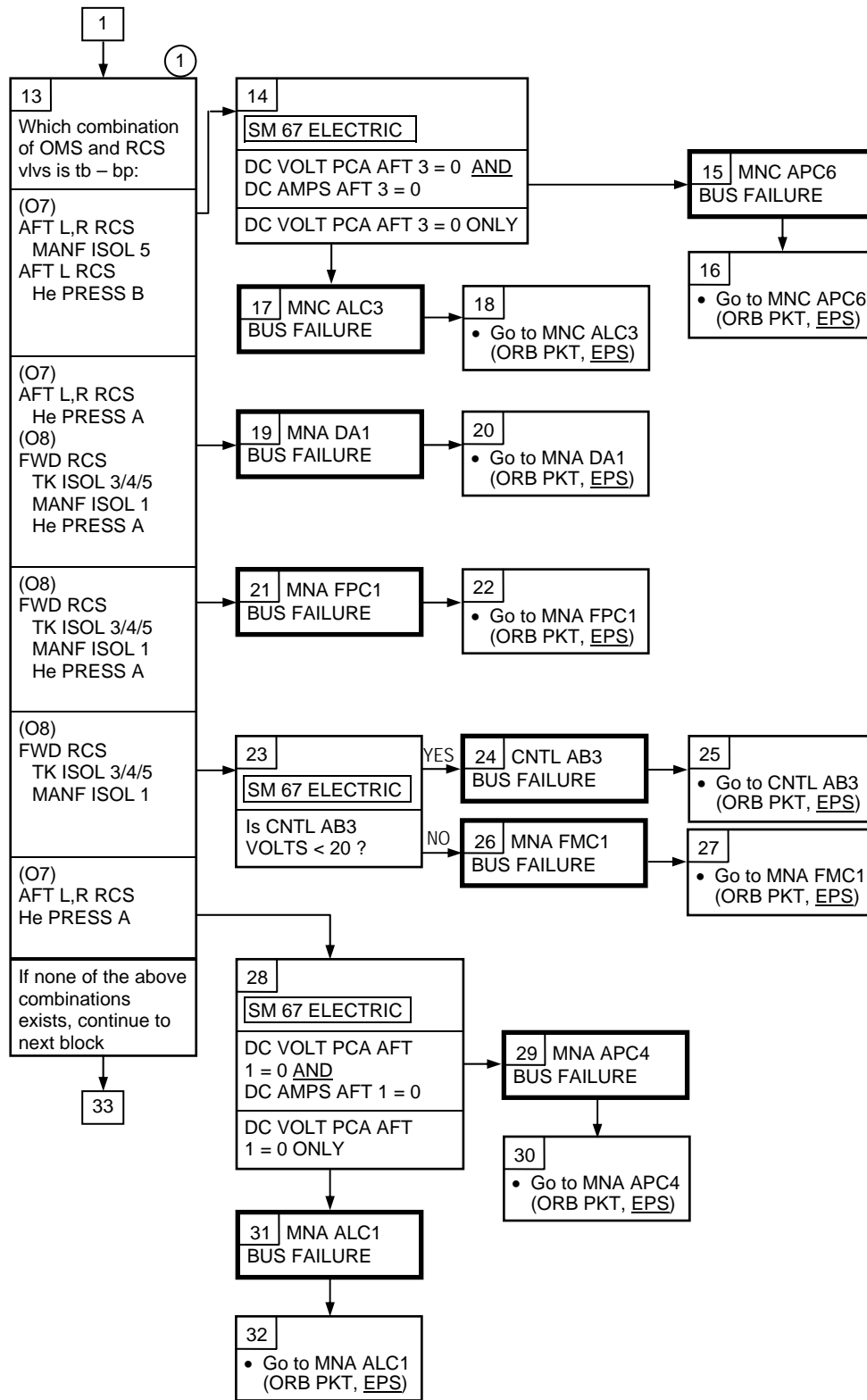
10.1a 38  
 10.1b 2      10.2b 2



RCS VLV  
MISCOMP

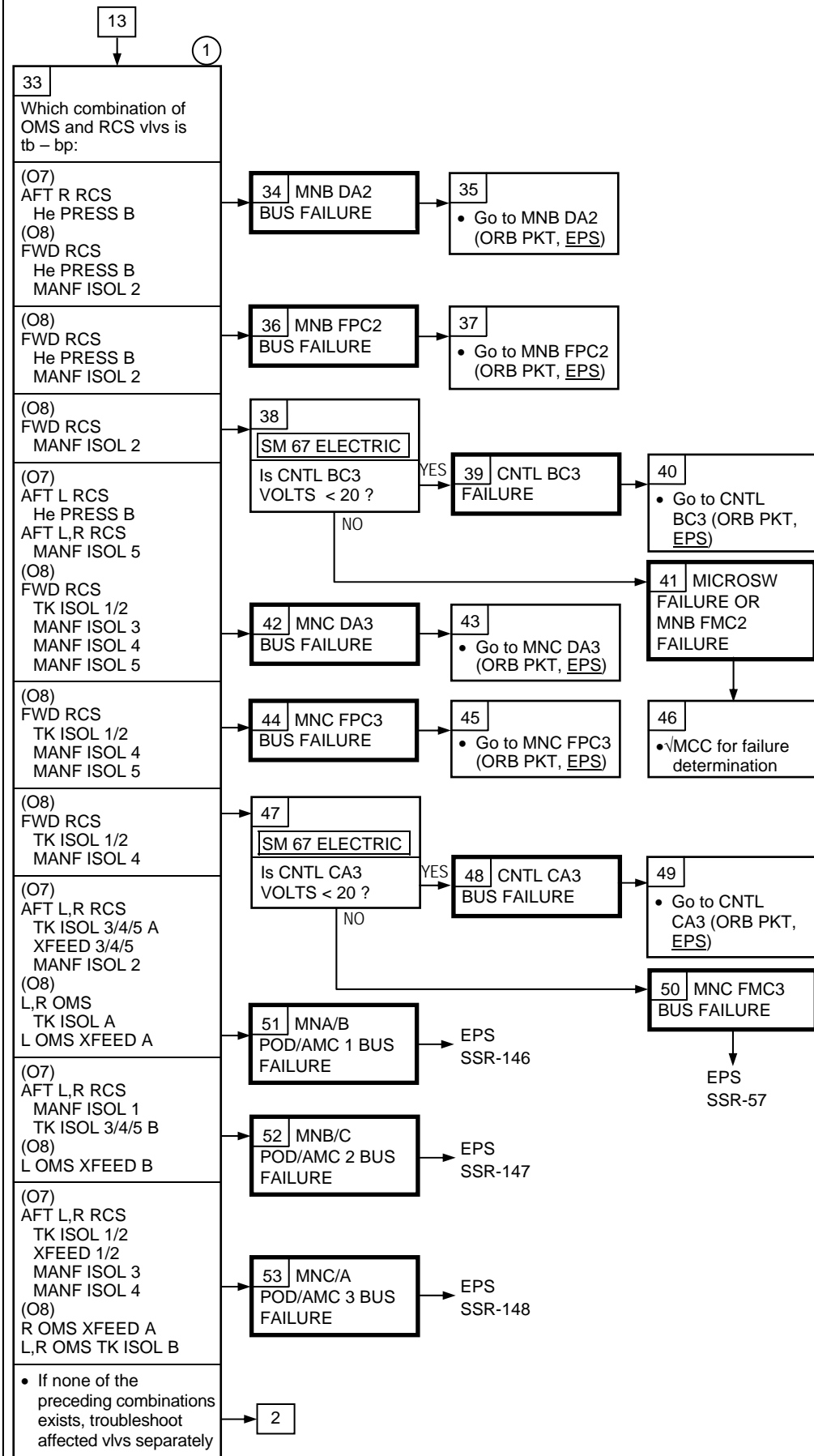
10.2

**RCS 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

**RCS 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

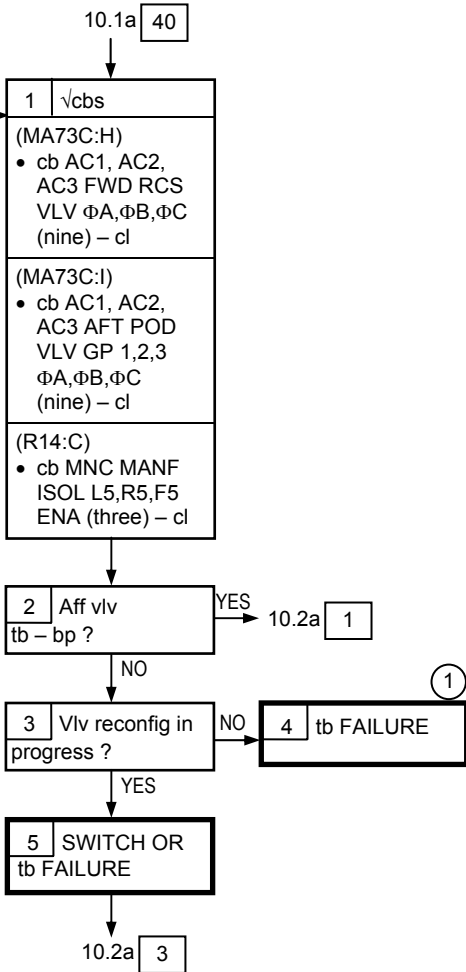


**RCS**

**10.2b RCS VLV tb AND sw POSITION DISAGREE**

RCS Vlv tb and sw Position Disagree

**Nominal Config:**  
 (MA73C:H)  
 cb AC1,AC2,AC3  
 FWD RCS VLV  
 ΦA,ΦB,ΦC  
 (nine) – cl  
 (MA73C:I)  
 cb AC1,AC2,AC3  
 AFT POD VLV GP  
 1,2,3 ΦA,ΦB,ΦC  
 (nine) – cl  
 (R14:C)  
 cb MNC MANF  
 ISOL L5, R5, F5  
 ENA (three) – cl



① Ignore tb. Vlv in commanded position

RCS PRPLT THERM/SYS

10.3

**RCS**

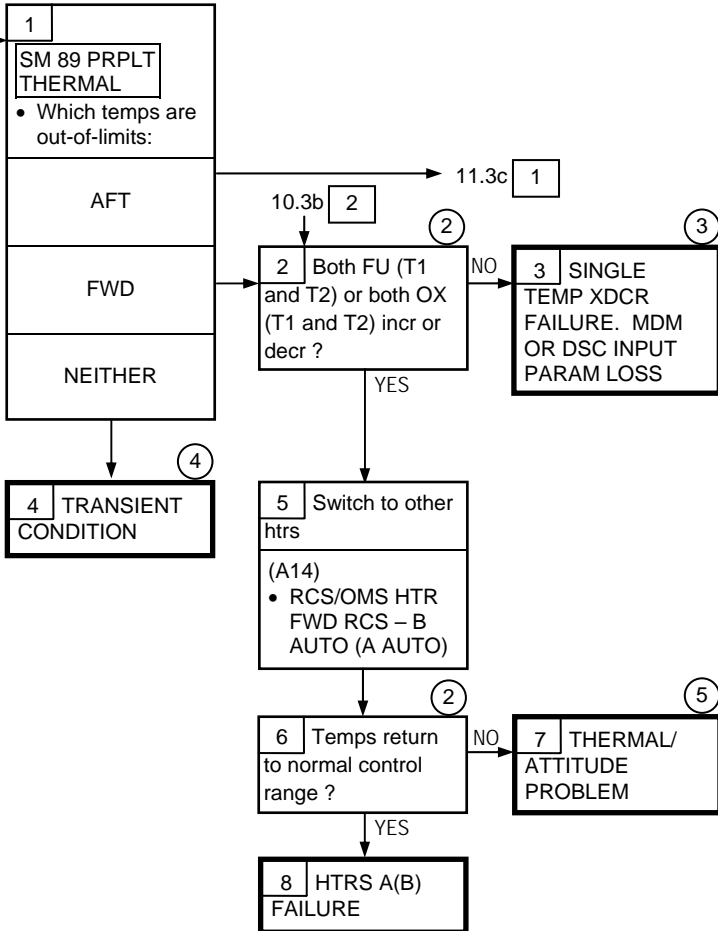
**10.3a 'S89 PRPLT THRM RCS'**

SM ALERT

S89 PRPLT THRM RCS

If:  
 FWD RCS FU(OX) < 46 > 105  
 or  
 Any AFT RCS MANF 1 OX < 50 > 140  
 DRN PNL < 49 > 125  
 VERN PNL < 45 > 140

**Nominal Config:**  
 (A14)  
 RCS/OMS HTR  
 FWD RCS – A AUTO  
 (B AUTO)



- ① Msg available in SM OPS 2 or 4 only
- ② Since FU and OX Htrs controlled by separate thermostats, both T1 and T2 FU temps normally incr or decr together. Both T1 and T2 OX temps normally incr or decr together
- ③ √MCC for other params possibly lost in same MDM or DSC Card
- ④ Htrs cycling high/low or intermittent xdcr failure. √MCC
- ⑤ √MCC for additional thermal analysis, possible vehicle attitude change, or htr reconfig. Fwd RCS control can be resumed when temps return to normal

RCS PRPLT THERM/SYS  
10.3

**RCS**

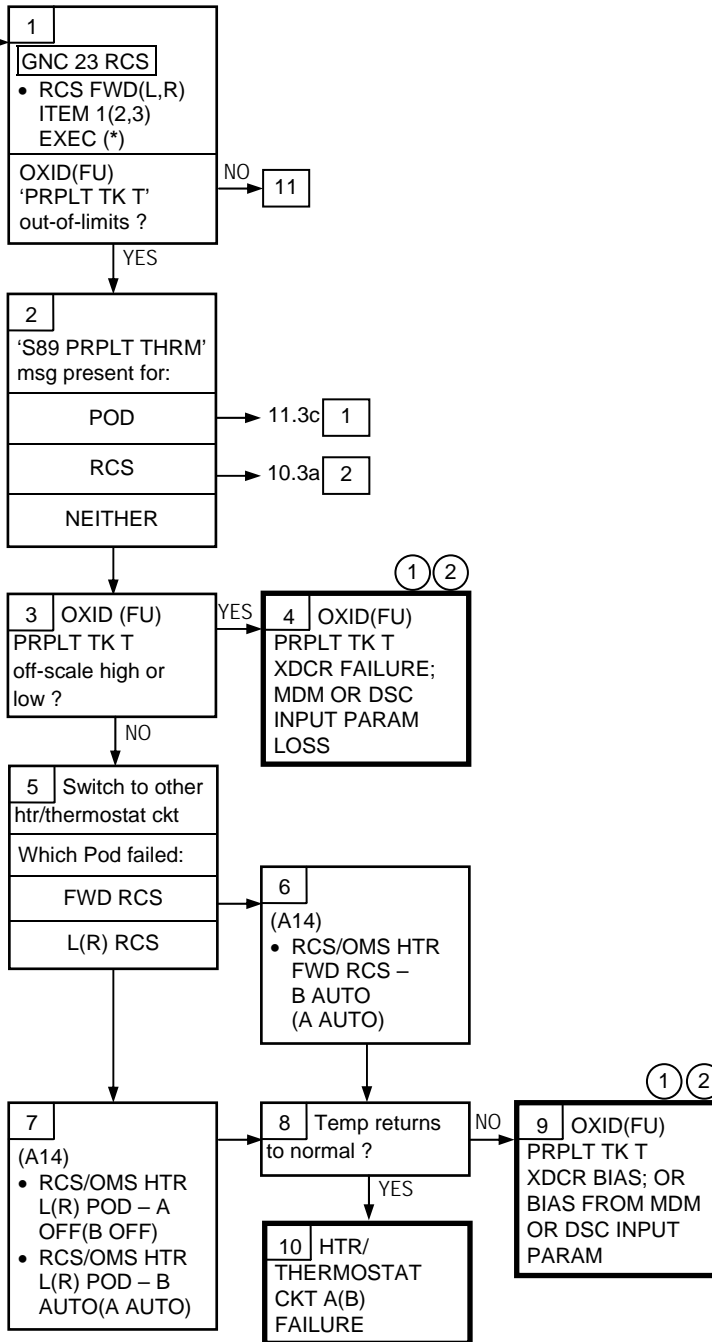
**10.3b 'G23 RCS SYSTEM F(L,R)'**

SM  
ALERT

G23 RCS  
SYSTEM F(L,R)

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

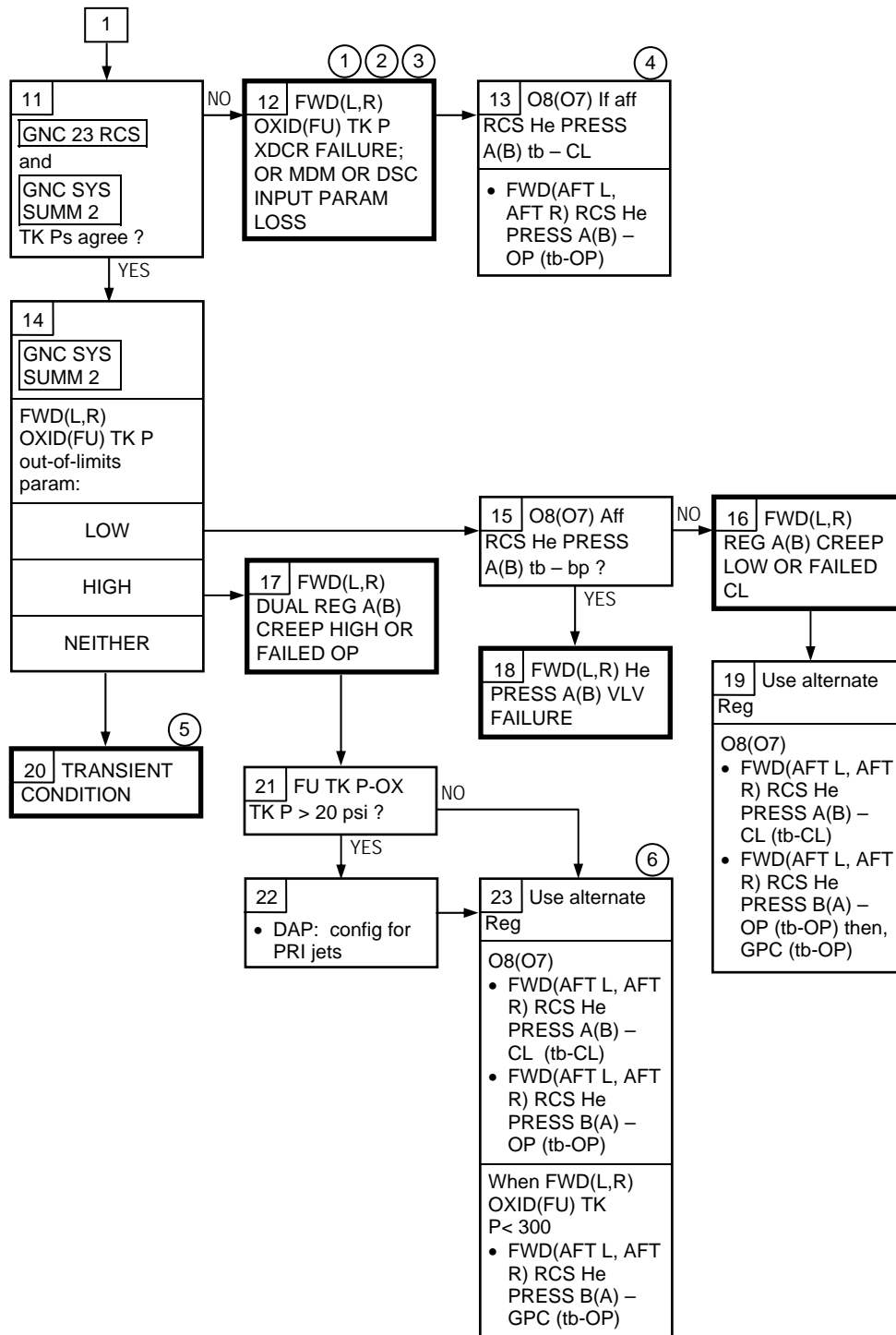
**Nominal Config:**  
O8(O7)  
FWD(AFT L, AFT R)  
RCS He PRESS  
A(B) – GPC  
(tb-OP)  
B(A) – CL  
(tb-CL)  
(A14)  
RCS/OMS HTR  
FWD RCS –  
A AUTO  
(B AUTO)  
RCS/OMS HTR L  
POD (two) –  
A AUTO(B AUTO)  
B OFF(A OFF)  
RCS/OMS HTR R  
POD (two) –  
A AUTO(B AUTO)  
B OFF(A OFF)



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

**RCS 10.3b (Cont)**



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

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RCS SSR

# RCS SSR-1

## RCS MIXED XFEED MEM READ/WRITE

**NOTE**

This procedure must be performed in OPS 3. OMS/RCS interconnect is assumed to be the initial configuration. A backout procedure is provided in the event of a deorbit waveoff, which would require a return from Mixed RCS Crossfeed to OMS-RCS Interconnect. Address locations are S/W release dependent and will be supplied by MCC. This procedure requires realtime ground verification (24 hr) prior to use

- O7 1. Check config:
  - √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)

- O7 2. MSTR RCS XFEED – FEED FROM L

**NOTE**

ADD IDs, TABLEs A, B, C, and D will be supplied by MCC

- 3. Zero (0) the appropriate RCS TK ISOL reset command:

GNC 0 GPC MEMORY

- √HEX – ITEM 27 (\*)
- BIT RST – ITEM 23 EXEC (\*)
- Enter ADD IDs and DESIRED values

ADD ID	DESIRED	TABLE A	TABLE B
28 _____	29 1000	_____	_____
30 _____	31 0400	_____	_____
32 _____	33 1000	_____	_____
34 _____	35 0400	_____	_____
36 _____	37 1000	_____	_____
38 _____	39 0400	_____	_____

- √Data values in ACTUAL column agree with TABLE A
- WRITE – ITEM 25 EXEC
- √Data values in ACTUAL column agree with TABLE B

- 4. Set to one (1) the appropriate RCS TK ISOL set command
- BIT SET – ITEM 22 EXEC (\*)
- Enter ADD IDs and DESIRED values

ADD ID	DESIRED	TABLE C	TABLE D
28 _____	29 1000	_____	_____
30 _____	31 0400	_____	_____
32 _____	33 1000	_____	_____
34 _____	35 0400	_____	_____
36 _____	37 1000	_____	_____
38 _____	39 0400	_____	_____

- √Data values in ACTUAL column agree with TABLE C
- WRITE – ITEM 25 EXEC
- √Data values in ACTUAL column agree with TABLE D

RCS SSR

## 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)

<b>CAUTION</b> 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:

#### GNC 20 DAP CONFIG

If PRI:

ITEM 13 +0.3 EXEC  
ITEM 17 +0.1 EXEC  
✓P(Y) OPTION – ITEM 15(16) ALL

If VERN:

ITEM 26 +0.0 3 EXEC

DAP: A/FREE/PRI(VERN)  
DAP TRANS: PULSE/PULSE/PULSE

If OPS 3:

DAP: INRTL  
DAP ROT: PULSE/PULSE/PULSE

### SET UP FOR HOT FIRE

2. GNC 23 RCS

Deselect jets per table

3. If jet to be selected is fail-off,  
reselect affected jet (Do not toggle RM)

O14,O15,O16    4. ✓cb L(R) DDU (two) – cl  
F7/F8            FLT CNTLR PWR L(R) – ON

### HOT FIRE (Perform during AOS)

5. If OPS 2:

Command maneuver per table with RHC(THC) and release  
If RHC, do not command past soft stop (no ACCEL mode)

If OPS 3:

Command maneuver per table with RHC(THC)  
If THC, command for approximately 1 sec and release  
If RHC, command past soft stop (ACCEL mode) for approximately 1 sec and release



## RCS SSR-2 (Cont)

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 L5L or R5R:

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

- |                     |  |
|---------------------|--|
| C3                  | 8. Config DAP: as reqd                 |
| F7(F8)              | 9. FLT CNTLR PWR L(R) – OFF            |
| O14,<br>O15,<br>O16 | 10. Config cb L,R DDU (four) – as reqd |

# RCS SSR-2 (Cont)

## HOT FIRE TABLE

SUBJECT JET	DESELECT JETS	MANEUVER REQD
F1F F2F F3F	F2F, F3F F1F, F3F F1F, F2F	(-) X TRANSLATION
F1L F3L F5L	F3L, R1R, R2R, R3R, R4R F1L, R1R, R2R, R3R, R4R R5R	(+) YAW
F2R F4R F5R	F4R, L1L, L2L, L3L, L4L F2R, L1L, L2L, L3L, L4L L5L	(-) YAW
F1U F2U F3U	F2U, F3U, L2D, L3D, L4D, R2D, R3D, R4D F1U, F3U, L2D, L3D, L4D, R2D, R3D, R4D F1U, F2U, L2D, L3D, L4D, R2D, R3D, R4D	(-) PITCH
F1D F2D F3D F4D	F2D, F3D, F4D, L1U, L2U, L4U, R1U, R2U, R4U F1D, F3D, F4D, L1U, L2U, L4U, R1U, R2U, R4U F1D, F2D, F4D, L1U, L2U, L4U, R1U, R2U, R4U F1D, F2D, F3D, L1U, L2U, L4U, R1U, R2U, R4U	(+) PITCH
L1L L2L L3L L4L L5L	L2L, L3L, L4L, F2R, F4R L1L, L3L, L4L, F2R, F4R L1L, L2L, L4L, F2R, F4R L1L, L2L, L3L, F2R, F4R F5R	(-) YAW
L1A L3A	L3A, R1A, R3A L1A, R1A, R3A	(+) X TRANSLATION
L1U L2U L4U	L2U, L4U, R1U, R2U, R4U, F1D, F2D, F3D, F4D L1U, L4U, R1U, R2U, R4U, F1D, F2D, F3D, F4D L1U, L2U, R1U, R2U, R4U, F1D, F2D, F3D, F4D	(+) PITCH
L2D L3D L4D L5D	L3D, L4D, R2D, R3D, R4D, F1U, F2U, F3U L2D, L4D, R2D, R3D, R4D, F1U, F2U, F3U L2D, L3D, R2D, R3D, R4D, F1U, F2U, F3U R5D	(-) PITCH
R1R R2R R3R R4R R5R	R2R, R3R, R4R, F1L, F3L R1R, R3R, R4R, F1L, F3L R1R, R2R, R4R, F1L, F3L R1R, R2R, R3R, F1L, F3L F5L	(+) YAW
R1A R3A	R3A, L1A, L3A R1A, L1A, L3A	(+) X TRANSLATION
R1U R2U R4U	R2U, R4U, L1U, L2U, L4U, F1D, F2D, F3D, F4D R1U, R4U, L1U, L2U, L4U, F1D, F2D, F3D, F4D R1U, R2U, L1U, L2U, L4U, F1D, F2D, F3D, F4D	(+) PITCH
R2D R3D R4D R5D	R3D, R4D, L2D, L3D, L4D, F1U, F2U, F3U R2D, R4D, L2D, L3D, L4D, F1U, F2U, F3U R2D, R3D, L2D, L3D, L4D, F1U, F2U, F3U L5D	(-) PITCH

# RCS SSR-3

## AFT RCS MANF/LEG PRESS, READ/WRITE

### 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:
  - 07   √Aff RCS TK ISOL 1/2(3/4/5 A,B) – CL (tb-CL)
  - √XFEED 1/2(3/4/5) – CL (tb-CL)
  - MANF ISOL 1,2(3,4,5) – OP (tb-OP)
3. Config SAME side OMS vlv:
  - 08   √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

ADD ID	DESIRED	Value A	Value B
28 _____	29 _____	_____	_____

  - √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

ADD ID	DESIRED	Value C
28 _____	29 _____	_____

  - √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
  - 07   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)

```

CRT      * If MANF P < 130 psia:                *
O8      *   L(R) OMS XFEED VLV A,B           - CL (tb-CL) *
O7      *   RCS XFEED VLV 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 >>                          *
  
```

```

O7      7. Perform FU line repress from OMS
        L(R) RCS XFEED 1/2(3/4/5) - OP (tb-OP)
        Wait 10 sec
CRT      √FU MANF P > 130 psia
  
```

```

O8      * If MANF P < 130 psia:                *
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 >>                          *
  
```

```

O8      8. Cleanup and reconfig:
O7      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), GPC
  
```

9. Reselect jets as reqd

10. DAP: as reqd

11. Zero (0) the appropriate RCS XFEED VLV set command:

GNC 0 GPC MEMORY

√HEX 27\*

BIT RST – ITEM 23 EXEC

Obtain and enter ADD IDs and DESIRED values from TABLE 2

ADD ID	DESIRED	Value D	Value E
28 _____	29 _____	_____	_____

√Data values in ACTUAL column agree with Value D (MCC supplied)

WRITE – ITEM 25 EXEC

√Data values in ACTUAL column agree with Value E (MCC supplied)

12. Set to One (1) the appropriate RCS XFEED VLV reset command:

BIT SET – ITEM 22 EXEC

Obtain and enter ADD IDs and DESIRED values from TABLE 1

ADD ID	DESIRED	Value F	Value G
28 _____	29 _____	_____	_____

√Data values in ACTUAL column agree with Value F (MCC supplied)

WRITE – ITEM 25 EXEC

√Data values in ACTUAL column agree with Value G (MCC supplied)

## RCS SSR-3 (Cont)

TABLE 1			
X-REF	ADD ID BIT RESET ADDRESS	COMMANDS	DESIRED
(1)	-----	L RCS OX 1/2 XFEED	4 0 0 0
(2)	-----	L RCS OX 3/4/5 XFEED	0 0 4 0
(3)	-----	R RCS OX 1/2 XFEED	4 0 0 0
(4)	-----	R RCS OX 3/4/5 XFEED	0 0 1 0

TABLE 2			
X-REF	ADD ID BIT SET ADDRESS	COMMANDS	DESIRED
(1)	-----	L RCS OX 1/2 XFEED	4 0 0 0
(2)	-----	L RCS OX 3/4/5 XFEED	0 0 4 0
(3)	-----	R RCS OX 1/2 XFEED	4 0 0 0
(4)	-----	R RCS OX 3/4/5 XFEED	0 0 1 0

## 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
- 07(O8) 2. Aff RCS XFEED(s) – CL (tb-CL)  
TK ISOL(s) – CL (tb-CL)  
MANF ISOL(s) – OP (tb-OP)
3. If aff MANF P(s) < 130 (OX and FU):  
Aff RCS MANF ISOL(s) – CL (tb-CL)  
TK ISOL(s) – OP (tb-OP)  
Repeat step 2
4. If aff MANF P(s) > 130 (OX or FU):  
Aff RCS MANF ISOL(s) – CL (tb-CL)  
TK ISOL(s) – OP (tb-OP)  
MANF ISOL(s) – OP (tb-OP), GPC one at a time
5. DAP: as reqd

# RCS SSR-5 LEAKING RCS PRPLT/He BURN

I

If FWD RCS LEAK, perform either -X TRANSLATION (uses OPS 2, part A) or FRCS DUMP (uses OPS 3, part B)  
(If no MCC, perform -X TRANSLATION)  
If AFT RCS LEAK, perform +X TRANSLATION (uses OPS 2, part C)

## A. If FRCS -X TRANSLATION:

- O14:F,  
O15:F,  
O16:F
- 08
1. RCS BURN PREP  
√Pri RJD LOGIC,DRIVER (sixteen) – ON
- FWD He PRESS A(B) – OP (tb-OP)  
B(A) – CL (tb-CL)  
TK ISOL (two) – OP (tb-OP)  
MANF ISOL 1,2,3,4 (four) – OP (tb-OP), GPC
- GNC 55 GPS STATUS
- √GPS TO NAV – INH (\*)
2. MNVR TO BURN ATTITUDE  
DAP: B1/AUTO/PRI
- GNC UNIV PTG
- TGT ID: 2
- √MCC for preferred burn  
If no COMM, maneuver to closest out-of-plane attitude and execute burn ASAP
- If out-of-plane burn:  
BODY VECTOR: 3  
OM: 90 (270 for nose south)  
Start TRK – ITEM 19 EXEC (CUR - \*)
- If retro burn (heads down):  
BODY VECTOR: 5  
P: 88  
Y: 0  
OM: 180  
Start TRK – ITEM 19 EXEC (CUR - \*)  
GNC, OPS 202 PRO
- GNC ORBIT MNVR EXEC
- RCS SEL – ITEM 4 EXEC  
TIG – ITEM 10 +(consult MCC) EXEC  
ΔVX – ITEM 19 -1 0 0 EXEC  
ΔVY – ITEM 20 +0 EXEC  
ΔVZ – ITEM 21 +0 EXEC  
LOAD – ITEM 22 EXEC  
TIMER – ITEM 23 EXEC
- Do not maneuver (no ITEM 27), ignore computed ATT, perform burn in final ATT**  
Go to step A3
- If posi burn (heads down):  
BODY VECTOR: 5  
P: 92  
Y: 0  
OM: 0  
Start TRK – ITEM 19 EXEC (CUR - \*)  
GNC, OPS 202 PRO
- GNC ORBIT MNVR EXEC
- RCS SEL – ITEM 4 EXEC  
TIG – ITEM 10 +(consult MCC) EXEC  
ΔVX – ITEM 19 -1 0 0 EXEC  
ΔVY – ITEM 20 +0 EXEC  
ΔVZ – ITEM 21 +0 EXEC  
LOAD – ITEM 22 EXEC  
TIMER – ITEM 23 EXEC
- Do not maneuver (no ITEM 27), ignore computed ATT, perform burn in final ATT**  
Go to step A3
- C2
- C2

# RCS SSR-5 (Cont)

## 3. TERMINATE CONDITIONS

Terminate RCS burn when any one of the following conditions exists:

If He LEAK:

- Aff He P < 456 psia, or
- CUR HP = 95 nmi, or
- Burn Time from below table expired

FRCS -X (2 JETS)	RCS PRPLT TO BE BURNED TO ACHIEVE MAX BLOWDN CURRENT NON-LEAKING (OX OR FU)%														
	24	25	30	35	40	45	50	55	60	65	70	75	80	85	90
	0:00	0:03	0:19	0:34	0:49	1:05	1:20	1:36	1:51	2:07	2:22	2:36	2:53	3:08	3:24

TIME FROM BURN INITIATION (M:S)

If PRPLT LEAK:

- First RCS jet FAIL OFF or
- CUR HP = 95 nmi

F6(F8)

## 4. BURN EXEC

ADI ERROR/RATE – MED

If burning out-of-plane:

- Verify burn attitude, execute burn ASAP, and ignore TIG references

If retro burn:

ADI ATT – LVLH  
√ATT

Retro  
Heads Down

R: 180  
P: 358  
Y: 000

If posi burn:

ADI ATT – LVLH  
√ATT

Posi  
Heads Down

R: 000  
P: 178  
Y: 000

GNC 20 DAP CONFIG

F7

P,Y OPTION – ITEM 35,36 EXEC (NOSE)  
FLT CNTLR PWR – ON  
DAP TRANS: NORM/PULSE/PULSE

TIG-0:30>

DAP: B1/INRTL/PRI  
ADI ATT – REF  
ATT REF pb – push

F5

At TIG: THC – X (pull)  
When terminate conditions are met:  
THC – release  
If burn is terminated at CUR Hp = 95, finish burn out-of-plane (step A2)

## 5. POST BURN RECONFIG

F7

FLT CNTLR PWR – OFF  
If retro or posi burn: GNC, OPS 201 PRO  
DAP TRANS: PULSE/PULSE/PULSE

C2

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 L5/F5/R5 DRIVER – OFF  
DAP: as reqd >>

# RCS SSR-5 (Cont)

## B. If FRCS DUMP:

O14:F, O15:F, O16:F

1. RCS DUMP PREP  
 √Pri RJD LOGIC,DRIVER (sixteen) – ON

O8 FWD He PRESS A(B) – OP (tb-OP)  
           B(A) – CL (tb-CL)  
           TK ISOL (two) – OP (tb-OP)  
           MANF ISOL 1,2,3,4 (four) – OP (tb-OP), GPC  
 Perform G2/G8 to G3 TRANS (ENT PKT, DPS)

2. TERMINATE CONDITIONS

Terminate RCS dump when any one of the following conditions exists:

If He LEAK:  
     Aff He P < 456 psia, or  
     Dump Time from below table expired

	24	25	30	35	40	45	50	55	60	65	70	75	80	85	90
OPS 3 FRCS DUMP (4 JETS)	0:00	0:02	0:11	0:20	0:29	0:38	0:47	0:56	1:05	1:14	1:23	1:32	1:41	1:50	1:59

RCS PRPLT TO BE DUMPED TO ACHIEVE MAX BLOWDN CURRENT NON-LEAKING (OX OR FU)%  
 TIME FROM DUMP INITIATION (M:S)

If PRPLT LEAK:  
     First RCS jet FAIL OFF

3. 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

4. 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

O16 If Prplt leak: Perform RCS SECURE (FWD,AFT) (ORB PKT, RCS)  
           RJD L5/F5/R5 DRIVER – OFF  
           DAP: as reqd >>

## C. If AFT RCS LEAK, perform +X TRANSLATION:

O14:F, O15:F, O16:F

1. XFEED FROM LEAKING RCS 1/2 LEG TO GOOD RCS 1/2 LEG  
 √Pri RJD LOGIC,DRIVER (sixteen) – ON

√DAP: FREE

O8 √L,R OMS XFEED (four) – CL (tb-CL)

O7 AFT L,R RCS TK ISOL 3/4/5 (four) – CL (tb-CL)  
 Good AFT RCS TK ISOL 1/2 – CL (tb-CL)  
 Leaking AFT RCS TK ISOL 1/2 – OP (tb-OP)  
           He PRESS A(B) – OP (tb-OP)  
                           B(A) – CL (tb-CL)  
 AFT L,R RCS MANF ISOL 1 (two) – OP (tb-OP), GPC  
                           2,3,4 (six) – CL (tb-CL)  
                           5 (two) – CL (tb-CL), GPC  
           XFEED 1/2 (two) – OP (tb-OP)  
                           3/4/5 (two) – CL (tb-CL)



## RCS SSR-5 (Cont)

If prior config was interconnect:

**GNC 23 RCS**

OMS PRESS ENA OFF – ITEM 7 EXEC (\*)

**GNC UNIV PTG**

CNCL – ITEM 21 EXEC

### 2. MNVR TO BURN ATTITUDE

DAP: B1/AUTO/PRI

**GNC 55 GPS STATUS**

√GPS TO NAV – INH (\*)

C2

GNC, OPS 202 PRO

**GNC ORBIT MNVR EXEC**

RCS SEL – ITEM 4 EXEC

TV ROLL – ITEM 5 +1 8 0 EXEC

√MCC for preferred burn

If no COMM, maneuver to closest out-of-plane attitude and execute burn ASAP

If out-of-plane burn:

TIG – ITEM 10 + (current MET + 10 min) EXEC

$\Delta V_X$  – ITEM 19 +0 EXEC

$\Delta V_Y$  – ITEM 20 -1 0 0 EXEC (+1 0 0 for nose south) EXEC

$\Delta V_Z$  – 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

$\Delta V_X$  – ITEM 19 -1 0 0 EXEC

$\Delta V_Y$  – ITEM 20 +0 EXEC

$\Delta V_Z$  – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

MNVR – ITEM 27 EXEC (\*)

Go to step C3

If posi burn:

TIG – ITEM 10 +(consult MCC) EXEC

$\Delta V_X$  – ITEM 19 +1 0 0 EXEC

$\Delta V_Y$  – ITEM 20 +0 EXEC

$\Delta V_Z$  – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

MNVR – ITEM 27 EXEC (\*)

### 3. TERMINATE CONDITIONS

Terminate RCS burn when any one of the following conditions exists:

If He LEAK:

Aff He P < 456 psia, or

CUR HP = 95 nmi, or

Burn Time from below table expired

	RCS PRPLT TO BE BURNED TO ACHIEVE MAX BLOWDN CURRENT NON-LEAKING (OX OR FU)%											
	35	40	45	50	55	60	65	70	75	80	85	90
AFT +X DUMP (2 JETS)	0:00	0:15	0:31	0:46	1:02	1:17	1:33	1:48	2:02	2:19	2:34	2:50
	TIME FROM BURN INITIATION (M:S)											

If PRPLT LEAK:

First RCS jet FAIL OFF or

CUR HP = 95 nmi

## RCS SSR-5 (Cont)

- F6(F8) 4. BURN EXEC  
 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
- F7 DAP B: P,Y OPTION – ITEM 35,36 EXEC (TAIL)  
 FLT CNTLR PWR – ON  
 DAP TRANS: NORM/PULSE/PULSE
- TIG-0:30  
 F5 DAP: B/INRTL/PRI  
 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 C11
- O7 5. SETUP TO CLEAR He  
 O8 Leaking RCS TK ISOL 1/2 – CL (tb-CL)  
 √L OMS TK ISOL (two) – OP (tb-OP)  
 XFEED B(A) – OP (tb-OP)  
GNC 23 RCS  
 L OMS TO AFT – ITEM 5 EXEC (\*)  
 Reselect failed-off jets  
 Set L,R pod fail limit to 0:  
 RCS L – ITEM 2 EXEC  
 FAIL LIM – ITEM 4 +0 EXEC  
 RCS R – ITEM 3 EXEC  
 FAIL LIM – ITEM 4 +0 EXEC
6. SET UP DAP  
GNC 20 DAP CONFIG  
 Change DAP A to A1
7. CLEAR He FROM LEFT RCS +X  
 DAP: A/INRTL/PRI  
 TRANS: NORM/NORM/NORM  
 If Hp ≤ 98, maneuver out-of-plane
- F5 THC +X  
 After 7 sec,  
 THC – release
8. CLEAR He FROM XFEED LINE AND RIGHT RCS +X  
GNC 23 RCS  
 Deselect L1A:  
 RCS L – ITEM 2 EXEC  
 JET DES – ITEM 33 EXEC
- F5 THC +X  
 After 16 sec,  
 THC – release
9. CLEAR He FROM RCS MANF 1 PITCH AND YAW  
 DAP: B/FREE/PRI  
 TRANS: NORM/NORM/NORM  
 RHC +yaw past soft stop (ACCEL mode) for 2 sec  
 RHC -yaw past soft stop (ACCEL mode) for 2 sec  
 RHC +pitch past soft stop (ACCEL mode) for 2 sec  
 DAP: A/INRTL/PRI  
 TRANS: PULSE/PULSE/PULSE

## RCS SSR-5 (Cont)

- F7 10. POST He CLEAR CLEANUP  
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), GPC  
5 (two) – OP (tb-OP), GPC  
  
If Group B(C) Powerdown:  
Pri RJD LOGIC,DRIVER (sixteen) – OFF  
RJD A 1A L2/R2 MANF DRIVER – ON  
O14:F,  
O15:F,  
O16:F  
  
DAP: A,B as reqd >>
- F7 11. SYSTEMS CLEANUP FOR He LEAKS  
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), GPC  
5 (two) – OP (tb-OP), GPC  
√L OMS TK ISOL (two) – OP (tb-OP)  
XFEED B(A) – OP (tb-OP)  
GNC 23 RCS  
Initiate interconnect usage counter:  
L OMS TO AFT – ITEM 5 EXEC (\*)  
If Group B(C) Powerdown:  
Pri RJD LOGIC,DRIVER (sixteen) – OFF  
RJD A 1A L2/R2 MANF DRIVER – ON  
O14:F,  
O15:F,  
O16:F  
  
DAP TRANS: as reqd  
DAP: A,B as reqd

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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

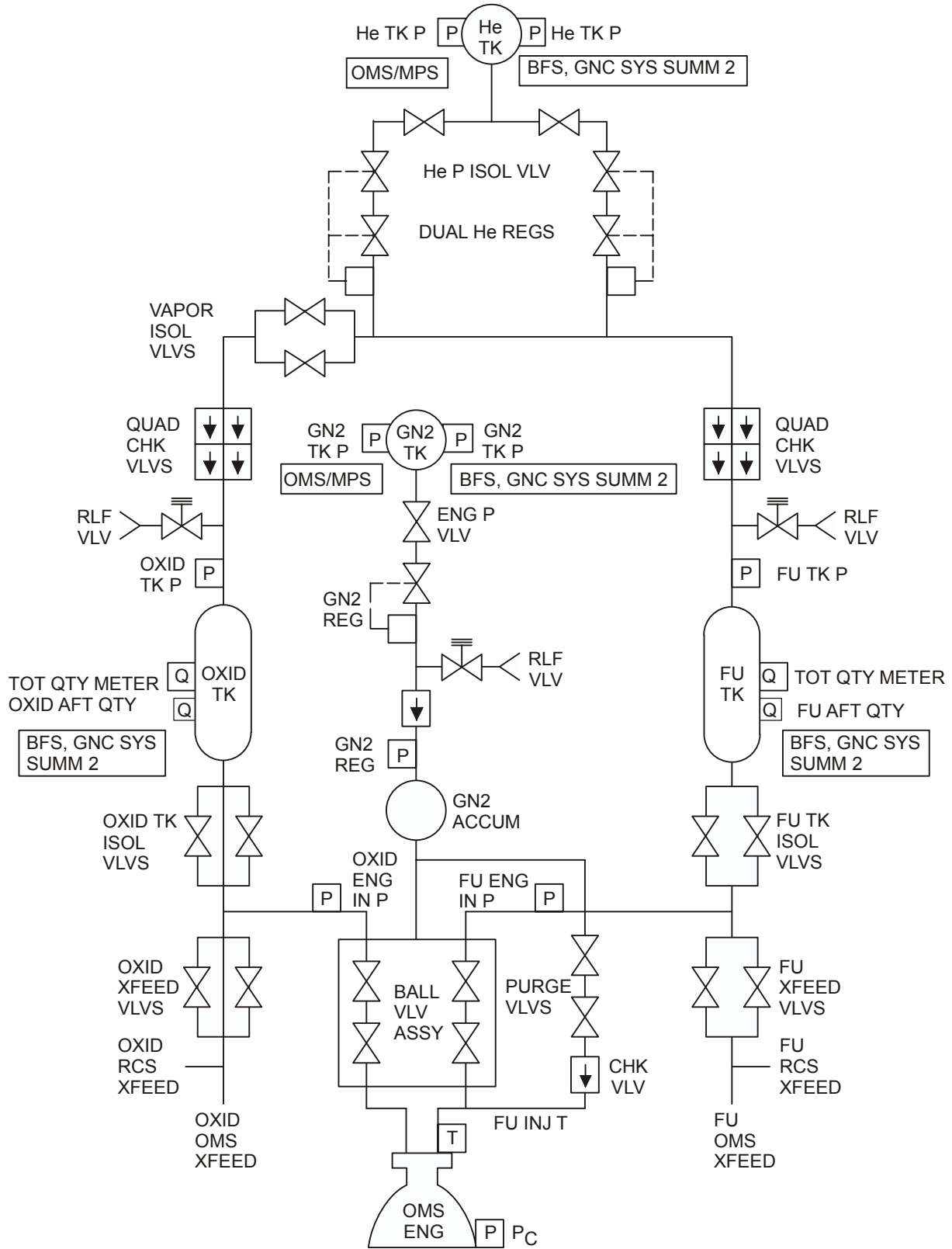
BFS FSM INDEX

11.3 OMS PRPLT THERMAL  
11.3b 'SM 0 THRM PRPLT' – THRM PRPLT ..... 11-15

OMS

11

# OMS SCHEMATIC



L(R) OMS

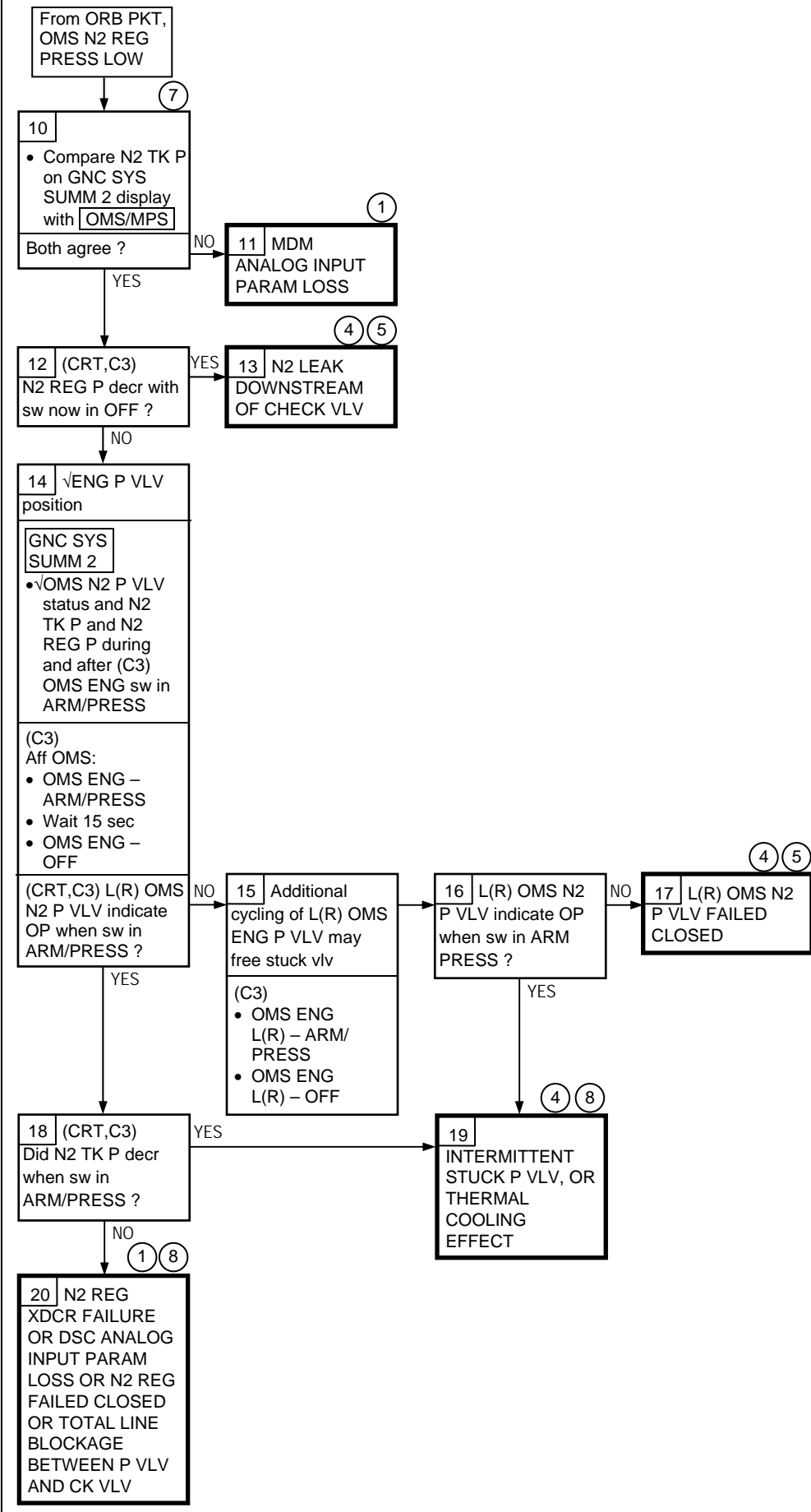
11.1

jsc48027\_017r3.cvx



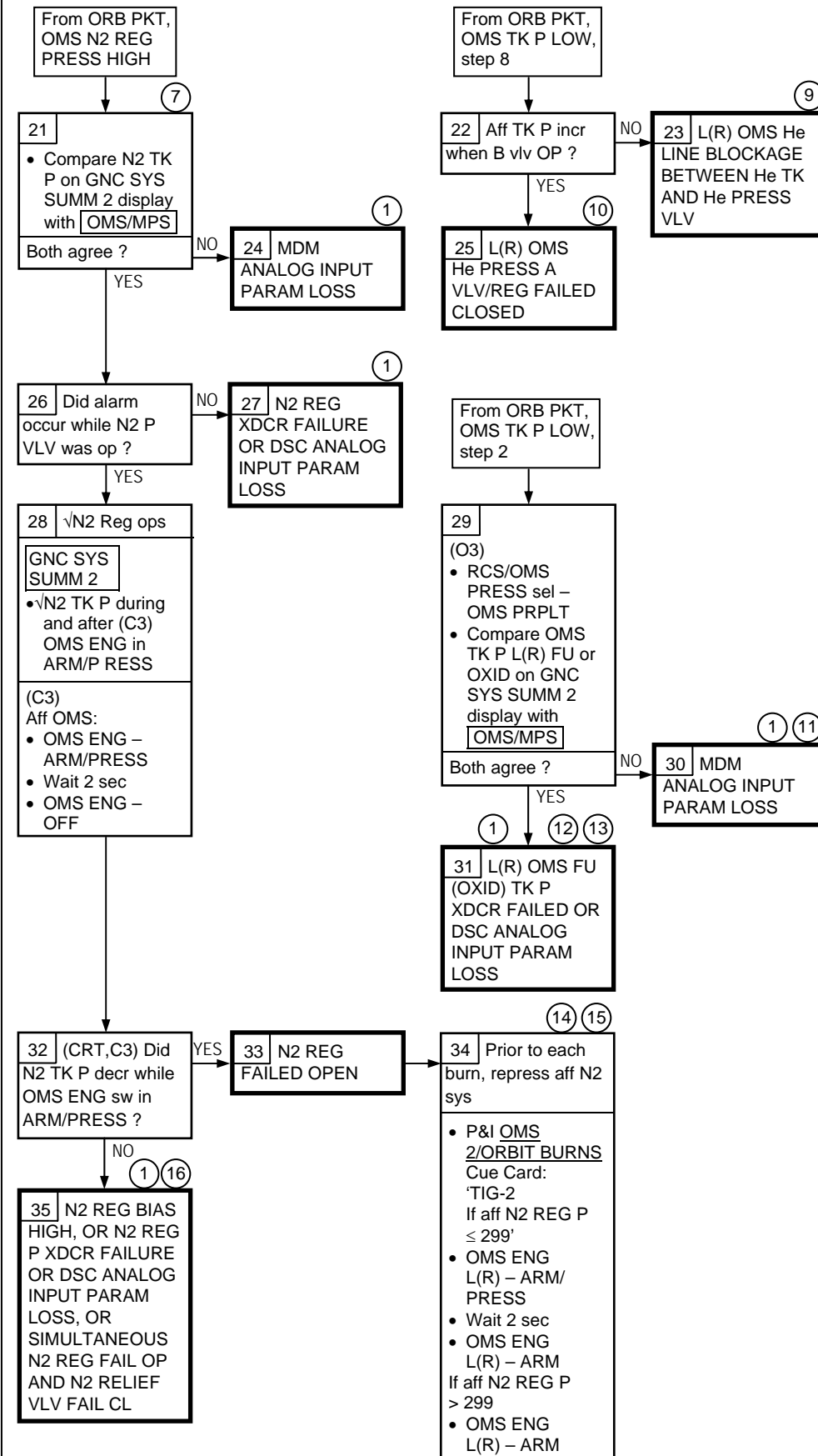


**OMS 11.1a (Cont)**



- ① √MCC for other params possibly lost in same MDM or DSC card
- ④ Do not use engine for additional on-orbit burns
- ⑤ √MCC to determine if engine is usable for deorbit
- ⑦ N2 REG xdcr and N2 TK P xdcr on CRT have common MDM card. This check detects MDM card failure
- ⑧ √MCC for further engine use

# OMS 11.1a (Cont)



① √MCC for other params possibly lost in same MDM or DSC card

⑦ N2 REG xdcr and N2 TK P xdcr on CRT have a common MDM card. This check detects MDM card failure

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 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

⑪ CRT display of affected TK P and associated msg are invalid. Use OMS/MPS and C/W for status

⑫ On GNC SYS SUMM 2 display, use ENG IN P as B/U to failed PRPLT TK P xdcr

⑬ H/W C/W lost for affected TK P

⑭ Flow through failed Reg will exceed relief vlv setting: 450 psig – RELIEF400 psig – RESEAT

⑮ If affected N2 TK P < 564 psia, do NOT use engine for orbit burns

⑯ Single failure can result in N2 Reg failing OP and N2 Relief vlv failing CL (N2 Reg P > 500 psia)

**OMS 11.1a (Cont)**

From ORB PKT,  
OMS TK P LOW,  
step 28

36 Aff 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 ?

41 (O7)  
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 ?

45 FROZEN LEAK SOURCE OR PARTIAL He LINE BLOCKAGE TO AFFECTED TANK

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)  
(C3)  
• DAP: as reqd

43 FU/OXID LEAK IN L(R) RCS MANF 5

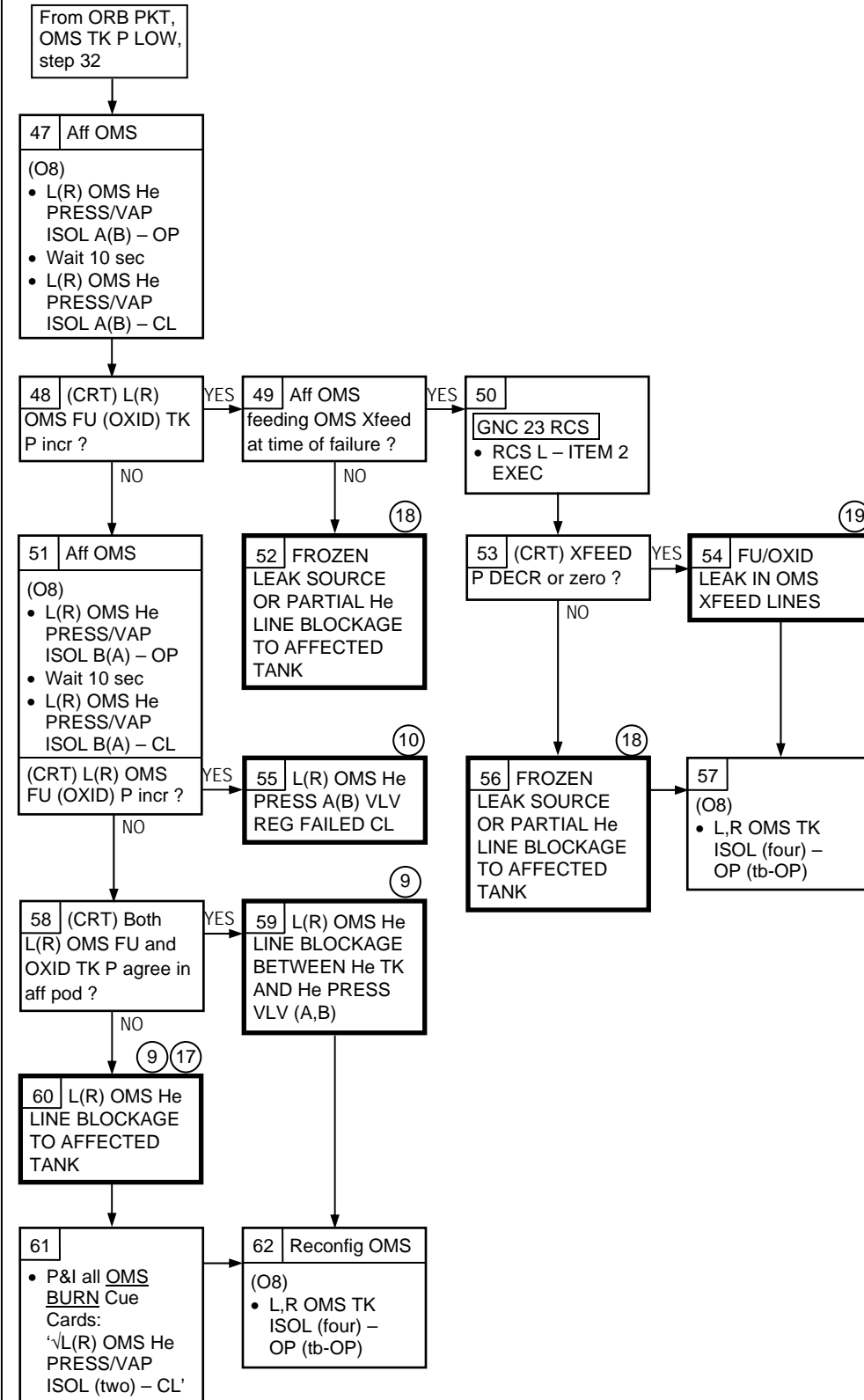
**WARNING**  
Repressing more than one manifold at a time when at low pressure may damage RCS propellant tank

44 (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), GPC  
• Wait 2 sec  
• AFT L,R RCS MANF ISOL 4 (two) – OP (tb-OP), GPC  
• Go to LOSS OF VERNIERS (ORB OPS, RCS)

46 Vernier control operational  
(O7)  
• AFT L,R RCS TK ISOL 3/4/5 (four) – OP (tb-OP)  
• AFT L,R RCS MANF ISOL 3,4 (four) – OP (tb-OP), GPC  
(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

**OMS 11.1a (Cont)**



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 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

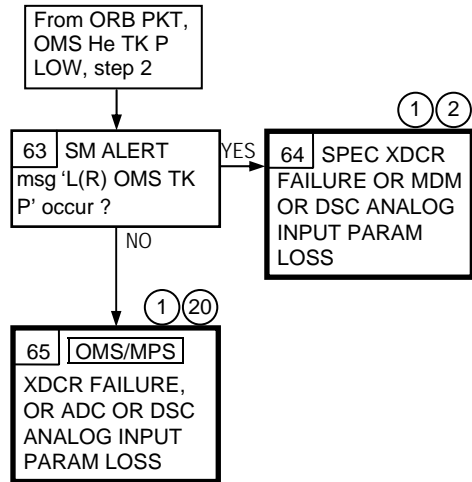
⑪ Perform subsequent burns in blowdown in affected pod to prevent mixture ratio variations

⑫ √MCC on action to be taken to minimize failure effects and config for subsequent burns

⑬ OMS and RCS operational in nominal config. Do not Xfeed or i'cnct

**OMS**

**11.1a (Cont)**



① √MCC for other params possibly lost in same MDM or DSC card

② N2 P available on OMS/MPS

② He P available on GNC SYS SUMM 2 display

**OMS SW/LV  
MISCOMP**

**11.2**

**OMS**

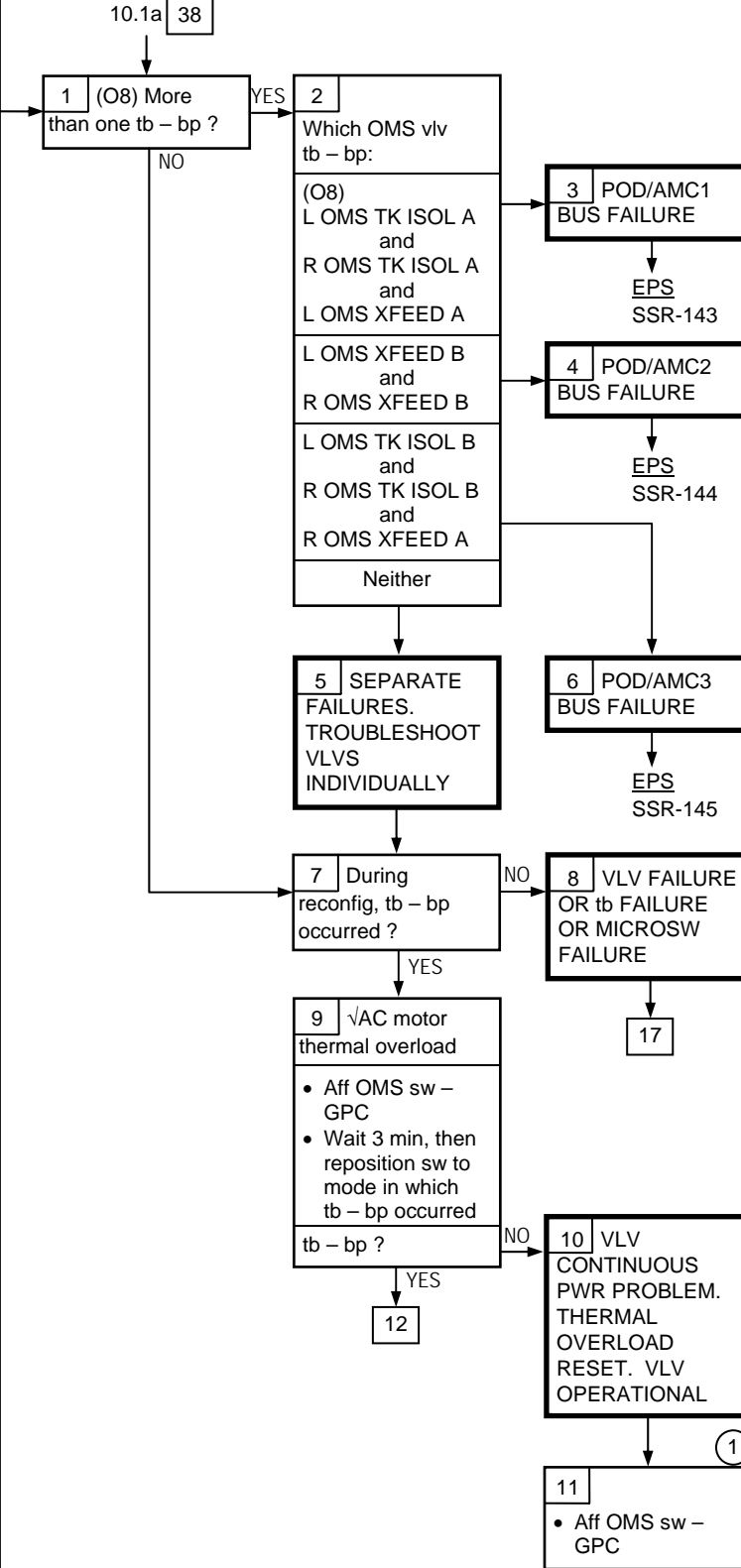
**11.2a OMS VLV tb – bp**

OMS Vlv  
tb – bp

If:  
Miscmpare  
exists in L,R  
OMS TK ISOL  
VLV A(B) or  
L,R OMS  
XFEED VLV A(B)

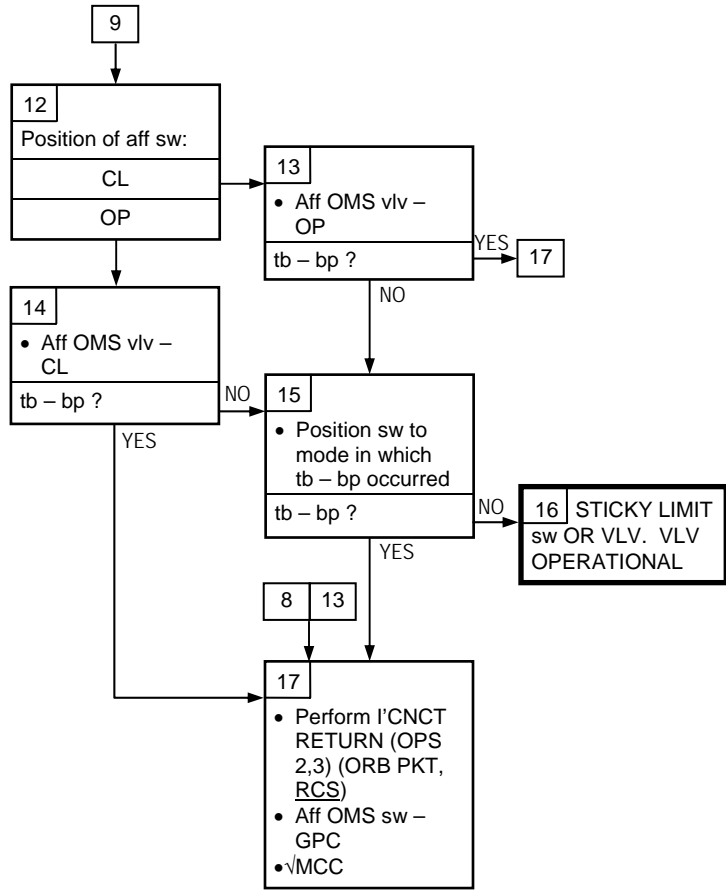
**Nominal Config:**

(MA73C:I)  
cb AC1 AFT POD  
VLV GP 1  
ΦA(ΦB,ΦC) – cl  
cb AC2 AFT POD  
VLV GP 2  
ΦA(ΦB,ΦC) – cl  
cb AC3 AFT POD  
VLV GP 3  
ΦA(ΦB,ΦC) – cl  
AFT POD VLV  
LOGIC GP  
1/3 – ON  
1/2 – ON  
2/3 – ON



① For subsequent reconfig, ignore tb – bp. After vlv commanded, wait 3 sec; then position appropriate sw to GPC

OMS SW/VLV  
MISCOMP  
11.2



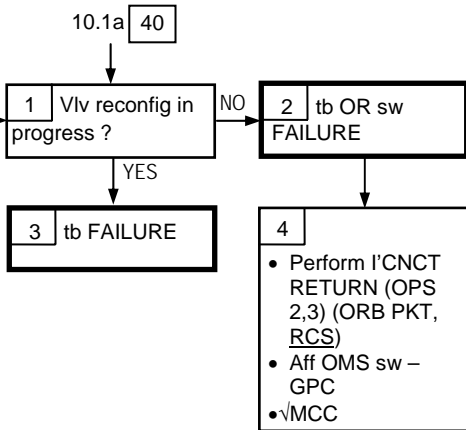
**OMS**

**11.2b OMS VLV tb AND sw POSITION DISAGREE**

OMS Vlv  
tb and sw  
Disagree

If:  
OMS vlv tb – OP  
but sw closed  
OMS vlv tb – CL  
but sw open

**Nominal Config:**  
(MA73C:I)  
cb AC1 AFT POD  
VLV GP 1  
ΦA(ΦB,ΦC) – cl  
cb AC2 AFT POD  
VLV GP 2  
ΦA(ΦB,ΦC) – cl  
cb AC3 AFT POD  
VLV GP 3  
ΦA(ΦB,ΦC) – cl  
AFT POD VLV  
LOGIC GP  
1/3 – ON  
1/2 – ON  
2/3 – ON





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OMS PRPLT  
THERMAL

11.3

**OMS**

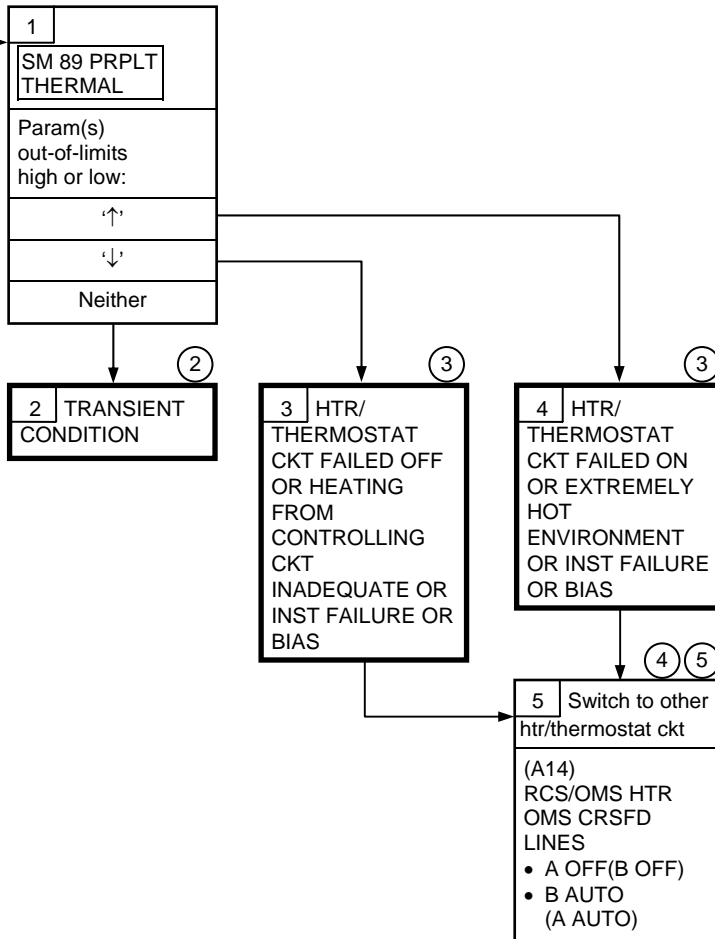
**11.3a PRPLT THRM OMS**

SM ALERT

S89 PRPLT THRM 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)



OMS THERMAL LIMIT TABLE					
PARAMETER				FDA LIMIT	
				LOW	HIGH
OMS CRSFD	L	R	C		
XFD	OX	XXXS	XXXS	50	90 (6)
	GMBL	LN	XXXS	50	90 (6)
DRN	OX	XXXS	XXXS	50	100 (7)
		FU	OX		

① Msg available with SM in RUN mode only

② Htrs cycling high/low or intermittent xcdr 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

OMS PRPLT THERMAL

11.3

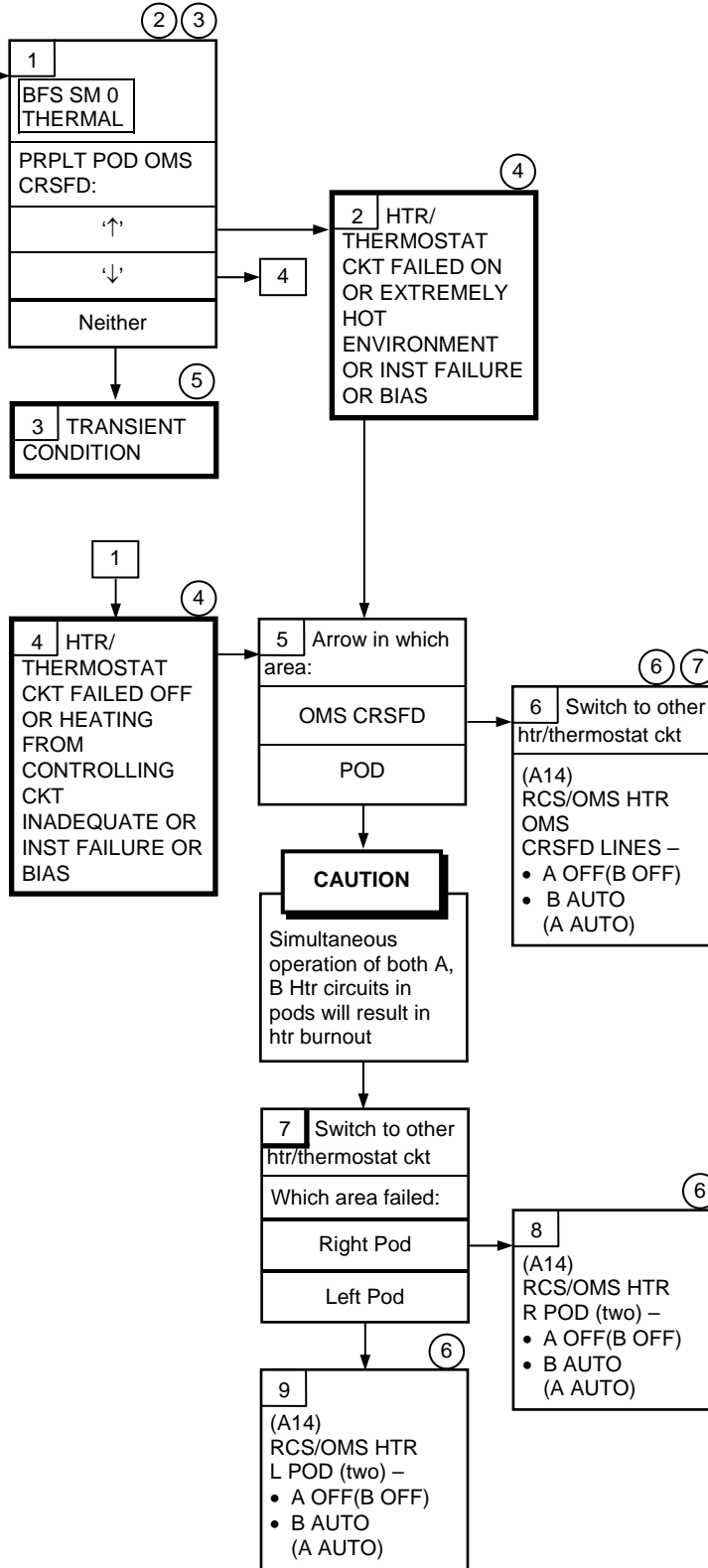
**OMS**

**11.3b THRM PRPLT**

① 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 AUTO) B OFF(A OFF)



- ① BFS msg available in MM 104, 105, 106, 301, 302, 303, and when BFS in OPS 0
- ② If SM 89 PRPLT THERMAL is available, display may be used to provide insight into problem, with MCC consultation
- ③ THERMAL display available only from BFS. No values displayed, only ↑, ↓, M, H, or L
- ④ Because of insufficient onboard data and complexity of interfacing htr/thermostat groups, crew cannot identify specific failure or determine instrument faults
- ⑤ Htrs cycling high/low or intermittent xcdr failure. √MCC
- ⑥ √MCC for further analysis, possible reconfig, and/or attitude change
- ⑦ When no onboard thermal visibility into CRSFD LINES (no SM and no BFS) exists, both A,B Htr sets will be turned to AUTO

**OMS**

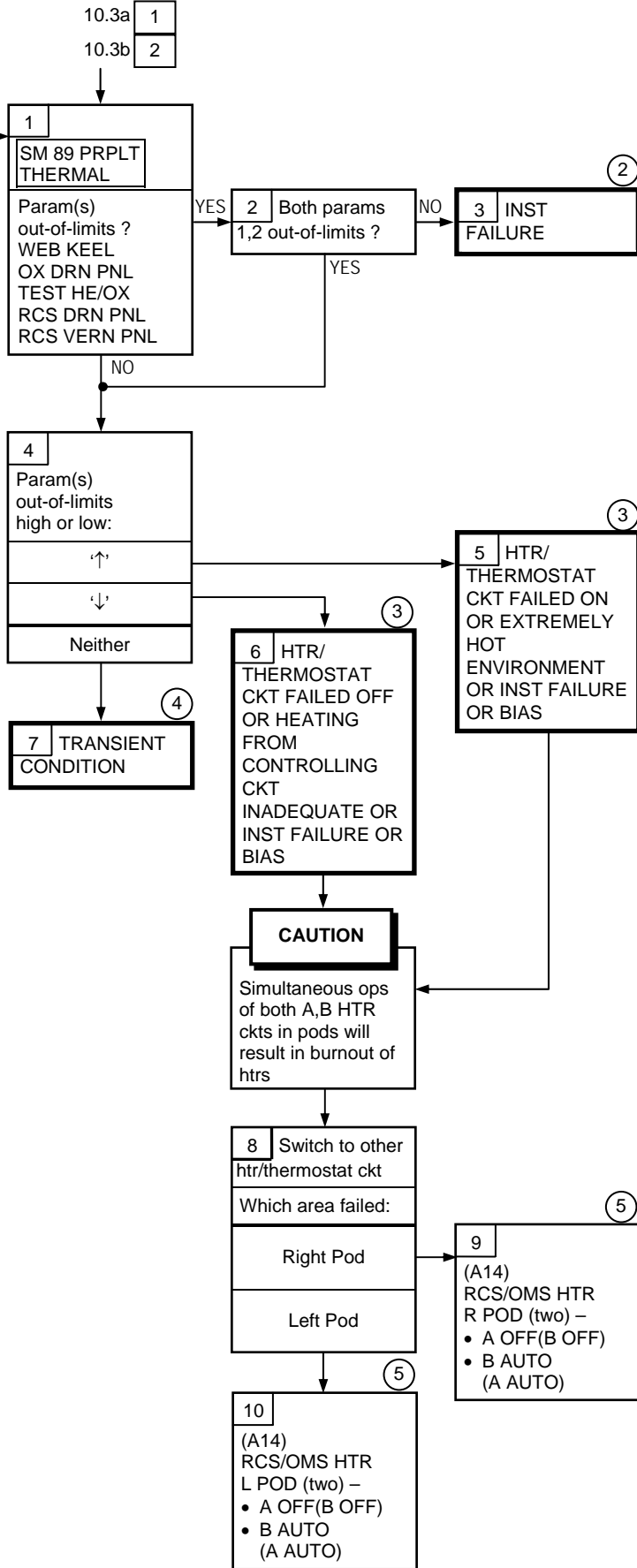
**11.3c PRPLT THRM POD**

**SM ALERT**

**S89 PRPLT THRM POD** (1)

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 Msg available with SM in RUN mode only
- ② √MCC for verification
- ③ Because of insufficient onboard data and complexity of interacting htr/thermostat groups, crew cannot identify specific failure or determine instrument faults
- ④ Htrs cycling high/low or intermittent xdcr failure. √MCC
- ⑤ √MCC for further analysis, possible reconfig, and/or attitude change

11.3c (Cont)

**POD THERMAL LIMIT TABLE**

PARAM					FDA LIMIT	
					LOW	HIGH
	POD		L	R		
OMS	TK	OX	XXXX	XXXX	45	95
		FU	XXXX	XXXX	45	95
ENG	IF	OX	XXXX	XXXX	45	110
		FU	XXXX	XXXX	45	110
		OX VLV	XXXX	XXXX	40	122
		FU INJ	XXXX	XXXX	36	260
WEB	KEEL	1	XXXX	XXXX	45	100
		2	XXXX	XXXX	45	100
	Y	OB	XXXX	XXXX	45	120
		UP	XXXX	XXXX	45	120
OX	DRN PNL	1	XXXX	XXXX	45	110
		2	XXXX	XXXX	45	110
ENG	COVER		XXXX	XXXX	45	
	SERV PNL		XXXX	XXXX	45	140
GSE	SERV PNL		XXXX	XXXX	45	120
TEST	HE/OX	1	XXXX	XXXX	35	95
		2	XXXX	XXXX	35	95

# OMS SSR-1

## MIXED XFD: OMS PRPLT FAILURE

### NOTE

Procedure uses MEMORY READ/WRITE to set appropriate OMS TK ISOL vlv and OMS XFEED vlv commands in order to connect usable OMS tk to opposite side. For single tank or single inlet failures, select engine in good pod. Unstow ASC PKT and reference DEORBIT MIXED XFD BURN PREP procedure on 7-6 for reqd address IDs. Desired values are given in Tables 1 thru 8

- O8 1. L,R OMS TK ISOL (four) – CL (tb-CL)  
XFEED (four) – CL (tb-CL)
- O7 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

Single Failures	Use Table	Dual Failures	Use Table
L OMS OX TK	4	L OMS FU TK AND R OMS OX TK	1
L OMS OX INLET	4	L OMS OX TK AND R OMS FU TK	2
L OMS FU TK	6	L OMS FU TK AND R OMS OX INLET	3
L OMS FU INLET	6	L OMS OX INLET AND R OMS FU TK	4
R OMS OX TK	3	L OMS OX TK AND R OMS FU INLET	5
R OMS OX INLET	3	L OMS FU INLET AND R OMS OX TK	6
R OMS FU TK	5	L OMS OX INLET AND R OMS FU INLET	7
R OMS FU INLET	5	L OMS FU INLET AND R OMS OX INLET	8

CRT 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

ADD ID		DESIRED	
28	_____	29	_____
30	_____	31	_____
32	_____	33	_____
34	_____	35	_____
		} From Tables 1-8	

Table A	Table B
_____	_____
_____	_____
_____	_____
_____	_____

√Data values in ACTUAL column agree with Table A (MCC supplied)

WRITE – ITEM 25 EXEC

√Data values in ACTUAL column agree with Table B (MCC supplied)

5. BIT SET – ITEM 22 EXEC (\*)

Obtain and enter ADD ID from ASC PKT, 7-6, DEORBIT MIXED XFD BURN PREP, step 4.

Obtain and enter DESIRED values from Tables 1 thru 8

ADD ID		DESIRED	
28	_____	29	_____
30	_____	31	_____
32	_____	33	_____
34	_____	35	_____
		} From Tables 1-8	

Table C
0 0 0 0
0 0 0 0
0 0 0 0
0 0 0 0

√Data values in ACTUAL column agree with Table C

WRITE – ITEM 25 EXEC

√Data values in ACTUAL column agree with DESIRED

- O8 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)

OMS SSR

OMS SSR-1 (Cont)

TABLE 1

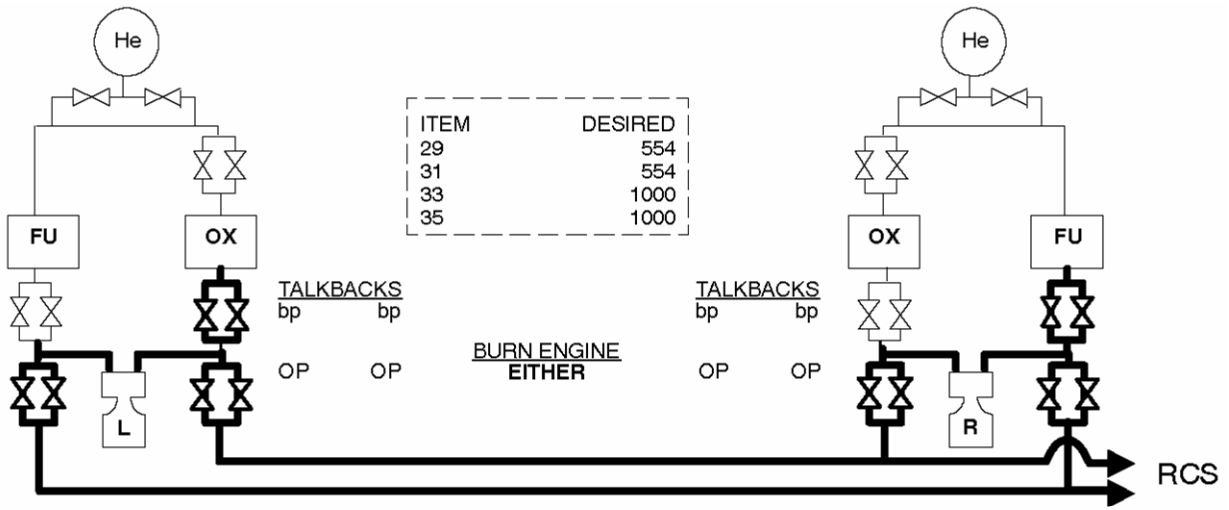
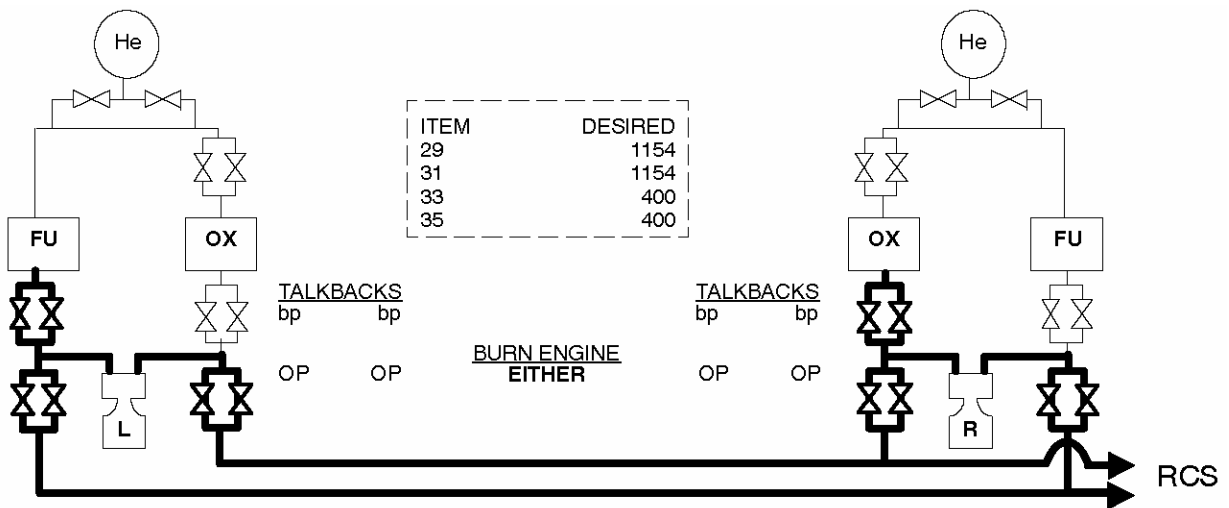


TABLE 2



OMS SSR-1 (Cont)

TABLE 3

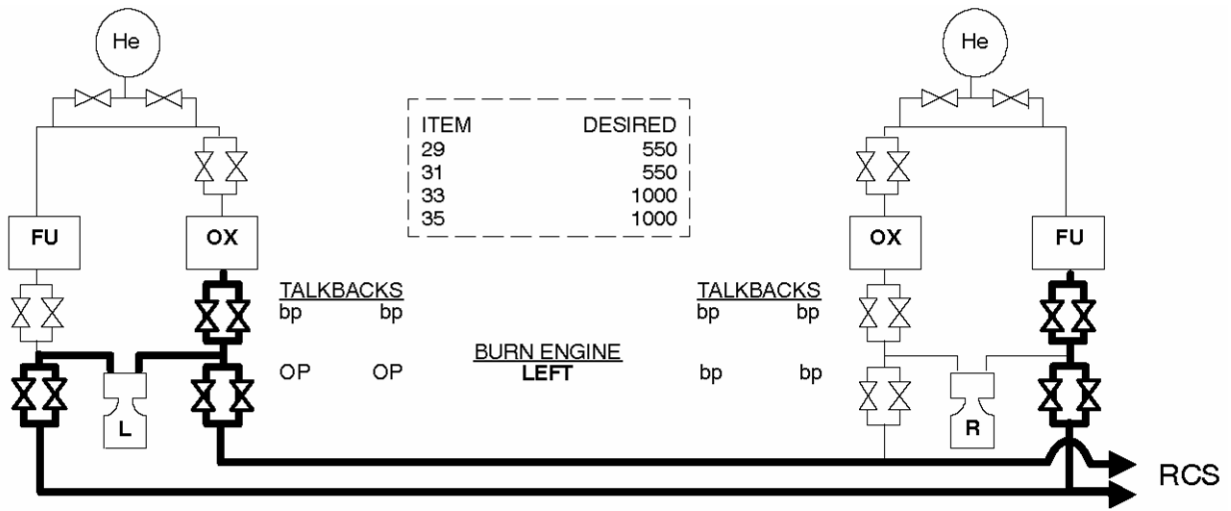
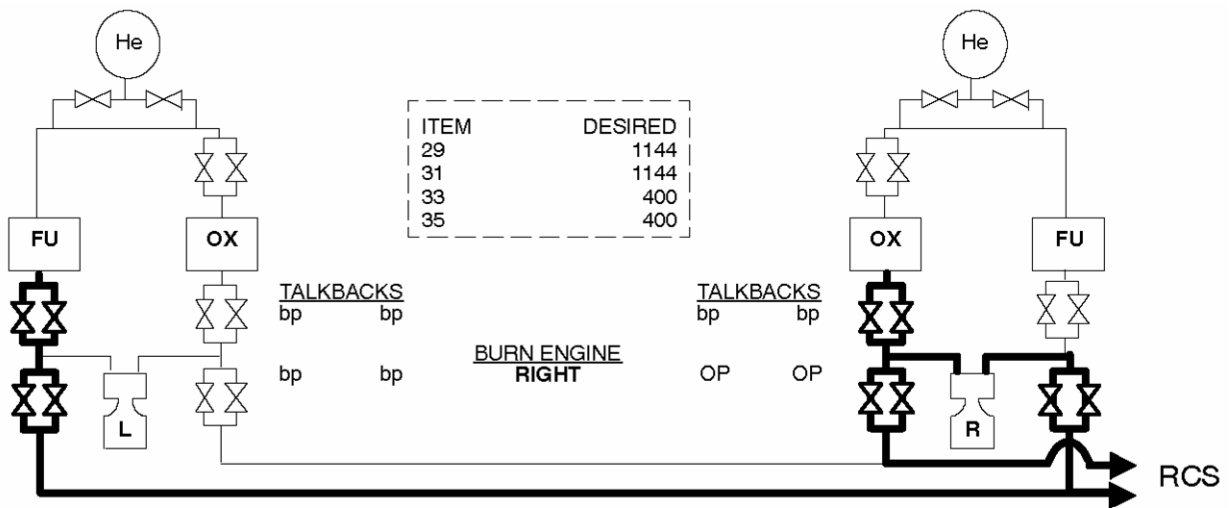


TABLE 4





OMS SSR-1 (Cont)

TABLE 5

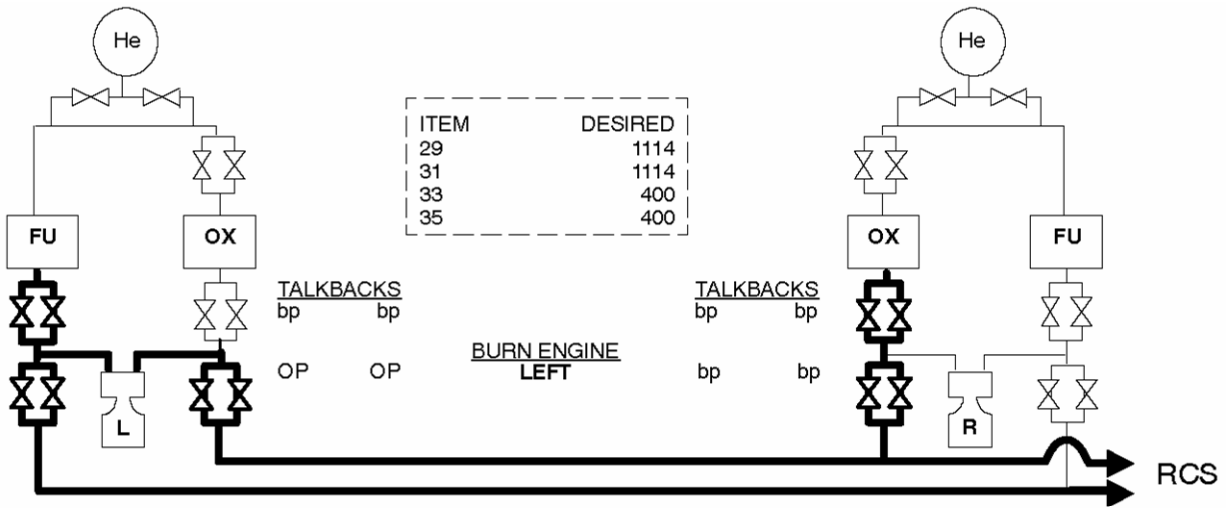
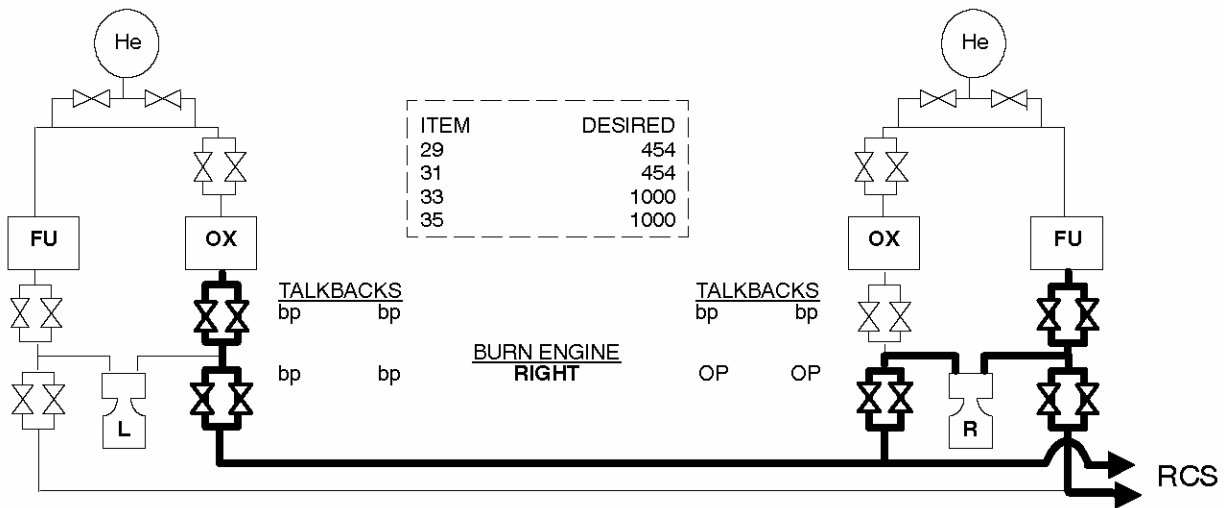


TABLE 6



OMS SSR-1 (Cont)

TABLE 7

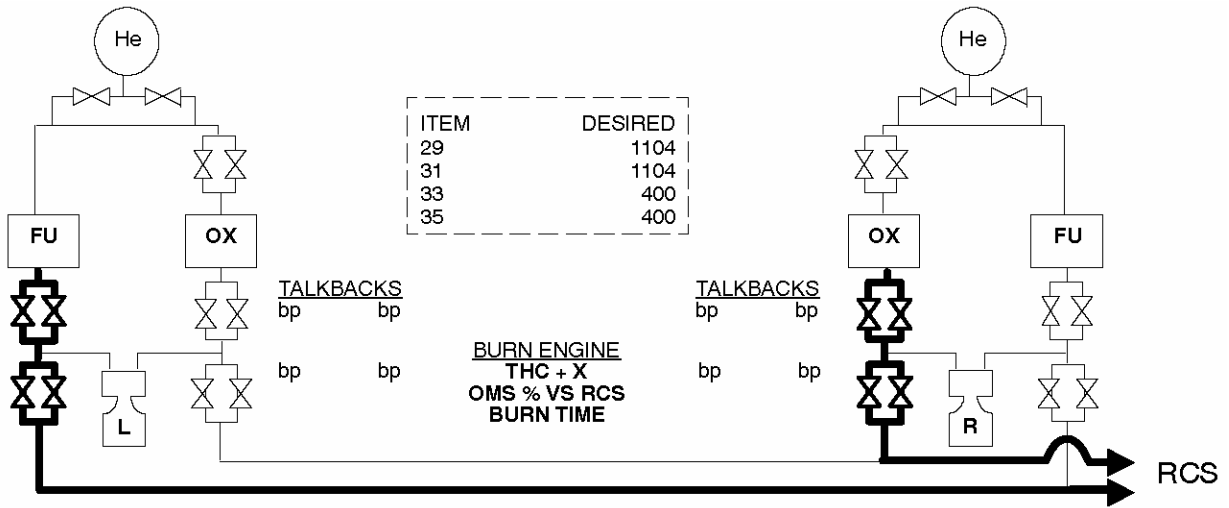
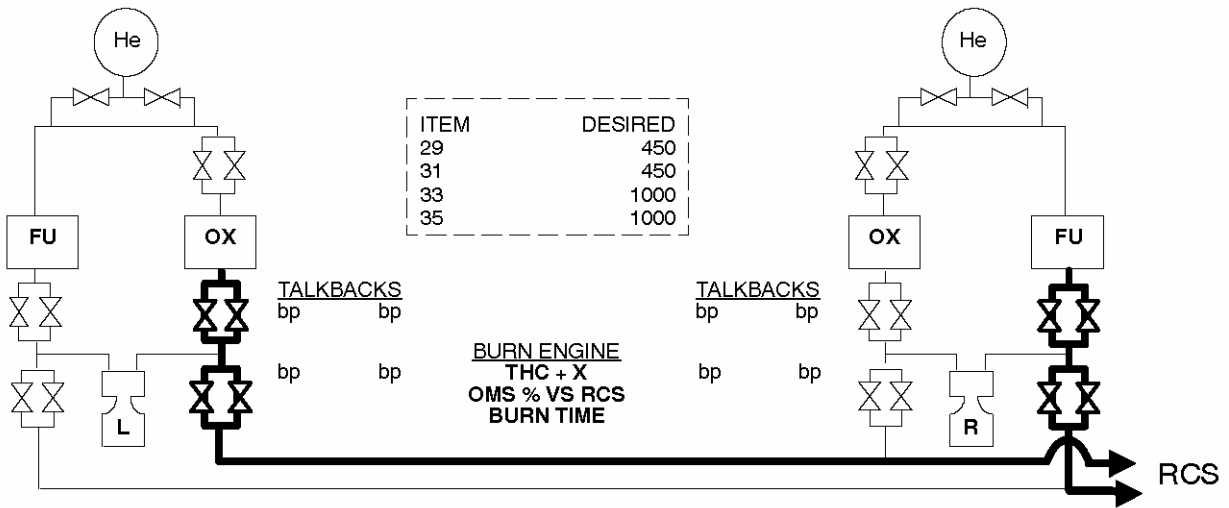


TABLE 8



PDRS

<u>12.1</u>	<u>RMS C/W</u>	
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 – 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
12.1h	– S96 PDRS CKCRT D .....	12-26
12.1i	– S96 PDRS TEST SPA.....	12-27
12.1j	– S96 PDRS CKCRT SY(SP, EP, WP, WY, WR).....	12-31
12.1k	– S96 PDRS CKCRT EE .....	12-33
12.1l	– S96 PDRS CKCRT T CK .....	12-36
12.1m	– S96 PDRS CKCRT HC .....	12-37
12.1n	– PDRS SLIP SY(SP, EP, WP, WY, WR, ALL).....	12-38
12.1o	– S94 PDRS WR R .....	12-39
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12.2b	BRAKES – ON, BUT BRAKES tb – OFF .....	12-55
12.2c	– OFF, BUT BRAKES tb – ON .....	12-56
12.2d	SAFING – AUTO, BUT SAFING tb – bp .....	12-57
12.2e	RESERVED.....	not used
12.2f	RESERVED.....	not used
12.2g	SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF.....	12-59
12.2h	SHLDR BRACE REL tb – bp AFTER CMD.....	12-61

<u>12.3</u>	<u>END EFFECTOR</u>	
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12.3b	EE FAILS TO RELEASE/DERIGIDIZE CONSTRAINED PL IN EE MODE – AUTO .....	12-64
12.3c	RESERVED.....	not used
12.3d	RESERVED.....	not used
12.3e	EE FAILS TO RELEASE IN EE MODE – MAN.....	12-72
12.3f	DERIGIDIZE/EXTEND IN MANUAL.....	12-74
12.3g	MULTIPLE EE tb ABNORMAL WHILE NO EE CMDS (EE MODE – AUTO OR MAN) .....	12-76
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12.3i	CAPTURE SEQ ABORTED (CUE CARD EXECUTED) .....	12-80
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12.5a	MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .....	12-98
12.5b	MPM STO – tb NOT STO, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .....	12-100
12.5c	MRL REL – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .....	12-102
12.5d	MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .....	12-104
12.5e	PORT(STBD) RMS RETEN LATCHES R-F-L tb – bp WHEN CRADLED .....	12-106
12.5f	PORT(STBD) RMS RETEN LATCHES R-F-L tb – gray WHEN UNCRADLED .....	12-107
	<u>PDRS SSR</u>	
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	SSR-2 RESERVED.....	not used
	SSR-3 BACKDRIVE TECHNIQUE – JOINT FREE.....	12-109
	SSR-4 RMS IFM D&C KIT .....	12-117

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**RMS C/W**

**12.1**

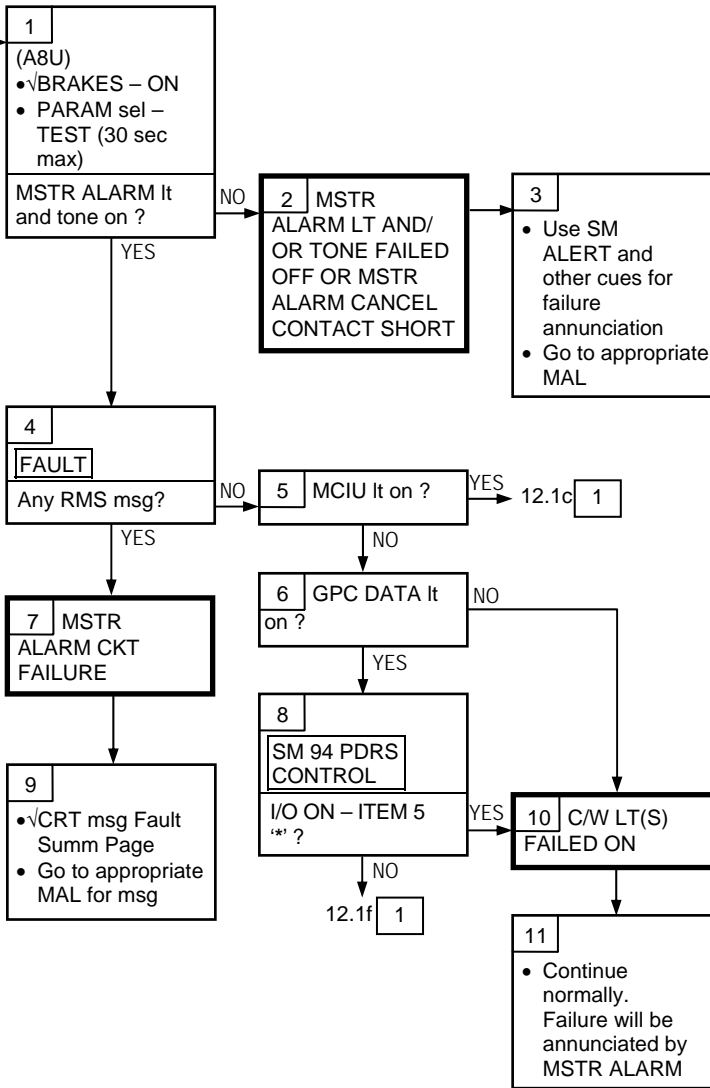
**PDRS**

**12.1a C/W LT(S) ON, BUT RMS MSTR ALARM LT/TONE OFF**

C/W Lt(s) On,  
but MSTR  
ALARM Lt and/or  
Tone Off  
  
(A8U)

SM  
ALERT

PDRS Fault  
Msgs

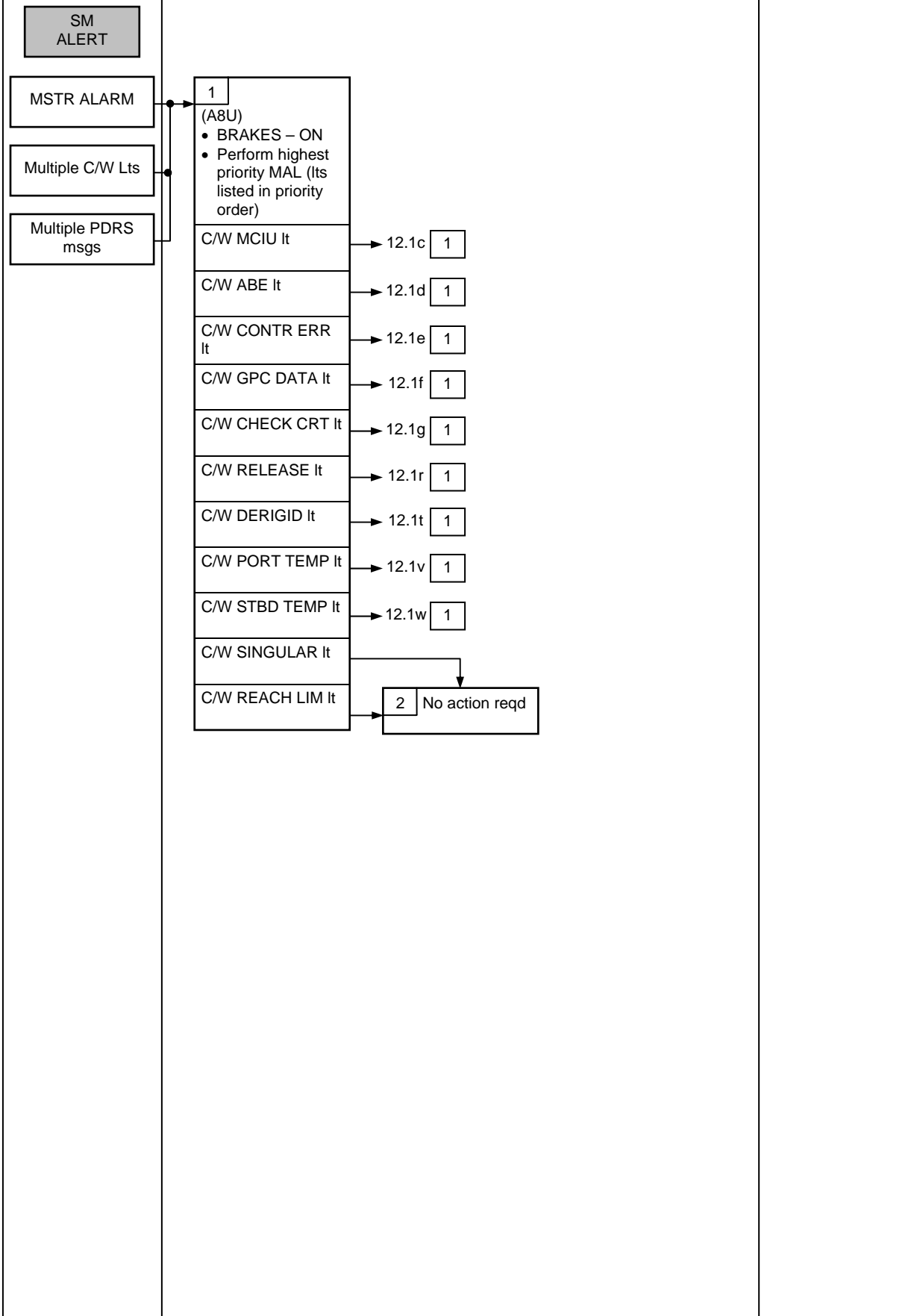


RMS C/W

12.1

**PDRS**

**12.1b MULTIPLE C/W LTS AND PDRS MSGS**

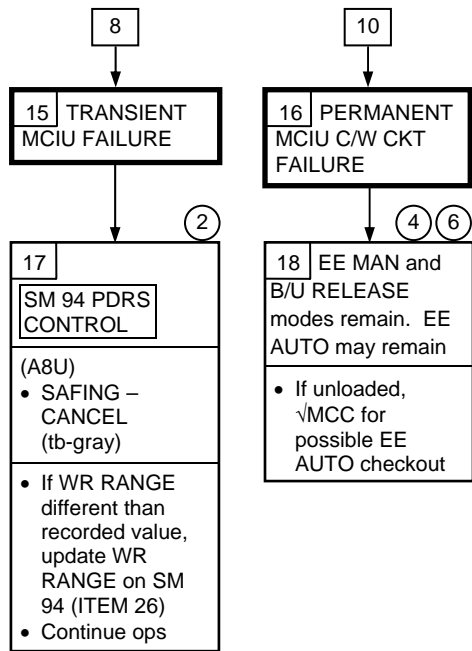






**PDRS**

**12.1c (Cont)**



- 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

**PDRS**

SM  
ALERT

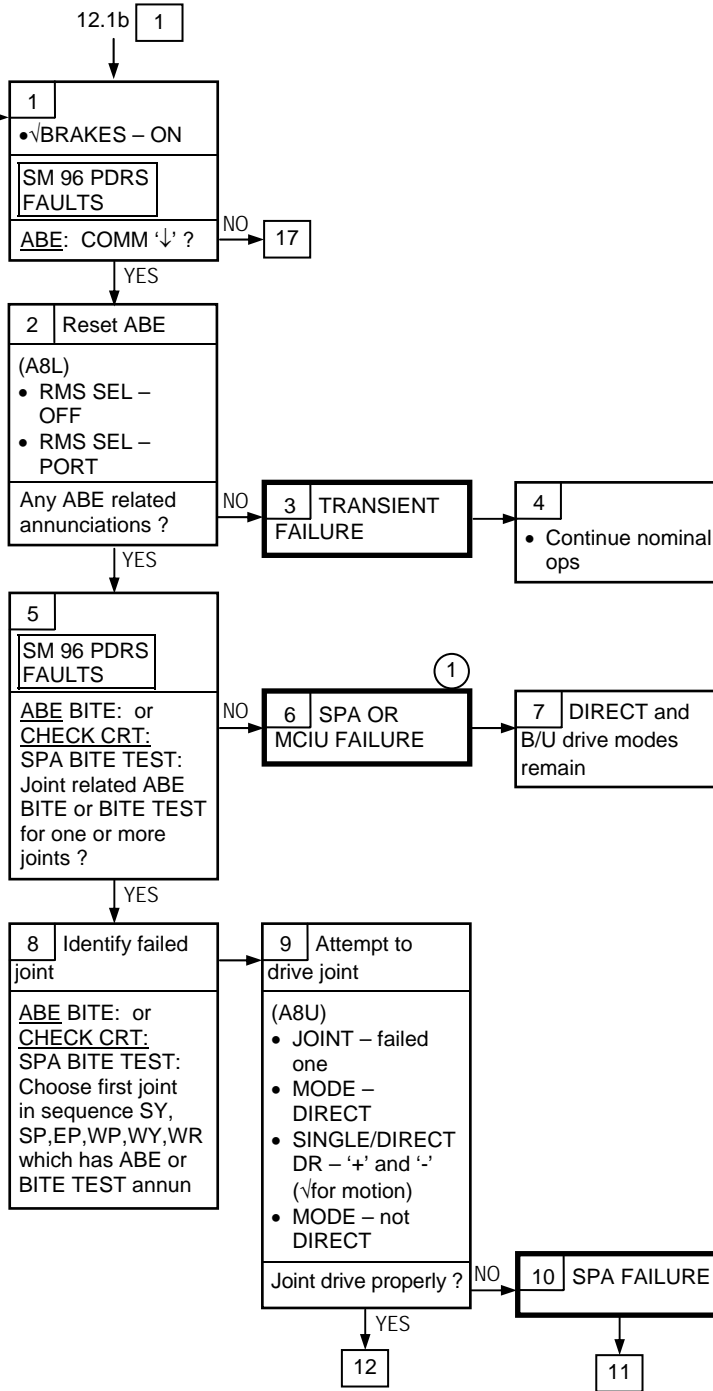
RMS MSTR  
ALARM

ABE

S96 PDRS  
ABE COMM (SY,  
SP, EP, WP, WY,  
WR)

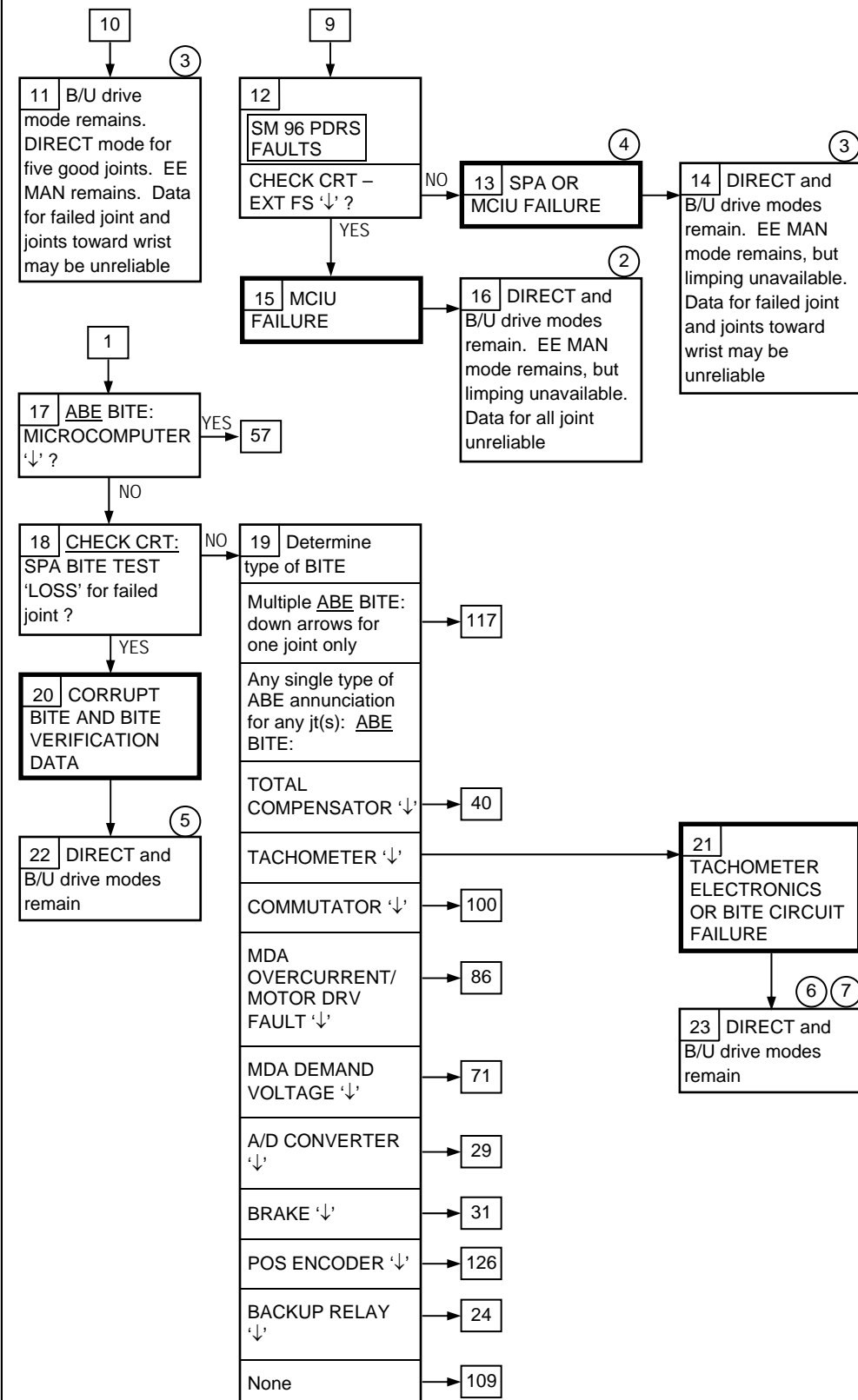
**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
RMS SEL – PORT  
(CRT)  
SM 94 I/O ON –  
ITEM 5 (\*)

**12.1d C/W ABE LT – S96 PDRS ABE COMM  
(SY, SP, EP, WP, WY, WR)**



① Full capability may be regained by RMS MCIU CHANGEOUT (IFM)

**PDRS 12.1d (Cont)**



(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

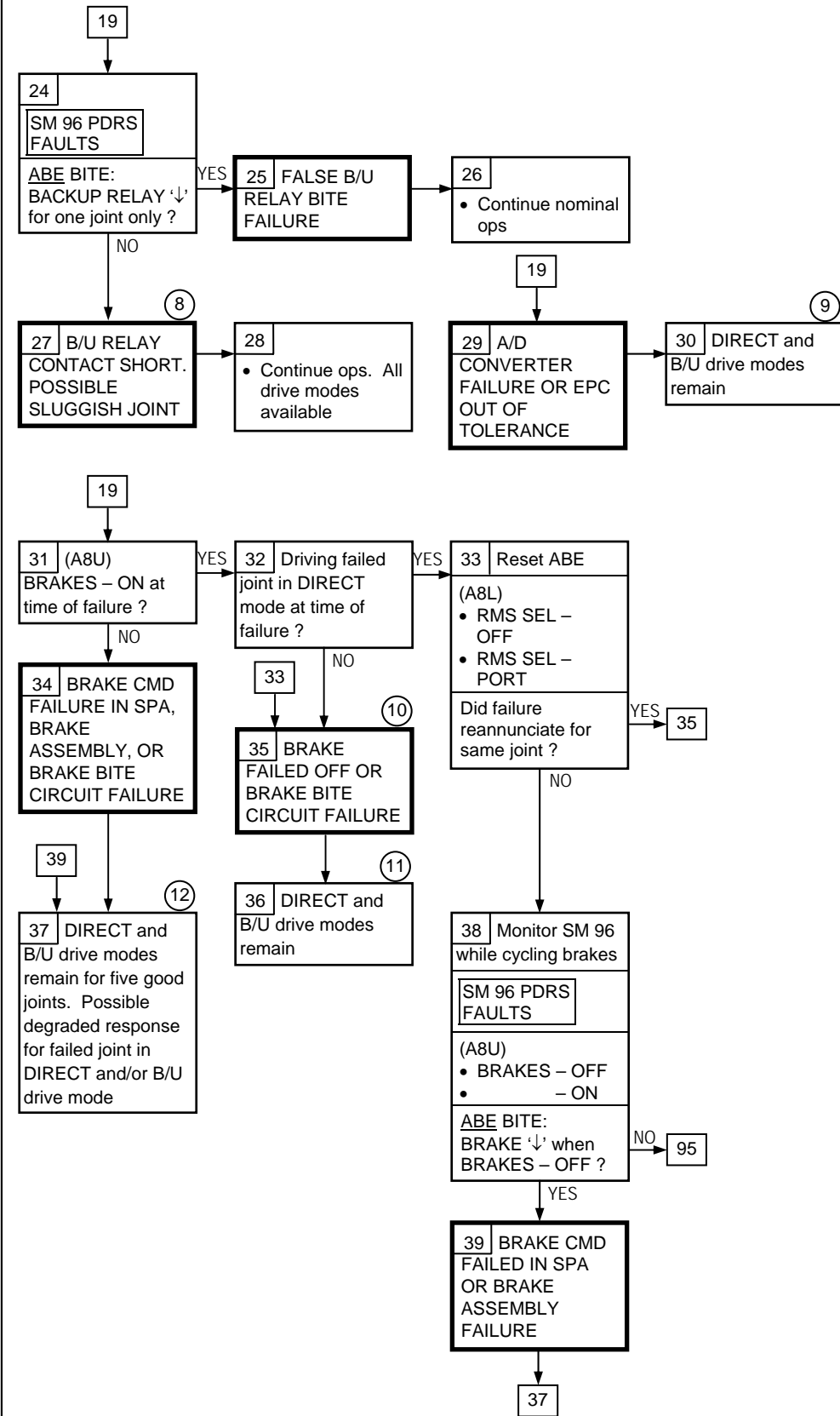
(4) If annunciation for all six joints is identical, full capability may be regained by RMS MCIU CHANGEOUT (IFM). If annunciation is not for all six joints, then SPA failure

(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

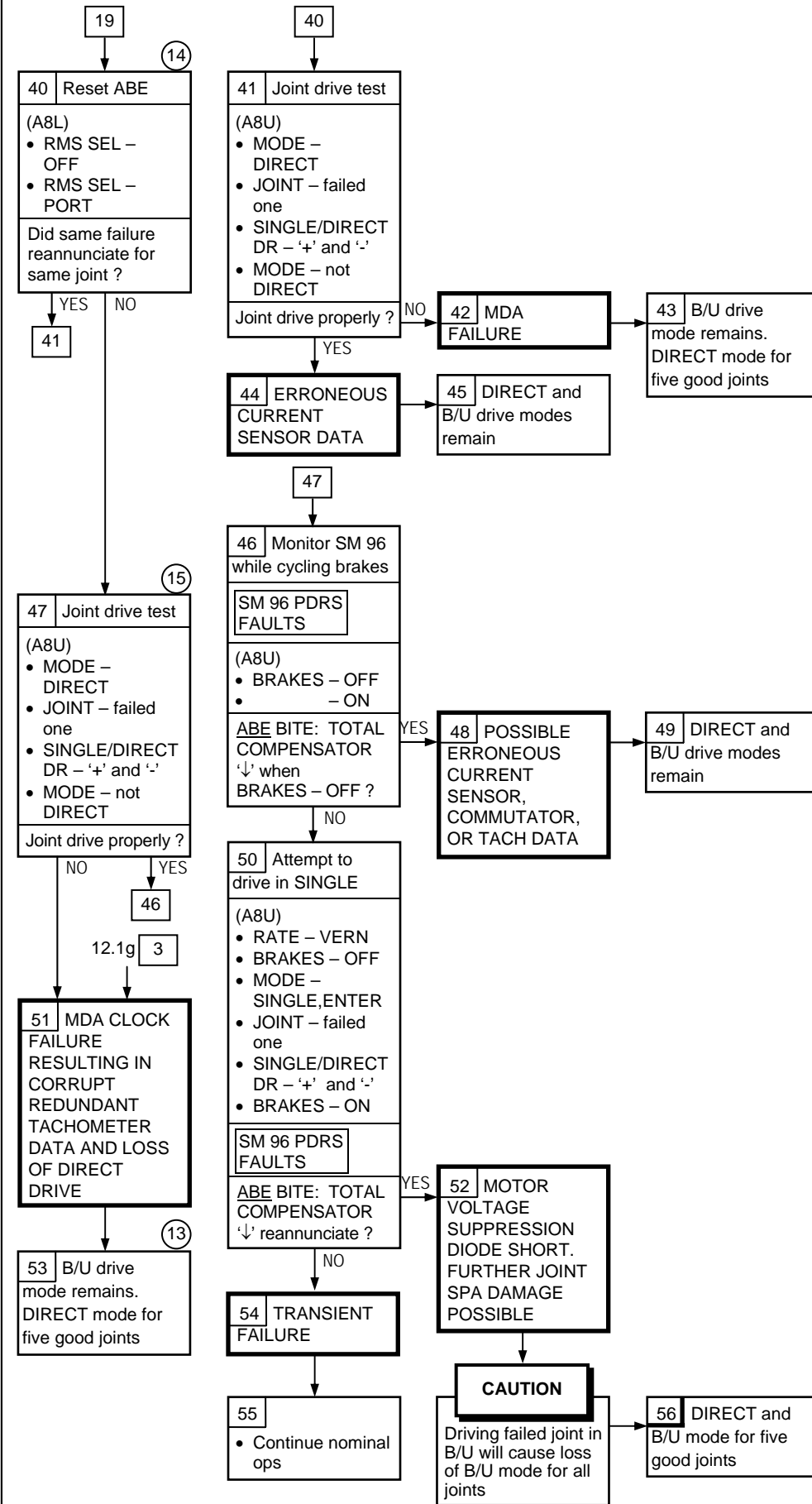
(7) For tach failure, rate data is unreliable

**PDRS 12.1d (Cont)**



- ⑧ Possible TOTAL COMPENSATOR BITE for failed joint while driving. Direct Drive joint test may determine failed joint
- ⑨ 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
- ⑩ 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
- ⑪ If brake failed off, brakes available for five good joints and dynamic braking for failed joint
- ⑫ MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Possible brake overdrive for failed joint. Ground may determine if joint is sluggish

**PDRS 12.1d (Cont)**

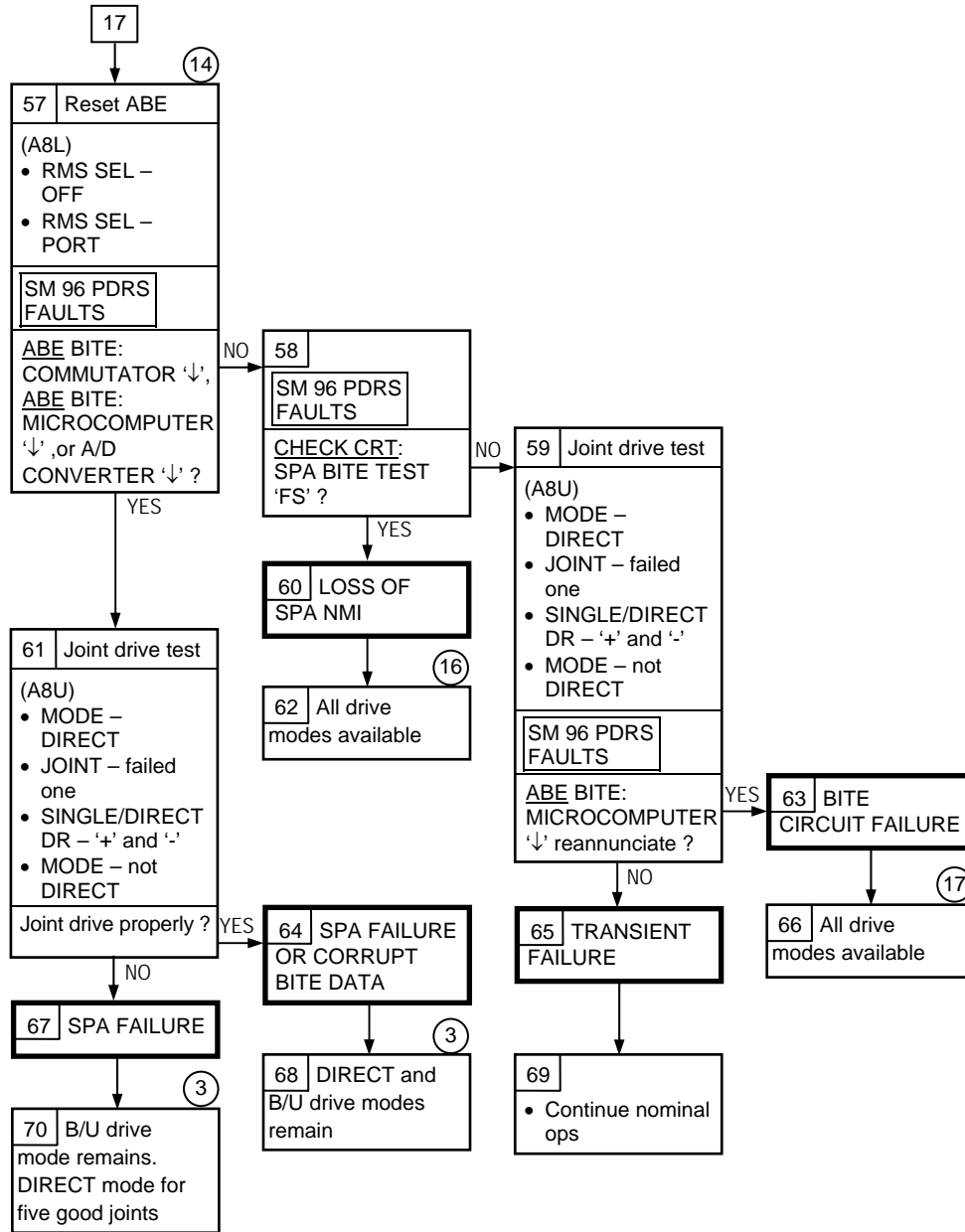


13 MCIU OVERRIDE: ABE OVRD C (ITEM 38) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes

14 Additional annunciations may be received after ABE reset

15 May receive CHECK CRT and DIRECT DRIVE BITE annunciation when driving in Direct mode. Cycle Brake sw to clear failure

**PDRS 12.1d (Cont)**



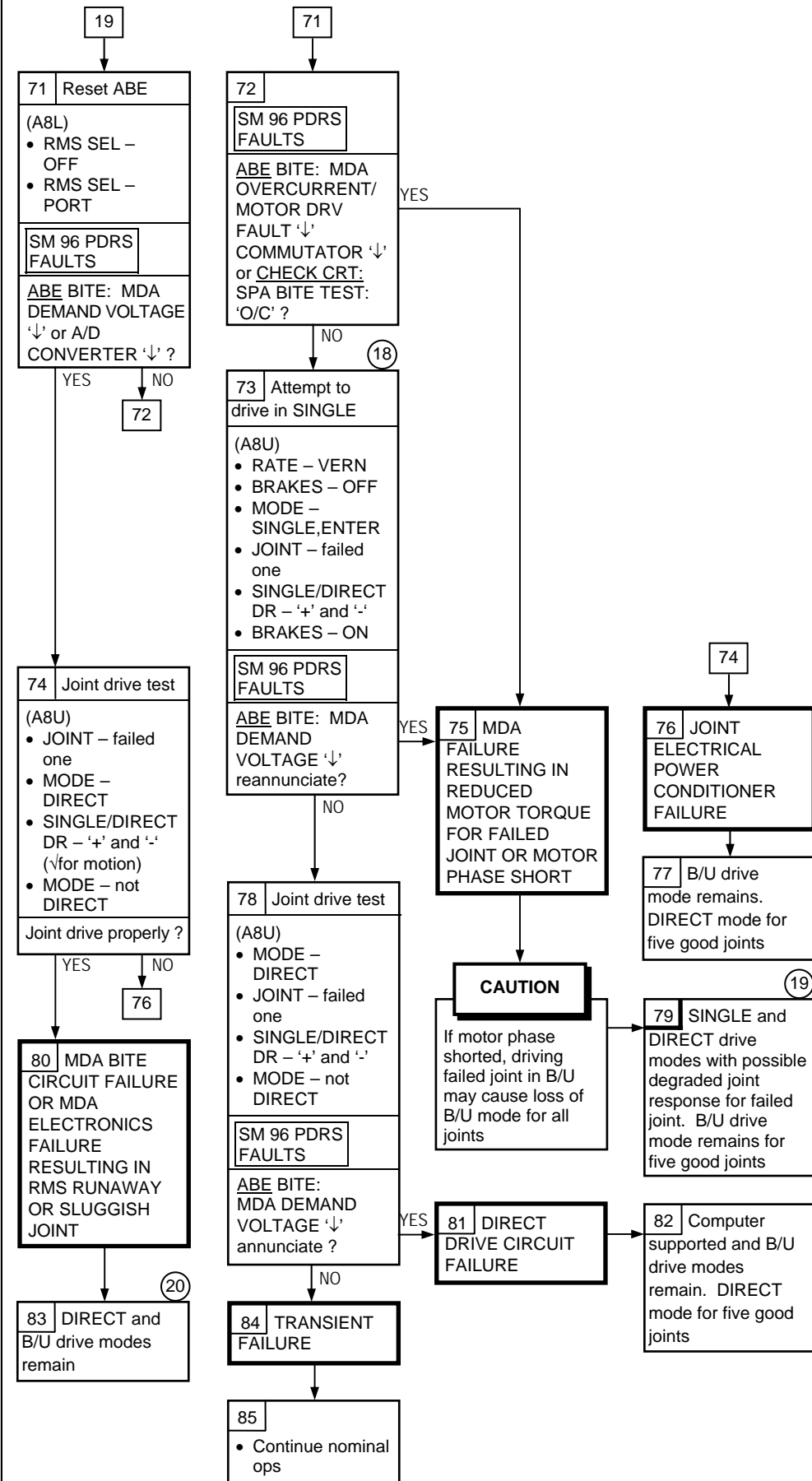
③ If any wrist joint data is unreliable, EE Auto mode may be lost

⑭ Additional annunciations may be received after ABE reset

⑮ One failure away from possible uncommanded motion, but protected by auto brakes and annunciated by CONTR ERR

⑰ When driving any joint in DIRECT, failure will reannunciate. Recycle arm select to regain computer supported modes

**PDRS 12.1d (Cont)**

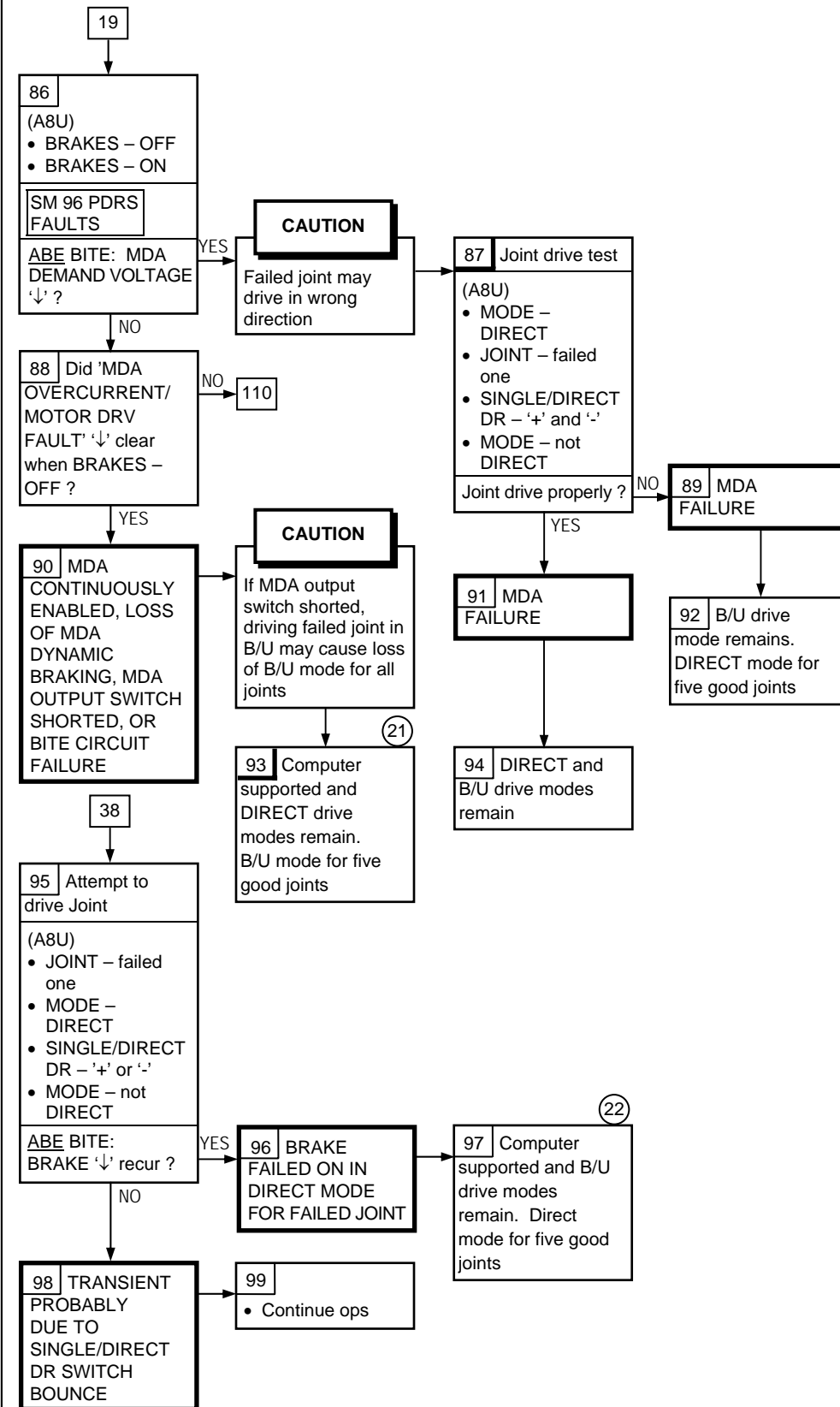


**18** Removing brakes may result in reannunciation of failure and autobrakes

**19** Subsequent MDA Demand Voltage BITE possible while driving failed joint. For commutator and MDA demand voltage failures, 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

**20** For MDA BITE circuit failure, 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 for sluggish joint (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes

**PDRS 12.1d (Cont)**

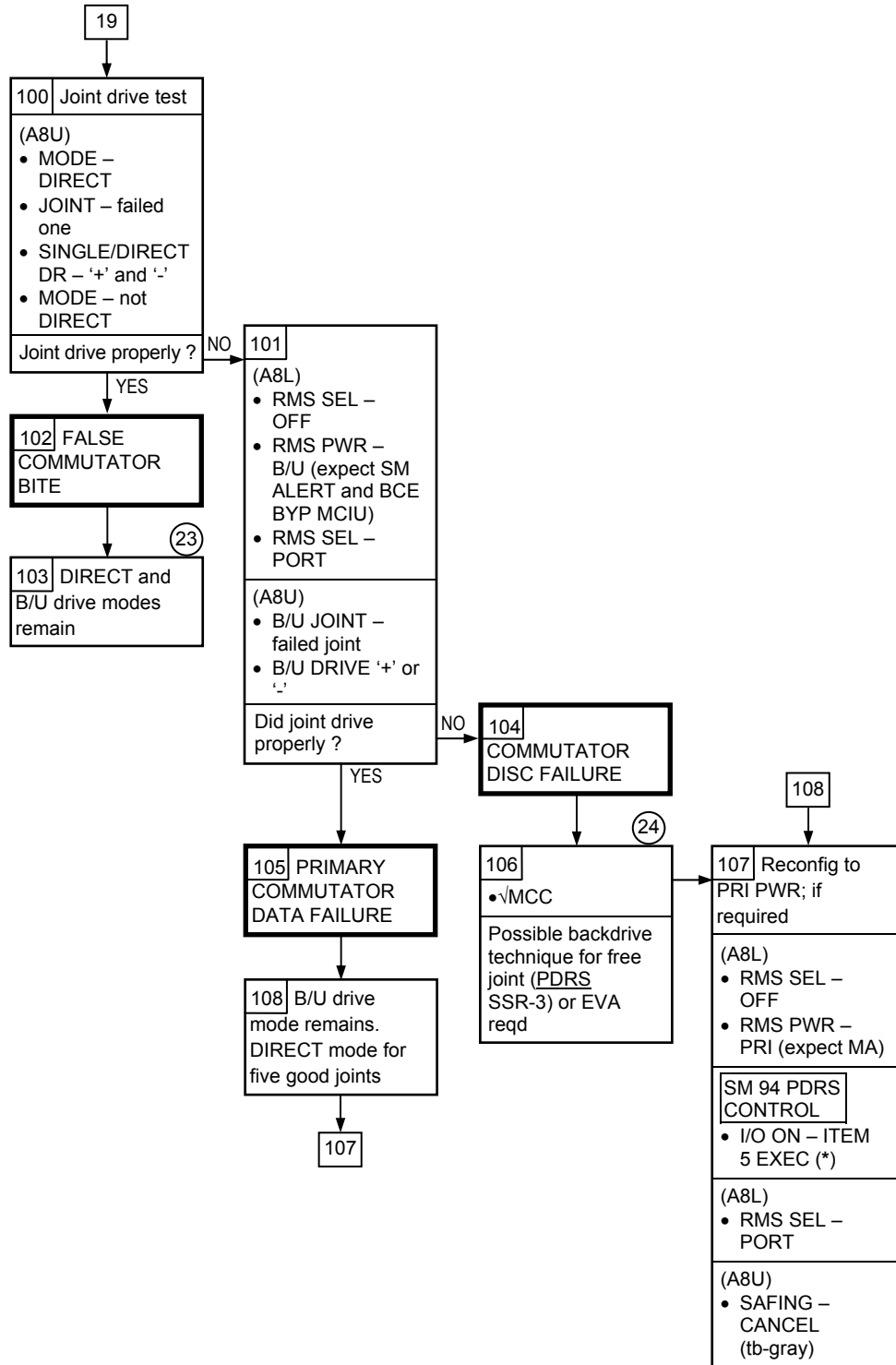


(21) For MDA continuously enabled or loss of dynamic braking, subsequent failure (runaway or failed free joint) will be annunciated but not stopped by autobrakes or dynamic braking, respectively

(22) Port RMS SEL will need to be cycled to regain computer supported modes



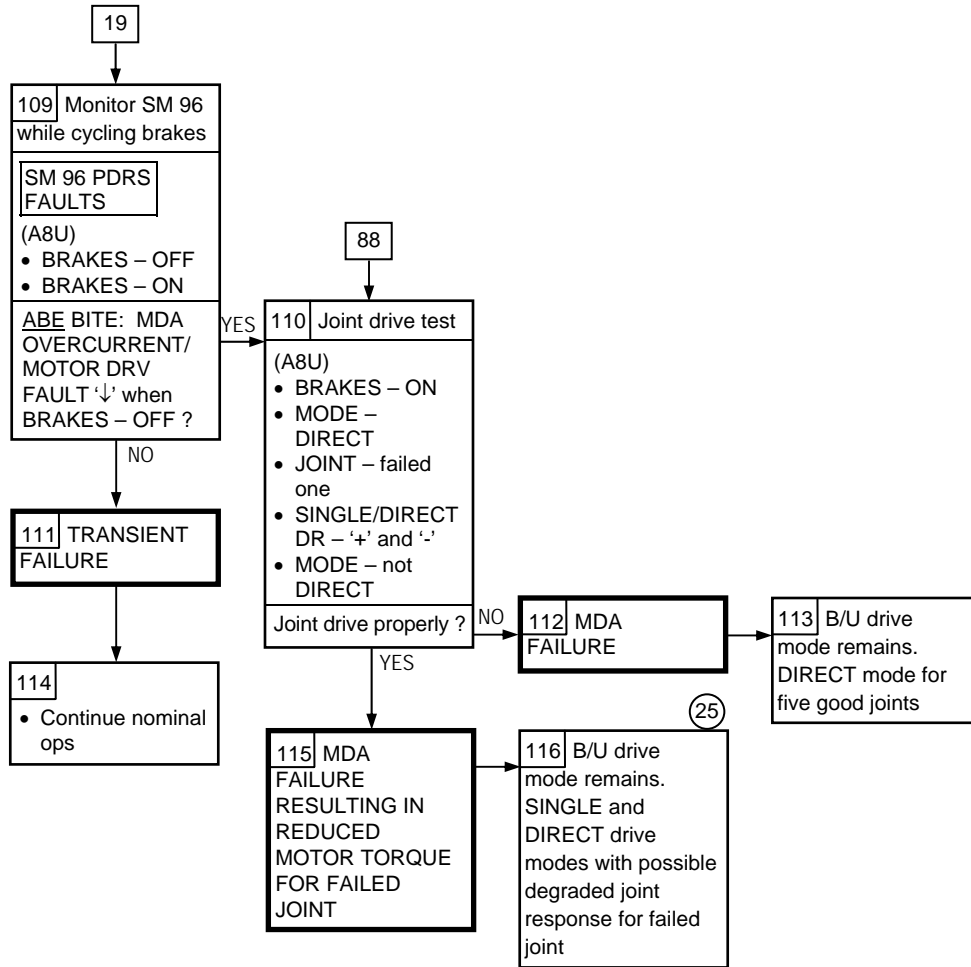
**PDRS 12.1d (Cont)**



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, but the MDA is inhibited on the failed joint, and is therefore, electrically free. Brakes will stop joint motion. Override may be used with caution on MCC GO

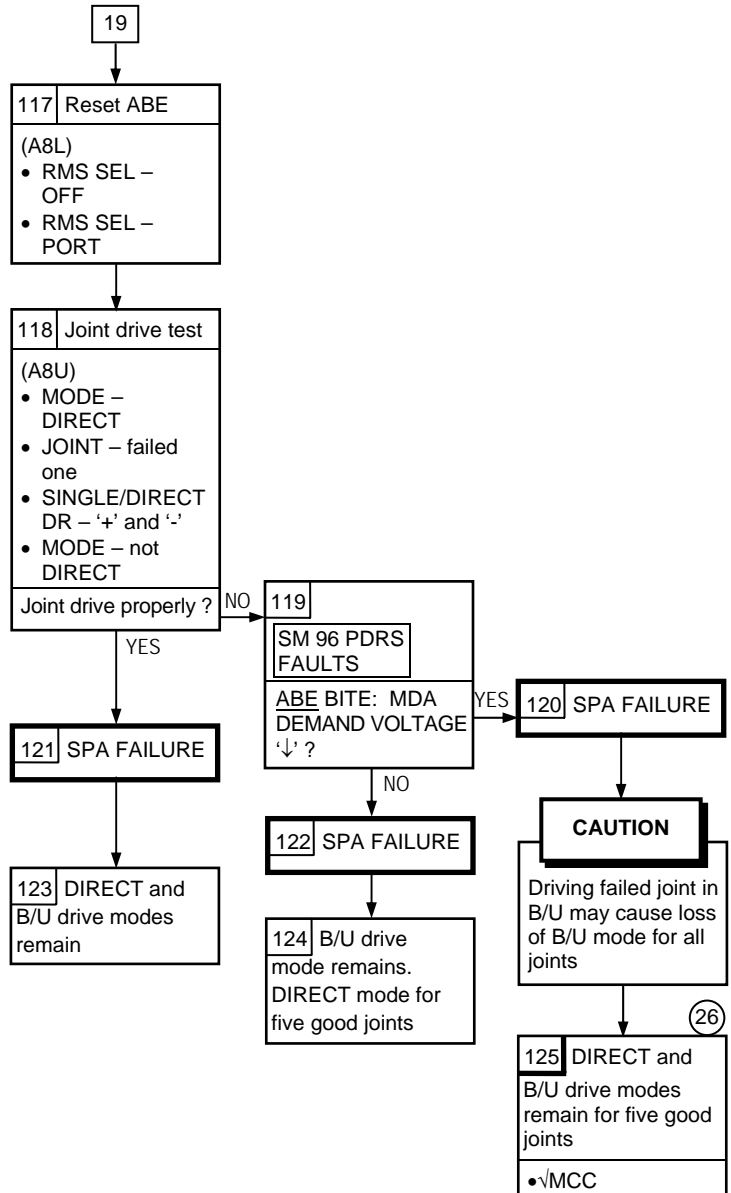
24 MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, required to regain computer supported modes for the backdrive technique

**PDRS 12.1d (Cont)**



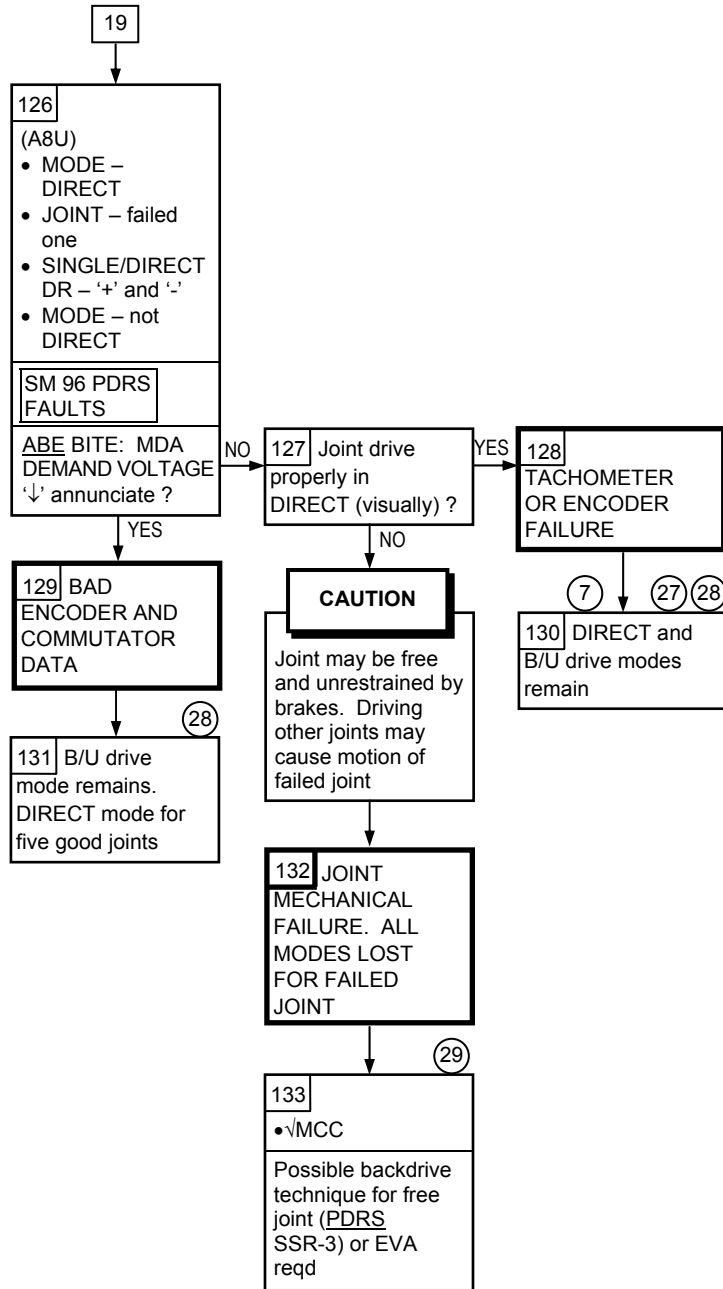
25 Subsequent MDA Demand Voltage BITE possible while driving failed joint

**PDRS 12.1d (Cont)**



②⑥ 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

**PDRS 12.1d (Cont)**



⑦ For tach failure, rate data is unreliable

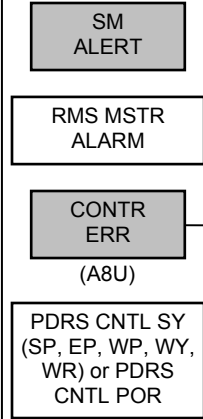
②⑦ For encoder failure, MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain SINGLE mode (on MCC GO). Position hold is not functional for failed joint. Subsequent TACH failure will be annunciated by CONTR ERR or TOTAL COMPENSATOR and protected by autobrakes

②⑧ For encoder failure, joint data is unreliable. REACH LIMIT and SOFT STOP annunciations not available for failed joint

②⑨ MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95 PDRS OVERRIDE required to regain computer supported modes for backdrive technique

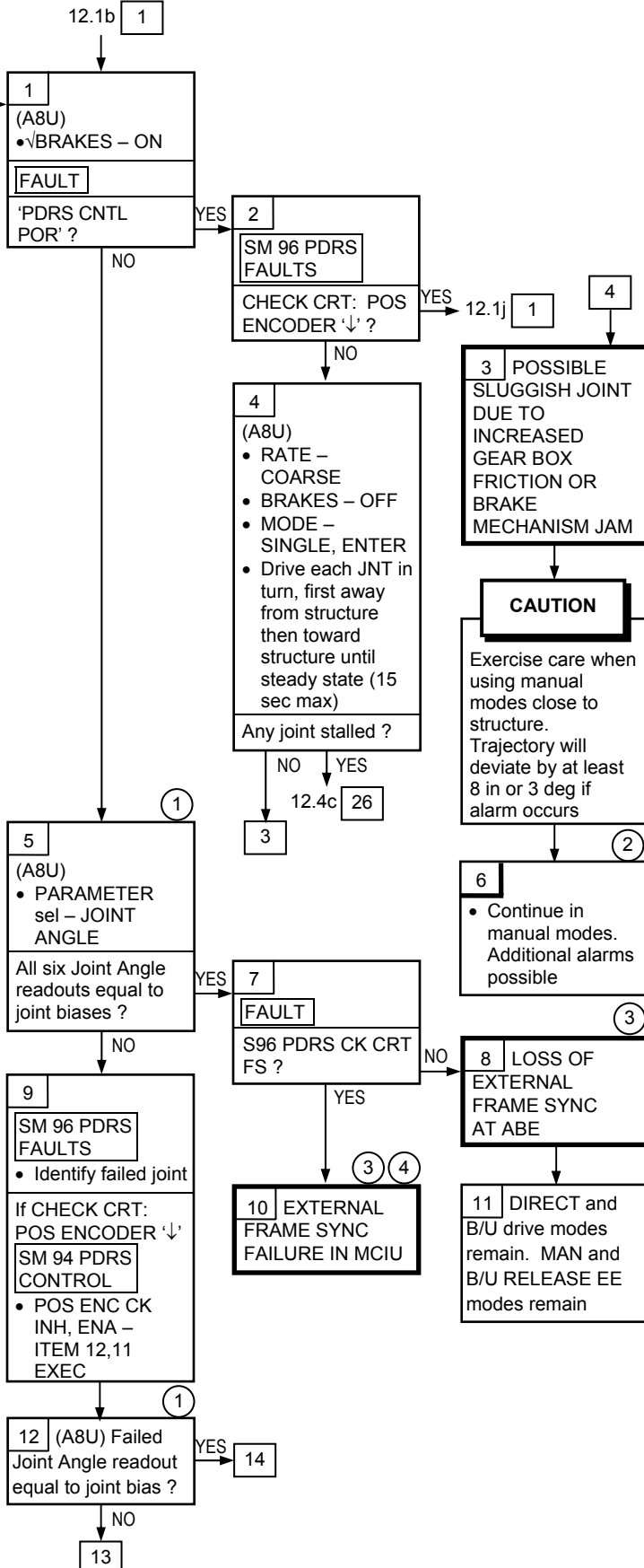
**PDRS**

**12.1e C/W CONTR ERR LT – S96 PDRS CNTL SY(SP, EP, WP, WY, WR) OR PDRS CNTL POR**



If:  
 SM 96 PDRS FAULTS  
 CONTR ERROR SY (SP, EP, WP, WY, WR) '↓' (Joint Consistency Check failed)

**Nominal Config:**  
 (A8L)  
 RMS PWR – PRI  
 SEL – PORT



① Joint biases  
 Arm S/N 201

SY	-2.5
SP	+2.0
EP	+0.5
WP	-0.4
WY	-1.0
WR	+0.1

Arm S/N 301

SY	-0.9
SP	+2.4
EP	-0.0
WP	-1.0
WY	-1.9
WR	+0.3

Arm S/N 303

SY	-2.4
SP	+4.0
EP	+3.6
WP	+0.9
WY	+0.1
WR	+2.8

Arm S/N 202

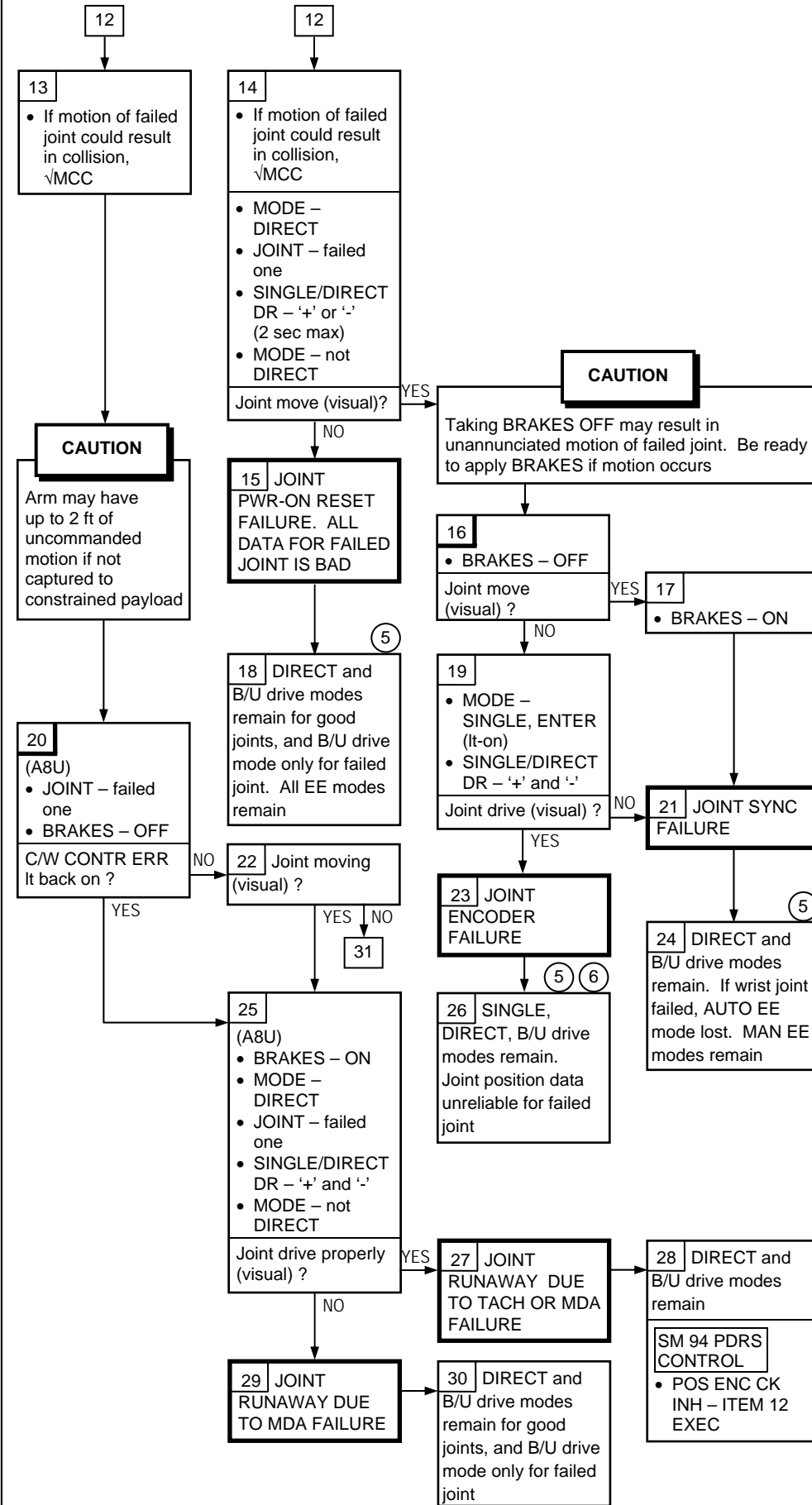
SY	+0.6
SP	+1.3
EP	-0.6
WP	-0.8
WY	+0.9
WR	+2.6

② If alarms become a nuisance, use vernier rates, SINGLE, or on MCC call inhibit POHS CNTL

③ EE tb(s) inaccurate. All display data bad

④ Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

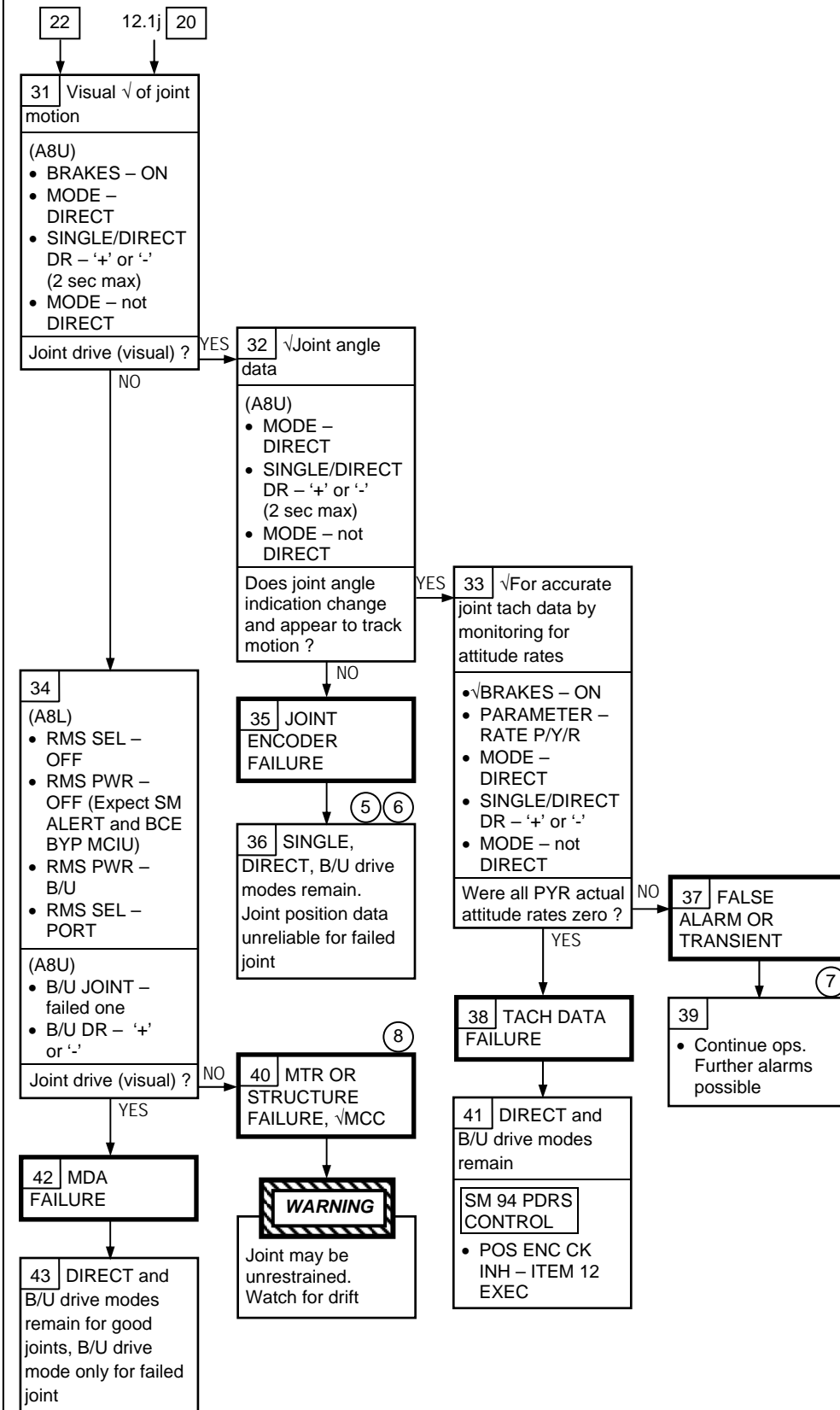
**PDRS 12.1e (Cont)**



⑤ REACH LIMITs and SOFT STOPs annunciation not available for failed joint

⑥ Position hold function will not work for failed joint

**PDRS 12.1e (Cont)**



⑤ REACH LIMITs and SOFT STOPs annunciation not available for failed joint

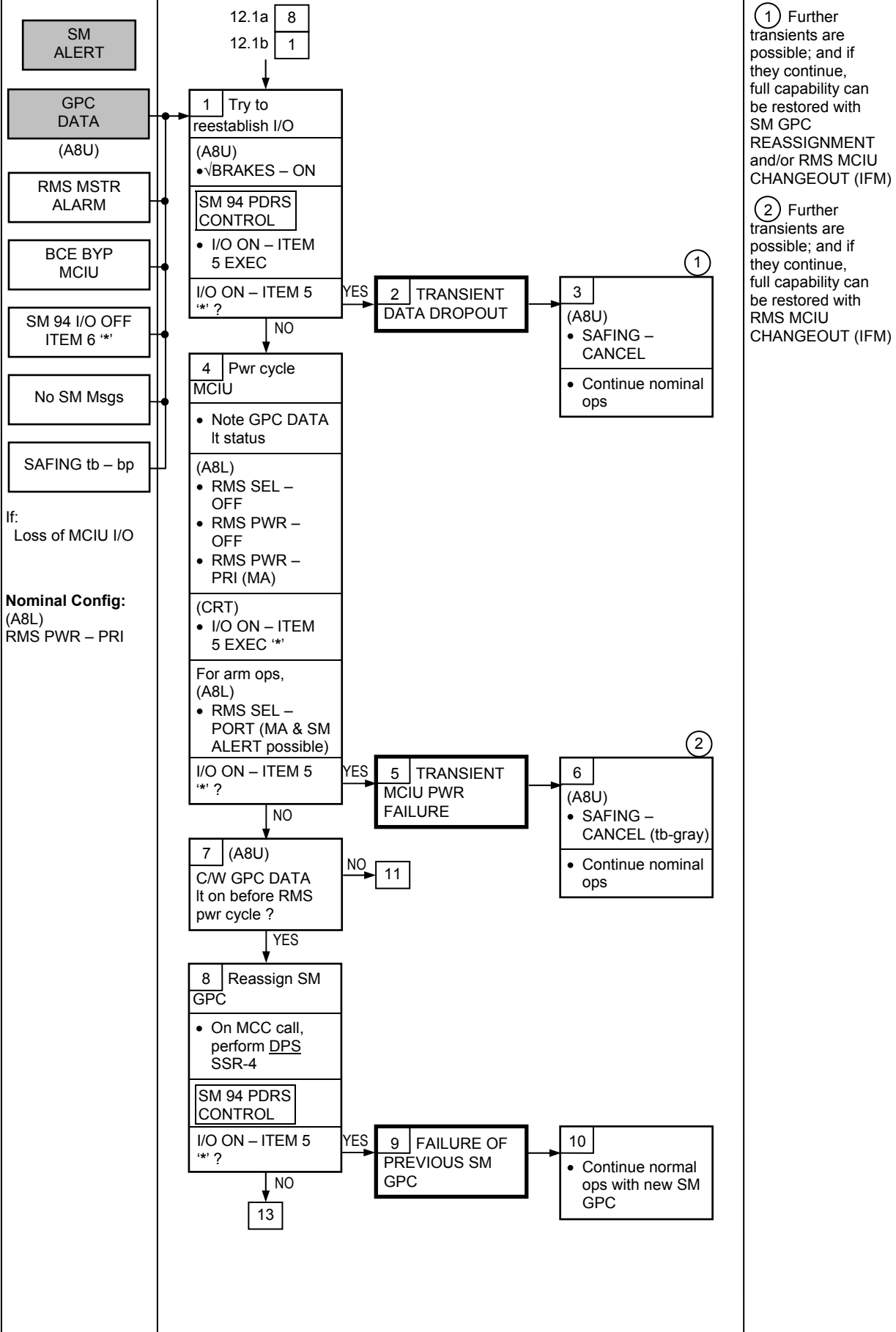
⑥ Position hold function will not work for failed joint

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

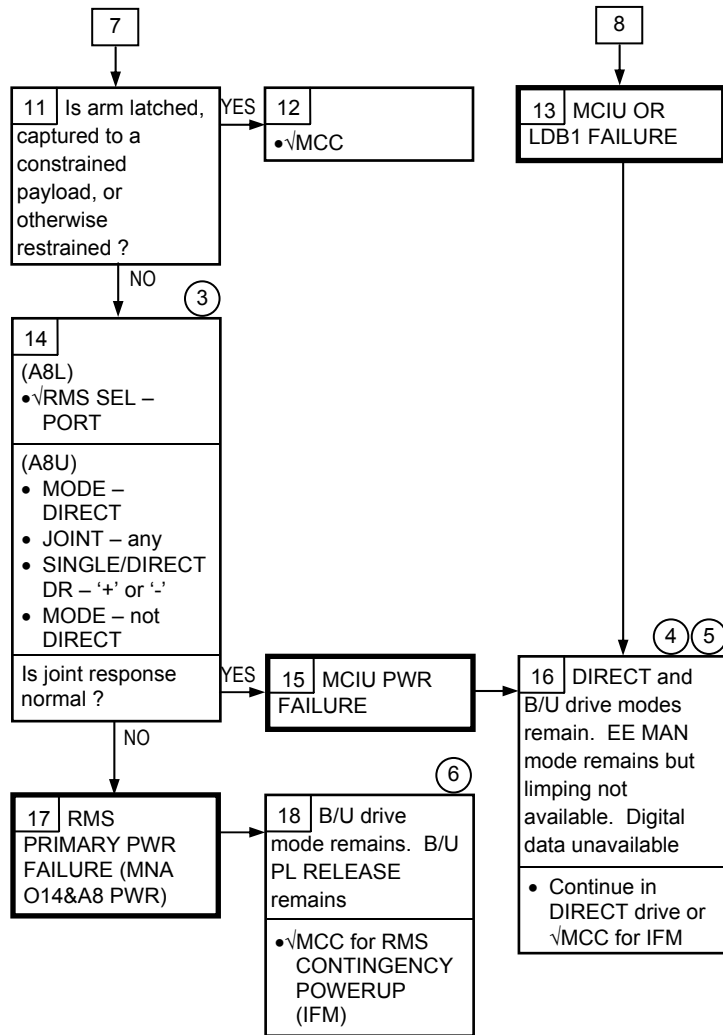
**PDRS**

**12.1f C/W GPC DATA LT OR BCE BYP MCIU**





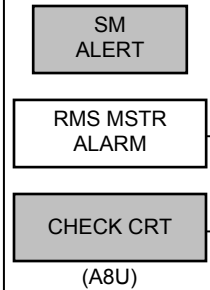
**PDRS 12.1f (Cont)**



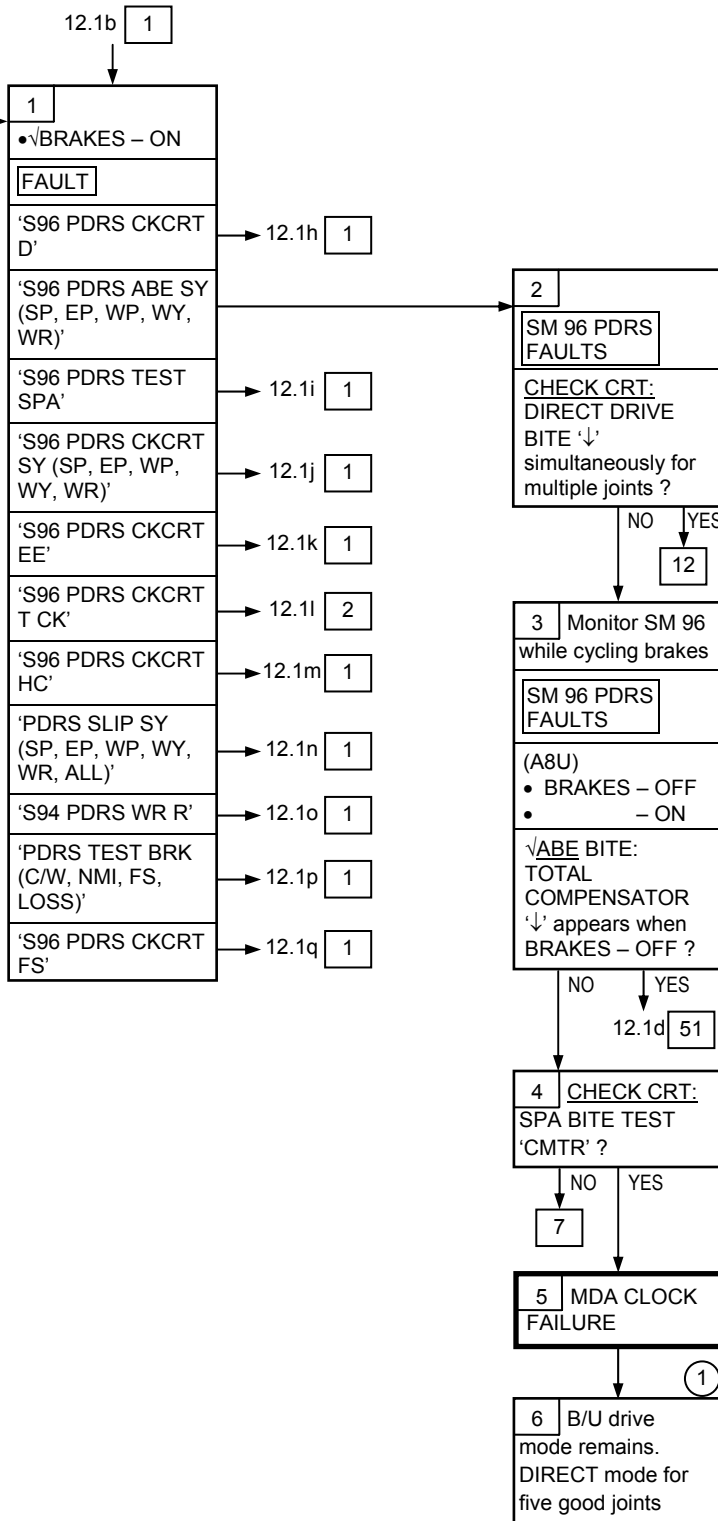
- ③ Mode It may not illuminate
- ④ Full capability may be restored with MCIU CHANGEOUT (IFM)
- ⑤ RSAD may be capable of displaying joint data
- ⑥ Primary pwr may be restored following IFM. Panel edge lighting may not be available

**PDRS**

**12.1g C/W CHECK CRT LT**

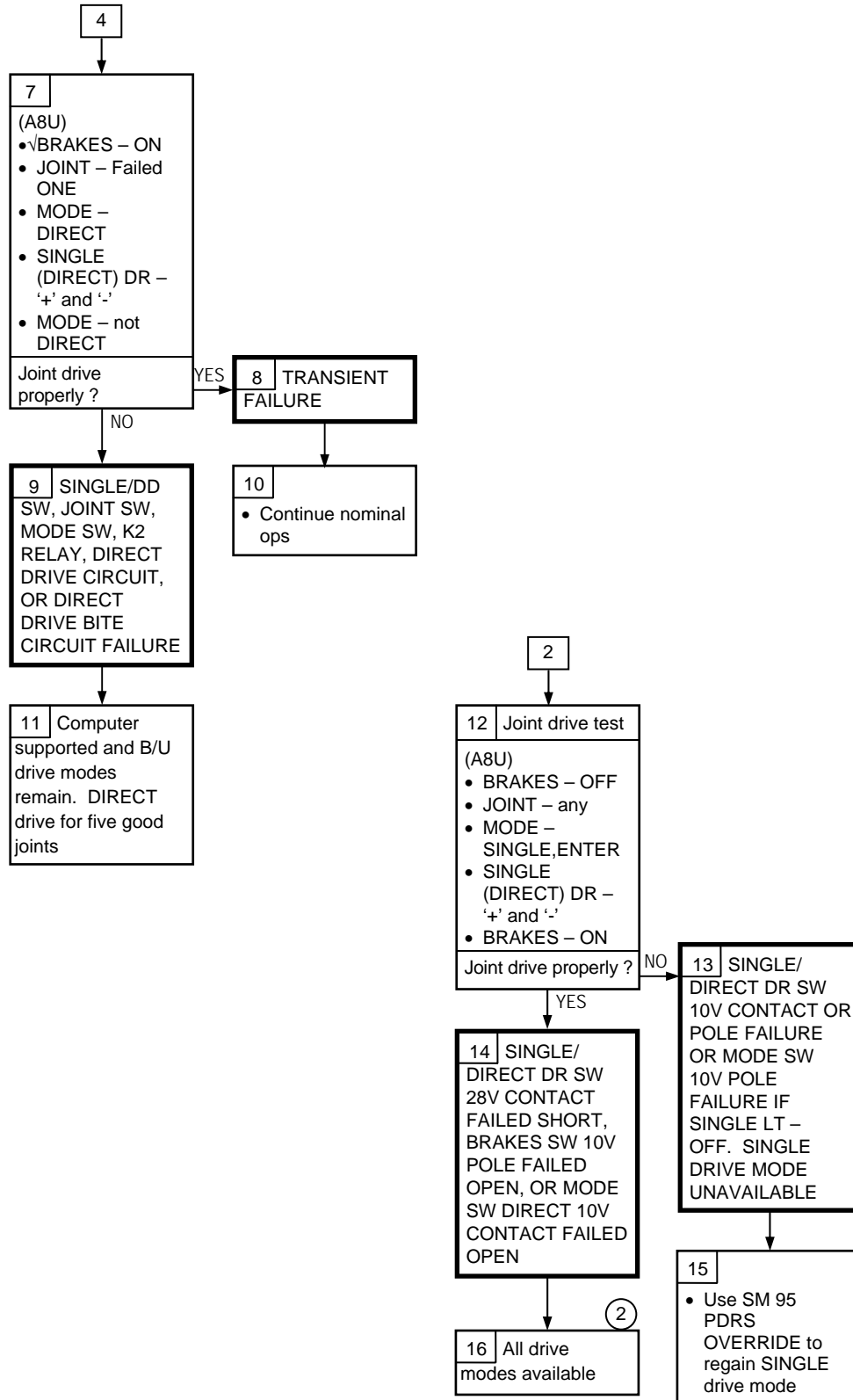


If:  
 SPA Direct Drive circuit failure, SPA BITE Verification Failure, Position Encoder, D&C Comm. EE Fail, Thermistor Circuit, HC, Brake Slip, WR Range out of limits, MCIU BITE Verification Test circuit failure



① Computer supported modes available but subsequent commutator failure for same joint will not be annunciated or protected by autobrakes

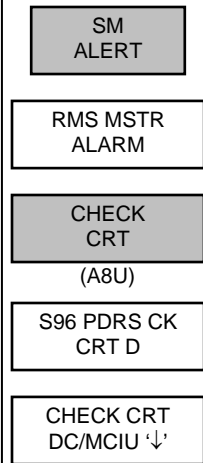
**PDRS 12.1g (Cont)**



② One failure away from uncommanded joint drive in DIRECT

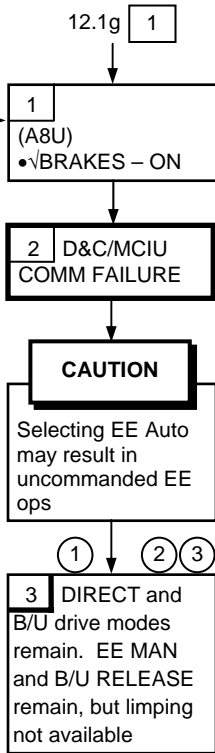
**PDRS**

**12.1h C/W CHECK CRT LT – S96 PDRS CKCRT D**



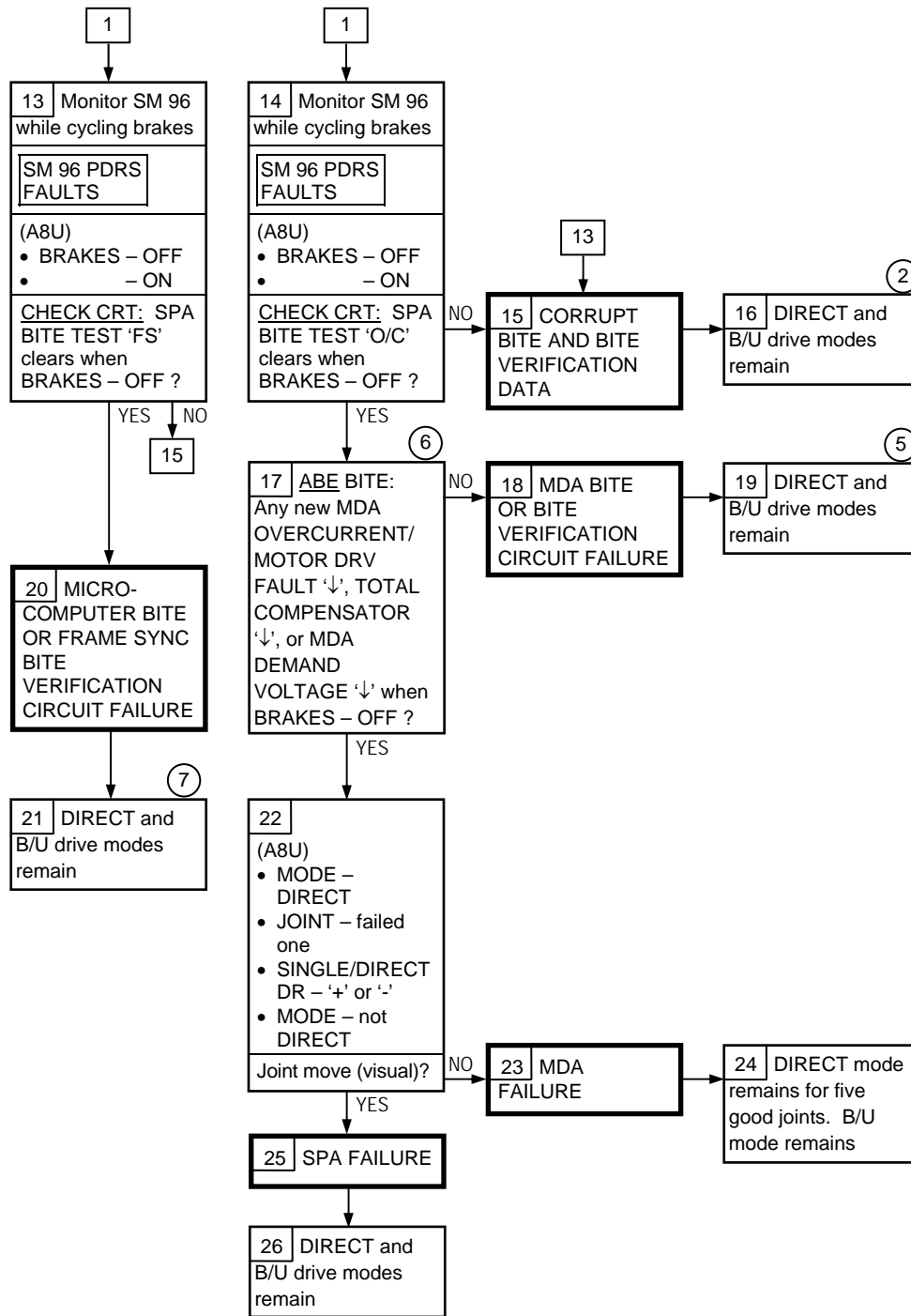
If:  
 D&C – MCIU transmission parity error, Testword miscompare, or address check fail

**Nominal Config:**  
 (A8L)  
 RMS PWR – PRI (CRT)  
 SM 94 I/O ON – ITEM 5 '\*'



- 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



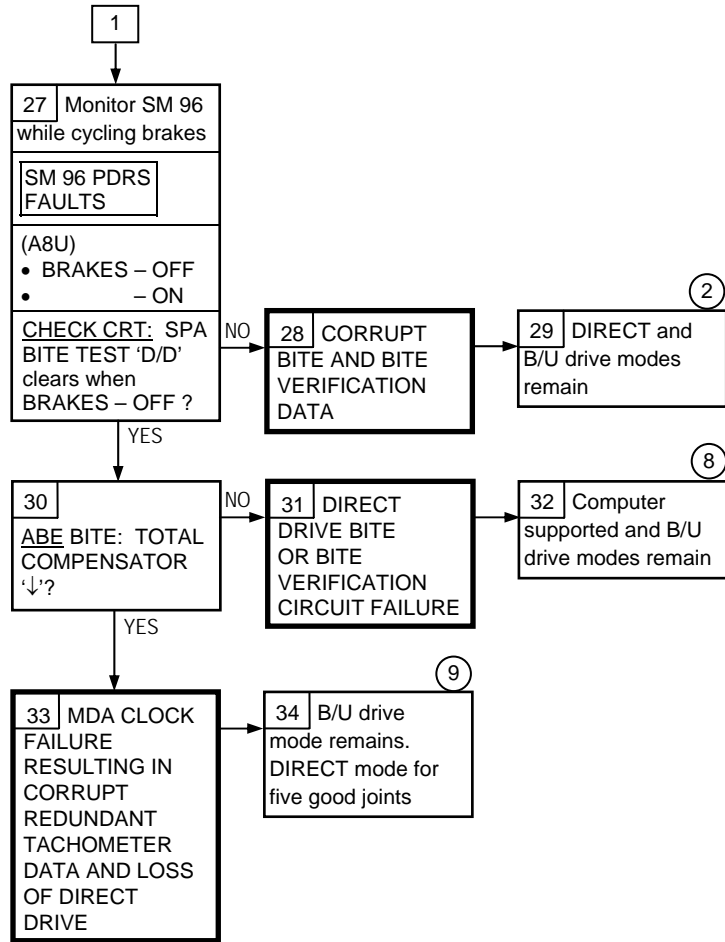


② Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations

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

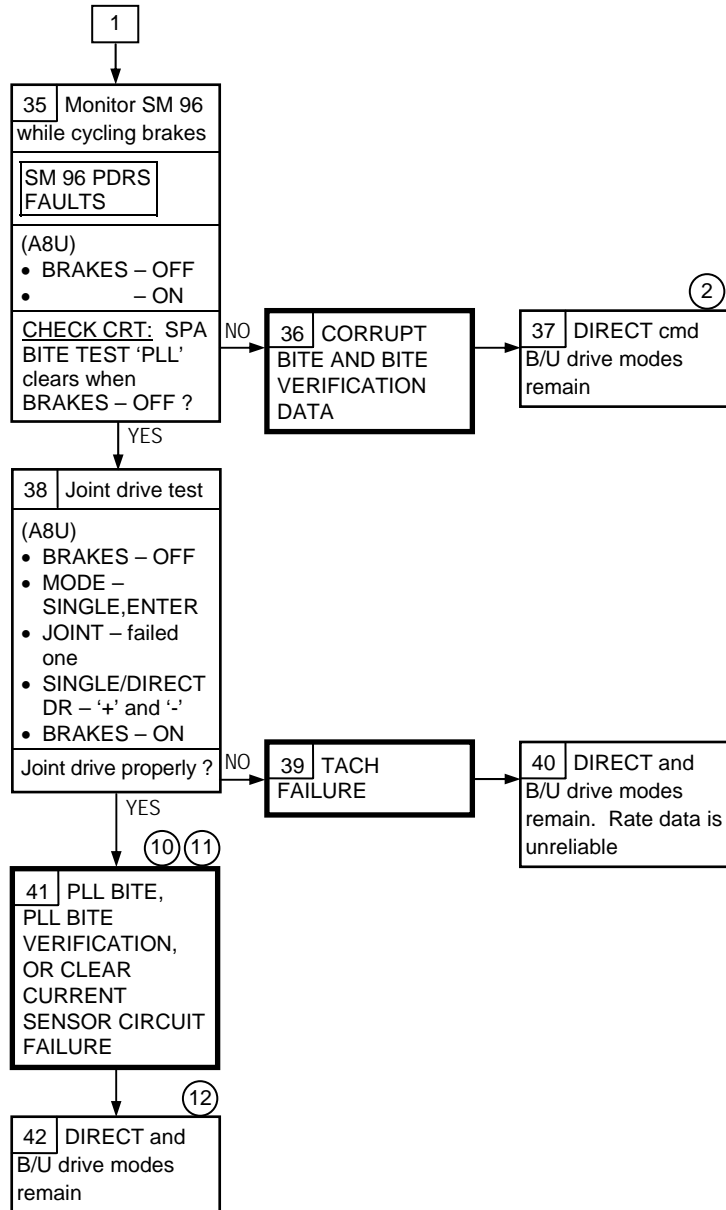


② Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations

⑧ For DIRECT DRIVE BITE failure, DIRECT mode available but for subsequent failure joint could drive in wrong direction or drive two joints simultaneously

⑨ 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

**PDRS 12.1i (Cont)**



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 Failure Subsequent tachometer failure for same joint will be annunciated by ABE It and ABE BITE: POS ENCODER '↓' 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 auto brakes

⑫ Computer supported modes available, but subsequent clock failure may not be annunciated or protected by autobrakes



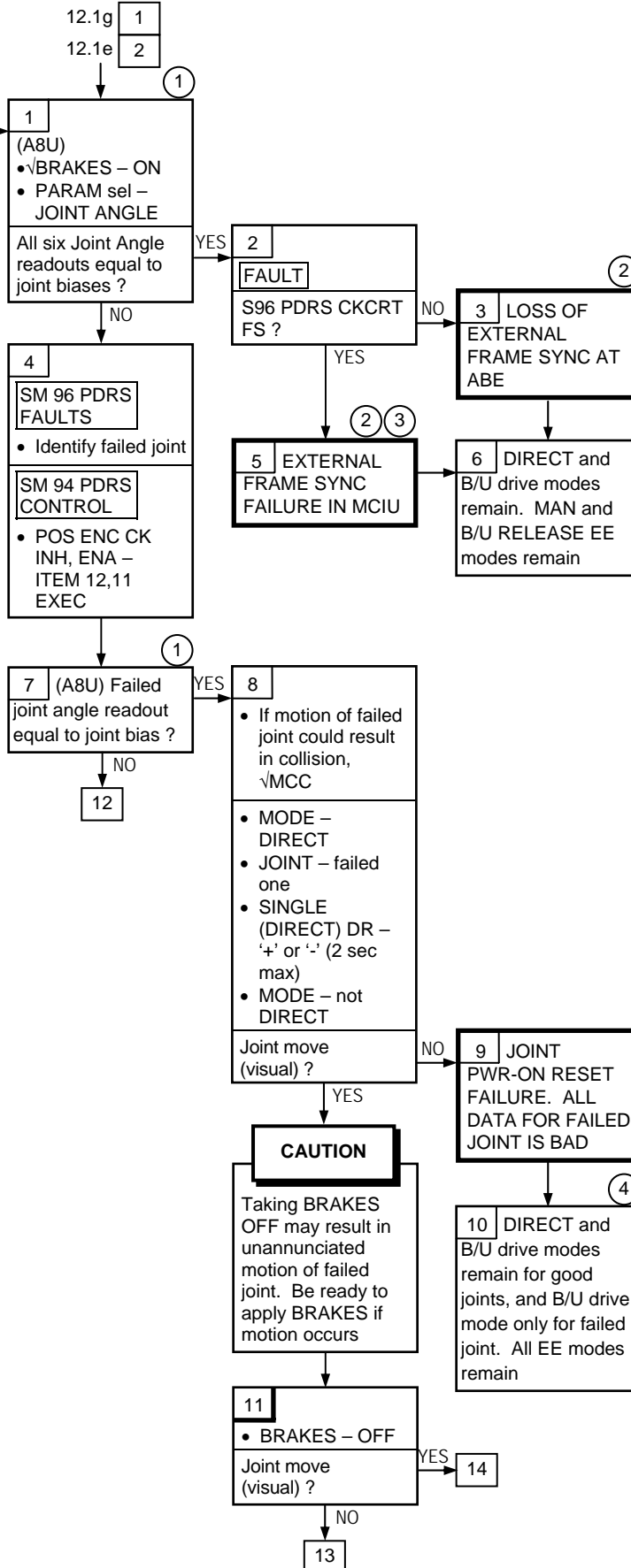
**PDRS**

- SM ALERT
- RMS MSTR ALARM
- CHECK CRT (A8U)
- S96 PDRS CKCRT SY (SP, EP, WP, WY, WR)

If CKCKT-POS SY (SP, EP, WP, WY, WR) ↓

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT

**12.1j C/W CHECK CRT LT – S96 PDRS CKCRT SY(SP, EP, WP, WY, WR)**



① Joint biases  
DDT&E (201)

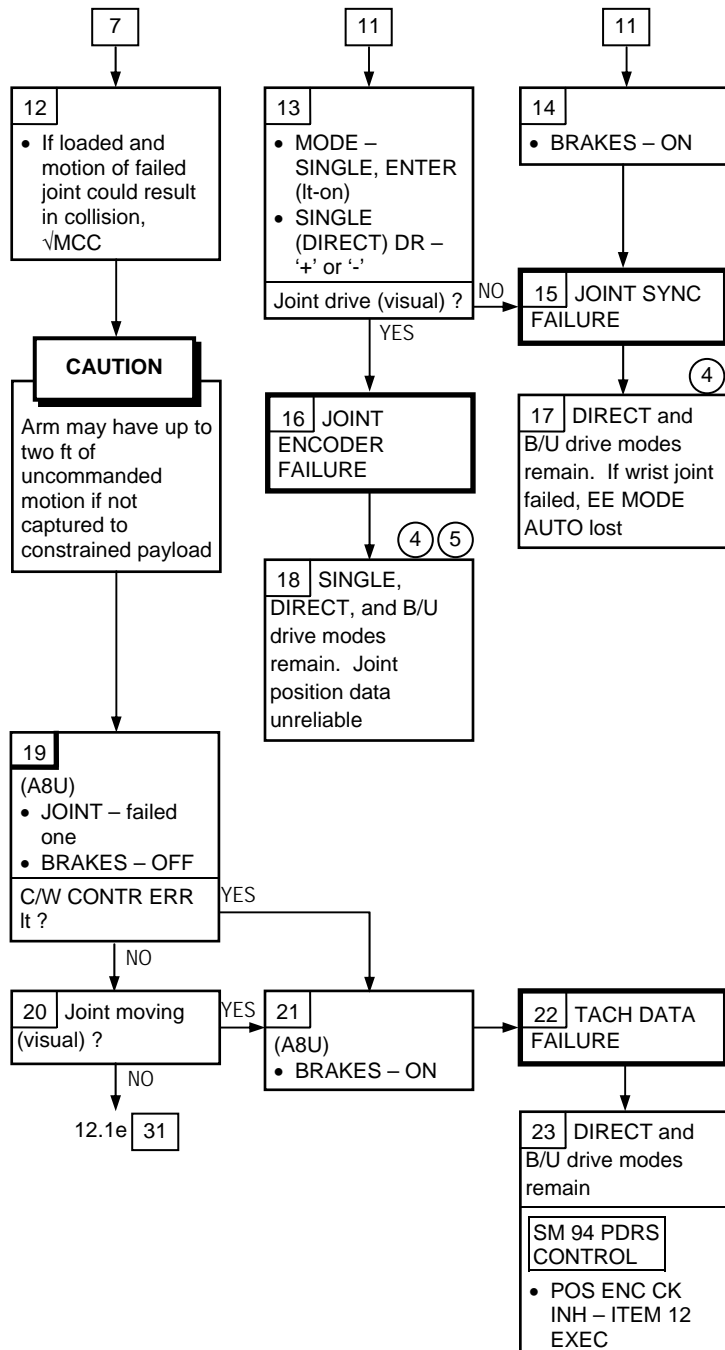
SY	-2.5
SP	+2.0
EP	+0.5
WP	-0.4
WY	-1.0
WR	+0.1
FOP1	(301)
SY	-0.9
SP	+2.4
EP	-0.0
WP	-1.0
WY	-1.9
WR	+0.3
FOP3	(303)
SY	-2.4
SP	+4.0
EP	+3.6
WP	+0.9
WY	+0.1
WR	+2.8
	(202)
SY	+0.6
SP	+1.3
EP	-0.6
WP	-0.8
WY	+0.9
WR	+2.6

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

**PDRS 12.1j (Cont)**

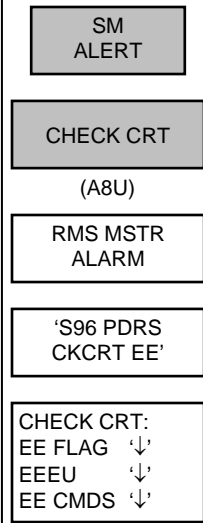


**4** REACH LIMITs and SOFT STOPs annunciation not available for failed joint

**5** Position hold function will not work for failed joint

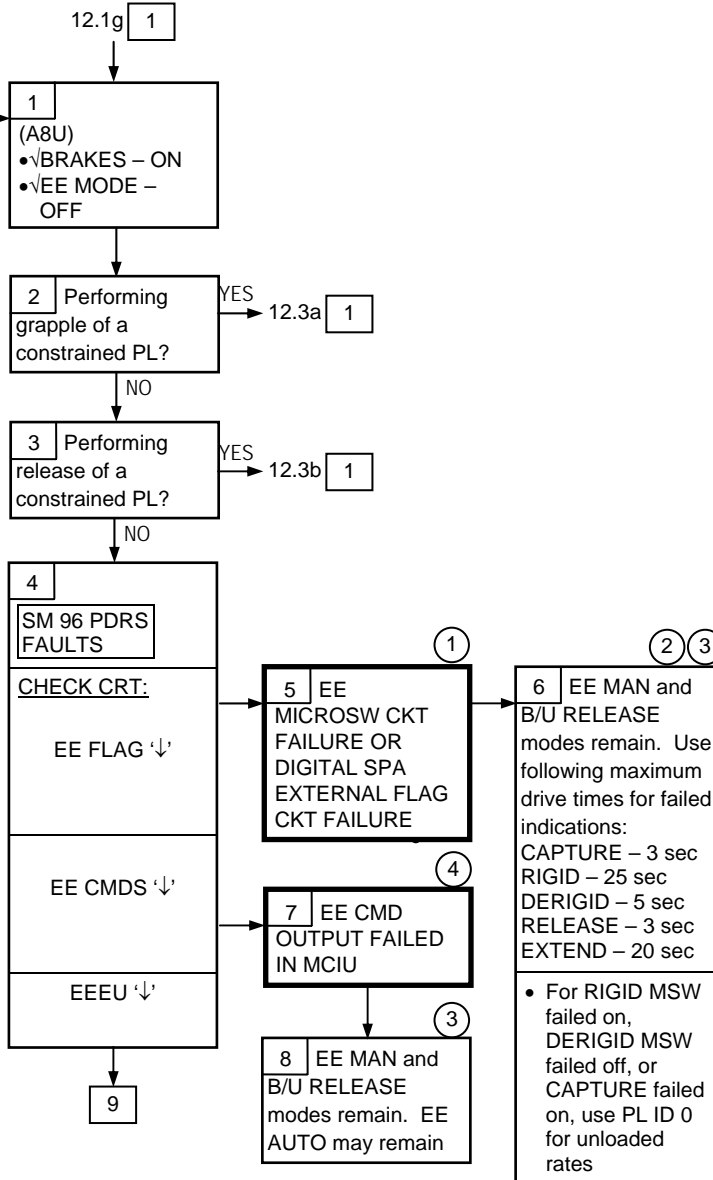
**PDRS**

**12.1k C/W CHECK CRT LT – S96 PDRS  
CKCRT EE**



If:  
EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT



① For digital SPA failure, external flags can fail in pairs:  
CAP/EXTEND  
OPEN/RIG  
DERIG/CLOSE

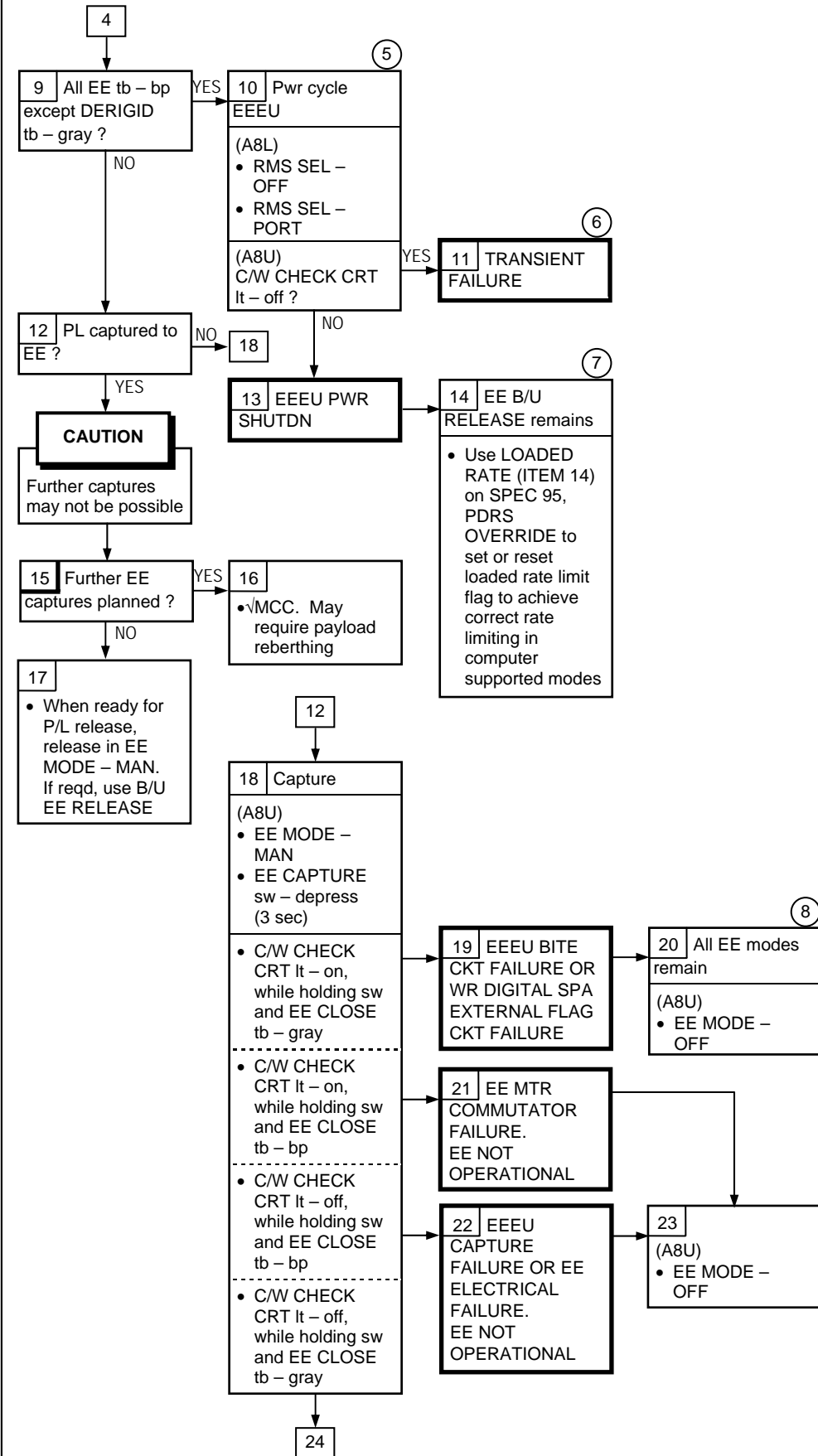
② Other CHECK CRT failures will be annunciated with MA and SM msg

③ Ground can determine which EE Auto functions remain

④ Full EE AUTO capability may be regained with an MCIU CHANGEOUT (IFM)

①  
② ③  
6 EE MAN and B/U RELEASE modes remain. Use following maximum drive times for failed indications:  
CAPTURE – 3 sec  
RIGID – 25 sec  
DERIGID – 5 sec  
RELEASE – 3 sec  
EXTEND – 20 sec  
• For RIGID MSW failed on, DERIGID MSW failed off, or CAPTURE failed on, use PL ID 0 for unloaded rates

**PDRS 12.1k (Cont)**



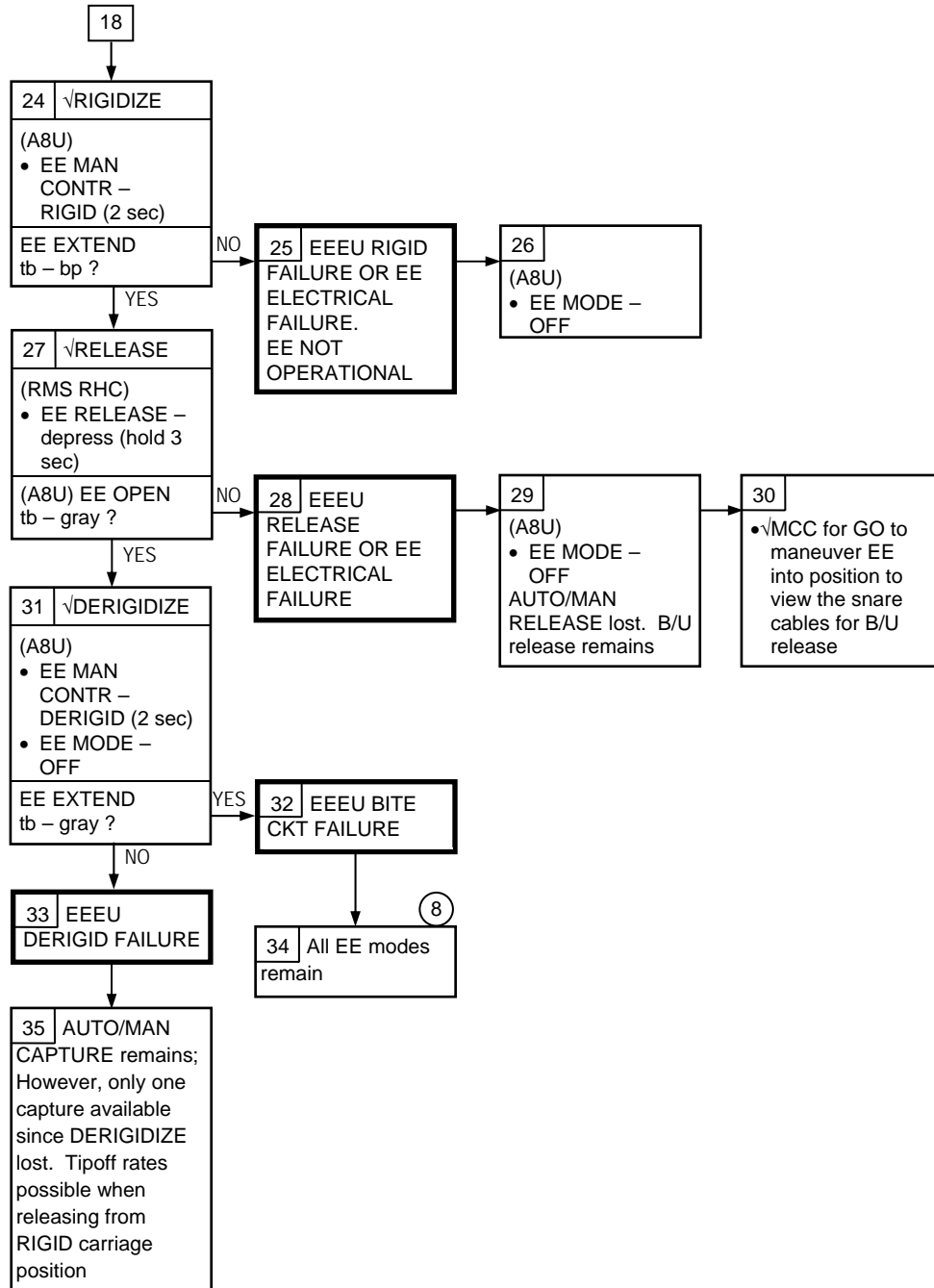
⑤ √WR roll range value. Deselecting and reselecting RMS may cause WR roll range value to be incorrect

⑥ Additional alarms possible

⑦ Subsequent uncommanded release or derigidization will not be annunciated

⑧ EEEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg

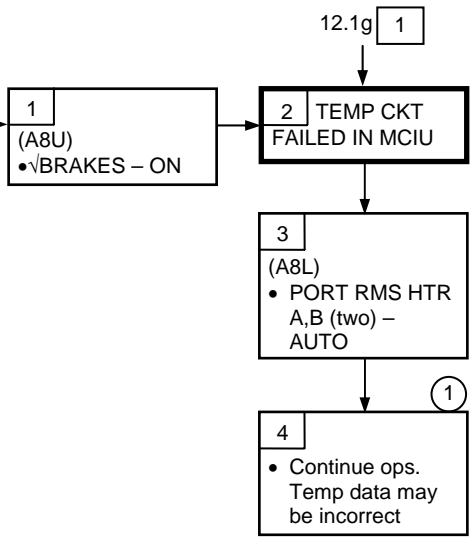
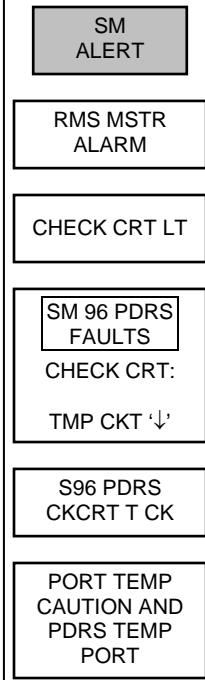
**PDRS 12.1k (Cont)**



⑧ EEEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg

**PDRS**

**12.1i C/W CHECK CRT LT – S96 PDRS  
CKCRT T CK**



If:  
Thermistor circuit reference voltage fail

**Nominal Config:**  
(A8L)  
PORT RMS  
HTR A(B) – AUTO

① MCC may TMBU temp limits to prevent nuisance alarms

**PDRS**

**12.1m C/W CHECK CRT LT – S96 PDRS  
CKCRT HC**

SM ALERT

RMS MSTR ALARM

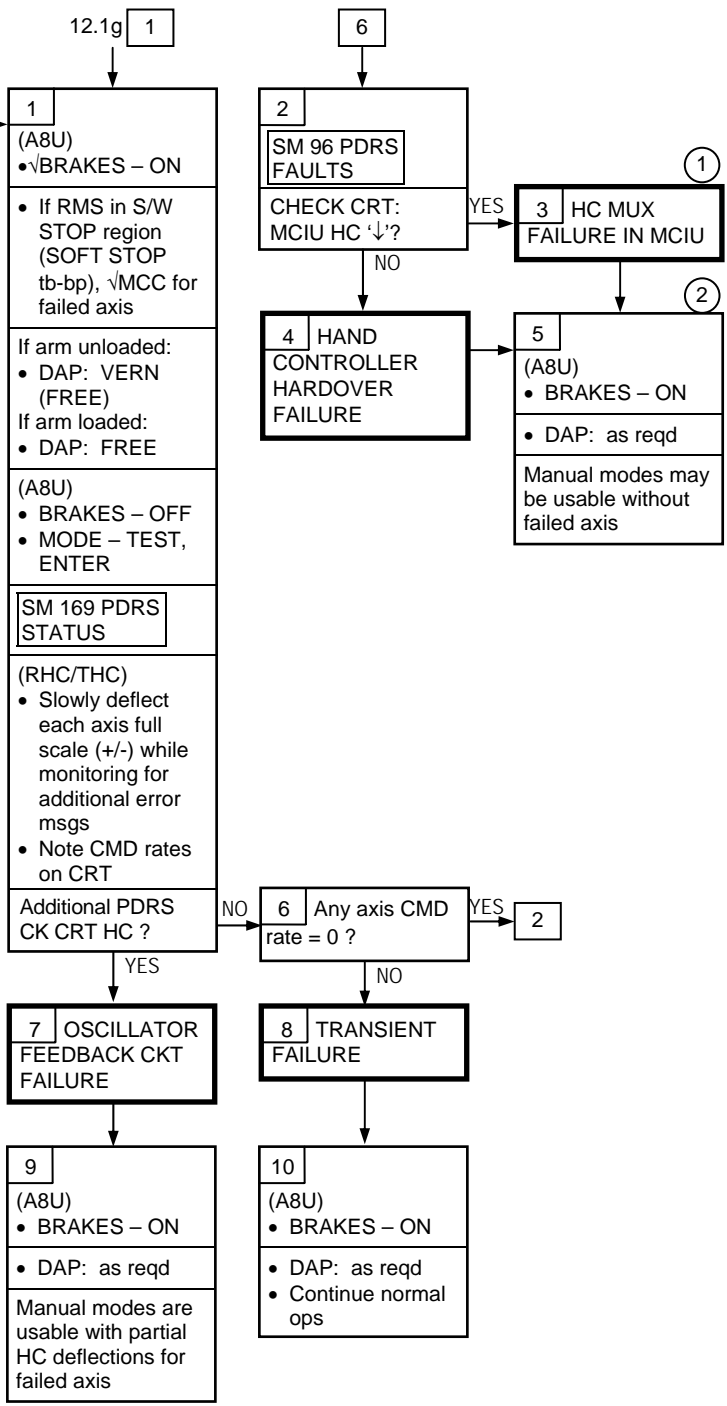
CHECK CRT (A8U)

S96 PDRS CKCRT HC

CHECK CRT: MCIU HC '↓'

If:  
HC hardover or MCIU MUX mismatch

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT



- ① Full capability may be restored with RMS MCIU CHANGEOUT (IFM)
- ② 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

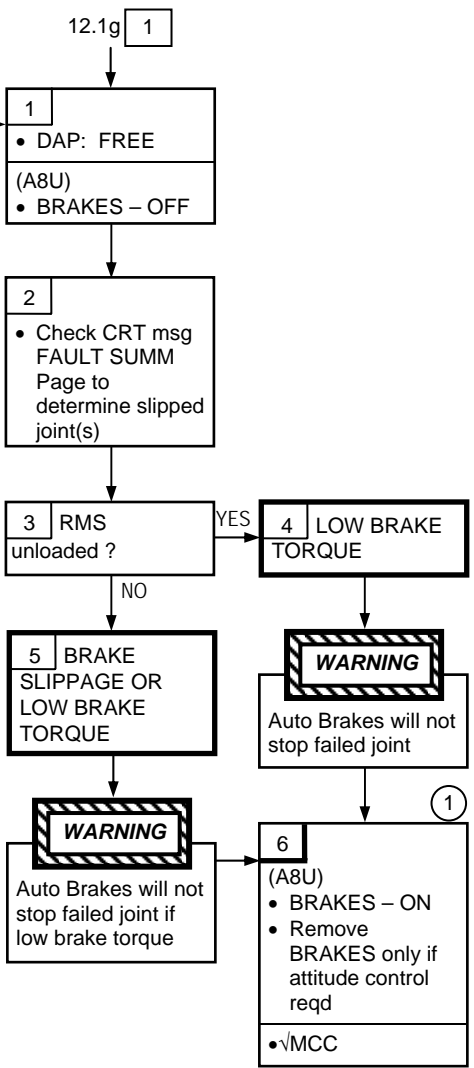
**PDRS**

**12.1n C/W CHECK CRT LT – PDRS SLIP SY(SP, EP, WP, WY, WR, ALL)**

- RMS MSTR ALARM
- CHECK CRT (A8U)
- PDRS SLIP SY(SP, EP, WP, WY, WR, ALL)

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

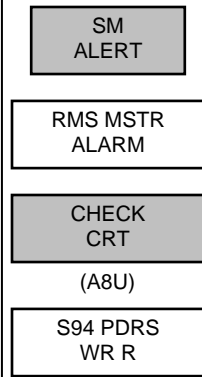


① MCC can attempt to correlate jet activity with 'PDRS SLIP' msg or may recommend a joint drive test to ascertain brake health



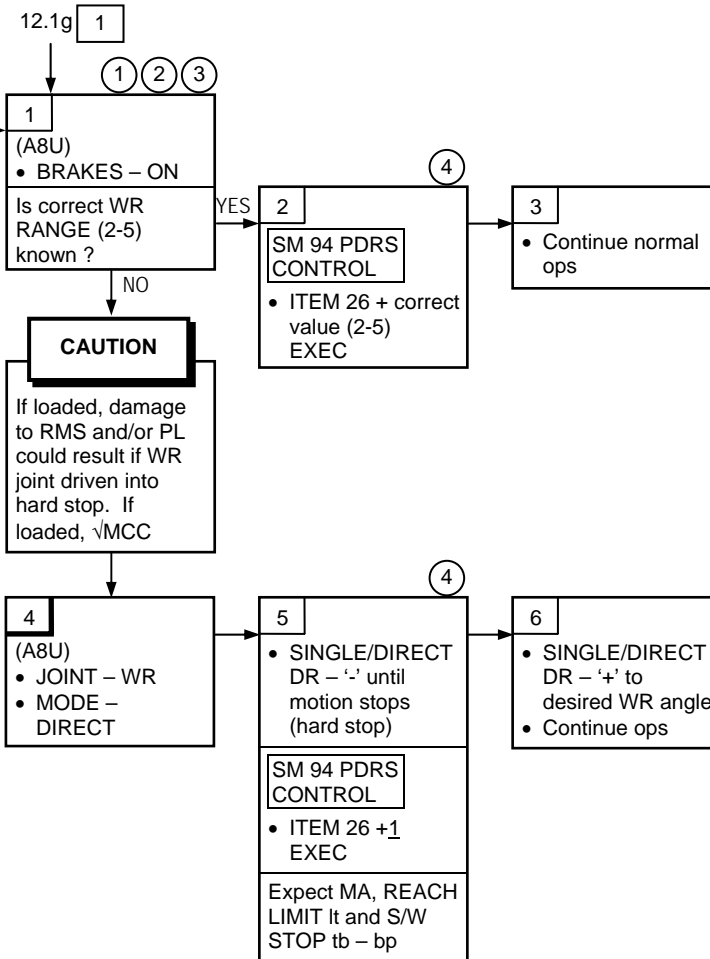
**PDRS**

**12.1o C/W CHECK CRT LT – S94 PDRS WR R**



If:  
WR range does not agree with encoder quadrant

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT



- 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

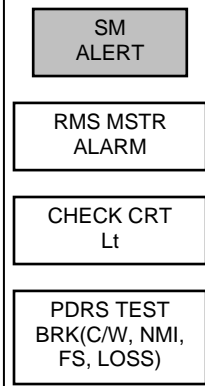
③

WR	WRR
-360 to -450	1
-180 to -360	2
0 to -180	3
0 to 180	4
180 to 360	5
360 to 450	6

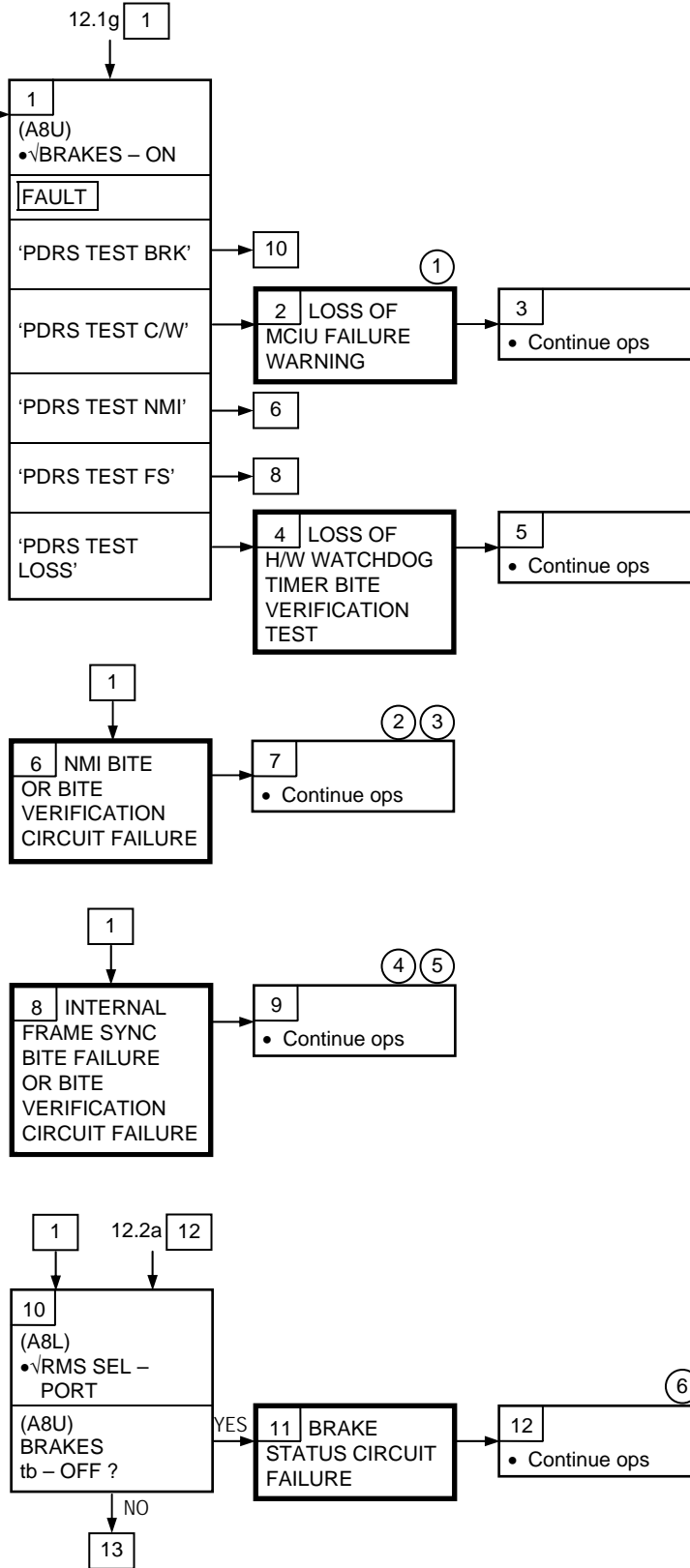
④ Expect CKCRT It and 'S96 PDRS CKCRT WR'. Clear with SM 94 PDRS CONTROL ITEM 12, 11

**PDRS**

**12.1p C/W CHECK CRT LT – PDRS TEST BRK (C/W, NMI, FS, LOSS)**

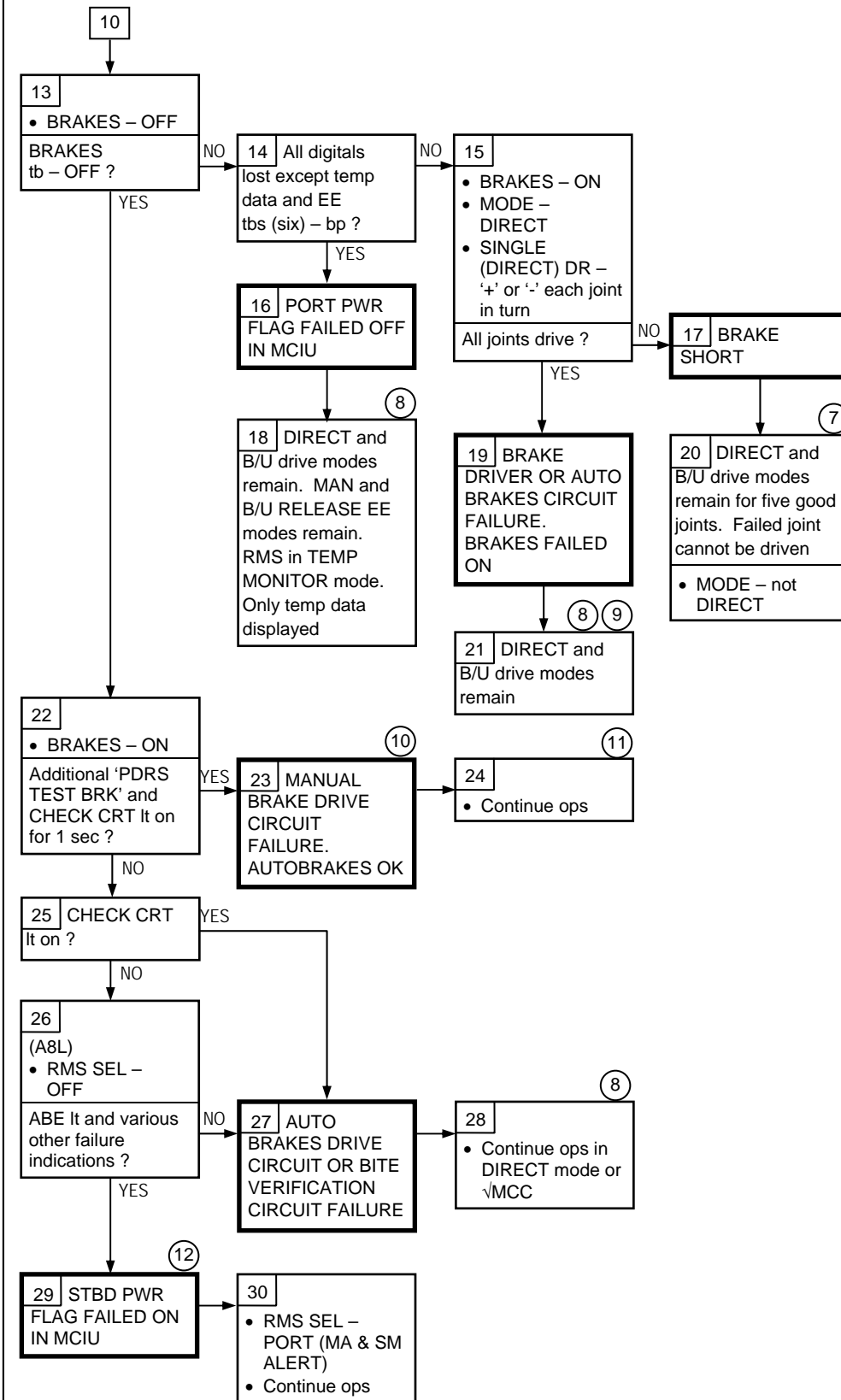


If: MCIU BITE Verification test circuit failure



- ① MCIU failure warning/Master Alarm may not be available for subsequent failures. Autobrakes remain
- ② Subsequent MCIU failure warning may be accompanied by additional msgs
- ③ NMI may be lost for subsequent H/W Watchdog Timer failure. Autobrakes remain
- ④ Autobrakes may not be available for a subsequent loss of Internal Frame Sync
- ⑤ Next failure may result in a six-joint runaway at last commanded rates. Annunciated
- ⑥ Brakes operate nominally, but tb will remain OFF

**PDRS 12.1p (Cont)**



⑦ Driving failed joint in B/U will blow +28V BDA fuse for all joints. EVA may be reqd to cradle arm

⑧ Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

⑨ RMS limping will not exist during EE ops. Use EE MAN RELEASE for single joint ops

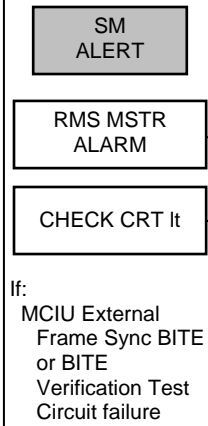
⑩ MCIU BITE verification test will apply brakes 1 sec after brake sw on

⑪ Failure will reannunciate with BRAKE sw transition from OFF to ON

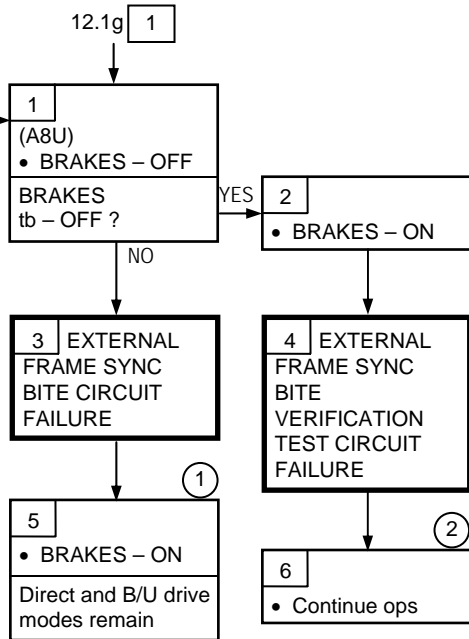
⑫ RMS temperature monitor mode not available

**PDRS**

**12.1q C/W CHECK CRT LT – S96 PDRS  
CKCRT FS**



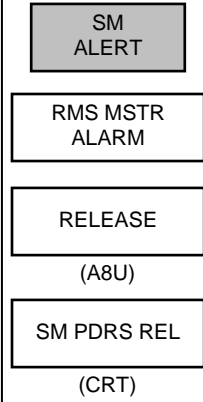
If:  
MCIU External  
Frame Sync BITE  
or BITE  
Verification Test  
Circuit failure



① Full capability will be restored with RMS MCIU CHANGEOUT (IFM)

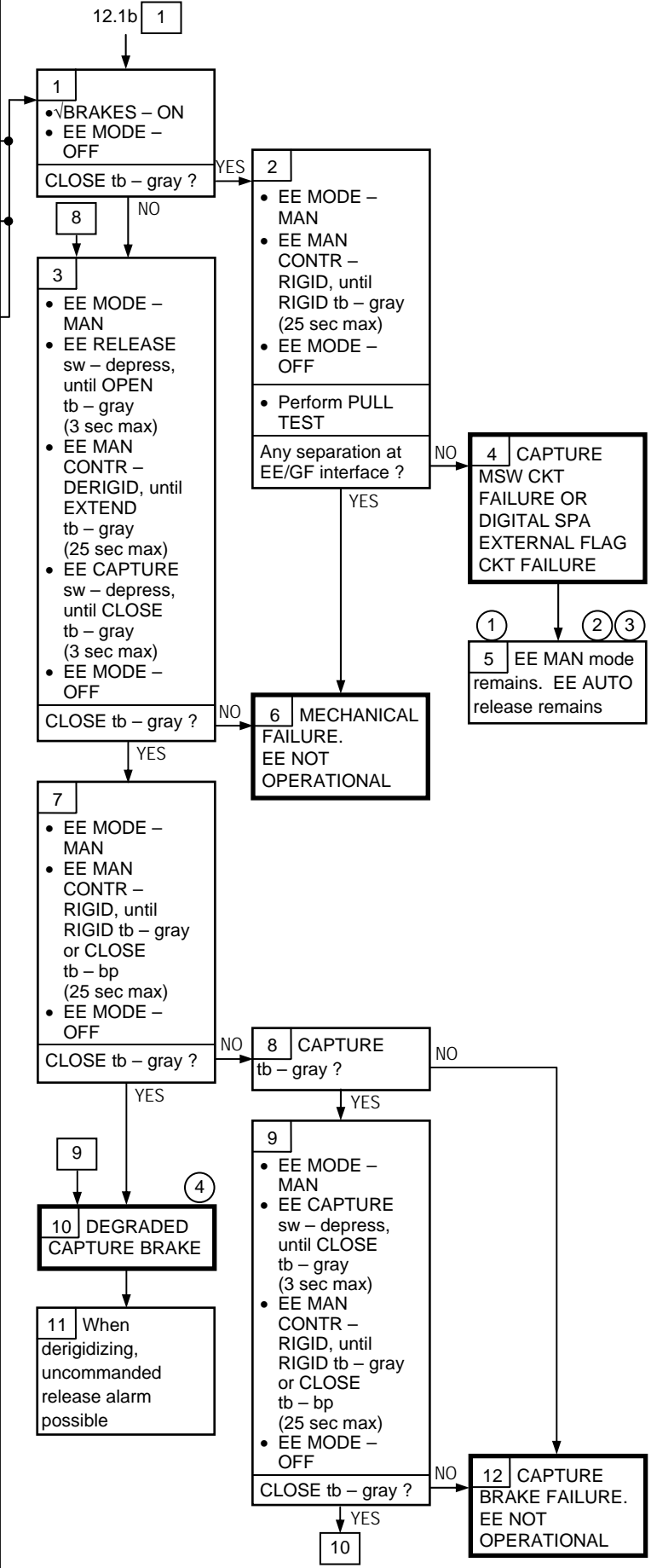
② Auto brakes available for subsequent loss of External Frame Sync due to SPA detected loss of Frame Sync

**PDRS**



If:  
Uncommanded  
release warning

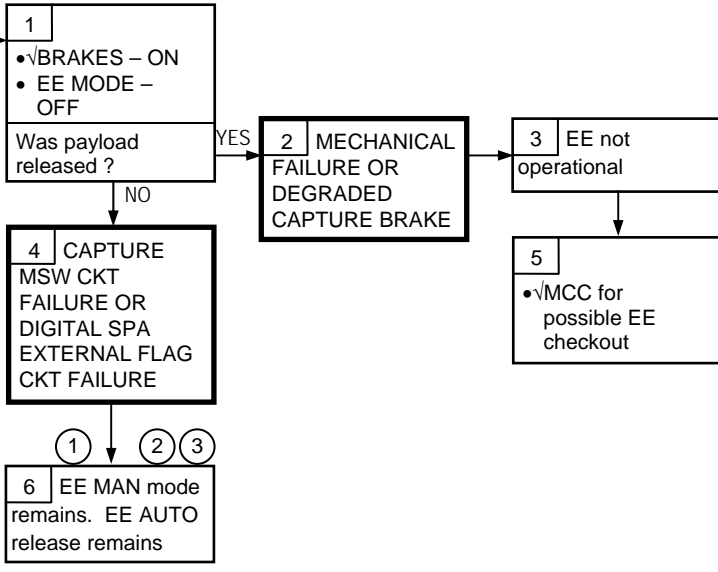
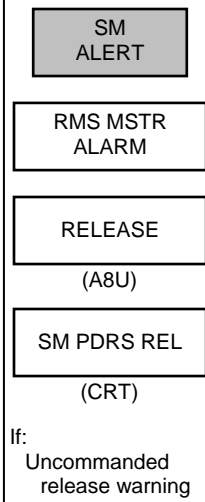
**12.1r C/W RELEASE LT – PDRS REL**



- ① Subsequent uncommanded release will not be annunciated
- ② RMS loaded rates can be set via SM 95 PDRS OVERRIDE
- ③ For digital SPA failure, EXTEND flag may be failed OFF causing EE motor to continue to drive until EE MODE - OFF during AUTO RELEASE
- ④ Rigidize brake is sufficient to hold EE drive train

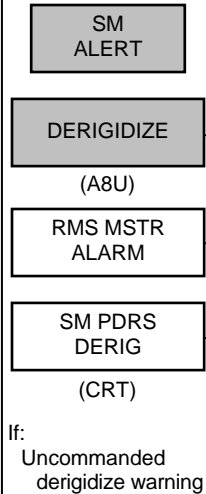
**PDRS**

**12.1s C/W RELEASE LT – PDRS REL  
(CUE CARD EXECUTED)**



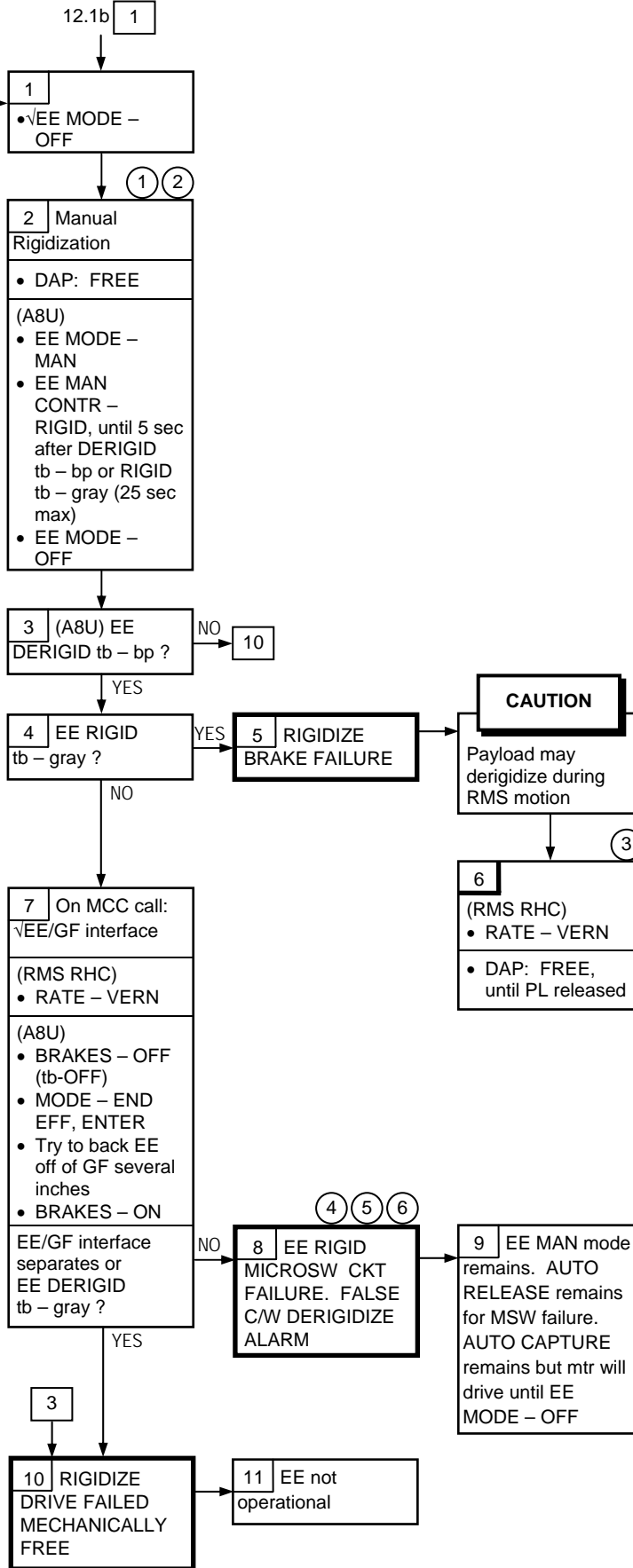
- ① Subsequent uncommanded release will not be annunciated
- ② For subsequent capture, RMS loaded rates can be set via SM 95 PDRS OVERRIDE
- ③ For digital SPA failure, EXTEND flag may be failed off causing EE motor to continue to drive until EE MODE – OFF during AUTO RELEASE

**PDRS**



If: Uncommanded derigidize warning

**12.1t C/W DERIGIDIZE LT – PDRS DERIG**



- ① DERIGID tb criteria used for RIGID MSW failure case
  - ② RIGID CMD will reset C/W DERIGIDIZE check and extinguish light
  - ③ Additional DERIG alarms possible
  - ④ Further uncommanded derigidizations will not be annunciated
  - ⑤ RMS loaded rates can be set via SM 95 PDRS OVERRIDE after next payload capture
  - ⑥ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG
- Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

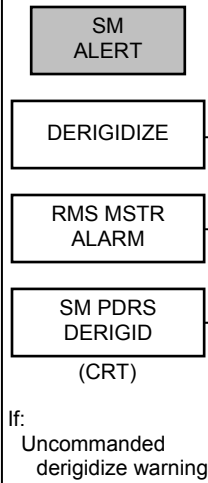
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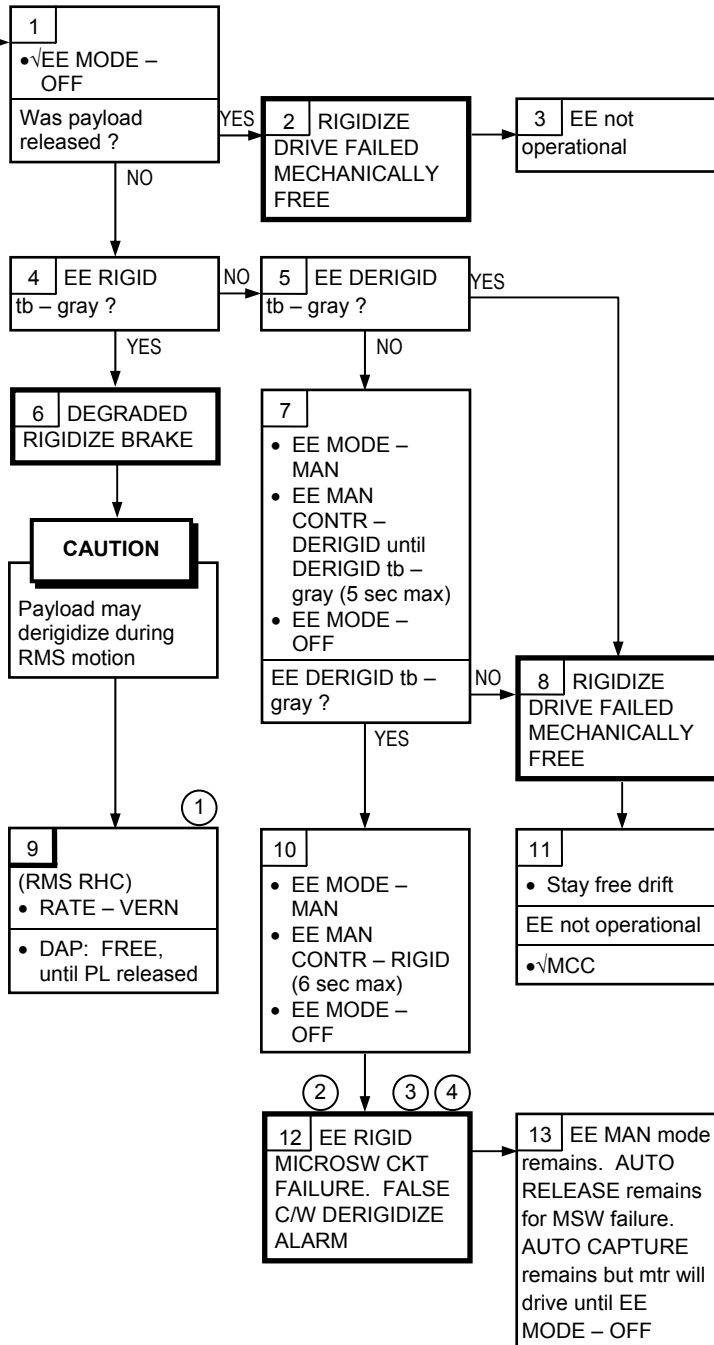
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**PDRS**

**12.1u C/W DERIGIDIZE LT – PDRS DERIG (CUE CARD EXECUTED)**



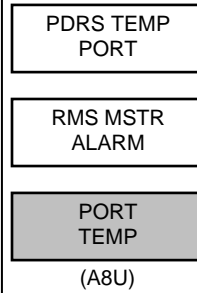
If: Uncommanded derigidize warning



- ① Additional DERIGID alarms possible
- ② Further uncommanded derigidizations will not be annunciated
- ③ RMS loaded rates can be set via SM 95 PDRS OVERRIDE after next payload capture
- ④ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode sw to OFF after spec time

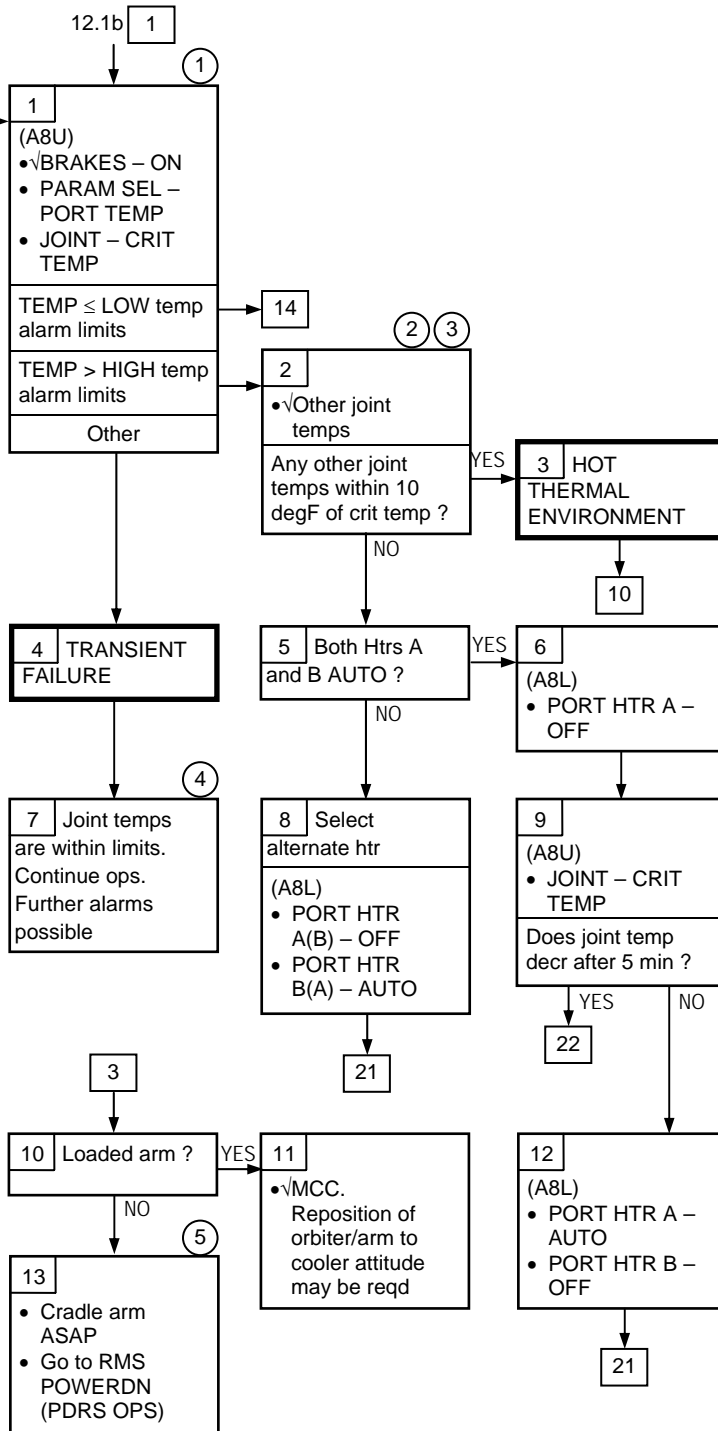
**PDRS**

**12.1v C/W PORT TEMP LT – PDRS TEMP PORT**



If:  
Temp exceeds alarm limits

**Nominal Config:**  
(A8L)  
PORT RMS  
HTR A(B) – AUTO  
or  
PORT RMS  
HTR A,B (two) – AUTO



① HIGH temp alarm limits:  
LED = 172  
ABE (SPA) = 106  
ABE (EE) = 144  
LOW temp alarm limits:  
LED = 0  
ABE (ALL) = 0

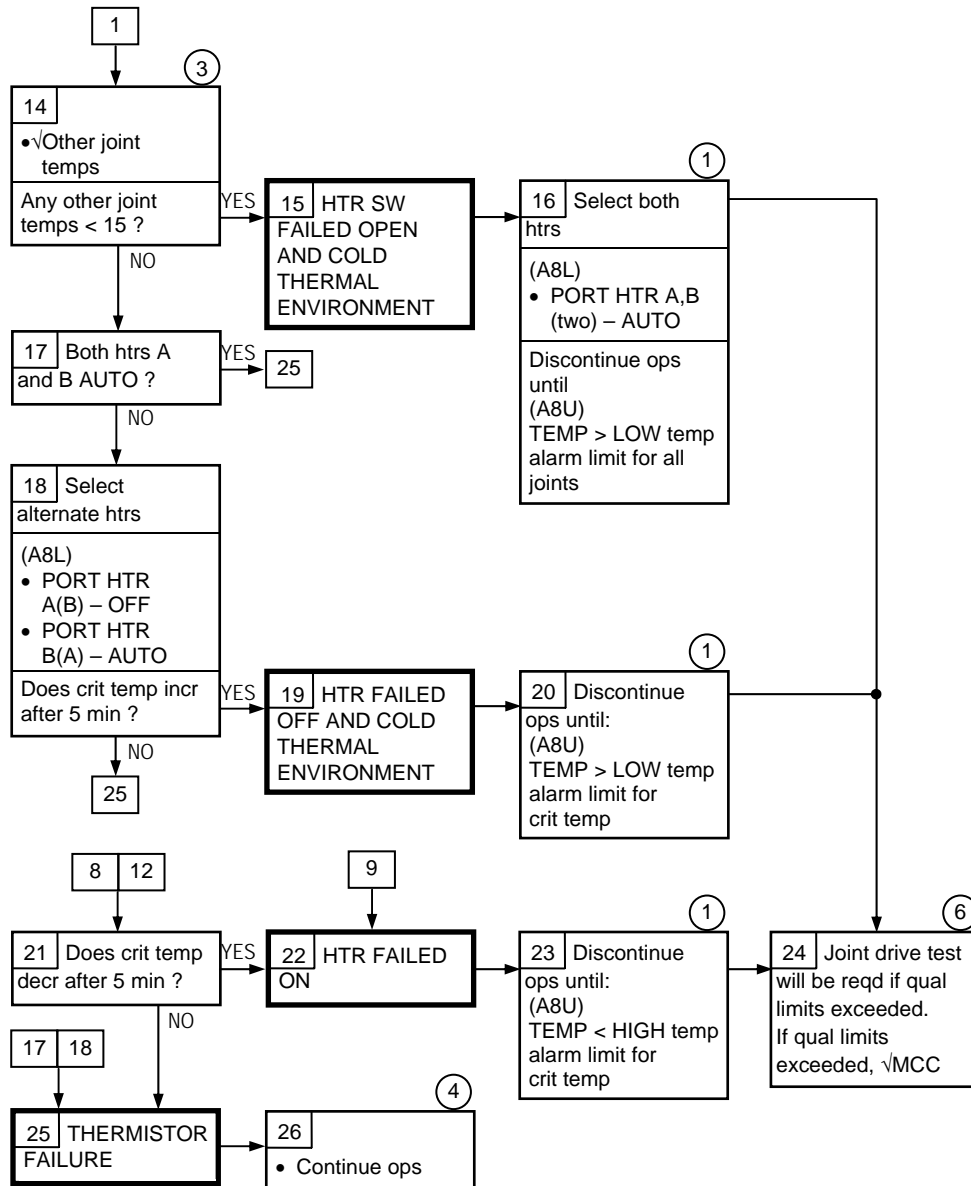
② Normally, joint temps vary between 15 degF and 60 degF

③ SP ABE and SY ABE represent single temp reading. WP ABE and WY ABE represent single temp reading

④ MCC may TMBU temp limits to prevent nuisance alarms

⑤ Since arm hardware damage may occur if limits exceeded, arm must be powered off prior to reaching temp acceptance limits (LED 181 degF, ABE SPA 117 degF, ABE EE 154 degF) to prevent jettison. RMS SEL – OFF will remove power to the arm, reducing heat contributed by arm electronics

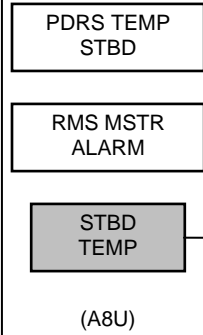
**PDRS 12.1v (Cont)**



- ① HIGH temp alarm limits:  
LED = 172  
ABE (SPA) = 106  
ABE (EE) = 144  
LOW temp alarm limits:  
LED = 0  
ABE (ALL) = 0
- ③ SP ABE and SY ABE represent single temp reading. WP ABE and WY ABE represent single temp reading
- ④ MCC may TMBU temp limits to prevent nuisance alarms
- ⑥ Arm qual temp high limits:  
LED = 202  
ABE (SPA) = 136  
ABE (EE) = 176  
Arm qual temp low limits:  
LED = -10  
ABE = -10

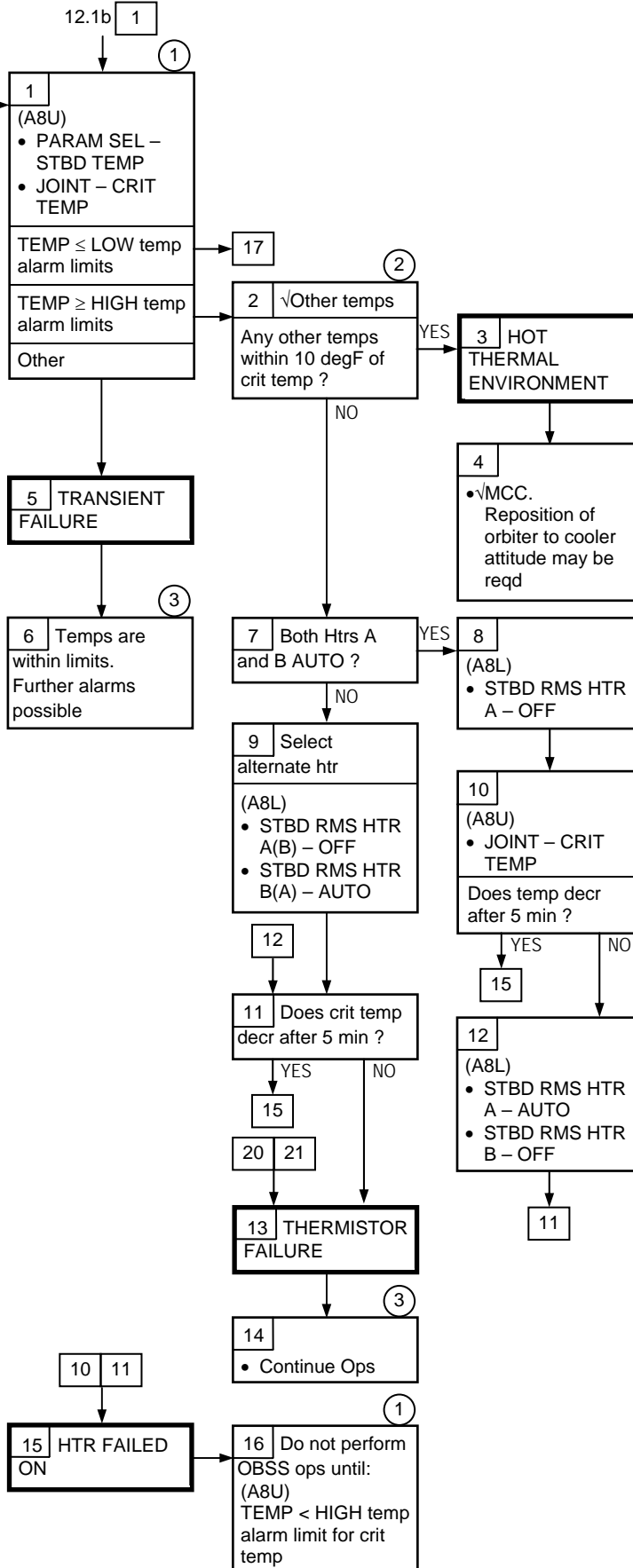
**PDRS**

**12.1w C/W STBD TEMP LT - PDRS TEMP STBD**



If: Temp exceeds alarm limits while OBSS berthed in Starboard MPMs

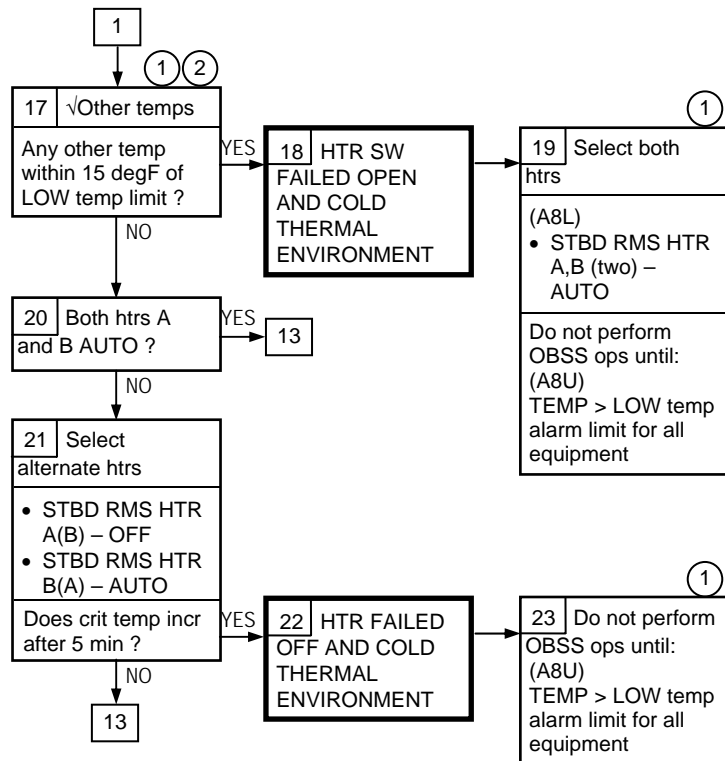
**Nominal Config:**  
(A8L)  
STBD RMS HTR A(B) – AUTO  
or  
STBD RMS HTR A,B (two) – AUTO



① HIGH/LOW temp alarm limits (deg F):  
LDRI: 156/39  
ITVC: 138/8  
PTU: 138/-10  
LCS: 119/15  
LDRI & LCS Avionics: 128/-10

② Joint selection corresponds to temps (joint ID) as follows:  
SY: LDRI (201)  
SP: ITVC (202)  
EP: PTU (203)  
WP: LCS (204)  
WR Ind 1: LDRI Avionics (206)  
WR Ind 2: LCS Avionics (206)

③ MCC may TMBU temp limits to prevent nuisance alarms



① HIGH/LOW temp alarm limits (deg F):

LDRI: 156/39

ITVC: 138/8

PTU: 138/-10

LCS: 119/15

LDRI & LCS

Avionics:

128/-10

② Joint selection corresponds to temps (joint ID) as follows:

SY: LDRI (201)

SP: ITVC (202)

EP: PTU (203)

WP: LCS (204)

WR Ind 1: LDRI

Avionics (206)

WR Ind 2: LCS

Avionics (206)

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**RMS D&C**

**12.2**

**PDRS**

**12.2a MSTR ALARM ON, BUT C/W LT(S) OFF**

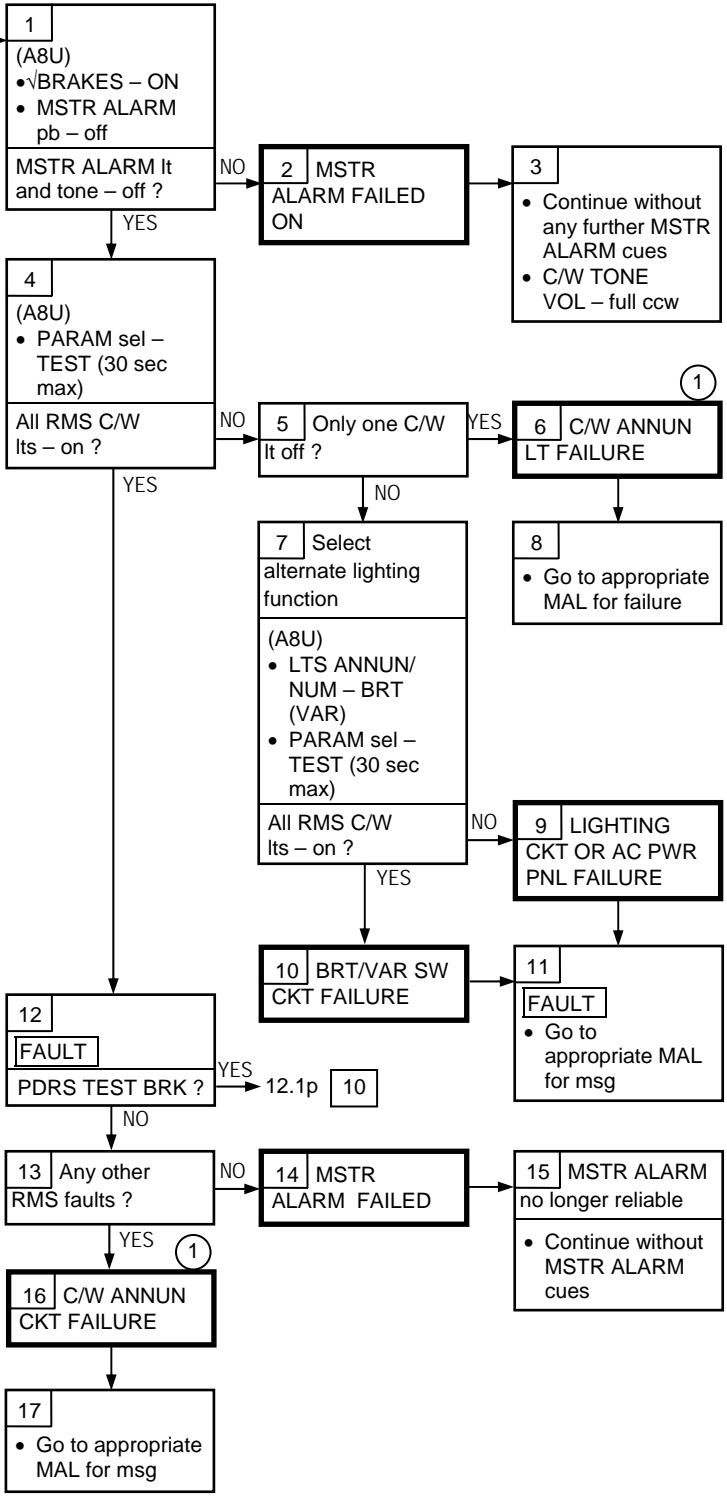
① C/W Lt associated with fault msg will not illuminate

SM ALERT

RMS MSTR ALARM  
and  
RMS C/W Lts - Off

RMS FAULT Msgs

**Nominal Config:**  
(MA73C:F)  
cb AC1 RMS  
PRIMARY A - cl



RMS D&C

12.2

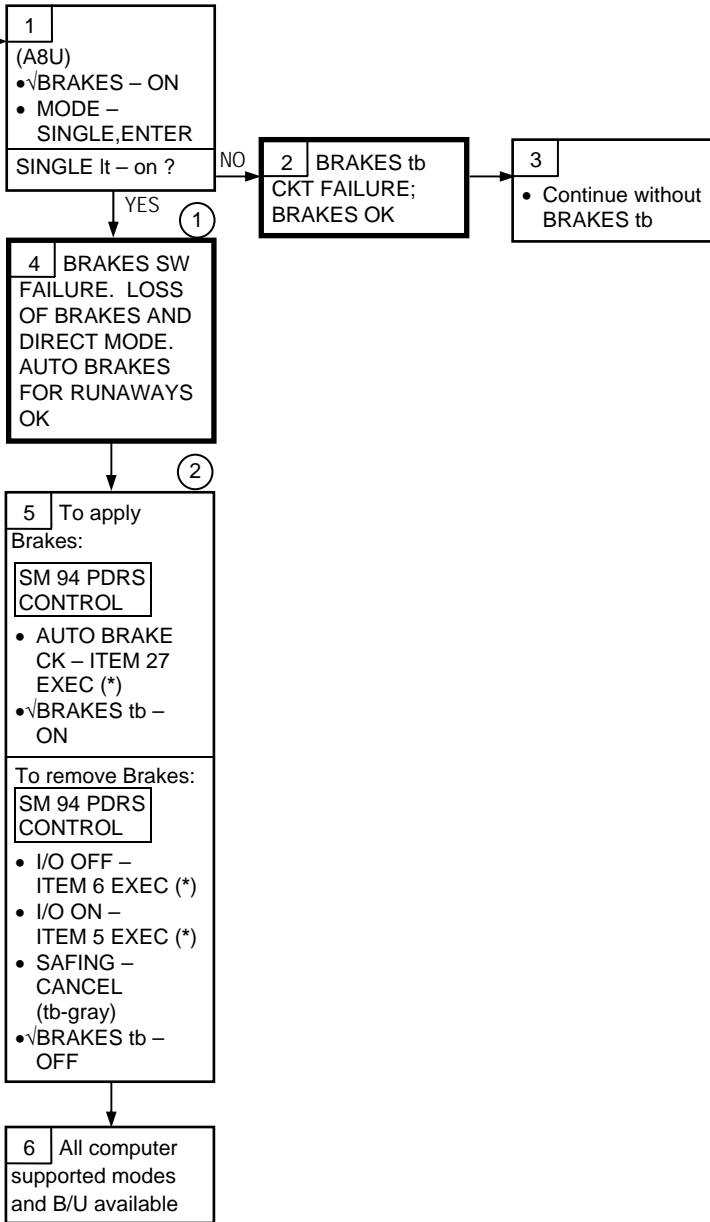


**PDRS**

**12.2b BRAKES – ON, BUT BRAKES tb – OFF**

**BRAKES – ON**  
But  
**BRAKES**  
tb – OFF

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT  
(A8U)  
**BRAKES – ON**  
SM 94 I/O ON  
ITEM 5 (\*)



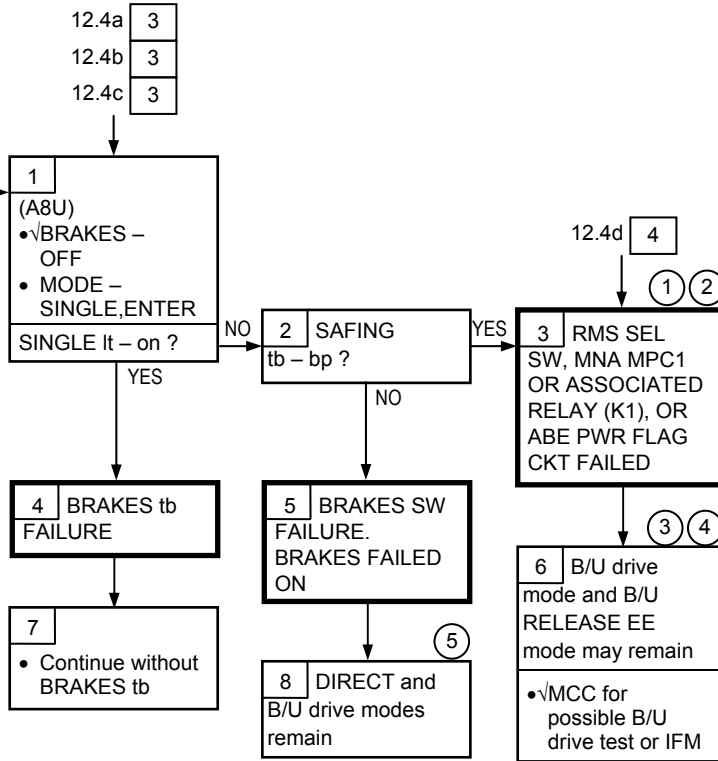
① RMS IFM D&C Kit available to regain DIRECT mode. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), AND PDRS SSR-4, RMS IFM D&C KIT

② If there was a "GOOD" next to ITEM 25 prior to cycling I/O, the "GOOD" indication will remain, but it is a false indication. A new ITEM 25 EXEC will be required after cycling I/O

12.2c BRAKES – OFF, BUT BRAKES tb – ON

BRAKES – OFF  
But  
BRAKES  
tb – ON

**Nominal Config:**  
(A8L)  
RMS SEL – PORT  
PWR – PRI



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)

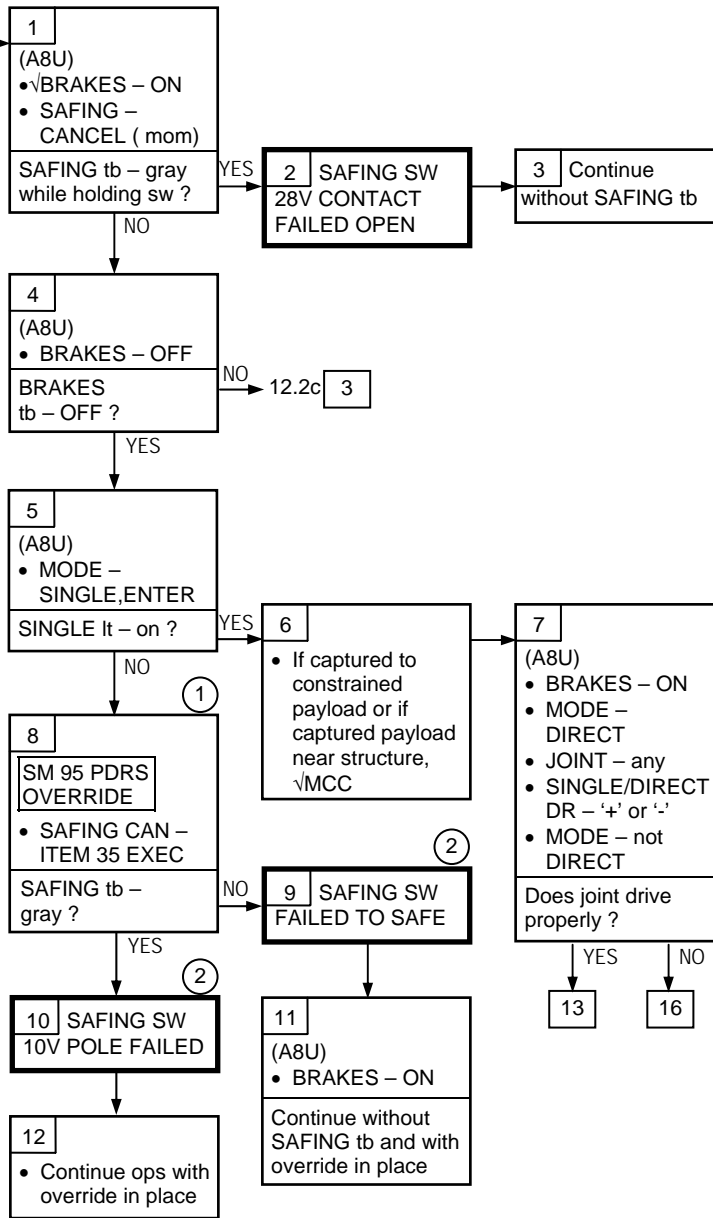
⑤ RMS limping will not exist during EE ops. Use EE MAN release for single joint ops

**PDRS**

**12.2d SAFING – AUTO, BUT SAFING tb – bp**

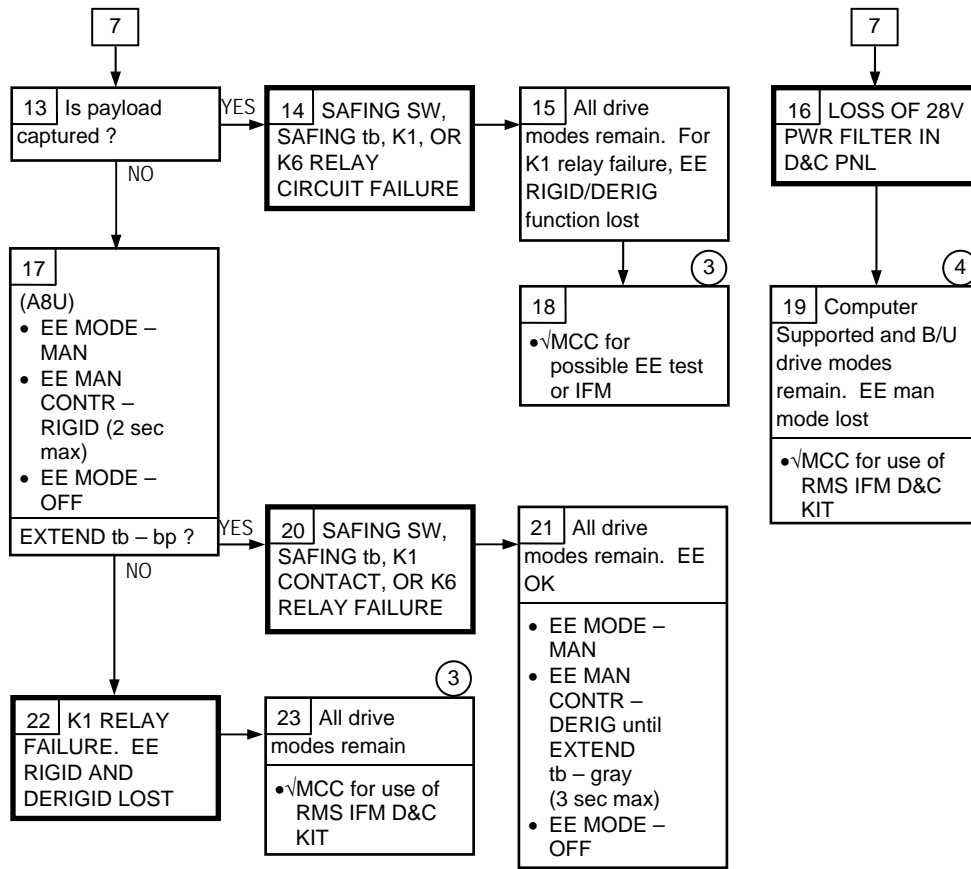
- SAFING – AUTO and SAFING tb – bp
- All RMS C/W Its – Off
- MASTER ALARM – Off
- No CRT SM Msgs
- No SM ALERT

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT



- ① SM 95 ITEM 35 SAFING CAN override is a toggle. If left in place it will override a D&C panel safing command
- ② MCIU SAFING circuit still operational

**PDRS 12.2d (Cont)**



③ 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

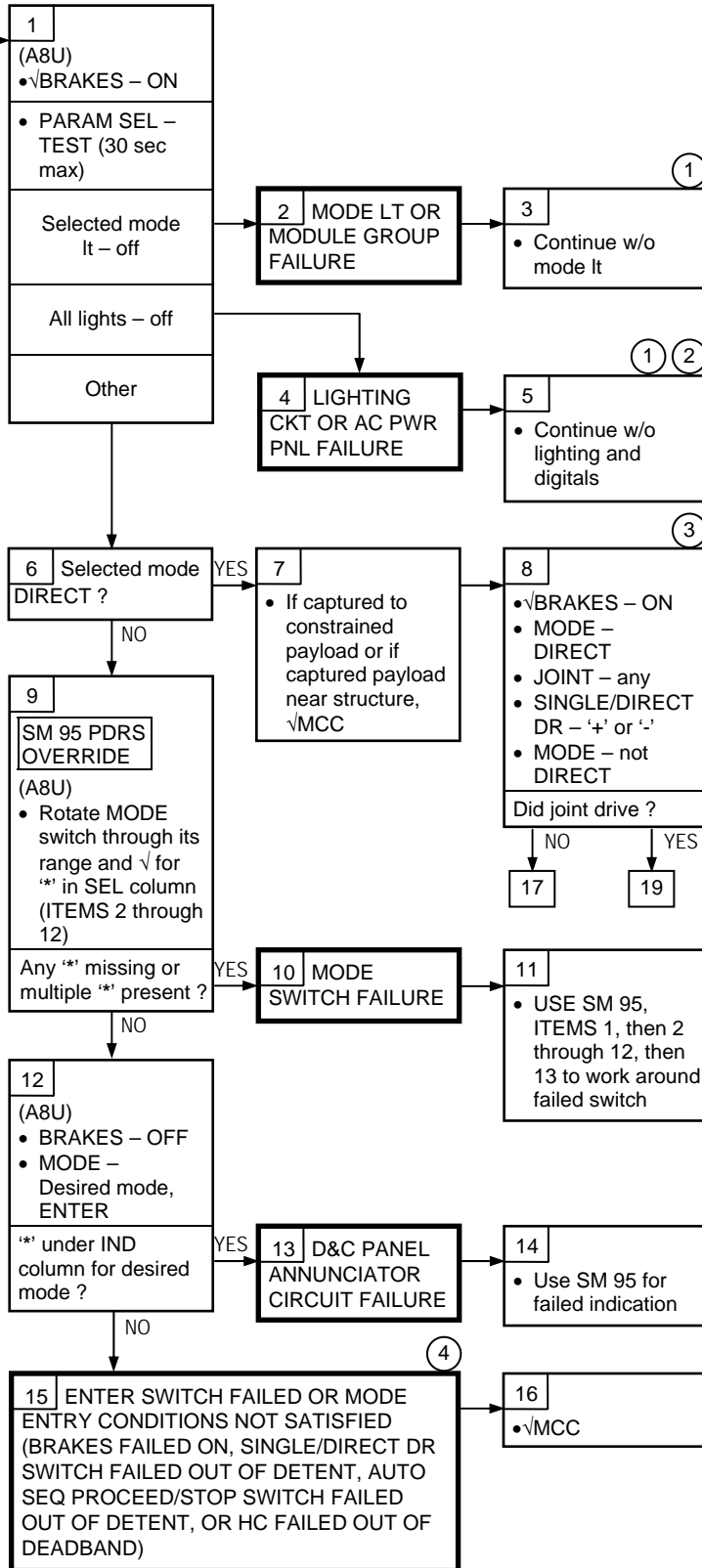
④ DIRECT drive, and EE MODE – MAN may be restored with RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

**PDRS**

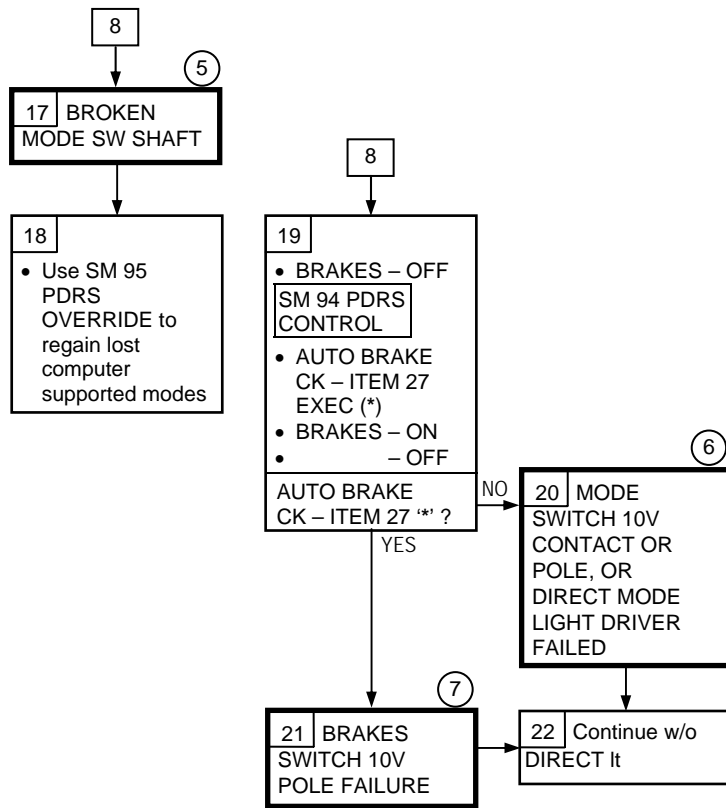
**12.2g SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF**

Selected Mode Lt Off

**Nominal Config:**  
 (MA73C:F)  
 cb AC1 RMS  
 PRI ΦA – cl  
 (A8U)  
 If mode not DIRECT:  
 SAFING tb – gray  
 If mode not DIRECT or SINGLE:  
 SOFTWARE STOP tb – gray  
 (A8L)  
 RMS PWR – PRI  
 SEL – PORT  
 If DIRECT:  
 BRAKES – ON  
 BRAKES tb – ON



- ① MODE indications can be read using SM 95 PDRS OVERRIDE
- ② Joint Angles can be read using SM 169 PDRS STATUS
- ③ May receive CK CRT lt and DIRECT DRIVE BITE '↓' for one or more joints
- ④ SM 95 PDRS OVERRIDE available to work around ENTER pb, SINGLE/DIRECT DR SW or AUTO SEQ PROCEED/STOP SW. Deflecting HCs may regain manual modes



⑤ DIRECT mode can be regained with RMS IFM D&C KIT

⑥ For MODE sw pole failure, use SPEC 95 for computer supported modes

⑦ For BRAKES sw failure, auto brakes can be removed via SM 94 PDRS CONTROL, ITEM 6, ITEM 5, and SAFING - CANCEL

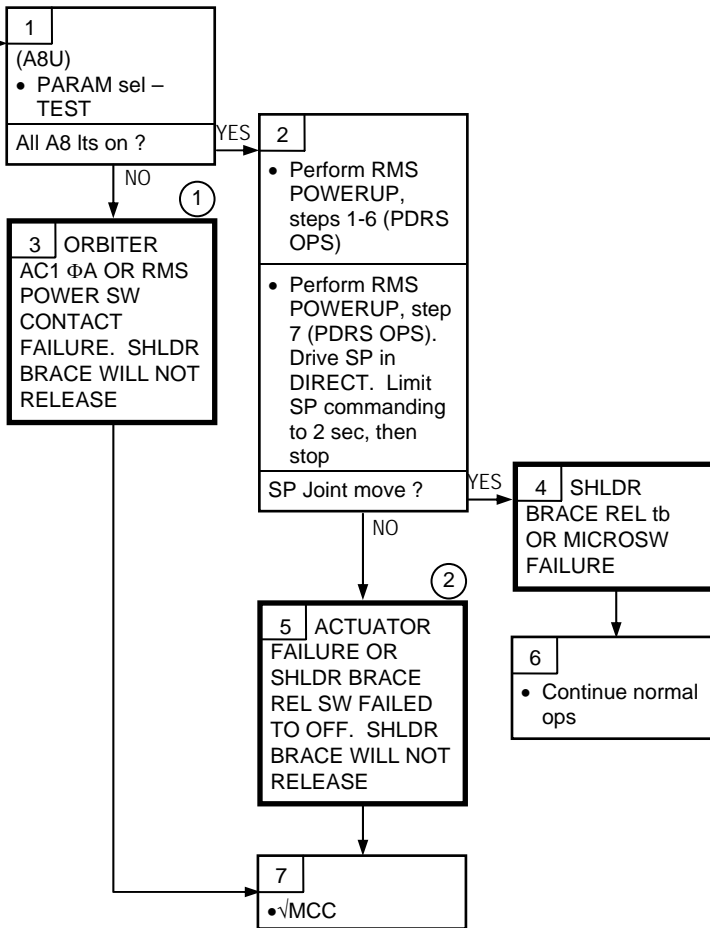
**PDRS**

**12.2h SHLDR BRACE REL tb – bp AFTER CMD**

SHLDR BRACE  
REL tb – bp  
After Cmd

**Nominal Config:**  
(MA73C:F)  
cb AC1 RMS  
PRI ΦA – cl  
(A8L)  
RMS PWR – PRI  
SEL – PORT

SM 94 PDRS  
CONTROL  
I/O ON – ITEM 5(\*)



① 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

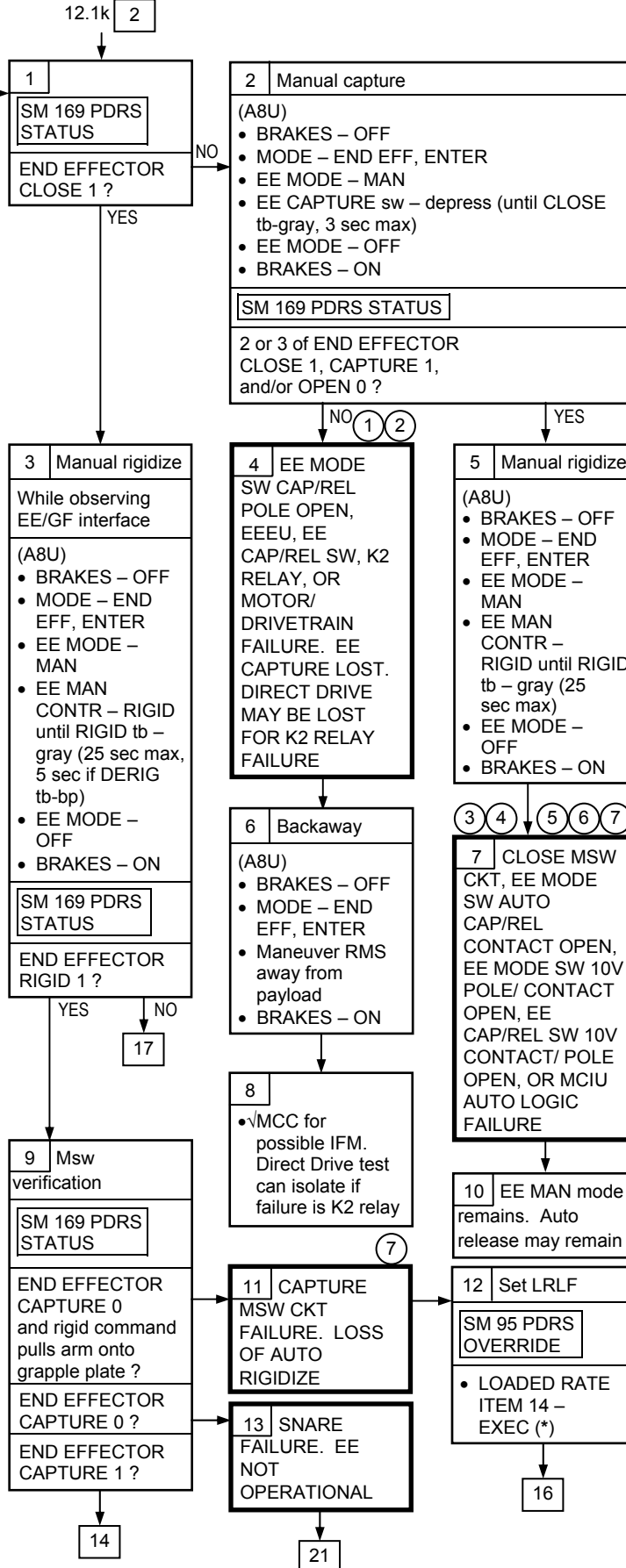
② If actuator failure, EVA possible to release shldr brace. If SW failure, RMS IFM D&C kit available to regain shldr brace

**PDRS**

**12.3a EE FAILS TO GRAPPLE CONSTRAINED PL IN EE MODE – AUTO**

If EE Failed to Capture and/or Rigidize in AUTO

**Nominal Config:**  
DAP: VERN(FREE)



① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE Mode sw, EE Cap/Rel sw, EE MAN Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

② Gnd can detect EE Cap/Rel sw and sw may feel loose

③ Limping will not occur in EE Manual for EE MODE sw 10V contact/pole or EE Cap/Rel 10V contact/pole (snare close)

④ MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

⑤ Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw failures

⑥ For EE Cap/Rel 10V pole failure, manual PL release will be accompanied by Uncommanded Release Warning

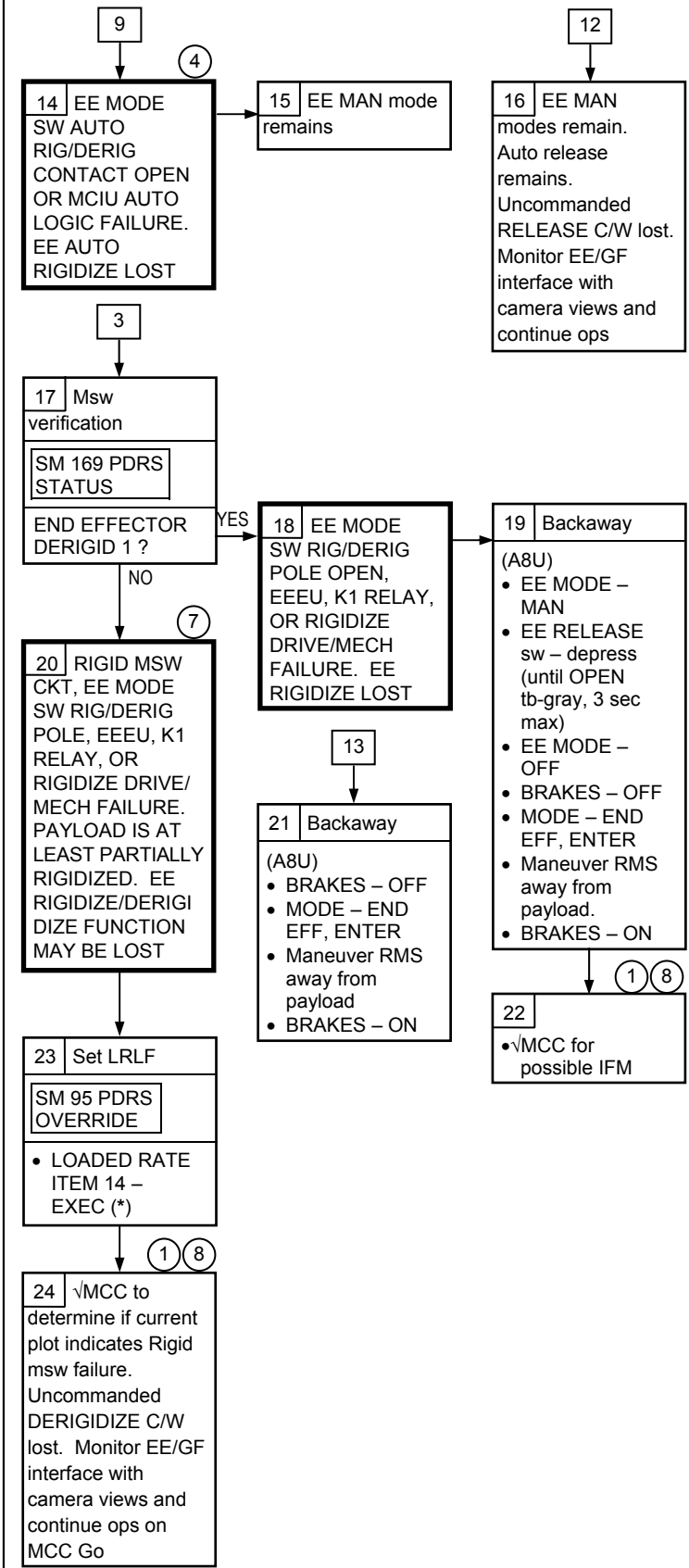
⑦ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:  
CAP/EXTEND  
OPEN/RIG  
CLOSE/DERIG  
Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

**END EFFECTOR**

**12.3**



**PDRS 12.3a (Cont)**



① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE Mode sw, EE Cap/Rel sw, EE MAN Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

④ MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

⑦ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:  
CAP/EXTEND  
OPEN/RIG  
CLOSE/DERIG  
Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

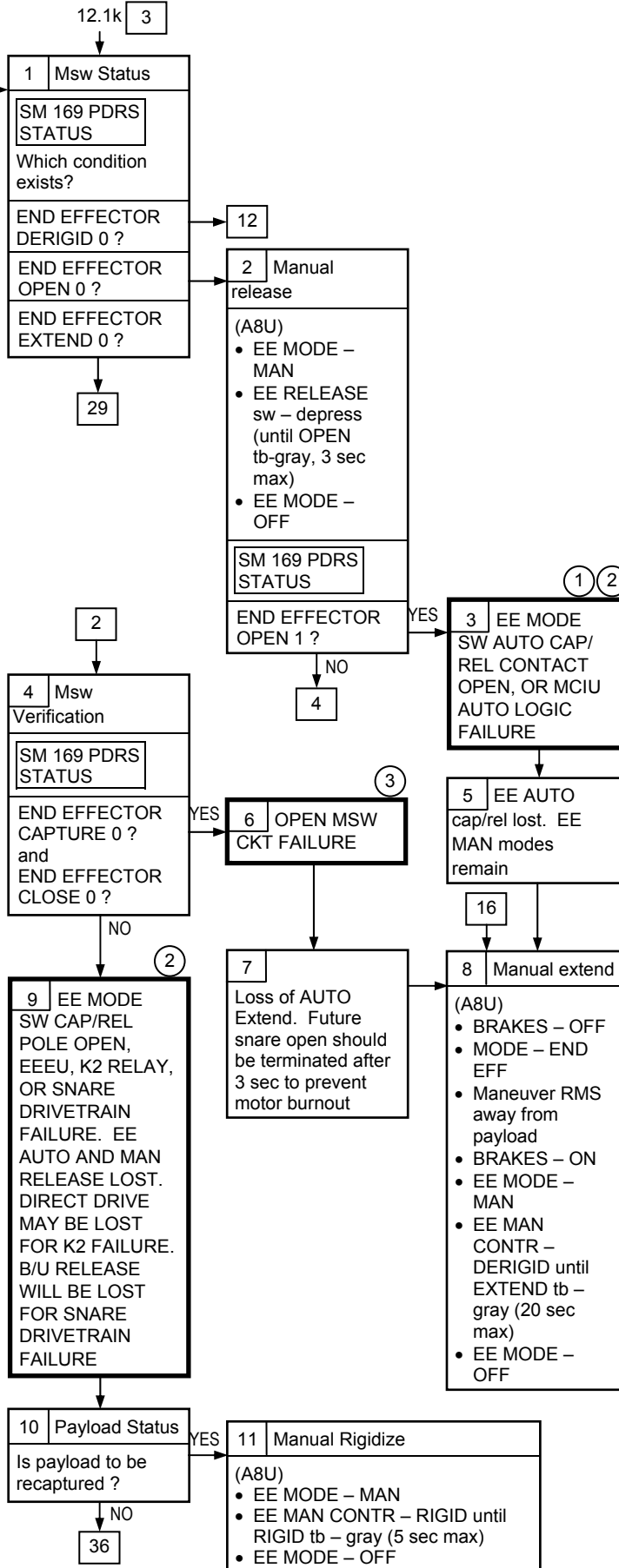
⑧ SAFING tb – bp is a good indication that K1 relay is failed

**PDRS**

**12.3b EE FAILS TO RELEASE/DERIGIDIZE  
CONSTRAINED PL IN EE MODE – AUTO**

If EE Failed to Release and/or Derigidize in AUTO

**Nominal Config:**  
DAP: VERN(FREE)

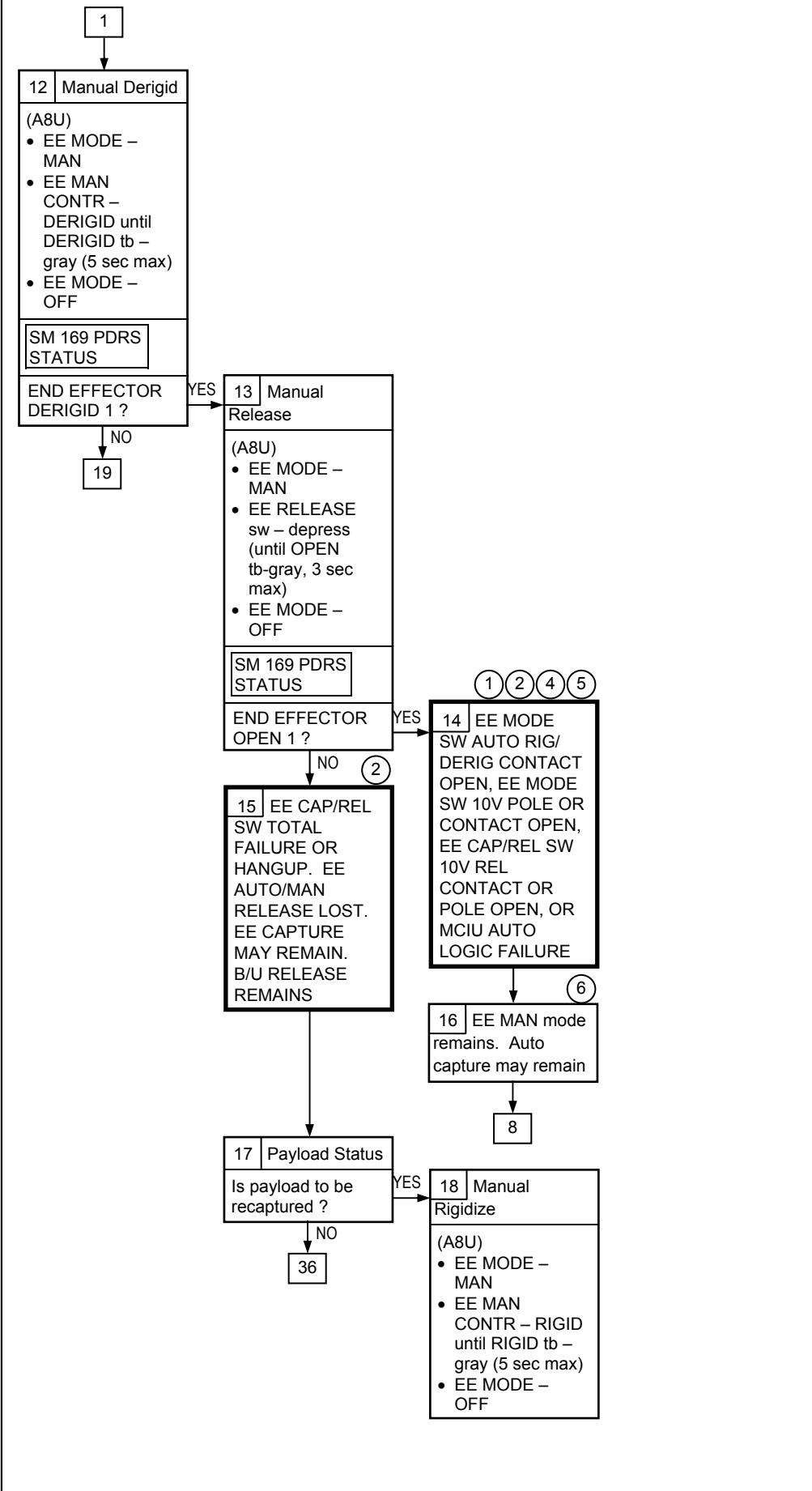


① MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMD5

② RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

③ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:  
CAP/EXTEND  
OPEN/RIG  
CLOSE/DERIG  
Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

**PDRS 12.3b (Cont)**



① MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

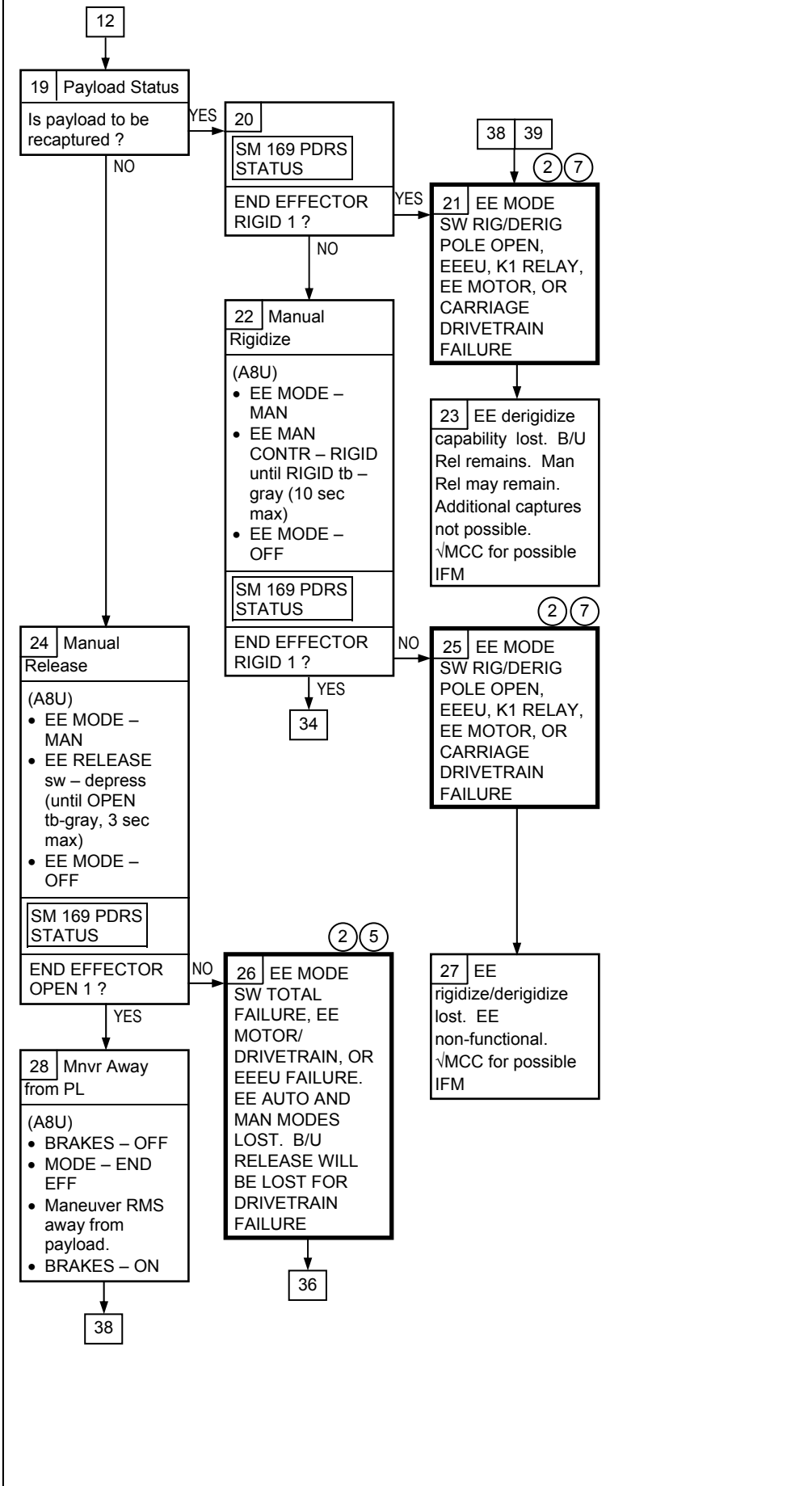
② RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

④ For EE Cap/Rel 10V pole failure, manual PL release is accompanied by Uncommanded Release Warning

⑤ Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw 10V failures

⑥ Limping will not occur in EE Manual for EE MODE sw 10V pole/contact failure, or during EE Manual capture for EE Cap/Rel sw pole

**PDRS 12.3b (Cont)**

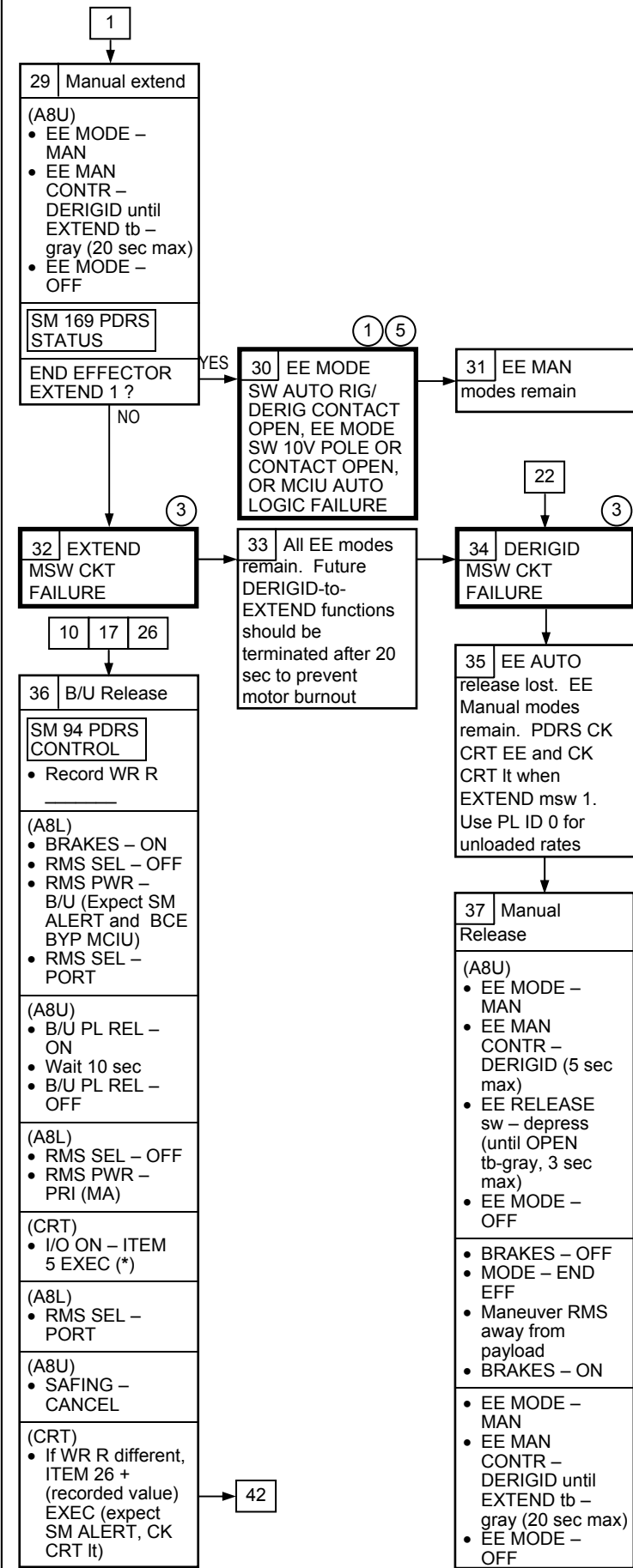


② RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

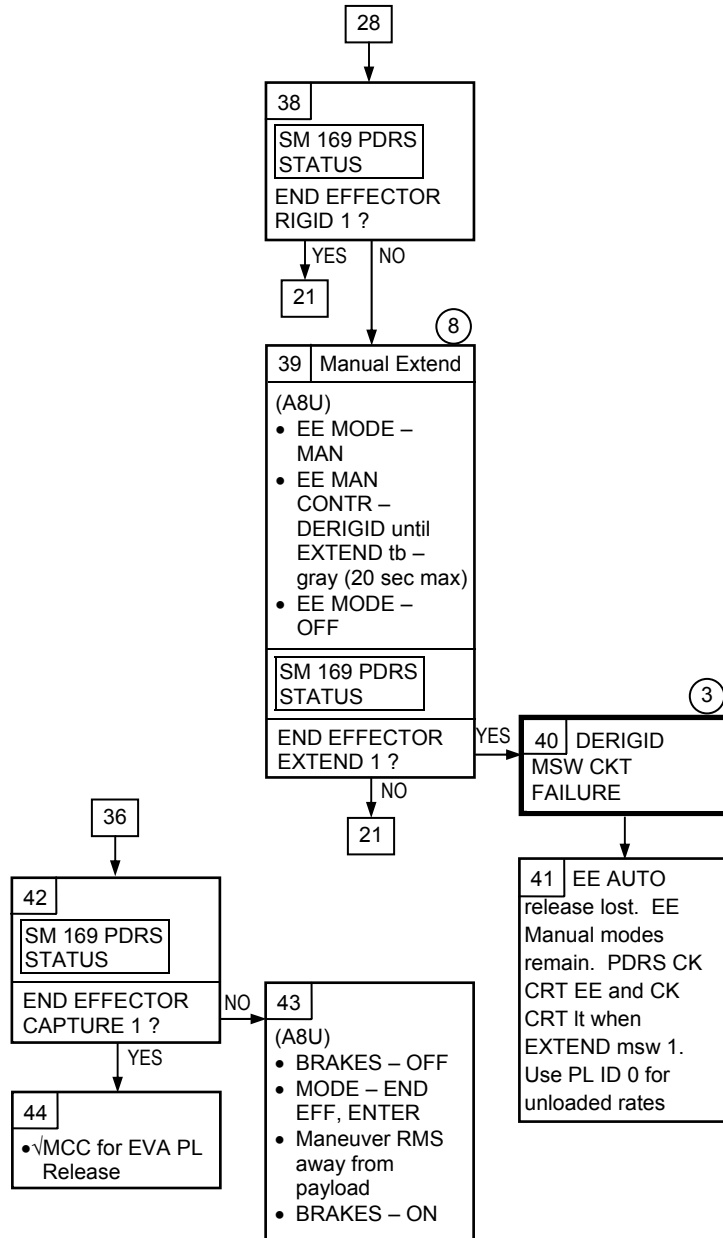
⑤ Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw 10V failures

⑦ SAFING tb – bp is a good indication that K1 relay is failed

**PDRS 12.3b (Cont)**



- ① MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS
- ③ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:  
CAP/EXTEND  
OPEN/RIG  
CLOSE/DERIG  
Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time
- ⑤ Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw 10V failures



③ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:  
 CAP/EXTEND  
 OPEN/RIG  
 CLOSE/DERIG  
 Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

⑧ May receive 'S96 PDRS CKCRT EE' and down arrow by EE FLAG

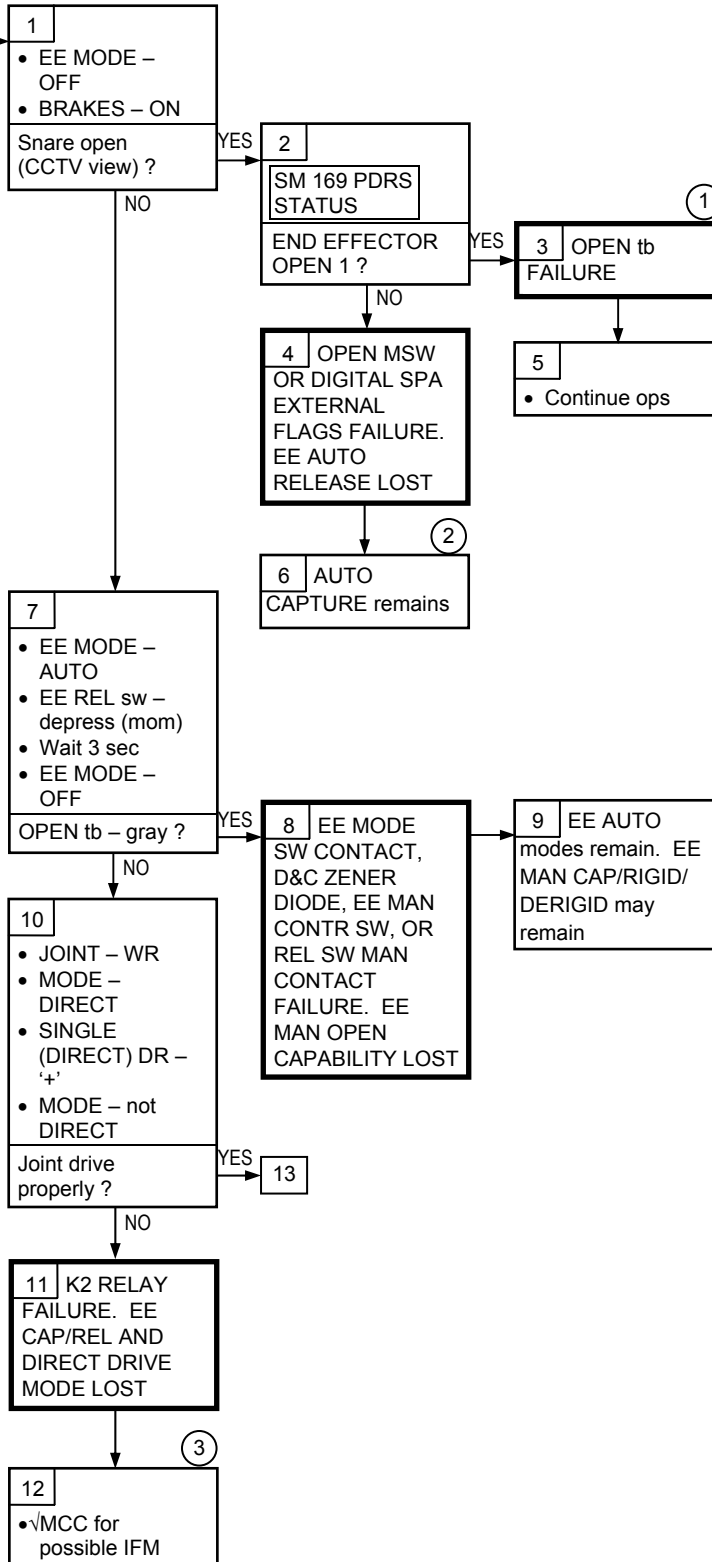
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**PDRS**

**12.3e EE FAILS TO RELEASE IN EE MODE – MAN**

EE OPEN  
tb – bp

**Nominal Config:**  
DAP: VERN(FREE)  
(A8U)  
SAFING tb – gray



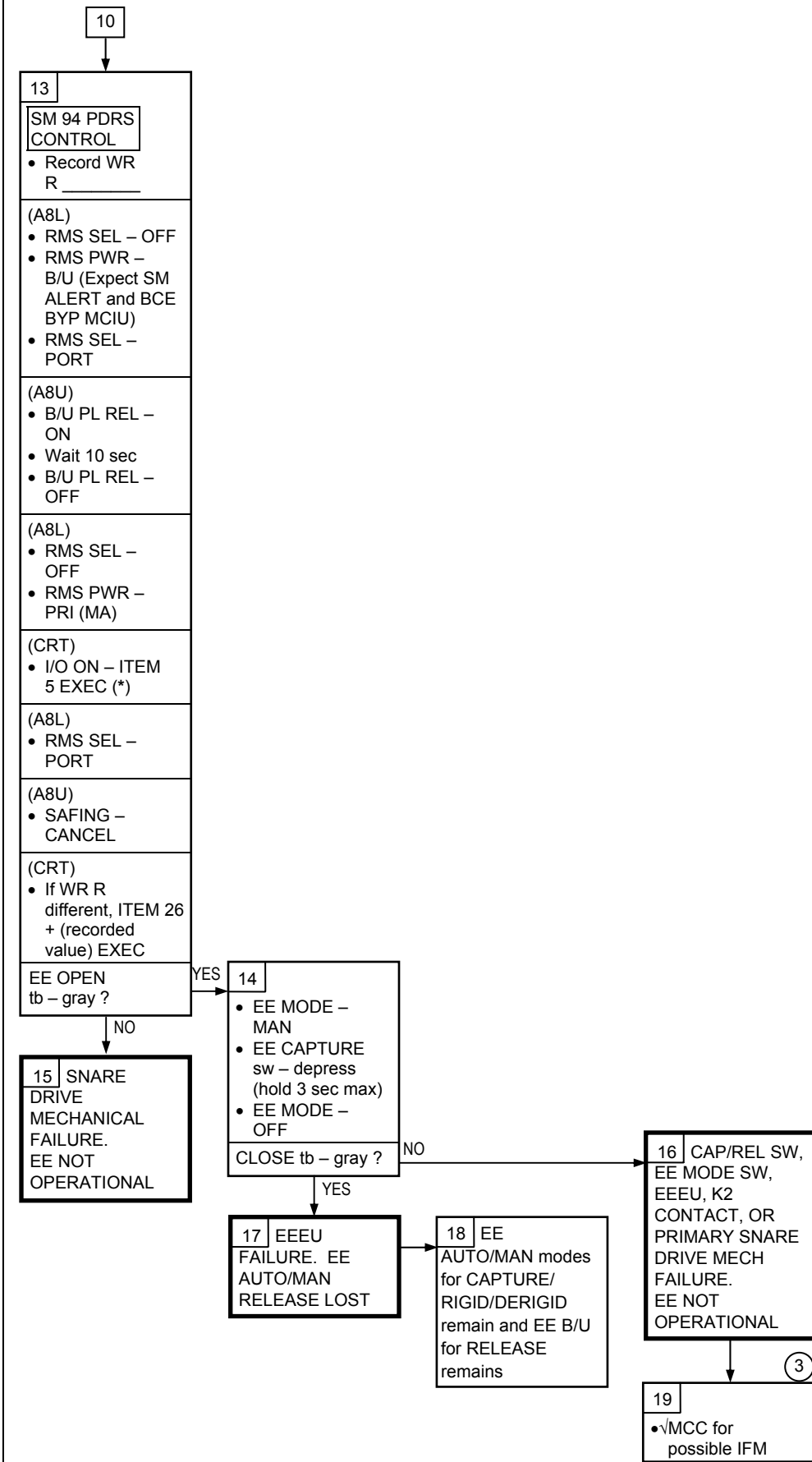
① For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb

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, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT



**PDRS 12.3e (Cont)**



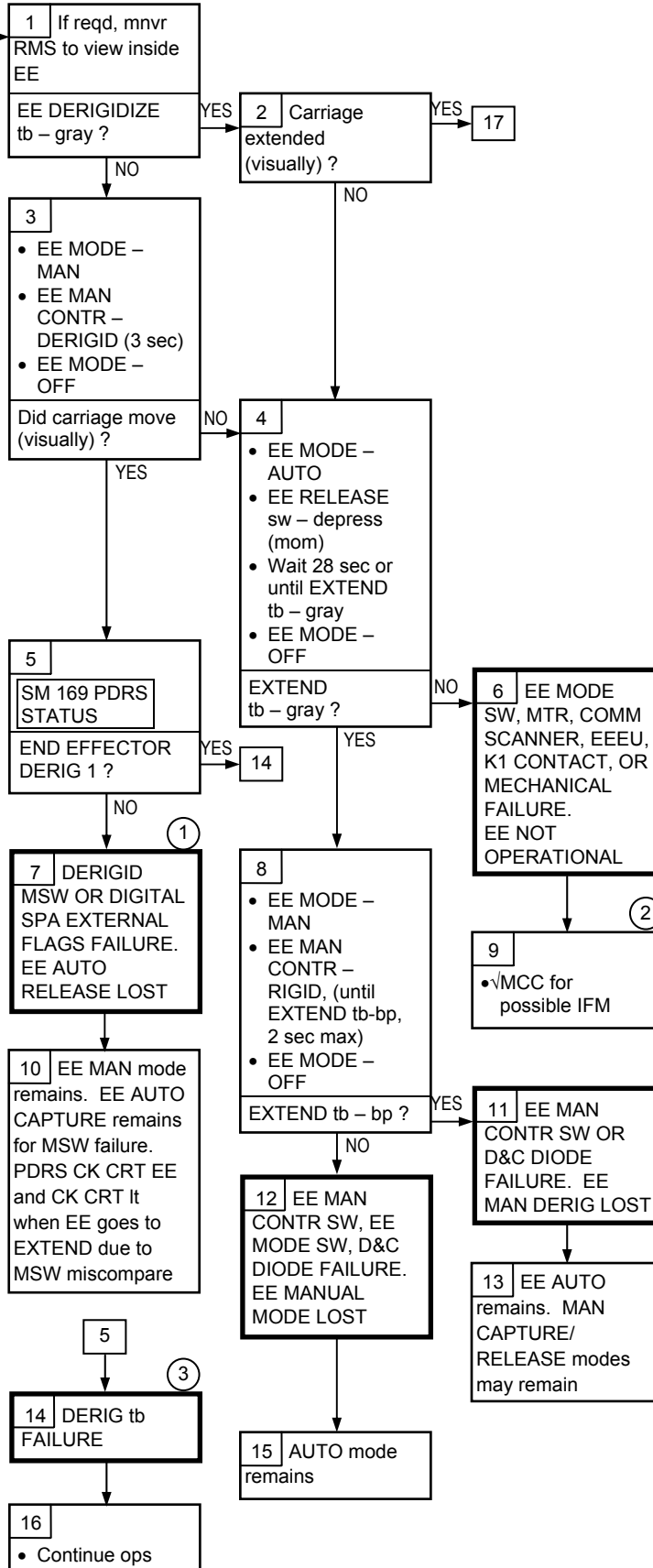
③ RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

**PDRS**

**12.3f EE FAILS TO DERIGIDIZE/EXTEND IN MANUAL**

EE Fails to Derigidize in Manual, DERIGID tb – bp, or EXTEND – bp

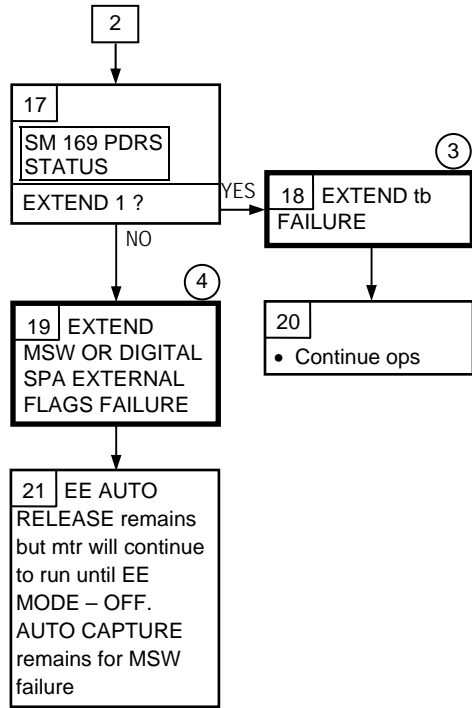
**Nominal Config:**  
 EE MODE – MAN  
 DAP: VERN(FREE) (A8U)  
 SAFING tb – gray



① 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, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

③ For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb



③ For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb

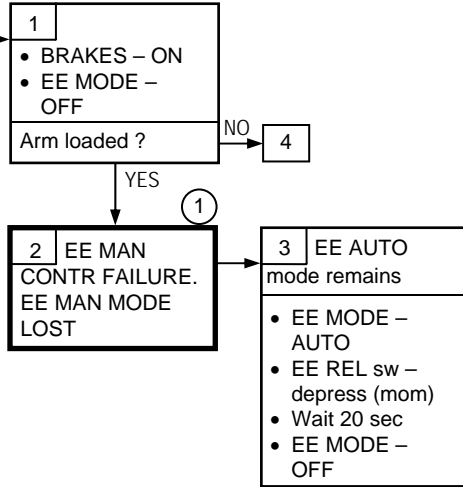
④ For digital SPA failure, CAPTURE flag may be failed OFF

**PDRS**

**12.3g MULTIPLE EE tb ABNORMAL WHILE NO EE CMDS (EE MODE – AUTO OR MAN)**

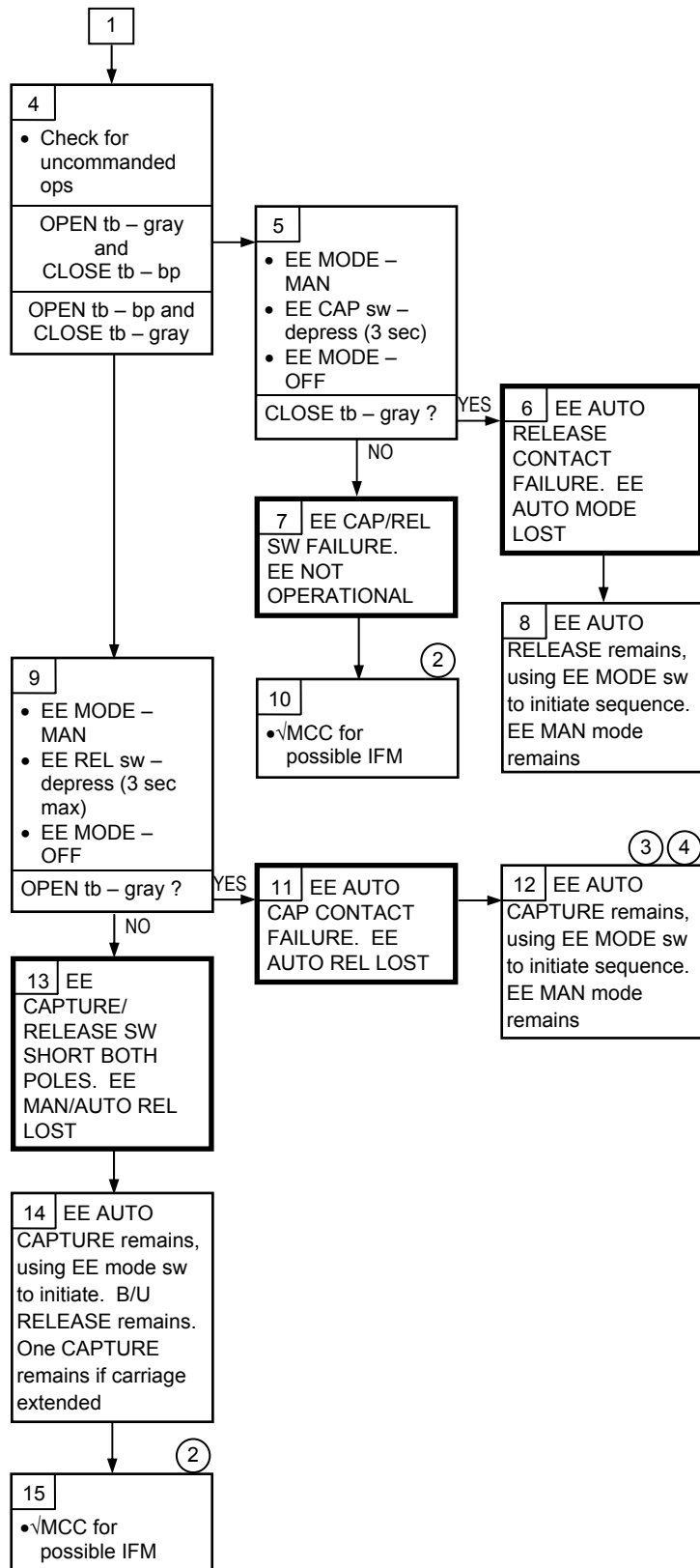
EE tb  
Abnormal  
While No EE  
Commands

**Nominal Config:**  
DAP: VERN(FREE)



① Assumes PL about to be released

**PDRS 12.3g (Cont)**



② RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

③ RMS limping will occur whenever EE MODE sw is not in OFF position and RMS is in computer supported mode

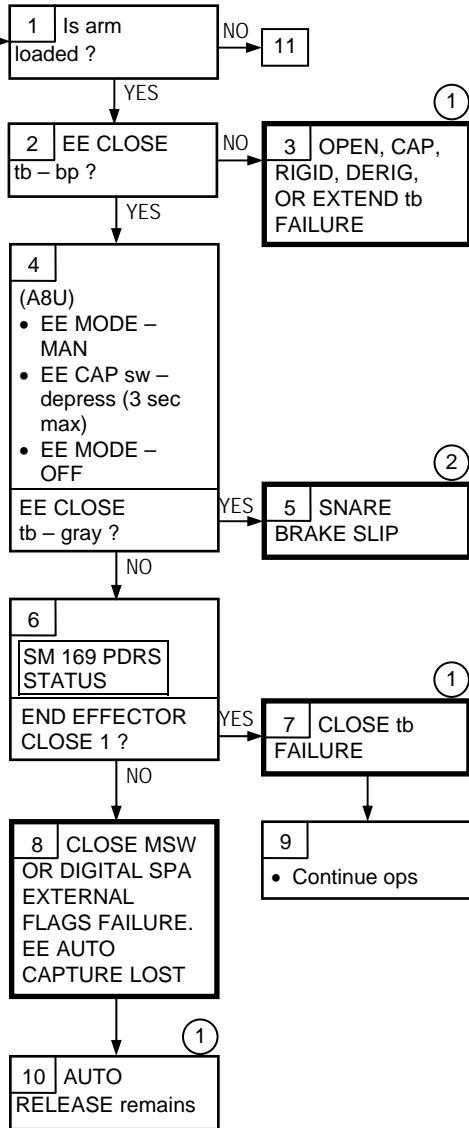
④ Uncommanded Release Warning is disabled

**PDRS**

**12.3h EE tb ABNORMAL WHILE EE MODE OFF**

EE tb Abnormal While EE MODE – OFF

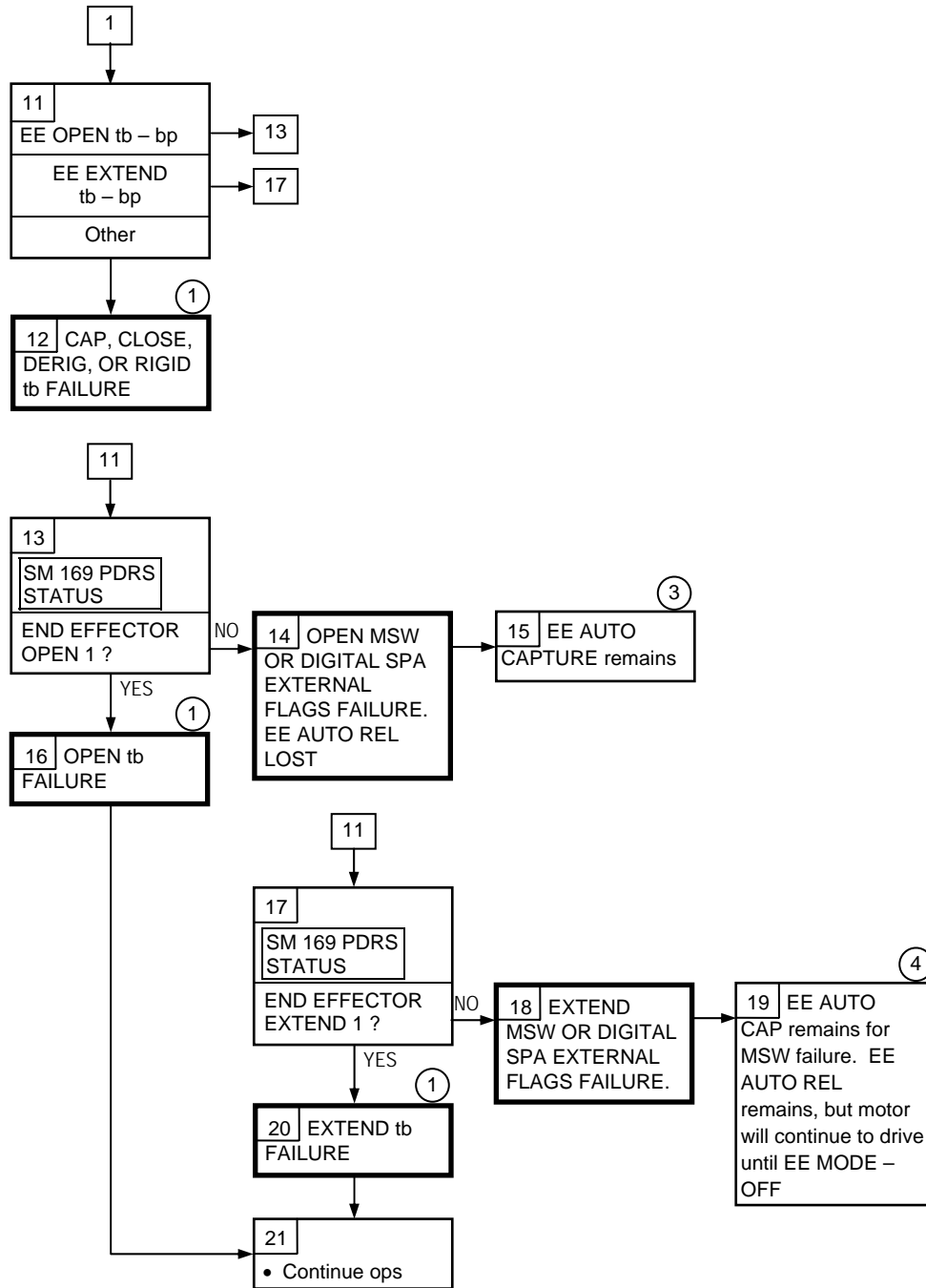
**Nominal Config:**  
DAP: VERN(FREE)



① For future EE OPS, use SM 169 PDRS STATUS to determine status of affected EE tb

② Subsequent slipping may occur

**PDRS 12.3h (Cont)**



① For future EE OPS, use SM 169 PDRS STATUS to determine status of affected EE tb

③ For digital SPA failure, RIGID flag may be failed OFF causing loss of loaded rates and motor to continue to drive until EE MODE - OFF during AUTO CAPTURE. Loaded rates can be sent via SM 95 PDRS OVERRIDE

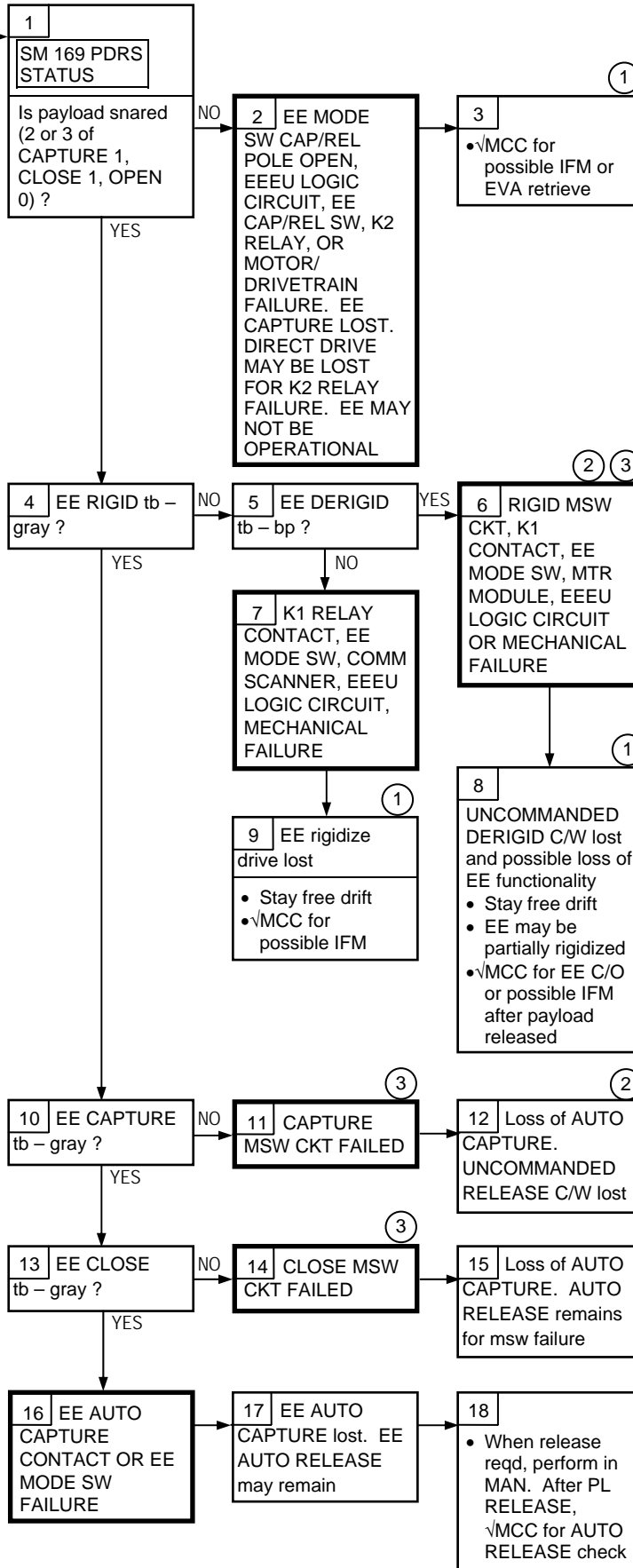
④ For digital SPA failure, CAPTURE flag may be failed OFF

**PDRS**

**12.3i CAPTURE SEQ ABORTED (CUE CARD EXECUTED)**

If EE Fails to Capture and/or Rigidize in AUTO

**Nominal Config:**  
SAFING tb – gray



① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

② Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE

③ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

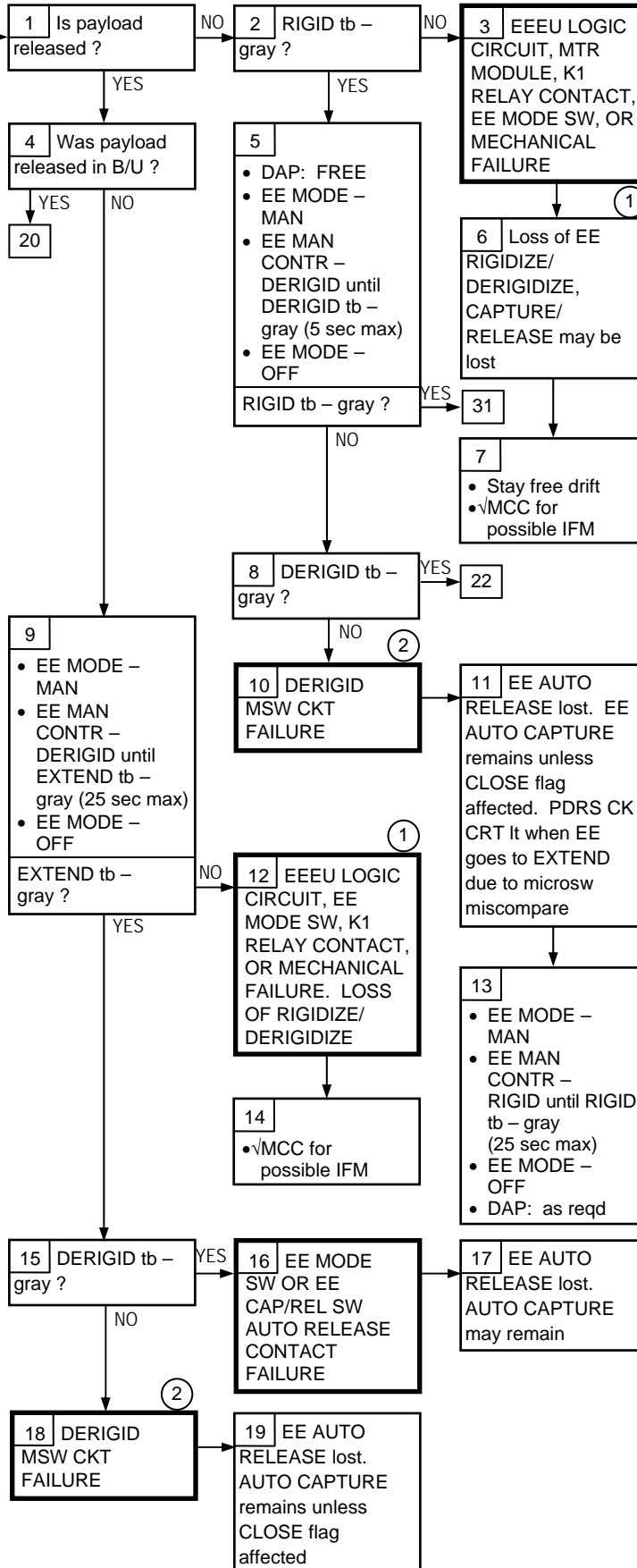


**PDRS**

**12.3j NO AUTO RELEASE (CUE CARD EXECUTED)**

EE Fails to Derigidize or Release in AUTO

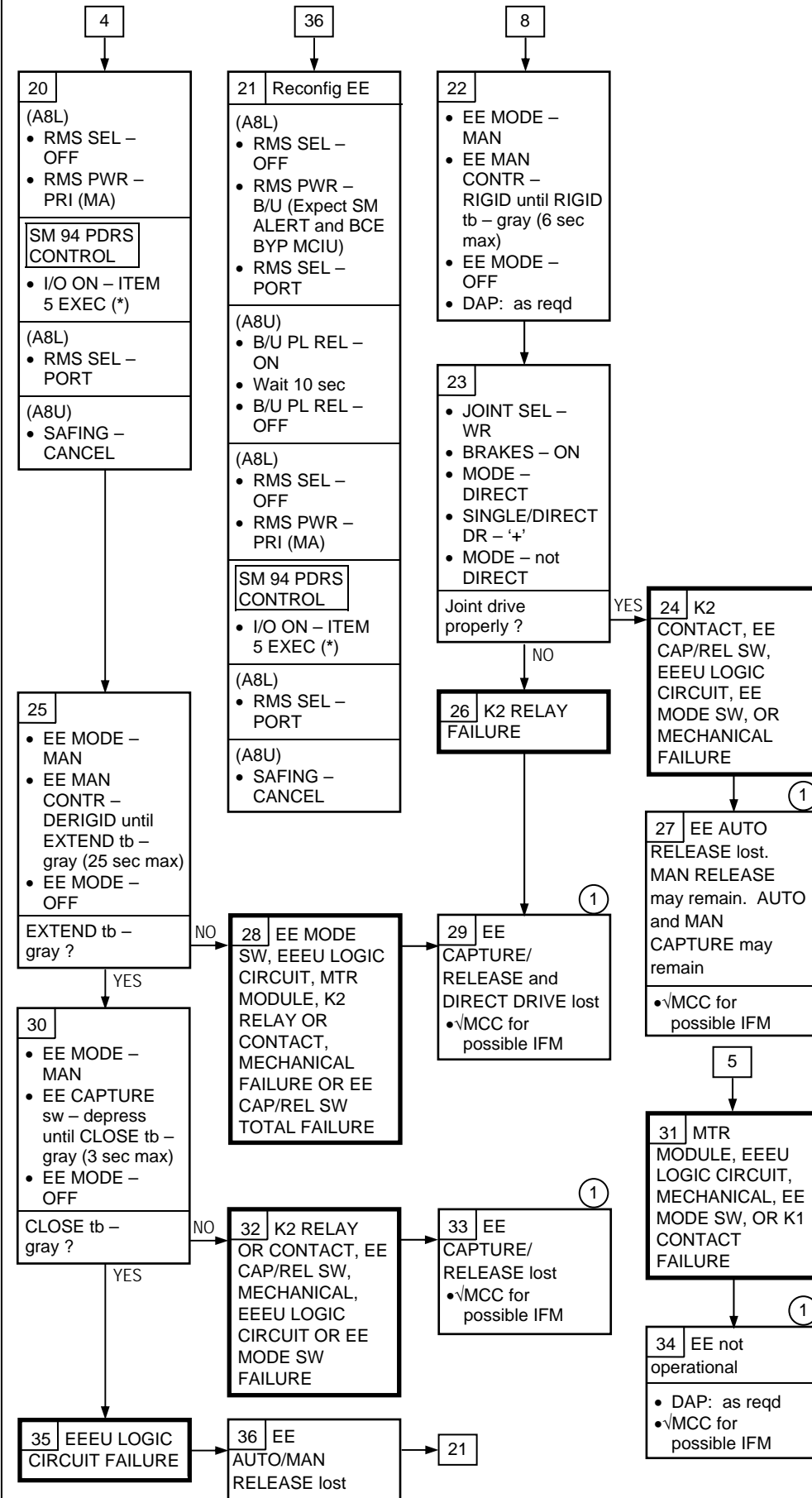
**Nominal Config:**  
SAFING tb – gray



① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

② MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

**PDRS 12.3j (Cont)**

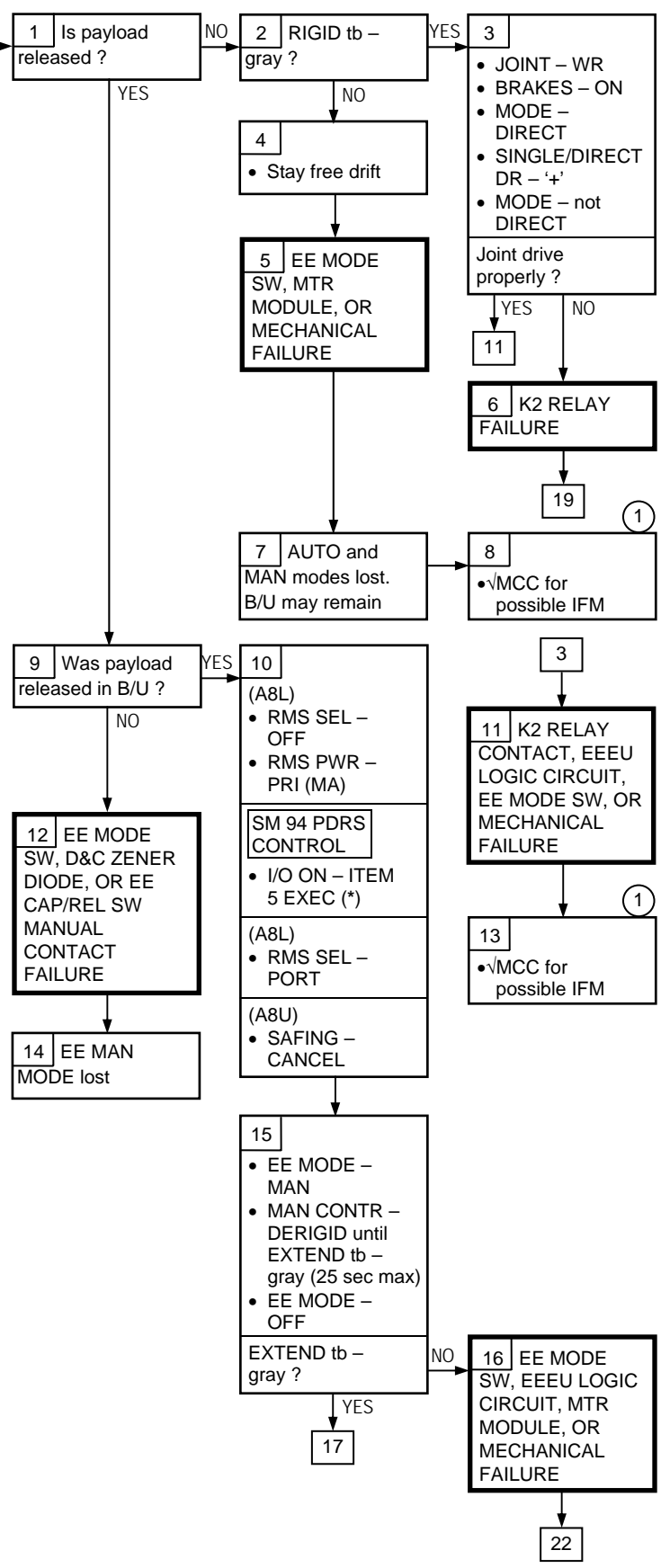


(1) RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

**PDRS**

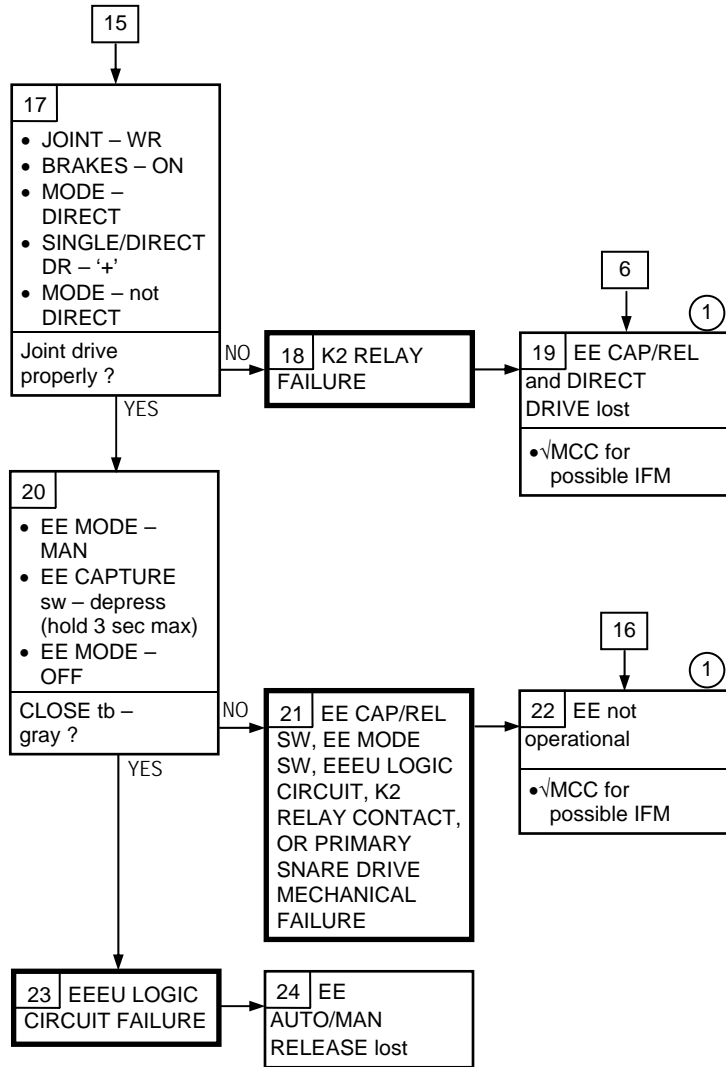
**12.3k NO MANUAL RELEASE  
(CUE CARD EXECUTED)**

EE OPEN tb – bp  
  
**Nominal Config:**  
SAFING tb – gray



① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

**PDRS 12.3k (Cont)**



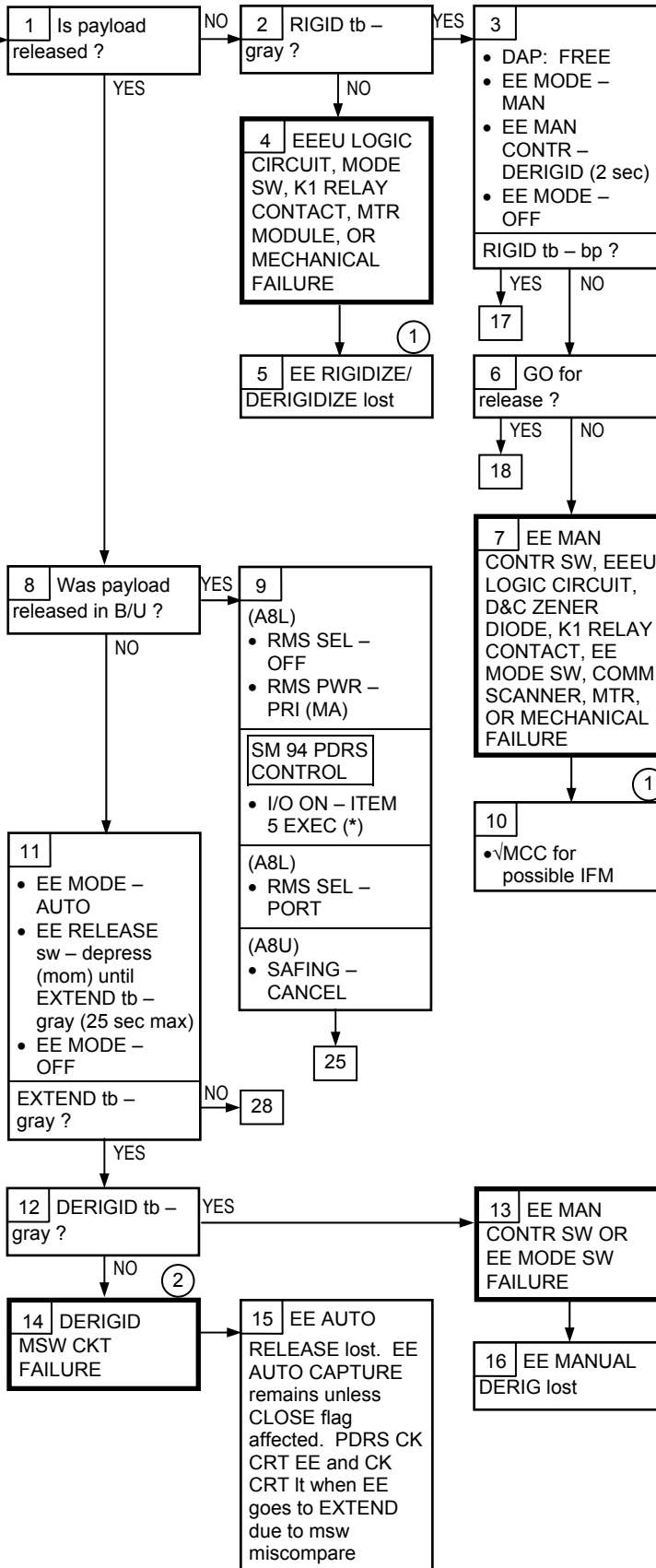
① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

**PDRS**

**12.3I NO MANUAL DERIGID (CUE CARD EXECUTED)**

EE Fails to Derigidize in Manual, DERIGID tb – bp

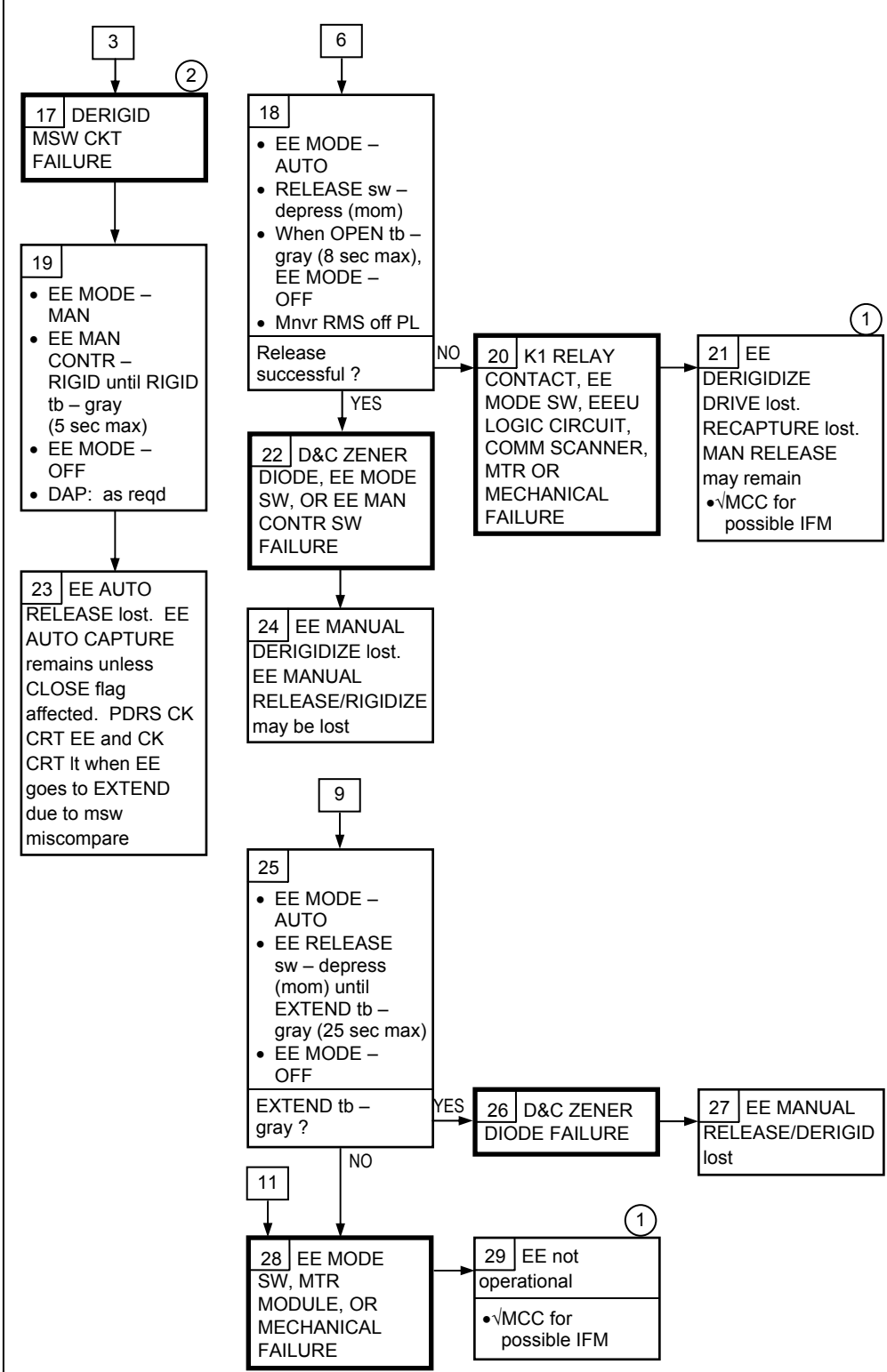
**Nominal Config:**  
SAFING tb – gray



① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

② MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

**PDRS 12.3I (Cont)**



(1) RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

(2) MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

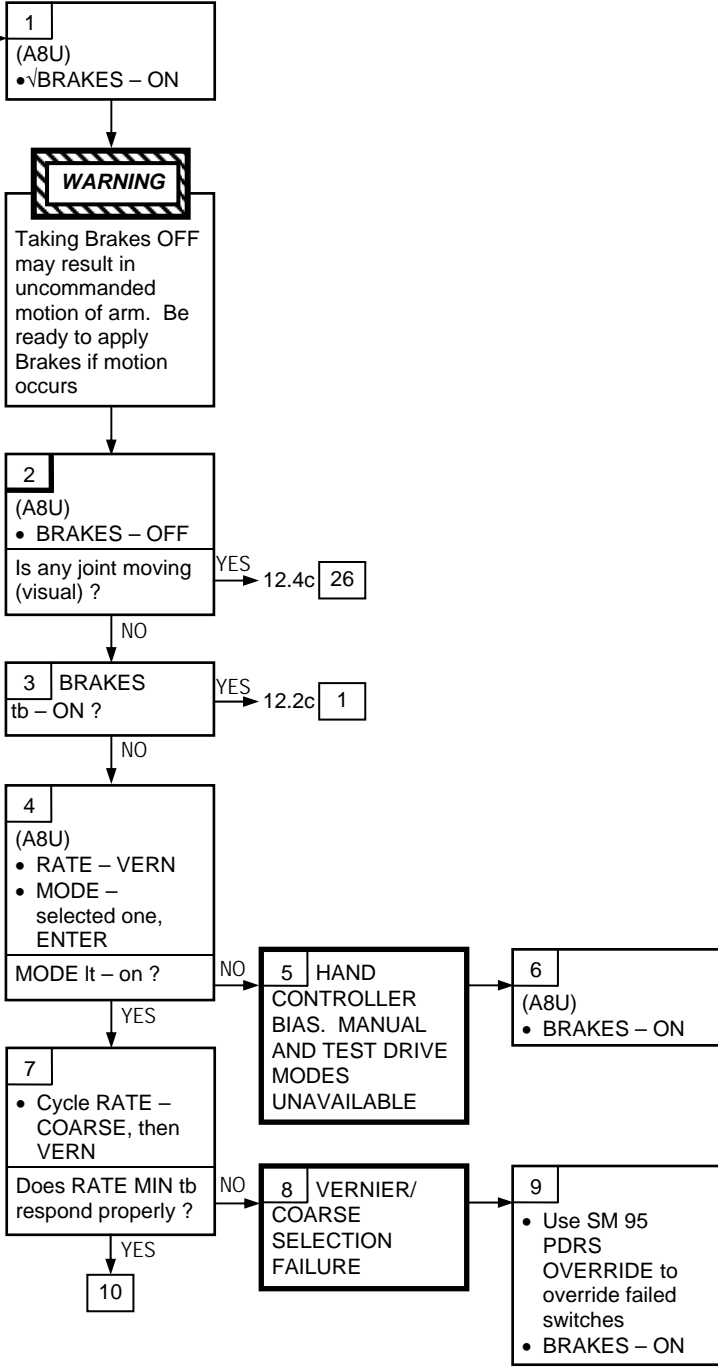
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PDRS

12.4a ARM RESPONSE ABNORMAL IN MANUAL MODES

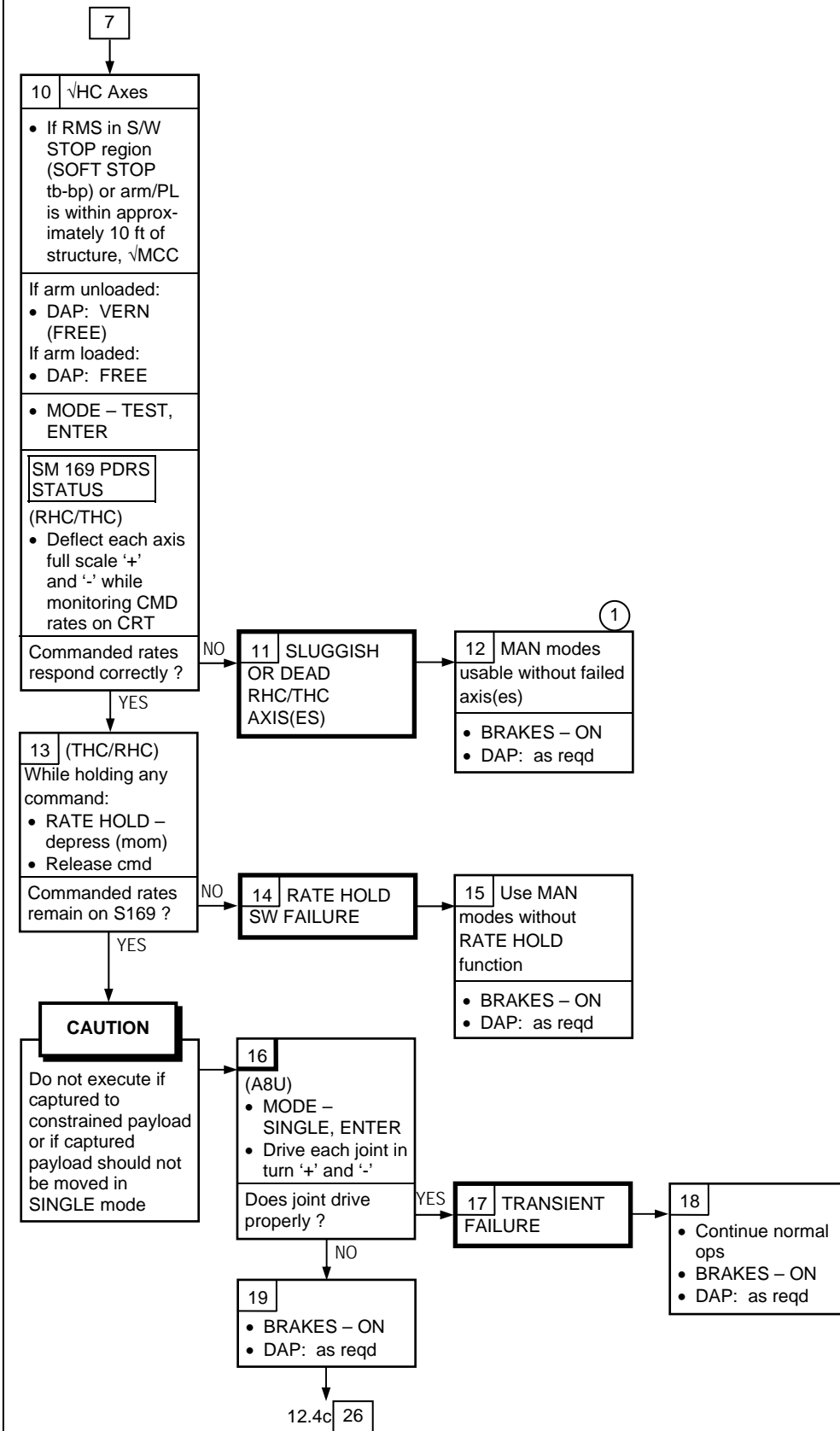
Arm Response Not Normal for Commands in Manual Modes

Nominal Config: (A8L) RMS PWR – PRI SEL – PORT (A8U) SAFING – AUTO SAFING tb – gray S/W STOP – gray EE MODE – OFF





**PDRS 12.4a (Cont)**



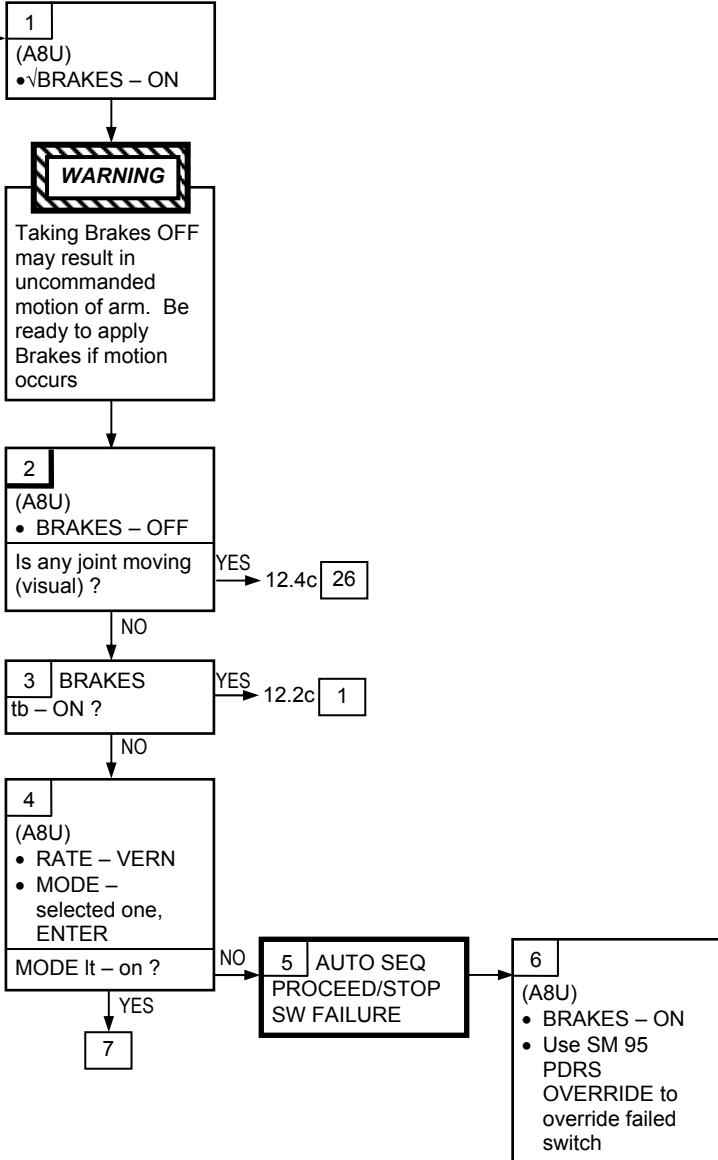
① Single HC axis failure workaround capability exists via SM 95 PDRS OVERRIDE

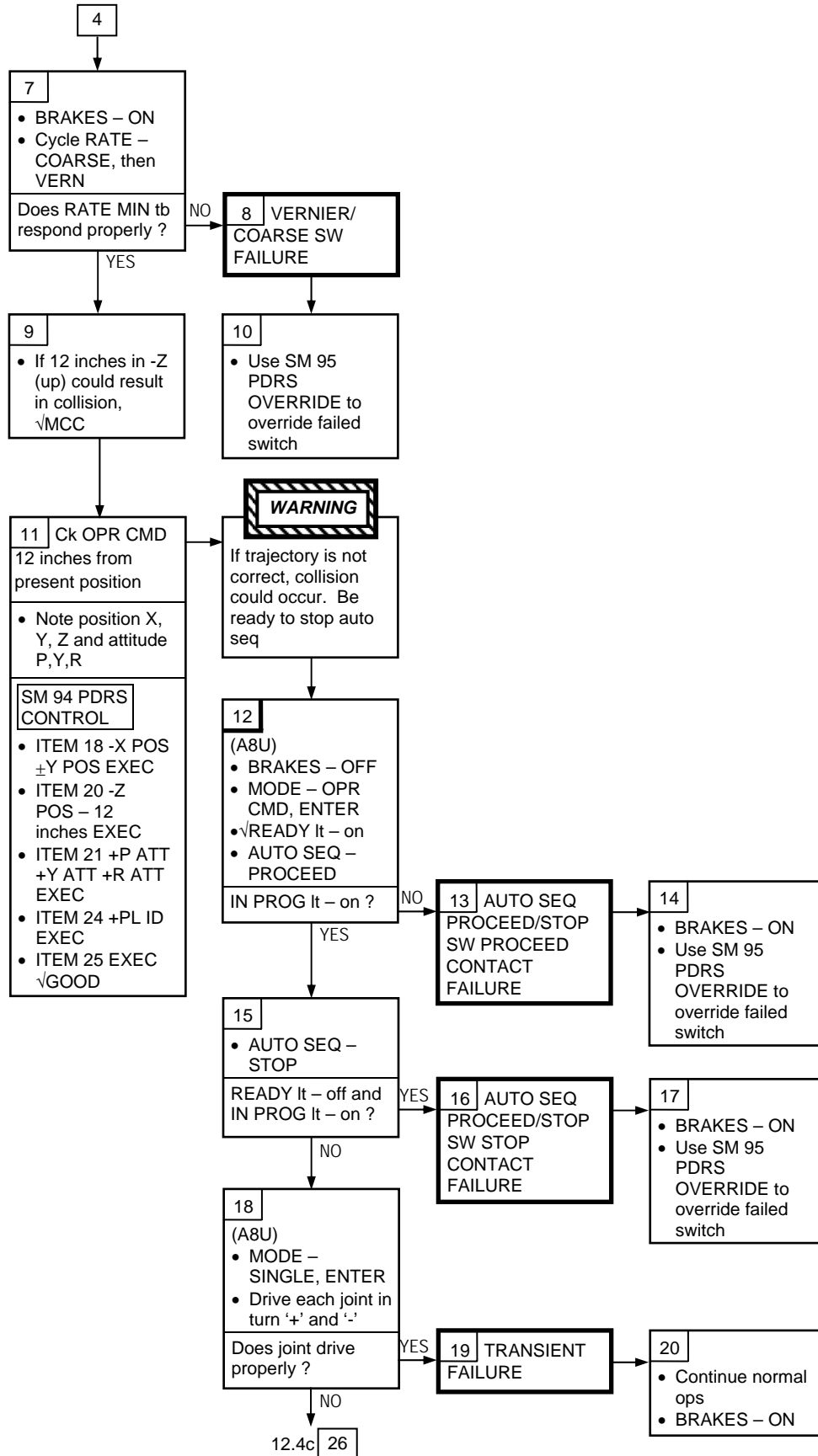
**PDRS**

**12.4b ARM RESPONSE ABNORMAL IN AUTO MODES**

Arm Response Not Normal for Commands in Auto Modes

**Nominal Config:**  
(A8L)  
RMS PWR – PRI  
SEL – PORT  
(A8U)  
SAFING tb – gray  
SOFTWARE STOP tb – gray  
EE MODE – OFF



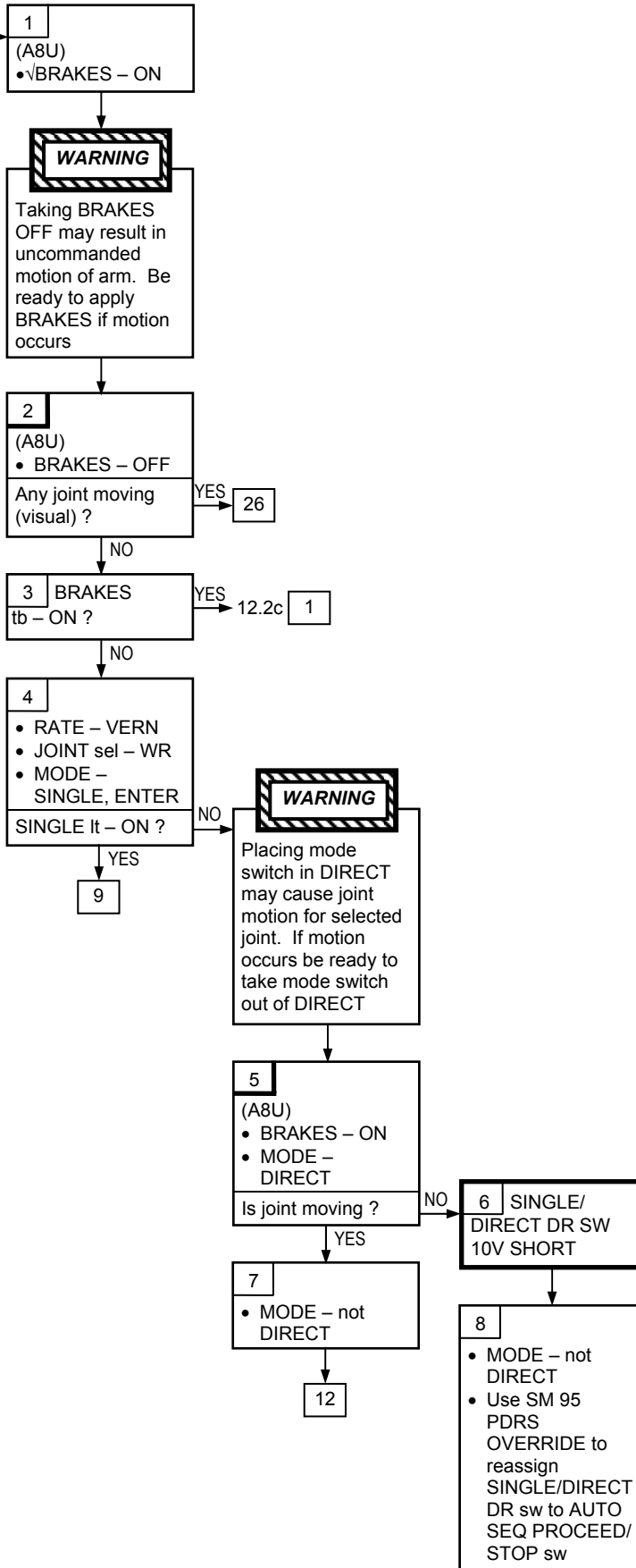


**PDRS**

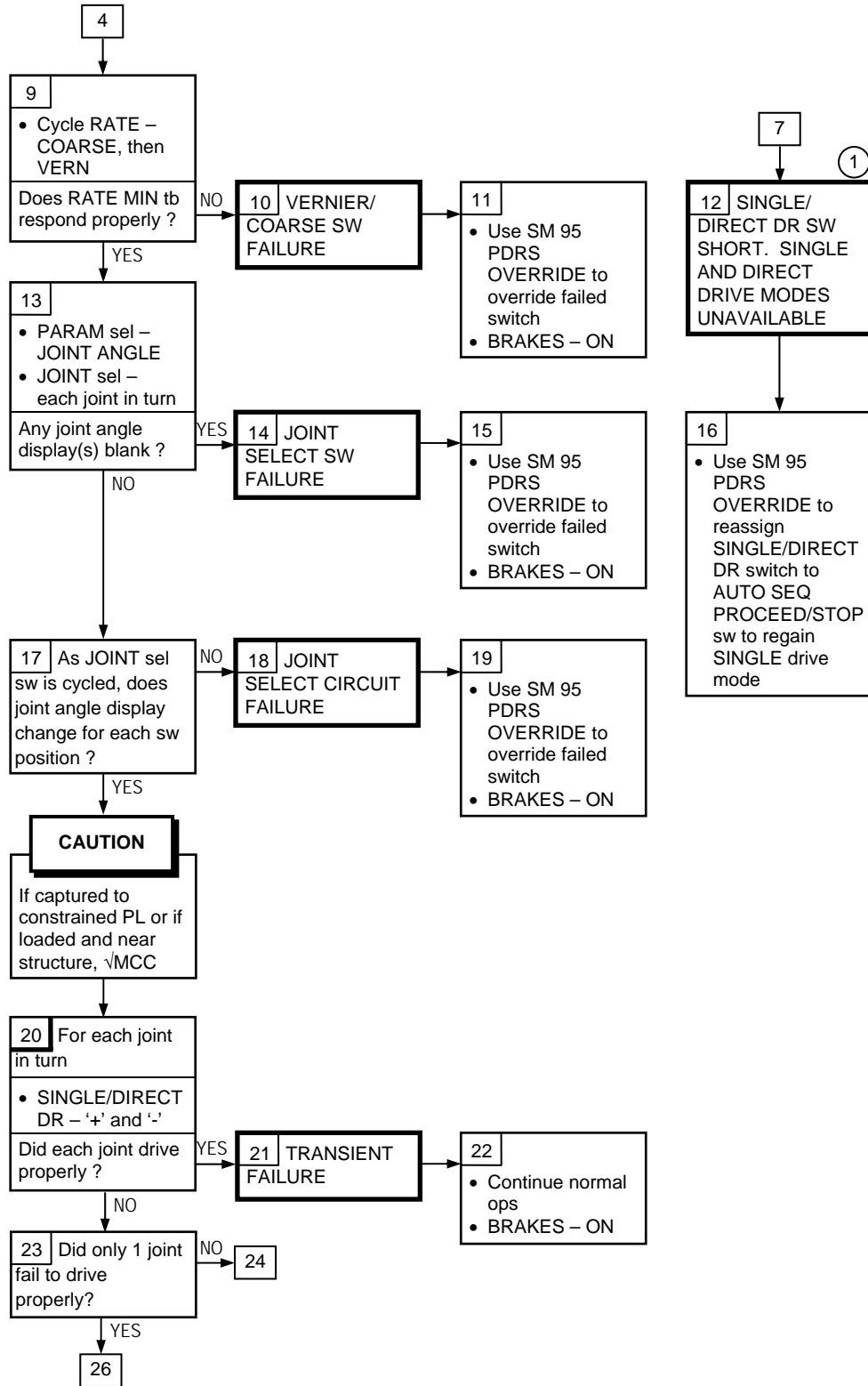
**12.4c JOINT RESPONSE ABNORMAL IN SINGLE MODE**

Joint Response Not Normal for Commands in Single Mode

**Nominal Config:**  
 (A8L)  
 RMS PWR – PRI  
 SEL – PORT  
 (A8U)  
 SAFING tb – gray  
 EE MODE – OFF



**PDRS 12.4c (Cont)**



① DIRECT mode can be regained with RMS IFM D&C KIT. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM), and PDRS SSR-4 RMS IFM D&C KIT

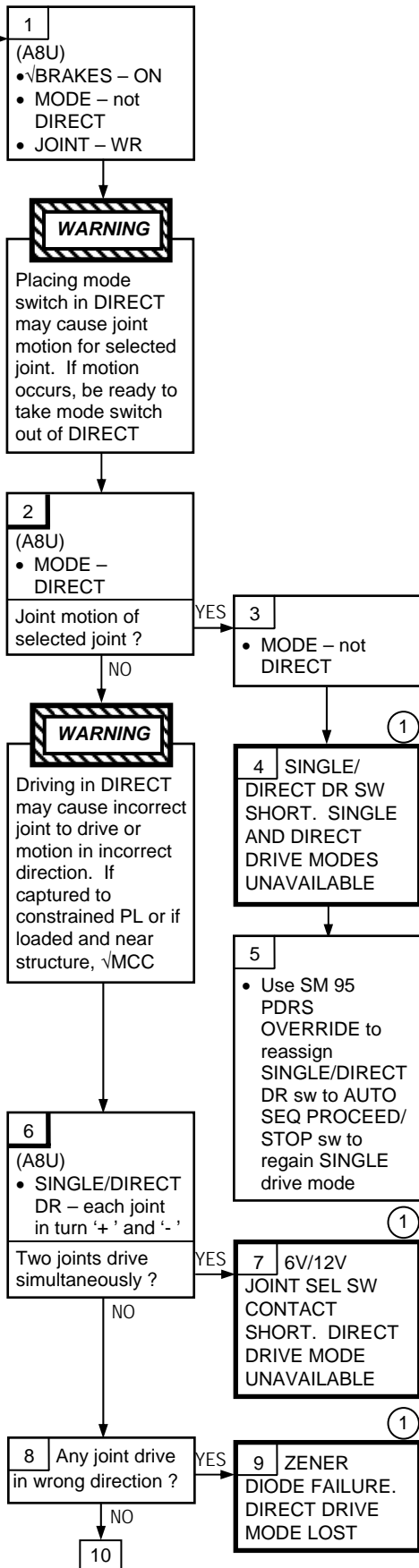


**PDRS**

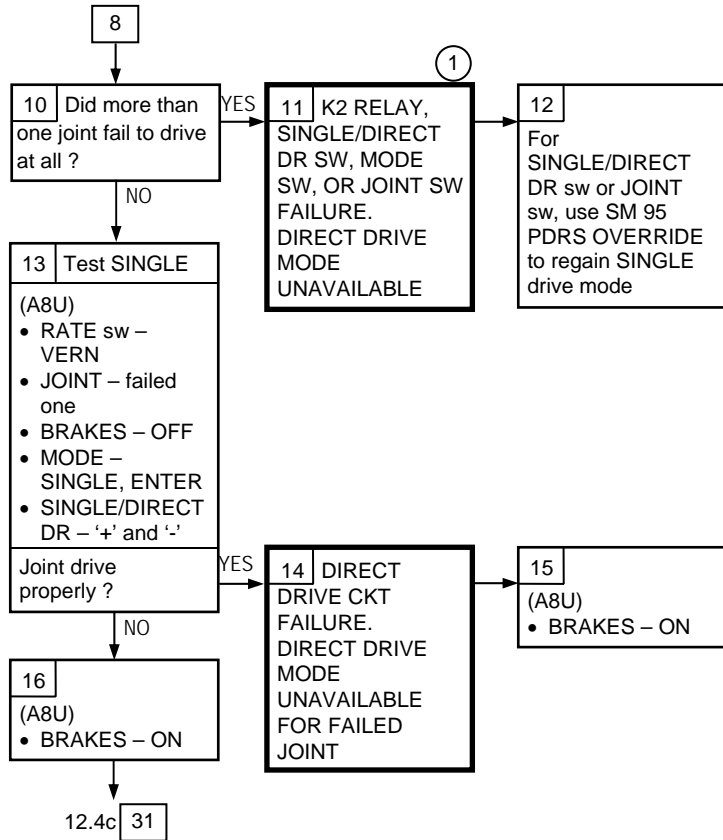
**12.4d JOINT RESPONSE ABNORMAL IN DIRECT MODE**

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



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



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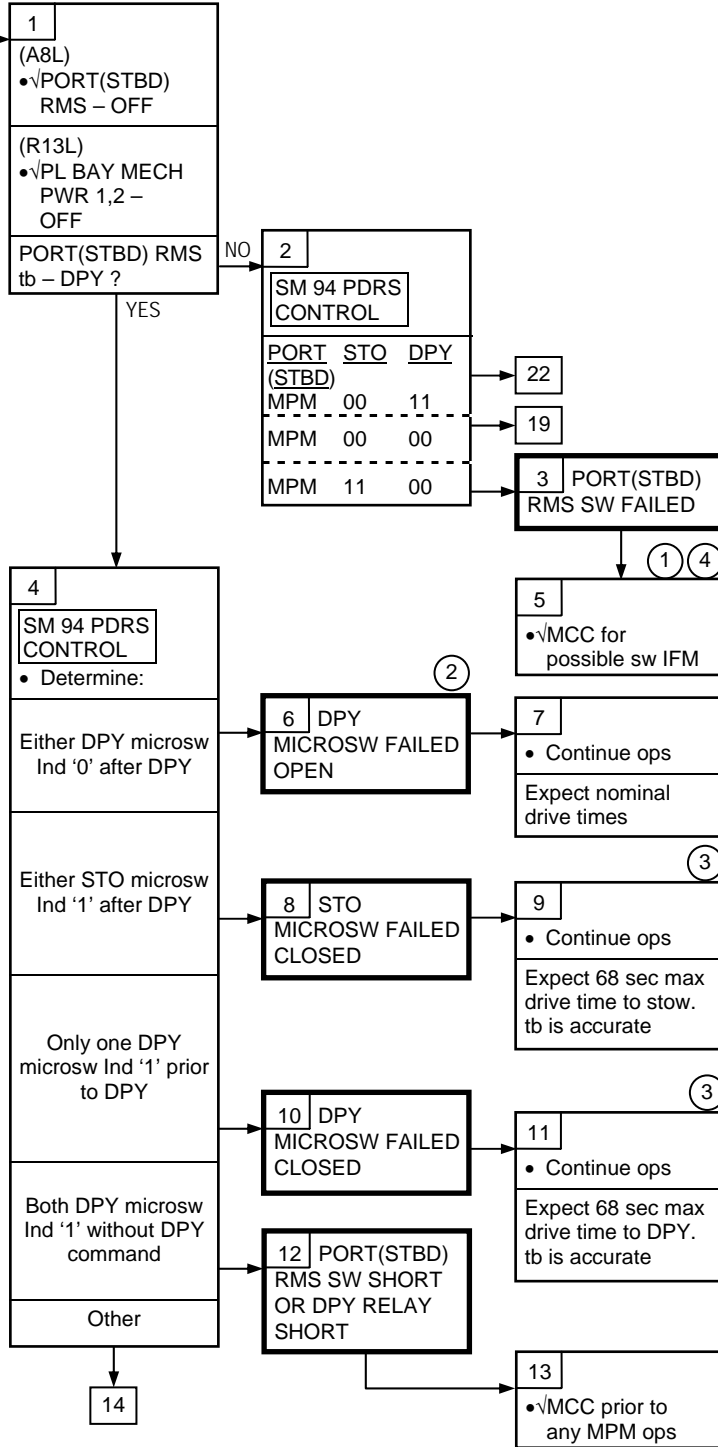
**PDRS**

**12.5a MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

tb Not DPY  
or  
SM 94 PDRS CONTROL

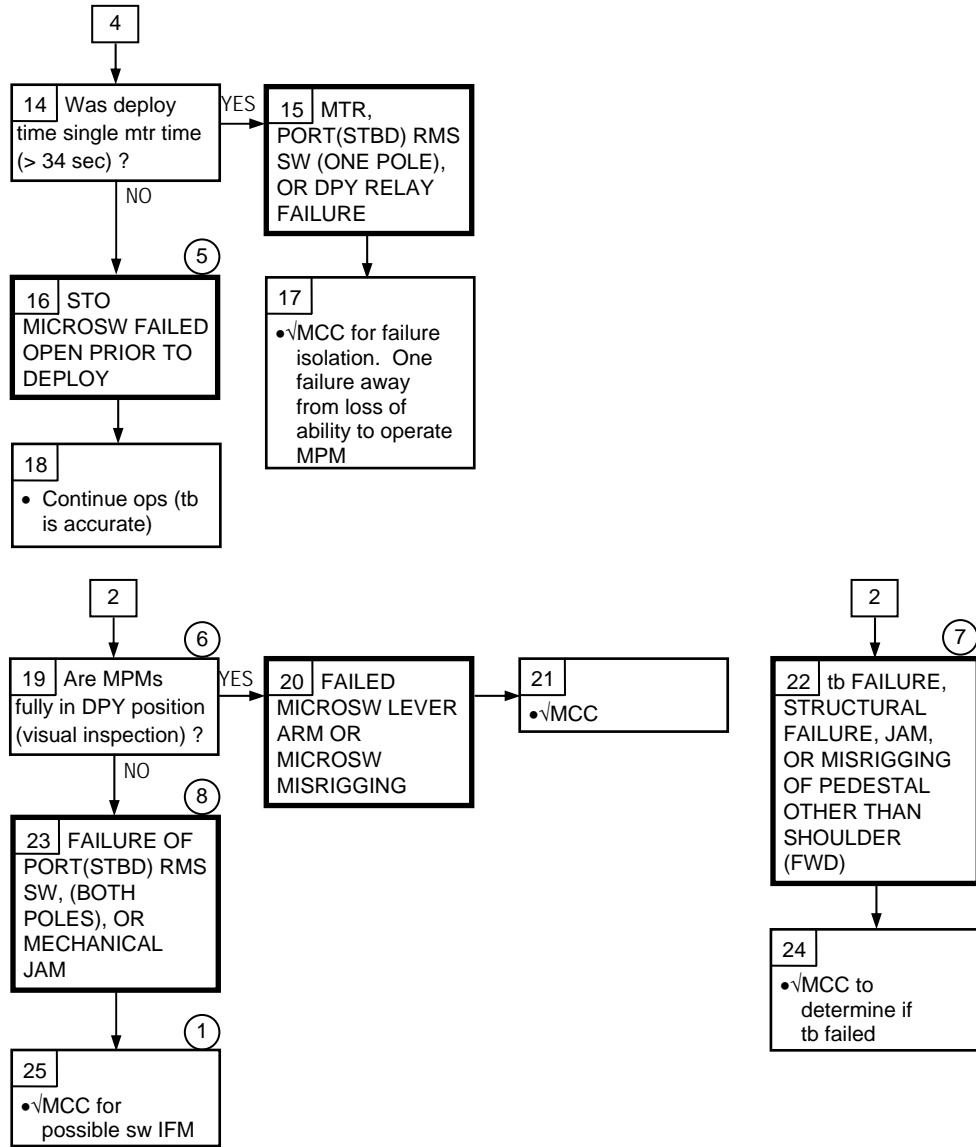
Microsw  
DPY/STO Ind  
Not Nominal  
or  
Single Mtr  
Drive Time  
(> 34 sec)

**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 AC2  
3Φ MID 2 – cl  
(MA73C:D)  
cb MCA PWR AC3  
3Φ MID 4 – cl



- ① Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
- ② One mtr will continue to run while deploying until PORT(STBD) RMS sw – OFF
- ③ PDRS SSR-1 MPM MTR INHIBIT DISABLE available to regain motor drive in the failed direction
- ④ Unloaded stowed ops can be performed on MCC GO. Refer to SM 95 PDRS OVERRIDE ITEM 15

**PDRS 12.5a (Cont)**



① Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

⑤ One mtr will continue to run while stowing until PORT(STBD) RMS sw – OFF

⑥ RMS should not be used unless shoulder linkage is overcenter locked

⑦ To trip port(stbd) tb, signals from all four (three) pedestals are required, i.e., all of SYS 1 or all of SYS 2. SM94 only shows the shoulder (fwd) indications

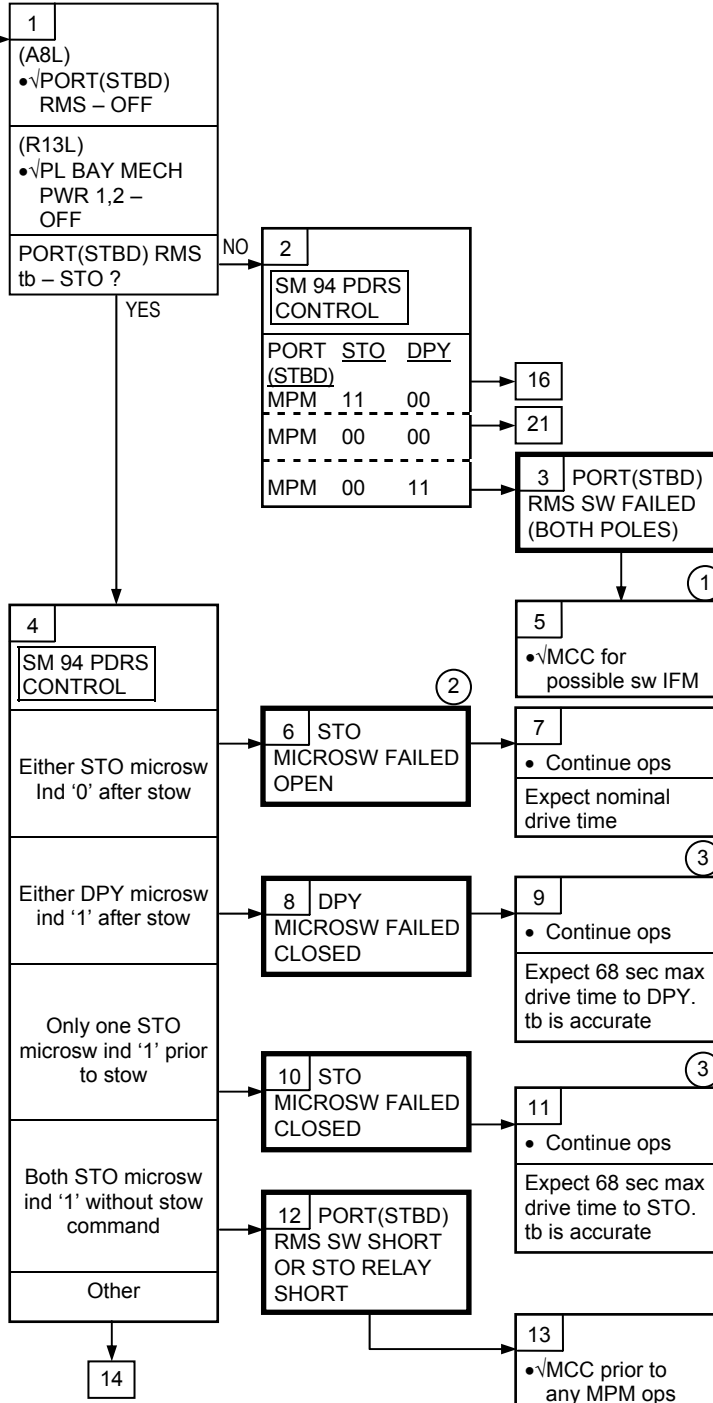
⑧ MCC can determine if switch is failed

**PDRS**

**12.5b MPM STO – tb NOT STO, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

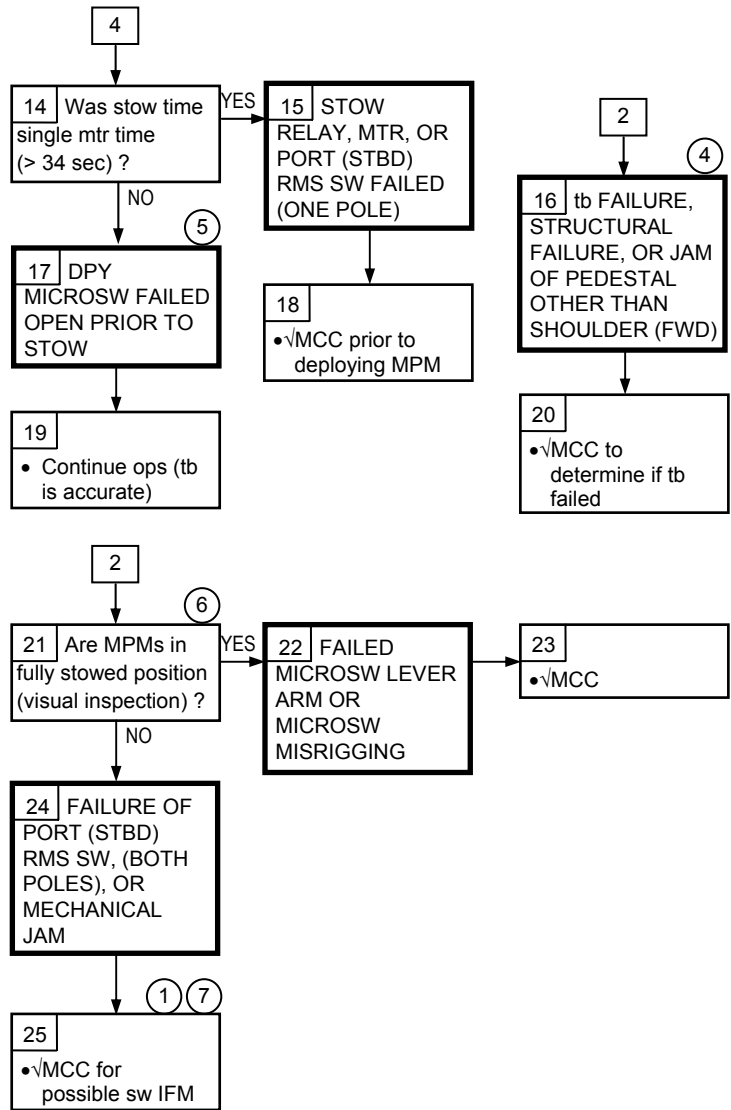
tb Not STO  
or  
SM 94 PDRS CONTROL  
Microsw  
DPY/STO Ind  
Not Nominal  
or  
Single Mtr  
Drive Time  
(> 34 sec)

**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  
AC2 3Φ MID 2 – cl  
(MA73C:D)  
cb MCA PWR  
AC3 3Φ MID 4 – cl



- ① Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
- ② One mtr will continue to run while stowing until PORT (STBD) RMS sw – OFF
- ③ PDRS SSR-1 MPM MTR Inhibit Disable available to regain motor drive in the failed direction

**PDRS 12.5b (Cont)**



① Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

④ To trip port (stbd) tb, signals from all four (three) pedestals are required, i.e., all of SYS 1 or all of SYS 2. SM94 only shows the shoulder (fwd) indications

⑤ One mtr will continue to run while deploying until PORT (STBD) RMS sw – OFF

⑥ RMS should not be used unless shoulder linkage is overcenter locked

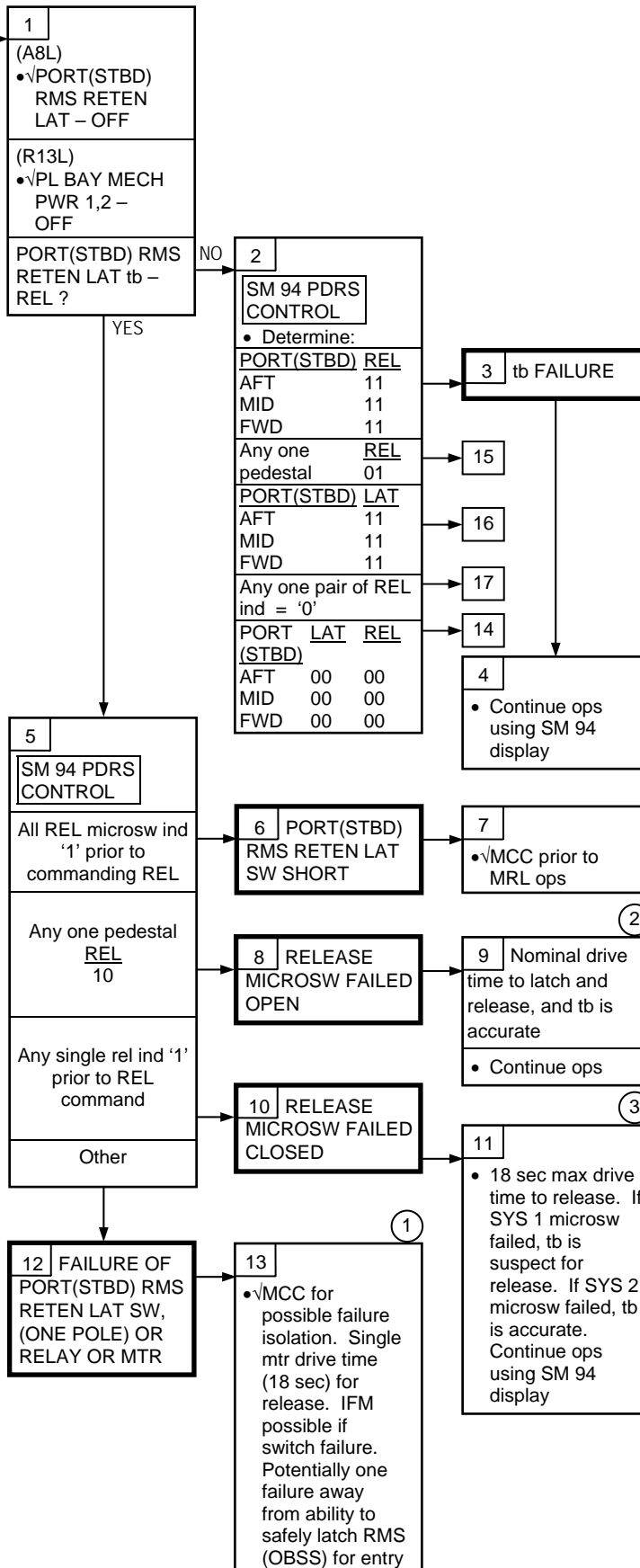
⑦ MCC can determine if switch is failed

**PDRS**

**12.5c MRL REL – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

tb Not REL  
or  
SM 94 PDRS CONTROL  
Microsw Rel/Lat Ind Not Nominal  
or  
Single Mtr Drive Time (> 8 sec)

**Nominal Config:**  
(MA73C:A)  
MCA LOGIC  
MNA MID 1 – ON  
MNB MID 2 – ON  
MNC MID 2 – ON  
(MA73C:B)  
MCA LOGIC  
MNA MID 3 – ON  
MNB MID 4 – ON  
MNC MID 4 – ON  
(MA73C:C)  
cb MCA PWR  
AC1 3Φ MID 1 – cl  
AC2 3Φ MID 2 – cl  
AC3 3Φ MID 2 – cl  
(MA73C:D)  
cb MCA PWR  
AC1 3Φ MID 3 – cl  
AC2 3Φ MID 4 – cl  
AC3 3Φ MID 4 – cl



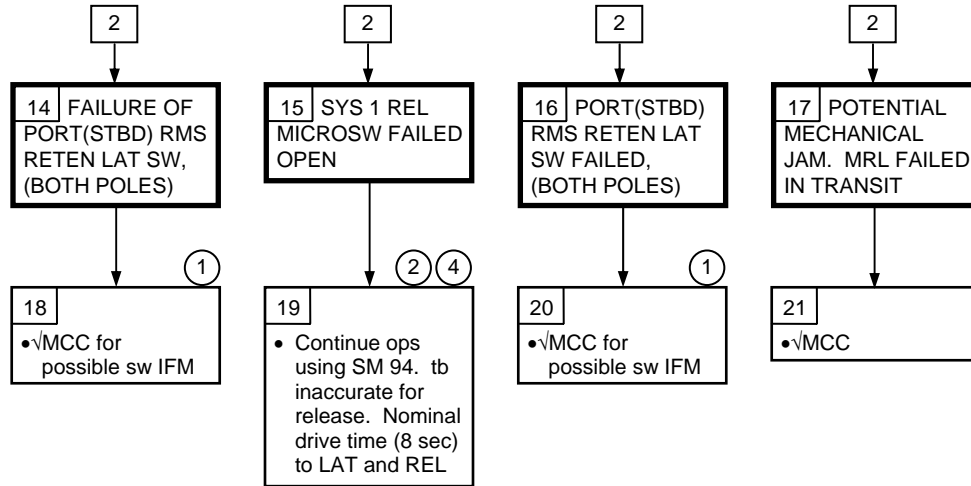
① Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

② One mtr will continue to drive when commanding release until PORT(STBD) RMS RETEN LAT – OFF

③ Failed-on microsw disables one mtr. The tb is inaccurate from 8-18 sec (latch halfway open at 8 sec)

**PDRS**

**12.5c (Cont)**



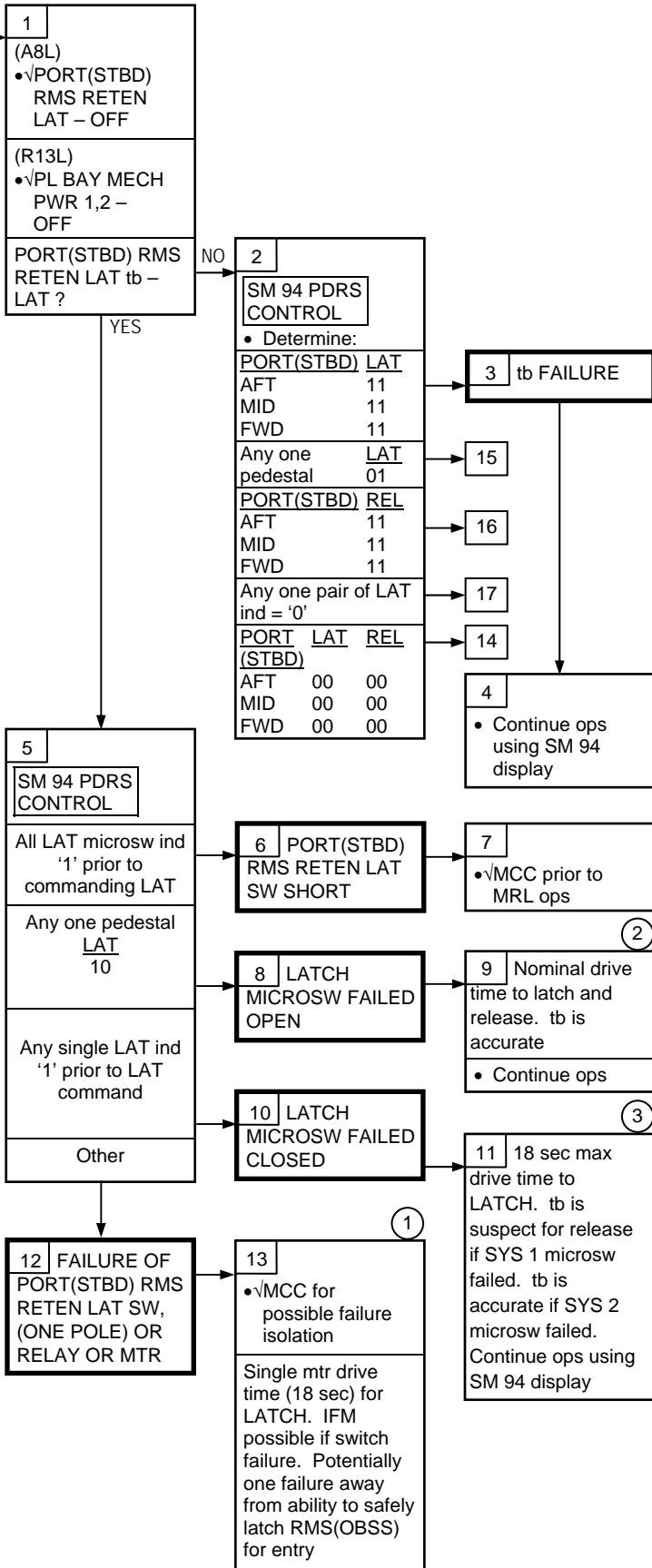
- ① Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)
- ② One mtr will continue to drive when commanding release until PORT(STBD) RMS RETEN LAT – OFF
- ④ tb is activated by receiving all three microsw indications from SYS 1 only

**PDRS**

**12.5d MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME**

tb Not LAT  
or  
SM 94 PDRS CONTROL  
Microsw  
Rel/Lat Ind  
Not Nominal  
or  
Single Mtr  
Drive Time  
(> 8 sec)

**Nominal Config:**  
(MA73C:A)  
MCA LOGIC  
MNA MID 1 – ON  
MNB MID 2 – ON  
MNC MID 2 – ON  
(MA73C:B)  
MCA LOGIC  
MNA MID 3 – ON  
MNB MID 4 – ON  
MNC MID 4 – ON  
(MA73C:C)  
cb MCA PWR  
AC1 3Φ MID 1 – cl  
AC2 3Φ MID 2 – cl  
AC3 3Φ MID 2 – cl  
(MA73C:D)  
cb MCA PWR  
AC1 3Φ MID 3 – cl  
AC2 3Φ MID 4 – cl  
AC3 3Φ MID 4 – cl

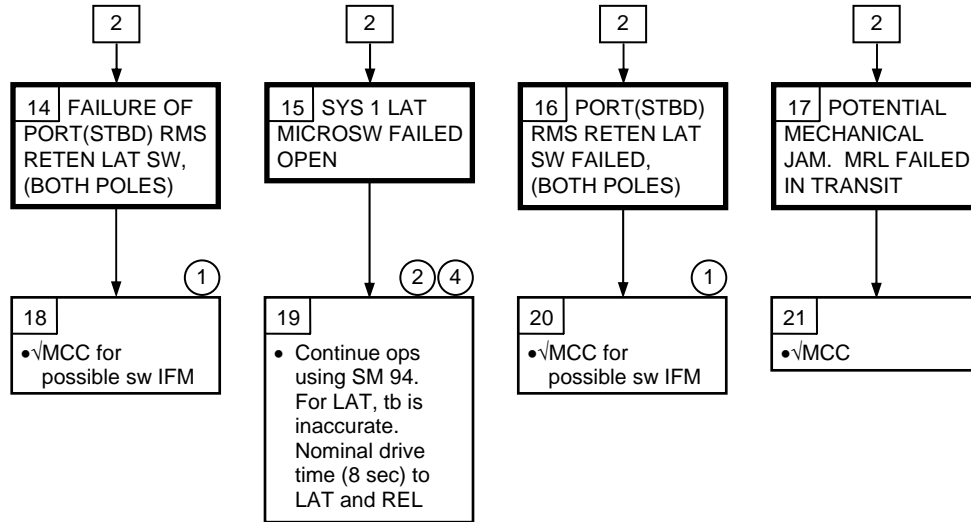


- ① Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE LATCH) (IFM)
- ② One mtr will continue to drive when commanding LATCH until PORT(STBD) RMS RETEN LAT – OFF
- ③ Failed-on microsw disables one mtr. The tb is inaccurate from 8-18 sec (latch halfway closed at 8 sec)



**PDRS**

**12.5d (Cont)**



① Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE/LATCH) (IFM)

② One mtr will continue to drive when commanding LATCH until PORT(STBD) RMS RETEN LAT – OFF

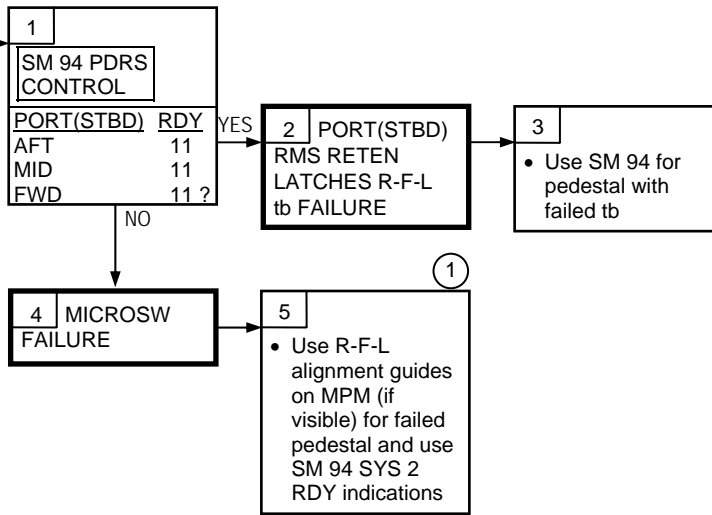
④ tb is activated by receiving all three microsw indications from SYS 1 only

**PDRS**

**12.5e PORT(STBD) RMS RETEN LATCHES R-F-L tb – bp WHEN CRADLED**

PORT(STBD)  
RMS Reten  
Latches R-F-L  
tb – bp

**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



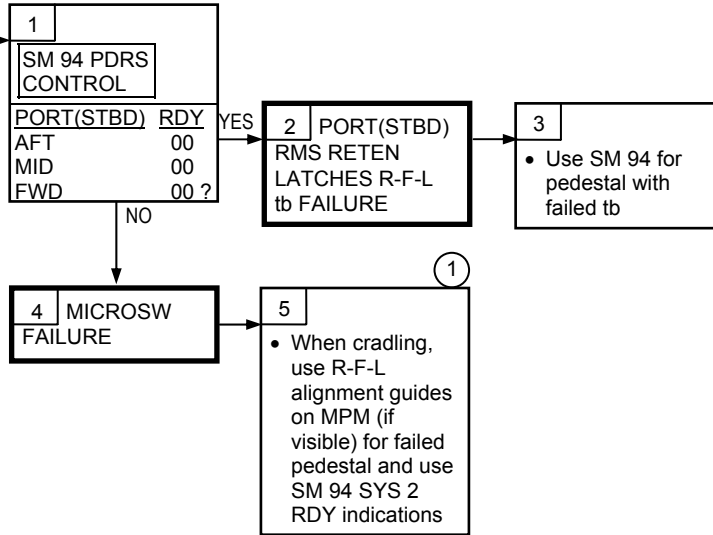
① Inaccurate tb because tb is driven by SYS 1 only

**PDRS**

**12.5f PORT(STBD) RMS RETEN LATCHES R-F-L tb – gray WHEN UNCRADLED**

PORT(STBD)  
RMS Reten  
Latches R-F-L  
tb – gray

**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

PDRS  
SSR

# PDRS SSR-1

## MPM MTR INHIBIT DISABLE

### SM 94 PDRS CONTROL

If PORT MPM STO/DPLY – 1 X 1 X (STBD MPM STO/DPLY – X 1 X 1):

- MA73C:A 1. INHIBIT MICROSWITCH  
MCA LOGIC MNC MID 2 – OFF
- CRT √PORT MPM STO/DPLY – 0 X 0 X (STBD MPM STO/DPLY – X 0 X 0)
- MA73C:D  
R13L 2. STOW(DEPLOY) MPM  
cb MCA PWR AC3 3Φ MID 4 – cl  
PL BAY MECH PWR SYS 2 – ON
- CAUTION**

If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result
- A8L PORT(STBD) RMS – STO(DPY) as reqd (68 sec max)  
– OFF
- CRT √MPM is stowed(deployed) using CRT indication (PORT RMS tb inaccurate):  
Stowed: PORT MPM STO/DPLY – 0 1 0 X (STBD MPM STO/DPLY – 1 0 X 0)  
(Deployed: PORT MPM STO/DPLY – 0 X 0 1 (STBD MPM STO/DPLY – X 0 1 0))
- MCC can verify status of FWD, MID, AFT pedestals
- R13L PL BAY MECH PWR SYS 2 – OFF
- MA73C:A  
A8L 3. ENABLE BUS  
MCA LOGIC MNC MID 2 – ON  
√PORT(STBD) RMS tb – STO(DPY) >>

If PORT MPM STO/DPLY – X 1 X 1 (STBD MPM STO/DPLY – 1 X 1 X):

- MA73C:B 4. INHIBIT MICROSWITCH  
MCA LOGIC MNB MID 4 – OFF
- CRT √PORT MPM STO/DPLY – X 0 X 0 (STBD MPM STO/DPLY – 0 X 0 X)
- MA73C:C  
R13L 5. STOW(DEPLOY) MPM  
cb MCA PWR AC2 3Φ MID 2 – cl  
PL BAY MECH PWR SYS 1 – ON
- CAUTION**

If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result
- A8L PORT(STBD) RMS – STO(DPY) as reqd (68 sec max)  
– OFF
- CRT √MPM is stowed(deployed) using CRT indication:  
Stowed: PORT MPM STO/DPLY – 1 0 X 0 (STBD MPM STO/DPLY – 0 1 0 X)  
(Deployed: PORT MPM STO/DPLY – X 0 1 0 (STBD MPM STO/DPLY – 0 X 0 1))
- MCC can verify status of FWD, MID, AFT pedestals
- R13L PL BAY MECH PWR SYS 1 – OFF
- MA73C:B  
A8L 6. ENABLE BUS  
MCA LOGIC MNB MID 4 – ON  
√PORT(STBD) RMS tb – STO(DPY)

PDRS  
SSR

# PDRS SSR-3 BACKDRIVE TECHNIQUE – JOINT FREE

## SP – FAILED

<p style="text-align: center;"><b>WARNING</b> PORT RADIATOR must be stowed</p>
--

### NOTE

Can expect CONTR ERR and Master Alarm

#### 1. SETUP

If RADIATORS deployed:  
Perform RAD STOW (ORB OPS, ECLS)

√BRAKES – ON (tb-ON)  
PARAM sel – JOINT ANGLE

√DAP: VERN(FREE)

If SP < 7.5 deg, go to step 3

Calculate IC: If SP < 45, IC = -(2 x SP)  
Otherwise, IC = -90

MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
+ 75	FREE	IC	0	0	0

MODE – not DIRECT (It off)

**SM 94 PDRS CONTROL**

AUTO BRAKE INH – ITEM 10 EXEC (\*)

#### 2. BACKDRIVE OPERATION

### NOTE

Hold SINGLE DR command for 4 sec,  
apply BRAKES – ON, then release  
SINGLE DR command

RATE – COARSE (RATE MIN tb-OFF)

JOINT sel – EP  
BRAKES – OFF (tb-OFF)  
MODE – SINGLE, ENTER

SINGLE DR – '+' after 4 sec and while holding sw  
BRAKES – ON (tb-ON)

If SP < 7.5 deg, go to step 3

If EP ≥ -15 deg, reconfig EP:  
MODE – DIRECT (It on)  
DIRECT DR EP to: -(2 x SP) or max -90  
MODE – not DIRECT (It off)

Repeat step 2

## PDRS SSR-3 (Cont)

### 3. RECONFIG JOINTS FOR CRADLE

<b>CAUTION</b> Use CCTVs to monitor proximity of RMS to orbiter
---

√BRAKES – ON (tb-ON)  
MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
CURRENT VALUE	FREE	+1	+10	0	0
0					
		-1			

MODE – not DIRECT (It 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  $EP \geq +1$  deg, reconfig EP:  
MODE – DIRECT (It on)  
DIRECT DR EP to: 0  
MODE – not DIRECT (It off)

Repeat step 4

### 5. COMPLETE RMS CRADLE

√BRAKES – ON (tb-ON)  
MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	FREE	0	0	0	0

MODE – not DIRECT (It off)

√PORT RMS R-F-L tb (three) – gray

Go to step 3, RMS PWRDN (PDRS OPS) >>

# PDRS SSR-3 (Cont)

## EP – FAILED

### NOTE

Can expect CONTR ERR and Master Alarm

### 1. SETUP

√BRAKES – ON (tb-ON)  
PARAM sel – JOINT ANGLE

√DAP: VERN(FREE)

If EP ≥ -1 deg, go to step 3

Calculate IC: If EP > -65, IC = -(2 x EP)  
Otherwise, IC = +130

MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
CURRENT VALUE	IC	FREE	+5	0	0
0					

MODE – not DIRECT (It off)

SM 94 PDRS CONTROL

AUTO BRAKE INH – ITEM 10 EXEC (\*)

### 2. BACKDRIVE OPERATION

#### NOTE

Hold SINGLE DR command for 4 sec  
Apply BRAKES – ON, then release  
SINGLE DR command

RATE – COARSE (RATE MIN tb-OFF)

JOINT sel – SP  
BRAKES – OFF (tb-OFF)  
MODE – SINGLE, ENTER

SINGLE DR – ‘.’ after 4 sec and while holding sw  
BRAKES – ON (tb-ON)

If EP ≥ -1 deg, go to step 3

If SP < -(EP), reconfig SP:  
MODE – DIRECT (It on)  
DIRECT DR SP to: -(2 x EP) or max +130  
MODE – not DIRECT (It off)

Repeat step 2

### PDRS SSR-3 (Cont)

3. RECONFIG FOR CRADLE

√BRAKES – ON (tb-ON)  
MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
CURRENT VALUE	+ 15	FREE	+ 10	0	0
0					

MODE – not DIRECT (It 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 (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	0	FREE	0	0	0

MODE – not DIRECT (It 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 CONTR ERR and Master Alarm

#### 1. SETUP

- √BRAKES – ON (tb-ON)
- √DAP: VERN(FREE)
- MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	+ 90	- 90	FREE	0	+ 19.5

MODE – not DIRECT (It off)

PARAM sel – JOINT ANGLE

SM 94 PDRS CONTROL

AUTO BRAKES INH – ITEM 10 EXEC (\*)

#### 2. BACKDRIVE OPERATION (To config $-0.1 \leq WP \leq +0.1$ 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  $-0.1 \leq WP \leq +0.1$ , go to step 2c

If  $SP > 120$  deg or  $< 60$  deg, go to step 3

If  $WP < -0.1$  deg, repeat step 2a

If  $WP > +0.1$  deg, go to step 2b

##### 2b. If $WP > +0.1$ deg

√RATE sw – COARSE (RATE MIN tb-OFF)  
If  $WP < +2.0$  deg,  
RATE sw – VERN (RATE MIN tb-ON)

√JOINT sel – WP  
BRAKES – OFF (tb-OFF)  
MODE – END EFF, ENTER

THC – ‘+Z’ (DOWN) 1/3 to 1/2 deflection

After 2-3 sec,  
THC – ‘-Z’ (UP) full deflection

When WP joint angle is constant:  
BRAKES – ON (tb-ON)  
Release THC

## PDRS SSR-3 (Cont)

If  $-0.1 \leq WP \leq +0.1$ , 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:

SY	SP	EP	WP	WY	WR
0	CURRENT VALUE	<u>+ 1 MA</u>	FREE	0	<u>0</u>
	<u>0 (MA)</u>	<u>0</u>			

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:

SY	SP	EP	WP	WY	WR
0	+ 90	- 90	FREE	0	+ 19.5

MODE – not DIRECT (lt off)

If  $WP < -0.1$  deg, go to step 2a

If  $WP > +0.1$  deg, go to step 2b

# PDRS SSR-3 (Cont)

## WY – FAILED

### NOTE

Can expect CONTR ERR and Master Alarm. Can also expect SINGULAR if WY is between +75 and +105 degrees or if the WY is between -75 and -105 degrees

#### 1. SETUP

- √BRAKES – ON (tb-ON)
- √DAP: VERN(FREE)
- MODE – DIRECT (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	+ 90	- 90	0	FREE	+ 19.5

MODE – not DIRECT (It off)  
PARAM sel – JOINT ANGLE

**SM 94 PDRS CONTROL**

AUTO BRAKE INH – ITEM 10 EXEC (\*)

#### 2. BACKDRIVE OPERATION (To config $-0.1 \leq WY \leq +0.1$ deg)

### NOTE

For steps 2a and 2b, THC input will be at 1/3 to 1/2 deflection. After 2-3 sec, quickly command full scale deflection in opposite direction. When WY joint angle displayed is constant, apply BRAKES – ON and release THC

##### 2a. If WY < -0.1 deg

RATE sw – COARSE (RATE MIN tb-OFF)  
If WY > -2.0 deg,

RATE sw – VERN (RATE MIN tb-ON)

- √JOINT sel – WY
- BRAKES – OFF (tb-OFF)
- MODE – END EFF, ENTER

THC – '+Y' (Right) 1/3 to 1/2 deflection

After 2-3 sec,  
THC – '-Y' (Left) full deflection

When WY joint angle is constant:  
BRAKES – ON (tb-ON)  
Release THC

If  $-0.1 \leq WY \leq +0.1$  deg, go to step 2c

If SP < 60 deg or EP > -60 deg, go to step 3

If WY < -0.1 deg, repeat step 2a

If WY > +0.1 deg, go to step 2b

##### 2b. If WY > +0.1 deg

- √RATE sw – COARSE (RATE MIN tb-OFF)
- If WY < +2.0 deg,
- RATE sw – VERN (RATE MIN tb-ON)

- √JOINT – WY
- BRAKES – OFF (tb-OFF)
- MODE – END EFF, ENTER

THC – '-Y' (Left) 1/3 to 1/2 deflection

After 2-3 sec,  
THC – '+Y' (Right) full deflection

When WY joint angle is constant:  
BRAKES – ON (tb-ON)  
Release THC

## PDRS SSR-3 (Cont)

If  $-0.1 \leq WY \leq +0.1$  deg, go to step 2c

If  $SP < 60$  deg or  $EP > -60$  deg, go to step 3

If  $WY > +0.1$  deg, repeat step 2b

If  $WY < -0.1$  deg, go to step 2a

2c. If  $-0.1 \leq WY \leq 0.1$  deg

√BRAKES – ON (tb-ON)  
MODE – DIRECT (It on)

DIRECT DR to cradle:

SY	SP	EP	WP	WY	WR
0	CURRENT VALUE	+ 1 MA	+ 5	FREE	0
	<u>0</u>	<u>0</u>	<u>0</u>		

MODE – not DIRECT (It 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 (It on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	+ 90	- 90	0	FREE	+ 19.5

MODE – not DIRECT (It off)

If  $WY < -0.1$  deg, go to step 2a

If  $WY > +0.1$  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-LOADED/RELEASE (Cue Card)

### 1. SETUP

Install RMS IFM D&C KIT, RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM, PROCEDURES M THRU R)

A8L RMS PWR – PRI (MA)  
**SM 94 PDRS CONTROL**  
I/O ON – ITEM 5 EXEC (\*)

A8L RMS SEL – PORT  
A8U SAFING – CANCEL (tb-gray)

### 2. SHOULDER BRACE RELEASE

If Shoulder Brace still engaged:  
O19 COAS PWR – ON

D&C Kit SHOULDER BRACE – RELEASE (Hold for 2 sec following tb-gray on pnl A8U)

O19 COAS PWR – OFF  
Go to step 7

### 3. INITIAL D&C KIT POWERUP FOR END EFFECTOR/DIRECT DRIVE

Position RMS/payload at least 5 ft away from structure, using best available mode on pnl A8U

D&C Kit If unloaded:  
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

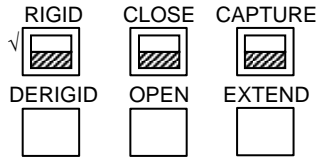
O19 DC UTIL PWR MNA – ON  
√No arm/payload motion  
DC UTIL PWR MNA – OFF

# PDRS SSR-4 (Cont)

## 4. UNLOADED END EFFECTOR TEST (Reqd for End Effector ops, Direct Drive)

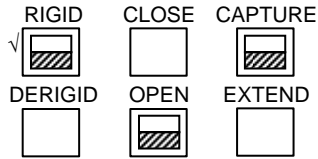
**CAUTION**  
End Effector test must be completed within  
2.5 min of DC UTIL PWR MNA sw – ON  
or End Effector mtr burnout could occur

A8U      √BRAKES – ON (tb-ON)  
          √tb(s)



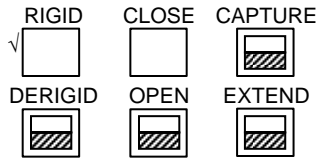
O19      DC UTIL PWR MNA – ON  
          √No tb(s) change

D&C Kit      EE CAPTURE/RELEASE sw – CAPTURE, until CLOSE tb – gray (3 sec max)



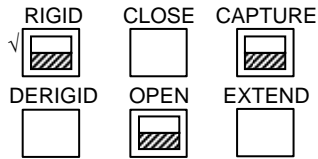
√No tb(s) change after capture

EE RIGID/DERIGID sw – RIGID, until RIGID tb – gray (25 sec max)



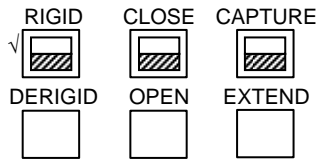
√No tb(s) change after rigidizing

EE RIGID/DERIGID sw – DERIGID; until DERIGID,EXTEND tb – gray (25 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)



O19 DC UTIL PWR MNA – OFF

To extinguish DERIGIDIZE It, take EE MAN CONTR sw to RIGID momentarily or cycle RMS SEL sw

A8U 5. DIRECT DRIVE TEST (For Direct Drive ops only)  
√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 It on, 'PDRS SLIP' for driven joint, and 'S96 PDRS ABE' for five undriven joints)

For other joints:  
Drive '+'  
√Correct joint responses  
(Expect MA, CK CRT It on, 'PDRS SLIP' for driven joint, and 'S96 PDRS ABE' for five undriven joints)

O19 DC UTIL PWR MNA – OFF

### 6. END EFFECTOR/DIRECT DRIVE

NOTE  
(Pnl O19) DC UTIL PWR MNA sw – OFF immediately after  
completing Direct Drive, or End Effector ops, or when  
unattended

DC UTIL PWR MNA – ON

Perform RMS IFM D&C Kit End Effector/Direct Drive function as reqd

DC UTIL PWR MNA – OFF

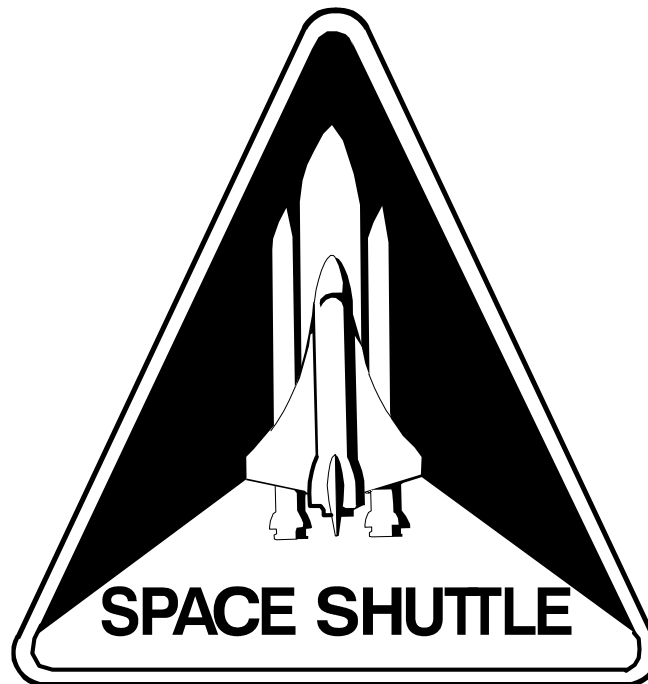
### 7. RECONFIG

Remove RMS IFM D&C KIT, RMS CONTINGENCY OPERATION/INSTALLATION  
AND REMOVAL OF THE RMS IFM D&C KIT (IFM, PROCEDURES M THRU R)

Power up RMS if further ops reqd  
Refer to ON-ORBIT INITIALIZATION, step 2 and RMS POWERUP, step 2 (PDRS OPS)  
(Note: disregard joint angle and position data in the nominal procedures if arm not starting at cradle)

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**MALFUNCTION  
PROCEDURES**

**STS  
ALL**