

Malfunction Procedures

**Mission Operations Directorate
Operations Division**

**Generic, Rev J
October 20, 2008**

NOTE

For STS-126 and subsequent flights

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



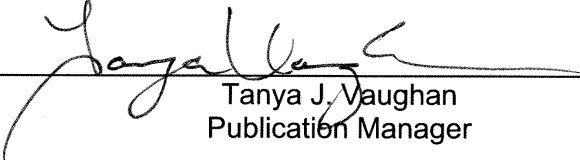
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MISSION OPERATIONS DIRECTORATE

MALFUNCTION PROCEDURES

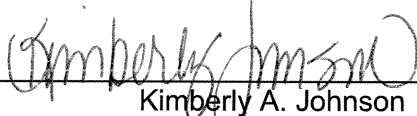
GENERIC, REVISION J
October 20, 2008

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MALFUNCTION PROCEDURES

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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

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

SM
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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
↑ ¹ 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

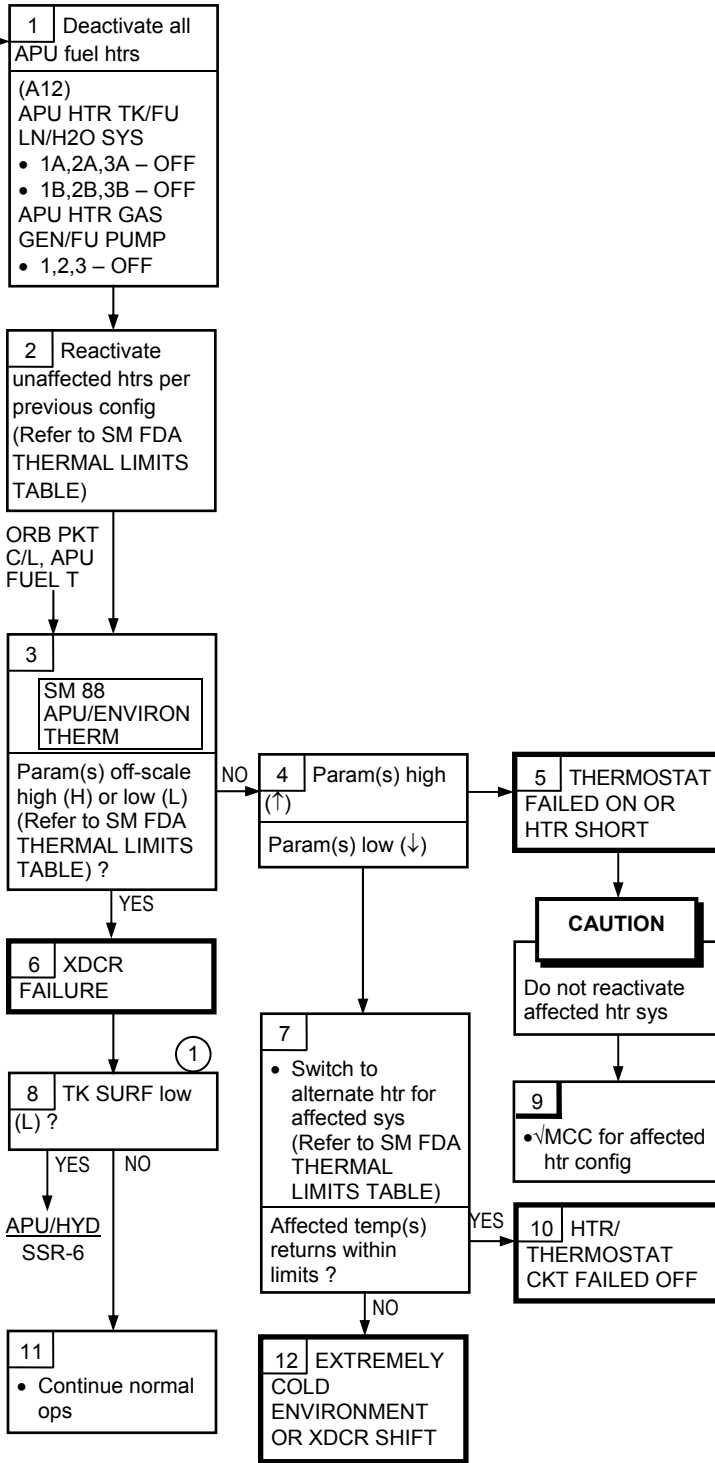
S88 APU FU LN 1(2,3)
 If APU FUEL T: TEST LN 1 1(2,3) < 45 degF > 110 degF or TEST LN 2 1(2,3) < 45 degF > 150 degF or FEED LN 1(2,3) < 45 degF > 120 degF or PUMP IN 1(2,3) < 45 degF > 125 degF or PUMP DRN LN 1 1(2,3) < 43 degF > 95 degF or PUMP DRN LN 2 < 43 degF 1(3) < 48 degF 2 > 140 degF 1(3) > 195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

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S86 FU TK
VLV 1(2,3)

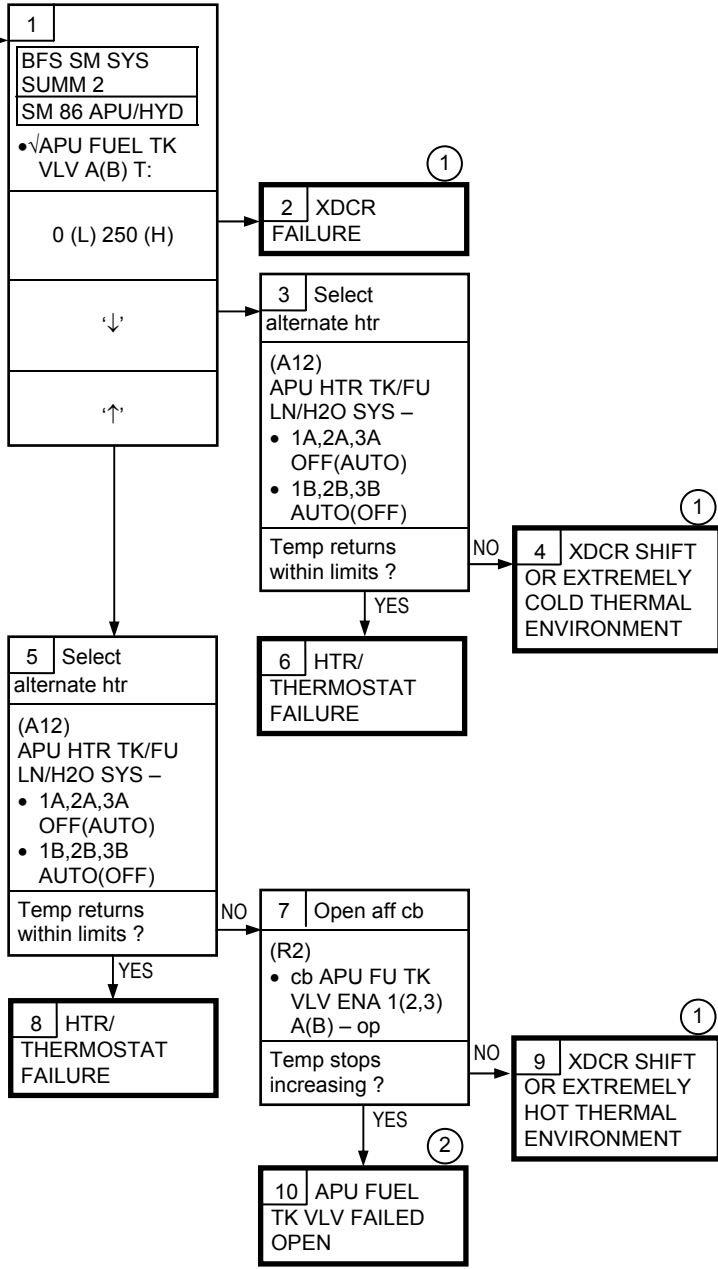
BFS

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)

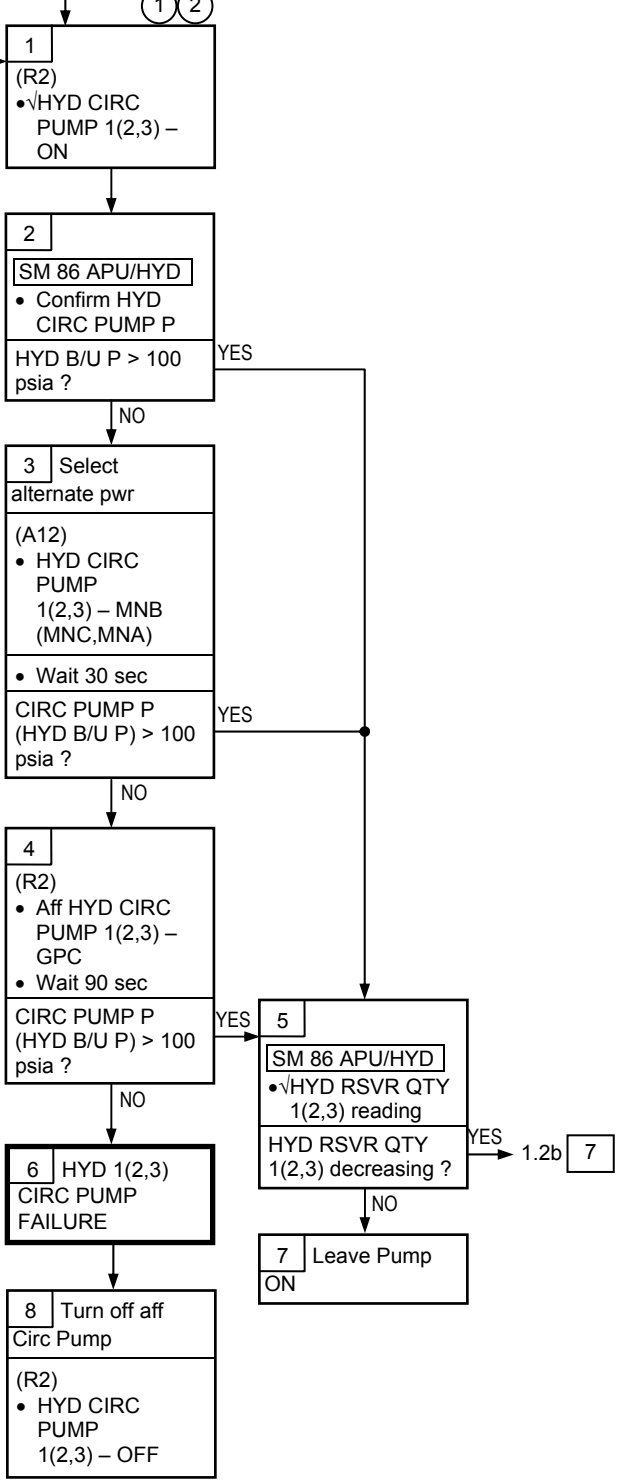
If:
 HYD 1(2,3)
 ACCUM 32 < P < 1930 psia
 and/or
 HYD 1(2,3) RSVR
 2 < P < 28 psia

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

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



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

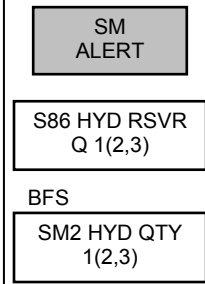
② ACCUM P MGMT software is designed to turn on Circ Pump before pressure decay causes FDA alarm to ring, if Circ Pump sw is in GPC

HYD

1.2

APU/HYD

1.2b HYD RSVR QTY ↑↓

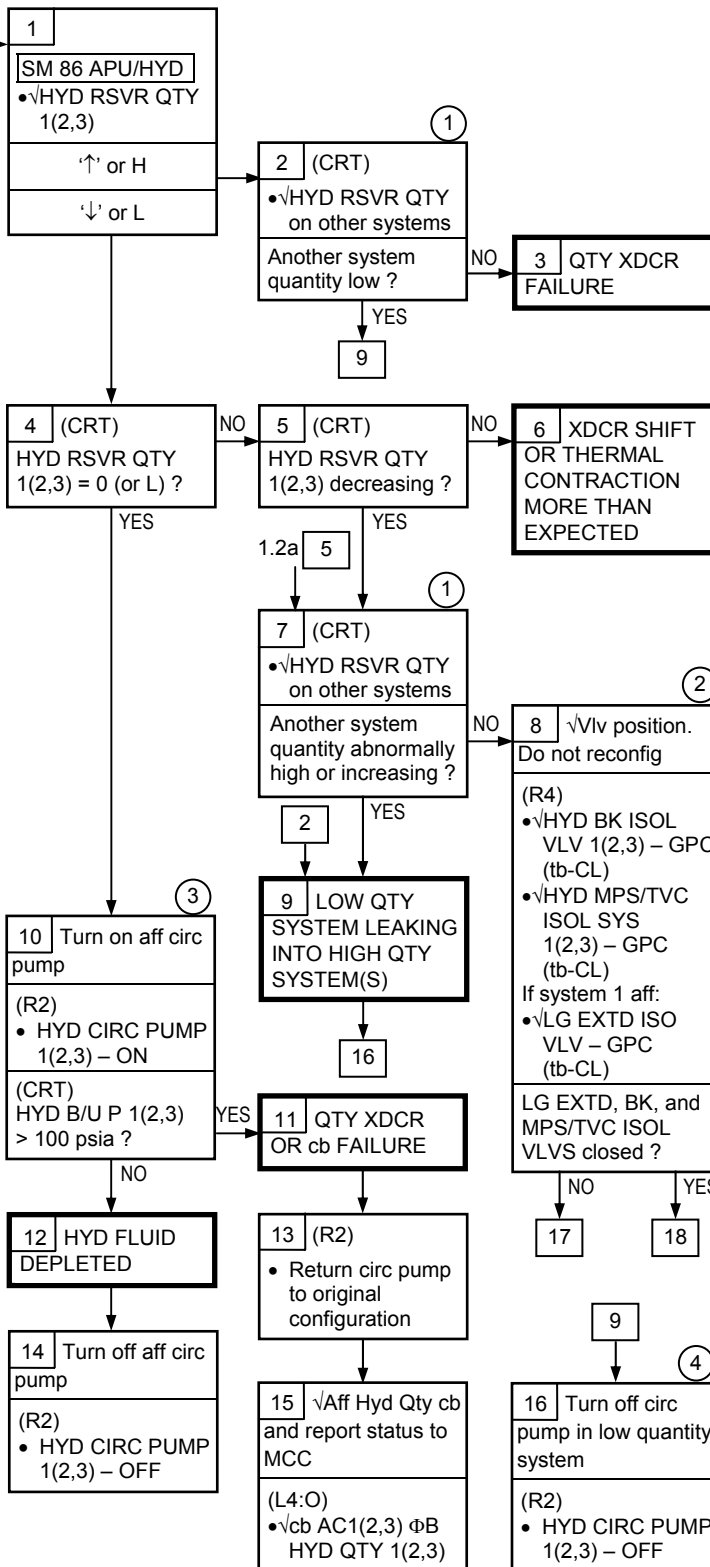


If:
HYD RSVR QTY 1(2,3) < 40% or > 95%

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

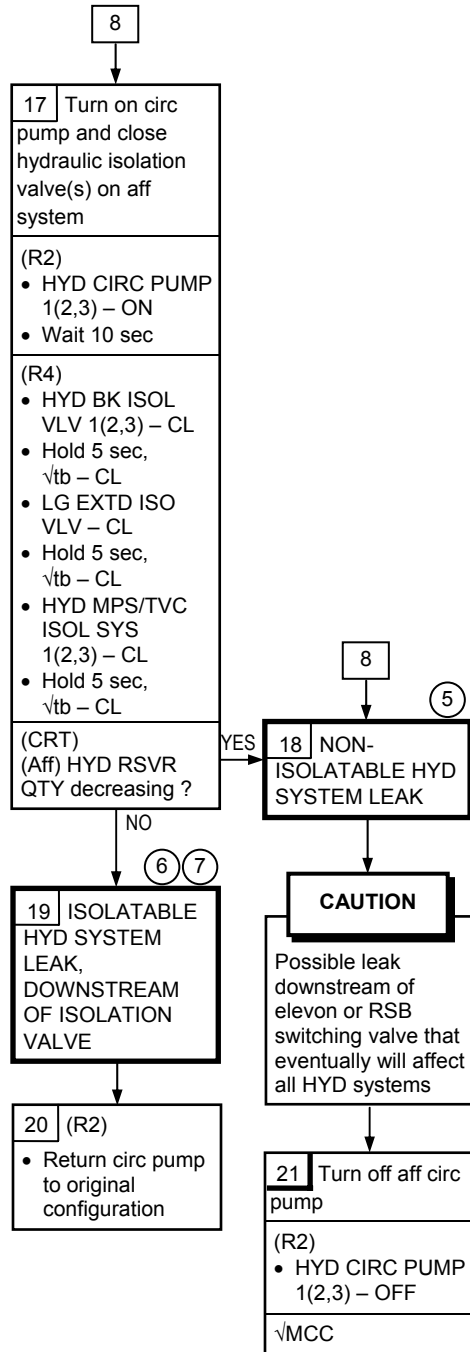
APU OFF Config:
(R2)
HYD MN PUMP PRESS (three) – NORM
HYD CIRC PUMP (three) – GPC (ON)
BLR CNTLR/HTR (three) – A(B)
BLR PWR (three) – OFF
BLR N2 SPLY (three) – OFF

(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

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-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 lts *
* 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 (*) *
10. APU SHUTDOWN
R2 BLR PWR X – OFF
APU OPER X – OFF
FU TK VLV X – CL
√Shutdn (HYD PRESS < 200)
APU CNTLR PWR X – OFF
BLR N2 SPLY X – OFF
11. HYD RECONFIG
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)
O14:F, ASA (four) – OFF
O15:F,
O16:F
O17:A ATVC (four) – OFF

APU/HYD SSR-6

APU FU TK SURF T XDCR FAILURE WORKAROUND

Inputting a temperature constant for the APU Fuel Comp

1. For APU 1 QTY:

SM 88 APU/ENVIRON THERM

Note: APU FUEL T 1 TK HTR

SM 60 SM TABLE MAINT

ITEM 16 +0 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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	SSR-22 OL2	2-52
	SSR-23 OR1	2-53
	SSR-24 OR2	2-54
	SSR-25 OM1	2-55
	SSR-26 OM2	2-56
	SSR-27 OA1	2-57
	SSR-28 OA2	2-58
	SSR-29 OA3	2-59
	SSR-30 OM3	2-60

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

TFL FAIL
S76 COMM CAMR OVERTEMP
PA2(1) OVERTEMP
PA2(1) OUTPUT LO
NSP 2(1) BITE
COMSEC 2(1) BITE
BCE BYP KU

COMM

2

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AUDIO

2.1

COMM

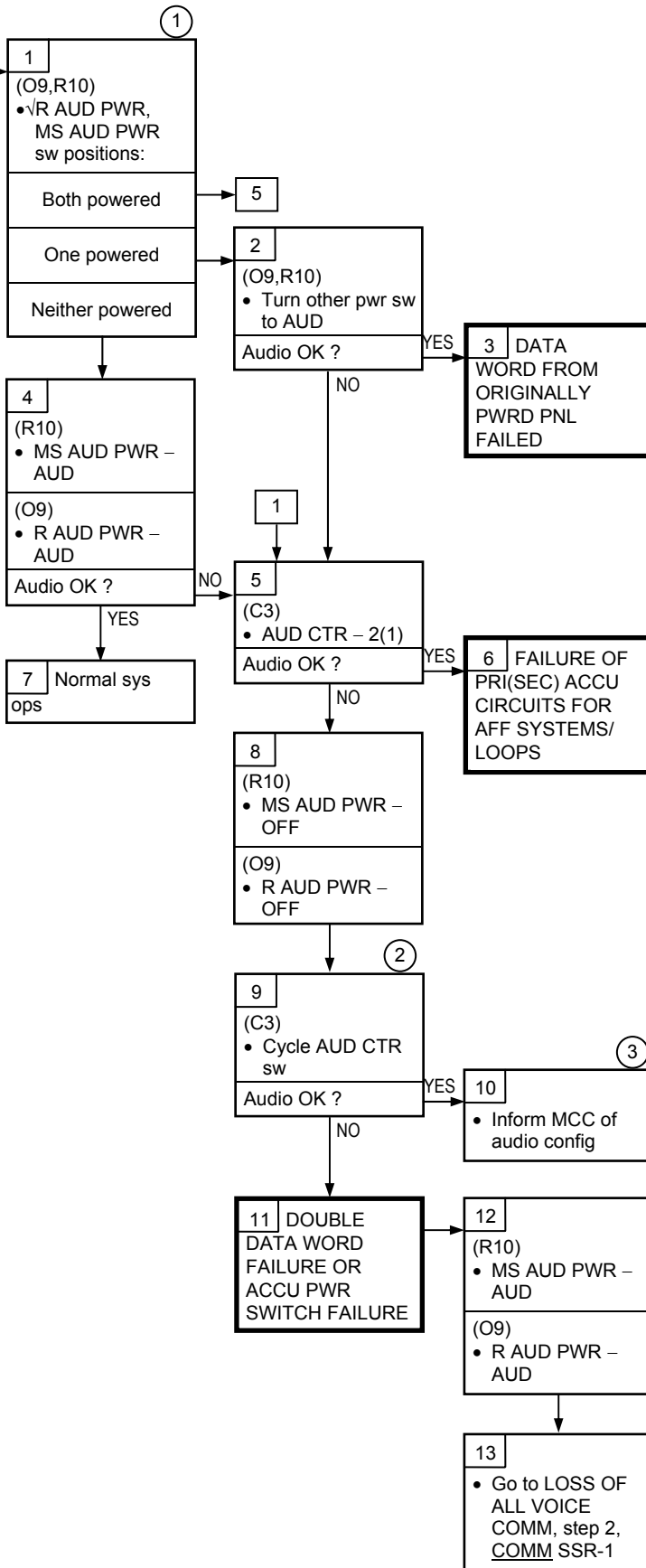
**2.1a NO AUDIO
(MULTIPLE PNL OR OTHER SUBSYSTEM)**

- 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 ↑

2

If AOS:
•√MCC

If LOS:
(A1U)
• KU PWR – STBY
• KU CNTL – PNL,CMD

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

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

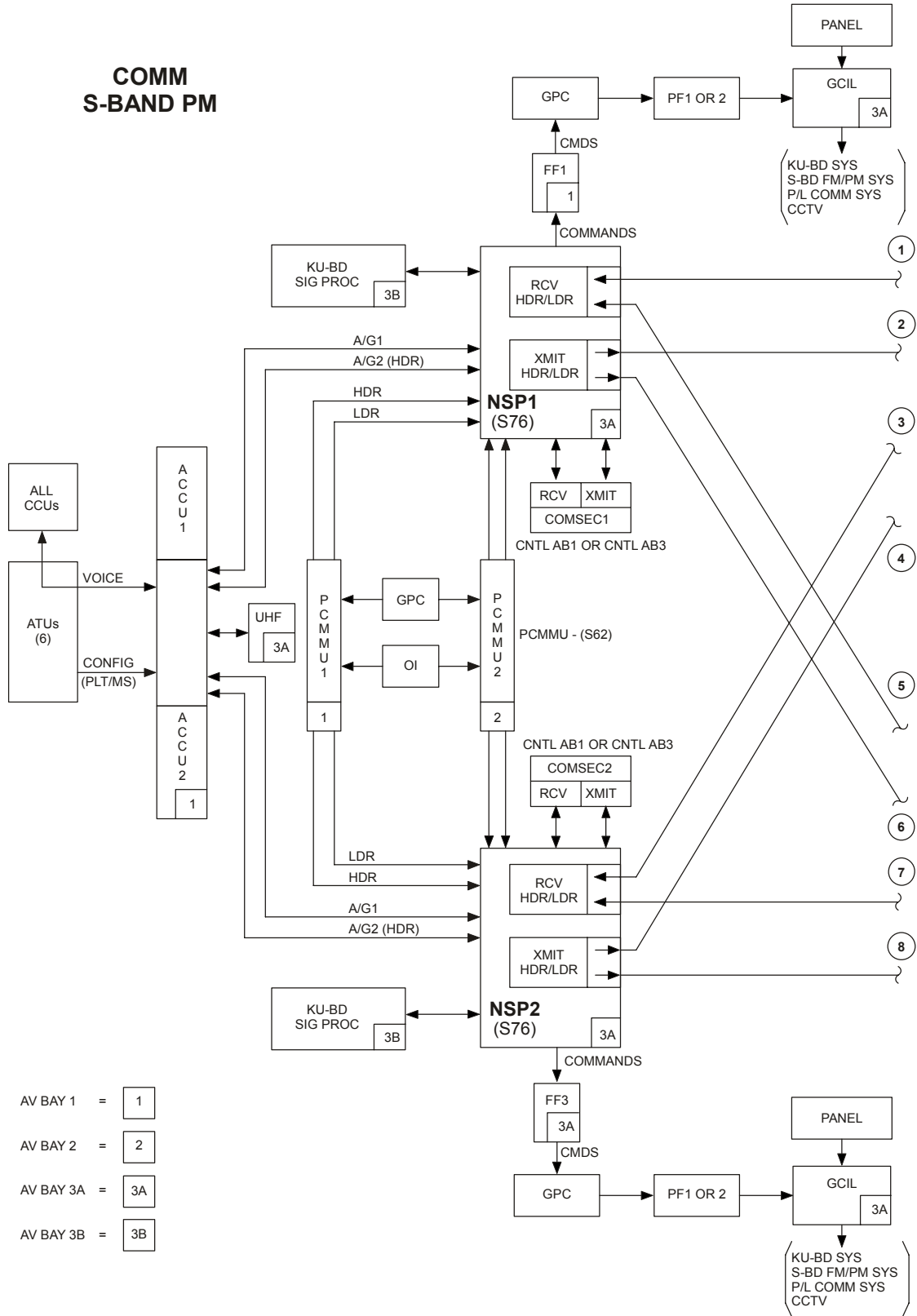
GCIL/KU
COMM

2.2

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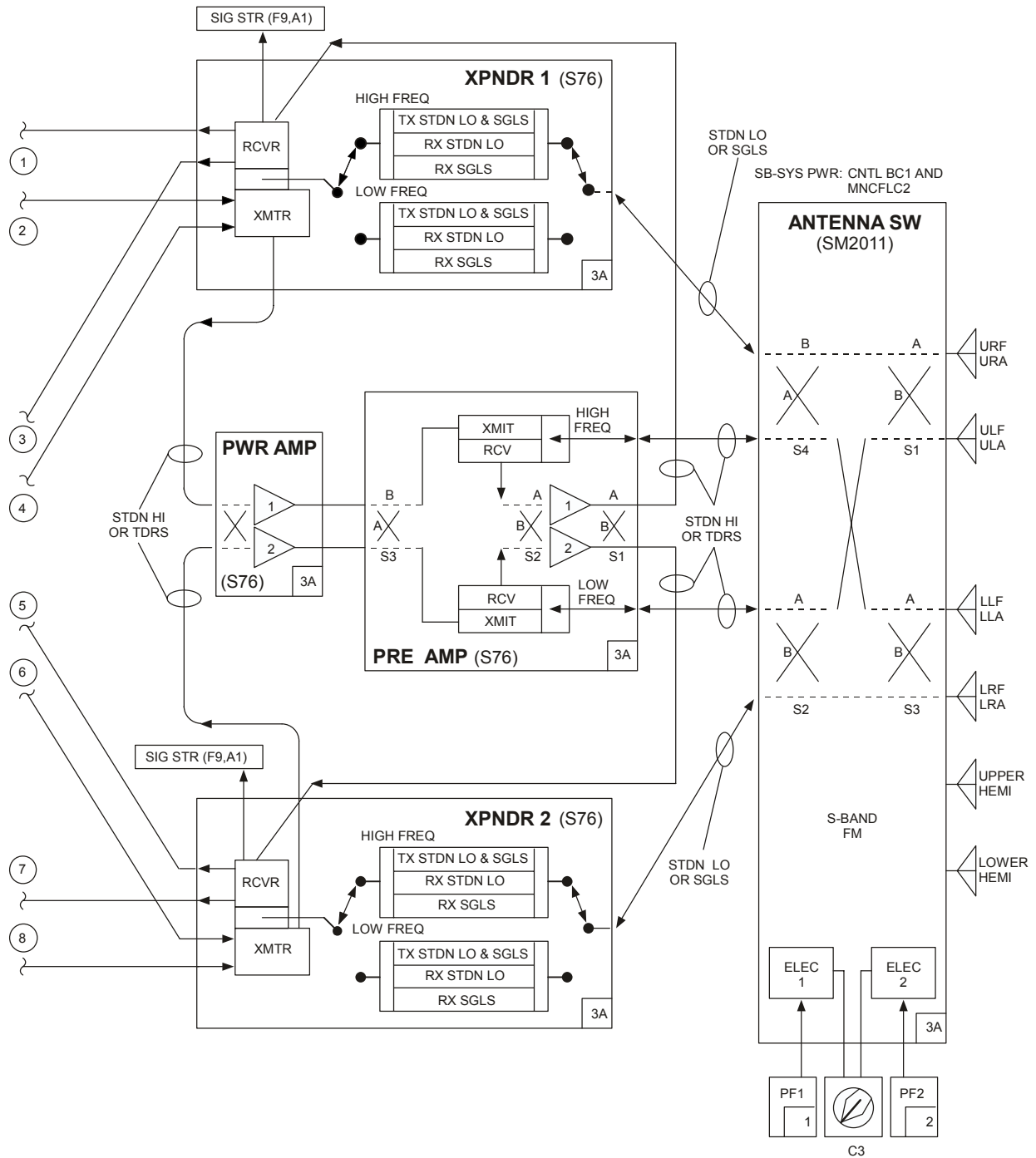
SB-SYS 1 PWR: CNTLBC1 AND MNBFLC2

COMM S-BAND PM



S-BD/UHF

SB-SYS 2 PWR: CNTLBC2 AND MNCFLC3



UPLINK/DOWNLINK COMMUNICATIONS TABLE

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

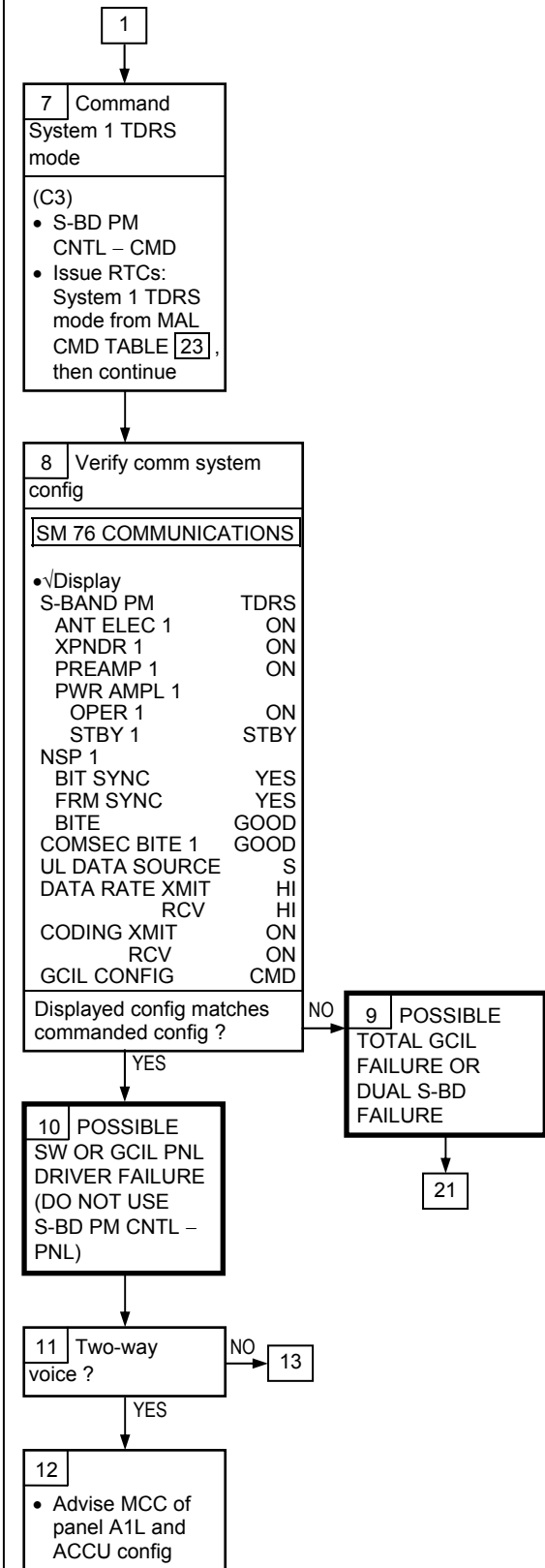
21

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

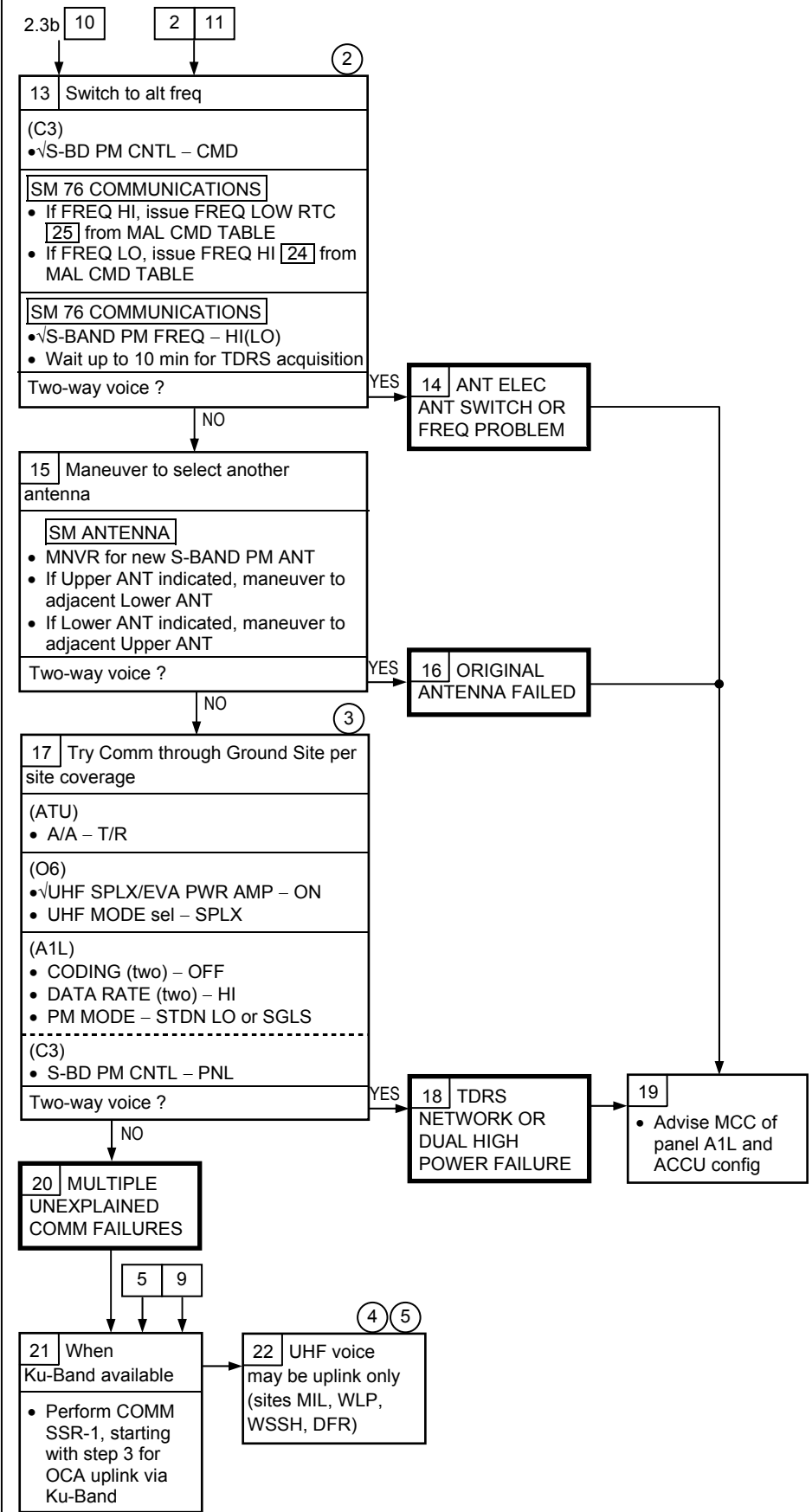
6
• Advise MCC of panel A1L and ACCU config

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

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

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

COMM

2.3b 'ANTENNA'

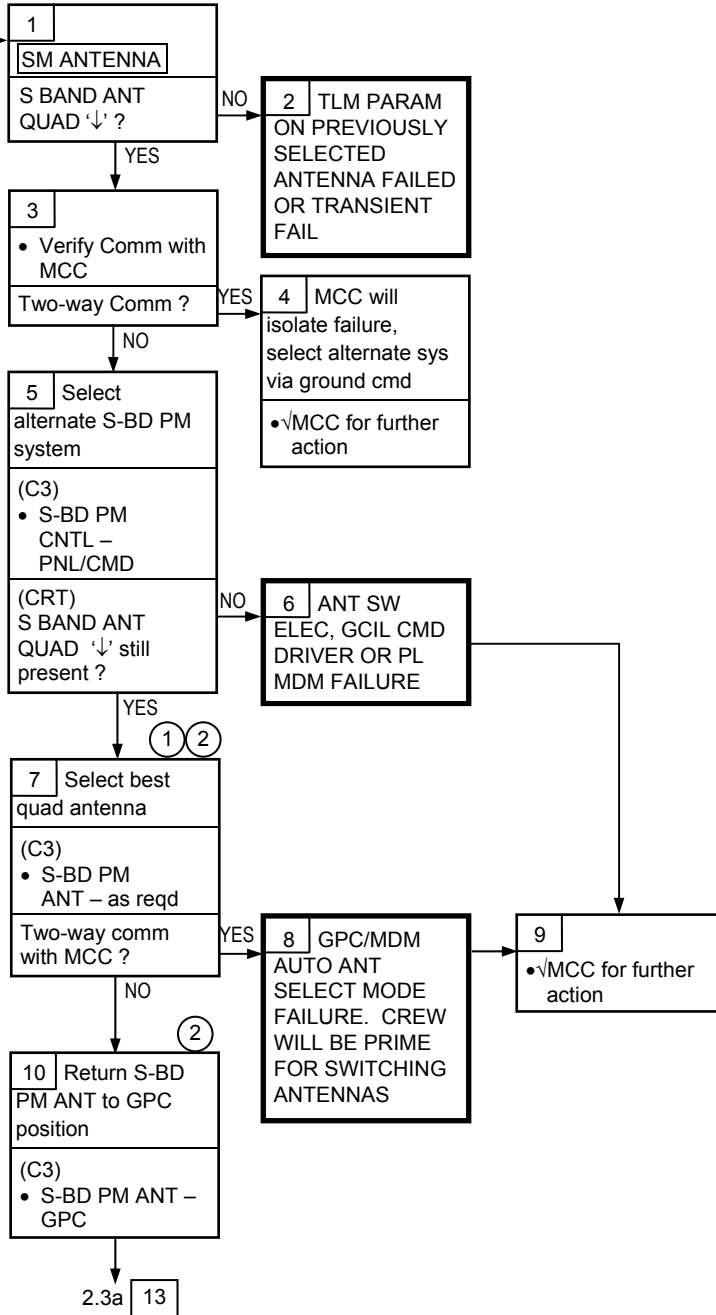
SM ALERT

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

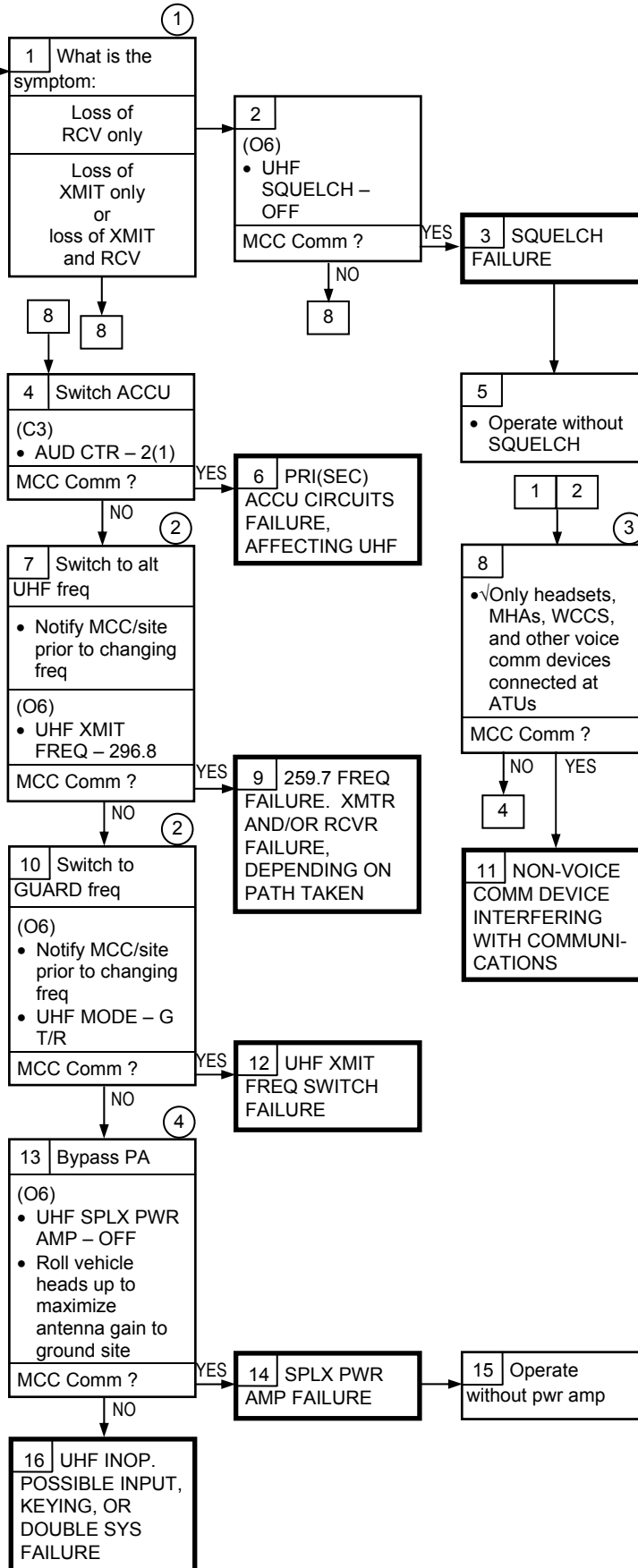
② Pause 2 sec between antenna selections

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

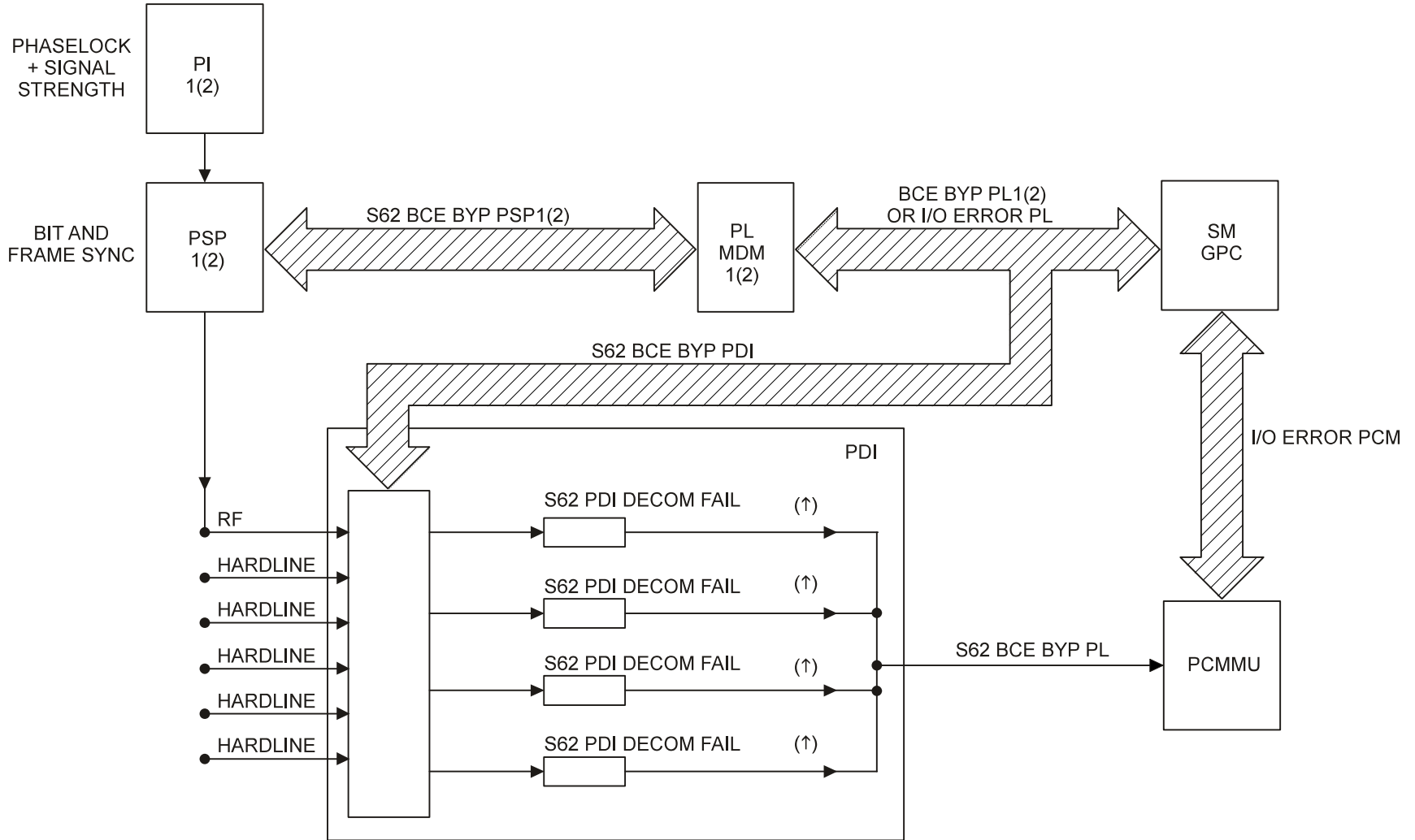
② Up to 30 sec may be reqd for MCC/site response

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



09/23/08

2-18

MAL/ALL/GEN J

COMM

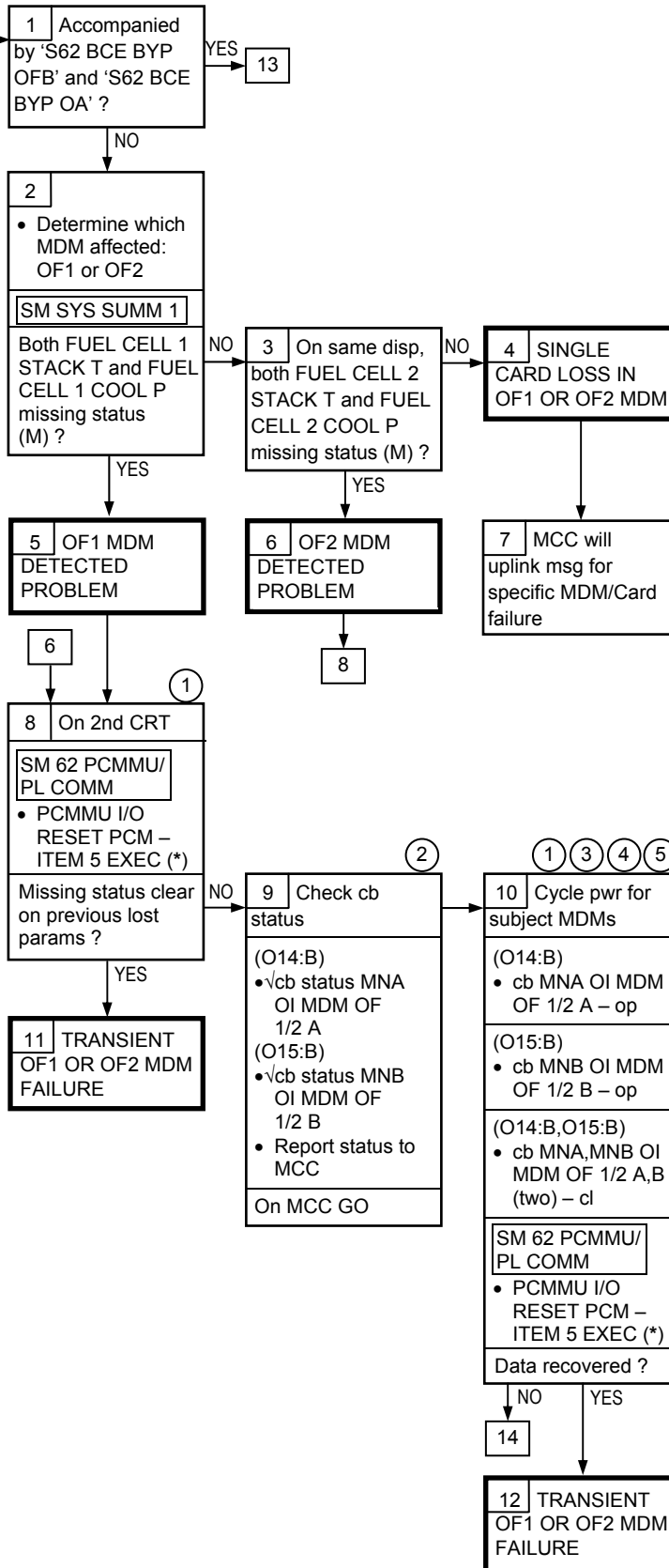
2.4a 'S62 BCE BYP OFA'

SM ALERT

S62 BCE BYP OFA

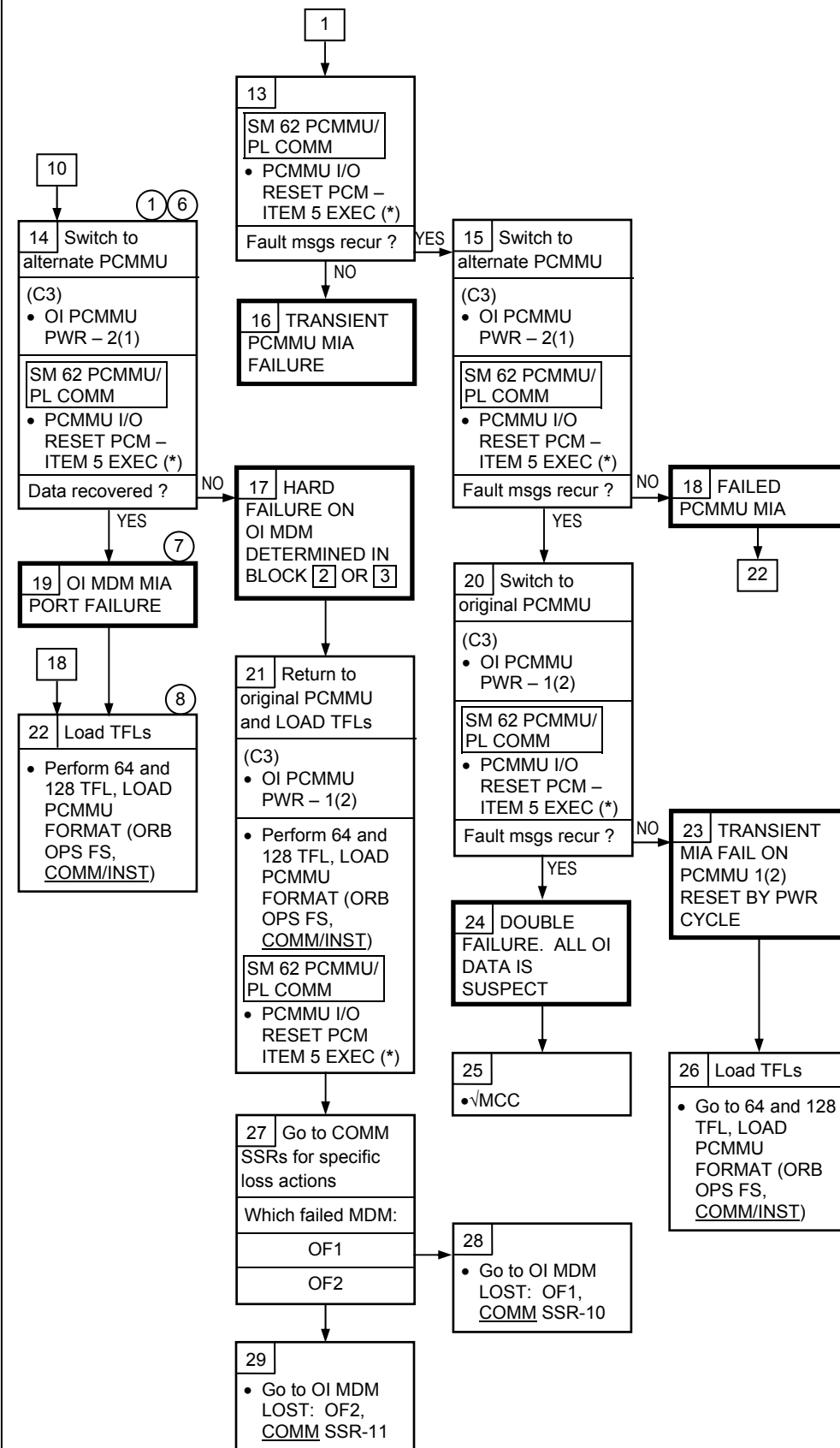
If:
OF1 or OF2 MDM failure, or Card failure in OF1 or OF2, or OF1/OF2 MDM data path PCMMU failure

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

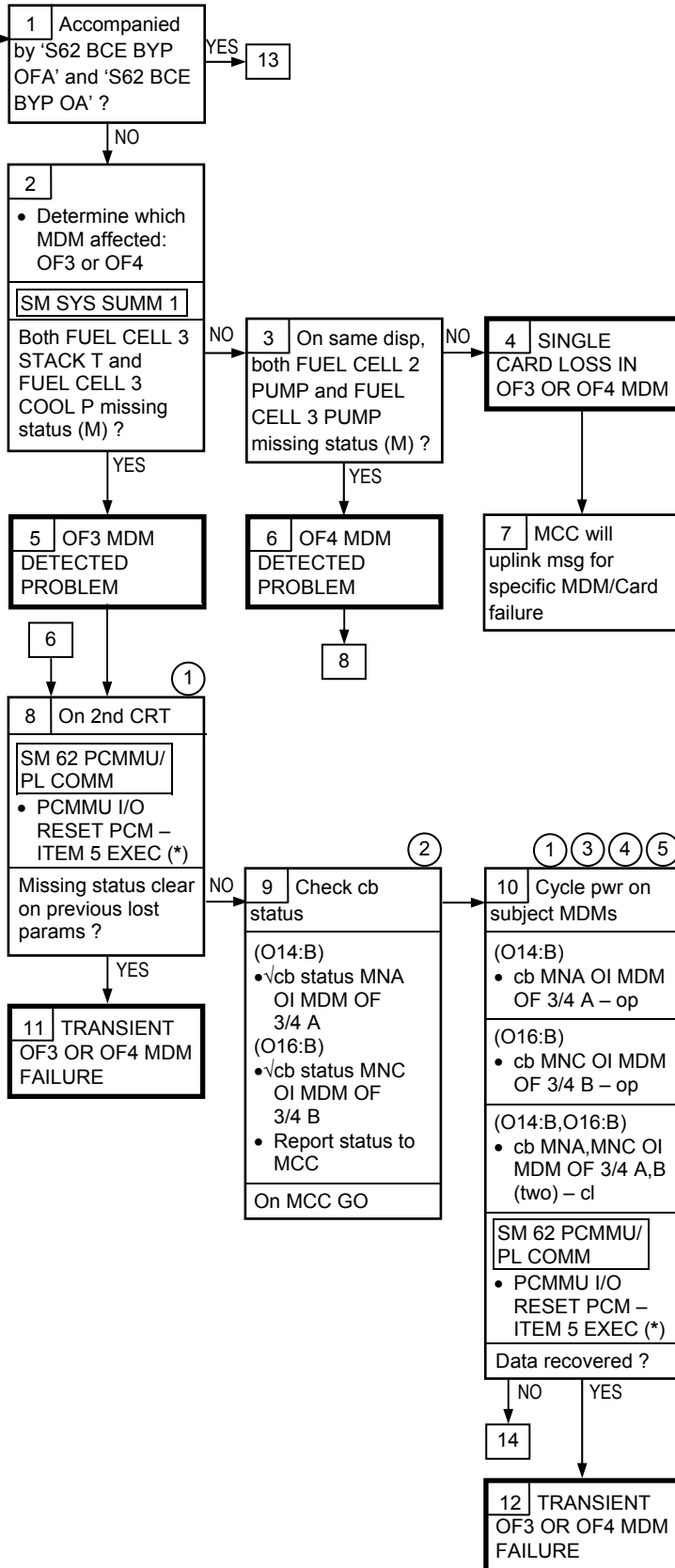
2.4b 'S62 BCE BYP OFB'

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

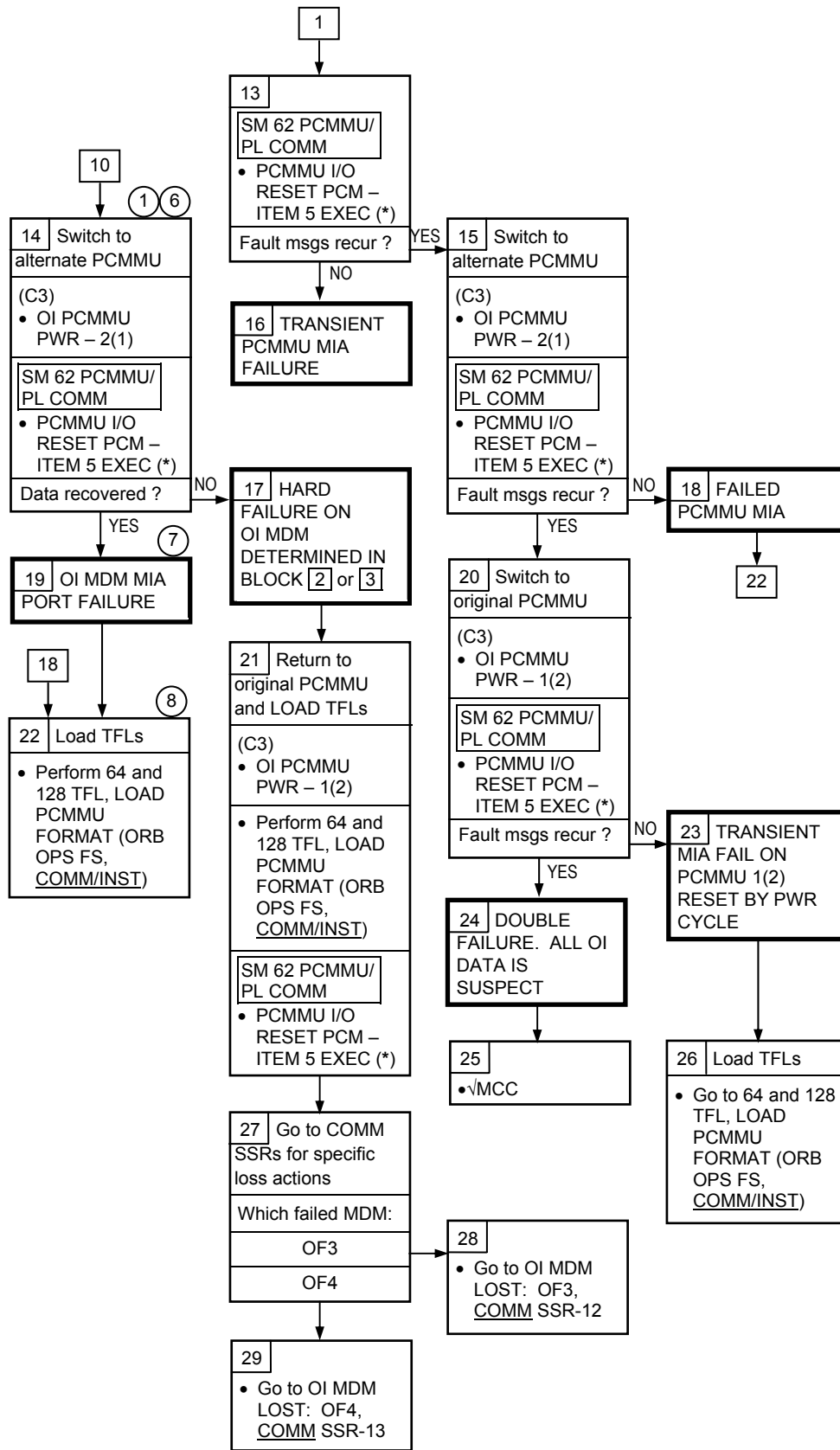
② Must obtain GO from MCC for cb cycle before proceeding to step 10

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

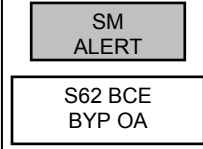
COMM 2.4b (Cont)



- 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

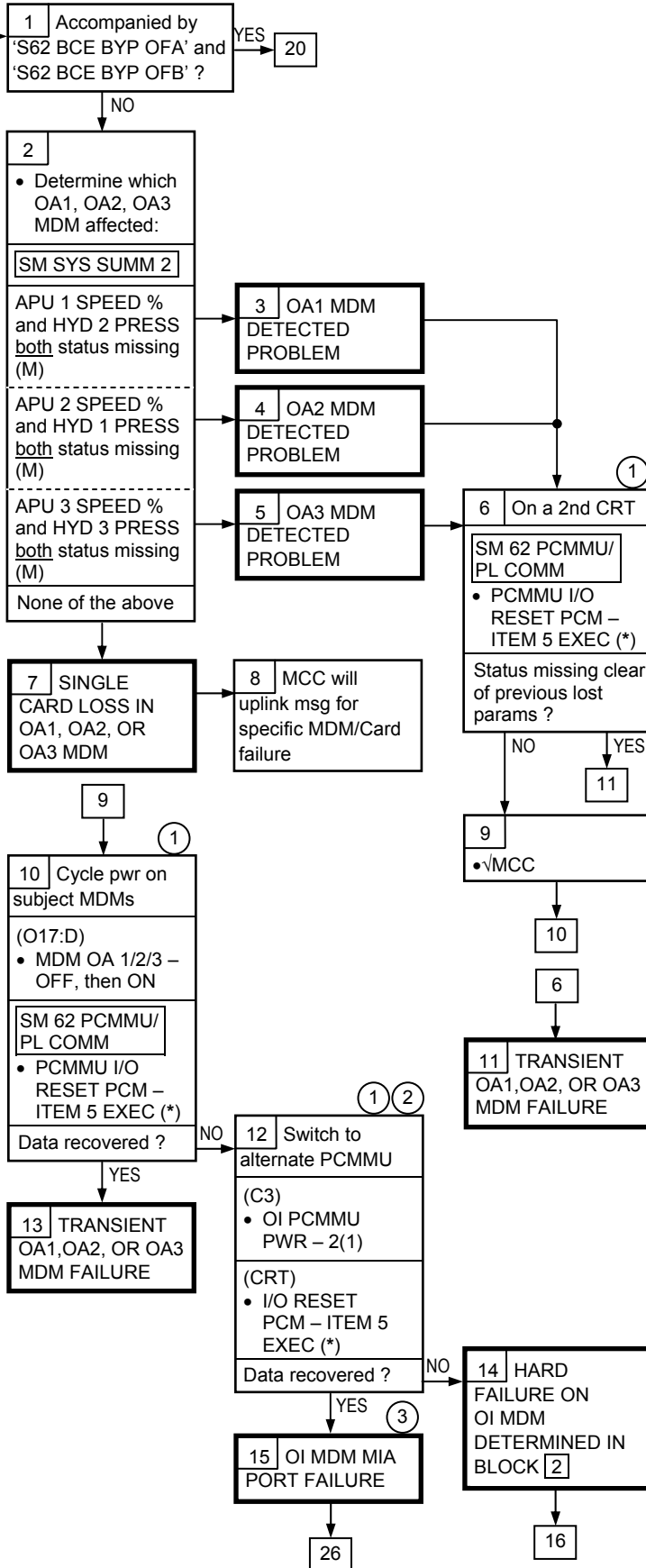
COMM

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



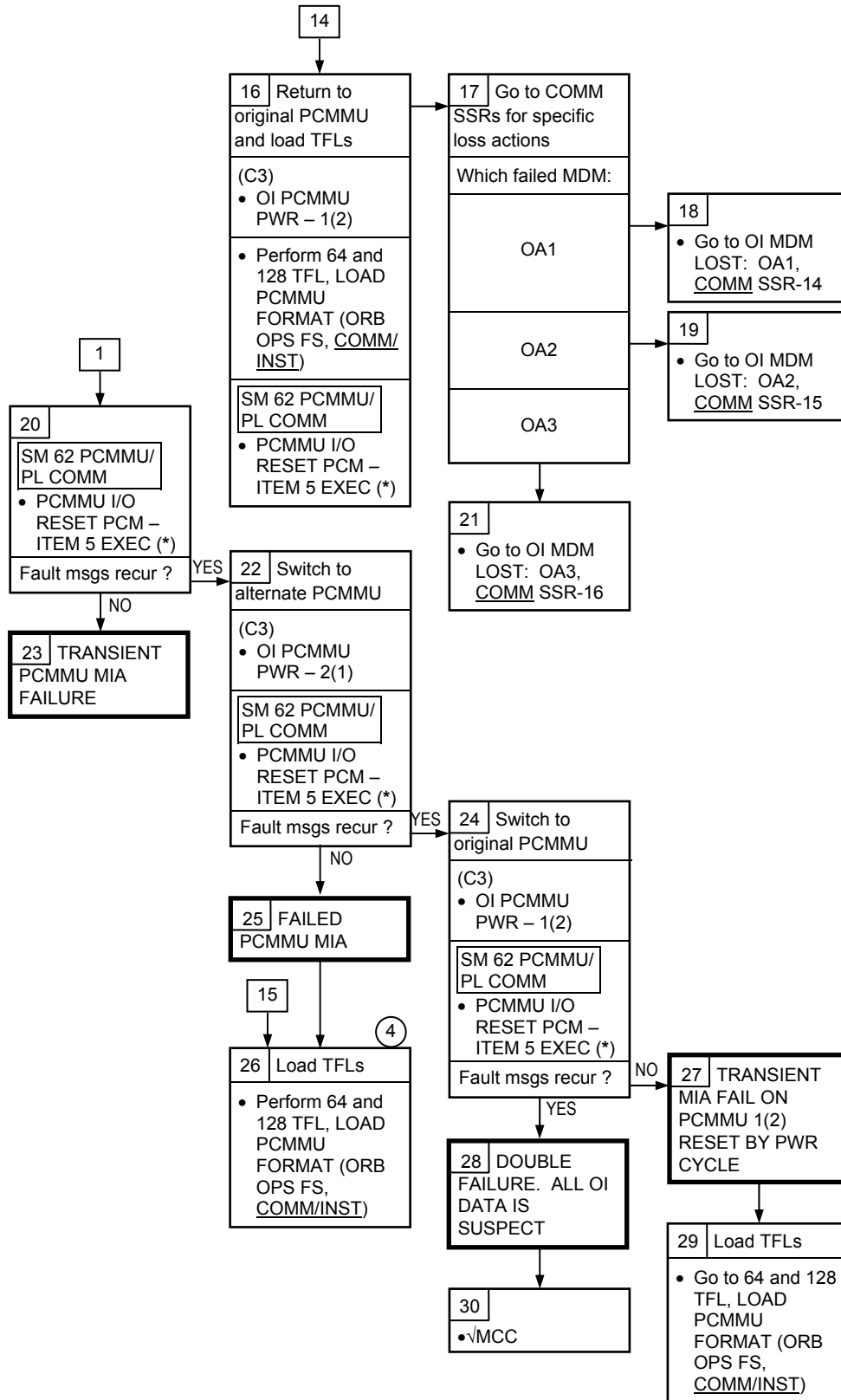
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwrd ON, PDI not receiving payload data which is FDAAd

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

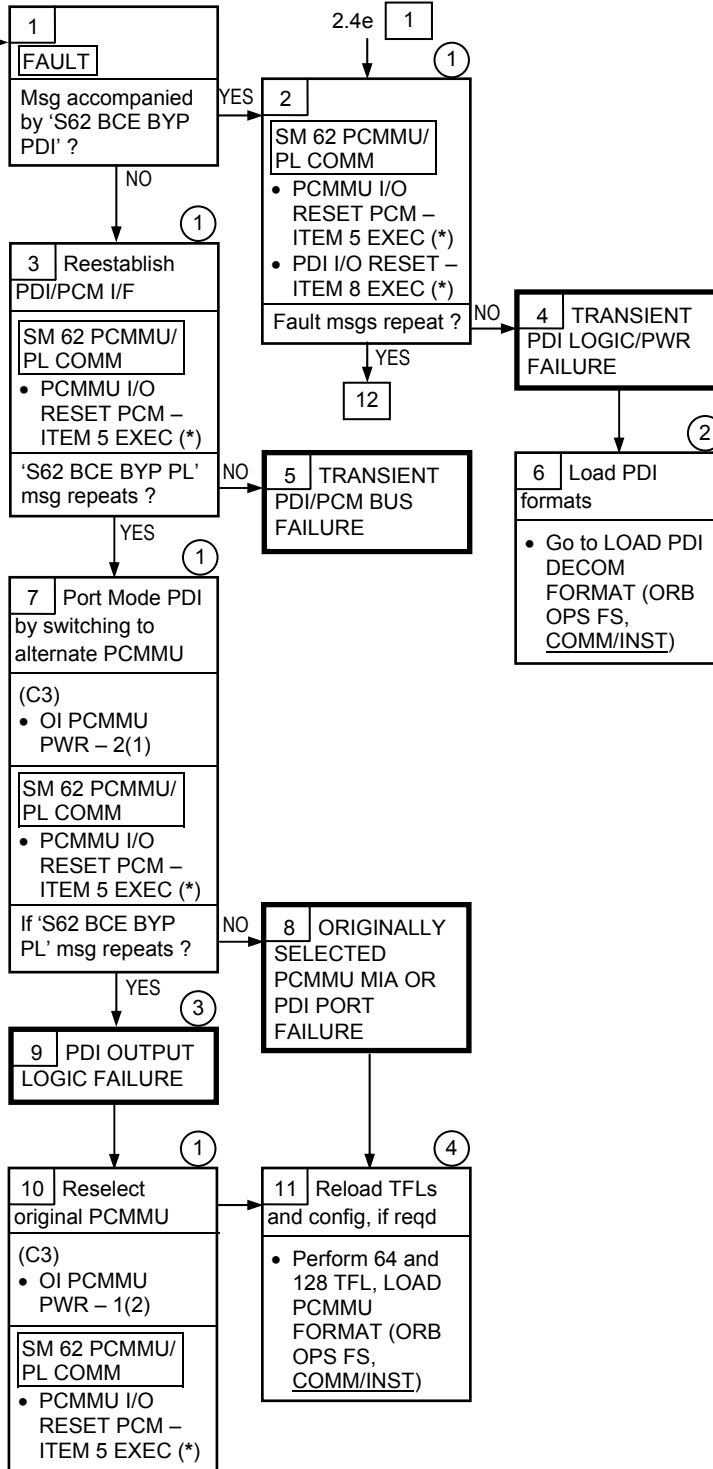
2.4d 'S62 BCE BYP PL'

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



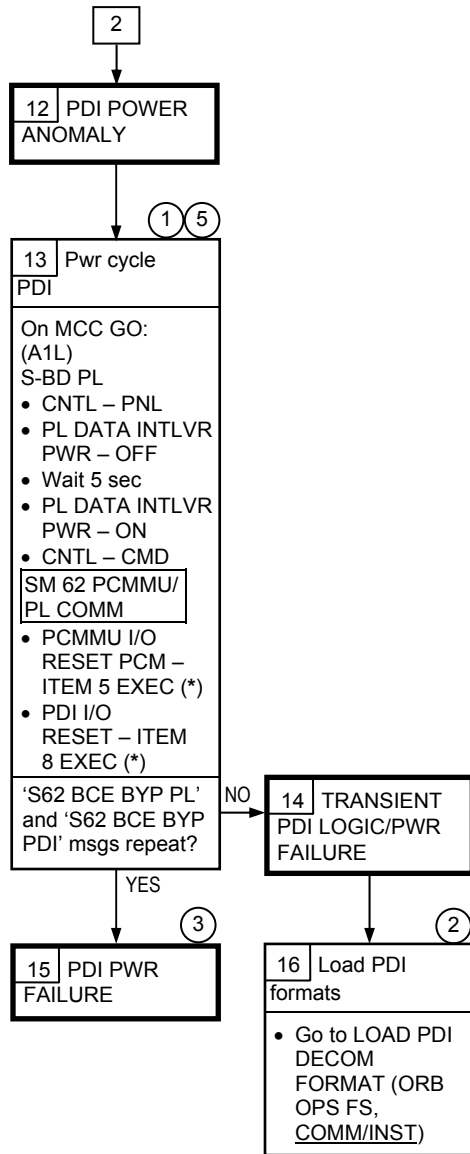
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwrd ON, PDI not receiving payload data which is FDAAd

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

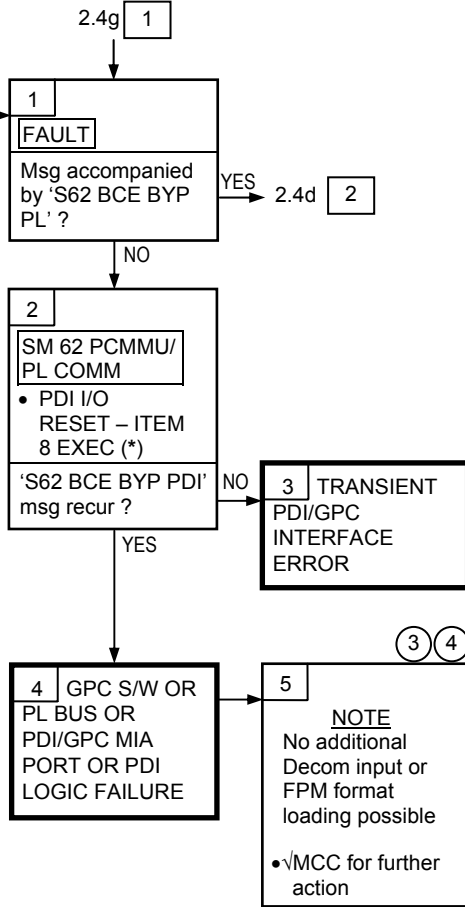
2.4e 'S62 BCE BYP PDI'

SM ALERT

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

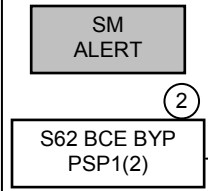
② Msg will occur if SM I/O RESET accomplished and PDI pwrd off

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

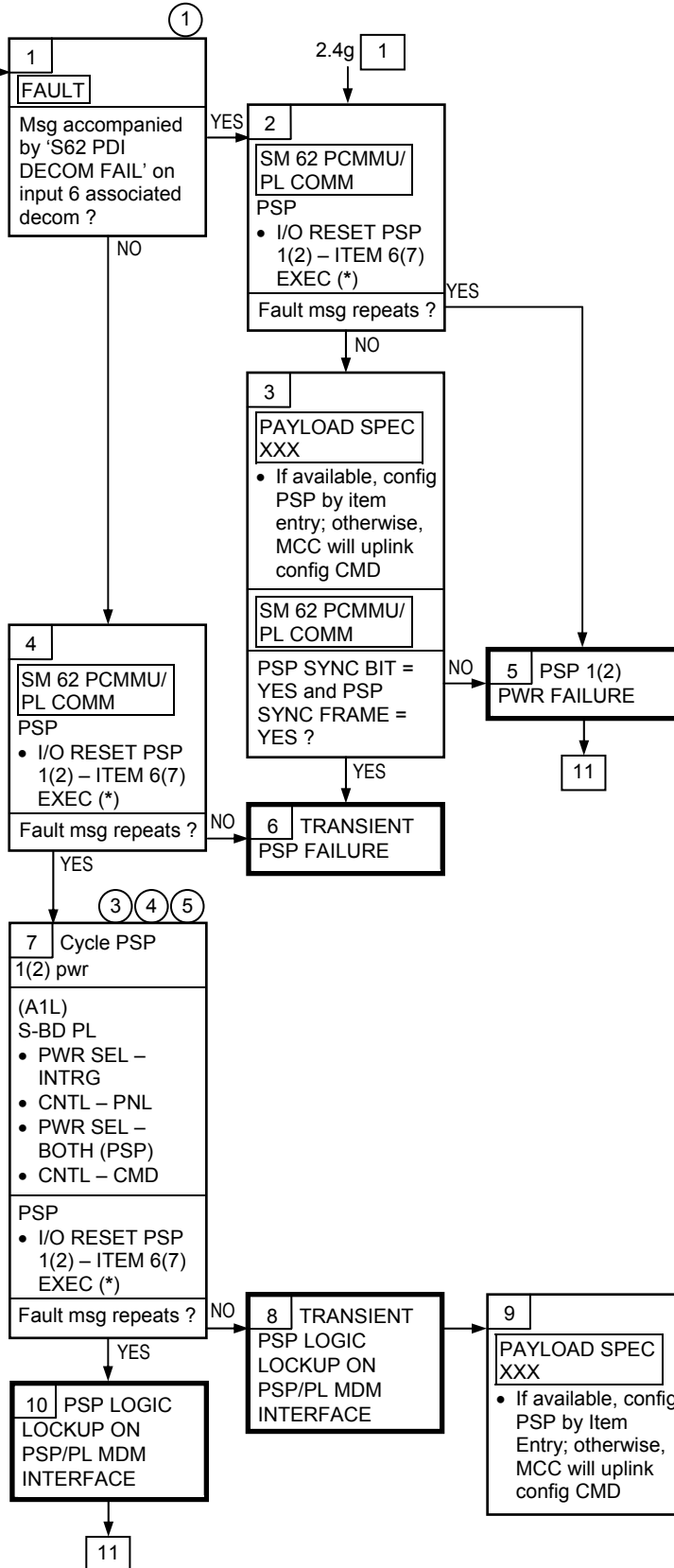
COMM

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



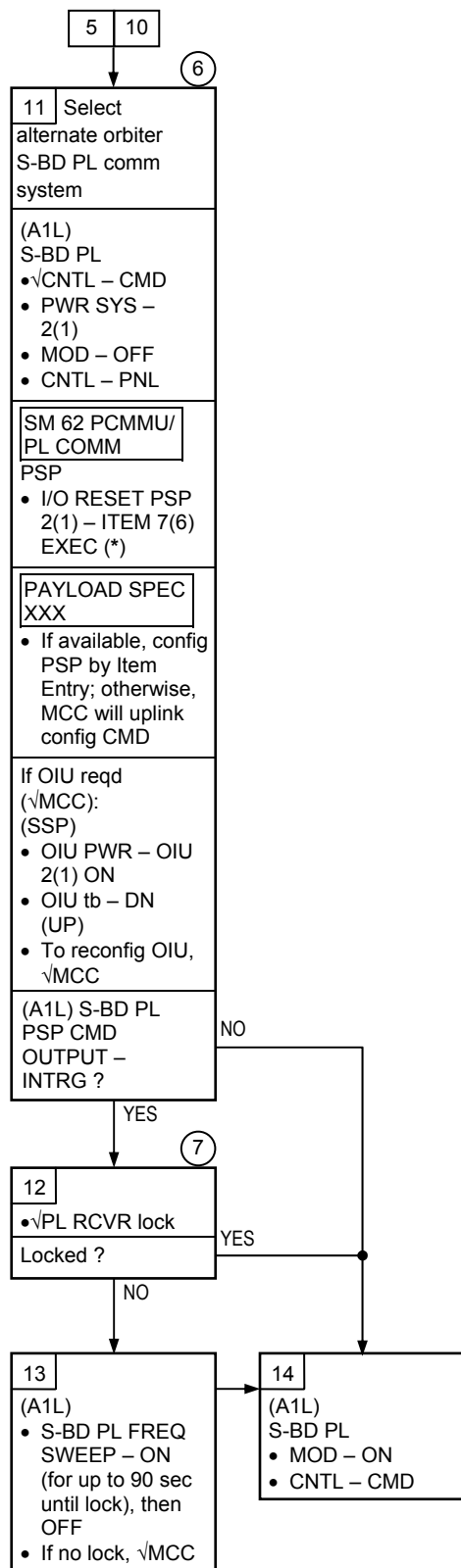
If:
PSP/PL MDM Interface fails or
PSP pwrd off or
PSP pwr supply failure

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)

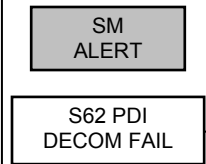


⑥ Selection of alternate S-BD PL sys will cause temporary loss of RF to PL

⑦ Indications of PL RCVR lock vary with flight

COMM

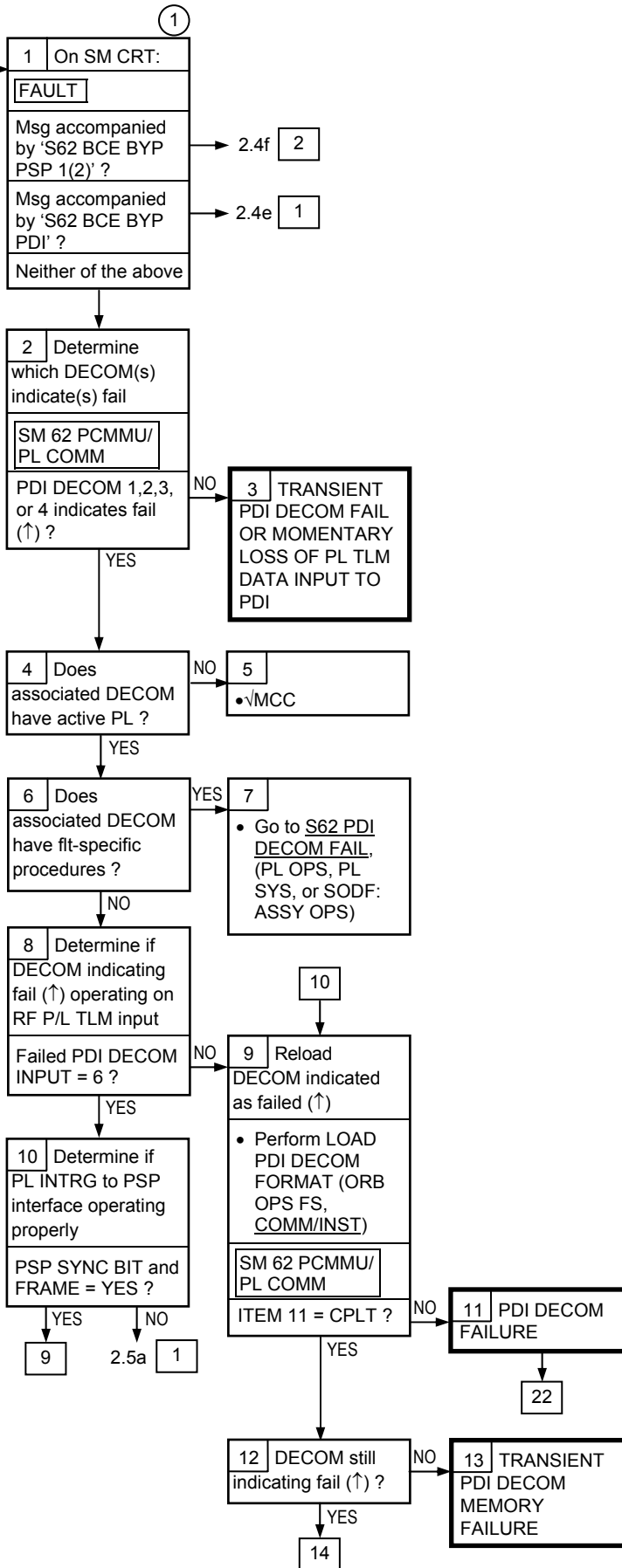
2.4g 'S62 PDI DECOM FAIL'



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

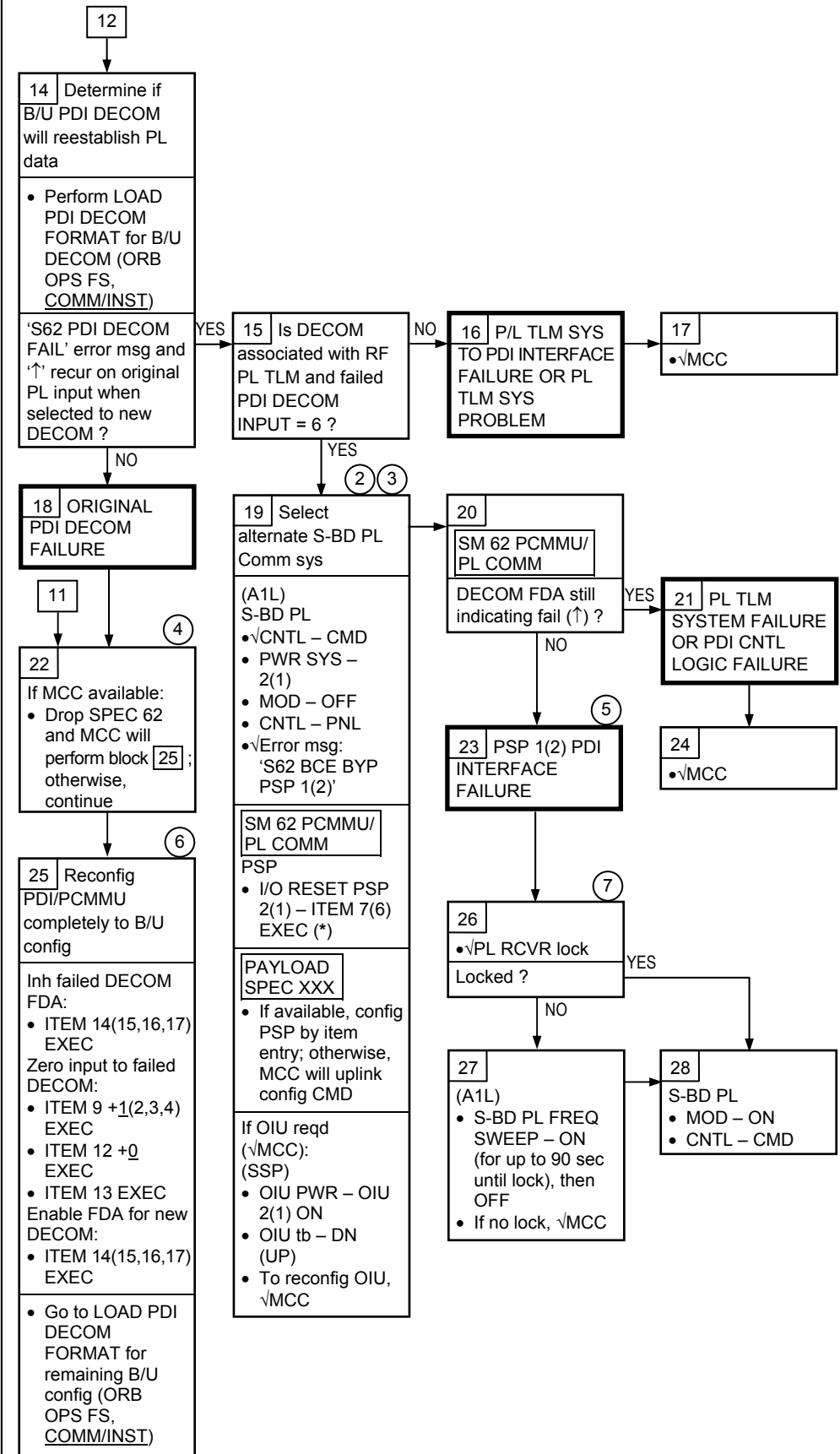
Nominal Config:
 (A1L)
 PL DATA INTLVR
 PWR – ON
 SM 62
 PCMMU/PL
 COMM

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

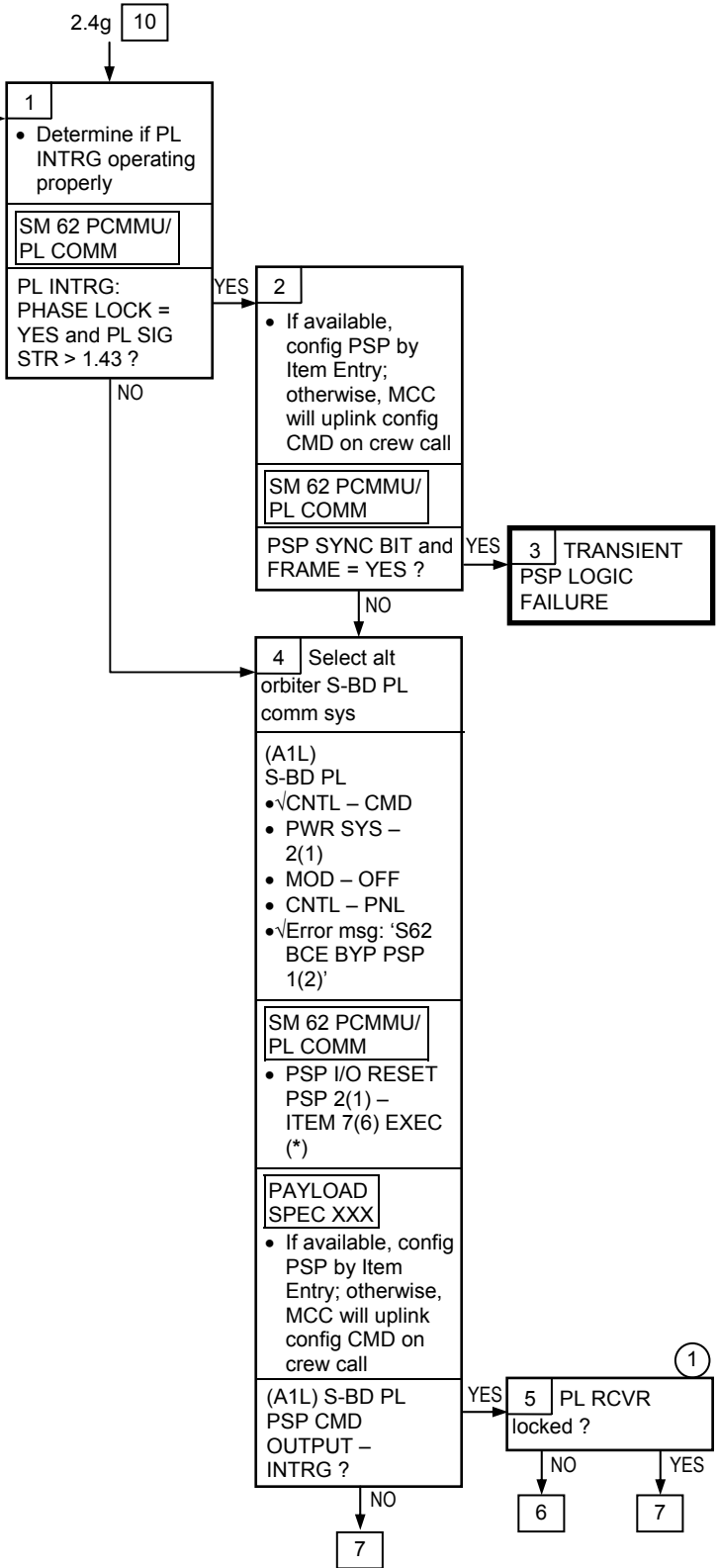
COMM

2.5a PSP BIT AND/OR
FRAME SYNC LOCK FAIL

Unable to Obtain
PSP Bit and/or
Frame Sync
Lock

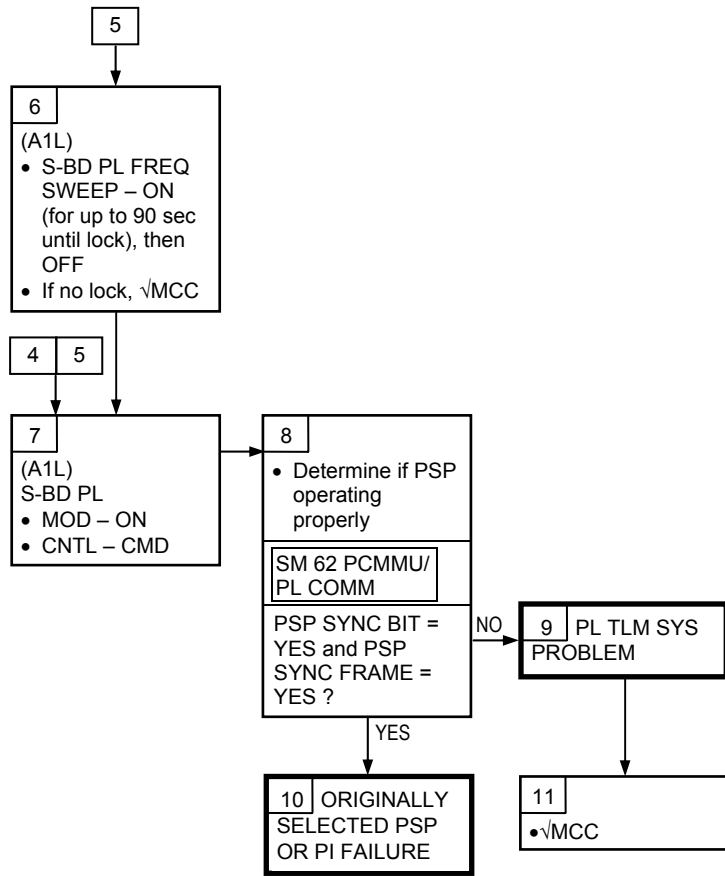
If:
PL INTRG/PSP
Interface failure or
PSP Bit Frame
Sync failure

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)



O I D S C

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

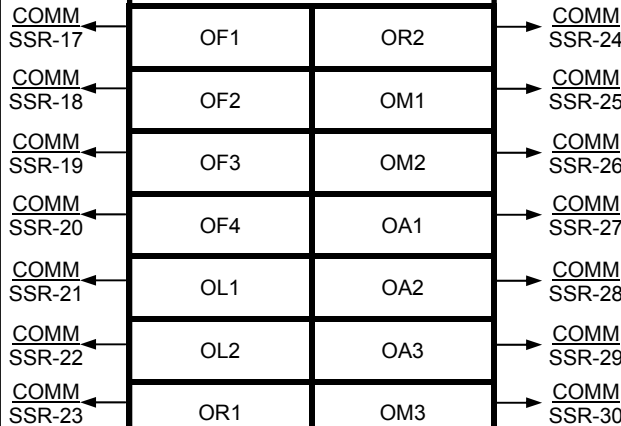
Nominal Config:

(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)

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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      XXXS      XXXS      XXXS      XXXS      XXXS
O2 PRESS      XXXXS     XXXXS     XXXXS     XXXXS     XXXXS
HTR T1        OM1       OM1       OM1       OM2       OF2
              T2        OM2       OM2       OF3       OF3       OF3

```

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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  XXXS     XXXS     XXXS     H2O QTY XXXS     XXXS     XXXS
PMP LK P  OM3      OM3      OM3     BYP VLV XXXS     XXXS     XXXS
OIL OUT P OA1      OA2      OA3

```

```

AV BAY
TEMP      OF2      OF3      OF1
FAN ΔP    X . XXS  X . XXS  X . XXS

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THERM CNTL      1          2
H2O PUMP P      OF2      OF3
FREON FLOW      OF2      OF3
EVAP OUT T      OA2      OA3

```

(XX)

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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

```

```

OMS CRSFD      L          R          C
XFD            OX OA1     OA2     OA3
              GMBL LN     OA1     OA2
DRN            OX OA3     OA3

```

```

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 • If on IMU FAN A: • IMU FAN B(C) – ON A – OFF • Monitor Cabin Fan flow by feel During sleep periods: • CAB FAN A,B (two) – ON • Maintain LiOH Canister(s) changeout schedule per cue card and FLIGHT PLAN	Av Bay 3 Fan ΔP Temp (MCC has limited insight) 1 Hum Sep A,B (two) Speed Snr Waste Qty 1 IMU Fan ΔP A Speed Snr Cab Fan ΔP	② Buses will be untied for entry. MCC will TMBU FC ΔAMPS 2 limits and notify crew. If loss of comm, reset limits to present value ± 40 ③ WST TK will be dumped by time (≈2 %/min) to provide ullage to make EOM, MCC will provide the time
• MN BUS TIE B,C (two) – ON (tb-ON)	POCO2 (MCC cannot assess) FC 1 pH Snr	④ This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line ⑤ Smoke Det H/W Alarm still available
(L1) If FLASH EVAP CNTLR PRI B enabled: • Perform FES RESTART <u>ECLS</u> SSR-5, using PRI A	FC2 SS1 ΔV SS2 ΔV SS3 ΔV	⑥ Xdcrs on disp SM 87 HYD THERMAL will show 'M' for some parameters ⑦ Visibility into Truss Flange temps lost
(R14:C) • cb MNB KU ANT HTR – op	Most FES Feedline A Htr measurements	⑧ One of two temps in each zone lost ⑨ Vlv position is normally closed. Position can be verified during EMU recharge
3 • √MCC about performing WASTE H2O DUMP	Ku Gyro temp monitoring Waste Qty 1	⑩ Freon Loop 2 Automatic Radiator Isolation capability is lost
4 (ML86B:A) • cb MNA, MNB H2O LINE HTR A, HTR B (two) – cl	Waste H2O Dump Line T N2 Qty (two) 1,2	⑪ Call MCC for MMU 1 action. If MMU 1 off, ITEM 4 EXEC
(ML86B:C) • cb MNA, MNB EXT ARLK HTR STRUC (two) – cl • cb MNA, MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl	5 Smoke Det A Concn Av Bay 2 5 A Concn Av Bay 3 5 Concn Cabin 6 HYD sys temps	
11 (O15:F) • MMU 2 – ON	7 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	

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 Concn Av Bay 1 5 Smoke Det B Concn Av Bay 3 5 Smoke Det Concn 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>SM 66 ENVIRONMENT</p> <ul style="list-style-type: none"> Monitor Cabin Press for cabin leaks 	<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"> H2O PUMP LOOP 1 – ON H2O LOOP 1 BYP MODE – AUTO H2O PUMP LOOP 2 – OFF H2O LOOP 2 BYP MODE – MAN 	<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"> C/W PARAM SEL tw (three) – 105 C/W LIMIT SET VALUE tw (three) – 1.50 C/W LIMIT SET LIMIT – LOWER C/W LIMIT SET FUNC – SET C/W PARAM SEL tw (three) – 115 C/W LIMIT SET VALUE tw (three) – 0.65 C/W LIMIT SET LIMIT – LOWER C/W LIMIT SET FUNC – SET C/W PARAM SEL tw – > 119 		<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"> Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card) 	<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>SM 60 SM TABLE MAINT</p> <p>5 Inhibit S-BD ANT QUAD Alert:</p> <ul style="list-style-type: none"> Param ID – ITEM 1 +0 9 2 1 0 4 9 EXEC INH – ITEM 10(15) EXEC 	<p>Antenna Select feedbacks</p>	
<p>(L1)</p> <p>If FLASH EVAP CNTLR PRI A enabled:</p> <ul style="list-style-type: none"> Perform FES RESTART, ECLS SSR-5, using PRI B 	<p>Most FES Feedline B Htr measurements</p>	
<p>SM ANTENNA</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>(Continued)</p>	<p>8 HYD sys temps</p> <p>(Continued)</p>	

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

ACTIONS	MEASUREMENT LOSS	NOTES
<ul style="list-style-type: none"> • Terminate all SUPPLY H2O Dump operations through dump nozzle • If Supply H2O Dump reqd, perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) 	Supply H2O Noz T A,B (two)	⑨ For leak detection
<ul style="list-style-type: none"> • Terminate all WASTE H2O Dump operations through dump nozzle 	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
	11 FC 1,2,3 Amps	⑭ Vestibule Temp 1 available
(ML86B:C) <ul style="list-style-type: none"> • cb MNA,MNB EXT ARLK HTR VEST (two) – cl • cb MNA,MNB EXT ARLK HTR STRUC (two) – cl • cb MNA,MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl 	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 discretcs	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"> • Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-1</u> for Circ Pump 1 • Perform SIMULTANEOUS CIRC PUMP ON/GPC OPS, <u>APU/HYD SSR-2</u> for Circ Pump 1 	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"> • Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-3</u>, for 'M' xdcrs on display SM 87 HYD THERMAL 	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"> • HI LOAD DUCT HTR – A/B 	Hi Load Inbd Duct Htr measurement	
(A14) <ul style="list-style-type: none"> • RCS/OMS HTR OMS CRSFD LINES (two) – AUTO 	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	
	If on PCS Sys 1: <ul style="list-style-type: none"> Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3
1	(L1) <ul style="list-style-type: none"> Monitor Cabin Fan by feel During sleep periods: CAB FAN A,B (two) – ON
2	(R13U) <ul style="list-style-type: none"> 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
	(R14:C) <ul style="list-style-type: none"> cb MNB KU ANT HTR – op
3	√MCC about performing WASTE H2O DUMP
4	(ML86B:A) <ul style="list-style-type: none"> cb MNA,MNB H2O LINE HTR A,HTR B (two) – cl
	(ML86B:C) <ul style="list-style-type: none"> cb MNA,MNB EXT ARLK HTR STRUC (two) – cl

MEASUREMENT LOSS	
	Most PCS 1 measurements
	Cab Fan ΔP
	PPO2 A
	Cab Fan ΔP
	Ku Gyro temp monitoring
	Waste Qty 1
	Waste H2O Dump Line T
	Sply H2O Qty A
5	Smoke Det A Concn Av Bay 2
5	A Concn Av Bay 3
5	Concn Cabin
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	AC1 volts

NOTES	
①	Turn on both Cabin Fans for sleep
②	C/W channels 14,34,54,104,114 also lost but high limit-sensed only
③	WST TK will be dumped by time (≈2%/min) to provide ullage to make EOM. MCC will provide the time
④	This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, and Vacuum Vent Line
⑤	Smoke Det H/W Alarm still available
⑥	Both htrs activated since visibility into temps lost
⑦	Alternate temps available in each zone
⑧	Use pnl F9 Meter for insight to AC volts

COMM SSR-18
OI DSC LOST: OF2

ACTIONS	MEASUREMENT LOSS	NOTES
<p>GNC 23 RCS 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>GNC SYS SUMM 2 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>2 (R13U) C/W PARAM SEL tw (three) – 004 • C/W PARAM – INH C/W PARAM SEL tw (three) – 016 • C/W PARAM – INH C/W PARAM SEL tw (three) – 044 • C/W PARAM – INH C/W PARAM SEL tw (three) – 105 • C/W PARAM – INH C/W PARAM SEL tw (three) – 106 • C/W PARAM – INH C/W PARAM SEL tw (three) – > 119</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 ⑦ 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	(ML86B:A) • cb MNA,MNB H2O LINE HTR A, HTR B (two) – cl	Sply H2O Dump Line T	
		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
	SM 66 ENVIRONMENT • 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>GNC 23 RCS</p> <p>RCS FWD</p> <ul style="list-style-type: none"> • ITEM 1 EXEC <p>Reprioritize jets:</p> <p>DES INH on F1,2 JETS</p> <ul style="list-style-type: none"> • F1L ITEM 8 EXEC (*) • F2R ITEM 12 EXEC (*) • F1U ITEM 16 EXEC (*) • F2U ITEM 20 EXEC (*) • F1D ITEM 22 EXEC (*) • F2D ITEM 26 EXEC (*) • F1F ITEM 30 EXEC (*) • F2F ITEM 34 EXEC (*) • Reselect auto deselected jets (2) <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> • ITEM 4+4 EXEC <p>Override Manf vlv status to CL for F1,2 Manifolds:</p> <p>OVRD MANF VLVS</p> <ul style="list-style-type: none"> • F1 ITEM 40 EXEC (CL) • F2 ITEM 41 EXEC (CL) 	<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>GNC SYS SUMM 2</p> <ul style="list-style-type: none"> •√MCC for sleep config 	<p>2 Fwd RCS TK and Manf Press and Qty</p>	
<p>(R13U)</p> <ul style="list-style-type: none"> • C/W PARAM SEL tw (three) – 006 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119 	<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>GNC 23 RCS</p> <p>RCS L</p> <ul style="list-style-type: none"> • ITEM 2 EXEC <p>Reprioritize jets:</p> <p>DES INH on L1,2 JETS</p> <ul style="list-style-type: none"> • L2L ITEM 10 EXEC (*) • L1L ITEM 14 EXEC (*) • L2U ITEM 18 EXEC (*) • L1U ITEM 20 EXEC (*) • L2D ITEM 26 EXEC (*) • L1A ITEM 32 EXEC (*) <ul style="list-style-type: none"> • Reselect auto deselected jets (2) <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> • ITEM 4+3 EXEC <p>Override Manf vlv status to CL for L1,2 Manifolds:</p> <p>OVRD MANF VLVS</p> <p>1</p> <ul style="list-style-type: none"> • L1 ITEM 40 EXEC (CL) • L2 ITEM 41 EXEC (CL) <p>If I'CNCT config:</p> <ul style="list-style-type: none"> • ITEM 48 EXEC (INH) 	<p>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<p>① Prior to deorbit, override L1 Manf vlv status to op</p> <p>② Auto overpressure protection lost for L RCS Oxidizer Dual Reg failure</p> <p>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</p> <p>④ Loss of fuel injector temp is no-go for noncritical on-orbit burns. Engine will be used for deorbit</p>
<p>(O7)</p> <ul style="list-style-type: none"> • AFT L RCS MANF ISOL 5 – CL (tb-CL), then GPC <ul style="list-style-type: none"> • Perform LOSS OF VERNIER RCS (ORB OPS, RCS) 	<p>Jet Injector temps (Jet leak RM detection)</p>	
<p>GNC SYS SUMM 2</p> <p>3</p> <ul style="list-style-type: none"> • Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC • √MCC for sleep config 	<p>2 Left RCS Tank and Manf Press and Qty (leak detection lost)</p>	
<p>(R13U)</p> <p>3</p> <ul style="list-style-type: none"> • C/W PARAM SEL tw (three) – 017 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 036 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 056 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119 	<p>L OMS Fu Tk ULL pressure</p> <p>L RCS OX Tk ULL pressure</p> <p>L RCS leak</p>	
<p>4 L OMS no-go for on-orbit burns</p>	<p>L OMS Fu Inj T</p>	

COMM SSR-22
OI DSC LOST: OL2

ACTIONS	MEASUREMENT LOSS	NOTES
<p>GNC 23 RCS</p> <p>RCS L</p> <ul style="list-style-type: none"> • ITEM 2 EXEC <p>Reprioritize jets</p> <p>DES INH on L3,4 jets:</p> <ul style="list-style-type: none"> • L4L ITEM 8 EXEC (*) • L3L ITEM 12 EXEC (*) • L4U ITEM 16 EXEC (*) • L4D ITEM 24 EXEC (*) • L3D ITEM 28 EXEC (*) • L3A ITEM 30 EXEC (*) <ul style="list-style-type: none"> • Reselect auto deselected jets (2) <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> • ITEM 4+3 EXEC <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"> • L3 ITEM 42 EXEC (CL) • L4 ITEM 43 EXEC (CL) <p>If I'CNCT config:</p> <ul style="list-style-type: none"> • ITEM 48 EXEC (INH) 	<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 (O3) L OMS N2 TK P, L OMS Pc are lost. (O3) L RCS FUEL PRPLT QTY ind on meter is invalid</p>
<p>GNC SYS SUMM 2</p> <p>3</p> <ul style="list-style-type: none"> • Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC • √MCC for sleep config • P/I OMS Burn Monitor Cue Card to (1) Monitor GMBL Angles and BALL Vlvs for left OMS performance (2) • Perform OMS Pc LOW for L OMS ↓ 	<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"> • C/W PARAM SEL tw (three) – 007 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 046 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 056 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 027 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119 	<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>GNC 23 RCS 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>GNC SYS SUMM 2 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) – > 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>GNC 23 RCS</p> <p>RCS R</p> <ul style="list-style-type: none"> • ITEM 3 EXEC <p>Reprioritize jets:</p> <p>DES INH on R3,R4 JETS</p> <ul style="list-style-type: none"> • R4R ITEM 8 EXEC (*) • R3R ITEM 12 EXEC (*) • R4U ITEM 16 EXEC (*) • R4D ITEM 24 EXEC (*) • R3D ITEM 28 EXEC (*) • R3A ITEM 32 EXEC (*) <p>• Reselect auto deselected jets (2)</p> <p>Increase PRI Jet Fail Limit:</p> <ul style="list-style-type: none"> • ITEM 4+3 EXEC <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"> • R3 ITEM 42 EXEC (CL) • R4 ITEM 43 EXEC (CL) <p>If I'CNCT config:</p> <ul style="list-style-type: none"> • ITEM 48 EXEC (INH) 	<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>GNC SYS SUMM 2</p> <p>3</p> <ul style="list-style-type: none"> • Monitor R RCS He ΔP for leaks. If R RCS leak suspected, secure sys and call MCC • √MCC for sleep config • P/I OMS Burn Monitor Cue Card to (1) Monitor GMBL Angles and BALL Vlvs for right OMS performance (2) • Perform OMS Pc LOW for R OMS '↓' 	<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"> • C/W PARAM SEL tw (three) – 037 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 076 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 086 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 057 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119 	<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	

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>GNC 23 RCS</p> <p>If I'CNCT config:</p> <ul style="list-style-type: none"> • ITEM 48 EXEC (INH) (A14) • RCS/OMS HTR OMS CRSFD LINES (two) – A AUTO, B AUTO <ul style="list-style-type: none"> • Perform CIRC PUMP XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-3</u> for 'L' xdcrs on display SM 87 HYD THERMAL • Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-1</u> for Circ Pump 1 	<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"> • C/W PARAM SEL tw (three) – 009 • C/W PARAM – INH • C/W PARAM SEL tw (three) – 039 • C/W PARAM – INH • C/W PARAM SEL tw (three) – > 119 	<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"> • HI LOAD DUCT HTR – A/B 	<p>Hi Load Inbd Duct Htr measurement</p>	

COMM SSR-28
OI DSC LOST: OA2

ACTIONS	MEASUREMENT LOSS	NOTES
<p>GNC 23 RCS 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 XDUCER FAILURE WORKAROUND, <u>APU/HYD</u> SSR-4 for APU 2</p>	<p>APU 2 FUEL TK P</p>	
<p>• Perform APU FUEL TANK T XDUCER FAILURE WORKAROUND, <u>APU/HYD</u> SSR-6 for APU 2</p>	<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) – > 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' xdcrs 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"> • Perform CIRC PUMP XDCR FAILURE WORKAROUND, APUY/HYD SSR-3 for ACCUM P 1 xdcr 	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
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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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C/W

4

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C/W

4

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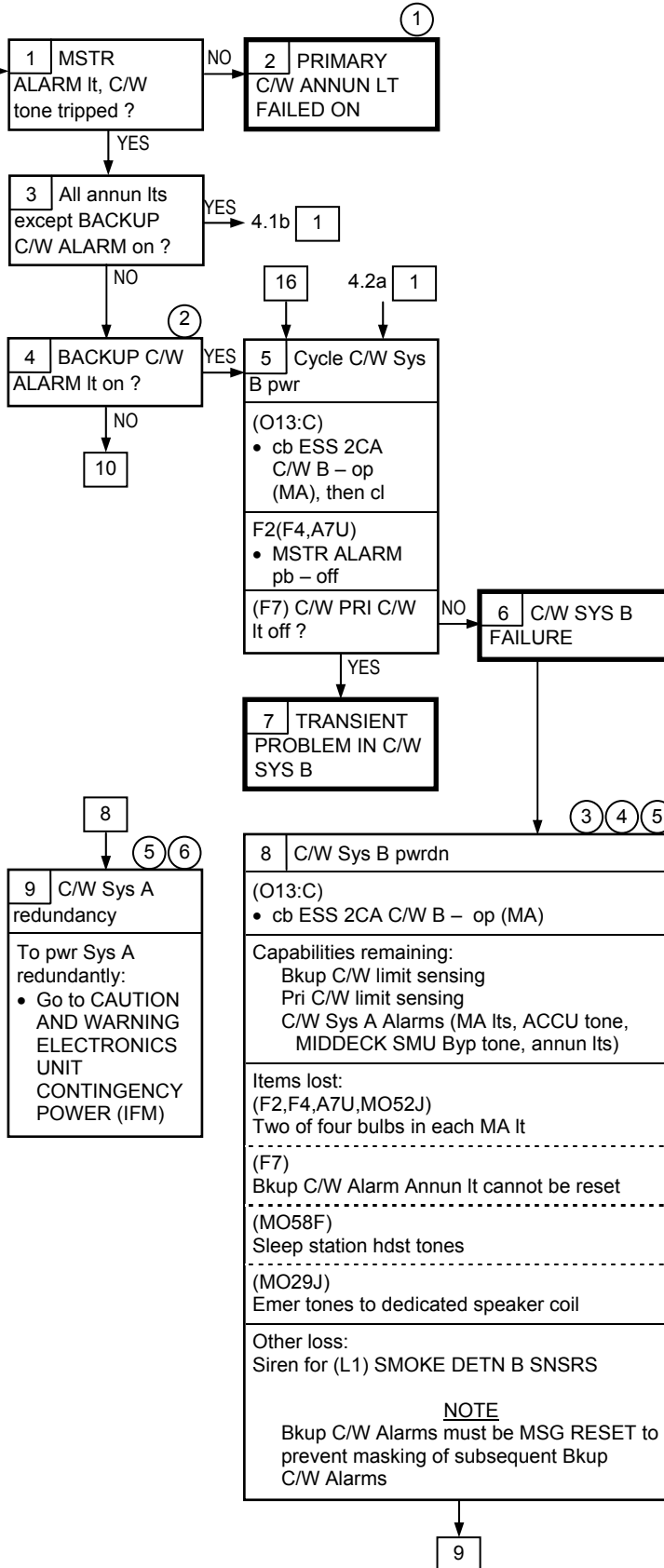
C/W

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

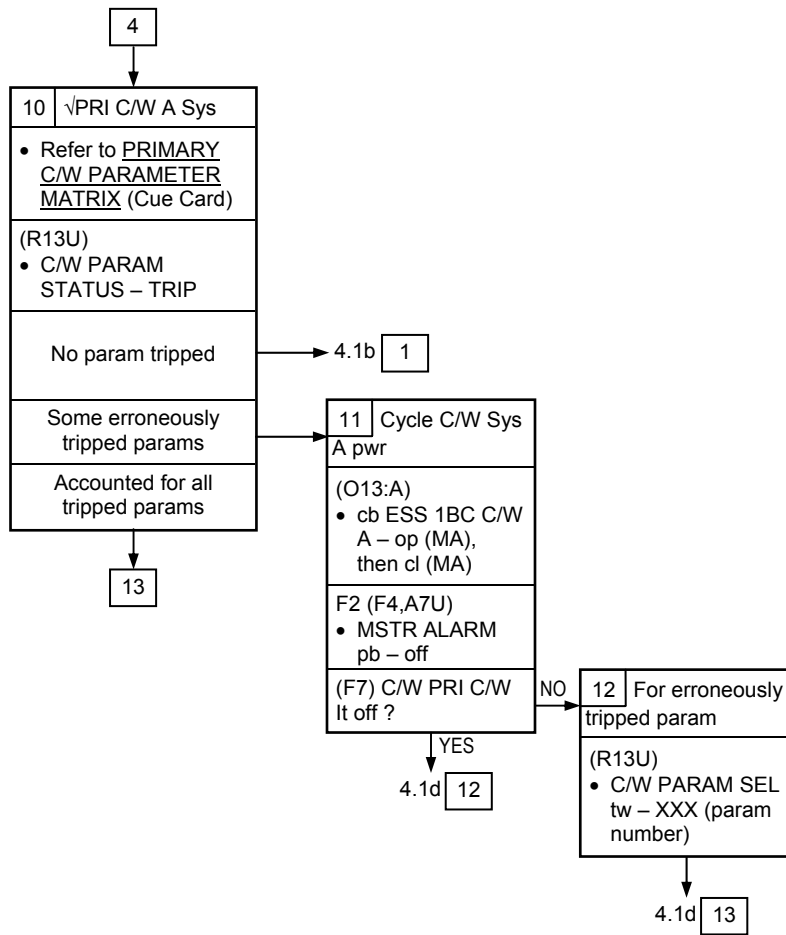


- ① To extinguish PRIMARY C/W It, remove bulbs or select (C3) C/W MODE – ACK
- ② BACKUP C/W ALARM It is not accompanied by fault msg and cannot be MSG RESET
- ③ All four bulbs in each MA It will illuminate during lamp test
- ④ To extinguish (F7) PRIMARY C/W and BACKUP C/W ALARM Its, remove bulbs or select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

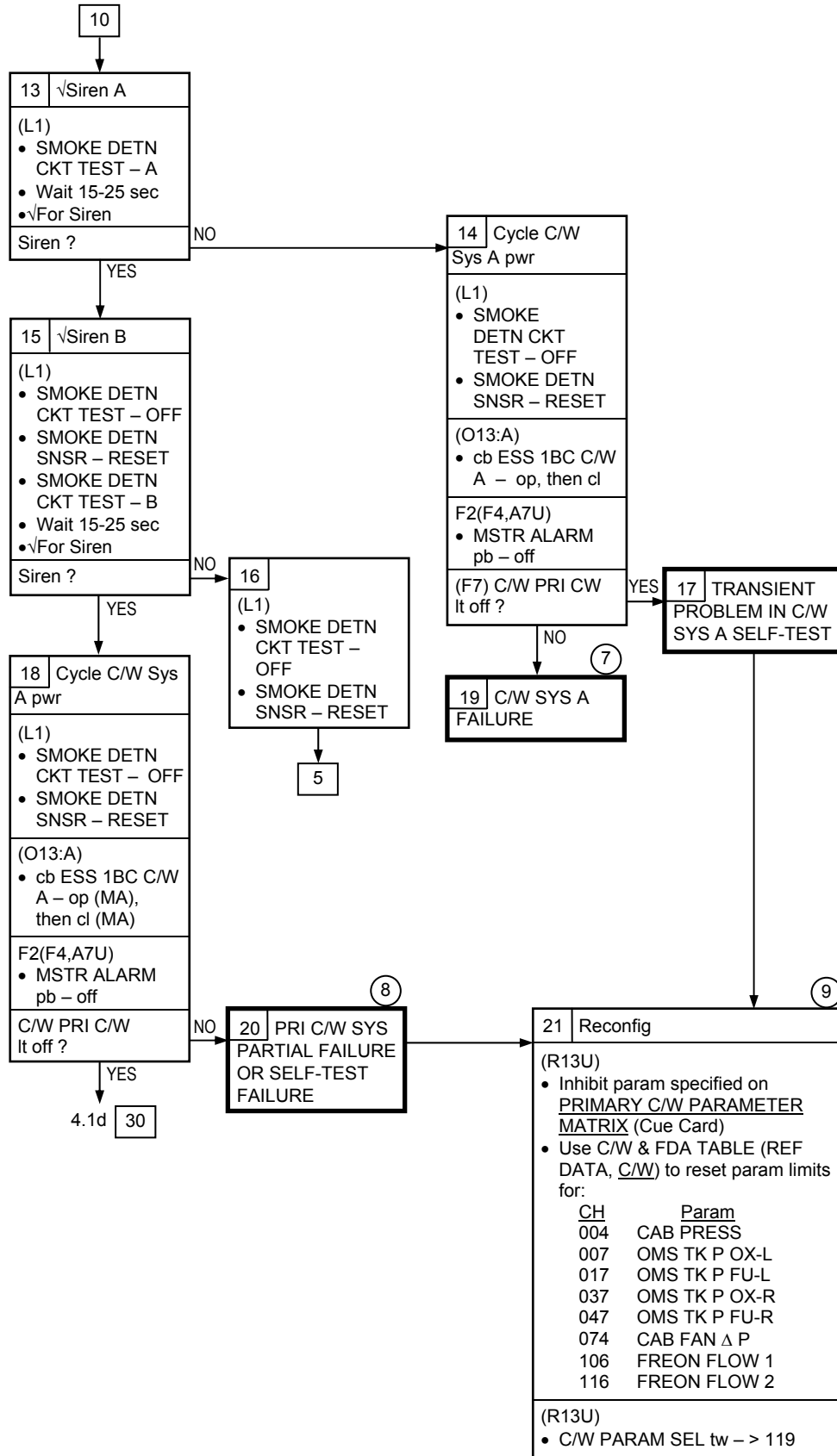
PRIMARY C/W

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

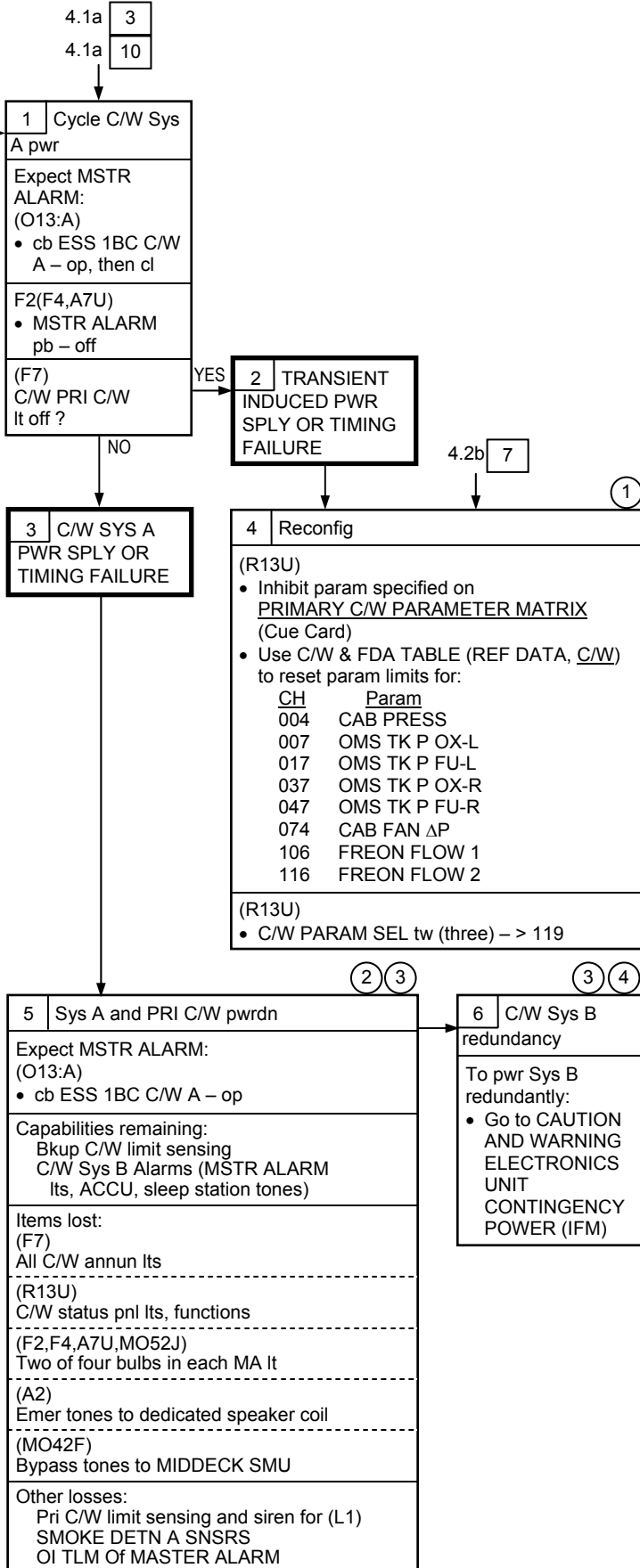
C/W

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

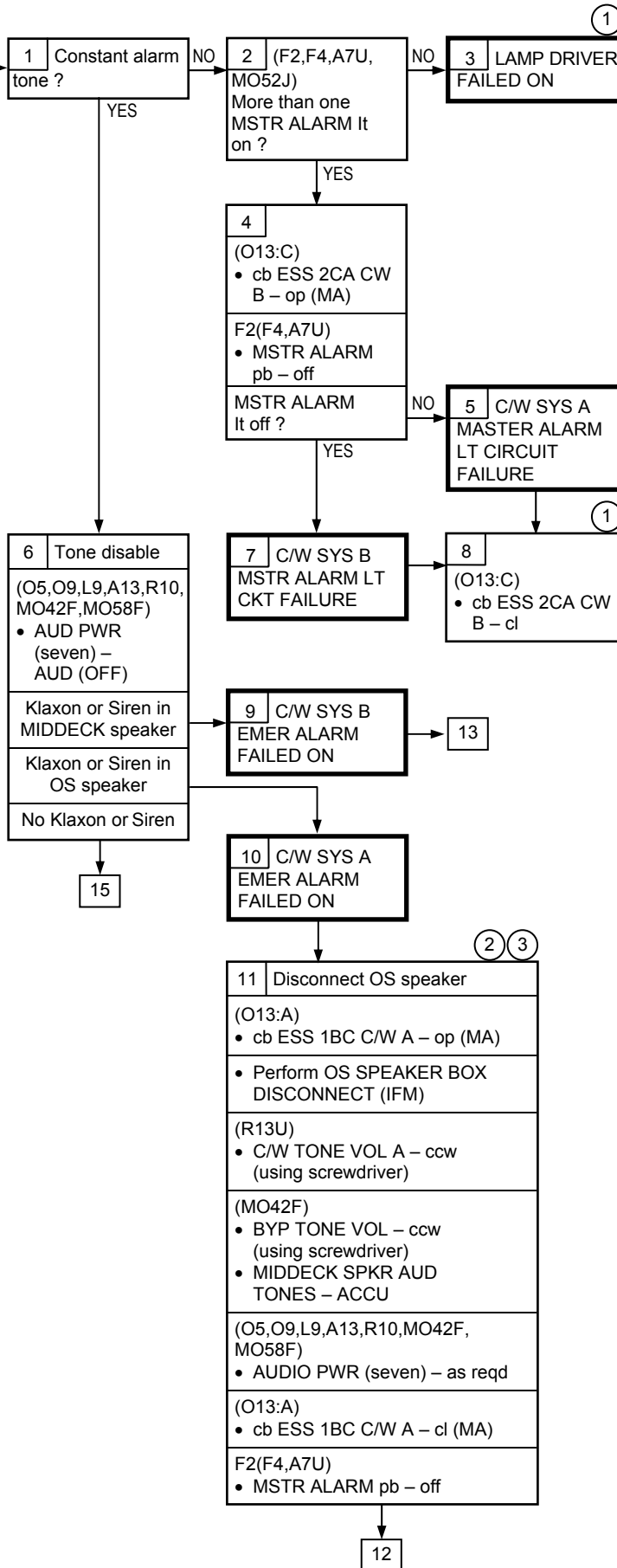
4.1c NONRESETTABLE MA LT OR TONE

MSTR ALARM

(Cannot be reset by depressing any MSTR ALARM pb)

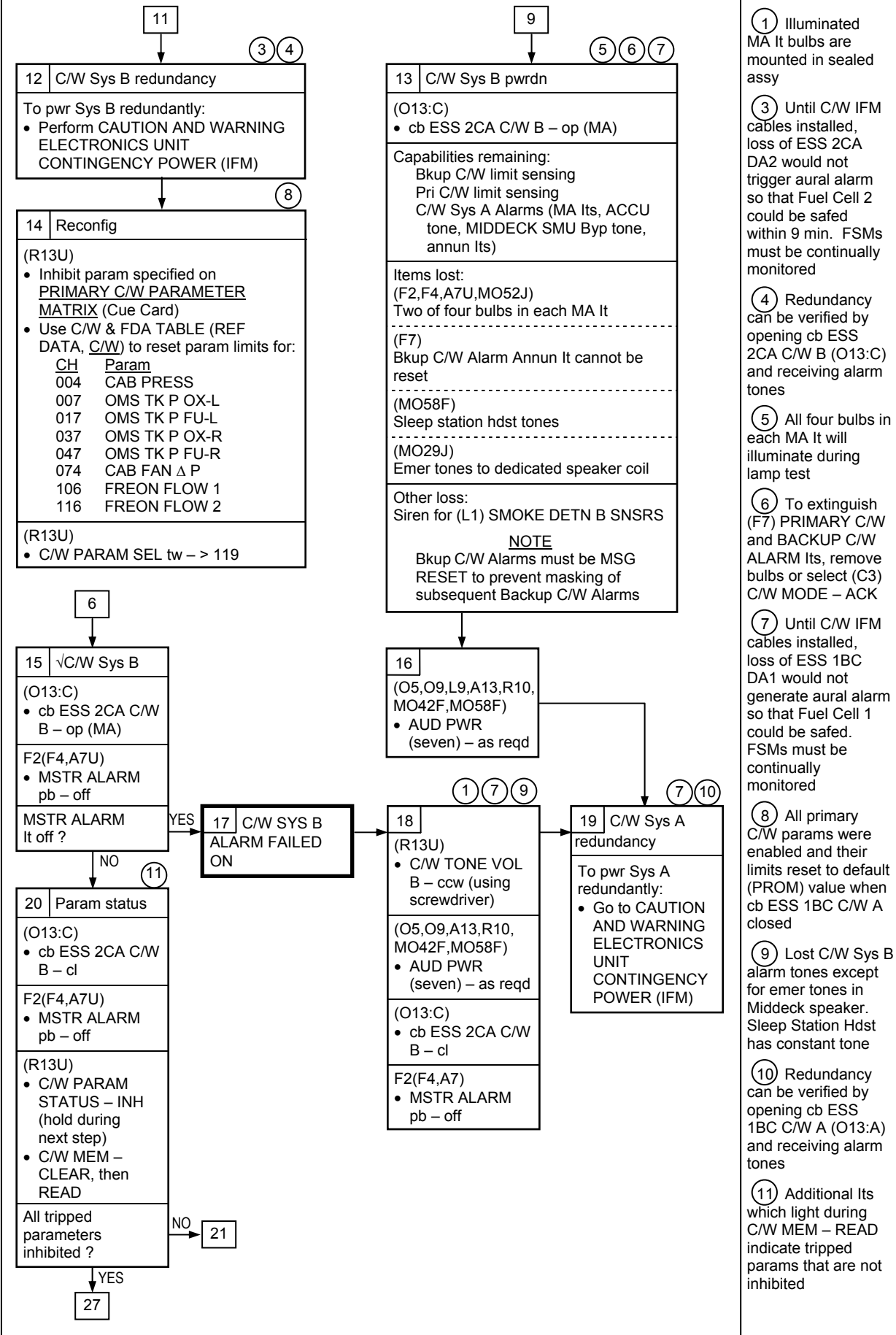
Caused by:
Lamp driver failed on
C/W Sys A(B) MA Signal failed on
C/W Sys A(B) EMER, C/W, or SM alarm failed on
Constant retriggering caused by PRI C/W trig mem or self-test failure

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

C/W 4.1c (Cont)



C/W

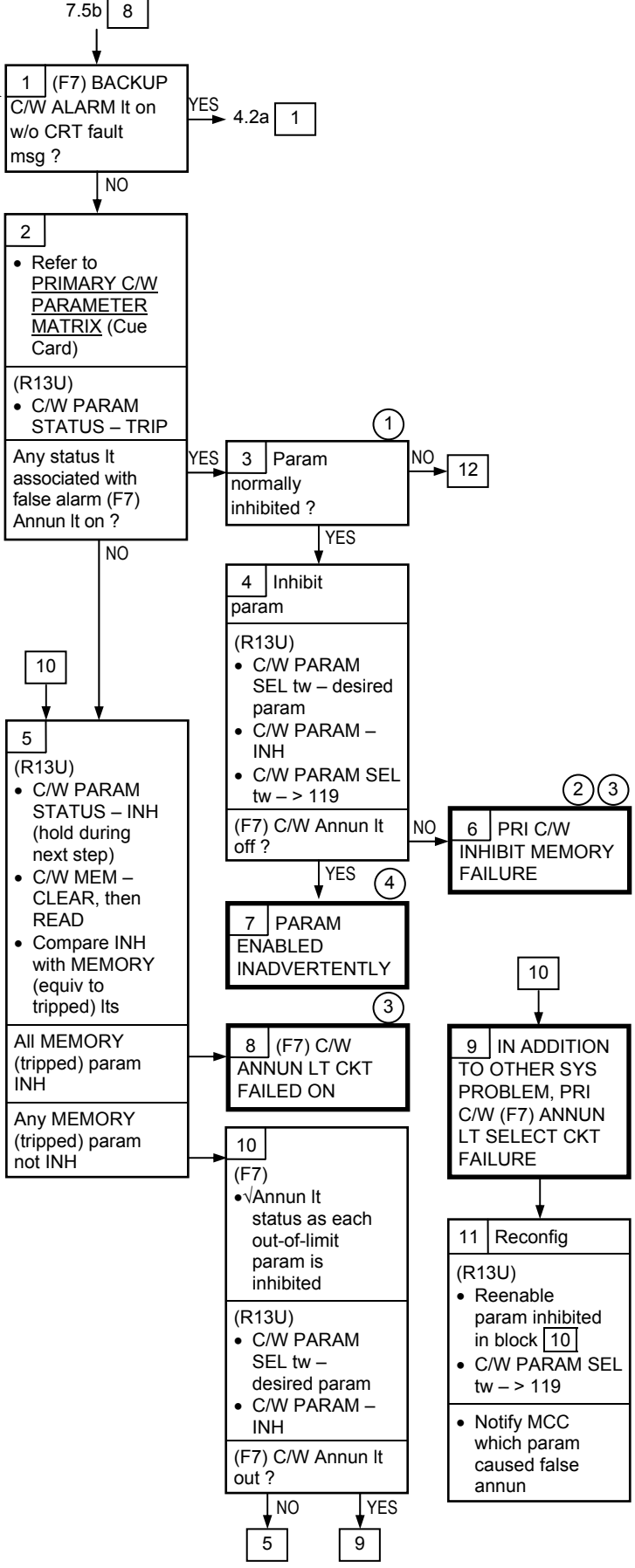
4.1d PRI C/W SYS ANNUNCIATES FALSE ALARM

PRI C/W Sys Annunciates False Alarm

(F7)
Annun It on but indicated sys checks normal

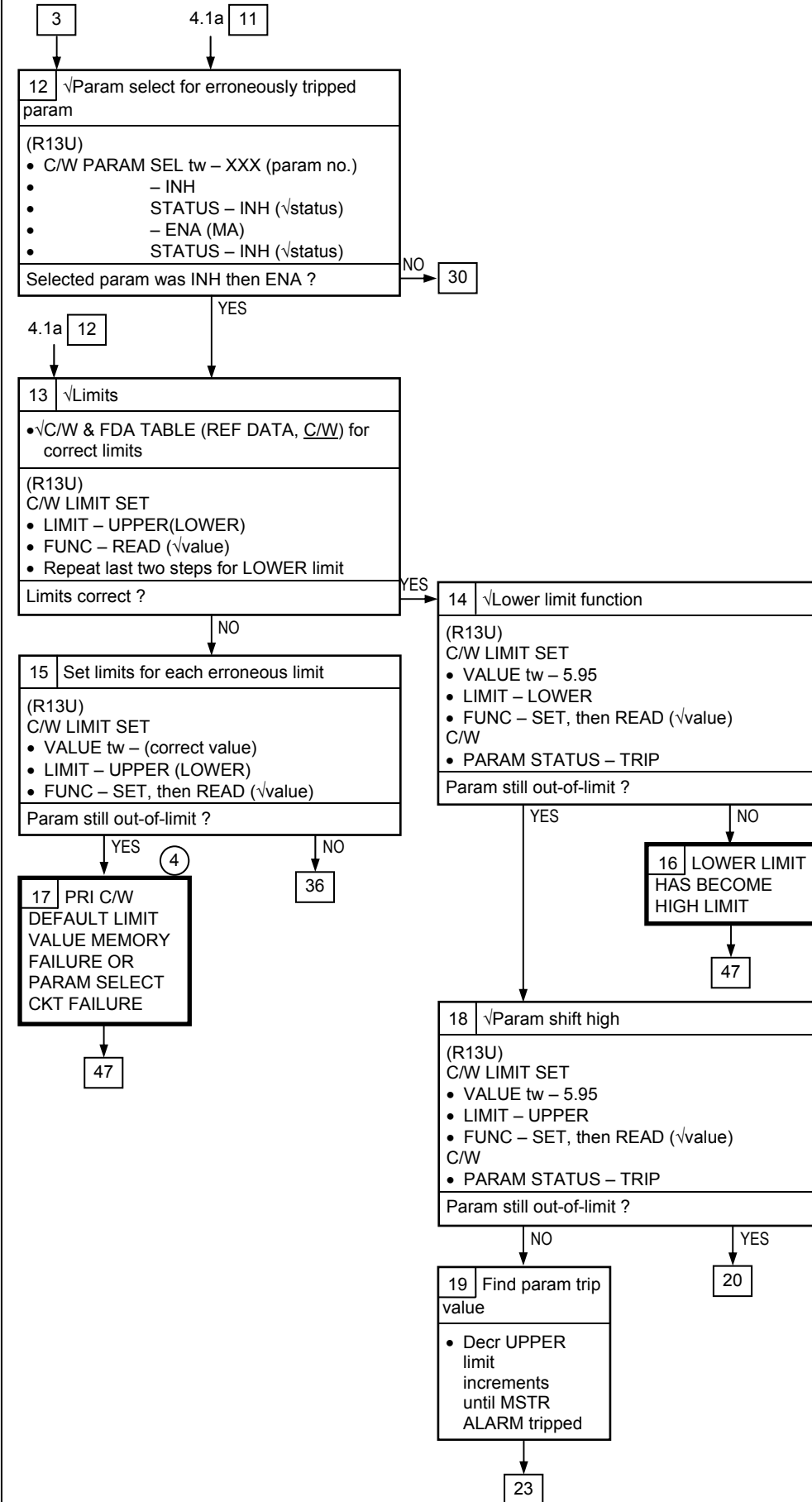
Caused by:
Annun It failed on PRI C/W Sys
Inhibit memory failure
Limit value failure
Limit sense failure
Signal Conditioner failure
Param Select or Multiplexer failure

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



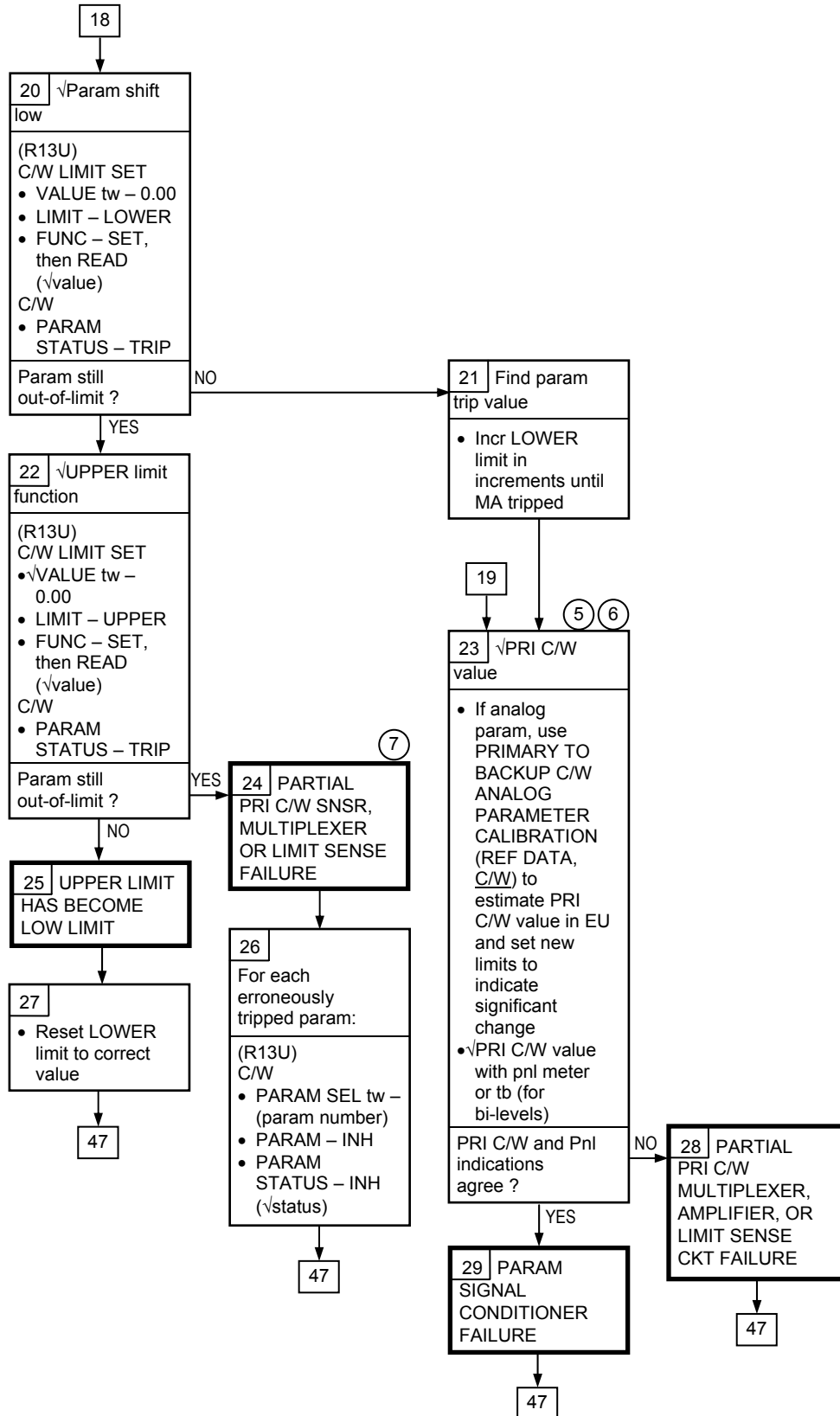
- ① Correct param inhibit status can be verified using PRIMARY C/W PARAMETER MATRIX Cue Card
- ② Depending on param value, It may be extinguished by changing limits
- ③ To disable Its, remove illuminated bulbs or select (C3) C/W MODE - ACK
- ④ Prior to changing any param limit value, √param select capability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

C/W 4.1d (Cont)



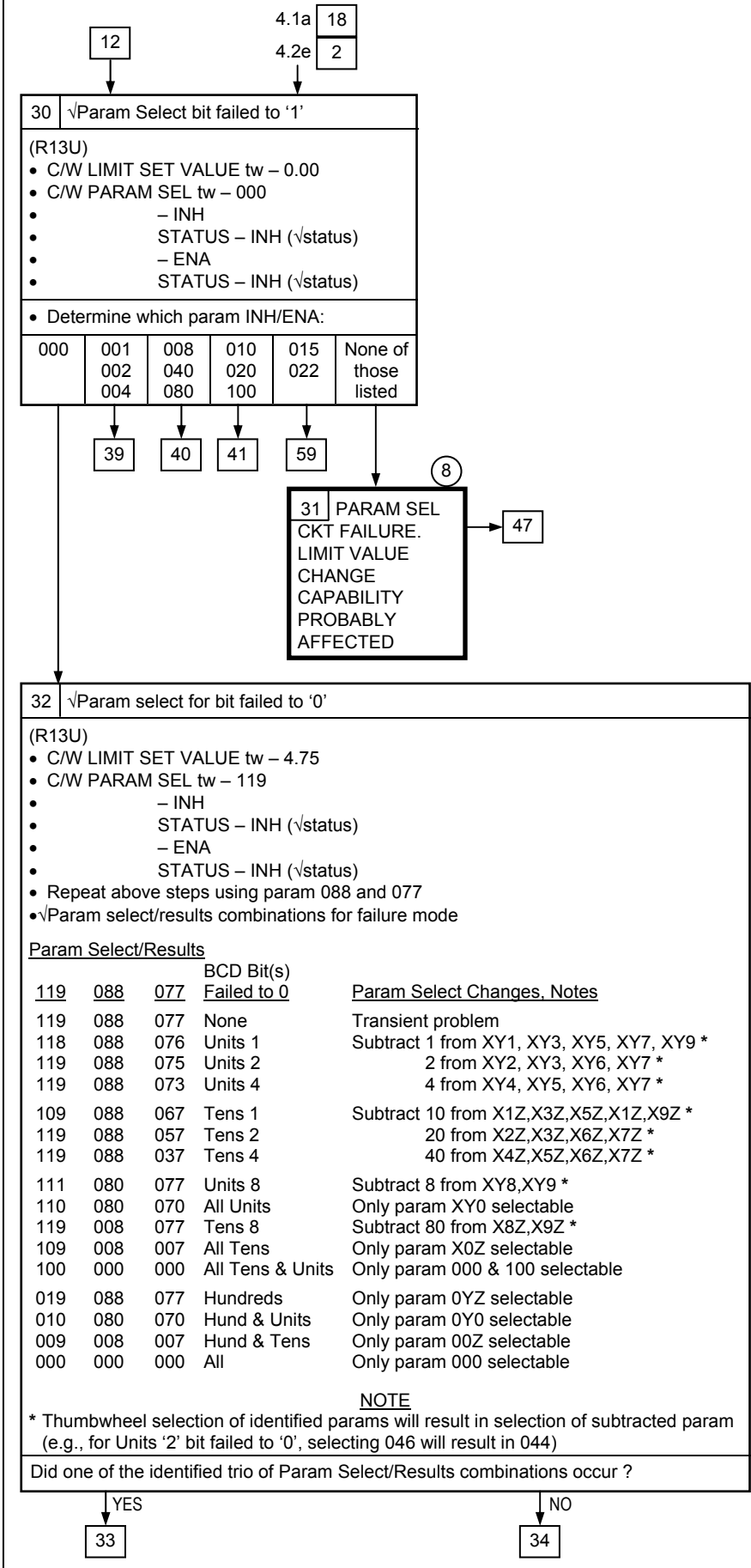
④ Prior to changing any param limit value, √param select capability with INH/ENA capability verification using procedure in block 12

C/W 4.1d (Cont)



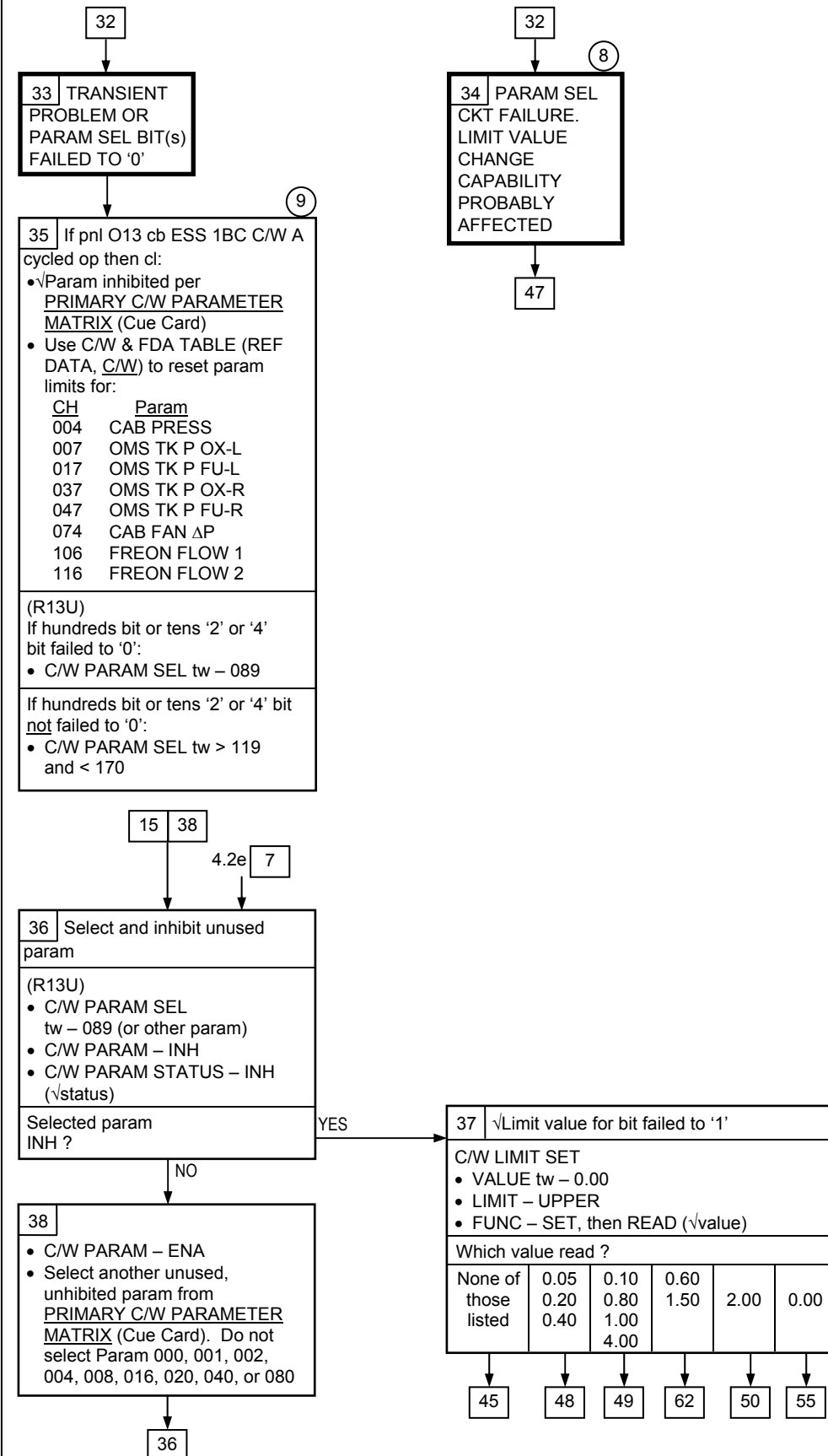
- ⑤ Notify MCC of change in PRI C/W param and limit values
- ⑥ Bi-level params are identified in NOTES column of C/W & FDA TABLE (REF DATA, C/W)
- ⑦ If pnl indicator and PRIMARY C/W param values agree, snsr output failed

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

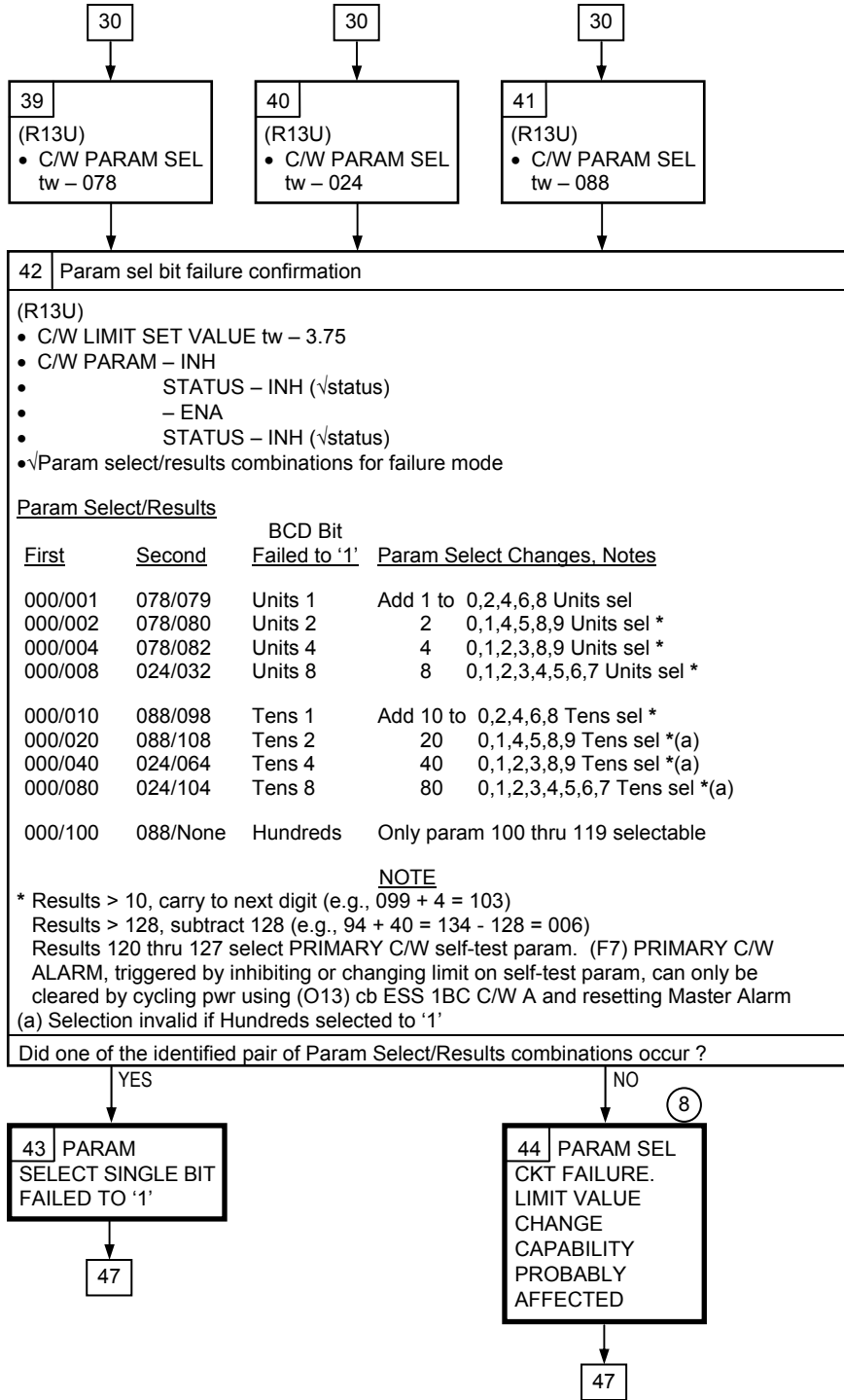
C/W 4.1d (Cont)



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

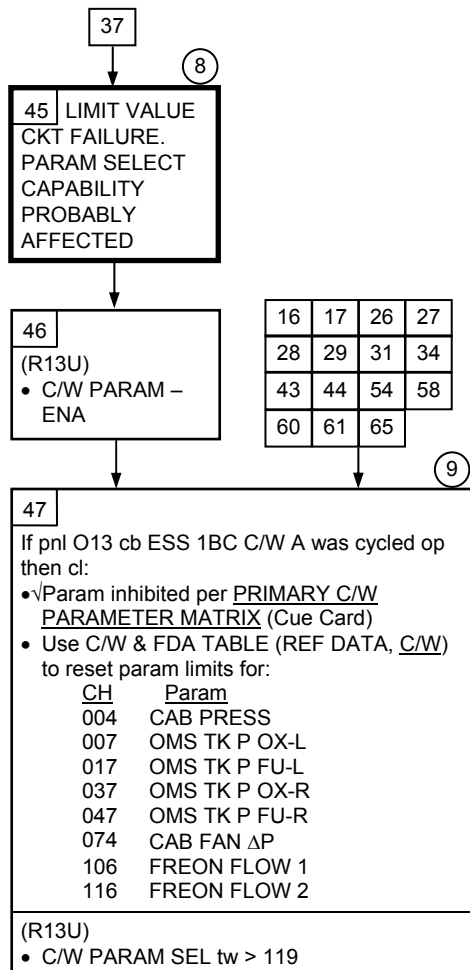
⑨ All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed

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

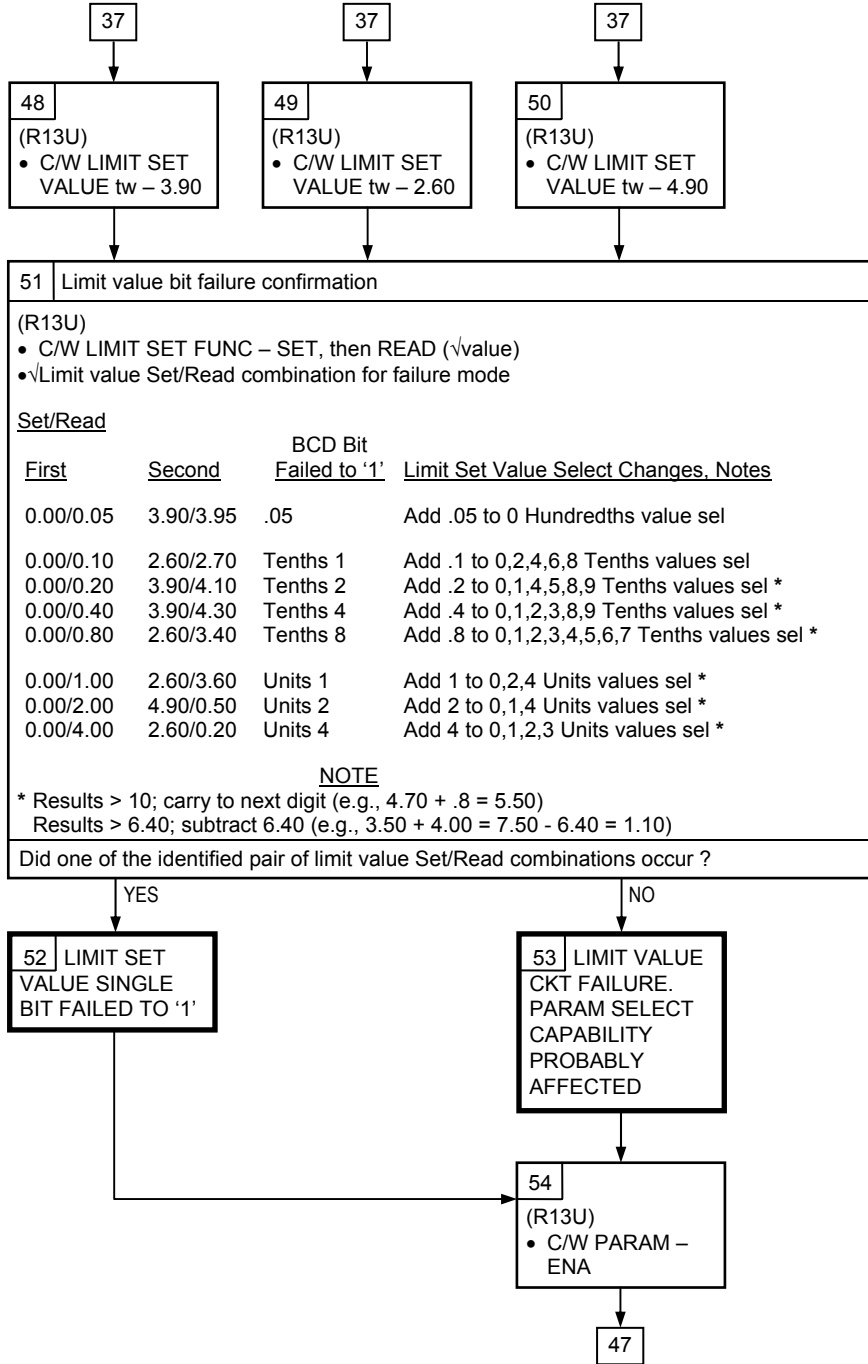
C/W 4.1d (Cont)



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 \sqrt Limit value for bit(s) failed to '0'

(R13U)

- C/W LIMIT SET VALUE tw – 3.65
 FUNC – SET, then READ (\sqrt value)
- Repeat above steps using limit value of 5.95
- \sqrt 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, \sqrt that desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block [12]), then \sqrt 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

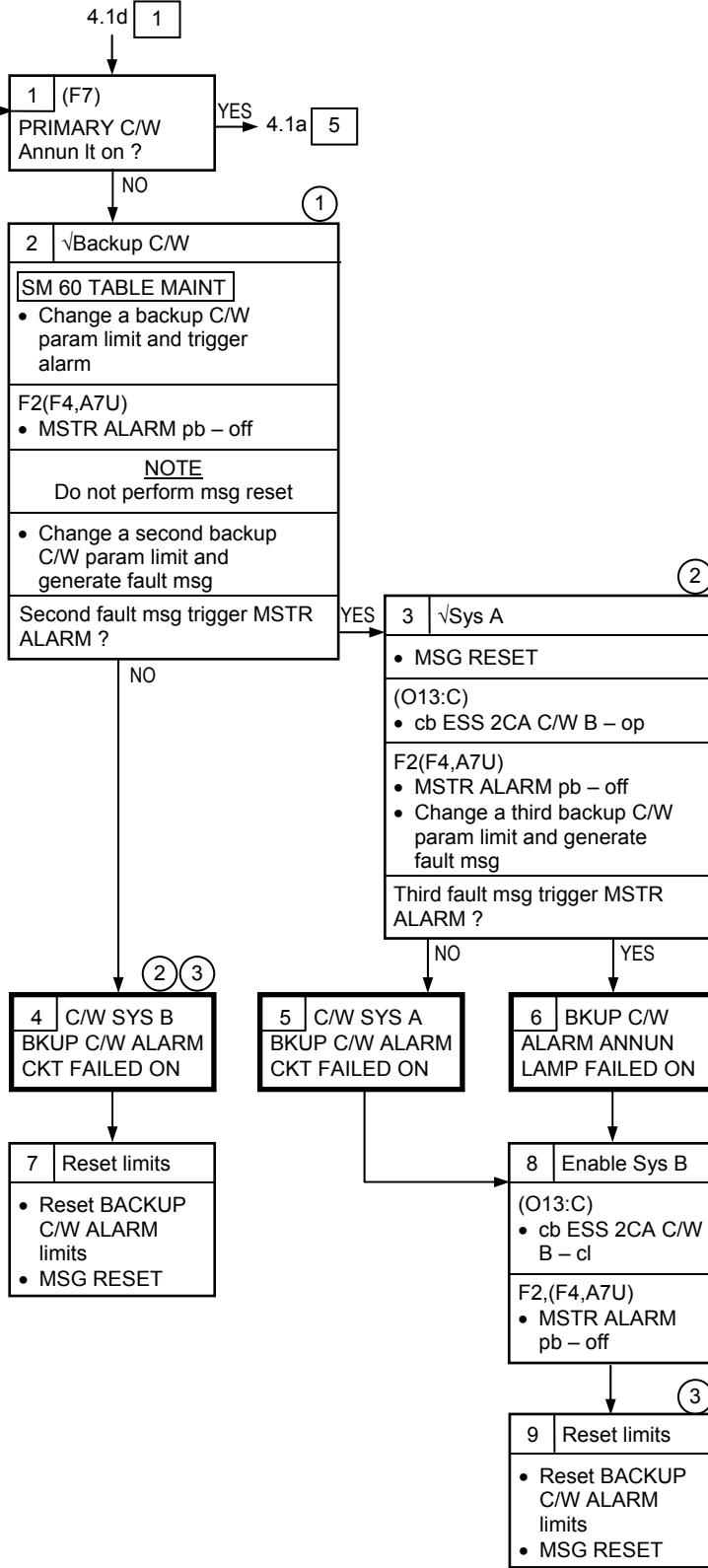
4.2a NONRESETTABLE BACKUP C/W ALARM LT

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

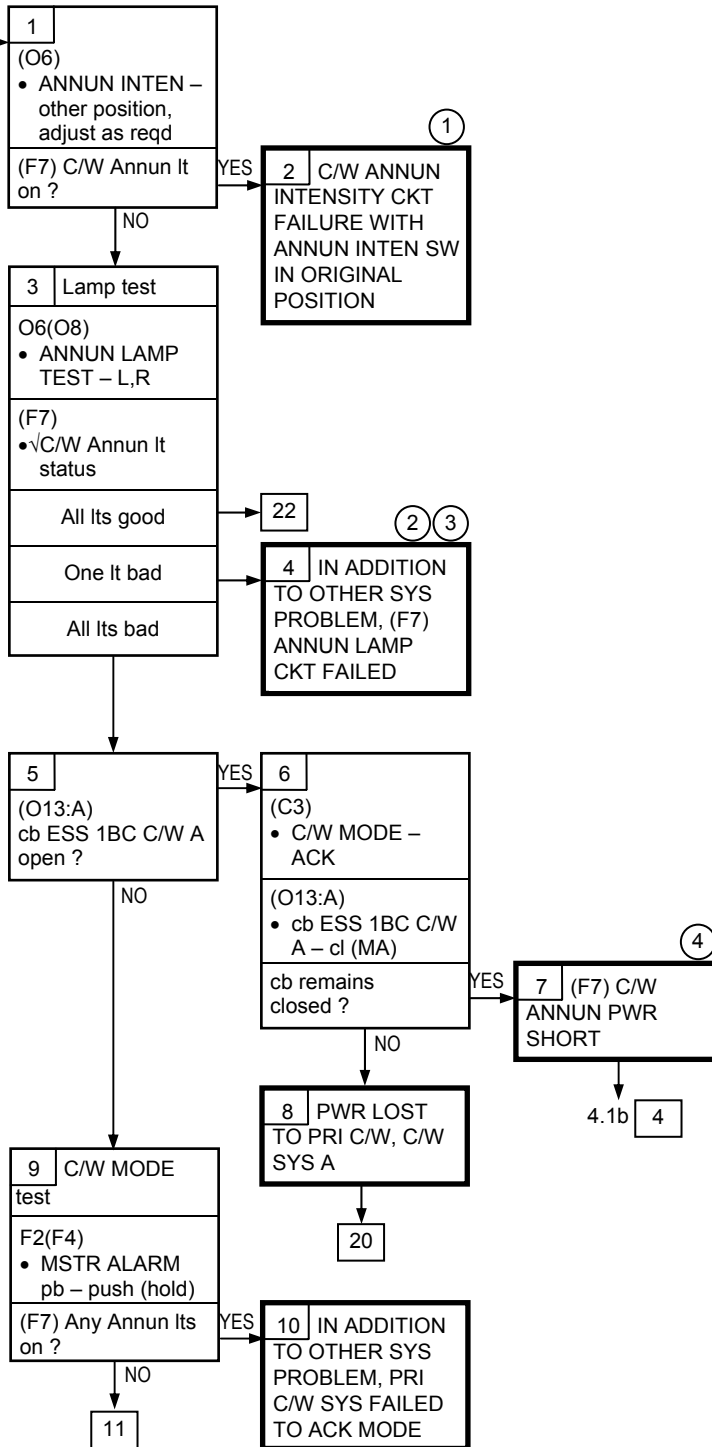
4.2b MA LT & C/W TONE – NO ANNUN LT

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



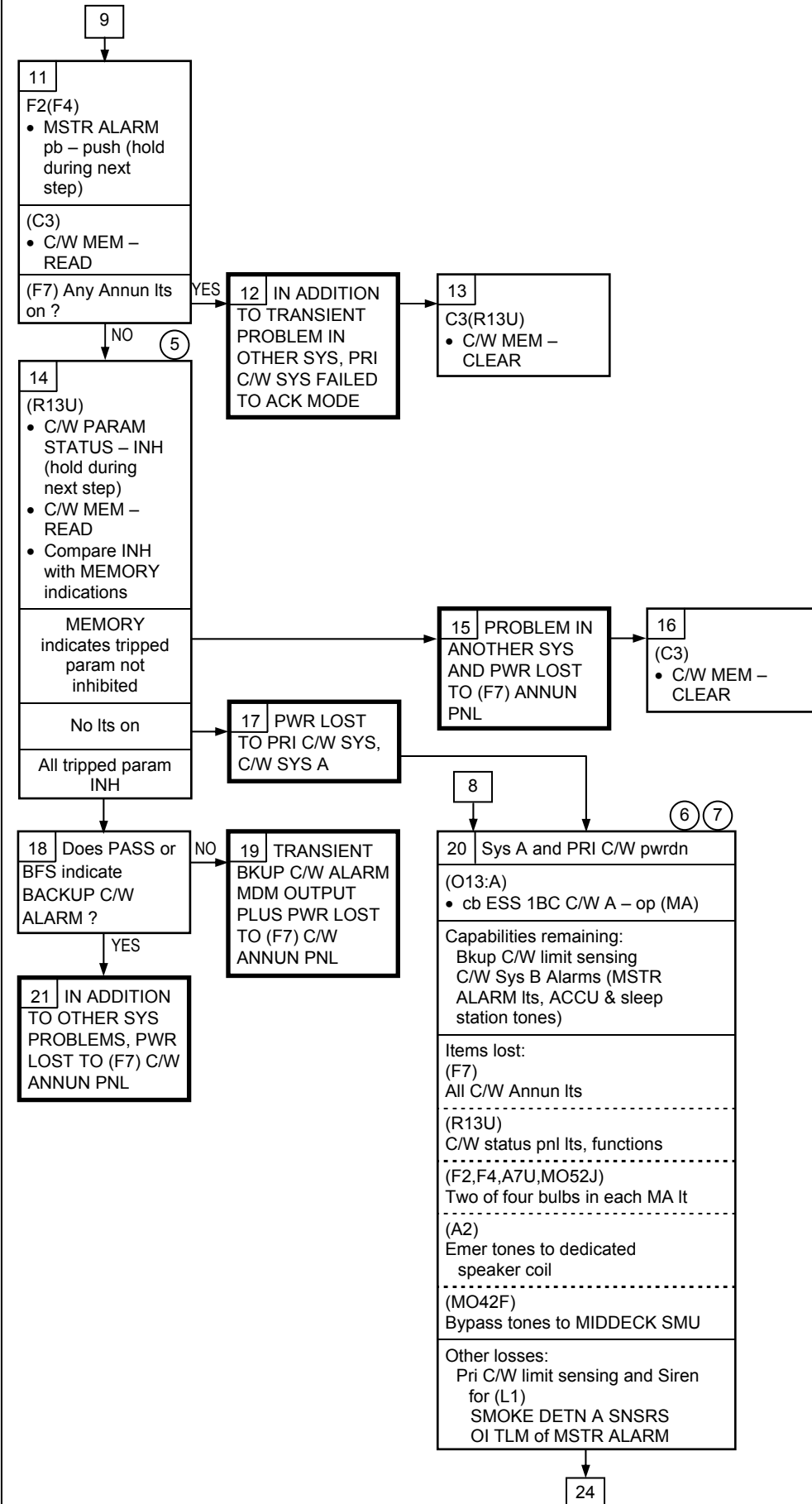
① ANNUN INTEN sw must be in non-failed position for normal (F7) C/W lts ops

② Verify lamp holder properly seated

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

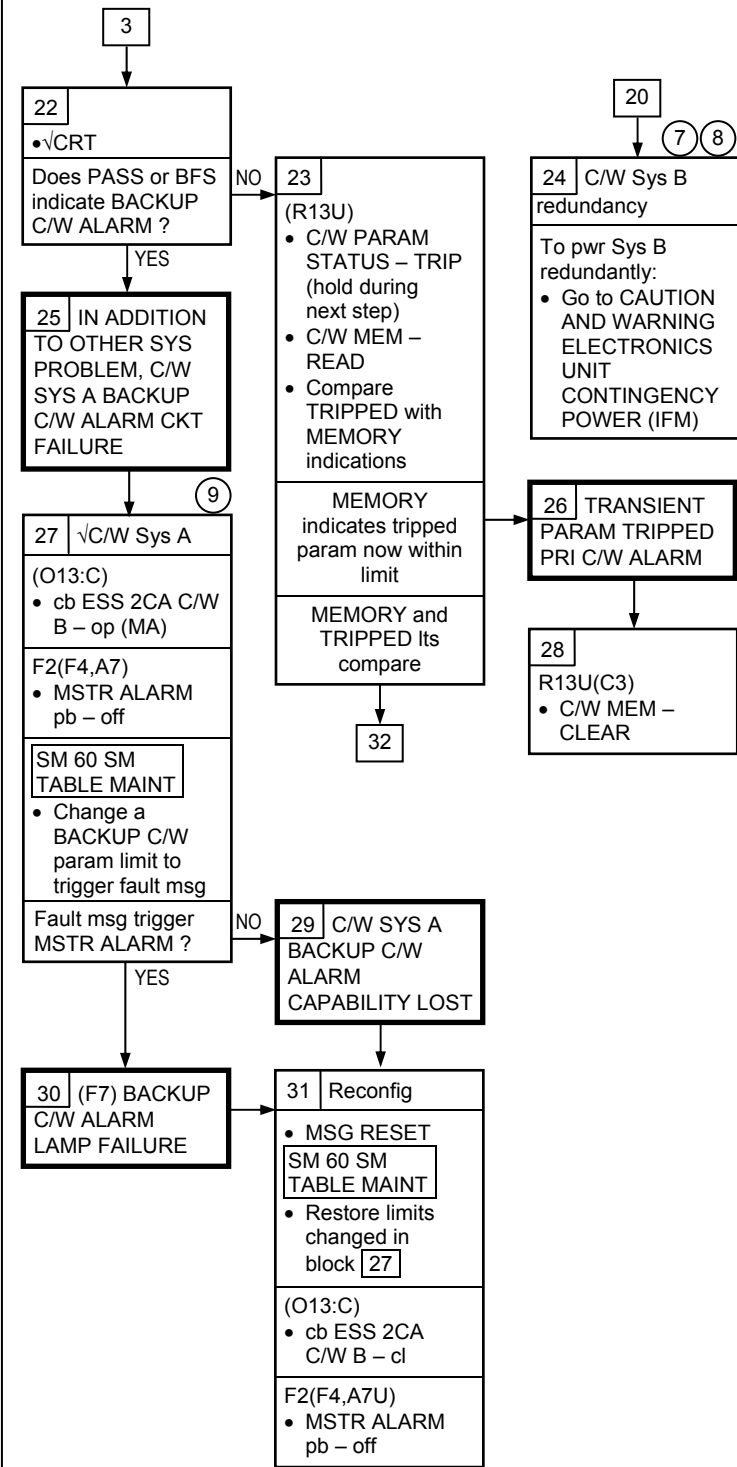
④ Use pnl A7U (MO52J) MSTR ALARM pb to reset alarms. If pnl F2(F4) pb must be used, pressing pb quickly may allow MA to reset without tripping cb. Pnl F7 annunciator lost

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

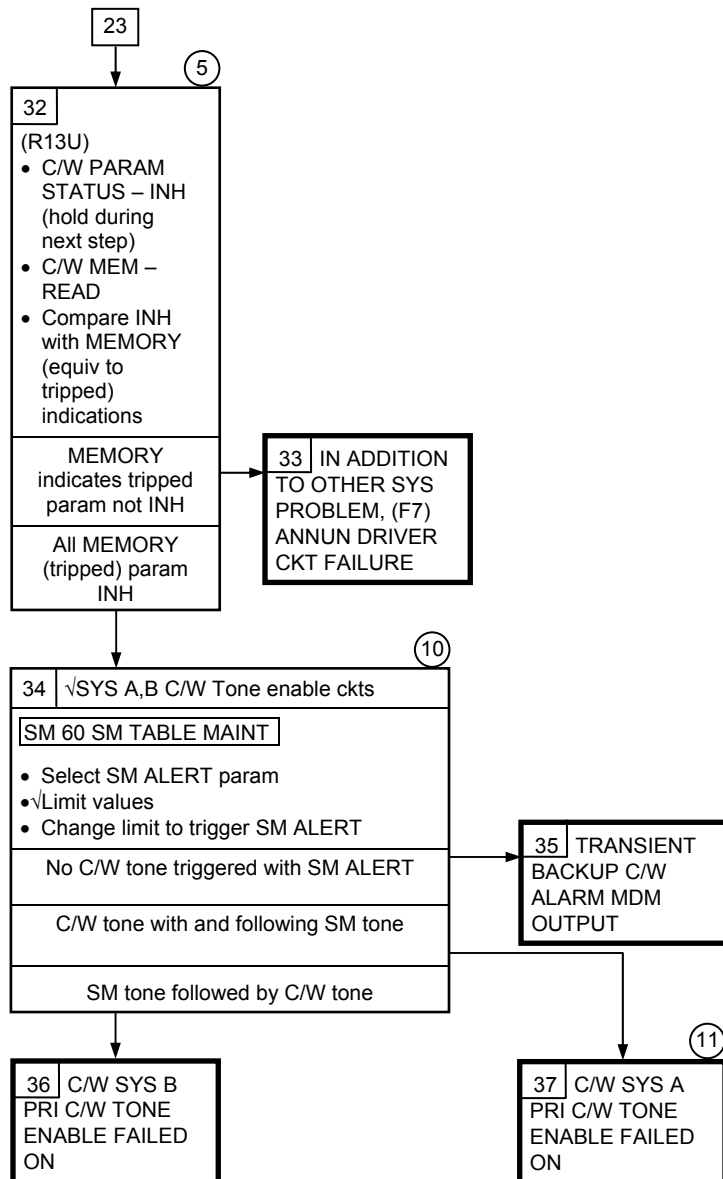
⑧ Redundancy can be verified by opening cb ESS 2CA C/W B (O13:C) and receiving alarm tones

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

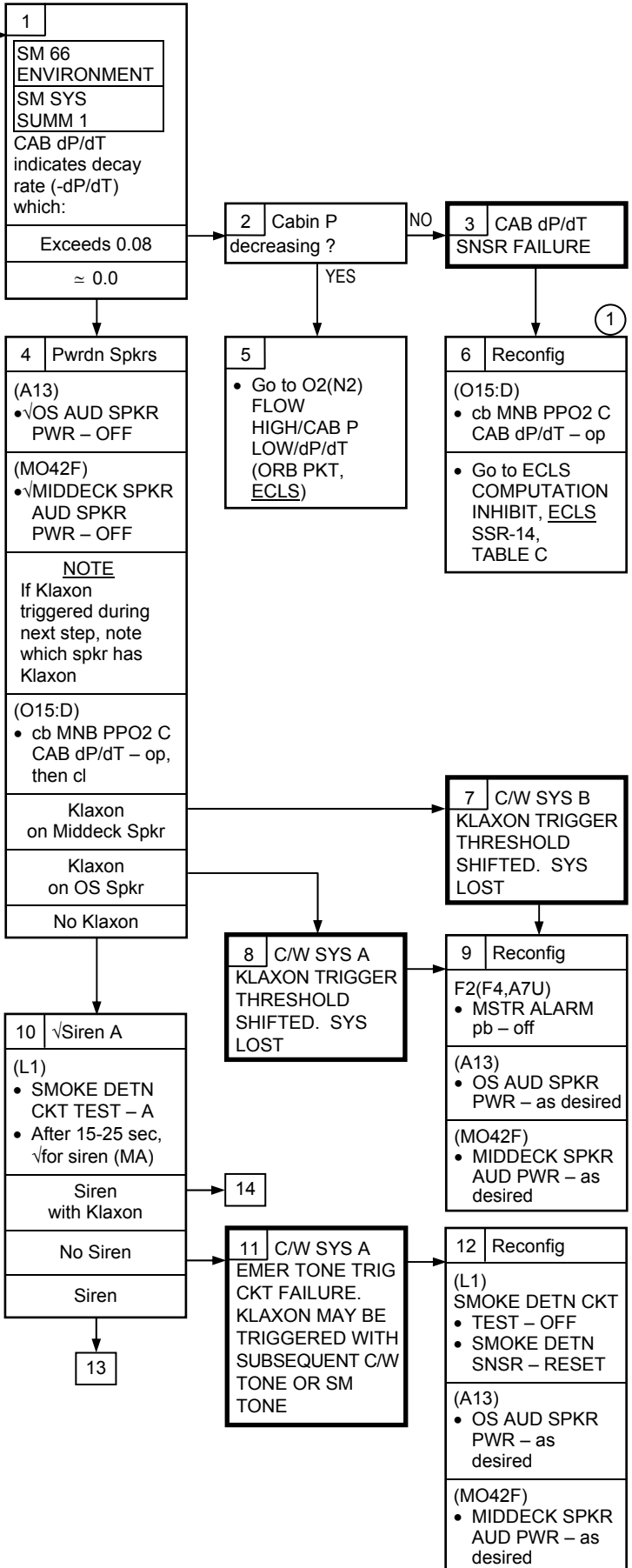
C/W

4.2c KLAXON – NO RAPID dP/dT

KLAXON – No Rapid dP/dT

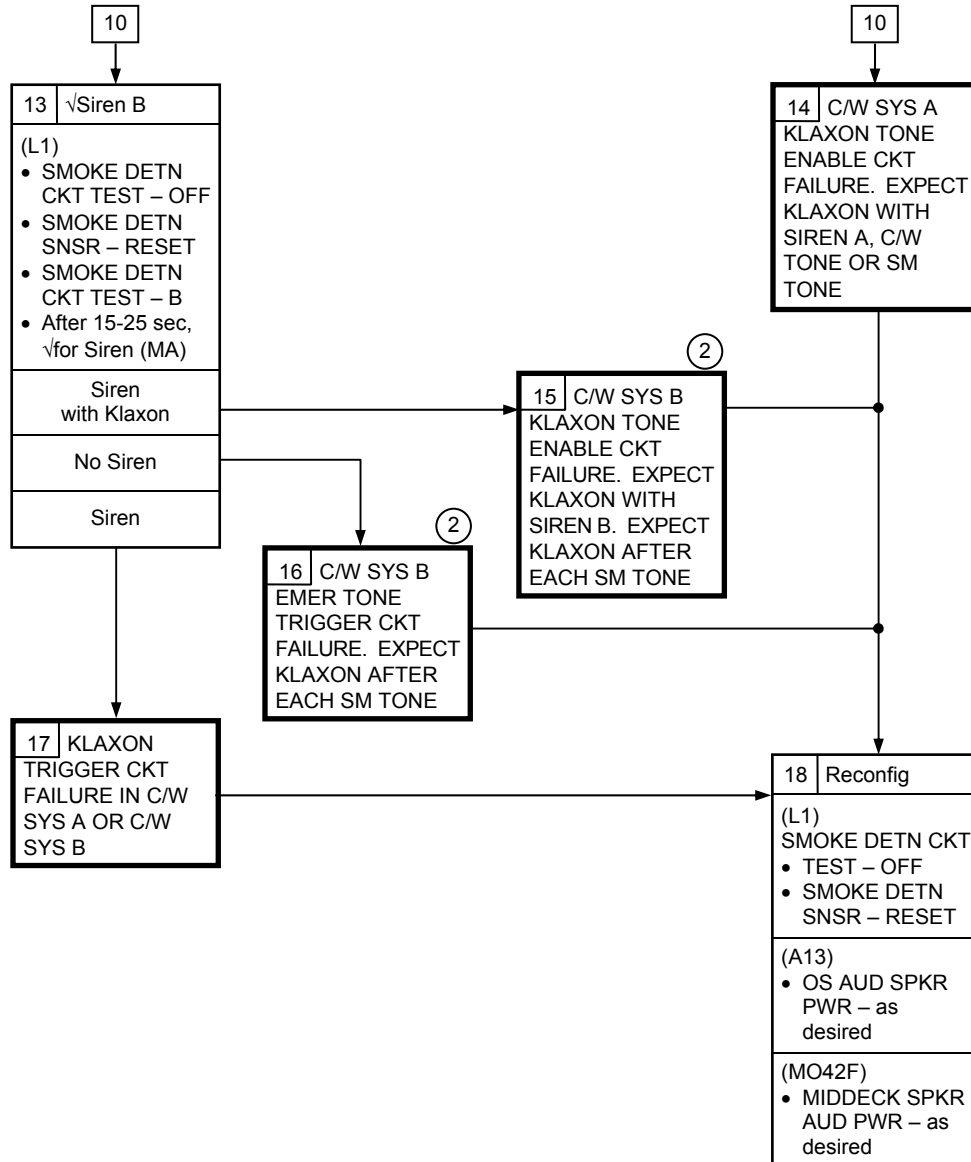
If:
 Snsr failure
 Alarm threshold shift
 C/W SYS A(B)
 Klaxon tone trigger or enable ckt failure

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



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

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

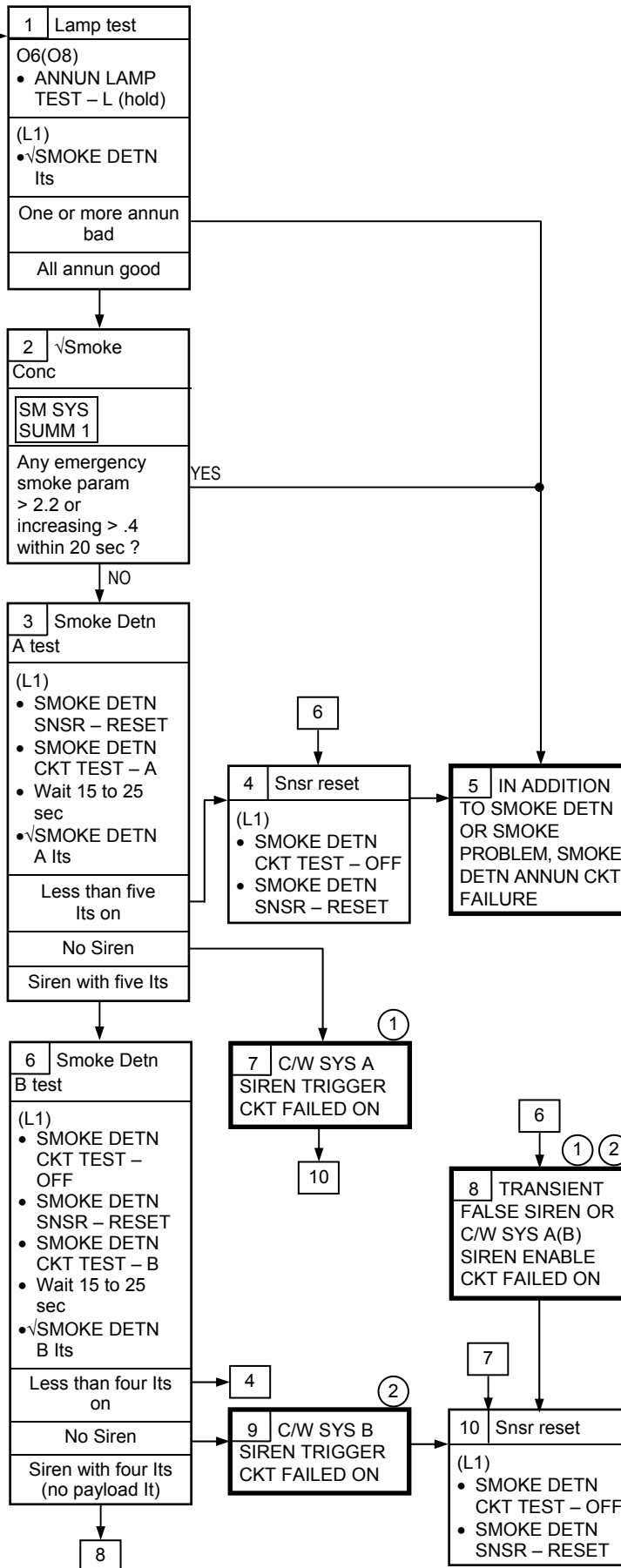
C/W

4.2d SIREN – NO SMOKE DETN LT

SIREN – No Smoke Detn Lt

If:
Smoke Detn Lt failure
C/W Sys A(B) Siren trigger or enable ckt failed

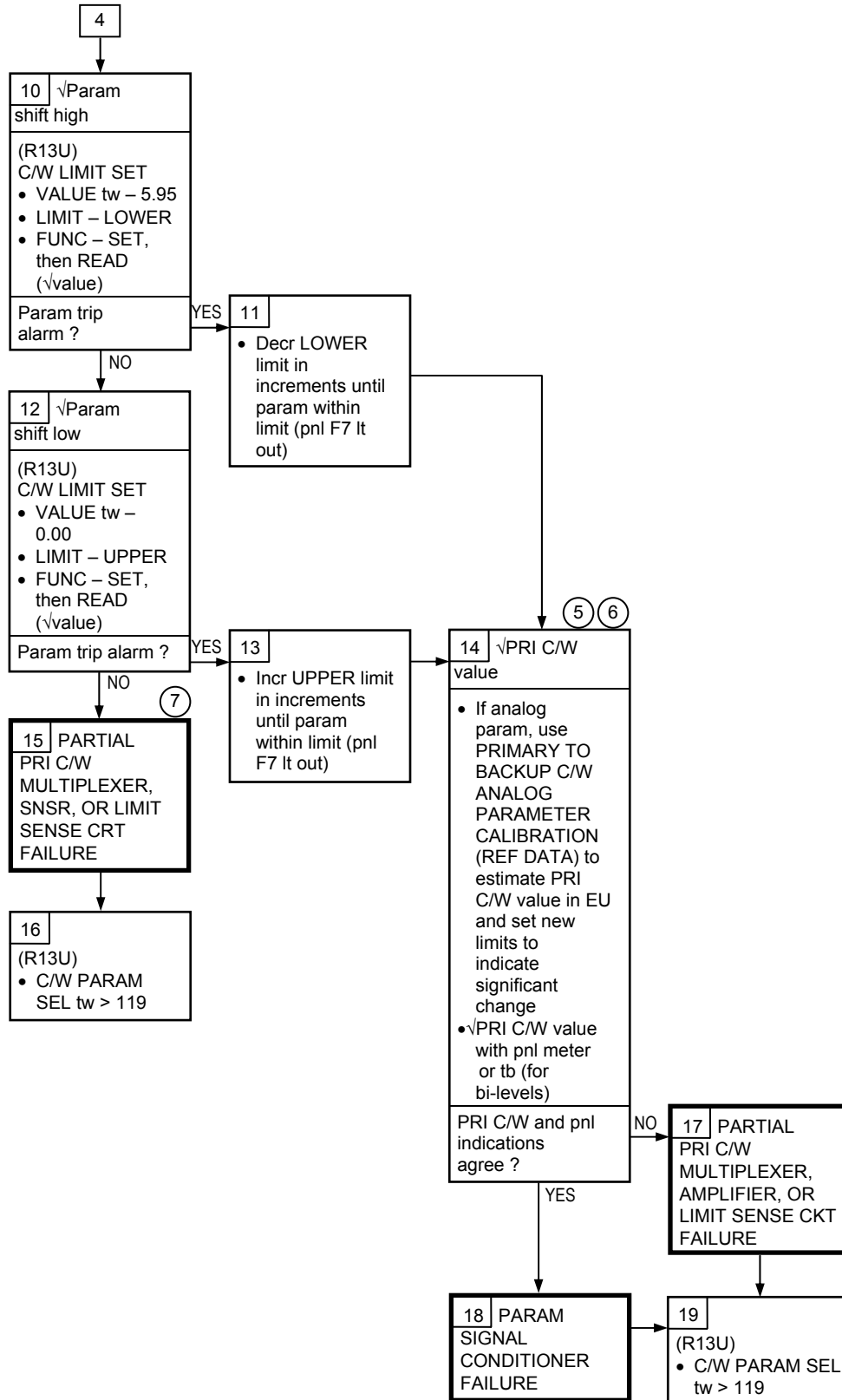
Nominal Config:
(O13:A)
cb ESS 1BC C/W A – cl
(O13:C)
cb ESS 2CA C/W B – cl
(C3)
C/W MODE – NORM
(R13U)
Annun ltrg sys operational
Smoke detn sys operational



① If C/W Sys A failed, Siren may occur with Klaxon, C/W tone, or SM tone

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

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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COMPUTER DATA BUS NETWORK	5-3
<u>5.1</u> <u>GPC</u>	
5.1a CS SPLIT	5-5
5.1b 'BFS GPC FAIL (BITE)' (ORBIT).....	5-10
<u>5.2</u> <u>MMU/MTU</u>	
5.2a 'I/O ERROR MMU 1(2)'	5-12
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5.2c RESERVED.....	not used
5.2d 'TIME MTU'	5-18
5.2e RESERVED.....	not used
5.2f CHECKPOINT FAIL	5-20
<u>5.3</u> <u>MDM</u>	
5.3a 'I/O ERROR FF(FA)'	5-22
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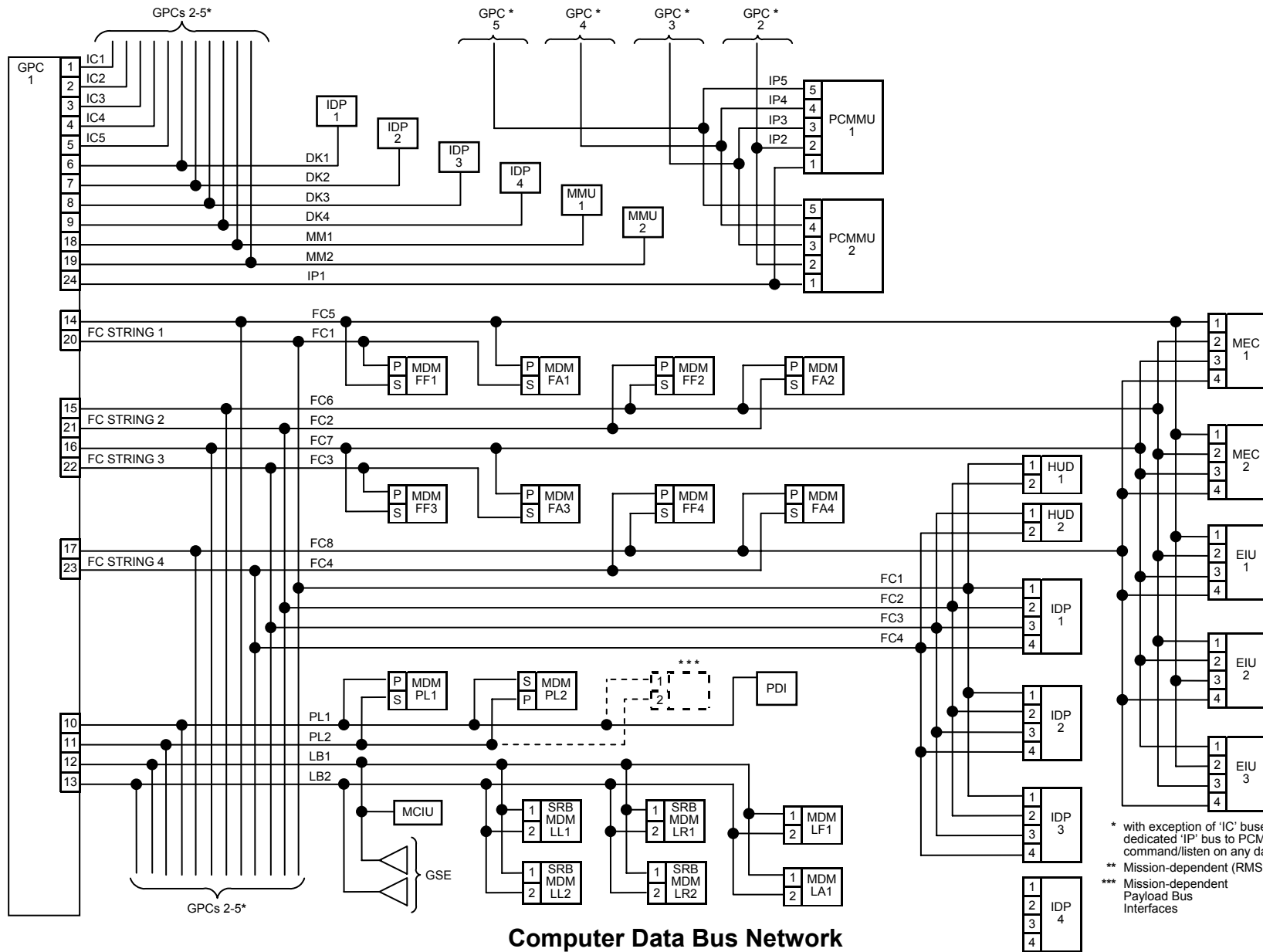
The following Fault Msgs have no corresponding MAL procedures in this book:

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

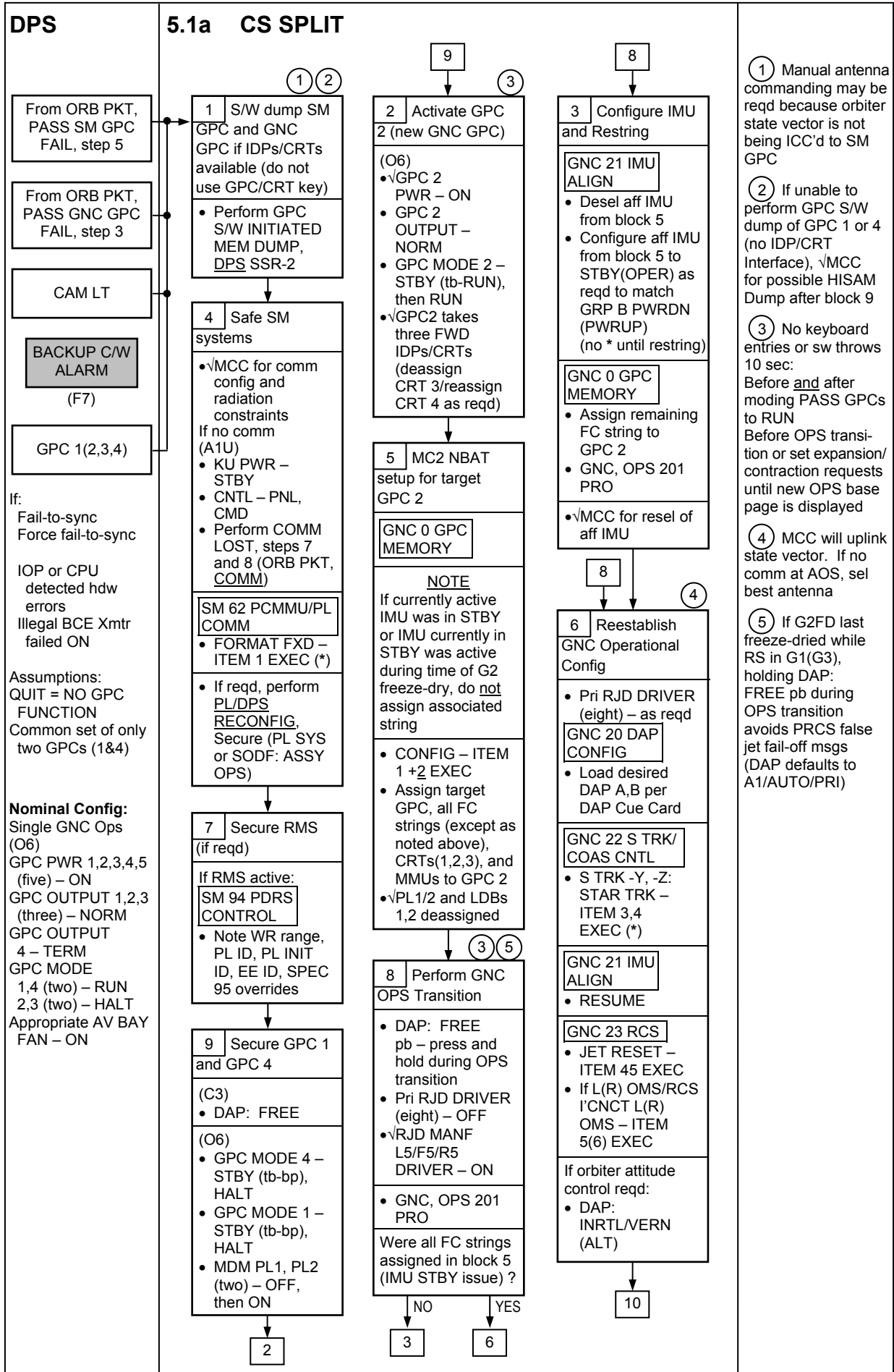
* with exception of 'IC' buses between GPCs and dedicated 'IP' bus to PCMMUs, any GPC can command/listen on any data bus

** Mission-dependent (RMS reqd)

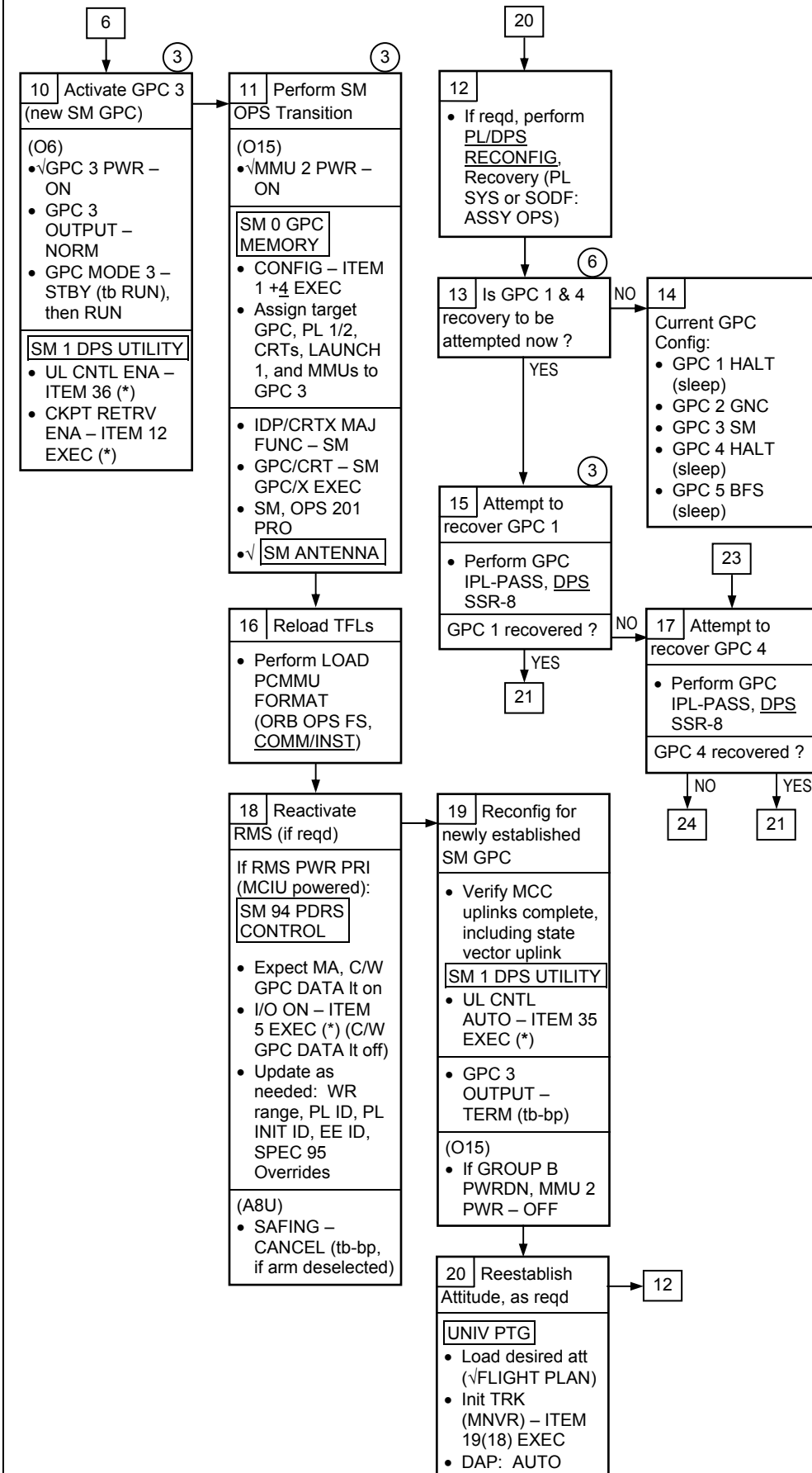
*** Mission-dependent Payload Bus Interfaces

(FLEX MDMs, FLEX PAIRS)

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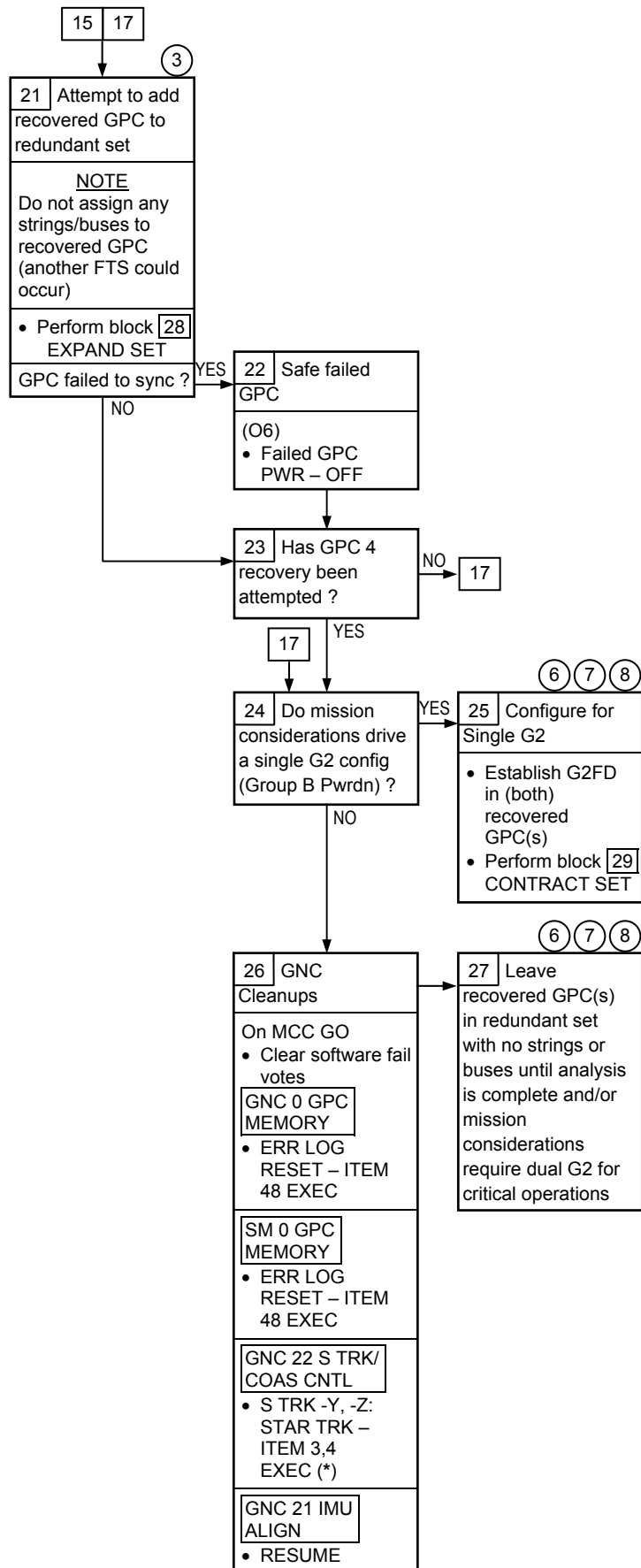
DPS 5.1a (Cont)



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

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	DO NOT	DO NOT
2	MODIFY	MODIFY	MODIFY
3	NBAT	NBAT	NBAT
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 downlister 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

OPS MODE RECALL (11)

- C3(A6U) • DAP: FREE
 • VERN(ALT)

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

- C3(A6U) • DAP: as reqd

FREEZE DRY GPC

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

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

CONFIG CLEANUP

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

CLEAR SOFTWARE FAIL VOTES (12)

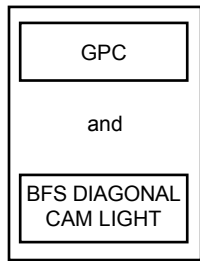
- GNC 0 GPC MEMORY
 • ITEM 48 EXEC
SM 0 GPC MEMORY
 • ITEM 48 EXEC

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

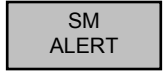
(12) Crew GO for Error Log Resets without prior MCC concurrence

DPS

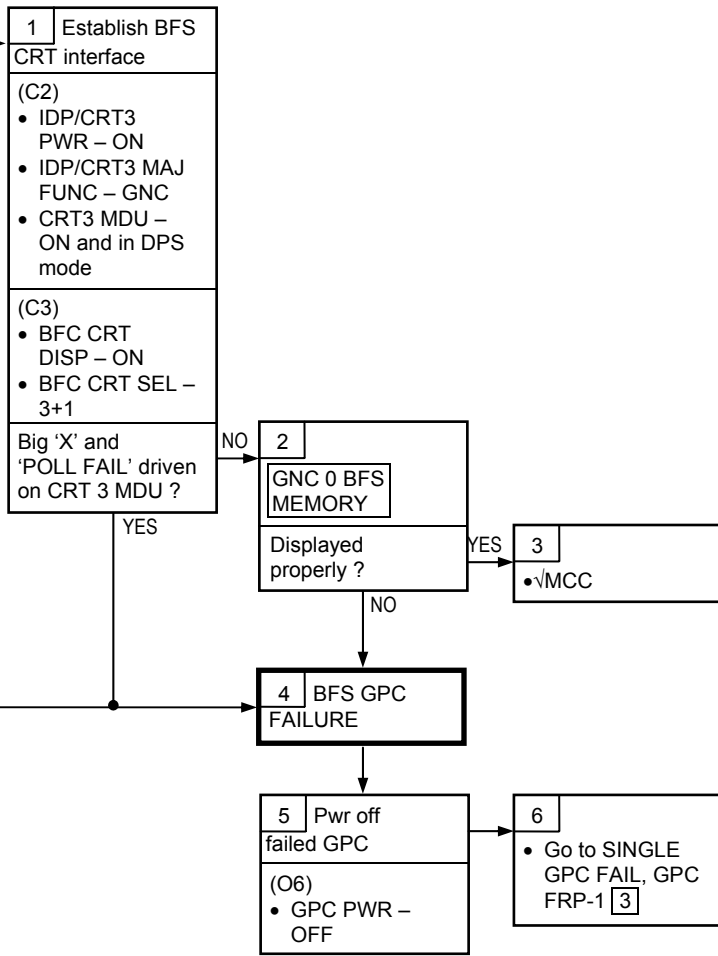
5.1b 'BFS GPC FAIL (BITE)' (ORBIT)



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



If:
BFS S/W initiates restart



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DPS

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

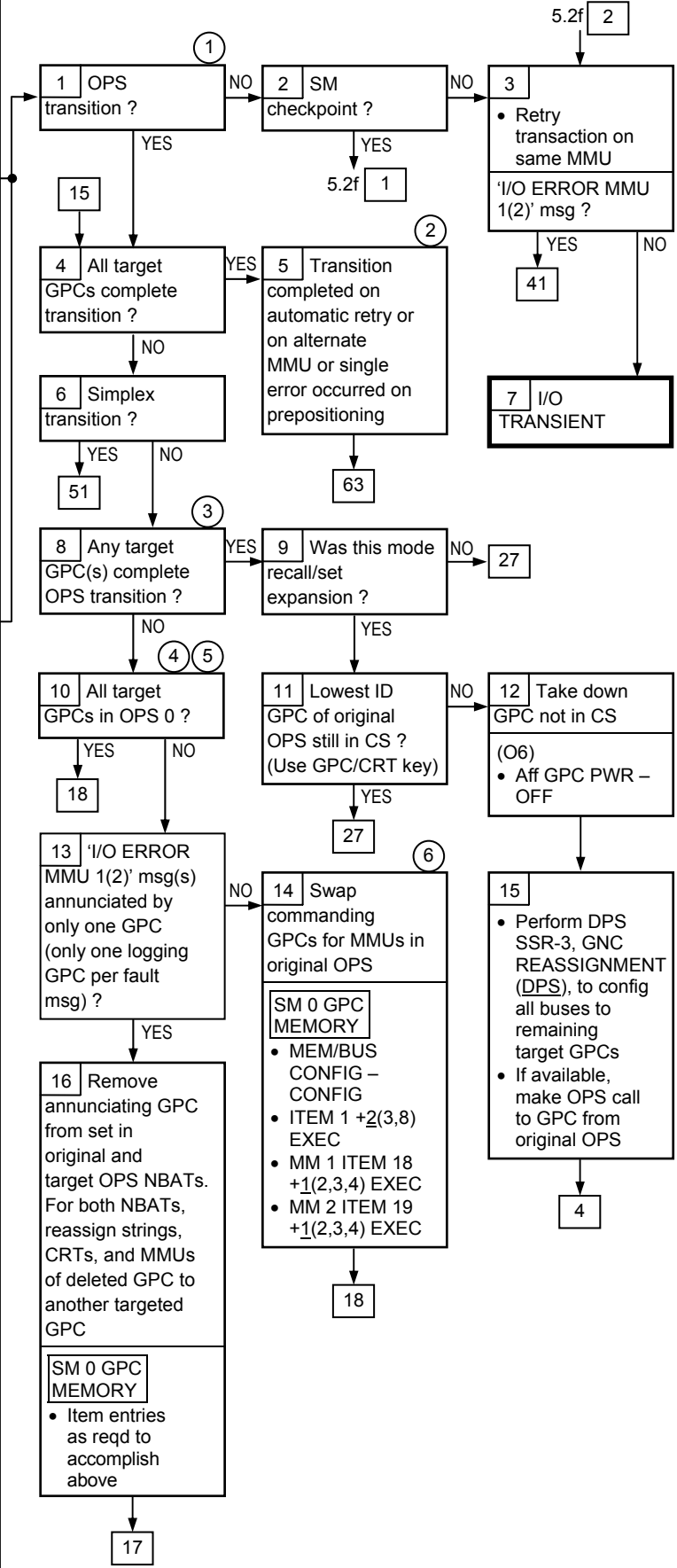
SM ALERT

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

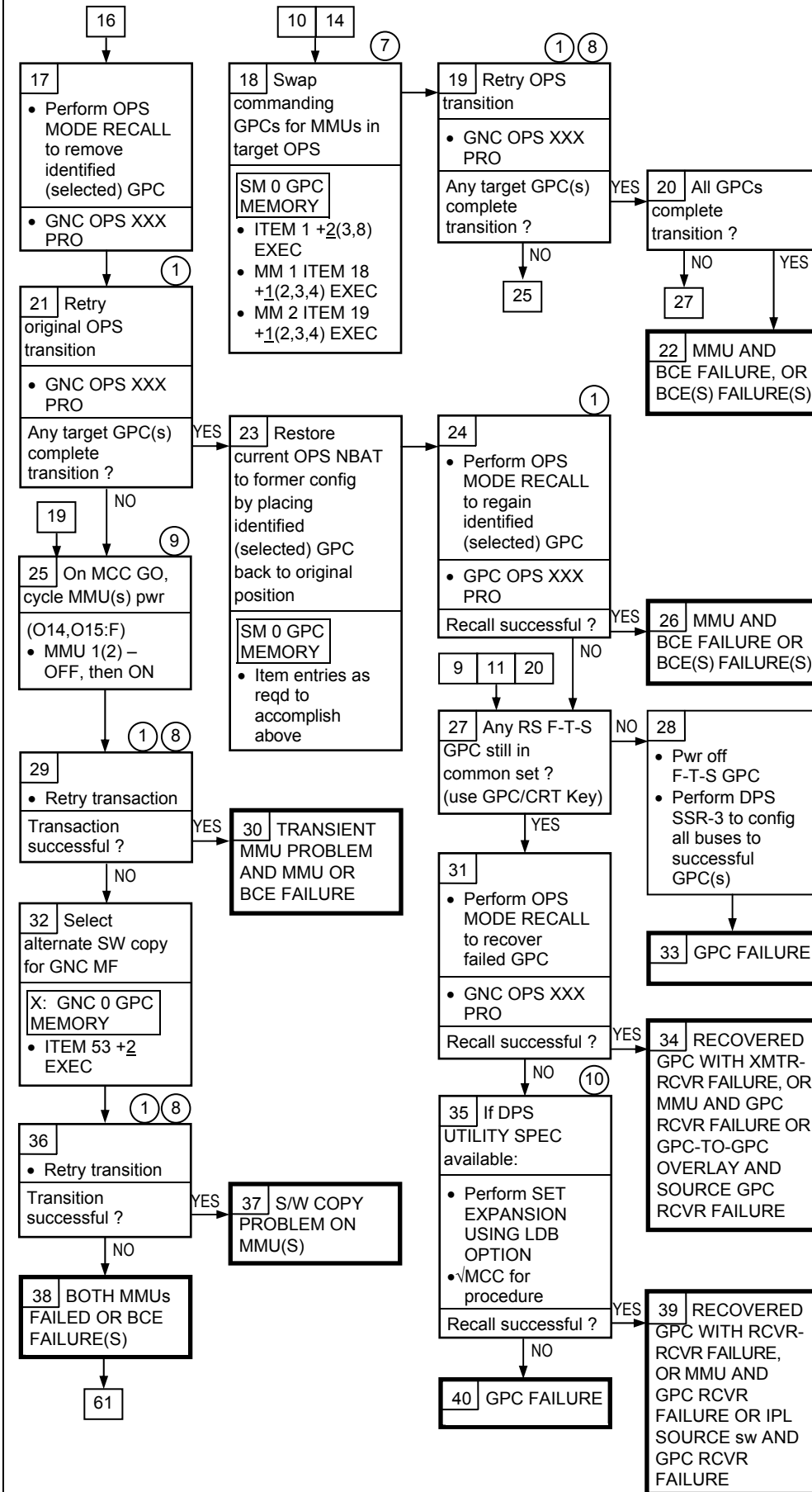
From ORB PKT, FD GPC ACTIVATE, step 1

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 msgs 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

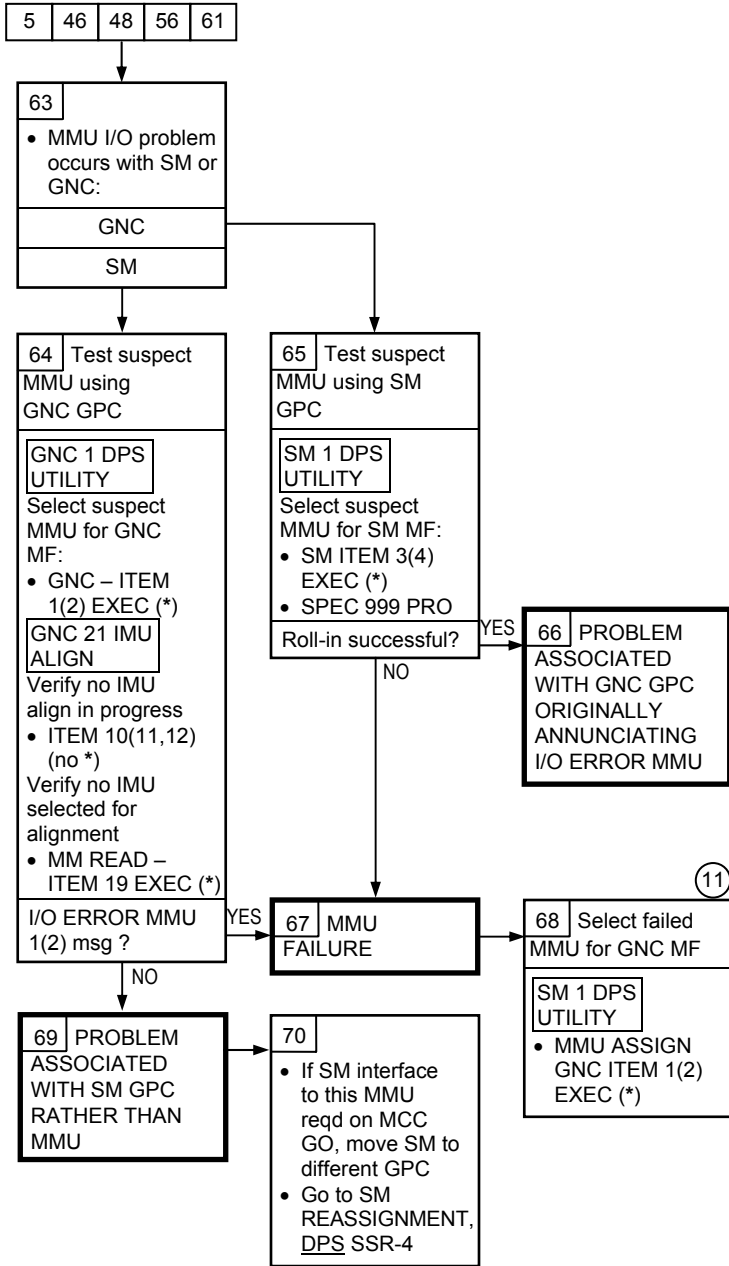
⑦ Software uses NBAT of target OPS to select GPC to command each MMU for the overlay reads

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)



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

DPS

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

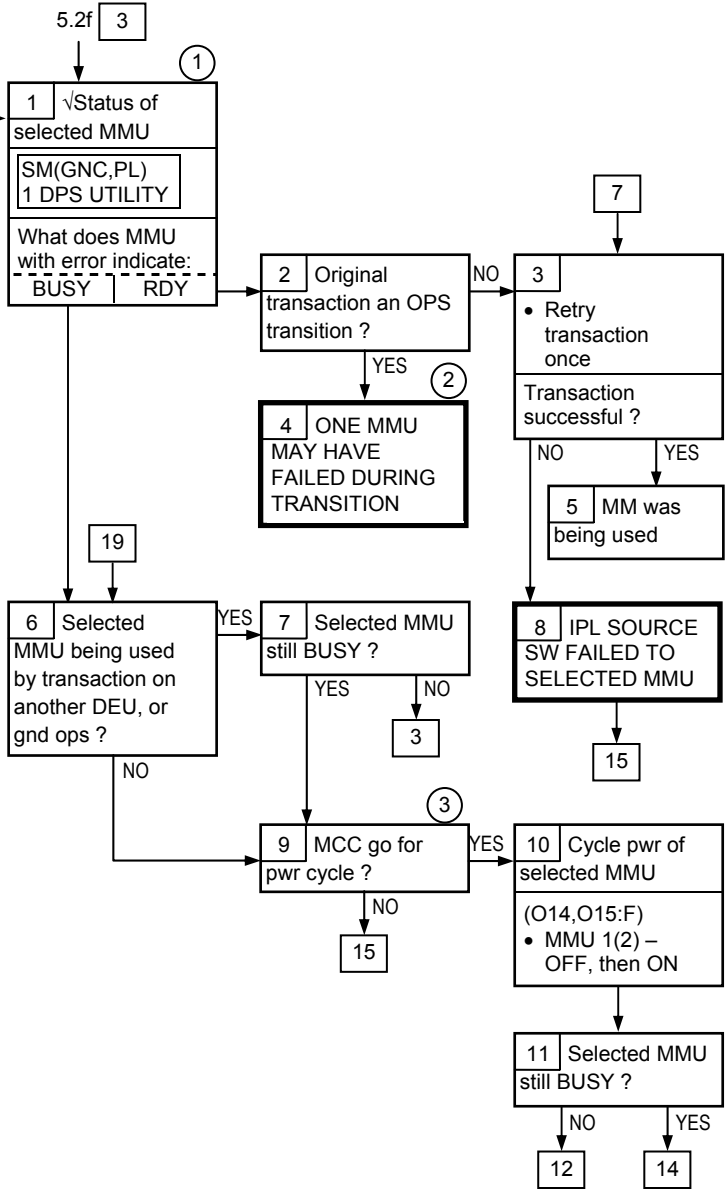
SM ALERT

OFF/BUSY MMU 1(2)

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

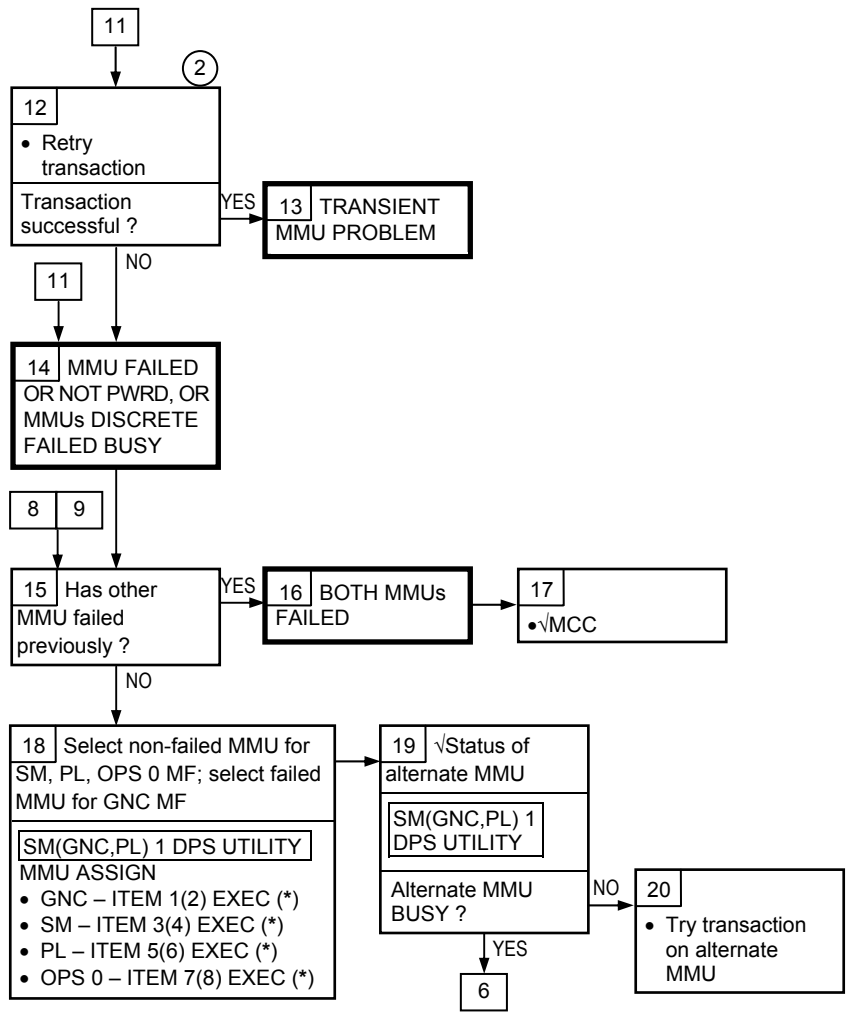
From ORB PKT, FD GPC ACTIVATE, step 1

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'

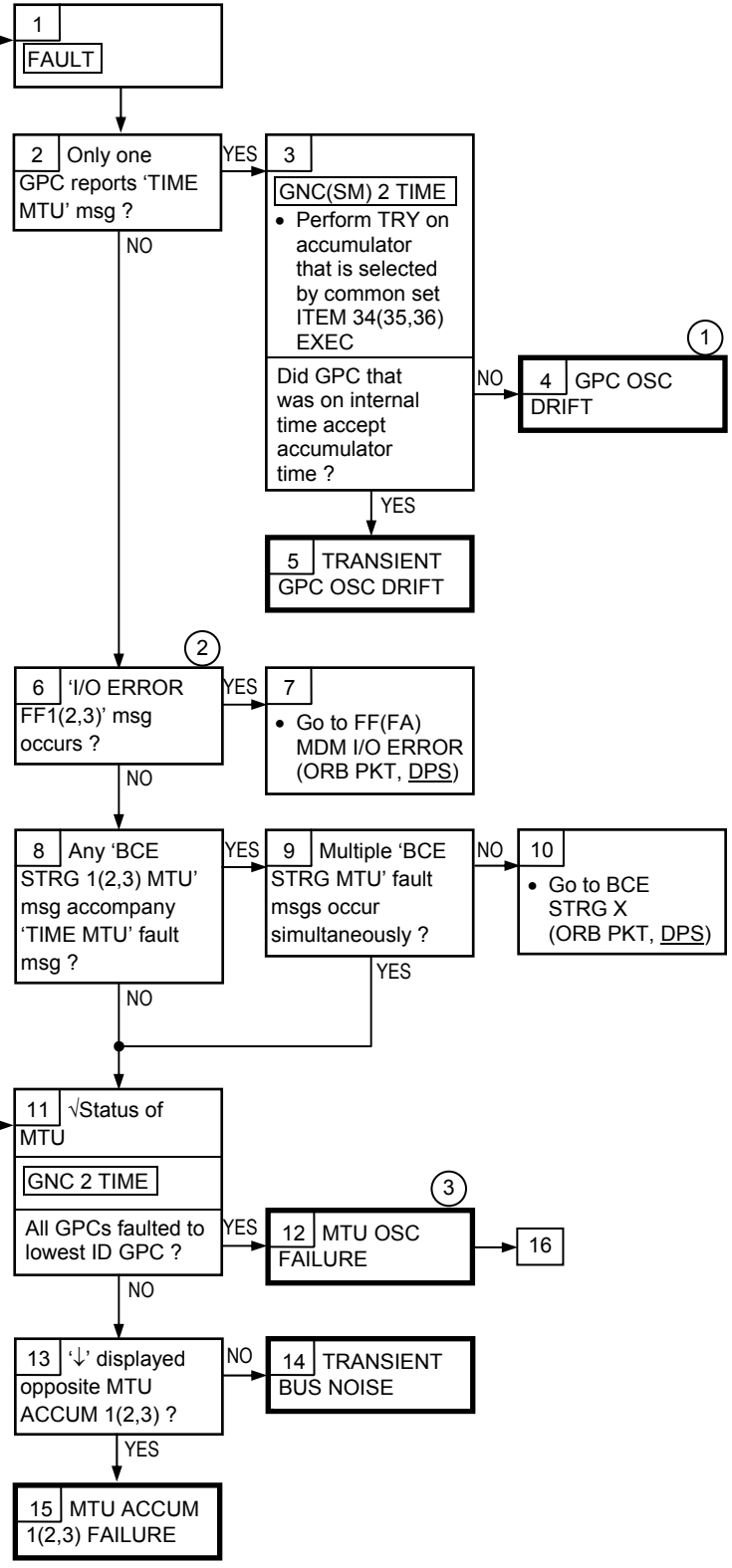
SM ALERT

TIME MTU

If:
GPC GMT time source change

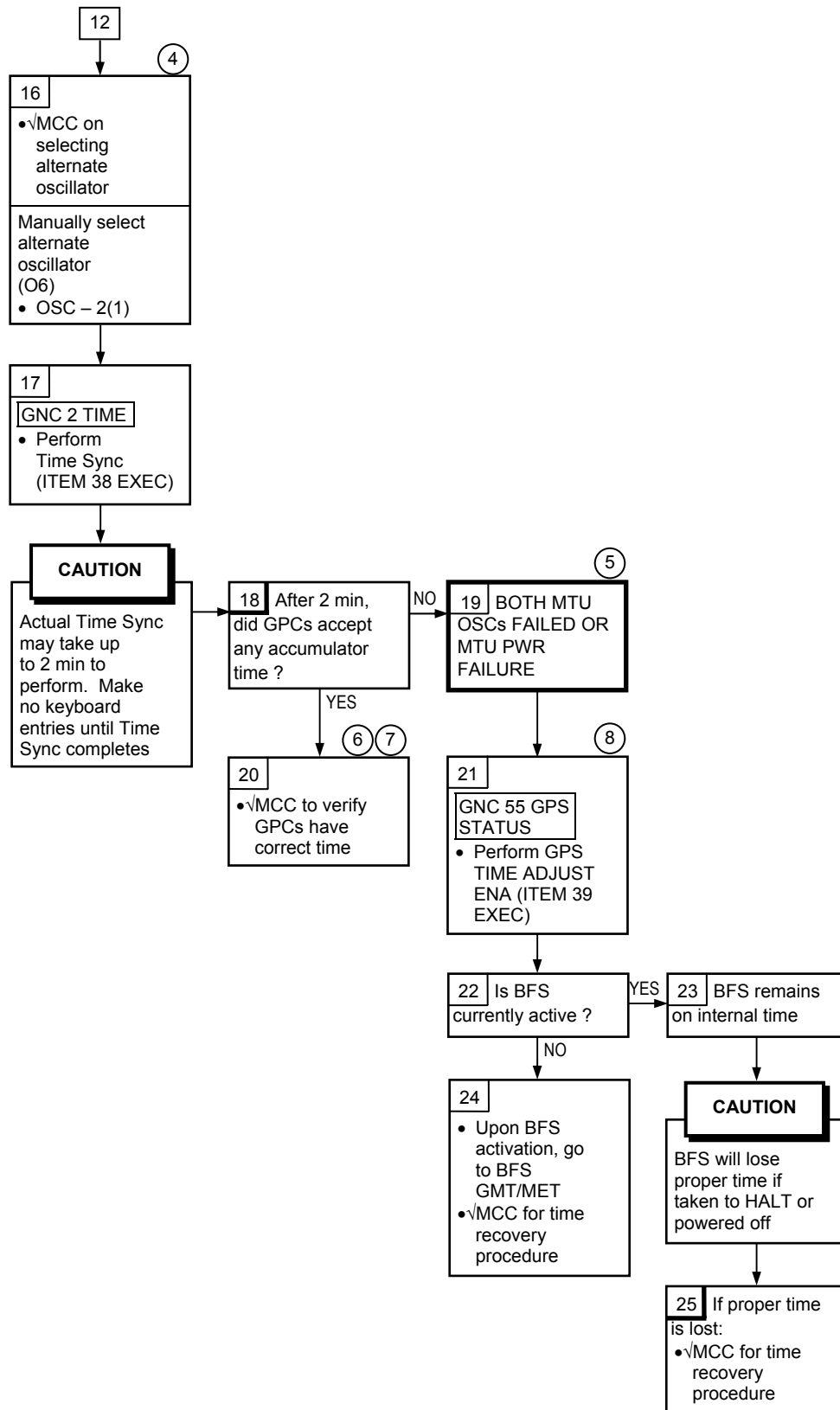
Nominal Config:
(O6)
MTU – AUTO
(O13:A)
cb ESS 1BC MTU
A – cl
(O13:C)
cb ESS 2CA MTU
B – cl

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
- ⑧ If GPS is currently in PVA mode (approximately 1 hr after MTU fails) then MCC will need to uplink a command to the GPS to fix aiding for entry

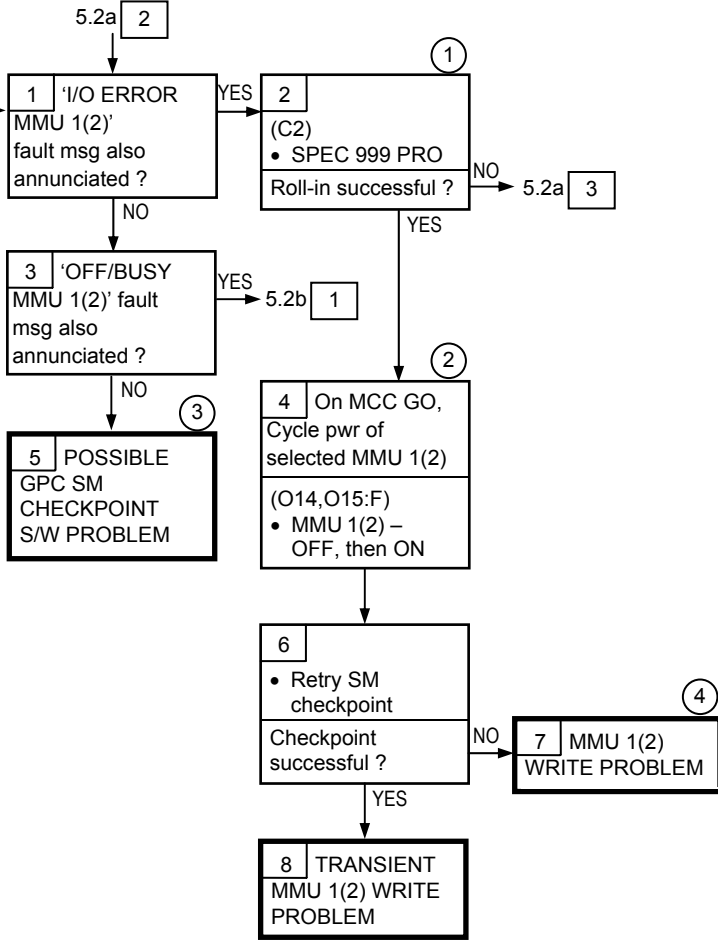
DPS

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

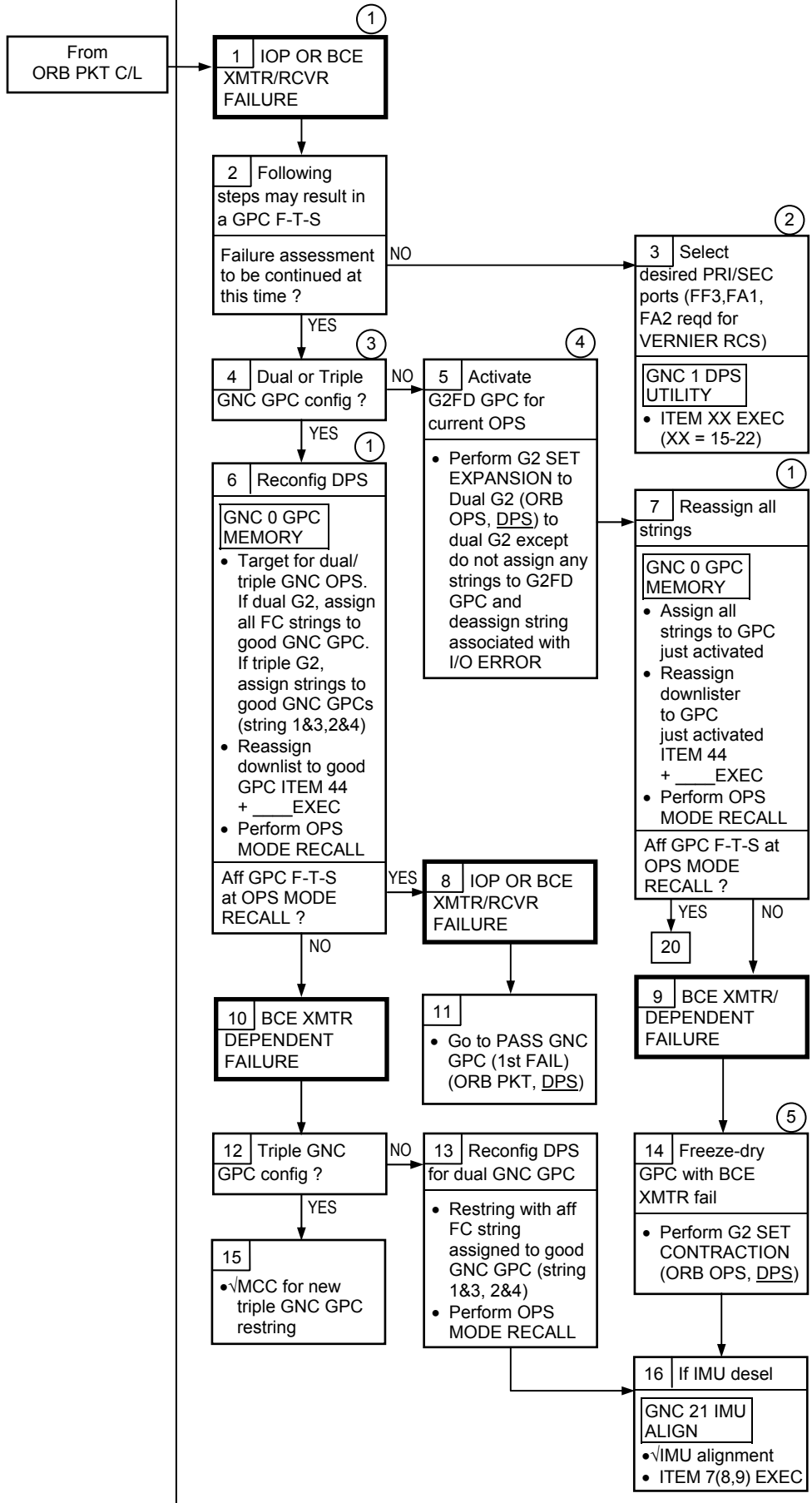
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MDM

5.3

DPS

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



① Mult MDM or GPC failures indicated if 'I/O ERROR' msg reoccurs after restrig 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

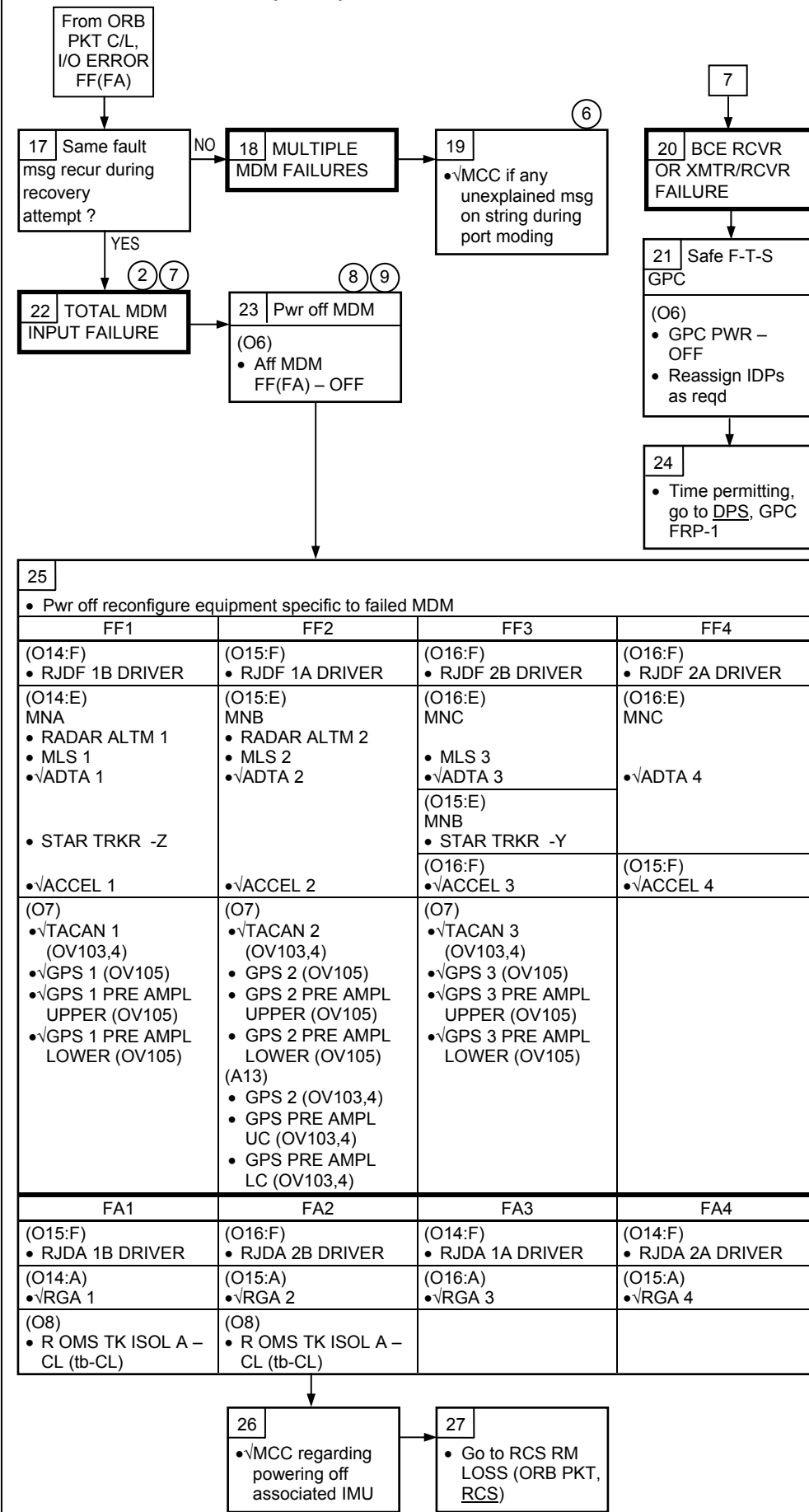
④ Original GPC will F-T-S before overlays can be transferred to G2FD GPC if original GPC has BCE receiver failure on Flt Critical 1,2,3 if affected string is not deassigned for set expansion. Flt Critical 4 problem is handled same as Flt Critical 1,2,3 for procedure simplicity

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

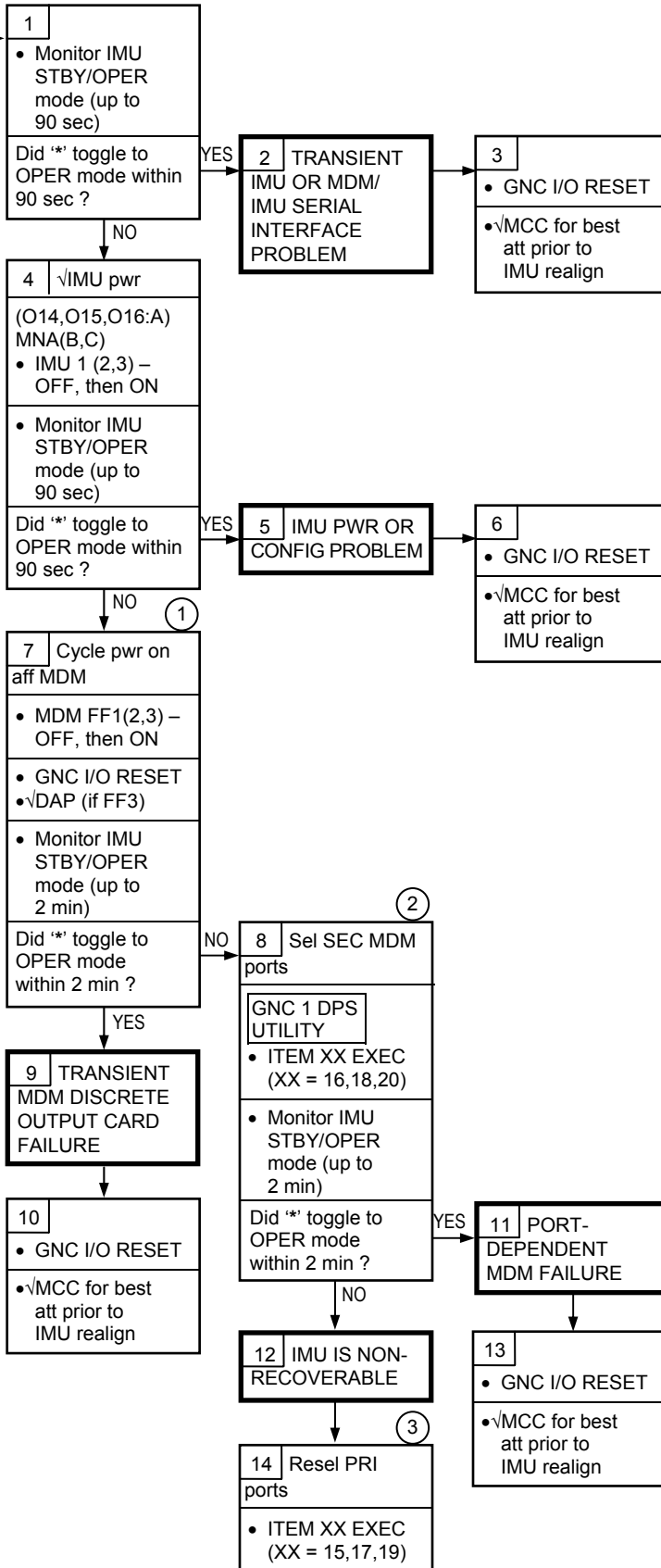
⑨ If failed MDM is FF1, FF2, or FF3, MDM may be candidate for MDM CHANGEOUT (IFM). √MCC

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'

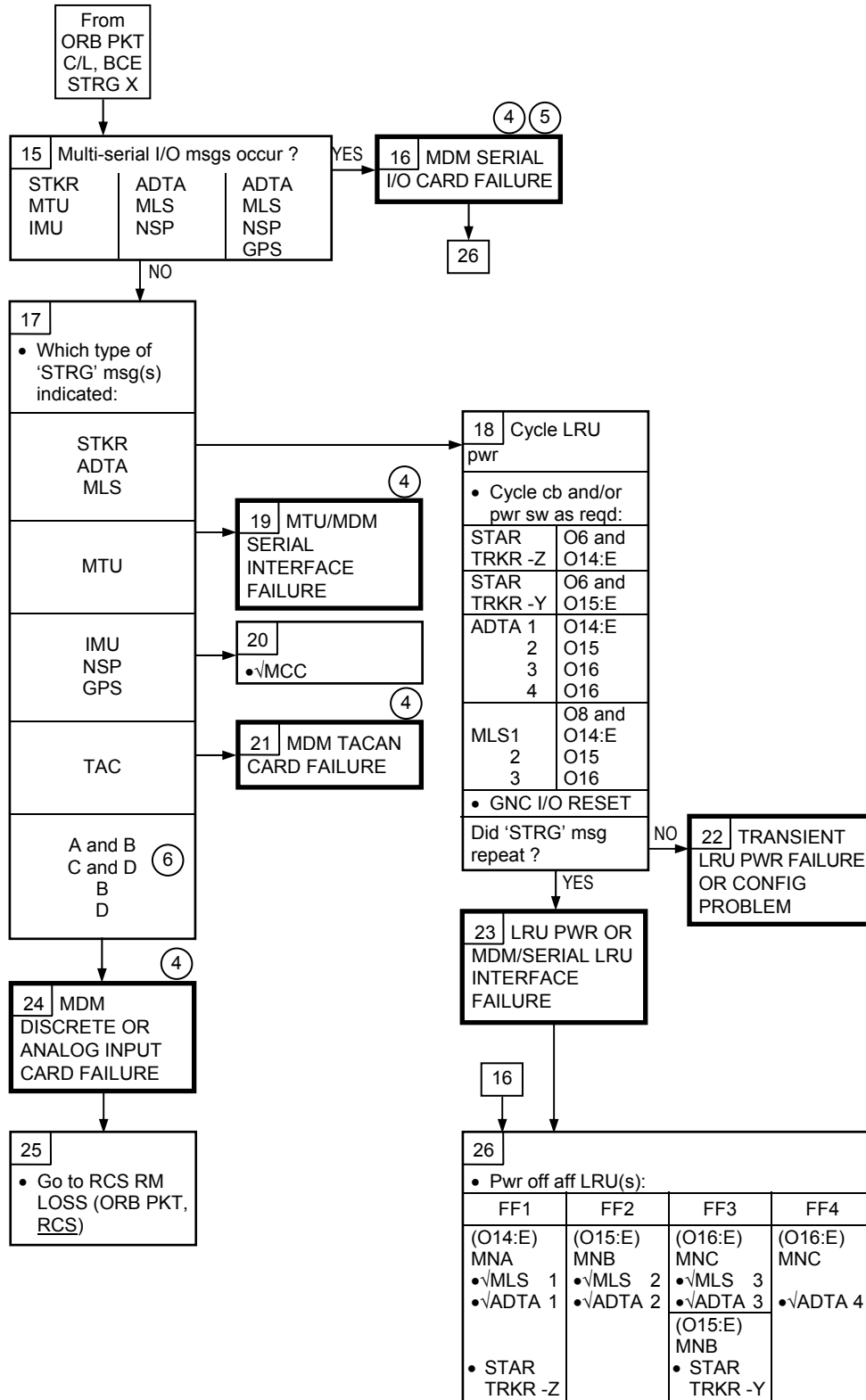
From ORB PKT C/L, BCE STRG X, step 4



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

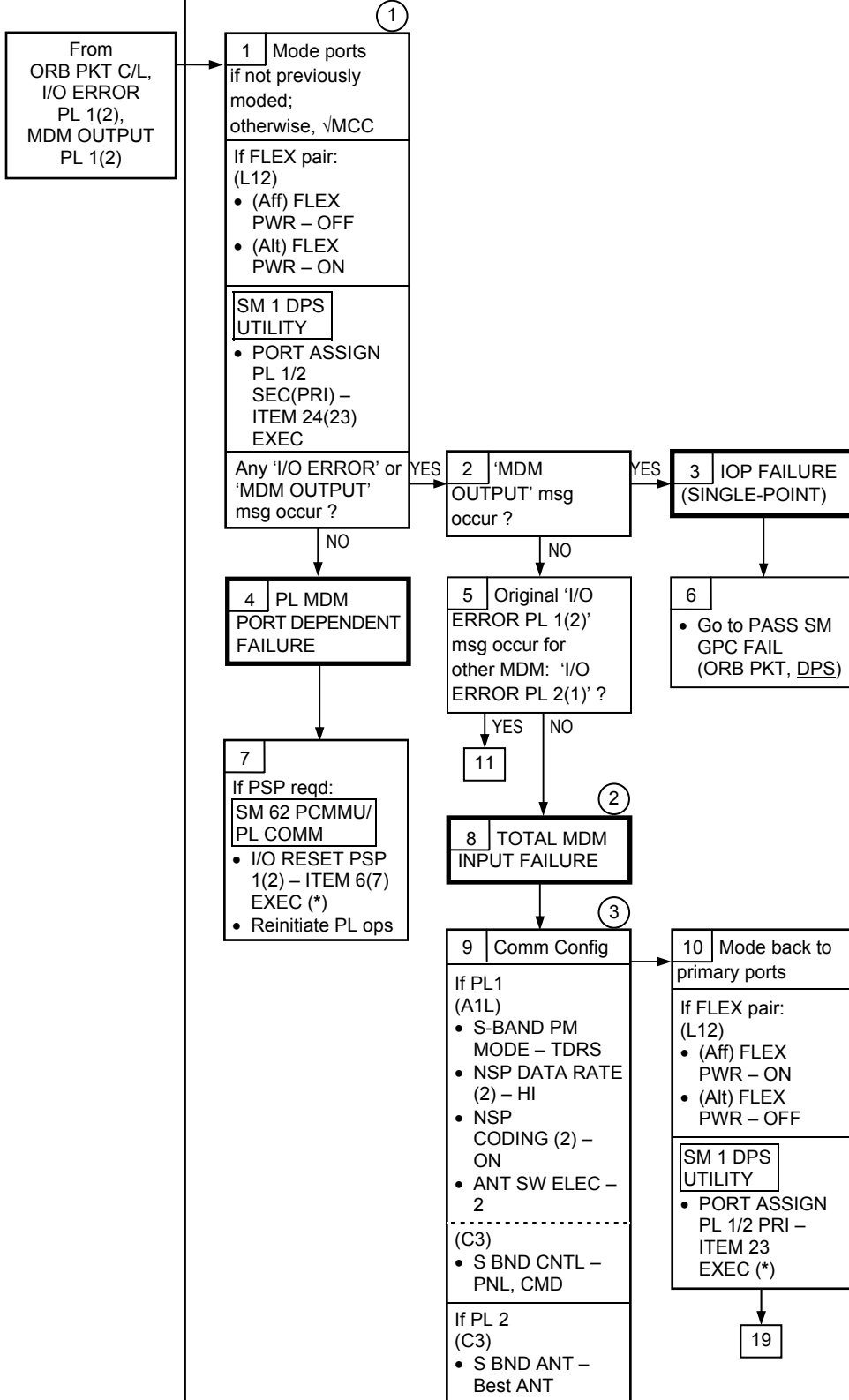
⑤ Total serial I/O card failures may result in single or multiple 'BCE STRG' msgs:

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

**5.3c 'I/O ERROR PL1(2)'
'MDM OUTPUT PL1(2)'**

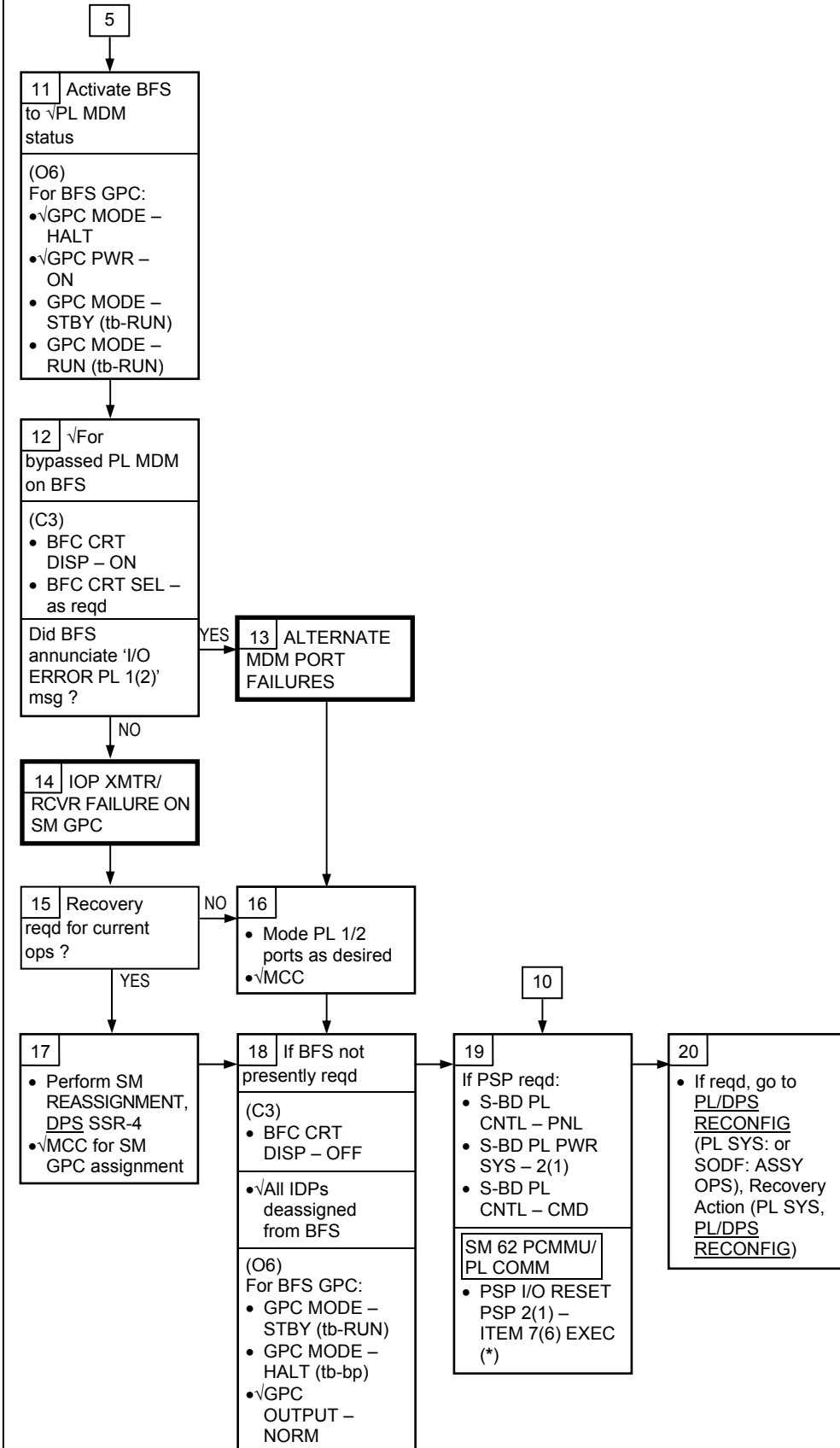


① Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes

② MDM outputs may still be good. MCC will advise if MDM should be turned off. Refer to MDM (REF DATA) for summary of data

③ 140 sec pwr-amp warmup

DPS 5.3c (Cont)



DPS

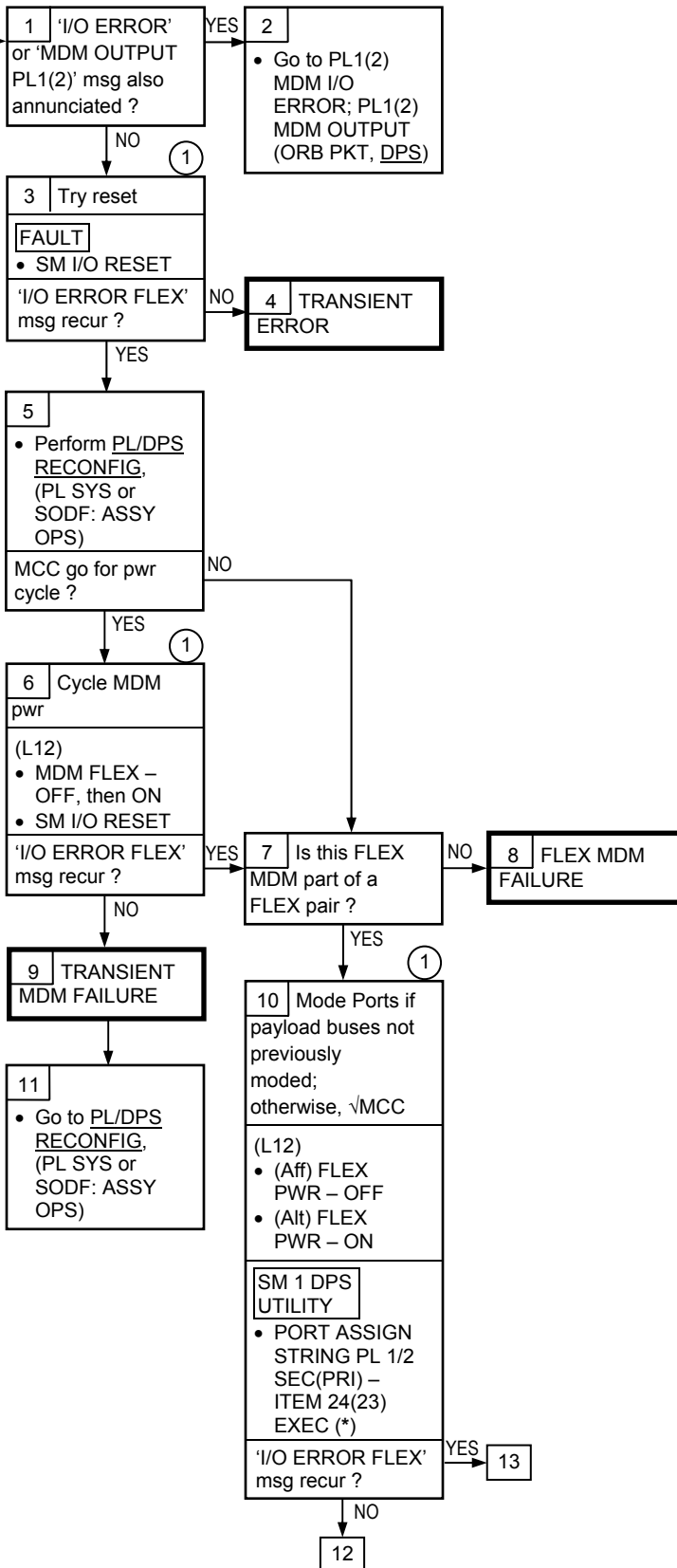
5.3e 'I/O ERROR FLEX'

SM
ALERT

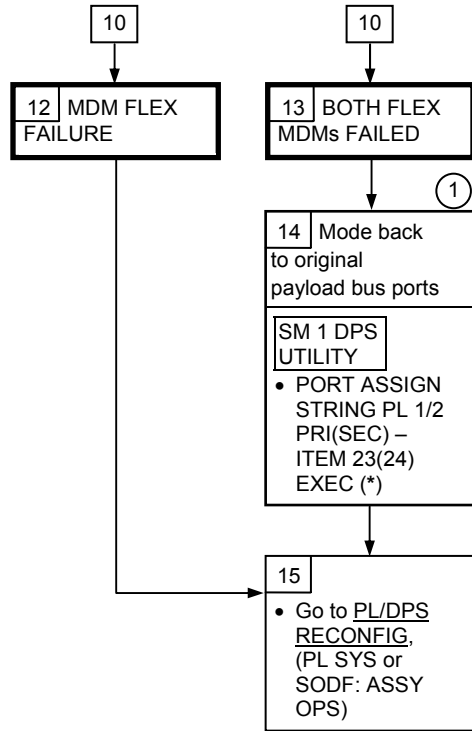
I/O ERROR
FLEX

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

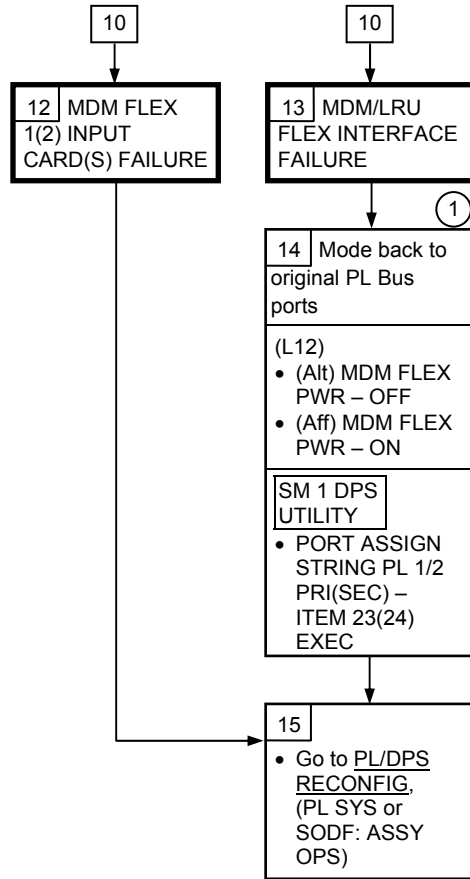
Nominal Config:
(L12)
MDM FLEX – ON
or
MDM FLEX 1(2) –
ON
MDM FLEX 2(1) –
OFF



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



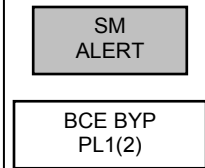
① Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes



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

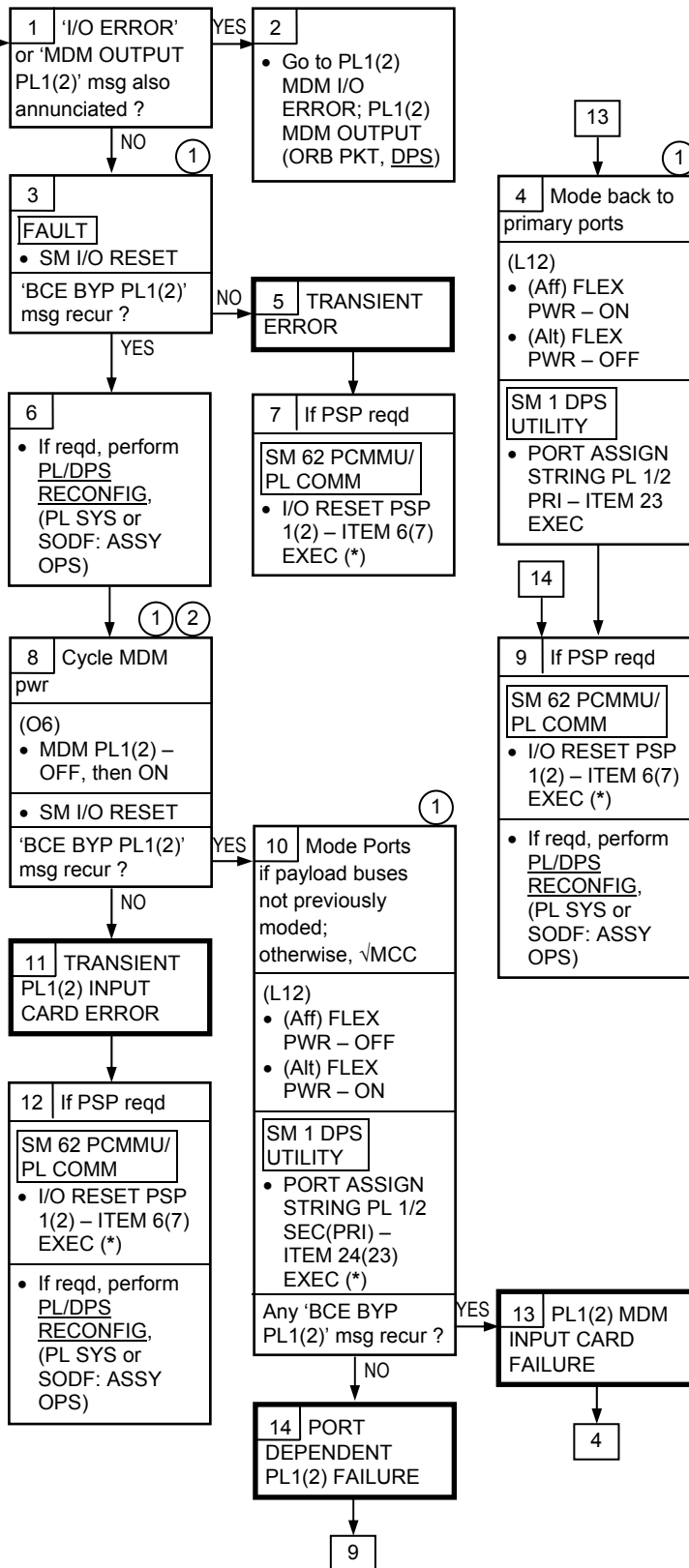
DPS

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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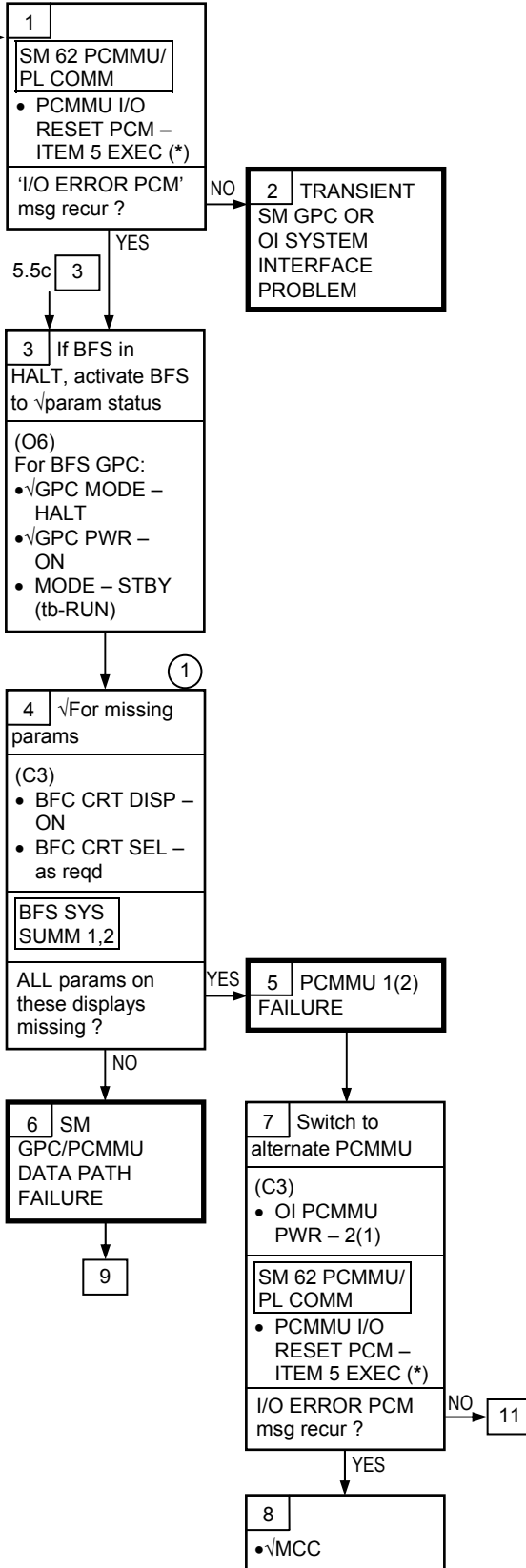
DPS

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

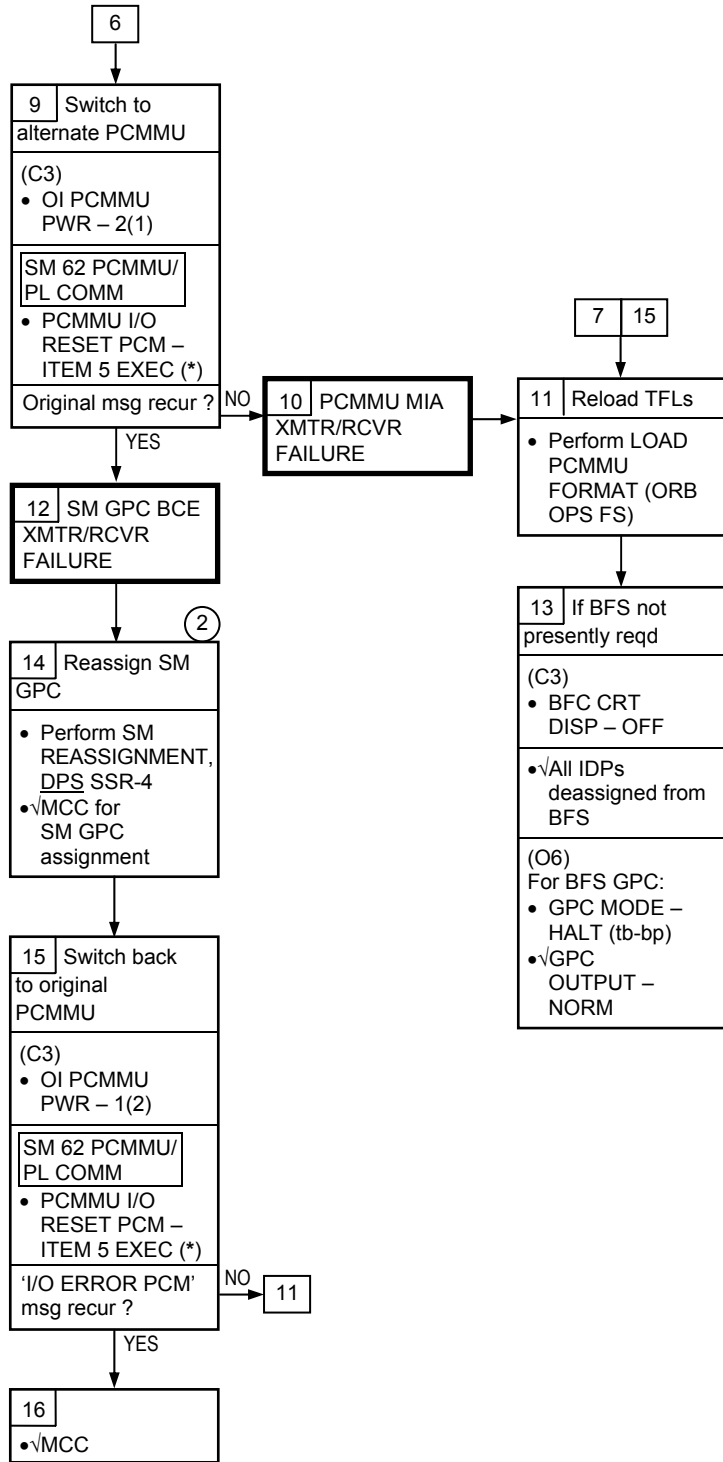


① Because of differences between PASS/BFS S/W implementation, ignore any BFS 'I/O ERROR PCM' fault msg

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

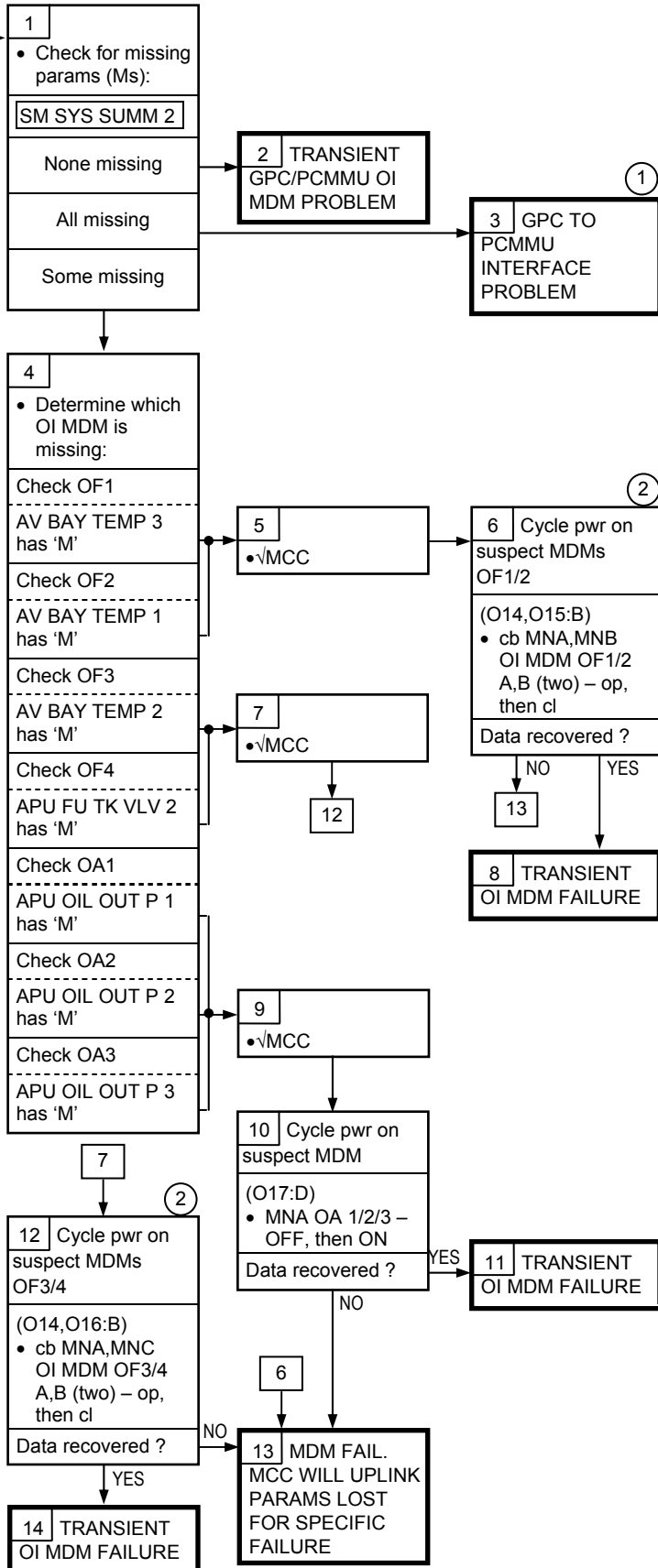
5.5b 'I/O ERROR PCM' (BFS)

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

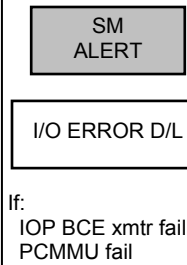


① √MCC regarding PCMMU switch. Selection of alternate PCMMU may preclude MCC viewing LDR telemetry

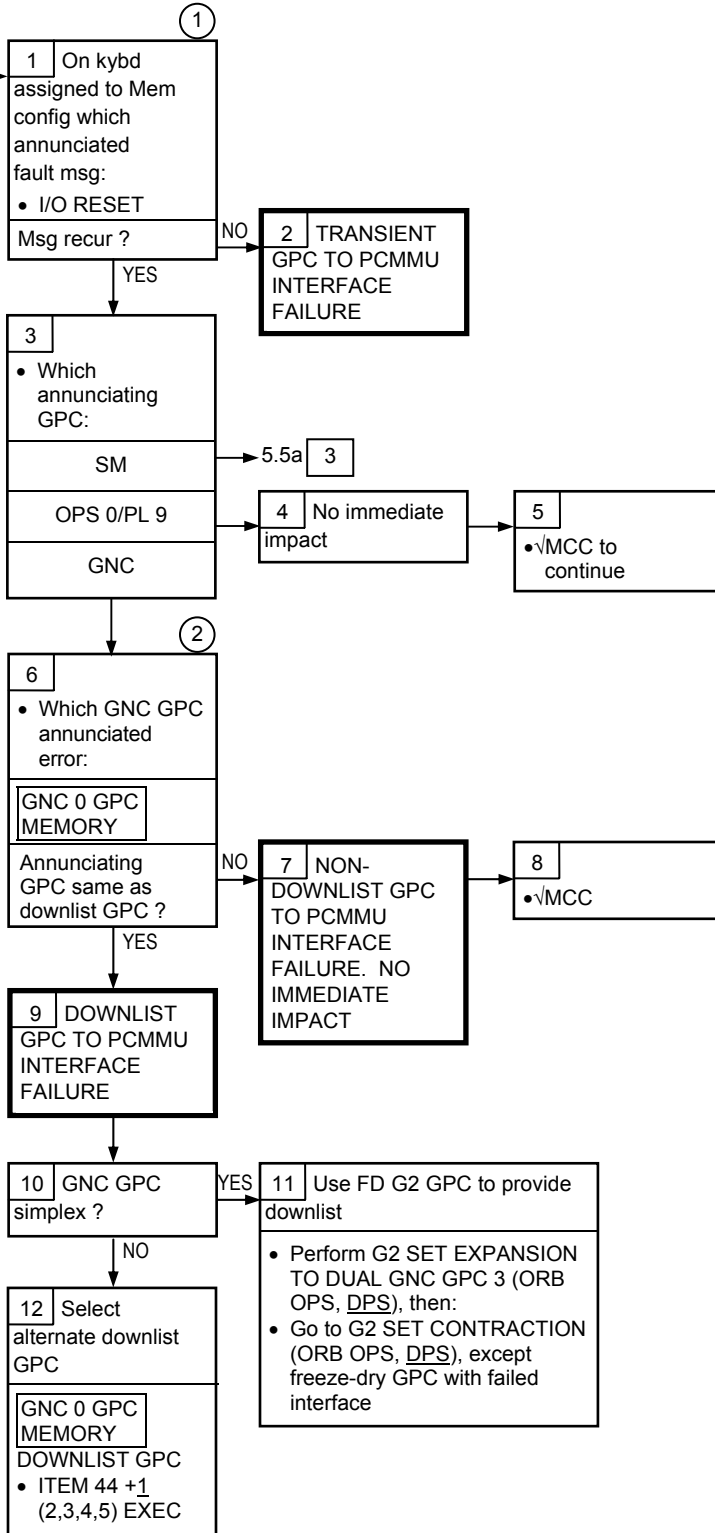
② Do not cycle open cb. √MCC

DPS

5.5c 'I/O ERROR D/L'

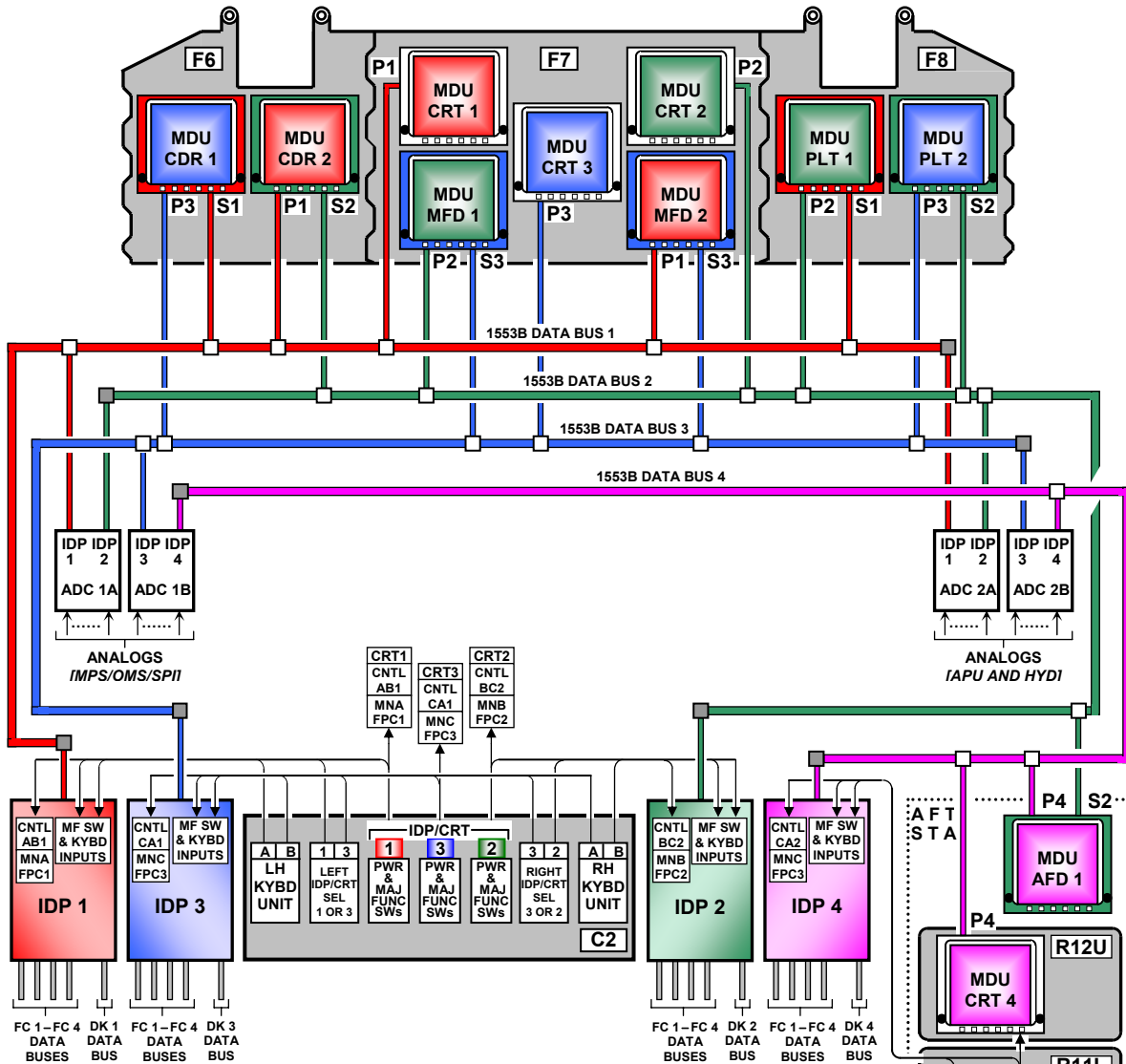


If:
IOP BCE xmtr fail
PCMMU fail

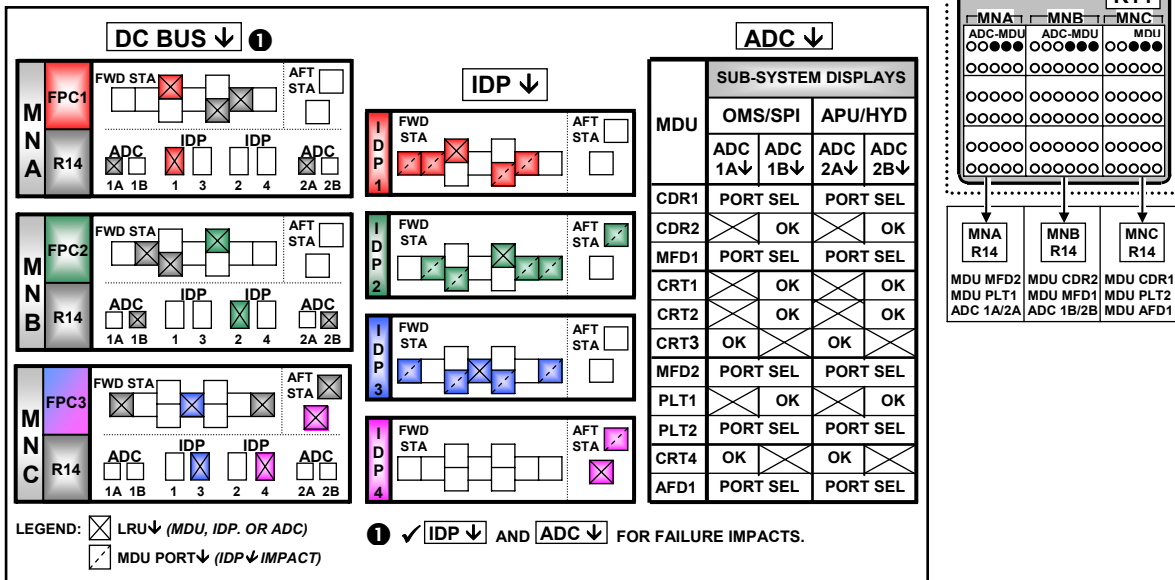


- ① I/O RESET not reqd to reestablish downlist. Action only verifies that anomaly continues
- ② All PASS GPCs output downlist. PCMMU ignores all but selected downlist GPC

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



DPS

SM
ALERT

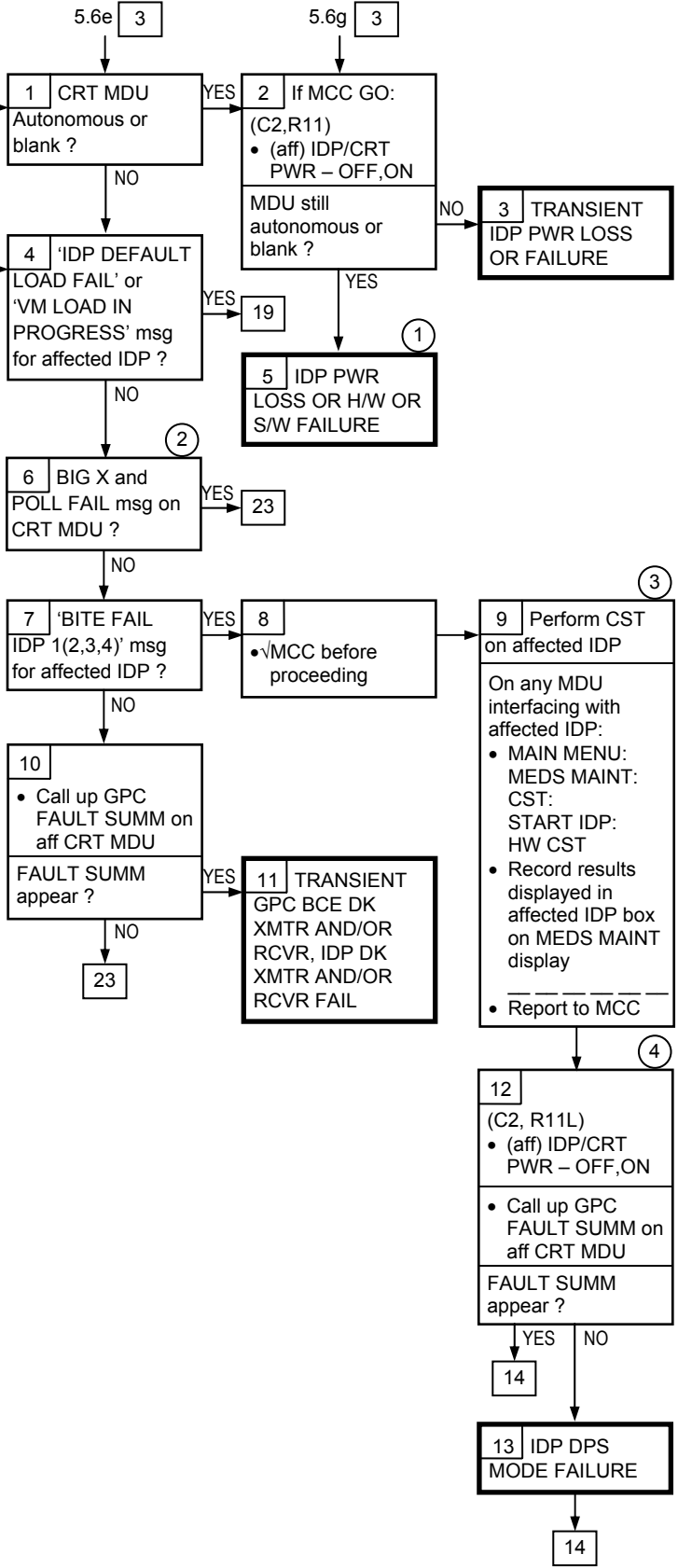
GPC 'I/O ERROR CRT 1(2,3,4)',
'BITE FAIL IDP 1(2,3,4)'

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

If:
GPC BCE 6(7,8,9)
XMTR and/or
RCVR failure
DK 1(2,3,4) BUS
anomaly
DK interface
disabled at
IDP 1(2,3,4)
IDP 1(2,3,4) pwr
loss
IDP 1(2,3,4) H/W or
S/W fail
IDP 1(2,3,4) DK
XMTR and/or
RCVR fail

If:
IDP 1(2,3,4) load
sw failure
Inadvertent IDP
1(2,3,4) load

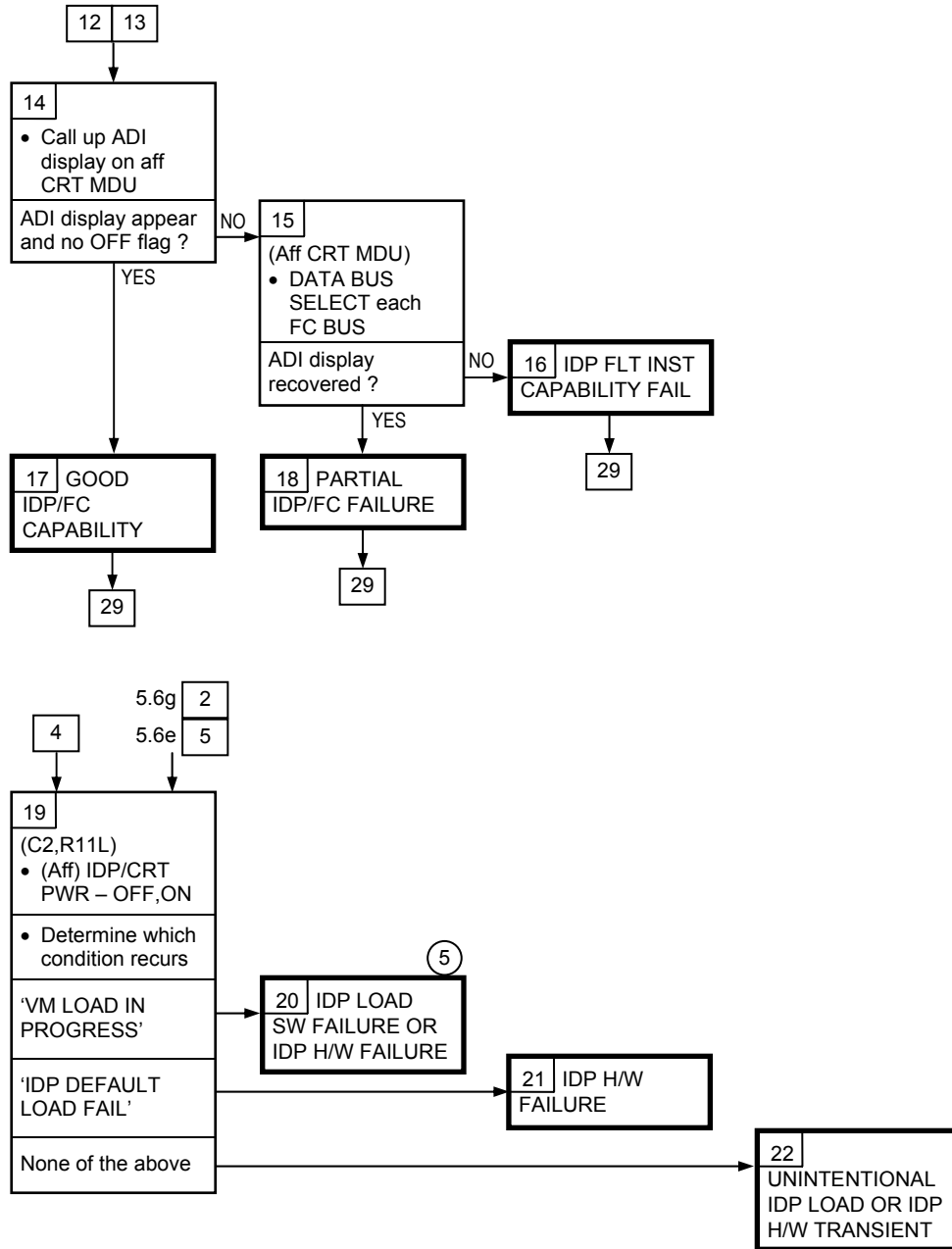
5.6a GPC 'I/O ERROR CRT 1(2,3,4)', 'BITE FAIL IDP 1(2,3,4)', 'IDP DEFAULT LOAD FAIL', 'VM LOAD IN PROGRESS'



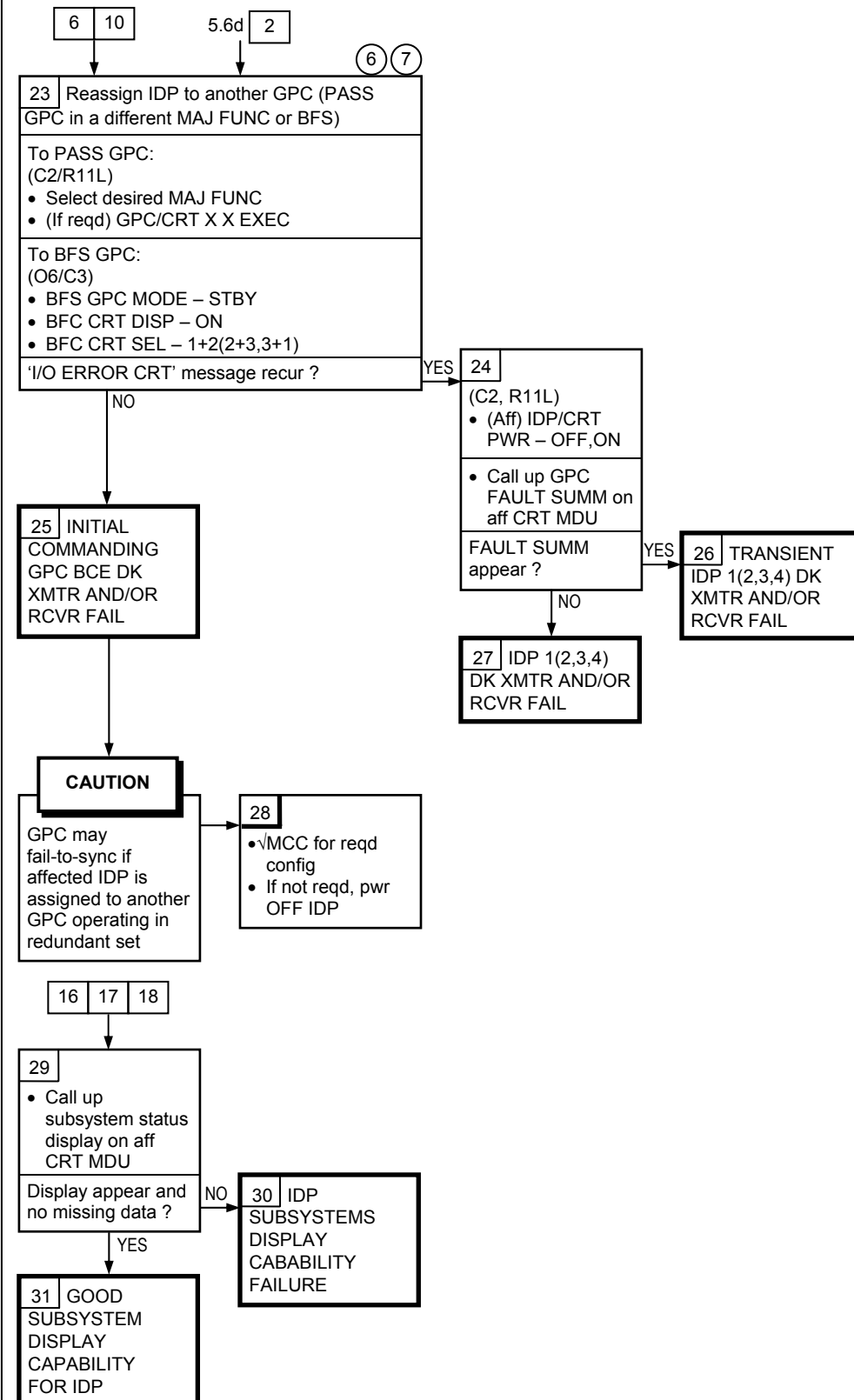
- ① √MCC for possible IFM replacement
- ② Both Big X and POLL FAIL msgs appear for complete GPC Data path failure. Appearance of only 1 msg indicates an internal GPC or IDP problem
- ③ Expect GPC 'I/O ERROR CRT X' message if a GPC is commanding the affected IDP. All other MDUs communicating with the IDP running CST will be temporarily inoperable. IDP CST results will be blank while H/W CST is running. IDP H/W CST takes ~75 sec. Nominal IDP CST result is '000000'
- ④ Following blocks will test IDP capabilities remaining after BITE

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

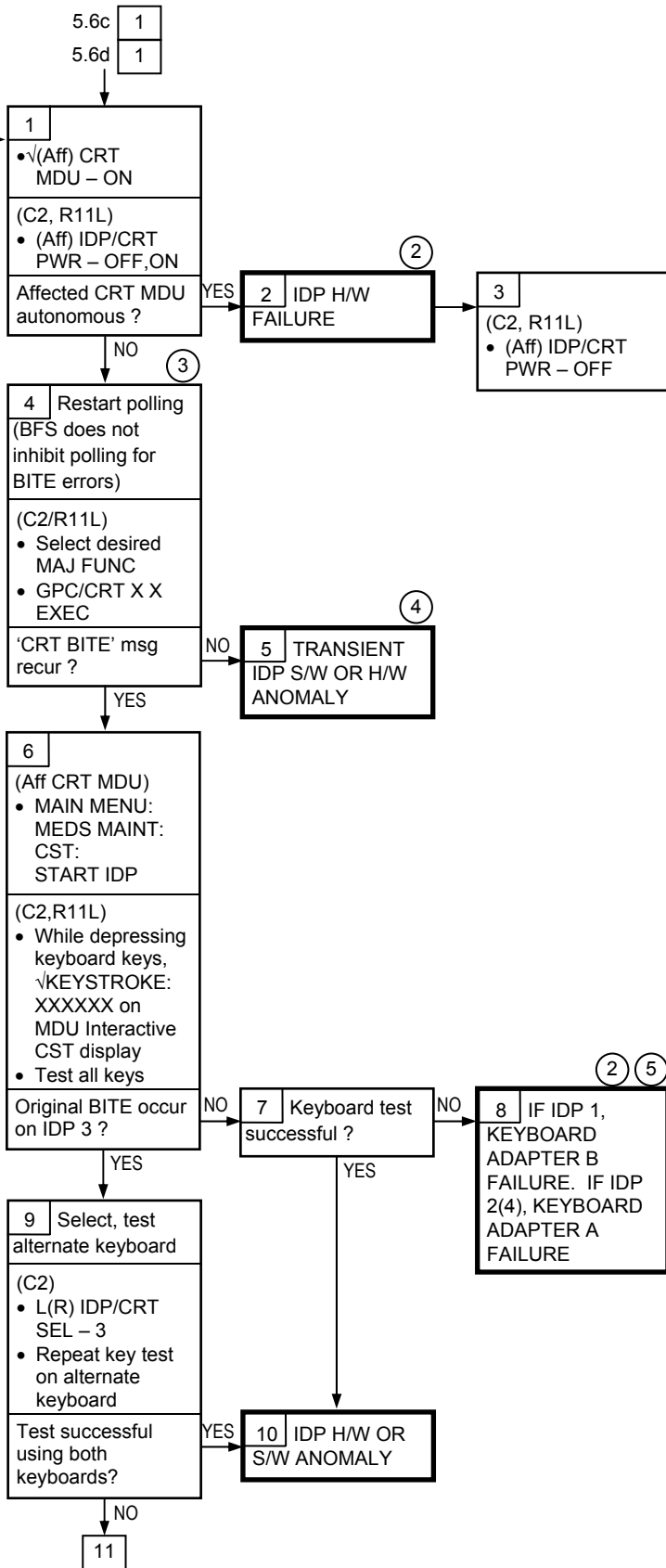
DPS

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

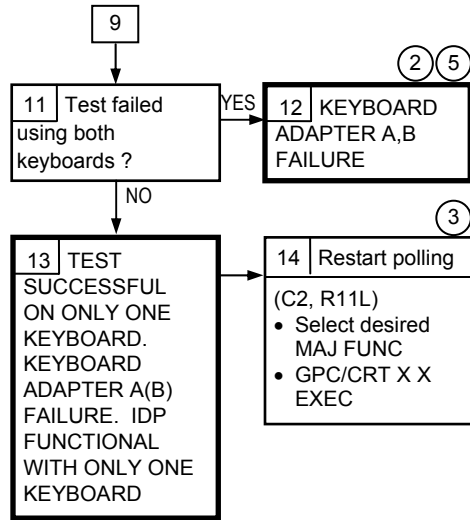
SM ALERT

'CRT BITE 1(2,3,4)'

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



- ① 'POLL FAIL' msg should appear on affected MDU in DPS mode (PASS). BFS does not inhibit polling for BITE errors
- ② Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/ two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink)
- ③ GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry
- ④ If error is Keyboard Adapter A(B) fail, failure may be associated with a specific key input
- ⑤ IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes



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

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

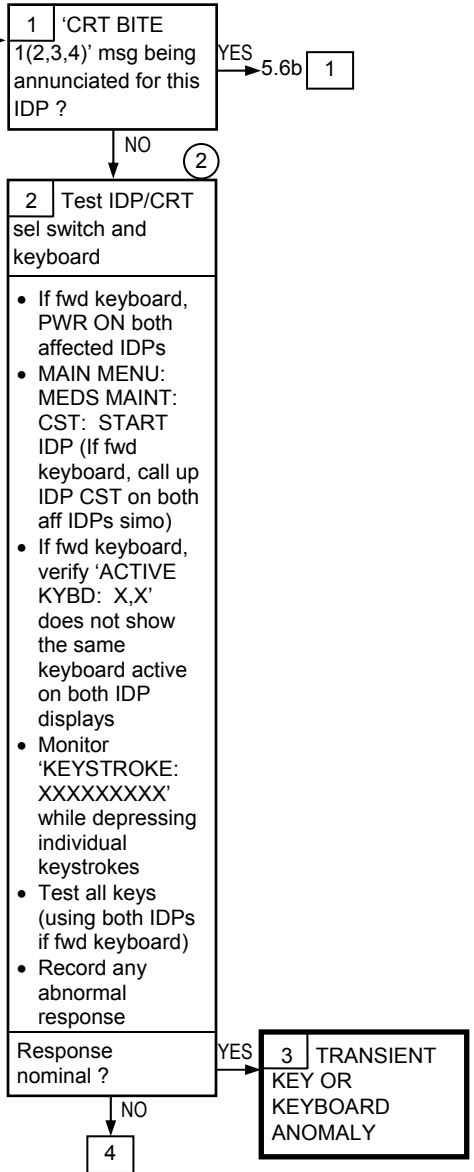
⑤ IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes

DPS

5.6c ABNORMAL RESPONSE FROM KEYBOARD INPUT

Abnormal Response from Keyboard Input ^①

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

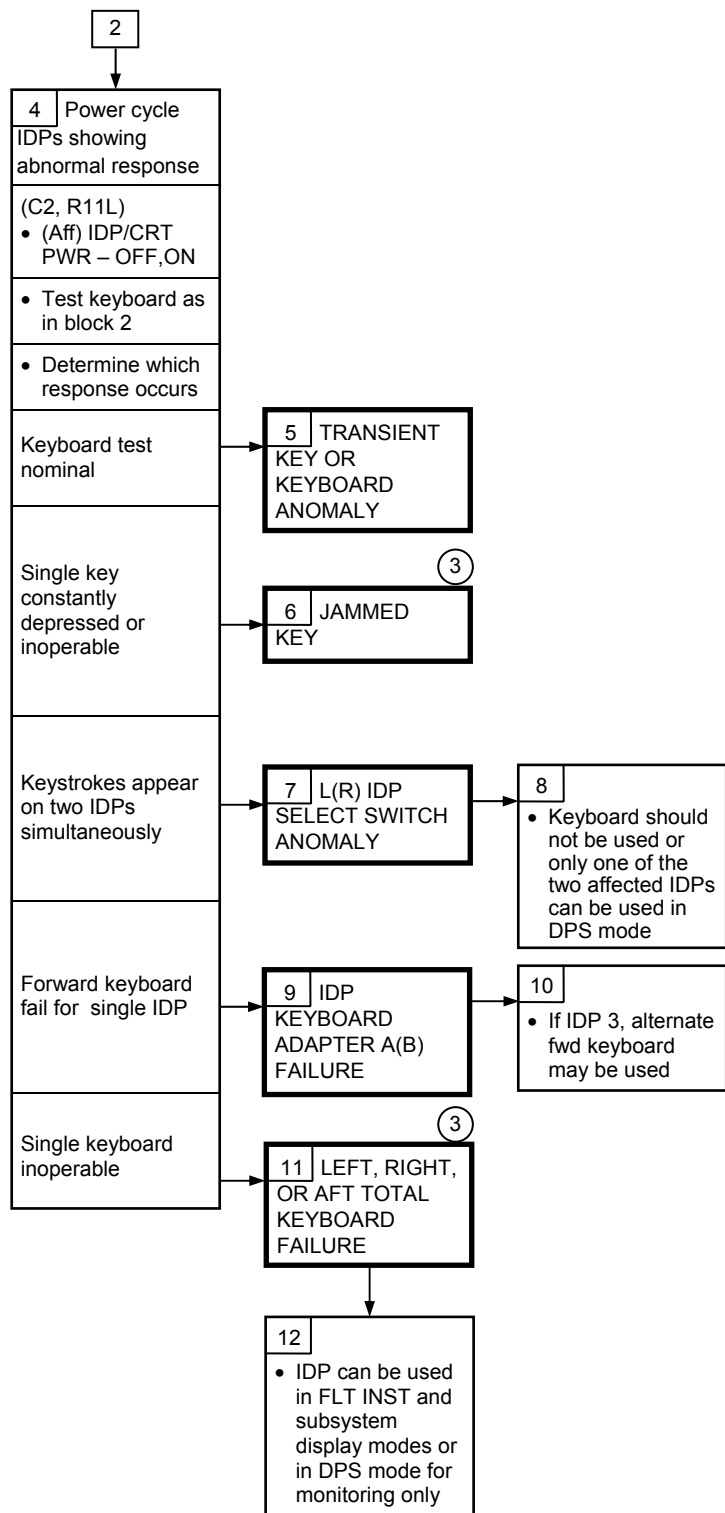


① Abnormal means keystroke does not appear on scratch pad line or wrong keystroke appears. User should always check IDP/CRT SEL sw position if applicable and repeat keystroke sequence prior to performing this procedure to eliminate user error and transients

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

DPS 5.6c (Cont)

③ √MCC for possible IFM

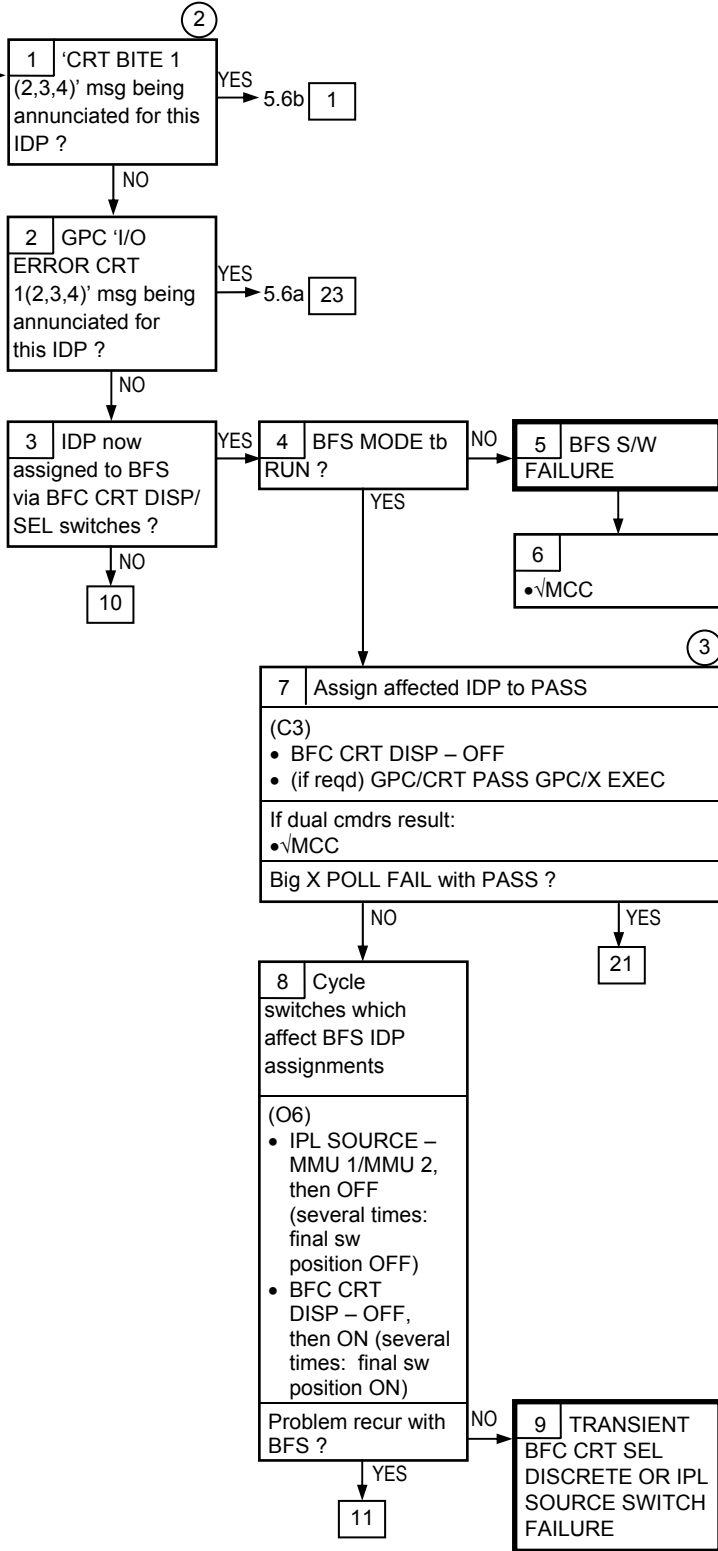


DPS

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

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

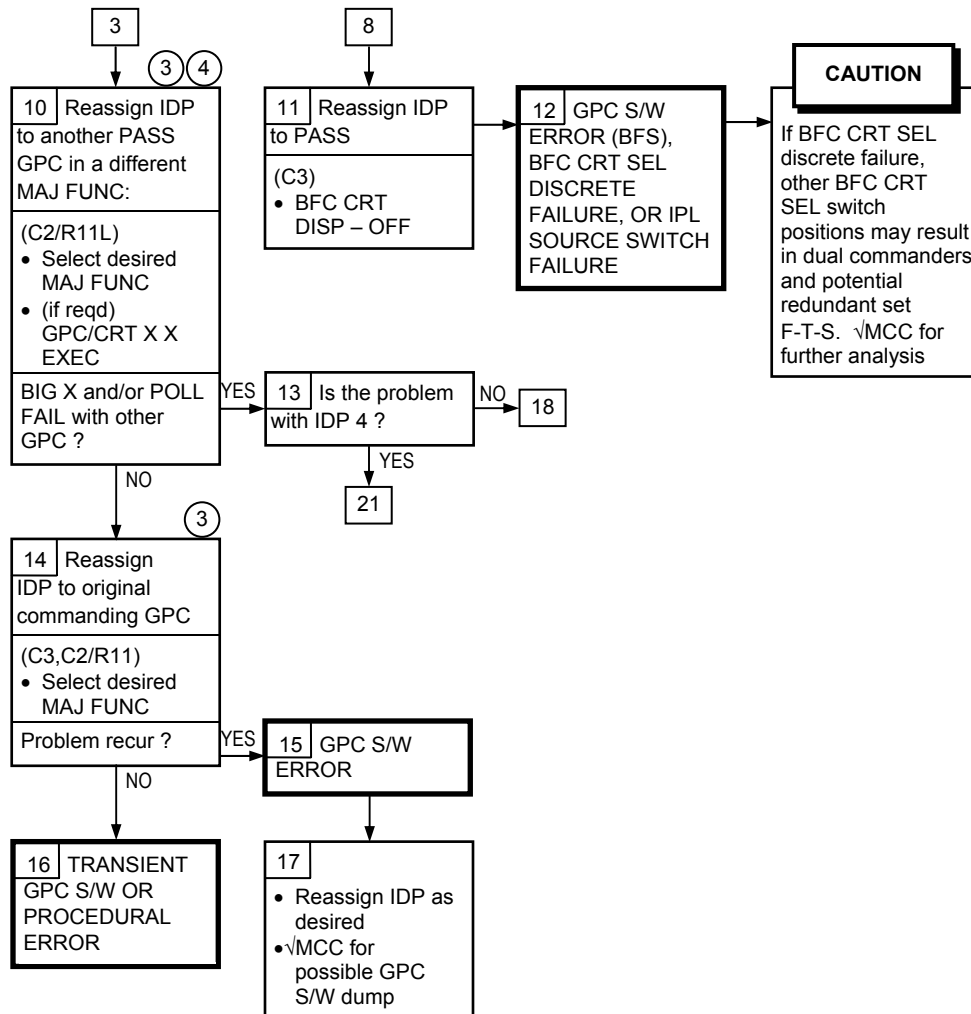
If:
 IDP S/W error
 IDP H/W error
 GPC S/W error
 BFS CRT SEL discrete failure
 BFC CRT DISP sw failure
 IPL SOURCE sw failure
 Procedural error



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

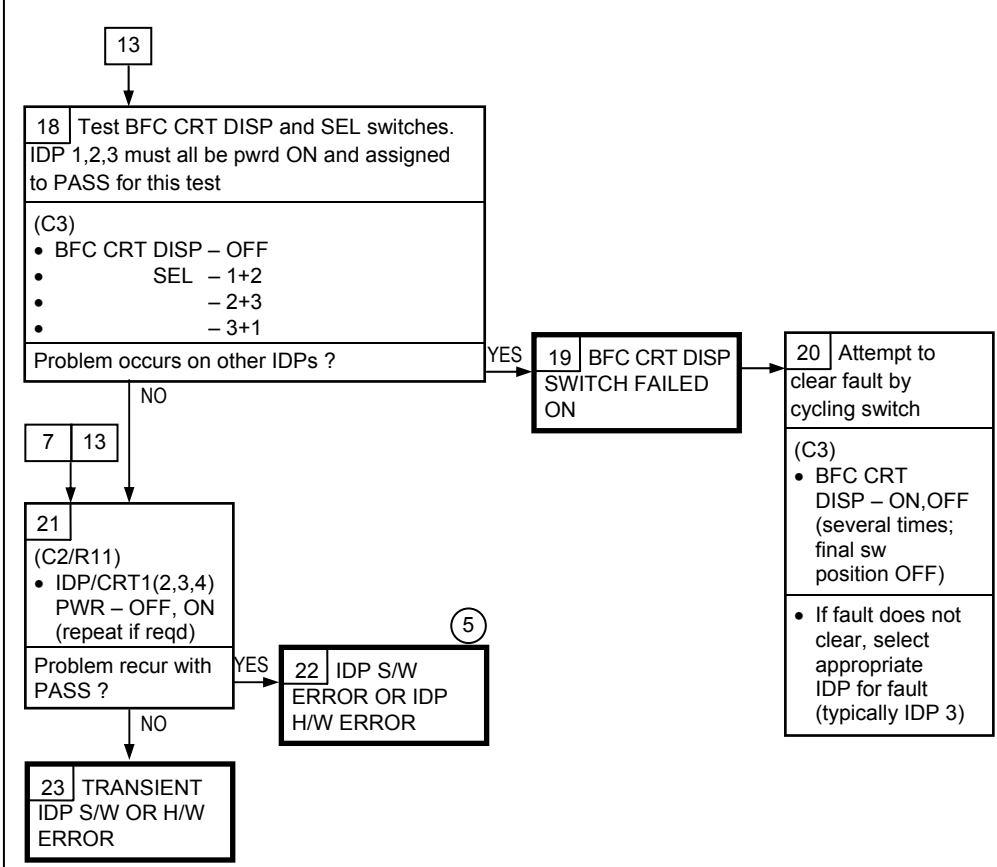
③ GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, always deassign IDP first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT keyboard entry



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

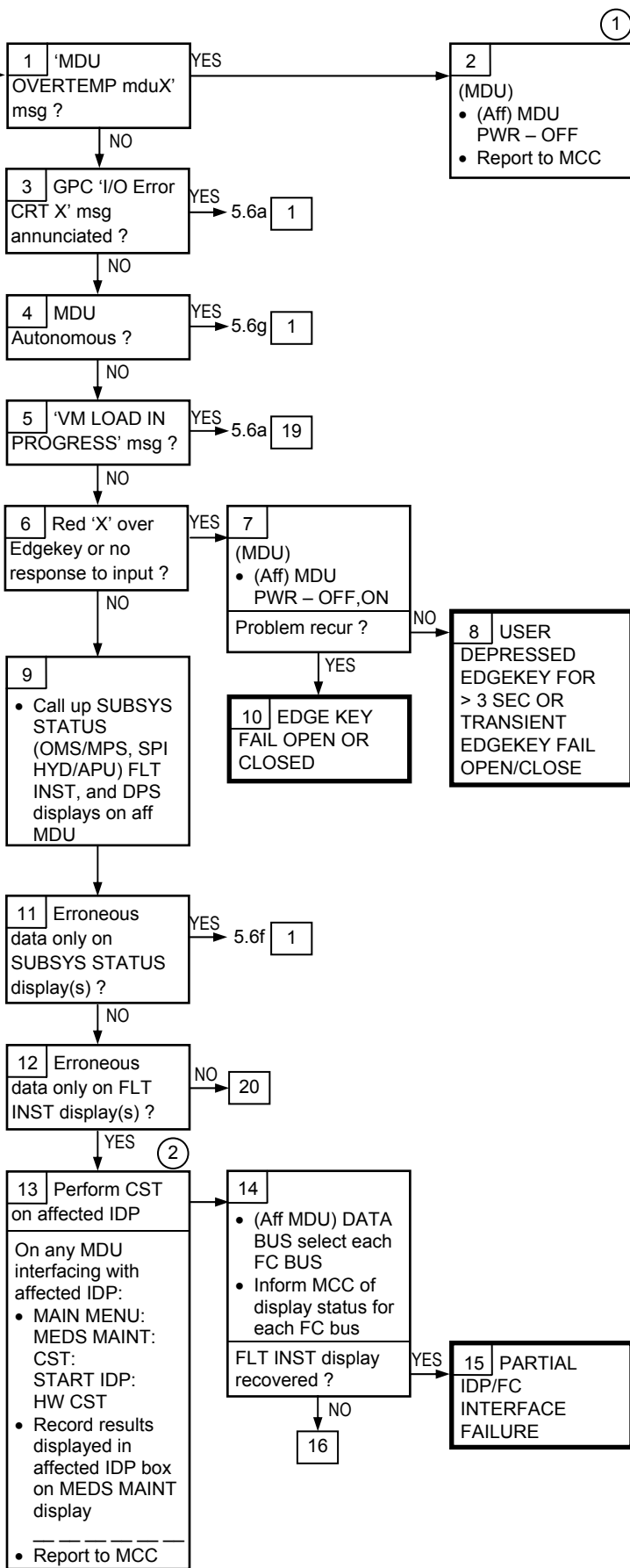
DPS

5.6e MDU ANOMALY

MDU Anomaly

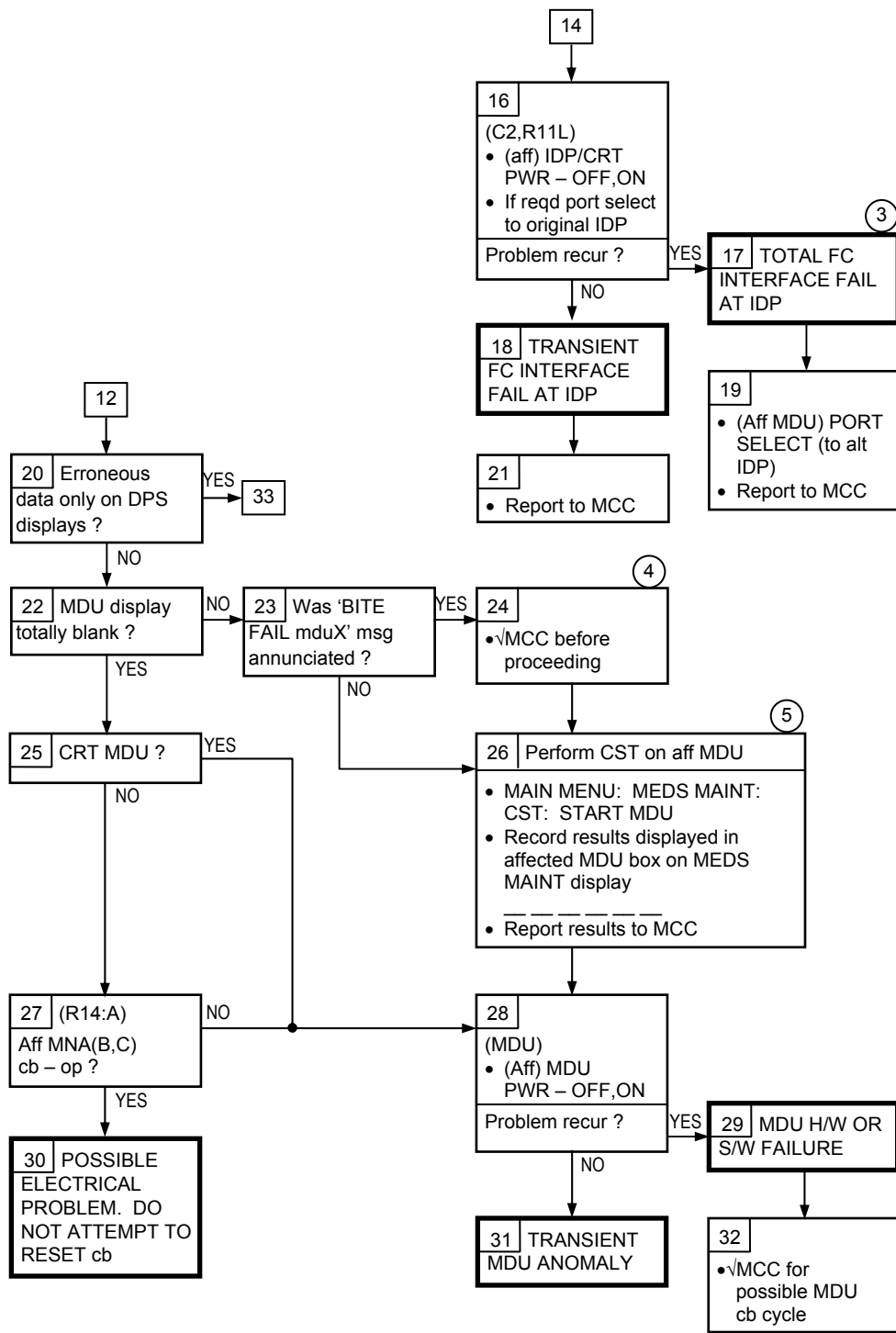
BLANK,
UNREADABLE,
ABNORMAL,
'BITE FAIL mduX',
'MEDS I/O ERROR
mduX', 'MDU
OVERTEMP
mduX',
'PROCESSOR
FAIL mduX'
WHERE mduX =
CDR1(2),
PLT1(2),MFD1(2),
CRT 1(2,3,4), AFD1

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'

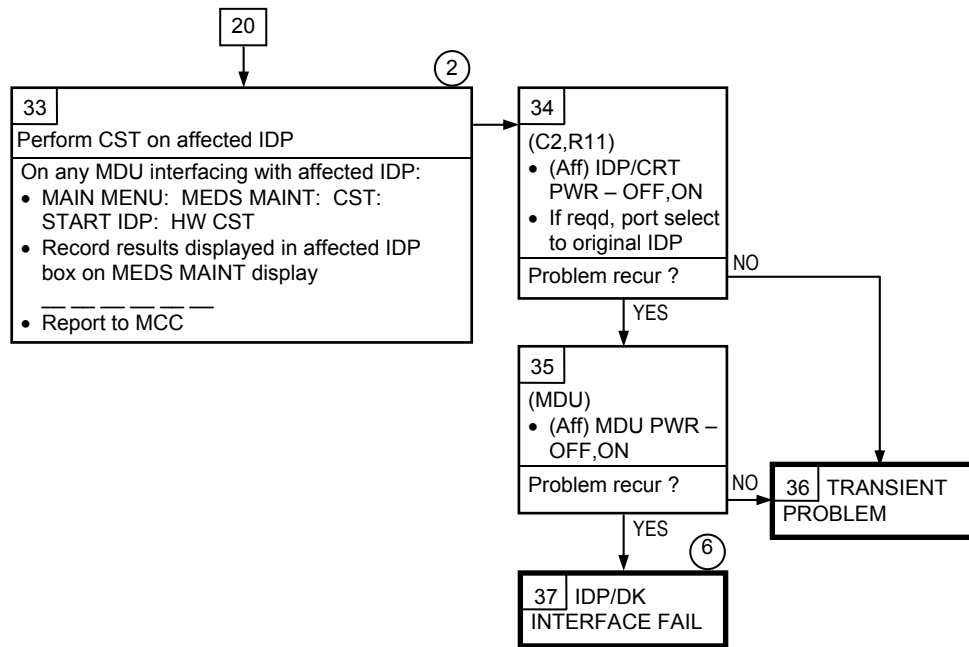


③ IDP cannot be used in FLT INST mode. May be usable in DPS and subsystem display modes

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

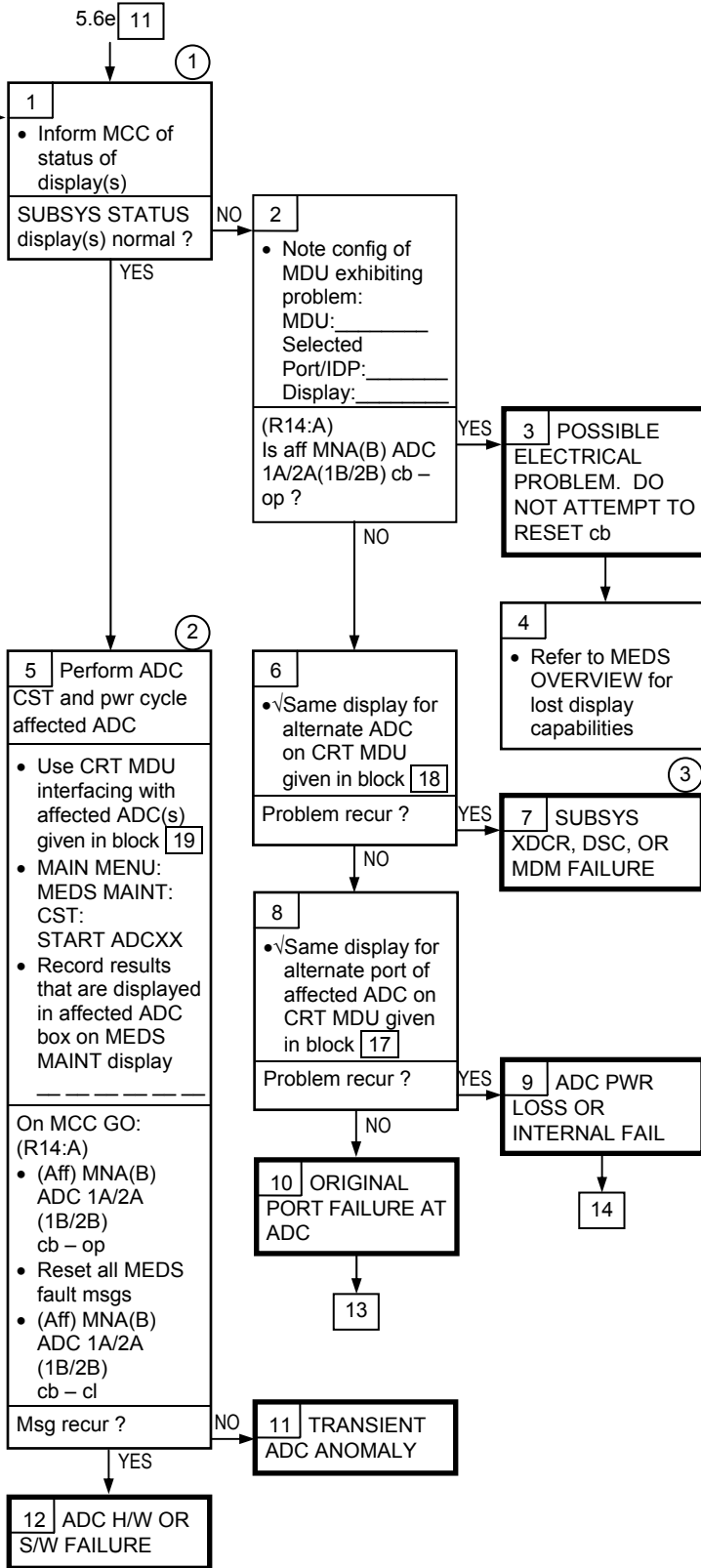
DPS

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

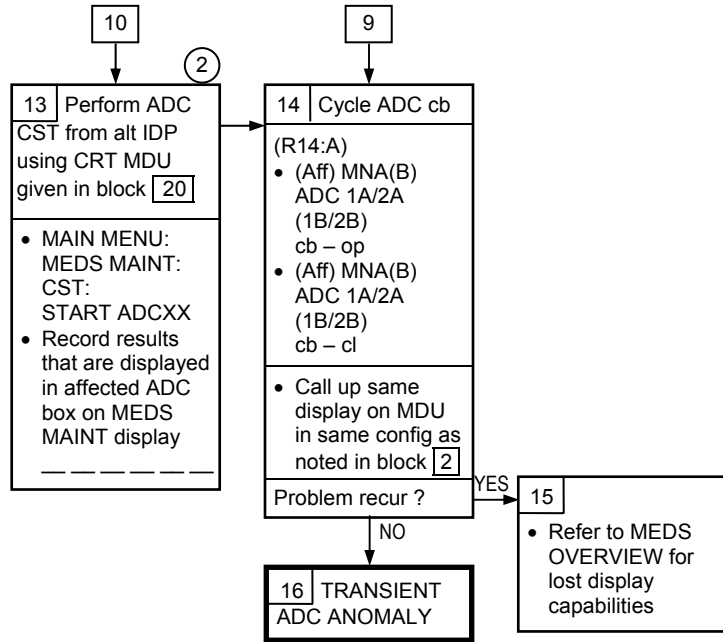
If:
ADC Port failure
ADC H/W failure
ADC S/W failure
ADC power loss/fail
Subsystem XDCR, DSC or MDM fail



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

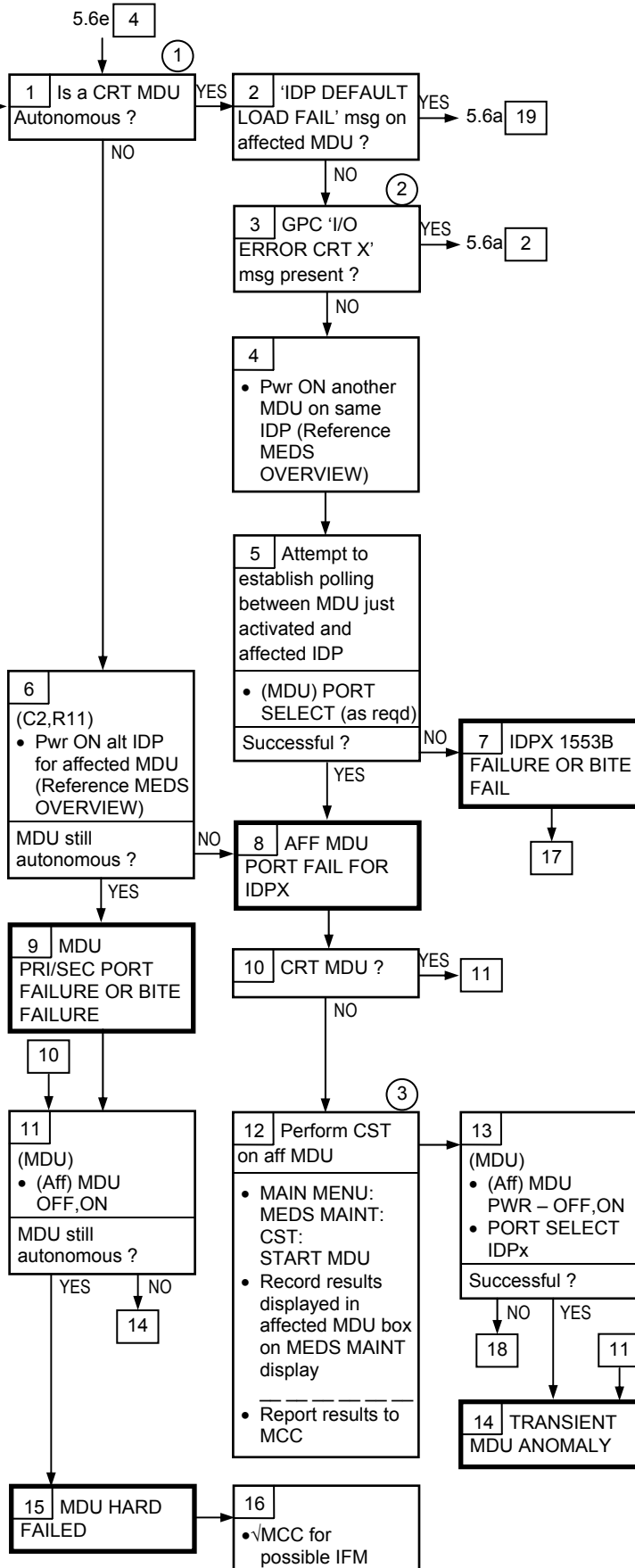
20	Affected Display (noted in block [2])	Selected IDP for Affected MDU (noted in block [2])	Perform CST for this ADC	Use this CRT MDU
OMS/MPS/SPI		IDP 1	ADC 1A	CRT2
		IDP 2	ADC 1A	CRT1
		IDP 3	ADC 1B	CRT4
		IDP 4	ADC 1B	CRT3
HYD/APU		IDP 1	ADC 2A	CRT2
		IDP 2	ADC 2A	CRT1
		IDP 3	ADC 2B	CRT4
		IDP 4	ADC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

DPS

5.6g MDU IS AUTONOMOUS

MDU Autonomous

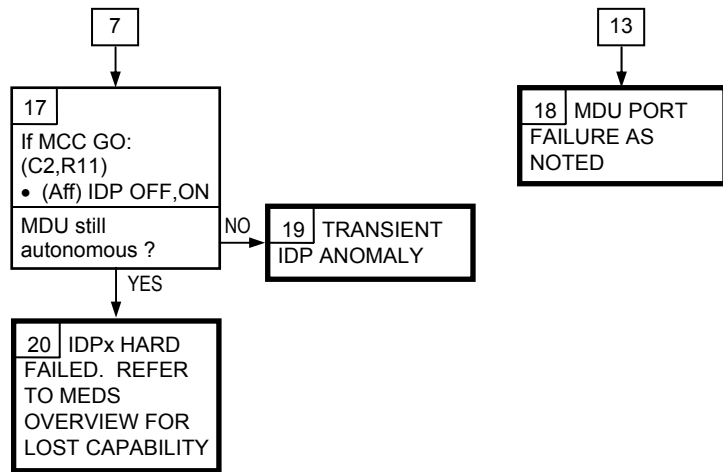
If:
MDU dual port fail,
CRT MDU port fail,
MDU port fail & alt
IDP OFF, 1553B fail
for IDP



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

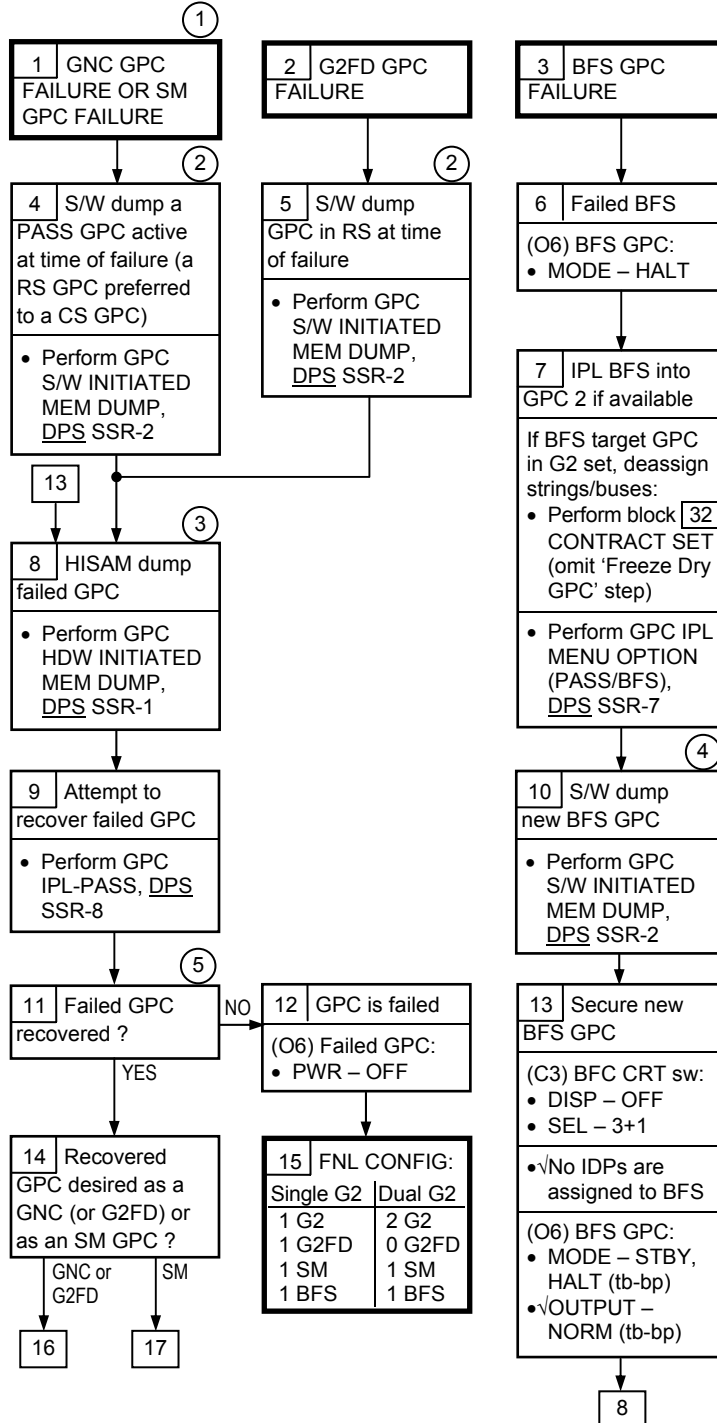
Attempt failed GPC recovery following on-orbit DPS reconfiguration via APCL, OPCL, MAL, or PI procedure. If recovered, target the 'transient' GPC as a redundant G2, G2FD, or SM based upon operational objectives. If RNDZ, EVA, or critical burn requires Dual G2 config, recovered GPC will be made G2FD

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

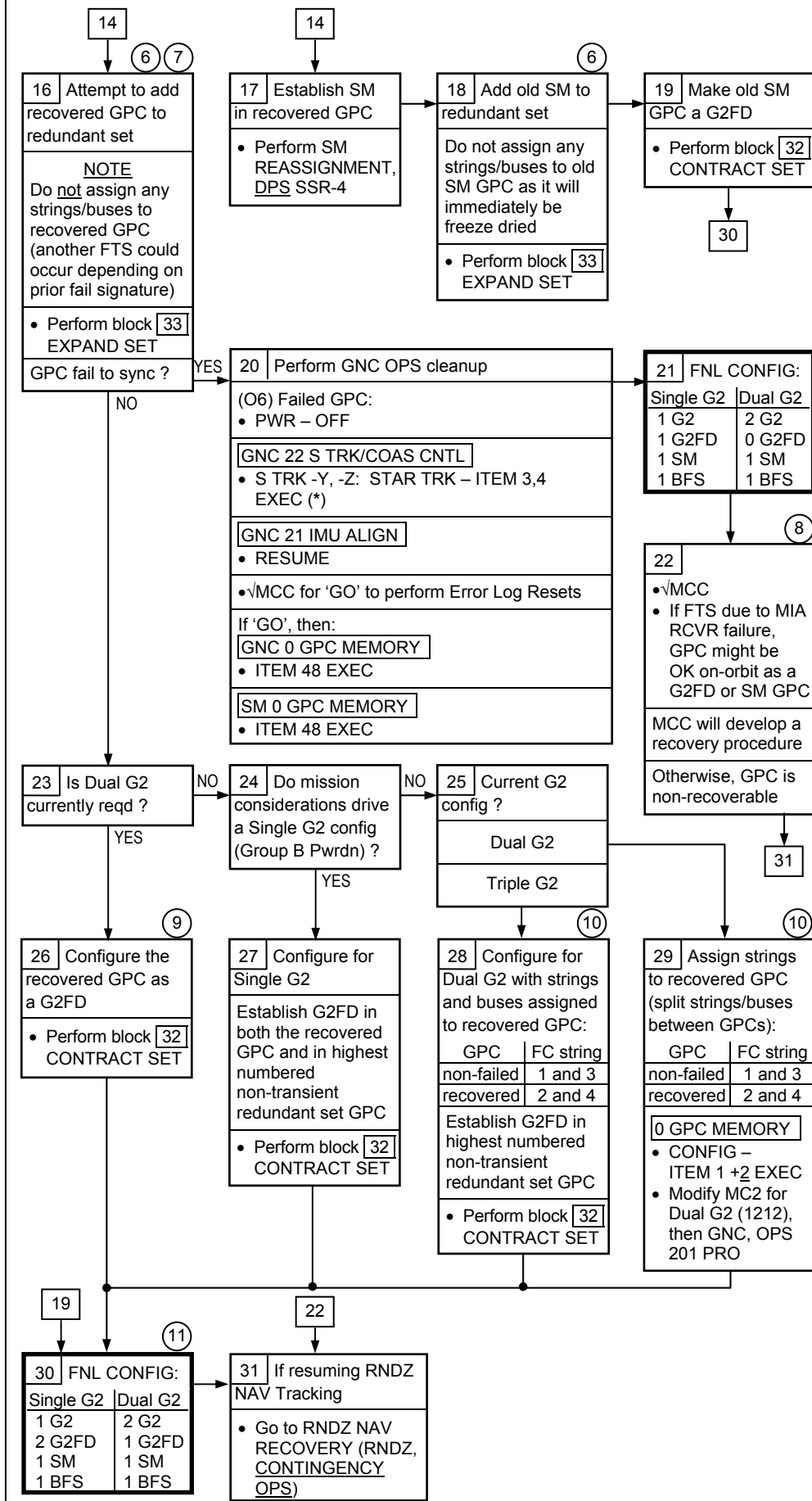
② S/W dump to capture GPC Sync Trace Log. MCC analysis of both S/W and H/W dumps may provide insight to the cause of a PASS GPC failure

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 downlist change following OPS Mode Recall

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

32	CONTRACT SET																																														
		<p><u>NOTE</u></p> <p>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</p>																																													
		<ul style="list-style-type: none"> • If RNDZ NAV enabled: C3(A6U) DAP: LVLH CRT GNC UNIV PTG CNCL – ITEM 21 EXEC 																																													
		<ul style="list-style-type: none"> • <u>CONFIGURE FOR SET CONTRACTION</u> CRT If MM202: GNC, OPS 201 PRO GNC 0 GPC MEMORY CONFIG – ITEM 1 +2 EXEC Assign MC2 per table → 																																													
		<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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4	1	2																																													
L 1	0	0																																													
2	0	0																																													
MM 1	1	1																																													
2	1	2																																													
		<ul style="list-style-type: none"> • <u>OPS MODE RECALL</u> ⑫ C3(A6U) DAP: FREE VERN(ALT) 																																													
		<ul style="list-style-type: none"> • GNC, OPS 201 PRO CRT Pause ~30 sec (DAP setting), then C3(A6U) DAP: as reqd 																																													
		<ul style="list-style-type: none"> • <u>FREEZE DRY GPC</u> CRTX MAJ FUNC – PL GPC/CRT G2FD/X EXEC X PL GPC MEMORY CONFIG – ITEM 45 +2 EXEC GPC – ITEM 46 +2(3) EXEC STORE – ITEM 47 EXEC Store complete when MC = 02 (~30 sec) √All IDPs deassigned from FD GPC 																																													
		<ul style="list-style-type: none"> • GPC MODE G2FD – STBY (tb-bp) – HALT (tb-bp) – STBY (tb-RUN) – HALT (tb-bp) 																																													
		<ul style="list-style-type: none"> • <u>CONFIG FOR CLEANUP</u> GNC 22 S TRK/COAS CNTL S TRK -Y, -Z: STAR TRK – ITEM 3,4 EXEC (*) GNC 21 IMU ALIGN RESUME 																																													
		<ul style="list-style-type: none"> • <u>CLEAR SOFTWARE FAIL VOTES</u> ⑬ GNC 0 GPC MEMORY ITEM 48 EXEC SM 0 GPC MEMORY ITEM 48 EXEC 																																													
		<ul style="list-style-type: none"> • O6 																																													

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

CONFIG – ITEM 1 +2 EXEC

Assign MC2 per table →

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		

• OPS MODE RECALL ⑮
 C3(A6U) DAP: FREE

CRT GNC, OPS 201 PRO
 Pause ~30 sec

C3(A6U) (DAP settling), then
 DAP: as reqd

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 G3	2 G3	3 G3	4 G3	5 -
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM 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)
- These additional uplinks may be required after completion of the FRP (\sqrt{MCC}):
 - RNP GPS uplink load
 - Reapplication of GMEMs (if reqd)

NOTE

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

1. Config GPCs:
 - O6 a. PASS GNC GPCs MODE – HALT
 - b. BFS GPC MODE – RUN
 - c. If BFS not in 301:
 - C2 BFS, GNC, OPS 301 PRO
 - d. Ensure BFS not hard assigned to any forward IDP:
 - GPC/CRT 01 EXEC
 - GPC/CRT 02 EXEC
 - GPC/CRT 03 EXEC
 - C3 e. BFC CRT DISP – OFF (BFS will default to IDPs 1 and 2)

2. If SM GPC currently active:

NOTE

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

- a. If AOS, \sqrt{MCC} for comm config and radiation constraints
 - If no comm:
 - A1U KU PWR – STBY
 - CNTL – PNL,CMD
 - If no comm, go to COMM LOST (ORB PKT, COMM) steps 7 and 8
 - O6 b. If SM GPC OUTPUT – TERM:
 - SM GPC OUTPUT – NORM
 - F7 \sqrt{FLT} CNTLR PWR – ON
 - BFS ENGAGE pb – push (set engage discretetes)
 - O1 c. If SM GPC self-fail CAM It on:
 - If reqd, perform PL/DPS RECONFIG (PL OPS or PL SYS or SODF: ASSY OPS):
 - 3: SM 1 DPS UTILITY
 - C2 CKPT RETRV ENA – ITEM 12 EXEC (no *)
 - O6 SM GPC MODE – STBY, then RUN
 - C2 SM, OPS 201 PRO
 - d. If SM GPC commanding IDP 4, reconfigure displays:
 - (1) BFC CRT DISP – ON
 - (2) SEL – 2+3
 - CRT Via IDP 1 (commanded by SM GPC):
 - (3) GPC/CRT 04 EXEC
 - (4) GPC/CRT 43 EXEC (BFS will continue to command IDP 3 until next step)
 - C2 (5) BFC CRT DISP – OFF
 - (6) Verify BFS commanding IDP 1 and 2, SM commanding IDP 3
 - e. Go to step 6

3. Attempt recovery of one GPC (begin with GPC 4 and proceed in descending order until a GPC is successfully IPL'd):
 - O15 a. \sqrt{MMU} 2 – ON
 - O6 b. IPL SOURCE – MMU 1(2)
 - \sqrt{GPC} OUTPUT 4(3,2,1) – NORM (tb-bp)
 - \sqrt{GPC} MODE 4(3,2,1) – HALT (tb-bp)
 - c. GPC PWR 4(3,2,1) – OFF,ON (clears engage discretetes)
 - F7 \sqrt{FLT} CNTLR PWR – ON
 - BFS ENGAGE pb – push (resets engage discretetes)
 - O6 d. IPL 4(3,2,1) pb – push (tb-IPL, then bp within 30 sec)

GPC FRP-4 (Cont)

- e. When tb – bp or 30 sec:
GPC MODE 4(3,2,1) – STBY (tb-RUN within 2 min)
 - f. When tb – RUN or 2 min, determine if IPL'd GPC can command IDP:
 - C2 (1) IDP/CRT 3 MAJ FUNC – PL
 - O6 (2) GPC MODE 4(3,2,1) – RUN (tb remains RUN)
 - C2 (3) √3: PL 0 GPC MEMORY driven by IPL'd GPC
 - g. If GPC cannot command IDP:
 - O6 GPC MODE 4(3,2,1) – HALT
 - If first IPL attempt:
 - IPL SOURCE – MMU 2(1)
 - Go to step 3c and proceed (one time only)
 - If second IPL attempt:
 - GPC PWR 4(3,2,1) – OFF
 - Go to step 3b for next highest numbered failed GPC
 - If no GPCs recovered, √MCC
 - O6 h. IPL SOURCE SW – OFF
4. For first successfully IPL'd GPC, establish SM GPC:
- C2 a. SM 1 DPS UTILITY
 - b. If checkpoint previously done, CKPT RETRV ENA – ITEM 12 EXEC (*)
 - C2 b. IDP/CRT 3 MAJ FUNC – SM
 - c. SM 0 GPC MEMORY
CONFIG – ITEM 1 +4 EXEC
Assign SM GPC, PL 1/2, CRTs, LAUNCH 1, MMs
 - d. SM, OPS 201 PRO
 - √3: SM ANTENNA
 - e. If reqd, go to PL/OPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)
5. Select MET as MISSION TIME:
- C2 3: SM 2 TIME
MISSION TIME MET – ITEM 2 EXEC
6. Hardware dump the remaining failed GPCs during AOS (Do not dump any post-engage IPL'd GPCs):
- O6 a. √GPC MODE 3(2,1) – HALT
√GPC PWR 3(2,1) – ON
GPC OUTPUT 3(2,1) – TERM
 - MO42F b. GPC MEM DUMP – 3(2,1)
 - O6 c. GPC MODE 3(2,1) – STBY (starts dump)
Wait: Double dump of PASS GPC complete after 4 min
GPC MODE 3(2,1) – HALT (stops dump)
GPC OUTPUT 3(2,1) – NORM
 - MO42F d. If another hardware dump to be performed, go to step 6a for next GPC
 - e. When all dumps complete, GPC MEM DUMP – OFF
 - f. If reqd, load post dump TFL:
Perform LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
 - F7 g. √FLT CNTLR PWR – ON
BFS ENGAGE pb – push (resets engage discretres)
7. Attempt recovery of each dumped GPC one at a time beginning with GPC 1:
- a. Perform IPL:
 - (1) 3: SM (GNC,PL) 1 DPS UTILITY
√IPL SOURCE SW MASK – ITEM 38 EXEC (no *)
 - O6 (2) IPL SOURCE – MMU 1(2)
 - (3) √GPC OUTPUT 1(2,3) – NORM (tb-bp)
√GPC MODE 1(2,3) – HALT (tb-bp)
 - F7 (4) GPC PWR 1(2,3) – OFF, ON (clears engage discretres)
√FLT CNTLR PWR – ON
BFS ENGAGE pb – push (resets engage discretres)
 - O6 (5) IPL 1(2,3) pb – push (tb-IPL, then bp within 30 sec)
 - (6) When tb – bp or 30 sec:
GPC MODE 1(2,3) – STBY (tb-RUN within 2 min)
 - (7) When tb – RUN or 2 min, determine if IPL'd GPC can command IDP:
 - C2 (a) IDP/CRT 3 MAJ FUNC – PL
 - O6 (b) GPC MODE 1(2,3) – RUN (tb remains RUN)
 - (c) On PASS IDP, GPC/CRT IPL'd GPC/3 EXEC
 - C2 (d) √3: PL 0 GPC MEMORY driven by IPL'd GPC
 - O6 (8) If GPC cannot command IDP (IDP 3 'Big X'):
 - (a) GPC MODE 1(2,3) – HALT
 - C2 (b) Reconfig IDPs to make GPC 4 command IDP 3:
IDP/CRT 3 MAJ FUNC – SM
BFC/CRT DISP – ON
SEL – 2+3
On IDP 1 – GPC/CRT SM GPC/3 EXEC (BFS will retain IDP 3 until next step)
BFC/CRT DISP – OFF
√SM GPC commanding IDP 3

GPC FRP-4 (Cont)

- O6 (c) If first IPL attempt:
IPL SOURCE – MMU 2(1)
Go to step 7a(4) and proceed (one time only)
If second IPL attempt:
GPC PWR 1(2,3) – OFF
Go to step 7a(3) for next highest numbered failed GPC
- (9) If there are any dumped GPCs remaining to be IPL'd, go to step 7a(3) for next highest numbered failed GPC
- O6 (10) IPL SOURCE – OFF
- (11) **3: SM (GNC,PL) 1 DPS UTILITY**
IPL SOURCE SW MASK – ITEM 38 EXEC (*)
- b. Configure GPCs (Final Configuration Tables based on GPCs recovered on 5-76 through 5-82):
If only 1 PASS GPC active, go to step 8
If two, three, or four PASS GPCs active, go to step 9
- 8. If one PASS GPC active, config for ENTRY:
 - a. Perform LOAD PCMMU FORMAT (ENTRY) (ORB OPS FS, COMM/INST)
OI PCMMU FORMAT – GPC
 - O6 b. Reassign SM GPC to GNC Major Function:
 - (1) √Target GPC OUTPUT – NORM
 - (2) If reqd, perform PL/DPS RECONFIG, secure (PL SYS or SODF: ASSY OPS)
 - (3) SM, OPS 000 PRO
 - C2 (4) IDP/CRT 3 MAJ FUNC – GNC
3: GNC 0 GPC MEMORY
CONFIG – ITEM 1 +3 EXEC
Assign PASS GPC all FC strings, PL 1/2, CRT, and MMs
 - O14, O15, O16 (5) Configure for G3 Transition:
 - √RGAs 1,2,3,4 – ON
 - √RJDA/RJDF (all) – ON
 - √cb ADTA (four) – cl
 - O8 MLS (three) – ON
 - C3 (6) GNC, OPS 301 PRO:
√**3: GNC DEORB MNVR COAST**
 - (7) If reqd, perform PL/DPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)
 - c. Go to step 10, PASS IMU attitude reference recovery
- 9. If two, three, or four PASS GPCs active:
 - C3 a. OI PCMMU FORMAT – FXD
 - C2 b. Establish G3 config in lowest number GPC(s):
 - (1) IDP/CRT 3 MAJ FUNC – GNC
GPC/CRT Target GNC GPC/3 EXEC
3: GNC 0 GPC MEMORY
CONFIG – ITEM 1 +3 EXEC
Assign desired GPC(s), FC strings, CRTs, and MMs per appropriate table:

If two GPCs recovered:

If three GPCs recovered:

If four GPCs recovered:

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

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

CONFIG GPC	3
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

GPC FRP-4 (Cont)

- O14,
O15,
O16
O8
C3
- (2) Configure for G3 Transition:
 - √RGAs 1,2,3,4 – ON
 - √RJDA/RJDF (all) – ON
 - √cb ADTA (four) – cl
 - MLS (three) – ON
 - (3) GNC, OPS 301 PRO:
 - √3: GNC DEORB MNVR COAST

10. PASS IMU attitude reference recovery:
O14:E,
O15:E
O6
- a. Ensure good Star Tracker config:
 - √cb MNA,B STAR TRKR -Z,-Y (two) – cl
 - √S TRK PWR (two) – ON
 - 3: GNC 21 IMU ALIGN
 - b. Mode IMUs 1,2,3 to OPERATE:
 - IMU OPER 1,2,3 – ITEM 4,5,6 EXEC
 - (* will not appear until DISENGAGE step)

If extended loss of comm (ZOE not included) or no uplink CMD capability, recover IMU attitude reference utilizing HUD and MATRIX alignment:

- c. Deselect two IMUs leaving one IMU selected:
 - IMU DES 1(2,3) – ITEM 7(8,9) EXEC (*)
- d. Maneuver to attitude for subsequent HUD alignment, STAR PAIRS PAD (ORB OPS FS, PTG)

NOTE

Establish an inertial attitude which will simplify a manual maneuver to second star

- C2
- e. Perform BFS disengagement (if comm, wait for MCC GO):
 - (1) Configure displays for disengage:
 - (a) BFC CRT DISP – ON
 - SEL – 1+2 (BFS commanding IDPs 1 and 2)
 - √PASS GNC GPC commanding IDP 3
 - (b) Deassign IDP 2 from PASS
 - Via IDP 3, GPC/CRT 02 EXEC (BFS still commanding IDP 2)

NOTE

BFS DISENGAGE can be verified by Big X/POLL FAIL on IDP 2, BFS GPC OUTPUT tb – bp (pnl O6), and BFC lt flashing (pnl F2/F4)

- F6
- (2) Perform BFS disengage:
 - On MCC GO:
 - BFC – DISENGAGE
 - Verify BFS disengage:
 - √BFS commanding IDP 1 only
 - √BFS GPC OUTPUT tb – bp
 - √BFC Light flashing or OFF

- C3
O6
- * If BFS still engaged: *
 - * BFS, OPS 000 PRO *
 - * GPC 5 OUTPUT – NORM *
 - * – B/U *
 - * Verify BFS disengage *
 - * BFS, OPS 301 PRO *

- C3
C2
F6/F8
- (3) Post disengage reconfig:
 - DAP: INRTL
 - BFS – I/O RESET
 - Reassign IDP 2 – GPC/CRT PASS GPC X/2 EXEC
 - BFC CRT SEL – 3+1 (PASS commanding IDPs 1 and 2, BFS commanding IDP 3)
 - ADI ATT (two) – REF
 - ATT REF pb – push

GPC FRP-4 (Cont)

NOTE

'↓' will remain for accumulators not selected by GPC driving SPEC.
If TRY is not successful ('↓' by MTU ACCUM 1 time), continue with procedures and √MCC

Acquire MTU time

If SM GPC available:

SM 2 TIME

MTU ACCUM 1 TRY – ITEM 34 EXEC

NOTE

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

f. Mass Memory Read of IMU calibration data:

GNC 21 IMU ALIGN

Select all IMUs for MASS MEMORY READ:

IMU 1,2,3 – ITEM 10,11,12 EXEC (*)

Initiate MM READ:

MM READ – ITEM 19 EXEC (*)

When MM READ complete:

√MM READ – ITEM 19 (no *)

g. Perform MATRIX (TORQUE) ALIGN USING HUD STAR DATA, GNC SSR-2 (GNC)

h. Reselect all deselected IMUs

GNC 21 IMU ALIGN

IMU DES – ITEM 7(8,9) EXEC (no *)

i. Go to step 11

If good comm and uplink CMD capability, recover IMU attitude reference utilizing Matrix Alignment using IMU data:

NOTE

The following steps assume recovery of 'operational' IMUs only.
Operational IMUs are IMUs in OPER and not previously caged

j. Deselect two IMUs leaving best IMU selected:

√MCC for best IMU

IMU DES 1(2,3) – ITEM 7(8,9) EXEC (*)

k. Disengagement of BFS:

(1) Configure displays for disengage

(a) BFC CRT DISP – ON

SEL – 1+2 (BFS commanding IDPs 1 and 2)

√PASS GNC GPC commanding IDP 3

(b) Deassign IDP 2 from PASS

Via IDP 3, GPC/CRT 02 EXEC (BFS still commanding IDP 2)

NOTE

BFS DISENGAGE can be verified by Big X/POLL FAIL on IDP 2,
BFS GPC OUTPUT tb – bp (pnl O6), and BFC lt flashing (pnl F2/F4)

(2) Perform BFS disengage:

On MCC GO:

BFC – DISENGAGE

Verify BFS disengage:

√BFS commanding IDP 1 only

√BFS GPC OUTPUT tb – bp

√BFC Light flashing or OFF

C2

F6

C3
O6

* If BFS still engaged: *
* BFS, OPS 000 PRO *
* GPC 5 OUTPUT – NORM *
* – B/U *
* Verify BFS disengage *
* BFS, OPS 301 PRO *

GPC FRP-4 (Cont)

- C3 (3) Post disengage reconfig:
DAP: INRTL
BFS – I/O RESET
Reassign IDP 2 – GPC/CRT PASS GPC X/2 EXEC
BFC CRT SEL – 3+1 (PASS commanding IDPs 1 and 2, BFS commanging IDP 3)

NOTE

‘↓’ will remain for accumulators not selected by GPC driving SPEC.
If TRY is not successful (‘↓’ by MTU ACCUM 1 time), continue with procedures and √MCC

Acquire MTU time
If SM GPC available:

SM 2 TIME

MTU ACCUM 1 TRY – ITEM 34 EXEC

NOTE

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

- l. Mass Memory Read of IMU calibration data:
GNC 21 IMU ALIGN
Select all IMUs for MASS MEMORY READ:
IMU 1,2,3 – ITEM 10,11,12 EXEC (*)
Initiate MM READ:
MM READ – ITEM 19 EXEC (*)
When MM READ complete:
√MM READ – ITEM 19 (no *)
- m. Confirm with MCC that REFSMMAT uplink has been performed. Do not proceed without confirmation
- n. Recover IMU attitude reference of one of the deselected operational IMUs, utilizing Matrix Alignment, aligning the IMU to itself:

CAUTION

Each IMU being recovered must be individually matrix aligned to itself in order to incorporate the uplinked REFSMMATs

GNC 21 IMU ALIGN

Utilize as reference one of the operational IMUs currently deselected:

REF IMU – ITEM 14 + ___ EXEC

TYPE – ITEM 15 EXEC (MATRIX)

Align Reference IMU to itself:

ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)

EXEC – ITEM 16 EXEC (*)

√MCC to repeat step 10n with other deselected operational IMU

- C3 o. Configure DAP:
√DAP: INRTL
DAP ROT: PULSE/PULSE/PULSE
- p. Deselect currently selected IMU (no selected IMUs):
IMU DES – ITEM 7(8,9) EXEC (*)
- q. Reselect IMU(s) aligned in step 10n:
IMU DES – ITEM 7(8,9) EXEC (no *)
- r. Configure DAP:
√DAP: INRTL
DAP ROT: DISC/DISC/DISC
- s. √MCC to repeat step 10n with remaining IMU
- t. When Matrix Align(s) using IMU data complete, reselect all recovered IMUs:
IMU DES – ITEM 7(8,9) EXEC (no *)
- u. Mnvr to acquire stars using AUTO DAP for STRK align. Only Stars 11-60 are available in OPS 3: choose appropriate star pair from pad STAR PAIRS PAD (ORB OPS FS, PTG)

GPC FRP-4 (Cont)

- v. If STAR TRKRs powered on in step 10a, configure STAR TRKRs and open doors:
 GNC I/O RESET
GNC 22 S TRK/COAS CNTL
 O6 S TRK DR CNTL SYS (two) – OP (start timer)
 √POS tb (two) – bp
 When both tb – OP (8-24 sec), or either tb – bp for > 24 sec:
 CNTL SYS (two) – OFF
 CRT If tb – bp > 8 sec, notify MCC
 STAR TRK – ITEM 3,4 EXEC (*)
- w. Perform IMU ALIGN – S TRK (ORB OPS, GNC)
11. If only one PASS GPC active, acquire MTU time in G2 and then go back to Entry config:
 a. Configure for G2:
 (1) √G2 NBAT (all FC strings, PL 1/2, CRT, and MMs assigned to target GPC)
 (2) GNC, OPS 201 PRO
 √GNC UNIV PTG

NOTE

‘↓’ will remain for accumulators not selected by GPC driving SPEC.
 If TRY is not successful (‘↓’ by MTU ACCUM 1 time), continue with procedures and √MCC

- b. Acquire MTU time:
GNC 2 TIME
 MTU ACCUM 1 TRY – ITEM 34 EXEC
- c. Configure for G3:
 GNC, OPS 301 PRO
 BFS, GNC, OPS 000 PRO
 BFS, GNC, OPS 301 PRO
- d. Entry Config Established:
 (1) Reference Final Configuration Table Set I, 5-76
 (2) As time permits, work GPC FRP-1 to Re-IPL the BFS into GPC 5 >>
12. If two PASS GPCs active and Entry Config Desired:
 a. Perform SM CHECKPOINT INITIATE (ORB OPS, DPS)
 b. Perform LOAD PCMMU FORMAT (ENTRY) (ORB OPS FS, COMM/INST)
 OI PCMMU FORMAT – GPC
 C3 c. Configure GPCs for GNC OPS 3:
 (1) √SM GPC OUTPUT – NORM
 (2) If reqd, perform PL/DPS RECONFIG, Secure (PL SYS or SODF: ASSY OPS)
 (3) SM OPS 000 PRO
 C2 (4) IDP/CRT X MAJ FUNC – GNC
GNC 0 GPC MEMORY
 CONFIG – ITEM 1 +3 EXEC
 Assign desired GPCs, strings, CRTs, and MMs per appropriate NBAT table

Recovered PASS GPCs

		1,2	1,3	1,4	2,3	2,4	3,4
CONFIG		3	3	3	3	3	3
GPC		12000	10300	10040	02300	02040	00340
STR	1	1	3	1	3	2	3
	2	2	1	4	2	4	4
	3	1	3	1	3	2	3
	4	2	1	4	2	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)

- C2 (5) IDP/CRT MAJ FUNC – GNC
 - (6) GNC, OPS 301 PRO
 - √ GNC DEORB MNVR COAST
 - (7) BFS, GNC, OPS 000 PRO
 - BFS, GNC, OPS 301 PRO
- d. Entry config established:
- (1) Reference Final Configuration Table Set II A on 5-77 and 5-78
 - (2) As time permits, work GPC FRP-1 to re-IPL BFS into GPC 5 >>

If orbit configuration desired for two, three, or four PASS GPCs active:

13. Secure BFS:
- C3 √BFC CRT DISP – ON
 - SEL – 3+1
 - C2 BFS, GNC, OPS 000 PRO
 - C3 BFC CRT DISP – OFF
 - √All CRTs deassigned from BFS
 - O6 BFS GPC MODE – STBY,HALT (tb-bp)
 - OUTPUT – NORM
14. If two PASS GPCs active:
- a. Config GNC GPC for OPS 2:
 - C2 (1) IDP/CRT X MAJ FUNC – GNC
 - GNC 0 GPC MEMORY
 - CONFIG – ITEM 1 +2 EXEC
 - Assign desired GPC all FC strings, CRTs, and MMs
 - (2) GNC, OPS 201 PRO
 - √GNC UNIV PTG
 - (3) √Appropriate DAP mode selected
 - C3 b. OI PCMMU FORMAT – GPC:
 - Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
 - c. SM (GNC,PL) 1 DPS UTILITY
 - UL CNTL AUTO – ITEM 35 EXEC (*)
 - d. If required, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
 - C2 e. Configure IDPs:
 - GPC/CRT 03 EXEC
 - GPC/CRT X/4 EXEC
 - Configure MDUs as desired
 - IDP/CRT 3 PWR – OFF
 - O6 f. SM GPC OUTPUT – TERM
 - g. Configure for Orbit:
 - O14, RGAs 1,2,3,4 – OFF
 - O15, RJDA/RJDF (all) – As reqd
 - O16, cb ADTA (four) – op
 - O8 MLS (three) – OFF
 - h. Orbit config established:
 - (1) Reference Final Configuration Table Set II B, 5-79 and 5-80
 - (2) As time permits, work GPC FRP-1 to re-IPL the BFS into GPC 5 >>
15. If three PASS GPCs active:
- a. Config GNC GPCs for OPS 2:
 - C2 (1) IDP/CRT X MAJ FUNC – GNC
 - GNC 0 GPC MEMORY
 - CONFIG – ITEM 1 +2 EXEC

GPC FRP-4 (Cont)

- (2) Assign desired GPCs all FC strings, CRTs, and MMs per appropriate table

Recovered PASS GPCs

CONFIG GPC	1,2,3		
	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	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

- (3) GNC, OPS 201 PRO
 √ GNC UNIV PTG
- (4) DAP: as reqd
- C3(A6U)
C3
- b. OI PCMMU FORMAT – GPC:
 Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
- c. SM (GNC,PL) 1 DPS UTILITY
 UL CNTL AUTO – ITEM 35 EXEC (*)
- d. If reqd, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
- e. Configure IDPs:
 GPC/CRT 03 EXEC
 GPC/CRT X/4 EXEC
 Configure MDUs as desired
 IDP/CRT 3 PWR – OFF
- C2
- O6
- f. SM GPC OUTPUT – TERM
- g. Configure for Orbit:
 RGAs 1,2,3,4 – OFF
 RJDA/RJDF (all) – As reqd
 cb ADTA (four) – op
 MLS (three) – OFF
- O14,
O15,
O16
O8
- h. If Orbit config desired, establish single G2:
 (1) IDP/CRT X MAJ FUNC – GNC
GNC 0 GPC MEMORY
 CONFIG – ITEM 1 +2 EXEC
 Assign desired GPC(s), all FC strings, CRTs, and MMs per table
- C2,R11L

Recovered PASS GPCs

CONFIG GPC	1,2,3	
	10000	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

GPC FRP-4 (Cont)

- C2,R11L (2) GNC, OPS 201 PRO
 √ GNC UNIV PTG
- C3(A6U) (3) DAP: as reqd
- C2 (4) Configure OPS 0 GPC as G3FD (√SPEC 6):
 IDP/CRT X MAJ FUNC – PL
 GPC/CRT target GPC/X EXEC
 PL 0 GPC MEMORY
 CONFIG – ITEM 45 +3 EXEC
 GPC – ITEM 46 +X EXEC (X = target GPC)
 STORE – ITEM 47 EXEC
 Store complete when MC = 03
- (5) Config G3 NBAT for FD GPC per table

Recovered PASS GPCs

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

CONFIG GPC	3 02000	3 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

- C2, R11L (6) √All IDPs deassigned from FD GPC
 O6 (FD GPC) GPC MODE – STBY (tb-bp)
 – HALT
 – STBY (tb-RUN)
 – HALT (tb-bp)
- i. Final Orbit config established:
 (1) Reference Final Configuration Table Set III, 5-81
 (2) As time permits work GPC FRP-1 to re-IPL the BFS into GPC 5 >>

16. If four PASS GPCs active:

- a. Config GNC GPCs for OPS 2:
 C2,R11L (1) IDP/CRT X MAJ FUNC – GNC
 GNC 0 GPC MEMORY
 √CONFIG – ITEM 1 +2 EXEC
 Assign desired GPC(s) all FC strings, CRTs, and MMs per table

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

- (2) GNC, OPS 201 PRO
 √ GNC UNIV PTG
- C3(A6U) (3) DAP: as reqd

GPC FRP-4 (Cont)

- C3 b. OI PCMMU FORMAT – GPC:
Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
- c. SM (GNC,PL) 1 DPS UTILITY
UL CNTL AUTO – ITEM 35 EXEC (*)
- d. If required, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
- e. Configure IDPs:
GPC/CRT 03 EXEC
GPC/CRT X/4 EXEC
Configure MDUs as desired
IDP/CRT 3 PWR – OFF
- O6 f. SM GPC OUTPUT – TERM
- g. Configure for Orbit:
RGAs 1,2,3,4 – OFF
RJDA/RJDF (all) – as reqd
cb ADTA (four) – op
MLS (three) – OFF
- O14,
O15,
O16
O8 h. Config GPC3 as G3 FD:
- C2 (1) IDP/CRT X MAJ FUNC – PL
GPC/CRT 3/X EXEC
(2) PL 0 GPC MEMORY
CONFIG – ITEM 45 +3 EXEC
GPC – ITEM 46 +3 EXEC
STORE – ITEM 47 EXEC
Store complete when MC = 03
(3) Config G3 NBAT for FD GPC per table

Recovered PASS GPCs

1,2,3,4

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

- O6 (4) √All IDPs deassigned from GPC 3
GPC 3 MODE – STBY (tb-bp)
– HALT
– STBY (tb-RUN)
– HALT (tb-bp)

- i. If single GNC GPC config desired:
- C2,R11 (1) √IDP/CRT X MAJ FUNC – GNC
GNC 0 GPC MEMORY
CONFIG – ITEM 1 +2 EXEC
Assign GPC 1, all FC strings, CRTs, and MMs per table
- C3(A6U) (2) DAP: FREE
VERN(ALT)
GNC, OPS 201 PRO
√GNC UNIV PTG
- C3(A6U) (3) Pause ~30 sec (DAP settling)
DAP: as reqd

1,2,3,4

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

GPC FRP-4 (Cont)

C2

- (4) Config GPC 2 as G2 FD:
 - IDP/CRT X MAJ FUNC – PL
 - GPC/CRT 2/X EXEC
 - PL 0 GPC MEMORY
 - CONFIG – ITEM 45 +2 EXEC
 - GPC – ITEM 46 +2 EXEC
 - STORE – ITEM 47 EXEC
 - Store complete when MC = 02
- (5) √All IDPs deassigned from GPC 2:
 - GPC 2 MODE – STBY (tb-bp)
 - HALT
 - STBY (tb-RUN)
 - HALT (tb-bp)
- j. Orbit config established:
 - (1) Reference Final Configuration Table Set IV A & B, 5-82
 - (2) As time permits work GPC FRP-1 to re-IPL BFS into GPC 5 >>

GPC FRP-4 (Cont)

Final Configuration Tables

I. Single PASS GPC

Final configuration for GPC 1 recovered						Final configuration for GPC 2 recovered					
GPC OPS	1 G3	2 -	3 -	4 -	5 BFS3	GPC OPS	1 -	2 G3	3 -	4 -	5 BFS3
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	OFF NORM HALT	ON BKUP RUN	POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON BKUP RUN
CONFIG GPC	3 10000					CONFIG GPC		3 02000			
STR 1	1					STR 1		2			
2	1					2		2			
3	1					3		2			
4	1					4		2			
PL 1/2	1					PL 1/2		2			
CRT 1	1					CRT 1		2			
2	1					2		2			
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	1					2		2			

Final configuration for GPC 3 recovered						Final configuration for GPC 4 recovered					
GPC OPS	1 -	2 -	3 G3	4 -	5 BFS3	GPC OPS	1 -	2 -	3 -	4 G3	5 BFS3
POWER OUTPUT MODE	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	ON BKUP RUN	POWER OUTPUT MODE	OFF NORM HALT	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	ON BKUP RUN
CONFIG GPC			3 00300			CONFIG GPC				3 00040	
STR 1			3			STR 1				4	
2			3			2				4	
3			3			3				4	
4			3			4				4	
PL 1/2			3			PL 1/2				4	
CRT 1			3			CRT 1				4	
2			3			2				4	
3			3			3				4	
4			0			4				0	
L 1			0			L 1				0	
2			0			2				0	
MM 1			3			MM 1				4	
2			3			2				4	

GPC FRP-4 (Cont)

Final Configuration Tables (Cont)

II. Two PASS GPCs

A. Entry Config

Final configuration for GPCs 1,2 recovered						Final configuration for GPCs 1,3 recovered					
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				

Final configuration for GPCs 1,4 recovered						Final configuration for GPCs 2,3 recovered					
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		3			
2	4					2		2			
3	1					3		3			
4	4					4		2			
PL 1/2	1					PL 1/2		3			
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)

Final Configuration Tables (Cont)

A. Entry Config (Cont)

Final configuration for GPCs 2,4 recovered						Final configuration for GPCs 3,4 recovered					
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 02040				CONFIG GPC			3 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		

GPC FRP-4 (Cont)

Final Configuration Tables (Cont)

B. Orbit Config

Final configuration for GPCs 1,2 recovered						Final configuration for GPCs 1,3 recovered					
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 02000				CONFIG GPC	2 10000		4 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		

Final configuration for GPCs 2,3 recovered						Final configuration for GPCs 1,4 recovered					
GPC OPS	1 -	2 G2	3 SM	4 -	5 BFS	GPC OPS	1 G2	2 -	3 -	4 SM	5 BFS
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	ON TERM RUN	OFF NORM HALT	ON NORM HALT	POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF 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	

GPC FRP-4 (Cont)

Final Configuration Tables (Cont)

B. Orbit Config (Cont)

Final configuration for GPCs 2,4 recovered						Final configuration for GPCs 3,4 recovered					
GPC OPS	1	2	3	4	5	GPC OPS	1	2	3	4	5
	-	G2	-	SM	BFS		-	-	G2	SM	BFS
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	ON TERM RUN	ON NORM HALT	POWER OUTPUT MODE	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	ON TERM RUN	ON NORM HALT
CONFIG GPC		2 02000		4 00040		CONFIG GPC			2 00300	4 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	

GPC FRP-4 (Cont)

Final Configuration Tables (Cont)

III. Three PASS GPCs

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

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

GPC FRP-4 (Cont)

Final Configuration Tables (Cont)

IV. Four PASS GPCs

A. Dual G2 Config

Final configuration for GPCs 1,2,3,4 recovered					
GPC OPS	1 G2	2 G2	3 G3FD	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		3(FD) 00300	4 00040	
STR 1	1		3	0	
2	2		3	0	
3	1		3	0	
4	2		3	0	
PL 1/2	0		0	4	
CRT 1	1		3	4	
2	2		3	4	
3	0		3	0	
4	2		0	4	
L 1	0		0	4	
2	0		0	0	
MM 1	1		3	4	
2	2		3	4	

B. Single G2 Config

Final configuration for GPCs 1,2,3,4 recovered					
GPC OPS	1 G2	2 G2FD	3 G3FD	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		3(FD) 00300	4 00040	
STR 1	1		3	0	
2	1		3	0	
3	1		3	0	
4	1		3	0	
PL 1/2	0		0	4	
CRT 1	1		3	4	
2	1		3	4	
3	0		3	0	
4	1		0	4	
L 1	0		0	4	
2	0		0	0	
MM 1	1		3	4	
2	1		3	4	

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					CONFIG GPC	1				
	12340						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

- Note WR range, PL ID, PL INIT ID, EE ID, SPEC 95 overrides
- SM GPC MODE – STBY (tb-bp), RUN (tb-RUN)
- GPC OUTPUT 4 – NORM
- IDP/CRT3 PWR – ON
- MDU PWR – ON (as desired)
- 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:

- Perform SM REASSIGNMENT DPS SSR-4 →
- IDP/CRT3 PWR – OFF
- MDU PWR OFF as desired
- BFC CRT DISP – OFF
- √All IDPs deassigned from BFS
- BFS GPC MODE – STBY,HALT (tb-bp)
- √BFS GPC OUTPUT – NORM

If Av Bay 2, reassign BFS to GPC3:

- Perform GPC IPL MENU OPTION (PASS/BFS) DPS SSR-7

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	2	2
GPC	02040	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-2

GPC S/W INITIATED MEM DUMP

NOTE

Perform AOS. This procedure will generate a complete GPC Software Memory Dump in all in-flight OPS. Single item entry dumps must be performed in a HDR TFL

1. SM 62 PCMMU/PL COMM
If reqd, load dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

2. If PASS:

- a. If GNC, SM, or PL9 Memory Dump:

On display assigned to GPC to be dumped,

GNC(SM,PL) 0 GPC MEMORY

If a specific GNC GPC to be dumped,

√DOWNLIST GPC – ITEM 44 +X EXEC

DUMP START/STOP – ITEM 43 EXEC

Item 40 (up), 41 (down) entries begin counting

Dump complete when ITEMS 40,41 blank

- b. If an OPS 0 GPC Memory Dump:

If target OPS 0 GPC MODE – HALT:

√Appropriate AV Bay Fan – ON

√Target GPC PWR – ON

Target GPC MODE – STBY (tb-RUN)

– RUN (OUTPUT tb-gray)

Assign desired IDP/CRT to OPS 0 GPC: GPC/CRT XX EXEC

PL 0 GPC MEMORY

DOWNLIST GPC – ITEM 44 +X EXEC

DUMP START/STOP – ITEM 43 EXEC

Item 40 (up), 41 (down) entries begin counting

Dump complete when ITEMS 40,41 blank

DOWNLIST GPC – ITEM 44 +X EXEC (lowest ID GNC GPC)

MF/OPS	GNC(OPS 0)	SM	PL9
DUMP TIME	2.2	5.7	MAX = 9.7

3. If BFS:

GNC 0 BFS MEMORY

DUMP START/STOP – ITEM 24 EXEC

Item 21 (up), 22 (down) entries begin counting

Dump complete when ITEMS 21,22 blank (after 8 min)

4. SM 62 PCMMU/PL COMM

If reqd, load post-dump TFL:

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

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:
 BFS CRT DISP – ON
 IPL SOURCE – MMU 2(1)
 Go to step 4 and proceed (one time only)
 - O6 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
- C2/R11L O6 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 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 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)
- C2/R11L O6 **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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ECLS	SSR-1	RESERVED	not used
	SSR-2	FES CORE FLUSH PROCEDURE	6-76
	SSR-3	RECONFIG TO ALT PCS SYS (AUTO OPS)	6-78
	SSR-4	H2O LOOP	6-81
	SSR-5	FES RESTART	6-83
	SSR-6	CABIN EQUIP PWRDN	6-84
	SSR-7	FLASH EVAPORATOR CHECKOUT	6-85
	SSR-8	SMALL CABIN-LEAK ISOL	6-87
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	SSR-10	H2O PUMP OPS VIA GPC	6-90
	SSR-11	FES FEEDLINE PURGE	6-91
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	SSR-14	ECLS COMPUTATION INHIBIT	6-98
	SSR-15	RESERVED	not used
	SSR-16	FREE WATER LEAKING FROM HUM SEP	6-99
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<u>ECLS FRP</u>			
ECLS	FRP-1	MANUAL CABIN ATMOSPHERE MANAGEMENT	6-108
	FRP-2	POST-FIRE CABIN CLEANUP CONTINUATION	6-109
	FRP-3	FIRE/HAZ SPILL O2 CONTROL	6-111
	FRP-4	O2 LEAK CONTROL	6-114
	FRP-5	CABIN AMMONIA CONTAMINATION CLEANUP (ISS AMMONIA LEAK)	6-117

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

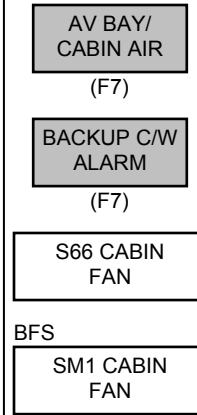
<u>6.1</u>	<u>AV BAY/CABIN AIR</u>		
6.1a	'SM1 CABIN FAN'	- CABIN FAN ΔP	6-4
6.1b	'SM2 AV BAY TEMP'	- AV BAY TEMP	6-5
6.1c	'SM2 AV BAY FAN'	- AV BAY FAN ΔP	6-6
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<u>6.2</u>	<u>CABIN ATM</u>		
6.2c	'SM1 CABIN PPO2'	- PPO2 ↑↓	6-21
<u>6.4</u>	<u>FREON/H2O LOOP</u>		
6.4f	'SM0 THRM FRN'	- ACCUM QTY ↓	6-45
6.4g	'SM0 THRM EVAP'	- EVAP TEMP HI LOAD INBD (OUTBD) DUCT(NOZ) ↑↓	6-47
6.4h		- EVAP TOPPING DUCT T FWD(AFT), L(R) ↑↓	6-48
6.4i		- EVAP TOPPING L(R) NOZ ↑↓	6-49
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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

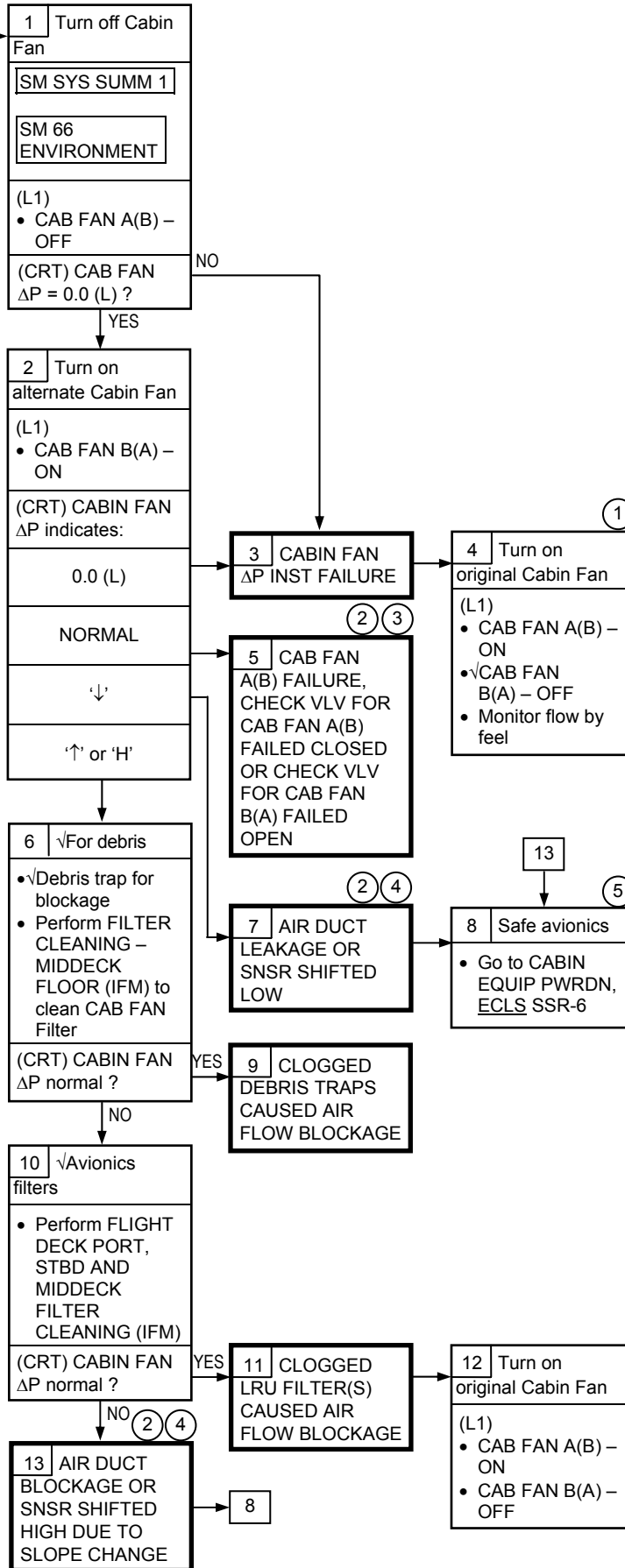


If:
CABIN FAN ΔP < 4.2 or > 6.8 (< 2.8 or > 4.88 if 10.2 ops)

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

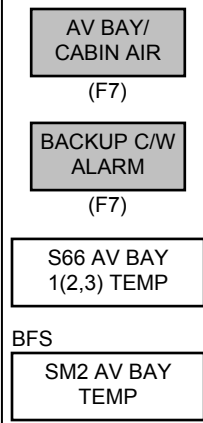
③ If check vlv is failed open, fan currently selected is the only operational fan available

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



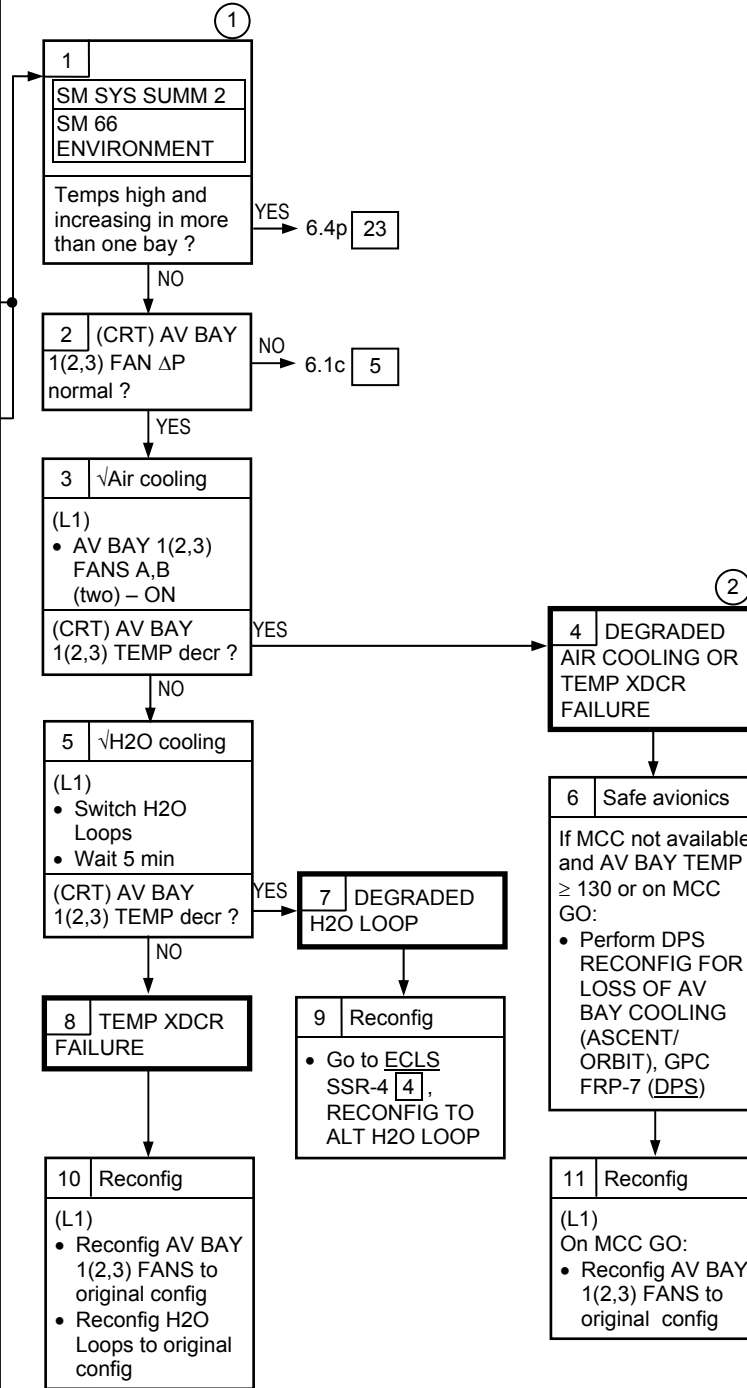
If:
AV BAY 1(2,3)
TEMP > 130 degF

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

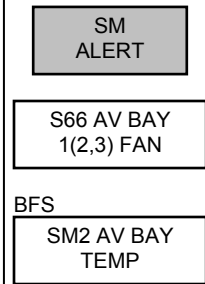


① Temps can be read from meter on pnl O1

② √MCC to determine exact failure

ECLS

6.1c AV BAY FAN ΔP

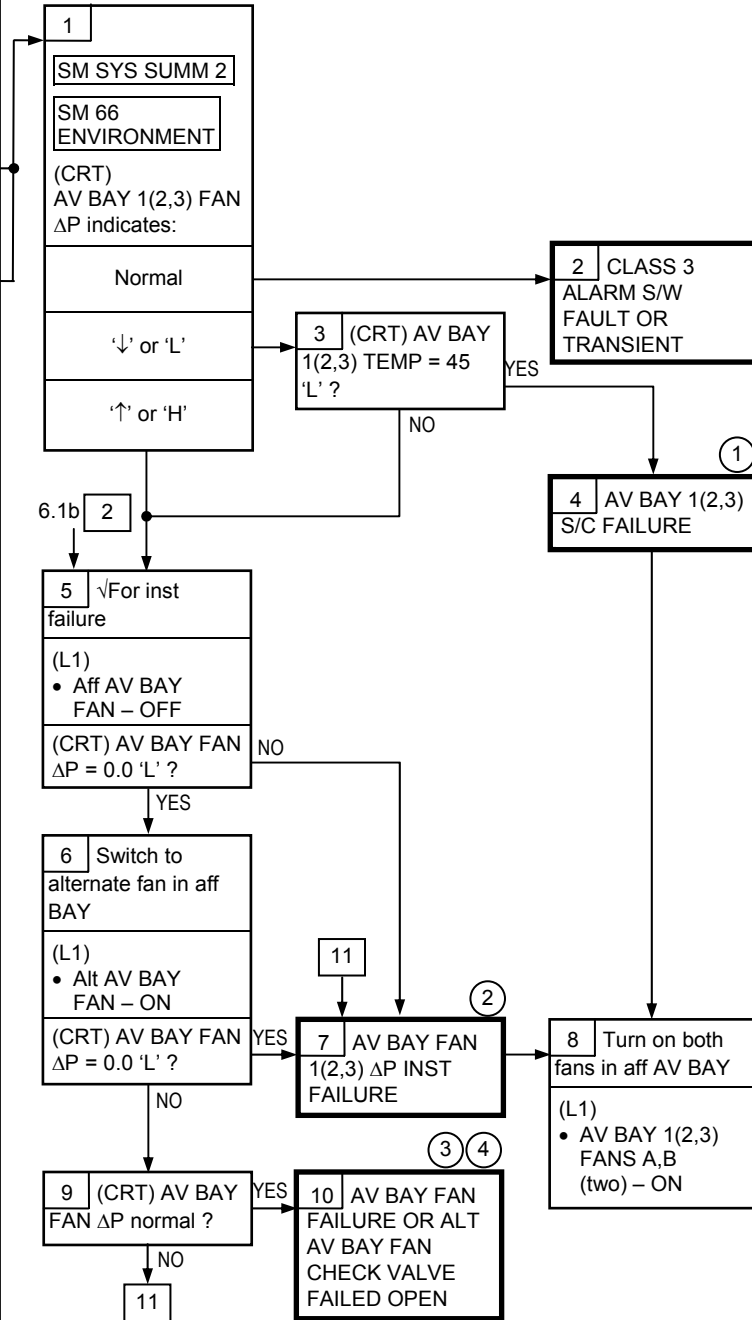


If:
AV BAY 1(2,3) FAN
ΔP < 2.5 or > 4.3
(3.3 if 10.2 ops)

If Upgraded AV BAY
FAN:
ΔP < 4.5 or > 7.8
(5.9 if 10.2 ops)

Nominal Config:

- (L4:G)
- cb AC1 AV BAY 1
FAN A (three) – cl
- cb AC2 AV BAY 1
FAN B (three) – cl
- cb AC3 AV BAY 3
FAN A (three) – cl
- (L4:H)
- cb AC1 AV BAY 3
FAN B (three) – cl
- cb AC2 AV BAY 2
FAN A (three) – cl
- cb AC3 AV BAY 2
FAN B (three) – cl
- (L4:L)
- cb AC1 φB AV BAY
2 S/C – cl
- cb AC2 φB AV BAY
3 S/C – cl
- cb AC3 φB AV BAY
1 S/C – cl
- (L1)
- AV BAY 1 FAN
B(A) – ON
- AV BAY 2 FAN
A(B) – ON
- AV BAY 3 FAN
B(A) – ON



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

② With loss of ΔP, monitor AV BAY TEMP. If > 130 degF, there is AV BAY cooling problem. If AV BAY TEMP ~H2O LP PUMP OUT T, this is indication of fan failure or duct leakage between fan and HX

③ √MCC to determine exact failure

④ If check valve failed open, fan currently selected for that AV BAY is the only operational fan available

ECLS

6.1d CABIN IMU

SM ALERT

S66 IMU FN SPD A(B,C)

IMU FAN Underspeed

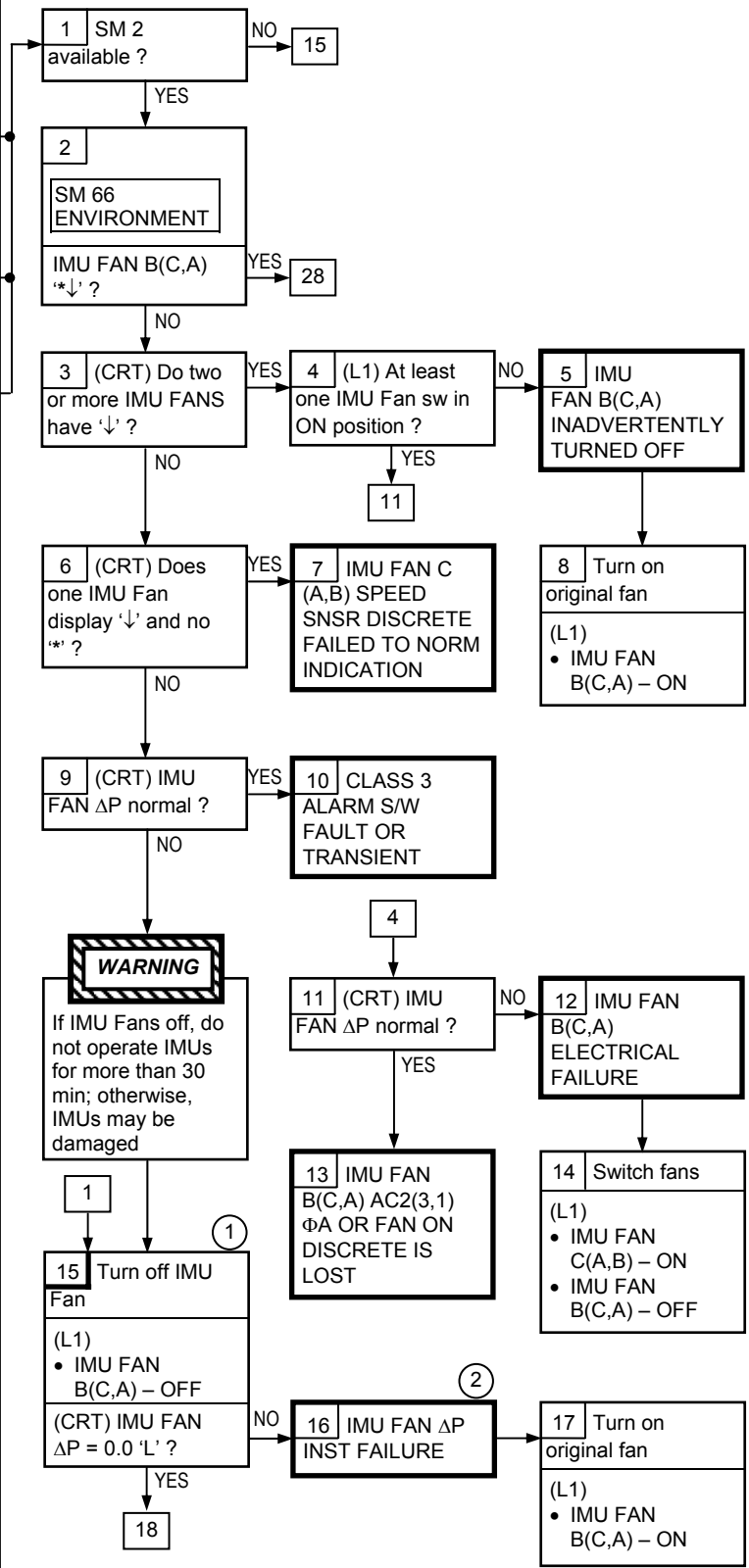
S66 IMU FAN DP

BFS

SM1 CABIN IMU

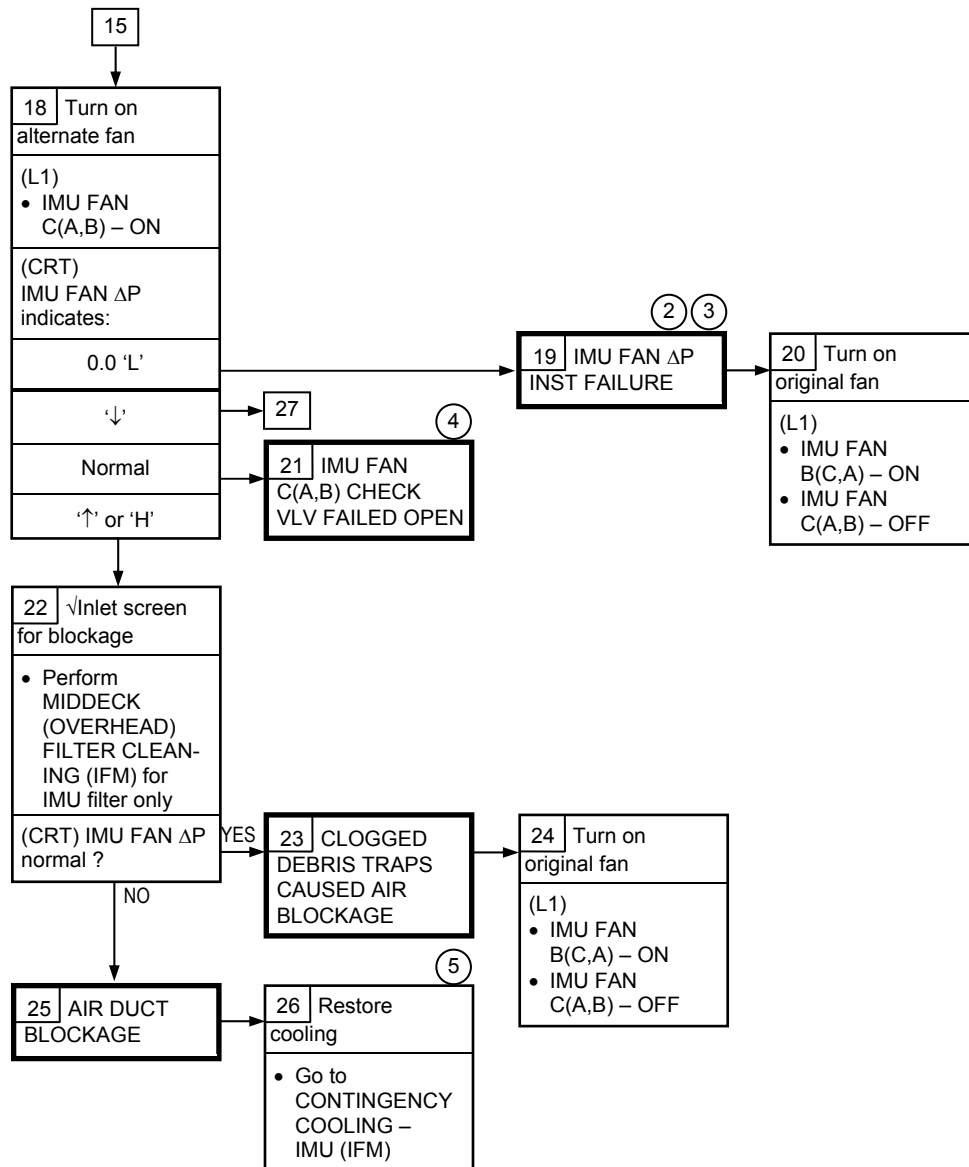
IMU FAN ΔP < 3.7 (3.0 if 10.2 ops) or > 4.95 (3.8 if 10.2 ops)

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)



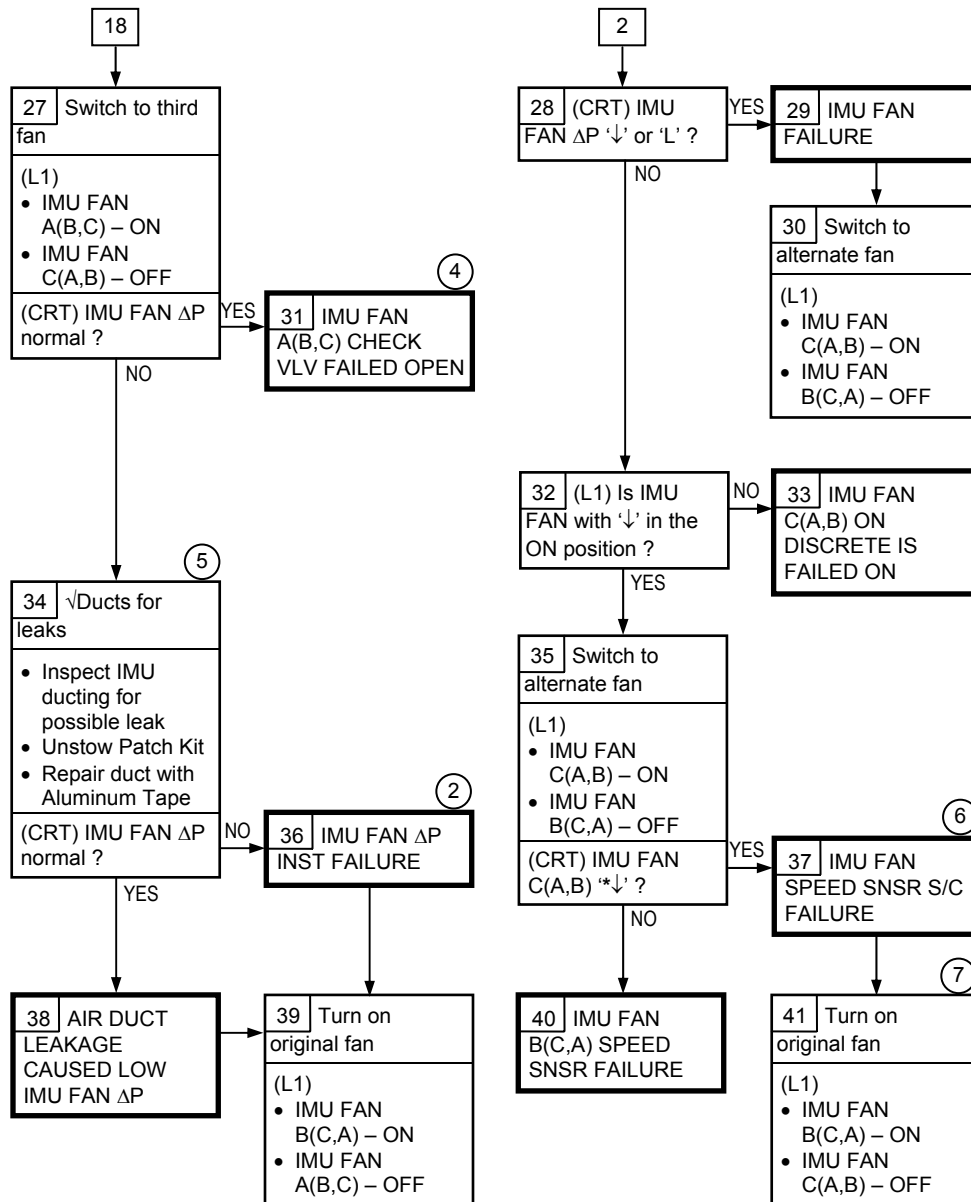
② Monitor Speed Snsr '↓' for fan failure if IMU ΔP is lost

③ If cb MNA O1 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

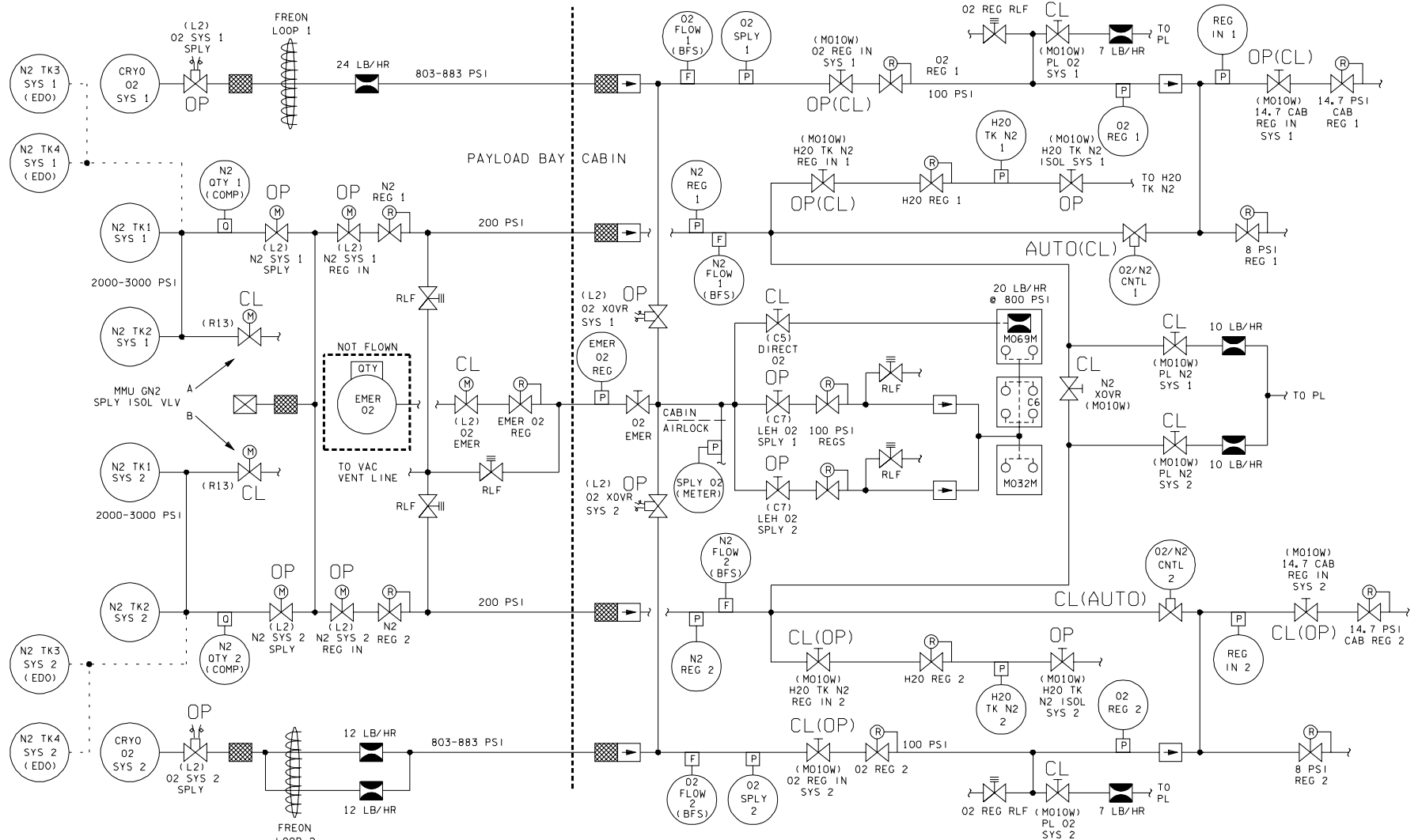
ECLS 6.1d (Cont)



- 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)

DATE 08/11/06

48027005_117.SCH 1

09/24/08

6-12

MAL/ALL/GEN J

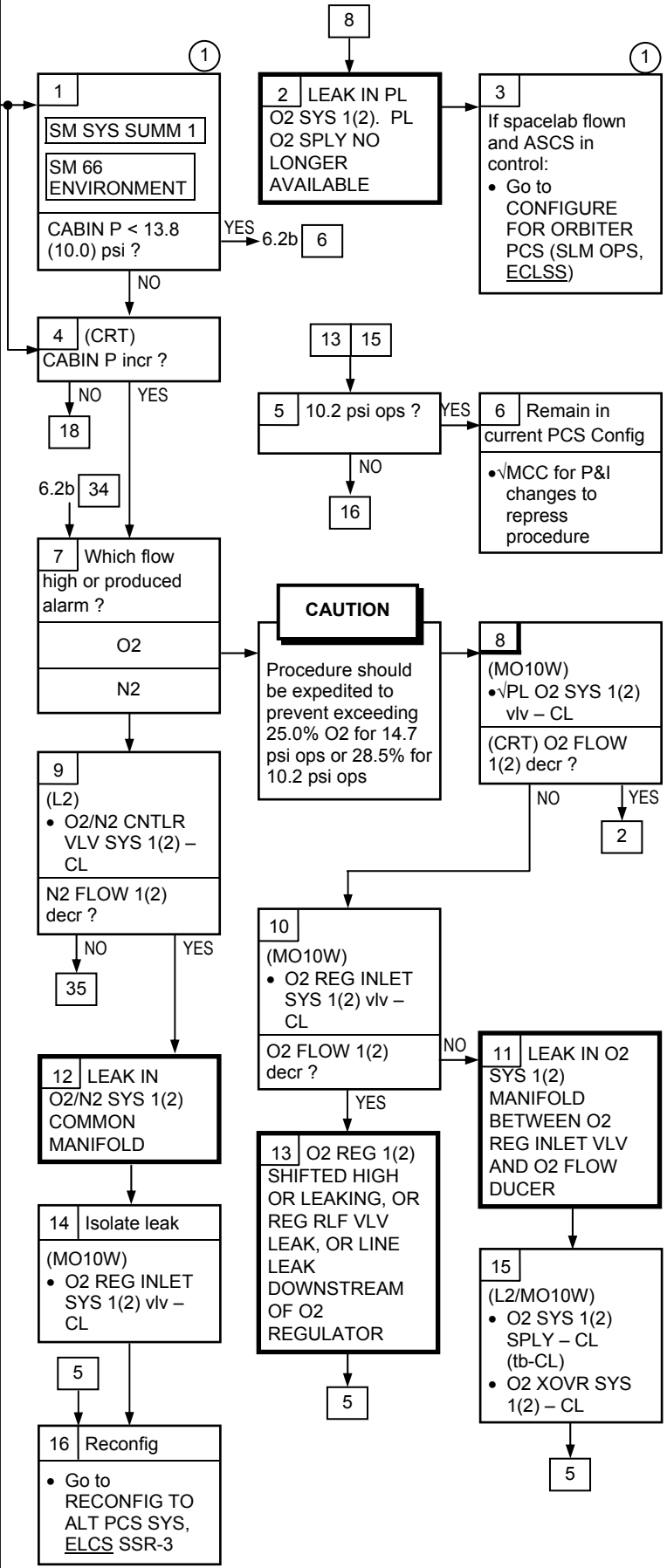
ECLS

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)



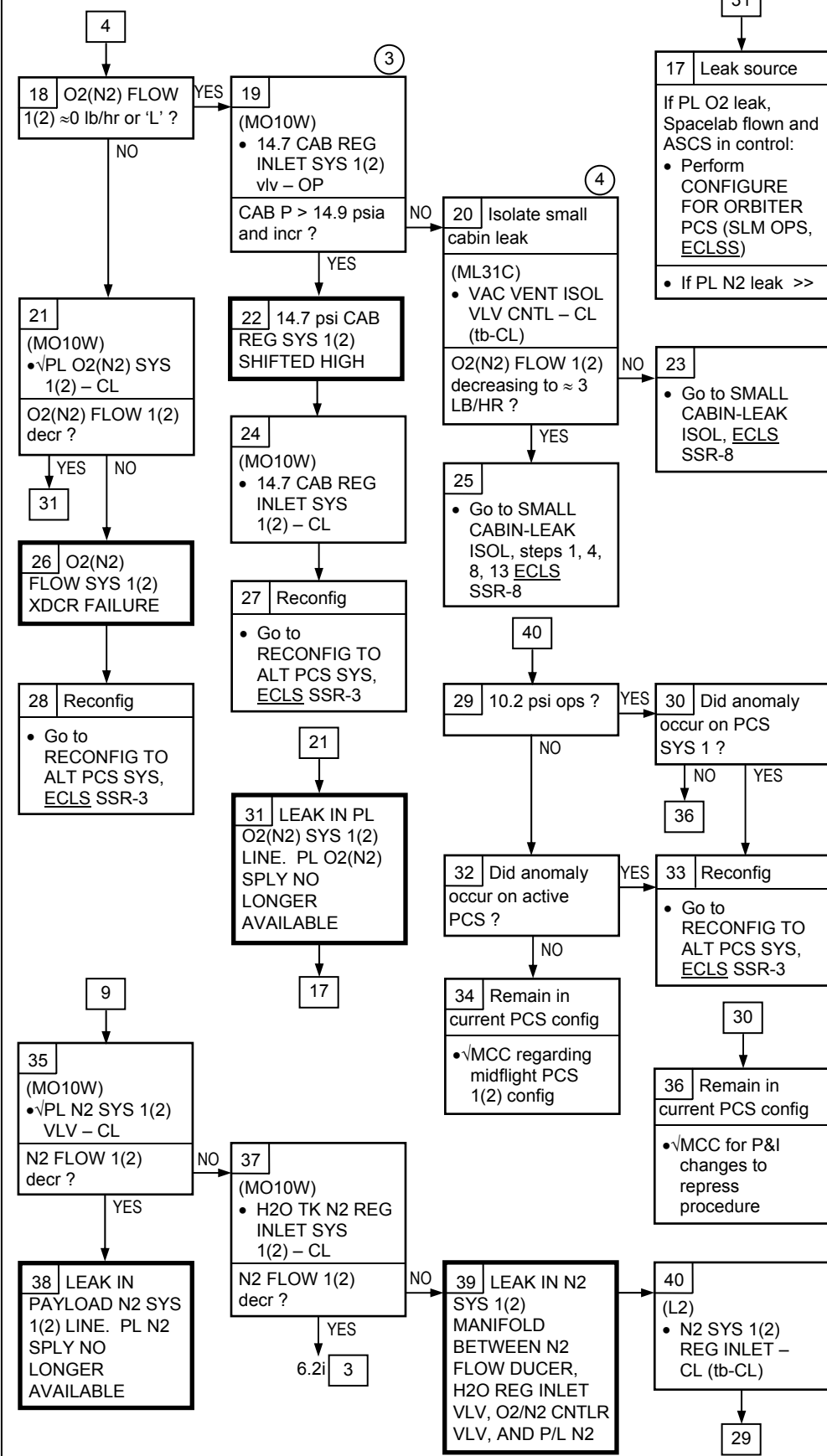
① Use numbers in parenthesis for 10.2 psi cabin ops

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)

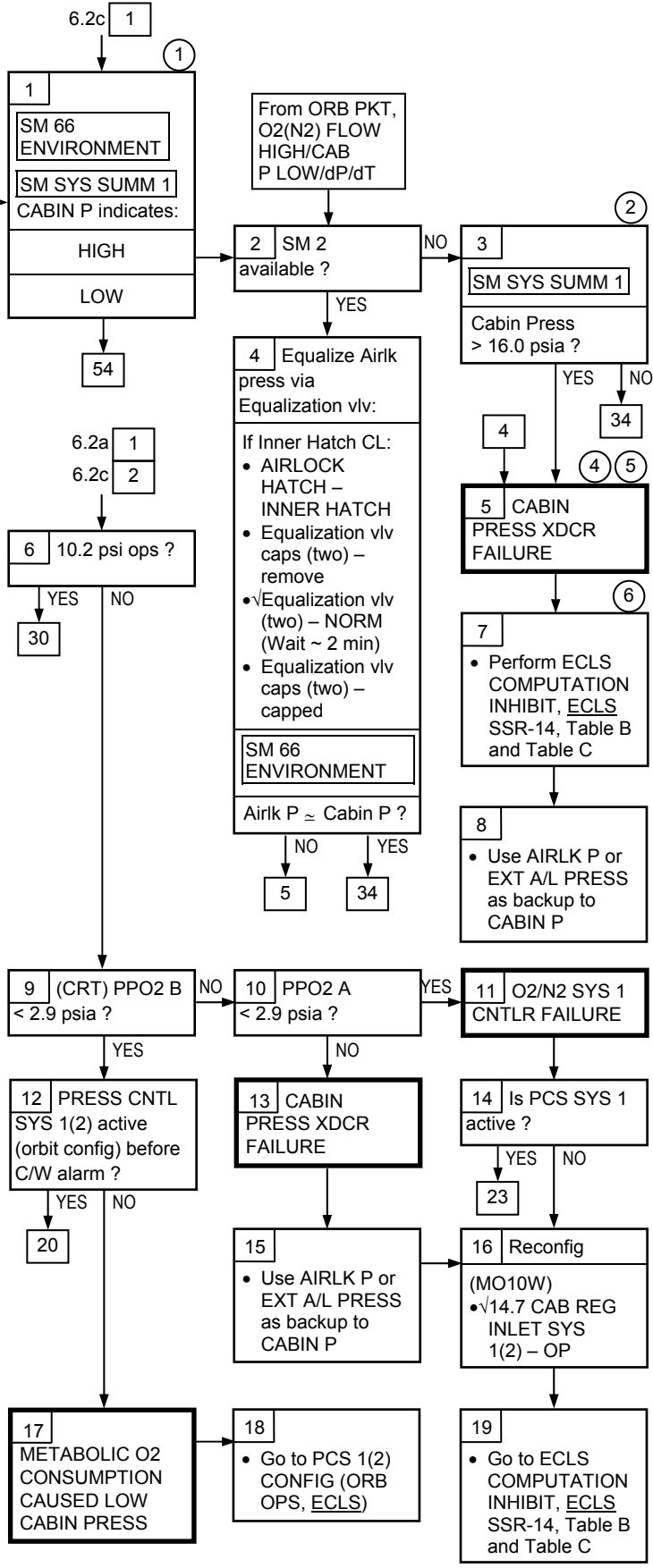
S66 CABIN PRES (BFS)

SM1 CABIN PRES

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

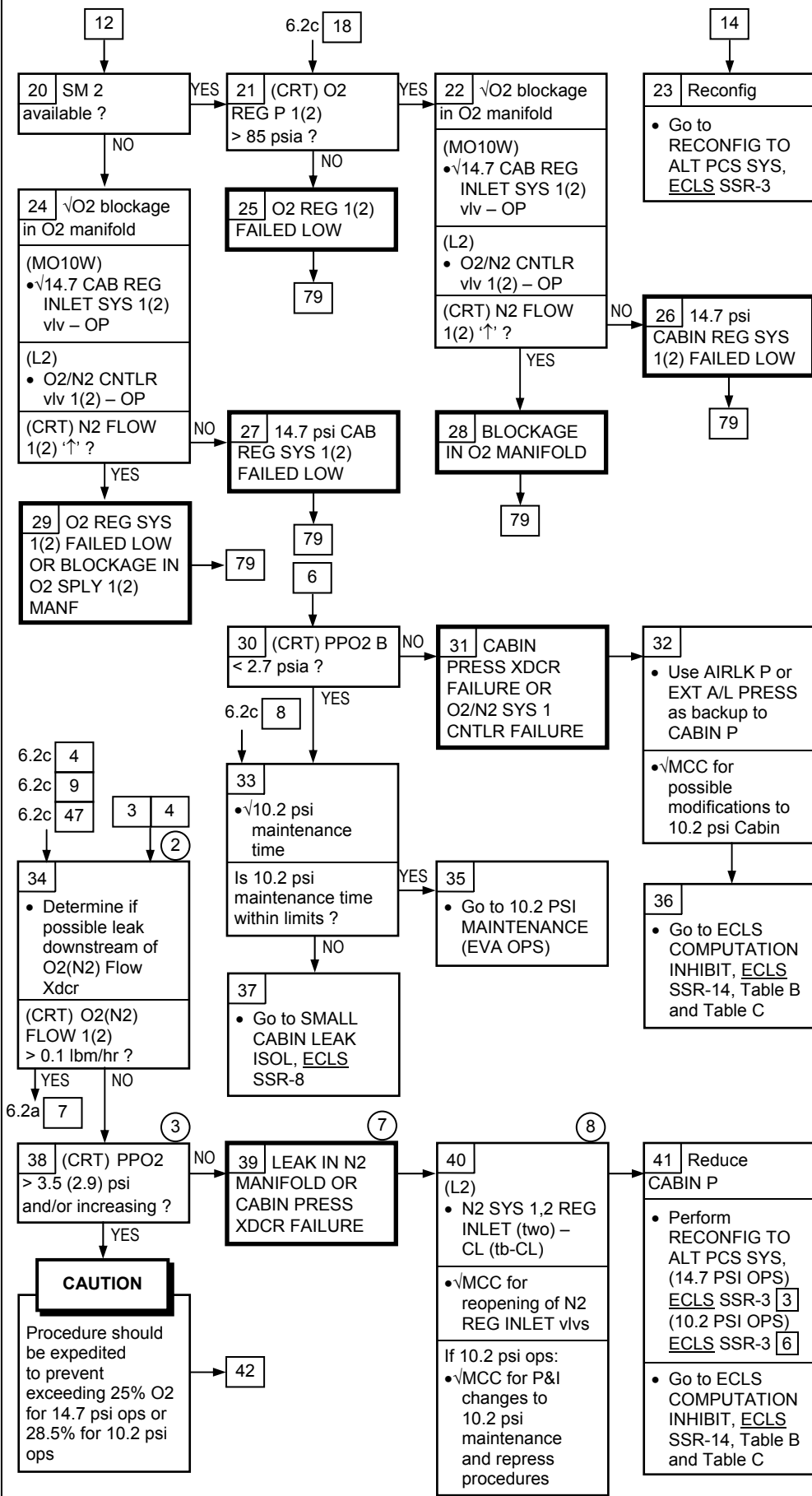
Nominal Config:
 (ORBIT)
 Refer to 6.2a

6.2b CABIN PRES ↑↓



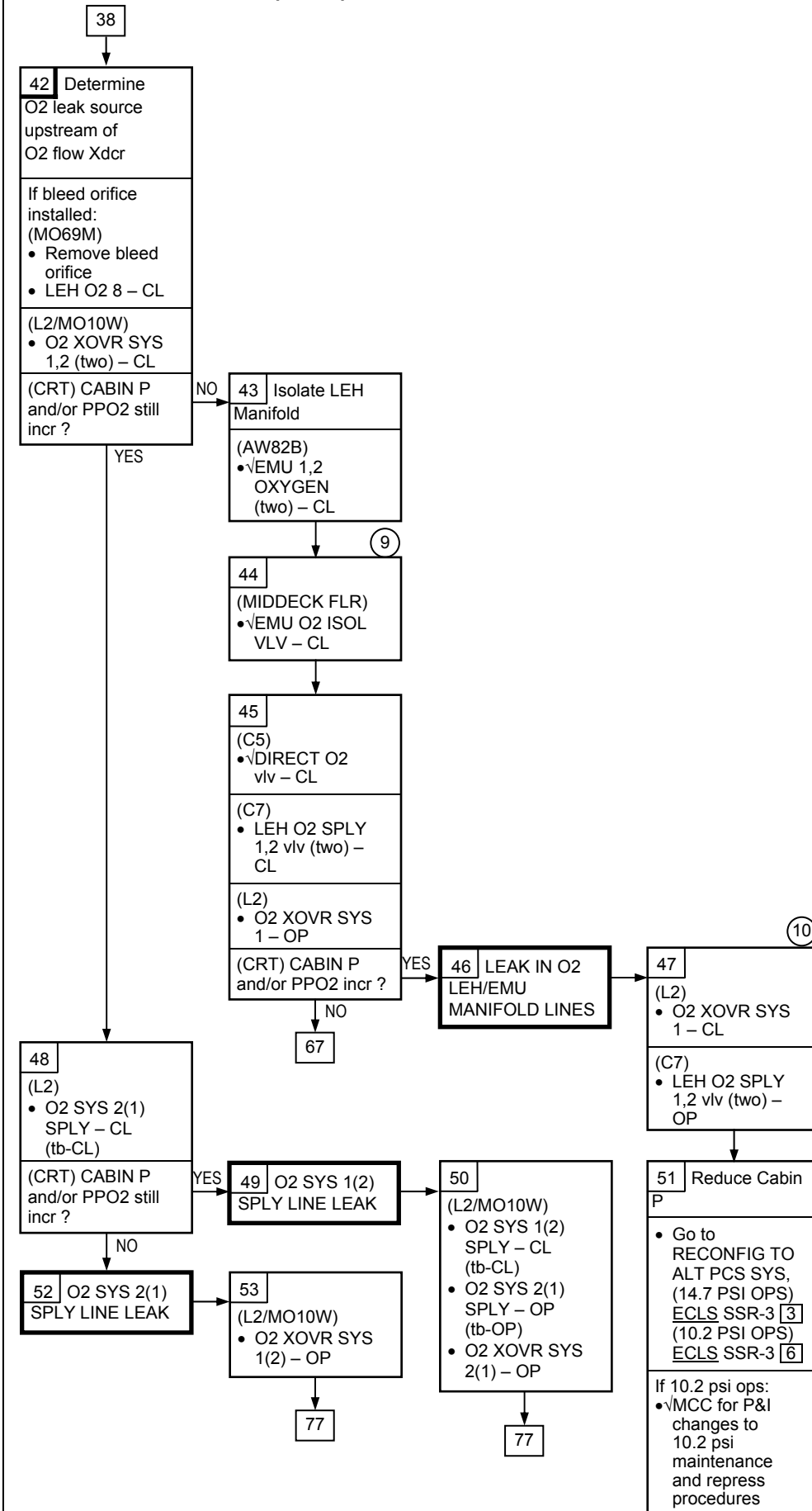
- ① This procedure should only be entered directly for CAB P ↑
- ② Cabin Press Relief vlvs crack at 15.5 psid. Full flow at 16.0 psid
- ③ Use number in parenthesis for 10.2 psia cabin ops
- ④ √MCC to determine exact failure. Suspect snsr yielding alarm
- ⑤ Unless failure is linear shift of Xdcr reading, 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

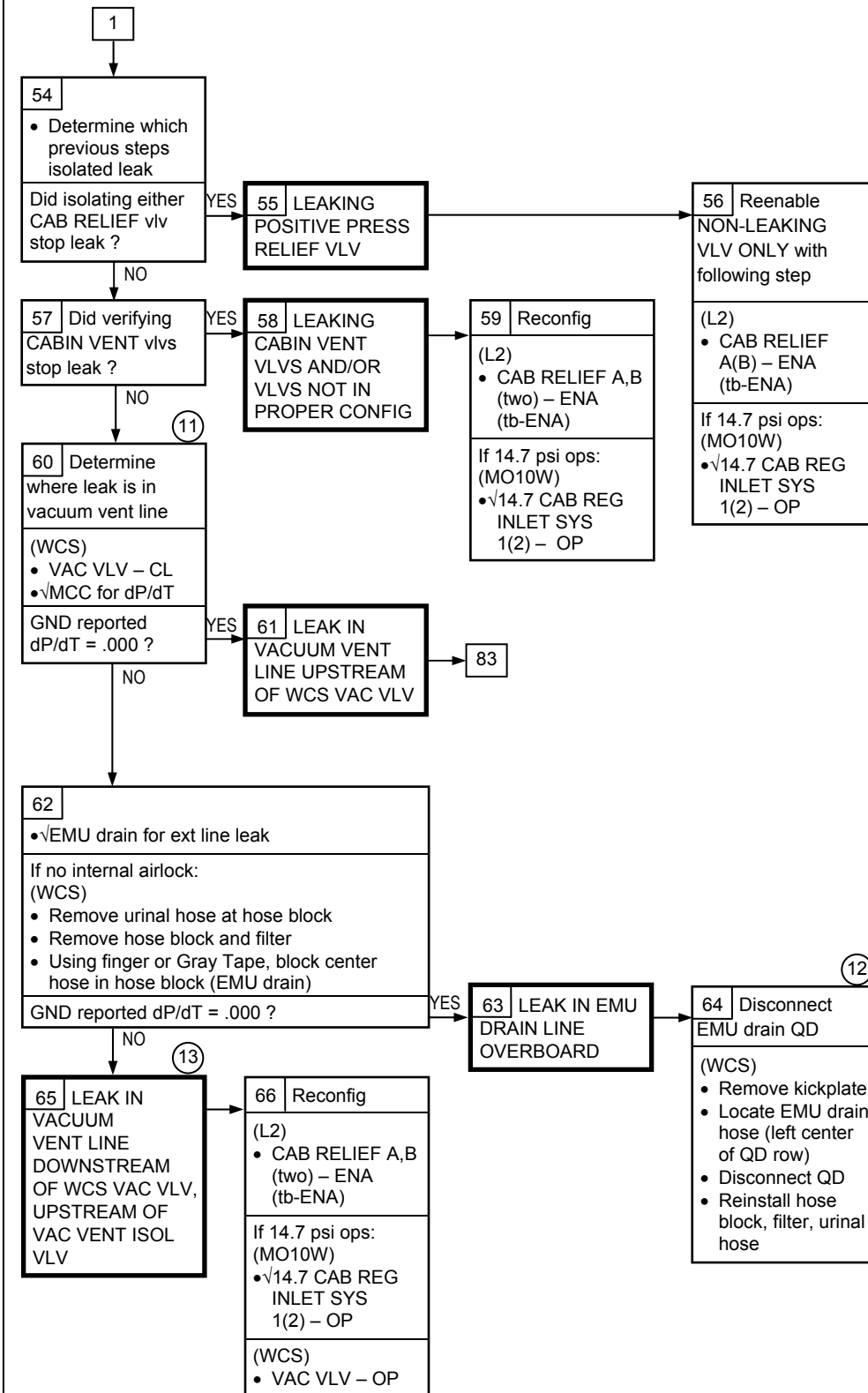
ECLS 6.2b (Cont)



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)

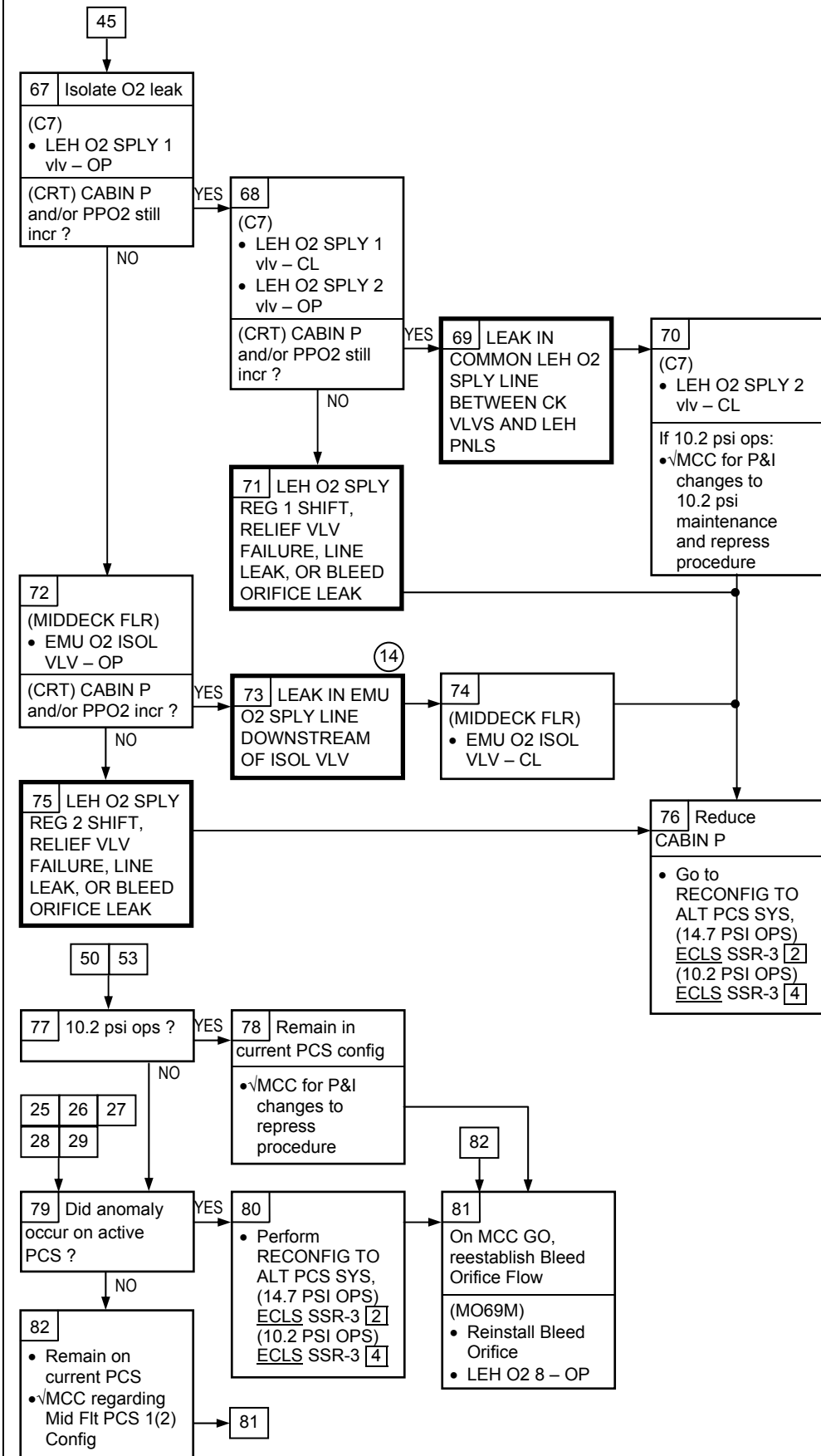


① MCC is reqd to determine if leak is isolated. Leak rate thru VAC Vent Isol vlv ~3 lb/hr (dP/dT = -0.004)

② EMU drain is lost

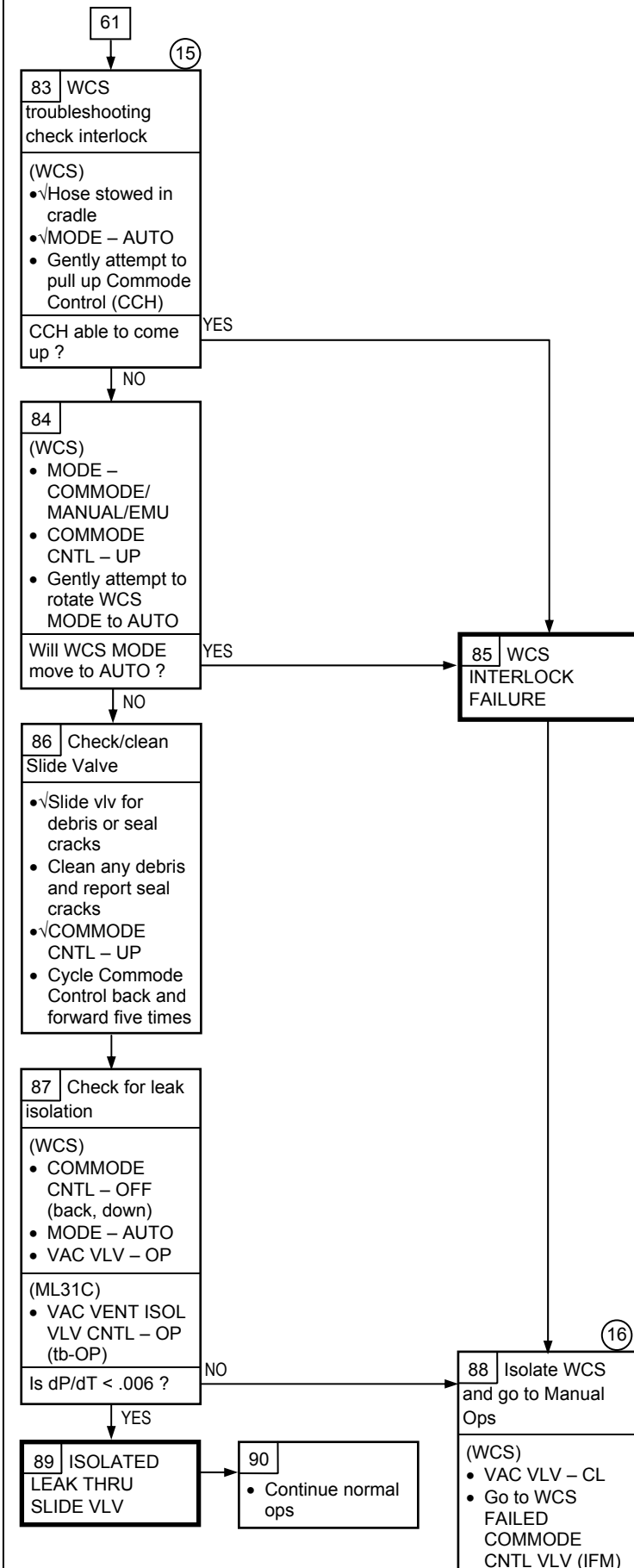
③ By isolating cabin leak with VAC VENT ISOL VLV CNTL, hydrogen entrapment in vacuum vent line could create hazardous condition. √MCC for impacts of leaving this vlv closed

ECLS 6.2b (Cont)



⑭ Possible loss of O2 Supply to EMUs or O2 transfer to ISS

ECLS 6.2b (Cont)



⑮ CCH has range of travel in which path to vacuum and cabin can be open simultaneously. Slow or incomplete extension of CCH may therefore result in cabin leak

⑯ Maintaining VAC VLV – CL to EOM may cause odor buildup due to inability to vent wet trash overboard

ECLS

CABIN ATM (F7)

BACKUP C/W ALARM (F7)

S66 CABIN PPO2 A(B)

(BFS)

SM1 CABIN PPO2

PPO2 A(B)
 < 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 ?

2 Is CAB PRESS ↓, PPO2 A ↓, and PPO2 B normal ?

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

4 10.2 psi ops ?

5 SM 2 available ?

7 SM 66 ENVIRONMENT
 (CRT) O2/N2 CNTL VLV 1(2) - N2 ?

9 N2 REG 1(2) P > 180 ?

10 Manually change vlv position (L2)
 • O2/N2 CNTLR VLV SYS 1(2) - OP
 (CRT) O2/N2 CNTL VLV 1(2) - N2 ?

11 N2 REG 1(2) FAILURE

13 PPO2 CNTLR 1(2) FAILURE

15 O2/N2 CNTLR VLV SYS 1(2) FAILURE

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

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

6 10.2 psi ops ?

8 CAB P > 10.0 ?

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

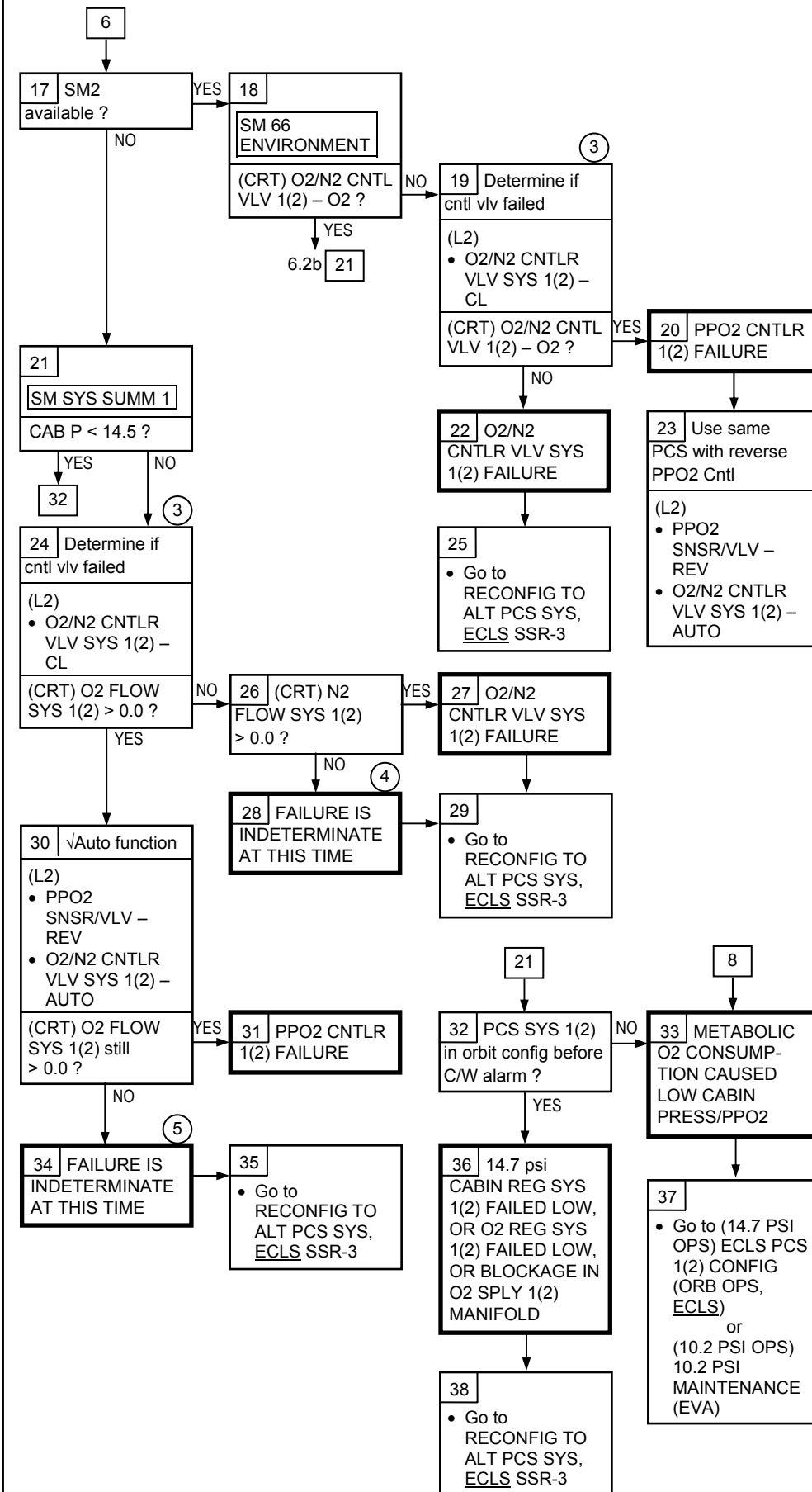
14 Use same PCS with reverse PPO2 Cntl (L2)
 • PPO2 SNSR/VLV - REV
 • O2/N2 CNTLR VLV SYS 1(2) - AUTO

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

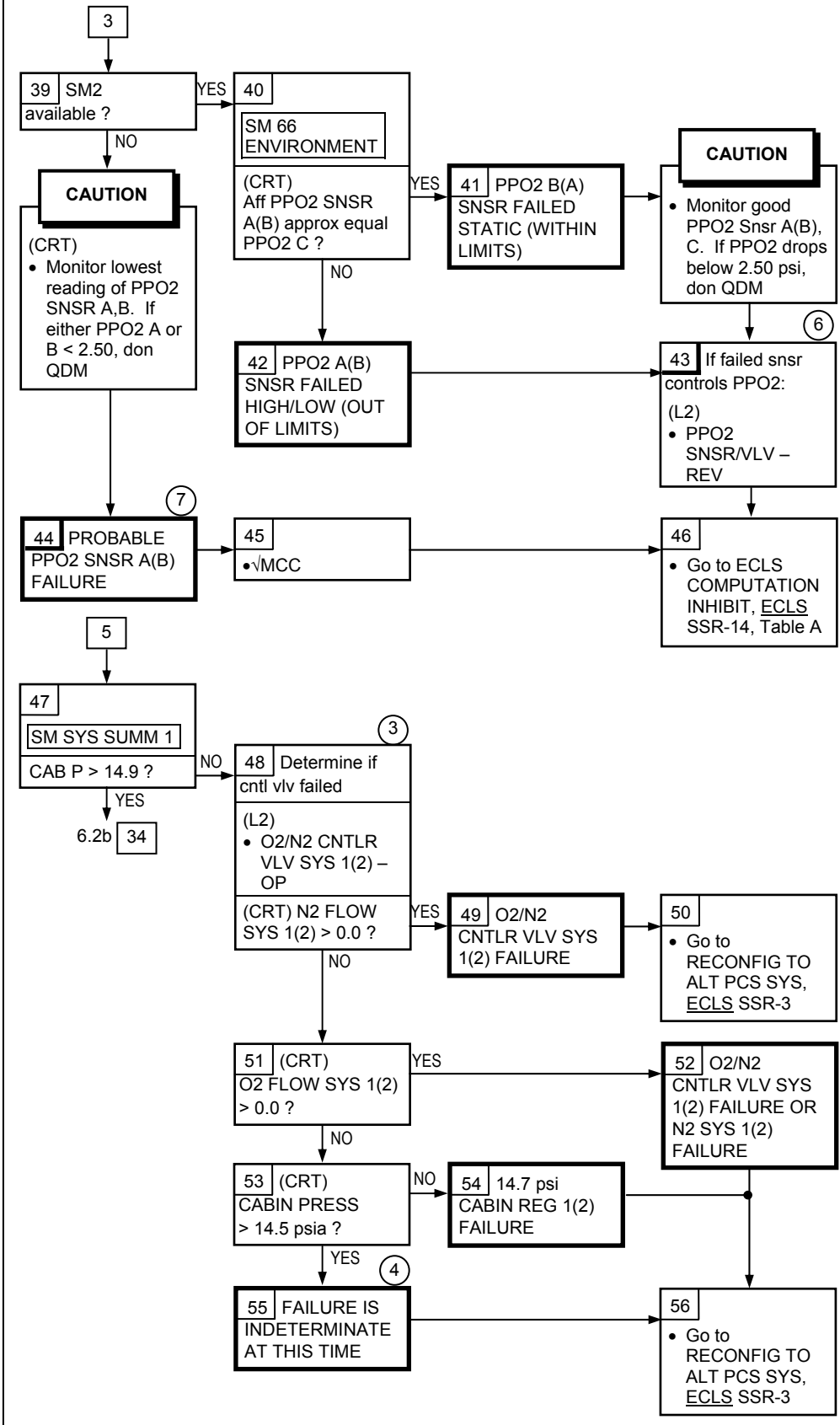
③ O2/N2 CNTLR VLV flows N2 in OP position, and O2 in CL position

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 CNTL 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 ↑↓

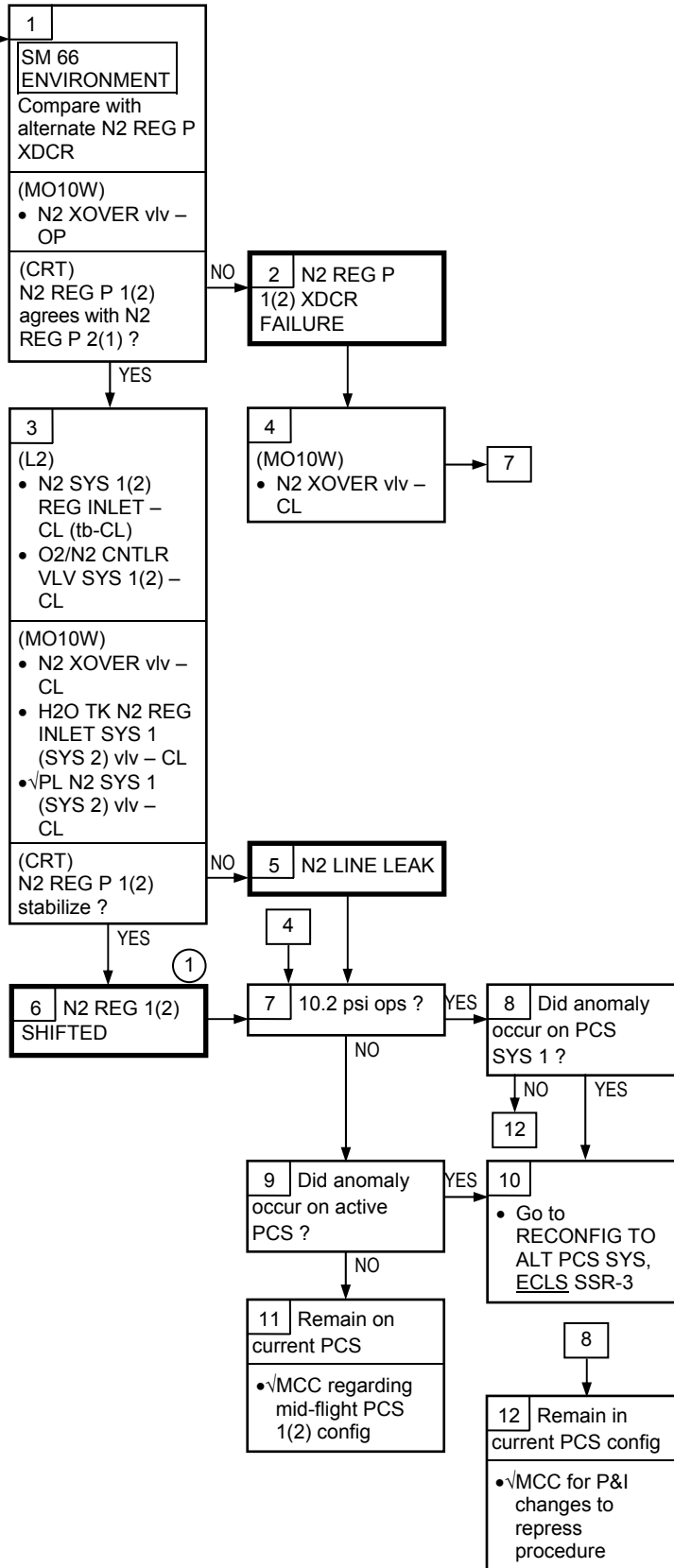
① If PL N2 line in use, √MCC for further isolation

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

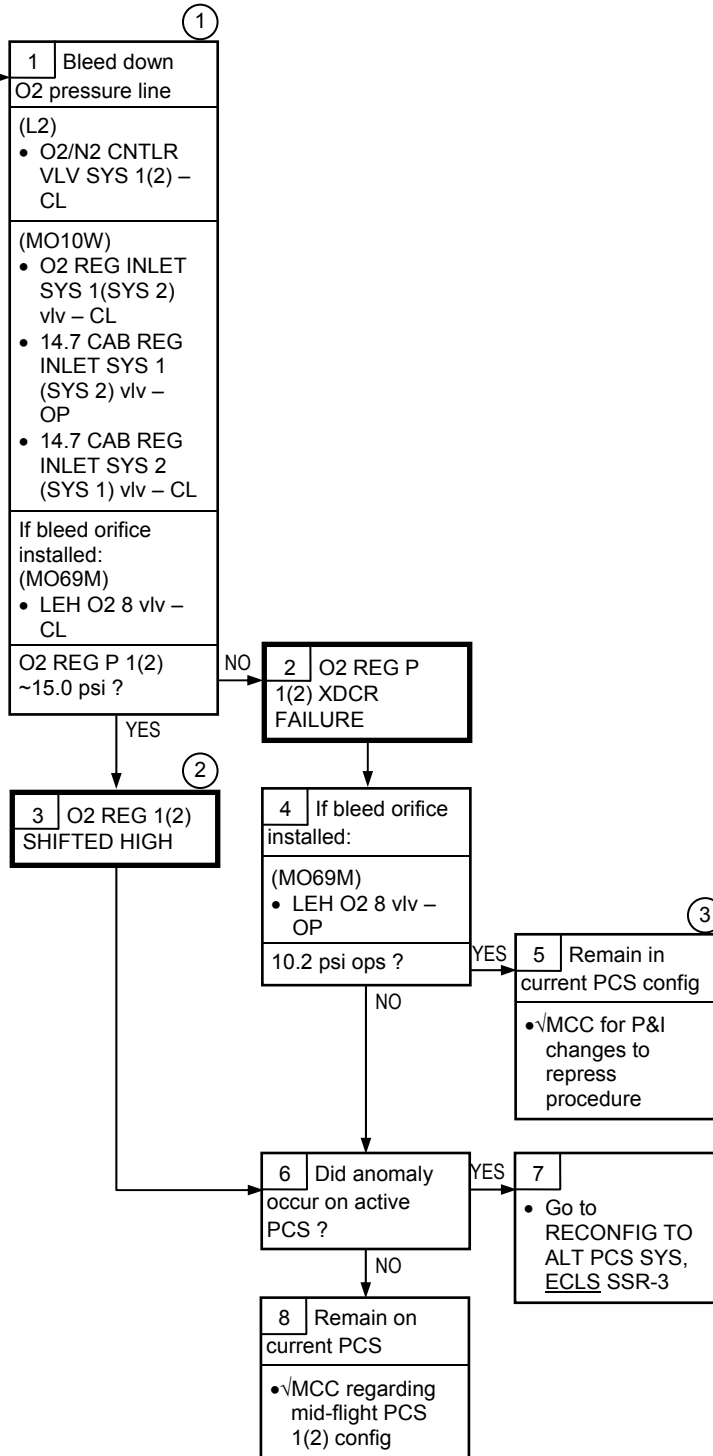
6.2e O2 REG P ↑

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

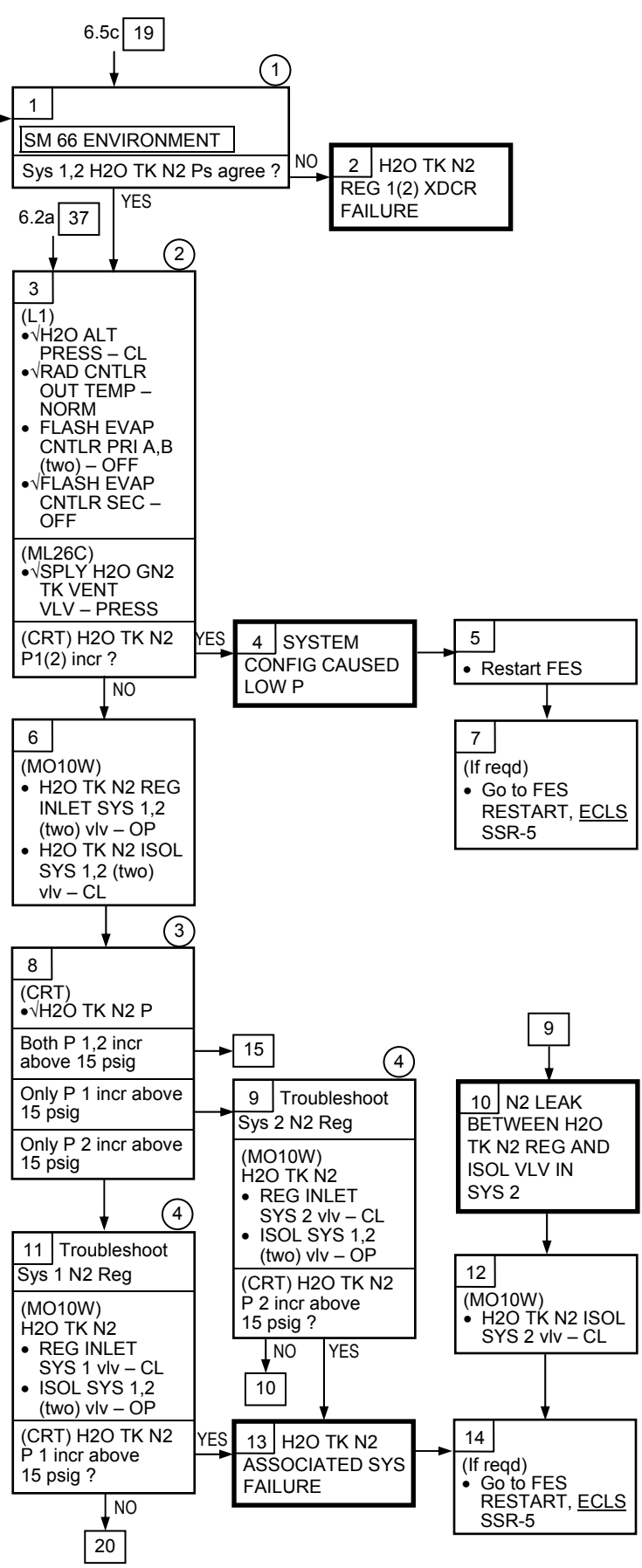
6.2i H2O TK N2 P ↓

SM ALERT

S66 CAB H2O N2 P 1(2)

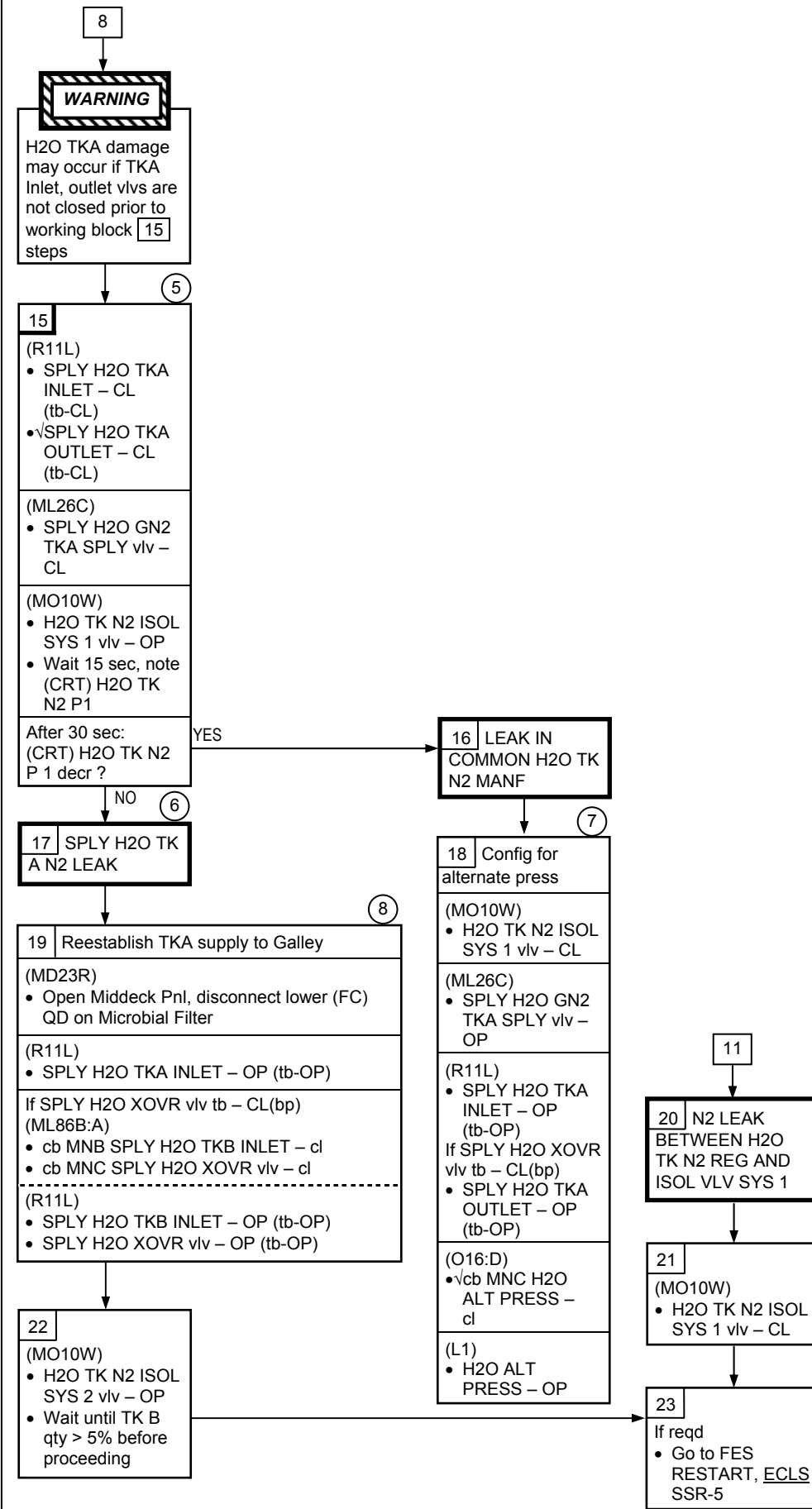
H2O TK N2 P 1(2) < 13.0 psig

Nominal Config:
(ORBIT)
Refer to 6.2a



- 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)

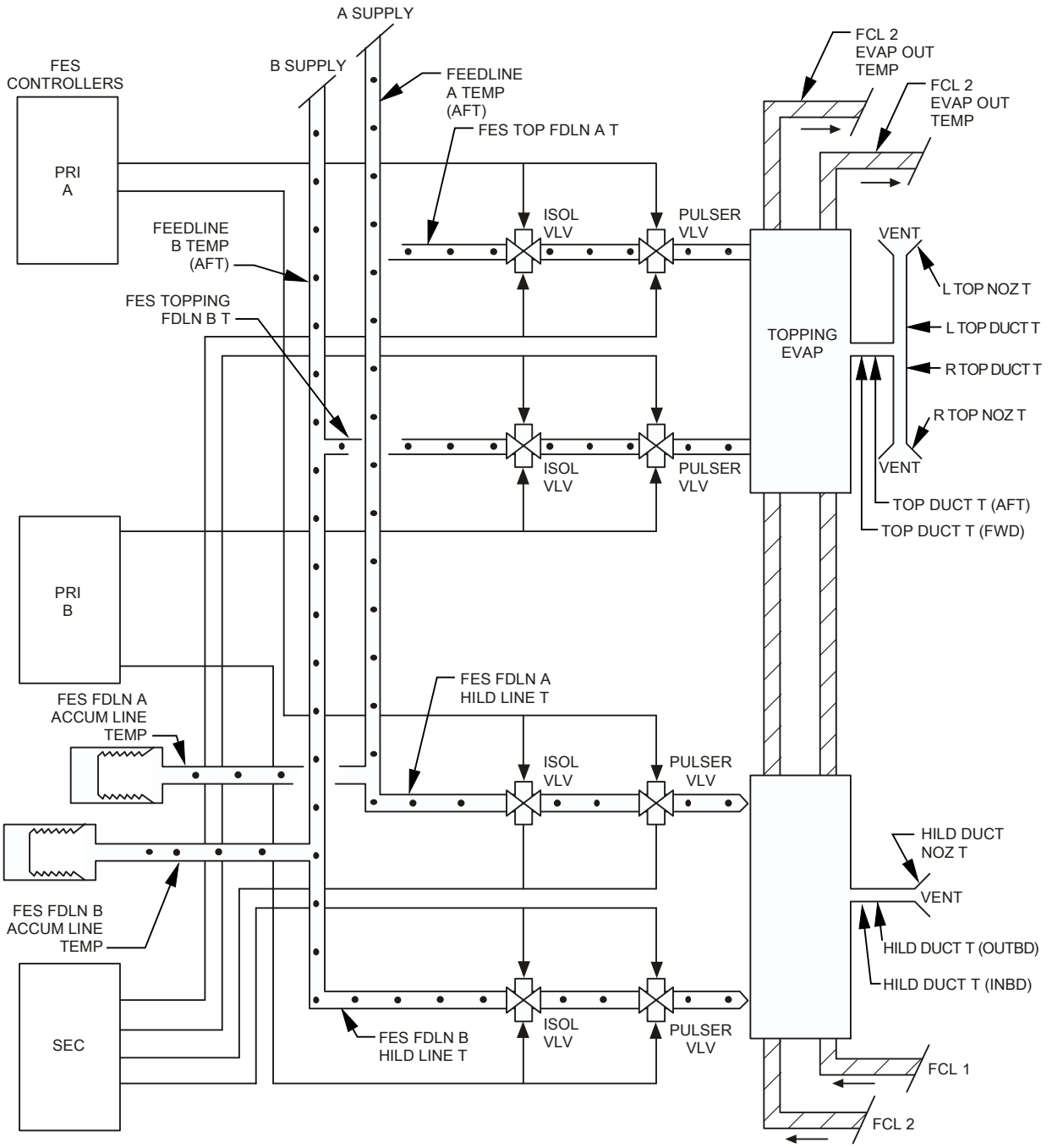


⑤ Repressurization of H2O tanks (except TK A) will cause H2O TK N2 P1 to decrease initially. If no leak in the common manifold is present, the H2O TK N2 P1 will increase until it stabilizes at 15.5 to 17.0 psig

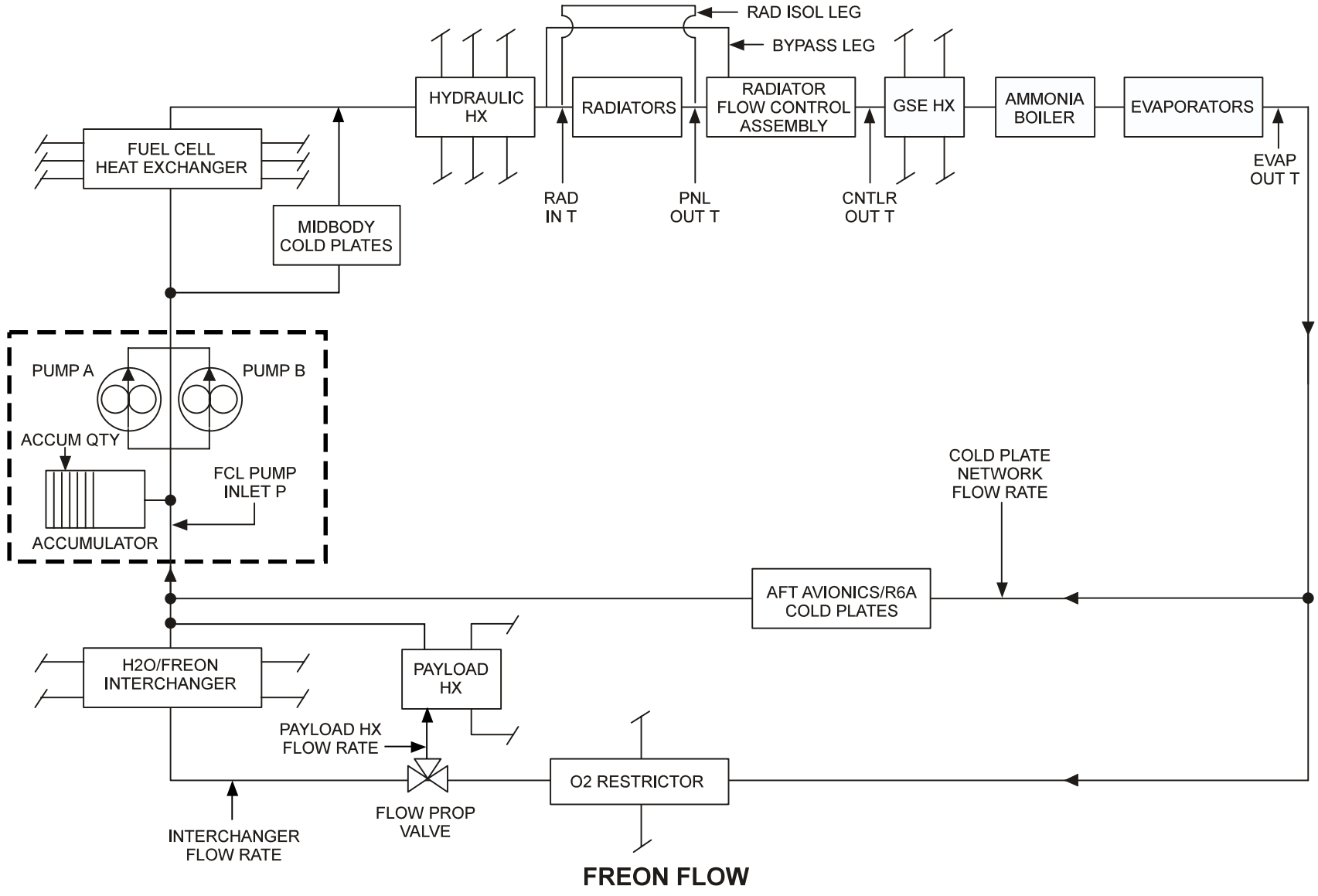
⑥ SPLY H2O dumps may need to be scheduled more frequently depending upon FLASH EVAP usage

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

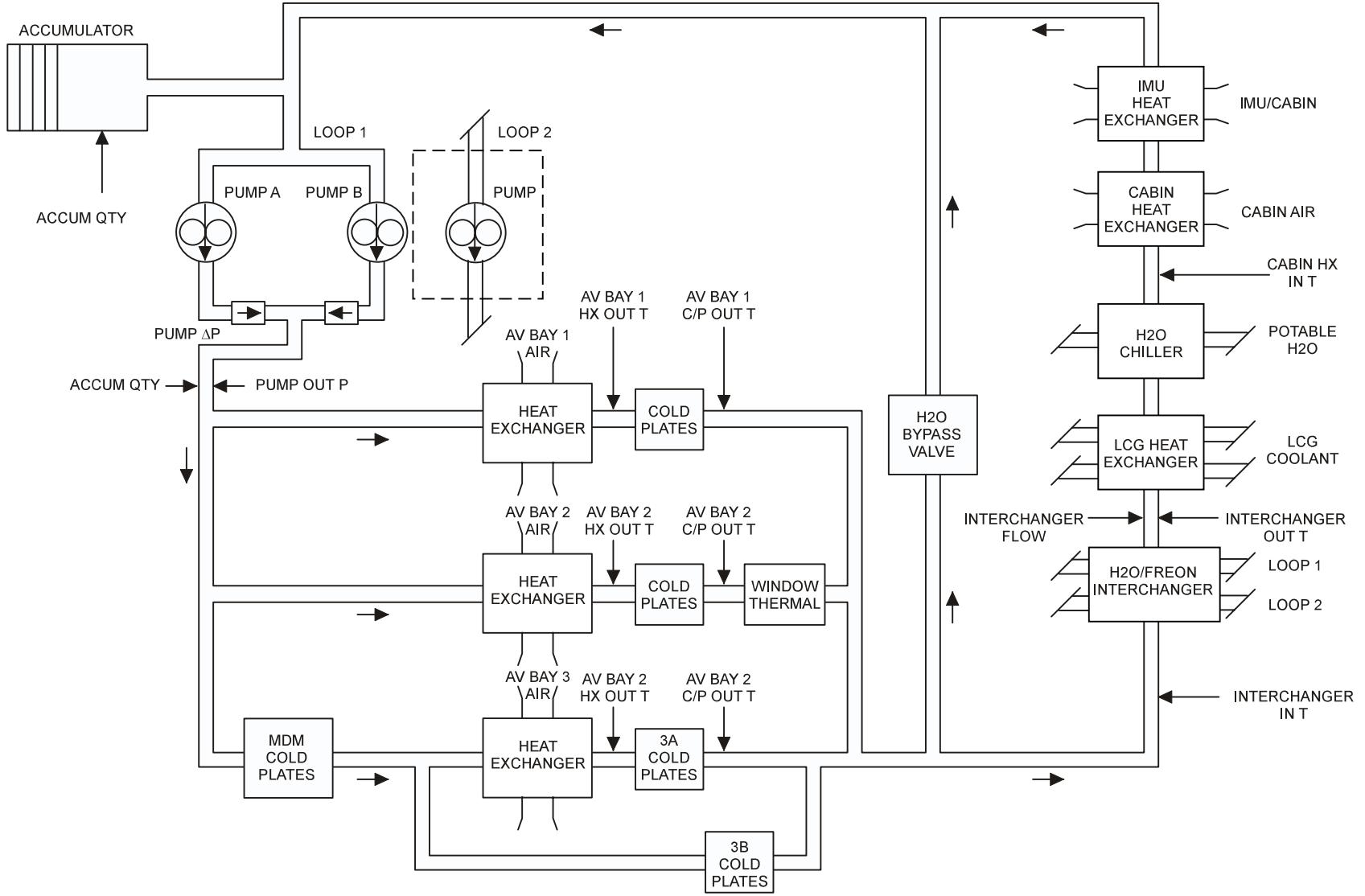
⑧ Allows utilization of TKA H2O. Only TKs B,C,D will fill FCP H2O. To fill TKA, QD must be remated



EVAPORATORS



FREON FLOW



H2O LOOPS

ECLS

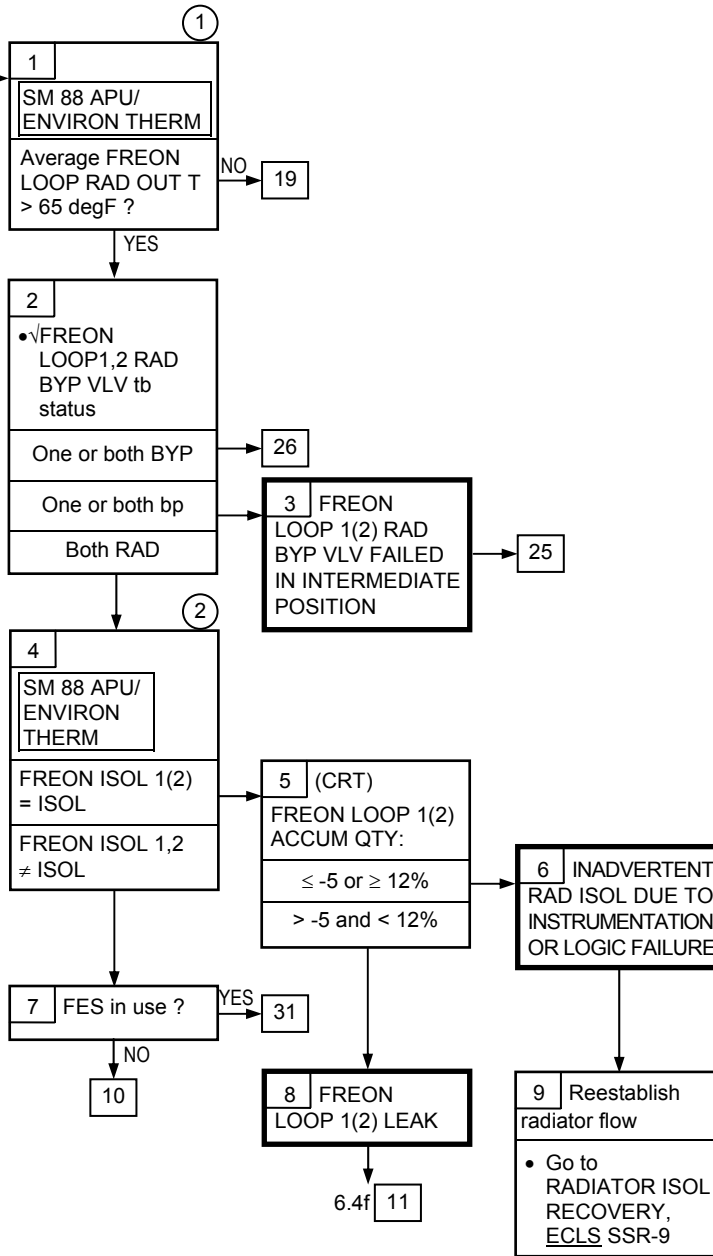
6.4a EVAP OUT T ↑↓

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

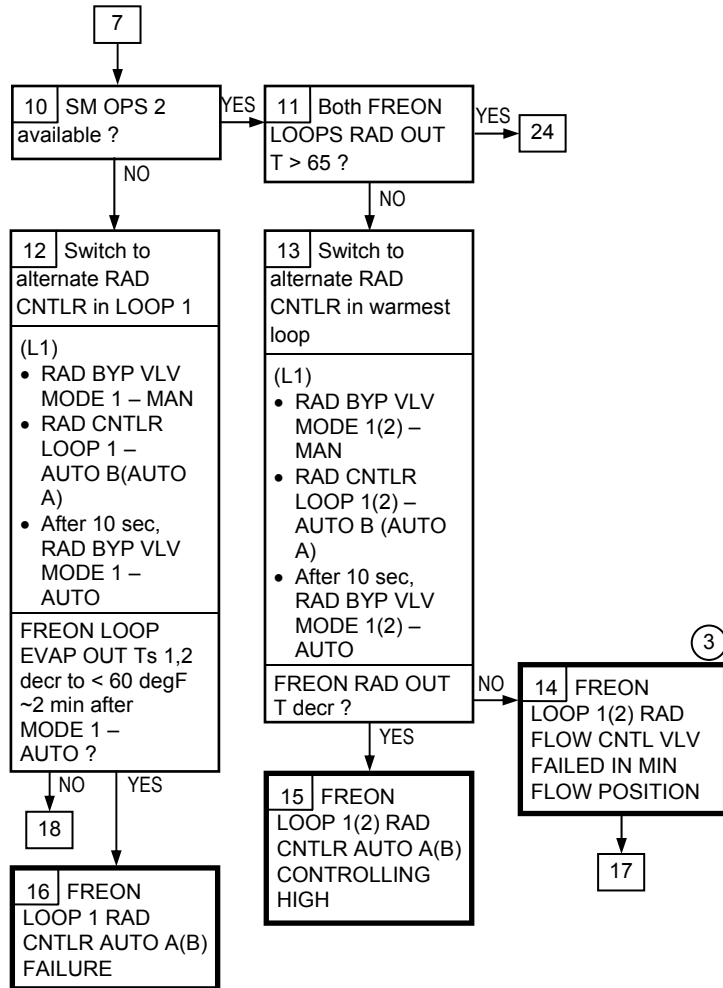
If payloads in use or crew comfort:

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:

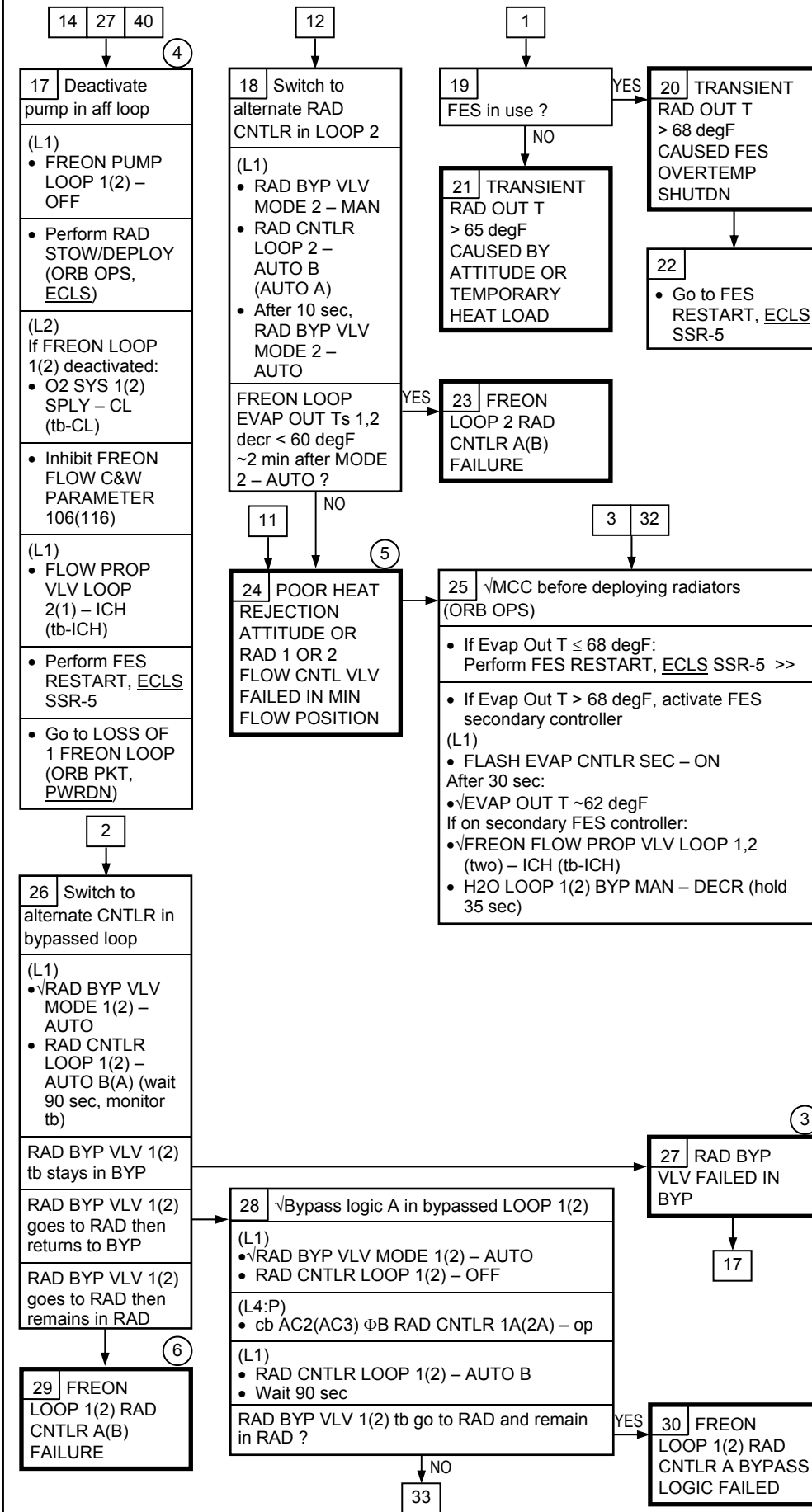
(L1)
HI LOAD EVAP –
ENA
HI LOAD EVA –
DUCT HTR – A(B)

ECLS 6.4a (Cont)

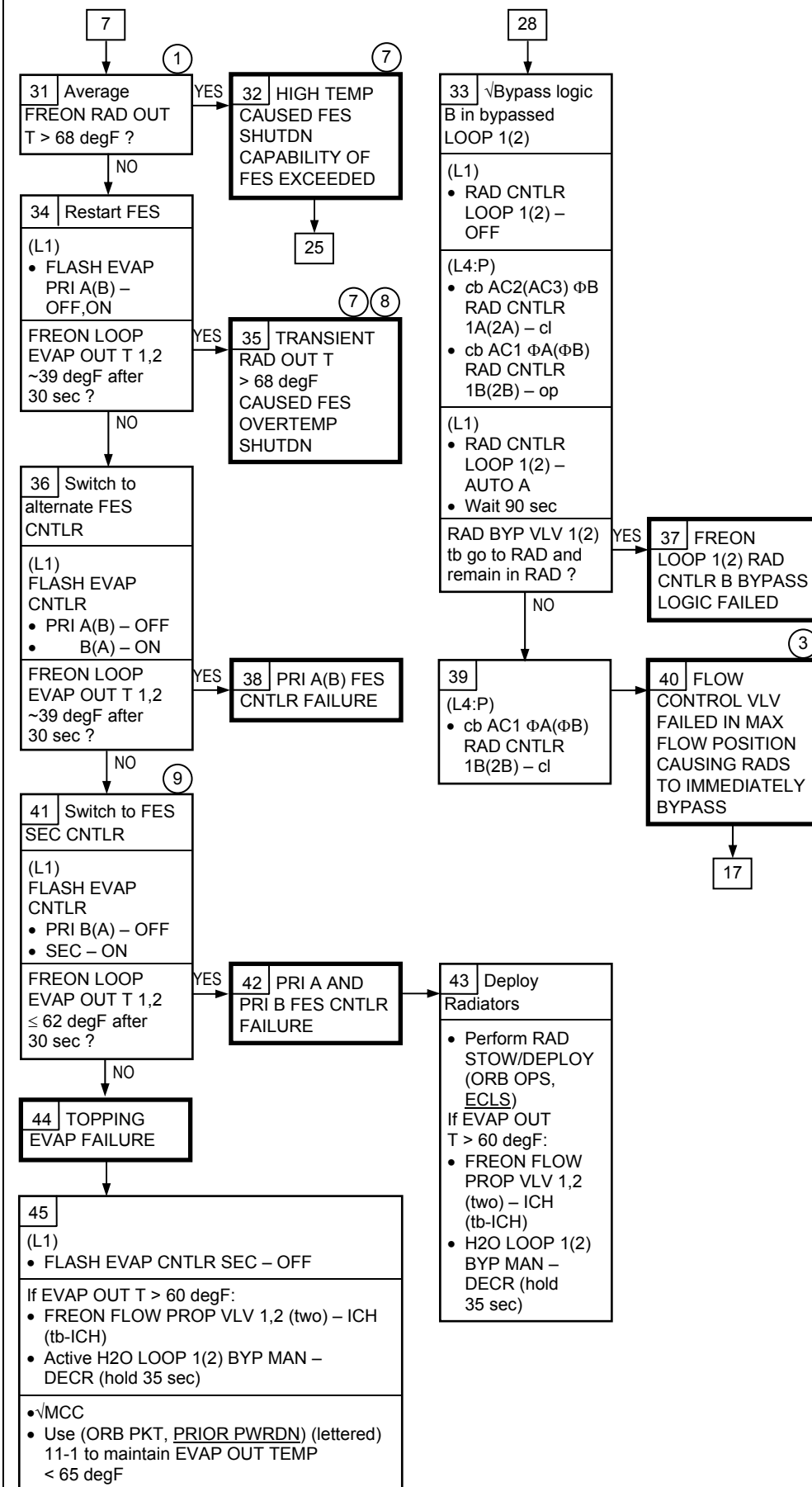


③ Loss of RFCA – Next PLS depending on H2O quantities

ECLS 6.4a (Cont)

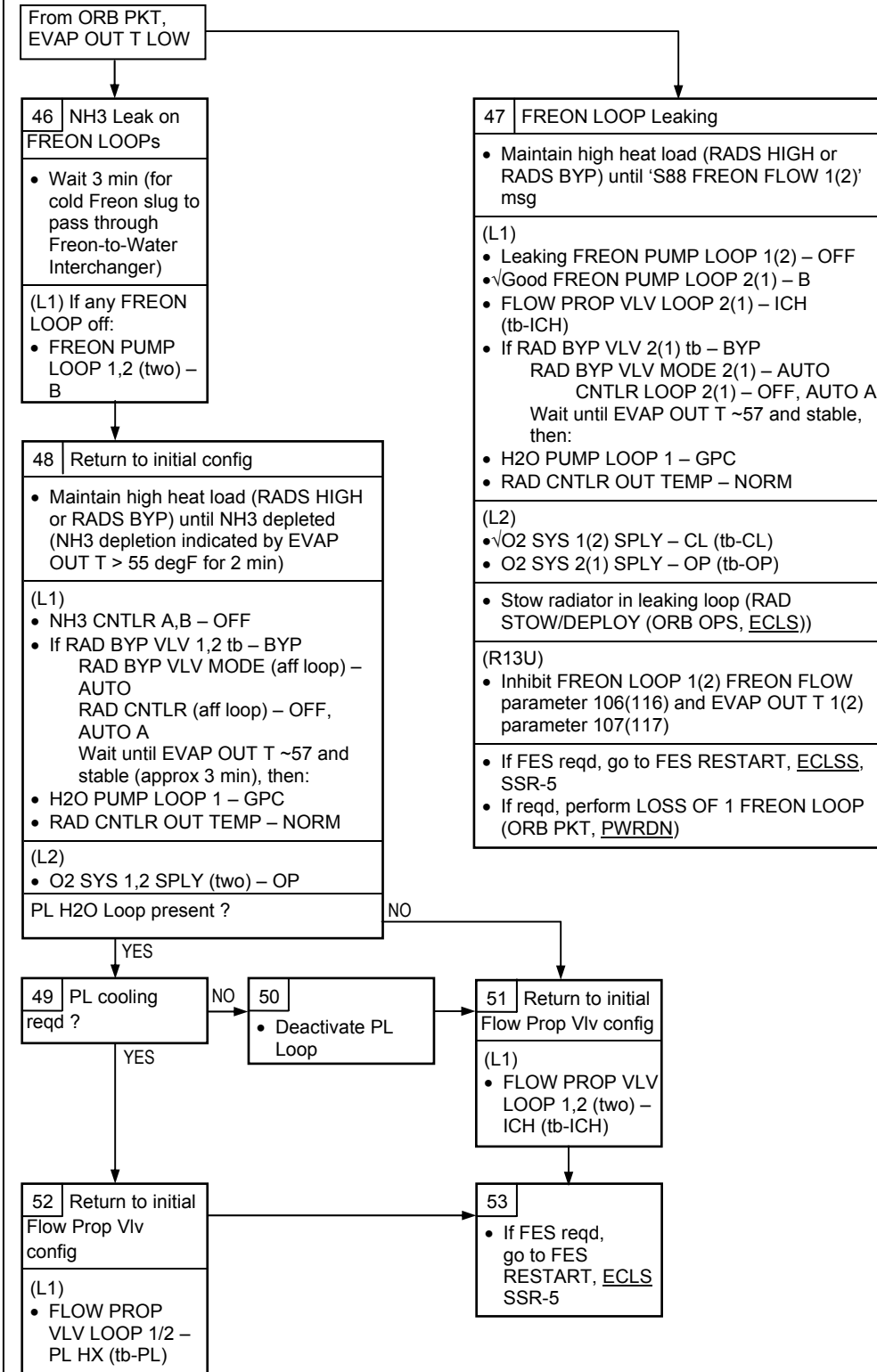


ECLS 6.4a (Cont)



- 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

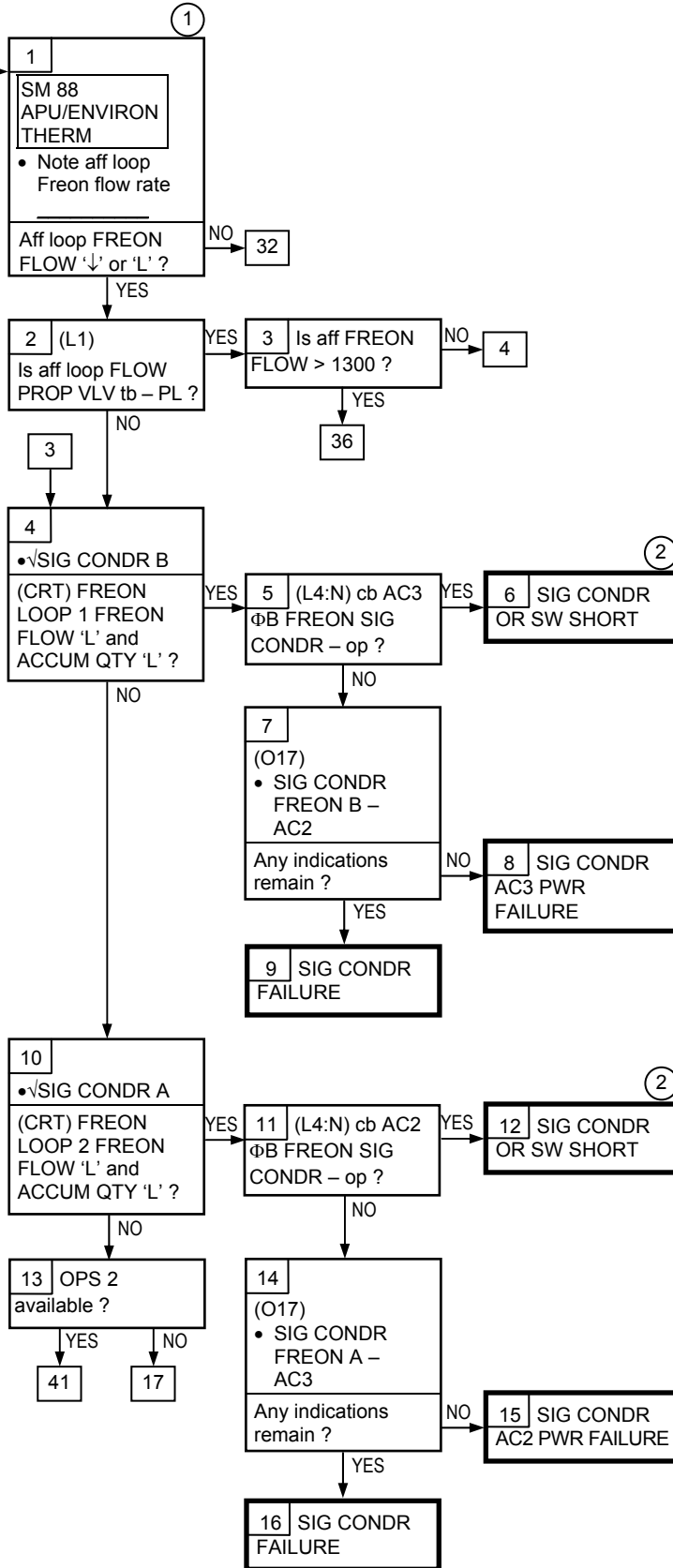
ECLS 6.4a (Cont)



ECLS

6.4b FREON FLOW LOW

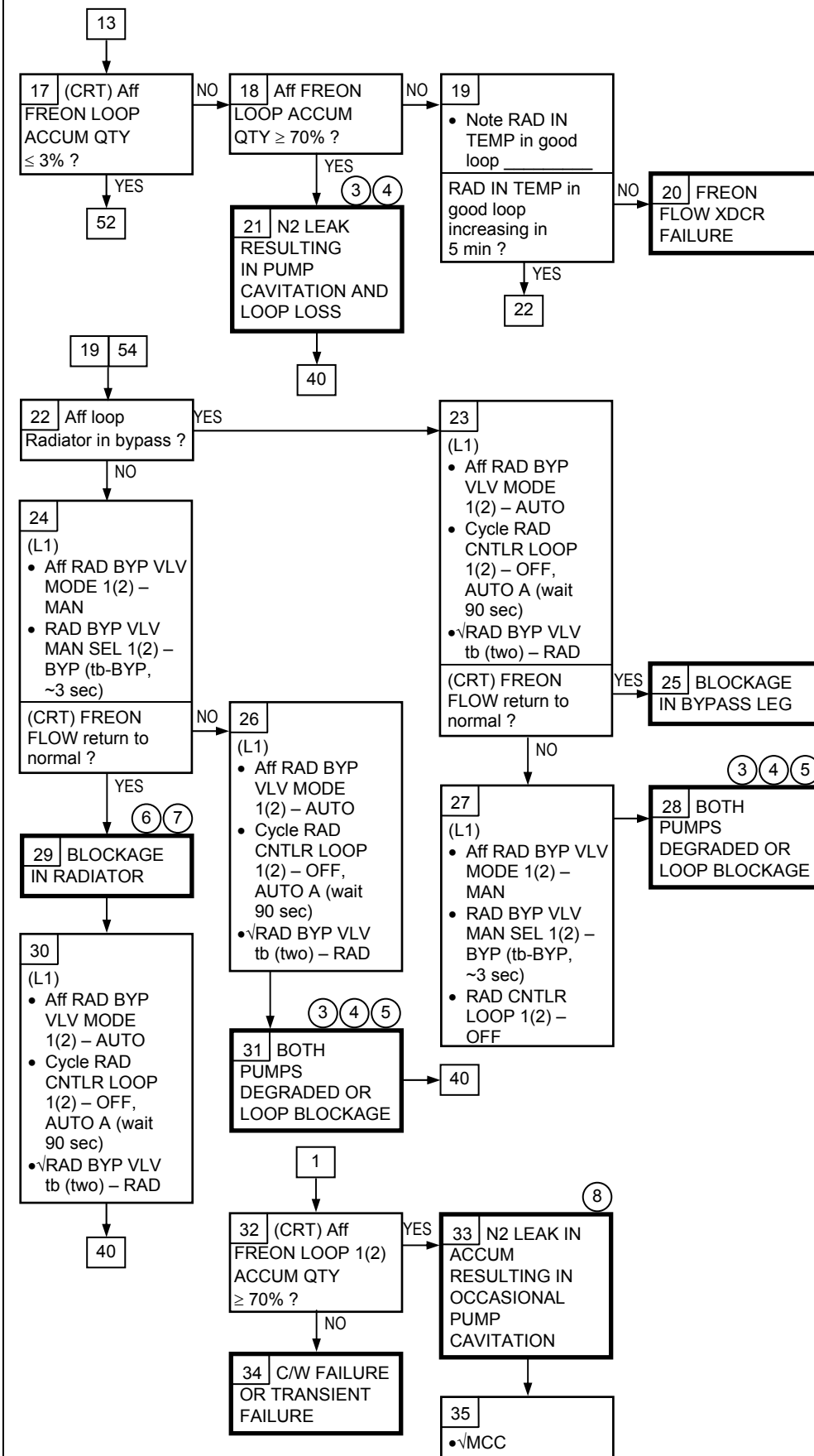
From ORB PKT,
FREON FLOW
LOW



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

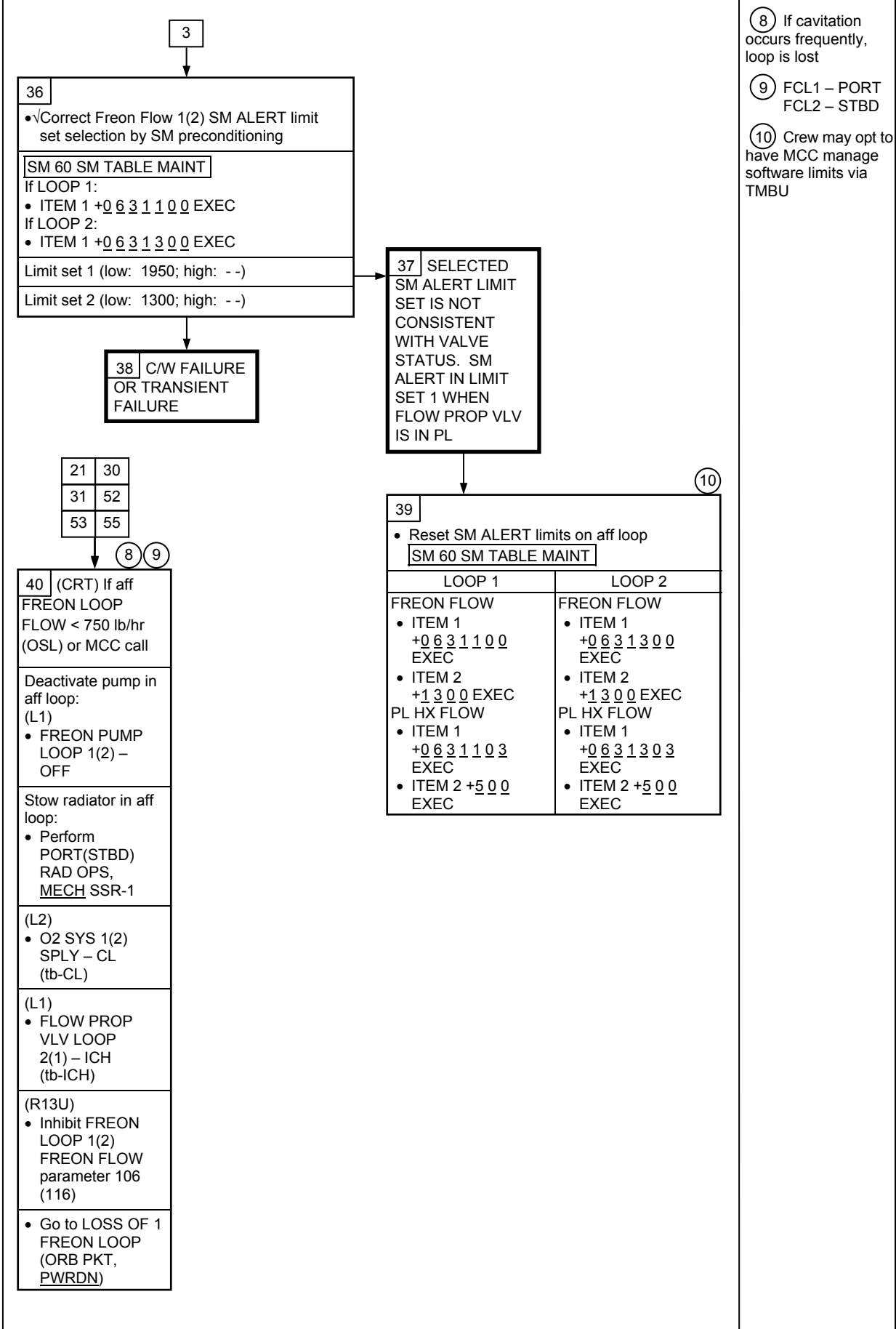
② Do not operate FREON SIG CONDR sw(s) on pnl O17 before √MCC

ECLS 6.4b (Cont)



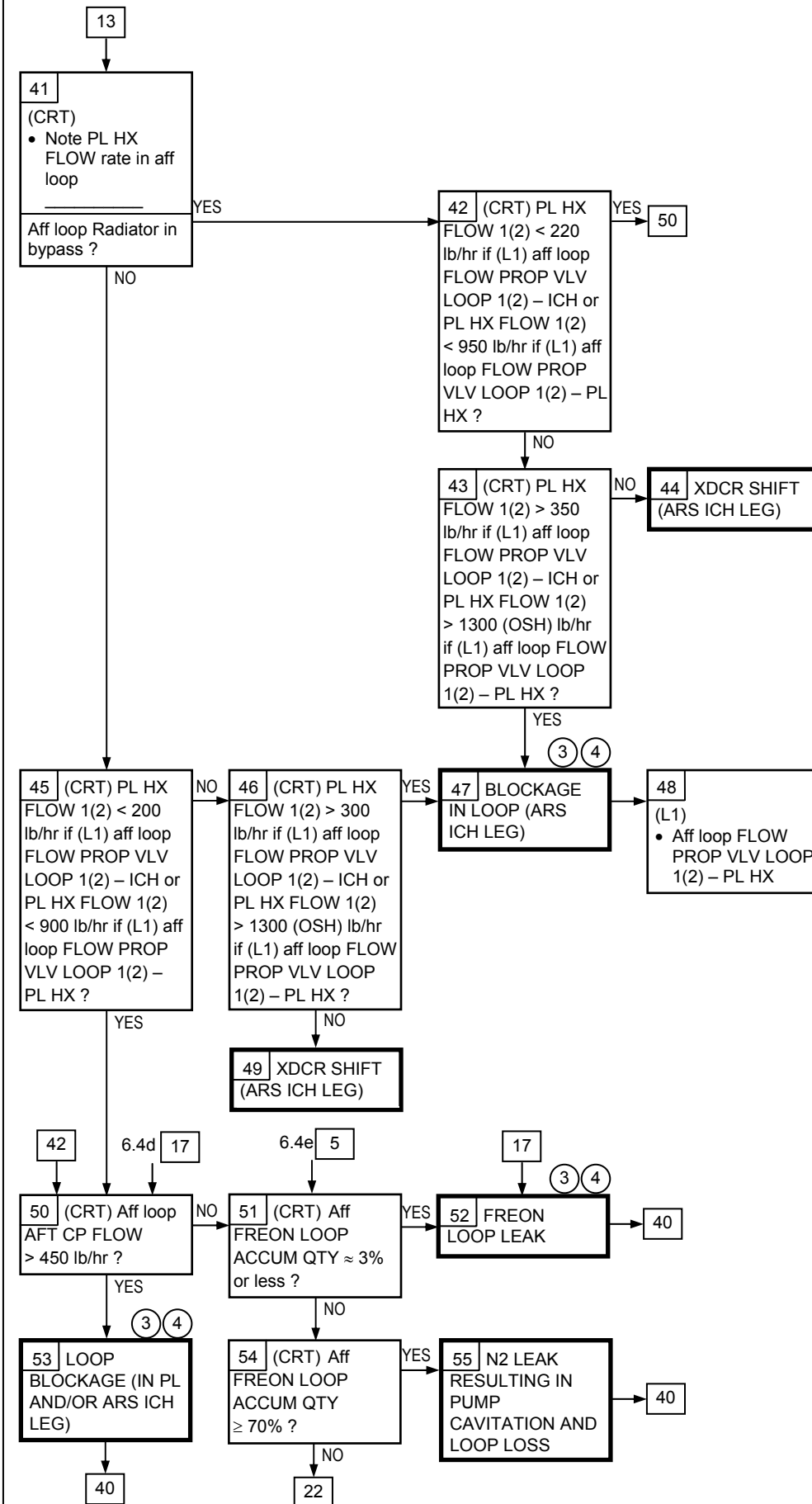
- ③ Pwrn of some equipment may be reqd depending on heat load
- ④ Loss of Freon Loop next PLS entry
- ⑤ √MCC to determine failure
- ⑥ With blockage in radiator, RADS may be manually bypassed to incr loop's flow in the event of loss of other FCL
- ⑦ If blockage in radiator deactivates Freon Loop, RADS 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 Pwrn of some equipment may be reqd depending on heat load

④ Loss of Freon Loop next PLS entry

ECLS

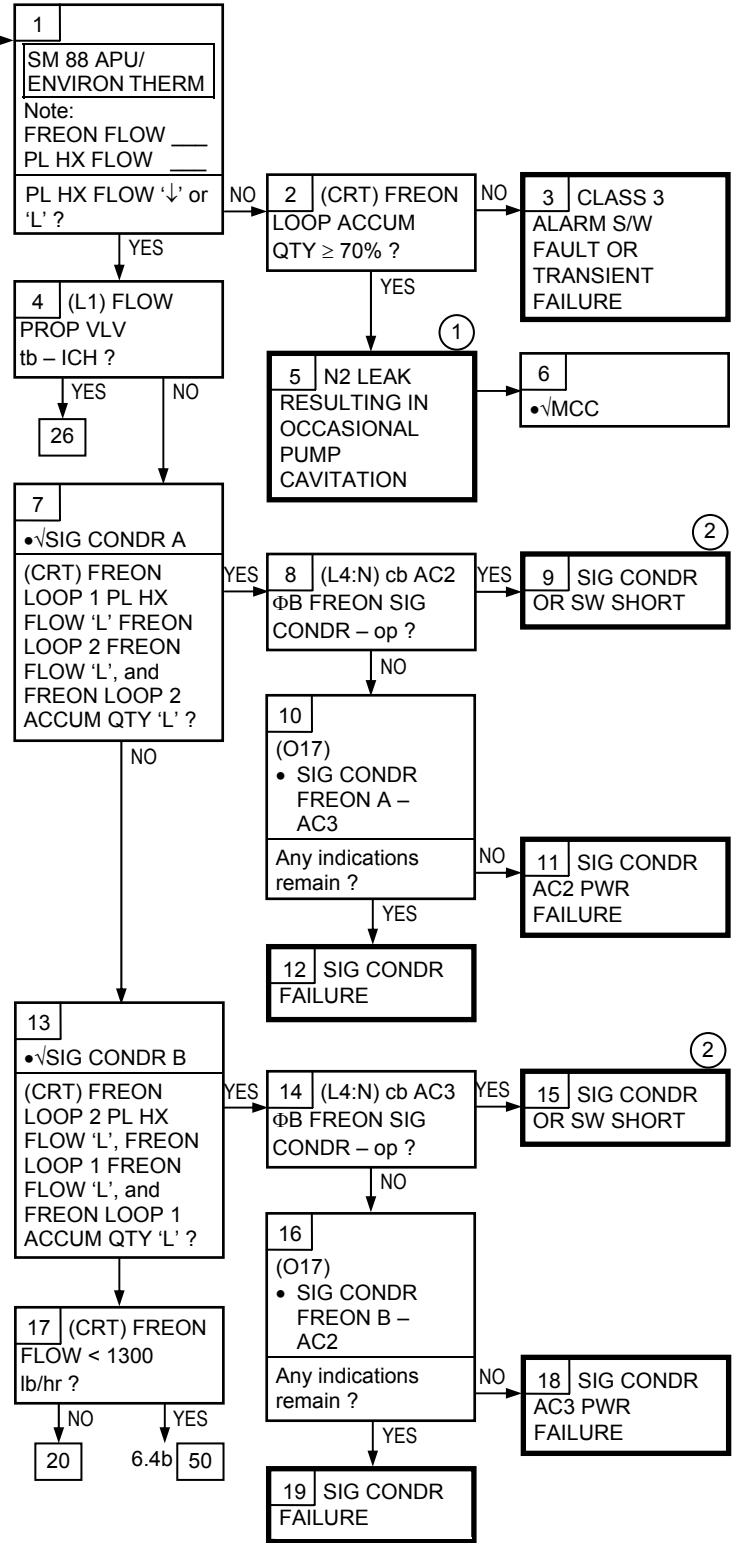
**6.4d FRN FLOW PROP VLV
PL HX FLOW ↓**

SM
ALERT

S88 FRN PL HX
1(2)

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

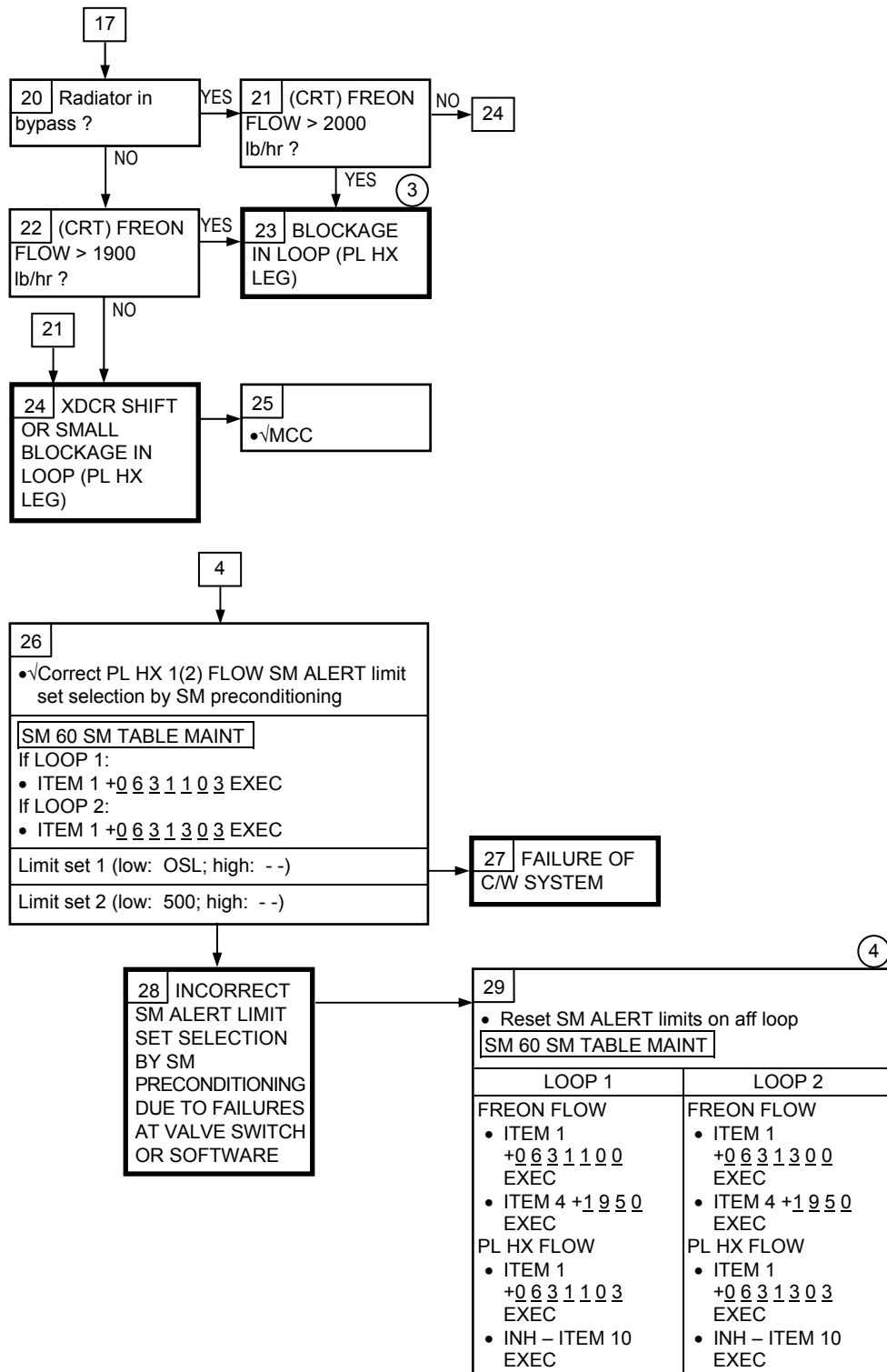
With FLOW PROP
VLV – ICH
PL HX FLOW is
TMBU – OSL



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

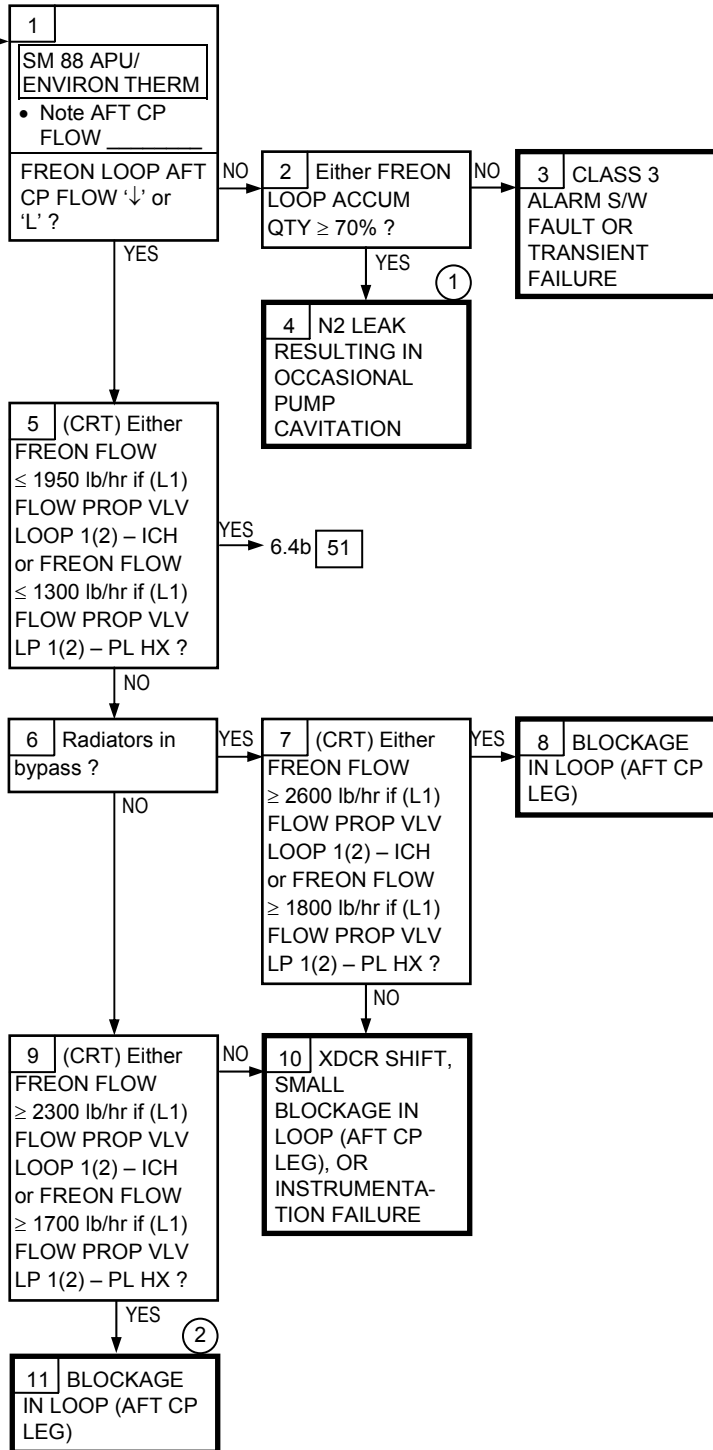
ECLS

6.4e AFT COLDPLATE FLOW ↓

SM
ALERT

S88 FRN AFT
CP 1(2)

AFT CP FLOW
< 200 lb/hr



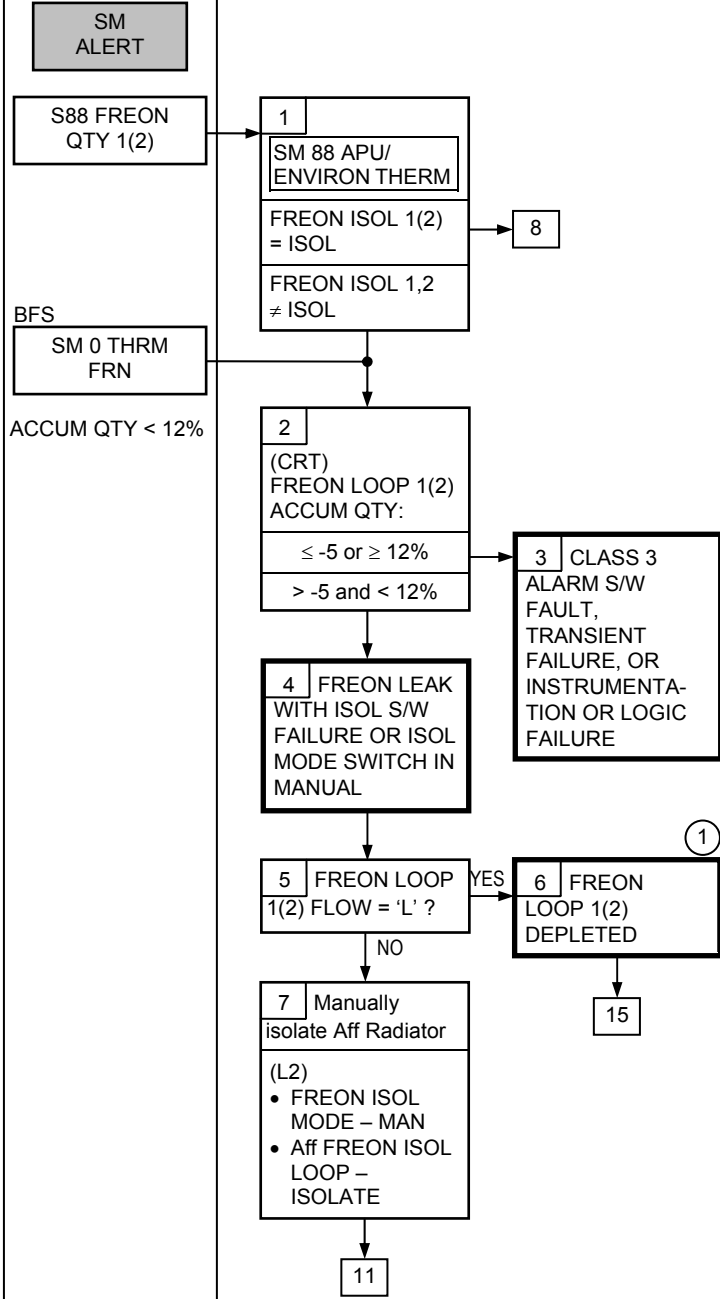
① N2 leak across FCL ACCUM bellows. Frequent cavitation = loop lost

② Loss of FCL definition next PLS entry

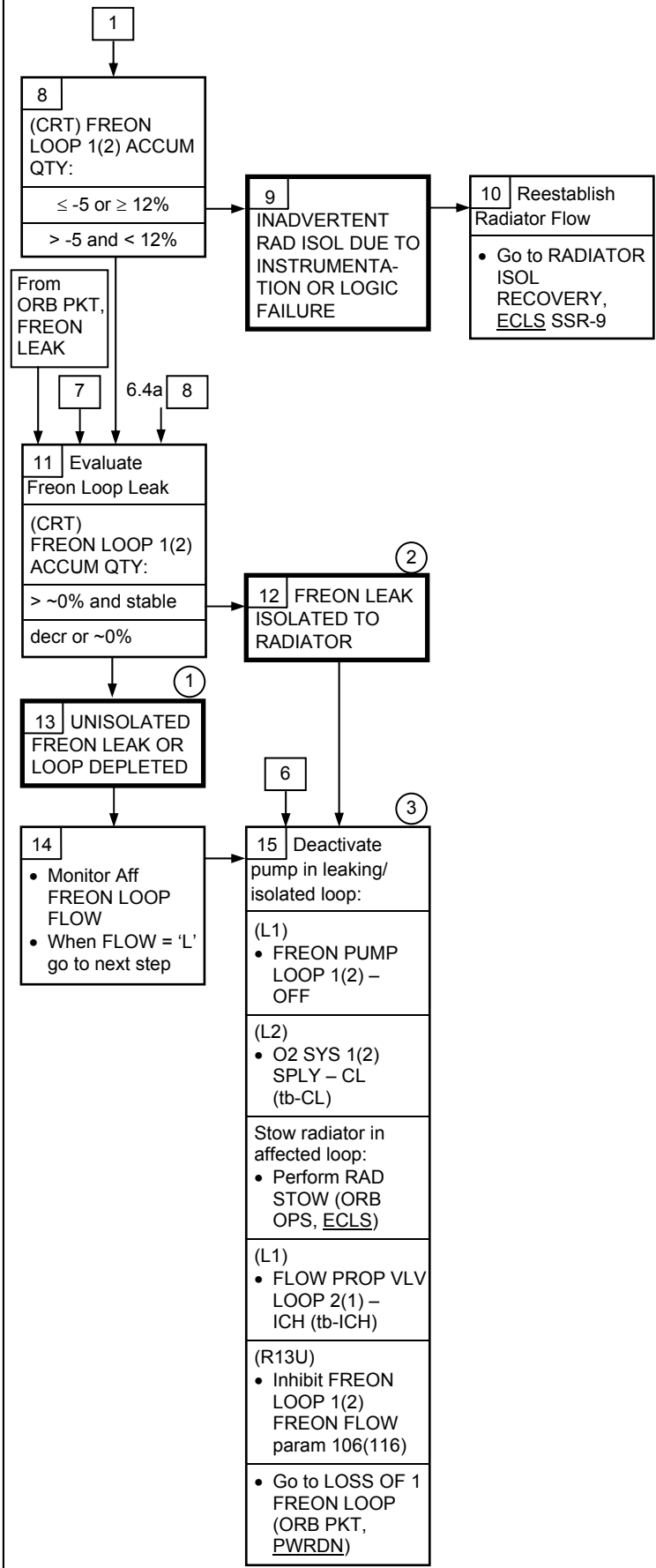
ECLS

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

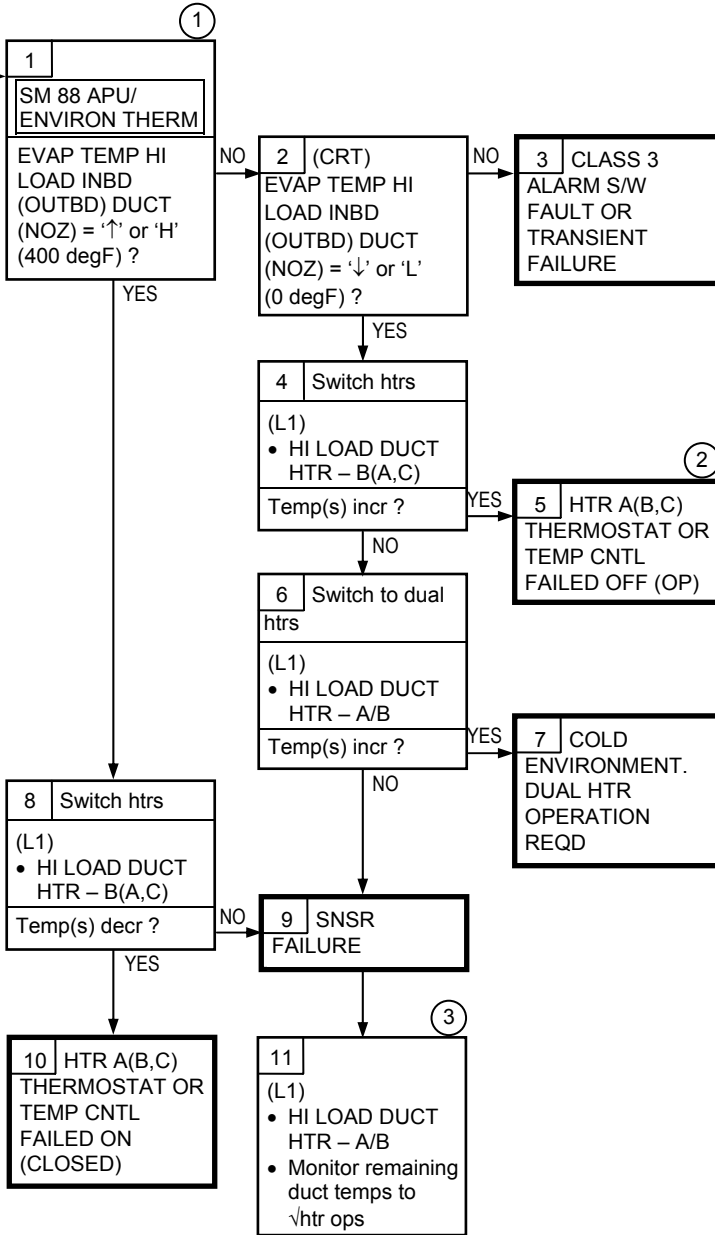
S88 EVAP HI LD TEMP

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

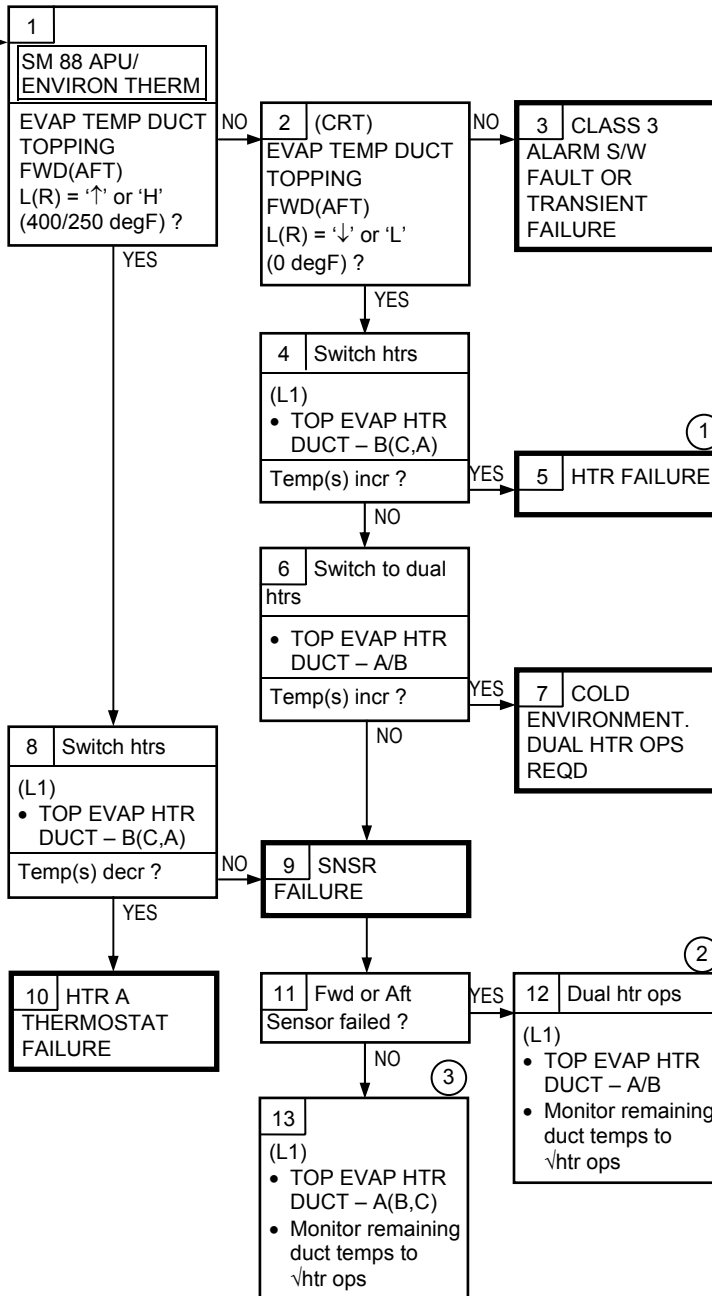
SM 0 THRM EVAP

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 ↑↓

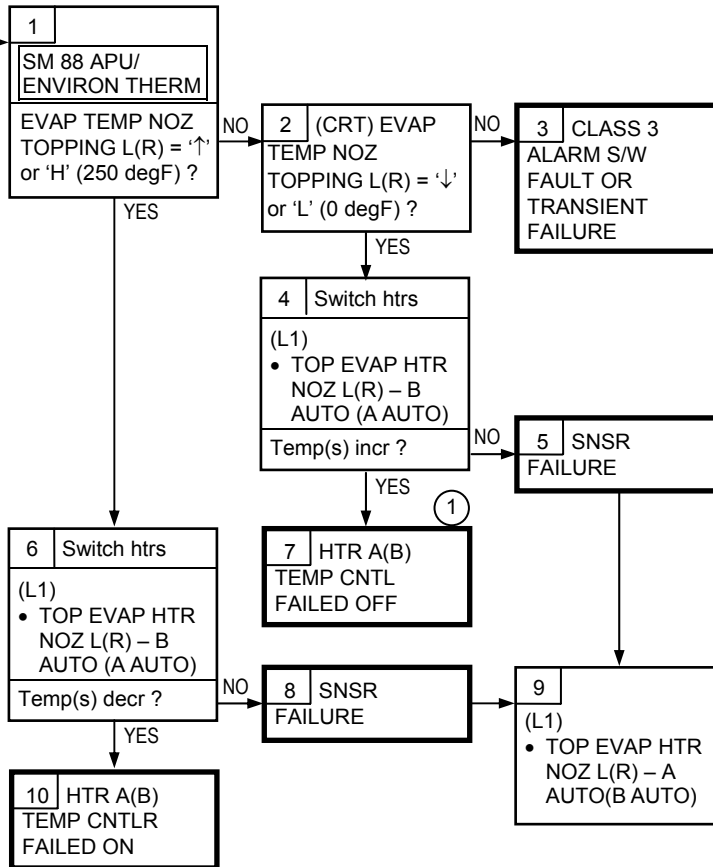
SM ALERT

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)

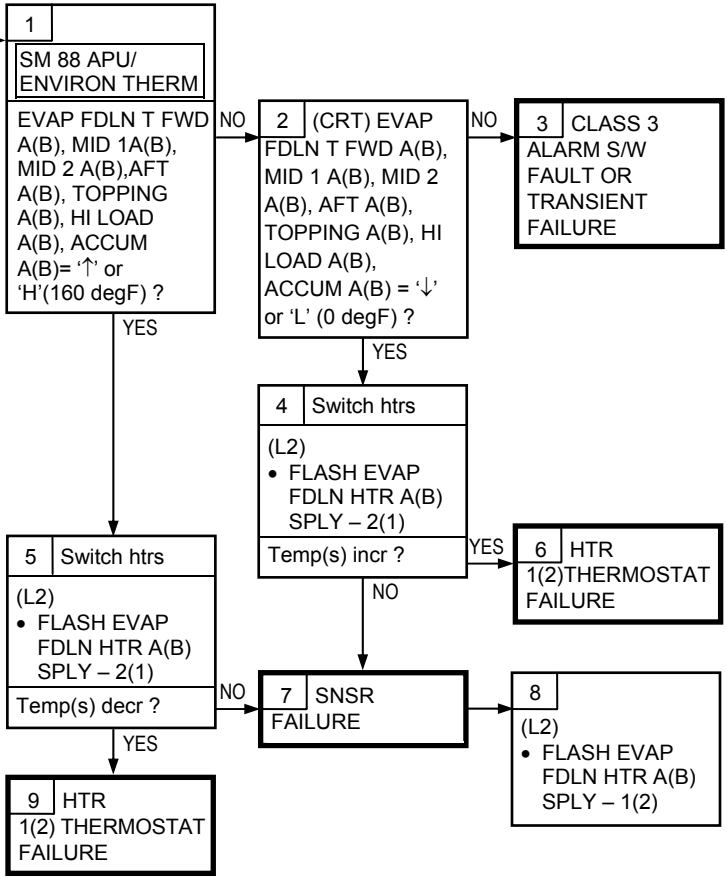
BFS
SM 0 THRM
EVAP

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

6.41 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

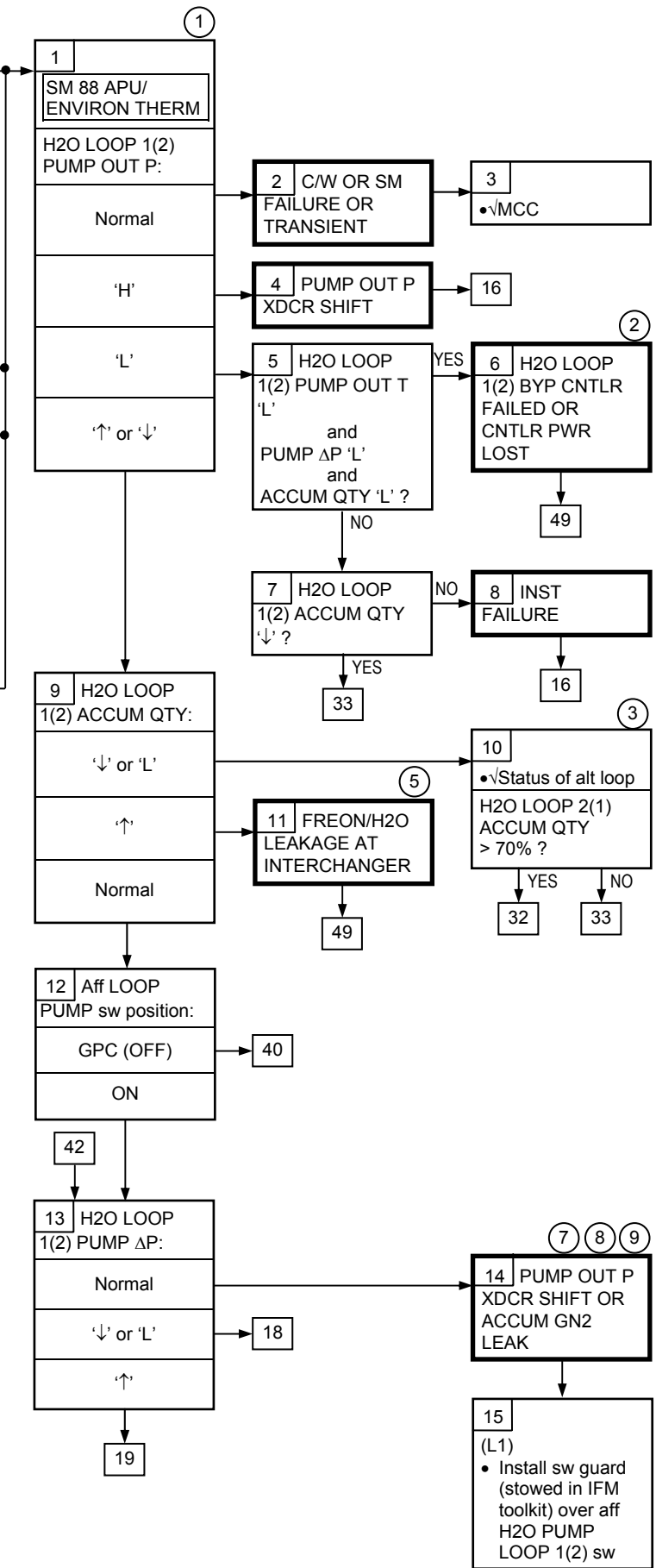
S88 H2O PUMP P 1(2)

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

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

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

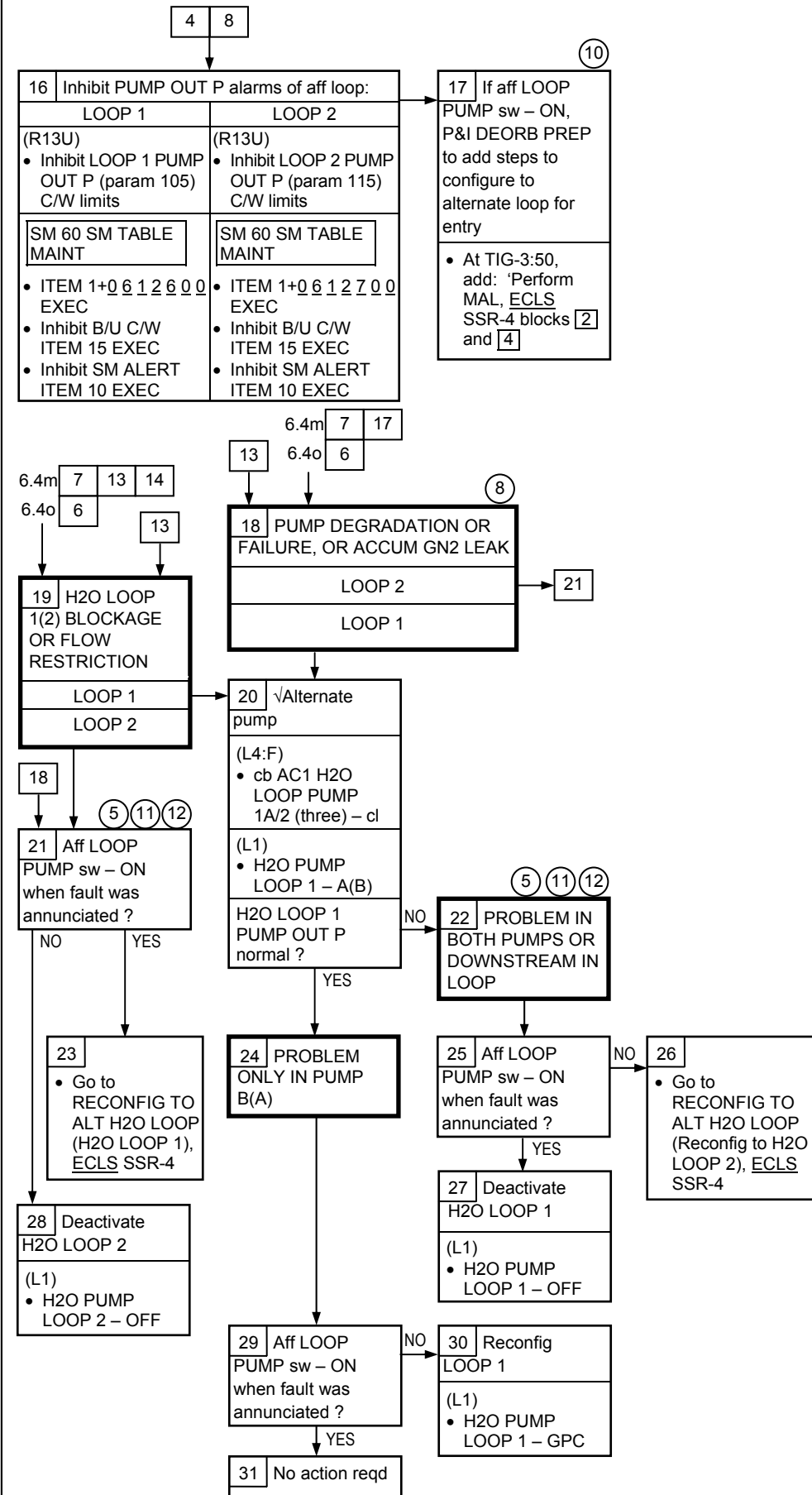
(Cont in notes column)



- ① Meter on pnl O1 is alternate readout source
- ② √MCC about reset cb
- ③ Normal accum quantities are about 45, 55 for H2O PUMP 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
- ⑨ Do not deactivate loop with potential GN2 LK. Loop may not restart

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

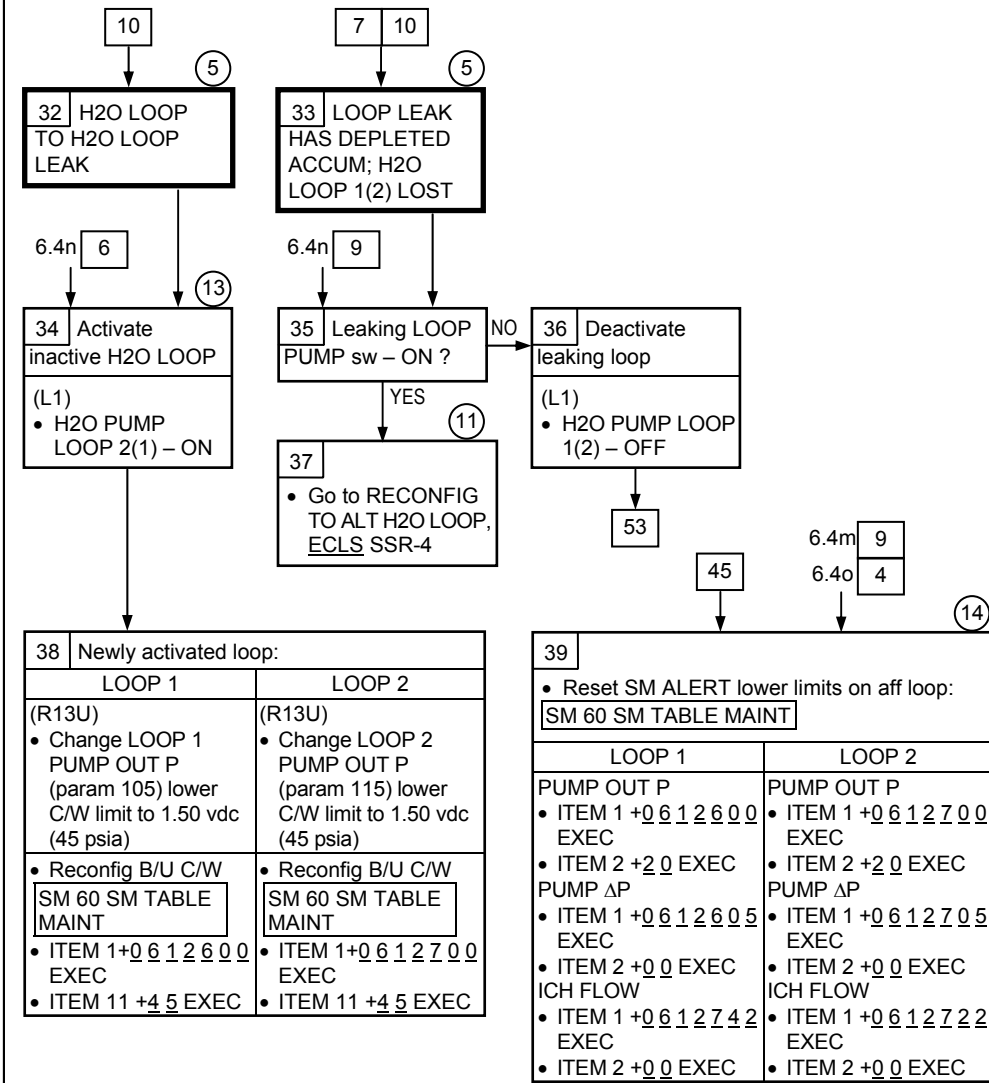
⑧ If repeated occurrence (same loop), √MCC for possibilities of ruptured bellows causing GN2 precharge and H2O to mix, or stuck bellows

⑩ Only PUMP OUT P is available on board while in BFS

⑪ If both loops are failed:
(L1)
H2O PUMP LOOP 1,2 – OFF, then go to LOSS OF 2 H2O LOOPS (ORB PKT, PWRDN)

⑫ 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

⑪ If both loops are failed:
(L1)
H2O PUMP LOOP 1,2 – OFF, then go to LOSS OF 2 H2O LOOPS (ORB PKT, PWRDN)

⑬ Operation of both H2O loops will prevent loss of H2O to alt loop

⑭ Crew may opt to have MCC manage software limits via TMBU

ECLS

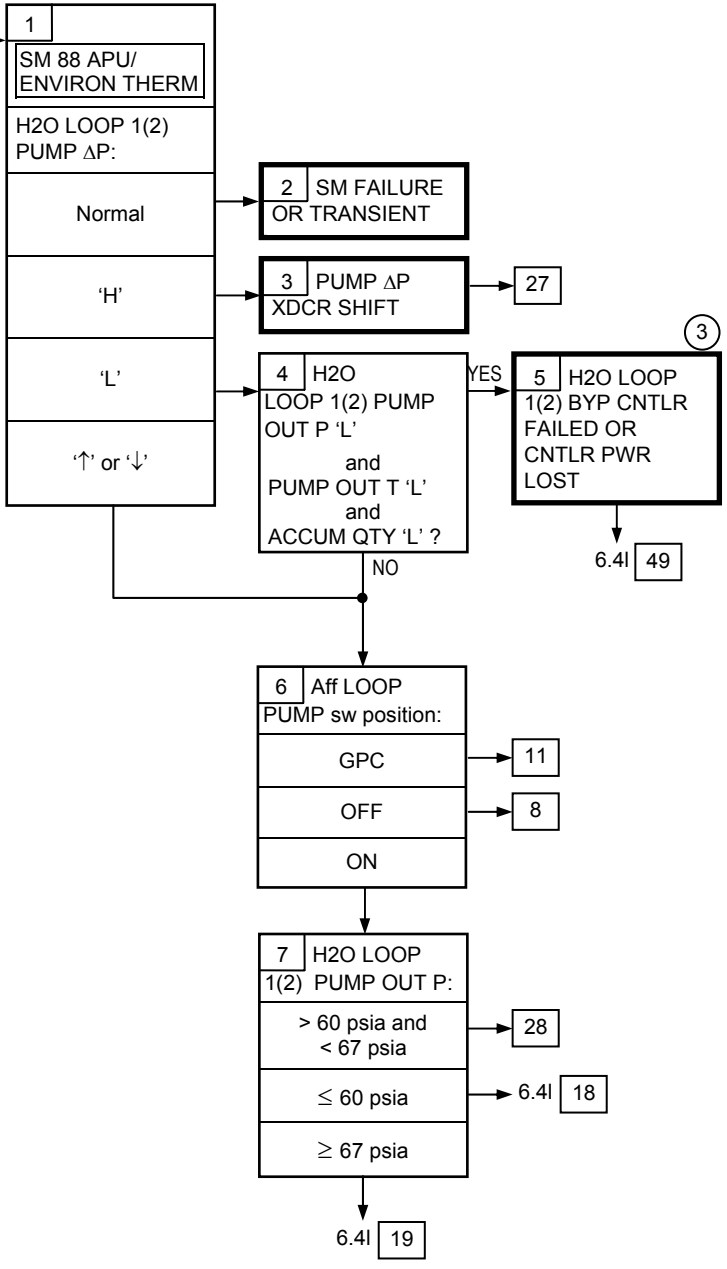
6.4m H2O PUMP ΔP 1(2) ↑↓

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

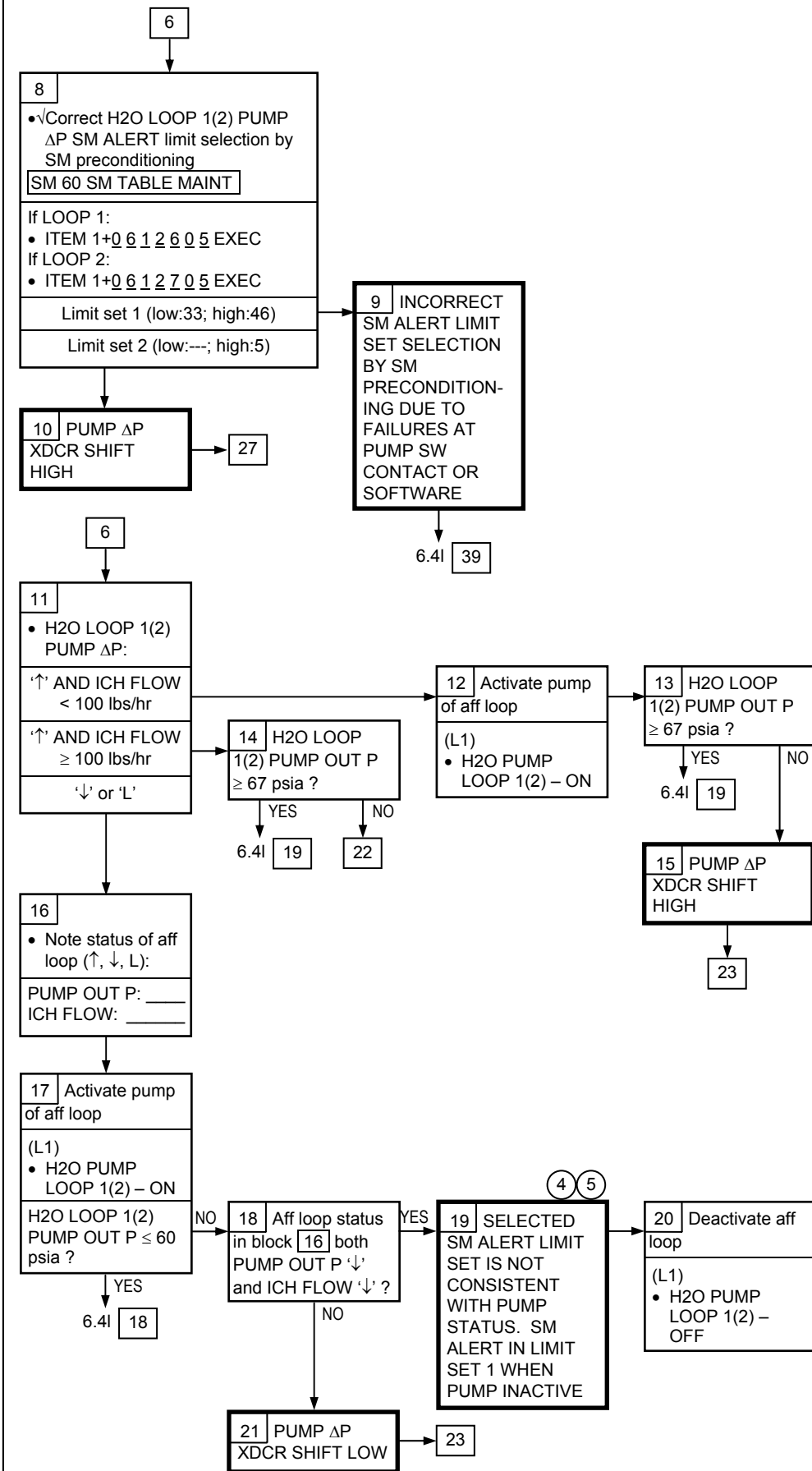


(1) Preconditioning will select this limit set if (L1) H2O PUMP LOOP 1(2) – ON, or H2O PUMP LOOP 1(2) – GPC and GPC – ON signal present

(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

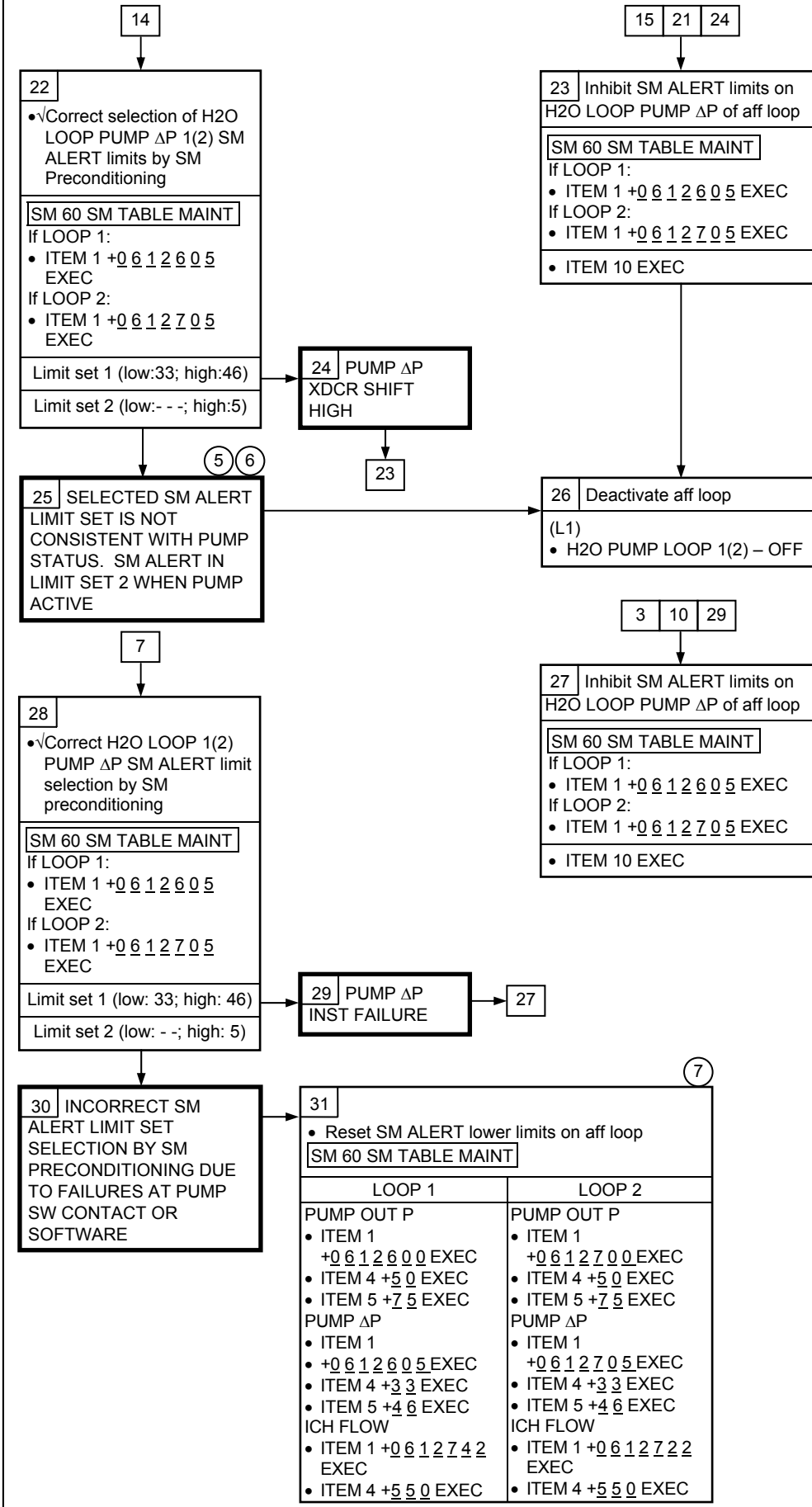
ECLS 6.4m (Cont)



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 6.4m (Cont)



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

⑥ Possible causes: PL-MDM failure causing pump failed on at GPC PUMP – ON cmd termination; or SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM ALERT limits

⑦ Crew may opt to have MCC manage software limit via TMBU

ECLS

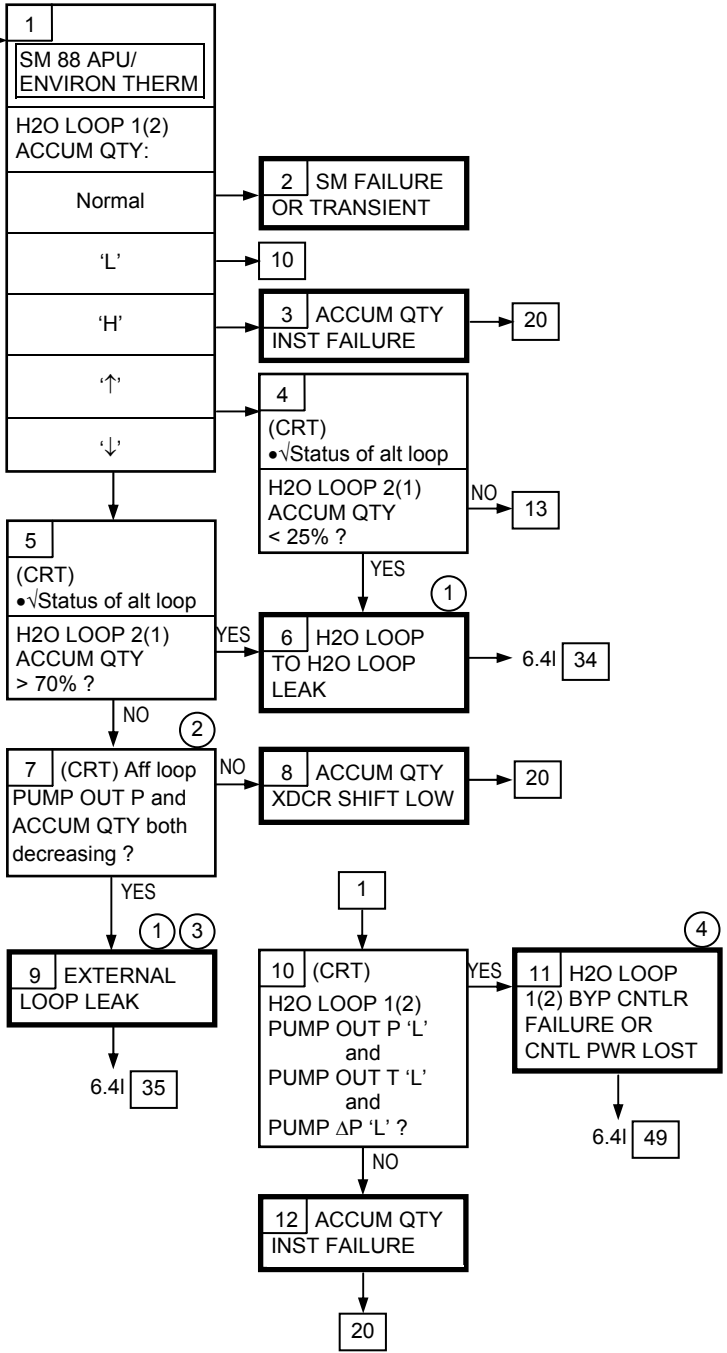
6.4n H2O ACCUM QTY 1(2) ↑↓

SM
ALERT

S88 H2O
LOOP 1(2) QTY

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

Nominal Config:
Refer to 6.4l



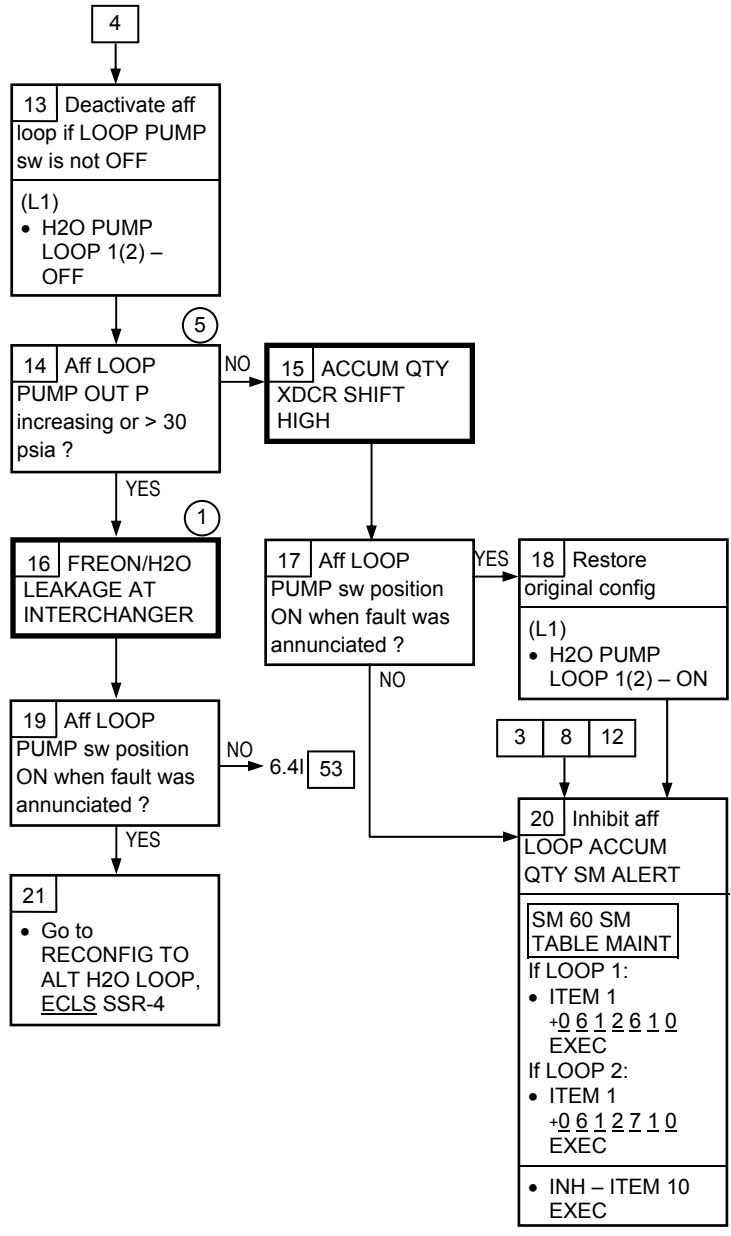
① Possible next PLS. √MCC

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

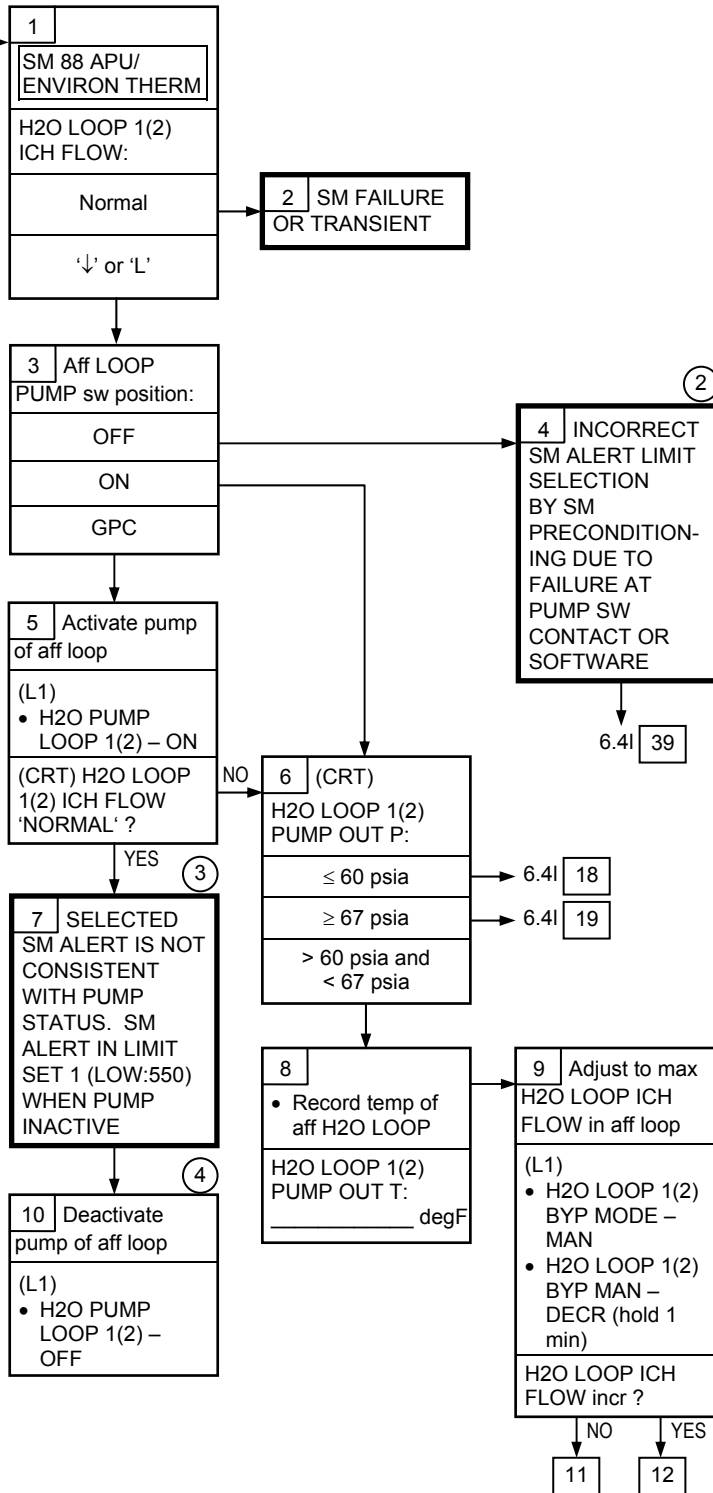
6.4o H2O ICH FLOW 1(2) ↓

SM ALERT

S88 H2O LOOP 1(2) FLOW

H2O LOOP 1(2) ICH FLOW < 550 lb/hr ^①

Nominal Config:
Refer to 6.4l



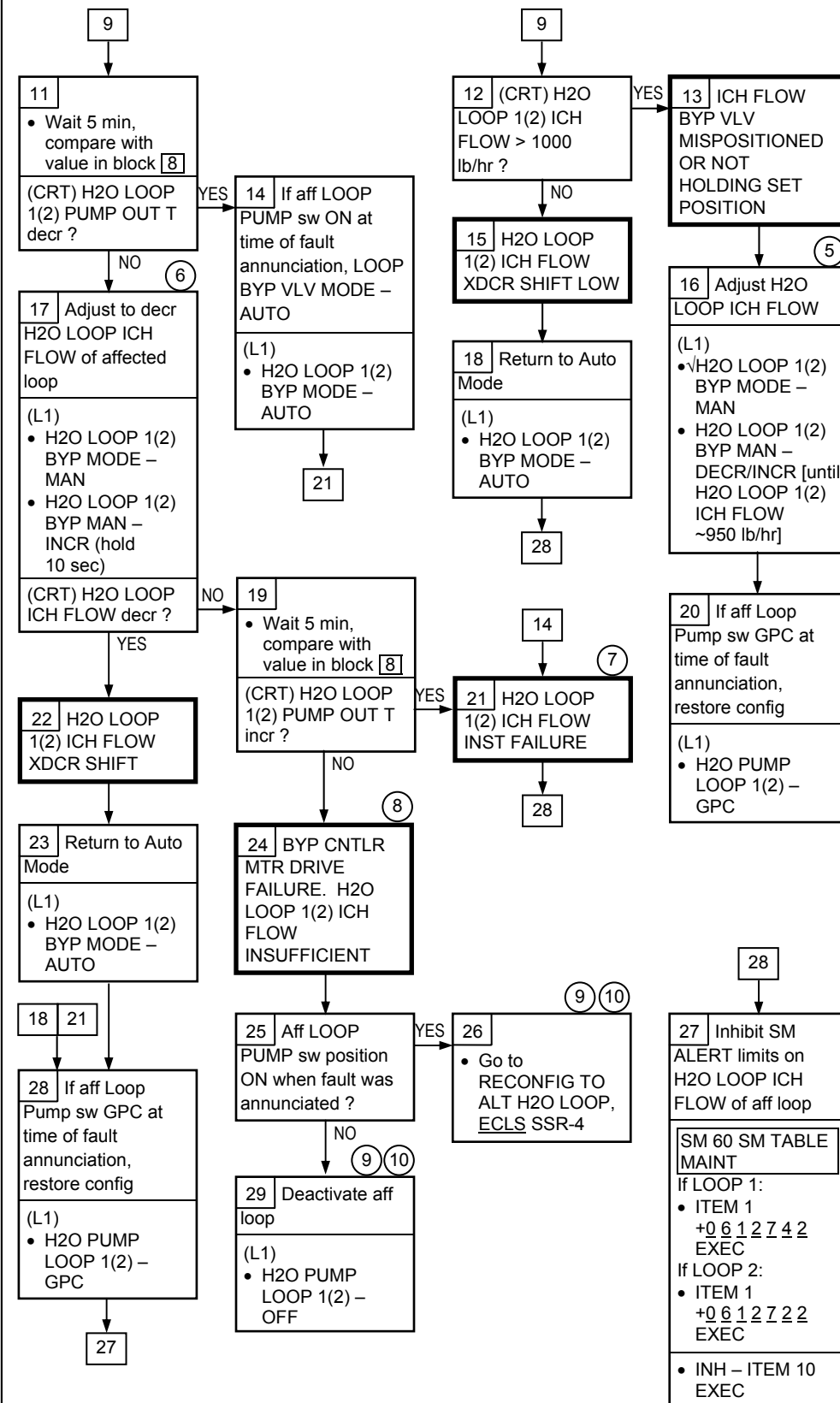
① Preconditioning will select this limit set if H2O PUMP LOOP 1(2) – ON; or H2O PUMP LOOP 1(2) – GPC and GPC – ON signal present

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

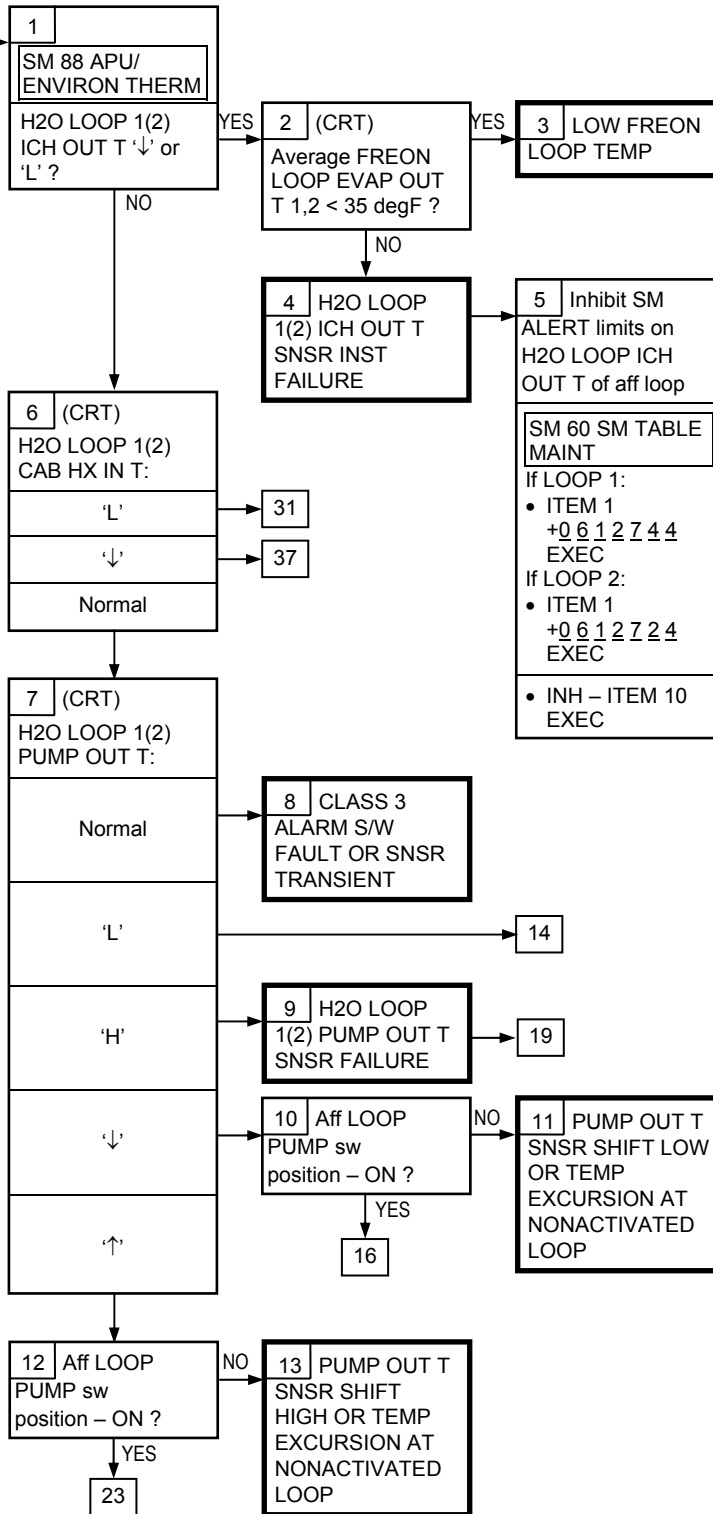
**6.4p H2O ICH OUT T 1(2) ↓
CAB HX IN T 1(2) ↓
PUMP OUT T 1(2) ↑↓**

SM
ALERT

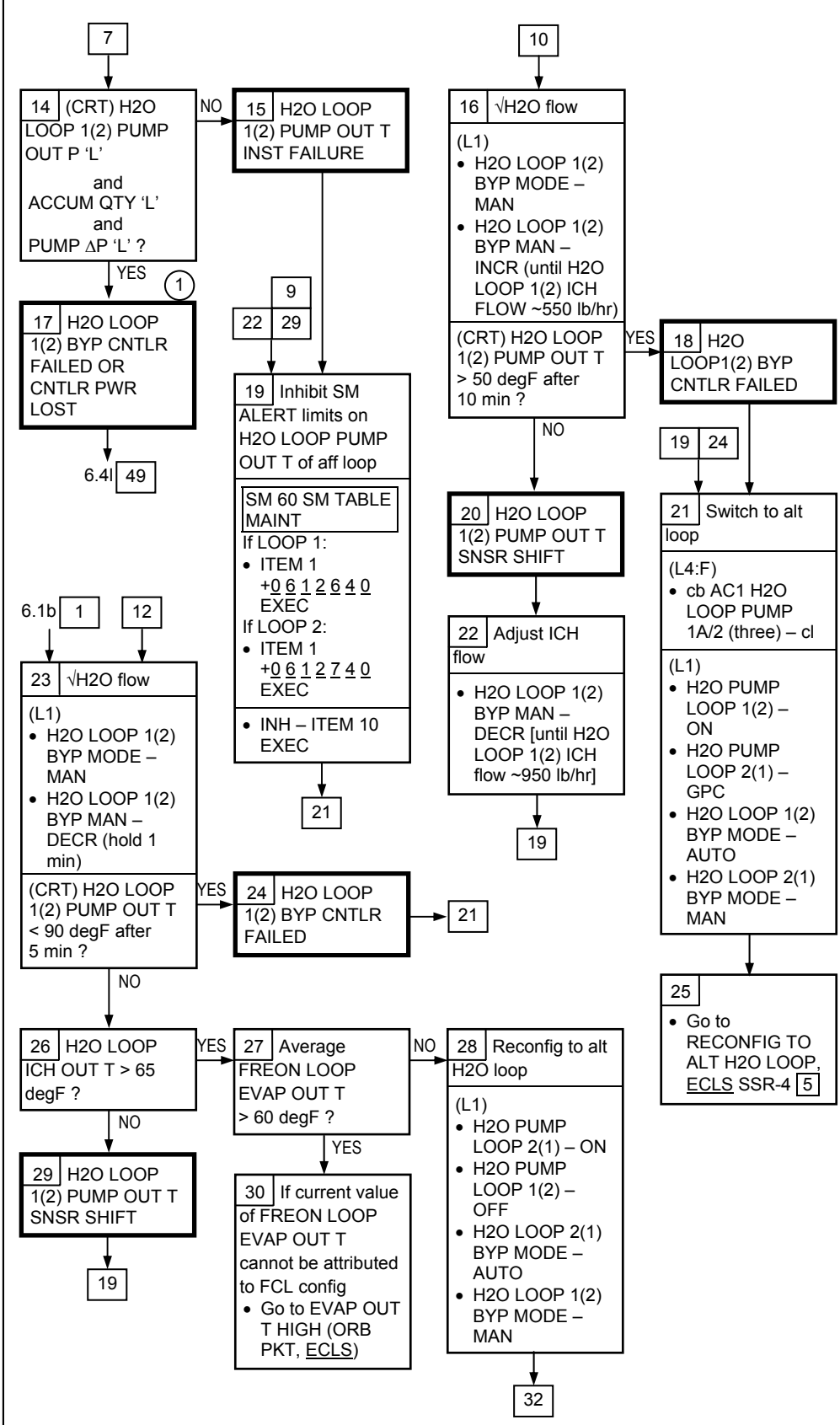
S88 H2O
LOOP 1(2)
TEMP

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

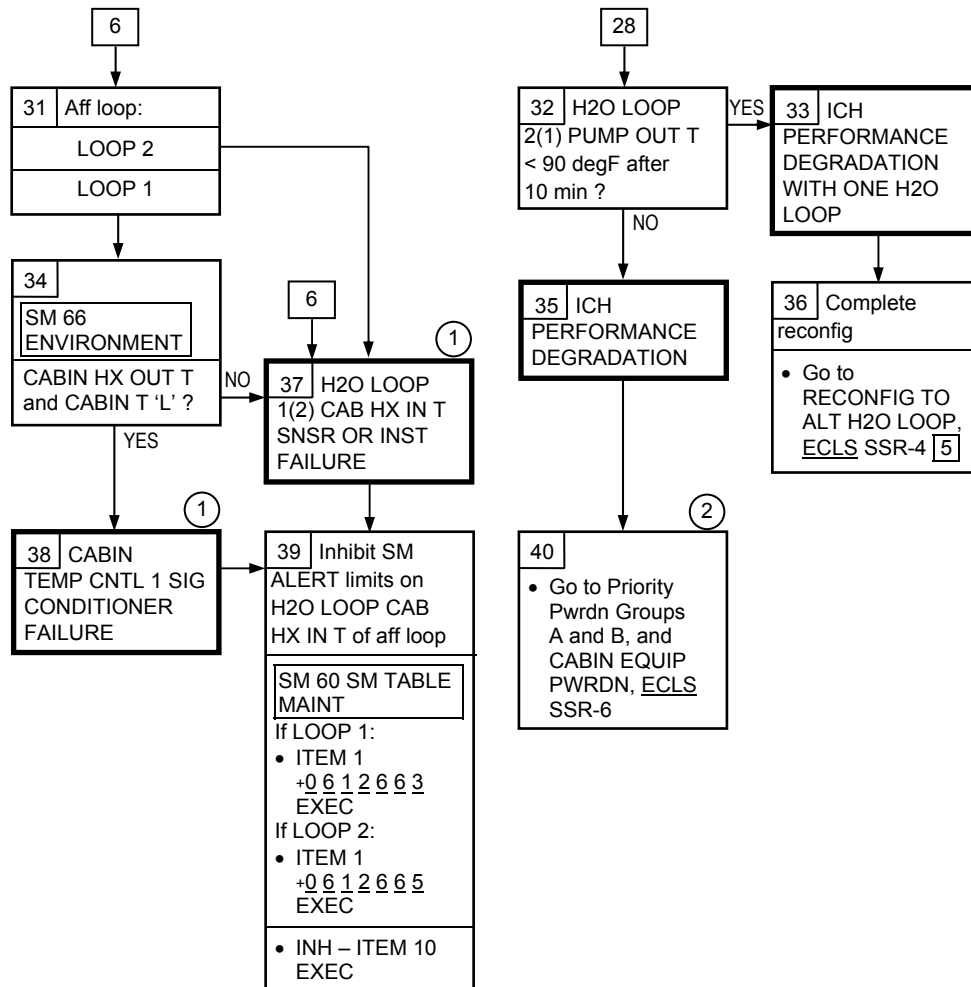


ECLS 6.4p (Cont)



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)



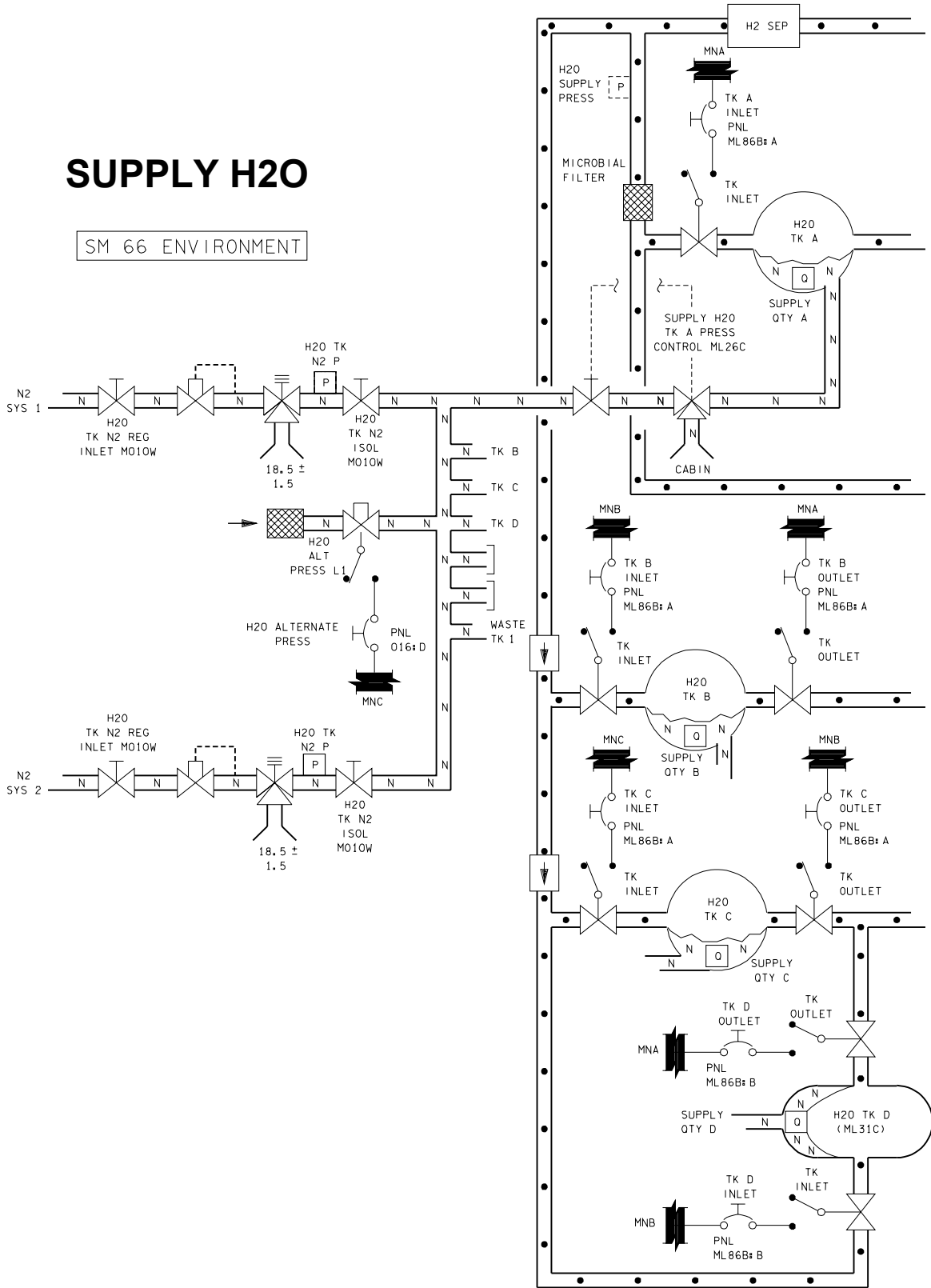
① √MCC to reset
LOOP 1:
(L4:L) cb AC2 ΦA
CAB T CNTLR 1
LOOP 2:
(L4:L) cb AC1 ΦA
CAB T CNTLR 2

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

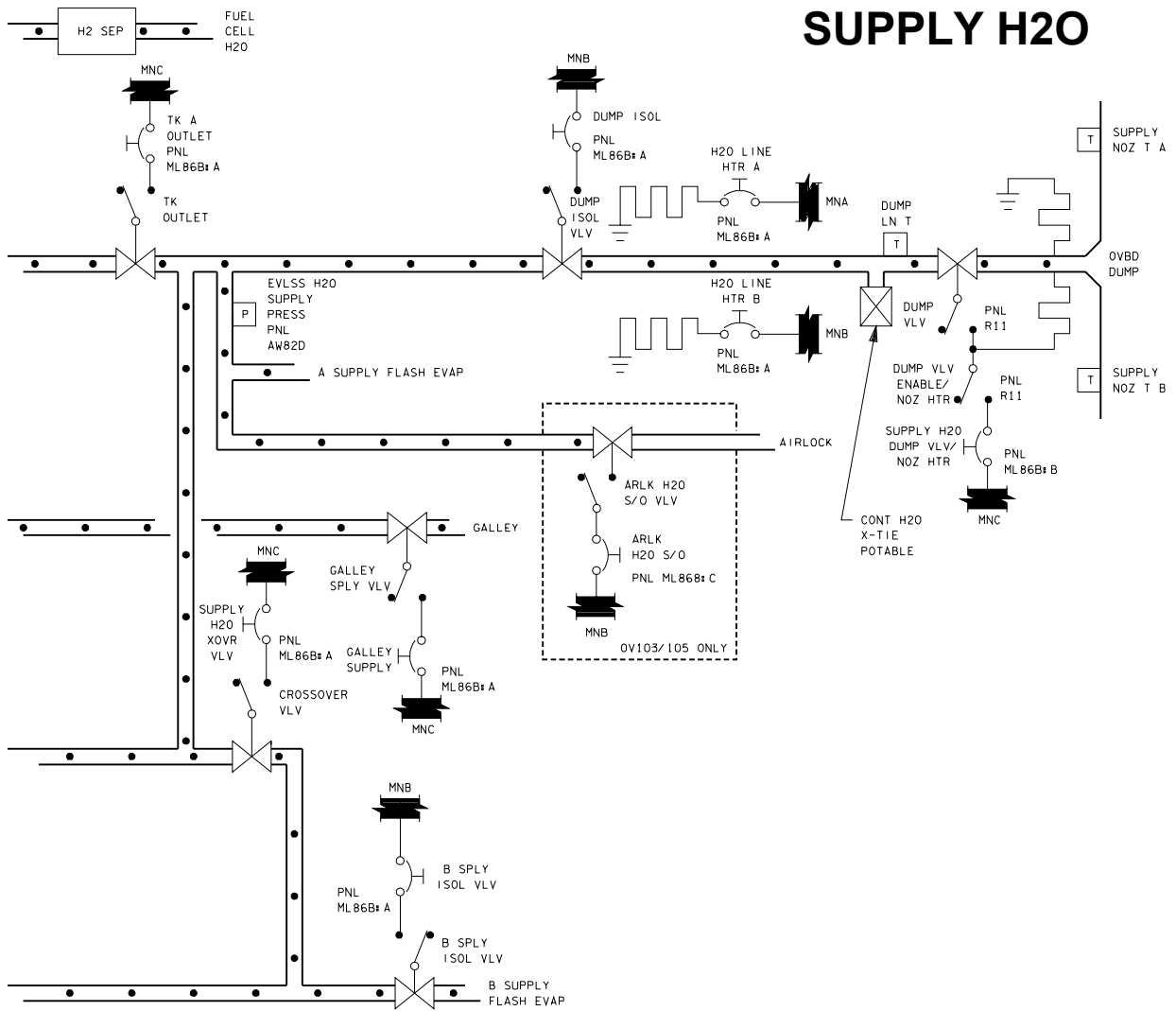
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SUPPLY H2O

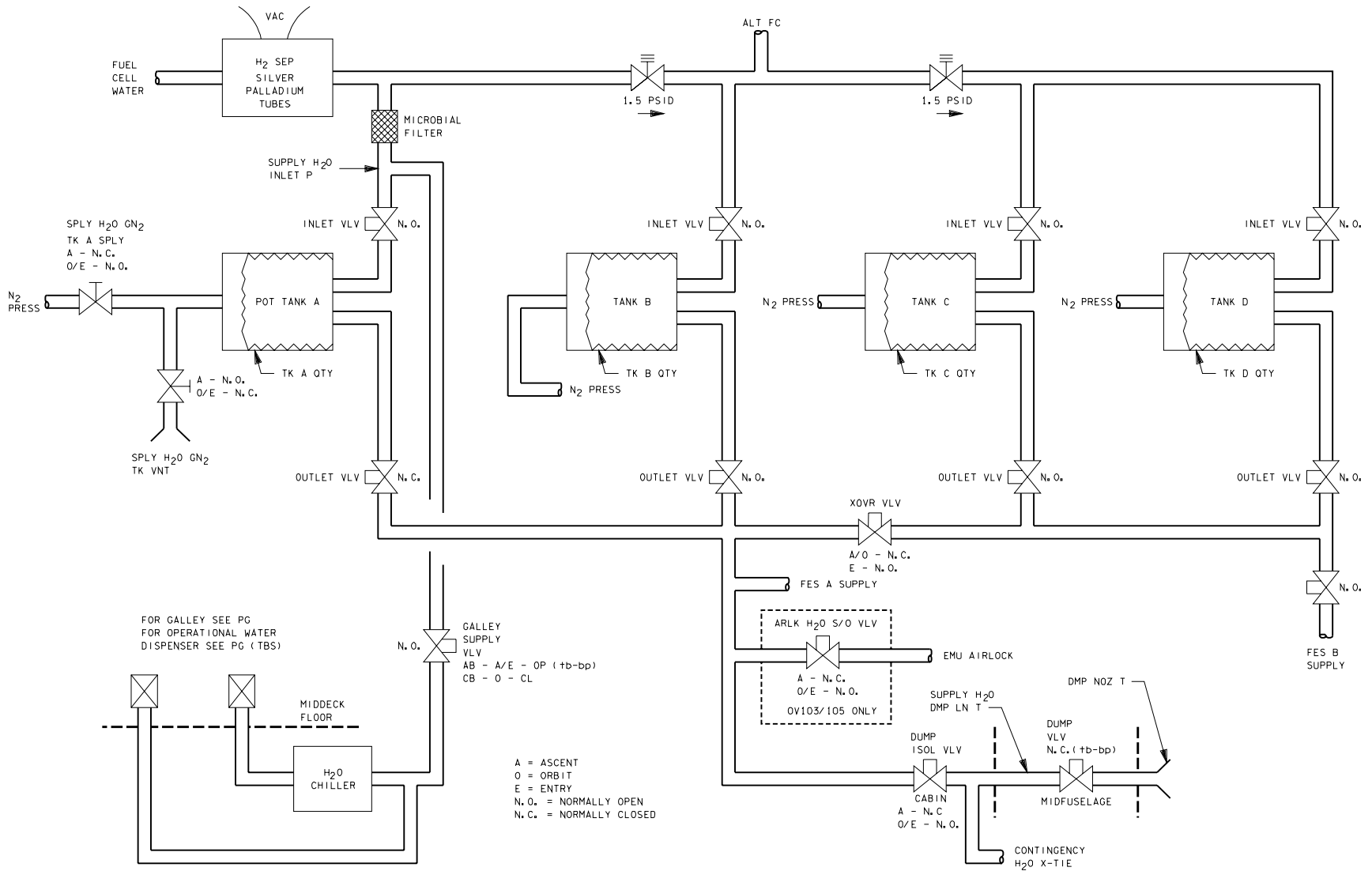
SM 66 ENVIRONMENT



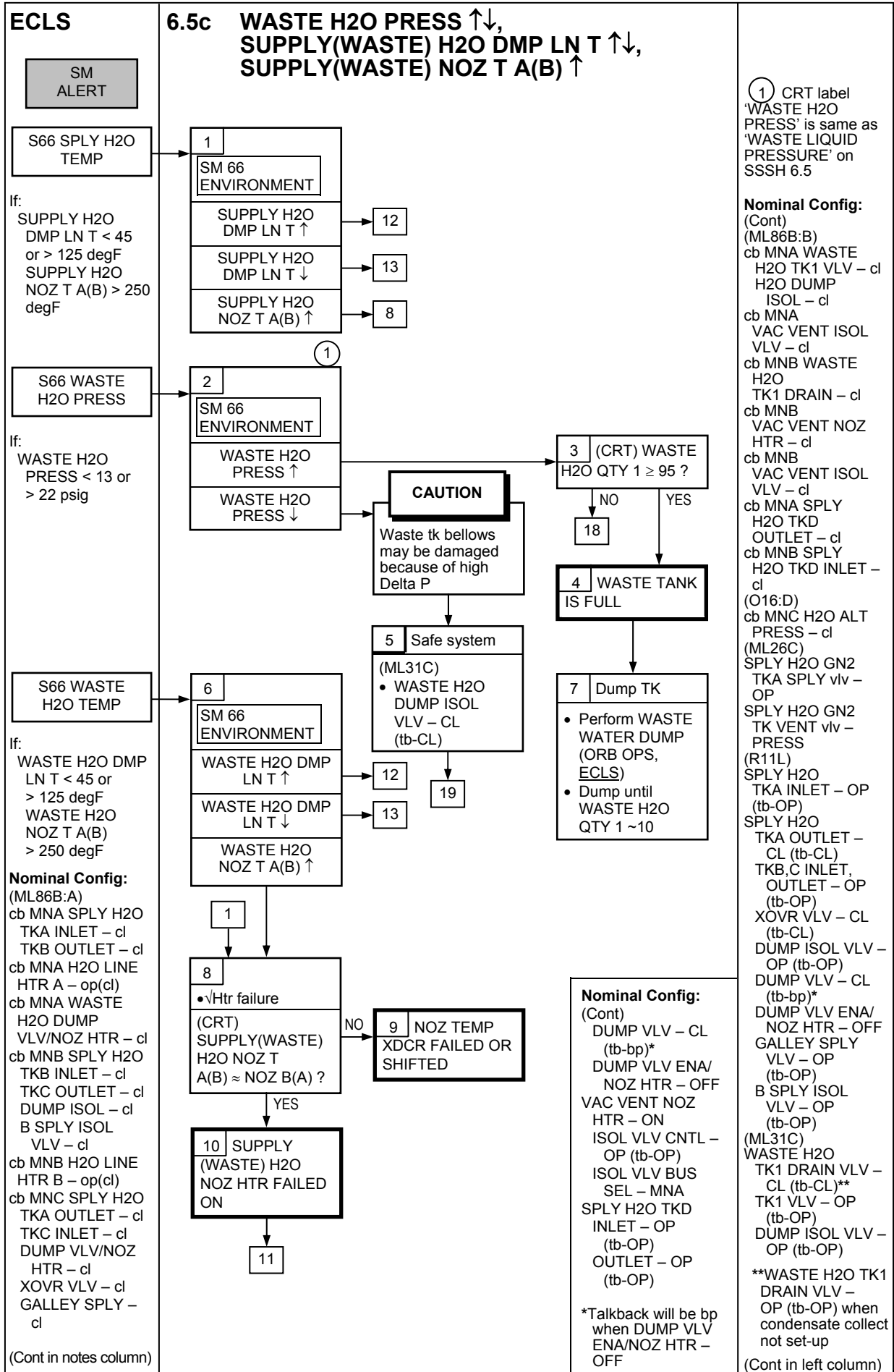
48027003_117. SCH 1



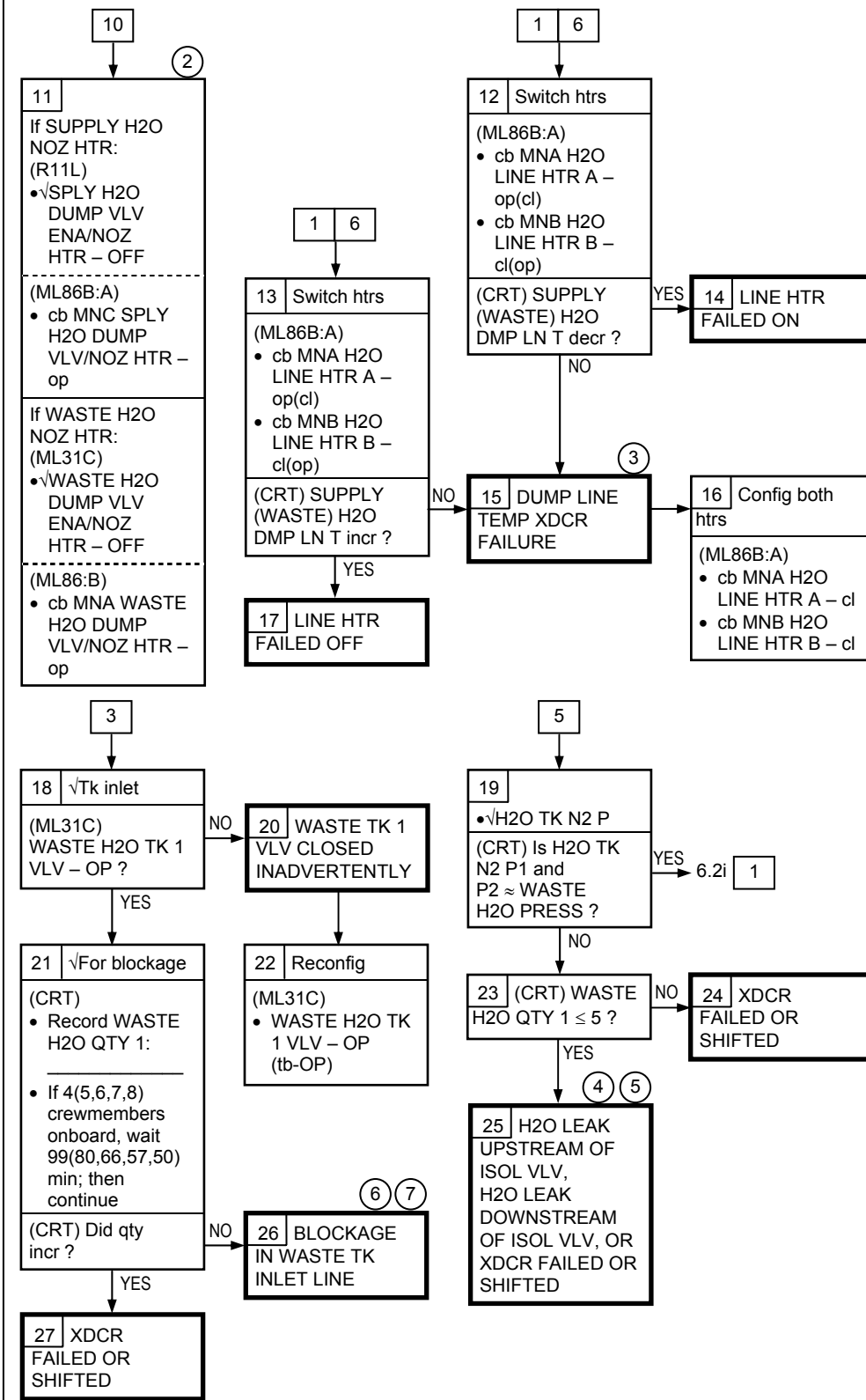
48027002_117. SCH 1



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

From ORB PKT, H2O SPLY PRESS HIGH

1 WATER TKS HARD FILLED

2

- Continue FES Dump initiated in OPCL and refer to SUPPLY WATER DUMP using FES (ORB OPS, ECLS)
- If no comm: Dump H2O tanks to provide 100% total ullage in any single or combination of TKs A,B,C,D

From ORB PKT, H2O SPLY PRESS HIGH

3 SM 66 ENVIRONMENT
Is SUPPLY H2O QTY A < 95 ?

4 Transfer H2O to TKB,D (R11L)

- SPLY H2O TKA OUTLET – OP (tb-OP)
- When SUPPLY H2O QTY A has decr 3%, continue:
- SPLY TKA OUTLET – CL (tb-CL)

(CRT) SUPPLY H2O PRESS decr ?

7 TK A/B CHECK VLV FAILURE

5 XDCR SHIFTED OR FAILED HIGH

6 Reset TKB limits

SM 60 SM TABLE MAINT

- ITEM 1 +0 6 2 0 4 2 0 EXEC
- Set upper limit to 93%

- 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

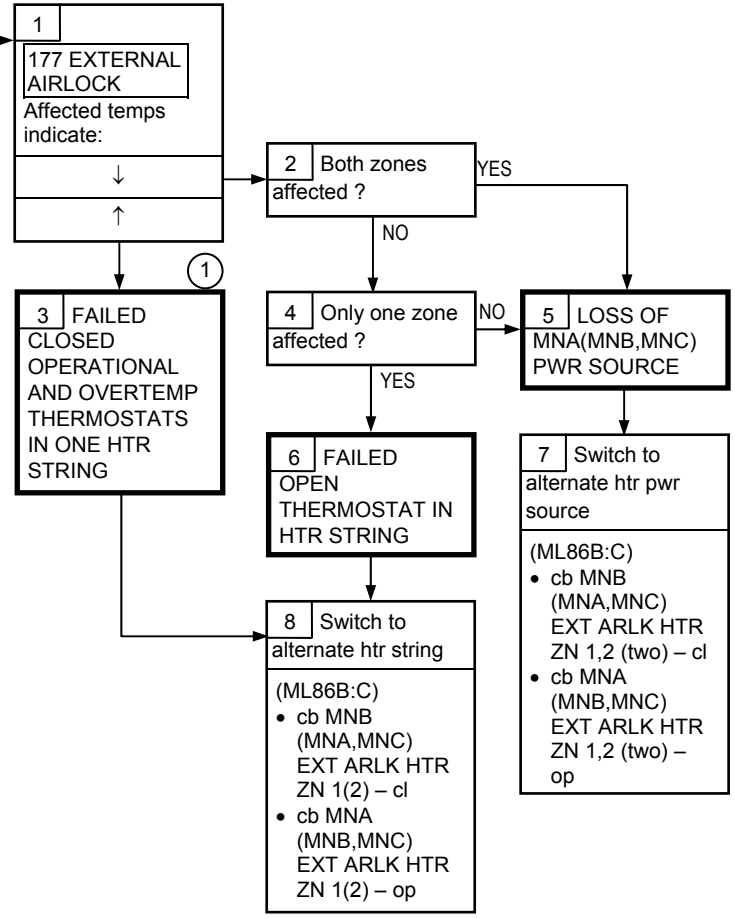
ECLS

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

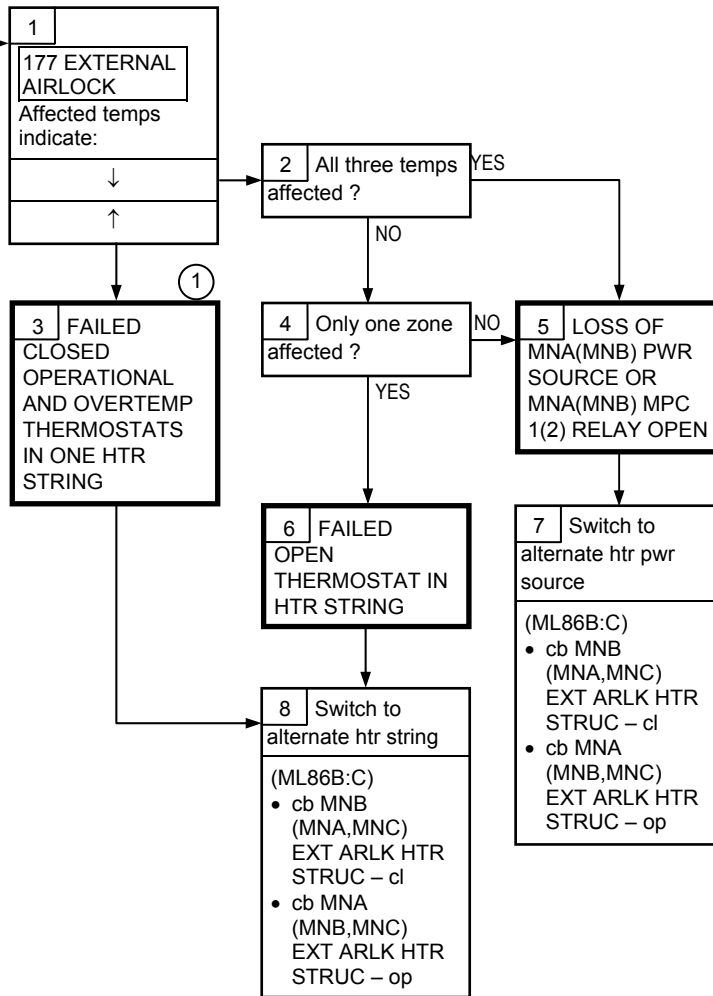
ECLS

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 altitude is causing high temps

CO2

6.8

6.8a RESERVED

CO2

6.8

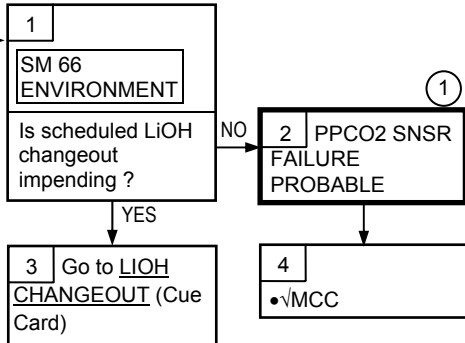
ECLS

6.8b PPCO2 ↑

SM
ALERT

S66 CAB
PPCO2

If:
Orbiter CO2
partial press
> 7.6mm Hg



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

ECLS SSR-2

FES CORE FLUSH PROCEDURE

NOTE

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

SM 88 APU/ENVIRON THERM

TOPPING CORE FLUSH (RADS ACTIVATED)

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

HI LOAD CORE FLUSH (RADS ACTIVATED)

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

ECLS SSR

ECLS SSR-2 (Cont)

SM 0 THERMAL

TOPPING CORE FLUSH (RADS NOT ACTIVATED)

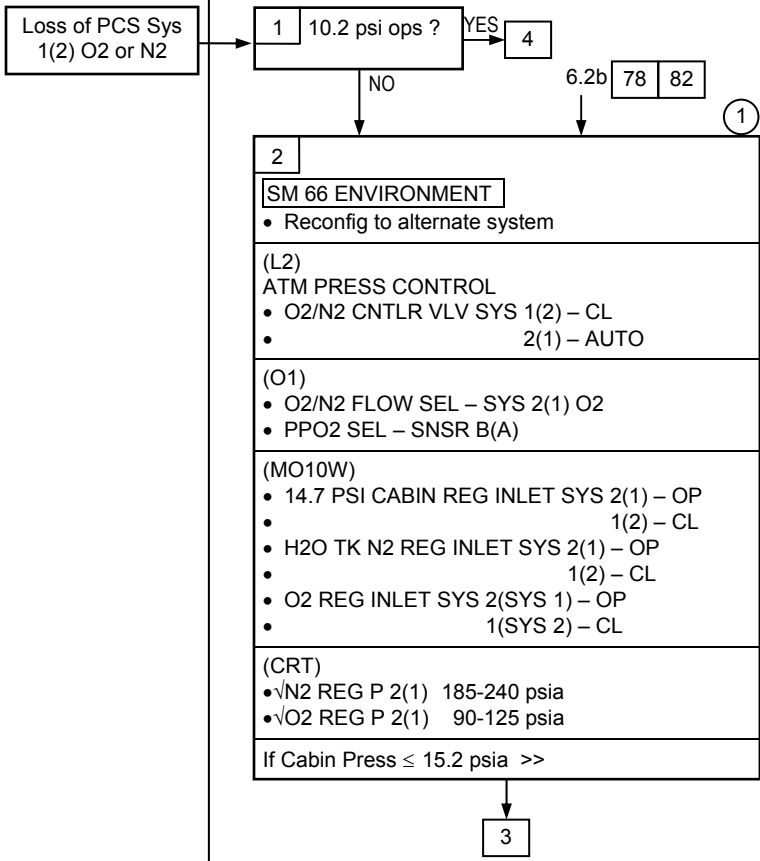
- L1 1. TOP EVAP HTR DUCT – A/B
CRT Proceed when TOPPING DUCT temps within limits (no ↓; if PASS SM 88 available, TOP FWD(AFT) > 120 degF)
L1 2. FLASH EVAP CNTLR SEC – OFF
3. HI LOAD EVAP – OFF
O1 Proceed when EVAP OUT T > 90 degF for 2 min
L1 4. FLASH EVAP CNTLR SEC – ON (wait 30 sec)
5. – OFF (wait 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)

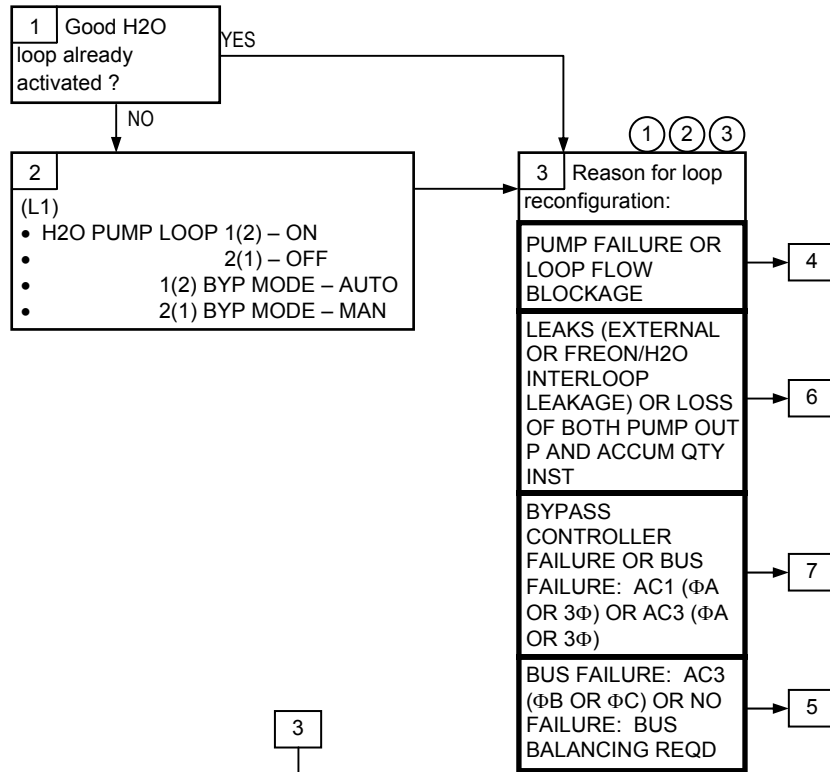
6.2b 41 51

4

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

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

ECLS SSR-4 RECONFIG TO ALT H2O LOOP



4 New active loop:	
LOOP 1	LOOP 2
(R13U) • Inhibit LOOP 2 PUMP OUT P (param 115) • Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia)	(R13U) • Inhibit LOOP 1 PUMP OUT P (param 105) • Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)
Reconfig B/U C/W SM 60 SM TABLE MAINT	Reconfig B/U C/W SM 60 SM TABLE MAINT
• ITEM 1 +0 6 1 2 7 0 0 EXEC • ITEM 15 EXEC • ITEM 1 +0 6 1 2 6 0 0 EXEC • ITEM 11 +4 5 EXEC	• ITEM 1 +0 6 1 2 6 0 0 EXEC • ITEM 15 EXEC • ITEM 1 +0 6 1 2 7 0 0 EXEC • ITEM 11 +4 5 EXEC

5 New active loop:	
LOOP 1	LOOP 2
(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 SM 60 SM TABLE MAINT	Reconfig B/U C/W SM 60 SM TABLE MAINT
• 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	• 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

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)

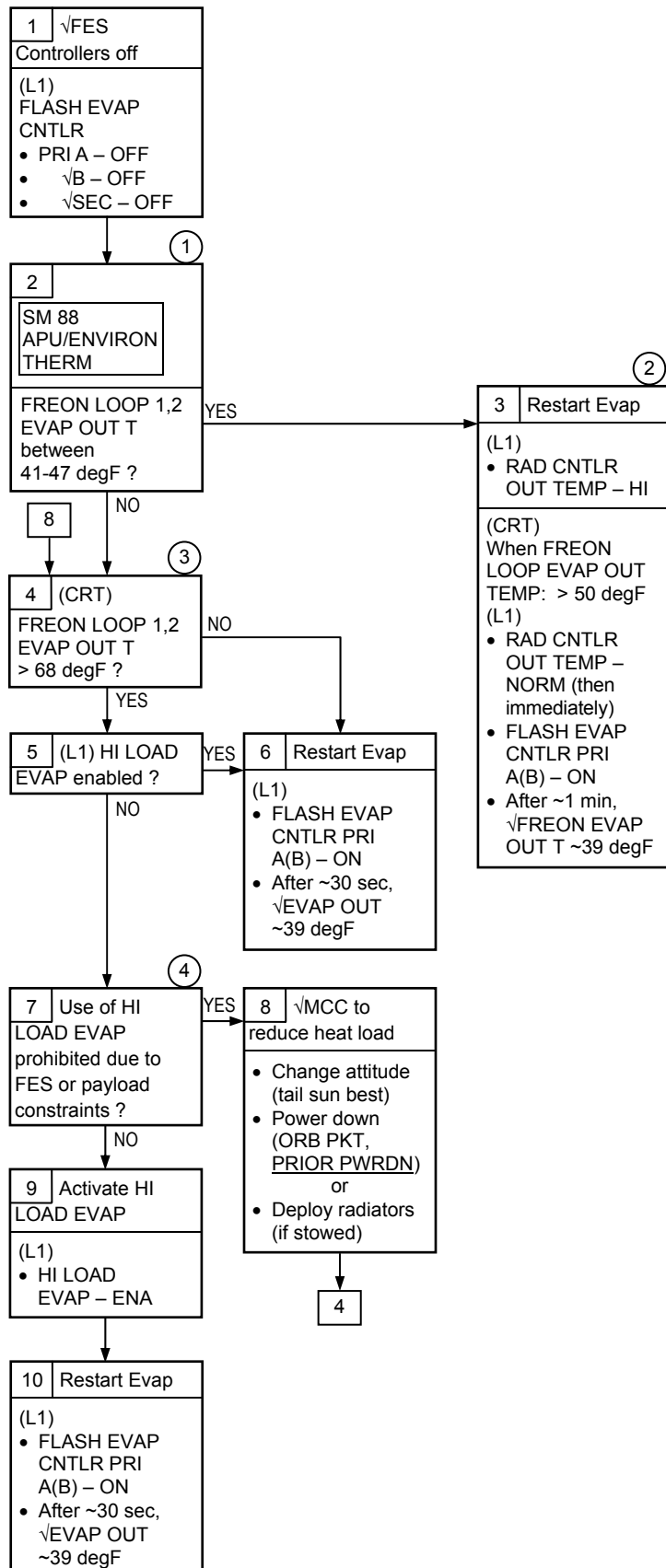
3

6 New active loop:	
LOOP 1	LOOP 2
(R13U) <ul style="list-style-type: none"> Inhibit LOOP 2 PUMP OUT P (param 115) Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia) 	(R13U) <ul style="list-style-type: none"> Inhibit LOOP 1 PUMP OUT P (param 105) Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)
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"> ITEM 1 +0612600 EXEC ITEM 11 +45 EXEC ITEM 1 +0612700 EXEC ITEM 15 EXEC 	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"> ITEM 1 +0612700 EXEC ITEM 11 +45 EXEC ITEM 1 +0612600 EXEC ITEM 15 EXEC
Inhibit LOOP 2 SM ALERTS <ul style="list-style-type: none"> ITEM 10 EXEC ITEM 1 +0612710 EXEC ITEM 10 EXEC 	Inhibit LOOP 1 SM ALERTS <ul style="list-style-type: none"> ITEM 10 EXEC ITEM 1 +0612610 EXEC ITEM 10 EXEC

3

7 New active loop:	
LOOP 1	LOOP 2
(R13U) <ul style="list-style-type: none"> Inhibit LOOP 2 PUMP OUT P (param 115) Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia) 	(R13U) <ul style="list-style-type: none"> Inhibit LOOP 1 PUMP OUT P (param 105) Change LOOP 2 PUMP OUT P (param 115) lower C/W to 1.50 vdc (45 psia)
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"> ITEM 1 +0612600 EXEC ITEM 11 +45 EXEC ITEM 1 +0612700 EXEC ITEM 15 EXEC 	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"> ITEM 1 +0612700 EXEC ITEM 11 +45 EXEC ITEM 1 +0612600 EXEC ITEM 15 EXEC
Inhibit LOOP 2 SM ALERTS <ul style="list-style-type: none"> ITEM 10 EXEC ITEM 1 +0612710 EXEC ITEM 10 EXEC ITEM 1 +0612740 EXEC ITEM 10 EXEC ITEM 1 +0612705 EXEC ITEM 10 EXEC 	Inhibit LOOP 1 SM ALERTS <ul style="list-style-type: none"> ITEM 10 EXEC ITEM 1 +0612610 EXEC ITEM 10 EXEC ITEM 1 +0612640 EXEC ITEM 10 EXEC ITEM 1 +0612605 EXEC ITEM 10 EXEC

ECLS SSR-5 FES RESTART



- ① Prior flight experience has demonstrated that FES shutdwn 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-7 FLASH EVAPORATOR CHECKOUT

NOTE

Procedure used to check all components

PRETEST SETUP

- L1 a. √Rad flow, PLBD opened
 - L1 b. FLASH EVAP TOP DUCT HTR – A(B)
NOZ (two) – AUTO A(B)
- If HI LOAD EVAP to be activated:
FLASH EVAP HI LOAD DUCT HTR – A(B)
Wait ~45 min before activating HI LOAD
- L2 c. FLASH EVAP FDLN HTR A SPLY – 1(2)
B SPLY – 1(2)
 - R11L d. √SPLY H2O TKB OUTLET – OP (tb-OP)
 - ML31C √B SPLY ISOL VLV – OP (tb-OP)
√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
FLASH EVAP CNTLR SEC – A SPLY(B SPLY)
2. PRI A – OFF
B – OFF
SEC – OFF
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN
MAN SEL (two) – BYP until tb – BYP
- CRT 4. When EVAP OUT T > 47 degF, FLASH EVAP CNTLR PRI A – ON
5. After 60 sec, √EVAP OUT T ~39 degF ± 1 degF
- L1 6. FLASH EVAP CNTLR PRI A – OFF
B – ON
- CRT After 60 sec, √EVAP OUT T ~39 degF ± 1 degF
- L1 7. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO
CNTLR LOOP 1,2 (two) – OFF, AUTO A(AUTO B)
After 90 sec, √tb (two) – RAD
8. After 2 min, HI LOAD EVAP – OFF
- f. PRIMARY CNTLR A,B, TOPPING, STARTUP FROM STBY CHECKOUT
- CRT 1. Perform FES RESTART, ECLS SSR-5, using A CNTLR
2. √RAD OUT T ~39 degF (FES to STBY)
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
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
FLR | 9. √CAB PURGE VLV – CL
√ISOL VLV – CL |
| EXT A/L | 10. EXT A/L DEPRESS vlv – CL
NEG PRESS RELIEF vlv covers (two) – CL (push firmly) |
| ML31C | 11. VAC VENT ISOL VLV CNTL – CL (tb-CL) |
| WCS | 12. CRADLE – AUTO INHIBIT
Remove urinal hose (at hose block), hose block, and filter
Place Gray Tape over center tube (EMU drain) |
| | If SH HATCH open: |
| | 13. Perform SH CABIN LEAK ISOLATION (Cue Card) |
| MIDDECK | 14. A/L HATCH – CL (per decal)
Equal vlv (two) – OFF |

LEAK DETECTION AND SEALING

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

If reqd (On MCC Go):

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

RECOVERY STEPS (On MCC call)

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

ECLS SSR-8 (Cont)

- ML31C 19. VAC VENT ISOL VLV CNTL – OP (tb-OP)
If flown, reactivate CO2 RMVL SYS:
- MO51F CO2 RMVL SYS MNA(MNC) – OFF
AC1(AC3) – OFF (hold 3 sec)
√CNTLR 1(2) FAIL 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)

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 SM 60 SM TABLE MAINT • 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 SM 60 SM TABLE MAINT • 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,B,SEC (three) – OFF

NOTE

Have towel ready for possible release of water when mating/demating any connections

- WCS
Outbd
Wall 2. Unstow and install SPLY H2O Dumpline Purge Device into CONT H2O X-TIE POT QD (lower QD with blue Velcro and "POTABLE" label)

- ML86B:A 3. cb MNC SPLY H2O XOVR VLV – cl

If only B FDLN requires purging:

NOTE

After evacuation of B FDLN, SPLY H2O can be managed in normal fashion by using Nozzle dumps and/or Supply Water dumps with FES PRI A

- ML31C
R11L 4. SPLY H2O TKD OUTLET – CL (tb-CL)
5. TKA,TKB,TKC OUTLET – CL (tb-CL)
√B SPLY ISOL VLV – OP
XOVR VLV – OP (tb-OP)
√DUMP ISOL VLV – OP (tb-OP)
- L1
O1 6. RAD CNTLR OUT TEMP – HI
7. When EVAP OUT T > 50 degF,
FLASH EVAP CNTLR PRI B – ON
8. When FES shuts down and EVAP OUT T again > 50 degF,
FLASH EVAP CNTLR PRI B – OFF, ON
9. Repeat step 8 until EVAP OUT T remains at ~57 degF,
then FLASH EVAP CNTLR PRI B – OFF
- R11L
L2 10. SPLY H2O B SPLY ISOL VLV – CL
11. FLASH EVAP FDLN HTR B SPLY – OFF
L1 12. √CNTLR SEC – A SPLY

13. **FDA RESET**

If comm, MCC will TMBU limits as reqd

If no comm, change limits via table

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
EVAP TEMP FDLN T FWD (B)	0631871	-10	
EVAP TEMP FDLN T MID 1 (B)	0631873	-10	
EVAP TEMP FDLN T MID 2 (B)	0631875	-10	
EVAP TEMP FDLN T AFT (B)	0631877	-10	
EVAP TEMP FDLN T TOPPING (B)	0631893	-10	
EVAP TEMP FDLN T ACCUM (B)	0631894	-10	
EVAP TEMP FDLN T HI LOAD (B)	0631896	-10	

Continue with procedure in step 27

If only A FDLN requires purging:

NOTE

After evacuation of A FDLN, SPLY H2O can be managed using Nozzle dumps and/or Supply Water dumps with FES PRI B

- R11L 14. SPLY H2O TKA,TKB OUTLET – CL (tb-CL)
√XOVR VLV – CL (tb-CL)
√DUMP ISOL VLV – OP (tb-OP)

ECLS SSR-11 (Cont)

- L1 15. RAD CNTLR OUT TEMP – HI
 O1 16. When EVAP OUT T > 50 degF,
 FLASH EVAP CNTLR PRI A – ON
 17. When FES shuts down and EVAP OUT T again > 50 degF,
 FLASH EVAP CNTLR PRI A – OFF, ON
 18. Repeat step 17 until EVAP OUT T remains at ~57 degF,
 then FLASH EVAP CNTLR PRI A – OFF
 L2 19. FLASH EVAP FDLN HTR A SPLY – OFF
 L1 20. CNTLR SEC – B SPLY

21. FDA RESET

If comm, MCC will TMBU limits as reqd

If no comm, change limits via table

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
EVAP TEMP FDLN T FWD (A)	0631870	-10	
EVAP TEMP FDLN T MID 1 (A)	0631872	-10	
EVAP TEMP FDLN T MID 2 (A)	0631874	-10	
EVAP TEMP FDLN T AFT (A)	0631876	-10	
EVAP TEMP FDLN T TOPPING (A)	0631891	-10	
EVAP TEMP FDLN T ACCUM (A)	0631892	-10	
EVAP TEMP FDLN T HI LOAD (A)	0631895	-10	

Continue with procedure in step 27

If both A,B FDLNs require purging:

NOTE

SPLY H2O can be managed by normal means after lines are refilled. Lines should be reevacuated after completion of dump

- L1 22. Perform steps 4 thru 9, then:
 FLASH EVAP CNTLR PRI A – ON
 L2 23. Perform steps 17 and 18, then:
 L1 24. FLASH EVAP FDLN HTR A,B SPLY (two) – OFF
 L1 25. TOP EVAP HTR DUCT – OFF
 NOZ L,R (two) – OFF

26. FDA RESET

If comm, MCC will TMBU limits as reqd

If no comm, change limits via table

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
EVAP TEMP TOPPING AFT	0631802	-10	
EVAP TEMP TOPPING FWD	0631801	-10	
EVAP TEMP TOPPING L DUCT	0631800	-10	
EVAP TEMP TOPPING L NOZ	0631878	-10	
EVAP TEMP TOPPING R DUCT	0631810	-10	
EVAP TEMP TOPPING R NOZ	0631879	-10	

Also update limits per steps 13 and 21

Continue with procedure in step 27

POST-PURGE RECONFIGURATION

- WCS 27. RAD CNTLR OUT TEMP – NORM
 Outbd 28. Remove, stow SPLY H2O Dumpline Purge Device from CONT H2O X-TIE POT QD
 Wall 29. √MCC for Supply Water Tank Config
 30. √MCC for FES Config

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

- 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

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
ΦC	14	5
AC3 3Φ	1	7
ΦA	15	3
ΦB	16	3
ΦC	13	3

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 Φ A:

- CRT
4. cb aff AC CONTR Φ 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 Φ A – op
 7. Repeat steps 4 thru 6 for Φ B, then Φ 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 Φ 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:
 - 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"> Notify MCC of disabled constant 		

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"> Notify MCC of inhibited parameter

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"> Notify MCC of inhibited parameter

TABLE D

REMOVAL OF FAILED/DEGRADED N2 TANK TEMP/PRESSURE FROM N2 QTY COMPS

Normally all temperature and pressure transducer flags are set to 1. If transducer fails, disable failed transducer's flag. For example, if SYS 1 N2 TANK 1 TEMP has failed, disable its flag, then the comp uses TK 2 TEMP in lieu of TANK 1 TEMP in the quantity computation. √MCC for multiple failures

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. Go to HUM SEP AIR OUTLET H2O ABSORPTION (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

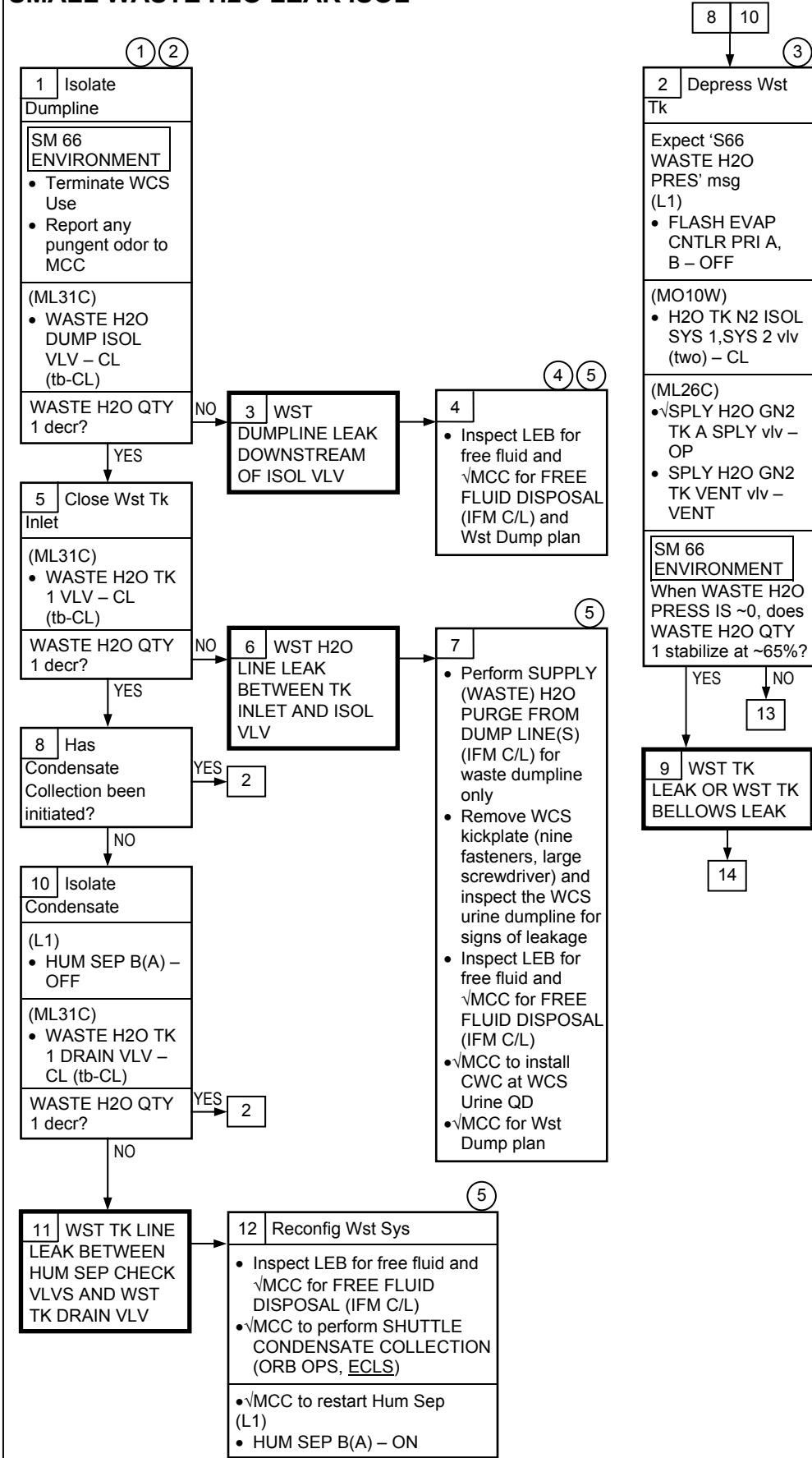
This procedure assumes that MCC is available for assistance and would inform crew of tank C leak (which is normally isolated) or dump line leak at nozzle. This procedure also assumes that tanks B, D are tied together and that tank C is isolated. Also note that Supply H2O tanks remain pressurized during 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)

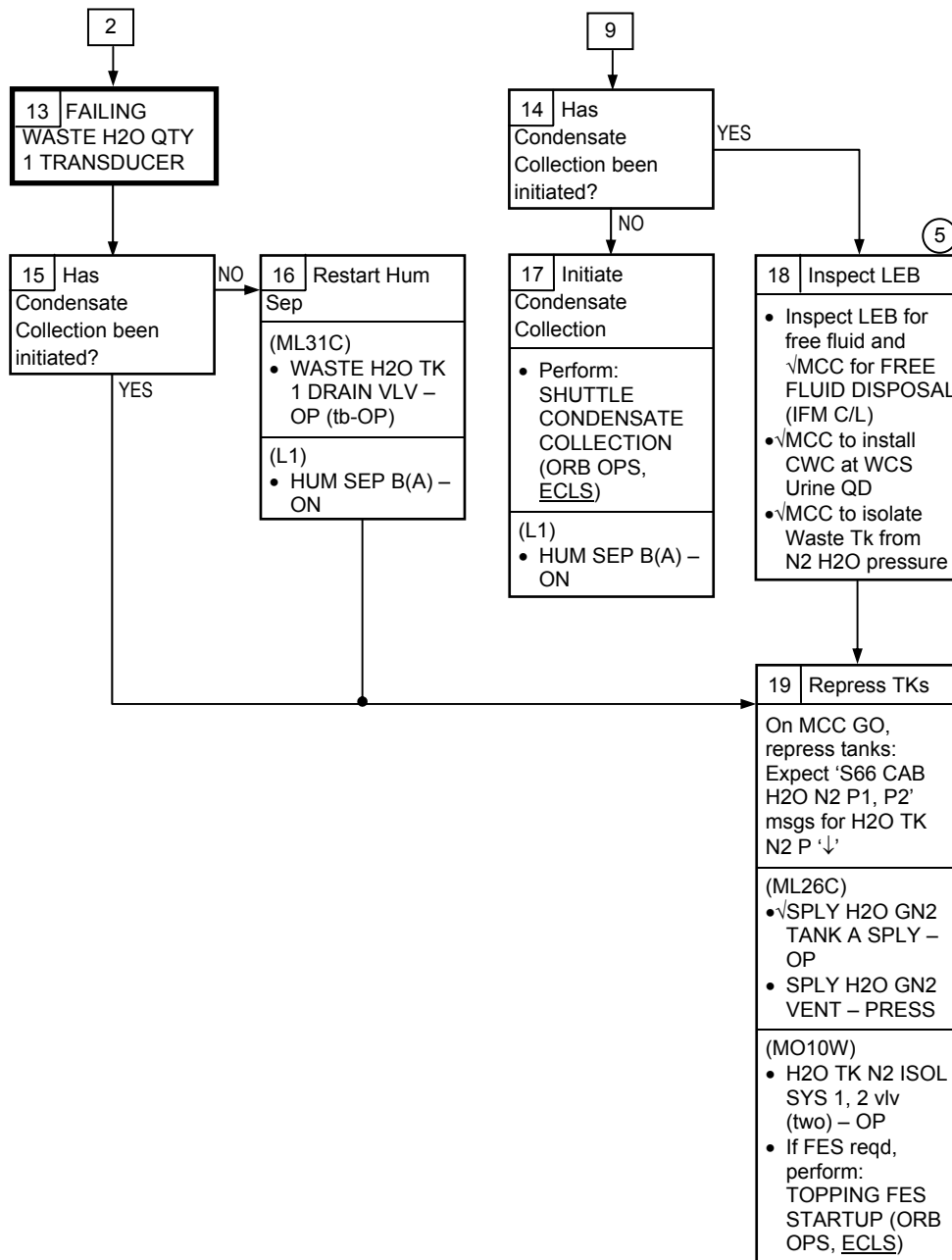
- MO10W 6. H2O TK N2 ISOL SYS 1,SYS 2 vlv – CL
ML26C SPLY H2O GN2 TANK A SPLY – OP
VENT – VENT
Expect audible vent and 'S66 WASTE H2O PRES' alert for Waste Pres '↓'
- ML26C 7. SPLY H2O GN2 TANK A SPLY – OP
VENT – PRESS
- MO10W H2O TK N2 ISOL SYS 1,SYS 2 vlv – OP
Expect 'S66 CAB H2O N2 P1, P2' msgs for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

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 If SPLY H2O QTY C,D const (leak in FES Feedline B):
R11L 32. Perform step 54 using FES PRI A On MCC GO >>
ML31C 33. SPLY H2O TKC INLET,OUTLET (two) – CL (tb-CL)
 34. TKD INLET,OUTLET (two) – CL (tb-CL)
- MCC/CRT If SPLY H2O QTY C decr (leak in TK C):
R11L 35. SPLY H2O B SPLY ISOL VLV – OP (tb-OP)
ML31C 36. TKD INLET – OP (tb-OP)
 37. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK C On MCC GO; dump TK C
 to ~0% >>
- MCC/CRT If SPLY H2O QTY D decr (leak in TK D):
R11L 38. SPLY H2O B SPLY ISOL VLV – OP (tb-OP)
 39. TKC INLET – OP (tb-OP)
 40. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK D On MCC GO; dump TK D
 to ~0% >>
- MCC/CRT If SPLY H2O QTY A,B,C,D filling at a nominal rate (leak in TK C/D Outlet Manifold):
R11L 41. SPLY H2O TKC INLET – OP (tb-OP)
ML31C 42. TKD INLET – OP (tb-OP)
 43. Perform steps 54-55 using FES PRI A On MCC GO >>
- MCC/CRT If SPLY H2O QTY A,B decr or filling at a decr rate (leak in TK C/D Inlet Manifold; depress H2O Tanks):
R11L 44. SPLY H2O TKC OUTLET – OP (tb-OP)
 45. B SPLY ISOL VLV – OP (tb-OP)
ML31C 46. TKD OUTLET – OP (tb-OP)
 47. Perform steps 48-51, 55 >>
- E. CLEAN UP STEPS
- MO10W 48. H2O TK N2 ISOL SYS 1,2 vlv (two) – CL
ML26C 49. SPLY H2O GN2 TK A SPLY vlv – OP

NOTE

Expect audible vent and 'S66 WASTE H2O PRES' alert for WASTE H2O PRESS ↓

- 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 SSR-21

MANUAL RAD BYPASS VALVE CONTROL

NOTE

This procedure shall not be attempted without MCC monitoring and assistance. This procedure provides a method of reestablishing or maintaining radiator flow by adjusting the position of the radiator bypass valve. Expect possible 'S88 EVAP OUT T 1(2)' or 'S88 FREON RAD T 1(2)' msgs

SM 88 APU/ENVIRON THERM

- L1 1. Aff RAD CNTLR LOOP – OFF
- 2. H2O PUMP LOOP 1,2 (two) – ON
- 3. LOOP 1,2 BYP MODE (two) – MAN
- 4. MAN (two) – DECR (hold 30 sec)
- 5. FLOW PROP VLV LOOP 1,2 (two) – PL HX (tb-PL)
- 6. RAD CNTLR OUT TEMP – HI
- 7. FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
- 8. Aff RAD BYP VLV MODE – MAN
- If Freon Loop 1 affected:
 - L4:P | 9. cb AC2 ΦB RAD CNTLR 1A – op
- If Freon Loop 2 affected:
 - 10. cb AC3 ΦB RAD CNTLR 2A – op
- CRT 11. Adjust aff RAD OUT T to ~40°F by performing momentary (< 1 sec) switch movements:
 - L1 Aff RAD BYP VLV MAN SEL – RAD FLOW (if too hot), and/or
– BYP (if too cold)
- On MCC GO:
 - 12. FLASH EVAP CNTLR PRI B(A) – ON
- If 'S88 FREON RAD T 1(2)' msg received during next orbital cycle:
 - 13. Aff RAD BYP VLV MAN SEL – BYP (momentary) as necessary to ensure aff RAD OUT T stays ≥ 40°F
- On MCC GO:
 - 14. H2O PUMP LOOP 1 – GPC
 - 15. LOOP 2 BYP MODE – AUTO
 - 16. RAD CNTLR OUT TEMP – NORM
 - 17. FLOW PROP VLV LOOP 1,2 (two) – ICH (tb-ICH)
- If Freon Loop 1 affected:
 - L4:P | 18. cb AC2 ΦB RAD CNTLR 1A – cl
- If Freon Loop 2 affected:
 - 19. cb AC3 ΦB RAD CNTLR 2A – cl

ECLS FRP-1 MANUAL CABIN ATMOSPHERE MANAGEMENT

NOTE

This procedure assumes Cabin P < 14.7 psi and is structured to flow N2 from PCS 1 and flow O2 from PCS 2, with metabolic makeup from Bleed Orifice

If SETUP completed, go to CABIN REPRESS

SETUP

- L2 O2/N2 CNTLR VLV SYS 1 – OP
2 – CL
- C7 √LEH O2 SPLY vlv (two) – OP
- MO10W 14.7 CAB REG INLET SYS 1,SYS 2 vlv (two) – CL
O2 REG INLET SYS 1,SYS 2 vlv (two) – OP
- MA9L Unstow O2 Bleed Orifice Assembly
- MO69M √LEH O2 8 vlv – CL
Insert O2 Bleed Orifice Assembly into LEH O2 8 QD
LEH O2 8 vlv – OP

CABIN REPRESS

SET C&W LIMITS

PARAMETER NAME	C/W CH	H/W C/W HI V	ENA/ INH	PARA ID	B/U C/W HI EU
PPO2 A	34	3.40		0612511	3.40
PPO2 B	44	3.40		0612513	3.40

NOTE

Expect possible 'S66 CAB O2 FLO 2' C&W alarm during execution of next step

- MO10W 14.7 CAB REG INLET SYS 2 vlv – OP
- * If C&W alarm: *
- * CABIN ATM and/or B/U 'S66 CABIN PPO2 A(B)' *
- * *
- * NOTE *
- * Expect possible 'S66 CAB N2 FLO 1' C&W alarm *
- * during execution of next step *
- * *
- * 14.7 CAB REG INLET SYS 2 vlv – CL *
- * 1 vlv – OP *
- * *
- * When N2 FLOW SYS 1 < 1.0 or CABIN PRESS > 14.7, *
- * 14.7 CAB REG INLET SYS 1 vlv – CL *

When O2 FLOW SYS 2 < 1.0 or CABIN PRESS > 14.7,
14.7 CAB REG INLET SYS 2 vlv – CL

If prior to sleep:
14.7 CAB REG INLET vlv (two) – CL

RESET C&W LIMITS

PARAMETER NAME	C/W CH	H/W C/W HI V	ENA/ INH	PARA ID	B/U C/W HI EU
PPO2 A	34	3.60		0612511	3.60
PPO2 B	44	3.60		0612513	3.60

Pen and Ink PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS) to perform this procedure each sleep period if necessary

ECLS FRP-2 POST-FIRE CABIN CLEANUP CONTINUATION

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 > 2.1 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 > 2.1, HCL > 1.0, or CO > 18 ppm for any CSA-CP reading:

2. If ATCO canister not yet installed, CO > 18 and HCL < 5 ppm:
Install ATCO (in place of one LiOH canister)
 3. √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 (2.1) ppm, HCL > 2.0 (1.0) ppm, *
 - * CO < 20 (18) ppm if at 14.7 (8.0) psia *
12. If symptoms experienced prior to donning QDM/visor, QDM/visor may be doffed only if all crewmembers are symptom free for > 10 min
13. If QDM/visor flow must continue and/or CABIN O2 CONC ≥ 25.9%, perform FIRE/HAZ SPILL O2 CONTROL, ECLS FRP-3

ECLS FRP-2 (Cont)

ON MCC CALL BACKOUT STEPS:

- WCS 14. COMMODE CNTL – OFF (BACK/DN)
- MD44F 15. Pin Cab temp cntl act link – PRI(SEC)
- L1 16. CAB TEMP CNTLR – 1(2)
- 17. SMOKE DETN SNSR – RESET
- 18. Report used LiOH cans to MCC

When Av Bay has been purged for 7 hr:

- 19. Disconnect Y/Y Hose from Vacuum Vent QD
- 20. Remove Free Fluid Nozzle from Av Bay fire port
- 21. Disconnect Free Fluid Nozzle from Y/Y hose
- 22. Stow in Cont Hose & Cable Kit:
 - Free Fluid Nozzle
 - 20-ft Y/Y Hose
 - Gray Tape

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 PSI

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

- \sqrt 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, \sqrt 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 INITIATE CABIN AIR SCRUBBING
1. MODE – COMMODE/MANUAL/EMU
 2. COMMODE CNTL – PULL UP (wait 15 sec)
– PUSH FWD
- L1
3. H2O PUMP LOOP 1 – ON
 4. LOOP 2 BYPASS MODE – MAN
 5. 1,2 BYP MAN (two) – DECR (hold 30 sec each)
 6. CAB TEMP CNTLR – OFF
Pin Cab temp cntl act link – FULL COOL
- MD44F
LiOH
Box
7. Install ATCO and one fresh LiOH canister
- L1
8. CAB FAN A, B (two) – ON
- EXT A/L
9. Connect external A/L halo inlet flex duct to halo inlet with T-handle clamp
 10. As required, all crewmembers change into long pants and long sleeve shirts and don gloves

SM SYS SUMM 1

When 'S78 CABIN O2 CONC'

- CRT
11. If QDM flow must continue and S78 CABIN O2 CONC \geq 25.9%, perform FIRE/HAZ SPILL O2 CONTROL, ECLS FRP-3

CM2 AMMONIA DETECTION KIT PREPARATION

12. Unstow AMMONIA DETECTION KIT
13. Remove both Draeger pumps and perform leak test using unbroken HI-Range Draeger tube in pump inlet. On both pumps, ensure the bellows do not expand and flow indicator remains black with inlet ports blocked (~1 min)
14. Reset stroke counter on both pumps
15. Stow one pump back inside kit. This pump will be used to verify doffing criteria sample at the end of the procedure

WARNING

Moisture droplets will produce a false low ppm if ingested into sample. Ensure Sample area is free from moisture droplets

HI-RANGE (0.5a) DRAEGER TUBE SAMPLING

16. Obtain HI-Range (0.5a) Draeger tube. Inspect to ensure tube has not reacted (yellow with no dark blue)
17. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
18. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
19. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
20. Repeat for a maximum of 10 strokes or until tube saturated; record results below and report to MCC

NOTE

Pump counter should be used as a backup only

Draeger Tube will change from yellow to dark blue in presence of Ammonia

Used tubes should be placed in dry trash

21. Repeat Draeger tube sampling every 30 min or on MCC call

Sample #	1	2	3	4	5	6	7	8	9	10
MET	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
Reading after 10 strokes										
or										
Stroke # when tube saturated										

22. When tube reads \leq 0.5 (500 ppm) after 10 strokes, immediately obtain another HI-Range sample to verify result
23. If second reading $>$ 0.5 (500 ppm), repeat step 21
24. If second reading \leq 0.5 (500 ppm), continue to step 25

ECLS FRP-5 (Cont)

MED-RANGE (5a) DRAEGER TUBE SAMPLING

25. Wait 30 min from last HI-Range reading, then continue
26. Obtain MED-Range (5a) Draeger tube. Inspect to ensure tube has not reacted (yellow with no dark blue)
27. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
28. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
29. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
30. Repeat for maximum of 10 strokes or until tube saturated; record results below and report to MCC
31. Repeat Draeger tube sampling every 30 min or on MCC call

Sample #	1	2	3	4	5	6	7	8	9	10
MET	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
PPM after 10 strokes										
or										
Stroke # when tube saturated										
Sample #	11	12	13	14	15	16	17	18	19	20
MET	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
PPM after 10 strokes										
or										
Stroke # when tube saturated										

32. When ppm \leq 20 after 10 strokes, immediately obtain another MED-Range sample to verify result
33. If second reading $>$ 20, repeat step 31
34. If second reading \leq 20, continue to step 35

NOTE

LO-Range Draeger tubes are calibrated for 5 strokes

LO-RANGE (2a) DRAEGER TUBE SAMPLING

35. Wait 15 min from last MED-Range reading, then continue
36. Obtain LO-Range (2a) Draeger tube. Inspect to ensure tube has not reacted (yellow with no dark blue)
37. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
38. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
39. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
40. Repeat for a maximum of 5 strokes or until tube saturated; record results below and report to MCC
41. Repeat Draeger tube sampling every 30 min or on MCC call

Sample #	1	2	3	4	5	6	7	8	9	10
MET	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
PPM after 5 strokes										
or										
Stroke # when tube saturated										

42. When ppm \leq 10 after 5 strokes, immediately obtain another LO-Range sample to verify result
43. If ppm $>$ 10, repeat step 41
44. When ppm \leq 10 and on MCC GO, continue to step 45

NOTE

~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

TERMINATE O2 CONTROL AND REPRESS

Exit ECLS FRP-3; terminate O2 control and repress using the following:

- | | |
|--------|---|
| AW82B | 45. \checkmark AIRLK DEPRESS vlv – CL, \checkmark cap installed |
| L2 | 46. O2/N2 CNTLR VLV SYS 1 – AUTO
2 – OP (N2) |
| MDDK | 47. CAB PURGE vlv – 0 |
| Floor | ISOL VLV – CL |
| Near | |
| Ladder | |
| MO10W | 48. 14.7 CABIN REG INLET SYS 1, 2 (two) – OP |

ECLS FRP-5 (Cont)

SM 66 ENVIRONMENT

CRT

When CABIN PRESS > 14 psi

49. Obtain alternate Draeger pump and LO-Range (2a) Draeger tube from kit. Inspect to ensure tube has not reacted (yellow with no dark blue)
50. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
51. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
52. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
53. Repeat for a maximum of 5 strokes or until tube saturated; record results below and report to MCC

Sample #	1	2	3	4	5	6	7	8
MET	: :	: :	: :	: :	: :	: :	: :	: :
PPM after 5 strokes								
or								
Stroke # when tube saturated								

54. If ppm > 10, repeat steps 49-53 in 15 min or MCC call

WARNING

If any crewmember exhibits adverse symptoms when QDMs doffed, have affected crewmember don QDM immediately. Symptoms could include irritation of the eyes, nose, throat, skin

Anytime emergency exposure: 100ppm
 1 hour exposure: 30ppm
 24 hour exposure: 20ppm
 7 day exposure: 10ppm

55. If ppm ≤ 10, doff QDMs per CDR directed sequence

ON MCC CALL CABIN AIR SCRUBBING BACKOUT STEPS

WCS

56. COMMODE CNTL – PULL BACK
 – PUSH DOWN

MD44F
L1

57. Pin Cab temp cntl act link – PRI(SEC)
58. CAB TEMP CNTLR – 1(2)
 SEL – as reqd

LiOH
Box
L1

59. H2O PUMP LOOP 1 – GPC
60. H2O LOOP 2 BYPASS MODE – AUTO
61. Replace ATCO with a fresh LiOH canister
62. √CAB FAN A – ON
 B – OFF

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EPS

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EPS SSR

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The following msgs have support procedures in the ORB PKT, but not in this book:

- 'S69 FC REAC 1(2,3)↓'
- 'S69 FC PUMP 1(2,3)↓'
- 'S69 FC DELTA V 1(2,3)'
- 'S69 FC H2O RLF NOZ'
- 'S67 ESS BUS V 1BC(2CA,3AB)'
- 'S67 CNTL BUS V'
- 'S67 CNTL RPC'

The following msgs have no support procedures in this book or in ORB PKT C/L:

- 'S67 APC/ALC A(B,C)'
- 'S67 FPC/FLC 1(2,3)'
- 'S67 MPC 1(2,3)'
- 'S68 O2(H2) MANF VLV'
- 'S69 FC READY 1(2,3)'
- 'FC PURGE 1(2,3)'

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BFS FSM INDEX

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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

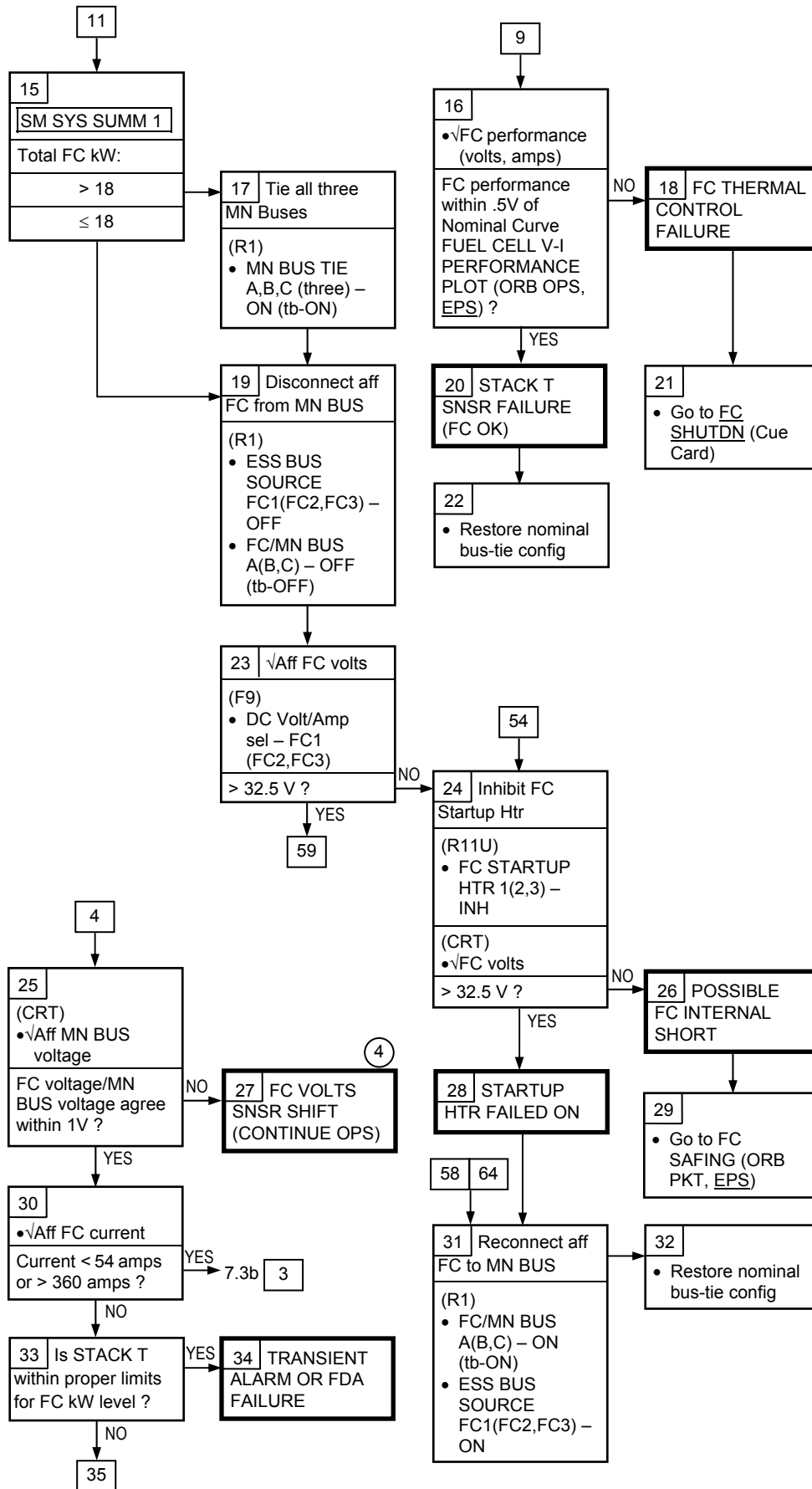
14 Restore nominal bus-tie config

- 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

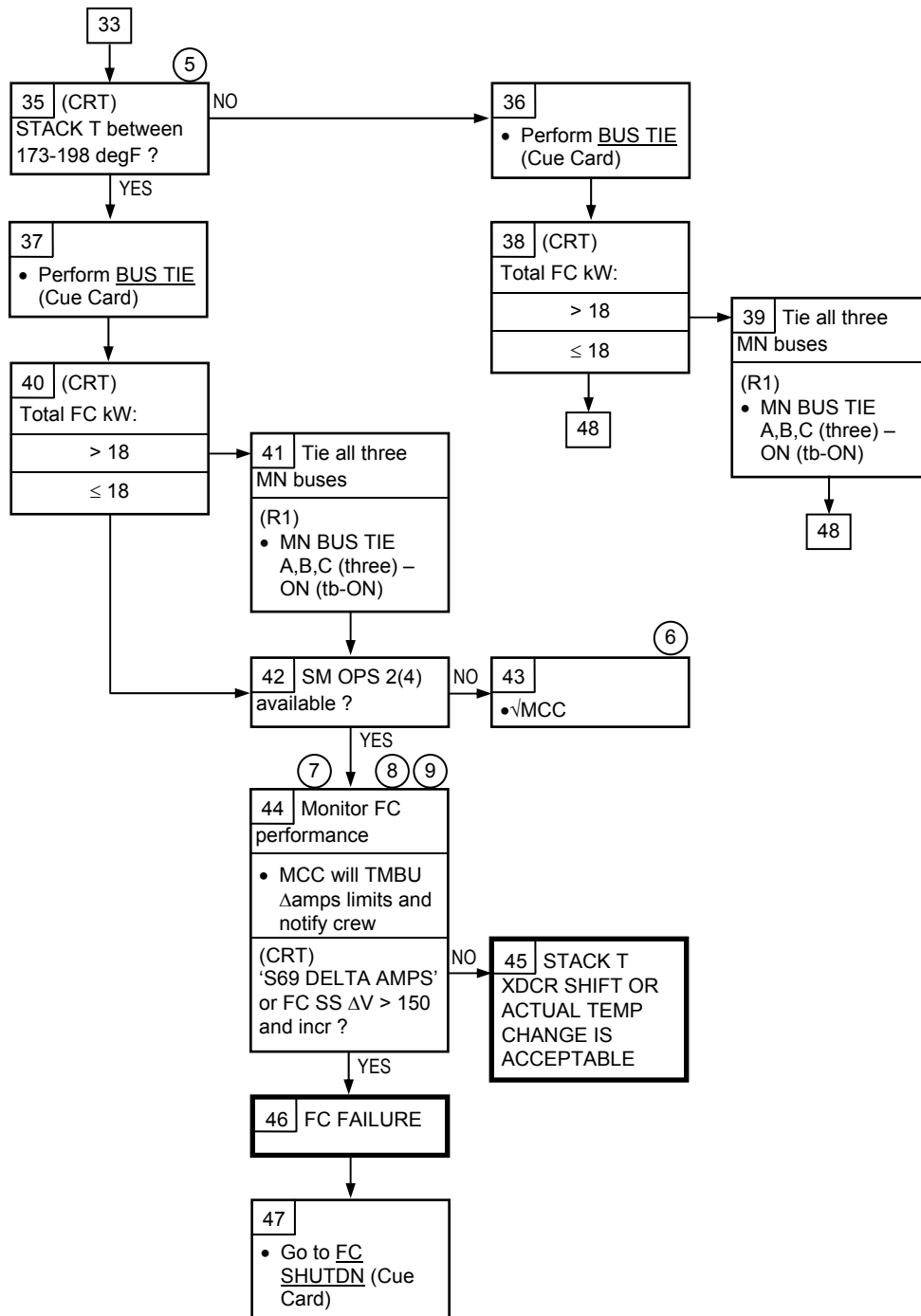
FC REAC/ PMP/STACK T
7.1

EPS 7.1b (Cont)



④ Loss of correct precondition check for STACK T FDA Class 3 limit set based on kW for this FC

EPS 7.1b (Cont)



⑤ This is the temp range that could result in low stack temp SM ALERT

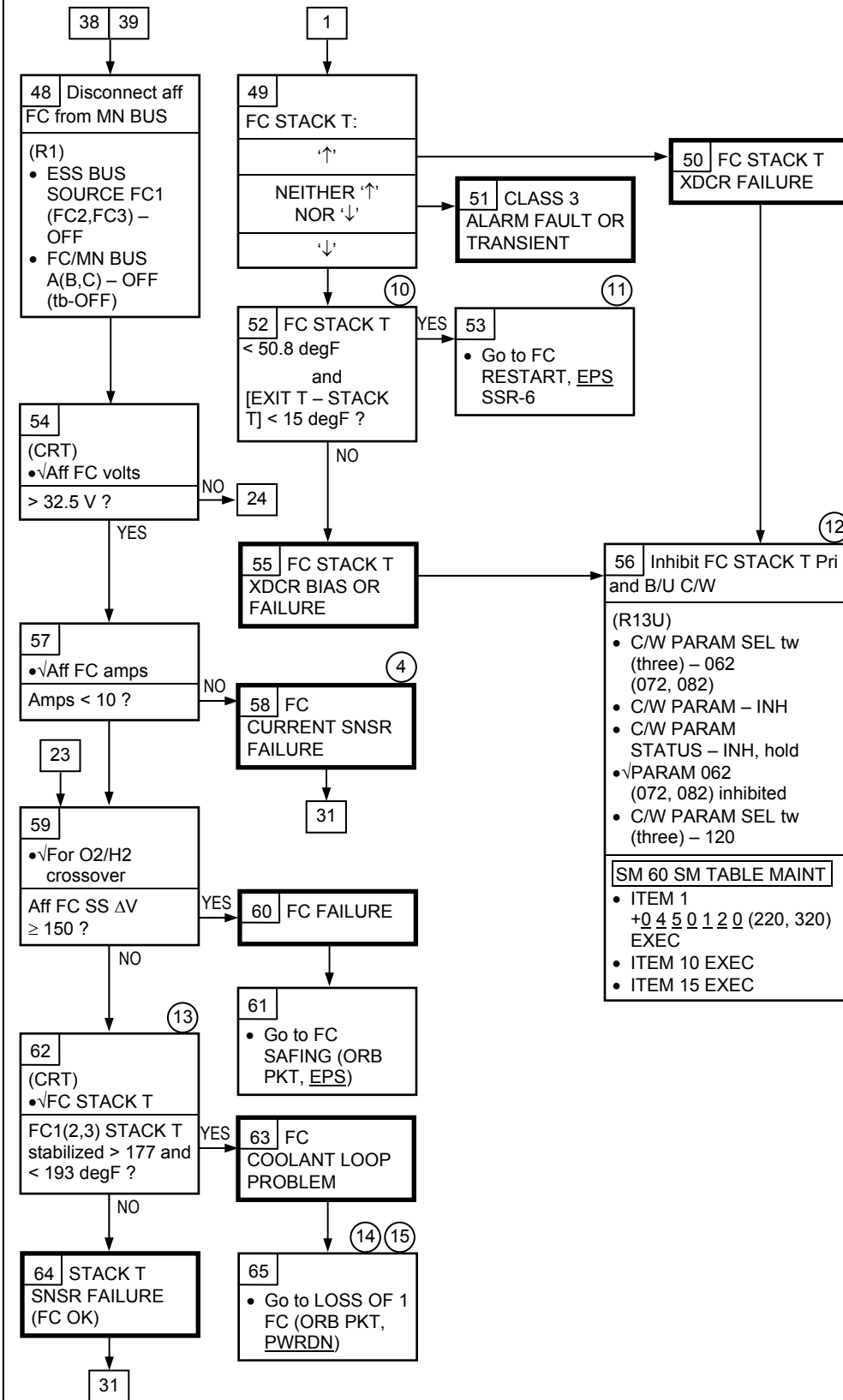
⑥ MCC will monitor FC performance by observing Δamps changes

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 pwrnd

⑮ Leave FC in STBY mode. MCC analysis may determine later need for FC shutdn

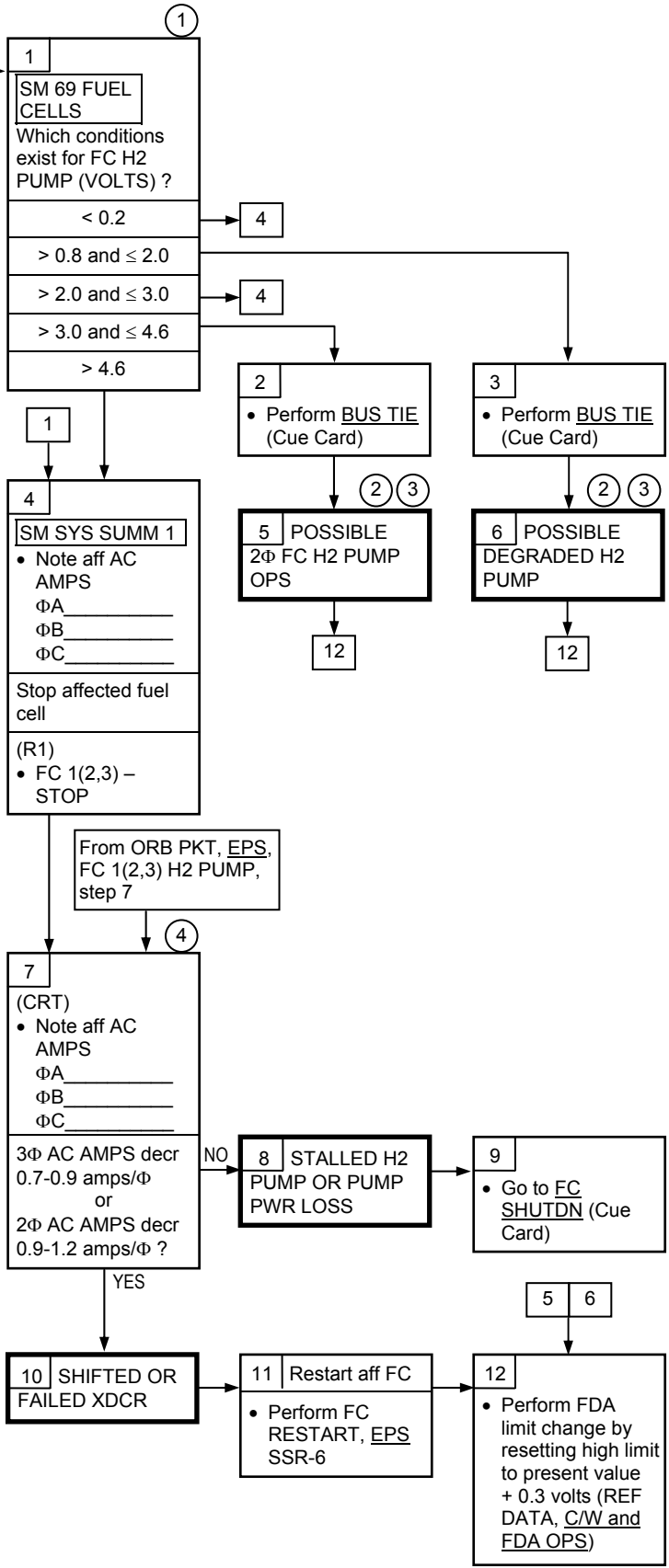
EPS

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 (1Φ cb open)	0.62	0.45	4.15-4.5
STALL	1.0	1.3	4.8

EPS

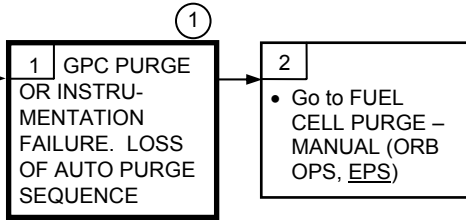
7.2b FC PURGE TEMP

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

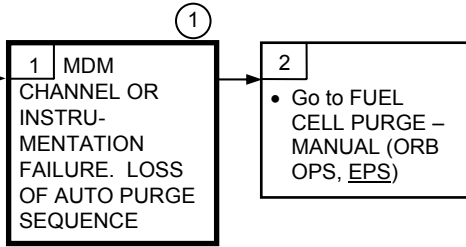
EPS

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

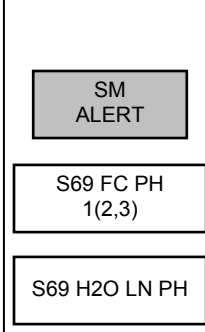
Nominal Config:
(R11U)
FC PURGE HTR – GPC



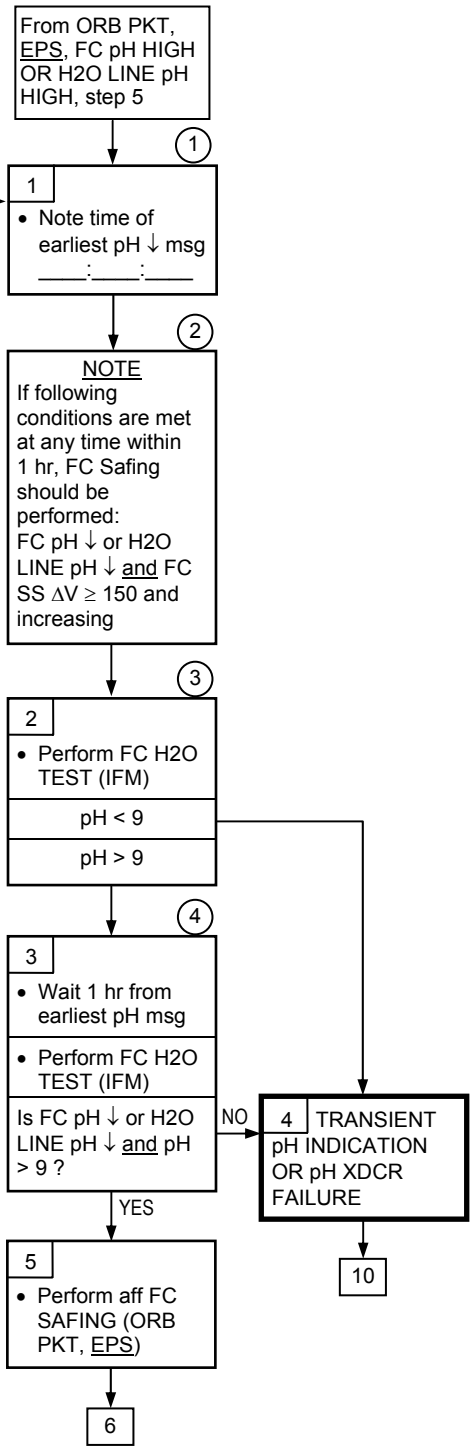
① If this alarm occurs: Purge vlv commanded closed. Purge line htrs are commanded OFF. May be verified by (R11U) FC GPC PURGE SEQ tb – bp

EPS

7.3a FC/H2O LINE pH HIGH



If:
pH high

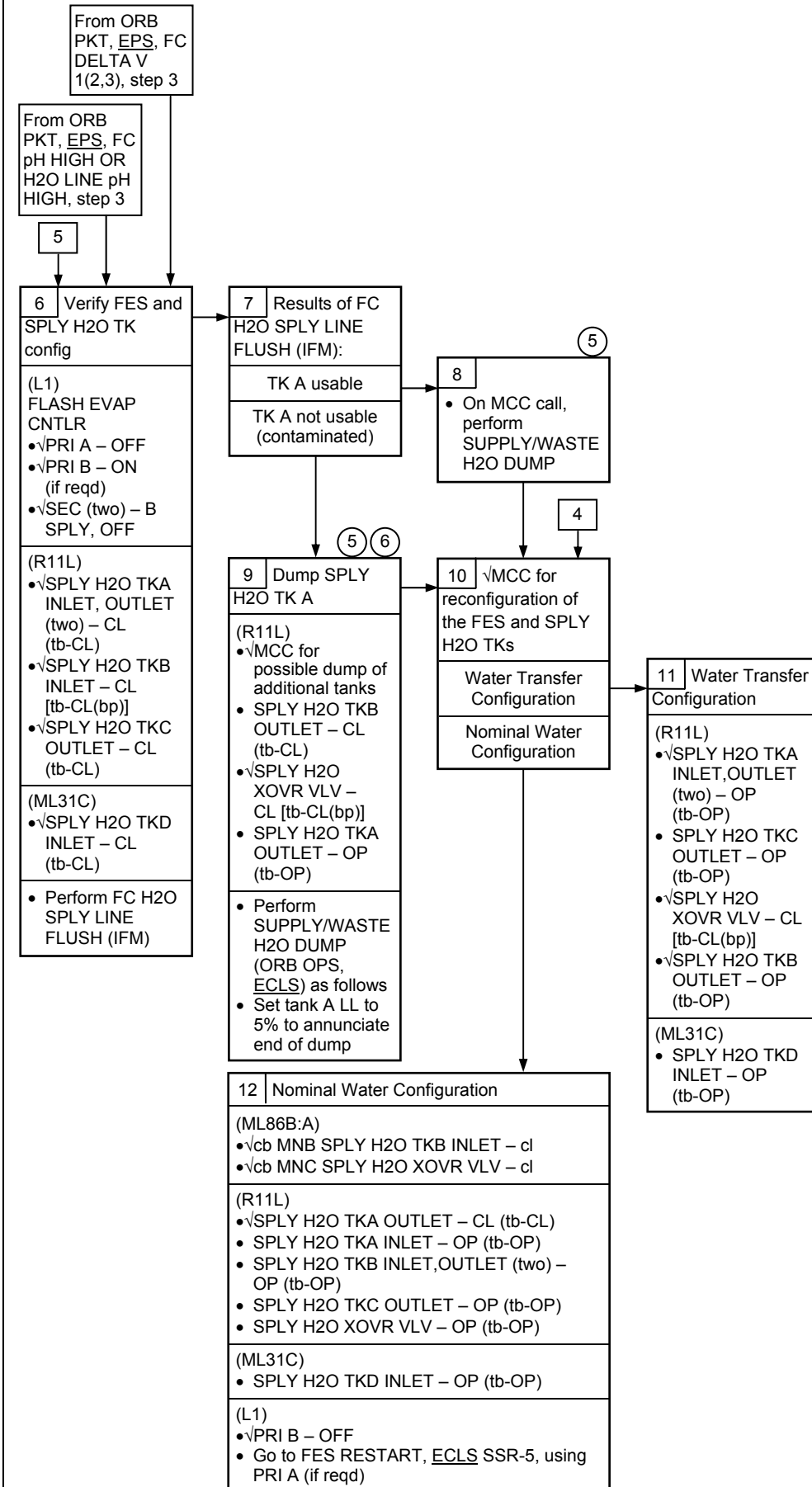


- ① After individual pH alarm, 10 min could elapse before H2O Line pH alarm activates
- ② FC health and performance will be monitored for 1 hr. If signs of FC flooding occur, FC Safing will be performed
- ③ May take as long as 20 min for aff FC H2O to reach galley QD
- ④ Waiting 1 hr may allow transient 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

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

9 (R13U)
• Determine which param triggered C/W ALARM

4 FC and MN Bus volts differ by > 1V ?
YES → 7
NO → 13

5 FC and MN Bus volts differ by > 1V ?
YES → 7
NO → 13

7 VOLTS SNSR FAILED

8 FC/MN BUS LIGHTLY LOADED

10 • Incr load to decr volts

11 SM 69 FUEL CELLS

Does FC AMPS (± 50) = O2 FLOW x 47.5 or FC AMPS (± 68) = H2 FLOW x 377 ?

12 FC AMP SNSR FAILURE

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

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

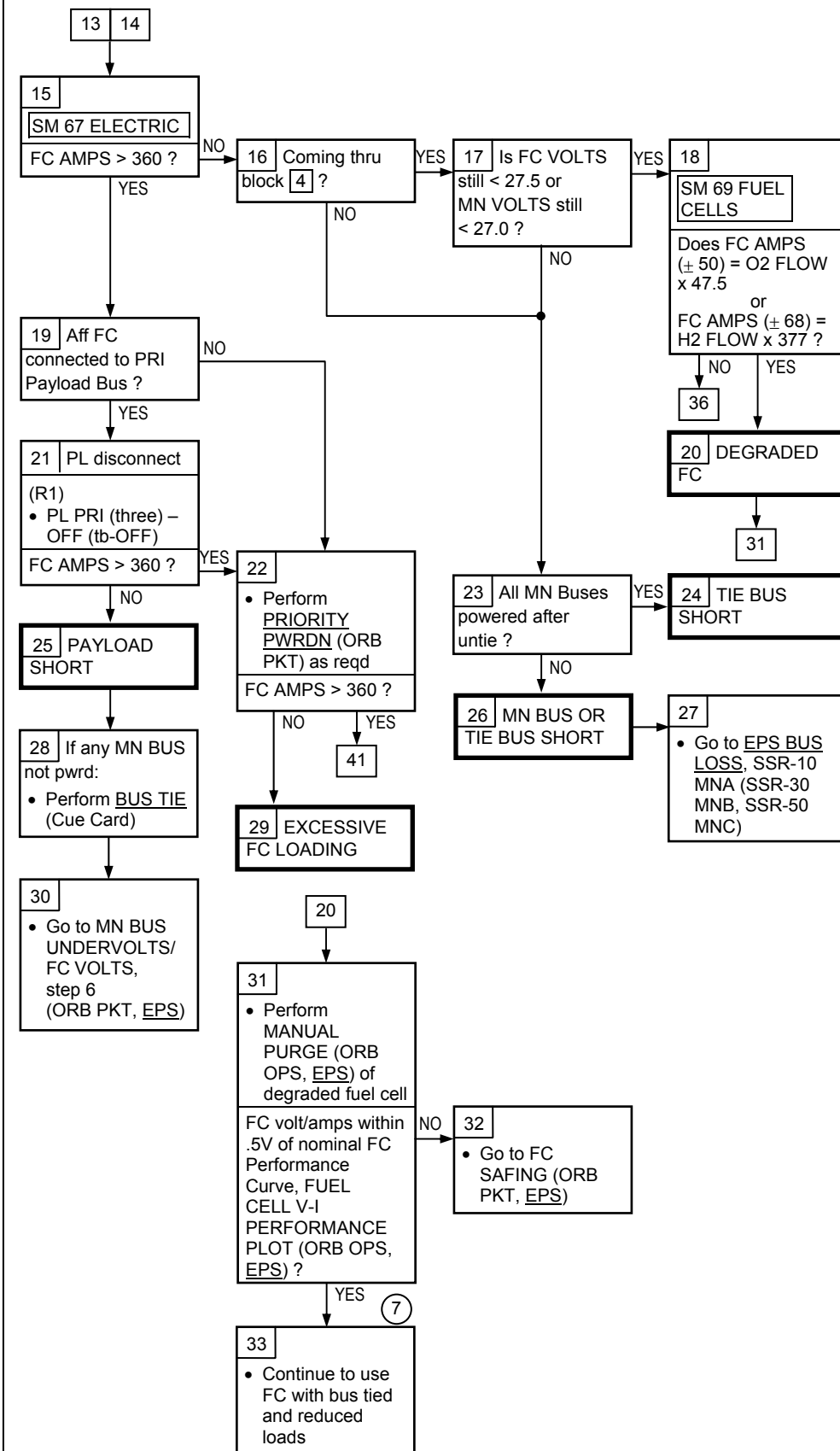
④ Consult MCC for powerup

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

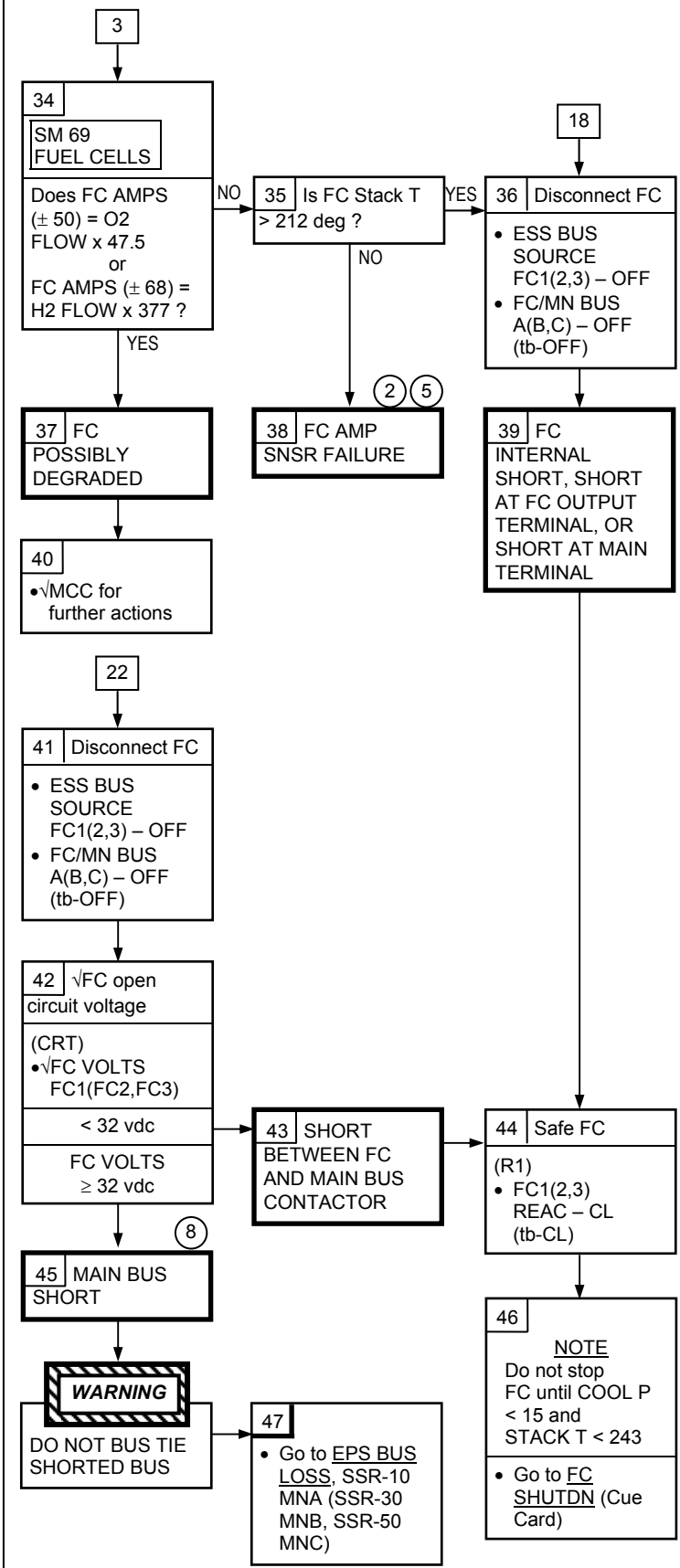
Nominal Config:
(Cont)
(O13:E)
PL PRI FC3 – OFF (tb-OFF)
PL PRI MNB – OFF (tb-OFF)
PL PRI MNC – ON (tb-ON)
If FC operating:
(R1)
FC/MAIN BUS A(B,C) – ON (tb-ON)
FC1(2,3) REAC (six) – OP
If FC shutdn:
Aff FC/MN BUS – OFF (tb-OFF)
Aff FC REAC (two) – CL

EPS 7.3b (Cont)



⑦ MCC analysis reqd before increasing loads on FC

EPS 7.3b (Cont)

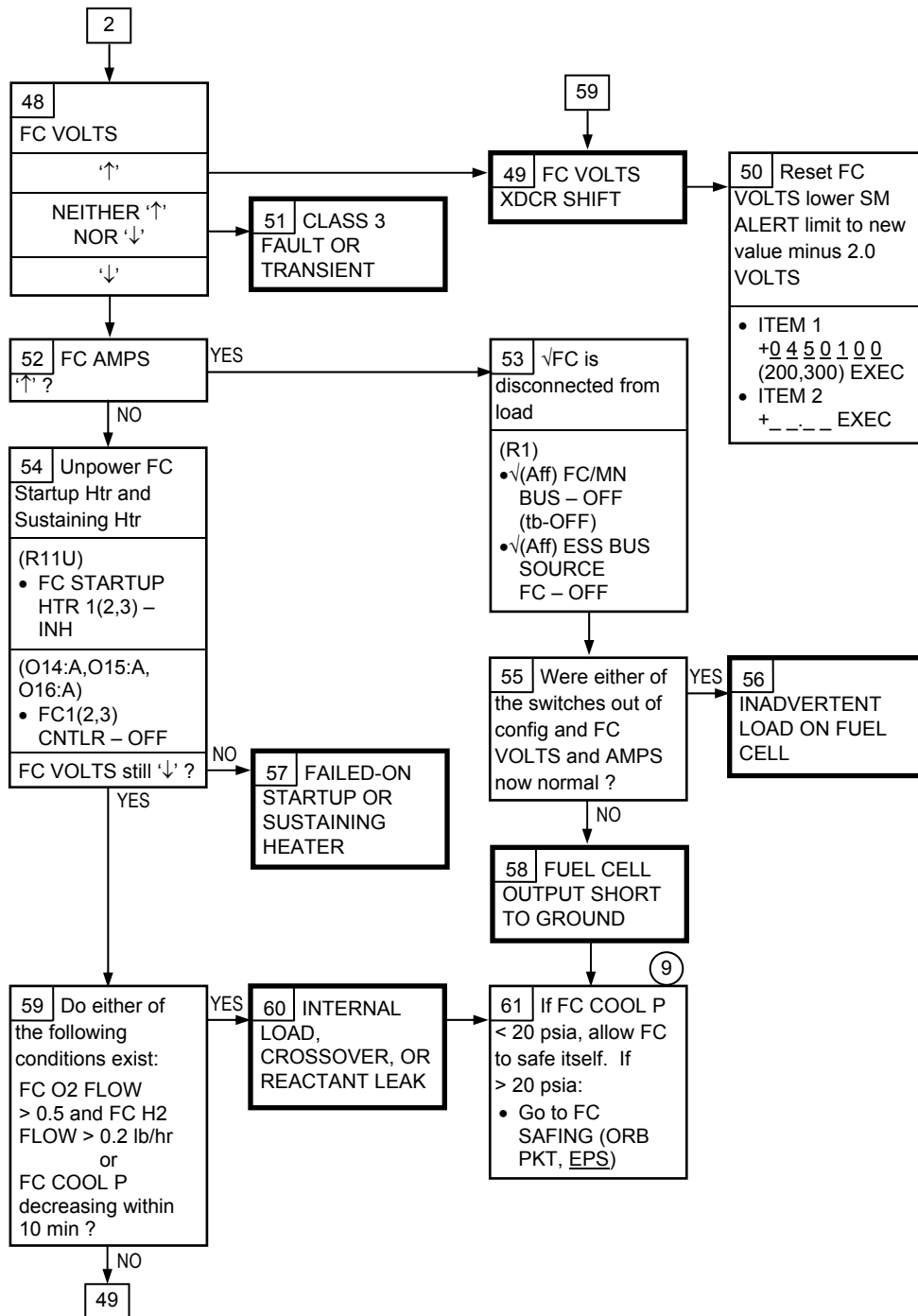


② FC Stack Temp Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU. Class 2 FDA still exists

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

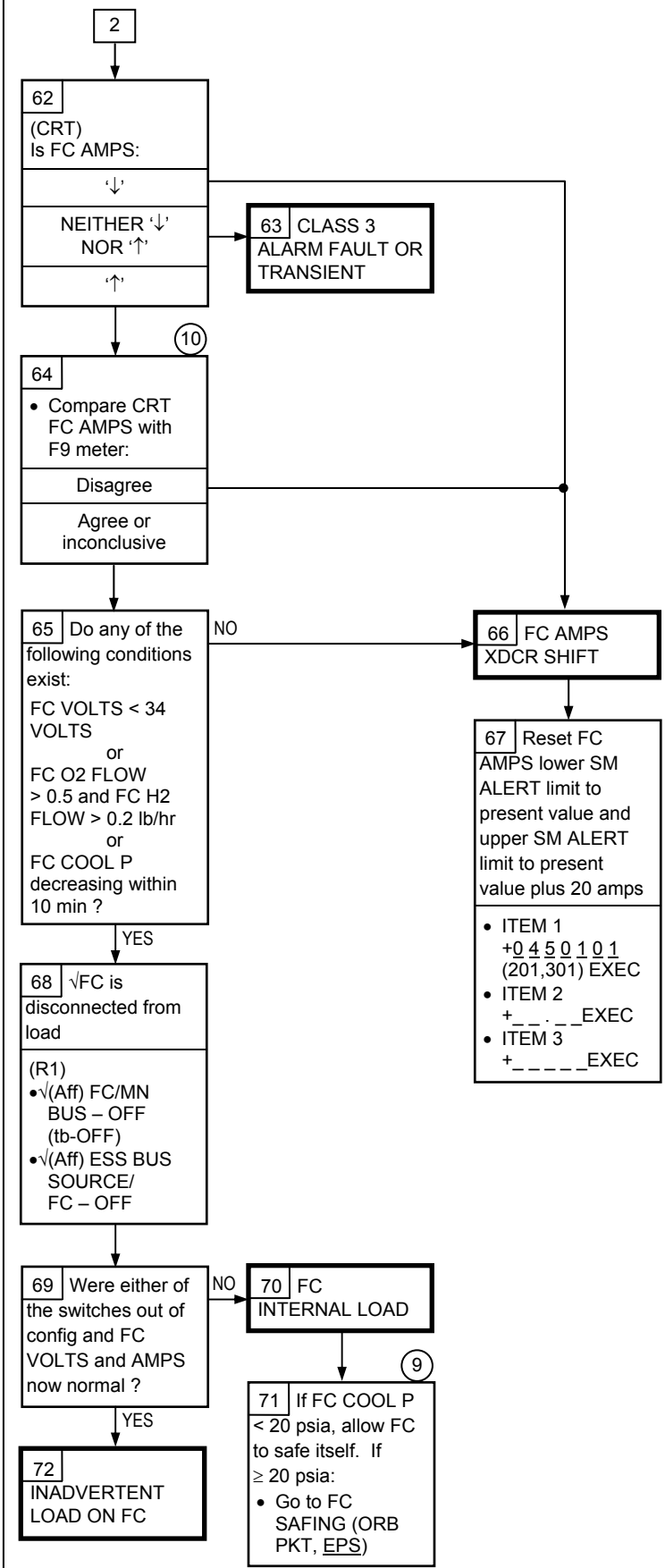
⑧ Short on MN BUS causes FC loss. For loss of MNC, FC3 pumps will be pwr'd with AC Transfer Cable and FC3 pwr will be supplied to MNB through PL pwr contactors

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)

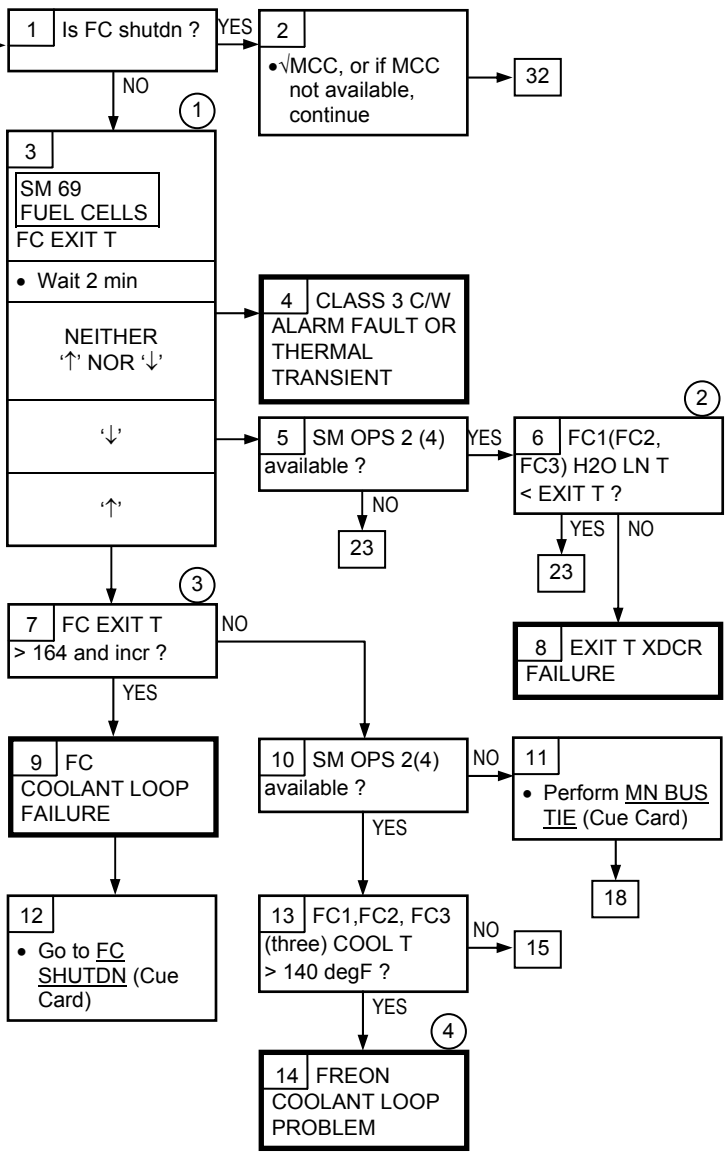
BFS

SM1 FC EXIT T 1(2,3)

If FC operating and Exit T(condenser) < 131 degF > 164 degF

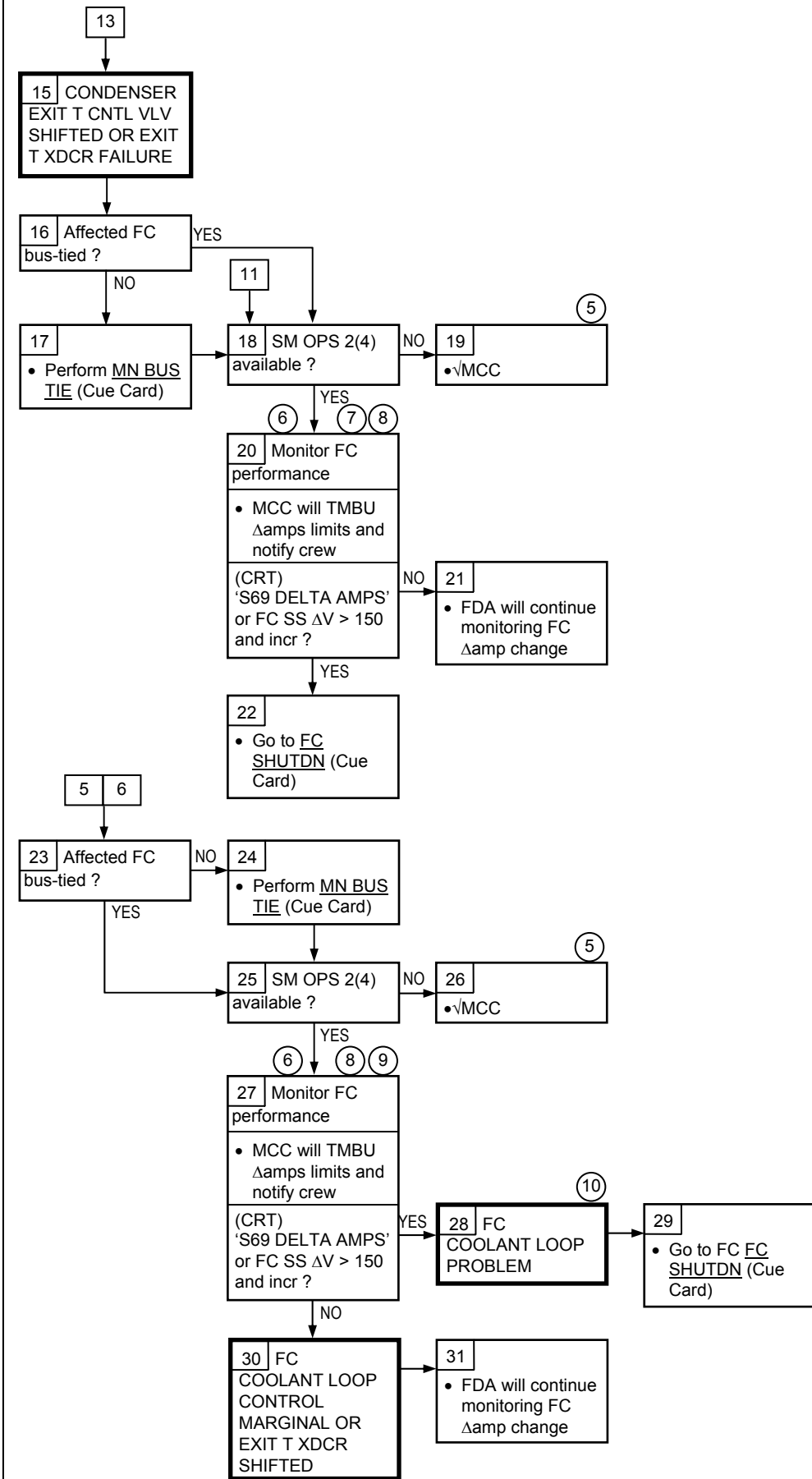
If FC shutdn and Exit T > 164 degF or < 50.8 degF

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



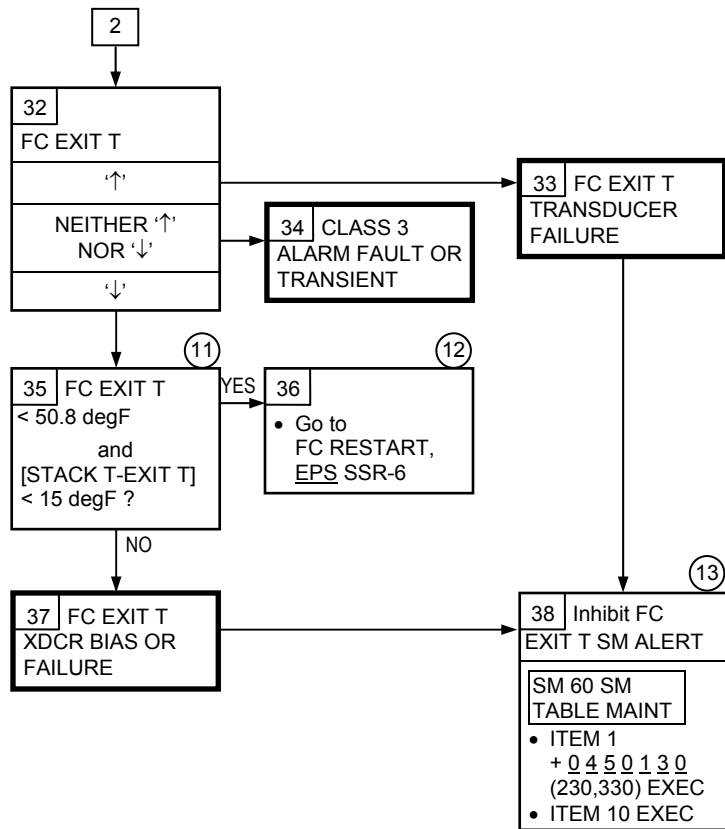
- ① Transient loads may cause EXIT T < LN T for up to 2 min
- ② Data indicates H2O LN T < EXIT T by up to 15 degF
- ③ FC EXIT T will quickly increase to FC STACK T if CONDENSER COOLANT FLOW is stopped while H2 PUMP is operational. FC should be quickly shutdn for possible Coolant Pump failure
- ④ √MCC

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

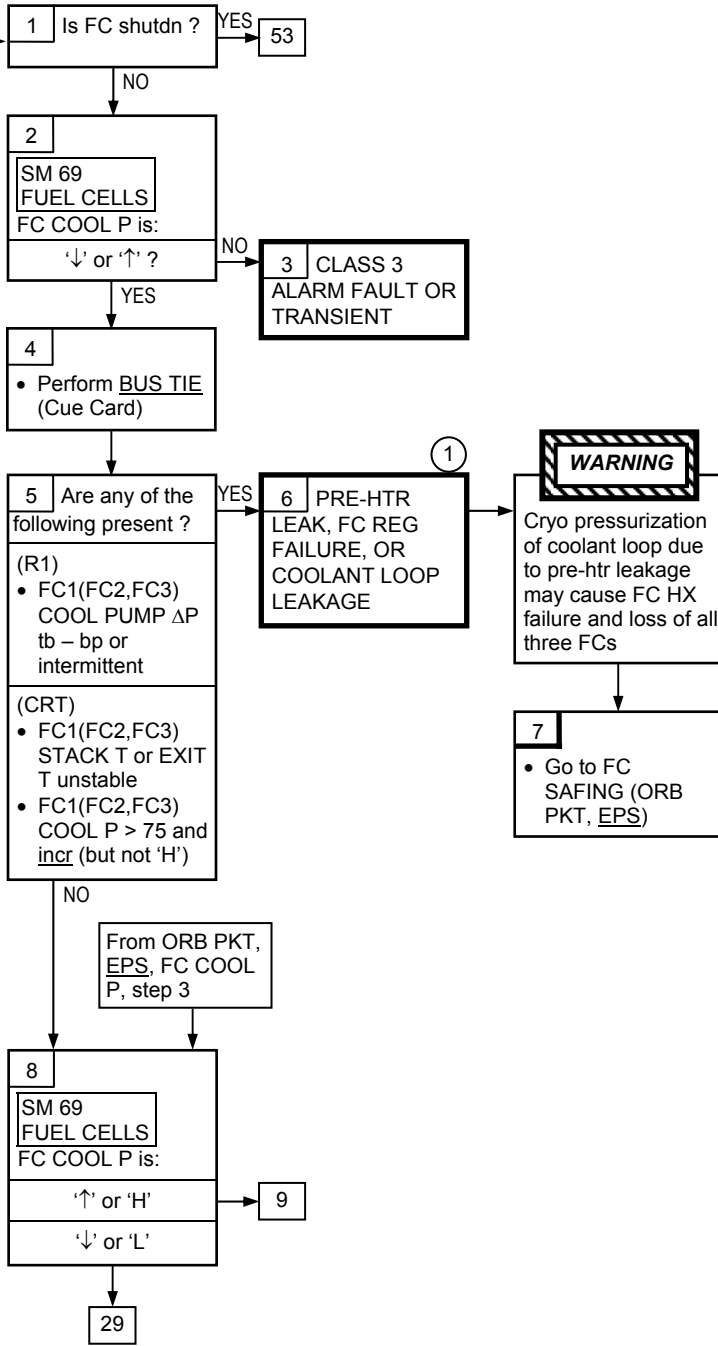
7.3e FUEL CELL COOL P ↑↓

S69 FC COOL P 1(2,3)

BFS

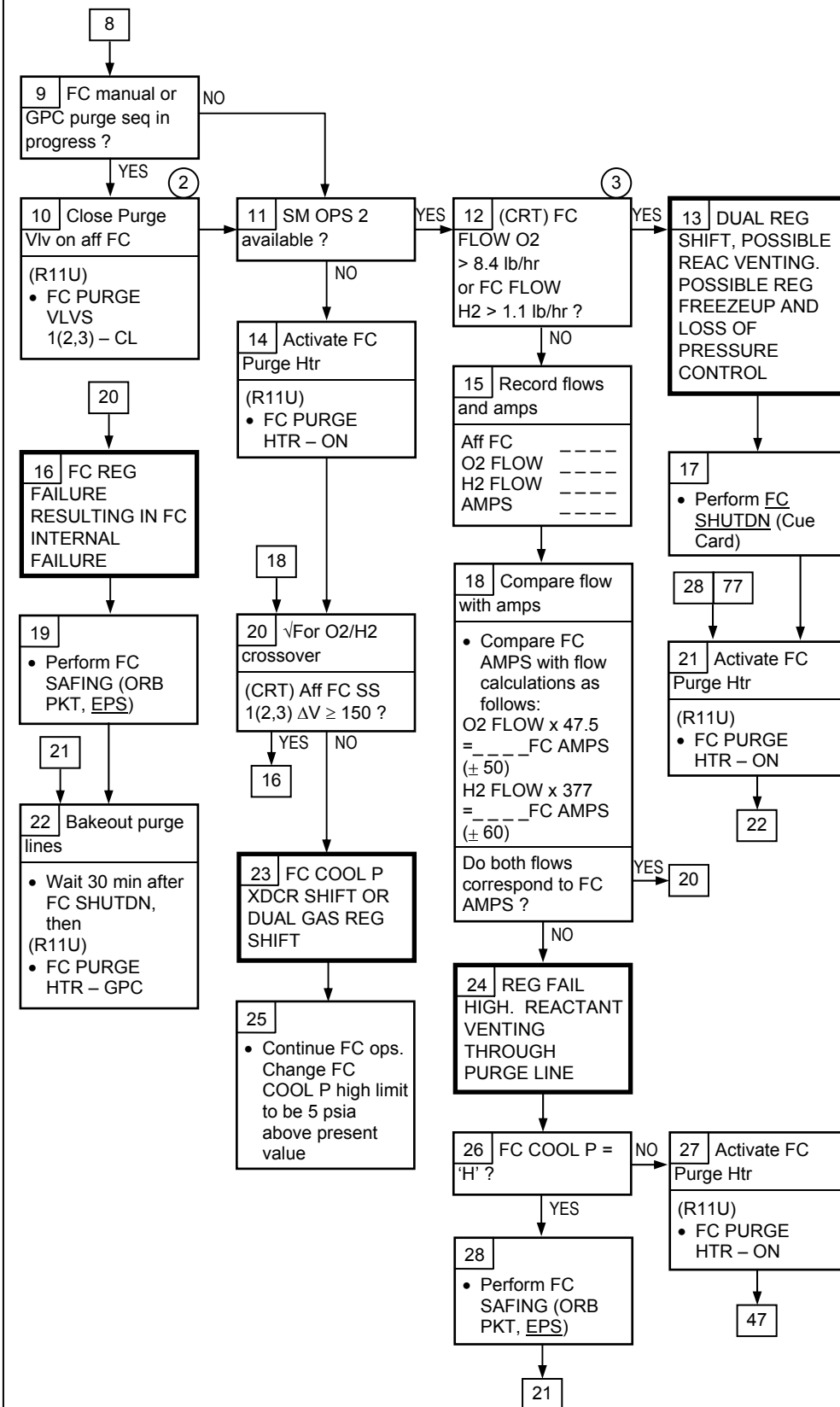
SM1 FC COOL P 1(2,3)

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

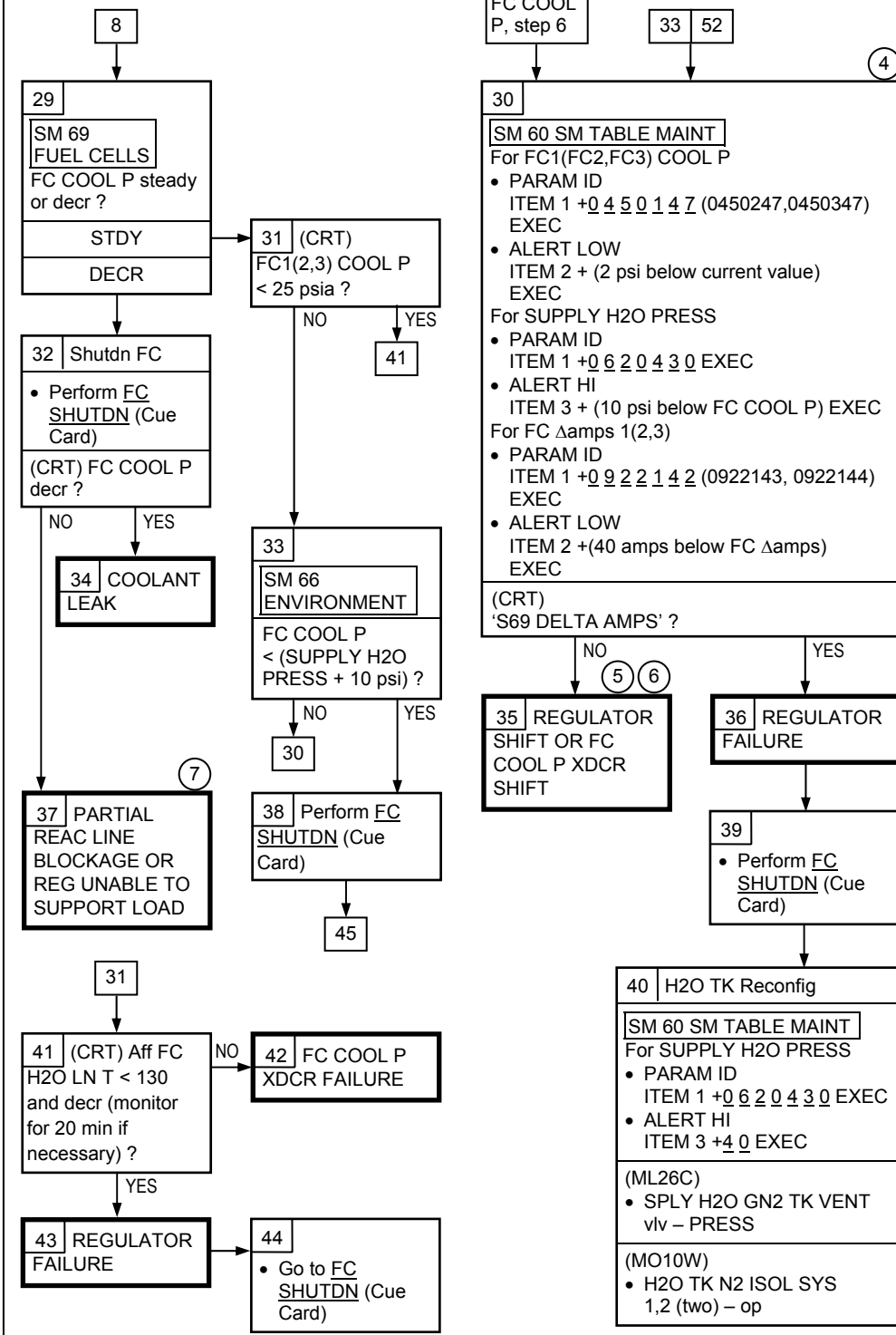
EPS 7.3e (Cont)



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

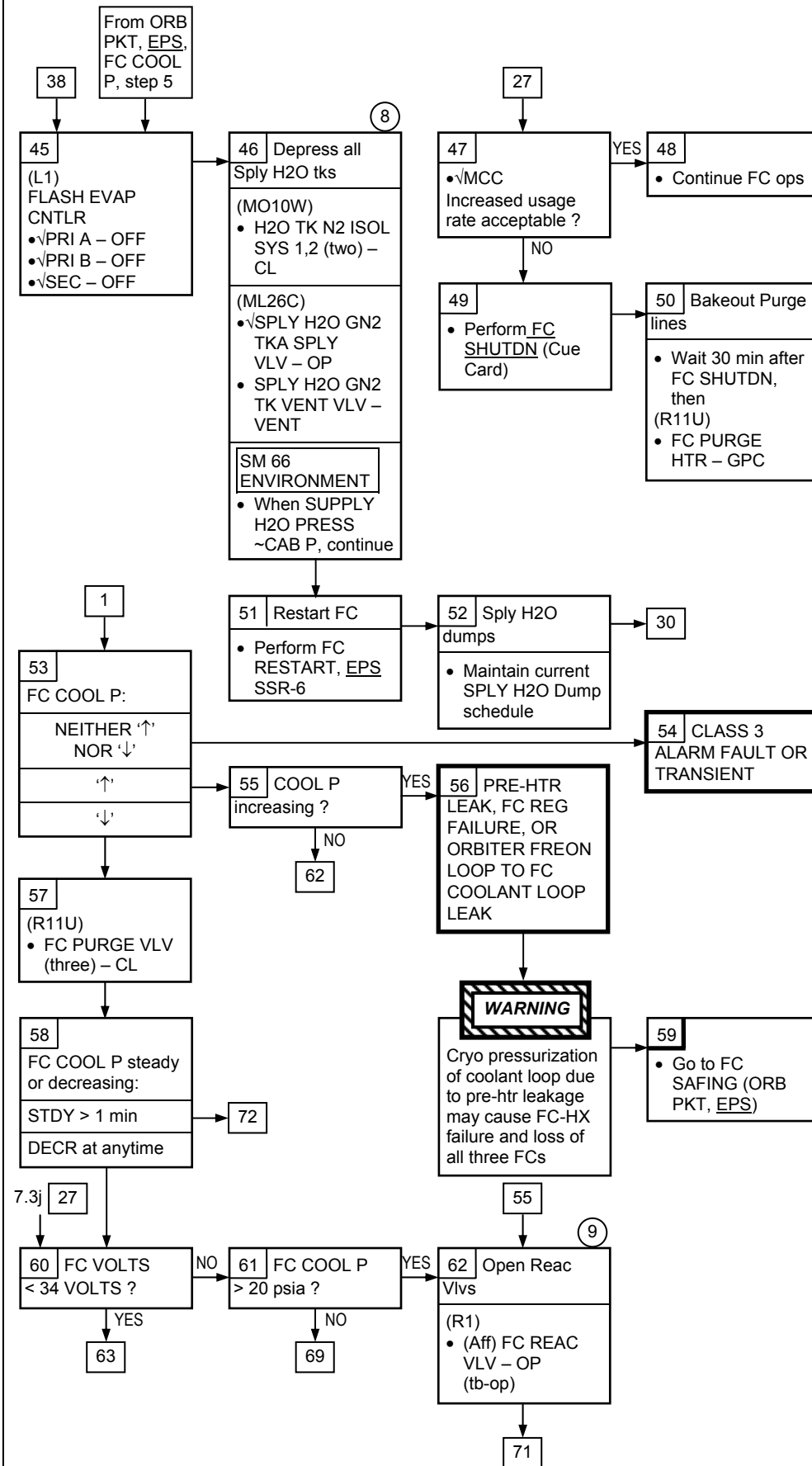
③ Flows correspond to 10 kW (~350 amps) load on FC plus flow sensor accuracy

EPS 7.3e (Cont)



- 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

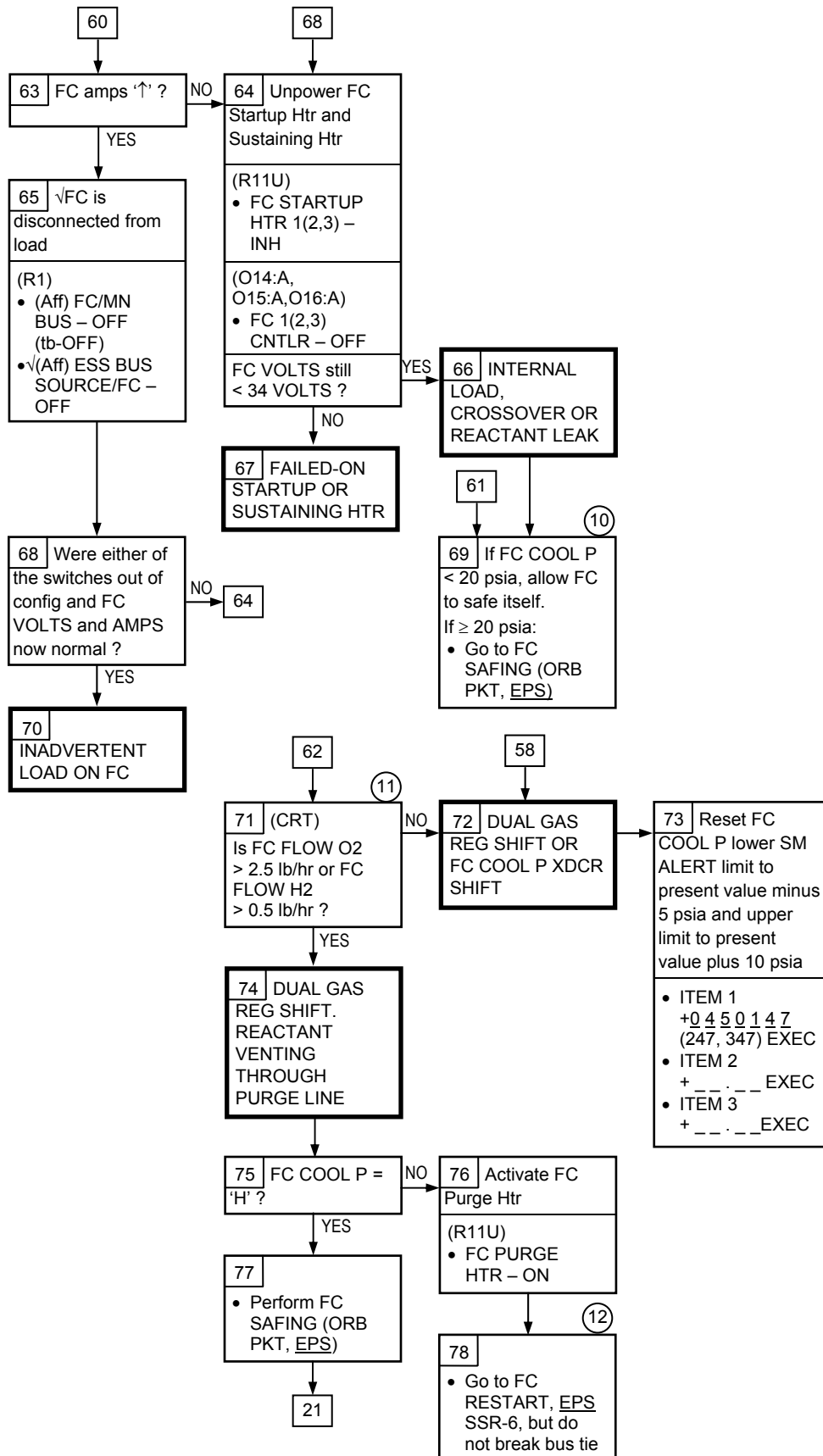
EPS 7.3e (Cont)



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

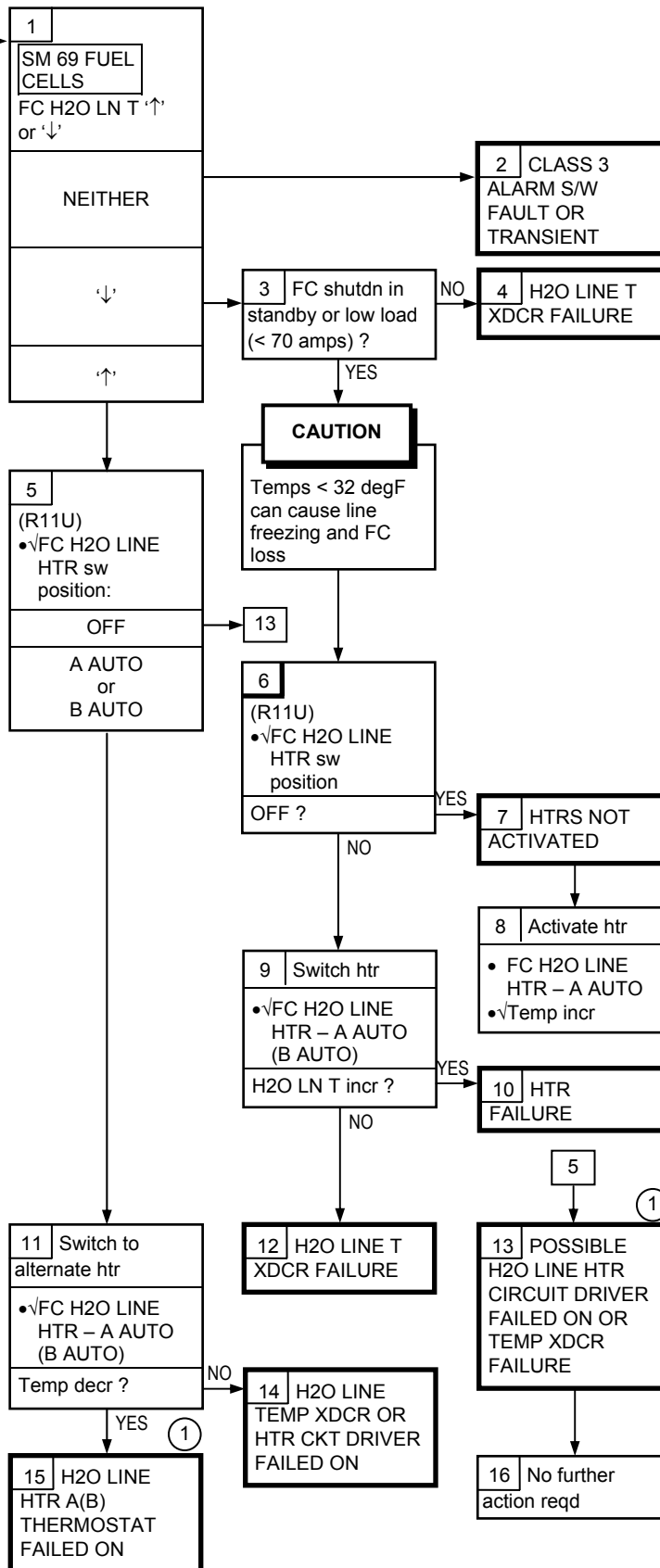
EPS

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)

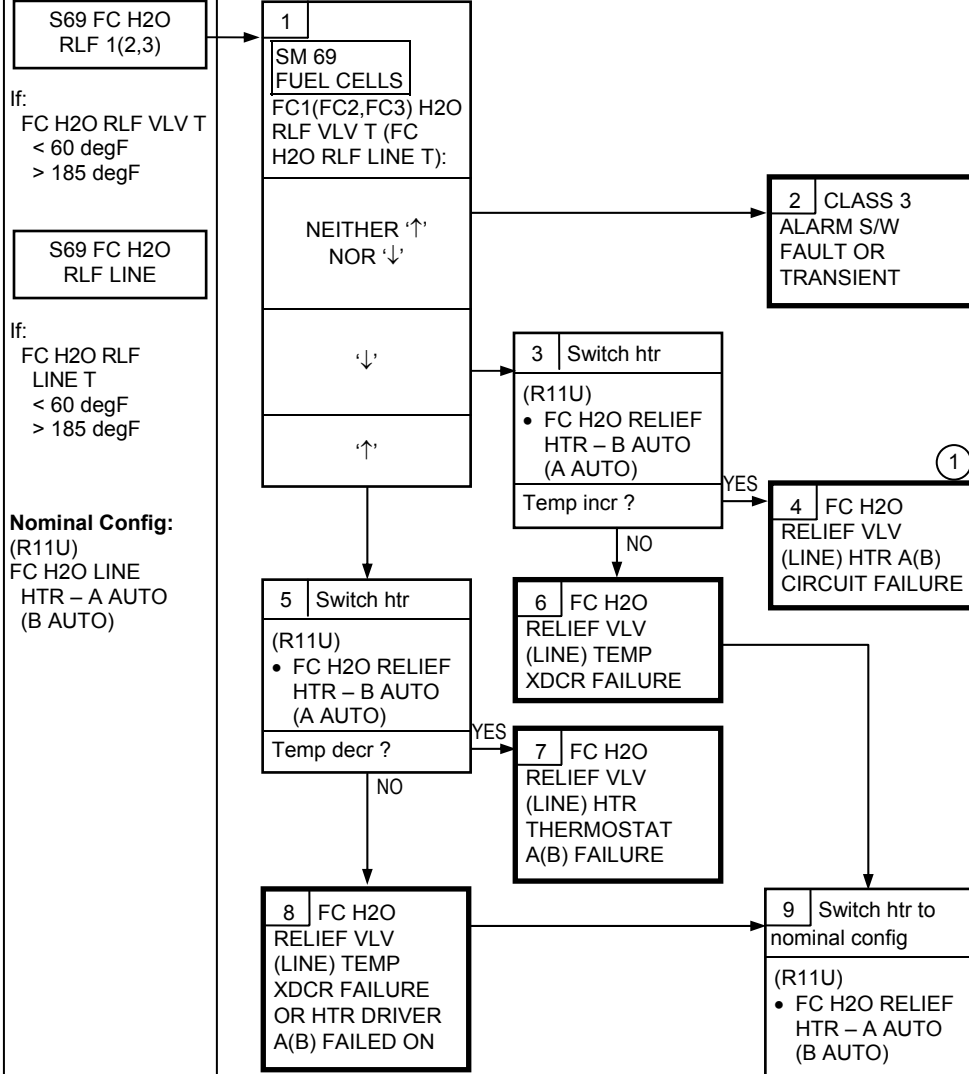


① Overtemp caused by driver or thermostat failure will only occur if FC shutdn in standby, or lightly loaded. Failure at normal loads not detectable

EPS

**7.3g FUEL CELL H2O RLF VLV T ↑↓
FUEL CELL H2O RLF LINE T ↑↓**

① Switching htrs isolated failed circuit



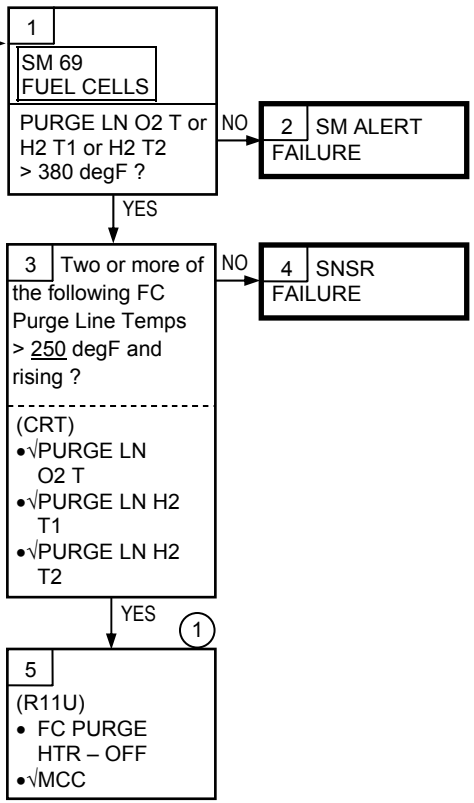
EPS

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)

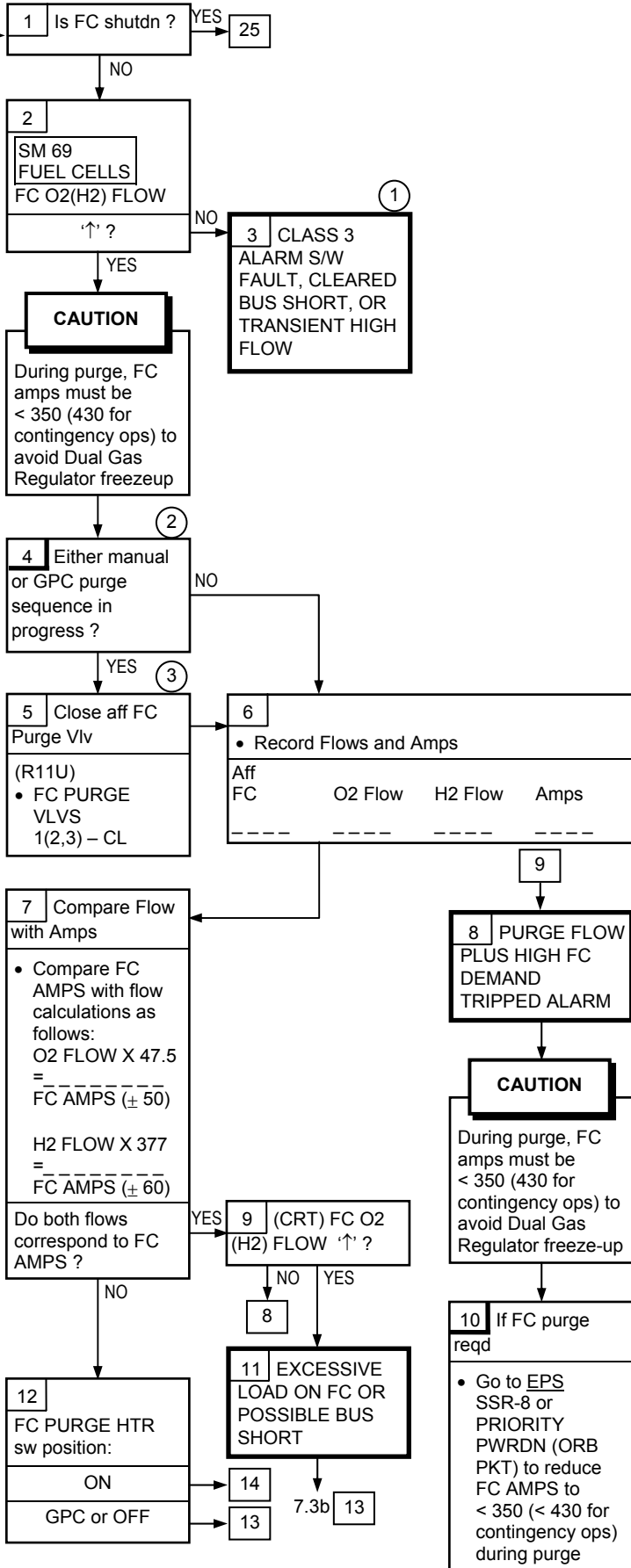
S69 FC H2 FLOW 1(2,3)

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

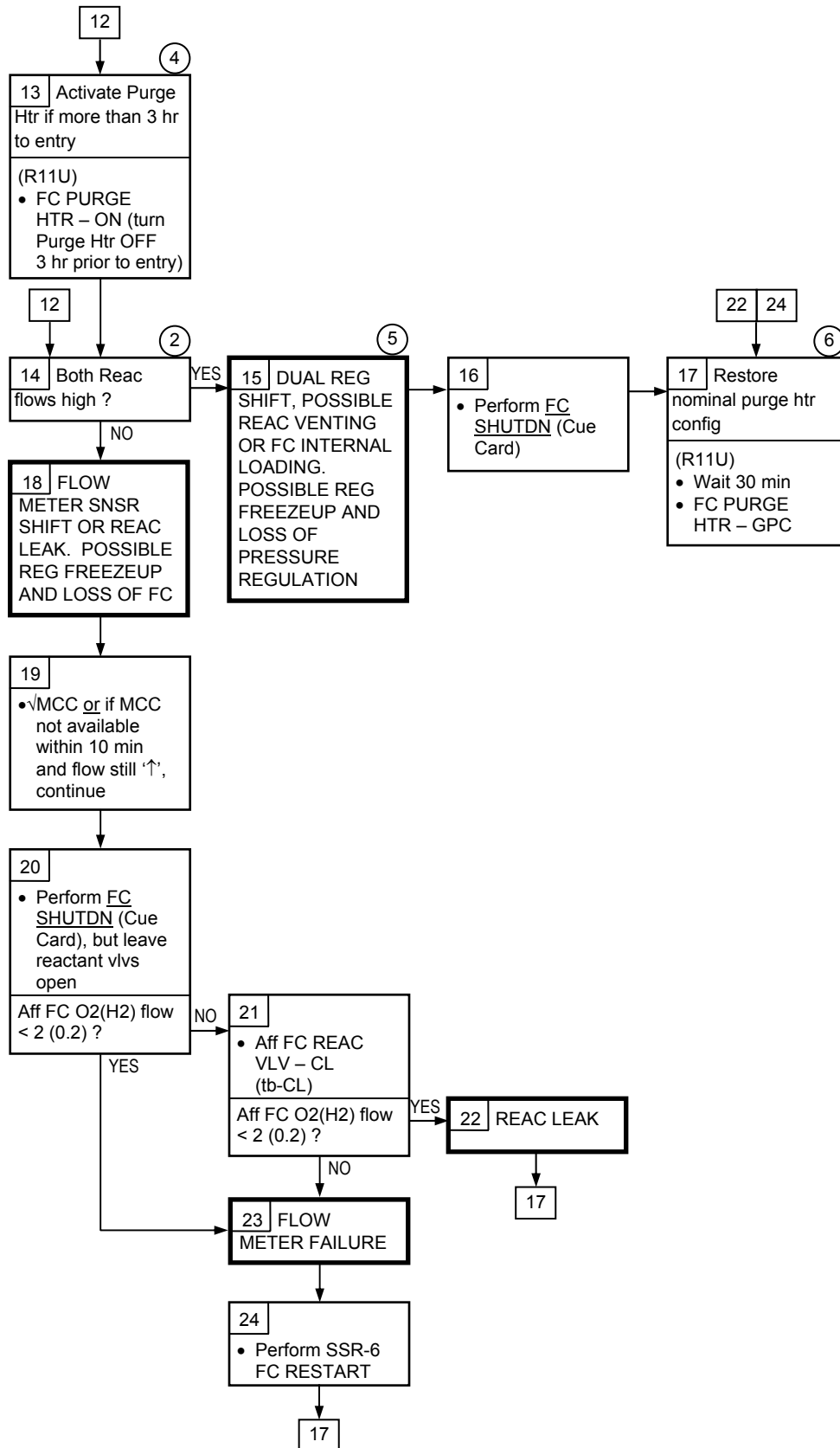


① If bus short caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications

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)

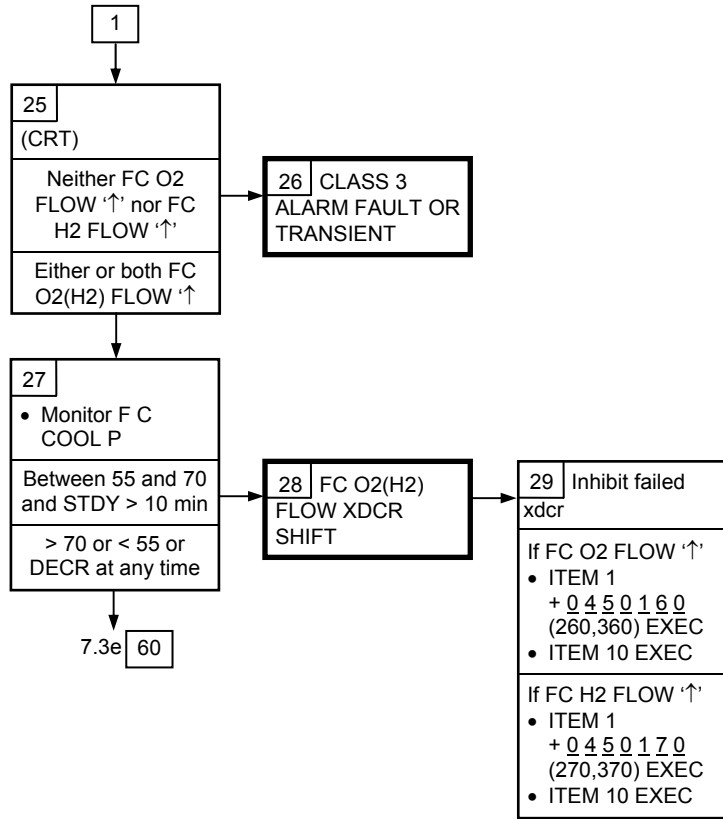


(2) If FC purge in progress, alarm may have tripped because of normal load plus purge flow. If one flowmeter previously failed, assume both flows high

(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

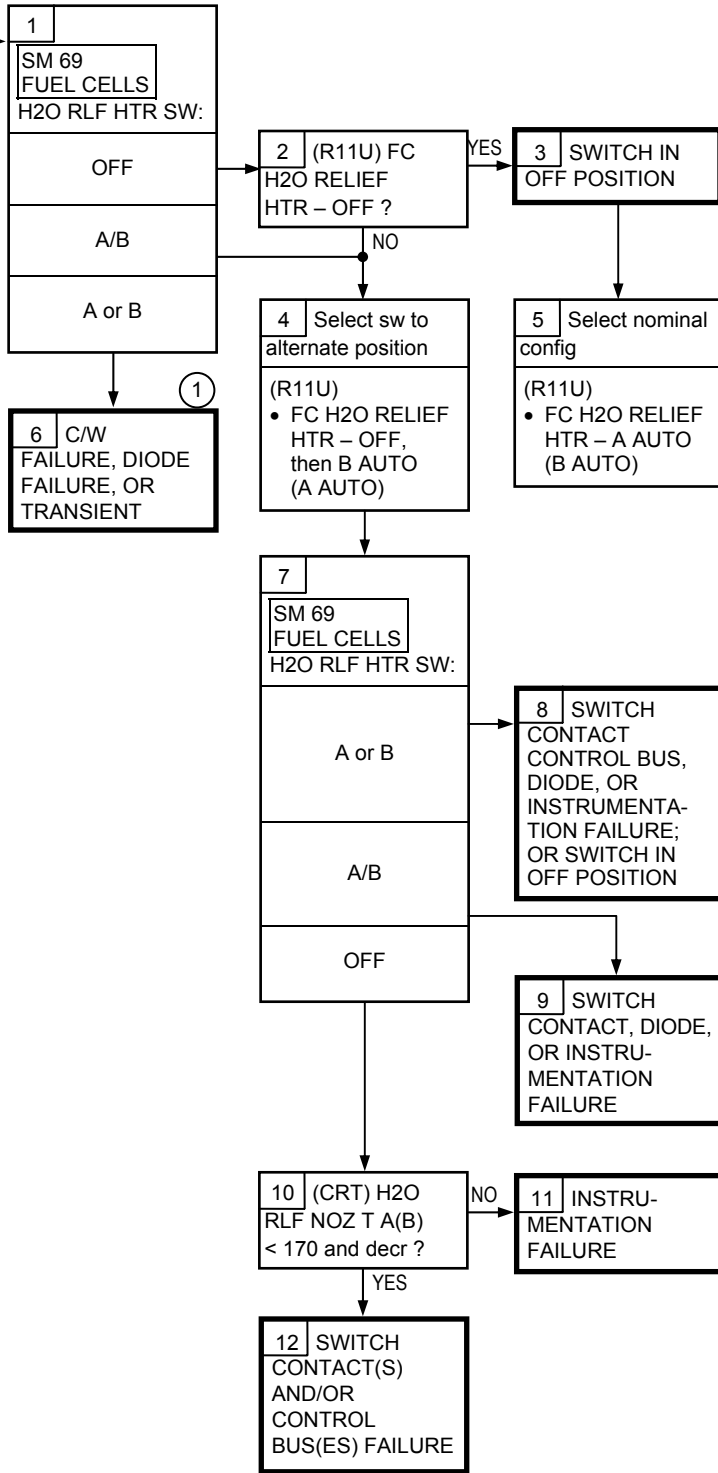
S69 FC H2O RLF HTR

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

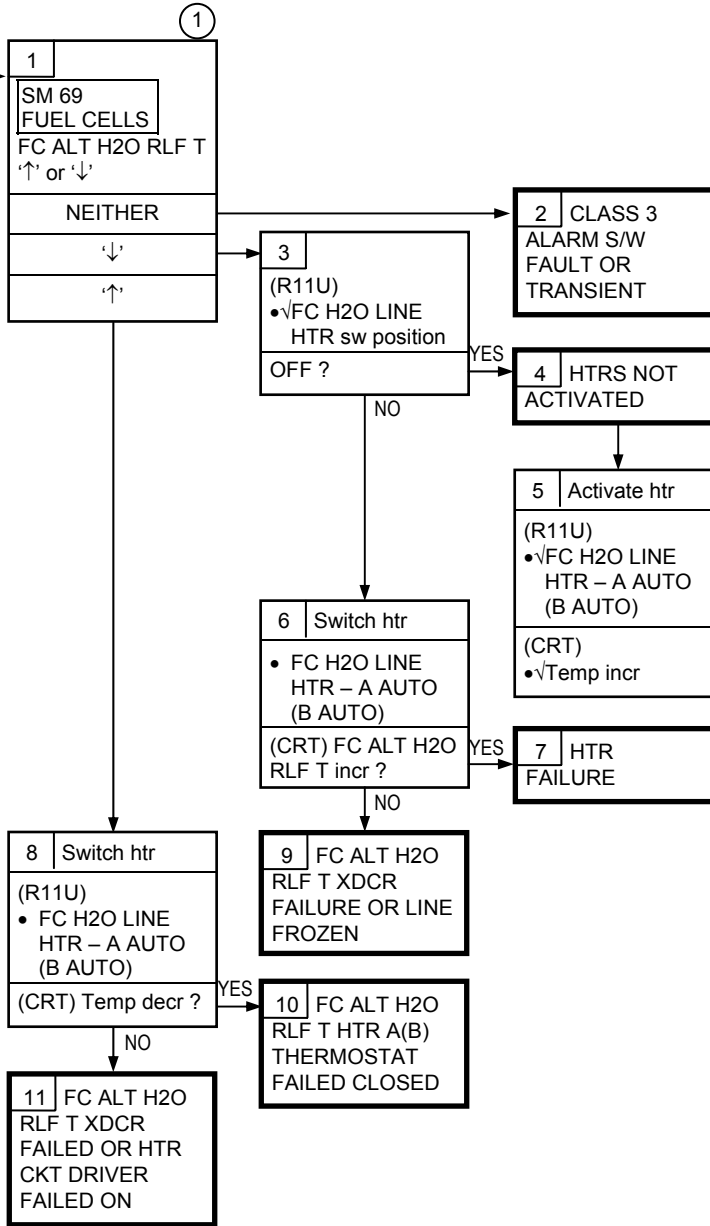
7.31 FUEL CELL ALT H2O RLF T ↑↓

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)

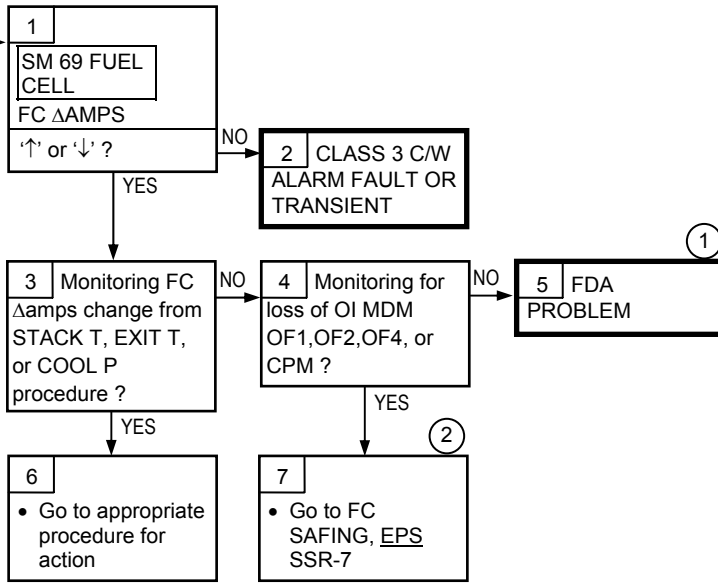


EPS

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 ϕ voltage < 102-108 vac for 6.5-8.5 sec or > 123-127 vac for 50-90 msec

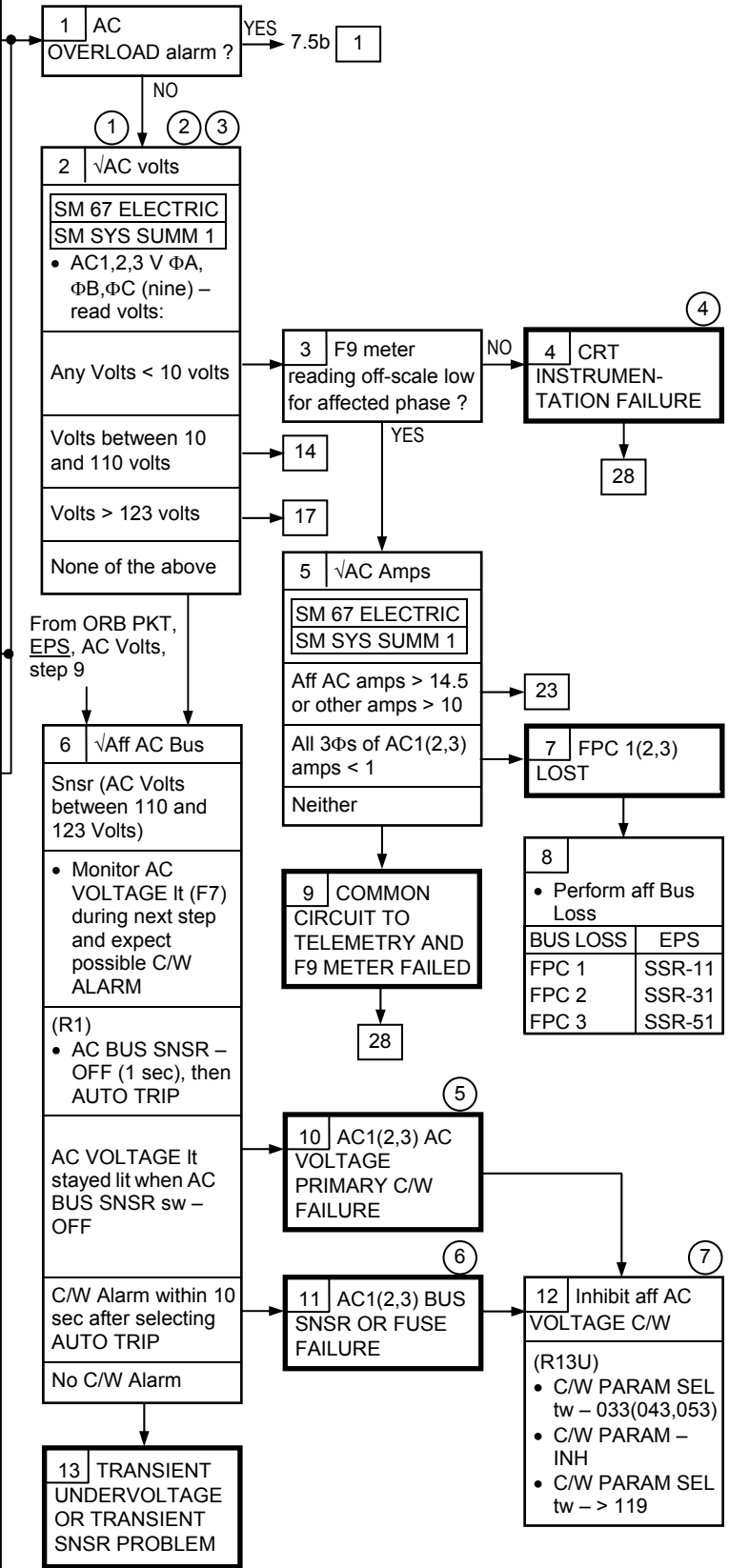
BACKUP C/W ALARM
(F7)

Backup C/W Light on if:
AC ϕ voltage < 108 vac or > 123 vac

S67 AC VOLTS 1(2,3)

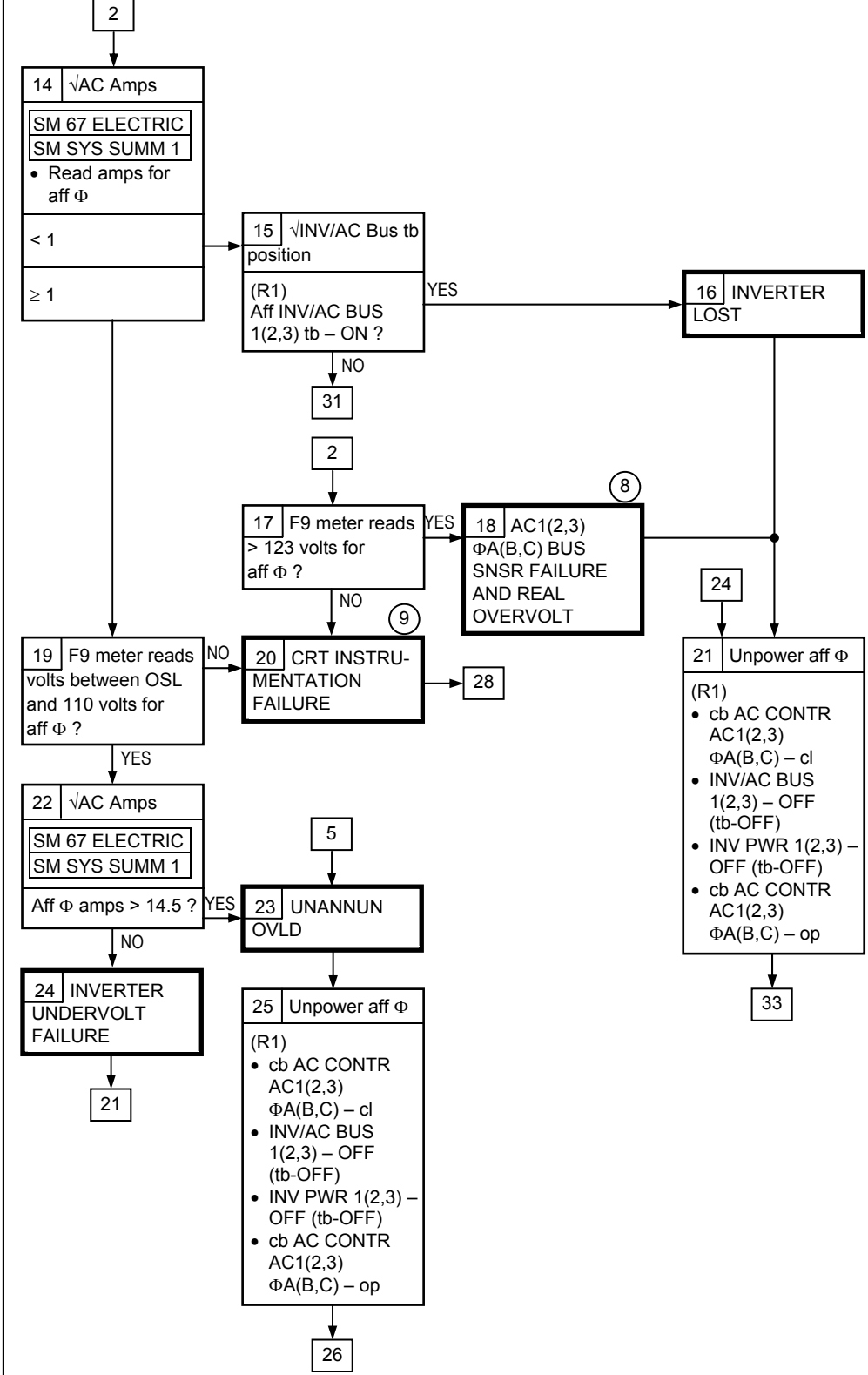
BFS
SM1 AC VOLTS 1(2,3)

Nominal Config:
(R1)
cb AC CONTR AC1, 2,3 ϕ A, ϕ B, ϕ 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 ϕ 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)

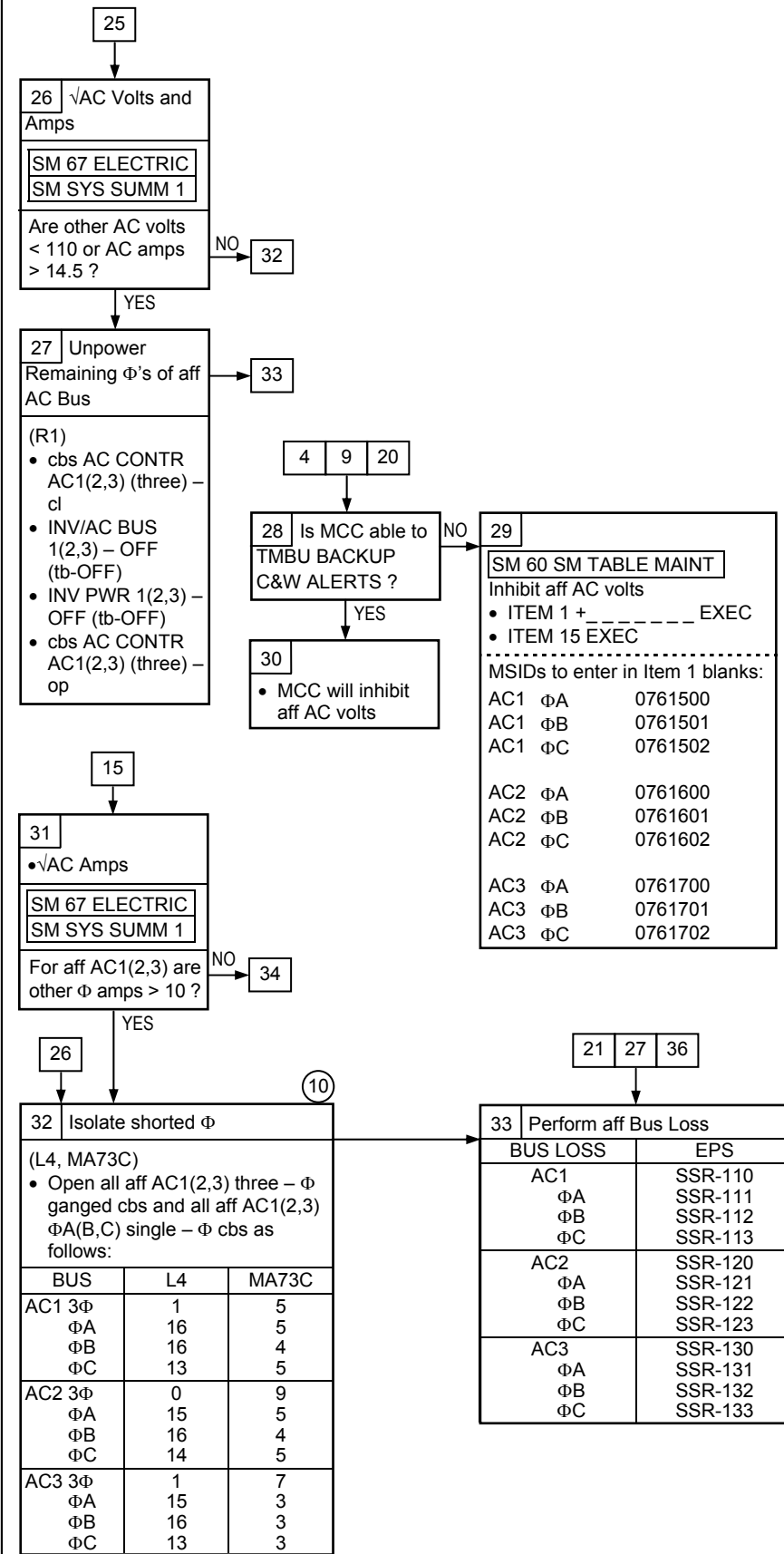


⑧ Backup C/W AC Voltage sensing exist. Auto Trip capability suspect

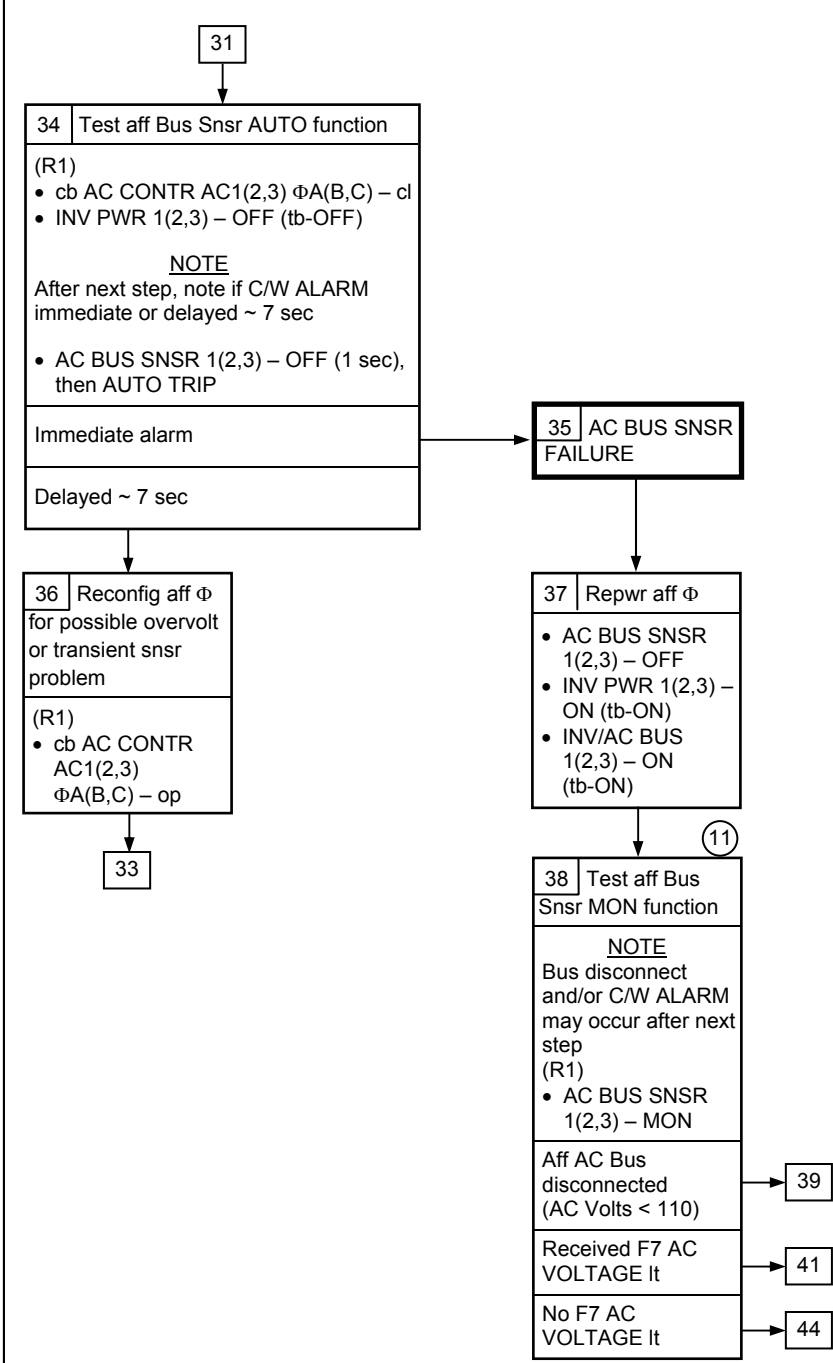
⑨ Still have primary C/W AC VOLTAGE alarm capability. Backup C/W lost for affected phase

EPS 7.5a (Cont)

⑩ Pnl L4 cbs
UTILITY PWR are
3Φ

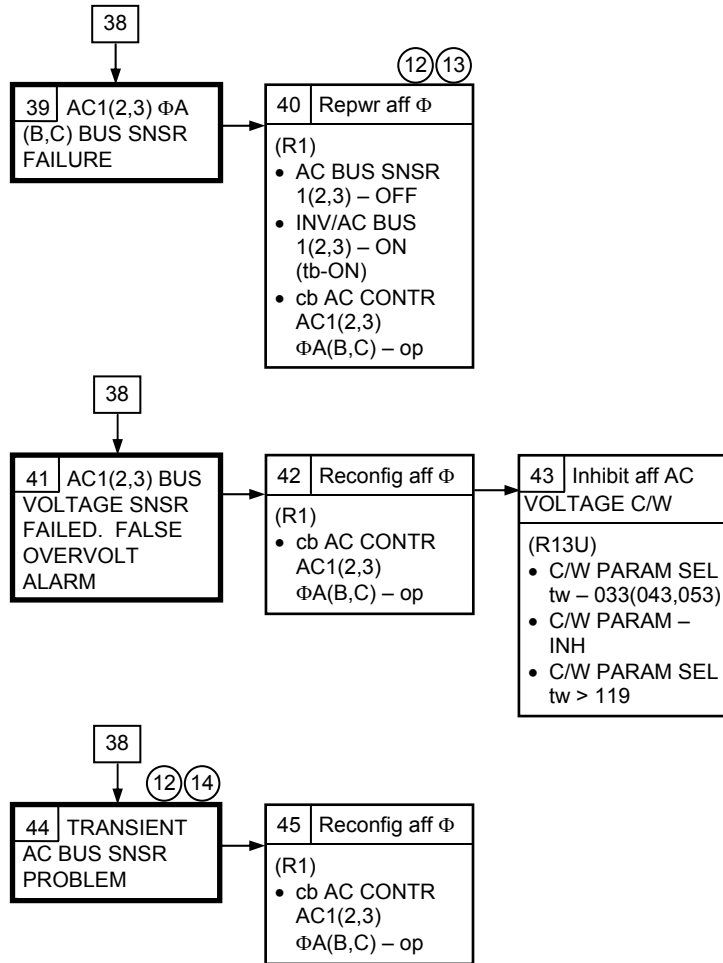


EPS 7.5a (Cont)



⑪ AC bus voltage can be read on pnl F9

EPS 7.5a (Cont)



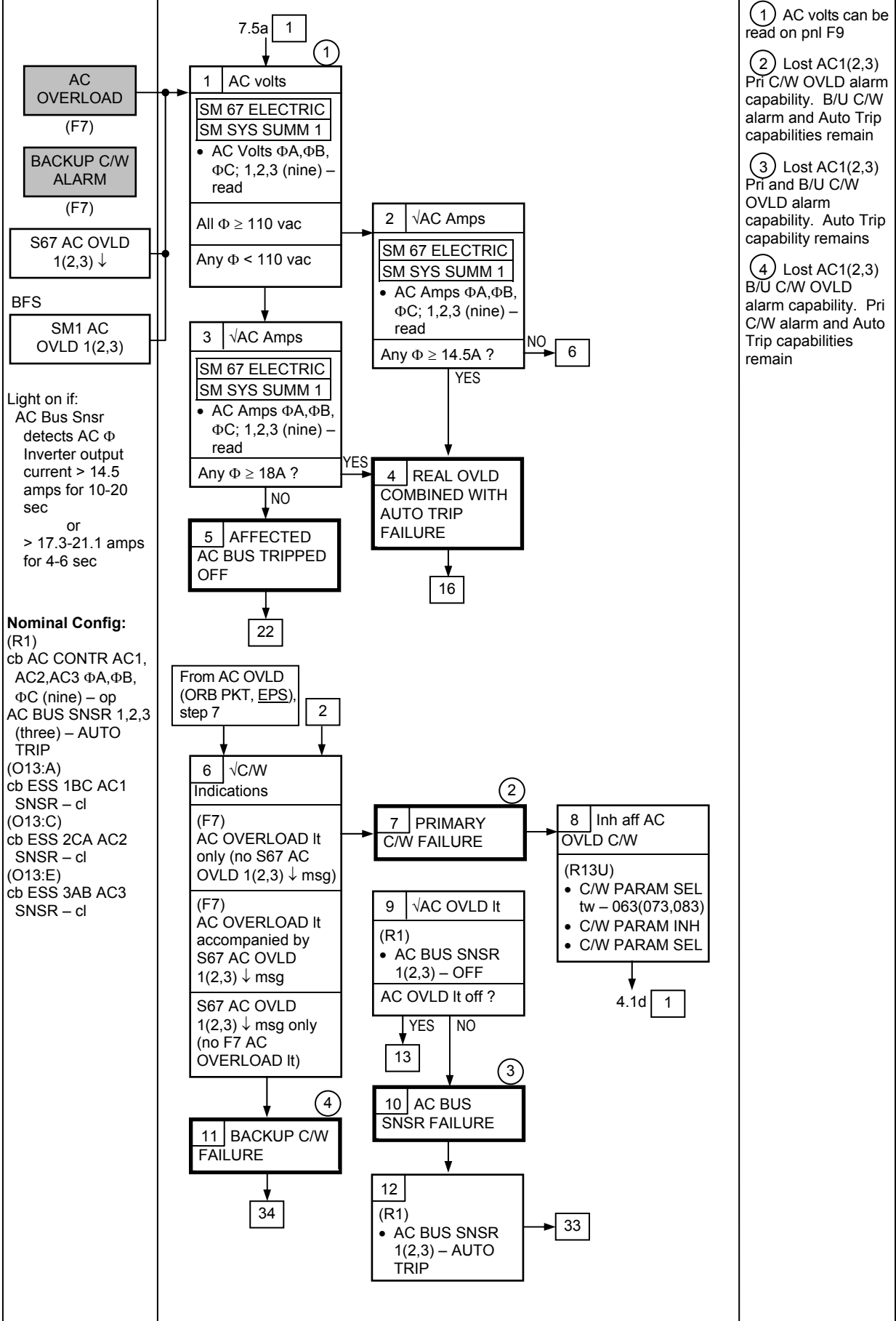
⑫ AC1(2,3) AC VOLTAGE primary C/W alarm and AUTO TRIP capability lost. Backup C/W AC VOLTAGE sensing remains

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) ↓

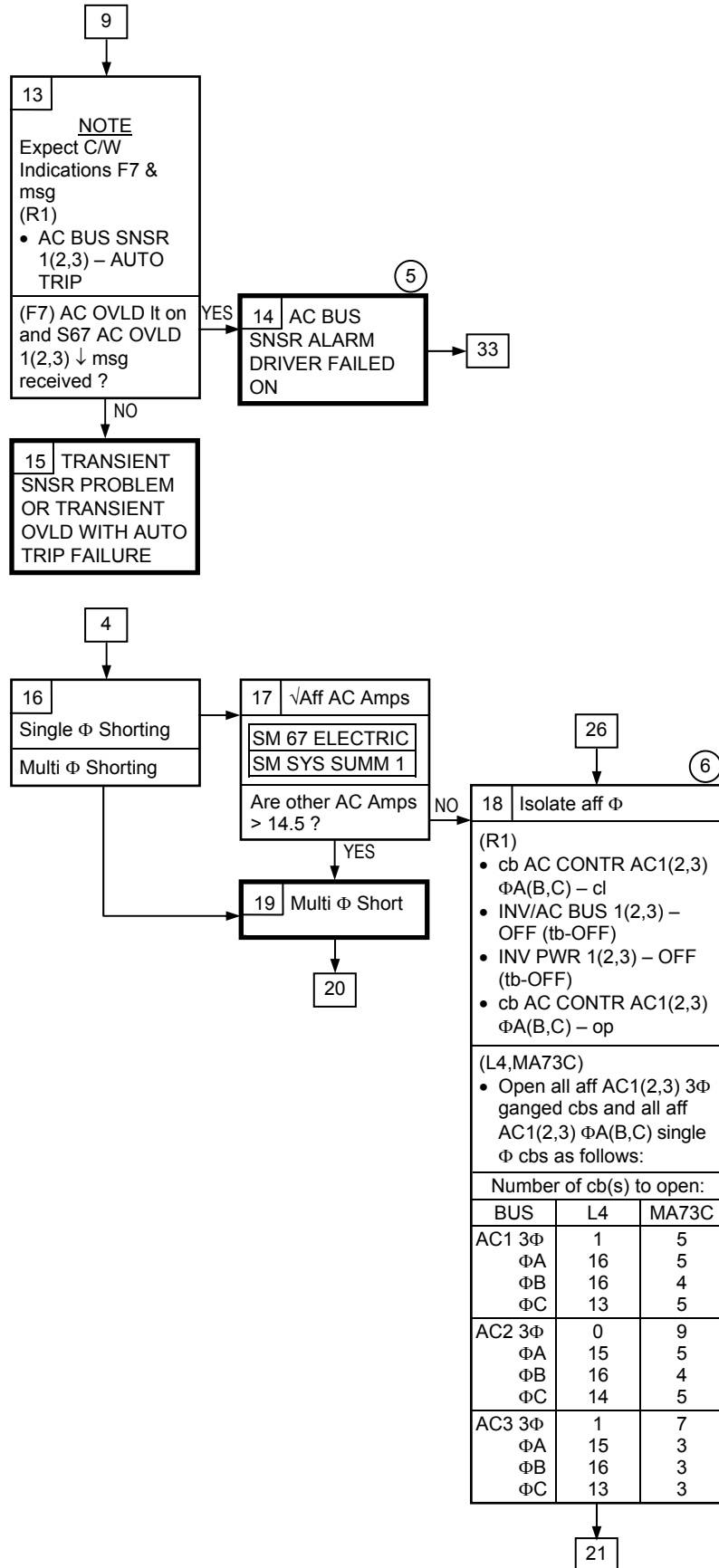


Light on if:
 AC Bus Snsr detects AC ϕ
 Inverter output current > 14.5
 amps for 10-20
 sec
 or
 > 17.3-21.1 amps
 for 4-6 sec

Nominal Config:
 (R1)
 cb AC CONTR AC1,
 AC2,AC3 ϕ A, ϕ B,
 ϕ 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

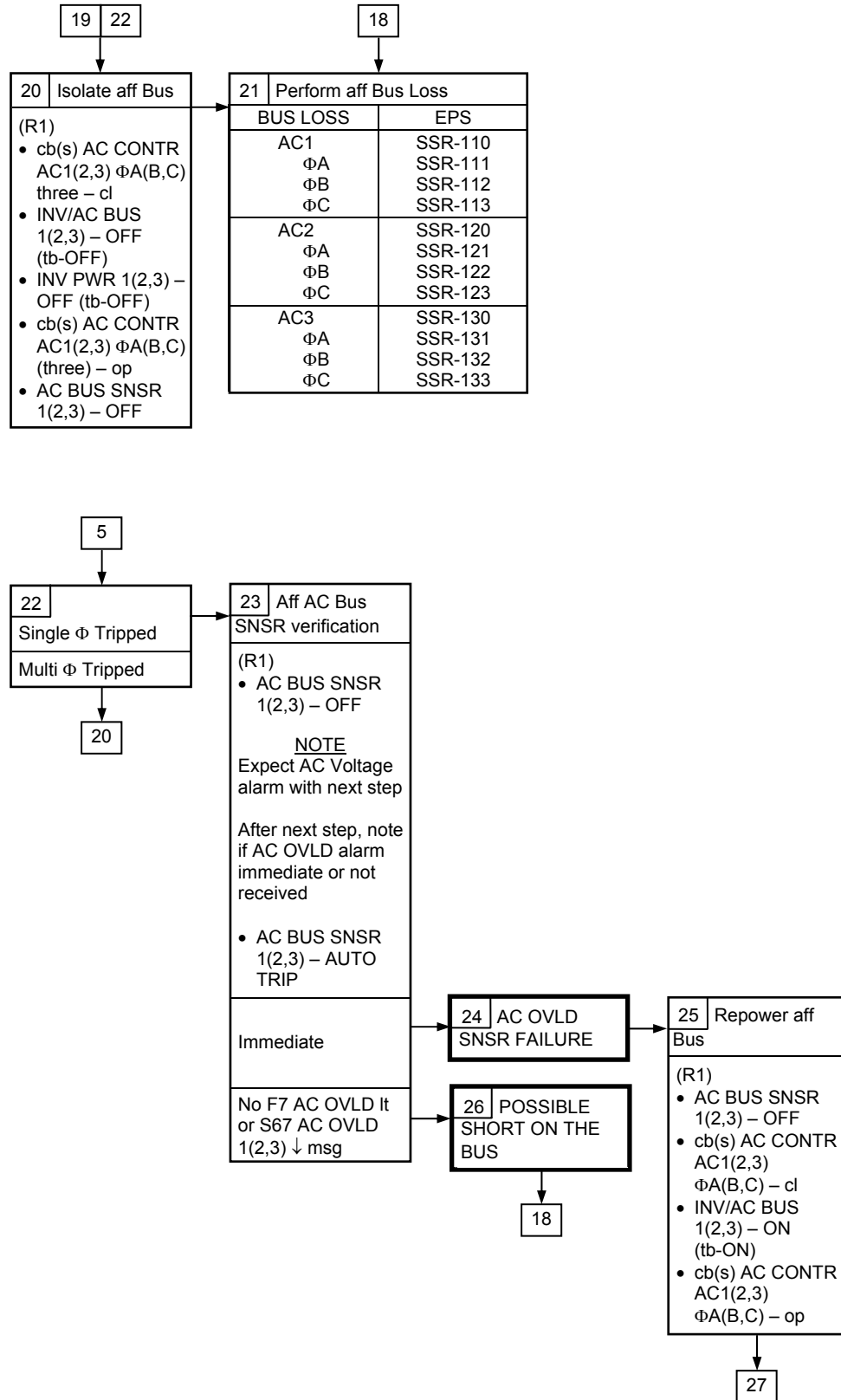
- ① AC volts can be read on pnl F9
- ② Lost AC1(2,3) Pri C/W OVLD alarm capability. B/U C/W alarm and Auto Trip capabilities remain
- ③ Lost AC1(2,3) Pri and B/U C/W OVLD alarm capability. Auto Trip capability remains
- ④ Lost AC1(2,3) B/U C/W OVLD alarm capability. Pri C/W alarm and Auto Trip capabilities remain

EPS 7.5b (Cont)

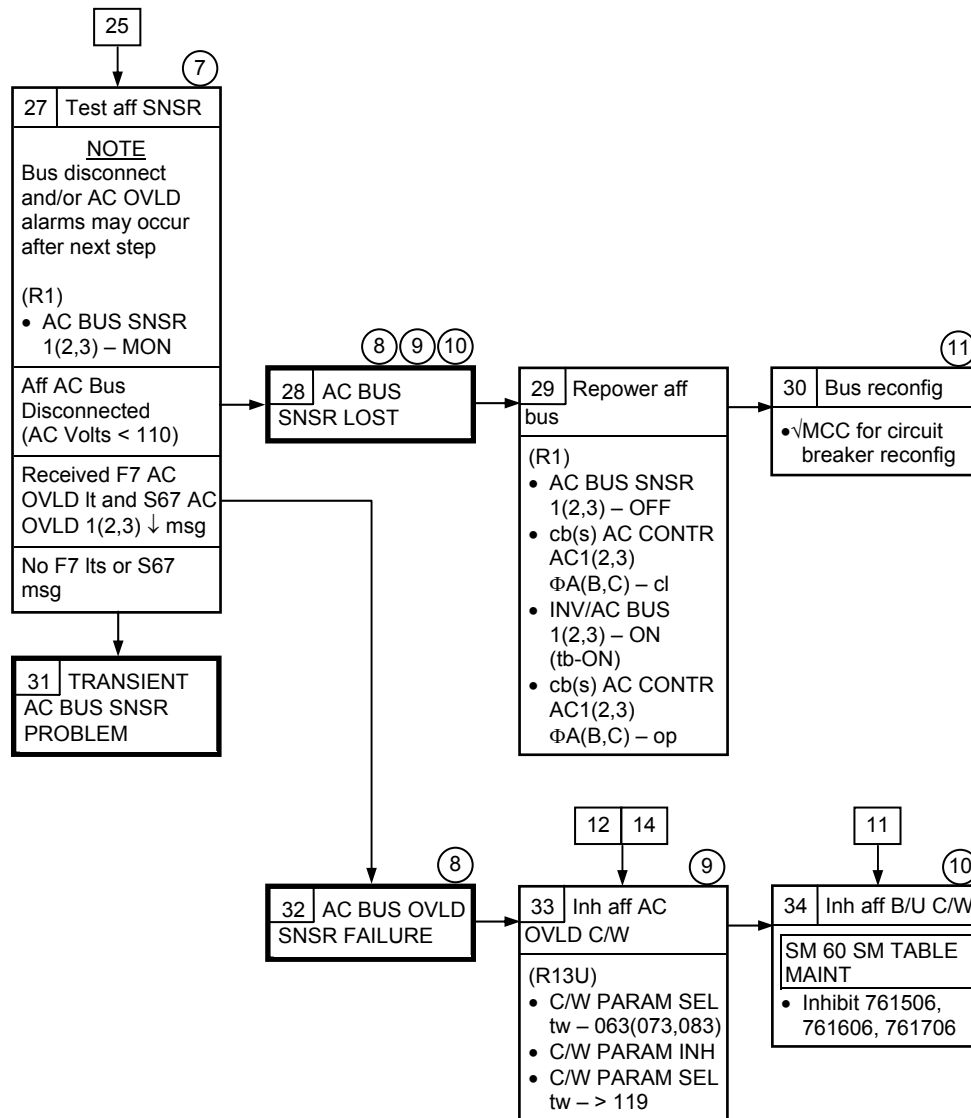


⑤ Lost AC1(2,3) Pri and B/U C/W OVLD alarm capability. Auto Trip capability remains

⑥ Pnl L4 cbs UTILITY PWR are 3 Φ



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

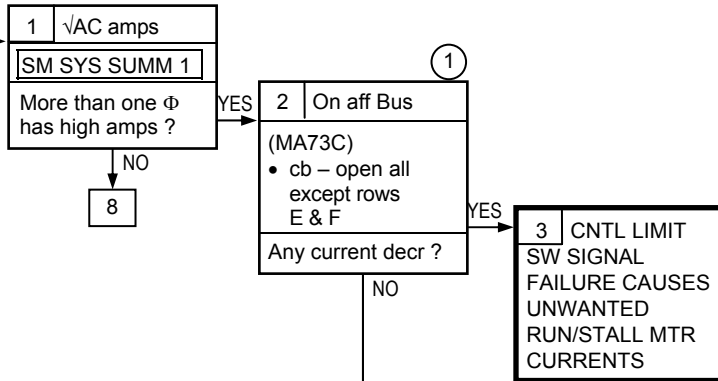
EPS

7.5c AC BUS CURRENT HIGH

SM ALERT

S67 AC AMPS 1(2,3)

If: AC AMPS 1(2,3) > 10 amps

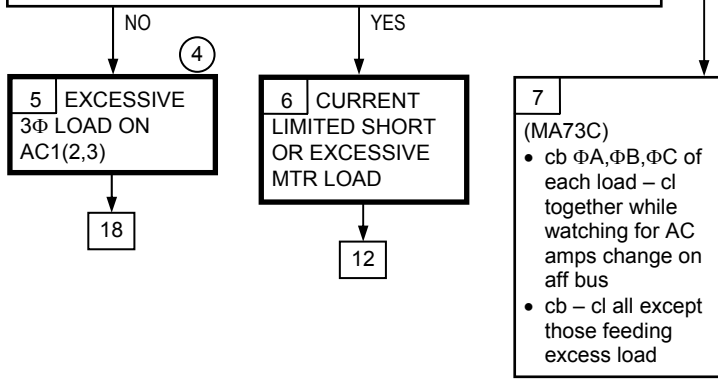


4 (MA73C,L4,R11)
• cb – op and cl ΦA,ΦB,ΦC together on each 3Φ load noting AC amps change on aff bus

Normal cb current listed in parentheses

EQUIPMENT	ID (AMPS/Φ)		
	AC1	AC2	AC3
(MA73C) :E WCS FAN SEP PAYLOAD	1 (.9)*	2 (.9)* AC2 (0)*	AC3 (< 1.7)
(L4) UTILITY PWR (3Φ cb)	(0)		(0)
:C FC PUMPS	1 (.8)	2 (.8)	3 (.8)
:D C,R ENG	C (< 1.6)*	C (< 1.6)*	R (< 1.6)*
:E R,L ENG	R (< 1.6)*	L (< 1.6)*	L (< 1.6)*
:F H2O LOOP PUMP	1A/2 (1.0)*	1B (1.0)*	2 (1.0)
:G AV BAY FAN	1A (.9)*	1B (.9)	3A (.9)*
:H AV BAY FAN	3B (.9)	2A (.9)	2B (.9)*
:I IMU FAN	A (.2)*	B (.2)	C (.2)*
:J HUM SEP	A (.3)*	B (.3)	
:K CAB FAN		B (1.7)*	A (1.7)
:M,N FREON LOOP PUMP	1A (1.7)* 2B (1.7)	1B (1.7)	2A (1.7)*

(CRT) Any AC amps excessive?



- 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"> • cb – op and cl single Φ load, one at a time • Monitor amps for proper change on aff Φ 									
Normal cb current (orbit & entry prep)									
Single Φ load AC amps									
Pnl & row	AC1			AC2			AC3		
	Φ A	Φ B	Φ C	Φ A	Φ B	Φ C	Φ A	Φ B	Φ 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) Φ A(Φ B, Φ C) – cl
• INV/AC BUS 1(2,3) – OFF (tb-OFF)
(CRT)
• Read AC1(2,3) Φ A(Φ B, Φ 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) Φ A(Φ B, Φ C) BUS

YES

14 CURRENT XDCR SHIFTED HIGH

16 Off-load Bus
(L4:P,Q,R)
• cb AC1(2,3) Φ A(Φ B, Φ C) (three) – op
(CRT) Φ amps < 8 ?

NO

20

19
• Monitor Bus for performance change

6
Which equip shows excessive current:
FC PUMPS
OTHER

11 (L4,MA73C)
• cb – op for load with soft short

15
• Monitor FC for performance change

17
• Select alternate system
• cb – op system with high amps

18
• Maintain AC BUS 1(2,3) Φ amps < 8 for continuous loads by transferring following loads:
(L1)
FREON LOOP PUMP
CABIN FAN
AV BAY FAN
H2O LOOP PUMP
IMU FAN
HUM SEP
(MA73C)
PL AC2 3 Φ
PL AC3 3 Φ

- 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 Φ		
(L4, MA73C)		
<ul style="list-style-type: none"> cb – open all AC1(2,3) ΦA(ΦB,ΦC) cbs (including 3Φ ganged cbs) on failed bus 		
Number of cb to open:		
BUS	L4	MA73C
AC1 3 Φ	1	5
Φ A	16	5
Φ B	16	4
Φ C	13	5
AC2 3 Φ	0	9
Φ A	15	5
Φ B	16	4
Φ C	13	5
AC3 3 Φ	1	7
Φ A	15	3
Φ B	16	3
Φ C	12	3
(R1)		
<ul style="list-style-type: none"> cb AC CONTR AC1(2,3) ΦA(ΦB,ΦC) – cl 		
<p>NOTE Expect C/W AC VOLTAGE alarm after next step</p>		
<ul style="list-style-type: none"> INV/AC BUS 1(2,3) – OFF (tb-OFF) INV PWR 1(2,3) – OFF (tb-OFF) cb AC CONTR AC1(2,3) ΦA(ΦB,ΦC) – op 		

↓

<u>BUS LOSS</u>	<u>EPS</u>
AC1 Φ A	SSR-111
Φ B	SSR-112
Φ C	SSR-113
AC2 Φ A	SSR-121
Φ B	SSR-122
Φ C	SSR-123
AC3 Φ A	SSR-131
Φ B	SSR-132
Φ C	SSR-133

11 If shorted bus is AC2(3), CABIN FAN B(A) will not start on remaining two phases

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

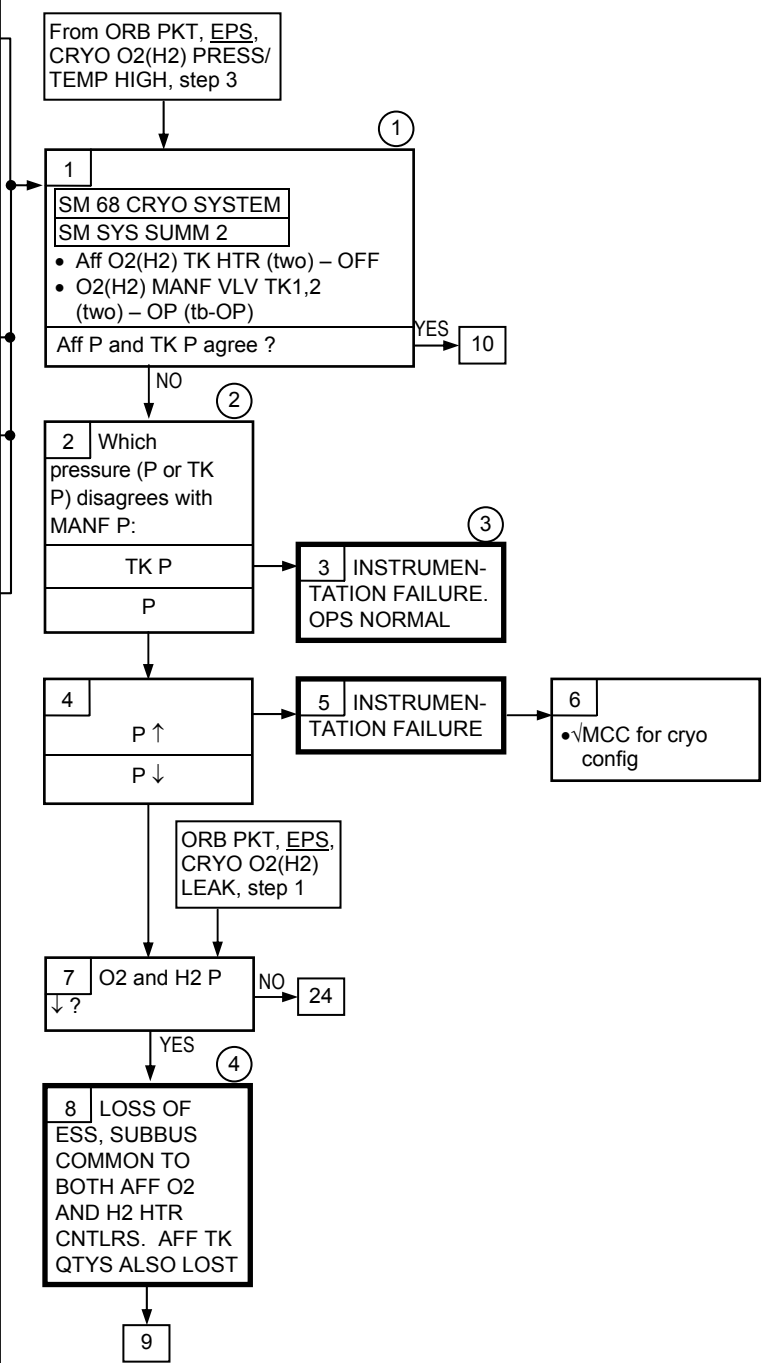
S68 O2(H2) TK P 1(2,3,4,5)

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)

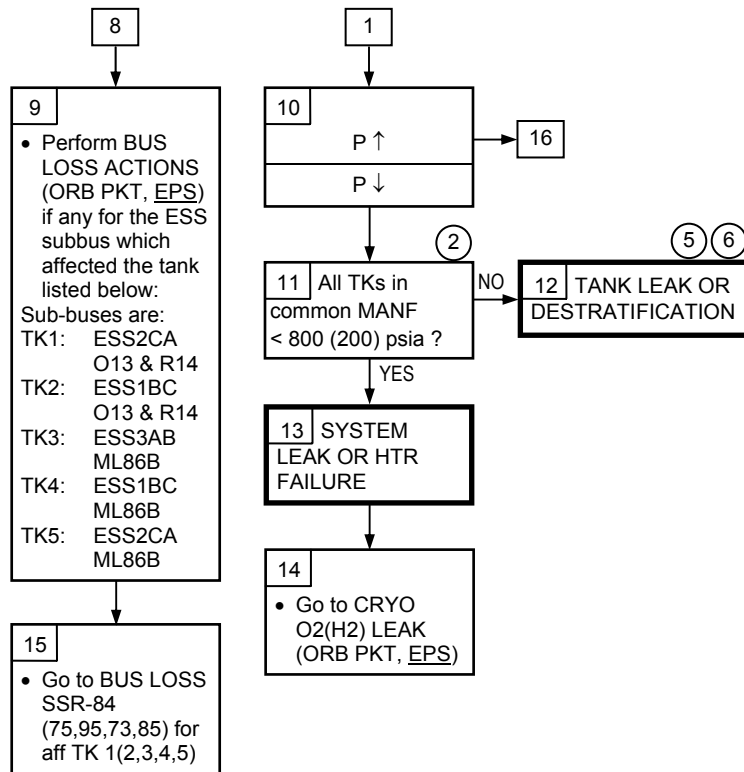


- ① Use pnl O2 meter for TK P if SM2 not available
- ② O2(H2) TK AUTO Control pressure ranges:
TK 1/2: 803-854 (200-226)
TK 3-5: 832-882 (217-243)
- ③ AUTO htr ops still available with failure of this Xdcr
- ④ Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low (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

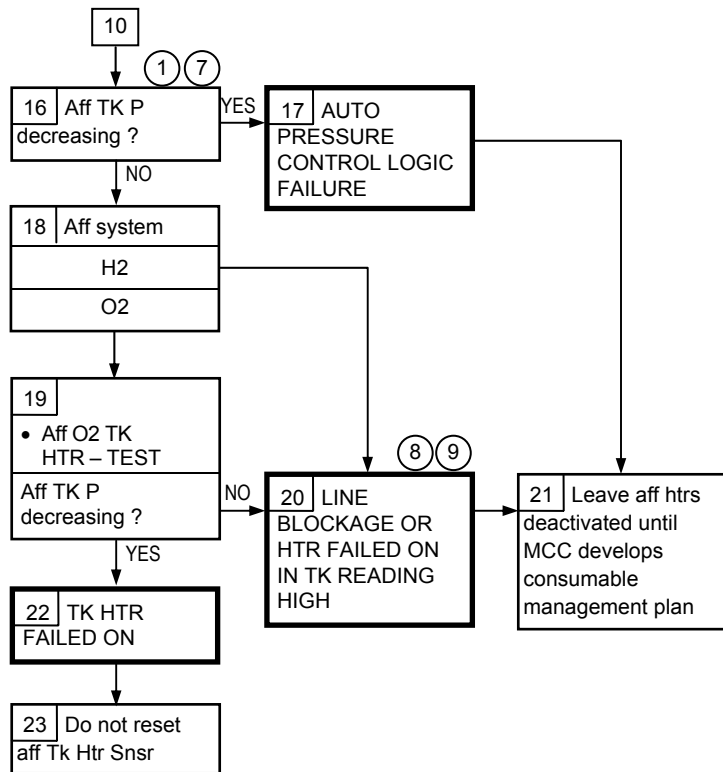
7.6b (Cont)



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



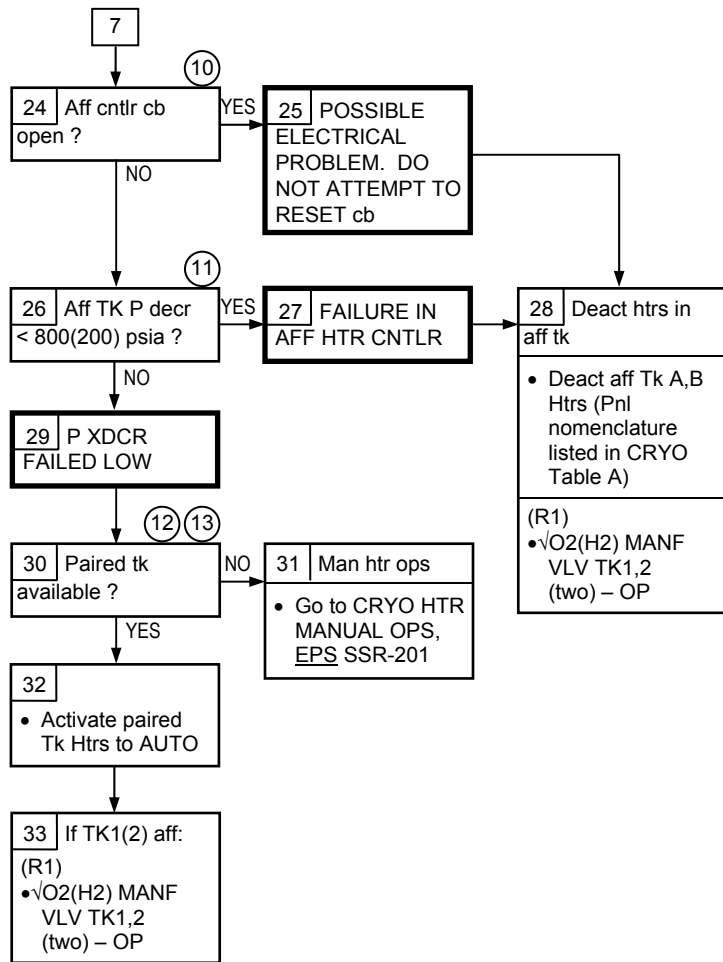
① Use pnl O2 meter for TK P if SM2 not available

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

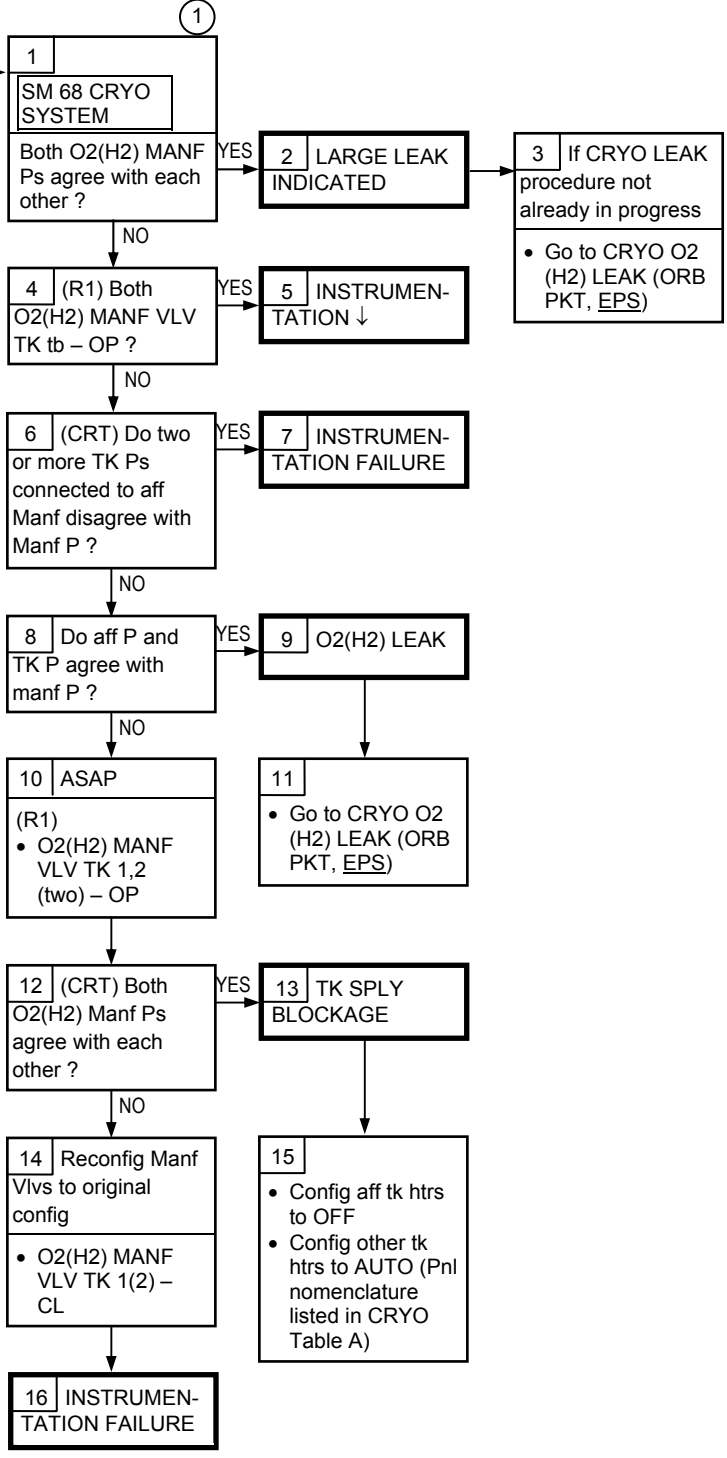
EPS

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

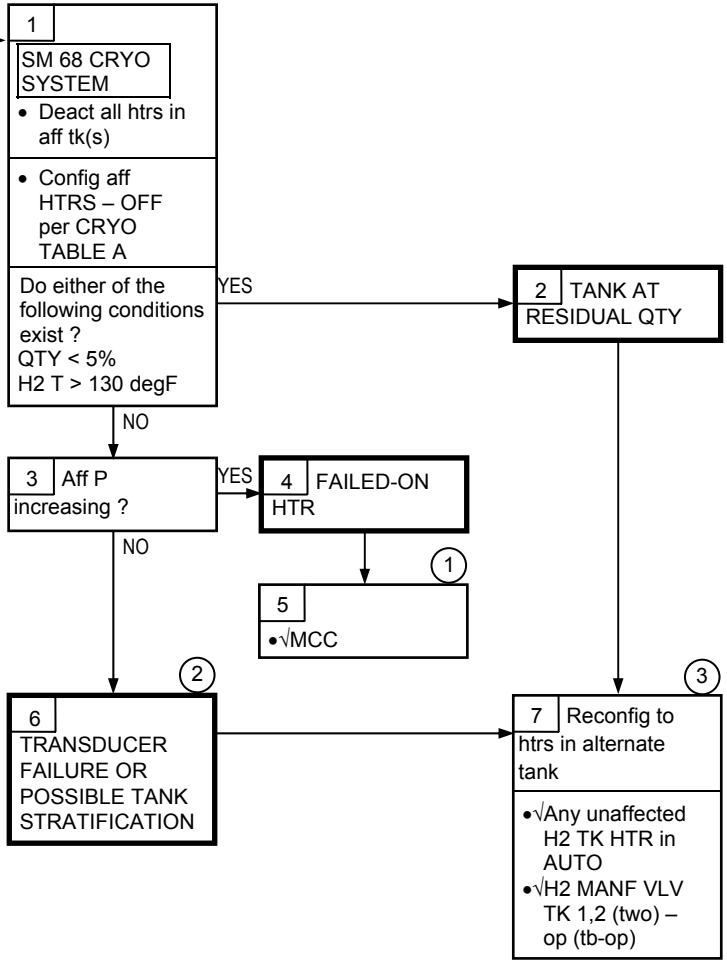
EPS

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

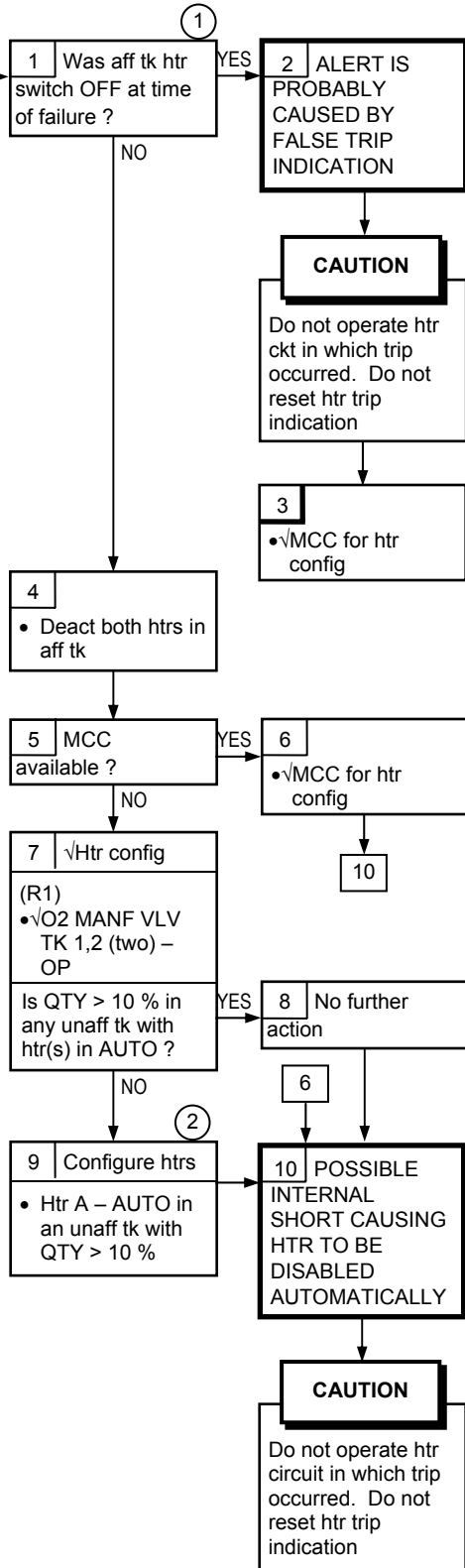
EPS

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

From ORB OPS, EPS, CRYO O2(H2) PRESS/TEMP HIGH, step 4

O2 HEATER TEMP (F7)

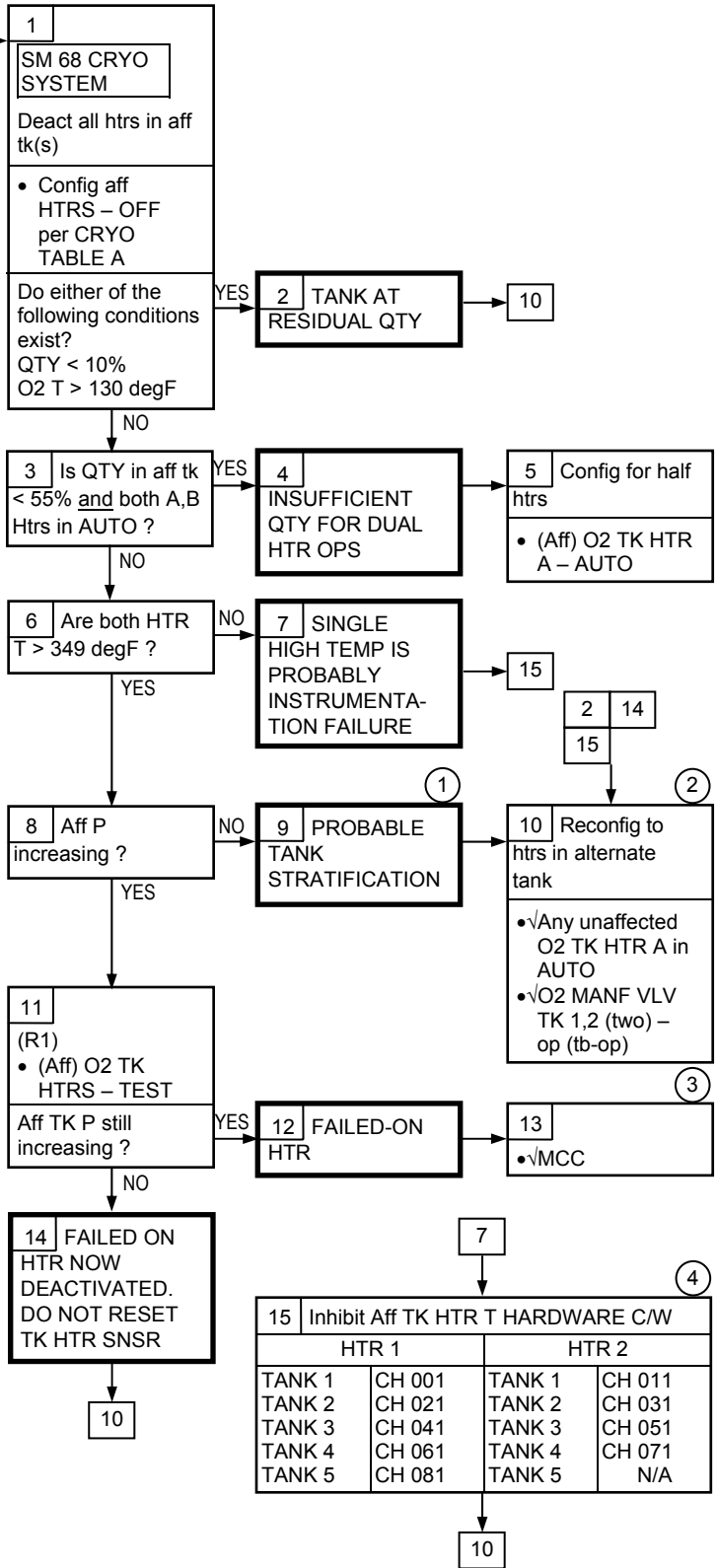
BACKUP C/W ALARM (F7)

If: O2 HTR T > 349 degF

S68 O2 HTR T 1(2,3,4,5)

BFS SM2 CRYO O2 HTR

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
7.7 (OPCU, APCU)

EPS

7.7a OPCU CH AMPS ↑

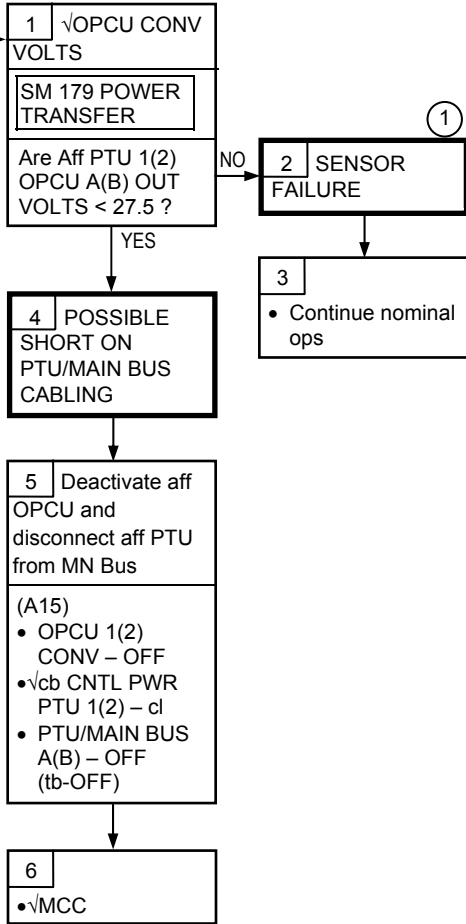
SM ALERT

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 ↓

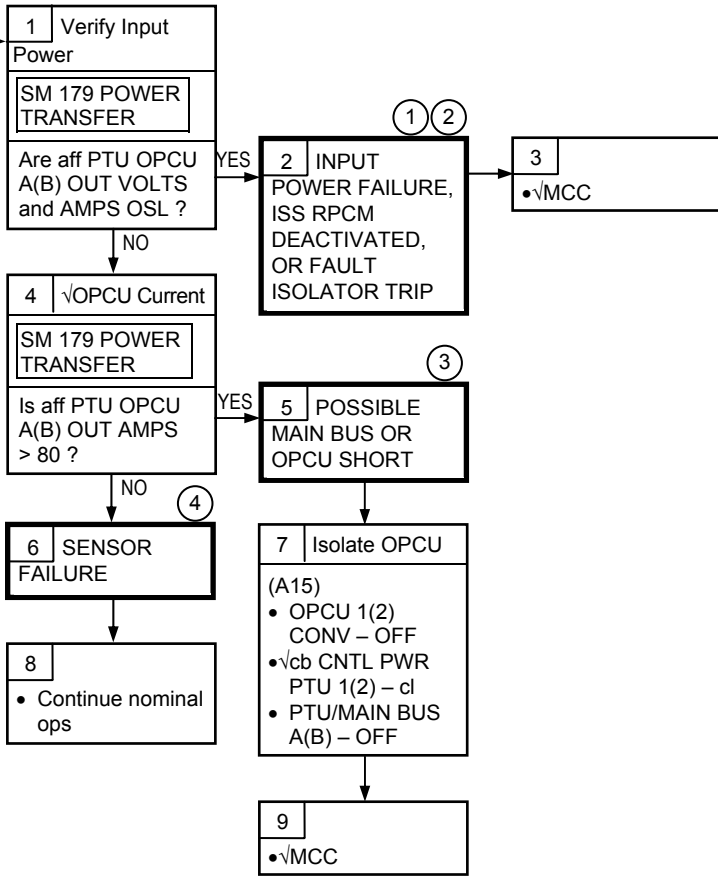
SM ALERT

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

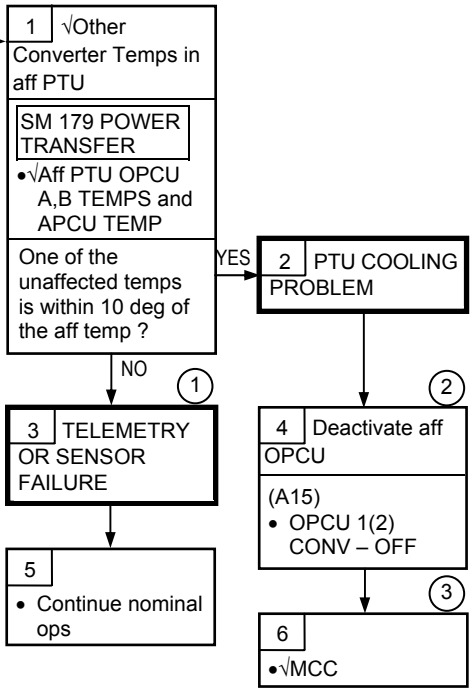
S179
APCU 1(2)
TEMP

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

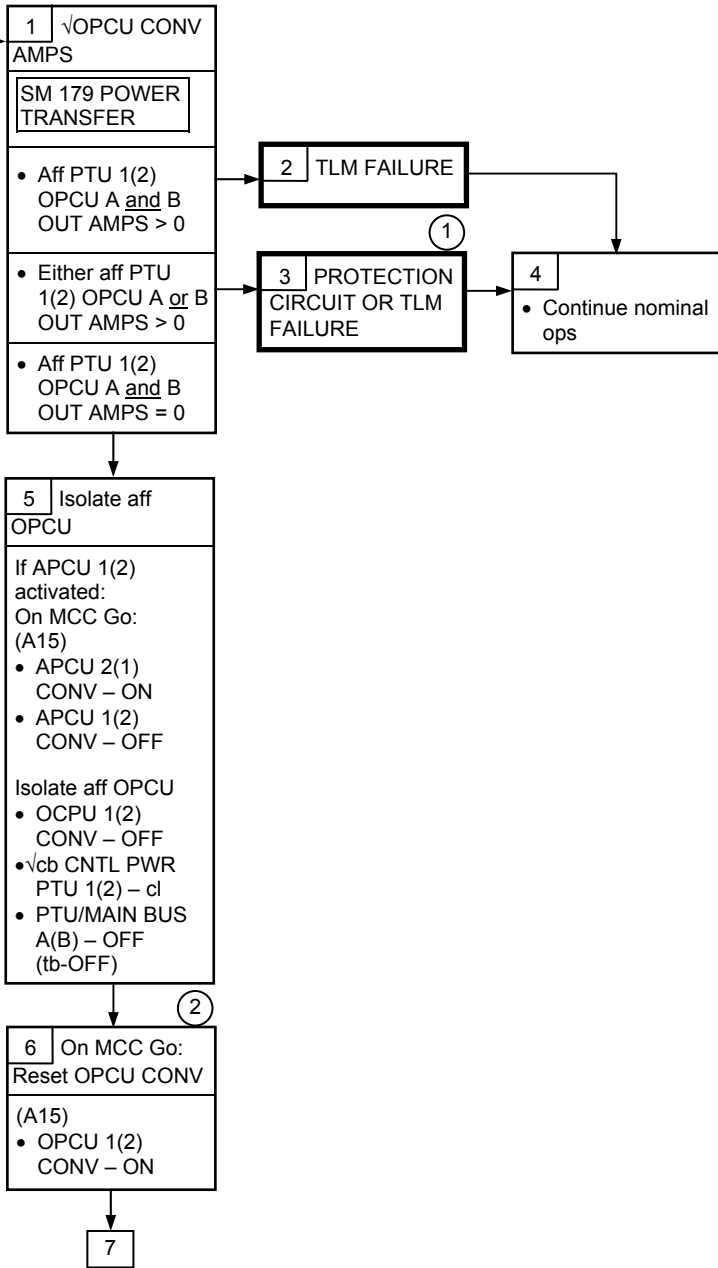
SM
ALERT

S179
OPCU 1(2)
CH A(B) O OV

OPCU TRIP = OUT
OV if Output Volts
> 32 volts

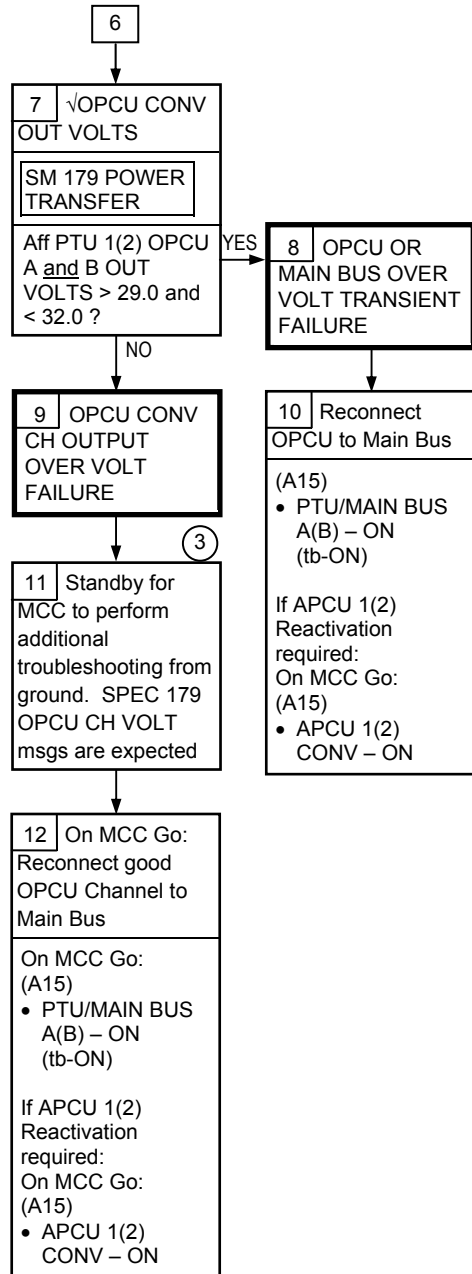
Dual PTU Config:
(A15)
cb CNTL PWR PTU
1,2 (two) – cl
PTU/MAIN BUS A,B
(two) – ON
OPCU 1,2 CONV
(two) – ON

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

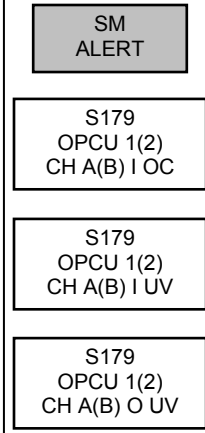
② A SPEC 179 OPCU CH A(B) VOLT message will be received if 1 of the 2 channels is not activated (all associated TLM is OSL)



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



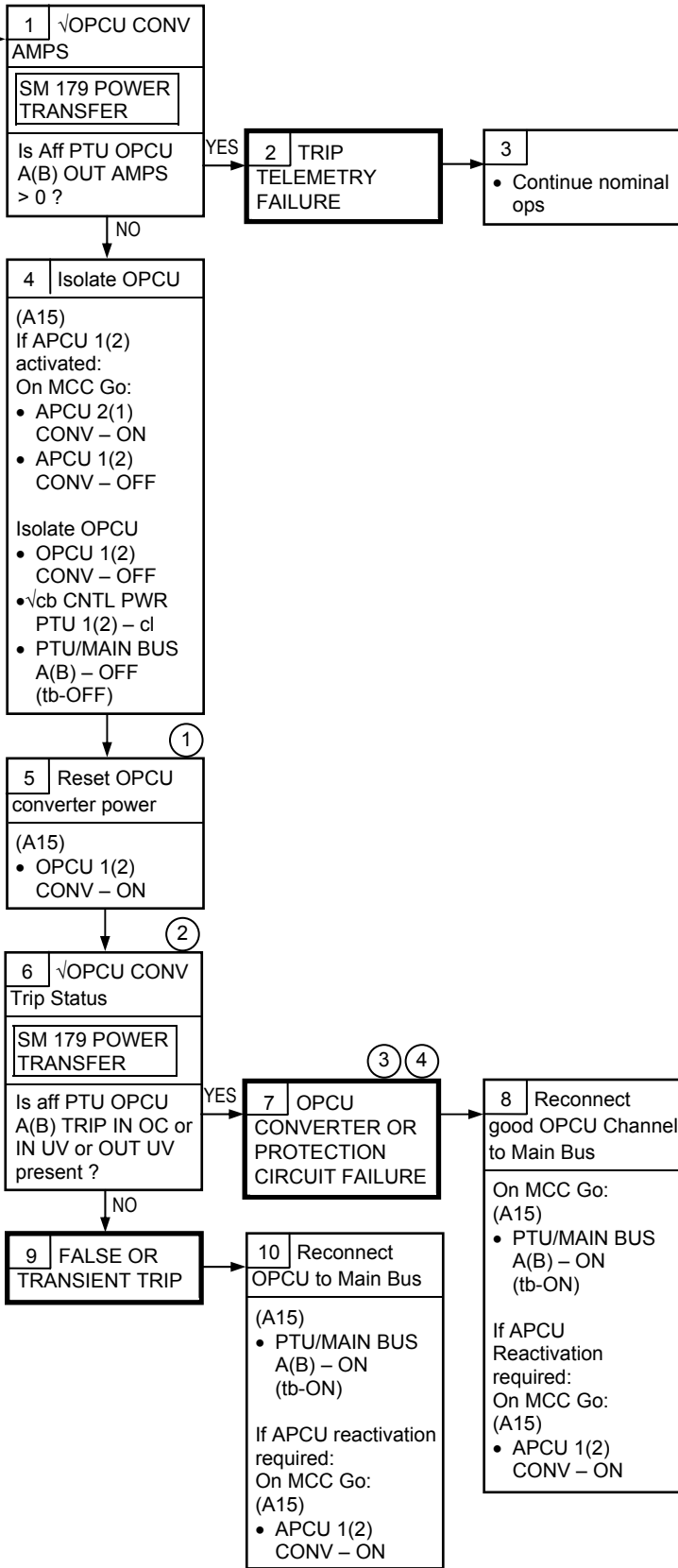
OPCU I OC
(In Over Current)
If Input Current > 22
amps

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 ↑↓

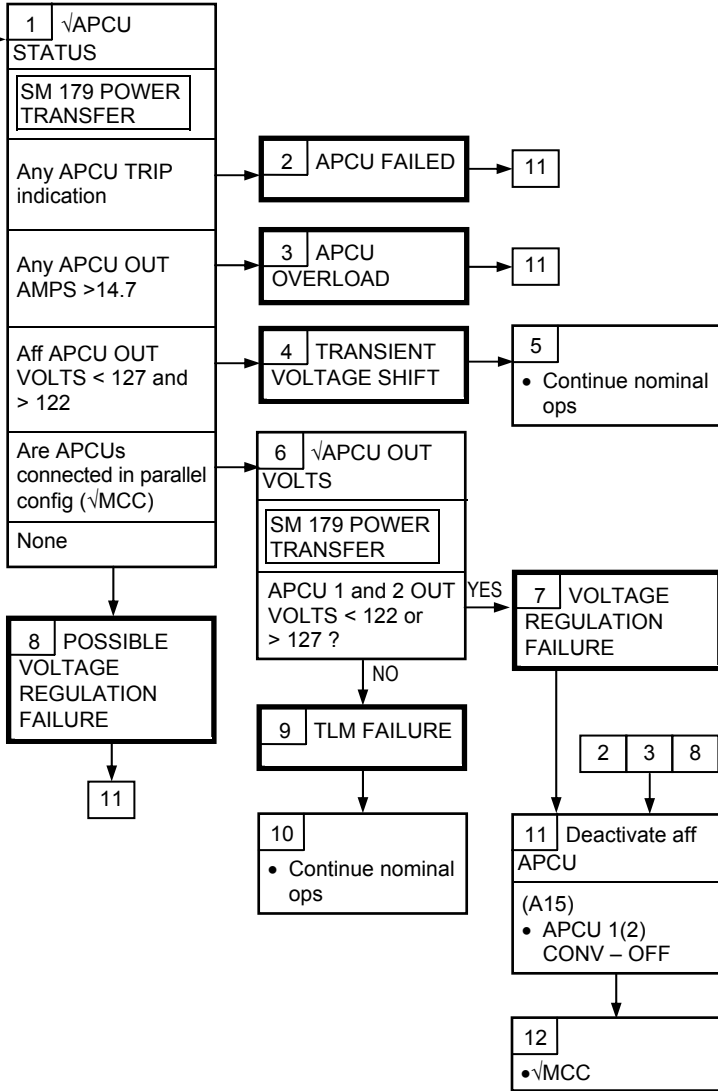
SM ALERT

SM 179
APCU 1(2)
OUT VOLT

If PTU 1(2) APCU
OUT VOLTS
> 127 ↑
or
< 122 ↓

Dual PTU Config:
(A15)
cb CNTL PWR PTU
1,2 (two) – cl
PTU/MAIN BUS A,B
(two) – ON
OPCU 1,2 CONV
(two) – ON

Single PTU Config:
(A15)
cb CNTL PWR PTU
1(2) – cl
PTU/MAIN BUS
A(B) – ON
OPCU 1(2) CONV –
ON



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 ↑

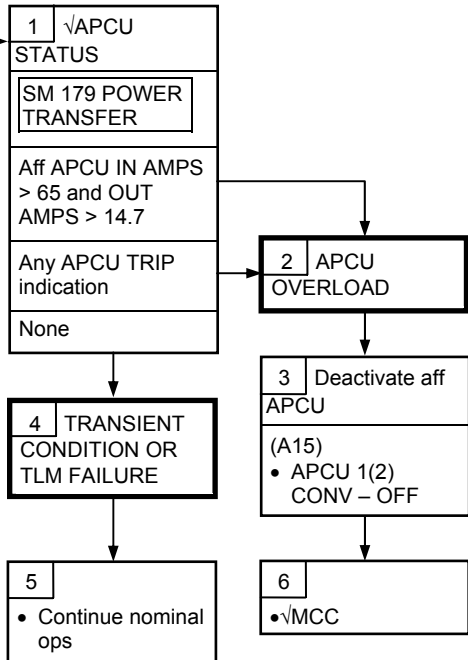
If PTU 1(2) APCU IN
AMPS > 85 ↑

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

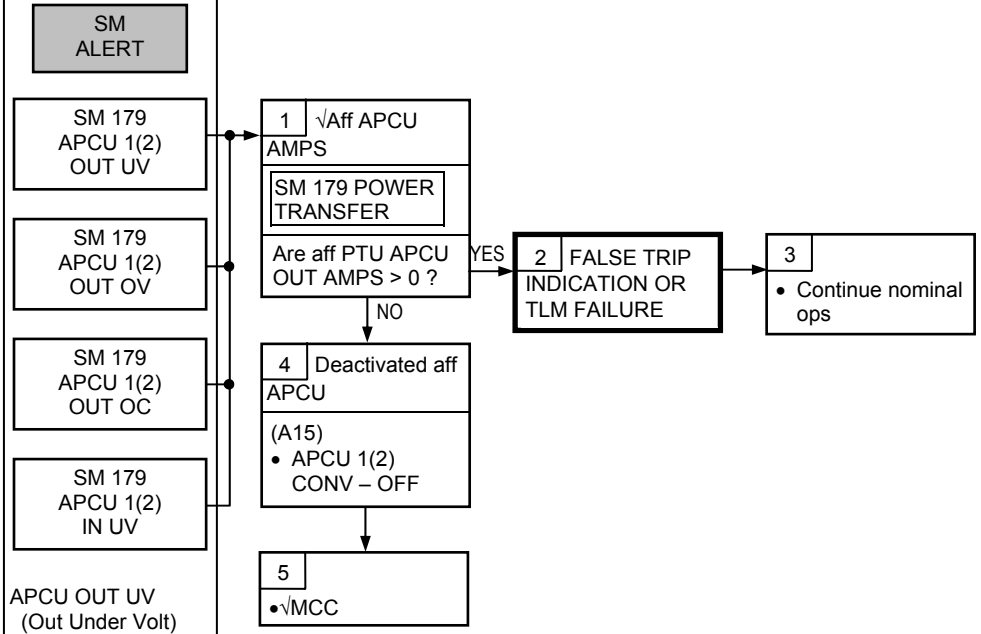
Single APCU

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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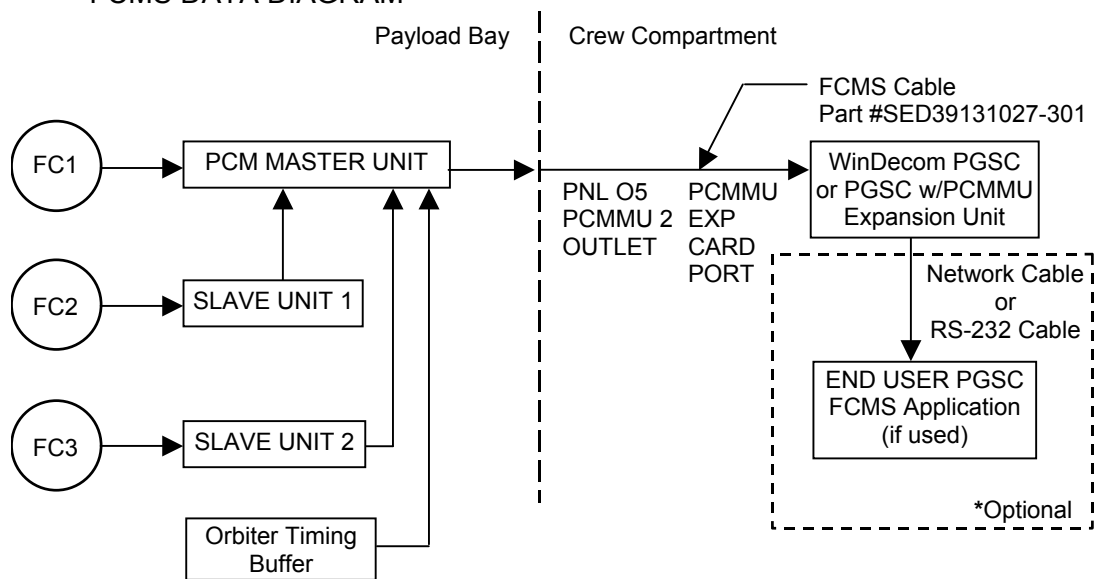
**EPS SSR-1
FC MONITORING SYS (FCMS) OPS**

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 fcDDHHMM.fcv or fcDDHHMM.ZIP where “DDHHMM” 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)

6. Connect FCMS cable from pnl O5 PCMMU 2 outlet to PCMMU expansion card port on PGSC that will run WinDecom-FCMS
- ML86B:E 7. cb MNA FC PCM – cl

Starting WinDecom-FCMS

8. Double-click 'Shuttle Apps' > 'WinDecom' > 'WinDecom-FCMS'
9. Expect TLM Monitor, TLM Pkt-net, and TLM Pkt-com windows to appear (possibly minimized). Data should be incrementing in TLM Pkt-net window

FCMS Application

10. Double-click 'Shuttle Apps' > 'Fuel Cell Monitoring'
11. Verify data being received on crew FCMS display (data updating and GMT incrementing on FCMS display, green "GO" sign in lower right hand corner of PGSC display)

If fuel cell open circuit voltage recording requested, following steps will be coordinated with MCC:

12. BUS TIE ____,__ (two) – ON (tb-ON)
13. ESS BUS SOURCE FC ____ – OFF
14. FC/MN BUS ____ – OFF
15. Record data file using record option specified by MCC
(Either full rate or one sample every X seconds for X hours)
16. When recording is complete, select Yes in popup window to copy data file (fcDDDDHHMM.ZIP) from C:\SPOCAPPS\FCMS directory to KFX PGSC *:\OCA_DOWN directory. Notify MCC

If fuel cell open circuit voltage recording was performed, on MCC GO:

17. FC/MN BUS ____ – ON
18. ESS BUS SOURCE FC ____ – ON
19. Bus Tie config per MCC

DEACTIVATION

- ML86B:E 1. cb MNA FC PCM – op
2. Close FCMS application
3. Double-click 'Shuttle Apps' > 'WinDecom' > 'WinDecom Shutdown'
4. Disconnect and stow FCMS cable
5. Reconfigure WinDecom PGSC as reqd per WINDECOM OPS (ORB OPS, PGSC)

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

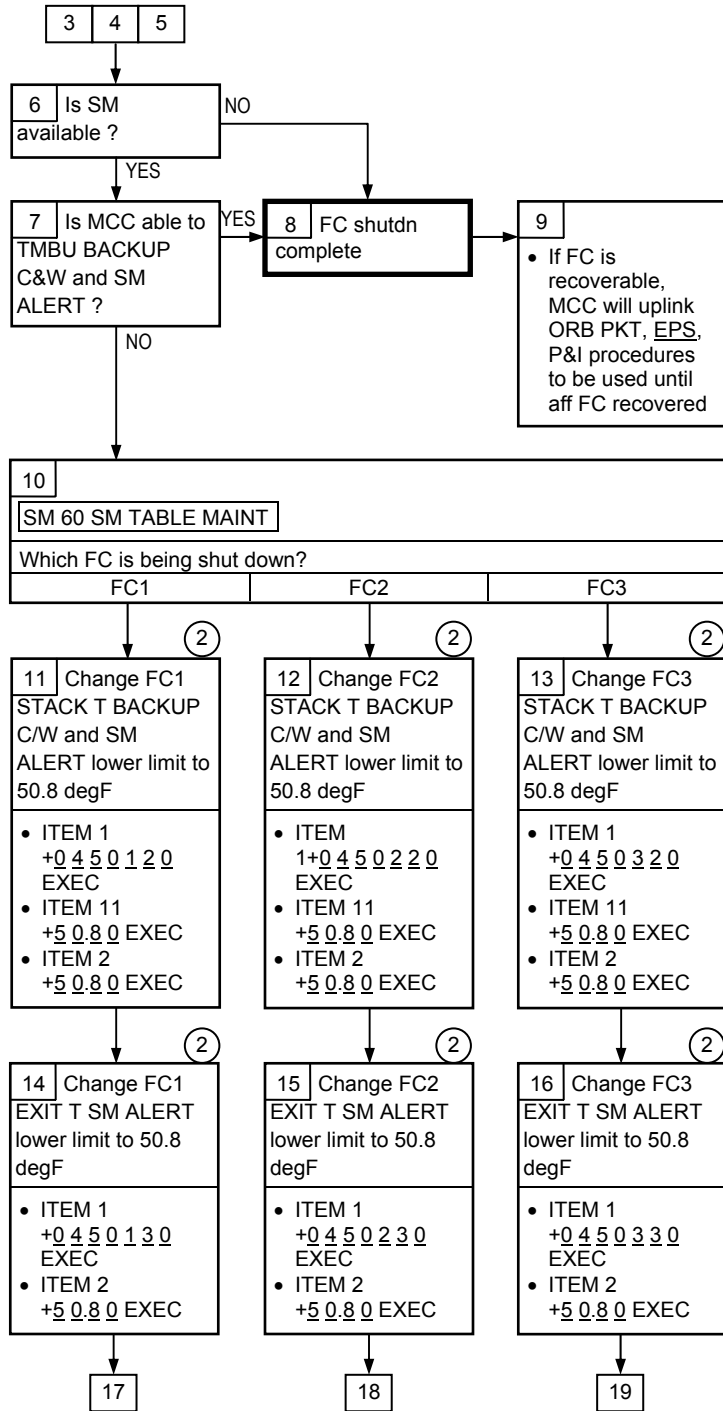
6

6

6

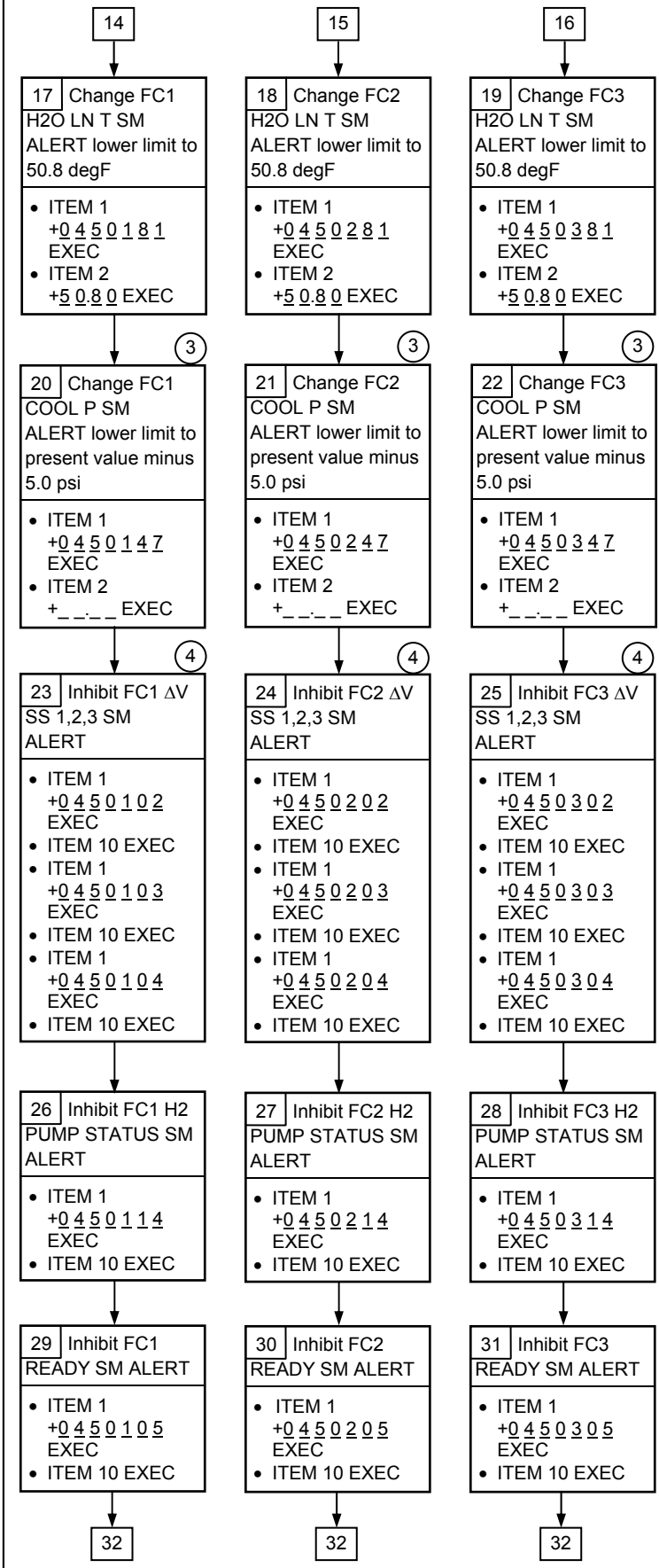
① Lower limit on FC temp during cooldown is 48 degF to protect from ice formation. Closest value > 48 degF that PRI C&W system can be set is 50.8 degF

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

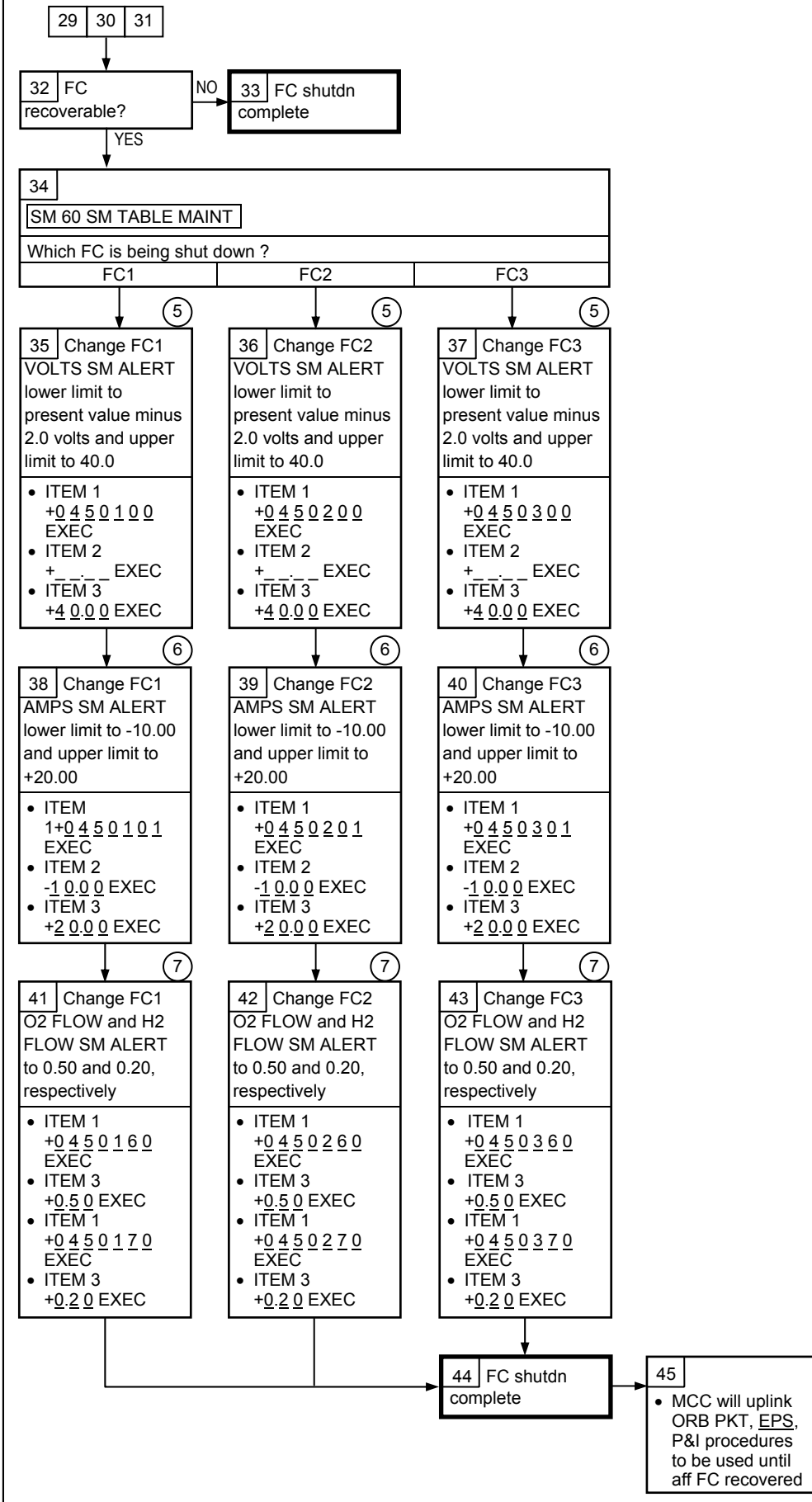
EPS SSR-3 (Cont)



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 O₂, H₂ FLOWS while fuel cell is shut down may indicate internal load or reactant leak

⑦ Increase in FC O₂, H₂ FLOWS while fuel cell is shut down may indicate internal load or reactant leak

EPS SSR-4 FC STANDBY

1

- If not tied, perform BUS TIE (Cue Card), then: (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

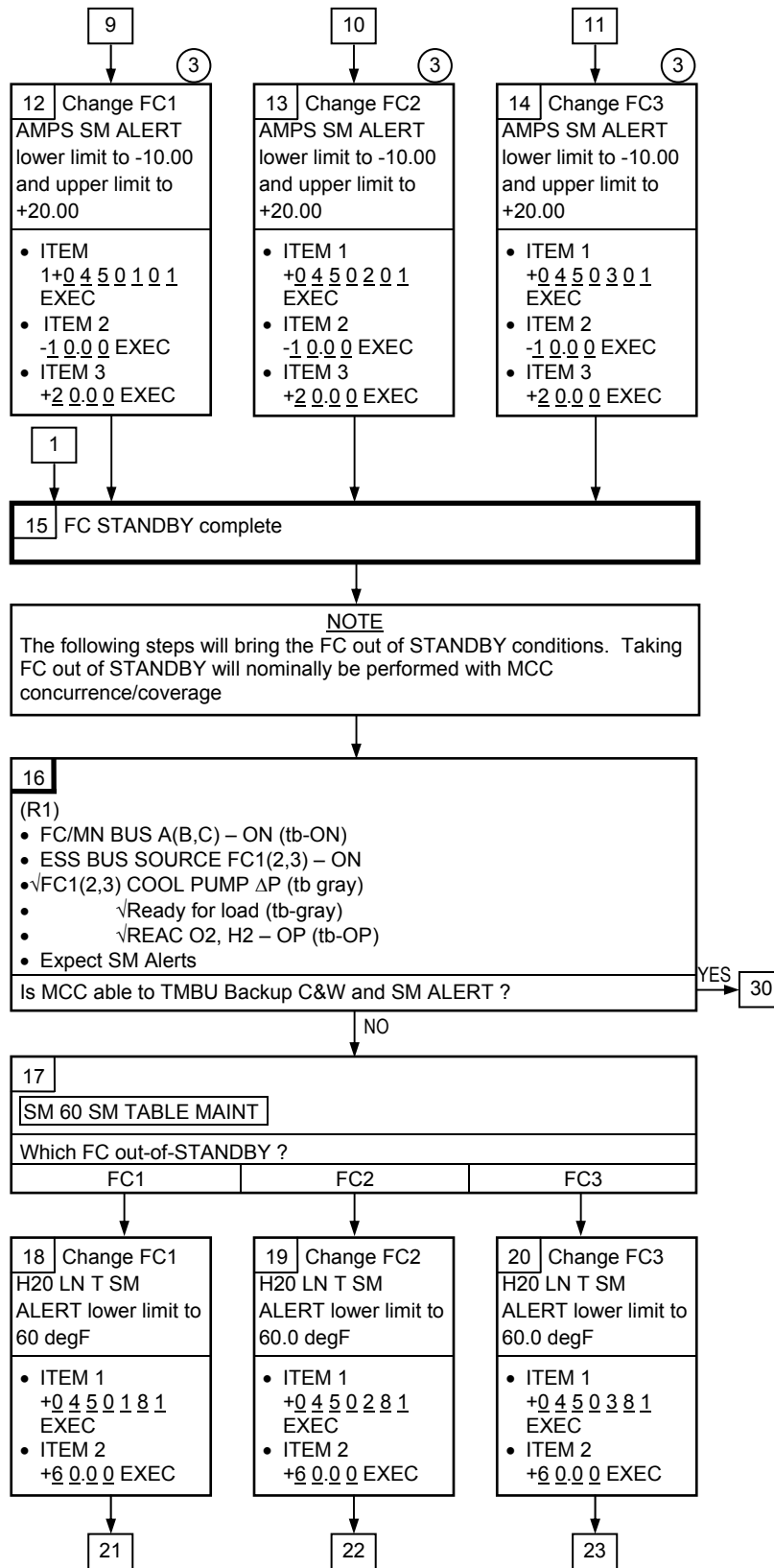
13

14

① Decrease in FC VOLTS beyond FDA limit while fuel cell is in STANDBY may indicate internal load, crossover, or reactant leak

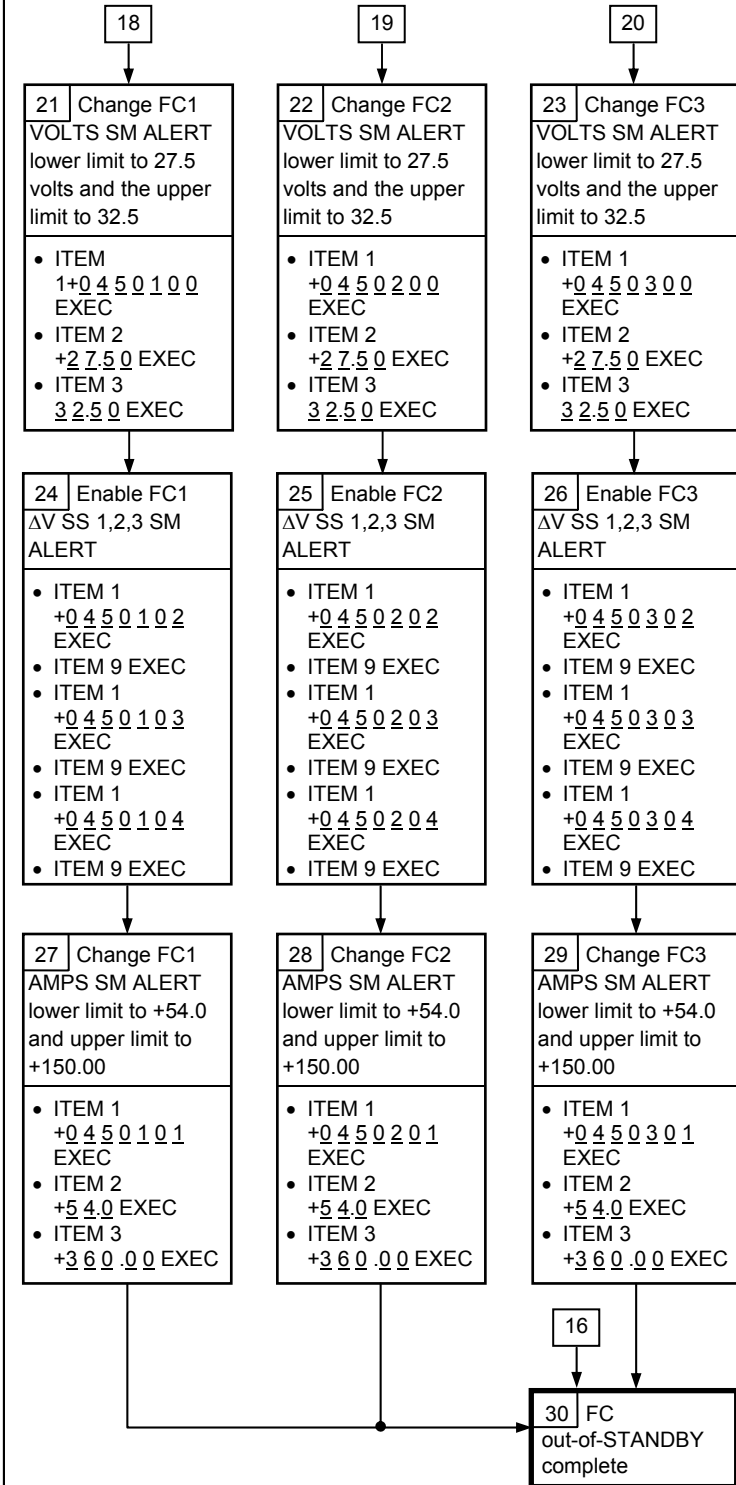
② FC SUBSTACK ΔVOLTS are not usable when fuel cell is in STANDBY

EPS SSR-4 (Cont)

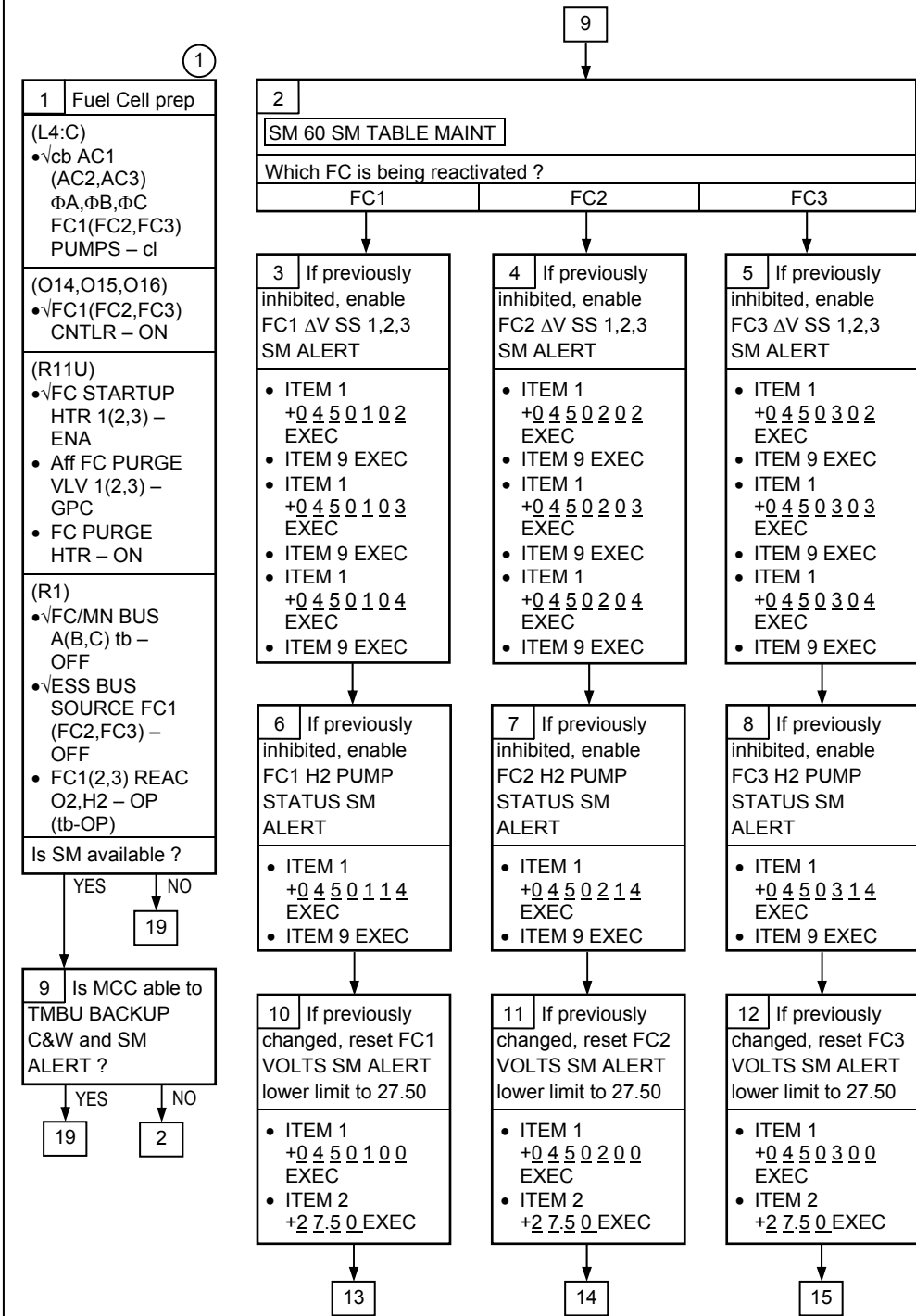


③ Increase in FC Amps beyond the FDA limit while fuel cell is in STANDBY may indicate external load on the fuel cell

EPS SSR-4 (Cont)

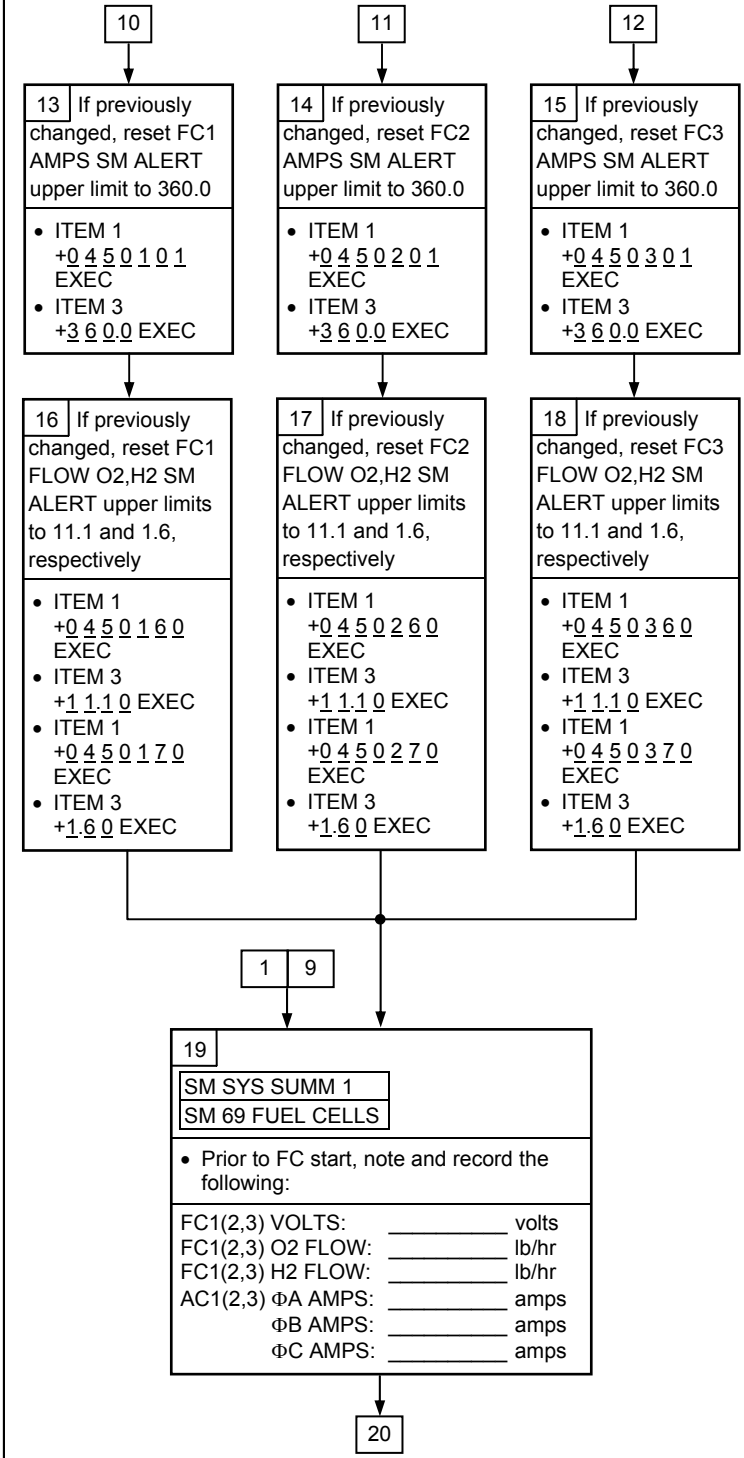


EPS SSR-6 FC RESTART

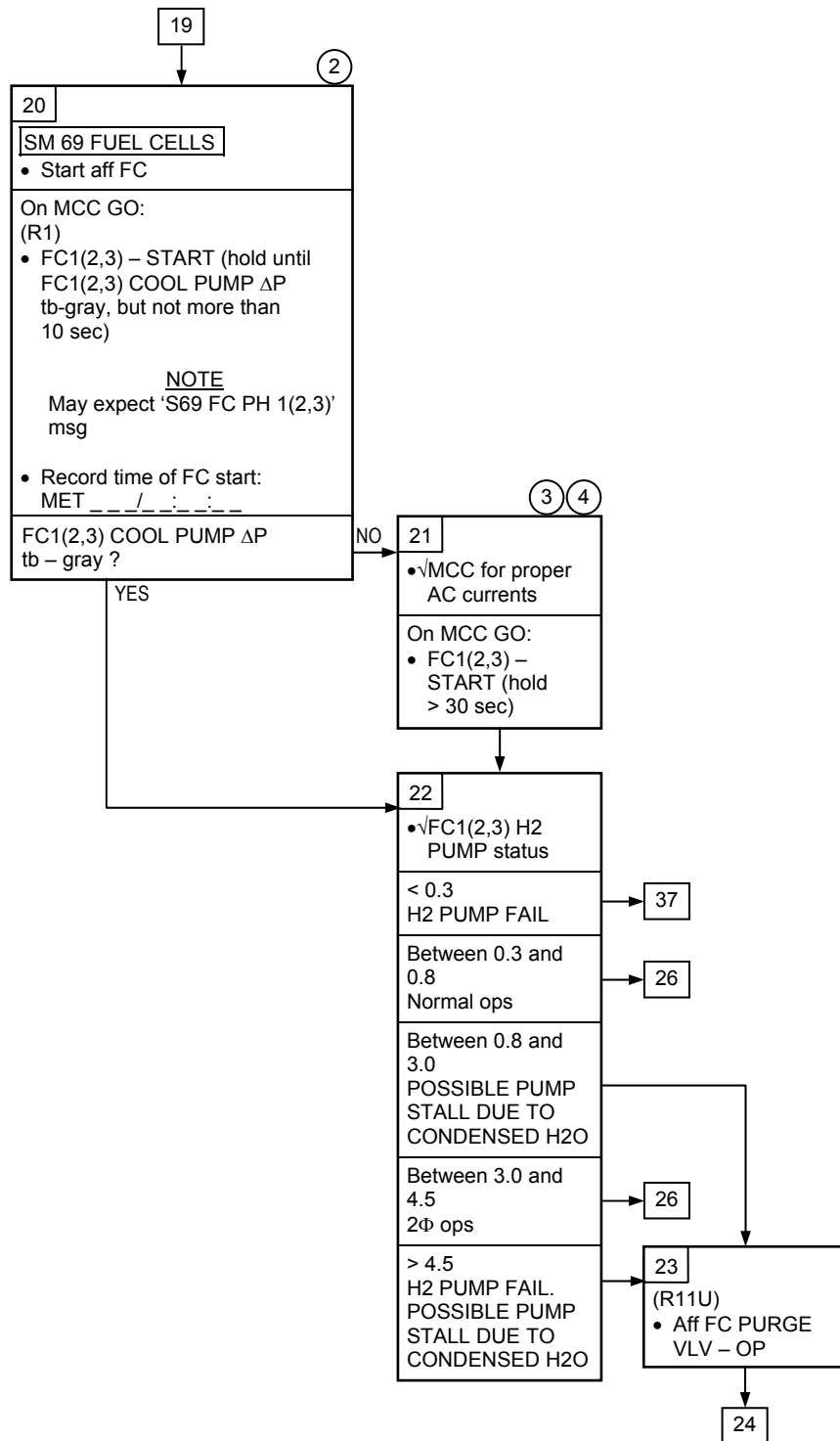


① FC may be restarted on two Φs. Loss of AC1(2,3) ΦA cb causes loss of FC1(2,3) pH sensing. Loss of AC2 ΦB cb causes loss of common pH sensing

EPS SSR-6 (Cont)



EPS SSR-6 (Cont)

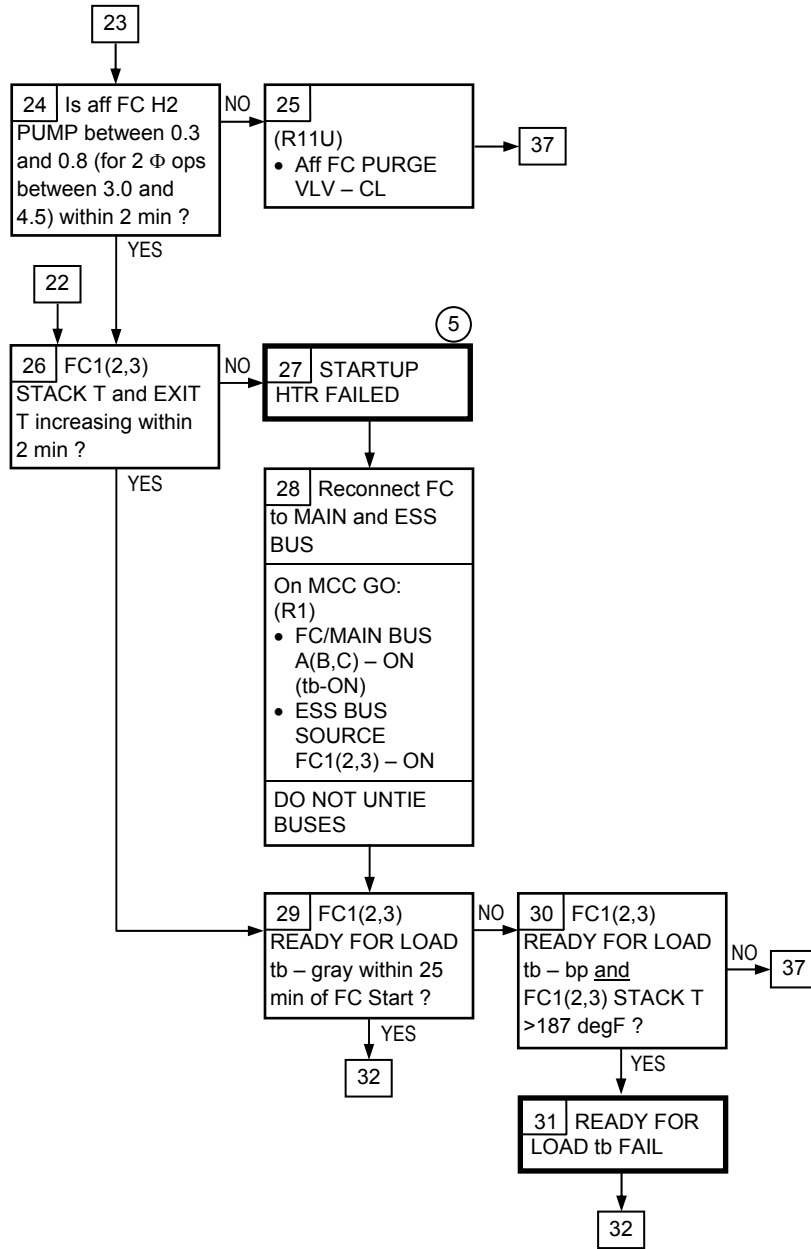


② May expect FC pH FSM when FC is started on some fuel cells due to addition of pH self-test capability

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)

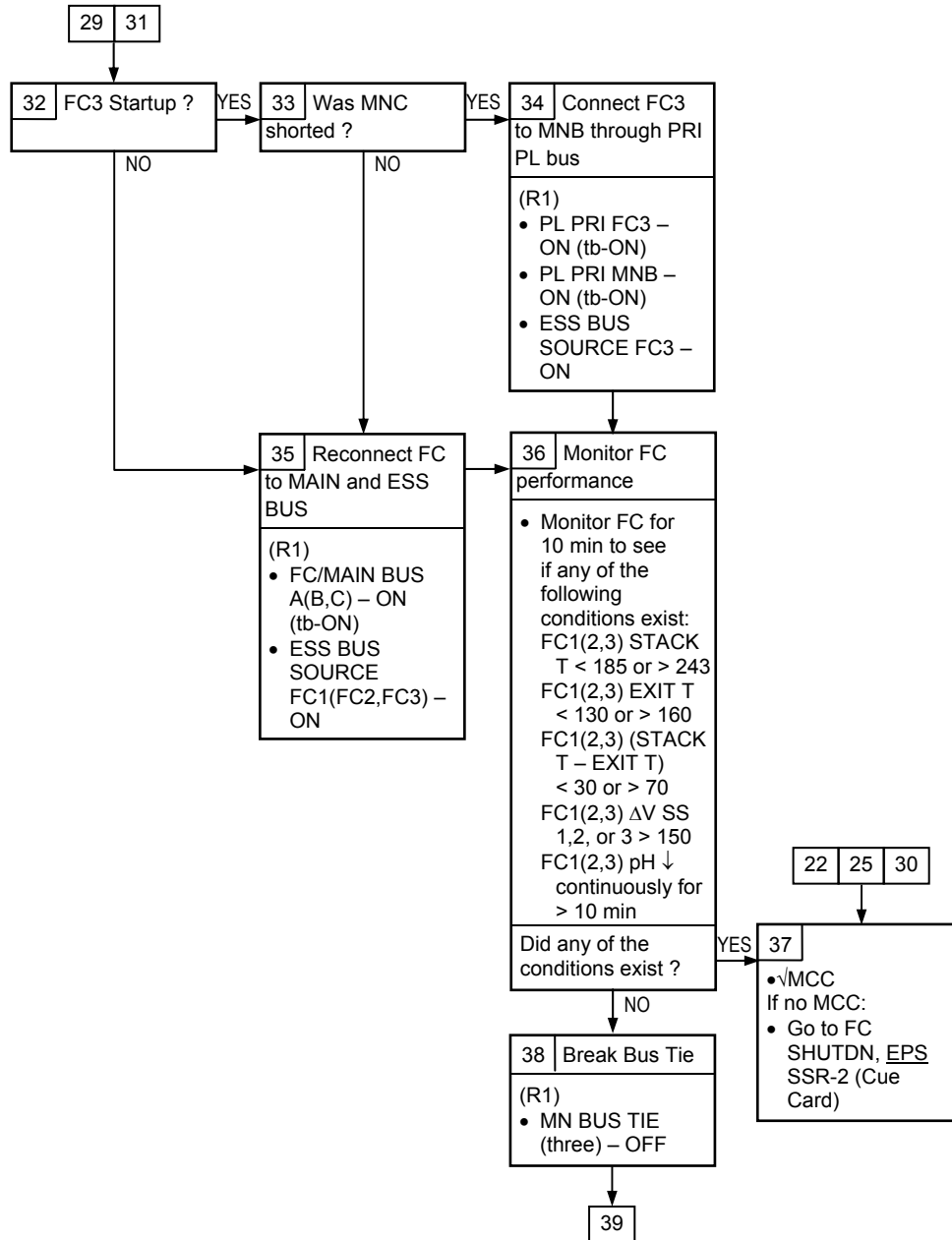
④ Failure of COOL PUMP ΔP tb will inhibit FC startup. Holding sw in START for > 30 sec will bypass Logic Timer and allow COOL PUMP and H2 mtr to run

EPS SSR-6 (Cont)

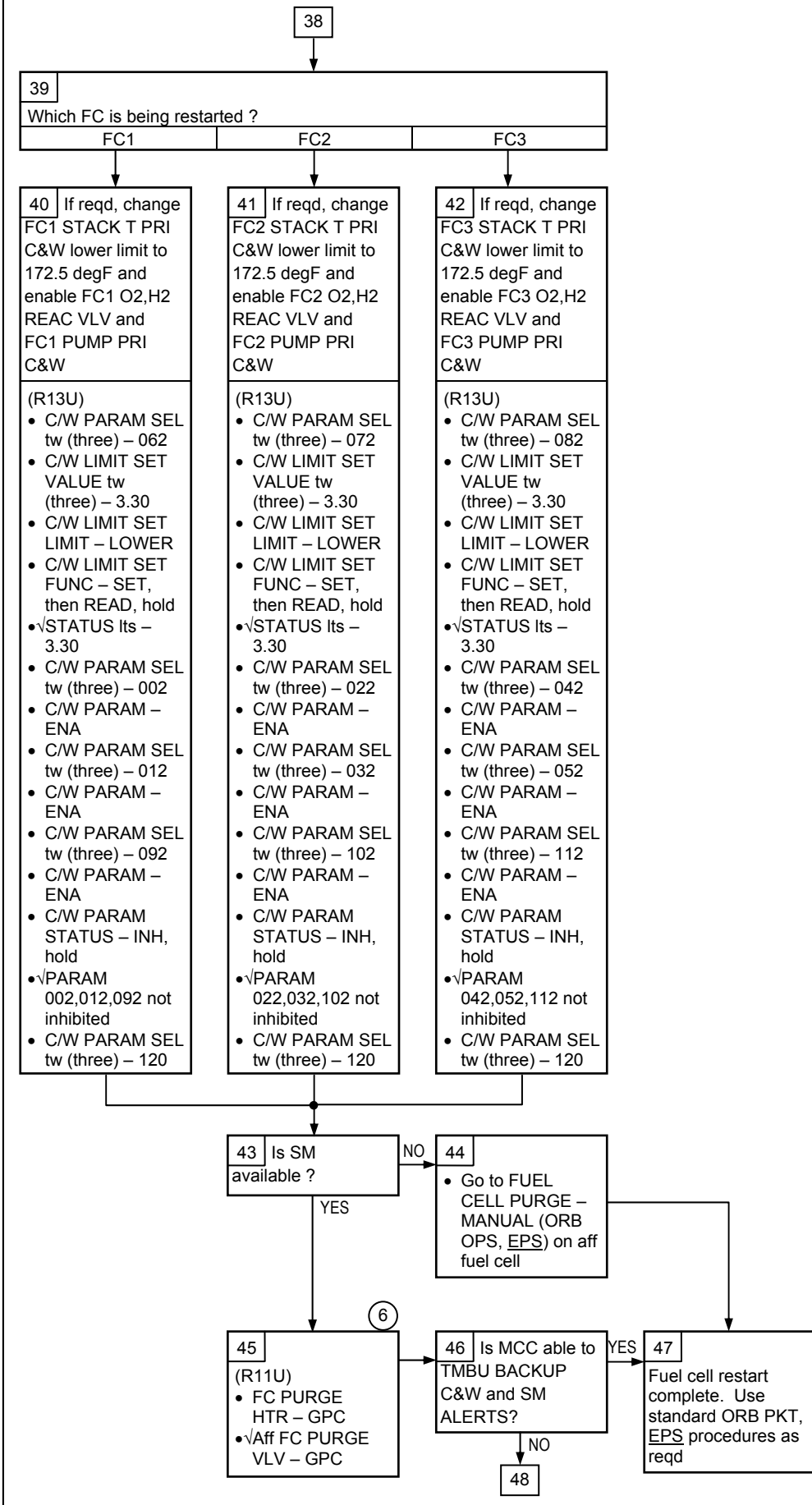


⑤ Expected indications of operating STARTUP HTR are:
 FC VOLTS ~32V
 FC O2 Flow ~1.4 lb/hr
 FC H2 FLOW ~0.2 lb/hr
 Placing FC on MAIN BUS will generate sufficient heat to raise FC temp to operating levels

EPS SSR-6 (Cont)

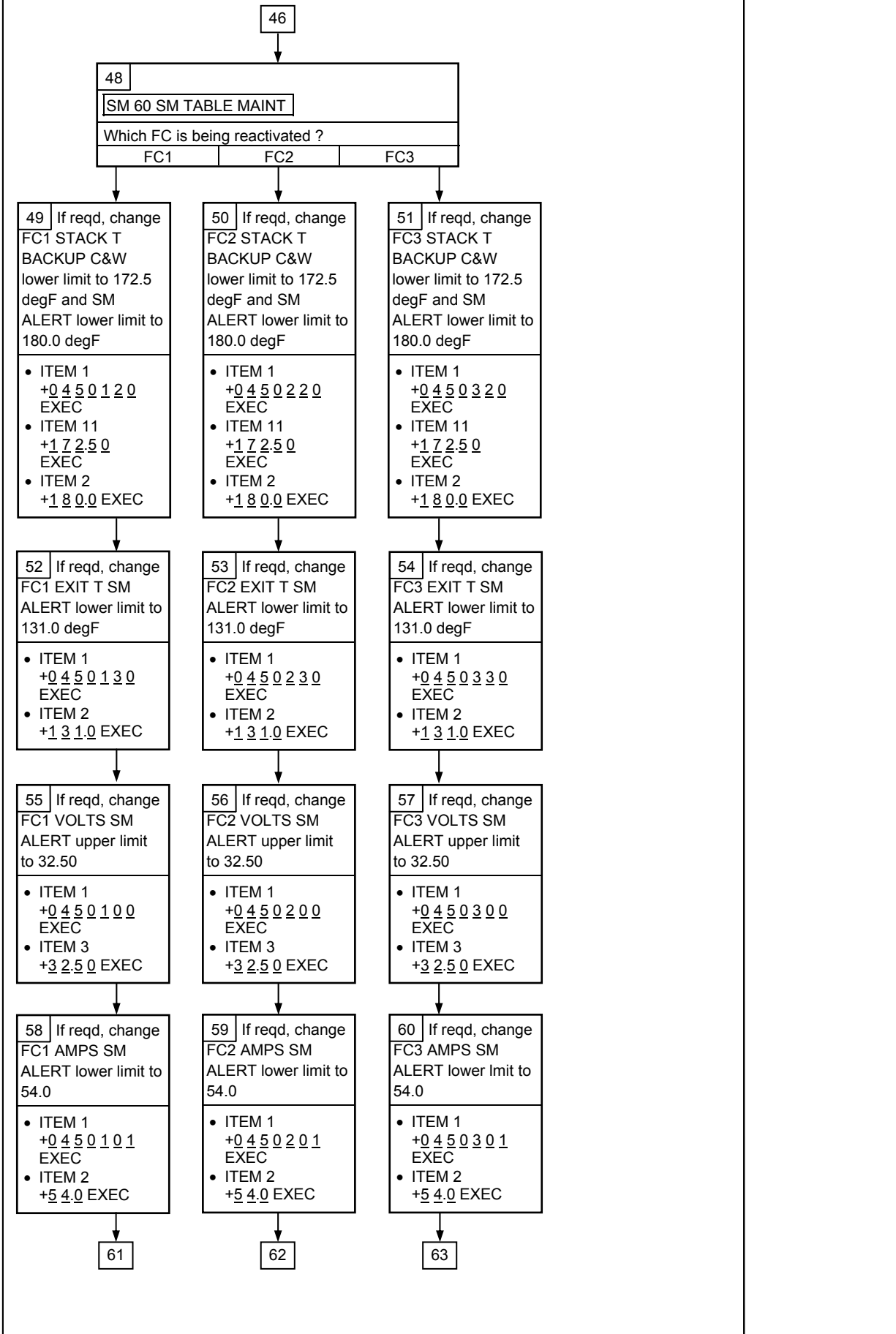


EPS SSR-6 (Cont)

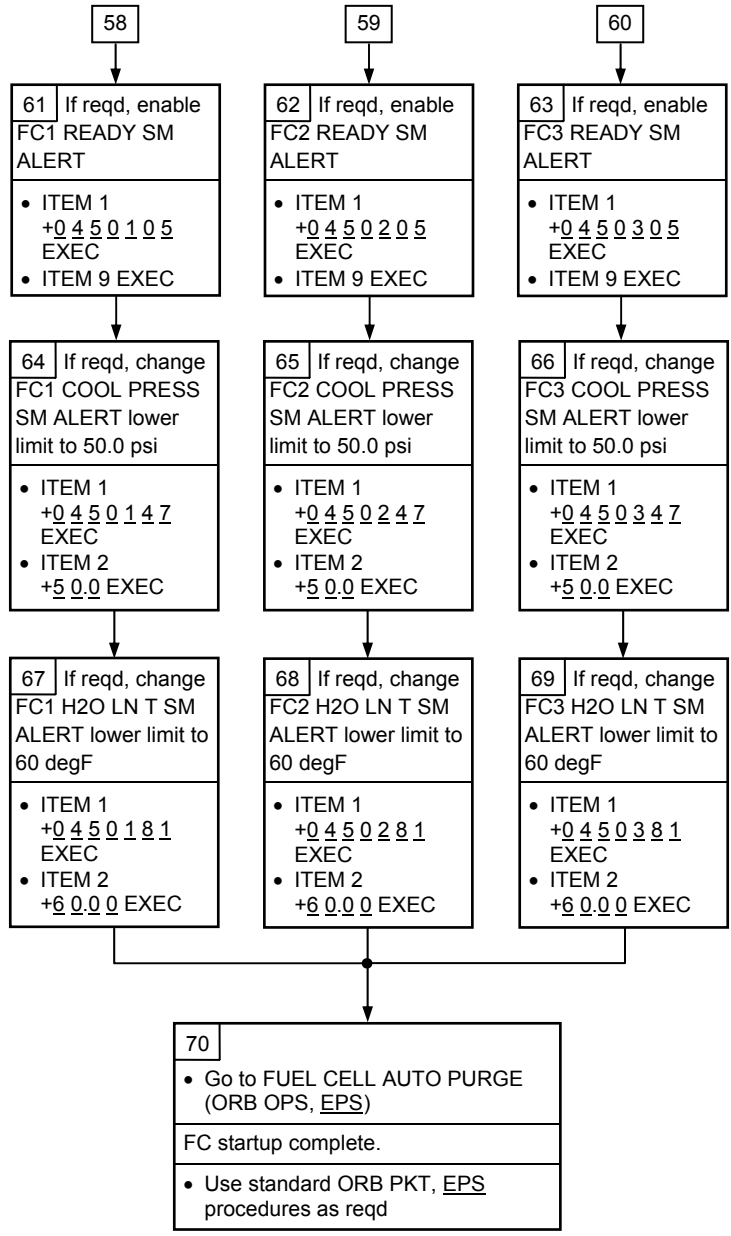


⑥ MCC will TMBU uplink post-restart FC purge

EPS SSR-6 (Cont)



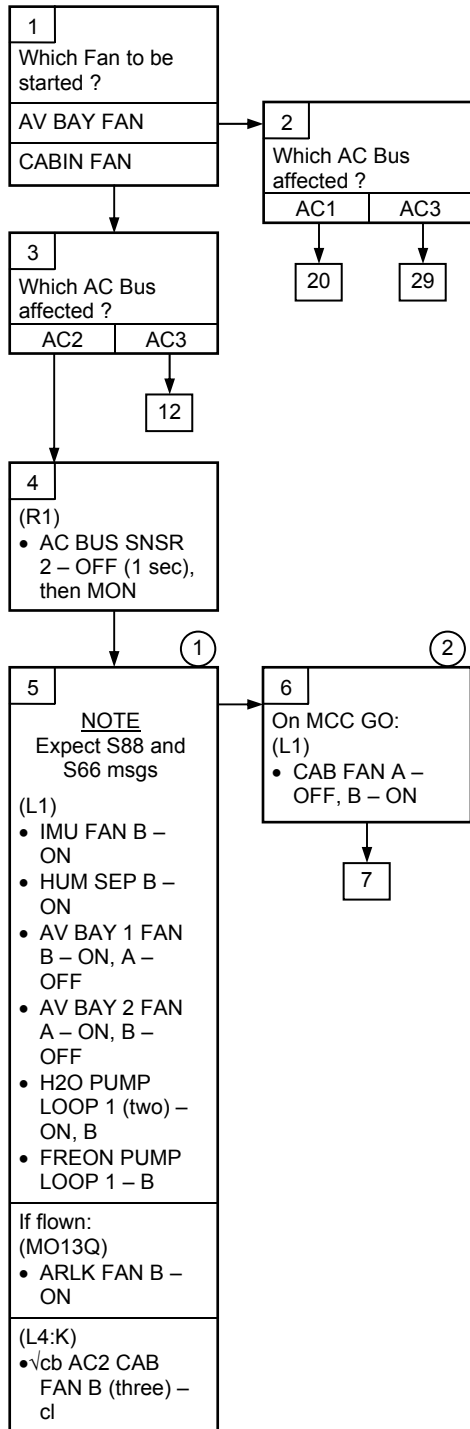
EPS SSR-6 (Cont)



EPS SSR-7 TWO-PHASE FAN START PROCEDURE

NOTE

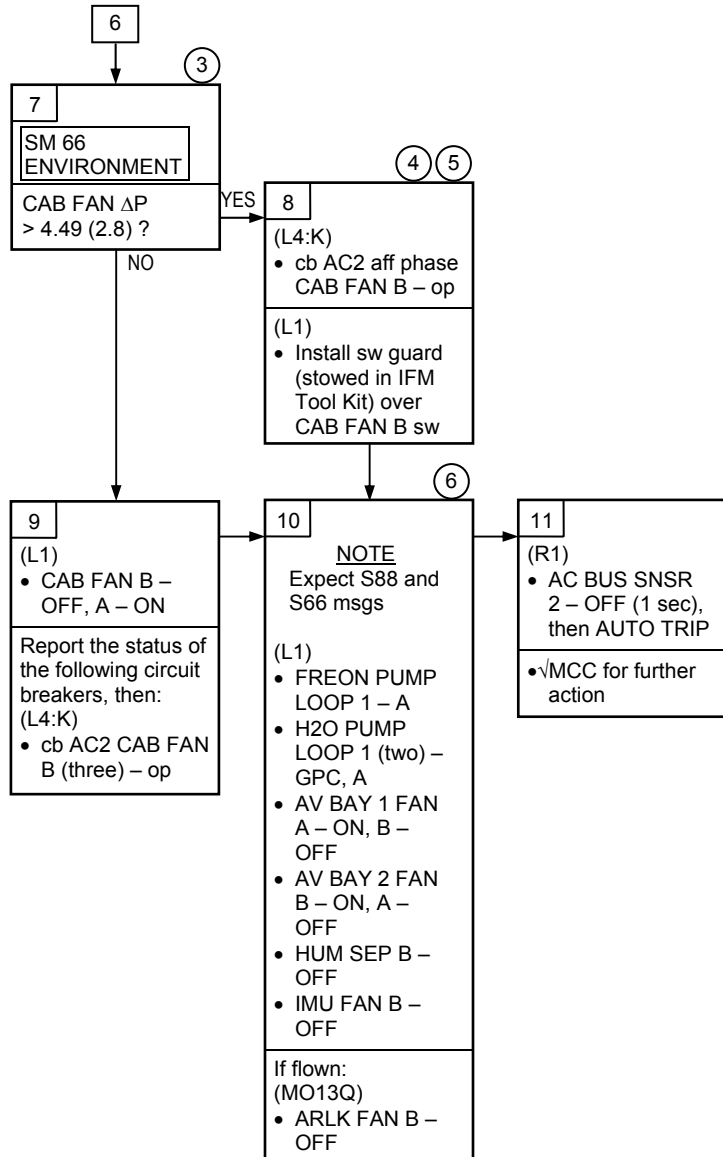
This procedure assumes the EPS MAL BUS LOSS SSR for the affected phase (not shorted) has already been completed. This procedure will be performed during MCC coverage



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)



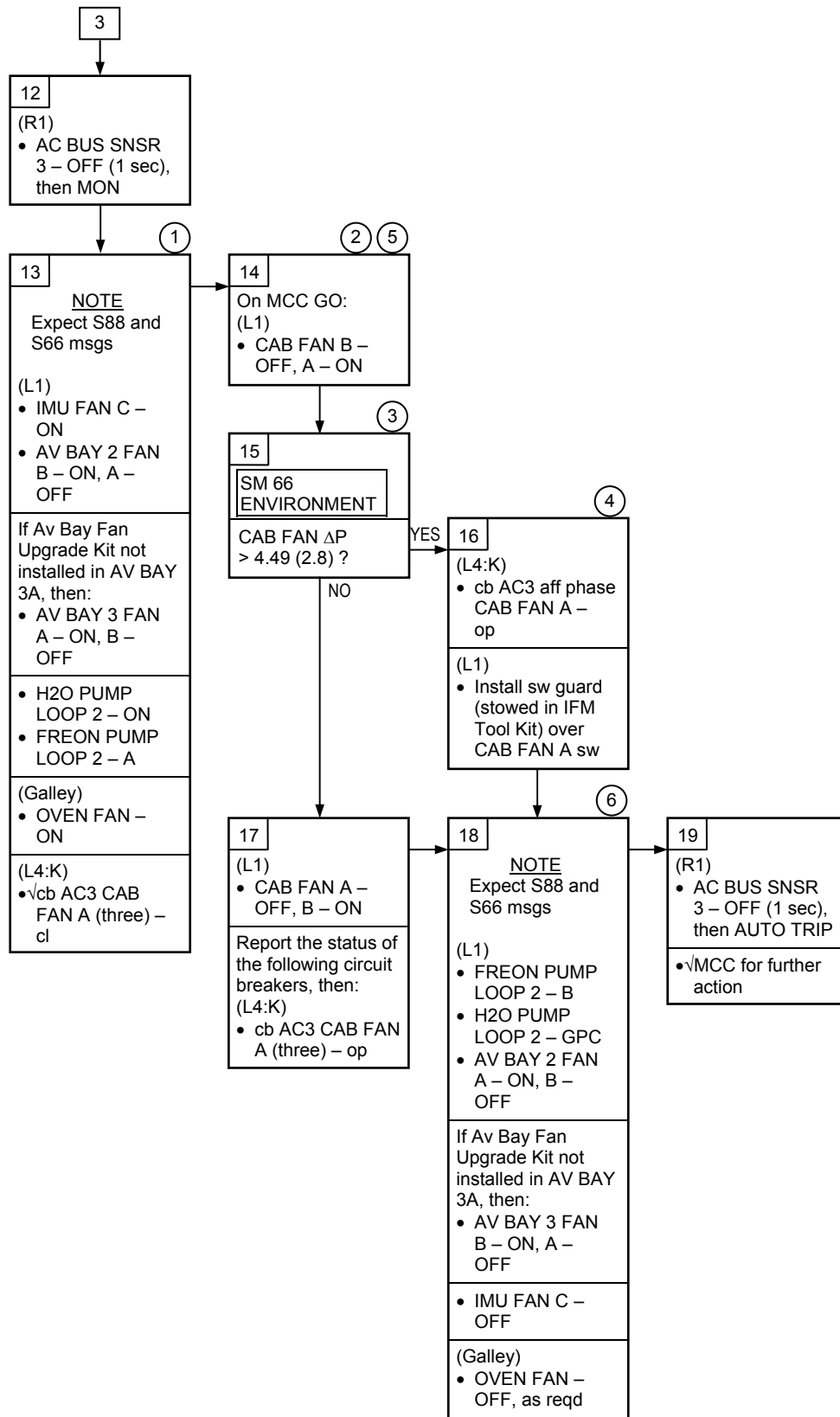
③ Value in () is the ΔP when the Cabin Press is at 10.2 psi

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

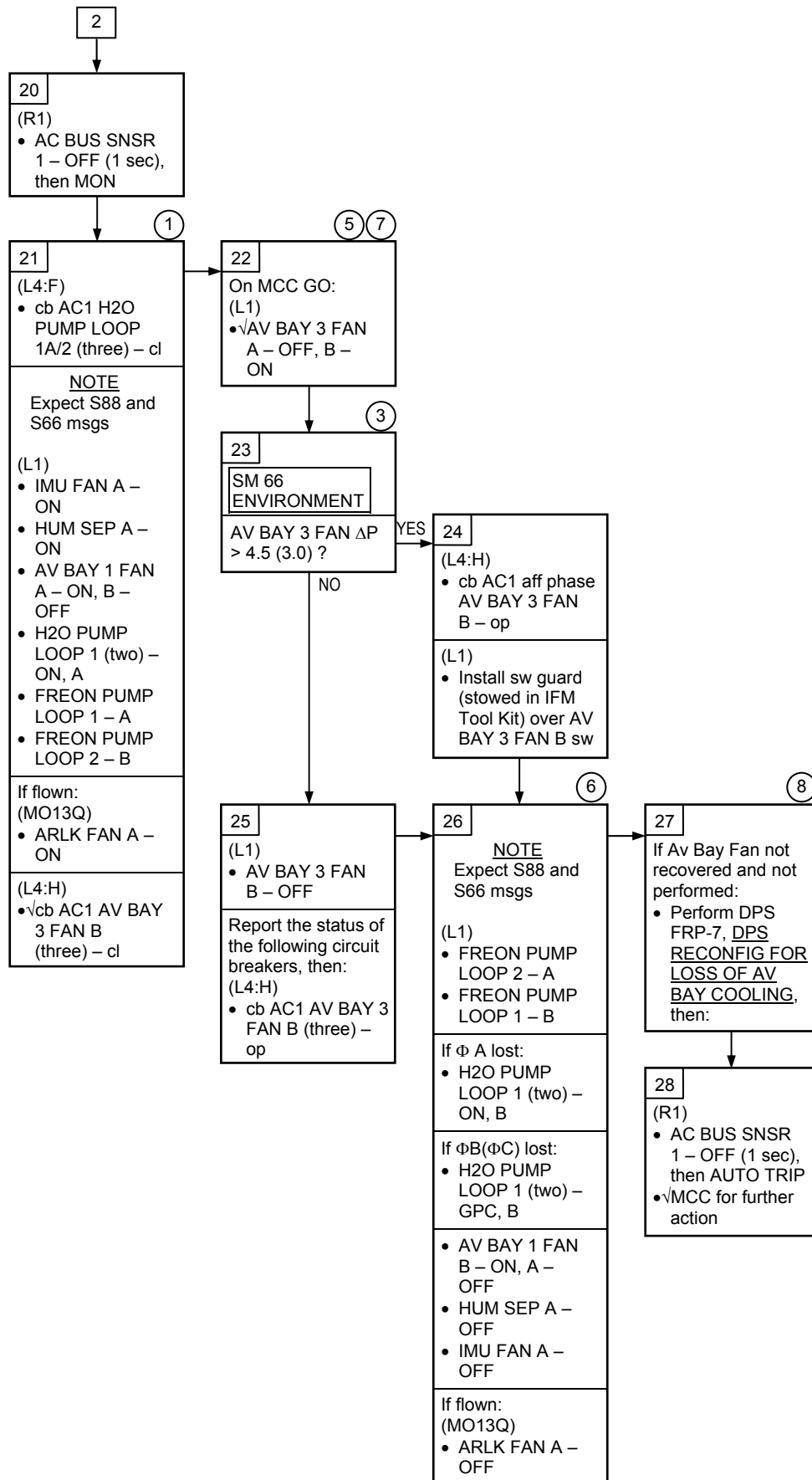
⑥ Reconfig back to alternate equipment

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

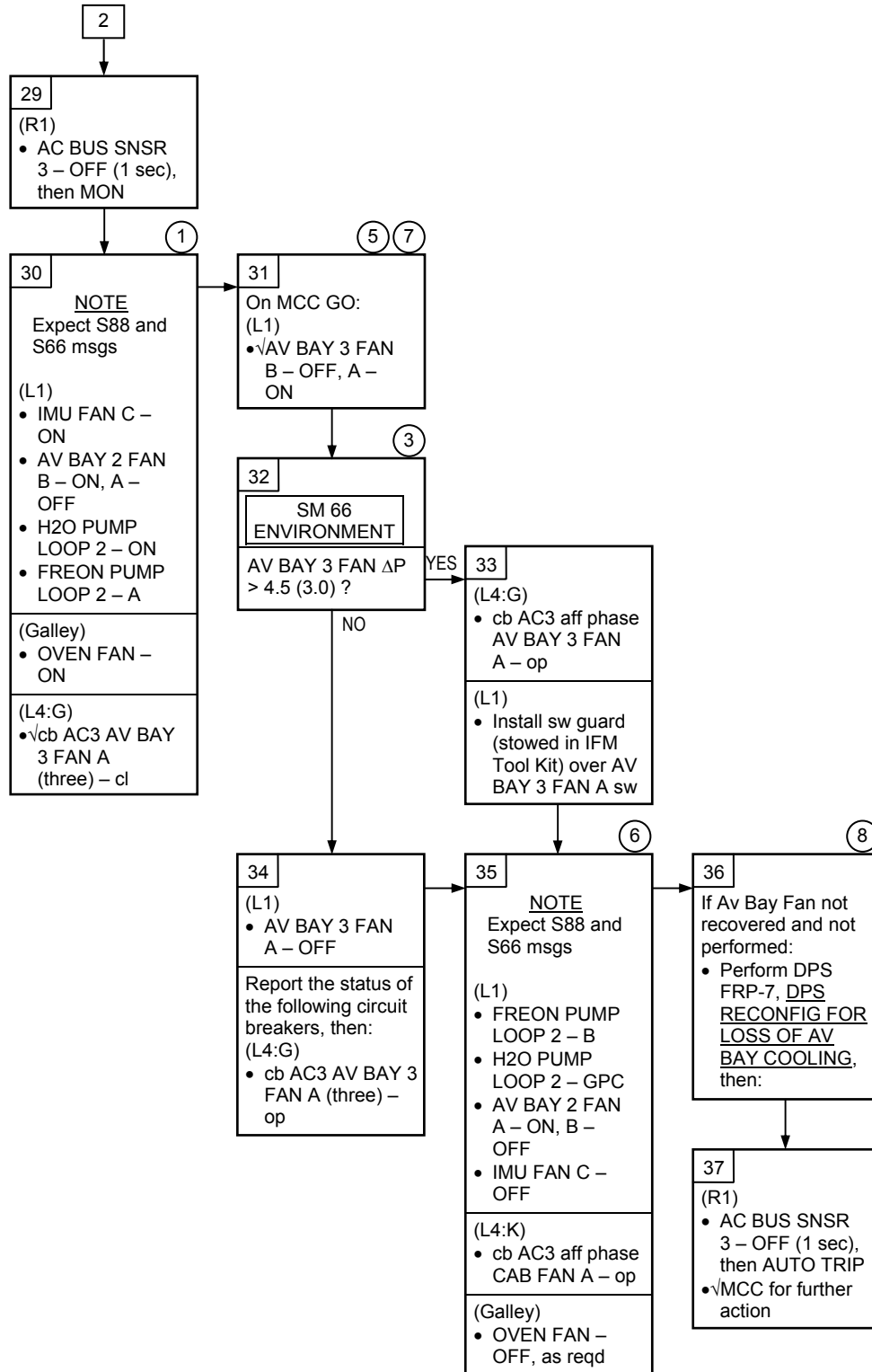
⑤ May receive 'S67 AC AMPS' msg

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"> Perform FC1 SHUTDN (FC SHUTDN Cue Card) 	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"> Perform LOSS OF 1 FC (ORB PKT, PWRDN) (R1) <ul style="list-style-type: none"> PL CAB – MNB cb AC CONTR AC1 ΦA,ΦB,ΦC (three) – cl INV/AC BUS 1 – OFF (tb-OFF) INV PWR 1 – OFF (tb-OFF) cb AC CONTR AC1 ΦA, ΦB,ΦC, (three) – op AC1 BUS SNSR – OFF O2,H2 MANF VLV TK1,2 (four) – OP 	2 MNA pwr to CABPL 1,2,3 buses AC1 ΦA,ΦB,ΦC Inverters	3 (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	
(R1) If O2(H2) Tk1 in use: <ul style="list-style-type: none"> O2(H2) TK1 HTR B – AUTO O2(H2) TK1 HTR A – OFF If O2(H2) Tk3 in use: <ul style="list-style-type: none"> O2(H2) TK3 HTR B – AUTO O2(H2) TK1 HTR A – OFF 	Cryo O2,H2 Tk1 Htrs A Cryo O2,H2 Tk3 Htrs A		
(A15) If Tk5 in use: <ul style="list-style-type: none"> O2(H2) TK5 HTR B – AUTO O2(H2) TK5 HTR A – OFF 	Cryo O2,H2 Tk5 Htrs A		
If EMU(s) in battery charge mode: (AW18H) <ul style="list-style-type: none"> PWR/BATT CHGR EMU 1(2) BUS SEL – MNB 	Av Bay 3 Agent discharge capability EMU 1,2 PWR/BATT Charger MNA pwr	(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"> LUBE OIL LN 1 – B AUTO 3 – A AUTO 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"> RUD SPDBK A – OFF B – AUTO BDY FLP A – OFF B – AUTO ELEV A – OFF B – AUTO 	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 (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	
If SSPTS: PTU 1 (OPCU 1 and APCU 1)			
(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
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	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
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	⑬ APU H2O QTY 1 if in BLR 1B. APU H2O QTY 3 if in BLR 3A
(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	⑭ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(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	[HYD/APU] HYD QTY 1 ind – 0% 13 APU H2O QTY ind – 0%	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
(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	(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	
(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)	(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) (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
GNC 23 RCS <ul style="list-style-type: none"> Reprioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc Set aft pod(s) PRI JET FAIL LIMIT to 6 	Aft RCS L,R Jet 2 Htrs	15 (R13L) MMU GN2 SPLY ISOL VLV A tb – bp	(11) All brakes ON and safing initiated
(O8) <ul style="list-style-type: none"> 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) <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> (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)
SM 1 DPS UTILITY (G2,G8,S2) MMU ASSIGN 22 <ul style="list-style-type: none"> GNC ITEM 1 EXEC SM ITEM 4 EXEC PL ITEM 6 EXEC 	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
(R11U) <ul style="list-style-type: none"> FC H2O LINE HTR – B AUTO FC H2O RELIEF HTR – B AUTO 	FC H2O Line Htrs A FC H2O Relief Htrs A	SM 94 PDRS CONTROL PORT RMS Indications lost: Mid MRL Mtr 1 LAT/REL/RDY Aft MRL Mtr 2 LAT/REL/RDY STBD RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY	(22) Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning
(R11L) 23 <ul style="list-style-type: none"> MS AUD CNTL – PS 	24 MS ATU, CCU & FD Spkr	If cooling by FES B only: 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'	(23) Listen only capability regained when headset used on MS CCU (from PS ATU) as FD speaker is also failed
(L9) <ul style="list-style-type: none"> √PS AUD PNL config for use 		(ML31C) 15 WASTE H2O TK 1 VLV tb – bp	(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
(A13) <ul style="list-style-type: none"> (OV103) GPS PRE AMPL UC – MNC (OV103) GPS PRE AMPL LC – MNC 		15 WASTE H2O DUMP ISOL VLV tb – bp	(25) Htr B remains
(A14) RCS/OMS HTR <ul style="list-style-type: none"> 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)	15 WASTE H2O DUMP VLV tb – bp	(26) Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge
(ML86B:A) <ul style="list-style-type: none"> 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	15 SPLY H2O TKD OUTLET tb – bp	(27) Htr A remains
(ML86B:C) <ul style="list-style-type: none"> 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	26 (AW82D) EMU 2 H2O SPLY,WASTE tb (two) – CL	
If in Rendezvous or Docked: <ul style="list-style-type: none"> cb MNB EXT ARLK HTR VEST Z1/2/3 – cl 	Ext Arlk Vest Htrs A	If OMS Gmbl Cmd Abs value > 2 deg: C/W OMS TVC It – on 'L OMS GMBL' (3,B)	
(ML86B:D) cb MNB <ul style="list-style-type: none"> MMU PORT,STBD HTR B (two) – cl 	25 MMU Port,Stbd Htr A	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 During Rad Dpy/Sto ops: (R13L) RAD LAT CNTL tbs (two) indicate single mtr ops	
(Continued)	(Continued)	(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 Bikhed Mtrs 1 Port Aft Bikhed 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)	L OMS Pri TVC	(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	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	CCTV Video and TV Annun Its lost if MNA selected for VCU CCTV Mon 1 lost	(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	STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec	(33) 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	(34) Sys A Sec Cntl man on capability remains
	33 FC3 Redundant Reac Vlv Cntl on pnl C3		(35) Lose Auto Temp Cntl via Cntl 2 and H2O Loop 2 Cabin Hx In Temp sns. Hx Byp vlv holds position. May be repwr'd after AC Pwr Transfer Cable connected
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR B – PRI/GPC	34 NH3 Sys A Pri Cntrl		
(ML31C) • VAC VENT ISOL VLV BUS SEL – MNB	Vac Vent Isol Vlv MNA Cntl		
If AC Pwr Transfer cable to be installed to regain AC: • Go to <u>EPS</u> 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	35 Cabin Temp Cntrl 2 and Hx Byp Vlv Mtr 2		
(L1) • CAB TEMP CNTLR – 1			
(R13U) H2O LOOP 2 OUT P • C/W PARAM SEL tw – 115 • PARAM – INH • C/W PARAM SEL tw – > 119			
(Continued)	(Continued)		

EPS SSR-10 (Cont)
BUS LOSS: MNA DA1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
36 SM 60 TABLE MAINT • Inhibit 0612705, 0612700, 0612740, 0612710, 0612665, 0612742			
(WCS) • √MODE – AUTO • √CRADLE – AUTO • √Hose stowed in cradle • √WCS ON It – OFF • FAN SEP SEL sw – OFF • HOSE BLOCK – SEP 2 • In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete • FAN SEP SEL sw – 2	WCS Fan/Sep 1 Sep Fan 1 Mtr Relay		(36) Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, Cabin HX in T, H2O Loop 1 Ich Flow respectively (37) H2O Loop 2 Byp viv holds position (38) H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost
(R2) • BLR CNTLR/HTR 1 – A 3 – B	Hyd H2O Blr Cntrl 1B 3A		(39) May be repwr'd after AC Pwr Transfer Cable connected
(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 37 H2O Loop 2 Byp Cntrl, Sig 38 Cond'r H2O Loop 2 Byp Viv pwr 2 Pump GPC Cntrl 1 Pump A Av Bay 1 Fan A 39 Av Bay 2 Sig Cond'r, Xdcrs 40 (ECLS SC3) Av Bay 3 Fan B Freon Loop 1 Pump A 2 Pump B		(40) AV Bay 2 Fan ΔP, Air Out Temp snrs lost (41) Use streamers (if flown) or monitor by feel during wake period if Cabin Air Sig Cond'r not recovered
41 During sleep periods: • CAB FAN (two) – ON	Cabin Air Sig Cond'r (ECLS SC6)		
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN A – OFF B – ON	Arlk/Tnl Fan A		
(Continued)	(Continued)		

EPS SSR-10 (Cont)
BUS LOSS: MNA DA1

42	BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	ONLY ON MCC CALL, PERFORM			(42) AC1 Bus Isolation for AC Pwr Transfer Cable Installation accomplished in MNA DA1 ACTIONS column. No additional bus isolation steps reqd (43) Redundant pwr source remains for equipment (44) H2O Loop 1 Intchgr Flow rate and IMU Fan ΔP snsr lost (45) Cabin Smoke Detector remains (46) Current Snsr 2 remains (47) Cntrl A remains
	• 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			
	(O14:B) cb MNA			
43	• OI SIG CONDR OF 1/4 A – op			
43	• OI SIG CONDR OM 1/2 A – op			
43	• OI MDM OF 1/2 A – op			
43	• OI H2O BYP LOOP 1 SNRSR – op • MNC CONTR – op • MSN TIMER FWD – op • EVENT TIMER AFT – op	44 H2O Byp Loop 1 Snsr (ECLS SC11) Fwd Mission Timer Aft Event Timer		
	(O14:C) cb MNA			
45	• (OV103,4) TACAN 1 – op			
	• SMOKE DETN L/R FLT DK – op	45 L,R Fit Dk Smoke Detectors		
	• SMOKE DETN BAY 2A/3B – op	Av Bay 2 Smoke Detector A Av Bay 3A Smoke Detector B		
	• FIRE SUPPR BAY 3 – op	MNA Utility pwr		
	• UTIL PWR O19/MO52J – op	L Console Floodlt		
	• FLOOD L CNSL – op			
	• ANNUN FWD ACA 1 – op	46 Cryo O2 Tk1 Htr Current Snsr 1		
	• cb MNA CRYO O2 HTR TK1 SNRSR 1 – op	Auto radiator isolation function		
	• cb RAD ISOL CONTR – op			
	(O14:D) cb MNA			
47	• FREON RAD CNTLR 1 – op			
47	• 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		
	• VENT ISOL – op			
	• (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			
(O14:E) cb MNA • RDR ALTM 1 – op • MLS 1 – op • ADTA 1 – op • S TRK -Z – op • ACCEL 1 – op 43 • DDU L – op 43 • AFT – op 48 • NWS – op	ADTA 1 AA 1 NWS 1		④③ Redundant pwr source remains for equipment ④⑧ NWS 2 is still available ④⑨ Six vlvs fail to non-isolation position ⑤⑩ Capability to xmit to gnd from UHF degraded ⑤① GCIL also pwr'd via MNC cb ⑤② MNB pwr may be selected via TV pwr sw (pnl A7) or GCIL if reqd
(O14:F) • MMU 1 – OFF	49 ATVC 2 Isol ME		
(R11U) • FC PURGE VLV 1 – CL • FC STARTUP HTR 1 – ENA	FC1 Startup Htr Inh capability		
(R14:A) • cb MNA AUD MS – op • ADC 1A/2A – op • MDU MFD 2 – op • PLT 1 – op	MS ATU FD Spkr		
(R14:B) cb MNA 43 cb PALLET/DSC • 1A/2B – op (EDO) • 3A – op (EDO) • UHF – op • GCILC – op • CNTL BUS BC1/2/3 – op	50 UHF Splx Pwr Amp 51 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 52 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			
(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 53 54 MNA pwr to DSP Logic buses 1,3 MNA Pyro System External Airlock Its 1,4	DSP SYS PWR SYS 1 tb – OFF	⑮ Vlv holds position ⑳ Htr B remains ⑤③ All docking mechanisms will have single mtr times ⑤④ 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>ONLY ON MCC CALL, PERFORM</p>			
<p>(ML86B:F) cb MNA FLOODS • MIDDECK 1/8 – op • WMC/MO13Q – op • AIRLK 1 – op cb MNA CRYO • O2 HTR TK3 SNSR 1 – op • O2 HTR TK5 SNSR 1 – op</p>	<p>Middeck floodlts 1,8 WMC Floodlt, MO13Q pnl lt 2 Airrk Floodlt 1</p> <p>46 Cryo O2 Tk3 Htr Current Snsr 1 Cryo O2 Tk5 Htr Current Snsr 1</p>	<p>Ctr MPS He reg A < 680 during entry (MM303)</p>	<p>⑦ Vlv holds position. N2 Sys 2 remains</p> <p>⑮ Vlv holds position</p> <p>⑳ Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge</p> <p>④⑥ Current Snsr 2 remains</p> <p>⑤⑤ Snsr 2 remains</p> <p>⑤⑥</p>
<p>(A15:H,I,J,K) • cb MNA TK6-TK9 O2 HTR SNSR 1 – op</p>	<p>55 Cryo O2 Tk 6-9 Htr Current Snsr 1</p>		<p>CAUTION</p> <p>No purge. Wait 10 min between burns</p>
	<p>CDR HUD</p> <p>Port,Stbd Rad Dpy/Sto Mtr 1 Port,Stbd Rad Lat 1-6, 7-12 Mtrs 1</p> <p>Fwd RCS Jet 1 Htrs</p> <p>56 L OMS Purge Vlv 1,2 57 L OMS Eng Pr Vlv Coil 1 58 L OMS Cntl Vlv 1,2 Coils 1 58 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2 59 OMS Qty Gaging 60 APU 1 Cntr Pwr Sply A 61 1 Fu Tk Vlv A 1 GBX GN2 Repress Vlv 62 3 Cntr Pwr Sply B 61 3 Fu Tk Vlv B</p> <p>Hyd Rsvr 1 Qty Snsr 15 TVC Hyd Sys 1 Isol Cntl 15 Hyd Brake Isol Vlv 1 Cntl 63 LG Extend Isol Vlv 63 Vlv 1 64 NWS Hyd Sys 1</p> <p>-Y Star Trkr Dr Sys 1 OP/CL capability LH Vents 5,6,8,9 Mtrs 1 RH Vents 1,2,3,5,6 Mtrs 1 65 L ADP Deploy Mtr 1 66 Htr Cntr 1</p> <p>67 Hyd Main Pump 1 Depress Solenoid RPC A 67 Hyd Main Pump 3 Depress Solenoid RPC B</p> <p>7 Atm Press Cntl O2 Sys 1 Sply Vlv Cntl 26 EMU 2 Sply and Waste H2O Vlv Cntl 68 EMU 1,2 Pwr/Batt Chgr MNA pwr</p> <p>PL Reten Sys A Rel/Lat Mtrs</p>	<p>GNC SYS SUMM 2</p> <p>⑥⑩ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</p> <p>⑥① Vlv fails closed. Redundant vlv remains</p> <p>⑥② Pwr Sply A remains. Turbine speed ind lost</p> <p>⑥③ 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</p> <p>⑥④ Hyd Sys 2 still available for NWS</p> <p>⑥⑤ Mtr 2 remains</p> <p>⑥⑥ Htr Cntr 2 remains</p> <p>⑥⑦ Redundant RPC remains</p> <p>⑥⑧ MNB pwr select capability remains</p>	
	<p>(Continued)</p>		

EPS SSR-10 (Cont)
BUS LOSS: MNA DA1

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>MPS:</p> <p>69 Ctr Eng He Intercon Outlet Vlv</p> <p>61 Ctr Eng He Isol A</p> <p>61 Pneu He Isol 1</p> <p>70 He Sply Blowdn Vlv 1,2</p> <p>71 Prplt F/D Inbd LH2 Vlv</p> <p>72 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1</p> <p>73 Ku-Bd Jettison Sys A</p> <p>73 Stbd RMS: Jett/Guil Sys A Deadface Relays</p> <p>74 Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs</p> <p>Ops Hyd Actr Instr</p>		<p>⑥1 Vlv fails closed. Redundant vlv remains</p> <p>⑥9 Vlv fails closed</p> <p>⑦0 Vlv fails closed. Aft compartment, OMS pods, ET umbilical cavity will not be purged during entry (MM304)</p> <p>⑦1 Vlv holds position. Loss of manual capability to inert LH2 Manf</p> <p>⑦2 Redundant mtrs remain</p> <p>⑦3 Sys B remains</p> <p>⑦4 Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains</p>

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"> • cb AC CONTR AC1 ΦA, ΦB, ΦC (three) – cl • INV/AC BUS 1 – OFF (tb-OFF) • INV PWR 1 – OFF (tb-OFF) • cb AC CONTR AC1 ΦA, ΦB, ΦC (three) – op • AC1 BUS SNSR – OFF 	<p>2 FC1 Pumps & 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>(F9) AC1 ΦA, ΦB, ΦC AC volts < 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"> • FWD RCS He PRESS A 	<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"> • L IDP/CRT SEL – 3 On MCC GO: • GPC/CRT 01 EXEC 	<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>MMU 1</p>	<p>7</p>	<p>⑤ Vlv holds position. Man OP capability remains. Isol B remains</p>
<p>8 • GNC – ITEM 1 EXEC • SM – ITEM 4 EXEC • PL – ITEM 6 EXEC • OPS 0 – ITEM 8 EXEC</p>	<p>Fwd RCS A Htrs (all)</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>(A14) • RCS/OMS HTR FWD RCS – B AUTO</p>	<p>EMU 1,2 Pwr/Batt Chgr MNA pwr</p>		<p>⑦ S86 WSB T1 if in BLR CNTLR/HTR 1B. S86 WSB T3 if in BLR CNTLR/HTR 3A</p>
<p>If EMU(s) in battery charge mode: (AW 18M) • PWR/BATT CHGR EMU 1(2) BUS SEL – MNB</p>			<p>⑧ Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning</p>
<p>(A8L) • PORT RMS HTR A – AUTO • PORT RMS HTR B – AUTO</p>	<p>10 RMS: 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&C Primary Ltg</p>	<p>(R1) FC1 COOL PUMP ΔP tb – bp</p>	<p>⑨ Temp sensing lost</p>
<p>If OBSS berthed: (A8L) • STBD RMS HTR A – AUTO • STBD RMS HTR B – AUTO</p>		<p>13 HYD/APU HYD QTY 1 ind – 0% APU H2O QTY ind – 0%</p>	<p>⑩ All brakes ON and safing initiated</p>
<p>Pre-seat ingress: • Discharge handheld fire ext into AV BAY 3</p>	<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>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>If AC Pwr Transfer Cable to be installed to regain AC: • Go to <u>EPS SSR-200</u>; otherwise, continue with bus loss actions</p>		<p>(O3) RCS/OMS PRPLT QTY Gage and MSN TIMER ind – blank</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>(Continued)</p>	<p>(Continued)</p>	<p>(O8) FWD RCS He PRESS A tb – bp TK ISOL 3/4/5 tb – bp MANF ISOL 1 tb – bp</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>(Continued)</p>		<p>5 15 L ADP deploy time incr from 15 to 30 sec</p>	<p>⑭ May be repwrdr after AC Pwr Transfer Cable connected</p>
<p>(Continued)</p>		<p>(Continued)</p>	<p>⑮ Vlv holds position</p>

EPS SSR-11 (Cont)
BUS LOSS: MNA FPC1

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BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
• MDU CRT 1 PWR – OFF			(23) AC1 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNA FPC1 ACTIONS column. No additional bus isolation steps reqd (24) Mtr 2 remains (25) Htr Cntrl 2 remains (26) Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup Release Sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2 (27) Buses remain pwrd (28) Redundant mtrs remain (29) Hyd Sys 2 still available for NWS (30) Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains
(C2) • IDP/CRT 1 PWR – OFF			
(O7) • (OV105) GPS 1 PWR – OFF • (OV105) GPS 1 PRE AMPL UPPER – OFF • (OV105) GPS 1 PRE AMPL LOWER – OFF	(OV105) GPS 1		
(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		
	CDR HUD -Y Star Trkr Dr Sys 1 OP/CL capability 24 L ADP Dpy Mtr 1 25 Htr Cntrl 1		
	RH Vents 1,2,3,5,6 Mtrs 1 LH Vents 5,6,8,9 Mtrs 1		
	26 LG Extend Vlv 1		
	27 MNA pwr to Cntl Buses AB1, AB2,AB3,CA1,CA2,CA3		
	28 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 Actr 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1		
	29 NWS Hyd Sys 1		
	30 Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs		
	Port,Stbd Rad Lat 1-6, 7-12 Mtrs 1 Port,Stbd Rad Dpy/Sto Mtr 1		
	PLBD: C/L Lat 1-4, 5-8, 9-12 Mtrs 1 Port,Stbd Fwd Blkhd Mtr 1 Port Aft Blkhd Mtr 1 Stbd Door Mtr 1		
	PL Reten Sys A Rel/Lat Mtrs		

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
<p>GNC 23 RCS</p> <p>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</p>		(FSM) L RCS D(L) JET	③ Vlv holds position. Man OP capability remains
<p>5 Reconfig following vlv(s) only if leak isolation reqd: (O7) • AFT L RCS He PRESS A,B • R RCS He PRESS A</p>	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
<p>(A12) APU HTR TK/FU LN/H2O • SYS 1A – OFF • 1B – AUTO • 3A – AUTO • 3B – OFF HYD HTR • RUD SPDBK A – OFF • B – AUTO</p>	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
<p>(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</p>	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
<p>10 Prior to using L(R) OMS: (O8)</p>	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
<p>12 L(R) OMS He PRESS/VAP • ISOL A – OP • B – GPC</p>	11 L,R OMS He Vap Isol 1 GPC Cntl		⑧ Htr B remains ⑨ Htr A remains
<p>GNC XXXXX MNVR YYYYY (3,B)</p> <p>Sel L OMS SEC TVC: • L OMS GMBL SEC – ITEM 30 EXEC 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>⑩ Lost TM: GNC SYS SUMM 2 L,R OMS ENG BALL VLV 1: Assume Vlv 1 status same as Vlv 2</p>
<p>BUS ISOLATION</p>			⑪ Vlv fails closed. Man cntl remains. Redundant Isols remain
<p>ONLY ON MCC CALL, PERFORM</p>			⑫ Maintains He Isol redundancy
<p>NONE</p>			

EPS SSR-14

BUS LOSS: MNA APC4

(Includes MNA APC1, MNA ALC1, MNA AMC1)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR GAS GEN/FUEL</p> <p>2 • PUMP 1 – B AUTO</p> <p>2 • 3 – A AUTO</p> <p>APU HTR</p> <p>• LUBE OIL LINE 1 – B AUTO</p> <p>• LUBE OIL LINE 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>• RUD SPD BK A – OFF</p> <p>• BK B – AUTO</p> <p>• BDY FLP A – OFF</p> <p>• B – AUTO</p> <p>• ELEVON 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>3 GG/Fu Pump Htrs B</p> <p>APU 1 Lube Oil Line Htr A</p> <p>APU 3 Lube Oil Line Htr B</p> <p>APU 1 Tk/Fu Ln Htrs A</p> <p>APU 1 Inj H2O Htrs A</p> <p>3 Tk/Fu Ln Htrs B</p> <p>Rud/Spd Brake Htr A</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>(F7) C/W RCS JET It – on</p> <p>SM ALERT Light/Tone – on</p> <p>(FSMs) L RCS D(L) JET</p> <p>(R4) 3 HYD BRAKE ISOL VLV 1 tb – OP</p> <p>4 LG EXTEND ISOL VLV tb – OP</p> <p>3 HYD MPS/TVC ISOL VLV SYS 1 tb – CL</p> <p>(O7) AFT L RCS He PRESS A tb – bp</p> <p>5 AFT R RCS He PRESS A tb – bp</p> <p>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</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. 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</p> <p>⑤ Vlv holds position. Man OP capability remains</p> <p>⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position</p> <p>⑦ Manf status <u>not</u> automatically declared closed. Fail-offs will occur when jet commanded</p> <p>⑧ Htr B remains</p> <p>⑨ Htr A remains</p> <p>⑩ Do not reconfig for reg switch or l'CNCT procedures</p> <p>⑪ Vlv holds position. Man CL, full GPC Cntl remains</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>If OMS GMBL cmd abs value > 2 deg: C/W OMS TVC It L OMS GMBL (3,B)</p>	
<p>(L2)</p> <p>FLASH EVAP FDLN</p> <p>• HTR 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>If OMS GMBL cmd abs value > 2 deg and TVC selected: C/W OMS TVC It R OMS GMBL (3,B)</p>	
<p>(R2)</p> <p>• BLR CNTLR/HTR 1 – A</p> <p>• 3 – B</p> <p>• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>Hyd H2O Blr 1 Cntr B</p> <p>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>(A14)</p> <p>RCS/OMS HTR</p> <p>• L POD (two) – A OFF, B AUTO</p> <p>• R POD (two) – B OFF, A AUTO</p> <p>• OMS CRSFD LINES (two) – A OFF, B AUTO</p>	<p>7 RCS Manf L5 RJD pwr (L5L,L5D)</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 L RCS He PRESS A,B</p> <p>• R RCS He PRESS A</p>	<p>8 L Pod A Htrs (all)</p> <p>9 R Pod B Htrs (partial)</p> <p>8 OMS Crsfd Ln A Htrs (all)</p>		
<p>If ICNCT config:</p> <p>(O7)</p> <p>6 • AFT L RCS TK ISOL 3/4/5 A – GPC (tb-bp)</p> <p>• 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</p> <p>11 Aft L RCS He Pr Isol B man OP capability</p> <p>AFT L,R RCS TK ISOL 3/4/5 A CL microswitch feedback</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-14 (Cont)
BUS LOSS: MNA APC4

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>GNC 23 RCS</p> <ul style="list-style-type: none"> • Reprioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest, etc <p>12 DES INH on L Manf 3 Jets:</p> <ul style="list-style-type: none"> • 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>Aft RCS L,R Jet 2 Htrs</p>		<p>⑫ Maintains control capability for APC3 failure</p> <p>⑬ Lost TM:</p> <p>GNC SYS SUMM 2</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"> • If Straight feed config, L OMS Crossfeed B – OP (tb-OP). Otherwise, √MCC 	<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"> • ISOL A – OP • B – GPC 	<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>GNC XXXXX MNVR YYYYY (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 CAUTION</p> <p>No purge. Wait 10 min between burns</p> <p>⑳ √MCC for OMS Qtys. Disregard qtys on meter and</p> <p>GNC SYS SUMM 2</p>
<p>If reqd during entry (< 120K ft): (L1)</p> <ul style="list-style-type: none"> • NH3 CNTLR B – PRI/GPC <p>If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</p> <ul style="list-style-type: none"> • H2O PUMP LOOP 1,2 (two) – ON • √FLOW PROP VLV LOOP 1,2 (two) – ICH • Activate PL H2O LOOP(s) (if applicable) 	<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>BUS ISOLATION</p>			<p>㉕ Vlv A remains</p>
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:B)</p> <ul style="list-style-type: none"> • MCA LOGIC MNA AFT 1 – OFF 	<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-14 (Cont)
BUS LOSS: MNA APC4

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>3 Hyd Brake Isol Vlv Cntl 4 LG Extend Isol Vlv Cntl 3 TVC Hyd Sys 1 Isol Cntl</p> <p>26 NWS Hyd Sys 1 27 Hyd Main Pump 1 Depress Solenoid RPC A 27 Hyd Main Pump 3 Depress Solenoid RPC B</p> <p>28 ATVC 2 Isol ME</p> <p>29 L OMS Purge Vlv 1,2 Qty gauging</p> <p>MPS: 30 Pneu He Isol 1 30 Ctr Eng He Isol A 29 Ctr Eng He Intercon Outlet Vlv 31 He Sply Blowdn Vlv 1,2 32 Prplt F/D Inbd LH2 Vlv</p> <p>33 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 GPC Cntl C/L Lat Actr 2 Mtr 1 GPC Cntl L Dr Closure Mtr 1 GPC CL capability L Dr Uplock Lat Mtr 1 GPC Lat capability</p> <p>34 AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1</p>	<p>Ctr MPS He reg A < 680 during entry (MM303)</p>	<p>③ Vlv holds position</p> <p>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</p> <p>⑥ Hyd Sys 2 stillavailable for NWS</p> <p>⑦ Redundant RPC remains</p> <p>⑧ Six vlvs fail to non-isolation position</p> <p>⑨ Vlv fails closed</p> <p>⑩ Vlv fails closed. Redundant vlv remains</p> <p>⑪ Vlv fails closed. Aft compartment, OMS pods, and ET Umbilical cavity will not be purged during entry (MM304)</p> <p>⑫ Vlv holds position. Loss of manual capability to inert LH2 manf</p> <p>⑬ Redundant mtrs remain</p> <p>⑭ Actuators continue to operate until Stow, Rel/Lat, or OP/CL sw is taken to GND or OFF</p>

**EPS SSR-15
BUS LOSS: MNA FLC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>2 Reconfig following vlv(s) only if leak isolation reqd: (O8)</p> <ul style="list-style-type: none"> • FWD RCS He PRESS A <p>4 GNC 23 RCS</p> <p>Override F1 Manf status to CL:</p> <ul style="list-style-type: none"> • RCS FWD – ITEM 1 EXEC • MANF VLVS 1 OVRD – ITEM 40 EXEC <p>Pre-seat ingress for entry:</p> <ul style="list-style-type: none"> • Discharge handheld fire ext into AV BAY 3 	<p>1 Fwd RCS He Press Isol GPC CNTL and MAN CL capability</p> <p>RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)</p> <p>Av Bay 3 agent discharge capability</p>	<p>MASTER ALARM Light/Tone – on</p> <p>(F7)</p> <p>3 C/W RCS JET It – on</p> <p>(FSM)</p> <p>3 F RCS D(F,L,U) JET</p> <p>(O8)</p> <p>1 FWD RCS He PRESS A tb – bp</p>	<p>① Vlv holds position. Man OP capability remains</p> <p>② Do not reconfig for reg switch or l'CNCT procedures</p> <p>③ Indications do not appear until jet commanded</p> <p>④ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur</p> <p>⑤ Htr Cntr 2 remains</p>
<p>BUS ISOLATION</p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(O14:C)</p> <ul style="list-style-type: none"> • cb MNA FIRE SUPPR BAY 3 – op 	<p>5 L ADP Htr Cntr 1</p>		

**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 l'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>GNC 23 RCS</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 Qty's. Disregard Qty's on meter and GNC SYS SUMM 2
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: GNS SYS SUMM 2 L OMS N2 P VLV: If Eng – ARM/PRESS, assume vlv OP
If reqd during entry (< 120K ft): (L1) • NH3 CNTLR B – PRI/GPC ----- If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1) • H2O PUMP LOOP 1,2 (two) – ON • √FLOW PROP VLV LOOP 1,2 (two) – PL HX If applicable • Activate P/L H2O LOOP(s)	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
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM	16 L OMS Cntl Vlv 1,2 Coils 1 16 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2		
NONE	10 OMS Qty gauging 17 L OMS GN2 Purge Vlv 1,2		⑰ CAUTION No purge. Wait 10 min between burns
	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		
			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)

**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
GNC 23 RCS 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	
BUS ISOLATION			
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 3 Port Door Mtr 2 CL Limit sw 4 Stbd Door Mtr 1 OP Limit sw	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: RETEN LAT tb – bp R-F-L MID tb – bp	
		STARBOARD RMS: DPY/STO tb – bp	
BUS ISOLATION		SM 94 PDRS CONTROL	
ONLY ON MCC CALL, PERFORM		PORT RMS Indications lost: Mid MRL Mtr 1 LAT/REL/RDY	
(MA73C:A) • MCA LOGIC MNA MID 1 – OFF	MNA MMC1 Bus pwr RH Vents 3,5,6 Mtrs 1	STBD RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY	
	5 Port RMS Mid MRL Mtr 1 6 Stbd RMS Fwd MRL Mtr 2		

EPS SSR-19
BUS LOSS: MNA MMC3

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(MA73C:D)</p> <p>1 • cb MCA LOGIC MCA PWR AC1 3Φ MID 3 – op</p> <p>For PLBD ops:</p> <ul style="list-style-type: none"> • OP/CL Drs in man mode 	<p>1 Stbd Rad Lats 1-6,7-12 Mtrs 1 Limit sw Stbd Rad Dpy/Sto Mtr 1</p> <p>2 Port Rad Dpy/Sto Mtr 2 Limit sw</p> <p>PLBD: C/L Lat 1-4,5-8 Mtr 1 Port Aft Bikhds Lats Mtr 1</p>	<p>(R13L)</p> <p>1 RAD CNTL PORT tb – bp If STBD RAD pnl stowed: RAD CNTL STBD tb – bp</p> <p>SM (BFS SM 63) PL BAY DOORS</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 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</p> <p>② Mtr 2 will continue to drive until Sys B Cntl sw is taken to OFF</p> <p>③ Single mtr time</p> <p>④ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
<p>BUS ISOLATION</p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:B)</p> <ul style="list-style-type: none"> • MCA LOGIC MNA MID 3 – OFF 	<p>MNA MMC3 Bus pwr LH Vents 5,6 Mtr 1</p>	<p>(A8L)</p> <p>STARBOARD RMS: RETEN LAT tb – bp R-F-L AFT tb – bp</p>	
	<p>3 Port RMS Aft MRL Mtr 2</p> <p>4 Stbd RMS Aft MRL Mtr 1</p>	<p>SM 94 PDRS CONTROL</p> <p>PORT RMS Indication lost: Aft MRL Mtr 2 LAT/REL/RDY</p> <p>STBD RMS Indications lost: Aft MRL Mtr 1 LAT/REL/RDY</p>	

**EPS SSR-20
BUS LOSS: MNA AMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	LH Vent 8,9 Mtr 1	(R4) 1 LG EXTEND ISOL VLV tb – OP	
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:B) • MCA LOGIC MNA AFT 1 – OFF	MNA AMC1 Bus pwr		① Vlv holds position. Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup release sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2
	2 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 GPC Cntl C/L Lat Actr 2 Mtr 1 GPC Cntl L Dr Closure Mtr 1 GPC CL capability L Dr Uplock Lat Mtr 1 GPC Lat capability		② Redundant mtrs remain ③ Actuators continue to operate until the Stow, Rel/Lat, or OP/CL sw is taken to GND or OFF
	3 AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1		④ Hyd Sys 2 still available for NWS
	1 LG Extend Isol Vlv		
	4 NWS Hyd Sys 1		

**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
BUS ISOLATION 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"> • PORT RMS HTR A – OFF • PORT RMS HTR B – AUTO <p>If OBSS berthed:</p> <p>(A8L)</p> <ul style="list-style-type: none"> • STBD RMS HTR A – OFF • STBD RMS HTR B – AUTO 	<p>RMS:</p> <p>1 Port Primary pwr</p> <p>3 Port Payload pwr</p> <p>2 MCIU</p> <p>Port Htr A</p> <p>Stbd Htr A</p>	<p>(A8U)</p> <p>2 RMS D&C tb – bp except:</p> <p>BRAKES tb – OFF</p> <p>RATE MIN tb – OFF</p> <p>RATE HOLD tb – OFF</p> <p>SOFT STOP tb – gray</p> <p>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>BUS ISOLATION</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 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	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		
• cb RAD ISOL CONTR - op	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; margin-bottom: 5px;">GNC 23 RCS</div> <ul style="list-style-type: none"> • Reprioritize FRCS Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc • Set forward pod PRI JET FAIL LIMIT to 4 	Fwd RCS Jet 1 Htrs	(A6U) PL RETEN RDY tb – bp RETEN/LAT tb – bp	① Single mtr time
BUS ISOLATION		(A6A1 – pnl overlay) RELAX tb – bp DEMATE tb – bp MATE tb – bp ELEC CONT tb – bp	
ONLY ON MCC CALL, PERFORM		<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">SM 97 PL RETENTION</div> Indication lost: RELAX DEMATE MATE	
NONE	PL Reten Sys A Rel/Lat Mtrs ROEU Logic Pwr Sys 1 Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) 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 ③ Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge ④ Without circulation, H2O will lose heat with time and never reheat to nominal temp ⑤ MNB and MNC line htrs remain. MNB struc and vestibule htrs remain
(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	
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	
(ML31C) • VAC VENT ISOL VLV BUS SEL – MNB	Vac Vent Isol MNA Cntl	(AW82D) 3 EMU 2 H2O SPLY, WASTE (two) tb – CL	
(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)	
(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		
(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	5 Ext A/L H2O and Structural Htrs MNA pwr		
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(ML86B:A) cb MNA H2O • LINE HTR A – op cb MNA SPLY H2O • TKA INLET – op • TKB OUTLET – op cb MNA WASTE H2O • DUMP VLV/NOZ HTR – op	2 Sply H2O Tka Inlet Vlv Cntl 2 Sply H2O Tkb,D Outlet Vlv Cntl		
(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		
(Continued)	(Continued)		

EPS SSR-26 (Cont)
BUS LOSS: MNA ML86B

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(ML86B:F) 6 • cb MNA CRYO O2 HTR TK3 SNSR 1 – op • cb MNA CRYO O2 HTR TK5 SNSR 1 – op</p>	<p>6 Cryo O2 Tk 3 Htr Current Snsr 1 Cryo O2 Tk 5 Htr Current Snsr 1</p>		<p>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</p>
<p>(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</p>	<p>1 MMU Port,Stbd Htr A 2 MMU GN2 Sply Isol Vlv A 7 Ku-Bd Jettison Sys A 7 Stbd RMS: Jett/Guil Sys A Deadface Relays</p>		<p>⑤ MNB and MNC line htrs remain. MNB struc and vestibule htrs remain ⑥ Current Snsr 2 remains ⑦ Sys B remains</p>
<p>(ML86B:E) cb MNA EMU 2 H2O • SPLY – op • WASTE – op cb MNA FLOOD • TNL ADAPT 2 – op</p>	<p>TA Floodlt 2</p>		
<p>(ML86B:F) cb MNA FLOODS • MIDDECK 1/8 – op • WMC/MO13Q – op • AIRLK 1 – op</p>	<p>Middeck Floodlts 1,8 WMC Floodlt, MO13Q pnl lt 2 Airlk Floodlt 1</p>		
	<p>3 EMU 2 Sply H2O Vlv Cntl Waste H2O Vlv Cntl</p>		
<p>(ML86B:C) 5 • cb MNA EXT ARLK HTR LINE ZN1 – op 5 • cb MNA EXT ARLK HTR LINE ZN2 – op 5 • cb MNA EXT ARLK HTR STRUC – op 5 • cb MNA EXT ARLK HTR VEST Z1/2/3 – op</p>	<p>5 Ext A/L H2O and Structural Htrs MNA pwr</p>		
<p>(ML86B:D) • cb MNA FC PCM – op</p>	<p>8 FCMS</p>		

**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
BUS ISOLATION			
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 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"> Perform FC2 SHUTDN (FC SHUTDN Cue Card) 	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 <div style="border: 1px dashed black; padding: 5px; display: inline-block;">TIME CRITICAL</div> * 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"> Perform LOSS OF 1 FC (ORB PKT, PWRDN) 			
(R1) <ul style="list-style-type: none"> PL CAB – MNA 	2 MNB pwr to CABPL 1,2,3 buses AC2 ΦA,ΦB,ΦC Inverters	3 (COMM LOST) All S-BD A/G voice lost if Sys 1 selected Middeck Spkr audio lost	
<ul style="list-style-type: none"> 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 		(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	
<ul style="list-style-type: none"> O2,H2 TK1 HTRS A – AUTO O2,H2 TK1 HTRS B – OFF O2,H2 MANF vlv TK1, TK2 – OP 	Cryo O2(H2) Tk2,3,4 Htrs A if in Auto Cryo O2,H2 Tk2,3,4 Htrs B		
<ul style="list-style-type: none"> O2,H2 TK2,3 HTRS A,B (eight) – OFF 			
(A11) <ul style="list-style-type: none"> O2,H2 TK4 HTRS A,B (four) – OFF 			
(A15) If O2,H2 TK5 QTY > 10%: <ul style="list-style-type: none"> O2,H2 TK5 HTR A (two) – AUTO 			
	Av Bay 1 Agent discharge capability	(F9) AC2 ΦA,ΦB,ΦC AC volts ind – < 90 DC VOLTS MNB ind – OSL	
(A12) APU HTR 4 • GAS GEN/FUEL PUMP 1 – A AUTO 4 • GAS GEN/FUEL PUMP 2 – B AUTO <ul style="list-style-type: none"> LUBE OIL LN 1 – A AUTO 2 – B AUTO APU HTR TK/FU LN/H2O 4 • SYS 1A – AUTO 4 • 1B – OFF 4 • 2A – OFF 4 • 2B – AUTO HYD HTR <ul style="list-style-type: none"> RUD SPD BK A – AUTO B – OFF BDY FLP A – AUTO B – OFF ELEV A – AUTO B – OFF AFT FUS A – OFF B – AUTO HYD CIRC <ul style="list-style-type: none"> PUMP PWR 1 – MNA 2 – MNC 	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)		
(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, <u>ECLS</u> 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		
SM 1 DPS UTILITY (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 Crsfed 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
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)	L OMS ENG VLV 2: Assume VLV 2 status same as VLV 1
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	(28) Man cntl remains. Vap Isol closes. Pr Isol normally closed
31 R OMS He PRESS/VAP ISOL • A(B) - GPC • B(A) - CL	32 OMS Eng/Xfeed Redundancy	SM (BFS,SM) 63 PL BAY DOORS	(29) Maintains He Isol redundancy
(O8) • Right OMS TK ISOL A - CL (tb-CL)	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	(30) GPC cntl remains. Vlv fails closed
If Supply H2O Dump reqd and DUMP ISOL VLV failed closed: • Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)	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)	(31) Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
If EMU(s) in battery charge mode: (AW18H) • PWR/BATT CHGR EMU 1(2) BUS SEL - MNA	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)	(32) Maintains deorbit capability for CNTL AB1 failure
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	Video Cntl Unit MNB pwr	If first RGA failure and rates sensed: 'RM FAIL RGA' (3)	(33) Not yet active on all vehicles
If CCTV reqd: (A7U) • TV PWR CONTR UNIT - MNA	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	(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
For SSME Hyd Reprss: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) - OP, wait 10 sec, then CL	5 MPS/TVC Hyd Sys 2 Isol Cntl	L,R ADP deploy times incr from 15 to 30 sec	(35) Sys B Pri Cntlr, auto switchover to Sec Cntlr remain
GNC XXXXX MNVR YYYYY Sel L OMS PRI GMBL • ITEM 28 EXEC	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	
(ML31C) • VAC VENT ISOL VLV BUS SEC - MNA	Vac Vent Isol MNB Cntl		
If reqd during entry (< 120 K ft): (L1) • NH3 CNTLR A(B) - PRI/GPC	35 NH3 Sys B Sec Cntlr Man capability		
(Continued)	(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
(R2) • BLR CNTLR/HTR 1 – B • 2 – A	Hyd H2O Blr 1 Cntr A 2 Cntr B		(39) Lose Auto Temp Cntl via Cntr 1 and Cabin Temp, Cabin Hx Air Out Temp, and H2O Loop 1 Cabin Hx In Temp snsrs. Hx Byp Vlv holds position
(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 Cntr 1 active: (L1) • CAB TEMP CNTLR – OFF	39 Cabin Temp Cntr 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			(40) 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) reqd to stow Ku-Bd. Jettison reqd 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
(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		⑤② All docking mechanisms will have single mtr times
(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		⑤③ Logic buses 1(2) remain pwr'd via MNA(MNC) 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	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 Cntrl Pwr Sply B 61 1 Fuel Tk Vlv B 62 2 Cntrl Pwr Sply A 2 Fuel Tk Vlv A APU 2 GBX GN2 Repress Vlv Hyd Rsvr 2 Qty Snsr 63 Freon Loop 2 Cntrl A Rad Byp Vlv Mtr Man Cntl 64 Freon Loop 1 Cntrl 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 Cntrl 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 Ops Hyd Actr Instr 73 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 Cntrl B Rad Byp Vlv Mtr Man Cntl remain (64) Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains (65) Mtr 1 remains (66) Htr Cntrl 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), pwrdrn not needed, then:	2 FC2 Pumps and pH Snsr	MASTER ALARM Light/Tone – on CRT 2 blanks	① TIME CRITICAL
(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 Snsr 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 ⑤ Do not reconfig for reg switch or I'CNCT procedures
(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	⑥ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books ⑦ When gear deployed, tb will not indicate DN
If simo loss of MNA & MNB: • NSP ENCRYPTION MODE – SEL • NSP ENCRYPTION SEL – BYP		(F6/F8) 7 LDG GEAR L,NOSE tb – bp	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
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]	⑨ OIU 2 interfaces with PSP 2 for commanding ⑩ Vlv holds position
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%	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)
(A1R) • S-BD FM PWR – 2	S-BD FM Sys 1	(R1) 4 FC2 COOL PUMP ΔP tb – bp	
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	
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	
(C2) • R IDP/CRT SEL – 3 On MCC GO: • GPC/CRT O2 EXEC	11 IDP 2 MDU CRT 2		
(A14) • RCS/OMS HTR FWD RCS A AUTO	Fwd RCS Htrs B (all)		
(Continued)	(Continued)	(Continued)	

EPS SSR-31 (Cont)
BUS LOSS: MNB FPC2

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>DPS UTILITY (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
(CDR's SEAT) • CDR SEAT PWR BUS SEL – AC3	CDR Seat Adj via AC2 pwr		⑩ Vlv holds position
(PLT's SEAT) • PLT SEAT PWR BUS SEL – AC3	PLT 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
If Cab Temp Cntrl 1 active: (L1) • CAB TEMP CNTLR – OFF	17 Cabin Temp Cntrl 1 and Hx Byp vlv Mtr 1		⑫ Bypass vlv holds position and Cntrl B Rad Byp vlv mtr remains
(MD44F) • Remove pin from PRI Actuator and BYP vlv linkage • Connect linkage to SEC Actuator			⑬ AC2 Bus isolation for AC Pwr Transfer Cable installation accomplished in MNB FPC2 Actions Column. No additional bus isolation steps reqd
(L1) • CAB TEMP CNTLR – 2			⑭ Motor B remains
• 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		
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(L1) • H2O PUMP LOOP 1 – OFF 2 – ON			
(L4:N) • cb AC2 ΦC RAD ISOL A – op	20 Freon Loop 1,2 Rad Isol Motor A		
• MDU CRT 2 PWR – OFF			
(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
(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		(23) Hyd Sys 1 still available for NWS
	-Y Star Trkr Dr Sys 2 OP/CL capability -Z Star Trkr Dr Sys 1 OP/CL capability		(24) Redundant mtrs remain
	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		(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
	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		(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
	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		(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 Ku Ant Sto/Dpy Mtr 2		
	PL Reten Sys B Rel/Lat Mtrs		
	Port,Stbd Rad Lat 1-6 Mtrs 2		(28) √MCC for stow reqmts

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 SM 62 PCMMU/PL COMM If OIU 2 active msg, 'S62 PDI DECOM FAIL'	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			
(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 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 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 Cntrl 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 pwr'd
	12 Freon Loop 2 Cntrl 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) req'd to stow Ku-Bd. Jettison req'd 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"> • AFT R RCS He PRESS A,B • L RCS He PRESS A <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"> • SYS 1A – AUTO • 1B – OFF 	<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 > 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: GNC SYS SUMM 2 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"> • A – GPC • B – OP <p>10 R OMS He PRESS/VAP ISOL</p> <ul style="list-style-type: none"> • A(B) – GPC • B(A) – CL <p>(A14) RCS/OMS HTR</p> <ul style="list-style-type: none"> • R POD (two) – A OFF, B AUTO • OMS CRSFD LINES – A AUTO, B OFF • L POD (two) – A AUTO, B OFF <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 Crsfd Ln B Htrs (all)</p> <p>L OMS Sec TVC</p>		
<p>BUS ISOLATION</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 > 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>(F7) 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>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>(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:
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		GNC SYS SUMM 2 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		
	GNC XXXXX MNVR YYYYY 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		
BUS ISOLATION				
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 < 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	① Man CL and full GPC cntl remains. Vlv holds position
(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	2 C/W RCS JET It – on	② Indications do not appear until jet commanded
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	(COMM LOST) All S-BD A/G voice lost if Sys 1 selected	③ Do not reconfig for reg switch or l'CNCT procedures
If no comm: (C3) • S-BD PM CNTL – PNL • – CMD		(FSM) 2 'F RCS D(F,R,U) JET'	④ Man OP capability remains. Vlv holds position
8 If OIU reqd: (SSP) • OIU PWR – OIU 2 ON • OIU tb – DN • √MCC, OIU reconfig		If site AOS and using S-BD ANT ELEC 1: 5 'ANTENNA' (2)	⑤ FSM caused by antenna miscompare
(A1R) • S-BD FM PWR – 2	S-BD FM Sys 1	If sys 1 pwrd: 'S62 BCE BYP PSP1' Loss of PL TLM and CMD	⑥ REACQ and PSP reconfig procedures are flight specific. If reqd, procedure can be found in payload or ISS specific books
9 GNC 23 RCS 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)	If PDI FDA enabled: 'S62 PDI DECOM FAIL'	⑦ When gear deployed, tb will not indicate DN
Pre-seat ingress: • Discharge handheld fire ext into AV BAY 1	Av Bay 1 agent discharge capability	If NSP 1 selected, 'BCE STRG 1 NSP'	⑧ OIU 2 interfaces with PSP 2 for commanding
BUS ISOLATION		(F6/F8) 7 LDG GEAR L,NOSE tb – bp	⑨ Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur
ONLY ON MCC CALL, PERFORM		(O8) 4 FWD RCS He PRESS B tb – bp	⑩ Htr Cntr 1 remains
(O15:C) • cb MNB FIRE SUPPR BAY 1 – op	10 L,R ADP Htr Cntr 2	(O8)	
	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) 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) If APUs active and using BLR CNTLR/HTR 1A or 2B: C/W APU TEMP It – on after ~2 min</p> <p>(F7) 1 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%</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
	If ICNCT config: (O7)			L MPS He Reg A < 680 during entry (MM303)	<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>⑥ Full vlv capability remains. If switch in CL, vlv will continuously drive to Cl position</p> <p>⑫ Maintains deorbit capability for CNTL AB1 failure</p> <p>⑬ To maintain He Isol redundancy</p> <p>⑭ Man cntl remains</p> <p>⑮ Sys B Pri Cntrl, auto switchover to Sec Cntrl remain</p> <p>⑯ √MCC for OMS Qtys</p> <p>⑰ Vlv fails closed. Redundant vlv remains</p> <p>⑱ Hyd Sys 1 still available for NWS</p> <p>⑲ Vlv fails closed</p> <p>⑳ Vlv holds position. Loss of manual capability to inert LO2,LH2 Manfs</p> <p>㉑ Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</p>
6	<ul style="list-style-type: none"> 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)	12	OMS Eng/Xfeed Redundancy		
	<ul style="list-style-type: none"> Right OMS TK ISOL A – CL (tb-CL) 				
	Prior to using L OMS: (O8)				
13	L OMS He PRESS/VAP ISOL	14	L OMS He Pr Isol B GPC Cntl		
	<ul style="list-style-type: none"> A – GPC B – OP 				
	For SSME Hyd Repress: (R4)	4	MPS/TVC Hyd Sys 2 Isol Cntl		
	<ul style="list-style-type: none"> HYD MPS/TVC ISOL VLV SYS 1,3 (two) – OP Wait 10 sec, then CL 				
	If reqd during entry (< 120K ft): (L1)	15	NH3 Sys B Sec Cntrl man ON capability		
	<ul style="list-style-type: none"> NH3 CNTLR A(B) – PRI/GPC 				
BUS ISOLATION					
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"> cb AC1 H2O LOOP PUMP 1A/2 (three) – cl <p>(L1)</p> <ul style="list-style-type: none"> H2O PUMP LOOP 1 – A <p>Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>GNC 23 RCS</p> <p>Override F2 Manf status to OP</p> <ul style="list-style-type: none"> RCS FWD ITEM 1 EXEC MANF VLVS 2 OVRD ITEM 41 EXEC 	<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>BUS ISOLATION</p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(MA73C:A)</p> <ul style="list-style-type: none"> MCA LOGIC MNB FWD 2 – OFF 	<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>BUS ISOLATION</p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(MA73C:A)</p> <ul style="list-style-type: none"> MCA LOGIC MNB MID 1 – OFF 	<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:</p> <ul style="list-style-type: none"> • OP/CL Drs in man mode MANUAL PLBD CLOSING (DEORBIT PREP) 	<p>1 Stbd Rad Lat 1-6 Mtr 2 Limit sw</p> <p>2 Stbd Rad Mtr 2 Dpy capability</p> <p>PLBD:</p> <p>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>SM (BFS SM 63) PL BAY DOORS</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>BUS ISOLATION</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>ONLY ON MCC CALL, PERFORM</p>		<p>SM 94 PDRS CONTROL</p>	
<p>(MA73C:A)</p> <ul style="list-style-type: none"> • MCA LOGIC MNB MID 2 – OFF 	<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:</p> <p>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>⑤ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
	<p>LH Vent 3 Mtr 2</p>	<p>(R13L) During RAD Dpy ops: RAD CNTL STBD tb indicates single mtr ops</p>	

EPS SSR-40
BUS LOSS: MNB MMC3

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:B) • MCA LOGIC MNB MID 3 – OFF			
	MNB MMC3 Bus pwr		

EPS SSR-41
BUS LOSS: MNB MMC4

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 If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	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
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	During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left	② Mtr 2 stow capability remains
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(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	③ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
	RH Vent 6 Mtr 2	(A8L) STARBOARD RMS: RETEN LAT tb – bp R-F-L FWD tb – bp R-F-L MID tb – bp	④ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	RMS: 3 Port Mid MRL Mtr 2 4 Stbd Fwd MRL Mtr 1 4 Stbd Mid MRL Mtr 1	SM 94 PDRS CONTROL PORT RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	⑤ With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed in GND position
	5 Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw	STBD RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 1 LAT/REL/RDY Mid MRL Mtr 1 LAT/REL/RDY	⑥ Redundant pwr (MNC) enables Ku-Band xmit
	6 Redundant Ku-Band Xmit Enable		⑦ MNC MMC2 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs
	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	
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:B) • MCA LOGIC MNB AFT 2 – OFF	1 ET Door Mtrs: C/L Lat Actr 1 Mtr 2 GPC Cntl L Dr Uplock Lat Mtr 2 GPC Lat capability R Dr Uplock Lat Mtr 2 GPC Lat capability R Dr Closure Mtr 2 GPC CL capability L,R DR RTL Ind 3		① Redundant mtrs and m/s remain ② Actuators continue to operate until the Stow, Rel/Lat, or OP/CL sw is taken to OFF
	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
BUS ISOLATION		(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
BUS ISOLATION			
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 Cntrl 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>		(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	
• Inhibit 0612513, 0612205, 0612554, 0612722 • Perform ECLS COMPUTATION INHIBIT <u>ECLS</u> SSR-14 Table A		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	
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	Av Bay 1 Agent discharge capability	If NWS 2 selected: (F3) NWS FAIL It – on	
• Prior to seat ingress for entry: discharge handheld ext into AV BAY 1		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 Snr 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 snr 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 Snr (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 Snr 2		
----- (O15:D) cb MNB 12 • 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 Snr 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
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(O15:E) cb MNB</p> <ul style="list-style-type: none"> • RADAR ALTM 2 – op • MLS 2 – op • (OV104) TACAN 2 – op • ADTA 2 – op • STAR TRKR -Y – op • ACCEL 2 – op • DDU L – op • R – op • DRAG CHUTE SYS 2 – op 	<p>Tacan 2 ADTA 2</p> <p>AA2</p> <p>9 Left DDU MNB pwr 9 Right DDU MNB pwr 14 Drag Chute, PLT Arm</p>		<p>⑨ Redundant pwr source remains</p> <p>⑭ CDR Arm remains</p>
<p>(A13)</p> <ul style="list-style-type: none"> • (OV104) GPS 2 PWR – OFF • (OV104) GPS 2 PRE AMPL UPPER – OFF • (OV104) GPS 2 PRE AMPL LOWER – OFF 	<p>GPS 2</p>		

EPS SSR-46
BUS LOSS: MNB R1A1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>NONE</p>	<p>1 MNB pwr to CNTLAB 1,2,3 CNTLBC 1,2,3 ESS1BC ESS3AB</p>	<p>NONE</p>	<p>① Buses remain pwr</p>
<p>BUS ISOLATION</p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>NONE</p>			

EPS SSR-47
BUS LOSS: MNB A6&A14

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>GNC 23 RCS</p> <ul style="list-style-type: none"> • Reprioritize Fwd Manf 2,3 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc • Set forward pod PRI JET FAIL LIMIT to 4 	<p>Fwd RCS Jet 2,3 Htrs</p>	<p>SM 97 RETENTION</p> <p>Indication lost: RELAX DEMATE MATE</p>	<p>① Single mtr time</p>
<p>BUS ISOLATION</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)	
(CDR's SEAT) • CDR SEAT PWR BUS SEL – AC3 (dn)	CDR Seat Adj via AC2 pwr	(MO13Q) 1 ARLK H2O S/O VLV – bp	
(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
ONLY ON MCC CALL, PERFORM			
(ML86B:A) cb MNB • SPLY H2O TKB INLET – op • SPLY TKC OUTLET – op • DUMP ISOL – op • SPLY H2O B SPLY ISOL VLV – op • H2O LINE HTR B – op	Sply H2O: 1 Tk B Inlet Vlv Cntl 1 Tk C Outlet Vlv Cntl 1 B Sply Isol Vlv Cntl		① Vlv holds position ② Htr A remains ③ MNA,MNC line hrs remain. MNA struct hrs remain ④ No redundancy ⑤ One htr strip pwrd by MNA ML86B still remains. Water will still heat, but at a very slow rate
(ML86B:B) cb MNB • VAC VENT NOZ HTR – op • WASTE H2O TK1 DRAIN – op • SPLY H2O TKD INLET – op • VAC VENT ISOL VLV – op • WCS CNTLR – op • GALLEY H2O HTR – op	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)		⑥ One failure away from loss of jettison capability ⑦ Current Snsr 1 remains ⑧ Current Snsr 2 remains
(ML86B:D) cb MNB MMU • PORT HTR B – op • STBD HTR B – op • GN2 SPLY ISOL VLV B – op cb MNB PYRO JETT SYS A • PORT RMS – op	2 MMU Port Htr B 2 Stbd Htr B 1 GN2 Sply Isol Vlv B Port RMS: 6 Jett/Guil Sys A Deadface Relays		
(ML86B:E) cb MNB SEAT • LEFT – op • RIGHT – op cb MNB FLOOD • TNL ADAPT 3 – op	TA Floodlt 3		
(ML86B:F) cb MNB FLOODS • MIDDECK 2/6 – op • BUNK 2/4 – op • PHS – op • AIRLK 3 – op cb MNB CRYO 7 • O2 HTR TK3 SNSR 2 – op 8 • O2 HTR TK4 SNSR 1 – op	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		
(ML86B:C) • cb MNB EXT ARLK HTR LINE ZN1 – op • cb MNB EXT ARLK HTR LINE ZN2 – op • cb MNB EXT ARLK HTR STRUC – op • cb MNB EXT ARLK HTR S/O VLV – op	3 Ext A/L H2O Line and Structural Htrs MNB pwr 1 A/L H2O Isol Vlv Cntl		

**EPS SSR-49c
BUS LOSS: MNB A7**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		VEST DEP VLV SYS 2 VENT ISOL tb – bp	
BUS ISOLATION		VEST DEP VLV SYS 2 VENT tb – bp	① DSP SYS 2 pwr still available to all users except MNB A7
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 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 Snsr Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor	SM ALERT Light/Tone – on MASTER ALARM Light/Tone – on	① Because of FC3 Purge Vlv loss, FC3 will remain isolated to limit voltage degradation and allow FC3 to MNB use during entry via PL Bus contactors ② May be repwr'd after AC Pwr Transfer Cable connected ③ Buses remain pwr'd ④ If Aud Ctr 2 selected, all intercomm, A/G, and recorded voice lost until AUD CTR 1 selected ⑤ Loss of redundant port to the following: IDP 3 MDU MFD 1 (S) MDU MFD 2 (S) IDP 4 MDU MFD 1 (P) ⑥ S86 WSB T 2 if in BLR CNTLR/HTR 2A. S86 WSB T 3 if in BLR CNTLR/HTR 3B ⑦ REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books ⑧ OIU 1 interfaces with PSP 1 for commanding ⑨ <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
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)		6 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)	HYD/APU 13 HYD QTY 3 ind – 0% APU H2O QTY ind – 0%	
	Prox Snsr 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	
17 Refer to OMS/RCS Slide Rule for vlv loss info 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
GNC 23 RCS • 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: GNC SYS SUMM 2
20 Save R OMS for deorbit (if reqd for additional on-orbit burns, √MCC)	20 R OMS GN2 Press Vlv Op TM	(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)	21 Eng Pr Vlv Coil 1	(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	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	(21) Unable to confirm redundant coil
24 L OMS He PRESS/VAP ISOL • A(B) – GPC • B(A) – CL	23 R OMS He Pr Isol B GPC Cntl	STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	(22) Maintains He Isol redundancy
GNC XXXXX MNVR VYYYY (3,B) Sel R OMS SEC TVC: • OMS GMBL SEC R ITEM 31 EXEC	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
(A6U) • ANNUN BUS SEL – MNB	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
(A12) HYD CIRC PUMP • PWR 2 – MNB • 3 – MNA	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
(A14) RCS/OMS HTR • L POD (two) – A AUTO, B OFF • R POD (two) – A AUTO, B OFF	MNC Circ Pump 2 pwr 3 pwr	If site AOS and using S-BD ANT ELEC 2: 'ANTENNA' (2)	(26) During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators
(AW18D) • AIRLK AUD CNTL – MIDDECK	L,R Pod Htrs B (partial)	If H2O Loop 2 Pump active: 'S88 H2O PUMP P2'	
(R11U) • FC H2O LINE HTR – A AUTO • FC H2O RELIEF HTR – A AUTO	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)	
For PLBD ops: • OP/CL Drs in man mode	FC H2O Line Htrs B	(F7) If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It – on after ~2 min	
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	FC H2O Relief Htrs B Noz Htr	If first RGA failure and Rates sensed: 'RM FAIL RGA'	
	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 ANNUN BUS SEL ACA 2/3 – MNC, L/R Event Seq Its lost	
	10 Sply H2O Dump Vlv Cntl Noz Htr	(L2) 10 O2 EMER tb – bp	
	10 Xovr Vlv Cntl	10 CAB RELIEF B tb – bp	
(Continued)	(Continued)	(Continued)	

EPS SSR-50 (Cont)
BUS LOSS: MNC DA3

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If reqd during entry (< 120K ft): (L1)</p> <ul style="list-style-type: none"> NH3 CNTLR A – PRI/GPC NH3 CNTLR B – SEC/ON <p>If AC Pwr Transfer Cable to be installed to regain AC:</p> <ul style="list-style-type: none"> Go to EPS SSR-200; otherwise, continue with bus loss actions 	<p>10 MPS/TVC Hyd Sys 3 Isol Cntl</p> <p>27 NH3 Sys A Sec Cntrl man ON capability</p> <p>28 NH3 Sys B Pri Cntrl</p>	<p>SM (BFS,SM) 63 PL BAY DOORS</p> <p>If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'</p>	<p>⑩ Vlv holds position</p> <p>⑳ Sys A Pri Cntrl, auto switchover to Sec Cntrl remain</p> <p>㉘ Sys B Sec Cntrl man On capability remains</p>
<p>(R2)</p> <ul style="list-style-type: none"> BLR CNTLR/HTR 2 – B 3 – A 	<p>APU/HYD Blr Cntrl/Htr 2A 3B</p>	<p>(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL tb (two) indicate single mtr ops</p>	<p>㉙ Not yet active on all vehicles</p>
<p>(L1)</p> <ul style="list-style-type: none"> IMU FAN B(A) – ON C – OFF <p>• Perform SSR-10 (H2O Loop 2 only), H2O PUMP OPS via GPC, <u>ECLS</u></p> <ul style="list-style-type: none"> 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 	<p>29 FC2 Redundant Reac Vlv Cntl on pnl C3</p> <p>IMU Fan C</p> <p>H2O Loop 2 Pump man ON capability</p> <p>10 H2O Loop 1 Byp Cntrl, Sig</p> <p>30 Cond</p> <p>H2O Loop 1 Byp Vlv pwr</p> <p>Cabin Fan A</p> <p>31 Av Bay 1 Sig Cond, Xdcrs (ECLS SC2)</p> <p>Av Bay 2 Fan B 3 Fan A</p> <p>Freon Loop 2 Pump A</p>		<p>㉚ H2O Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</p> <p>㉛ Av Bay 1 Fan ΔP, Air Out Temp snrs lost</p> <p>㉜ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrs lost</p> <p>㉝ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost</p> <p>㉞ Maintains deorbit capability for CNTL BC1 failure</p> <p>㉟ Inhibits H2O Loop 1 Pump ΔP, Pump Out Temp, Accum Qty, respectively</p>
<p>(O17:C)</p> <ul style="list-style-type: none"> SIG CONDR FREON A – AC2 SIG CONDR FREON B – AC2 	<p>32 Freon S/C A AC3 pwr (ECLS SC 1A)</p> <p>33 Freon S/C B AC3 pwr (ECLS SC 1B)</p>		
<p>(CDR SEAT PNL)</p> <ul style="list-style-type: none"> CDR SEAT PWR BUS SEL – AC2 (up) 	<p>CDR Seat adj via AC3 pwr</p>		
<p>(PLT SEAT PNL)</p> <ul style="list-style-type: none"> PLT SEAT PWR BUS SEL – AC2 (up) 	<p>PLT Seat adj via AC3 pwr</p>		
<p>(O8)</p> <ul style="list-style-type: none"> Right OMS XFEED B – OP (tb-OP) 	<p>34 OMS Eng/Xfeed Vlv Redundancy</p>		
<p>SM 60 SM TABLE MAINT</p> <p>35 • Inhibit 0612605, 0612600, 0612640, 0612610</p>			
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-50 (Cont)
BUS LOSS: MNC DA3

36	BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	ONLY ON MCC CALL, PERFORM			(10) Vlv holds position
	• MDU CRT 3 PWR – OFF • MDU CDR 1 PWR – OFF • MDU PLT 2 PWR – OFF			(36) AC3 bus isolation for AC Pwr Transfer Cable installation accomplished in MNC DA3 ACTIONS column. No additional bus isolation steps reqd
	(C2) • IDP/CRT 3 PWR – OFF			(37) Motor A remains
	(L4:N) • cb AC3 ΦC RAD ISOL B – op	37 Freon Loop 1,2 Rad Isol Motor B		(38) Redundant pwr source remains
	(R1) • PL AFT MNC – OFF	Aft Payload C pwr		(39) Current Snsr 1 remains
	(O7) • (OV105) GPS 3 PWR – OFF • (OV105) GPS 3 PRE AMPL UPPER – OFF • (OV105) GPS 3 PRE AMPL LOWER – OFF	(OV105) GPS 3		(40) Current Snsr 2 remains
	(O8) • MLS 3 – OFF • R SEAT/CTR CNSL FLOOD – OFF	R Seat/Ctr Cnsl Floodlts		(41) If Emer O2 Mission Kit not flown, cb is open prelaunch
	(O16:A) • RGA 3 – OFF	RGA 3		
	(O16:B) cb MNC			
38	• 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	Orbiter Timing Buffer Aft Mission Timer		
	(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		
	(O16:D) cb MNC			
41	• 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	39 Cryo O2 Tk1 Htr Current Snsr 2 40 Cryo O2 Tk2 Htr Current Snsr 1 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 42 Drag Chute, CDR Arm		④② PLT Arm remains ④③ Six vlvs fail to non-isolation position ④④ Logic buses 2(3) remain pwr'd via MNB(MNA) ④⑤ Redundant pwr source remains for equipment
(A7U) PL BAY • FLOOD AFT PORT – OFF • MID STBD – OFF	43 ATVC 1 Isol ME PLB Aft Port Floodlt Mid Stbd Floodlt		
(A7L) IF DOCKING MISSION • PYRO PWR MNC – OFF cb MNC • LOGIC 2 – op • 3 – op	MNC Pyro system 44 MNC pwr to DSP Logic buses 2,3		④⑥ Ku Comm and RDR function lost. KU-BAND CONT STOW – EA1 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		
45 (R14:B) cb PALLET/DSC • 2A – op (EDO) • 3B/4A – op (EDO)			
(R14:C) • cb MNC KU SIG PROC – op • cb UHF EVA – op	46 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 ③⑨ Current Snr 1 remains ④⑦ √MCC for Ku Ant stow reqmts ④⑧ Redundant mtr remains ④⑨ Htr Cntl 2 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		⑤⑩ 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
	47 Ku Ant Sto/Dpy Mtr 1		⑤① SYS A remains
	R HUD 48 -Z Star Trkr Dr Sys 2 OP/CL capability		⑤② One failure away from loss of jettison capability
	PL MNC Cur Sig Condr		
	Port,Stbd Rad Dpy/Sto Mtr 2 Port,Stbd Rad Lat 7-12 Mtrs 2 48 R ADP Dpy Mtr 1 49 Htr Cntrl 1 LH Vents 1,2,3 Mtrs 1 6 Mtrs 2 RH Vents 8,9 Mtrs 1 3,5 Mtrs 2 50 NLG,LMG,RMG Bkup Rel Sys 1		
(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	51 Ku-Bd Jettison Sys A 52 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	39 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
	53 R OMS ENG Pr Vlv Coil 1 54 R OMS ENG Cntl Vlv 1,2 Coils 1 55 R OMS Purge Vlv 1,2 56 OMS QTY Gauging for all R OMS Single Engine burns Press Vlv Op Sig		⑤③ Unable to confirm redundant coils
	57 APU 2 Cntr Sply B pwr 58 3 Cntr Sply A pwr 59 2 Fu Tk Vlv B 59 3 Fu Tk Vlv A		⑤④ Redundant coils remain
	APU 3 GBX GN2 Repress Vlv 10 HYD BK ISOL VLV 3 Cntl Hyd Rsvr 3 Qty Snsr		⑤⑤ Vlv fails closed
	10 EMU 1 Waste H2O Vlv Cntl 10 Sply H2O Vlv Cntl		<p align="center">CAUTION</p> <p>No purge. Wait 10 min between burns</p>
	60 Freon Loop 1 Cntr A Rad By Vlv Mtr man Cntl 61 Freon Loop 2 Cntr A Rad By Vlv Mtr		⑤⑥ √MCC for OMS Tot Qtys. Aft Qtys are found on
	10 Freon Loop 2 Flow Prop vlv Freon Loop 2 Cold Plate Flow Xdcr		GNC SYS SUMM 2
	MPS:		⑤⑦ Pwr Sply A remains. Turbine speed ind lost
	62 R Eng He Intercon Outlet Vlv		⑤⑧ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
	62 L Eng He Xovr Vlv		⑤⑨ Vlv fails closed. Redundant vlv remains
	59 R Eng He Isol A		⑥⑩ Cntrls A,B Rad By Mtrs Auto Cntl and Cntr B Rad By Vlv Mtr remain
	63 Manf Repress LO2 Vlv 1,2		⑥① Bypass vlv holds position and Cntr B Rad By Vlv Mtr remains
	64 Prplt F/D Outbd LO2 Vlv		⑥② Vlv fails closed
	65 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		⑥③ Vlv fails closed. LO2 manf will not be pressured with He during entry (MM304)
	66 No WOW Relay K9,K11,K13		⑥④ Vlv holds position. Loss of manual capability to inert LO2 manf
	67 Hyd Main Pump 3 Depress Solenoid RPC A		⑥⑤ Redundant mtrs remain
	67 Hyd Main Pump 2 Depress Solenoid RPC B		⑥⑥ Brake/Skid Cntl Box A,B enabled before WOW
			⑥⑦ 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 FREON FLOW 1 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)	
(R14:C) 11 • cb MNC KU SIG PROC – op	10 Ku-Bd Sys Rdr & Comm I/F Cont Unit (EA1)	8 LDG GEAR NOSE tb – bp 9 LDG GEAR R tb – bp	
(Continued)	(Continued)	(Continued)	

EPS SSR-51 (Cont)
BUS LOSS: MNC FPC3

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	12 HYD/APU HYD QTY 3 ind – 0% APU H2O QTY ind – 0%	⑫ APU H2O QTY 2 if in BLR CNTLR/HTR 2A. APU H2O QTY 3 if in BLR CNTLR/HTR 3B
	13 RMS: 14 Port MPM Mtr 1 14 Stbd MPM Mtr 2 15 Port Fwd MRL Mtr 2 15 Port Aft MRL Mtr 1 17 Stbd Mid MRL Mtr 2 17 Stbd Fwd MRL Mtr 1	16 (O8) FWD RCS TK ISOL 1/2 tb – bp 16 MANF ISOL 4 tb – bp 16 5 tb – bp	⑬ MPM and MRLS may be repwr'd after AC Pwr Transfer Cable connected
If AC Pwr Transfer Cable to be installed to regain AC: • Go to <u>EPS SSR-200</u> ; otherwise, continue with bus loss actions		(O1) H2O PUMP OUT PRESS LOOP 1 ind – 0 psia H2O PUMP OUT PRESS LOOP 2 ind – 20-25 psia	⑭ 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
18 SM 60 SM TABLE MAINT • INHIBIT 0612605, 0612600, 0612640, 0612610		AIR TEMP AV BAY ind – 45 degF FREON FLOW 1 ind – 578 pph	⑮ Single mtr time. If unlatched, one failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
(CDR SEAT PNL) • CDR SEAT PWR BUS SEL – AC2 (up)	CDR Seat Adj via AC3 pwr	R ADP deploy time incr from 15 to 30 sec	⑯ Single mtr time. If unlatched, one failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
(PLT SEAT PNL) • PLT SEAT PWR BUS SEL – AC2 (up)	PLT Seat Adj via AC3 pwr	(F7) If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It – on after ~2 min	⑰ 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
(O17) • SIG CONDR FREON A – AC2 • SIG CONDR FREON B – AC2	19 Freon Sig Condr A AC3 pwr (ECLS SC 1A) 20 Freon Sig Condr B AC3 pwr (ECLS SC 1B)	STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec	⑱ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrsrs lost
(R2) • BLR CNTLR/HTR 2 – B • 3 – A	APU/HYD Blr Cntrlr/Htr 2A 3B Hyd Rsvr 3 Qty Snsr		⑲ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrsrs lost
(L1) • IMU FAN B(A) – ON • C – OFF • Perform (H2O Loop 2 only) H2O PUMP OPS via GPC, <u>ECLS SSR-10</u> • 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	IMU Fan C H2O Loop 2 Pump man ON capability 16 H2O Loop 1 Byp Cntrlr, Sig 21 Condr H2O Loop 1 Byp vlv pwr Cabin Fan A Av Bay 1 Sig condr, Xdcrs (ECLS SC2) 22 Av Bay 2 Fan B Av Bay 3 Fan A Freon Loop 2 Pump A		⑳ H2O Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snrsrs lost ㉑ AV Bay 1 Fan ΔP, Air Out Temp snrsrs lost
(Continued)	(Continued)		

EPS SSR-51 (Cont)
BUS LOSS: MNC FPC3

23

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
• MDU CRT 3 PWR – OFF			(16) Vlv holds position (23) AC3 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNC FPC 3 ACTIONS column. No additional bus isolation steps reqd (24) Motor A remains (25) Mtr 2 remains (26) Htr Cntr 2 remains (27) LG can still be deployed by Pri Hyd System or by redundant Pyro Backup Release System 2. NLG extension pwr assist still available from redundant sys. NLG can also be deployed by Hyd Sys 2 (28) Redundant mtrs remain (29) Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains (30) √MCC for Ku Ant stow reqmts
(L4:N) • cb AC3 ΦC RAD ISOL B – op	24 Freon Loop 1,2 Rad Isol Motor B		
(C2) • IDP/CRT 3 PWR – OFF			
(O7) • (OV105) GPS 3 PWR – OFF • (OV105) GPS 3 PRE AMPL UPPER – OFF • (OV105) GPS 3 PRE AMPL LOWER – OFF	(OV105) GPS 3		
(O16:C) • cb MNC FIRE SUPPR BAY 2 – op			
• MDU CRT 4 PWR – OFF			
(R11L) • IDP/CRT 4 PWR – OFF			
(MA73C:A) • MCA LOGIC MNC FWD 3 – OFF	MNC FMC 3 Bus pwr		
(R14:C) • cb MNB KU ELEC – op			
(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		
	25 R ADP Dpy Mtr 1		
	PLT HUD		
	26 R ADP Htr Cntr 1		
	27 NLG Ext Sys 1		
	27 NLG, LMG, RMG Bkup Rel Sys 1		
	MNC Pwr to CNTL Buses BC1, BC2, BC3, CA1, CA2, CA3		
	28 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		
	29 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		
	30 Ku Ant Sto/Dpy Mtr 1		

EPS SSR-52

BUS LOSS: MNC MPC3

(Includes MNC MMC2 & MNC MMC4)

ACTIONS	
1	<ul style="list-style-type: none"> Perform MNC BUS TIE (BUS TIE Cue Card) Monitor, record Δamps between FC3 and tied FC
(L2)	<ul style="list-style-type: none"> FLASH EVAP FDLN HTR B SPLY – 2
(A12)	<ul style="list-style-type: none"> HYD HTR AFT FUS A – AUTO HYD HTR AFT FUS B – OFF
(R11U)	<ul style="list-style-type: none"> FC H2O LINE HTR – A AUTO FC H2O RELIEF HTR – A AUTO
(MA73C:C,D)	<ul style="list-style-type: none"> cb MCA PWR AC3 3Φ MID 2 – op
2	<ul style="list-style-type: none"> cb MCA PWR AC3 3Φ MID 4 – op
For PLBD ops:	
<ul style="list-style-type: none"> OP/CL Drs in man mode 	
(L1)	<ul style="list-style-type: none"> TOP EVAP HTR DUCT – A(B) If Hi Load Evap enabled: HI LOAD DUCT HTR – A(B)

BUS ISOLATION	
ONLY ON MCC CALL, PERFORM	
(A7U)	<ul style="list-style-type: none"> PL BAY FLOOD AFT PORT – OFF MID STBD – OFF
(A7L)	<ul style="list-style-type: none"> IF DOCKING MISSION PYRO PWR MNC – OFF cb MNC LOGIC 2 – op 3 – op
(O16:A)	<ul style="list-style-type: none"> RGA 3 – OFF
(R11U)	<ul style="list-style-type: none"> FC PURGE VLV 3 – CL FC STARTUP HTR 3 – ENA
(MA73C:A,B)	<ul style="list-style-type: none"> MCA LOGIC MNC MID 2,4 (two) – OFF

EQUIP/FUNCTION LOST	
1	FC3 Purge Vlv O2,H2 Flow Xdcrs SS ΔV Snrsrs
	FES H2O Fdln B Mid 2 Htr 1
	Aft Fuselage Hyd Htrs B
	FC H2O Line Htrs B Relief Htrs B Noz Htr
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
	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
	Topping Evap Duct Fwd,Aft Htr C
	Hi Load Duct Inbd,Outbd Htr C
	PLB Aft Port Floodlt Mid Stbd Floodlt
	MNC Pyro system
4	MNC pwr to DSP Logic buses 2,3
	RGA 3
	FC3 Startup Htr INH capability
	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)	

CREW INDICATIONS	
(R13L)	2 RAD CNTL PORT,STBD (two) tb – bp
(Lights Lost)	PLB Floodlts Aft Port, Mid Stbd
If first RGA failure and rates sensed: 'RM FAIL RGA' (3)	
If FC H2O Rlf Htrs in B AUTO: SM ALERT Light/Tone – on 'S69 FUEL CELL'	
SM (BFS SM 63) PL BAY DOORS	
If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	
During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left	
(A8L)	PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp
STARBOARD RMS: DPY/STO tb – bp	
SM 94 PDRS CONTROL	
PORT RMS Indications lost: MPM Mtr 1 STO/DPY Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY	
STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	

NOTES	
①	Buses are tied due to: <u>Loss of FC3 Purge capability.</u> As FC3 loses performance the tied FC will pick up load, slowing FC3 degradation. If degradation projection does not allow for nominal EOM, Fuel Cell will be shut down. √MCC and <u>Loss of FC3 SS ΔV Snrsrs.</u> Change in ΔAmps >12 amps indicates possible cell crossover problem. ΔAmps shift due to loss of FC3 purge capability is indicated by change in ΔAmps between pre- and post-purge readings. MCC will aid in this determination
②	If AC3 MMC2 and MMC4 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 7-12 continues to run until Sys B Lat Cntl sw placed to OFF
③	Mtrs 1 will continue to drive until Sys A,B Cntl sw are taken to OFF
④	Logic buses 2(3) remain pwr'd via MNB(MNA)
⑤	Buses remain pwr'd
⑥	Cntrlrs A,B Rad Byp Mtrs Auto Cntl and Cntrl B Rad Byp Vlv Mtr Man Cntl remain

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>GNC 23 RCS</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 > 2 deg: C/W OMS TVC It – on 'R OMS GMBL' (3,B)</p>	<p>① Maintains control capability for APC4 failure</p>
<p>3 Refer to OMS/RCS Slide Rule for vlv loss info (use APC6 Slide for Aft RCS) 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: GNC SYS SUMM 2</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>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</p>
<p>5 Prior to using L,R OMS: (O8)</p>			<p>⑧ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</p>
<p>6 R OMS He PRESS/VAP ISOL • A – GPC • B – OP</p>	<p>7 R OMS He Vap Isol 2 GPC Cntl</p>		<p>⑨ Vlv normally closed. GPC cntl remains</p>
<p>8 L OMS He PRESS/VAP ISOL • A(B) – GPC • B(A) – CL</p>	<p>7 R OMS He Pr Isol B GPC Cntl 9 L OMS He Pr/Vap Isol A,B man Cntl</p>		<p>⑩ Vlv fails closed. Redundant vlv remains</p>
<p>GNC XXXXX MNVR YYYYY (3,B) Sel R OMS SEC TVC: • GMBL SEC R – ITEM 31 EXEC</p>	<p>R OMS Pri TVC</p>		
<p>BUS ISOLATION</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"> FLASH EVAP CNTLR PRI A – OFF FLASH EVAP CNTLR PRI B(SEC) – ON (if reqd) TOP EVAP HTR NOZ R – A AUTO <p>If HI LOAD EVAP enabled:</p> <ul style="list-style-type: none"> HI LOAD DUCT HTR – A(B) 	<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"> FLASH EVAP FDLN HTR B SPLY – 2 	<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>* 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>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"> AFT L RCS He PRESS B R RCS He PRESS B 	<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>GNC 23 RCS</p> <ul style="list-style-type: none"> Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc <p>4 DES INH on L Manf 3 Jets:</p> <ul style="list-style-type: none"> 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>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"> BLR CNTLR/HTR 2 – B 3 – A 	<p>APU/HYD Blr Cntrl/Htr 2A 3B</p>	<p>If OMS Gmbl cmd abs value > 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"> SYS 2A – AUTO 2B – OFF <p>5</p> <ul style="list-style-type: none"> SYS 3A – OFF 3B – AUTO 	<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"> PUMP 2 – A AUTO 3 – B AUTO <p>5</p> <p>APU HTR</p> <ul style="list-style-type: none"> LUBE OIL LINE 2 – A AUTO LUBE OIL LINE 3 – B AUTO <p>HYD CIRC</p> <ul style="list-style-type: none"> PUMP PWR 2 – MNB 3 – MNA 	<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"> L POD (two) – A AUTO, B OFF R POD (two) – A AUTO, B OFF 	<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)			GNC SYS SUMM 2
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 MNVR YYYYYY (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 ⑭ Six vlvs fail in non-isolation position
BUS ISOLATION			⑮ Pwr Sply A remains. Turbine Speed ind lost
ONLY ON MCC CALL, PERFORM			⑯ Vlv fails closed. Redundant vlv remains
(R1) • PL AFT MNC – OFF	Aft Payload C pwr PL MNC Cur Sig Condr		⑰ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
	14 ATVC 1 Isol ME		⑱ Redundant RPC remains
(MA73C:B) • MCA LOGIC MNC AFT 3 – OFF	MNC AMC3 Bus pwr RH Vents 8,9 Mtr 1		
	Freon Loop 2 Cold Plate Flow Xdcr 15 APU 2 Cntrl Pwr Sply B Fu Tk Vlv B 16 APU 3 Cntrl Pwr Sply A Fu Tk Vlv A 16 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 < 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>CAUTION</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>8 GNC 23 RCS</p> <p>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>9 Refer to OMS/RCS Slide Rule for vlv loss info</p> <p>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>BUS ISOLATION</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"> FLASH EVAP CNTLR PRI A – OFF FLASH EVAP CNTLR PRI B(SEC) – ON (if reqd) TOP EVAP HTR NOZ R – A AUTO <p>If HI LOAD EVAP enabled:</p> <ul style="list-style-type: none"> HI LOAD DUCT HTR – A(B) 	<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"> FLASH EVAP FDLN HTR B SPLY – 2 	<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"> AFT R RCS He PRESS B L RCS He PRESS B 	<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>GNC 23 RCS</p> <ul style="list-style-type: none"> Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc Set aft pod(s) PRI JET FAIL LIMIT to 6 	<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"> BLR CNTLR/HTR 2 – B 3 – A 	<p>3 APU/HYD Blr Cntr/Htr 2A</p> <p>3 3B</p>		<p>⑤ Lost TM: GNC SYS SUMM 2 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"> 2B – OFF 3A – OFF 3B – AUTO <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"> LINE 2 – A AUTO 3 – B AUTO <p>HYD CIRC</p> <ul style="list-style-type: none"> PUMP PWR 2 – MNB 3 – MNA 	<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"> A – GPC B – OP 	<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 (< 120K ft): (L1)</p> <ul style="list-style-type: none"> • NH3 CNTLR A – PRI/GPC <p>If reqd for Post Rollout:</p> <ul style="list-style-type: none"> • NH3 CNTLR B – SEC/ON <hr/> <p>If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</p> <ul style="list-style-type: none"> • H2O PUMP LOOP 1,2 (two) – ON • √FLOW PROP VLV LOOP 1,2 (two) – ICH <p>If applicable:</p> <ul style="list-style-type: none"> • Activate PL H2O LOOP(s) 	<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 < 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>
BUS ISOLATION			
<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 style="text-align: center;">CAUTION</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>

EPS SSR-57
BUS LOSS: MNC FMC3

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<ul style="list-style-type: none"> Refer to OMS/RCS Slide Rule for vlv loss info <p>GNC 23 RCS</p> <p>Override F4 Manf status to OP</p> <ul style="list-style-type: none"> RCS FWD – ITEM 1 EXEC MANF VLVS 4 OVRD – ITEM 43 EXEC 		(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	① Vlv holds position ② Mtr 2 remains ③ Htr Cntr 2 remains
<p>BUS ISOLATION</p> <p><u>ONLY ON MCC CALL, PERFORM</u></p>	-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 Cntr 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"> cb MCA PWR AC3 3Φ MID 2 – op <p>For PLBD Ops:</p> <ul style="list-style-type: none"> OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP) 	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	① If AC3 MMC2 cb not opened, Lat Mtr 2 of Stbd Lat 7-12 Actuator continues to run until Sys B Lat Cntl sw placed to OFF ② Mtr 1 will continue to drive until Sys B Cntl sw is taken to OFF ③ With an inoperative limit switch, mtr will continue to run until stow sw returned to gnd ④ Redundant sig (MNB) enables Ku-Band Xmit ⑤ MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II Signal for Stow mtrs ⑥ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists ⑦ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
<p>BUS ISOLATION</p> <p><u>ONLY ON MCC CALL, PERFORM</u></p> <p>(MA73C:A) <ul style="list-style-type: none"> MCA LOGIC MNC MID 2 – OFF </p>			

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"> • OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP) 	<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) RAD CNTL STBD tb – bp If PORT RAD pnl deployed: RAD CNTL PORT tb – bp</p> <p>SM (BFS SM 63) PL BAY DOORS</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>BUS ISOLATION</p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:B)</p> <ul style="list-style-type: none"> • MCA LOGIC MNC MID 4 – OFF 	<p>MNC MMC 4 Bus pwr</p>	<p>(A8L) STARBOARD RMS: DPY/STO tb – bp</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>SM 94 PDRS CONTROL</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	
BUS ISOLATION			
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
BUS ISOLATION ONLY ON MCC CALL, PERFORM		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
BUS ISOLATION			
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
BUS ISOLATION			④ Redundant pwr remains
ONLY ON MCC CALL, PERFORM			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
BUS ISOLATION			
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		
BUS ISOLATION			
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 MNA,MNB line htrs remain
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 Xovv Vlv Cntl	(LIGHTS LOST) Middeck Floodlts 3,4,5,7 Bunk Floodlts 1/3 Airlock Floodlt 4 MO13Q Pnl It 1 TA Floodlt 4	
(ML86B:C) • cb MNA(MNB) EXT ARLK HTR LINE ZN1 – cl • cb MNA(MNB) EXT ARLK HTR LINE ZN2 – cl	3 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 ③ MNA,MNB line htrs remain ④ Sys A remains ⑤ One failure away from loss of jettison capability ⑥ 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>4 Ku-BD Jettison Sys B 5 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</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 Airk Floodlt 4 6 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>3 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:	1 FC1 Controller and Pumps	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 (R1) • PL CAB – MNB	4 FC1 Reac Vlv Cntl via pnl R1 sw	L Audio lost L Glrshld Floodlt lost	
2 (O5) • L AUD CNTL – R	5 MNA pwr to CABPL 1,2,3 buses	(F7) 6 No C/W Its Two of four bulbs in MA Its not It SM ALERT Light/Tone – on	
2 (O6) • MTU – OSC 2	2 L Audio pwr	(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 4 FC1 RDY tb – bp	
If add'l Itg reqd: (C3) • EMER LTG – ON/OFF	8 L Glareshield Floodlts via pnl O6 sw	11 FC1 COOL PUMP ΔP tb – bp	
(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	(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	
(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	7 If SSPTS: (A15) PTU 1 tb – OFF	
	Cryo Tk3 O2,H2 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in AUTO Cryo Tk4 O2,H2 Htrs Auto ops	(Continued)	
12 If GPC 1 or 4 dump reqd, attempt S/W dump in RUN	12 GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6)		
13 To release crewmember from constant monitoring requirement:	12 GPC Output sw Terminate capability for GPCs 1,4		
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 reqd: • 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>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 < 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>⑱ Disables AC1 AUTO TRIP. AC1 Voltage and OVLD c/w 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>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>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 20 APU 1 Fu Tk Vlv A</p>		<p>⑳ Vlv closes. Redundant vlv B remains</p>
<p>(O7) • (OV105) GPS 1 PWR – OFF • (OV105) GPS 1 PRE AMPL UPPER – OFF • (OV105) GPS 1 PRE AMPL LOWER – OFF</p>	<p>(OV105) GPS 1</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
BUS ISOLATION			
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
BUS ISOLATION		(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	
BUS ISOLATION		(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 Cryo O2,H2 Tk4 Qty Xdcrs	Airk Floodlt 2 lost TA Floodlt 1	

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
BUS ISOLATION	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 ESS1BC Volts 25-32V	⑤ Caused by loss of purge vlv sw position TM
NONE	(OV103,4) TACAN 1 Auto Self-Test		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 Floodlt 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	(F7) 2 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 Snr</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: 14 • Perform C&W EU CONTINGENCY POWER (IFM)		(R1) 3 FC/MN BUS B tb – OFF 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	③ FC/MN BUS B and MN BUS TIE B sws work, but tbs lost ⑧ Vlv holds position, but tb and sw lost 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
BUS ISOLATION ONLY ON MCC CALL, PERFORM		(F9) ESS2CA DC VOLTS – OSL	⑭ IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS 2CA DA2 bus ⑮ AC2 Inverters and buses remain pwr'd, but switches and tbs lost ⑯ FC2 Coolant Pump ΔP tb lost ⑰ Retain C/W Sys A Alarm tones (Pri & B/U) Ref C/W MAL 4.1a ⑧ for capabilities lost. Only lower two of four bulbs lit in MA It. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable ⑱ Disables AC2 AUTO Trip. AC2 Voltage and OVLD C/W lost ⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
(O13:C) cb ESS 2CA 17 • C/W B – op 18 • AC2 SNSR – op • MTU B – op	17 C/W Sys B Alarm Tones 18 AC2 Bus Snsr	SM 67 ELECTRIC ESS2CA Volts < 20	(O2) CRYO O2,H2 QTY TK1 meters (two) ind – 0%
(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		⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
(R14:F) cb ESS 2CA • FLOOD R GLRSHLD – op • AUD R – op • CTR 1 – op			⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
(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		⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
	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		⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
	(OV103,4) TACAN 2 Auto Self-Test 20 APU 2 Fu Tk Vlv A		⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
	(OV105) GPS 2		⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
(O7) • (OV105) GPS 2 PWR – OFF • (OV105) GPS 2 PRE AMPL UPPER – OFF • (OV105) GPS 2 PRE AMPL LOWER – OFF			⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
(O15:C) • (OV105) cb MNB GPS 2 PRE AMPL UPPER – op			⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
(O15:D) • (OV105) cb MNB GPS 2 PRE AMPL LOWER – op			⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains
			⑲ FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected ⑳ Vlv closes. Redundant vlv B remains

**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
BUS ISOLATION			
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
BUS ISOLATION		(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
BUS ISOLATION			
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 & 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&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	4	MASTER ALARM Light/Tone – on		
	If add'l Itg reqd: (C3) • EMER LTG – ON/OFF	3	R Glareshield Floodlts via pnl O8 sw		(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%		
BUS ISOLATION							
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) – > 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>BUS ISOLATION</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
BUS LOSS: ESS3AB DA3

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	<ul style="list-style-type: none"> Perform FC3 SHUTDN (FC SHUTDN Cue Card) 	1	FC3 Controller and Pumps	MASTER ALARM		<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 FC/MN BUS C and MN BUS TIE C switches work, but tbs are lost</p> <p>③ Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains</p> <p>④ Switch works, but tb lost</p> <p>⑤ AC3 inverters and buses remain pwr'd. INV PWR 3 and INV/AC BUS 3 switches and tbs lost</p> <p>⑥ GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU</p> <p>⑦ 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>⑧ FC3 Coolant Pump ΔP tb lost</p> <p>⑨ Inhibits Primary C/W for O2 and H2 Tk 3 Control Pressure</p> <p>⑩ Disables AC3 Auto Trip. AC3 Voltage and OVLD C/W lost</p> <p>⑪ Ltg pwr remains via individual lt sws</p>	
2		3	Reac Vlv Cntl via pnl R1 sw	Light/Tone – on			
3	<p>(R1)</p> <ul style="list-style-type: none"> O2,H2 MANF VLV TK1,2 (four) – OP O2,H2 TK1,2 HTRS A (four) – AUTO O2,H2 TK1,2 HTRS B (four) – OFF O2,H2 TK3 HTRS A,B (four) – OFF 		Cryo Tk3 O2,H2 Htrs Auto ops	<p>(F7)</p> <ul style="list-style-type: none"> C/W O2 PRESS lt – on C/W H2 PRESS lt – on 			
			Cryo O2,H2 Tk4 Htr Auto ops if O2,H2 Tk3 Htrs A(B) in Auto	<p>3</p> <ul style="list-style-type: none"> C/W FC REAC lt – on C/W FC PUMP lt – on SM ALERT lt/Tone – on 			
7	<ul style="list-style-type: none"> If GPC 3 dump req'd, attempt S/W dump in RUN 	6	FC GPC Purge Seq Start sw	<p>(R1)</p> <ul style="list-style-type: none"> 4 FC/MN BUS C tb – OFF 4 MN BUS TIE C tb – OFF 5 INV/AC BUS 3 tb – OFF 4 PL PRI FC3 tb – OFF 4 PL PRI MNC tb – OFF 3 FC3 REAC (two) tb – CL FC3 RDY tb – bp 8 FC3 COOL PUMP ΔP tb – bp 			
		7	GPC Mode sw Halt Contacts for GPC 3 (pnl O6)	<p>(A12)</p> <ul style="list-style-type: none"> 4 FC3 STRUCT RTN tb – OFF 			
		7	GPC Output sw Terminate capability for GPC 3 (pnl O6)	<p>(FSMs)</p> <ul style="list-style-type: none"> S67 ESS BUS V 3AB S68 H2 CNTL P 3 S68 O2 CNTL P 3 S69 FC PUMP 3 S69 FC REAC 3 S69 H2 PUMP 3 			
9	<p>(R13U)</p> <ul style="list-style-type: none"> C/W PARAM SEL tw (three) – 020, 070 C/W PARAM – INH MEM – CLEAR C/W PARAM SEL tw (three) – > 119 			<p>(F9)</p> <ul style="list-style-type: none"> ESS 3AB DC VOLTS ind – OSL 			
BUS ISOLATION				SM 67 ELECTRIC			
ONLY ON MCC CALL, PERFORM				ESS 3AB Volts < 20			
	<p>(O13:E)</p> <ul style="list-style-type: none"> cb ESS 3AB AC3 SNSR – op GPC STAT – op 	10	AC3 Bus Snsr Computer Status Matrix (pnl O1) and CCIU	<p>(O1)</p> <ul style="list-style-type: none"> GPC status lts lost 			
	<p>(C3)</p> <ul style="list-style-type: none"> EMER LTG – OFF/ON 	11	Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glrshld Floodlts, OS Floodlt)	<p>(O2)</p> <ul style="list-style-type: none"> CRYO O2,H2 QTY TK3 ind (two) – 0% 			
	<p>(ML18F)</p> <ul style="list-style-type: none"> EMER LTG – ON/OFF 						
11	<p>(ML86B:G)</p> <ul style="list-style-type: none"> cb ESS 3AB CRYO CNTLR TK3 (two) – op CRYO QTY TK3 (two) – op 		Cryo O2,H2 Tk3 Htrs Auto ops				
			Cryo O2,H2 Tk3 Qty Xdcrs				
		5	AC3 Inverters: Input DC Pwr Cntl INV/AC Bus Cntl				
			Cryo O2 Tk3 Htr Snsr Test/Reset sw				
	<p>(O7)</p> <ul style="list-style-type: none"> (OV105) GPS 3 PWR – OFF (OV105) GPS 3 PRE AMPL UPPER – OFF (OV105) GPS 3 PRE AMPL LOWER – OFF 		(OV105) GPS 3				
	<p>(O16:D)</p> <ul style="list-style-type: none"> cb MNC (OV105) GPS 3 PRE AMPL UPPER – op (OV105) GPS 3 PRE AMPL LOWER – op 						

(Continued)

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
BUS ISOLATION			
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
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(R1)	2 FC3 REAC (two) tb – CL FC3 RDY tb – bp 4 FC3 COOL PUMP ΔP tb – bp
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(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>SM 67 ELECTRIC 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>BUS ISOLATION</p> <p>ONLY ON MCC CALL, PERFORM</p> <p>(C3)</p> <p>5 • EMER LTG – OFF/ON</p> <p>(ML18F)</p> <p>5 • EMER LTG – ON/OFF</p>	<p>5 Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glrshld Floodlts OS Floodlt)</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
BUS ISOLATION		(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 (R13U) 1 • C/W PARAM SEL tw (three) – 020, 070 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119	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 (F7) C/W O2 PRESS lt C/W H2 PRESS lt (FSMs) S68 H2 CNTL P 3 S68 O2 CNTL P 3 (O2) CRYO O2,H2 QTY TK3 METER (two) ind – 0%	① Inhibits Primary C/W for O2 and H2 Tk 3 Control Pressure
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM (ML86B:G) cb ESS 3AB • CRYO CNTLR O2,H2 TK3 (two) – op • CRYO QTY O2,H2 TK3 (two) – op	Cryo O2,H2 Tk3 Qty Xdcrs		

**EPS SSR-100
BUS LOSS: CNTLAB1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR 1 • GAS GEN/FUEL PUMP 1 – B AUTO 1 • GAS GEN/FUEL PUMP 3 – A AUTO • LUBE OIL LINE 1 – B AUTO APU HTR TK/FU LINE/H2O/ 1 • SYS 1A – OFF 1 • 1B – AUTO 1 • 3A – AUTO 1 • 3B – OFF HYD HTR • ELEV A – OFF • B – AUTO • AFT FUS A – OFF • B – AUTO HYD CIRC PUMP • PWR 1 – MNB • 3 – MNC</p>	<p>(A12) APU 1 GG/Fu Pump Htrs A APU 3 GG/Fu Pump Htrs B APU 1 Lube Oil Line Htrs A 1 Tk/Fu Ln Htrs A APU 1,2 GG Inj H2O Htrs 4A,5A APU 3 Tk/Fu Ln Htrs B Elevon Actr Htrs A Aft Fuselage Htrs A Circ Pump 1 MNA pwr 3 MNA pwr</p>	<p>CRT 1 blanks SM ALERT Light/Tone – on (FSMs) S68 H2 MANF VLV S68 O2 MANF VLV S86 APU/HYD APU SM0 THRM HYD S67 CNTL BUS V S69 FC REAC 1 I/O ERROR CRT 1</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>SM 67 ELECTRIC CNTL AB1 Volts < 20</p>	<p>SM 67 ELECTRIC CNTL AB1 Volts < 20</p>	<p>SM 67 ELECTRIC CNTL AB1 Volts < 20</p>	<p>② Msg occurs only if A AUTO (pnl R12U) selected for FC H2O Relief Htr</p>
<p></p>	<p>(R4) HYD Brake Htrs A</p>	<p>During Rad Dpy/Sto: (R13L) RAD CNTL tbs (four) indicate single mtr ops</p>	<p>③ Pri B Man ON Sel capability remains. Pri A and Sec Cntrls remain</p>
<p>(L1) If using B CNTLR: • FLASH EVAP CNTLR PRI B – ON • TOP EVAP HTR DUCT – B If Hi Load Evap enabled: • HI LOAD DUCT HTR – B(C)</p>	<p>(L1A2) 3 Flash Evap Cntrl Pri B GPC Sel capability Top Evap Duct Fwd,Aft L,R Htrs A Hi Load Duct Outbd,Inbd Noz Htrs A</p>	<p>L ADP deploy time incr from 15 to 30 sec</p>	<p>④ Vlv holds position. Vlv B remains</p>
<p>(L2) • FLASH EVAP FDLN HTR B SPLY – 2</p>	<p>(L2A1) FES H2O Fdln B Htrs 1</p>	<p>STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec</p>	<p>⑤ Do not reconfig for reg switch or l'CNCT procedures</p>
<p>(R2) • BLR CNTLR/HTR 1 – A</p>	<p>(R2) Hyd H2O Blr 1 Cntrl B</p>	<p>(F7) If APUs active and using BLR CNTLR/HTR 1B: C/W APU TEMP It – on after ~2 min</p>	<p>⑥ Vlv holds position</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info 5 Reconfig following vlv(s) only if leak isolation reqd:</p>	<p>(O7) 4 Aft L RCS He Pr Isol A man CL capability</p>	<p>CCTV Video TV Annun is lost if MNA selected for VCU</p>	<p>⑦ Vlv normally closed</p>
<p>(O7) • AFT L RCS He PRESS A • AFT L,R RCS XFEED 3/4/5</p>	<p>6 Aft L,R RCS Xfeed Vlv 3/4/5 man CL capability</p>	<p>SM 76 COMMUNICATIONS Ku Band A,B, GMBL and PA TEMP Read High '↑'</p>	<p>⑧ Pwr to MCA Drivers lost through ENABLE sw</p>
<p>(O8) • L OMS XFEED A • R OMS XFEED A • FWD RCS He PRESS A</p>	<p>7 R OMS He Press Isol A man Cntrl and He Vap Isol 1,2 man Cntrl</p>	<p>SM (BFS,SM) 63 PL BAY DOORS</p>	<p></p>
<p></p>	<p>4 L,R OMS Tk Isol A man CL capability 4 L,R OMS Xfeed Vlv A man CL capability 4 Fwd RCS He Press Isol A man CL capability</p>	<p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	<p></p>
<p></p>	<p>8 (R13A2) PLBD: C/L Lat 9-12 Mtr 1 Port,Stbd Fwd Blkhd Mtrs 1 Stbd Door Mtr 1</p>	<p></p>	<p></p>
<p>If AB1,2,3 unpwr'd at same time:</p>	<p></p>	<p></p>	<p></p>
<p>GNC 23 RCS Override F1 Manf status to CL: • RCS FWD – ITEM 1 EXEC • MANF VLVS 1 OVRD – ITEM 40 EXEC</p>	<p>(O14) RCS Manf F1 RJD pwr (F1F, F1L, F1U, F1D)</p>	<p></p>	<p></p>
<p>(Continued)</p>	<p>(Continued)</p>	<p></p>	<p></p>

EPS CNTL
SSR 100-109

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 SM 1 DPS UTILITY (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: GNC 43 CONTROLLERS Deselect L Pnl Trim L1: • DES PNL TRIM L1 – ITEM 36 EXEC Deselect Bdy Flp UP/DN L1: • DES BDY FLP L1 – ITEM 19 EXEC	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 Cntr, Auto switchover to Sec Cntr 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
GNC 23 RCS • 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	(L1A2) 14 NH3 Sys A Sec Cntr 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
BUS ISOLATION			⑬ Loss of manual capability to inert LH2 Manf
ONLY ON MCC CALL, PERFORM			⑰ Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
• MDU CRT 1 PWR – OFF			⑱ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
(C2) • IDP/CRT1 PWR – OFF			⑲ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
(O14:F) • MMU 1 – OFF			⑳ Single mtr time
(F3) • TRIM RHC PNL – ENA • PNL – OFF			㉑ Vlv holds position. FC1 Redundant Reac Vlv Close Cntl on pnl C3 remains
(R4) • MPS FILL/DRAIN LH2 INBD – GND	(R4) 16 Prplt F/D Inbd LH2 Vlv Man OP capability		㉒ Vlv holds position. Sys 2 remains
(R14D) • cb MNA TV CONTR UNIT – op	(A7A1) Video Cntl Unit MNA pwr		㉓ Cntrlrs A,B Rad Byp Vlv Mtrs Auto Cntl and Cntrl A Rad Byp Vlv Mtr Man Cntl remain
(A7U) PL BAY • FLOOD AFT STBD – OFF • FLOOD FWD PORT – OFF • FLOOD FWD BHD – OFF	(A7A1) PLB Floodlts: Aft Stbd Fwd Port Blkhd		
	(R1A2) 17 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: Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) ODA mtr 1 latch/release		
	(R1A2) 21 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		
	(L2A1) 22 Atm Press Cntl O2 Sys 1 Sply Vlv Cntl		
	(L1A2) 23 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
	(O14) 24 RJDF 1B F1 Manf Logic sw pwr (F1F,F1L,F1U,F1D)	(F3) 25 NWS fail lt (for actuator pressure sw)	(6) Vlv holds position (24) <div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 5px auto;"> WARNING </div> Driver pwr to F1 jets lost if RJDF 1B Driver sw OFF (O14:F)
	(F6A1) L ADI Att Ref Set capability		
	(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		(25) NWS fail light still driven by miscompare logic feedback on rollout (26) Redundant mtrs remain (27) Vlv closes. Redundant vlv remains
	(R2) 27 APU 1 Fu Tk Vlv A 28 Cntrl Pwr Sply A APU 1 GBX GN2 Repress Vlv		(28) Redundant pwr sply remains. GG Bed T and GBX P ind lost when APU running (29) Redundant RPC remains
	29 Hyd Main Pump 1 Depress Solenoid RPC A 29 Hyd Main Pump 3 Depress Solenoid RPC B		(30) Vlv holds position. GPC OP capability remains during entry (31) Loss of redundant hyd NLG deploy and NWS redundancy
	(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 LMG, RMG Backup Rel Sys 2		(32) Hyd Sys 1 still available for NWS (33) MNB pwr select capability remains
	31 LG Extend Vlv 2 32 NWS Hyd Sys 2		(34) Mtr 2 remains (35) Htr Cntrl 2 remains
	(FPC1/AW18H) 33 EMU 1,2 Pwr/Batt chgr MNA pwr		(36) L OMS auto shutdown if Pc < 80% and '↓' on MNVR EXEC display
	(O6) -Y Star Trkr Dr Sys 1 OP/CL capability		<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 5px auto;"> CAUTION </div> No purge. Wait 10 min between burns
	(C3A5) 34 L ADP Dpy Mtr 1 35 Htr Cntrl 1		(37) Redundant coils remain
	(A6A1) PL Reten Sys A Rel/Lat Mtrs		
	(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		
	(A14) 6 Ku-Band Temp Meas PA, Rcvr, A&B Gimbal, Rate Snsr, Ant Feed		
	(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		

**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 SM 67 ELECTRIC CNTL AB2 Volts < 20</p>	<p>① Indications do not appear until jet commanded ②</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>
<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</p>	<p>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</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>L ADP deploy time incr from 15 to 30 sec STAR TRKR DR POS -Y CL time incr from 8 to 16 sec (F7) If APUs active and using H2O BLR CNTLR/HTR 1B: C/W APU TEMP It – on after ~2 min SM (BFS,SM) 63 PL BAY DOORS</p>	<p>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>(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>		
(Continued)	(Continued)		

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
(R2) • BLR CNTLR/HTR 1 – A	(R2) Hyd H2O Blr 1 Cntr B		
10 GNC 23 RCS 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)		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
11 SM 1 DPS UTILITY (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		
12 If Network Sig Proc Encryption Select – Bypass (A1L) and no SM GPC: (C3) • UPLK – NSP BLK	13 (C3A5) Uplink switch GPC block of UL Cmds capability		⑭ Vlv normally closed ⑮ B Htrs remain
When reqd: • Perform FC1 purges in AUTO mode (ORB OPS)	14 (R11U) 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	12 (A6A1) 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
BUS ISOLATION			
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;"> WARNING </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;"> CAUTION </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>* 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 Freon Loop 1 Flow Prop Vlv operation not affected</p> <p>③ Vlv holds position</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>⑤ Vlv holds position. GPC OP capability remains. Isol B remains. Auto Overpress protection lost on R RCS A reg</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 < 20</p> <p>LADP deploy time incr from 15 to 30 sec</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>(F7) If APUs active and using H2O BLR CNTLR/HTR 1A or 3A: C/W APU TEMP It – on after ~2 min</p>	
<p>(L1) • H2O PUMP LOOP 1 – B • 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>Refer to OMS/RCS Slide Rule for vlv loss info</p>	<p>5 (O7) Aft R RCS He Press Isol A man Cntl, GPC CL capability</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>SM (BFS,SM) 63 PL BAY DOORS</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>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 Bikh Mtrs 1 Port Aft Bikh Mtr 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw</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>• PLT RHC pb – push, if BFS engage reqd</p>	<p>(F6) CDR BFS no eng capability GPC 1,2,4 no eng capability</p>		
	<p>COMSEC 1 & 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
6 AB1,2,3 unprwd at same time: (A1L) NSP ENCRYPTION MODE – SEL NSP ENCRYPTION SEL – BYP ----- No SM GPC or LOS: (C3) UPLK – NSP BLK	If AB 1,2,3 unprwd at same time: (A1A2) COMSEC 1,2 Key ----- -----	STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec (L1) If H2O PUMP LOOP1,A ON: 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 LOOP 1 ind – 20-25 psia	⑥ When SM not available, use NSP block to inhibit UL cmds. 'BCE STRG 1(3) NSP' annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS ⑦ Lose Hyd deploy capability for all Ldg Grs. Pyro backup release sys will deploy Ldg Grs. NLG can also be deployed by Hyd Sys 2 ⑧ Hyd Sys 2 still available for NWS ⑨ Mtr 2 remains ⑩ Htr Cntr 2 remains ⑪ Vlv closes. Redundant vlv remains ⑫ Redundant pwr sply remains. Turbine speed ind lost ⑬ Use pb on Aft pnl A6 ⑭ Loss of manual capability to inert LH2 Manf ⑮ Redundant mtrs remain
BUS ISOLATION ONLY ON MCC CALL, PERFORM	(MA73C) Stbd Rad Dpy/Sto Mtr 1 Port Rad Dpy/Sto Mtr 1 -Y Star Trkr Dr Sys 1 OP/CL capability	(A8L) PORT RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L MID tb – bp	
NONE	(R4) 7 LG Extend Isol Vlv 7 LG Extend Vlv 1 8 NWS Hyd Sys 1	STARBOARD RMS: DPY/STO tb – bp RETEN LAT tb – bp R-F-L AFT tb – bp	
	(MA73C) LH Vents 5,6,8,9 Mtrs 1 RH Vents 1,2,3,5,6 Mtrs 1	SM 94 PDRS CONTROL PORT RMS Indications lost: Mid MRL Mtr 1 LAT/REL/RDY Aft MRL Mtr 2 LAT/REL/RDY	
	(MA73C) 9 L ADP Deploy Mtr 1 Disc 1 10 Htr Cntr 1	STBD RMS Indications lost: Fwd MRL Mtr 2 LAT/REL/RDY Aft MRL Mtr 1 LAT/REL/RDY	
	(R2) 11 APU 3 Fu Tk Vlv B 12 Cntr Pwr Sply B		
	(C3A6) 13 Fwd Pnl Trans X,Y Norm, Pulse, and Fwd Pnl Roll, Pitch,Yaw Disc Rate, Pulse, Select capability 13 Fwd Pnl Trans Z High, Norm, Pulse Sel capability 13 Fwd Pnl Trans Low Z Sel capability 13 Fwd Pnl PRI,ALT,VERN Sel capability 13 Fwd Pnl PCT Exec capability		
	(R4) 14 MPS Inbd LH2 Prplt Vlv man Cntl		
	(R2) MPS Pneu He Isol 1 man Cntl R MPS He Isol B man Cntl		
	(MA73C) 15 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 GPC Cntl C/L Lat Actr 2 Mtr 1 GPC Cntl L Dr Closure Mtr 1 GPC CL capability L Dr Uplock Lat Mtr 1 GPC Lat capability		

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 < 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</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>If Site AOS and using S-BD Ant Elec 1: 'ANTENNA' 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</p>	<p>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>(A1R) • S-BD FM PWR – 2 If no comm: (C3) • S-BD PM CNTL – PNL • – CMD</p>	<p>(A1A3) S-BD FM Sys 1</p>	<p>If SYS 1 pwrd: 'S62 BCE BYP PSP 1' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'</p>	<p>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>If OIU reqd: (SSP) • OIU PWR – OIU 2 ON • OIU tb – DN • √MCC, OIU reconfig</p>		<p>If first RGA failure and rates sensed: 'RM FAIL RGA' (3)</p>	<p>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>(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>(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</p>	<p>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>(R2) • BLR CNTLR/HTR 2 – A</p>	<p>(R2) Hyd H2O Blr 2 Cntr B</p>	<p>CCTV Video and Annun is lost if MNB selected for VCU</p>	<p>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>8 (R13A2) PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Mtr 2 Port Drive Mtr 2</p>	<p>PLB Floodlts 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>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>(Continued)</p>	<p>(Continued)</p>		


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, <u>EPS</u>)	(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: GNC 43 CONTROLLERS Deselect L Pnl Trim L2: • DES PNL TRIM L2 – ITEM 37 EXEC Deselect L Bdy Flp UP/DN L2: • DES BDY FLP L2 – ITEM 20 EXEC	(F6A7) 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
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(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
	(L2A1) 22 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl		22 Vlv holds position. Sys 1 remains
	(F8) R HUD Rt ADI Aft Ref Set capability (C3A5) L,R ADP Dpy Mtrs 2 Probe Htr Cntr 2		23 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
	(A8L) Port RMS: 23 MPM Mtr 2 24 Fwd MRL Mtr 1 24 Mid MRL Mtr 2		24 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
	STBD RMS: 23 MPM Mtr 1 25 Mid MRL Mtr 1 25 Aft MRL Mtr 2		25 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	ROEU AC2 pwr to: 24 Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B) 24 ODA mtr 2 latch/release		26  Driver pwr to F2 jets lost if RJDF 1A Driver sw OFF (pnl O15:F)
	(O6) -Y Star Trkr Dr Sys 2 CL capability -Z Star Trkr Dr Sys 1 OP/CL capability		
	(O15) 26 RJDF 1A F2 Manf Logic pwr (F2F,F2R,F2U,F2D)		27 Redundant pwr sply remains. Turbine speed ind lost
	(R2) 27 APU 1 Cntr 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		28 Redundant RPC remains
	(F6A5,F8A5) NLG Ext 2 Fire 1, Fire 2 NLG,LMG,RMG Bkup Rel 2 Fire 1		29 Vlv closes. Redundant vlv A remains
	30 LG Extend Vlv 2 31 NWS Hyd Sys 2		30 Loss of redundant hyd NLG deploy and NWS redundancy
	(R4) 32 Hyd Brake Isol 2 Man Cntl		31 Hyd Sys 1 still available for NWS
	(R13A2) Rad Cntl sys: Stbd Rad Lat 1-6 Mtr 2 Dpy/Sto Mtr 1 Port Rad Lat 1-6 Mtr 2		32 Vlv holds position. GPC cntl remains. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed
	(R13A2) PL Reten Sys B Rad/Lat Mtrs 33 Ku Ant Sto/Dpy Mtr 2 Direct Stow Mtr 2		33 Mtr 1 remains
	34 Redundant Stow Initiate Signal to Ku-Band		34 Redundant stow initiate sig (CNTL CA1) to Ku-Band remains
	(F2,F3) 35 CDR Dpy Fire 2 35 Jett Fire 2		35 Plt Dpy/Jett remains

**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>• 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>	<p>(A1A2) S-BD PM Sys 2: Xpndr 2 Pre Amp 2, Pwr Amp 2 PM and FM Ant sw 2</p> <p>NSP 2/COM SEC 2</p> <p>S-BD PL Intrg 2 PSP 2</p>	<p>All S-BD A/G voice lost if sys 2 selected CRT 2 blanks</p> <p>(F7) 2 RCS JET C/W It – on SM ALERT Light/Tone – on</p> <p>(FSMs) S86 APU/HYD W/B SM0 THRM HYD (B) BCE STRG 3 NSP (if using NSP 2) S67 CNTL/ESS V DISPLAY SW R 2 F,L,R RCS(F,R,L,U,D) JET I/O ERROR CRT2</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>(A1R) • S-BD FM PWR – 1</p> <p>If no comm: (C3) • S-BD PM CNTL – PNL – CMD</p>	<p>(A1A3) S-BD FM Sys 2</p>	<p>SM 67 ELECTRIC CNTL BC2 Volts < 20</p> <p>4 If site AOS and using S-BD Ant Elec 2: 'ANTENNA' (2)</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>If OIU reqd: (SSP) • OIU PWR – OIU 1 ON • OIU tb – UP • √MCC, OIU reconfig</p>		<p>(L1) If H2O PUMP LOOP 1,B active: C/W H2O LOOP It 'S88 H2O PUMP P1' 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP'</p>	<p>⑥</p> <p style="text-align: center;">* - - - - - TIME * - - - - - CRITICAL</p>
<p>(A12) APU HTR</p> <p>6 • GAS GEN/FUEL PUMP 2 – B AUTO</p> <p>APU HTR TK/FU LINE/H2O/</p> <p>6 • SYS 1A – AUTO</p> <p>6 • 1B – OFF</p> <p>6 • 2A – OFF</p> <p>6 • 2B – AUTO</p> <p>HYD HTR</p> <p>• ELEV A – AUTO</p> <p>• B – OFF</p> <p>• CIRC PUMP PWR 2 – MNC</p>	<p>(A12) APU 2 GG/Fu Pump Htrs A 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 (R2) Circ Pump 2 MNB pwr</p>	<p>(O1) H2O PUMP OUT PRESS LOOP 1 – 20-25 psia</p> <p>During Rad Dpy/Sto: (R13L) RAD LAT CNTL tbs (two) indicate single mtr ops RAD CNTL STBD tb indicates single mtr ops</p> <p>STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec</p> <p>STAR TRKR DR POS -Z CL time incr from 8 to 16 sec</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>(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</p>			<p>⑨ Pwr to MCA Drivers lost through ENABLE sw</p>
<p>(L1) • H2O PUMP LOOP 1 – A</p> <p>If using Sec Cntr: • FLASH EVAP CNTLR SEC – ON • TOP EVAP HTR DUCT – A</p> <p>If Hi Load Evap enabled: • HI LOAD DUCT HTR – A(C)</p>	<p>(L1A2) H2O Loop 1 Pump B man ON capability</p> <p>7 FES Sec Cntr GPC Sel capability Top Evap Duct Fwd,Aft Htrs B</p> <p>Hi Load Duct Outbd,Inbd Noz Htrs B</p>	<p>(F7) If APUs active and using H2O BLR CNTLR/HTR 2B: C/W APU TEMP It – on after ~2 min</p> <p>If sys pwrd: 'S62 BCE BYP PSP 2' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'</p>	
<p>(L2) • FLASH EVAP FDLN HTR A SPLY – 1</p>	<p>(L2A1) FES H2O Fdln A Htrs 2 (all)</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>8</p> <p>8</p>	<p>ROEU AC2 pwr to: Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B) ODA mtr 2 latch/release</p>		
<p>9</p>	<p>(R13A2) 9 PLBD: Port,Stbd Fwd Blkhd Mtrs 2 Stbd Door Mtr 2</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

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 EPS 7.6 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			(16) Manf status <u>not</u> automatically declared closed. Jet fail-offs may occur
(C2) • R IDP/CRT SEL – 3 On MCC GO: • GPC/CRT O2 EXEC	-----		
[GNC 23 RCS]			(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
16 Override F2 Manf status to CL: • ITEM 1,41 EXEC • For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)	(R2) Hyd H2O Blr 2 Cntr B (C2A2) MDU CRT 2 15 IDP 2 (C3) FC1 Redundant Reac Vlv Close Cntl		
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
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		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)
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		㉑ Sys B Sec Cntlr man ON capability remains
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 Cntlr		㉒ A Htrs remain ㉓ B Htrs remain
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)			㉔ Vlv holds position. Loss of manual capability to inert LO2 Manf
(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)		
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
• MDU CRT 2 PWR – OFF			
(C2) • IDP/CRT2 PWR – OFF			
(F3) • R TRIM RHC/PNL – ENA • PNL – OFF			
(R2) • MPS He I'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 Cntrls 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 Cntrls 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) APU HTR</p> <p>1 • GAS GEN/FUEL PUMP 2 – A AUTO</p> <p>• 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 B – OFF</p> <p>HYD</p> <p>• CIRC PUMP PWR 2 – MNB</p>	<p>(A12) APU 2 GG/Fu Pump Htr B 2 Lube Oil Line Htrs B 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>SM 67 ELECTRIC</p> <p>CNTL BC3 Volts < 20</p> <p>(FSM) RM DLMA MANF</p> <p>(O8) 2 FWD RCS MANF ISOL 2 tb – bp</p> <p>If H2O PUMP LOOP 1,B – ON: C/W H2O LOOP It – on 'S88 H2O PUMP P 1' 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP'</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>(A14) • RCS/OMS HTR OMS CRSFD LINES – A AUTO, B OFF</p>	<p>(A14) OMS Crsfd Ln Htrs B (all)</p>	<p>(O1) H2O PUMP OUT PRESS LOOP 1 meter ind – 20-25 psia</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>(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</p>		<p>(F7) If APUs active and using H2O BLR CNTLR/HTR 1A or 2A: C/W APU TEMP It on after ~2 min</p>	<p>④ Sec Cntrl On sel capability remains. Pri A,B Cntrls remain</p>
<p>(L1) • H2O PUMP LOOP 1 – A</p> <p>3 • 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: • HI LOAD DUCT HTR – A(C)</p>	<p>(L1A2) H2O Loop 1 Pump B</p> <p>4 FES Sec Cntrl man On Sel capability Top Evap R Noz Htr A</p> <p>Top Evap Duct Fwd,Aft L,R Htrs B Hi Load Duct Outbd,Inbd Htrs B</p>	<p>During Rad Dpy ops: (R13L) RAD CNTLR tbs (two) indicate single mtr ops</p> <p>L,R ADP deploy time incr from 15 to 30 sec</p> <p>STAR TRKR DR POS (two) OP/CL time incr from 8 to 16 sec</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>(R2) • BLR CNTLR/HTR 1,2 (two) – B</p>	<p>(R2) Hyd H2O Blr 1,2 Cntrl A</p>	<p>SM (BFS SM 63) PL BAY DOORS</p>	<p>⑥ Sys A Sec Cntrl man On capability remains</p>
<p>Refer to OMS/RCS Slide Rule for vlv loss info Do not perform if BC1,2,3 unpwrd at same time: GNC 23 RCS</p> <p>Override F2 Manf status to OP: • RCS FWD – ITEM 1 EXEC • MANF VLVS 2 OVRD – ITEM 41 EXEC</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) 5 • cb MCA PWR AC2 3φ MID 2,4 (two) – op</p>	<p>(MA73C) 5 Stbd,Port Rad Lat 1-6 Mtr 2 Limit sw</p>	<p>(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</p>	
<p>For PLBD ops: • OP/CL Drs in man mode</p>	<p>(MA73C) PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Mtr 2 Port Drive Mtr 2 Port,Stbd Fwd Blkhd Mtr 2 Stbd Door Mtr 2 Port,Stbd Door Mtr 1 CL Limit sw</p>	<p>SM 94 PDRS CONTROL</p> <p>PORT RMS Indications lost: MPM Mtr 2 STO/DPY Fwd MRL Mtr 1 LAT/REL/RDY Mid MRL Mtr 2 LAT/REL/RDY</p> <p>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</p>	
<p>If reqd during entry (< 120K ft): (L1) • NH3 CNTLR B – PRI/GPC</p>	<p>(L1A2) 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;"> WARNING </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>
BUS ISOLATION			
<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
	15 (MA73C) 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		⑮ Redundant mtrs remain ⑯ With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed to GND position ⑰ MNC MMC2 pwr for Ku-Bd Xmit Enable signal remains ⑱ MNC MMC2 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs ⑲ Vlv closes. Redundant Vlv A remains
	(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		
	(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		
	(R2) 19 APU 3 Fu Tk Vlv B		

**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 SM 67 ELECTRIC CNTL CA1 < 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 TIME CRITICAL 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 SM 88 APU/ENVIRON THERM 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: GNC 23 RCS 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"> • Reprioritize L,R Manf 3 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest, etc • Set aft pod(s) PRI JET FAIL LIMIT to 3 	(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
BUS ISOLATION			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 (C3A5) R ADP Dpy Mtr 1 11 Htr Cntrl 1 (R1A2) 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 Byv Vlv Mtr man Cntl		⑲ Cntrls A,B Rad Byv Vlv Mtrs Auto Cntl and Cntr B Rad Byv Vlv Mtr Man Cntl remain
	(A6A1) Aft ADI Att ref set capability		⑳
	(O16) 20 RJDF 2A F3 Manf Logic pwr (F3L,F3D,F3U,F3F)		<div style="border: 2px solid black; padding: 5px; text-align: center;">WARNING</div> Driver pwr to F3 Jets lost if RJDF 2A Driver sw OFF (O16:F)
	(C3A1) 21 R OMS Eng Pr Vlv Coil 1 and Cntl Vlv 1,2 Coils 1		⑳ Redundant coils remain
	22 R OMS Arm 1, Arm/Press 1 sw contacts		㉑ R OMS auto shdn if Pc < 80% and '↓' on MNVR EXEC display
	(R4) 23 HYD BK ISOL VLV 3 man Cntl (F6A5,F8A5)		<div style="border: 2px solid black; padding: 5px; text-align: center;">CAUTION</div> No purge. Wait 10 min between burns
	24 LG Extend Vlv 1		㉒ Vlv holds position. GPC capability remains
	25 NWS Hyd Sys 1		㉓ 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		㉔ 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
BUS LOSS: CNTLCA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) 1 • APU HTR GAS GEN/FUEL PUMP 3 – B 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 – MNA</p>	<p>(A12) APU 3 GG/Fu Pmp Htrs A 2 Tk/Fu Ln Htrs B APU 3 Tk/Fu Ln Htrs A APU 3 GG Inj H2O Htrs 3A,23A (R2) Circ Pump 3 MNC pwr</p>	<p>MASTER ALARM Light/Tone – on</p>	<p>①</p>
<p>(R1) If TK1 in use: • O2,H2 TK1 HTR B (two) – AUTO • O2,H2 TK1 HTR A (two) – OFF If TK3 in use: • O2,H2 TK3 HTR A (two) – AUTO • O2,H2 TK3 HTR B (two) – OFF</p>	<p>(R1A2) Cryo O2,H2 Tk1 Htr A Cryo O2,H2 Tk3 Htr B</p>	<p>(F7) SM ALERT Light/Tone – on 2 C/W FREON LOOP It – on 3 C/W RCS JET It – on CRT 4 blanks</p>	<p>* TIME * * CRITICAL * If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p>
<p>(A15) If Tk5 in use: • O2,H2 TK5 HTR B (two) – AUTO • O2,H2 TK5 HTR A (two) – OFF</p>	<p>(A15) Cryo O2,H2 Tk5 Htr A</p>	<p>(FSMs) S67 CNTL BUS V S67 DISPLAY SW A (2) 2 S88 EVAP OUT T 1,2 3 F RCS D(L,U,F) JET 4 I/O ERROR CRT4</p>	<p>② If FES Cntrl Pri A in ON position and cooling by FES only</p>
<p>(R2) • BLR CNTLR/HTR 3 – A</p>	<p>(R2) APU/HYD Blr Cntrl/Htr 3B</p>	<p>SM 67 ELECTRIC CNTL CA2 < 20 V</p>	<p>③ Indications do not appear until jets commanded</p>
<p>(L1) • FLASH EVAP CNTLR PRI A – OFF • FLASH EVAP CNTLR PRI B – ON (if reqd) • TOP EVAP HTR DUCT – A(B) If HI LOAD EVAP enabled: • HI LOAD DUCT HTR – A(B)</p>	<p>(L1A2) 5 FES Cntrl Pri A man ON Sel capability Topping Evap Duct Fwd,Aft Htrs C Hi Load Duct Inbd,Outbd, Noz Htrs C</p>	<p>During Rad Dpy/Sto ops: (R13L) RAD CNTL PORT tbs (two) indicate single motor ops</p>	<p>④ If GPC commands CRT</p>
<p>(C2) On MCC GO: • GPC/CRT 04 EXEC</p>	<p>(R12A2) 6 IDP 4 MDU CRT 4</p>	<p>R ADP deploy time incr from 15 to 30 sec</p>	<p>⑤ Pri A GPC Sel capability remains. Pri B and Sec Cntrls remain</p>
<p>(C3) FC2 Redundant Reac Vlv Close Cntl</p>	<p>(C3) FC2 Redundant Reac Vlv Close Cntl</p>	<p>(F7) If APUs active and using BLR CNTLR/HTR 3B: C/W APU TEMP It – on after ~2 min</p>	<p>⑥ Loss of redundant port to the following: MDU AFD 1 (P)</p>
<p>(Continued)</p>	<p>(Continued)</p>		

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 Ovrdr 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 GNC 23 RCS 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		
10 GNC 23 RCS • Reprioritize L,R Manf 4 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest priority, etc • Set aft pod(s) PRI JET FAIL LIMIT to 6	(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: GNC 43 CONTROLLERS 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
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(F3) • TRIM RHC – ENA • PNL – OFF	(O6) 13 -Z Star Trkr Dr Sys 2 CL capability		
(R11L) • IDP/CRT4 PWR – OFF	(R1A2) 14 FC3 Reac Vlv Cntl via pnl R1 sw		
• MDU CRT 4 PWR – OFF	15 FC3 STOP capability via START/STOP sw		
	(C3A5) 13 R ADP Dpy Mtr 1 16 Htr Cntrl 1 (A6A1) 17 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 (C3A1) 18 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;"> CAUTION </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
4 (R1) If Tk2 in use: 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
4 (A11) If TK4 in use: 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	⑥ Manf 4 status automatically declared closed
	6 (O16) RCS Manf F4 RJD pwr (F4R,F4D)	STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec	
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	(F7) If APUs active, using BLR CNTLR/HTR 2A or 3A: C/W APU TEMP It – on after ~2 min	
(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
BUS ISOLATION		(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
	(MA73C) -Z Star Trkr Dr Sys 2 OP/CL capability 7 R ADP Deploy Mtr 1 8 Deploy Dsc 1 Htr Cntr 1	STBD RMS Indications lost: MPM Mtr 2 STO/DPY Mid MRL Mtr 2 LAT/REL/RDY	
	(MA73C) LH Vents 1,2,3 Mtrs 1 Vent 6 Mtr 2 RH Vents 8,9 Mtrs 1 Vent 3 Mtr 2 Vent 5 Mtr 2		
	(MA73C) 9 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		
	(A8L) Port RMS: 10 MPM Mtr 1 11 Fwd MRL Mtr 2 11 Aft MRL Mtr 1		
	STBD RMS: 10 MPM Mtr 2 12 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		⑬ With an inop limit sw, mtr will continue to run until primary sw returned to GND
	(MA73C) 14 Redundant Ku-Bd Xmit Enable Signal		⑭ MNB MMC4 pwr for Ku-Bd Xmit Enable Signal remains
	15 Redundant Boom Stow Enable II Excitation Signal		⑮ MNB MMC4 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs
	(R2) 16 APU 3 FU Tk Vlv A		⑯ Vlv closed. Redundant vlv remains
	17 Cntr pwr Sply A GBX GN2 Repress Vlv		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
1 • Perform FC1 SHUTDN FC SHUTDN (Cue Card) (R1) • AC1 BUS SNSR – OFF (R2) • BLR CNTLR/HTR 1 – A 3 – B (L1) • HUM SEP A – OFF √B – ON • IMU FAN A – OFF B(C) – ON • H2O PUMP LOOP 1 (two) – ON, B • H2O LOOP 1 BYP MODE – AUTO • H2O PUMP LOOP 2 – OFF • 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 • FREON PUMP LOOP 2 – A (MO13Q) If Arlk/Tnl Fan active: • ARLK FAN A – OFF B – ON	FC1 Pumps and pH Snsr Hyd H2O Blr 1 Cntrl B 3 Cntrl A Humidity Sep A IMU Fan A 2 H2O Loop 2 Byp Cntrl, Sig Condr 3 H2O Loop 2 Byp Vlv pwr 2 Pump GPC Cntrl 1 Pump A Av Bay 1 Fan A 4 Av Bay 2 Sig Condr, Xdcrs (ECLS SC3) Av Bay 3 Fan B Freon Loop 1 Pump A 2 Pump B Arlk/Tnl Fan A	MASTER ALARM Light/Tone – on (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 (F9) AC1 ΦA,ΦB,ΦC AC volts < 90 (LIGHTS LOST) Instr Its R (pnls C2,F8,F9) 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) Orbit Sta Instr Its (pnls A1, A2) (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 (R1) FC1 COOL PUMP ΔP tb – bp HYD/APU HYD QTY 1 ind – 0% APU H2O QTY 3 ind – 0% (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 (O3) RCS/OMS PRPLT QTY Gage and MSN TIME ind blank (L1) If H2O LOOP 1 PUMP A active: 'S88 H2O PUMP P 1' 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' ----- (O1) H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia If HUM SEP A ON: 'S66 HUMID SEP A'	① * TIME * * CRITICAL * FC1 must be shutdn within 9 min to avoid potentially hazardous condition ② H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost ③ H2O Loop 2 Byp vlv holds position ④ Av Bay 2 Fan ΔP, Air Out Temp snrs lost ⑤ Crew and gnd have lost PPCO2 Xdcr ⑥ Use streamers (if flown) or monitor by feel during wake period ⑦ CO2 partial Press and Cabin Fan ΔP snrs lost ⑧ Inhibits Primary C/W for CAB Fan ΔP, H2O Loop 2 Pump P, FC1 stack Temp, FC1 Cool Pump ΔP ⑨ Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, and Cabin HX In Temp respectively
5 • Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN During sleep periods: (L1) 6 • CAB FAN (two) – ON (R13U) • C/W PARAM SEL tw (three) – 115, 074, 092, 062 8 • C/W PARAM – INH MEM – CLEAR • C/W PARAM SEL tw (three) – > 119 9 SM 60 SM TABLE MAINT • Inhibits 0612705, 0612700, 0612740, 0612710, 0612665 (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	7 Cabin Air S/C (ECLS SC6) WCS Fan/Sep 1	(Continued)	(Continued)

EPS SSR-110 (Cont)
BUS LOSS: AC1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If CAB TEMP CNTLR 2 active: (L1)</p> <ul style="list-style-type: none"> • CAB TEMP CNTLR – OFF (MD44F) • Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR <p>(L1)</p> <ul style="list-style-type: none"> • CAB TEMP CNTLR – 1 <p>Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS and FMC1 Slide for Fwd RCS)</p>	<p>10 Cabin Temp Cntrlr 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 APUs active and using H2O BLR CNTLR/HTR 1B or 3A, then C/W APU TEMP It on after ~2 min</p> <p>STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec</p> <p>L ADP deploy time incr from 15 to 30 sec</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>(O1) FREON FLOW LOOP 2 ind – 578 pph</p>	<p>⑩ Lose Auto Temp Cntrl via Cntrlr 2 and H2O Loop 2 Cabin Hx In Temp Snstr. Hx Byp Vlv holds position</p> <p>⑪ Redundant mtr remains</p> <p>⑫ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</p> <p>⑬ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</p>
<p>BUS ISOLATION</p>			
<p>ONLY ON MCC CALL, PERFORM</p>			
<p>(MA73C:C) cb MCA PWR</p> <ul style="list-style-type: none"> • AC1 3Φ FWD 1 – op • MID 1 – op 	<p>11 AC1 FMC1 Bus pwr RH Vent 1,2 Mtr 1 -Y Star Trkr Dr Sys 1 OP/CL capability</p> <p>11 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>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>During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops</p>	
<p>(MA73C:D) cb MCA PWR</p> <ul style="list-style-type: none"> • AC1 3Φ MID 3 – op • AFT 1 – op 	<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>(MA73C:E) • cb AC1 WCS FAN SEP 1 (three) – op</p>			
<p>(MA73C:F) cb AC1</p> <ul style="list-style-type: none"> • RMS PRI ΦA – op <p>• MAR 3Φ – op</p> <p>• OPS INST HYD ACTR ΦC – op</p>	<p>12 RMS: Port Mid MRL Mtr 1 12 Port Aft MRL Mtr 2 13 Stbd Fwd MRL Mtr 2 13 Stbd Aft MRL Mtr 1 D&C Primary Itg Shldr Brace release AC1 Middeck Utility Pnl (MUP) Ops Hyd Actr Instr</p>		
<p>(MA73C:G) IF DOCKING MISSION</p> <ul style="list-style-type: none"> • cb AC1 ARLK/TNL FAN A (three) – op 	<p>Arkl/Tnl Fan A</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>(MA73C:H,I) <ul style="list-style-type: none"> • cb AC1 FWD RCS VLV (three) – op • cb AC1 AFT POD VLV GP 1 (three) – op </p>			<p>⑭ Bypass vlvs hold position and Cntr A Rad Byp Vlv Mtrs remain</p>
<p>(L4:A-E) <ul style="list-style-type: none"> • cb UTIL PWR F1/MO52J • AC1 – op </p>	<p>AC1 Util pwr (F1/MO52J)</p>		
<p>cb AC1 <ul style="list-style-type: none"> • FC1 PUMPS (three) – op • CTR ENG (three) – op • R ENG (three) – op </p>			
<p>(L4:F-J) cb AC1 <ul style="list-style-type: none"> • √H2O LOOP PUMP 1A/2 (three) – op • AV BAY 1 FAN A (three) – op • AV BAY 3 FAN B (three) – op • IMU FAN A (three) – op • HUM SEP A (three) – op </p>			
<p>(L4:K) cb AC1 <ul style="list-style-type: none"> • ΦA H2O CNTLR 2 – op • ΦB CAB AIR S/C – op </p>			
<p>(L4:L) cb AC1 <ul style="list-style-type: none"> • ΦA CAB T CNTLR 2 – op • ΦB AV BAY 2 S/C – op </p>			
<p>(L4:M,N) cb AC1 ΦA,ΦB,ΦC <ul style="list-style-type: none"> • FREON LOOP 1 PUMP A (three) – op • FREON LOOP 2 PUMP B (three) – op </p>			
<p>(L4:O) cb AC1 <ul style="list-style-type: none"> • ΦA BLR HYD BYP 1B – op • ΦB HYD QTY 1 – op • ΦC BLR HYD BYP 3A – op </p>	<p>Hyd Rsvr 1 Qty Snsr</p>		
<p>(L4:P) cb AC1 <ul style="list-style-type: none"> • ΦA RAD CNTLR 1B – op • ΦB RAD CNTLR 2B – op </p>	<p>14 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"> • ΦA LTG PNL L/CTR – op • ΦB LTG PNL L OVHD – op • ΦC LTG INST OS – op </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>15 Inst Its R Numeric Its (pnls O3,F7) (RCS/OMS Prplt Qty, Gauge, Mission and Event Timers)</p>		<p>① Redundant mtr remains ② √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>11 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"> •√HUM SEP A – OFF <ul style="list-style-type: none"> •√B – ON •√IMU FAN A – OFF <ul style="list-style-type: none"> •√B(C) – ON • H2O PUMP LOOP 1 (two) – ON, B • H2O LOOP 1 BYP MODE – AUTO • H2O PUMP LOOP 2 – OFF •√FREON PUMP LOOP 1 – B •√FREON PUMP LOOP 2 – A •√AV BAY 1 FAN A – OFF <ul style="list-style-type: none"> •√B – ON • 3 FAN A – ON • B – OFF 	<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 < 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"> • ARLK FAN A – OFF • B – ON 	<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</p> <p>SM 60 SM TABLE MAINT</p> <ul style="list-style-type: none"> • Inhibits 0612705, 0612700, 0612740, 0612710, 0612665 • Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value +0.3 volts 	<p>1Φ of FC1 H2 Pump</p> <p>1Φ of FC1 Coolant Pump</p>	<p>3</p> <p>(O1) H2O PUMP OUT PRESS LOOP 1 ind – 40-45 psia</p>	<p>⑥ 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power</p>
<p>If CAB TEMP CNTLR 2 active:</p> <p>(L1)</p> <ul style="list-style-type: none"> • CAB TEMP CNTLR – OFF 	<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>(MD44F)</p> <ul style="list-style-type: none"> • Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR 		<p>If HUM SEP A ON: 'S66 HUMID SEP A'</p>	
<p>(L1)</p> <ul style="list-style-type: none"> • CAB TEMP CNTLR – 1 		<p>If APUs active, and using BLR CNTLR/HTR 1B: C/W APU TEMP It – on after ~2 min</p>	
<p>5</p> <p>(R13U)</p> <ul style="list-style-type: none"> • C/W PARAM SEL tw (three) – 033,115 • C/W PARAM – INH • MEM – CLEAR • C/W PARAM SEL tw (three) – > 119 			
<p>(R1)</p> <ul style="list-style-type: none"> • AC1 BUS SNSR – OFF (1 sec) • AC1 BUS SNSR – AUTO TRIP 			
<p>(WCS)</p> <ul style="list-style-type: none"> •√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>6 1Φ of WCS Fan/Sep 1</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-111 (Cont)
BUS LOSS: AC1 ΦA

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>8 If bus shorted:</p> <ul style="list-style-type: none"> • Open all AC1 ΦA cbs that pwr 3Φ loads on pnls L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs) • Open all AC1 3Φ ganged cbs on pnls L4: B (1 cb), MA73C: C,D,F (5 cbs) <p>9 If bus not shorted:</p> <ul style="list-style-type: none"> • Perform the following BUS ISOLATION steps 	<p>7 1Φ of AC Utility Power Outlets at F1 and MO52J</p> <p>8 AC1 FMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr AMC1 Bus pwr</p>		<p>⑦ MCC will provide equipment reconfig info if required</p> <p>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</p>
<p>9 BUS ISOLATION</p> <p>IF BUS <u>NOT</u> SHORTED, PERFORM</p> <p>(L4:K) • cb AC1 ΦA H2O CNTLR 2 – op</p> <p>(L4:L) • cb AC1 ΦA CAB T CNTLR 2 – op</p> <p>(L4:O) • cb AC1 ΦA BLR HYD BYP 1B – op</p> <p>(L4:P) • cb AC1 ΦA RAD CNTLR 1B – op</p> <p>(L4:Q) • cb AC1 ΦA LTG PNL L/CTR – op</p> <p>(L4:R) • cb AC1 ΦA INST R – op</p> <p>(MA73C:F) • cb AC1 RMS PRI ΦA – op</p>	<p>10 Freon Loop 1 Cntr B Rad Byp Vlv Mtr</p> <p>Pnl Its L/Ctr (pnls L1,L2,L4, C2,C3,F2,F6,F7)</p> <p>Instr Its R (pnls C2,F8,F9)</p> <p>RMS: 1Φ 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</p> <p>FC1 pH Snsr</p>		<p>⑨ For unshorted bus, perform single Φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases</p> <p>⑩ Bypass vlv holds position and Cntr A Rad Byp Vlv Mtr remains</p>

EPS SSR-112
BUS LOSS: AC1 Φ B

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> • \sqrtHUM SEP A – OFF • \sqrtB – ON • \sqrtIMU FAN A – OFF • \sqrtB(C) – ON • H2O PUMP LOOP 2 – ON • H2O PUMP LOOP 1 (two) – GPC, B • AV BAY 2 FAN (two) – ON • FREON PUMP LOOP 1 – B • FREON PUMP LOOP 2 – A • \sqrtAV BAY 1 FAN A – OFF • \sqrtB – ON • 3 FAN A – ON • B – OFF 	<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>① If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</p>
<p>(MO13Q)</p> <p>If Arlk/Tnl Fan active:</p> <ul style="list-style-type: none"> • ARLK FAN A – OFF • B – ON 	<p>1Φ of Arlk/Tnl Fan A</p>	<p>(F7) C/W AC VOLT It – on C/W AV BAY/CAB AIR It – on SM ALERT Light/Tone – on</p>	<p>② Av Bay 2 Fan ΔP, Air Out Temp snrs lost</p>
<p>3 • Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN</p> <p>During sleep periods: (L1)</p> <p>4 • CAB FAN (two) – ON</p>	<p>4 Cab Air Sig Cond</p> <p>5 (ECLS SC6)</p>	<p>(F7) EVENT TIME ind blank</p>	<p>③ Crew and gnd have lost PPCO2 Xdcr</p>
<p>(R13U)</p> <ul style="list-style-type: none"> • C/W PARAM SEL tw (three) – 033, 074 • C/W PARAM – INH • MEM – CLEAR • C/W PARAM SEL tw (three) – > 119 		<p>(F9) AC1 ΦB volts < 90</p>	<p>④ Use streamers (if flown) or monitor by feel during wake period</p>
<p>(R1)</p> <ul style="list-style-type: none"> • AC1 BUS SNSR – OFF (1 sec) • AC1 BUS SNSR – AUTO TRIP 		<p>(LIGHTS LOST) Pnl Its L/OH (pnls O5,O6, O7,O13,O14,O15) Numeric Its (pnls O3,F7)</p>	<p>⑤ CO2 partial Press and Cabin Fan ΔP snrs lost</p>
<p>(WCS)</p> <ul style="list-style-type: none"> • \sqrtMODE – AUTO • \sqrtCRADLE – AUTO • \sqrtHose stowed in cradle • \sqrtWCS 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>7 1Φ of WCS Fan/Sep 1</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>⑥ Inhibits Primary C/W for AC1 voltage and Cabin Fan ΔP</p>
<p>SM 60 SM TABLE MAINT</p> <ul style="list-style-type: none"> • Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts 	<p>1Φ of FC1 H2 Pump</p> <p>1Φ of FC1 Coolant Pump</p>	<p>HYD/APU HYD QTY 1 – 0%</p>	<p>⑦ 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power</p>
<p>(Continued)</p>	<p>8 1Φ of AC Utility Power Outlets at F1 and MO52J</p> <p>(Continued)</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>If H2O PUMP LOOP 1,A active: 1 H2O LOOP C/W It 'S88 H2O PUMP P 1' (O1) 1 H2O PUMP OUT PRESS LOOP 1 – 40-45 psia</p>	<p>⑧ MCC will provide equipment reconfig info if reqd</p>

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"> 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) Open all AC1 3Φ ganged cbs on pnls L4:B (1 cb), MA73C: C,D,F (5 cbs) 	<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 GNC SYS SUMM 2</p>
<p>10 If bus not shorted:</p> <ul style="list-style-type: none"> Perform the following BUS ISOLATION steps 			
<p>BUS ISOLATION</p> <p>IF BUS NOT SHORTED, PERFORM</p>			
	<p>RMS: 1Φ of Port Mid MRL Mtr 1 Port Aft MRL Mtr 2 Stbd Fwd MRL Mtr 2 Stbd Aft MRL Mtr 1</p>		
<p>(L4:K)</p> <ul style="list-style-type: none"> cb AC1 ΦB CAB AIR S/C – op 			
<p>(L4:L)</p> <ul style="list-style-type: none"> cb AC1 ΦB AV BAY 2 S/C – op 			
<p>(L4:O)</p> <ul style="list-style-type: none"> cb AC1 ΦB HYD QTY 1 – op 	Hyd Rsvr 1 Qty Snsr		
<p>(L4:P)</p> <ul style="list-style-type: none"> cb AC1 ΦB RAD CNTLR 2B – op 	11 Freon Loop 2 Cntrl B Rad Byp Vlv Mtr		
<p>(L4:Q)</p> <ul style="list-style-type: none"> cb AC1 ΦB LTG PNL L OVHD – op 	Pnl Its L/OH (pnls O5,O6,O7, O13,O14,O15)		
<p>(L4:R)</p> <ul style="list-style-type: none"> 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
<p>(R2)</p> <ul style="list-style-type: none"> 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> <p>② If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</p>
<p>(L1)</p> <ul style="list-style-type: none"> √HUM SEP A – OFF √B – ON √IMU FAN A – OFF √B(C) – ON H2O PUMP LOOP 2 – ON H2O PUMP LOOP 1 (two) – GPC, B FREON PUMP LOOP 1 – B 2 – A √AV BAY 1 FAN A – OFF √B – ON 3 FAN A – ON B – OFF 	<p>1Φ of Hum Sep A</p> <p>1 1Φ of IMU Fan A</p> <p>2 1Φ of H2O Loop 2 Pump GPC Cntrl pwr</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 A</p>	<p>(F7) C/W AC VOLT It – on SM ALERT Light/Tone – on</p> <p>(F9) AC1 ΦC AC volts < 90</p> <p>(LIGHTS LOST) Orbit Sta Instr Its (pnls A1,A2)</p> <p>(FSMs) S67 AC VOLTS 1 S69 FC H2 PUMP 1 S86 WSB T SM0 THRM HYD (B)</p>	
<p>(MO13Q)</p> <p>If Arlk/Tnl Fan active:</p> <ul style="list-style-type: none"> ARLK FAN A – OFF B – ON 	1Φ of Arlk/Tnl Fan A	<p>HYD/APU</p> <p>APU H2O QTY 3 – 0%</p>	
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	

EPS SSR-113 (Cont)
BUS LOSS: AC1 ΦC

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
(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	③ 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power
(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	3 1Φ of WCS Fan/Sep 1		④ MCC will provide equipment reconfig info if reqd
SM 60 SM TABLE MAINT • Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts	1Φ of FC1 H2 Pump 1Φ of FC1 Coolant Pump		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
5 If bus shorted: • Open all AC1 ΦC cbs that pwr 3Φ loads on pnls L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs) • Open all AC1 3Φ ganged cbs on pnls L4:B (1 cb), MA73C: C,D,F (5 cbs)	4 1Φ of AC Utility Power Outlets at F1 and MO52J 5 AC1 FMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr AMC1 Bus pwr		⑥ For unshorted bus, perform single isolation steps to prevent powering single phase loads with coupled energy from remaining two phases
If bus not shorted: • Perform the following BUS ISOLATION steps			
6 BUS ISOLATION			
IF BUS NOT SHORTED, PERFORM			
(L4:O) • cb AC1 ΦC BLR HYD BYP 3A – op			
(L4:Q) • cb AC1 ΦC 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	
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:C) • cb MCA LOGIC MCA PWR AC1 3Φ FWD 1 – op	AC1 FMC1 Bus pwr RH Vent 1,2 Mtr 1 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			
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:C) • cb MCA LOGIC MCA PWR AC1 3Φ MID 1 – op	PLBD: C/L Lat 9-12 Mtr 1 Port, Stbd Fwd Blkhd Mtrs 1 Stbd Door Mtr 1 RH Vents 3,5,6 Mtrs 1 AC1 MMC1 Bus pwr Port Rad Lat 1-6, 7-12 Mtrs 1 Dpy/Sto Mtr 1 PL Reten Sys A Rel/Lat Mtrs 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			
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:D) • cb MCA LOGIC MCA PWR AC1 3Φ MID 3 – op	PLBD C/L Lat 1-4, 5-8 Mtrs 1 Port Aft Blkhd Mtr 1 LH Vents 5,6 Mtrs 1 AC1 MMC3 Bus pwr Stbd Rad Lat 1-6, 7-12 Mtrs 1 Dpy/Sto Mtr 1 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
BUS ISOLATION			
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 Cntr A 2 Cntr 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)	PLT Seat Adj via AC2 pwr	(R1) FC2 COOL PUMP ΔP tb – bp	⑨ Inhibits Primary C/W for FC2 Stack Temp, and Pump ΔP
(R13U) • C/W PARAM SEL tw (three) – 072,102 • C/W PARAM – INH 9 • MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		(O1) AIR TEMP AV BAY 3 – 45 degF FREON FLOW LOOP 2 – 578 pph AIR TEMP CAB HX OUT – 45 degF	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 SM 60 SM TABLE MAINT • 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 CAB TEMP CNTLR 1 active: (L1) • CAB TEMP CNTLR – OFF	11 Cabin Temp Cntrl 1 and Hx Byp Vlv Mtr 1	If APU active and using H2O Blr Cntrl 1A or 2B: C/W APU TEMP It – on after ~2 min	
(MD44F) • Remove pin from PRI ACTUATOR and BYP Vlv linkage, connect linkage to SEC ACTUATOR		If H2O Loop 1 Pump B active: H2O LOOP C/W It 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' 'S88 H2O PUMP P1'	
(L1) • CAB TEMP CNTLR – 2		(O1) H2O PUMP OUT PRESS LOOP 1 – 20-25 psia	
Refer to OMS/RCS Slide Rule for vlv loss info (use FPC2 Slide for Aft RCS and FMC2 for Fwd RCS)		L,R ADP deploy times incr from 15 to 30 sec	
BUS ISOLATION		SM (BFS SM 63) PL BAY DOORS	
ONLY ON MCC CALL, PERFORM		During PLBD OP/CL, single mtr run time noted on actuators listed at left	
(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	(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL tbs (two) indicate single mtr ops	
(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
If Cab Temp Cntrlr 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 Cntrlr A
6 1Φ of WCS Fan/Sep 2
7 Cabin Temp Cntrlr 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 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power
⑦ Lose Auto Temp Cntl via Cntrlr 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 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 unprwing sub-buses: SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129
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		⑪ For unshorted bus, perform single Φ isolation steps to prevent prwing single phase loads with coupled energy from remaining two phases ⑫ √MCC for Reconfig ⑬ Flow prop vlv holds position
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 If bus not shorted: • Perform the following BUS ISOLATION steps	12 DTV Vertical Interval Processor (VIP)		
11 BUS ISOLATION			
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
(MO13Q) If Arlk/Tnl Fan active: • ARLK FAN B – OFF • √A – ON	1Φ of Arlk/Tnl Fan B	(A4) Mission and Event Timers blank	④ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 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%	⑤ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
(R13U) • C/W PARAM SEL tw (three) – 043 (AC2 voltage) • C/W PARAM – INH • MEM – CLEAR • C/W PARAM SEL tw (three) – > 119		(O1) AIR TEMP AV BAY 3 – 45 degF FREON FLOW LOOP 2 – 578 pph	⑥ 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power
(R1) • AC2 BUS SNSR – OFF (1 sec) • AC2 BUS SNSR – AUTO TRIP		1 If H2O Loop 1 Pump active: C/W H2O LOOP It 'S88 H2O PUMP P1'	
[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	1 (O1) H2O PUMP OUT PRESS LOOP 1 – 40-45 psia	
(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
<p>7 If bus shorted:</p> <ul style="list-style-type: none"> • 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) 	<p>8 If bus shorted: AC2 payload 3Φ Bus pwr (pwrs MS, PS Patch panel)</p> <p>7 AC2 FMC2 Bus pwr MMC1 Bus pwr MMC2 Bus pwr MMC3 Bus pwr MMC4 Bus pwr AMC2 Bus pwr</p>		<p>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</p>
<p>9 If bus not shorted:</p> <ul style="list-style-type: none"> • Perform the following BUS ISOLATION steps 			
<p>BUS ISOLATION</p>			
<p>IF BUS <u>NOT</u> SHORTED, PERFORM</p>			
<p>(L4:L) • cb AC2 ΦB AV BAY 3 S/C – OP</p>			
<p>(L4:N) • cb AC2 ΦB FREON SIG CONDR – op</p>			<p>⑧ Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short</p>
<p>(L4:O) • cb AC2 ΦB HYD QTY 2 – op</p>	<p>Hyd Rdvr 2 Qty Snsr</p>		<p>⑨ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases</p>
<p>(L4:P) • cb AC2 ΦB RAD CNTLR 1A – op</p>	<p>10 Freon Loop 1 Cntrl A Rad Byp Vlv Mtr</p>		<p>⑩ Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains</p>
<p>(L4:Q) • cb AC2 ΦB LTG PNL R – op</p>	<p>H2O Ln pH Snsr</p>		
<p>(L4:R) • cb AC2 ΦB INST OVHD – op</p>	<p>R pnl Itg (pnls F4,F8,F9,R1, R2,R4)</p>		
<p></p>	<p>Ovhd Instr Itg (pnls O1,O2, O3)</p>		
<p></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></p>	<p>1Φ of AC2 payload</p>		
<p></p>	<p>3Φ Bus pwr (pwrs MS, PS Patch pnl)</p>		

EPS SSR-123
BUS LOSS: AC2 ΦC

ACTIONS
(L4:F) • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl
(L1) • HUM SEP A – ON • B – OFF • IMU FAN A(C) – ON • B – OFF • H2O PUMP LOOP 1 (two) – GPC,A • H2O PUMP LOOP 2 – ON 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
(R2) • BLR CNTRL/HTR 2 – A
(R13U) • C/W PARAM SEL tw (three) – 043 (AC2 voltage) • C/W PARAM – INH • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119
(R1) • AC2 BUS SNSR – OFF (1 sec) • AC2 BUS SNSR – AUTO TRIP
SM 60 SM TABLE MAINT • Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts
(WCS) • √MODE – AUTO • √CRADLE – AUTO • √Hose stowed in cradle • √WCS ON It – OFF • FAN SEP SEL sw – OFF • HOSE BLOCK – SEP 1 • In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete • FAN SEP SEL sw – 1
(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 AV Bay 1 Fan B
1Φ of AV Bay 2 Fan A
1Φ of Arlk/Tnl Fan B
1Φ of Cabin Fan B
HYD H2O Blr 2 Cntrl B
1Φ of FC2 H2 Pump
1Φ of FC2 Coolant Pump
4 1Φ of WCS Fan/Sep 2
(Continued)

CREW INDICATIONS
MASTER ALARM Light/Tone – on
(F7) C/W AC VOLT It SM ALERT Light/Tone
(LIGHTS LOST) Orbit Sta Numeric (pnls A2,A4)
(FSM) S67 AC VOLTS 2 S69 FC H2 PUMP 2 S86 WSB T SM0 THRM HYD (B)
1 If H2O Loop 1 Pump B active: C/W H2O LOOP It 'S88 H2O PUMP P 1'
(O1) H2O PUMP OUT PRESS LOOP 1 = 40-45 psia
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%
(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 APU H2O QTY 2 ind – 0% if in BLR CNTRLR/HTR 2B
④ 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power

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"> • Open all AC2 ΦC cbs that pwr 3Φ loads on pnl L4: C-K,M (10 cbs), pnl MA73C: E,G,H,I (4 cbs) • Open all AC2 3Φ ganged cbs on pnl MA73C: C-G (9 cbs) 	<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"> • Perform the following BUS ISOLATION steps 			
<p>7 BUS ISOLATION</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	
BUS ISOLATION			
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	
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:C) • cb MCA LOGIC MCA PWR AC2 3φ MID 1 – op	AC2 MMC1 Bus pwr LH Vent 5 Mtr 2		

**EPS SSR-126
BUS LOSS: AC2 MMC2**

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
BUS ISOLATION		(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
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:D) • cb MCA LOGIC MCA PWR AC2 3Φ MID 3 – op	AC2 MMC3 Bus pwr PL Reten Sys B Rel/Lat Mtrs ROEU 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
BUS ISOLATION		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
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:D) • cb MCA LOGIC MCA PWR AC2 3Φ AFT 2 – op	AC2 AMC2 Bus pwr LH,RH Vents 8,9 Mtr 2 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) SM 60 SM TABLE MAINT 11 • Inhibit 0612605, 0612600, 0612640, 0612610 (R13U) 12 • 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 Snr 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 Snr 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 4 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 HYD/APU 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	①  TIME * 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 snrs 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 snrs lost ⑦ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs 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
<p>ONLY ON MCC CALL, PERFORM</p>		<p>R ADP deploy time incr from 15 to 30 sec</p>	<p>⑬ √MCC for Ku Ant stow reqmts</p>
<p>(MA73C:C) cb MCA LOGIC MCA PWR • AC3 3Φ FWD 3 – op</p> <p>• AC3 3Φ MID 2 – op</p>	<p>13 KU ANT Sto/Dpy Mtr 1 AC3 FMC3 Bus pwr 14 R ADP Dpy Mtr 1 14 -Z Star Trkr Dr Sys 2 OP/CL capability LH Vents 1,2 Mtr 1 AC3 MMC2 Bus pwr PLBD C/L Lat 1-4 Mtr 2 5-8 Mtr 2 Port Aft Blkhd Mtr 2 Stbd Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2 LH Vent 6 Mtr 2 3 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>⑭ Redundant mtrs remain</p> <p>⑮ Hum Sep A,B Speed Norm Snrs lost</p>
<p>(MA73C:D) cb MCA LOGIC MCA PWR • AC3 3Φ AFT 3 – op • MID 4 – op</p>	<p>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</p>	<p>During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops</p>	<p>⑯ IMU Fan A,B,C Speed Norm Snrs lost</p>
<p>(MA73C:E) • cb AC3 PAYLOAD 3Φ – op</p>	<p>AC3 pwr to MS, PS Patch pnls</p>		
<p>(MA73C:G) • cb AC3 GALLEY FAN (three) – op</p>	<p>Galley Fan</p>		
<p>(MA73C:H,I) • cb AC3 FWD RCS VLV (three) – op • cb AC3 AFT POD VLV GP 3 (three) – op</p>			
<p>(L4:A) • cb UTIL PWR A15/MO13Q AC3 – op</p>	<p>AC3 Utility pwr (A15/MO13Q)</p>		
<p>(L4:C-E) cb AC3 • FC3 PUMPS (three) – op • R ENG (three) – op • L ENG (three) – op</p>			
<p>(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</p>			
<p>(L4:I,J) cb AC3 • IMU FAN C (three) – op • ΦA SIG/CONDR HUM SEP – op • ΦB SIG/CONDR IMU FAN – op</p>	<p>15 Hum Sep Sig Condr (ECLS SC5) 16 IMU Fan Sig Condr (ECLS SC7)</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-130 (Cont)
BUS LOSS: AC3

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
ONLY ON MCC CALL, PERFORM			
(L4:K,L) cb AC3 • CABIN FAN A (three) – op • ΦA H2O CNTLR 1 – op • ΦB AV BAY 1 S/C – op			② Vlv holds position
(L4:M,N) cb AC3 • FREON LOOP 2 PUMP A (three) – op • ΦA FREON FLOW PROP 2 – op • ΦB FREON SIG/CONDR – op	2 Freon Loop 2 Flow Prop Vlv		⑭ Redundant mtrs remain
(L4:N) • cb AC3 ΦC RAD ISOL B – op	17 Freon Loop 1,2 Rad Isol Motor B		⑰ Motor A remains
(L4:O) cb AC3 • ΦA BLR HYD BYP 2A – op • ΦB HYD QTY 3 – op • ΦC BLR HYD BYP 3B – op	Hyd Rsvr 3 Qty Snsr		⑱ Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains
(L4:P) cb AC3 • ΦA LG SNSR 1 – op • ΦB RAD CNTLR 2A – op	18 Freon Loop 2 Cntr A Rad Byp Vlv Mtr		⑲ Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
(L4:Q) cb AC3 • ΦA LTG COAS – op • ΦB LTG PNL MS – op • ΦC LTG PNL OS – op	Sta 1,2 COAS Itg pwr MS pnl Its (pnls R10,R12) OS pnl Its (pnls A1,A2,A6,A7,A8,A13,L9)		⑳ Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
(L4:R) • cb AC3 ΦB INST L/CTR – op	L/Ctr Inst Its (pnls C2,F6,F7)		㉑ Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
	14 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		
	RMS: 19 Port MPM Mtr 1 19 Stbd MPM Mtr 2 20 Port Fwd MRL Mtr 2 20 Port Aft MRL Mtr 1 21 Stbd Mid MRL Mtr 2 21 Stbd Fwd MRL Mtr 1		

EPS SSR-131
BUS LOSS: AC3 Φ A

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> • $\sqrt{1}$ IMU FAN B – ON • \sqrt{C} – OFF • H2O PUMP LOOP 1 (two) – ON, B <p>• Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, <u>ECLS</u> SSR-10</p> <ul style="list-style-type: none"> • FREON PUMP LOOP 2 – B • \sqrt{AV} BAY 2 FAN A – ON • \sqrt{B} – OFF • $\sqrt{3}$ FAN A – OFF • \sqrt{B} – ON 	<p>1 Φ of IMU Fan C</p> <p>1 1Φ 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>1Φ of Freon Loop 2 Pump A</p> <p>1Φ of AV Bay 2 Fan B</p> <p>1Φ 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 ΦA AC volts < 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 ΔP, 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"> • Install sw guard (stowed in IFM tool kit) over Cab Fan A sw in the ON position 	<p>1Φ 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 ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively</p>
<p>(L4:P)</p> <ul style="list-style-type: none"> • cb AC2 ΦA LG SNSR 2 – cl 	<p>7 Prox Snr Electronics Box 1</p>	<p>If APU's 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 Pump P and AC3 voltage</p>
<p>SM 60 SM TABLE MAINT</p> <p>8</p> <ul style="list-style-type: none"> • Inhibit 0612605, 0612600, 0612640, 0612610 • Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value +0.3 volts 	<p>1Φ of FC3 H2 Pump</p> <p>1Φ 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"> • BLR CNTLR/HTR 2 – B 	<p>APY/HYD Blr Cntr/Htr 2A</p>		
<p>(R13U)</p> <ul style="list-style-type: none"> • C/W PARAM SEL tw (three) – 105, 053 • C/W PARAM – INH • C/W MEM – CLEAR • C/W PARAM SEL tw (three) – > 119 			
<p>(R1)</p> <ul style="list-style-type: none"> • AC3 BUS SNSR – OFF (1 sec) • AC3 BUS SNSR – AUTO TRIP 			
<p>10 If bus shorted:</p> <ul style="list-style-type: none"> • Open all AC3 ΦA cbs that pwr 3Φ loads on pnls L4: C-I,K,M (9 cbs), MA73C: G-I (3 cbs) • Open all AC3 3Φ ganged cbs on pnls L4:B (1 cb), MA73C: C-G (7 cbs) 	<p>11 If bus shorted: AC3 payload 3Φ Bus pwr (pwr MS, PS Patch panel)</p> <p>10 AC3 FMC3 Bus pwr MMC2 Bus pwr MMC4 Bus pwr AMC3 Bus pwr</p>		
	<p>12 1Φ of AC Utility Power Outlets at A15 and MO13Q</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-131 (Cont)
BUS LOSS: AC3 ΦA

13

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
IF BUS NOT SHORTED, PERFORM			
(L4:J) • cb AC3 ΦA SIG CONDR HUM SEP – op	14 Hum Sep Sig Condr (ECLS SC 5)		⑬ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases
(L4:L) • cb AC3 ΦA H2O CNTLR 1 – op			⑭ Hum Sep A,B Speed Norm snrs lost
(L4:N) • cb AC3 ΦA FREON FLOW PROP 2 – op	15 Freon Loop 2 Flow Prop Vlv		⑮ Vlv holds position
(L4:O) • cb AC3 ΦA BLR HYD BYP 2A – op			
(L4:P) • cb AC3 ΦA LG SNSR 1 – op			
(L4:Q) • cb AC3 ΦA LTG COAS – op	Sta 1,2 COAS pwr		
	NLG,RMG Backup Rel 1 Fire 2, Arm FC 3 pH Snsr		
	RMS: 1Φ of Port MPM Mtr 1 Stbd MPM Mtr 2 Port Fwd MRL Mtr 2 Port Aft MRL Mtr 1 Stbd Fwd MRL Mtr 1 Stbd Mid MRL Mtr 2		
	1Φ of AC3 payload 3Φ Bus pwr (pwr MS, PS Patch pnl)		

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	① If H2O Loop 2 Pump active, Loop 2 Pump Out Press must drop below 45 psia to trigger C/W
(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	② Av Bay 1 Fan ΔP, Air Out Temp snrs lost ③ Switch guard installed to prevent Cab Fan A from being turned off during LiOH can changeout and cabin fan filter cleaning
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		(F9) AC3 ΦB AC volts < 90	④ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrs lost
(O17:C) • SIG CONDR FREON A – AC2 • SIG CONDR FREON B – AC2	1Φ of Cabin Fan A 4 Freon Sig Condr A AC3 pwr (ECLS SC1A) 5 Freon Sig Condr B AC3 pwr (ECLS SC1B)	HYD/APU HYD QTY 3 – 0% (LIGHTS LOST) L/Ctr Instr Its (pnls C2,F6,F7) MS pnl Its (pnls R10,R12)	⑤ Freon Loop 2 P/L Hx Flow Rate Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost ⑥ Inhibits Primary C/W for AC3 Voltage ⑦ Sets H2O Loop 1 Pump P low limit to 45 psia and H2O Loop 2 Pump P low limit to 19.5 psia
6 (R13U) • C/W PARAM SEL tw (three) – 053 7 • 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		HYD/APU HYD QTY 3 – 0% (LIGHTS LOST) L/Ctr Instr Its (pnls C2,F6,F7) MS pnl Its (pnls R10,R12)	⑧ H2O PUMP OUT PRESS LOOP 2 – 40-45 psia FREON FLOW 1 – 578 pph AV Bay 1 Air Out – 45 degF
(R1) • AC3 BUS SNSR – OFF (1 sec) • AC3 BUS SNSR – AUTO TRIP		(O1) 1 H2O PUMP OUT PRESS LOOP 2 – 40-45 psia FREON FLOW 1 – 578 pph AV Bay 1 Air Out – 45 degF	
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			
(Continued)	(Continued)		

EPS SSR-132 (Cont)
BUS LOSS: AC3 Φ B

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>8 If bus shorted:</p> <ul style="list-style-type: none"> • Open all AC3 ΦB cbs that pwr 3Φ loads on pnls L4: C-I, K, M (9 cbs), MA73C: G-I (3 cbs) • Open all AC3 3Φganged cbs on pnls L4:B (1 cb), MA73C: C-G (7 cbs) 	<p>9 If bus shorted: AC3 payload 3Φ Bus pwr (pwrs MS, PS Patch panel)</p> <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 BUS ISOLATION</p> <p>IF BUS NOT SHORTED, PERFORM</p> <p>(L4:J) • cb AC3 ΦB SIG CONDR IMU FAN – op</p> <p>(L4:L) • cb AC3 ΦB AV BAY 1 S/C – op</p> <p>(L4:N) • cb AC3 ΦB FREON SIG CONDR – op</p> <p>(L4:O) • cb AC3 ΦB HYD QTY 3 – op</p> <p>(L4:P) • cb AC3 ΦB RAD CNTLR 2A – op</p> <p>(L4:Q) • cb AC3 ΦB LTG PNL MS – op</p> <p>(L4:R) • cb AC3 ΦB INST L/CTR – op</p>	<p>12 IMU Fan Sig Condr (ECLS SC7)</p> <p>Hyd Rsvr 3 Qty Snsr</p> <p>13 Freon Loop 2 Cntrlr A Rad Byp Vlv Mtr</p> <p>MS pnl lts (pnl R10, R12)</p> <p>L/Ctr Inst lts (pnl C2, F6, F7)</p> <p>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</p> <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	
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		1 (O1) H2O PUMP OUT PRESS LOOP 2 ind – 40-45 psia	
	1Φ of Cabin Fan A	If APUs active and using BLR CNTLR/HTR 3B: C/W APU TEMP It – on after ~2 min	
(R2) • BLR CNTLR/HTR 3 – A	APU/HYD Blr Cntrl/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			
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		
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			
6 If bus shorted: • Open all AC3 ΦC cbs that pwr 3Φ loads on pnls L4: C-I,K,M (9 cbs), MA73C: G-I (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 (pwrs 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 (pwr 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
BUS ISOLATION		R ADP deploy time incr from 15 to 30 sec	
ONLY ON MCC CALL, PERFORM (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ FWD 3 – op	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 ② Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists ③ √MCC for Ku Ant stow reqmts
BUS ISOLATION		During PLBD OP/CL, single mtr run time noted on actuators listed at left	
ONLY ON MCC CALL, PERFORM (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ MID 2 – op	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	
	RMS: 1 Port Aft MRL Mtr 1 2 Stbd Mid MRL Mtr 2 3 KU ANT Dpy/Sto Mtr 1		

**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
BUS ISOLATION		(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	
BUS ISOLATION			
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
BUS ISOLATION			
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
BUS ISOLATION			
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
BUS ISOLATION			
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
BUS ISOLATION			
ONLY ON MCC CALL, PERFORM			
(MA73C:I) • cb AC 1 AFT POD VLV GP 1 (three) – op			

EPS SSR-144
BUS LOSS: AC2 POD/AMC2

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
BUS ISOLATION			
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
BUS ISOLATION			
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
BUS ISOLATION		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		2 (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
BUS ISOLATION		(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
BUS ISOLATION		(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)

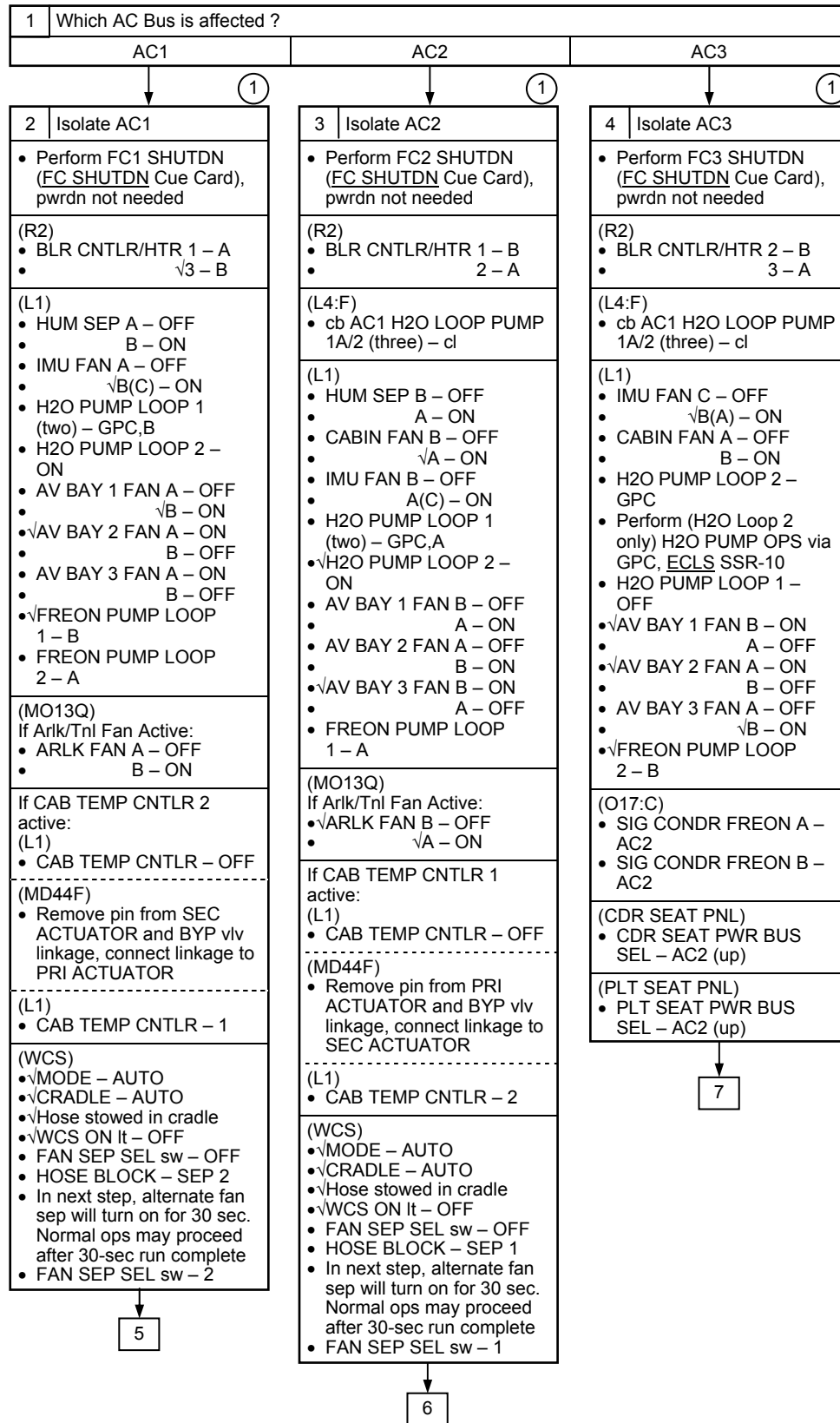
EPS SSR-200 AC PWR TRANSFER CABLE

NOTE

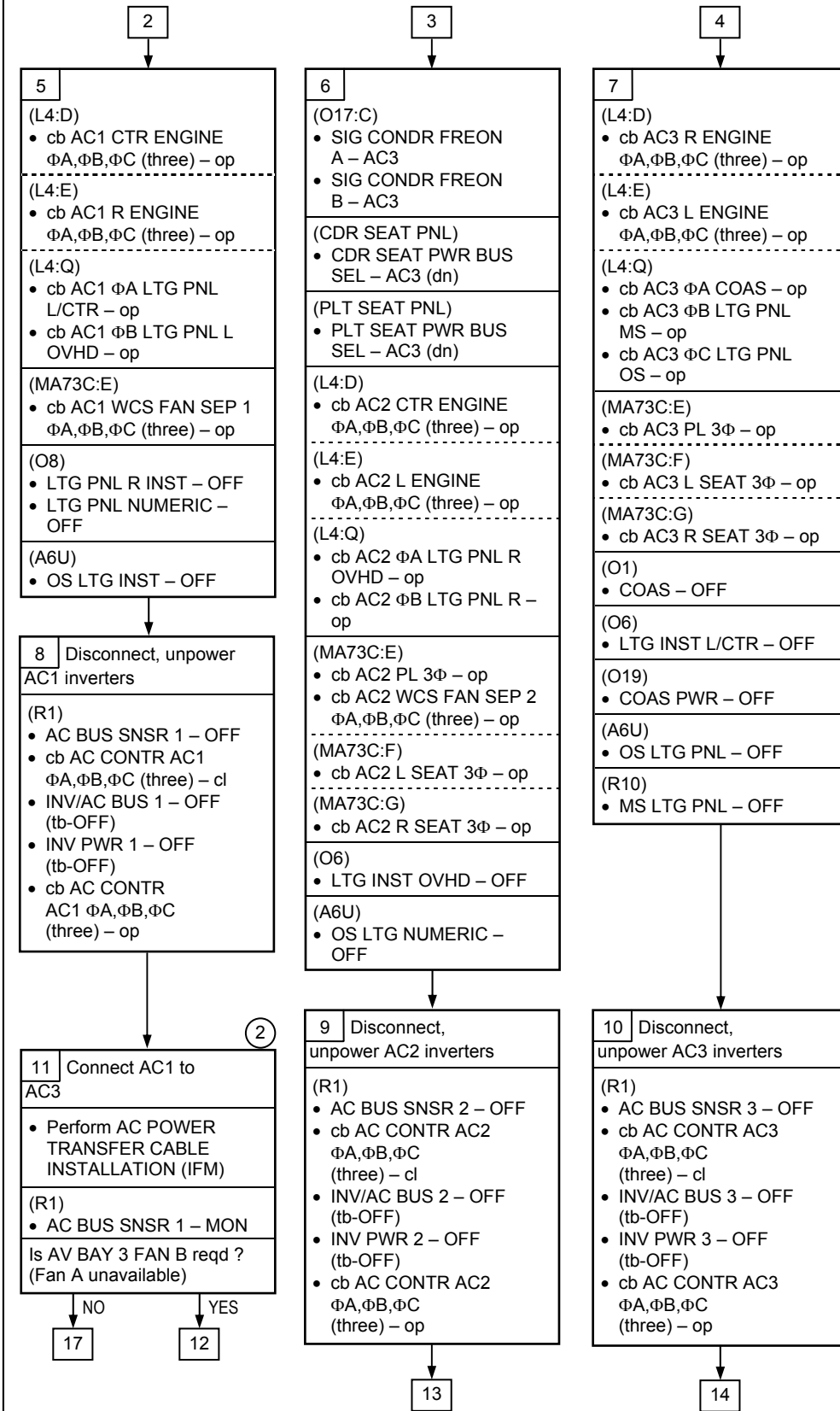
This procedure is designed to be a standalone procedure with all necessary Bus Loss Actions included. The procedure also may be entered from the MN bus or FPC Bus Loss Actions (MAL or ENT PKT)

① TIME CRITICAL

FC must be shut down within 9 min to avoid potentially hazardous condition

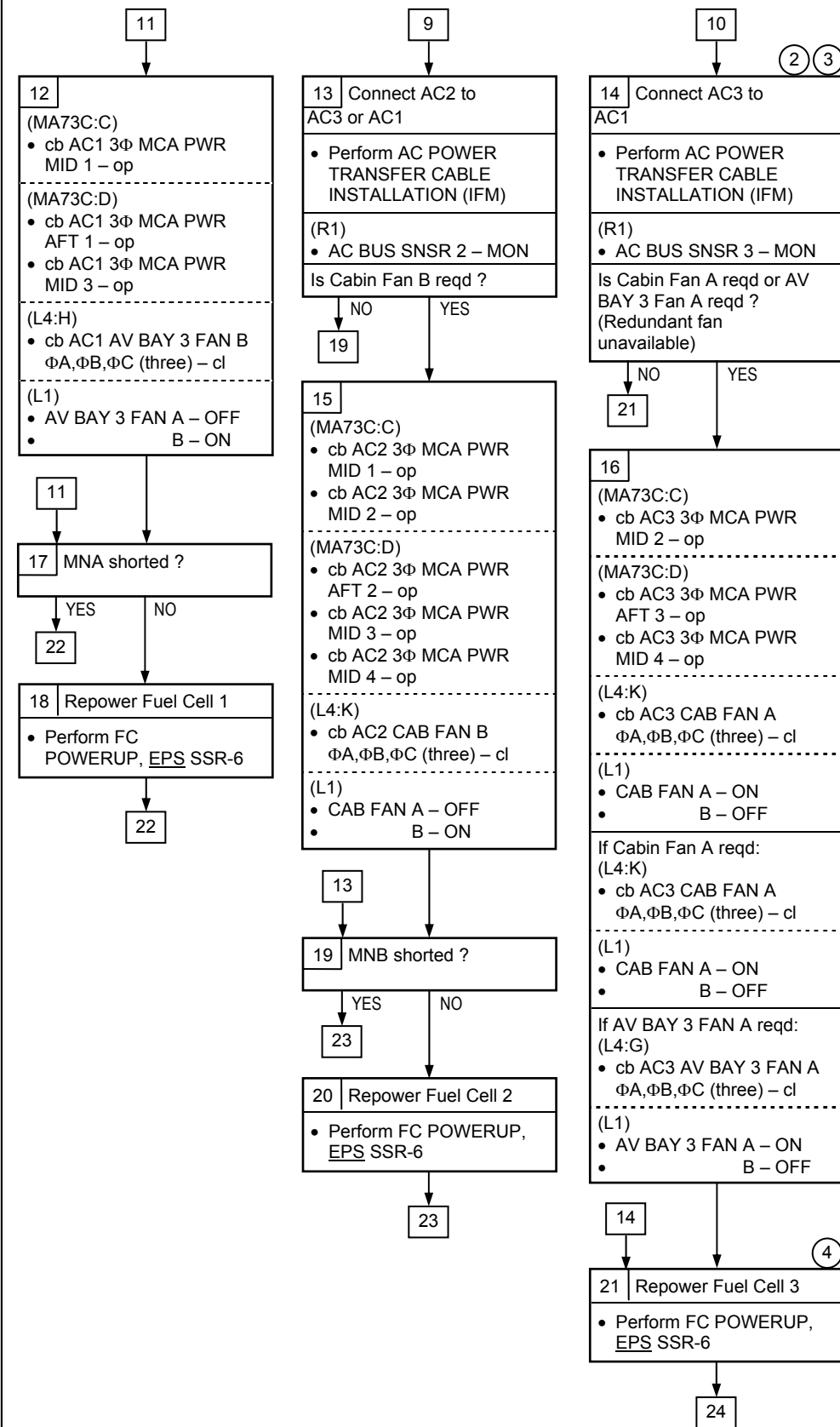


EPS SSR-200 (Cont)



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)



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)

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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 ⑨ 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			
CONTINGENCY EQUIPMENT After cable installation, the following AC3 continuous equipment will be switched off but available for CONTINGENCY use only. Minimize loading to prevent exceeding 3 amps/phase				
(L4:F) H2O LOOP PUMP 2 ⑨ ⑰	1.03			
(L4:G) AV BAY 3 FAN A (upgraded) ⑨	1.66			
(L4:G) AV BAY 3 FAN A ⑨	.75			
(L4:H) AV BAY 2 FAN B ⑨	.75			
(L4:I) IMU FAN C ⑨	.18			
(L4:K) CABIN FAN A	1.66			
(L4:M) FREON LOOP 2 PUMP A ⑨	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 ⑫	2.66			
(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	

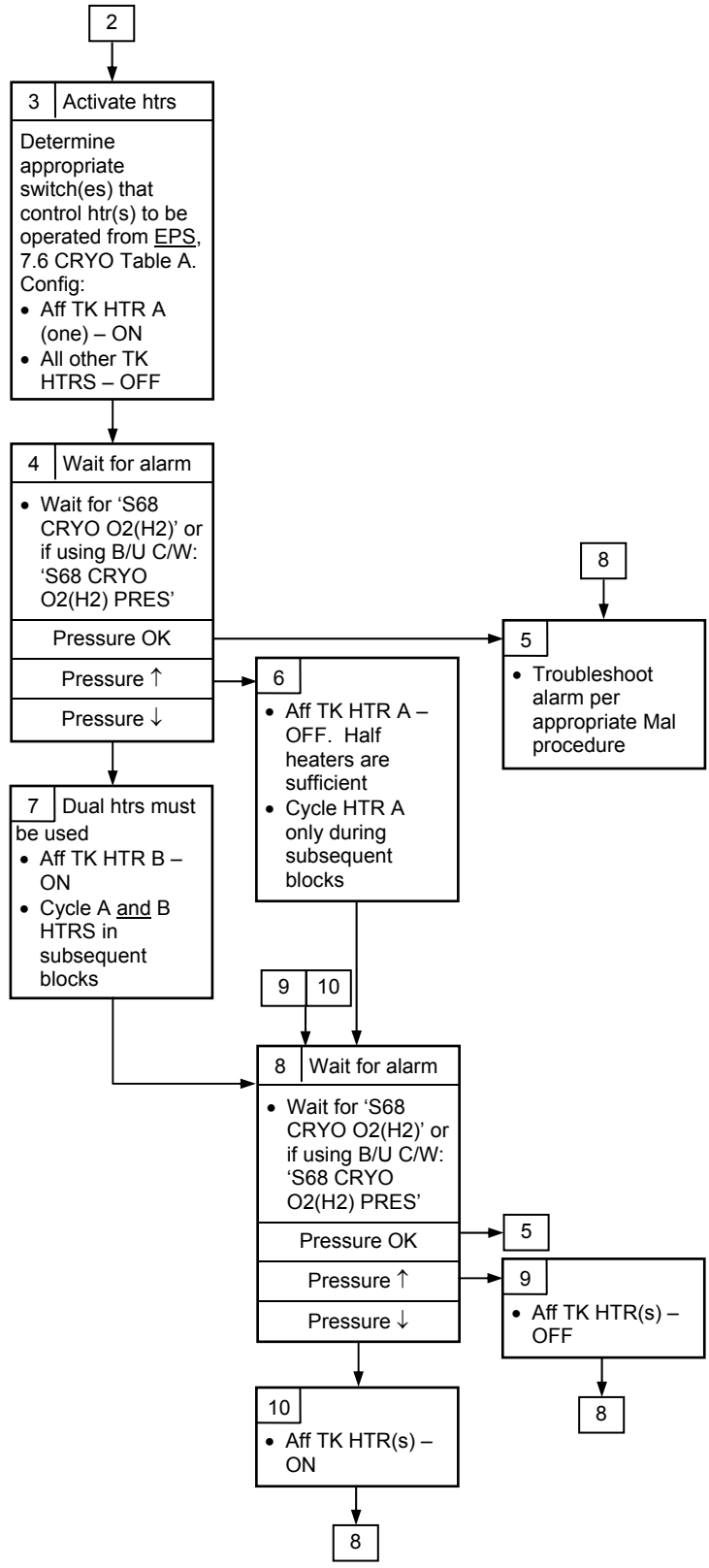
3

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

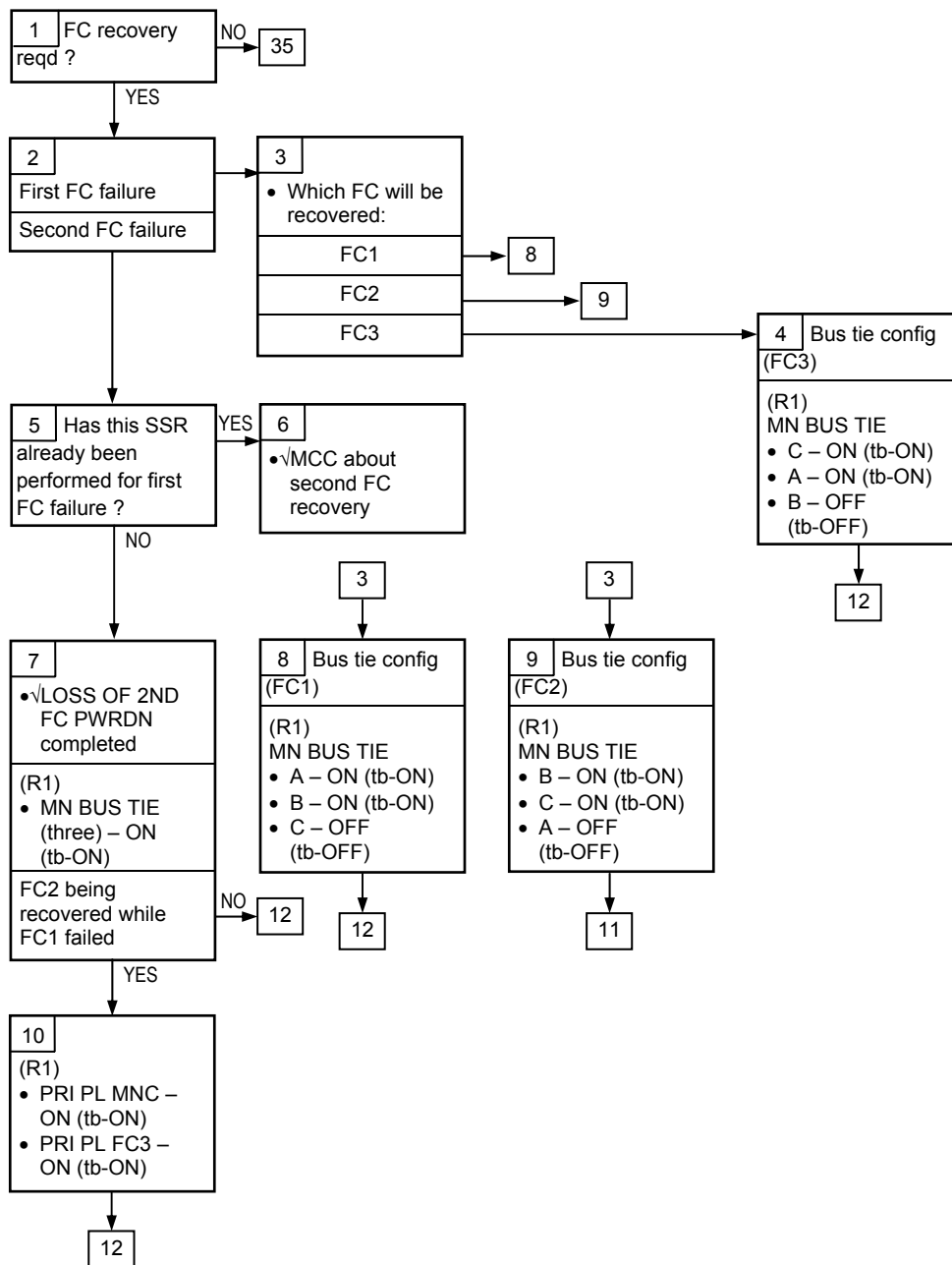
EPS SSR-201 (Cont)



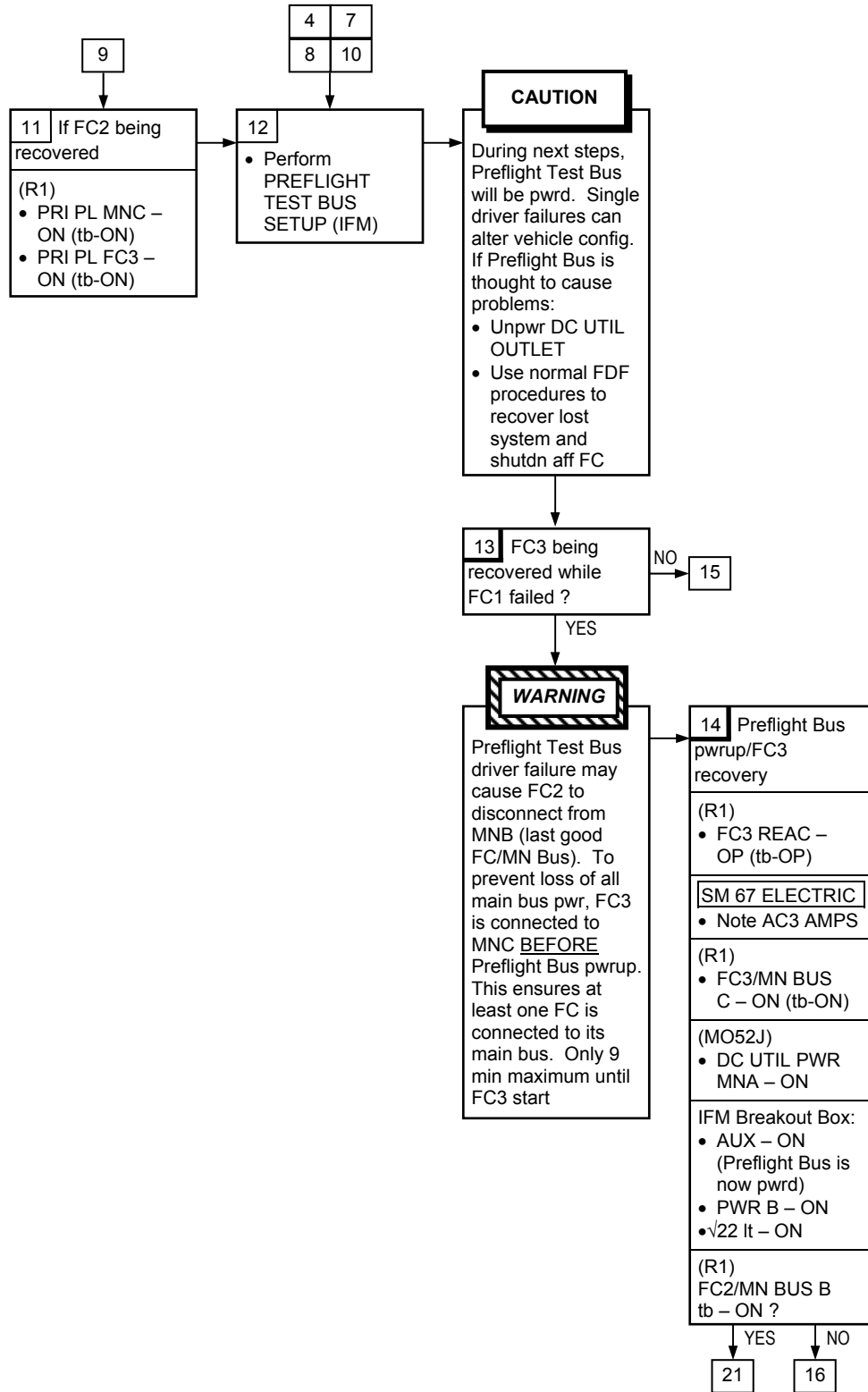
EPS SSR-202 PREFLIGHT TEST BUS USE

NOTE

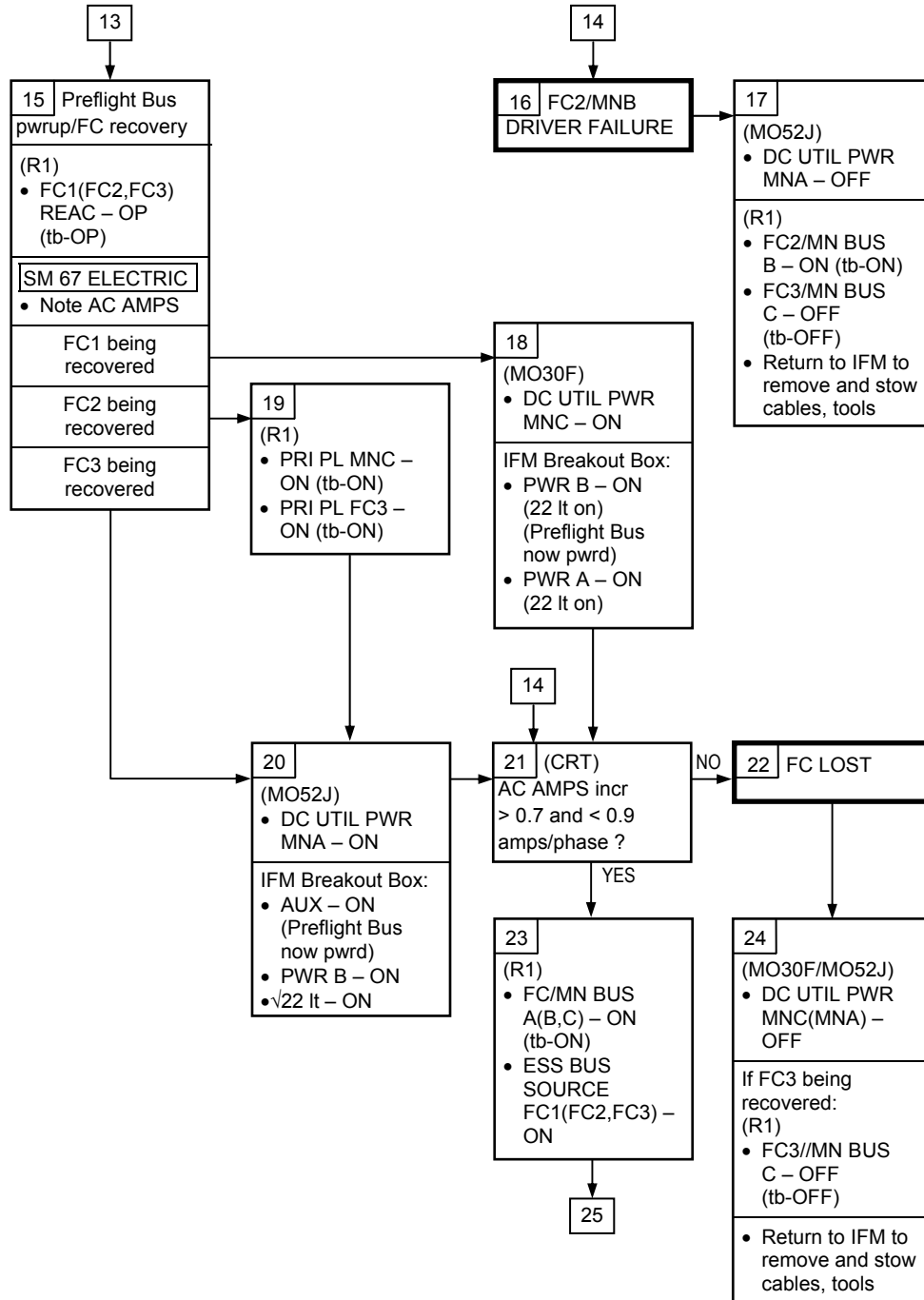
Powering Preflight Test Bus enables single string circuits that use launch MDMs and data bus normally used to operate many orbiter systems during ground turnaround. Due to design, a single driver failure could cause equipment to be inadvertently commanded whenever Preflight Test Bus is powered. See Table 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



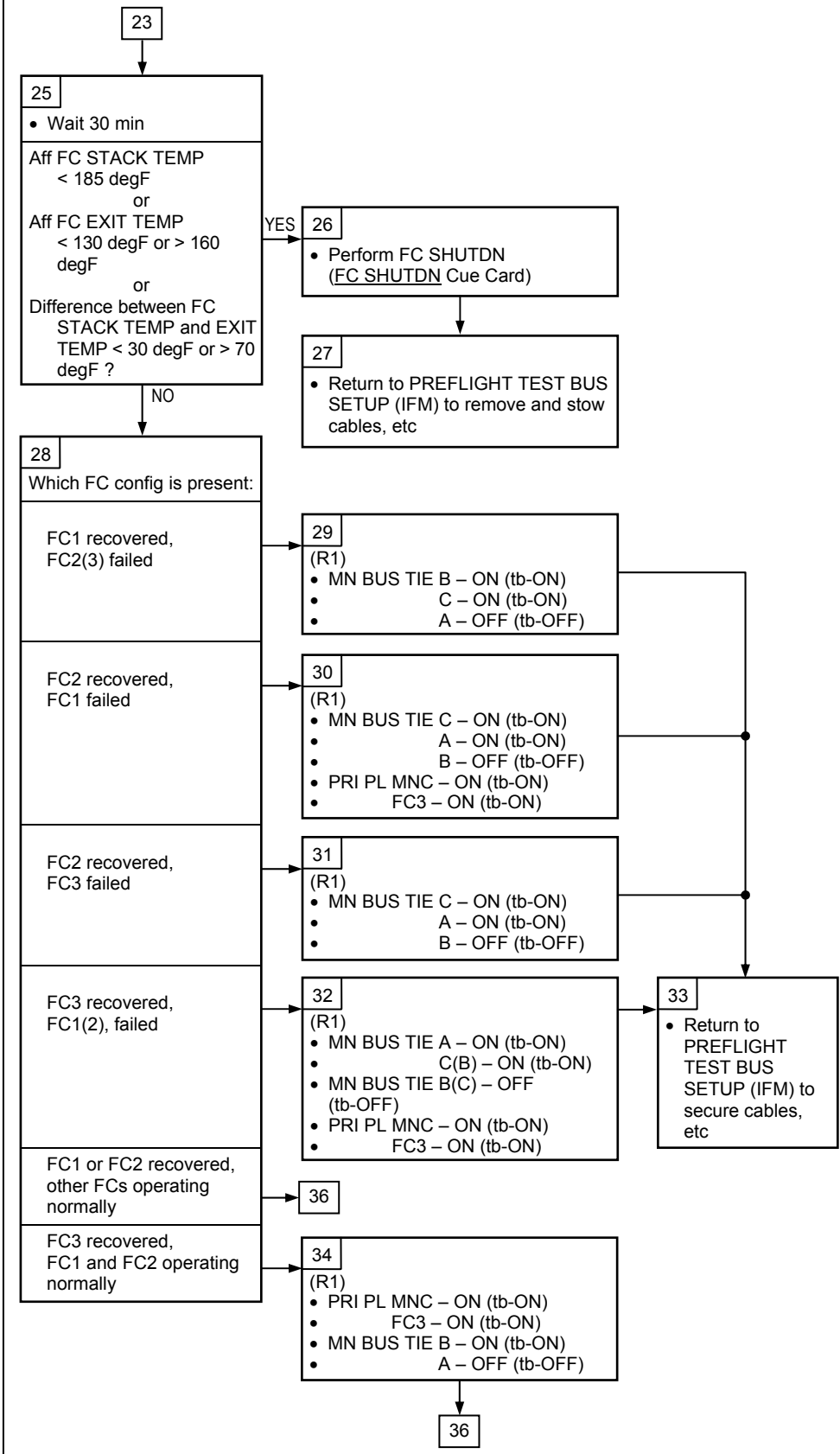
EPS SSR-202 (Cont)



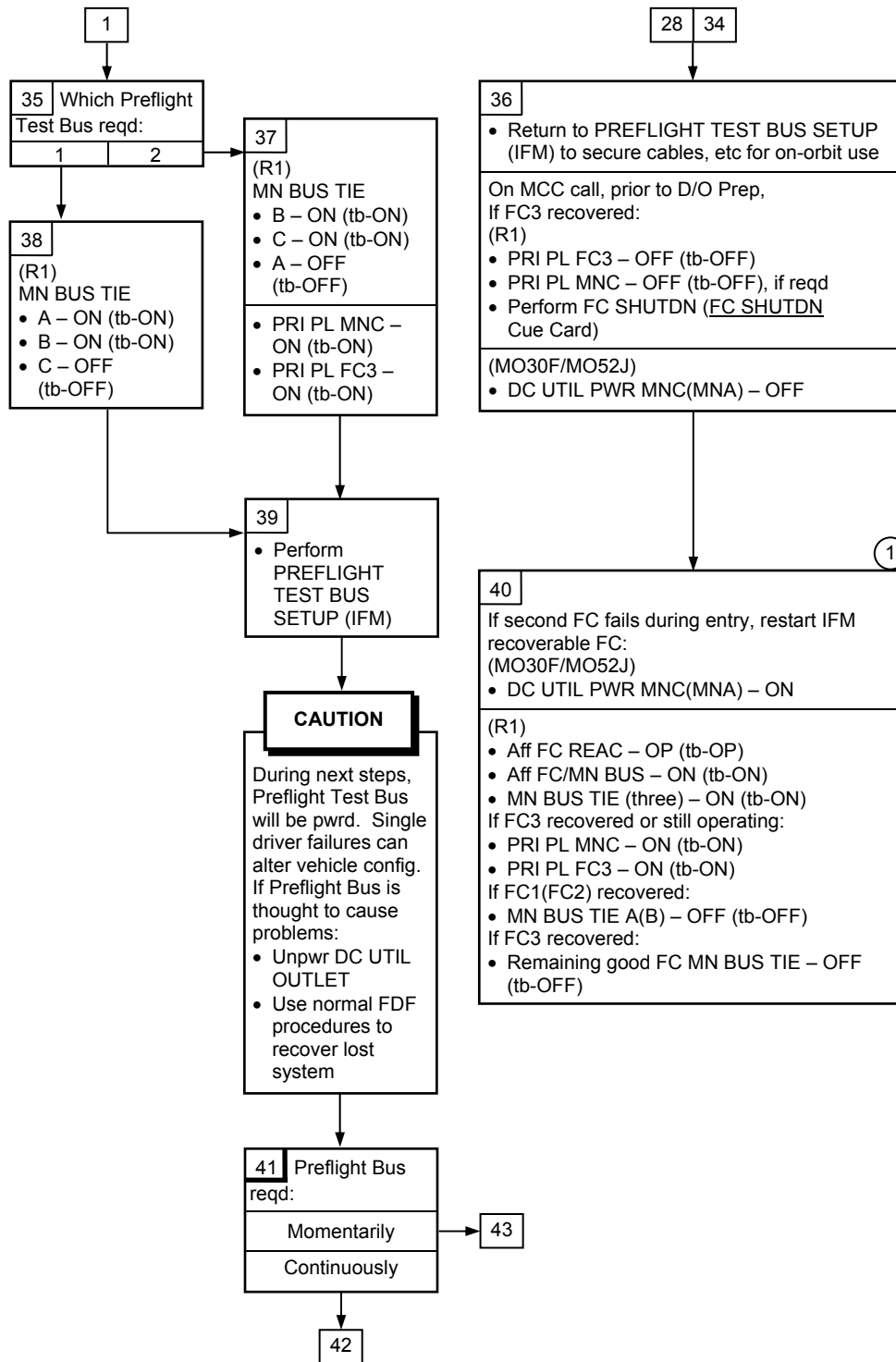
EPS SSR-202 (Cont)



EPS SSR-202 (Cont)

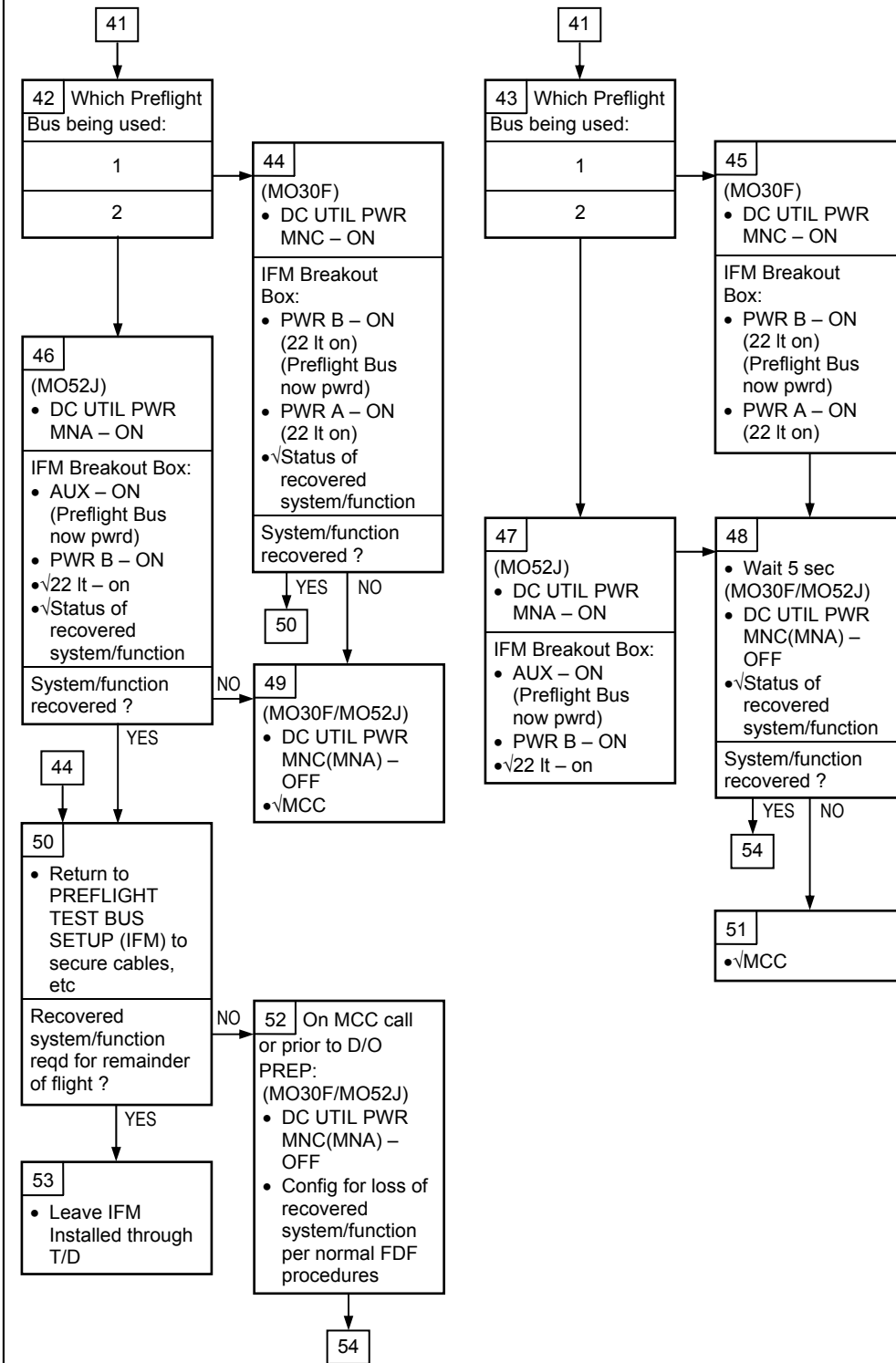


EPS SSR-202 (Cont)



① Crewmember must be able to reach DC UTIL PWR switch while secured in seat

EPS SSR-202 (Cont)



EPS SSR-202 (Cont)

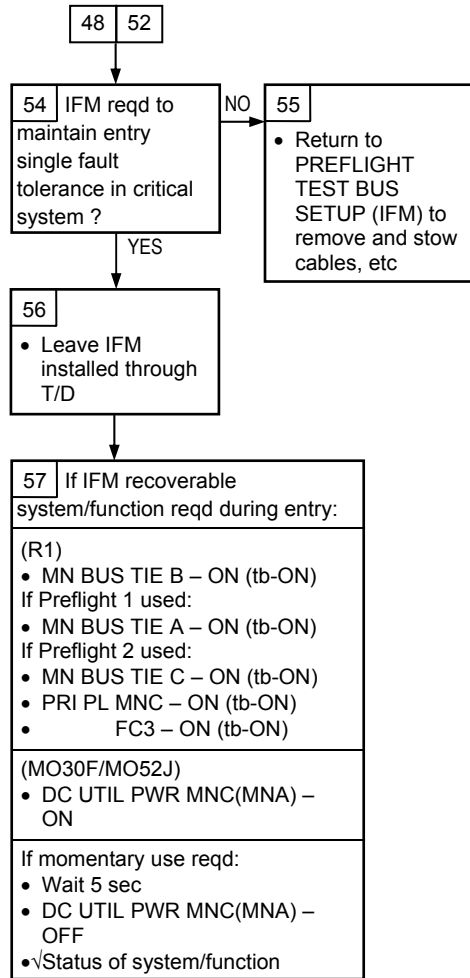


TABLE 1
POSSIBLE PREFLIGHT TEST AND DATA BUSES COMMANDS

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-203 APCU RECOVERY

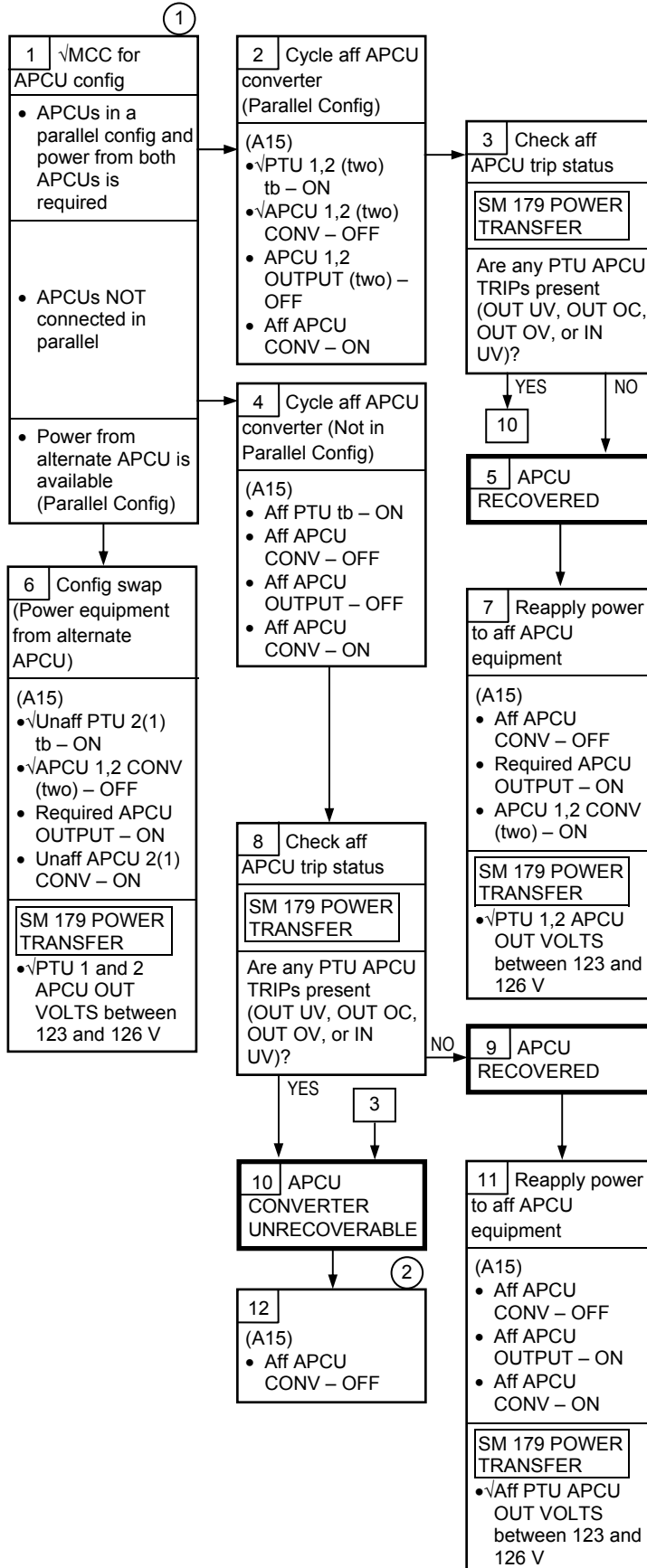
APCU TRIP Conditions:

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



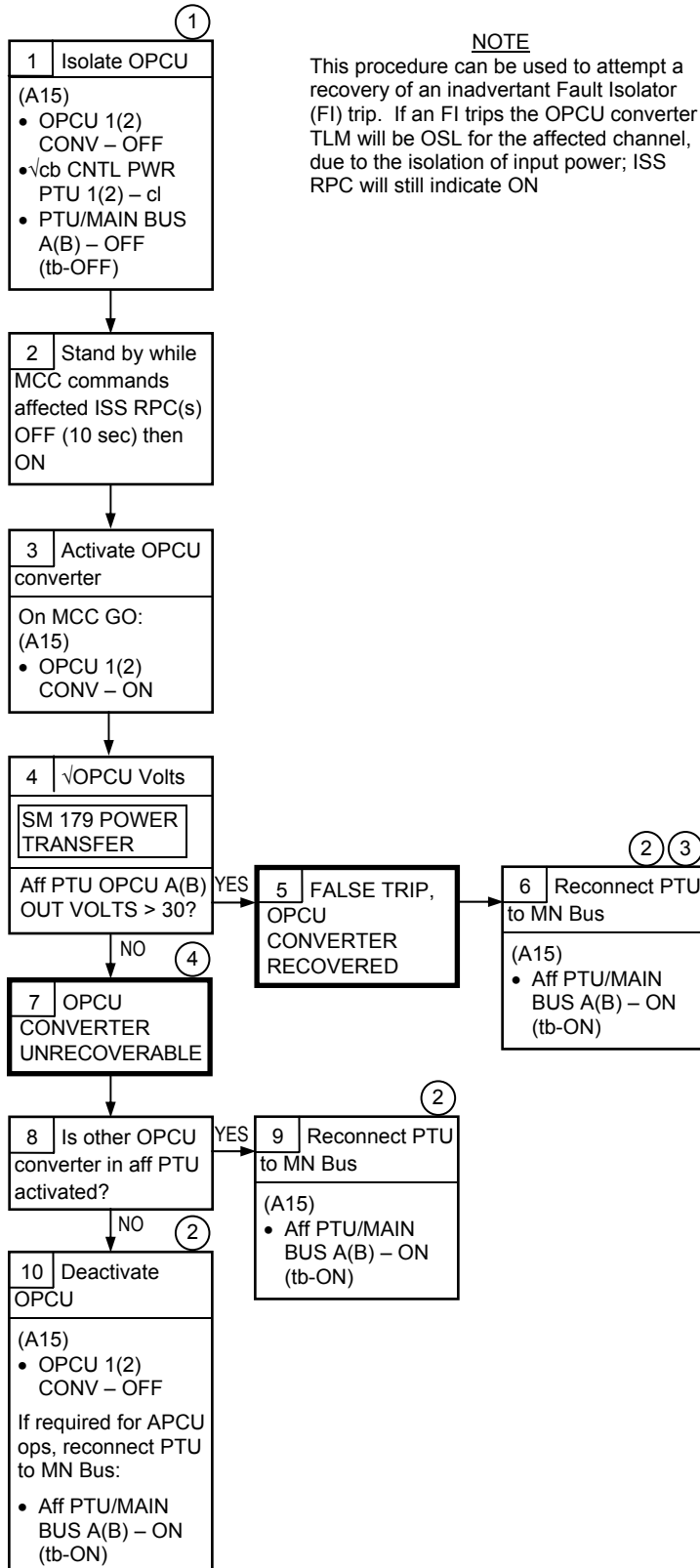
① If APCUs are connected in parallel and the output APCU power requirement is < 1800 watts, then alternate APCU can be used to power the equipment

② Loss of power to equipment powered from APCU

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



- 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
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GNC SSR

GNC SSR-1	ACTIVATE IMU(s)	8-10
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SSR-4	IMU DATA.....	8-12
SSR-5	RESERVED	not used
SSR-6	RESERVED	not used
SSR-7	RESERVED	not used
SSR-8	POSITION OMS THROUGH CG.....	8-13
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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. If all IMUs have been caged, perform steps 1-7. Step 8 of the procedure assumes recovery of "operational" IMUs only. Operational IMUs are IMUs in OPER and not previously caged

- O6
1. Configure DAP
 - √DAP: INRTL
 - √DAP ROT: DISC/DISC/DISC
 2. Ensure pwr ON to both STAR TRKRs and doors open
 - √S TRK PWR (two) – ON
 - √DR POS tb (two) – OP

NOTE

'IMU BITE/T' may be annunciated until READ/WRITE is performed to restore IMU gyro delta bias terms. Previous IMU Bias and Scale Factor READ/WRITEs of uplinks will have to be performed again

3. Mass Memory Read of IMU calibration data (gyro and accel biases, scale factors, etc.) computed in preflight cal

GNC 21 IMU ALIGN

 Select all IMUs for MASS MEMORY READ
 - IMU 1,2,3 – ITEM 10,11,12 EXEC (*)
 - MM READ – ITEM 19 EXEC (*)
 - √MM READ – ITEM 19 (no *)

- O6
4. Configure DAP
 - √DAP: INRTL
 - DAP ROT: PULSE/PULSE/PULSE
 5. Deselect IMU(s) leaving one IMU selected

NOTE

RM may fail IMU(s) during deselection process

- a.

GNC 21 IMU ALIGN

 IMU DES 1(2,3) – ITEM 7(8,9) (*)
 - b. Verify one operational IMU remains selected (no *)
6. Configure DAP
 - √DAP: INRTL
 - DAP ROT: DISC/DISC/DISC
 7. If extended loss of comm (ZOE not included) or no uplink CMD capability:
 - a. Perform Matrix Align of IMUs 1,2,3 in MATRIX (TORQUE) ALIGN USING HUD STAR DATA GNC SSR-2
 - b. Reselect all deselected IMUs

GNC 21 IMU ALIGN

 IMU DES – ITEM 7(8,9) EXEC (no *)

NOTE

Once comm reestablished, verify with MCC uplink of REFSMMATs complete and then proceed to IMU ALIGN – S TRK (ORB OPS, GNC)

8. If comm and uplink CMD capability exists:
 - a. Confirm with MCC uplink of REFSMMATs has been performed. Do not proceed without confirmation

GNC FRP

GNC FRP-1 (Cont)

CAUTION

Each IMU being recovered must be individually matrix aligned to itself in order to incorporate the uplinked REFSMMATs

- b. Recover IMU attitude reference of a deselected operational IMU, utilizing Matrix Alignment, aligning the IMU to itself

GNC 21 IMU ALIGN

Utilize as reference one of the IMUs currently deselected
REF IMU – ITEM 14 + __ EXEC
TYPE – ITEM 15 EXEC (MATRIX)

Align Reference IMU to itself
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*)

√MCC to repeat step 8b with other deselected operational IMU

- c. Configure DAP
√DAP: INRTL
DAP ROT: PULSE/PULSE/PULSE
- d. Deselect currently selected IMU (no selected IMUs)

GNC 21 IMU ALIGN

IMU DES – ITEM 7(8,9) EXEC (*)

- e. Reselect IMU(s) aligned in step 8b

GNC 21 IMU ALIGN

IMU DES – ITEM 7(8,9) EXEC (no *)

- f. √DAP: INRTL
DAP ROT: DISC/DISC/DISC

- g. √MCC to repeat step 8b with remaining IMU

- h. When Matrix Alignment(s) Using IMU Data complete, reselect all recovered IMUs:

GNC 21 IMU ALIGN

IMU DES – ITEM 7(8,9) EXEC (no *)

- i. DAP: as reqd
- j. Go to IMU ALIGN – S TRK (ORB OPS, GNC)

GNC FRP-2 IMU REFERENCE RECOVERY

NOTE

If GNC GPCs IPL'd, use GNC FRP-1 for Reference Recovery.
Preferable to accomplish this procedure in OPS 2; however, it
is also valid for MM301

- O6 1. Apply pwr to both STAR TRKR
 √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 (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-4 MATRIX ALIGN USING IMU DATA

NOTE

Procedure assumes ground knowledge of platform
orientation of at least a single IMU

GNC 21 IMU ALIGN

√IMU 1(2,3) STAT – (blank)
REF IMU – ITEM 14 + (REF IMU) EXEC
TYPE – ITEM 15 EXEC (MATRIX)
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*), Rcd MET ___ : ___ : ___
√EXEC – ITEM 16 (no *)

GNC SSR-8 POSITION OMS THROUGH CG

NOTE

This procedure sets up a dummy single engine L(R) OMS burn to position L(R) OMS Thrust Vector through CG. Actual burn will not be executed. When procedure completed, L(R) OMS will be protected from loss due to PRI(SEC) GMBL pwr or data path failures

GNC, OPS 202(302) PRO

GNC XXXXX MNVR YYYYY

If L OMS to be positioned:

| L OMS PRI(SEC) SEL – ITEM 28(30) EXEC

If R OMS to be positioned:

R OMS PRI(SEC) – ITEM 29(31) EXEC

C3
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 deselection 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

RADIATOR POWER CONFIGURATION	9-2
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<u>9.1</u> <u>PLB DOORS</u>	
9.1a NO MOTION/'OP/CL' NOT BLANK/'O' OR 'C'/'R' MICROSW = 1 AFTER DRIVE INITIATION	9-4
9.1b '?' DISPLAYED IN 'OP/CL' COLUMN	9-6
9.1c PBD SEQ FAIL	9-7
9.1d LATCH GANG NOT 'OP' IN SINGLE MTR TIME	9-8
9.1e 'CL' IN SINGLE MTR TIME	9-10
9.1f DOOR NOT 'OP' IN SINGLE MTR TIME	9-12
9.1g 'CL' IN SINGLE MTR TIME	9-15
9.1h PBD CONFIG	9-17
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9.2a RAD LAT CNTL PORT(STBD) tb NOT LAT IN 60 SEC OR REL IN 30 SEC	9-18
9.2b RAD CNTL PORT(STBD) tb NOT DPY OR STO WITHIN 50 SEC AND NO MOTION	9-20
<u>9.3</u> <u>KU ANT</u>	
9.3a KU ANT tb NOT DPY IN 46 SEC	9-22
9.3b NOT STO IN 46 SEC	9-23
9.3c GIMBAL ANGLES INCORRECT AFTER 50 SEC	9-24
<u>9.4</u> <u>MEC ROEU</u>	
9.4a ROEU DEMATE – tb NOT REL, MICROSW IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	9-26
9.4b ROEU MATE – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	9-28
9.4c ROEU RELEASE – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	9-30
9.4d ROEU LATCH – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	9-32
9.4e ROEU RELAX – tb NOT NOMINAL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	9-34
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<u>MECH SSR</u>	
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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 J

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

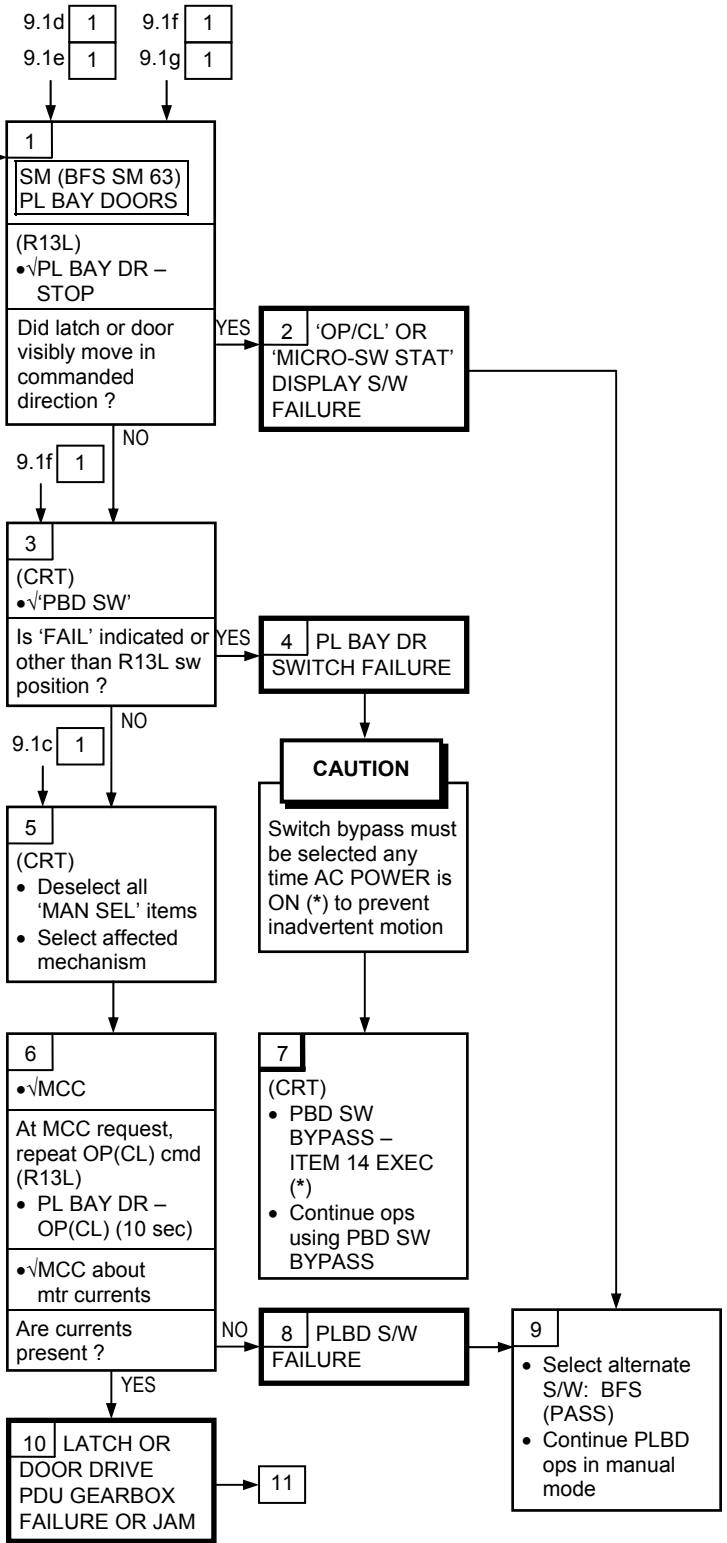
No Motion after Drive Initiation
~10 sec

'OP/CL' Status Not Blank after Drive Initiation
~10 sec

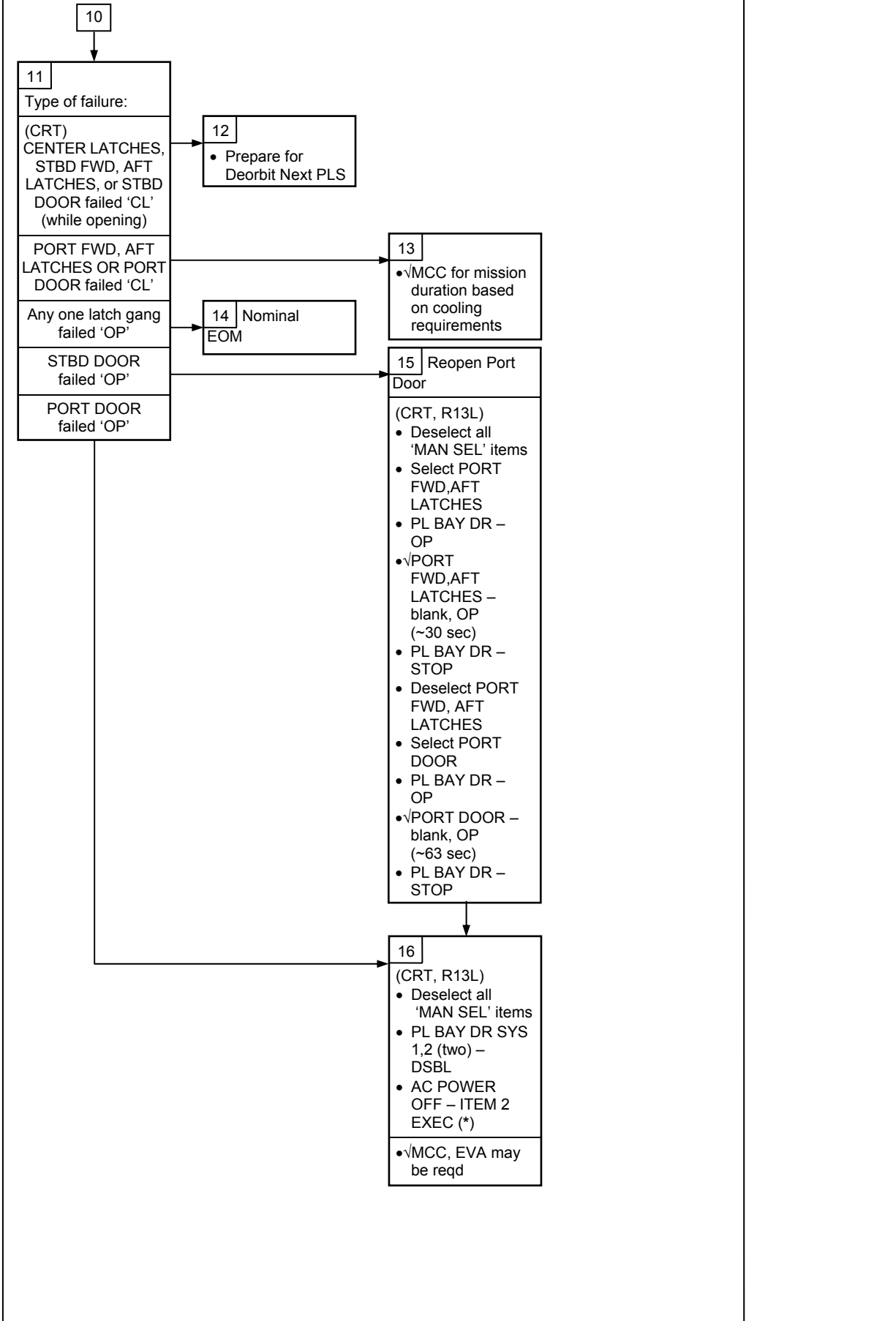
All 'O' or 'C'/R' 'MICRO-SW STAT' = 1 after Drive Initiation
~10 sec

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



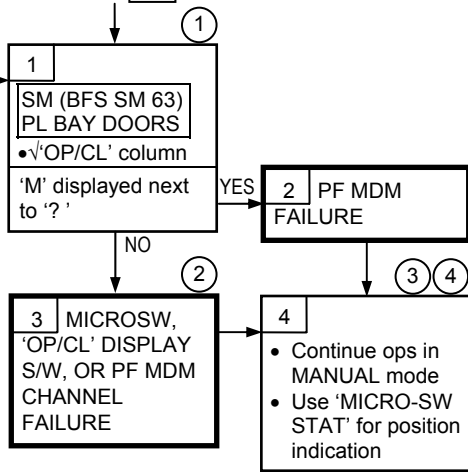
MECH

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

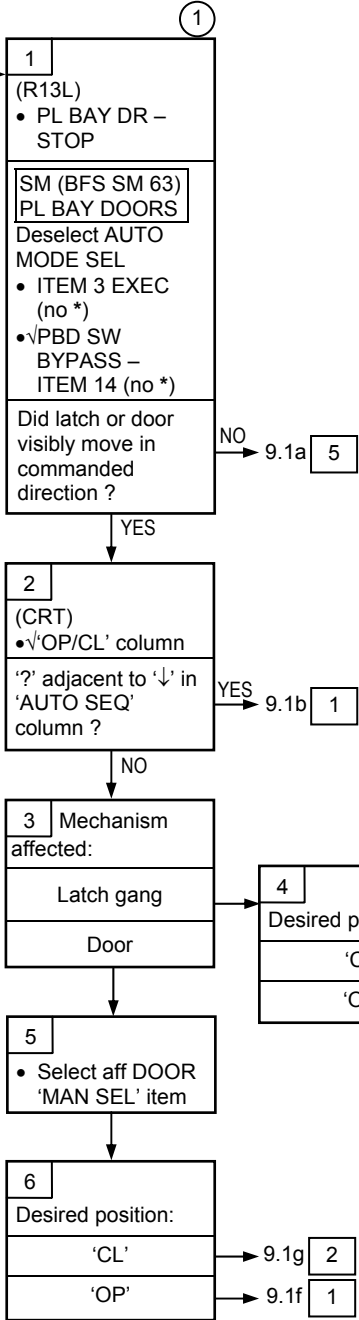
PBD SEQ FAIL

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 – *



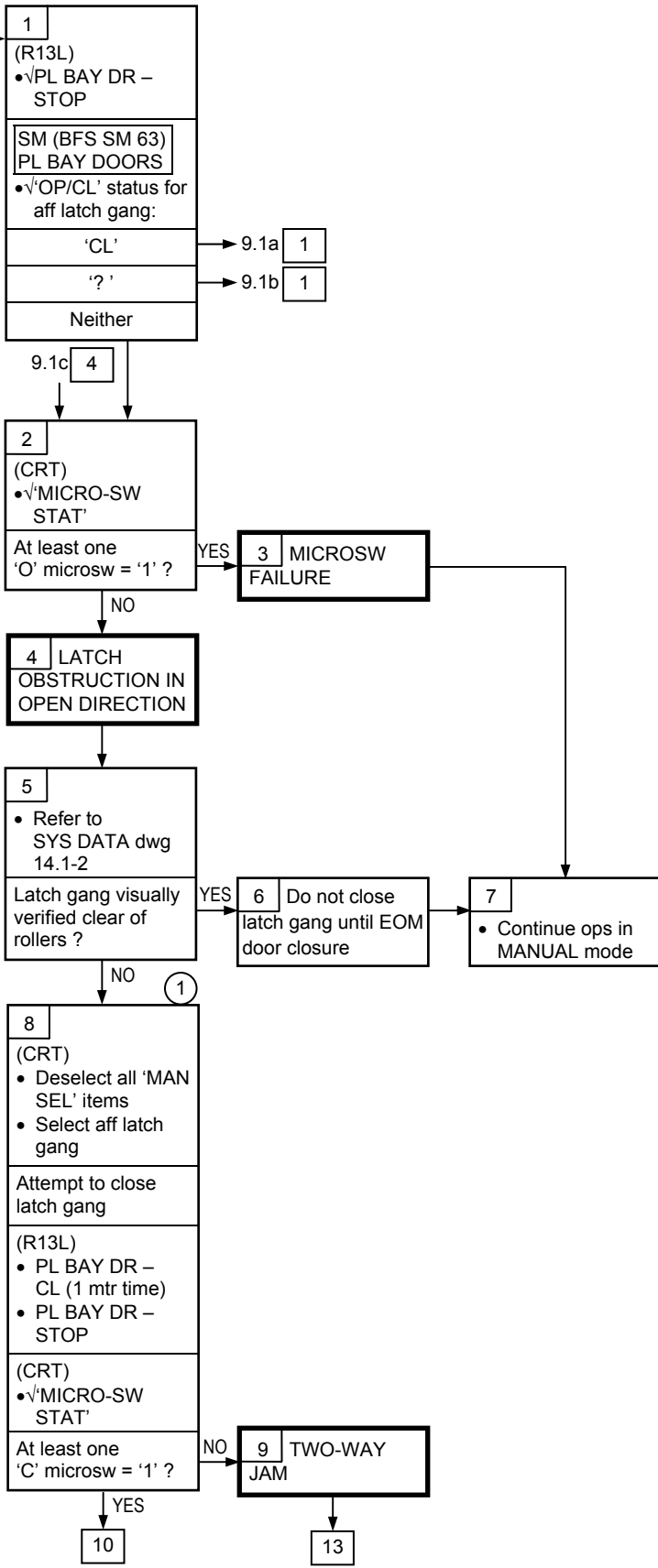
① Although PBD SEQ FAIL will terminate AUTO MODE, ITEM 3 (AUTO MODE SEL) remains selected (*). To reselect AUTO MODE, ITEM 3 must be deselected (no *), then reselected (*)

MECH

9.1d LATCH GANG NOT 'OP' IN SINGLE MTR TIME

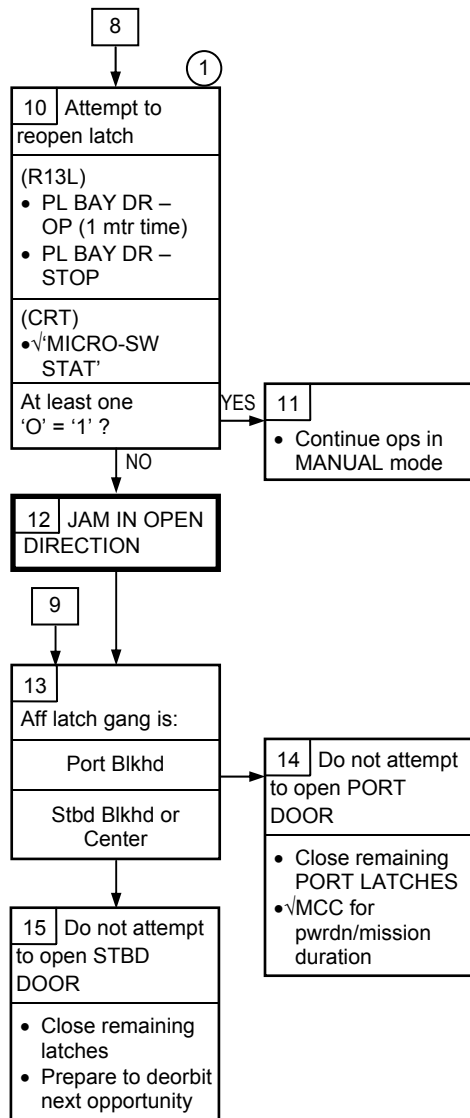
① Latch Gang Does Not Indicate 'OP' in Single Mtr Drive Time

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)



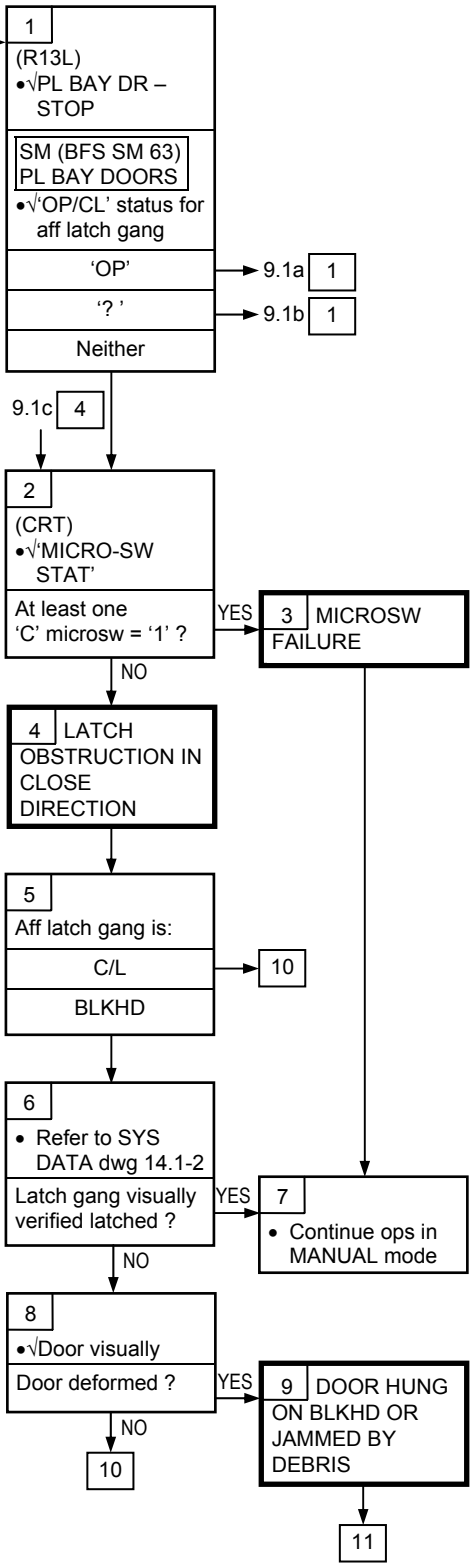
- ① Ops Times
 CENTER LATCHES
 2 mtrs ~20 sec
 1 mtr ~40 sec
 FWD,AFT
 LATCHES
 2 mtrs ~30 sec
 1 mtr ~60 sec
 DOORS
 2 mtrs ~63 sec
 1 mtr ~126 sec

MECH

9.1e LATCH GANG NOT 'CL' IN SINGLE MTR TIME

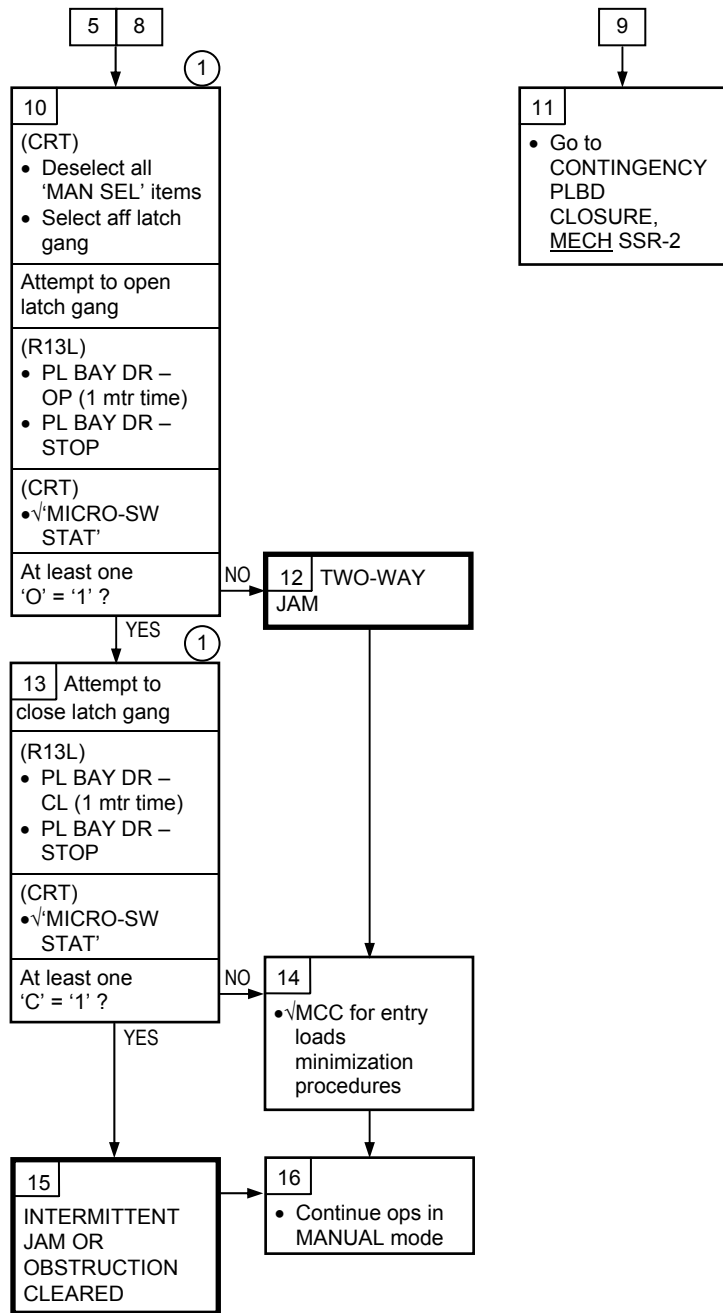
① Latch Gang Does Not Indicate 'CL' in Single Mtr Drive Time

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)



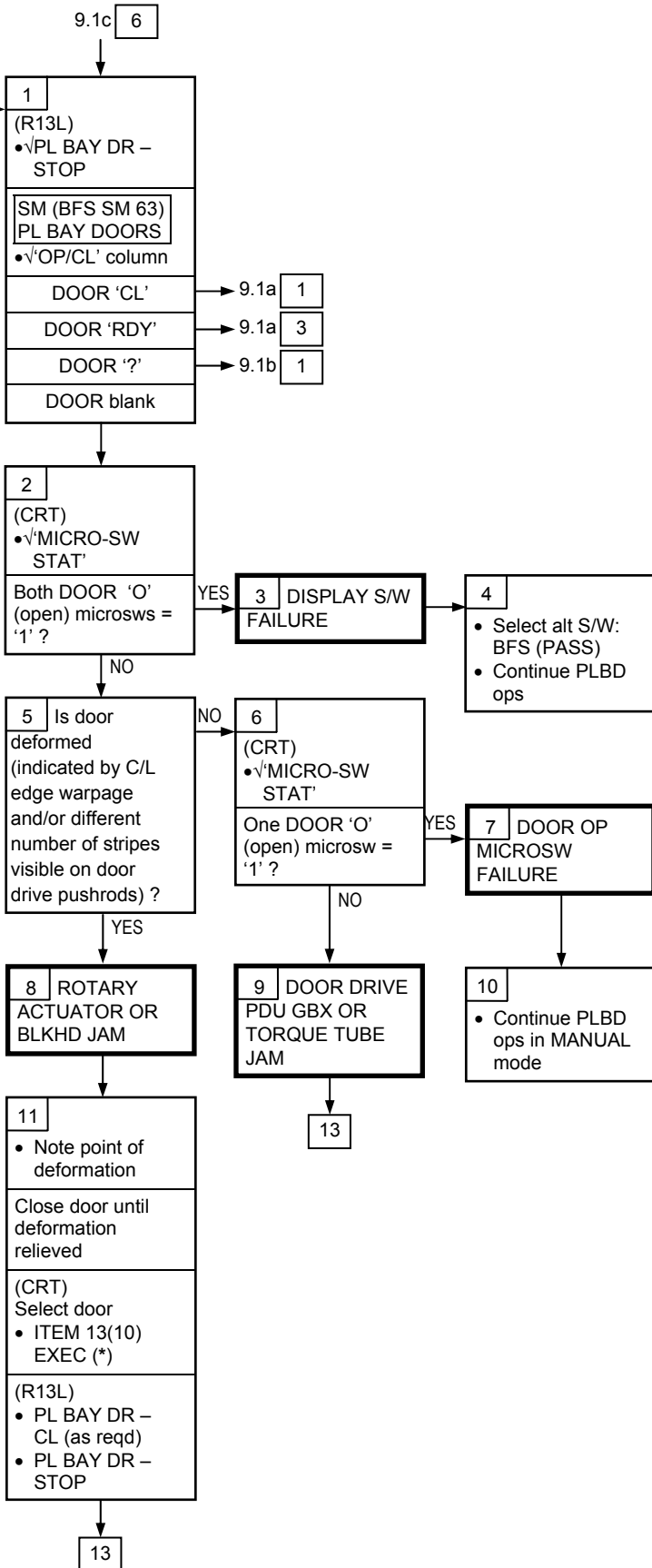
- ① Ops Times
- CENTER LATCHES
- 2 mtrs ~20 sec
- 1 mtr ~40 sec
- FWD, AFT LATCHES
- 2 mtrs ~30 sec
- 1 mtr ~60 sec
- DOOR
- 2 mtrs ~63 sec
- 1 mtr ~126 sec

MECH

9.1f DOOR NOT 'OP' IN SINGLE MTR TIME

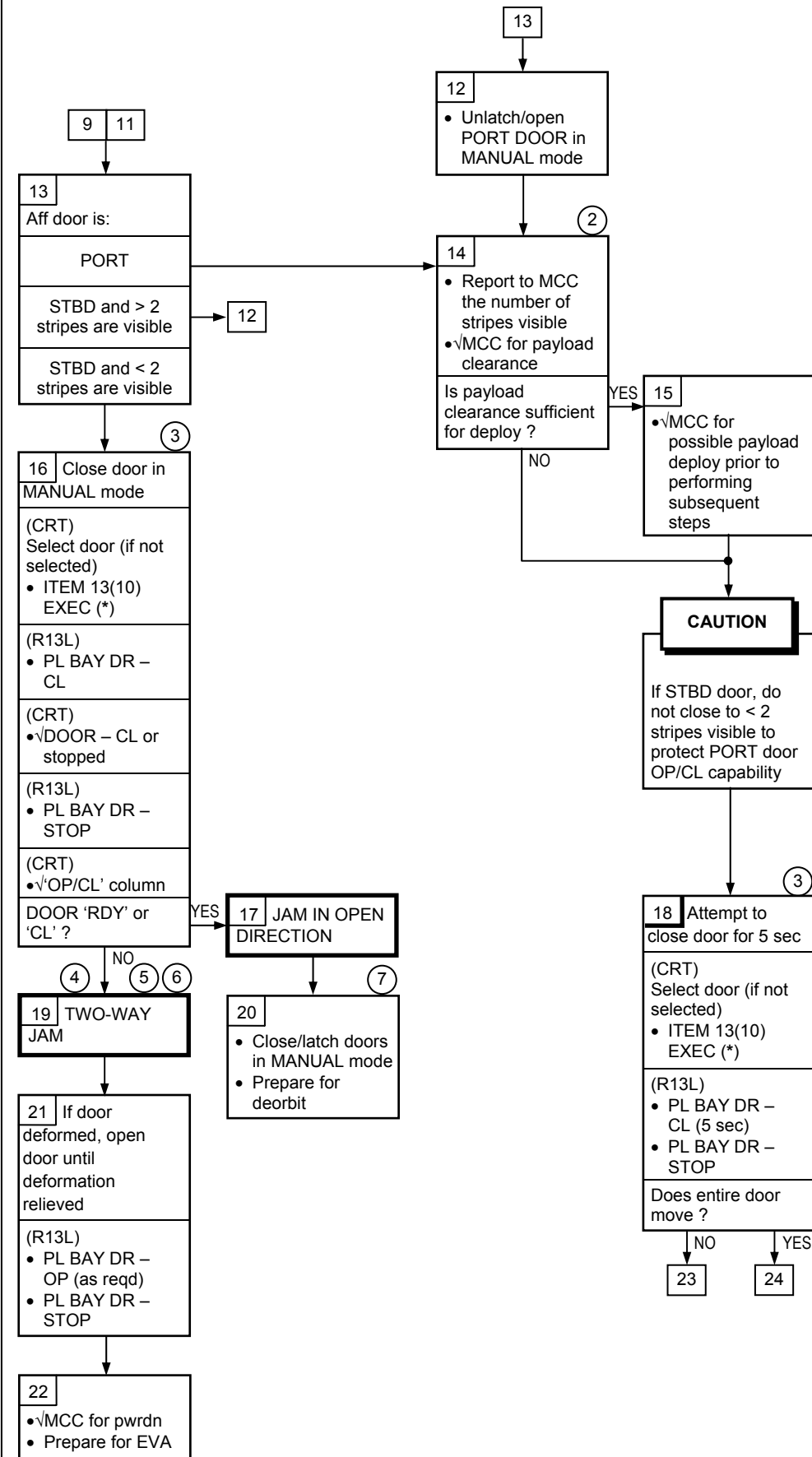
① Door Does Not Indicate 'OP' in Single Mtr Time

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 – *)

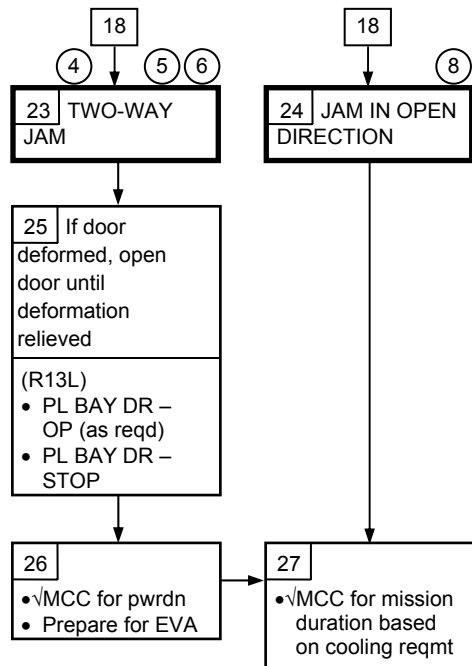


① Drive Times
 CENTER LATCHES
 2 mtrs ~20 sec
 1 mtr ~40 sec
 FWD,AFT LATCHES
 2 mtrs ~30 sec
 1 mtr ~60 sec
 DOORS
 2 mtrs ~63 sec
 1 mtr ~126 sec

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



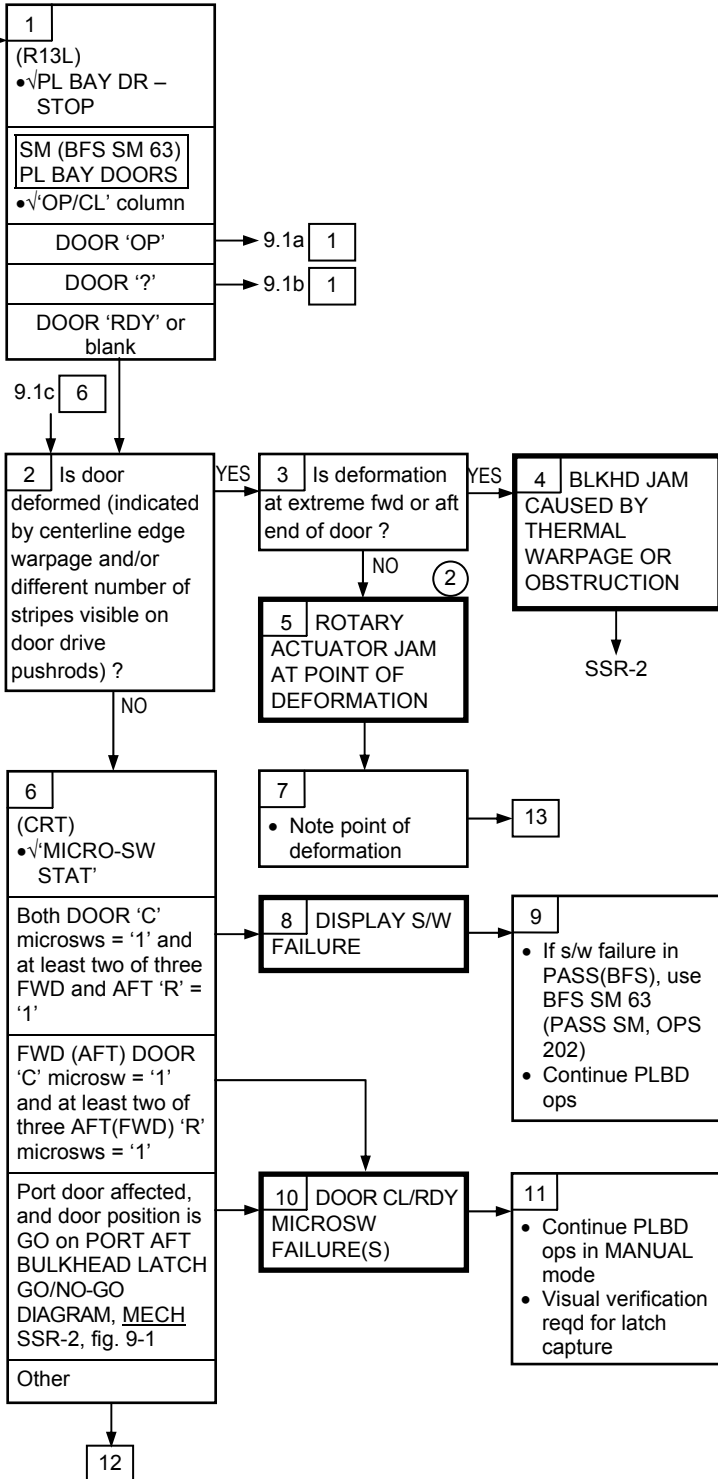
- ④ For rotary actuator jam, EVA reqd to cut door drive linkage(s) closest to point of deformation
- ⑤ For door drive PDU gearbox jam, EVA reqd to disconnect PDU
- ⑥ For door drive torque tube jam, EVA reqd to remove obstruction or cut door drive linkage(s)
- ⑧ No EVA reqd to close door

MECH

9.1g DOOR NOT 'CL' IN SINGLE MTR TIME

①
DOOR Does Not indicate 'CL' in Single Mtr Drive Time

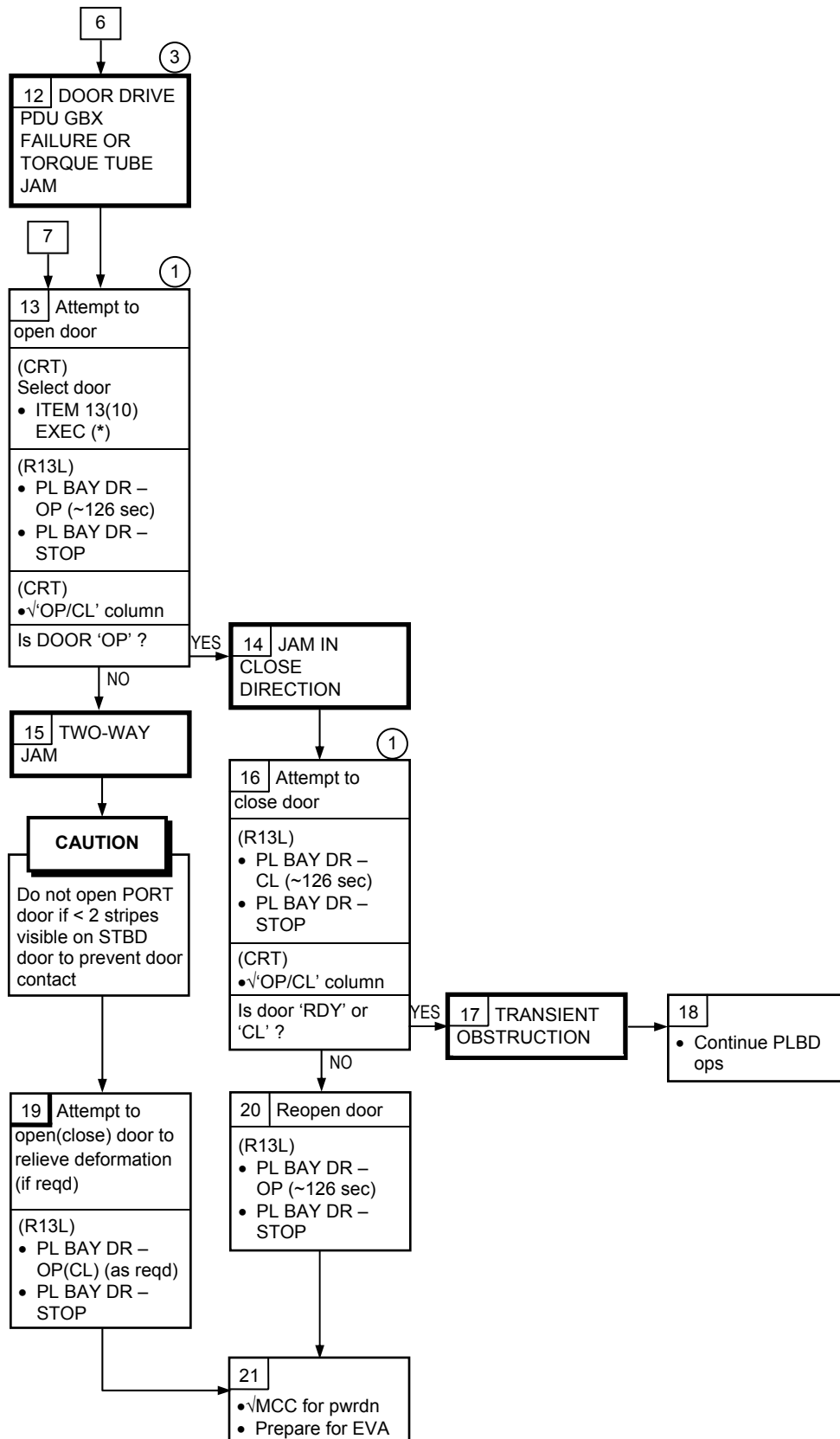
Nominal Config:
(R13L)
PL BAY DR
SYS 1,2 (two) – ENA
(MA73C)
MCA LOGIC
MNA MID 1,3 (two) – ON
MNB MID 2,4 (two) – ON
MNC MID 2,4 (two) – ON
cb MCA PWR
AC1 3Φ MID 1,3 (two) – cl
AC2 3Φ MID 2,4 (two) – cl
AC3 3Φ MID 2,4 (two) – cl
(CRT)
AC POWER ON, ITEM 1 – *



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

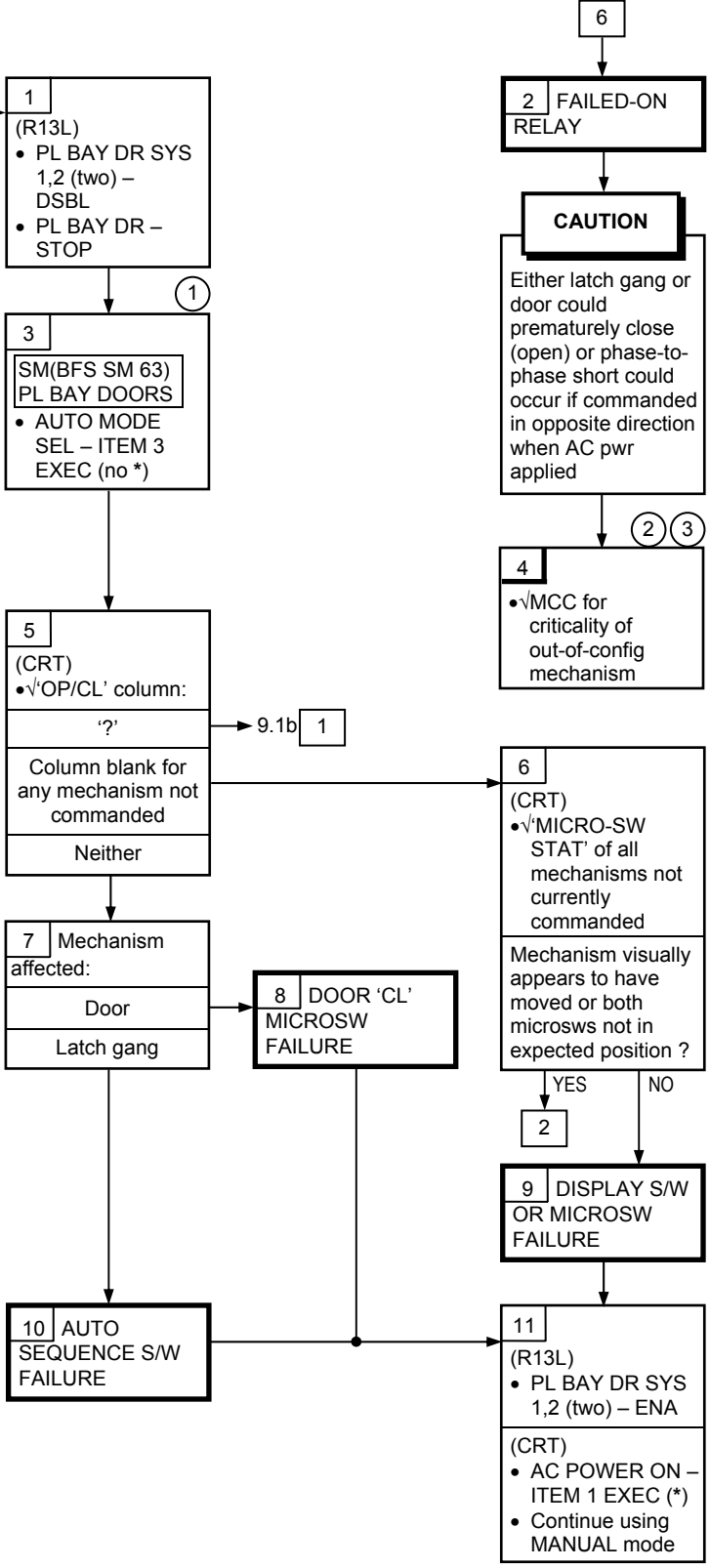
9.1h PBD CONFIG

PASS
PBD CONFIG

BFS
S63 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 – *



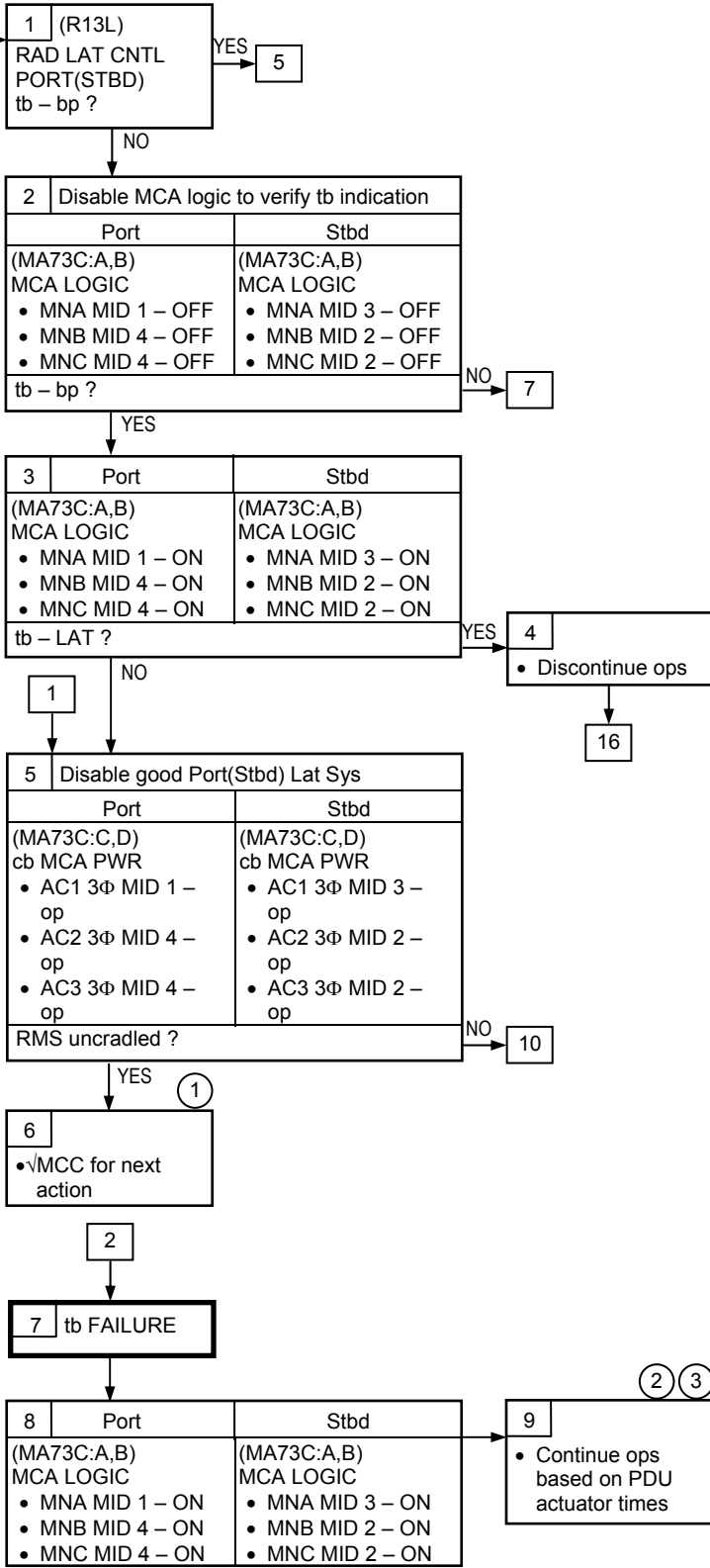
- ① When PBD CONFIG message annunciated, AC POWER ON, ITEM 1 – (no *) will automatically be deselected and any active commands are disabled
- ② MCC to recommend removal of pwr and/or repositioning affected mechanism
- ③ Use manual mode for all subsequent PLBD ops

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

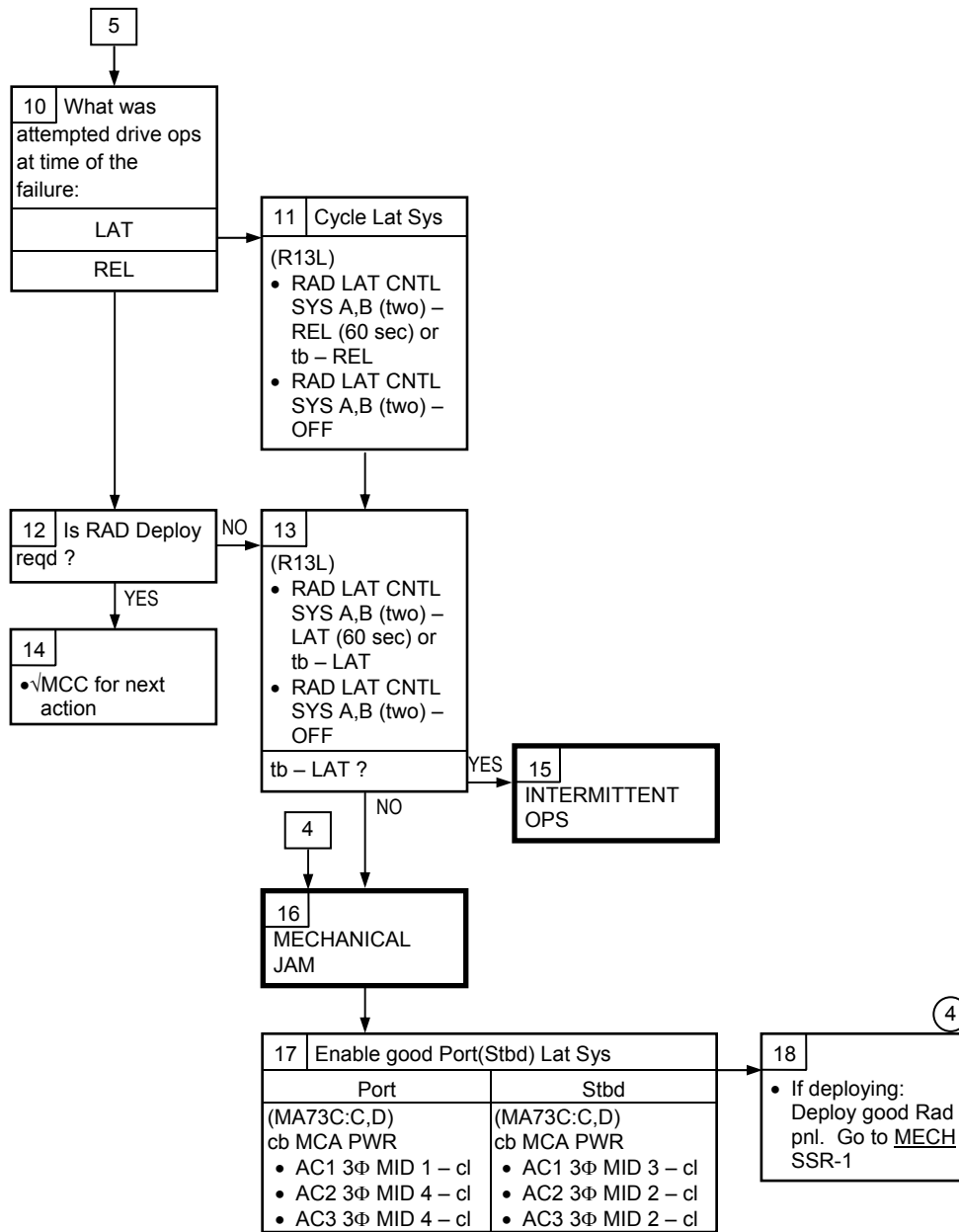


① Opened MCA cbs (for RMS uncradled) prevent verification of dual motor ops during RAD troubleshooting

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)

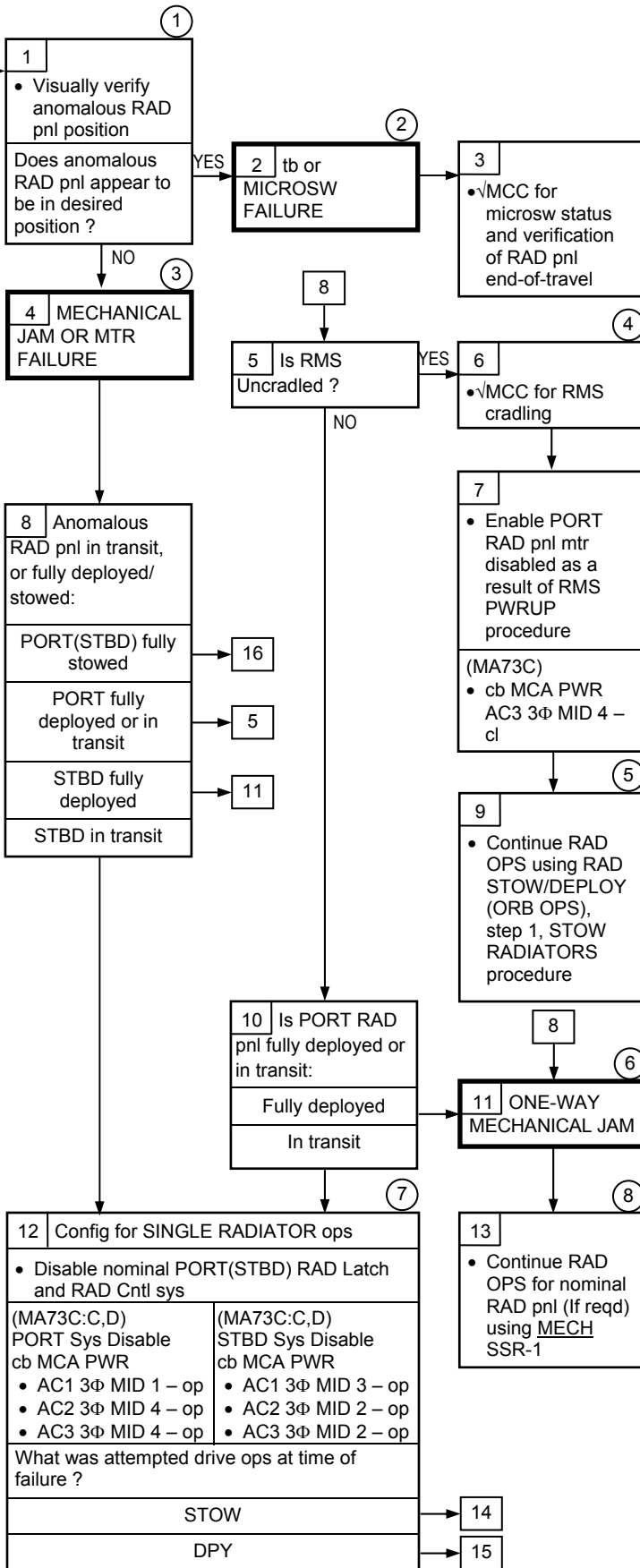
cb MCA PWR

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

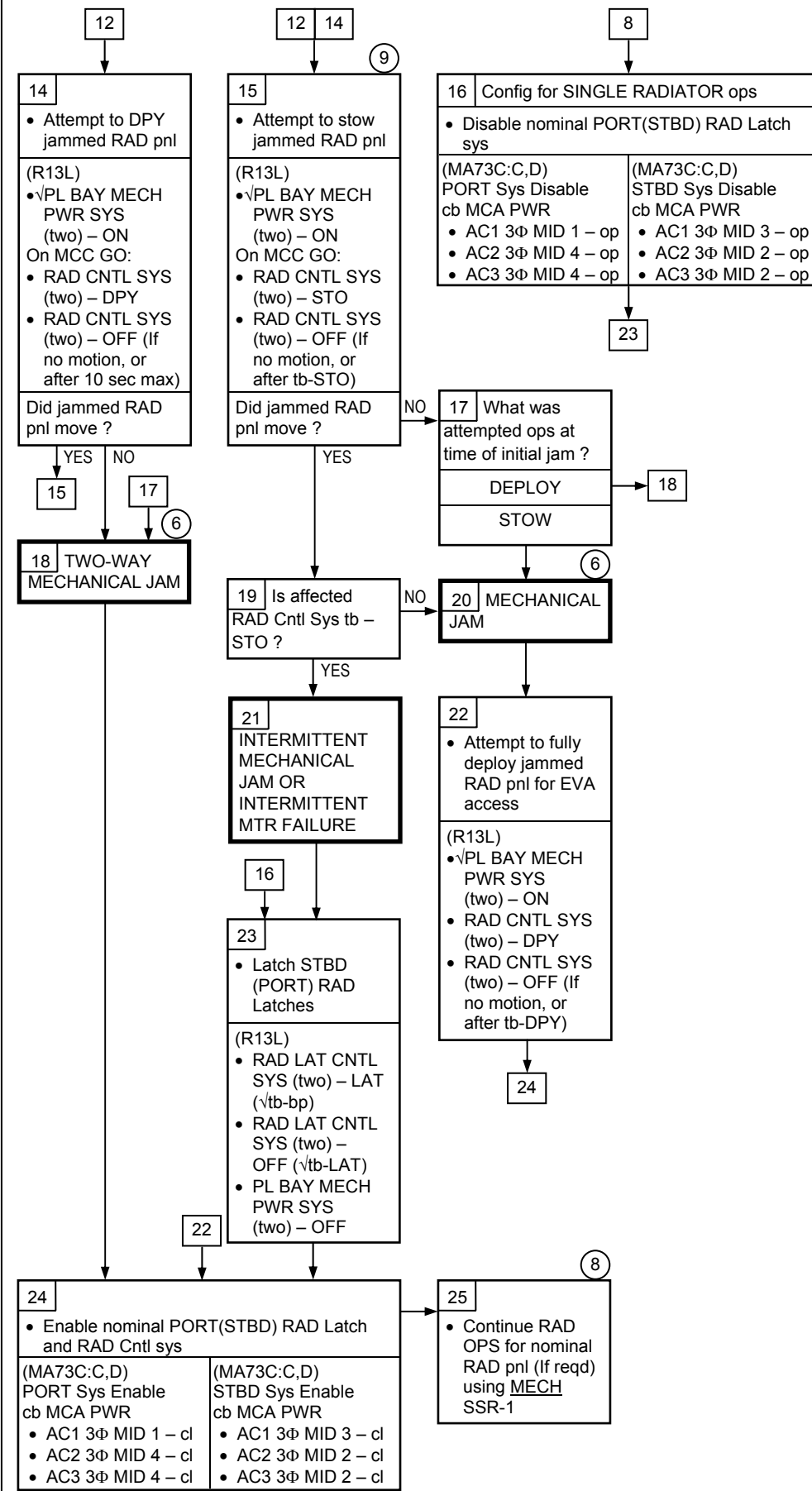
⑤ Resume in block [12] if RAD STOW/DPY OPS unsuccessful, and affected RAD pnl failed in transit

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 pwrdn is reqd
- ⑨ PDU Actuator Times
Dual Mtr
Lat – 30 sec
Rad – 50 sec
Single Mtr
Lat – 60 sec
Rad – 100 sec

KU ANT

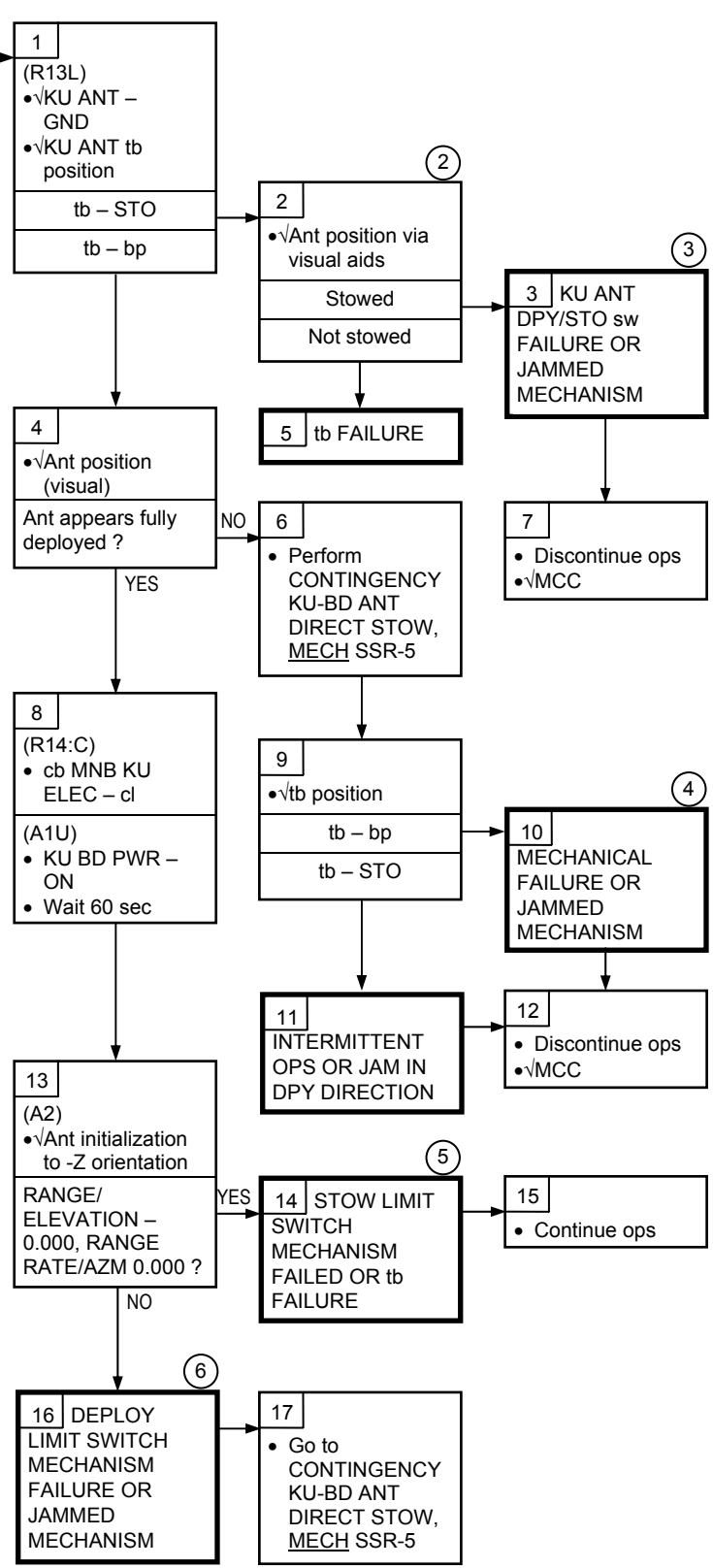
9.3

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
 (A1U) KU ANT – GND KU PWR – OFF (A2)
 DIGI-DIS SEL – EL/AZ (R14:C) cb MNB KU ELEC – op



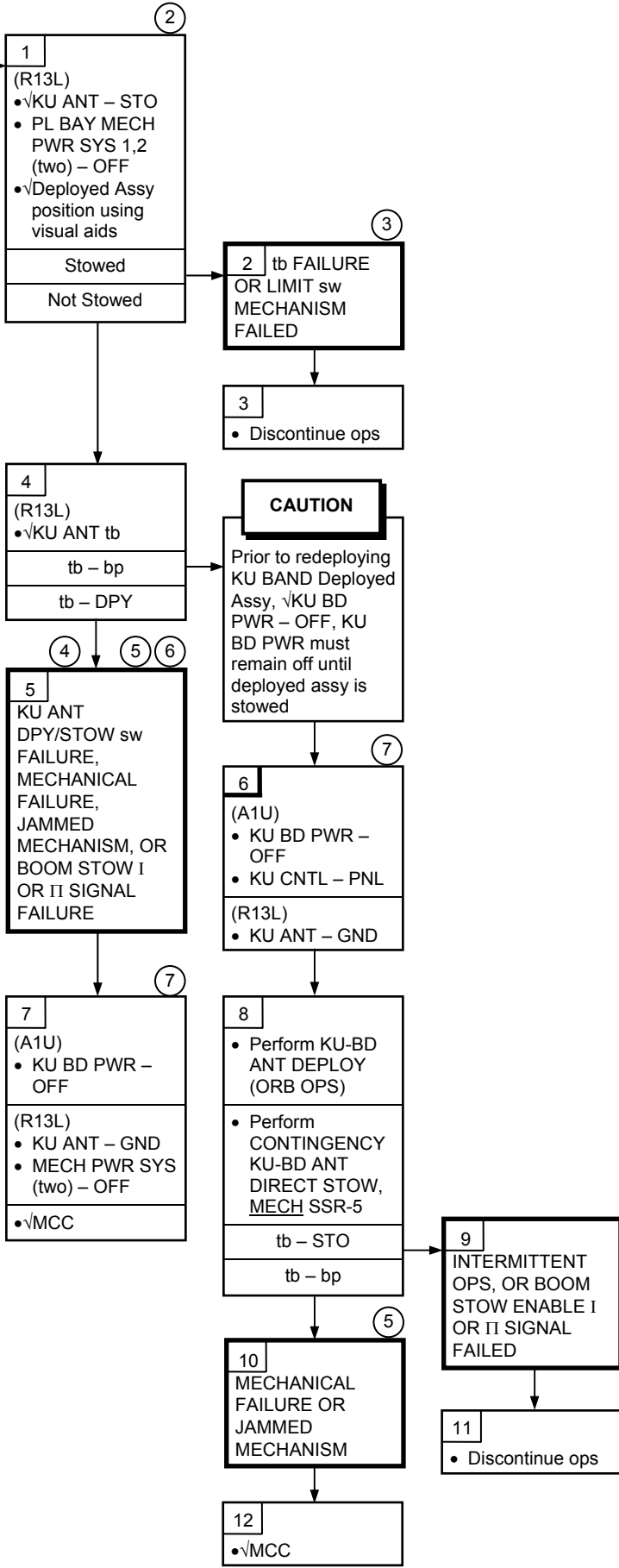
- ① Drive Time
Single mtr – 46 sec
Dual mtr – 23 sec
- ② KU-BD CCTV overlay located in Middeck Transparency Kit
- ③ KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW FAILED DEPLOY STOW SWITCH (IFM) may be reqd
- ④ Possible Ant jettison reqd
- ⑤ If limit sw mechanism failed in stow position, MECH SSR-7 reqd for stow ops
- ⑥ If limit sw mechanism failed to transfer deploy signal, failure results in loss of Ku-Bd comm and radar ops

MECH

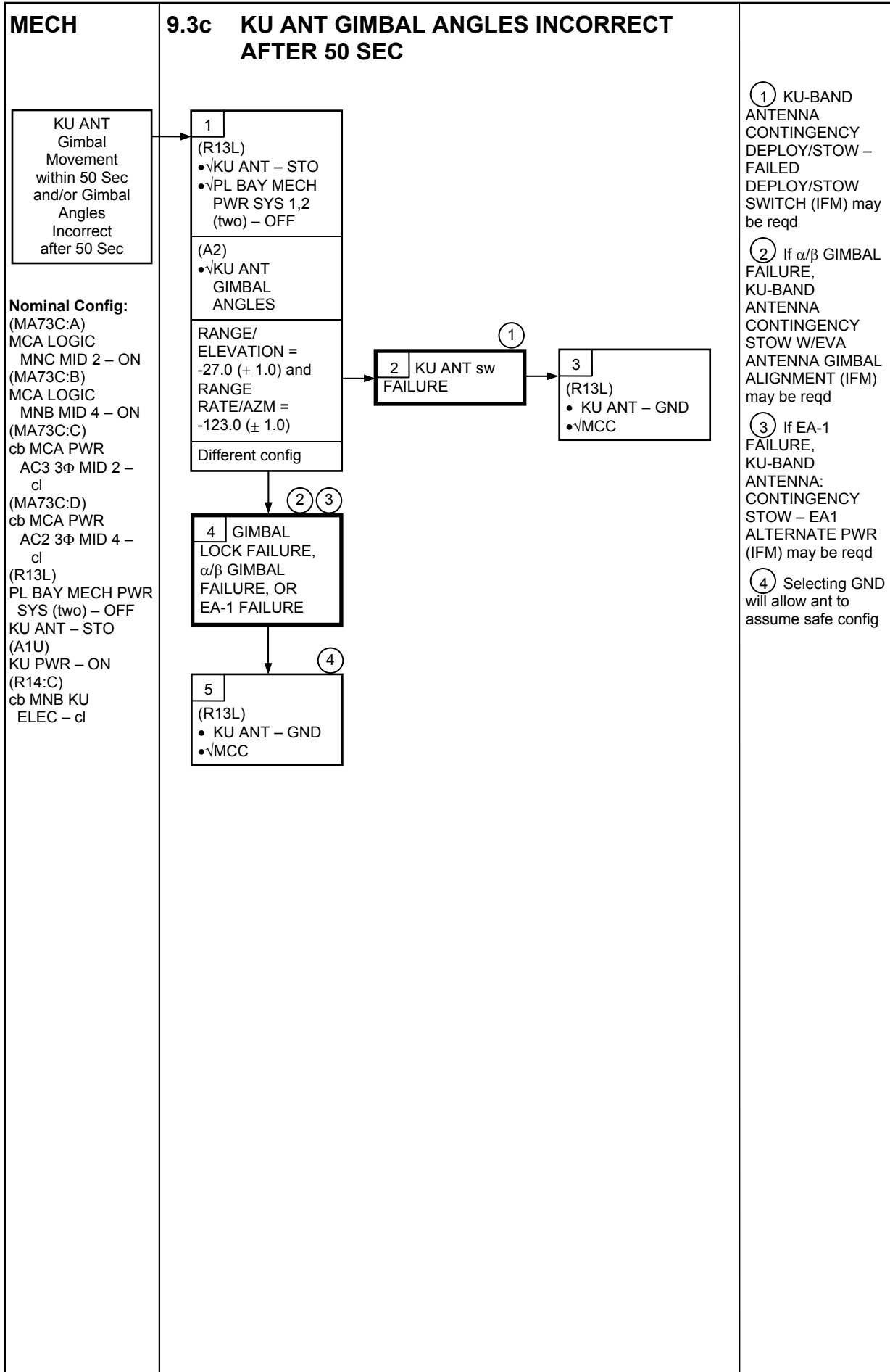
9.3b KU ANT tb NOT STO IN 46 SEC

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

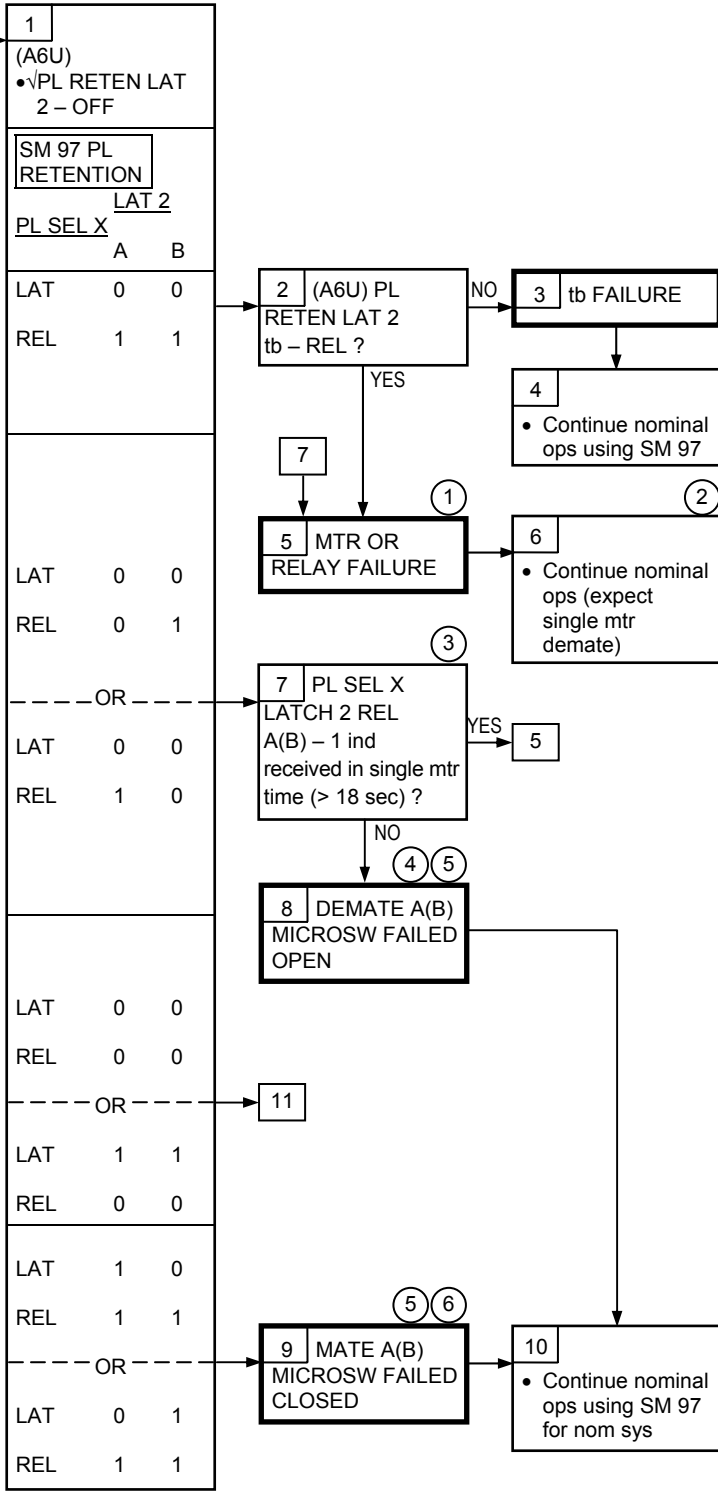
MECH

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

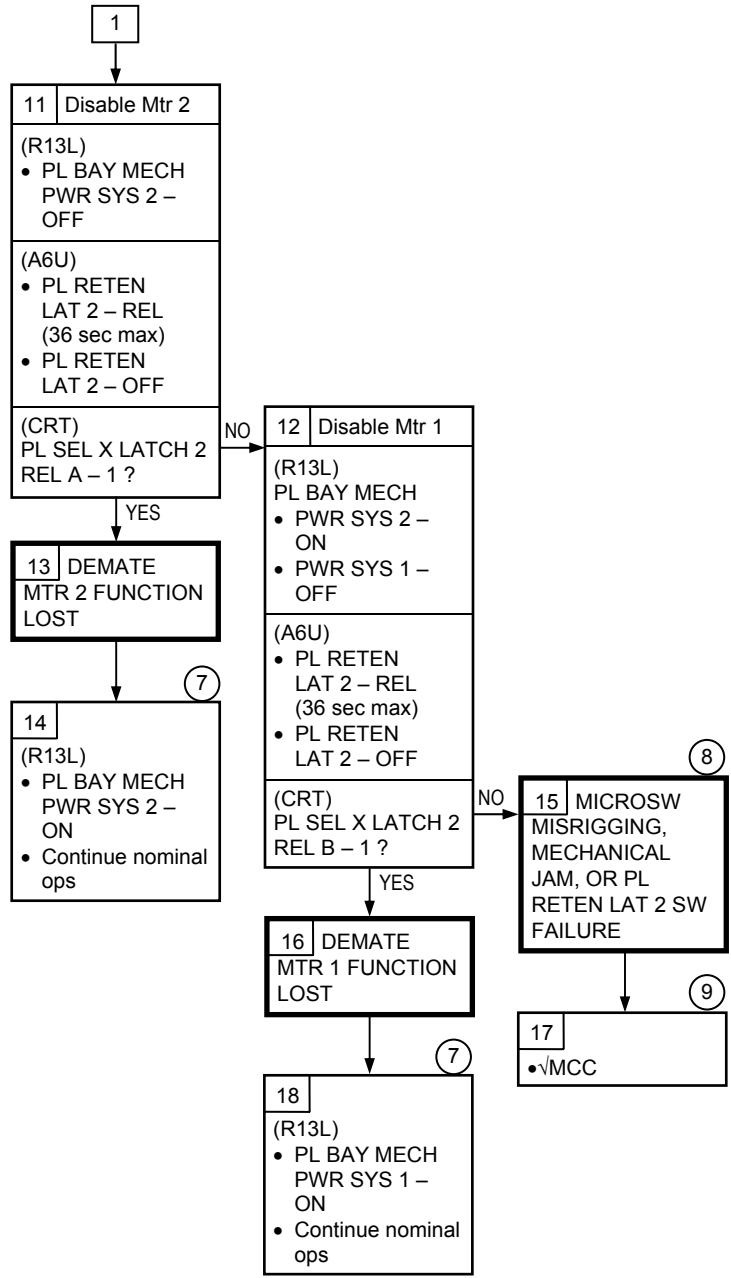


- ① MCC can determine which condition exists
- ② Expect single mtr mate/demate/relax for mtr failure
- ③ If PL SEL X LATCH 2 REL A(B) – 1 ind received in single mtr time, microsw misrigged
- ④ One mtr will continue to drive while demating until PL RETEN LAT 2 sw turned OFF
- ⑤ If SYS A Microsw failed, tb will be inaccurate
- ⑥ Expect single mtr drive time for mate

**MEC
ROEU**

9.4

MECH 9.4a (Cont)



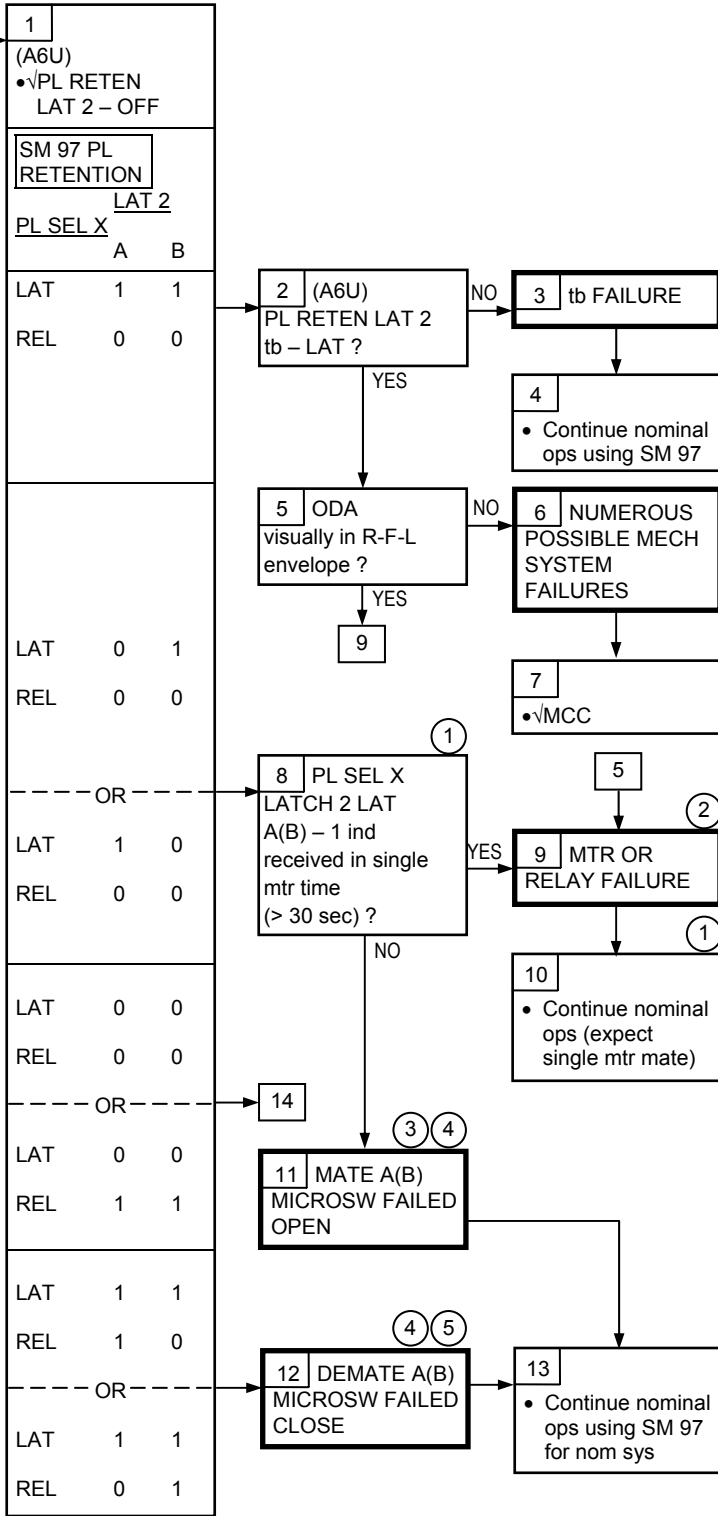
- ⑦ One mtr Φ lost. Good mtr will backdrive failed mtr. Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system
- ⑧ EVA capability exists to perform ROEU demate
- ⑨ MCC can determine if switch is failed

MECH

9.4b ROEU MATE – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

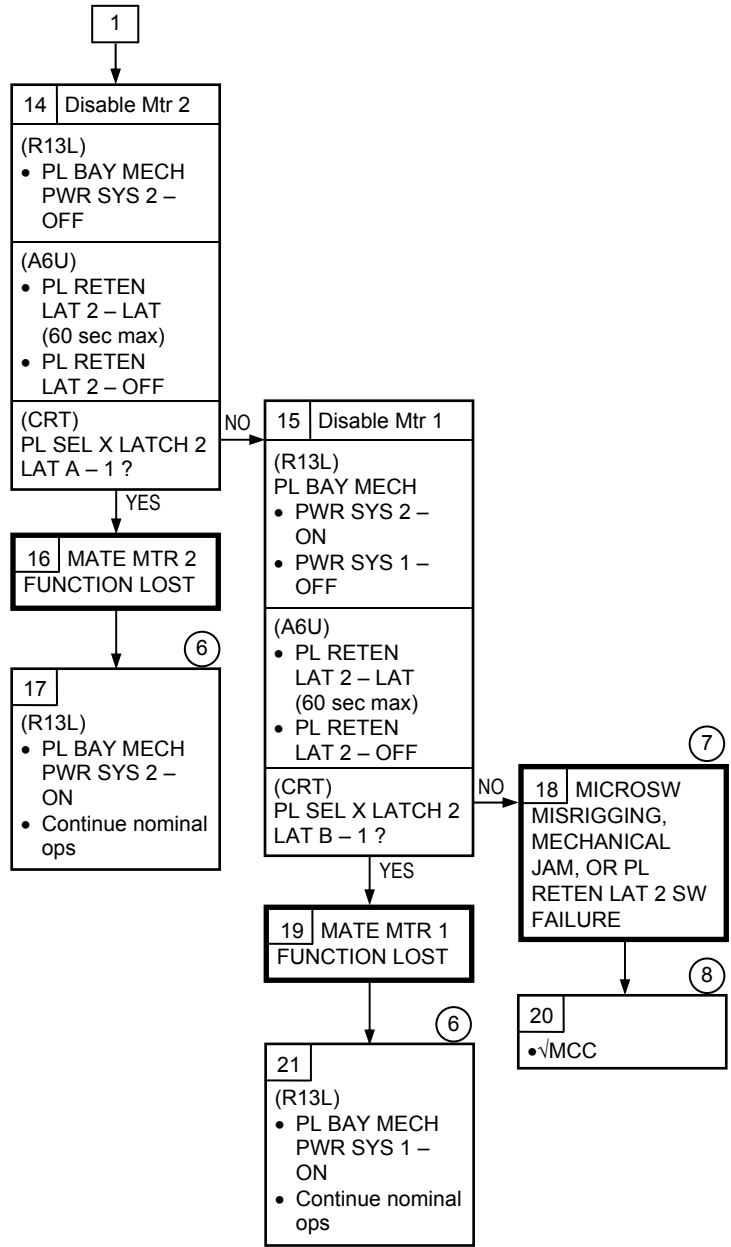
Mate tb Not Lat
or
SM 97 PL RETENTION
Microsw LAT/REL Ind Not Nominal
or
Single Mtr Drive Time > 30 sec
or
Not Visually R-F-L

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 Φ lost. Good mtr will backdrive failed mtr. Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system

⑦ EVA capability exists to perform ROEU demate

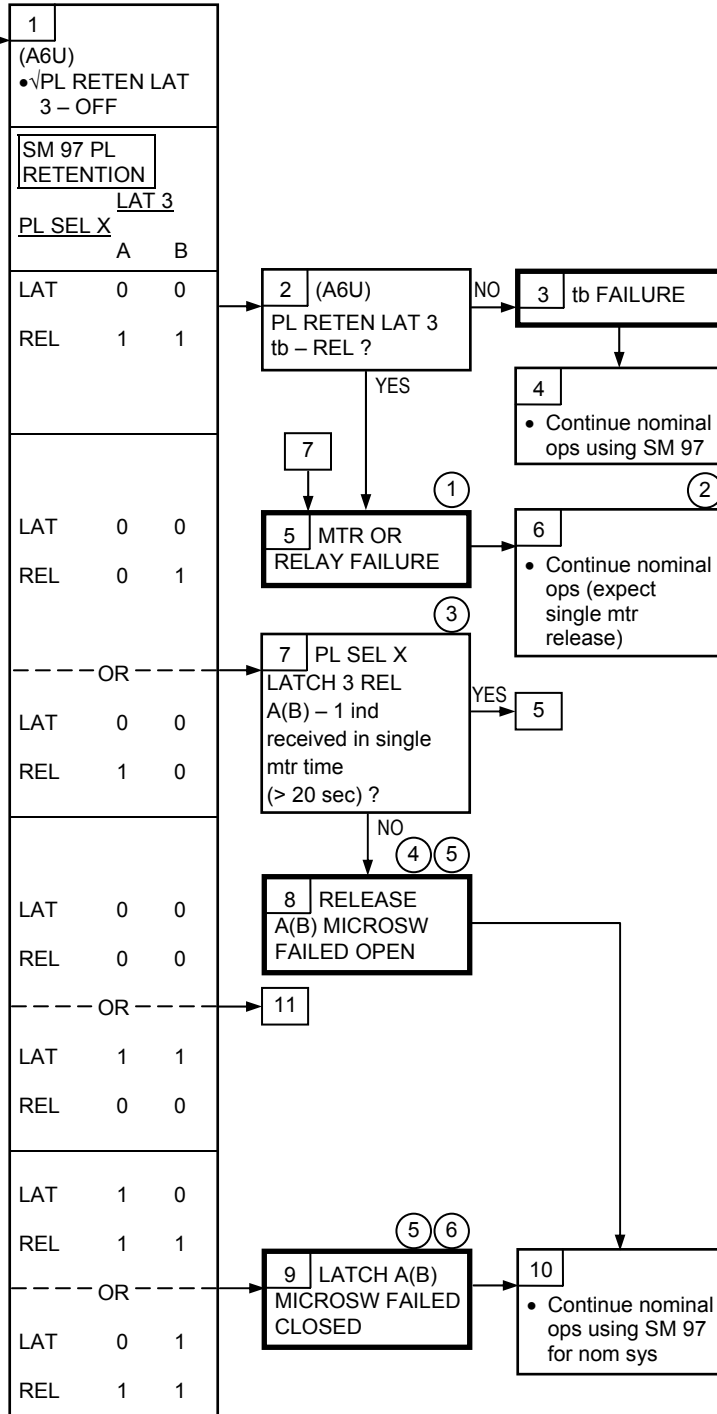
⑧ MCC can determine if switch is failed

MECH

9.4c ROEU RELEASE – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

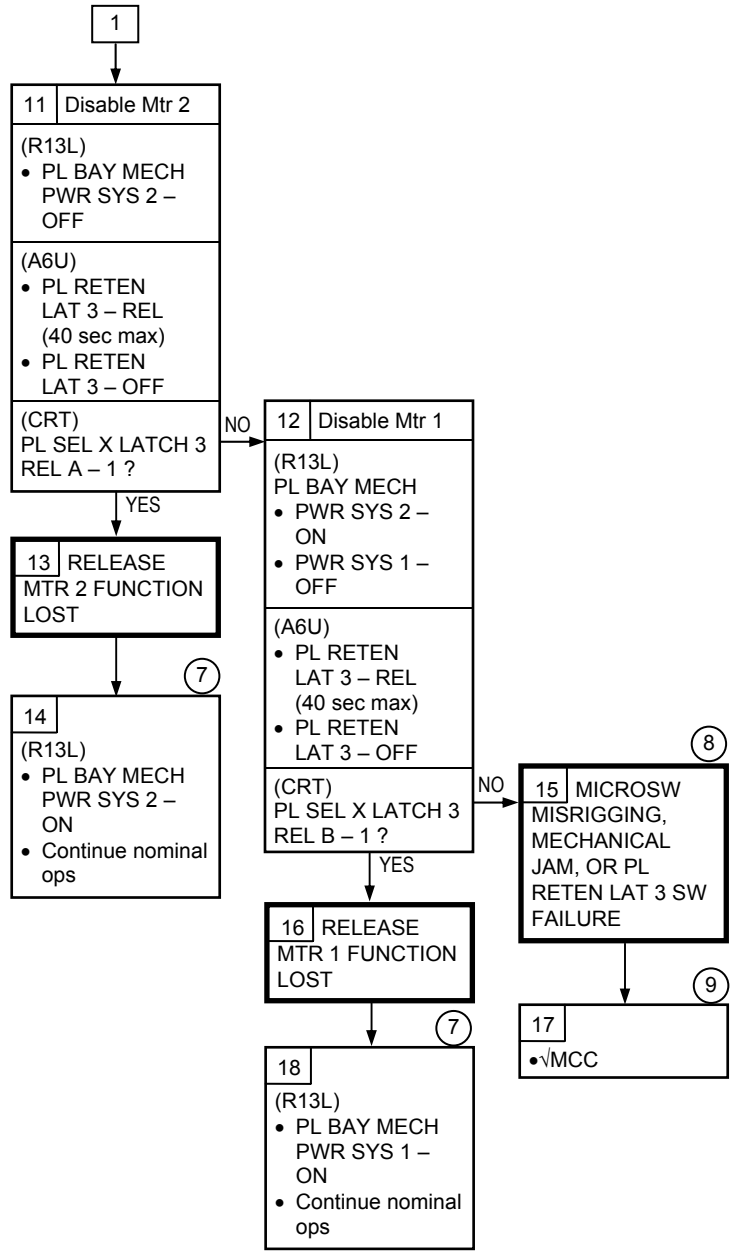
Release tb Not Rel
or
SM 97 PL RETENTION
Microsw LAT/REL Ind Not Nominal
or
Single Mtr Drive Time > 20 sec

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)



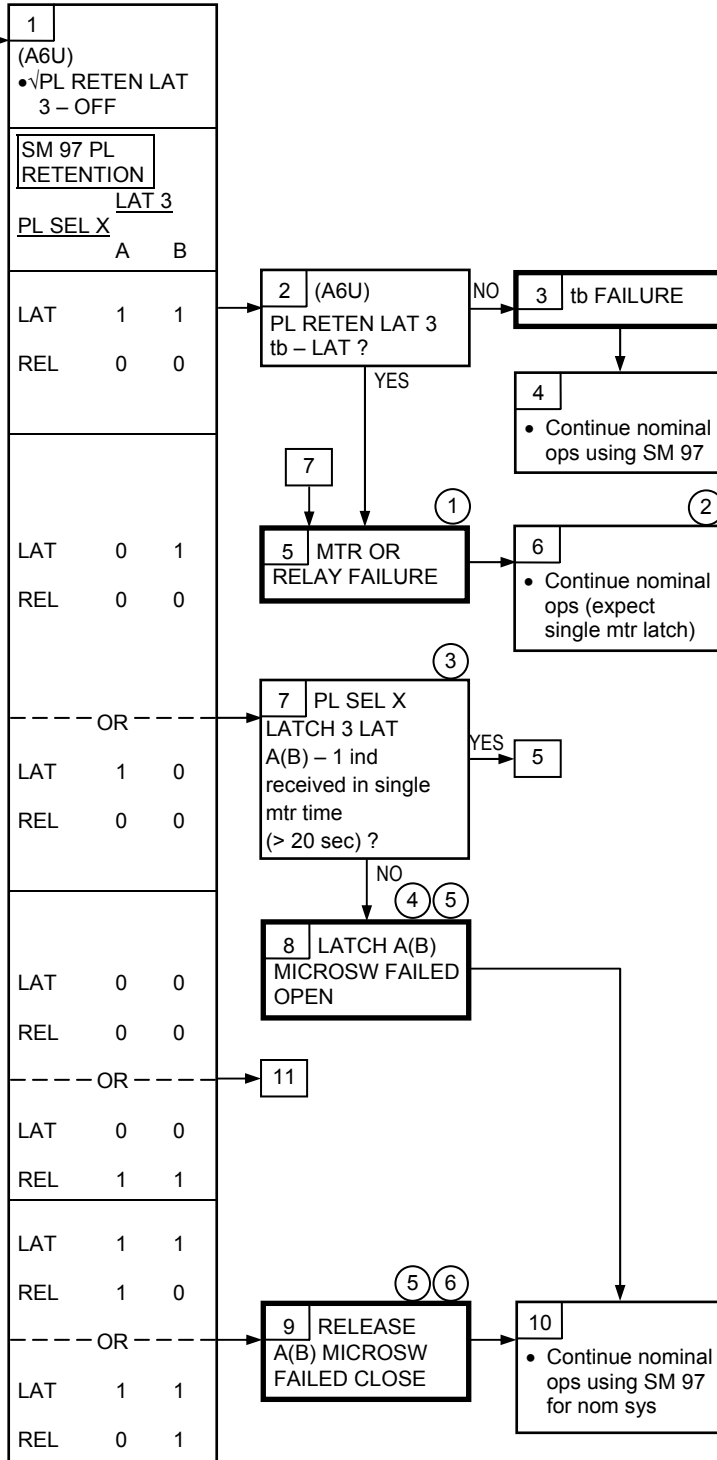
- ⑦ One mtr Φ lost. Good mtr will backdrive failed mtr. Subsequent release and latch ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system
- ⑧ EVA capability exists to perform ROEU releaseE
- ⑨ MCC can determine if switch is failed

MECH

9.4d ROEU LATCH – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

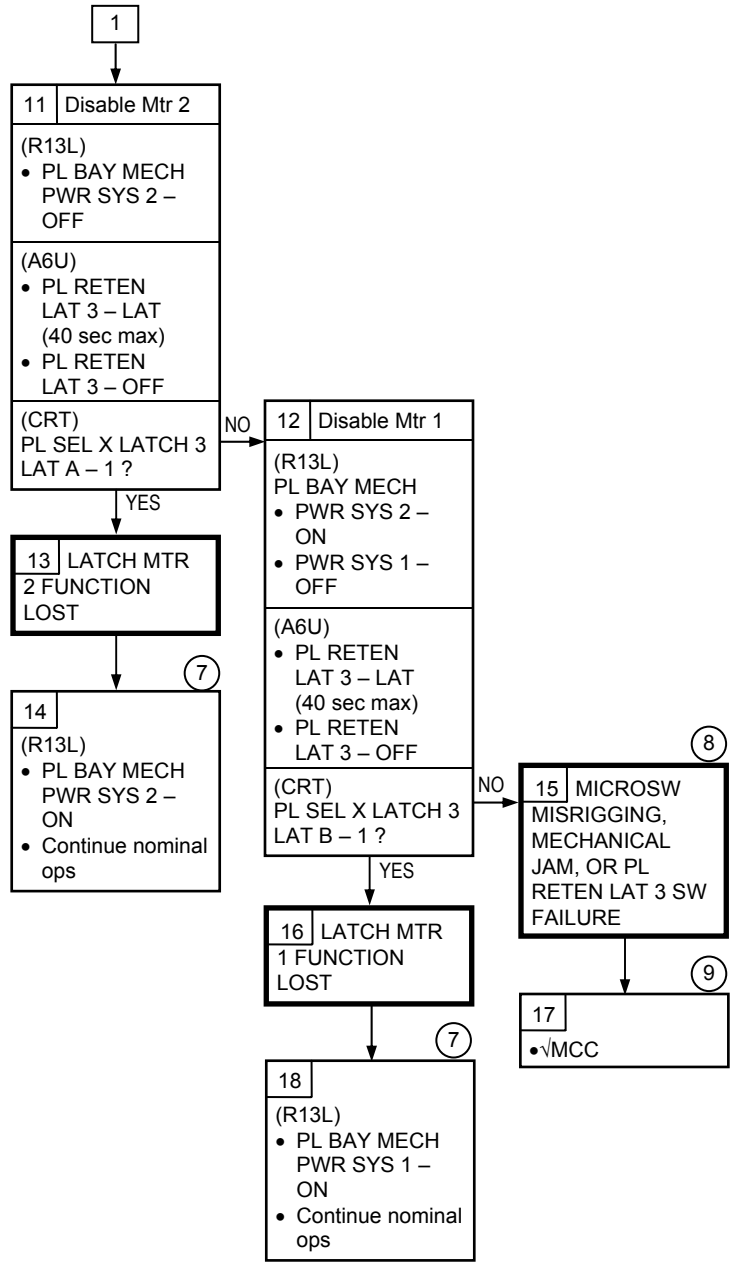
Latch tb Not Lat
or
SM 97 PL RETENTION
Microsw LAT/REL Ind Not Nominal
or
Single Mtr Drive Time > 20 sec

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 Φ lost. Good mtr will backdrive failed mtr. Subsequent release and latch ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system
- 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

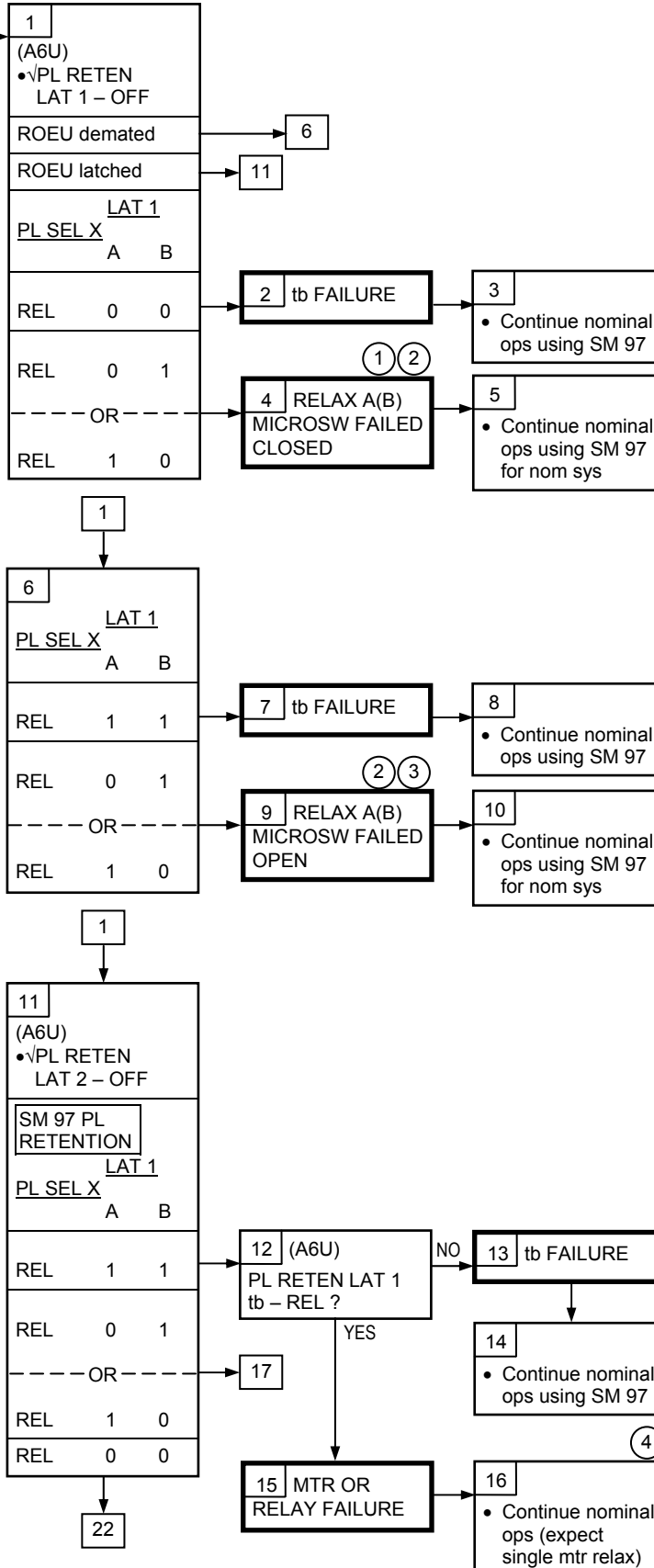
RELAX tb Not Nominal
or
SM 97 PL RETENTION
Microsw REL Ind Not Nominal or Single Mtr Drive Time > 12 sec

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

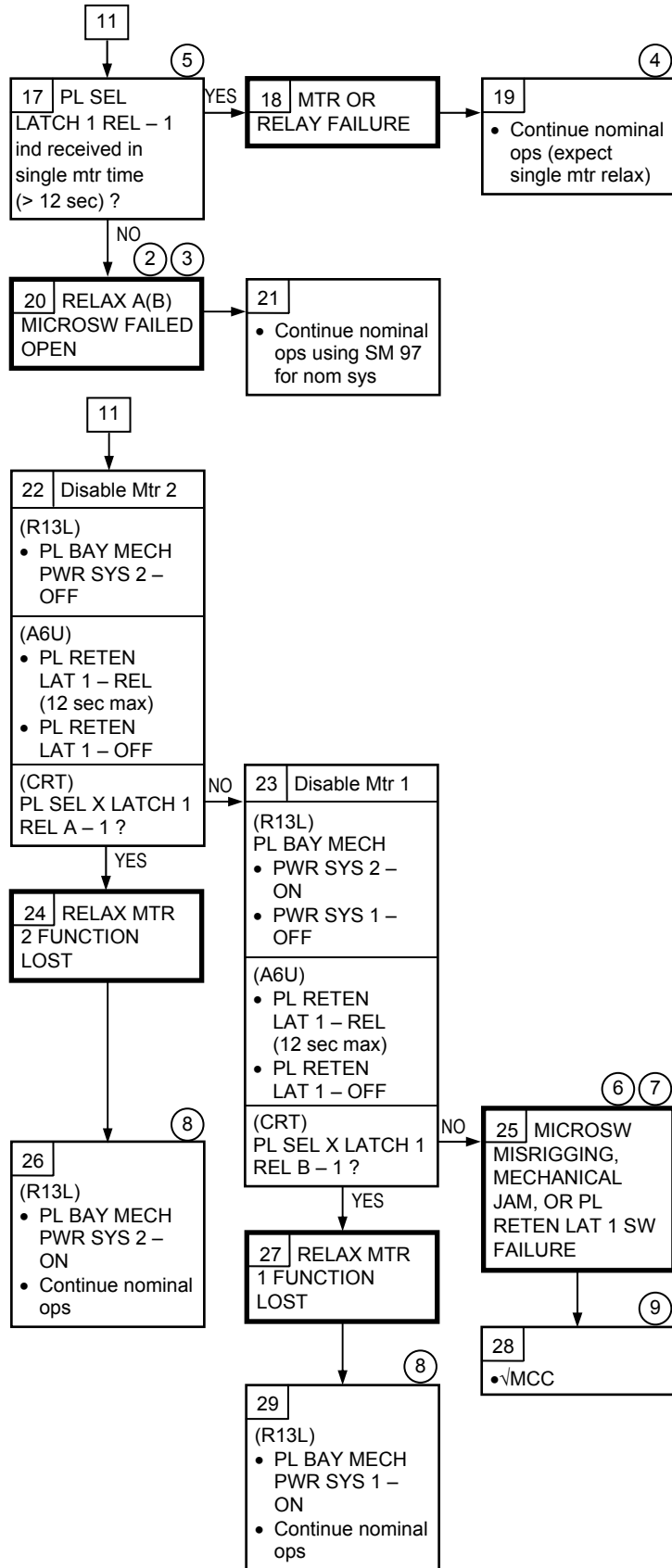
If MATED and RELAXED
(A6U)
PL RETEN LAT 1 tb – REL
SM 97 PL RETENTION
PL SEL X LATCH 1 REL A,B – 1

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

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

1	(A6U) •√PL RETEN LAT 3 – OFF
	SM 97 PL RETENTION LAT 3 PL SEL X A B
	RDY 1 1 LAT 1 1 REL 0 0
	RDY 0 1 LAT 1 1 REL 0 0
	--- OR ---
	RDY 1 0 LAT 1 1 REL 0 0
	RDY 0 1 LAT 0 0 REL 1 1
	--- OR ---
	RDY 1 0 LAT 0 0 REL 1 1
	RDY 0 0 LAT 0 0 REL 1 1

2 tb FAILED bp

3
• Continue nominal ops using SM 97

4 ELECTRICAL CONTINUITY A(B) CIRCUIT/IND FAILED OPEN

5 ELECTRICAL CONTINUITY A(B) CIRCUIT/IND FAILED CLOSED

6
• Continue nominal ops using SM 97 for nom sys

7 tb FAILED GRAY

8
• Continue nominal ops using SM 97

① If SYS A Microsw failed, tb will be inaccurate

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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

- AC1 3Φ MID 3 – op
- AC2 3Φ MID 2 – op
- AC3 3Φ MID 2 – op

PORT Panel Disable (MA73C:C,D)
cb MCA PWR

- AC1 3Φ MID 1 – op
- AC2 3Φ MID 4 – op
- AC3 3Φ MID 4 – op

2 PORT(STBD) ops
reqd:

STO

DPY

3 Stow,latch PORT(STBD) ①

(R13L)

- PL BAY MECH PWR SYS 1,2 – ON
- RAD CNTL SYS A,B – STO
- PORT(STBD) tb – STO
- SYS A,B – OFF
- LAT CNTL SYS A,B – LAT
- RAD LAT CNTL PORT(STBD) tb – LAT
- RAD LAT CNTL SYS A,B – OFF
- PL BAY MECH PWR SYS 1,2 – OFF

4 Release,deploy ①
PORT(STBD) RAD

(R13L)

- PL BAY MECH PWR SYS 1,2 – ON
- RAD LAT CNTL SYS A,B – REL
- RAD LAT CNTL PORT(STBD) tb – REL
- RAD LAT CNTL SYS A,B – OFF
- RAD CNTL SYS A,B – DPY
- RAD CNTL PORT(STBD) tb – DPY
- RAD CNTL SYS A,B – OFF
- PL BAY MECH PWR SYS 1,2 – OFF

5 Enable
STBD(PORT) RAD sys

STBD (MA73C:D,C)
cb MCA PWR

- AC1 3Φ MID 3 – cl
- AC2 3Φ MID 2 – cl
- AC3 3Φ MID 2 – cl

PORT (MA73C:C,D)
cb MCA PWR

- AC1 3Φ MID 1 – cl
- AC2 3Φ MID 4 – cl
- AC3 3Φ MID 4 – cl

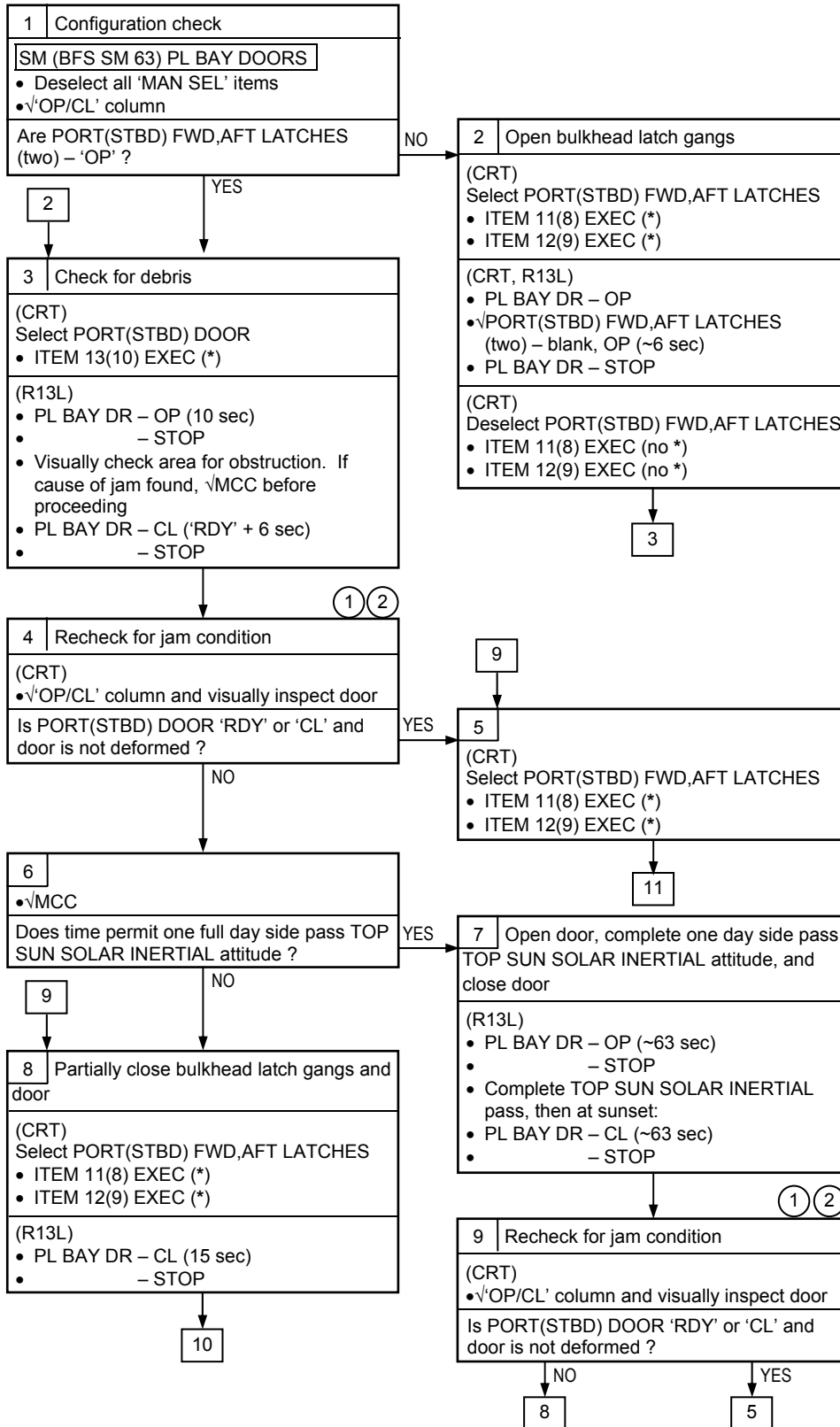
① PDU Actuator
Times Normal (2 mtr)
Lat – 30 sec
Rad – 50 sec
Single Mtr
Lat – 60 sec
Rad – 100 sec

MECH SSR

MECH SSR-2 CONTINGENCY PLBD CLOSURE

NOTE

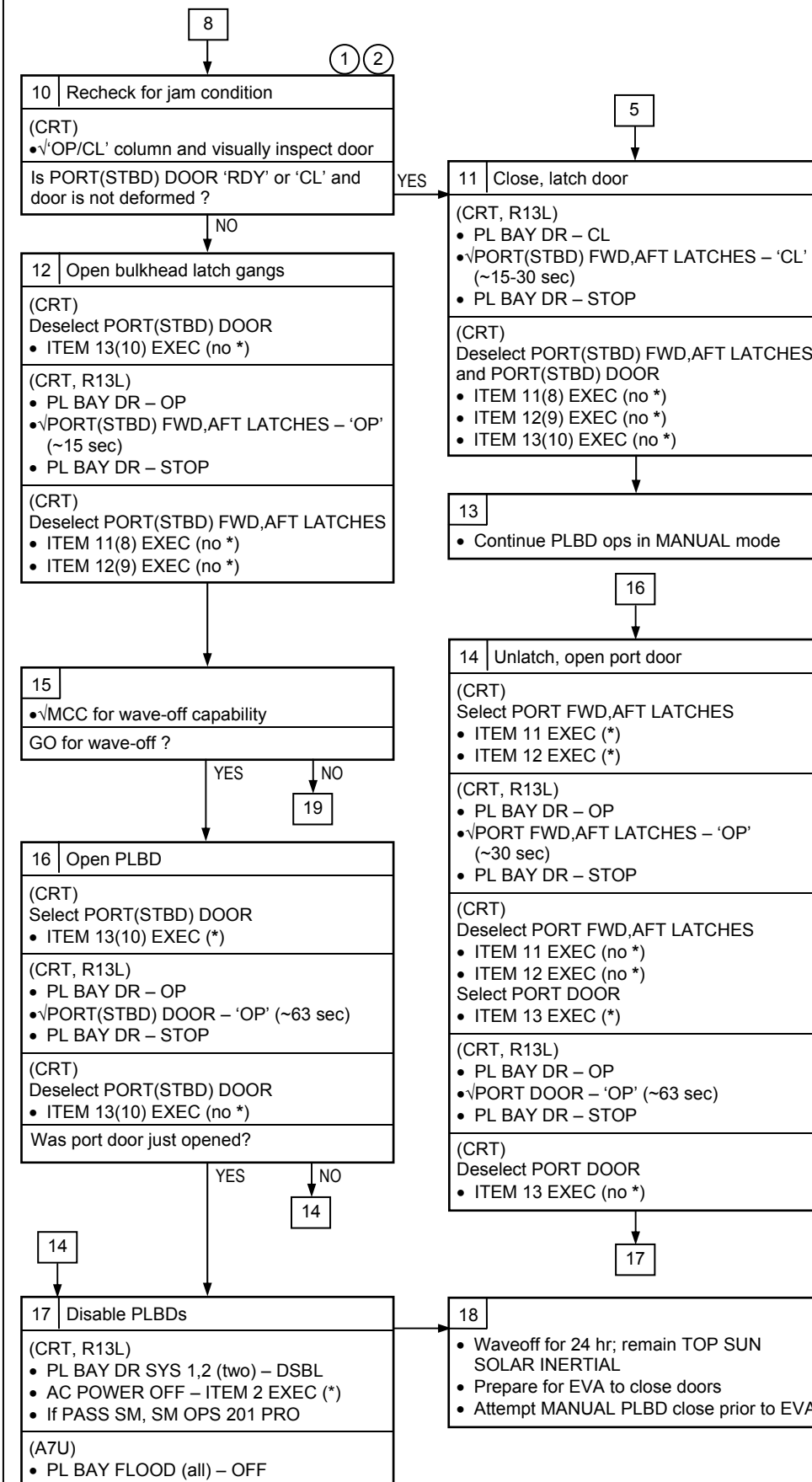
This procedure assumes that the door has jammed from orbiter thermal warpage or debris



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)

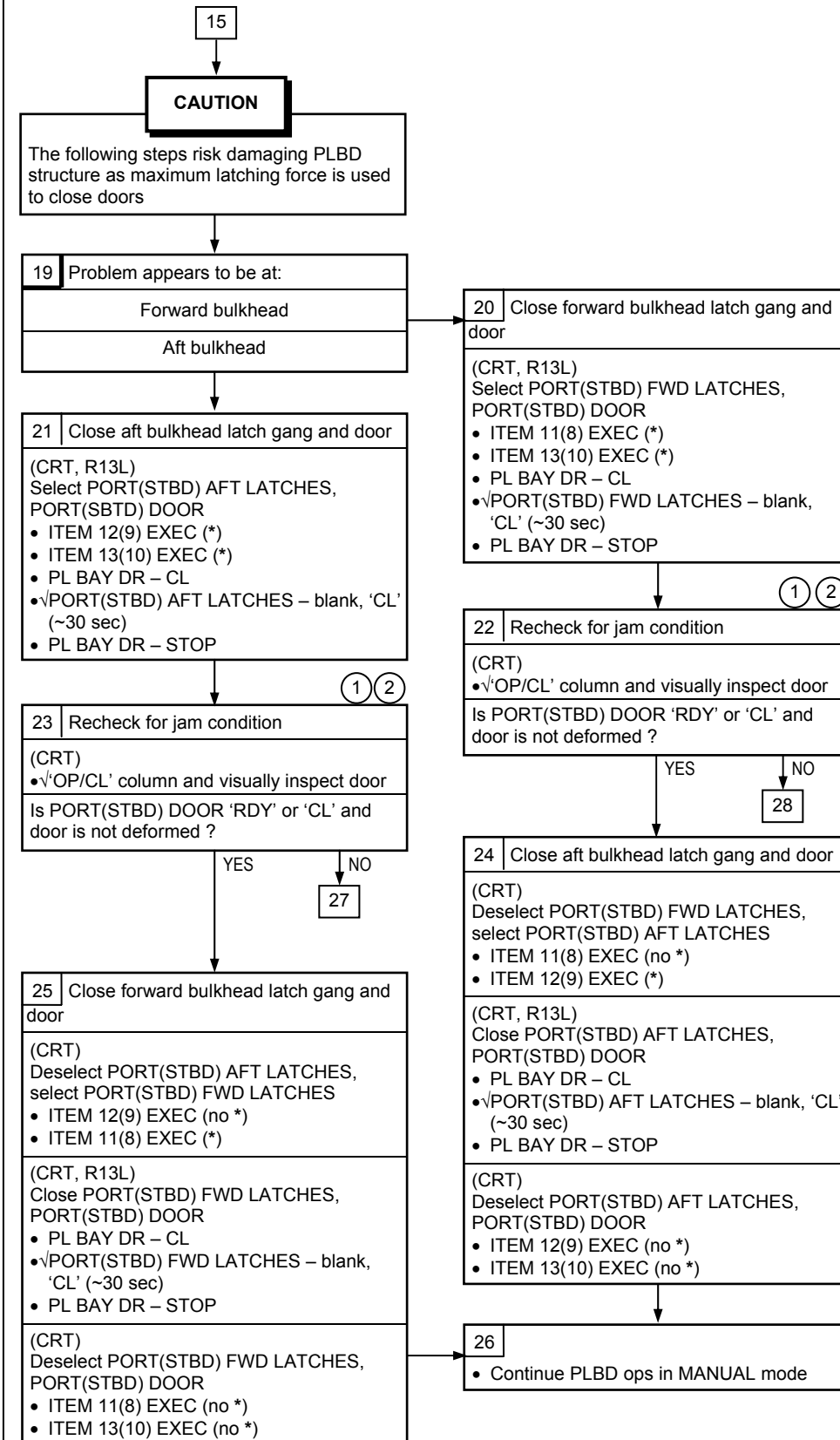
MECH SSR-2 (Cont)



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)

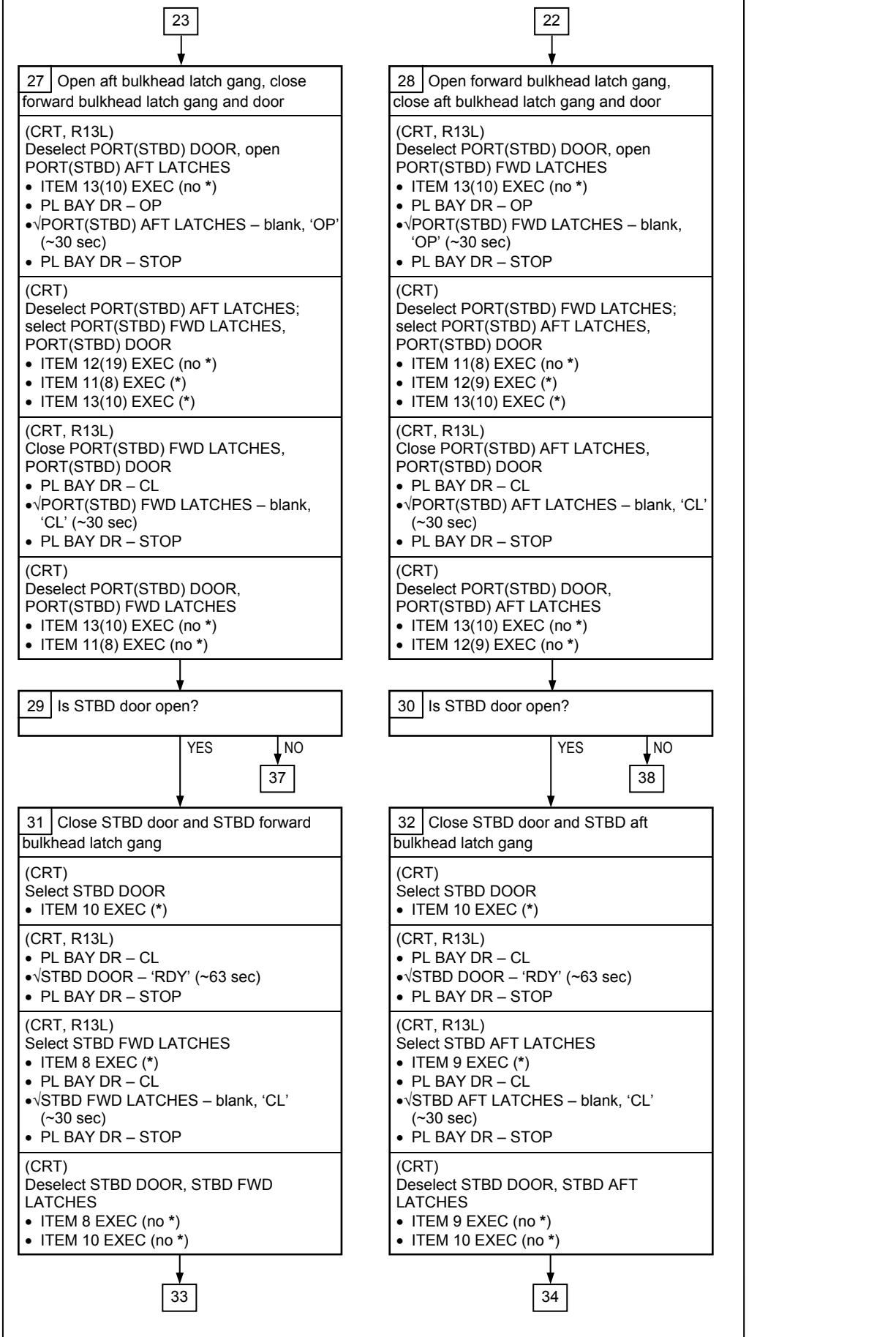
MECH SSR-2 (Cont)



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)



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"> • ITEM 13 EXEC (*) • ITEM 10 EXEC (*) • ITEM 6 EXEC (*)
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> •√CENTER LATCHES 1-4 – blank, 'CL' (~20 sec) • PL BAY DR – STOP
(CRT)	Deselect CENTER LATCHES 1-4 <ul style="list-style-type: none"> • ITEM 6 EXEC (no *) • Repeat closure for CENTER LATCHES 5-8, 9-12, 13-16 in order

↓

35	Close aft bulkhead latch gangs and doors
(CRT)	Select PORT, STBD AFT LATCHES <ul style="list-style-type: none"> • ITEM 12 EXEC (*) • ITEM 9 EXEC (*)
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> •√PORT, STBD AFT LATCHES – blank, 'CL' (~30 sec) • PL BAY DR – STOP
(CRT)	Deselect PORT, STBD AFT LATCHES, PORT, STBD DOOR <ul style="list-style-type: none"> • ITEM 12 EXEC (no *) • ITEM 9 EXEC (no *) • ITEM 13 EXEC (no *) • ITEM 10 EXEC (no *)

↓

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"> • ITEM 13 EXEC (*) • ITEM 10 EXEC (*) • ITEM 7 EXEC (*)
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> •√CENTER LATCHES 13-16 – blank, 'CL' (~20 sec) • PL BAY DR – STOP
(CRT)	Deselect CENTER LATCHES 13-16 <ul style="list-style-type: none"> • ITEM 7 EXEC (no *) • Repeat closure for CENTER LATCHES 9-12, 5-8, 1-4 in order

↓

36	Close forward bulkhead latch gangs and doors
(CRT)	Select PORT, STBD FWD LATCHES <ul style="list-style-type: none"> • ITEM 11 EXEC (*) • ITEM 8 EXEC (*)
(CRT, R13L)	• PL BAY DR – CL <ul style="list-style-type: none"> •√PORT, STBD FWD LATCHES – blank, 'CL' (~30 sec) • PL BAY DR – STOP
(CRT)	Deselect PORT, STBD FWD LATCHES, PORT, STBD DOOR <ul style="list-style-type: none"> • ITEM 11 EXEC (no *) • ITEM 8 EXEC (no *) • ITEM 13(10) EXEC (no *) • ITEM 10 EXEC (no *)

↓

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"> • ITEM 10 EXEC (*) • ITEM 6 EXEC (*)
(CRT, R13L)	<ul style="list-style-type: none"> • PL BAY DR – CL • ✓CENTER LATCHES 1-4 – blank, 'CL' (~20 sec) • PL BAY DR – STOP
(CRT)	Deselect CENTER LATCHES 1-4 <ul style="list-style-type: none"> • ITEM 6 EXEC (no *) • Repeat closure for CENTER LATCHES 5-8, 9-12, 13-16 in order

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"> • ITEM 10 EXEC (*) • ITEM 7 EXEC (*)
(CRT, R13L)	<ul style="list-style-type: none"> • PL BAY DR – CL • ✓CENTER LATCHES 13-16 – blank, 'CL' (~20 sec) • PL BAY DR – STOP
(CRT)	Deselect CENTER LATCHES 13-16 <ul style="list-style-type: none"> • ITEM 7 EXEC (no *) • Repeat closure for CENTER LATCHES 9-12, 5-8, 1-4 in order

39	Close aft bulkhead latch gang and door
(CRT)	Select STBD AFT LATCHES <ul style="list-style-type: none"> • ITEM 9 EXEC (*)
(CRT, R13L)	<ul style="list-style-type: none"> • PL BAY DR – CL • ✓STBD AFT LATCHES – blank, 'CL' (~30 sec) • PL BAY DR – STOP
(CRT)	Deselect STBD AFT LATCHES, STBD DOOR <ul style="list-style-type: none"> • ITEM 9 EXEC (no *) • ITEM 10 EXEC (no *)

40	Close forward bulkhead latch gang and door
(CRT)	Select STBD FWD LATCHES <ul style="list-style-type: none"> • ITEM 8 EXEC (*)
(CRT, R13L)	<ul style="list-style-type: none"> • PL BAY DR – CL • ✓STBD FWD LATCHES – blank, 'CL' (~30 sec) • PL BAY DR – STOP
(CRT)	Deselect STBD FWD LATCHES, STBD DOOR <ul style="list-style-type: none"> • ITEM 8 EXEC (no *) • ITEM 10 EXEC (no *)

35 36

41	Disable PLBDs
(CRT, R13L)	<ul style="list-style-type: none"> • PL BAY DR SYS 1,2 (two) – DSBL • AC POWER OFF – ITEM 2 EXEC (*) • If PASS SM, SM OPS 201 PRO
(A7U)	<ul style="list-style-type: none"> • PL BAY FLOOD (all) – OFF

MECH SSR-2 (Cont)

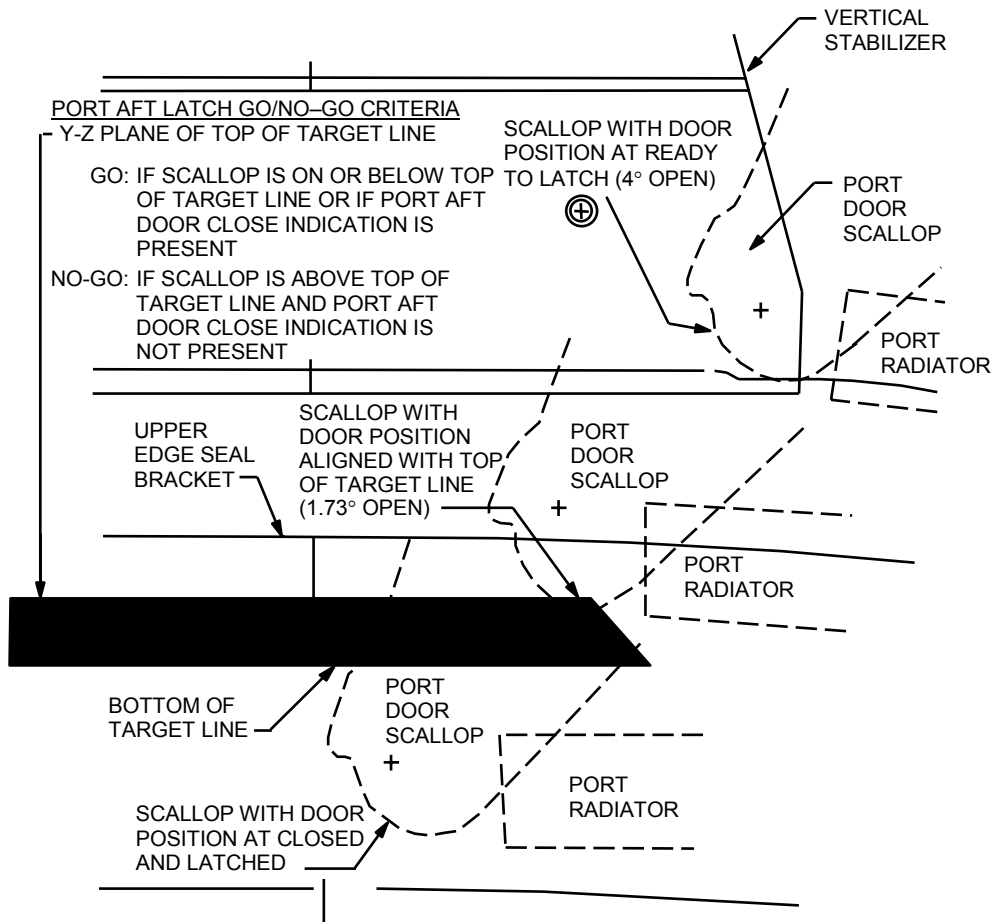
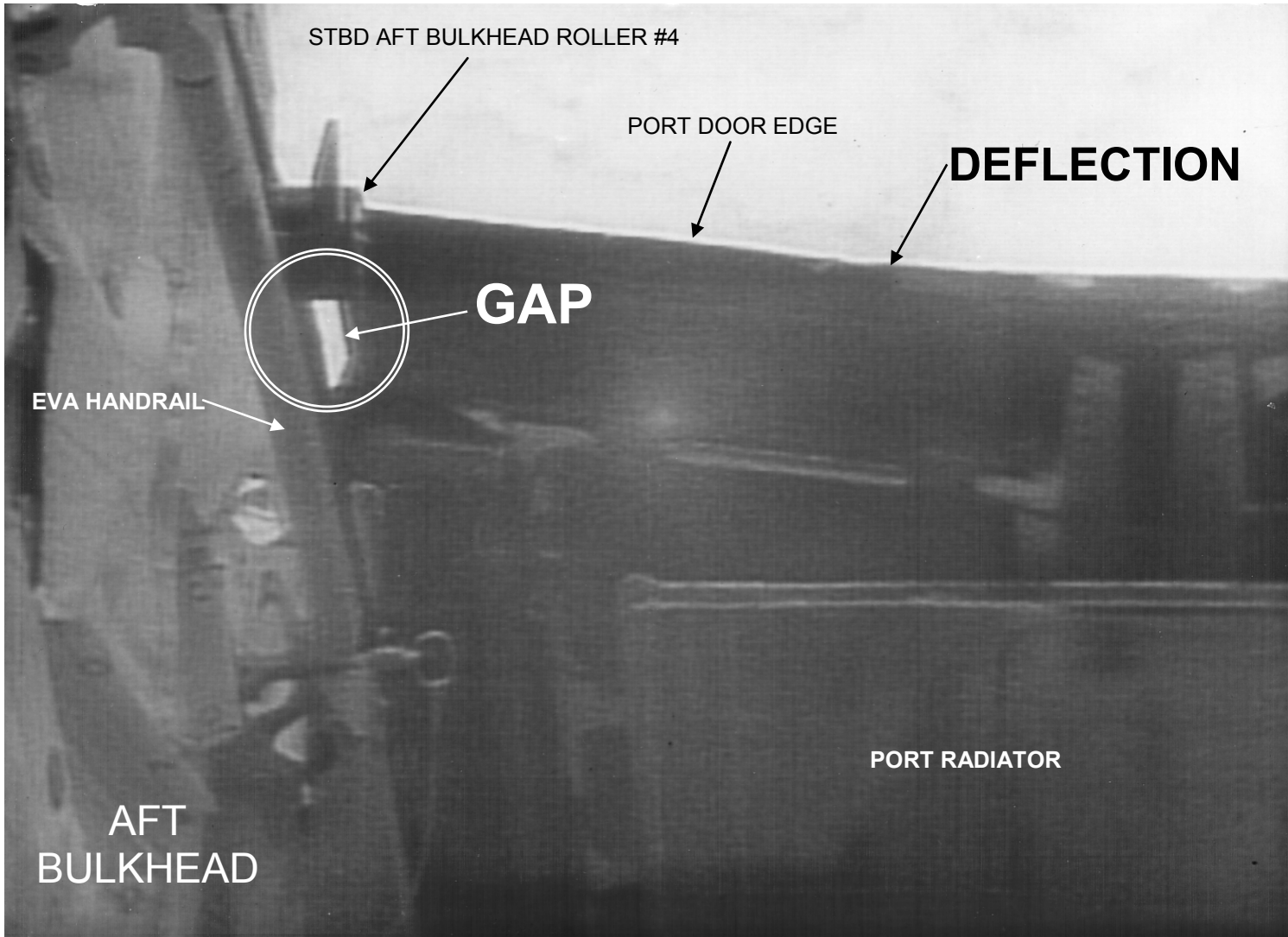


Figure 9-1.- Port aft bulkhead latch GO/NO-GO diagram.



Shows worst case upwards deflection of PLBD seen on STS-4

Figure 9-2.- Port aft centerline viewed by camera C.

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 YES

12

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 ?

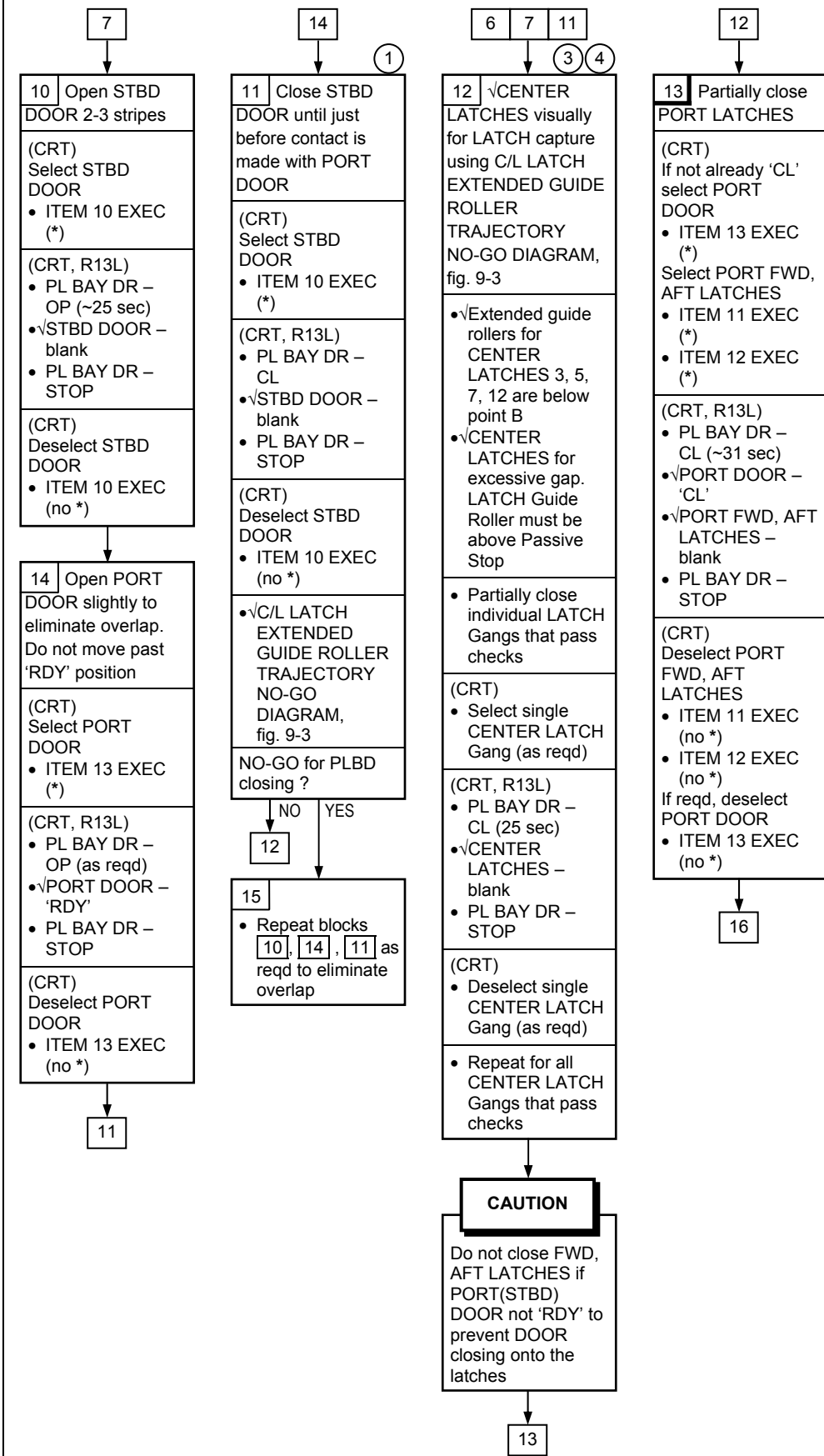
YES NO

10 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)

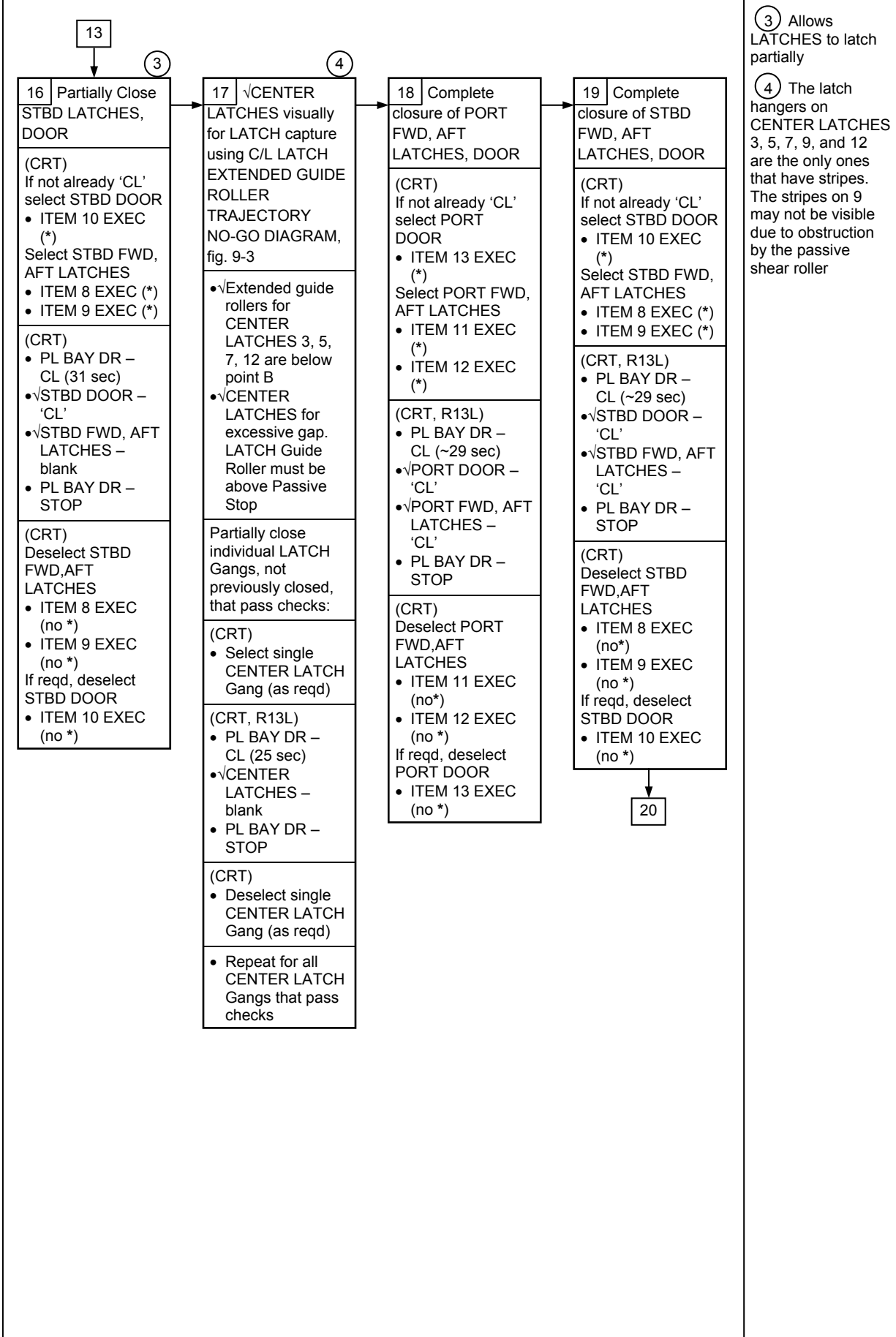


① Depending on the position of the port door, STBD DOOR may show 'RDY' instead of blank

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)



MECH SSR-3 (Cont)

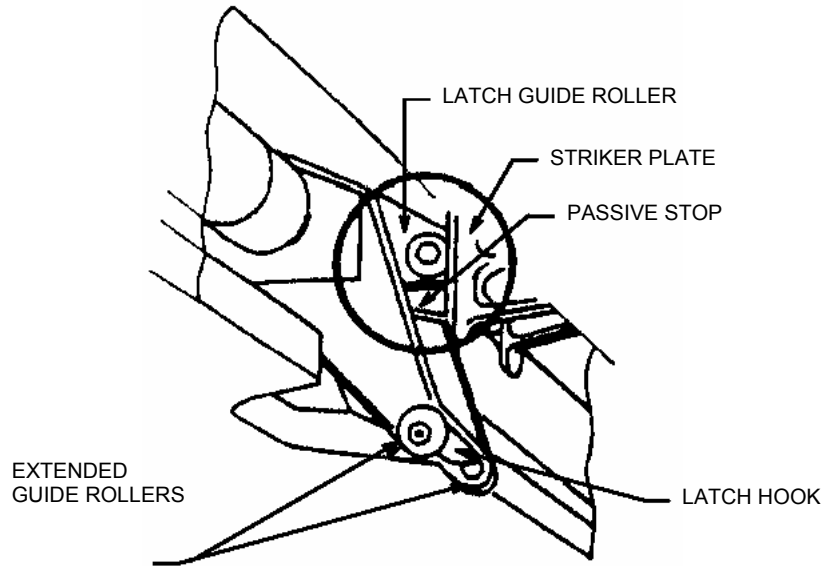
19

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

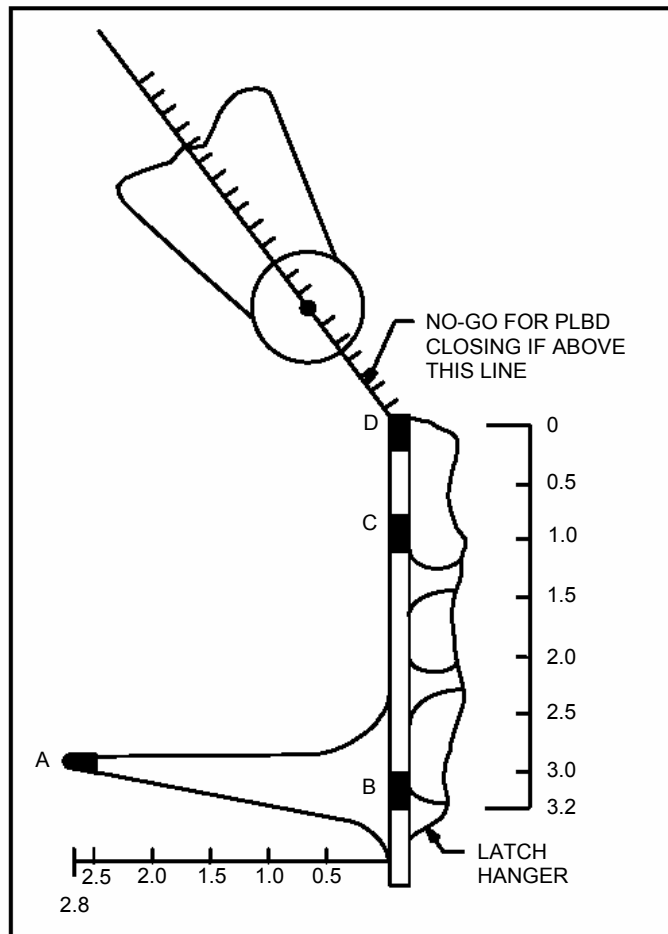


Figure 9-3.- C/L Latch Extended Guide Roller Trajectory NO-GO Diagram

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 (*)
- 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"> •√AC POWER ON – (*) •√AUTO MODE SEL – (no *) •√MAN SEL (ten) – (no *) 	
(R13L)	
<ul style="list-style-type: none"> •√PL BAY DR SYS (two) – ENA • √DR – STOP 	

2	Aff DOOR:
STBD	
PORT	

3	<ul style="list-style-type: none"> • Close,latch PORT DOOR in MANUAL mode
---	--

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"> • MCA LOGIC MNB MID 4 – OFF 	<ul style="list-style-type: none"> • MCA LOGIC MNA MID 1 – OFF 	
(CRT)	(CRT)	
<ul style="list-style-type: none"> •√PORT DOOR FWD 'C' MICRO-SW STAT – '0' 	<ul style="list-style-type: none"> •√PORT DOOR AFT 'C' MICRO-SW STAT – '0' 	

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"> • MCA LOGIC MNB MID 2 – OFF 	<ul style="list-style-type: none"> • MCA LOGIC MNC MID 4 – OFF 	
(CRT)	(CRT)	
<ul style="list-style-type: none"> •√STBD DOOR FWD 'C' MICRO-SW STAT – '0' 	<ul style="list-style-type: none"> •√STBD DOOR AFT 'C' MICRO-SW STAT – '0' 	

6	Close PORT DOOR
(CRT)	
Select PORT DOOR	
<ul style="list-style-type: none"> • ITEM 13 EXEC (*) 	
(R13L)	
<ul style="list-style-type: none"> • PL BAY DR – CL 	
(CRT)	
<ul style="list-style-type: none"> •√'OP/CL', 'MICRO-SW STAT' columns 	
After PORT DOOR 'RDY' and one DOOR 'C' = '1', or ~126 sec:	
(R13L)	
<ul style="list-style-type: none"> • PL BAY DR – STOP 	
(CRT)	
Deselect PORT DOOR	
<ul style="list-style-type: none"> • ITEM 13 EXEC (no *) 	

7	PLBD fit check
(CRT)	
Select STBD DOOR	
<ul style="list-style-type: none"> • ITEM 10 EXEC (*) 	
(R13L)	
<ul style="list-style-type: none"> • PL BAY DR – CL 	
When STBD DOOR as close as possible to PORT DOOR before contact:	
(R13L)	
<ul style="list-style-type: none"> • PL BAY DR – STOP • Determine C/L Latch Clearance on C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY NO-GO DIAGRAM, <u>MECH SSR-3, fig. 9-3:</u> 	
GO	NO-GO

8	Reenable MCA LOGIC pwr
MTR 1 (MA73C:B)	MTR 2 (MA73C:A)
<ul style="list-style-type: none"> • MCA LOGIC MNB MID 4 – ON 	<ul style="list-style-type: none"> • MCA LOGIC MNA MID 1 – ON

11

9

12

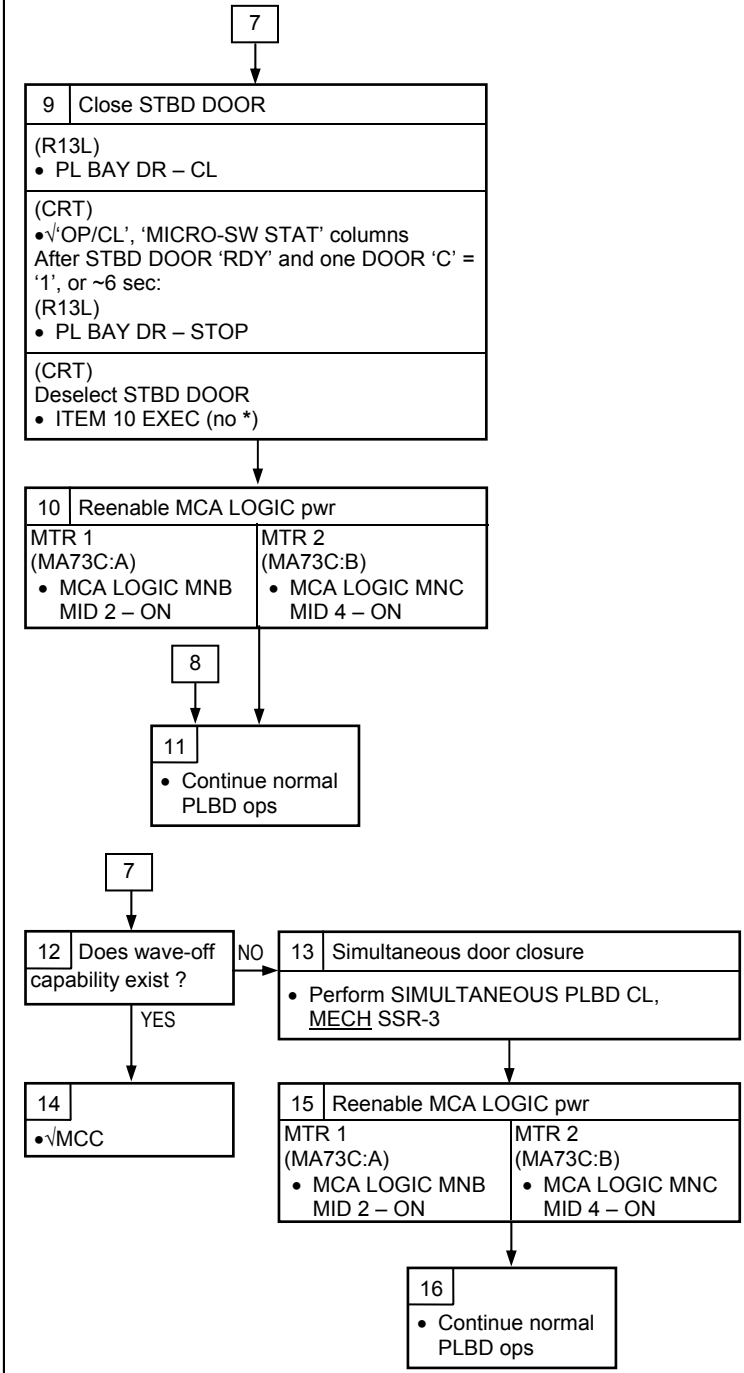
① To enable mtr 1, this step also disables pwr to:
PORT FWD BLKHD MTR 2
STBD DOOR MTR 2
STBD FWD BLKHD MTR 2

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

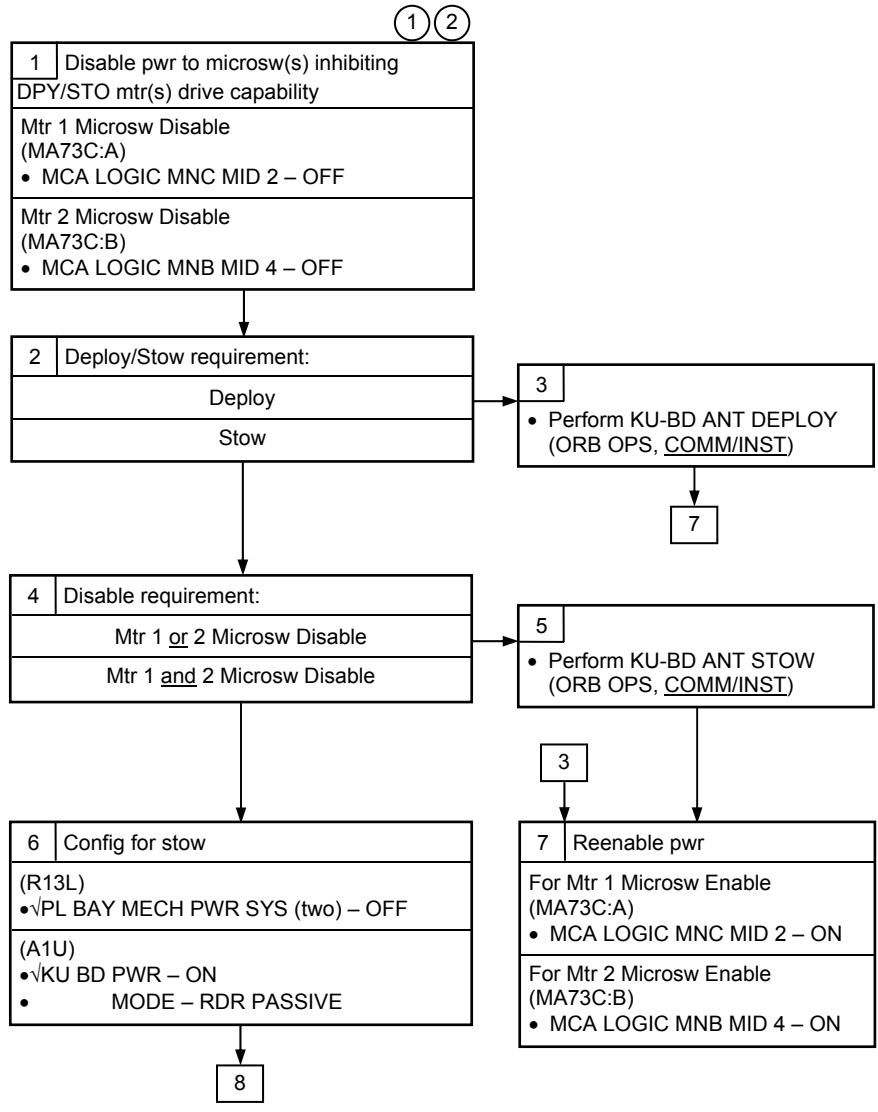
MECH SSR-6 (Cont)



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"> DAP: VERN(FREE)
(A1U)	<ul style="list-style-type: none"> SLEW RATE – as reqd ELEV – as reqd
(A2)	<ul style="list-style-type: none"> R/EL ind: $-27.0 (\pm 1^\circ)$
(A1U)	<ul style="list-style-type: none"> SLEW AZM – as reqd
(A2)	<ul style="list-style-type: none"> R/AZM ind: $-123.0 (\pm 1^\circ)$
(R13L)	<ul style="list-style-type: none"> KU ANT – STOW

CAUTION

KU ANT sw must remain in STOW until after KU BD PWR sw is in OFF

9	
	After 50 sec:
(A2)	<ul style="list-style-type: none"> R/EL ind: $-29.0 (\pm 1^\circ)$ R/AZM ind: $-125.0 (\pm 1^\circ)$
(A1U)	<ul style="list-style-type: none"> KU BD PWR – OFF CNTL – PNL
(R14C)	<ul style="list-style-type: none"> cb MNB KU ELEC – op MNC KU SIG PROC – op
(R13L)	<ul style="list-style-type: none"> KU ANT – GND
	<ul style="list-style-type: none"> DAP: as reqd

② ③

10	Stow deployed assy
(R13L)	<ul style="list-style-type: none"> KU ANT DIRECT STO – ON PL BAY MECH PWR SYS (two) – ON
	After 23 sec max:
	<ul style="list-style-type: none"> PL BAY MECH PWR SYS (two) – OFF KU ANT DIRECT STO – OFF
	<ul style="list-style-type: none"> KU-BD deployed assy is within GO FOR PLBD CLOSURE envelope

11	Reenable pwr
	For Mtr 1 Microsw Enable (MA73C:A)
	<ul style="list-style-type: none"> MCA LOGIC MNC MID 2 – ON
	For Mtr 2 Microsw Enable (MA73C:B)
	<ul style="list-style-type: none"> 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

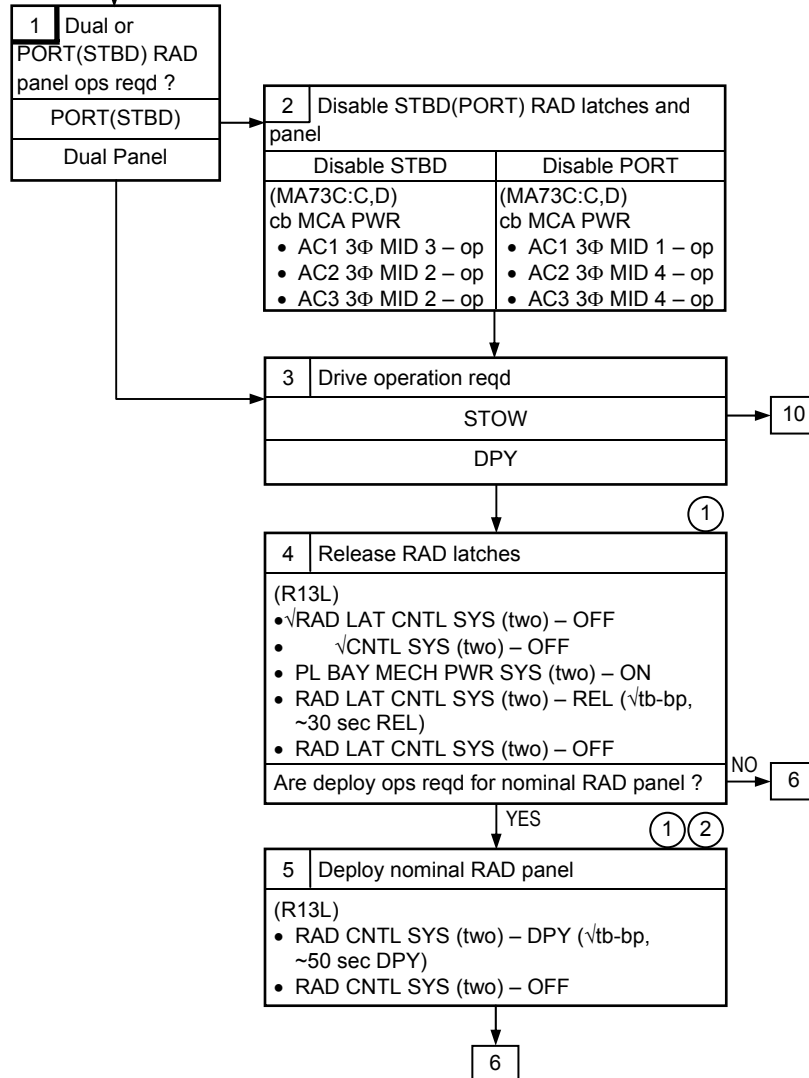
MECH SSR-8 RAD DPY/STO MICROSWS FAILURE WORKAROUND

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

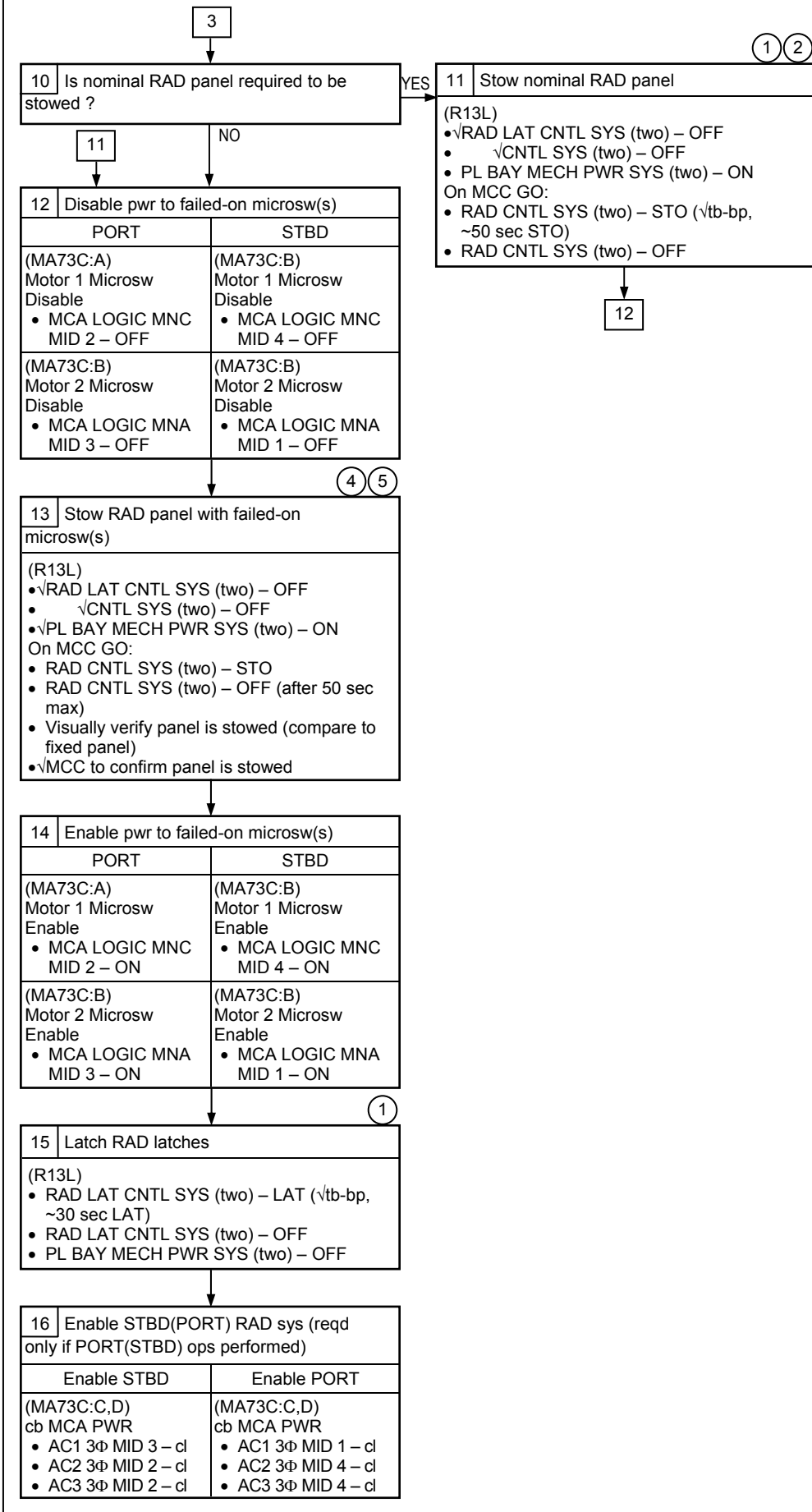
① Drive Times

(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

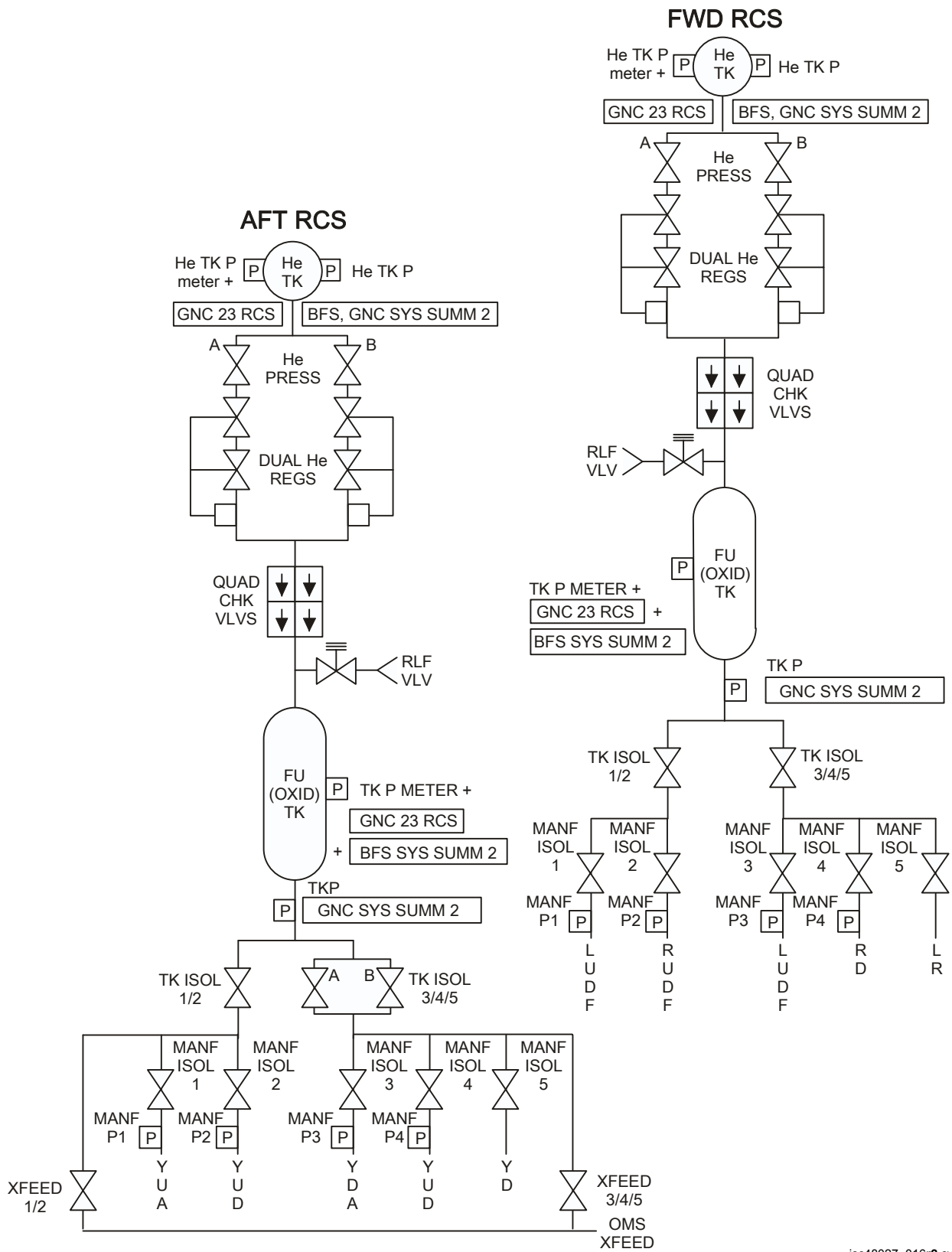
RCS

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)

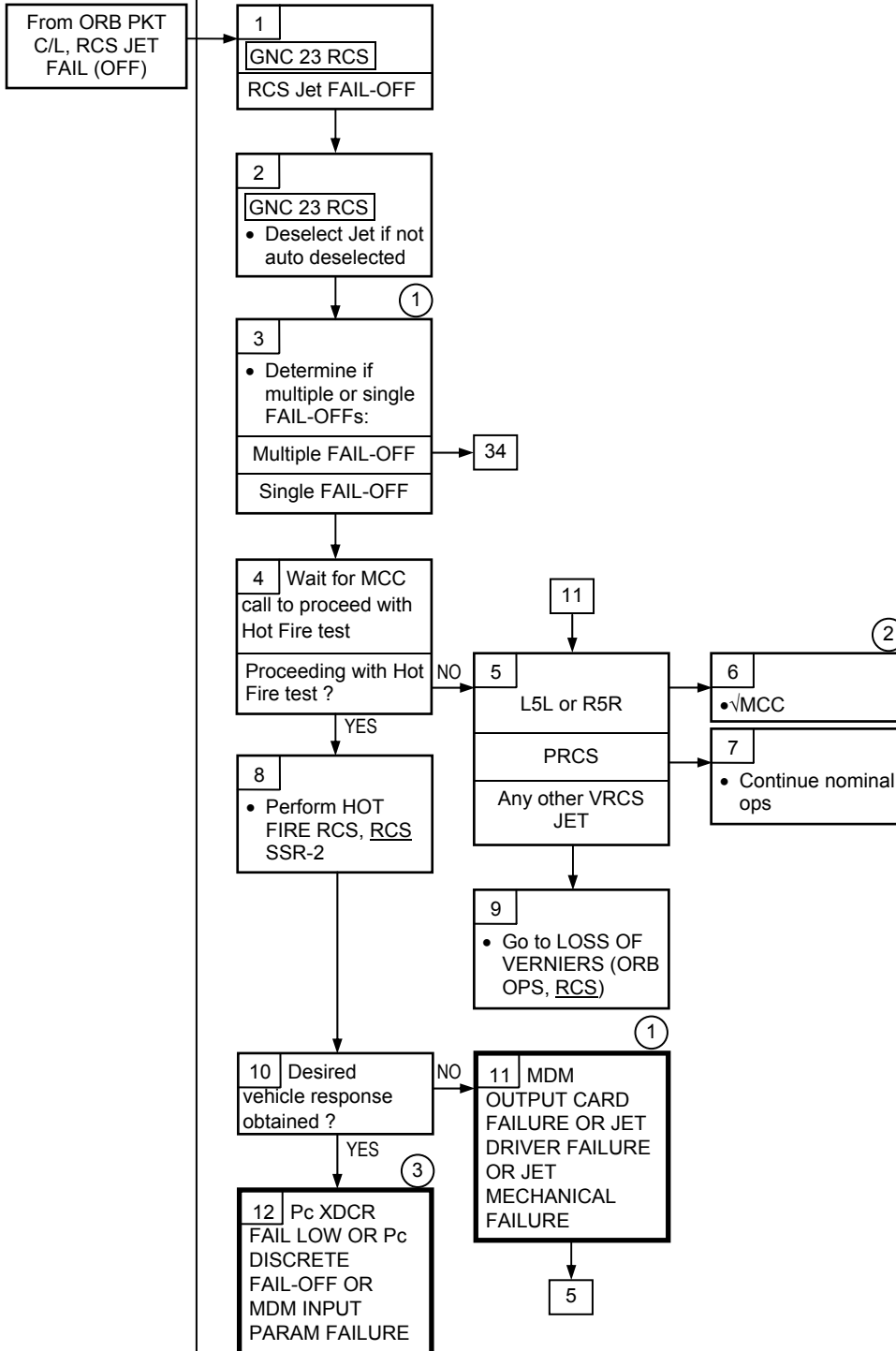
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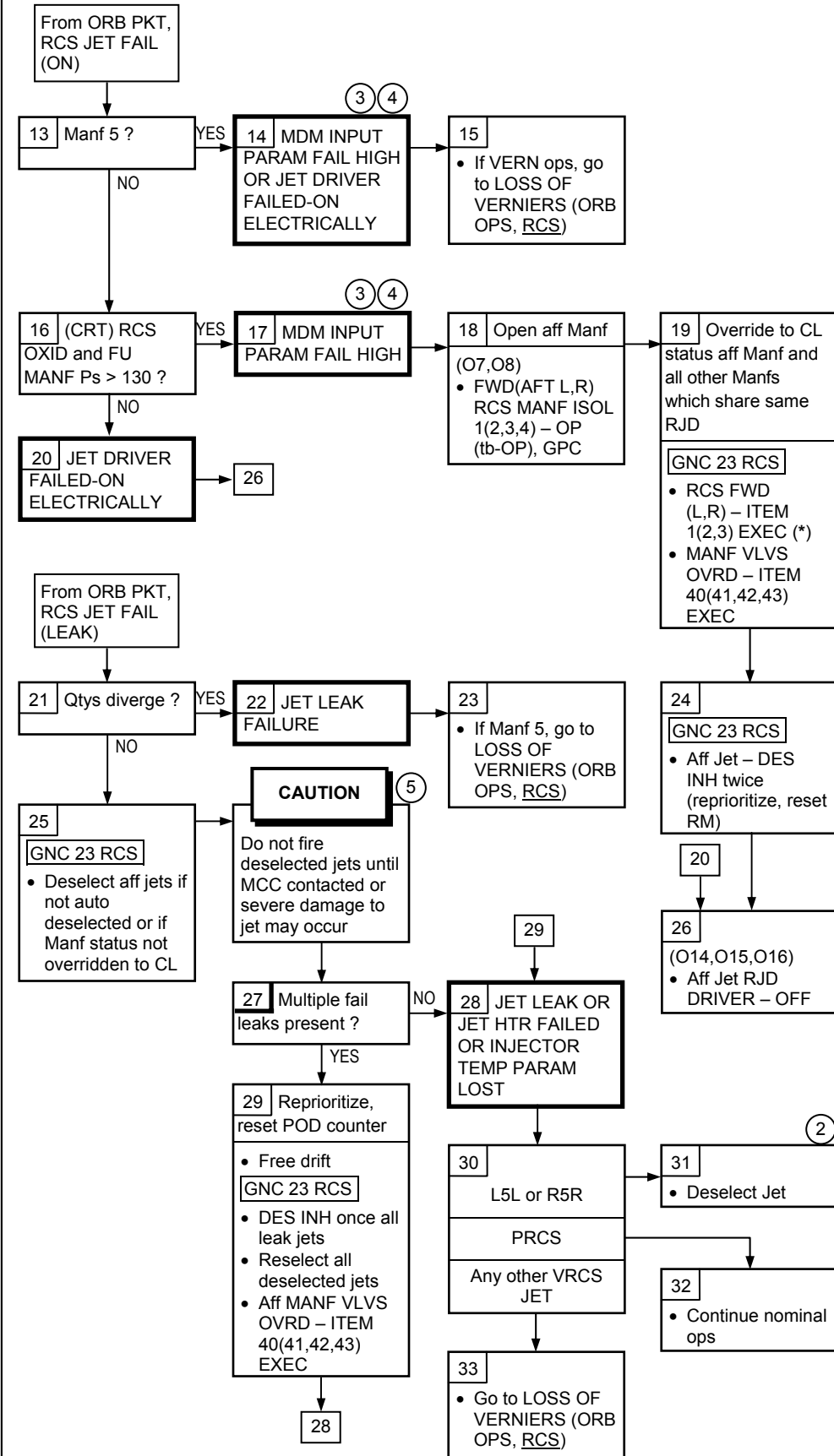
RCS

10.1a 'L(R,F) RCS (L,U,D,R,A,F) JET'
'F(L,R) RCS TK P'
'F(L,R) RCS LEAK'



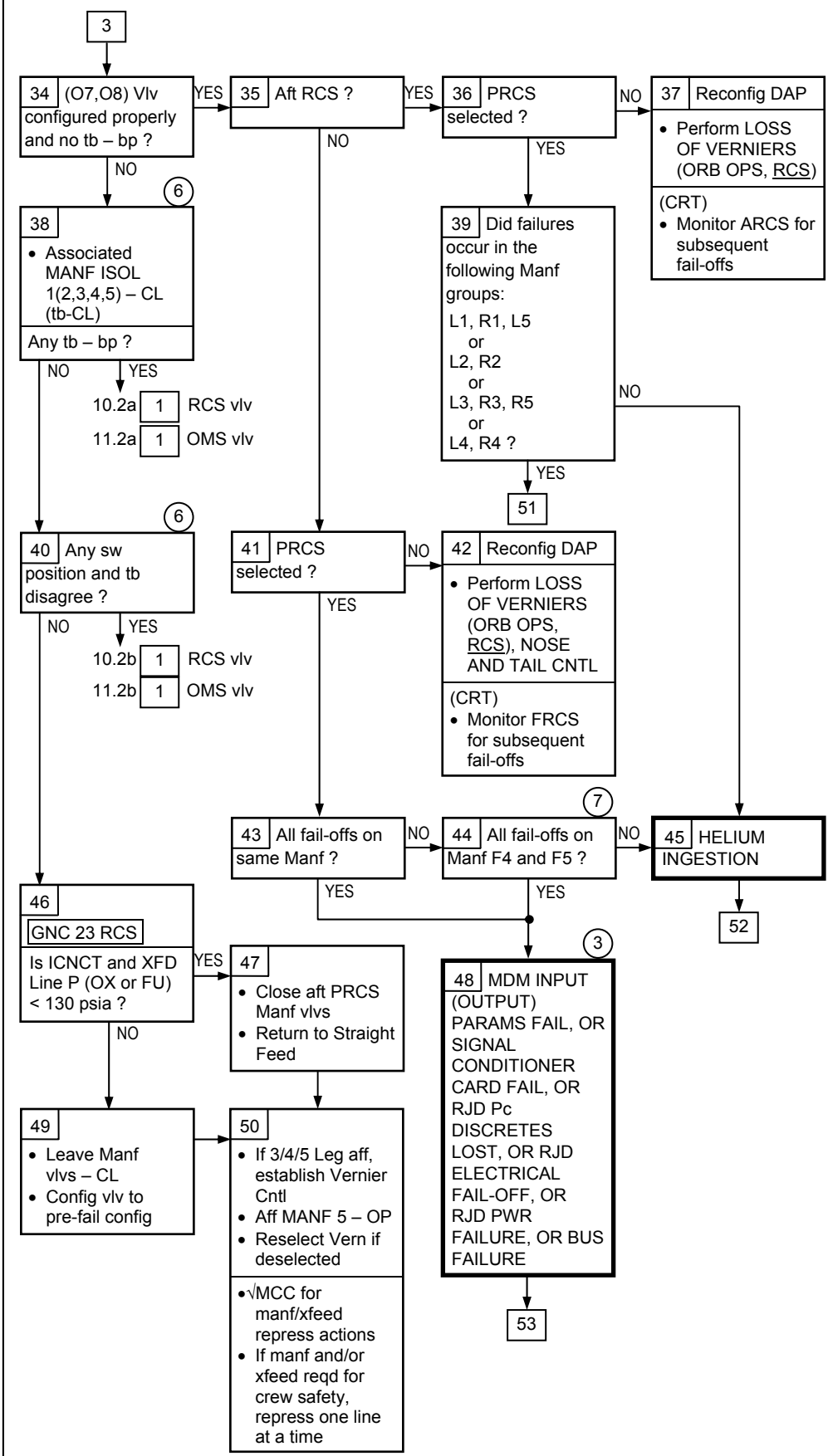
- ① To determine if multiple fail-off jets occurred, √both Aft pods
- ② If L5L or R5R failed, vernier control available except during certain loaded PDRS ops
- ③ √MCC for other params possibly lost

RCS 10.1a (Cont)



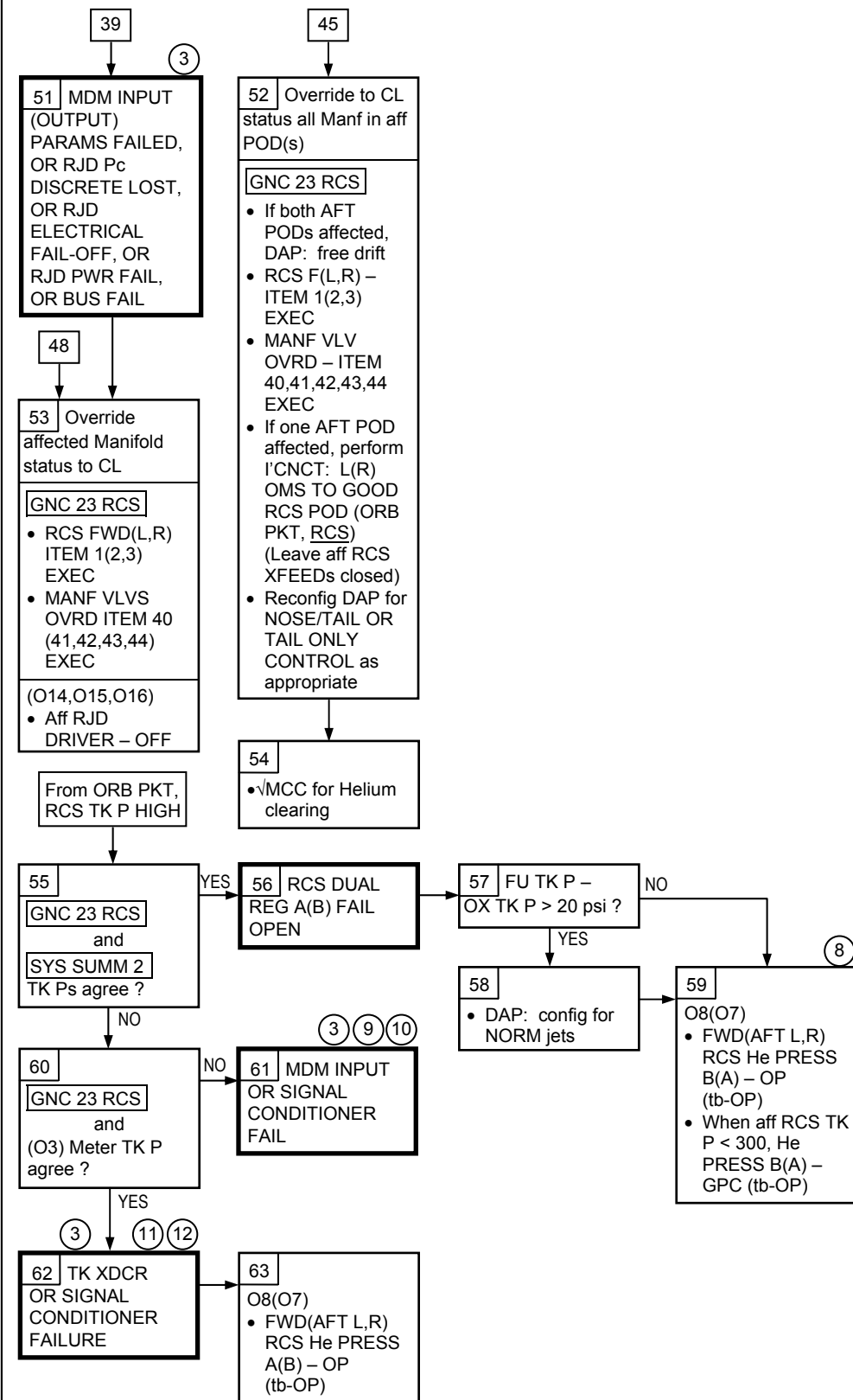
- ② If L5L or R5R failed, vernier control available except during certain loaded PDRS ops
- ③ √MCC for other params possibly lost
- ④ Fail-on protection lost for affected jet
- ⑤ MCC call based on jet injector temps

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

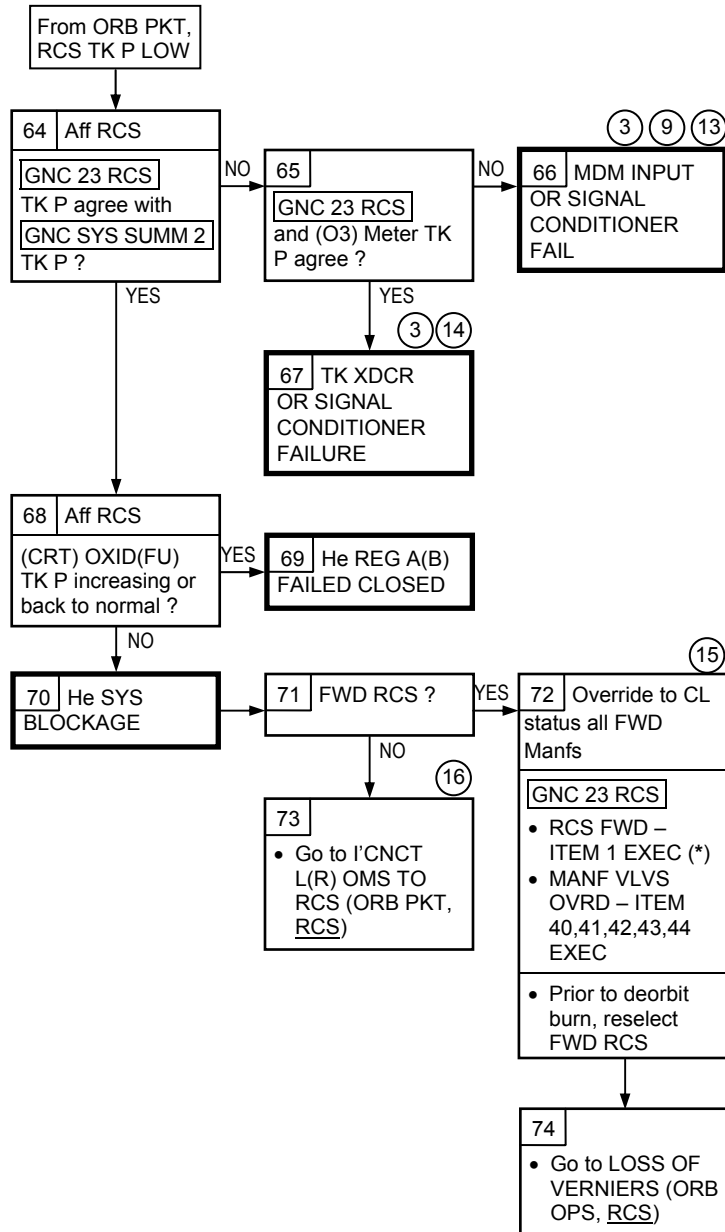
SYS SUMM

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

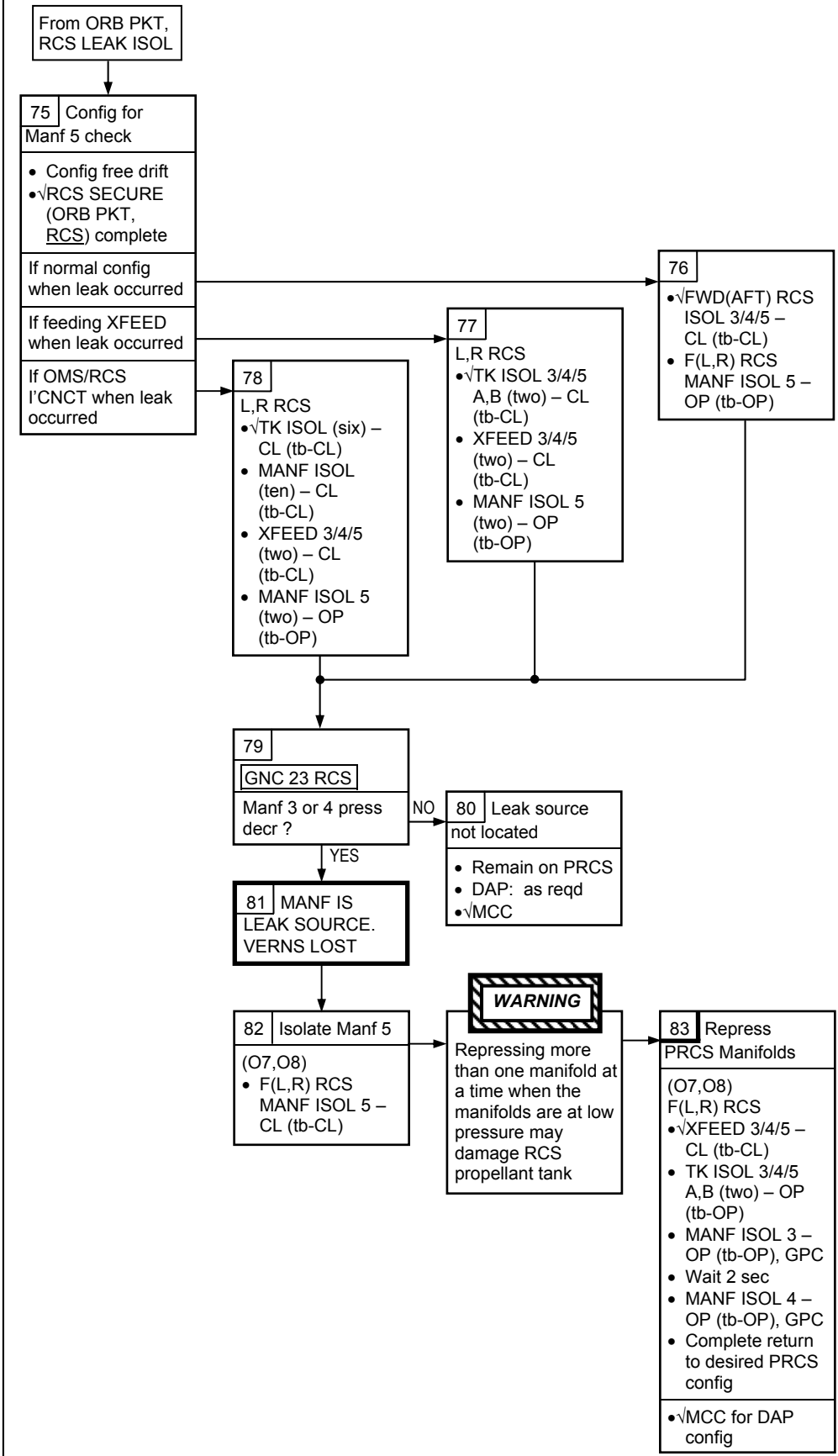
or (O3) meter TK P only (O3) Meter

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

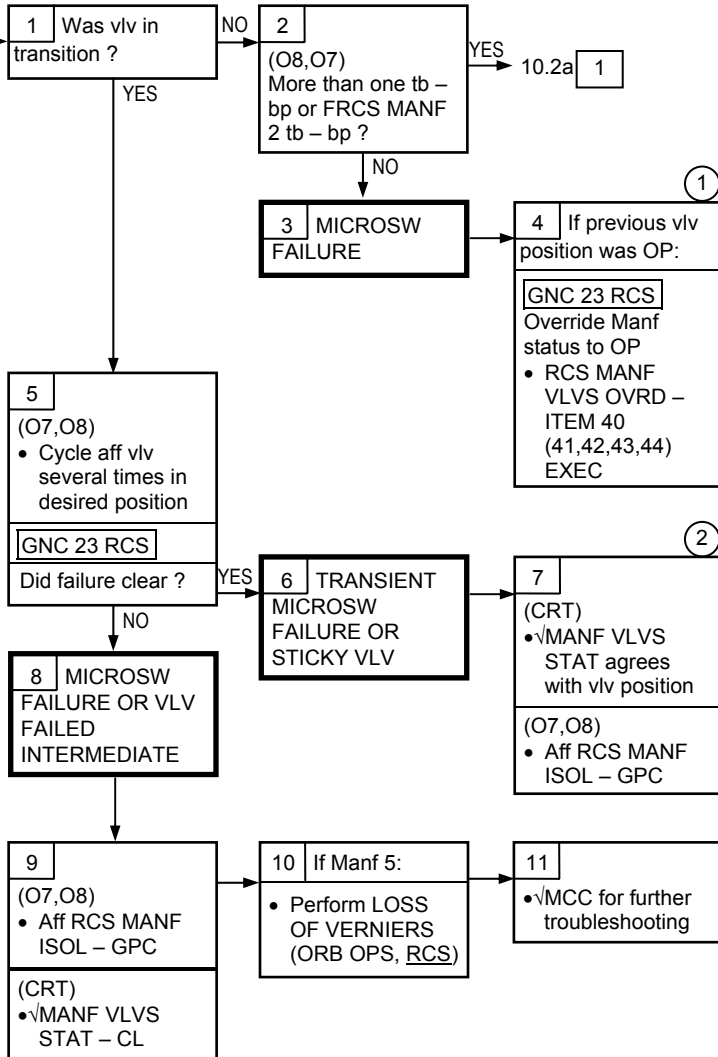
10.1b 'RM DLMA MANF'

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

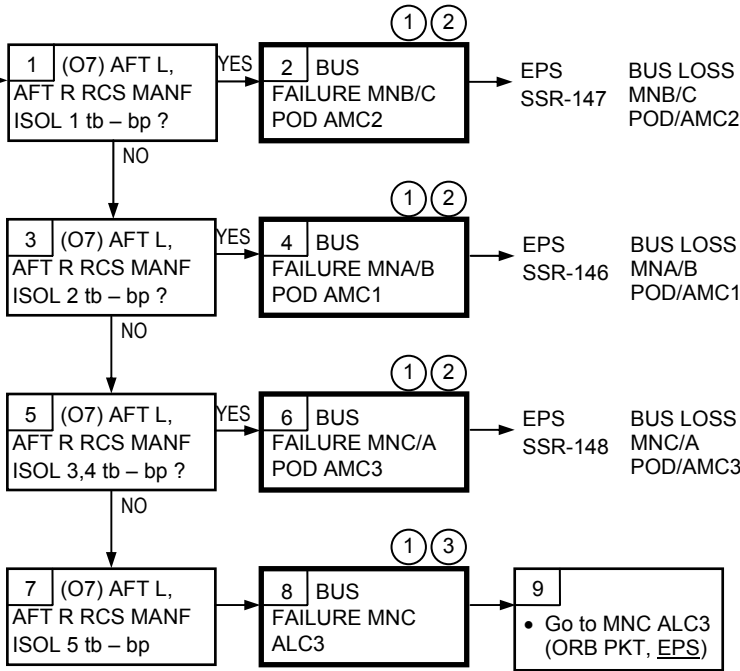
10.1c 'RCS PWR FAIL'

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

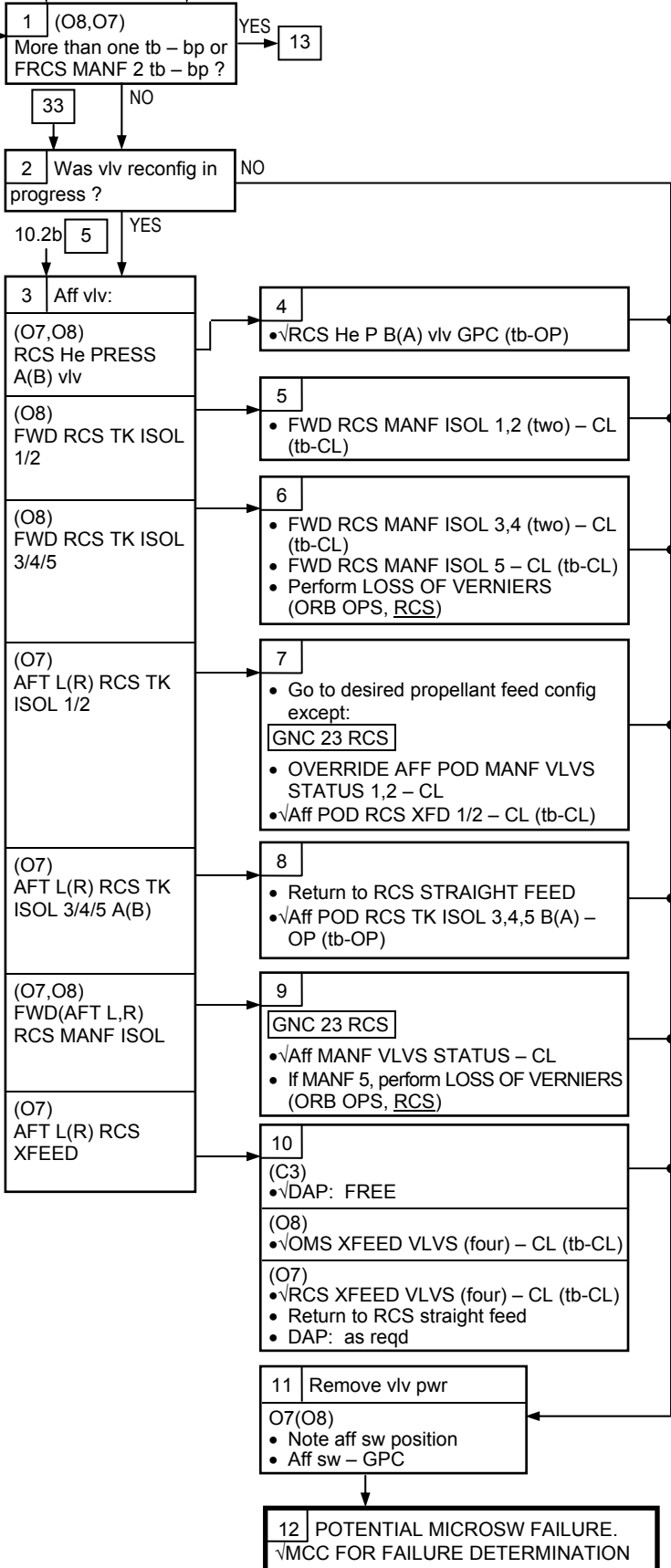
10.2a RCS VLV tb – bp

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)

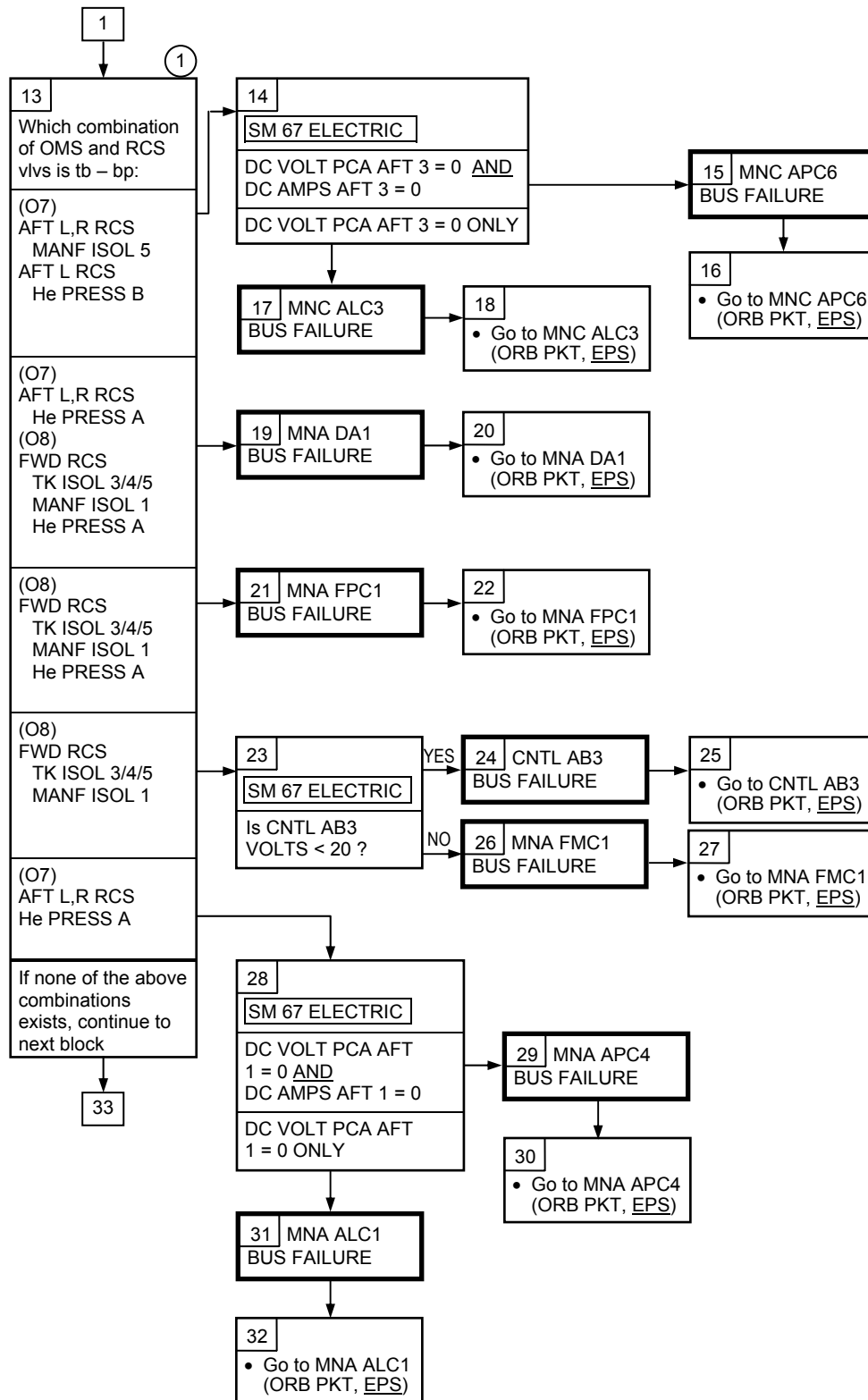
Nominal Config:
 (MA73C:A)
 MCA LOGIC
 MNA FWD 1 – ON
 MNB FWD 2 – ON
 MNC FWD 3 – ON
 (MA73C:I)
 AFT POD VLV
 LOGIC GP
 1/3 – ON
 1/2 – ON
 2/3 – ON
 (MA73C:H)
 cb AC1,AC2,AC3
 FWD RCS VLV
 φA,φB,φC
 (nine) – cl
 (MA73C:I)
 cb AC1,AC2,AC3
 AFT POD VLV GP
 1,2,3 φA,φB,φC
 (nine) – cl
 (R14:C)
 cb MNC MANF ISOL
 L5,R5,F5 ENA
 (three) – cl

10.1a 38
 10.1b 2
 10.2b 2



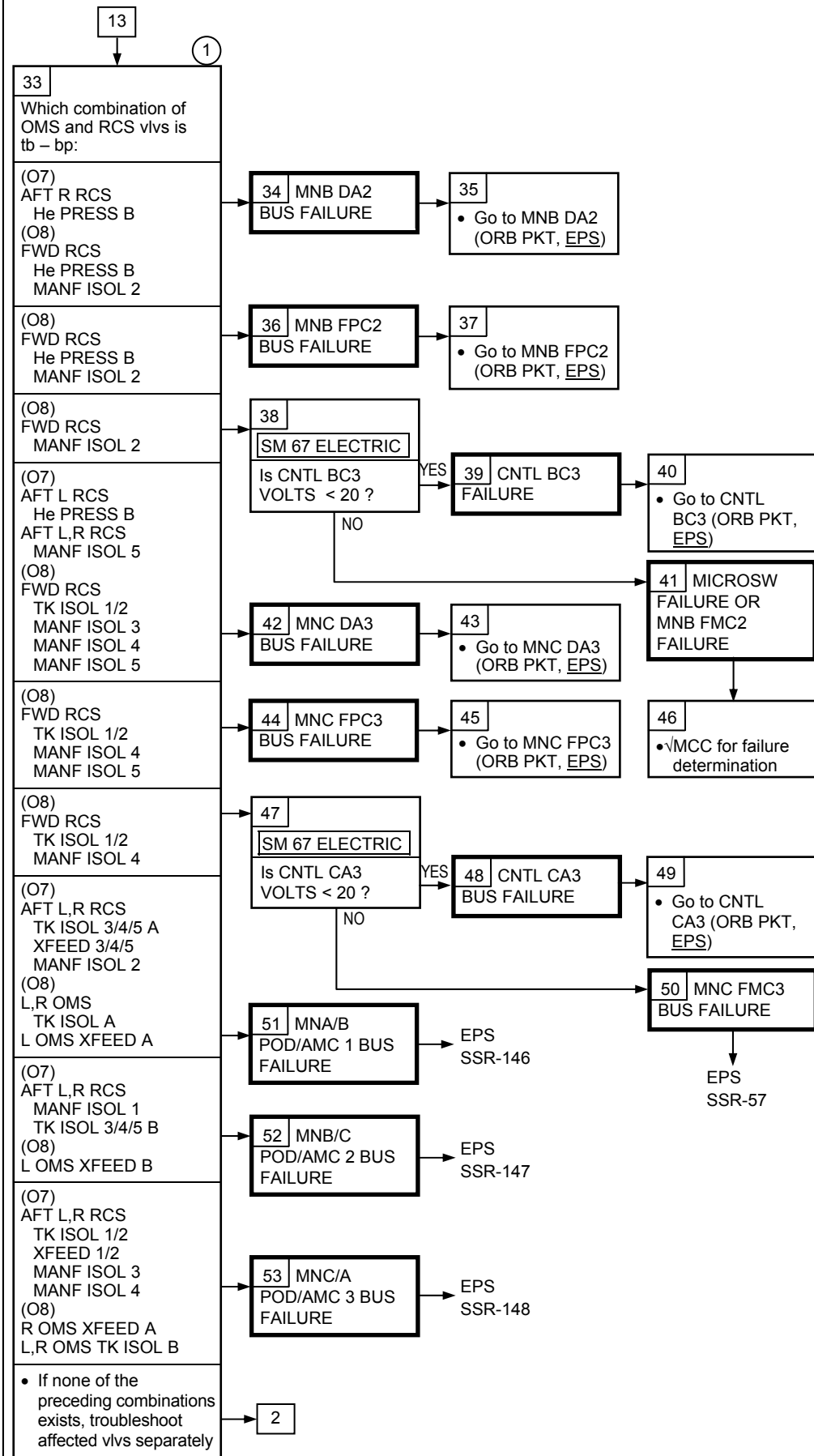
RCS VLV
MISCOMP
10.2

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)



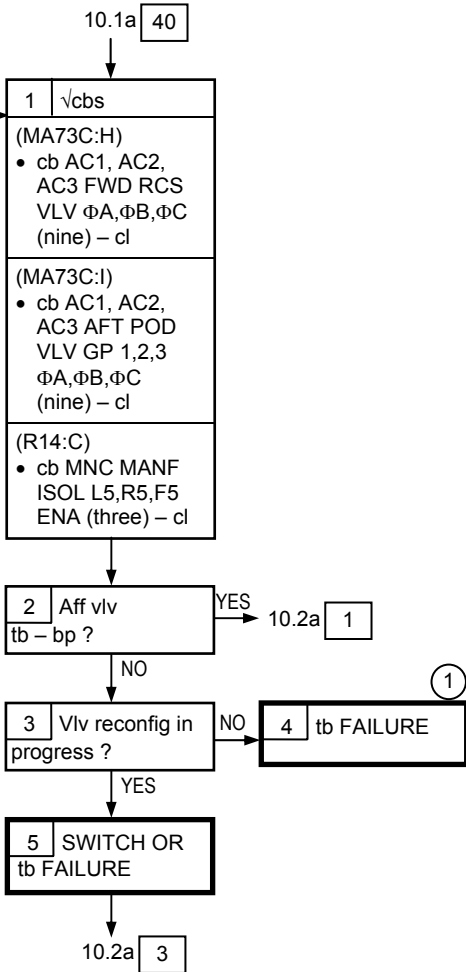
① Refer to BUS LOSS ID Table (ORB PKT, EPS) for bus loss verification. Proceed to BUS LOSS SSR if bus loss confirmed. For OMS/RCS function loss, refer to OMS/RCS operational Slide Rule for appropriate bus failure

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

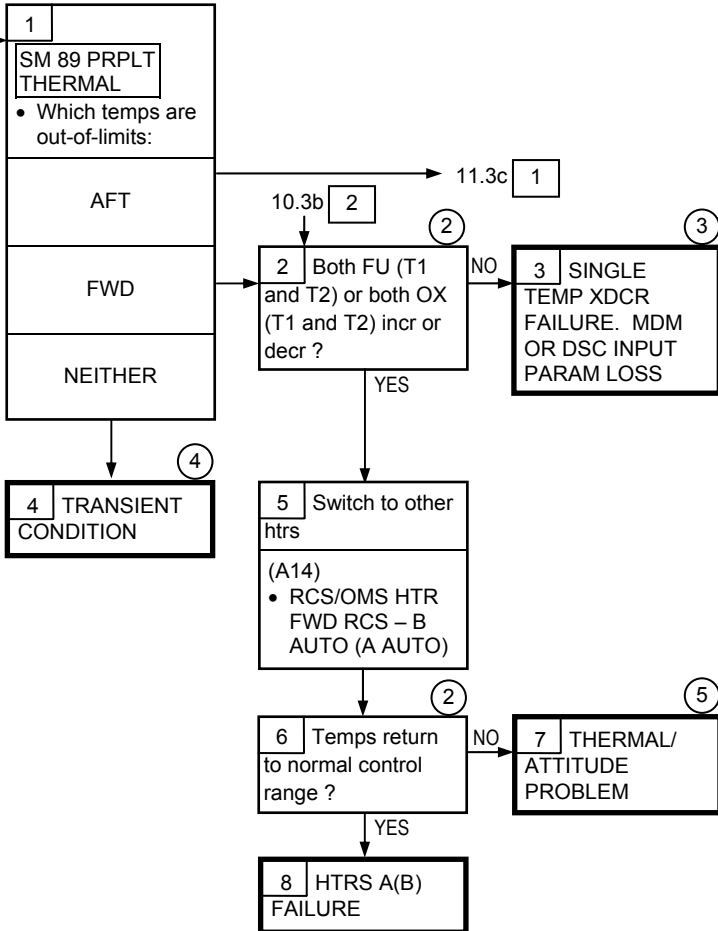
10.3a 'S89 PRPLT THRM RCS'

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

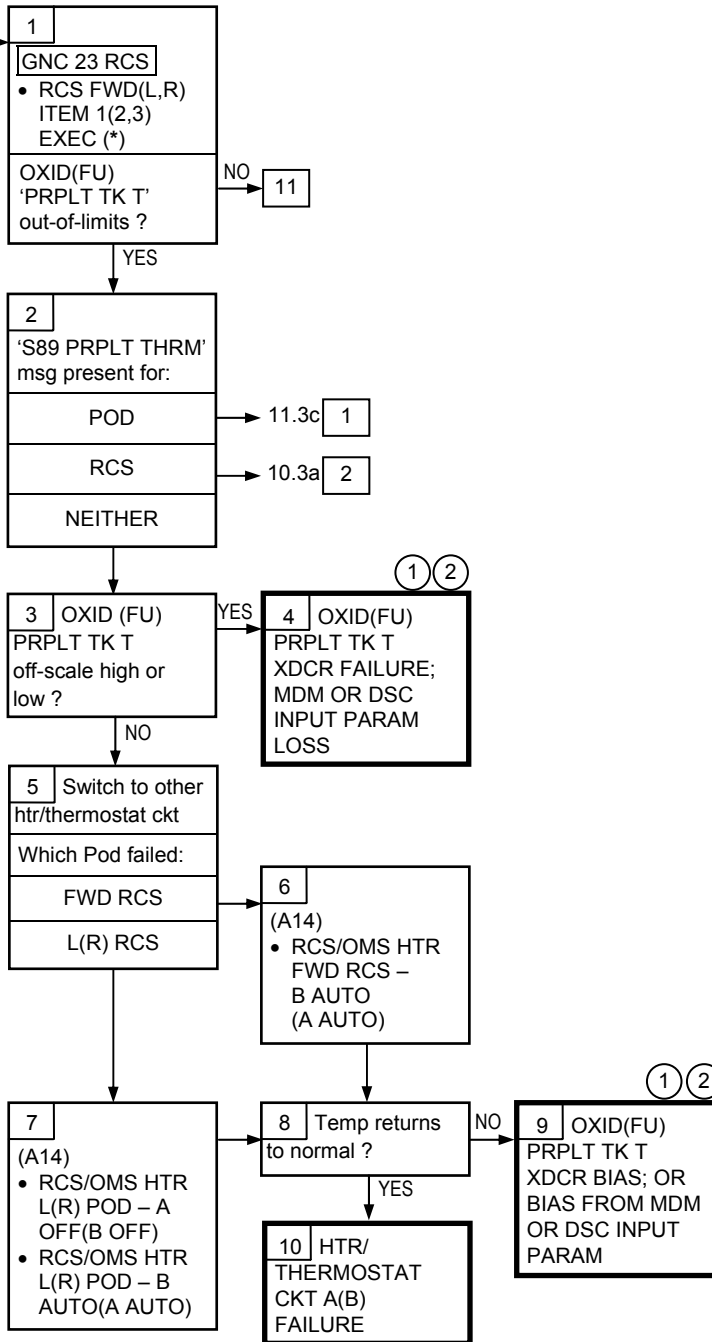
10.3b 'G23 RCS SYSTEM F(L,R)'

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

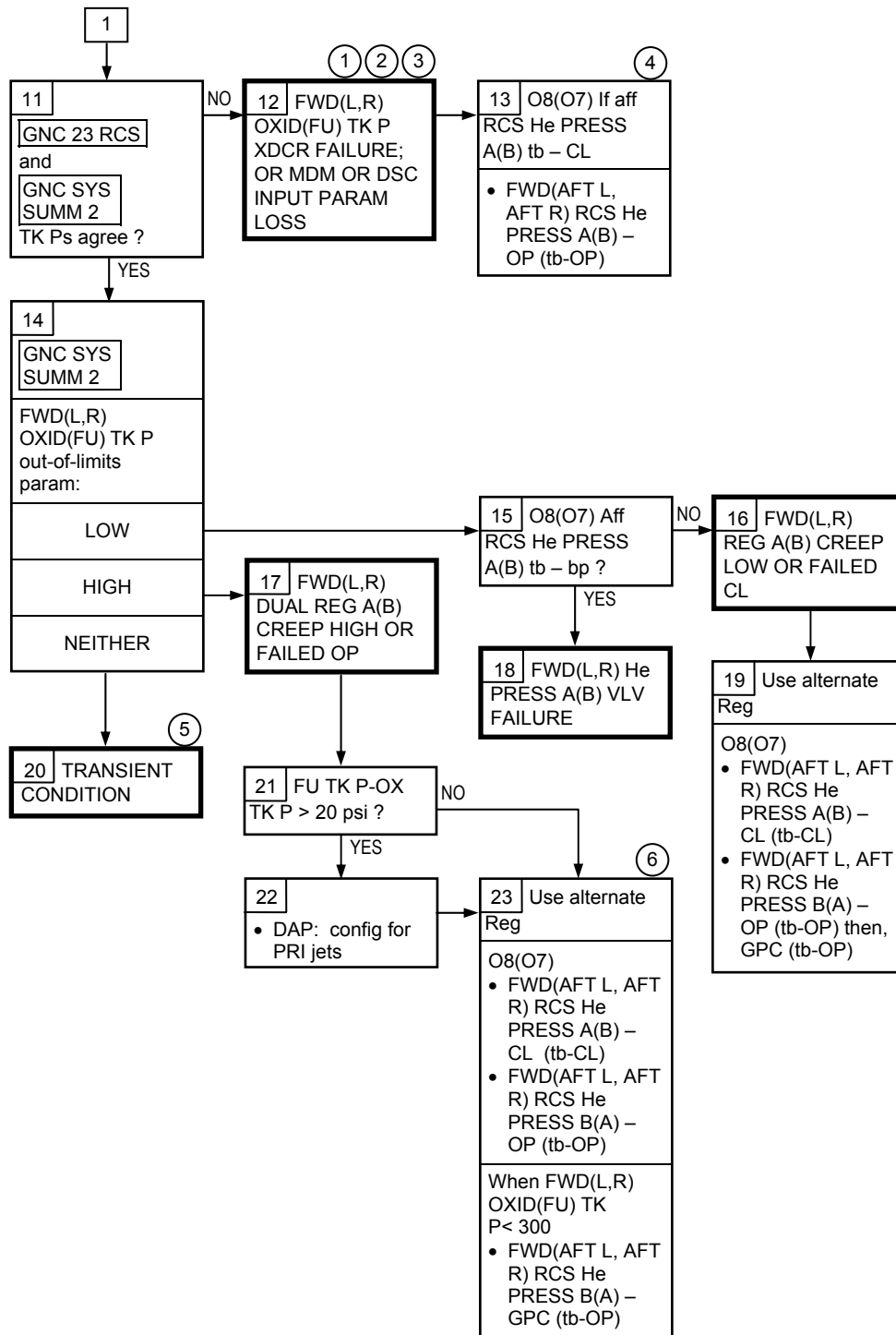
Nominal Config:
O8(O7)
FWD(AFT L, AFT R)
RCS He PRESS
A(B) – GPC
(tb-OP)
B(A) – CL
(tb-CL)
(A14)
RCS/OMS HTR
FWD RCS –
A AUTO
(B AUTO)
RCS/OMS HTR L
POD (two) –
A AUTO(B AUTO)
B OFF(A OFF)
RCS/OMS HTR R
POD (two) –
A AUTO(B AUTO)
B OFF(A OFF)



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)

CAUTION Wait for MCC verification of correct config
--

AFT L,R RCS XFEED (four) – OP (tb-OP)

6. Resume attitude control:
DAP: as reqd

RCS MIXED XFEED TERMINATE (PERFORM IN OPS 3)

Establish L(R) OMS interconnect config:

- F7 1. √FLT CNTLR PWR – OFF
C3 DAP: INRTL
DAP ROT: PULSE/PULSE/PULSE
- O7 2. L,R RCS TK ISOL (six) – CL (tb-CL)
√XFEED (four) – OP (tb-OP)
3. If RCS MANF P (OX and FU) > 130, continue
Otherwise, √MCC >>
- O8 4. √L(R) OMS He PRESS/VAP ISOL (two) – CL
TK ISOL (two) – OP (tb-OP)
√R(L) OMS XFEED (two) – CL (tb-CL)
L(R) OMS XFEED A – CL (tb-CL)
B – OP (tb-OP)
- O7 5. MSTR RCS XFEED – OFF
- C3 6. DAP: as reqd

NOTE

Gauging not avail in OPS 3

7. After OPS 2 transition:

GNC 23 RCS

OMS PRESS ENA L(R) OMS – ITEM 5(6) EXEC

RCS SSR-2 HOT FIRE RCS

O7(O8) √Prop feed vlvs – OP
O14(O15,O16) √Appropriate RJD LOGIC, DRIVER – ON
 Perform Hot Fire during AOS

CONFIG DAP FREE DRIFT FOR HOT FIRE

1. If OPS 2:

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,
O15,
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

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

	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
FRCS -X (2 JETS)	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 – MED
RATE – HI

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)

F7
C2

5. POST BURN RECONFIG

FLT CNTLR PWR – OFF
If retro or posi burn: GNC, OPS 201 PRO
DAP TRANS: PULSE/PULSE/PULSE

GNC 20 DAP CONFIG

P,Y OPTION – ITEM 15,16 EXEC (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)
RJD L5/F5/R5 DRIVER – OFF

O16

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

ΔVX – ITEM 19 +0 EXEC

ΔVY – ITEM 20 -1 0 0 EXEC (+1 0 0 for nose south) EXEC

ΔVZ – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

MNVR – ITEM 27 EXEC (*)

Go to step C3

If retro burn:

TIG – ITEM 10 +(consult MCC) EXEC

ΔVX – ITEM 19 -1 0 0 EXEC

ΔVY – ITEM 20 +0 EXEC

ΔVZ – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

MNVR – ITEM 27 EXEC (*)

Go to step C3

If posi burn:

TIG – ITEM 10 +(consult MCC) EXEC

ΔVX – ITEM 19 +1 0 0 EXEC

ΔVY – ITEM 20 +0 EXEC

ΔVZ – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

MNVR – ITEM 27 EXEC (*)

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 ERROR – MED
 RATE – HI
 ATT – INRTL
 √ADI ATT
 ADI ATT – REF
 ATT REF pb – push
 If burning out-of-plane, execute burn ASAP and ignore TIG references
GNC 20 DAP CONFIG
- F7 DAP B: P,Y OPTION – ITEM 35,36 EXEC (TAIL)
 FLT CNTLR PWR – ON
 DAP TRANS: NORM/PULSE/PULSE
- TIG-0:30 DAP: B/INRTL/PRI
 F5 At TIG: THC +X
 When terminate conditions are met:
 THC – release
 If burn was terminated at CUR Hp = 95, finish burn out-of-plane (step C2)
 DAP: FREE
- O7 Leaking RCS He PRESS A(B) – CL (tb-CL)
 C2 GNC, OPS 201 PRO
 If He leak, go to step 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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OMS

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11.1a 'L(R) OMS TK P'	11-4
<u>11.2</u> <u>OMS SW/VLV MISCOMP</u>	
11.2a OMS VLV tb – bp	11-10
11.2b tb AND sw POSITION DISAGREE.....	11-12
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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

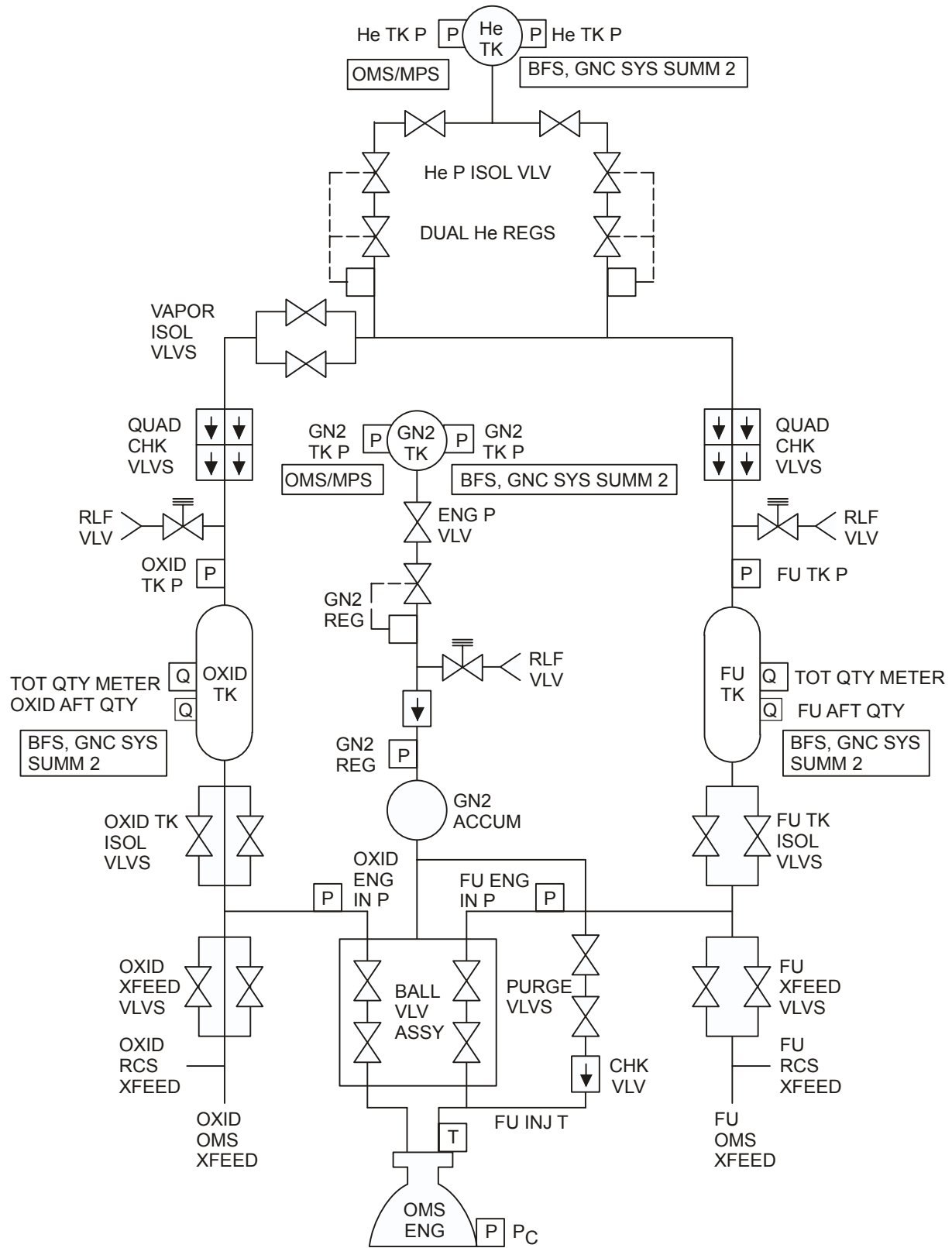
BFS FSM INDEX

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 'L(R) OMS TK P'

From ORB PKT,
OMS N2 TK
PRESS LOW

1 SM ALERT
msg 'L(R) OMS
TK P' occur ?

YES 2 SPEC XDCR
FAILURE OR MDM
OR DSC ANALOG
INPUT PARAM
LOST

NO 3 OMS/MPS
XDCR FAILURE
OR MDM OR ADC
OR DSC ANALOG
INPUT PARAM
LOST

From ORB PKT,
OMS N2 TK
PRESS LOW

4 N2 TK P
decreasing ?

YES 5 N2 TK LEAK

6 When TK P
< 470 psia
• P&I DEORBIT
OMS BURN Cue
Card:
'TIG -2 Aff OMS
ENG L(R) -
ARM'

NO 7 N2 REG P
decreasing ?

YES 8 N2 LEAK
DOWNSTREAM
OF CHECK VLV

NO 9 N2 LEAK
BETWEEN OMS P
VLV AND CK VLV
OR N2 RELIEF
VLV FAILED OPEN

① √MCC for other
params possibly lost
in same MDM or
ADC or DSC card

② N2 P
available on
OMS/MPS

③ N2 P available
on GNC SYS SUMM
2 display

④ Do not use
engine for additional
on-orbit burns

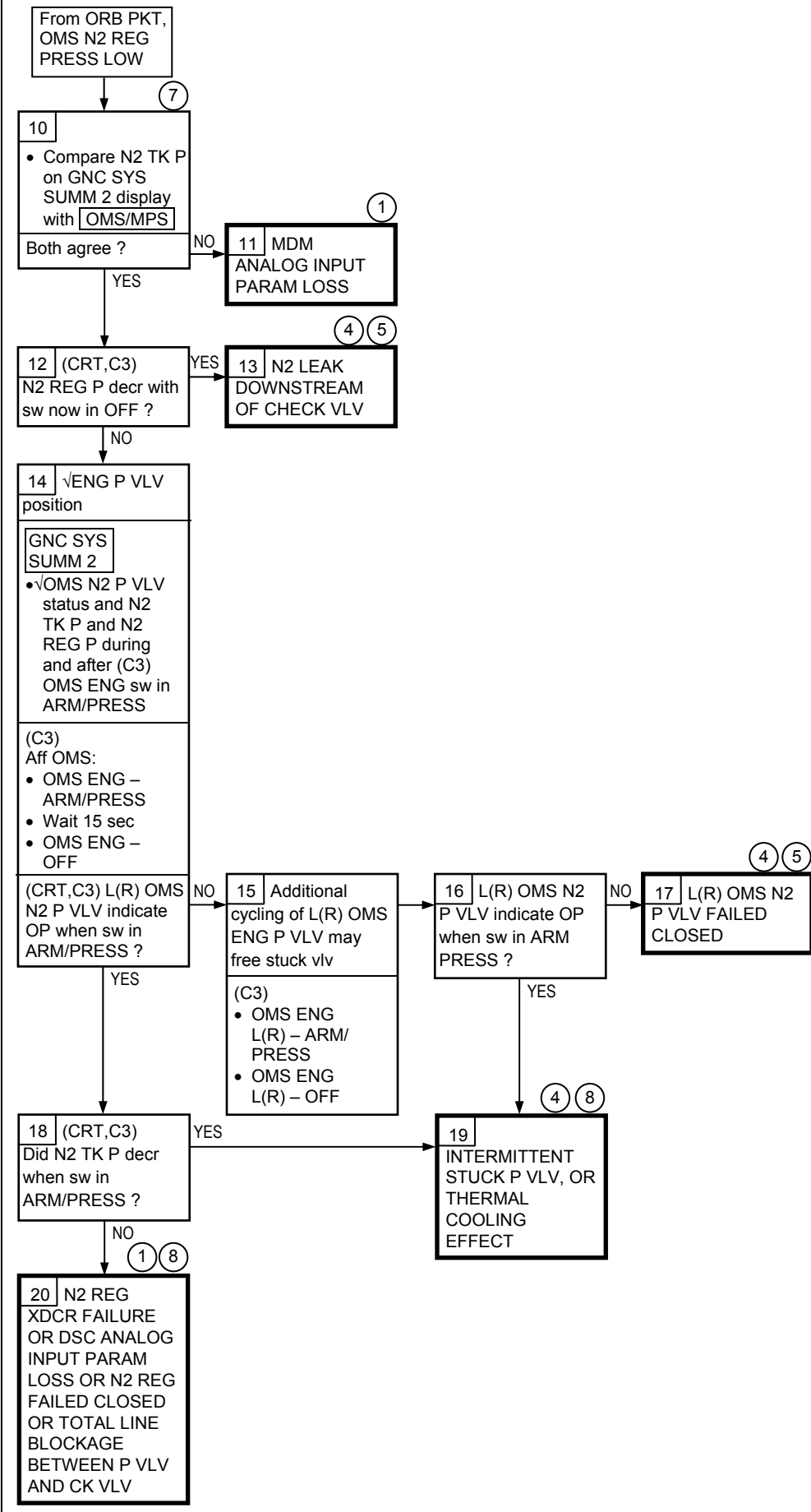
⑤ √MCC to
determine if engine
is usable for deorbit

⑥ If after manual
repress, N2 REG P
< 299 psia, OMS
engine inop

N2 TK P > 564 psia
Attempt repress of
N2 sys prior to each
burn. Monitor N2
REG P

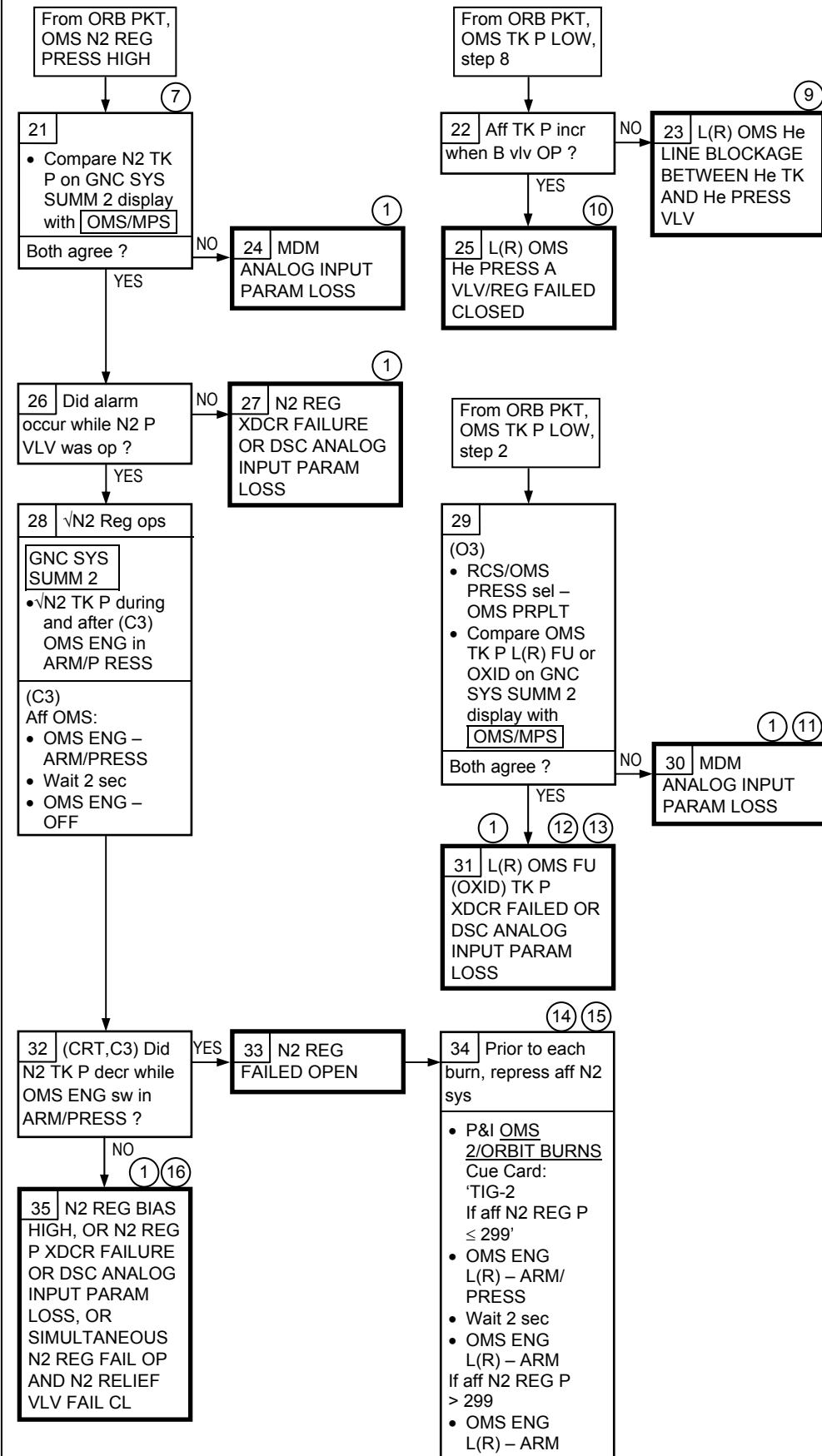
N2 TK P < 564 psia
Save for Deorbit
Burn. Capability
exists to allow one
additional actuation of
bipropellant vlvs from
N2 REG. Ignore
'L(R) OMS TK P' msg
caused by low N2
REG P (P < 299
psia)

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

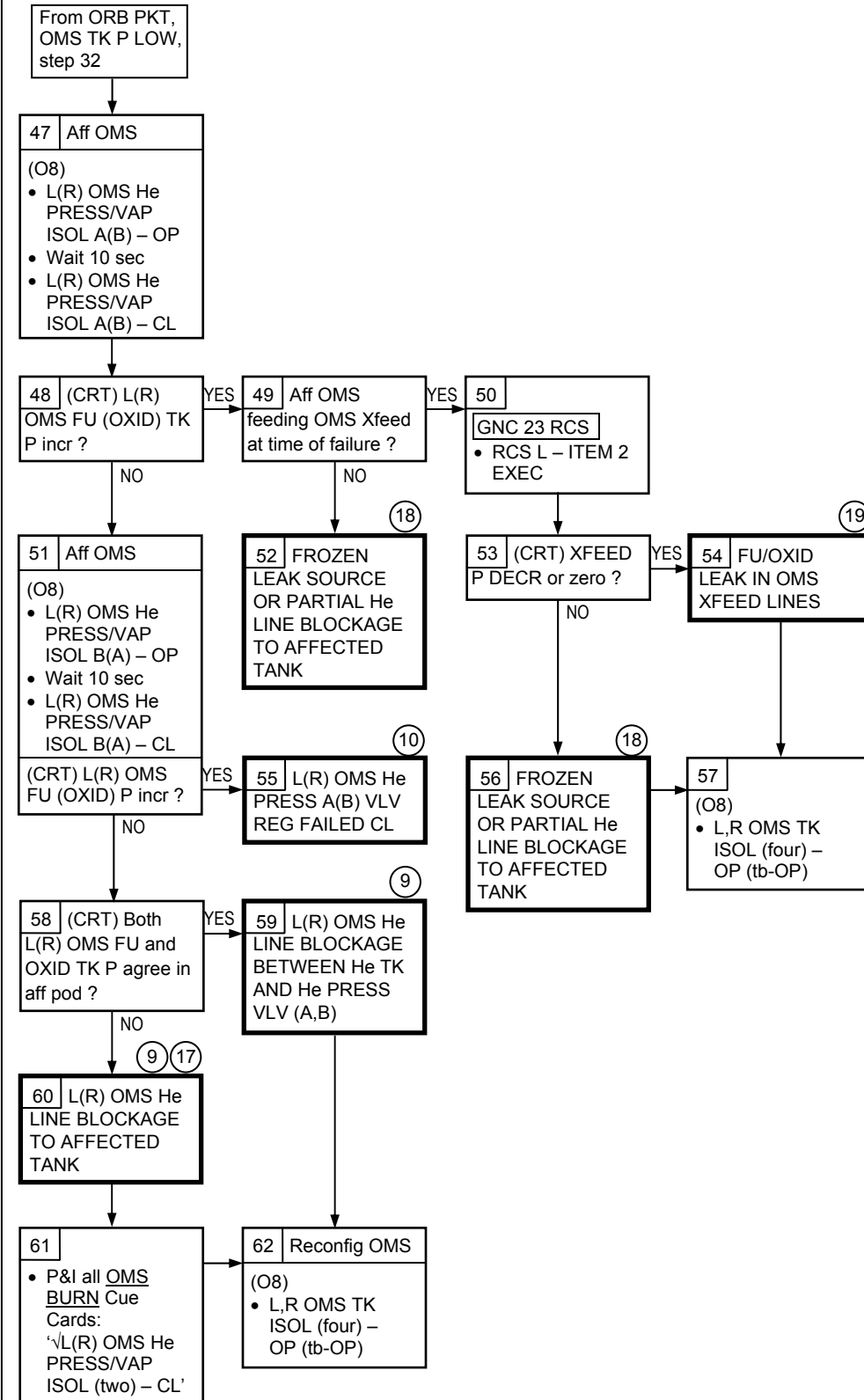
WARNING
Repressing more than one manifold at a time when at low pressure may damage RCS propellant tank

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)



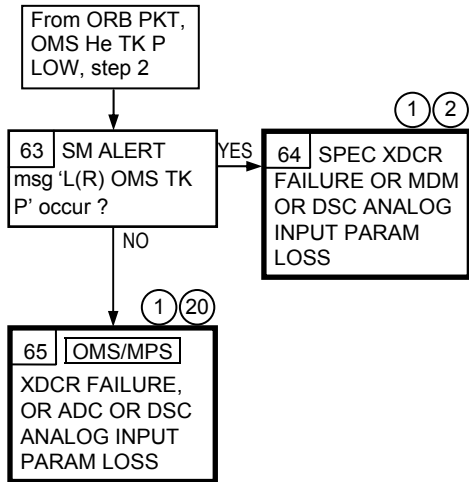
⑨ √MCC for blowdown capability. If full blowdown exists, continue with nominal mission profile. If not full blowdown, save available blowdown for deorbit burn

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



① √MCC for other
params possibly lost
in same MDM or
DSC card

② N2 P
available on
OMS/MPS

②① He P available
on GNC SYS SUMM
2 display

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

10.1a 38

1 (08) More
than one tb – bp ?

2
Which OMS vlv
tb – bp:

(08)
L OMS TK ISOL A
and
R OMS TK ISOL A
and
L OMS XFEED A

L OMS XFEED B
and
R OMS XFEED B

L OMS TK ISOL B
and
R OMS TK ISOL B
and
R OMS XFEED A

Neither

3 POD/AMC1
BUS FAILURE

EPS
SSR-143

4 POD/AMC2
BUS FAILURE

EPS
SSR-144

5 SEPARATE
FAILURES.
TROUBLESHOOT
VLVS
INDIVIDUALLY

6 POD/AMC3
BUS FAILURE

EPS
SSR-145

7 During
reconfig, tb – bp
occurred ?

8 VLV FAILURE
OR tb FAILURE
OR MICROSW
FAILURE

17

9 √AC motor
thermal overload

- Aff OMS sw – GPC
- Wait 3 min, then reposition sw to mode in which tb – bp occurred

tb – bp ?

12

10 VLV
CONTINUOUS
PWR PROBLEM.
THERMAL
OVERLOAD
RESET. VLV
OPERATIONAL

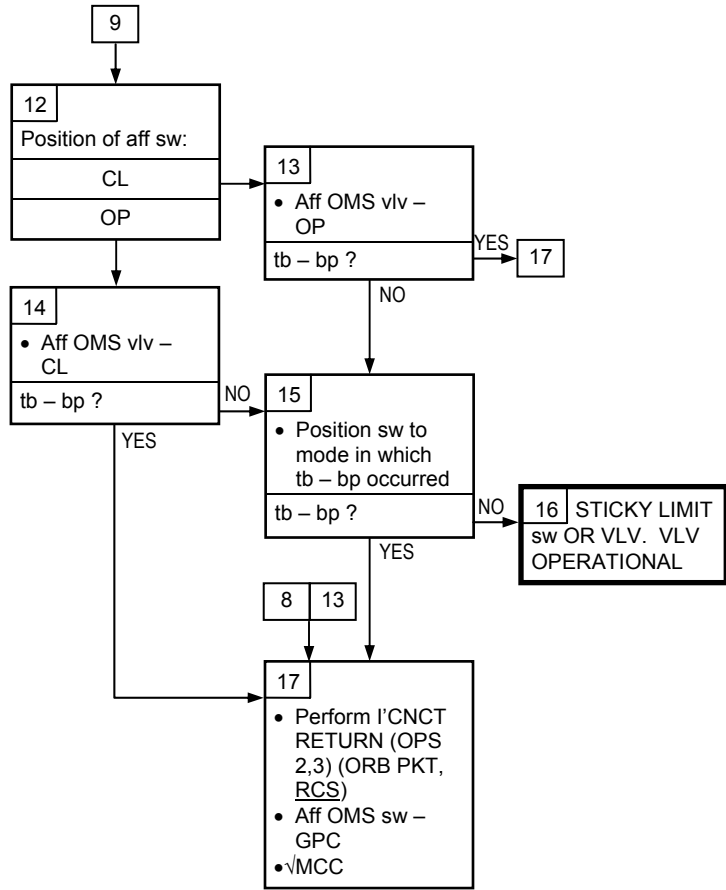
1

11

- Aff OMS sw – GPC

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

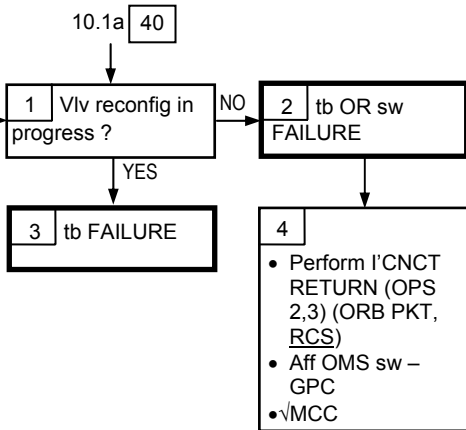
11.2b OMS VLV tb AND sw POSITION DISAGREE

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

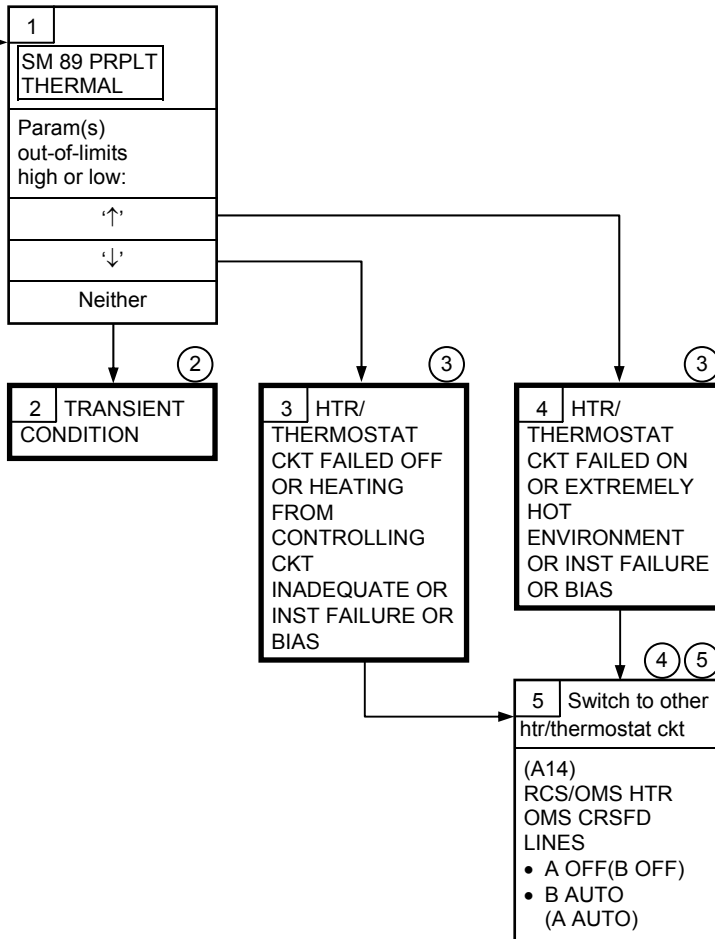
11.3a PRPLT THRM OMS

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

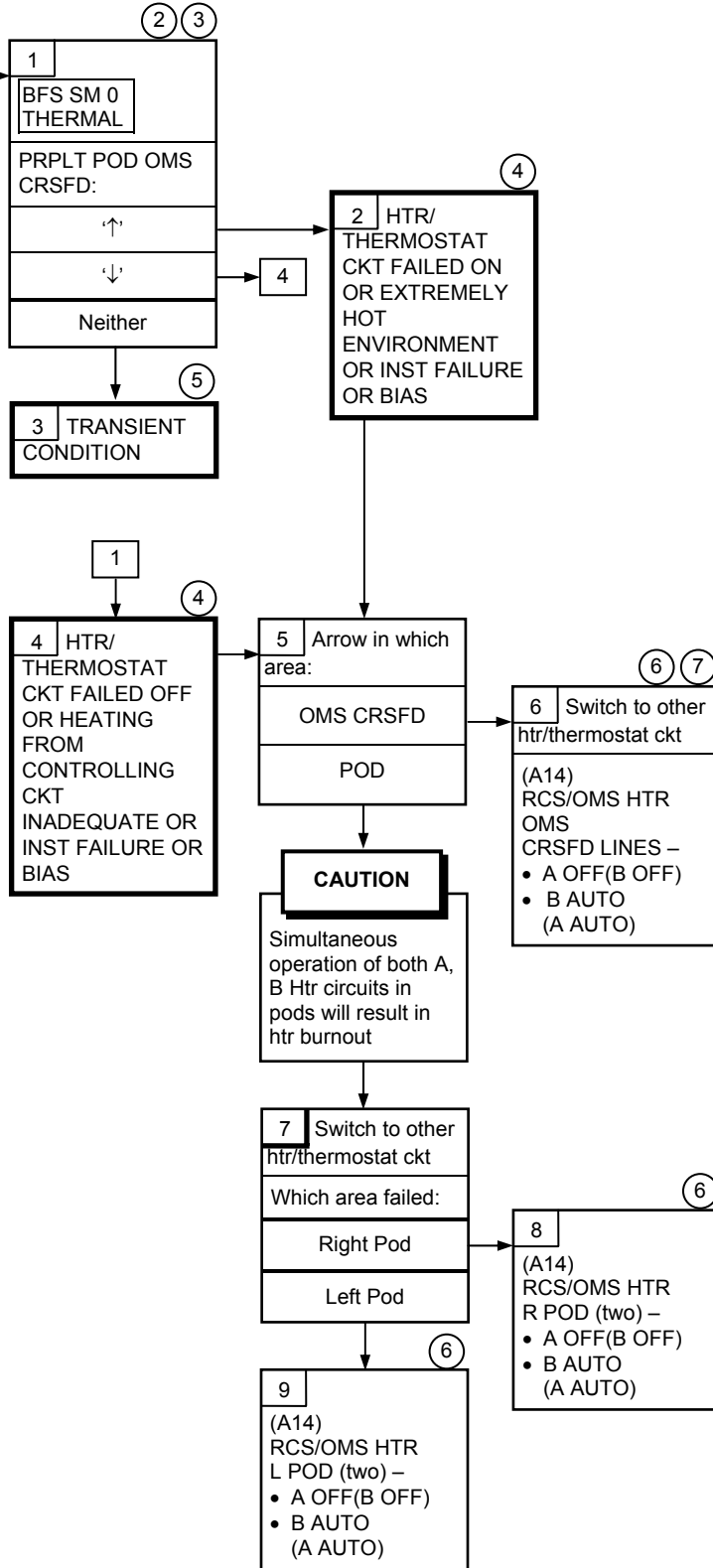
OMS

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 xdcr 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

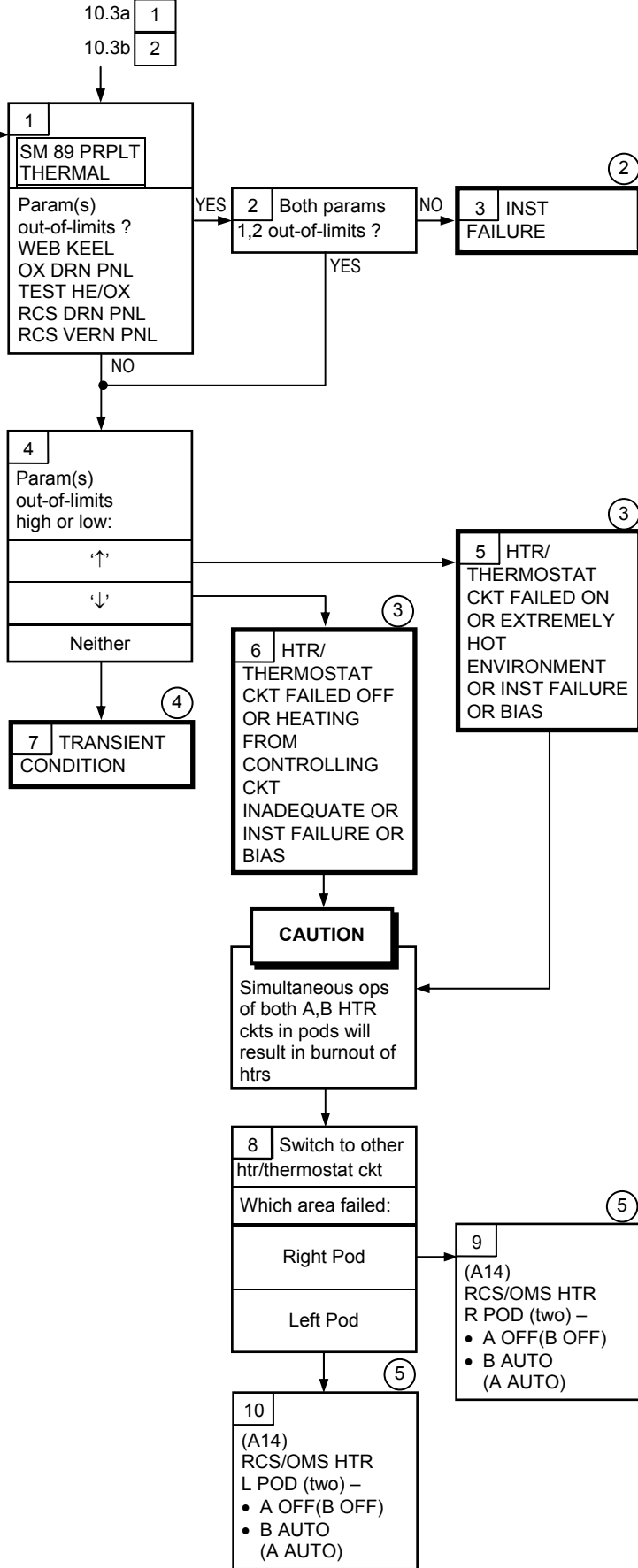
11.3c PRPLT THRM POD

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	XXXS	XXXS	45	95
		FU	XXXS	XXXS	45	95
ENG	IF	OX	XXXS	XXXS	45	110
		FU	XXXS	XXXS	45	110
		OX VLV	XXXS	XXXS	40	122
		FU INJ	XXXS	XXXS	36	260
WEB	KEEL	1	XXXS	XXXS	45	100
		2	XXXS	XXXS	45	100
	Y	OB	XXXS	XXXS	45	120
		UP	XXXS	XXXS	45	120
OX	DRN PNL	1	XXXS	XXXS	45	110
		2	XXXS	XXXS	45	110
ENG	COVER		XXXS	XXXS	45	
	SERV PNL		XXXS	XXXS	45	140
GSE	SERV PNL		XXXS	XXXS	45	120
TEST	HE/OX	1	XXXS	XXXS	35	95
		2	XXXS	XXXS	35	95

OMS SSR

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	Table A	Table B
28	29	_____	_____
30	31	_____	_____
32	33	_____	_____
34	35	_____	_____

} From Tables 1-8

√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	Table C
28	29	0 0 0
30	31	0 0 0
32	33	0 0 0
34	35	0 0 0

} From Tables 1-8

√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

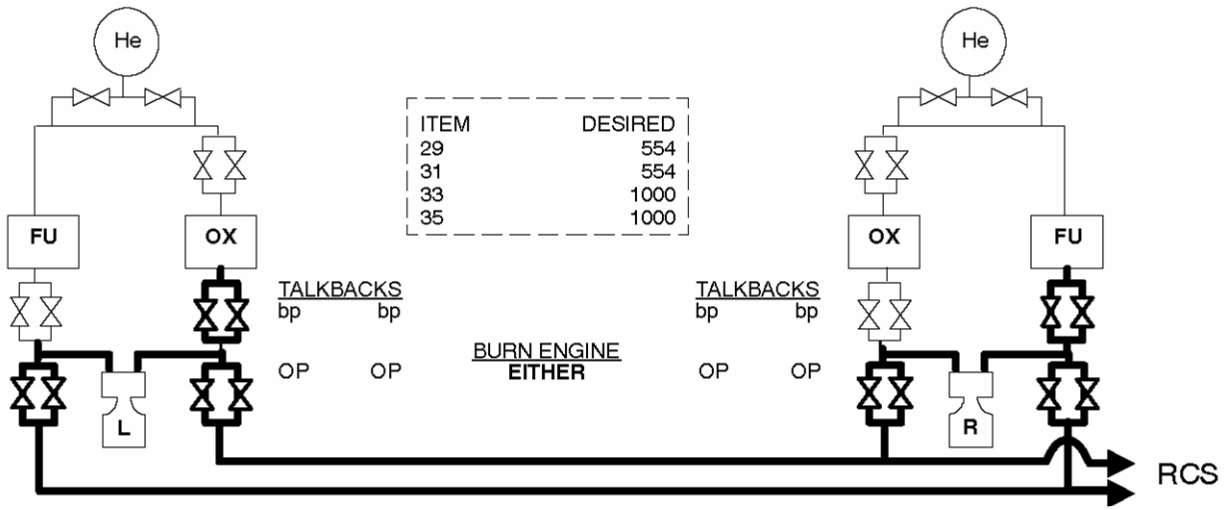
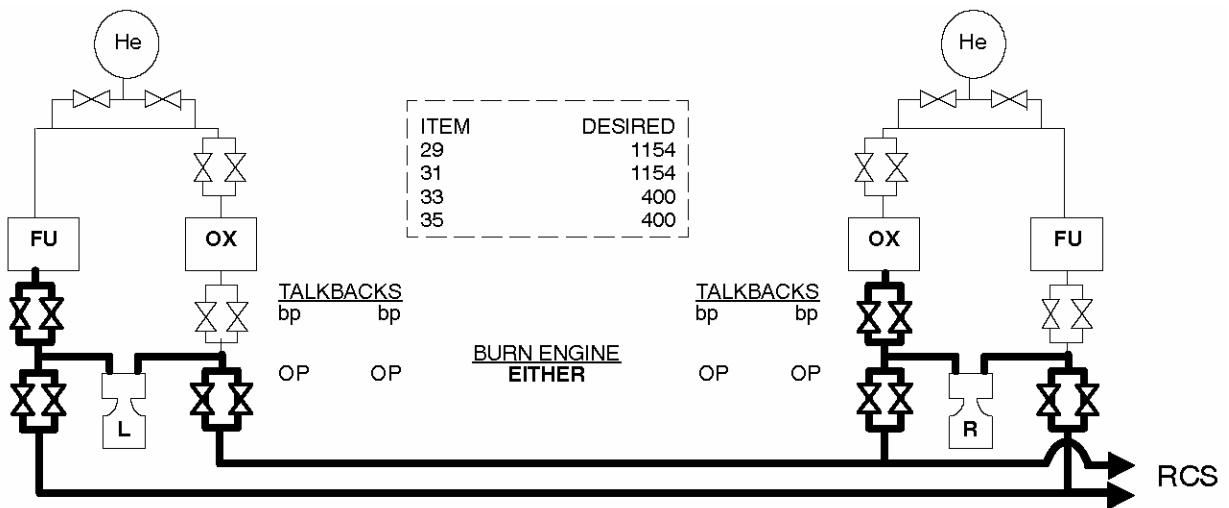


TABLE 2



OMS SSR-1 (Cont)

TABLE 3

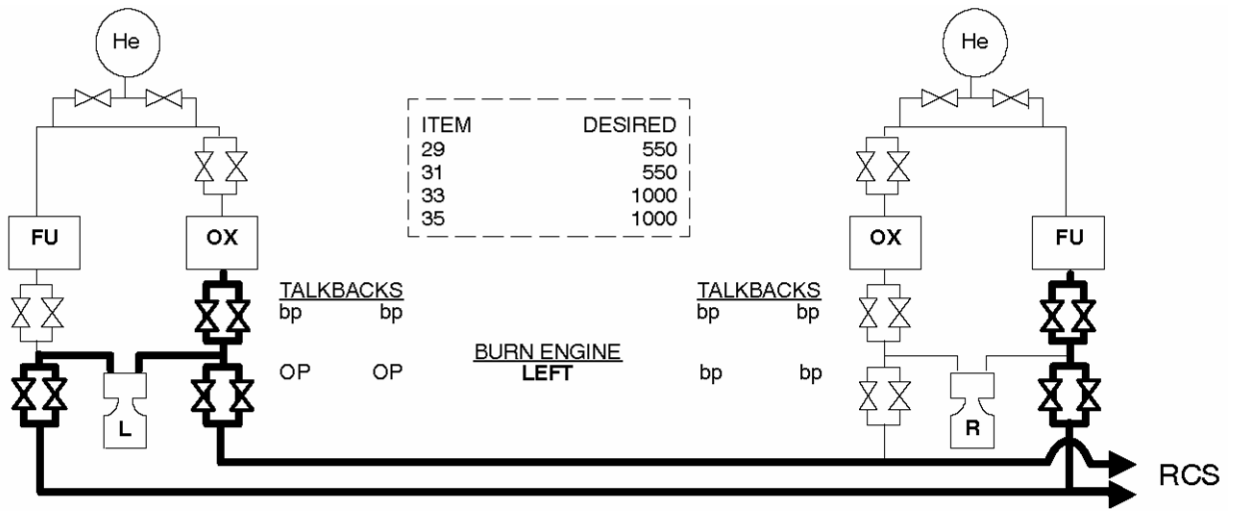


TABLE 4

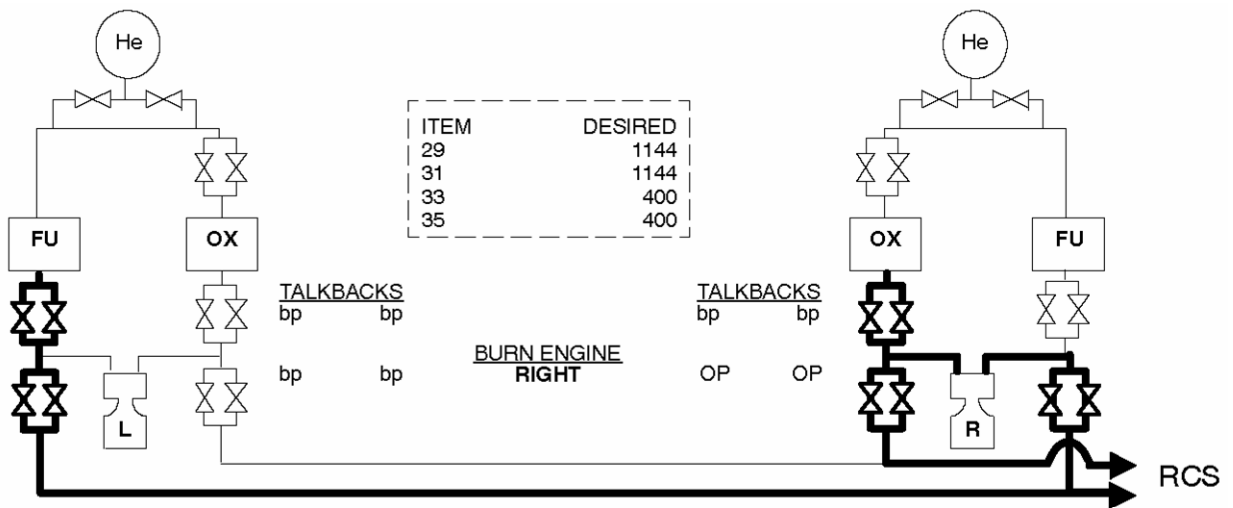


TABLE 5

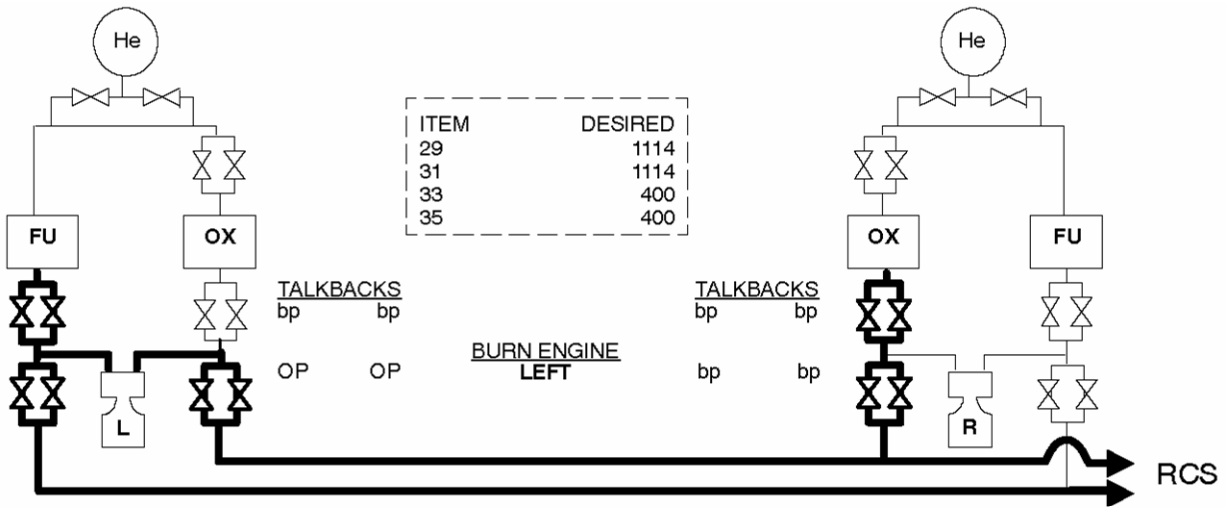
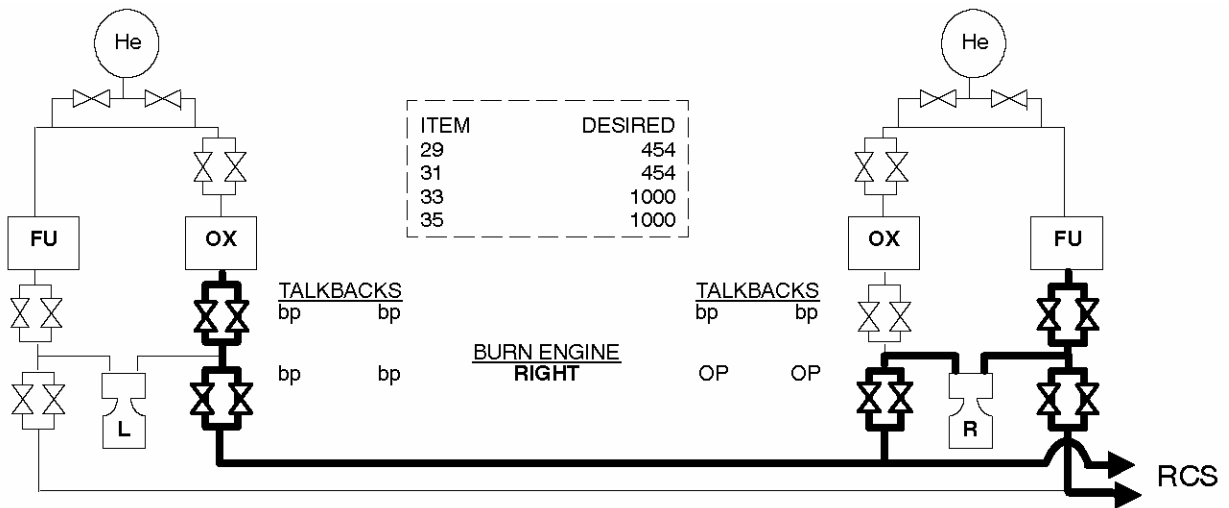


TABLE 6



OMS SSR-1 (Cont)

TABLE 7

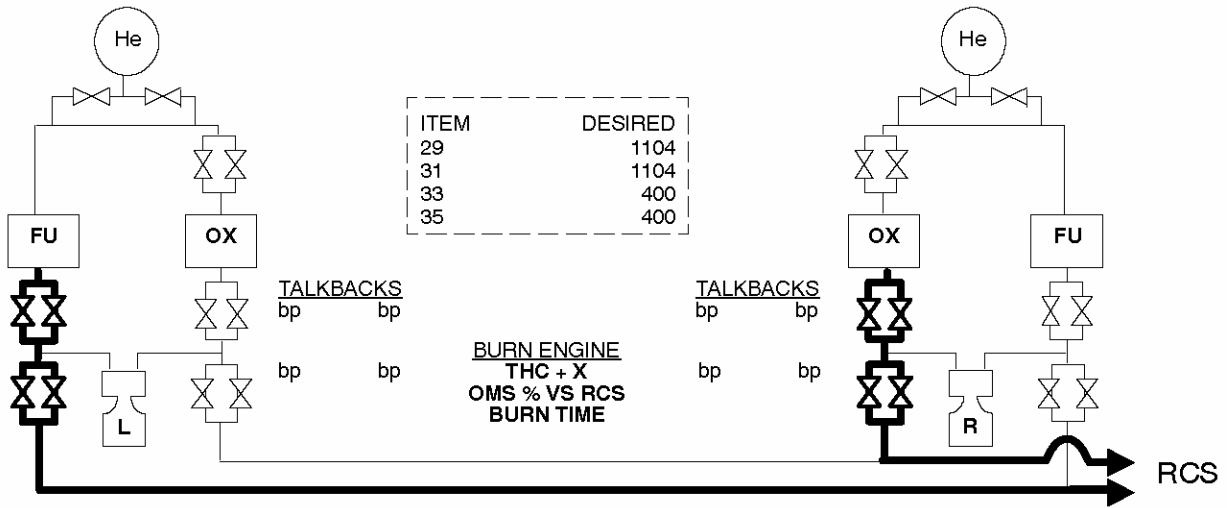
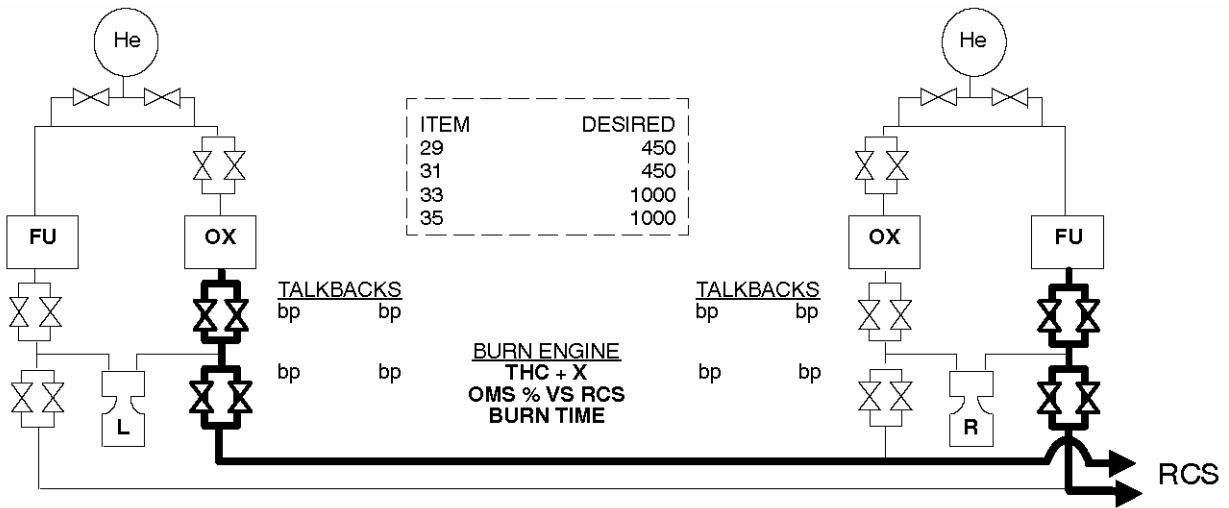


TABLE 8



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
12.1p	– PDRS TEST BRK(C/W, NMI, FS, LOSS).....	12-40
12.1q	– S96 PDRS CKCRT FS	12-42
12.1r	RELEASE LT – PDRS REL	12-43
12.1s	– PDRS REL (CUE CARD EXECUTED).....	12-44
12.1t	DERIGIDIZE LT – PDRS DERIG	12-45
12.1u	– PDRS DERIG (CUE CARD EXECUTED)	12-46
12.1v	PORT TEMP LT – PDRS TEMP PORT	12-47
12.1w	STBD TEMP LT – PDRS TEMP STBD.....	12-49
<u>12.2</u>	<u>RMS D&C</u>	
12.2a	MSTR ALARM ON, BUT C/W LT(S) OFF	12-52
12.2b	BRAKES – ON, BUT BRAKES tb – OFF	12-53
12.2c	– OFF, BUT BRAKES tb – ON	12-54
12.2d	SAFING – AUTO, BUT SAFING tb – bp	12-55
12.2e	RESERVED.....	not used
12.2f	RESERVED.....	not used
12.2g	SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF	12-57
12.2h	SHLDR BRACE REL tb – bp AFTER CMD	12-59
<u>12.3</u>	<u>END EFFECTOR</u>	
12.3a	EE FAILS TO GRAPPLE CONSTRAINED PL IN EE MODE – AUTO	12-60
12.3b	EE FAILS TO RELEASE/DERIGIDIZE CONSTRAINED PL IN EE MODE – AUTO	12-62
12.3c	RESERVED.....	not used
12.3d	RESERVED.....	not used
12.3e	EE FAILS TO RELEASE IN EE MODE – MAN	12-67
12.3f	DERIGIDIZE/EXTEND IN MANUAL	12-69
12.3g	MULTIPLE EE tb ABNORMAL WHILE NO EE CMDS (EE MODE – AUTO OR MAN)	12-71
12.3h	EE tb ABNORMAL WHILE EE MODE OFF	12-73
12.3i	CAPTURE SEQ ABORTED (CUE CARD EXECUTED)	12-75
12.3j	NO AUTO RELEASE (CUE CARD EXECUTED).....	12-76
12.3k	MANUAL RELEASE (CUE CARD EXECUTED).....	12-78
12.3l	DERIGID (CUE CARD EXECUTED)	12-80

<u>12.4</u>	<u>RMS OPS</u>	
12.4a	ARM RESPONSE ABNORMAL IN MANUAL MODES	12-82
12.4b	AUTO MODES	12-84
12.4c	JOINT RESPONSE ABNORMAL IN SINGLE MODE	12-86
12.4d	DIRECT MODE	12-89
<u>12.5</u>	<u>MPM/MRL</u>	
12.5a	MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	12-92
12.5b	MPM STO – tb NOT STO, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	12-94
12.5c	MRL REL – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	12-96
12.5d	MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME	12-98
12.5e	PORT(STBD) RMS RETEN LATCHES R-F-L tb – bp WHEN CRADLED	12-100
12.5f	PORT(STBD) RMS RETEN LATCHES R-F-L tb – gray WHEN UNCRADLED	12-101
	<u>PDRS SSR</u>	
PDRS	SSR-1 MPM MTR INHIBIT DISABLE	12-102
	SSR-2 RESERVED	not used
	SSR-3 BACKDRIVE TECHNIQUE – JOINT FREE	12-103
	SSR-4 RMS IFM D&C KIT	12-111

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RMS C/W

12.1

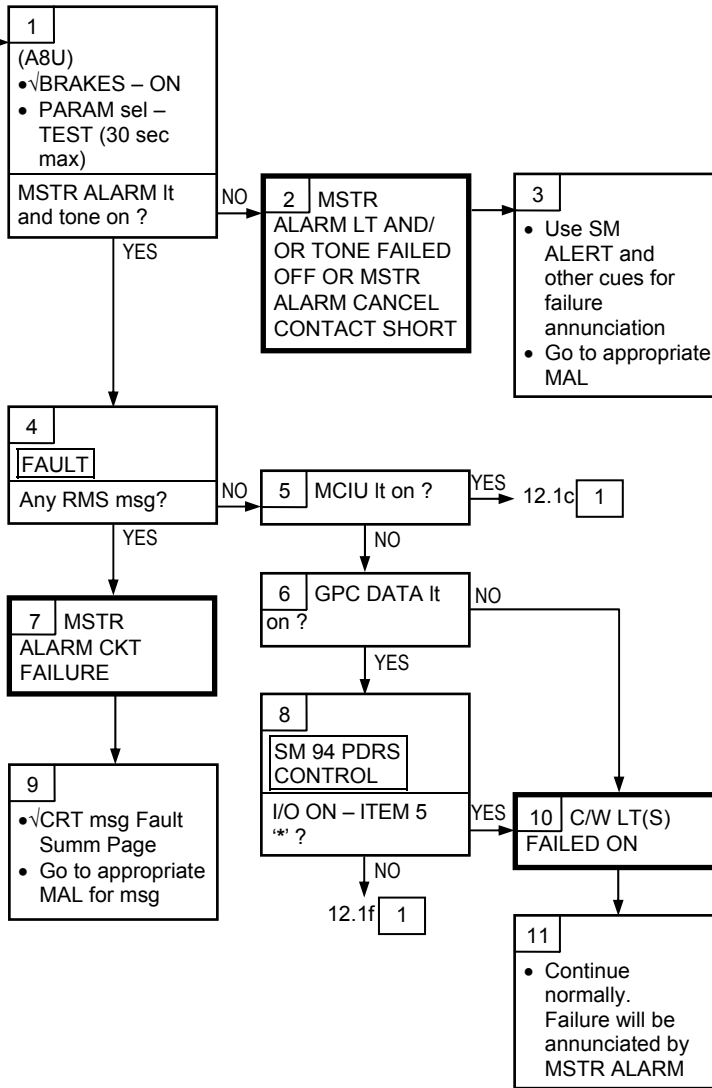
PDRS

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

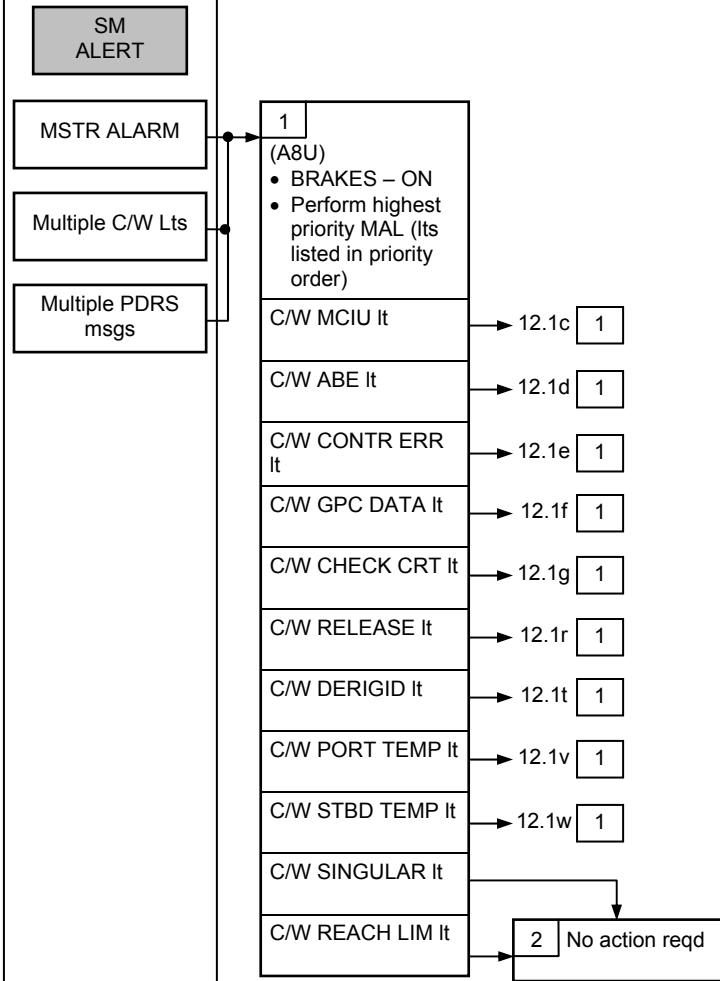


RMS C/W

12.1

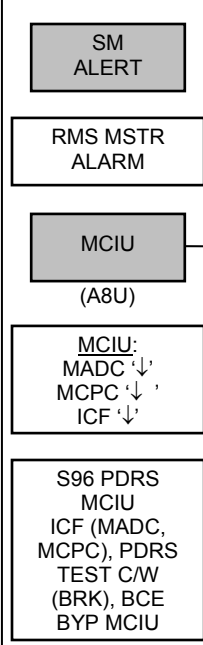
PDRS

12.1b MULTIPLE C/W LTS AND PDRS MSGS



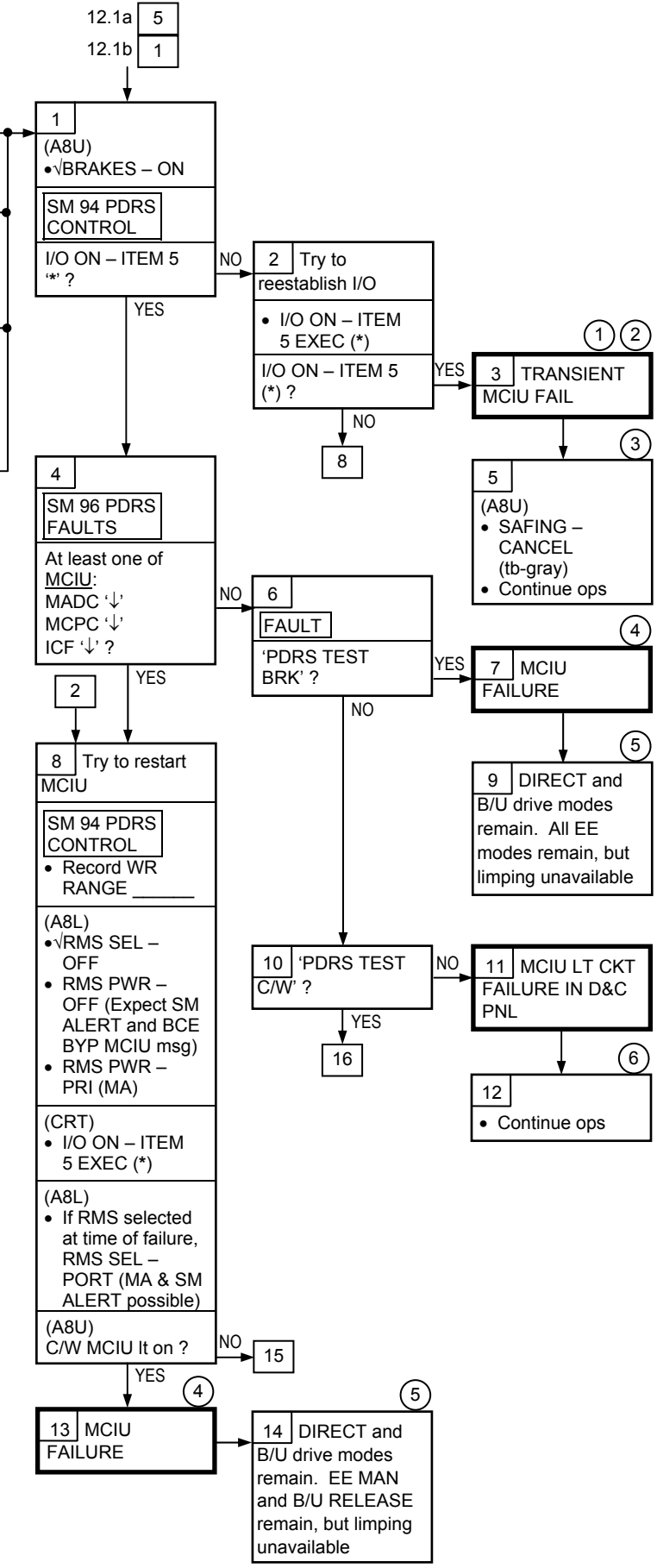
PDRS

12.1c C/W MCIU LT



If:
MADC, MCPC, ICF, Frame Sync, MCIU failure warning circuit failure

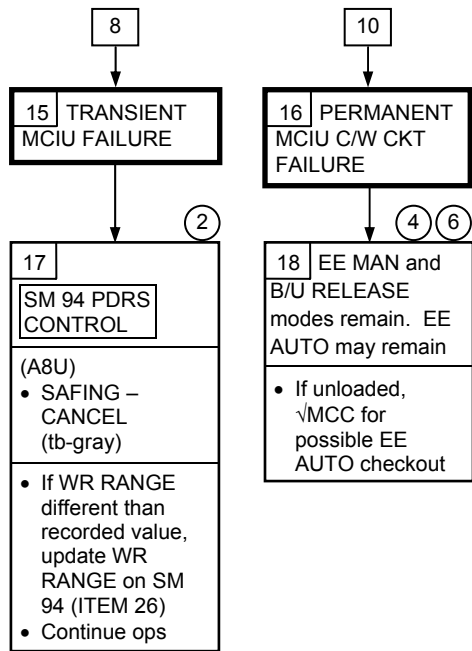
Nominal Config:
(A8L)
RMS PWR – PRI



- ① Ground can detect if failure was NON-MASKABLE INTERRUPT (NMI) before removing brakes
- ② Additional transients possible
- ③ Taking brakes off will clear MCIU It and related down arrows
- ④ Full capability may be restored with RMS MCIU CHANGEOUT (IFM)
- ⑤ Display data may be unreliable. Additional fault msgs and C&W lights possible
- ⑥ MCIU It not available for subsequent MCIU failures, but MSTR ALARM still available

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

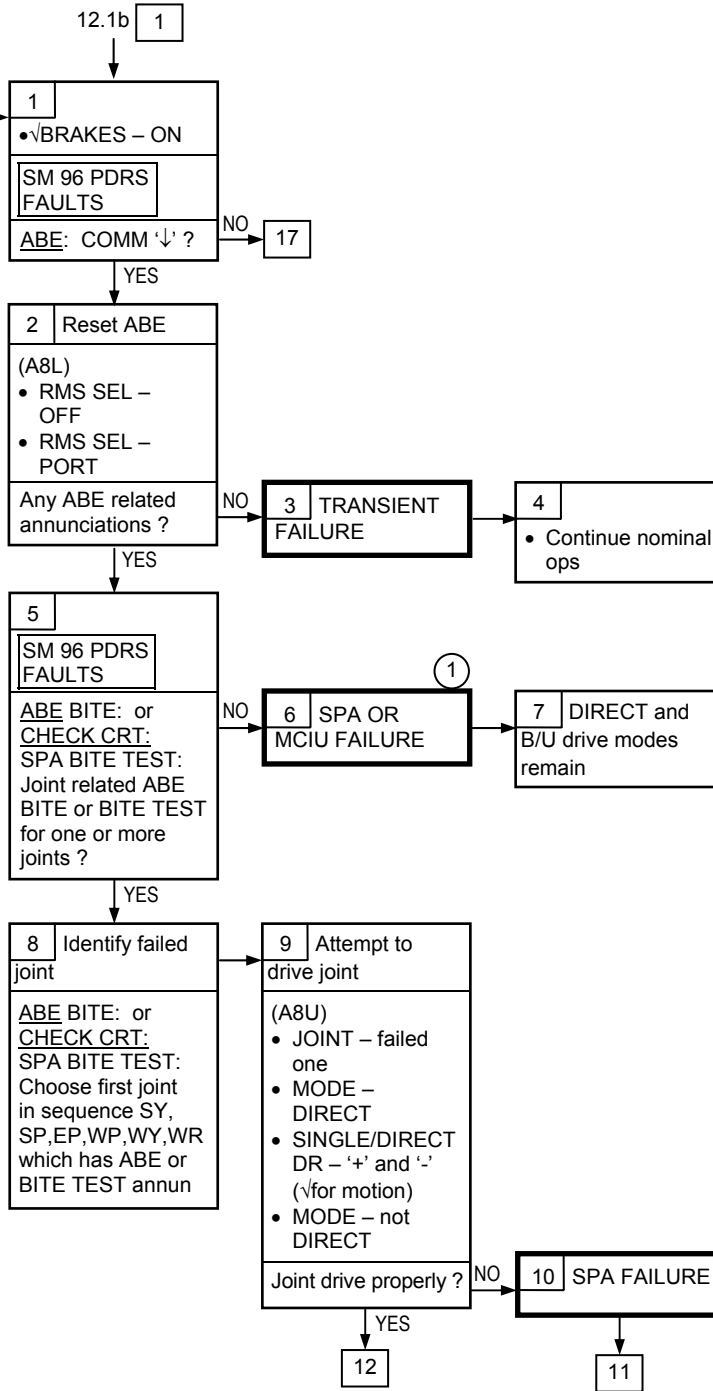
RMS MSTR
ALARM

ABE

S96 PDRS
ABE COMM (SY,
SP, EP, WP, WY,
WR)

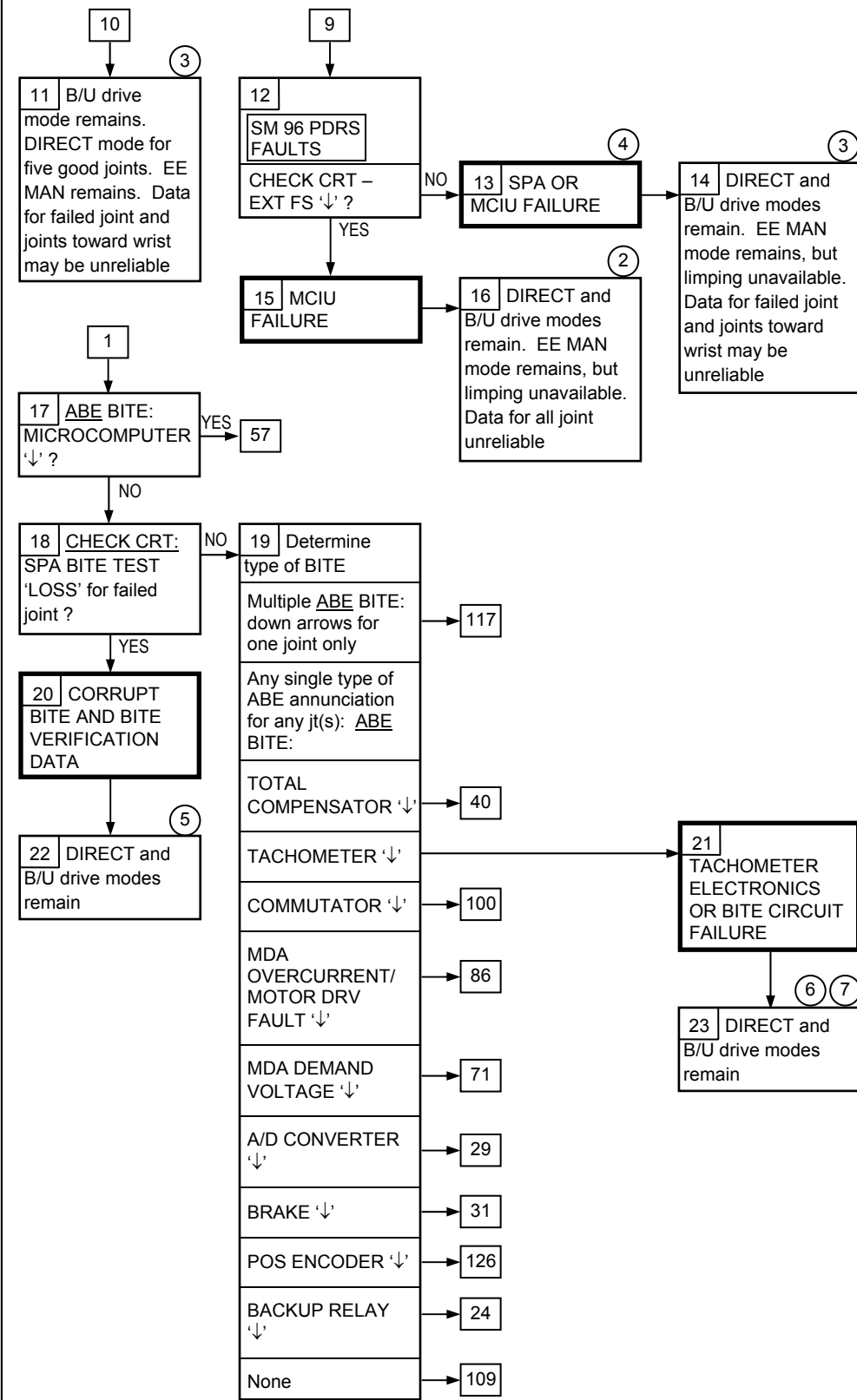
Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT
(CRT)
SM 94 I/O ON –
ITEM 5 (*)

**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

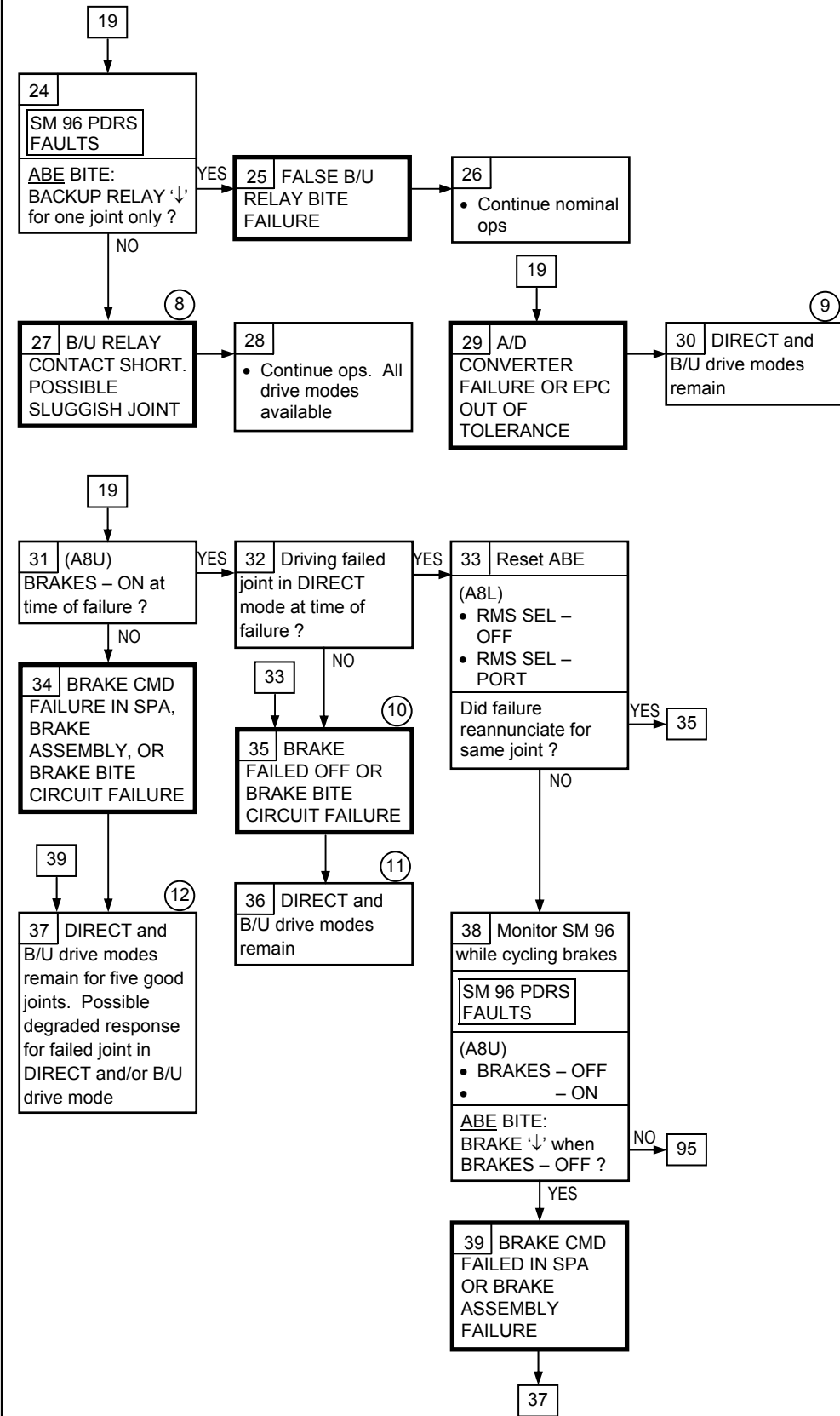
(4) If annunciation for all six joints is identical, full capability may be regained by RMS MCIU CHANGEOUT (IFM). If annunciation is not for all six joints, then SPA failure

(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

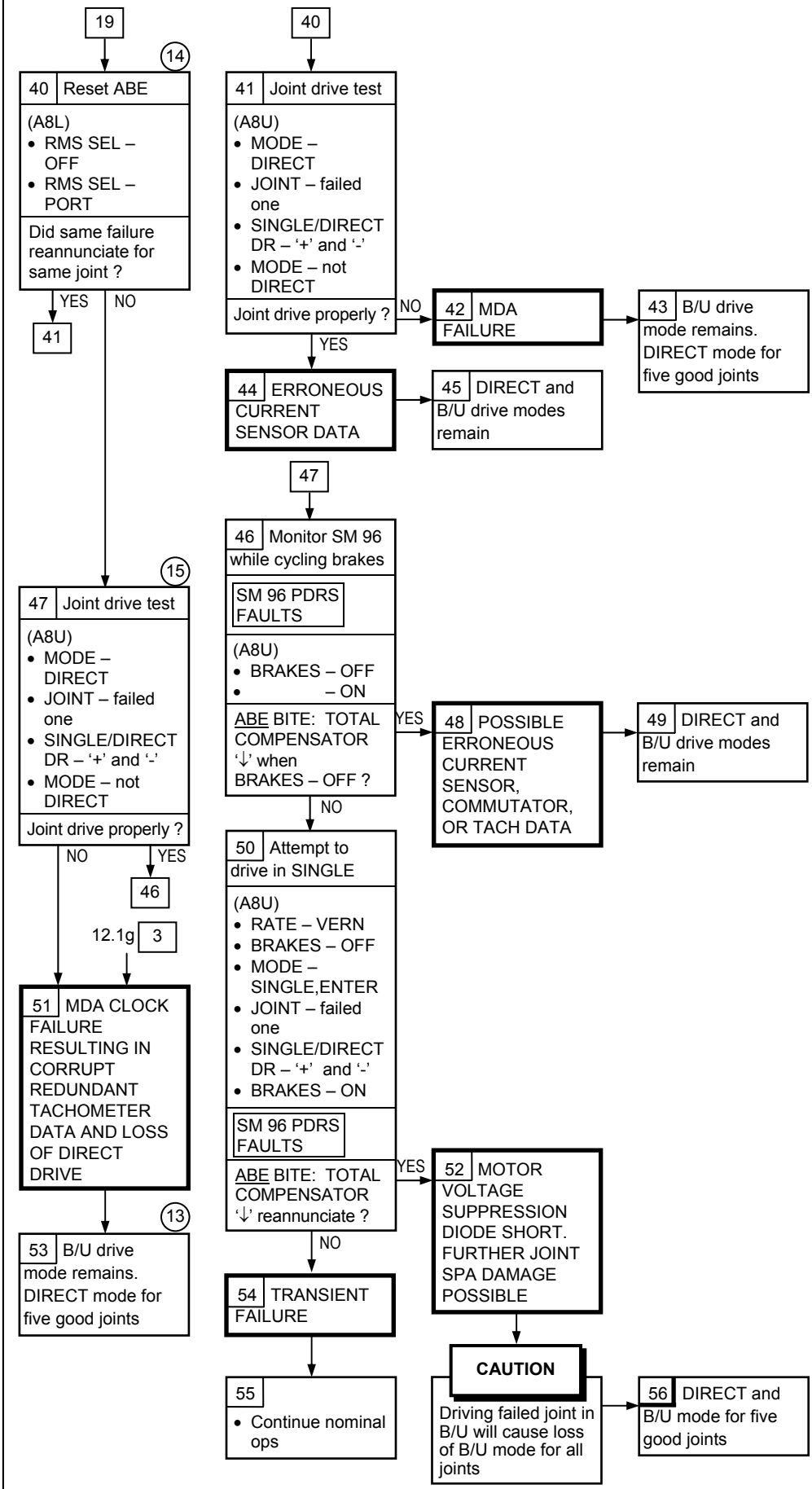
(7) For tach failure, rate data is unreliable

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)

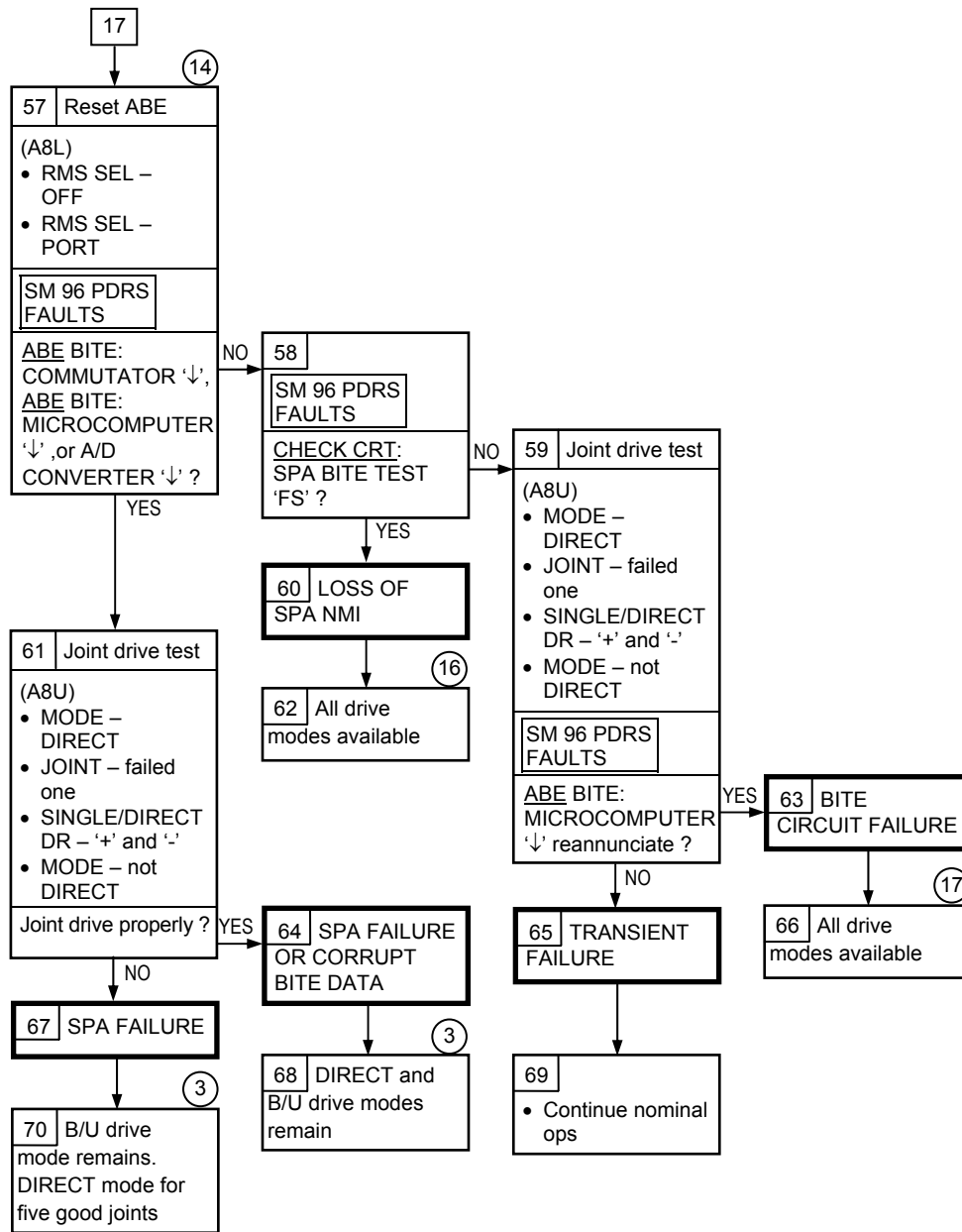


13 MCIU OVERRIDE: ABE OVRD C (ITEM 38) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes

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)



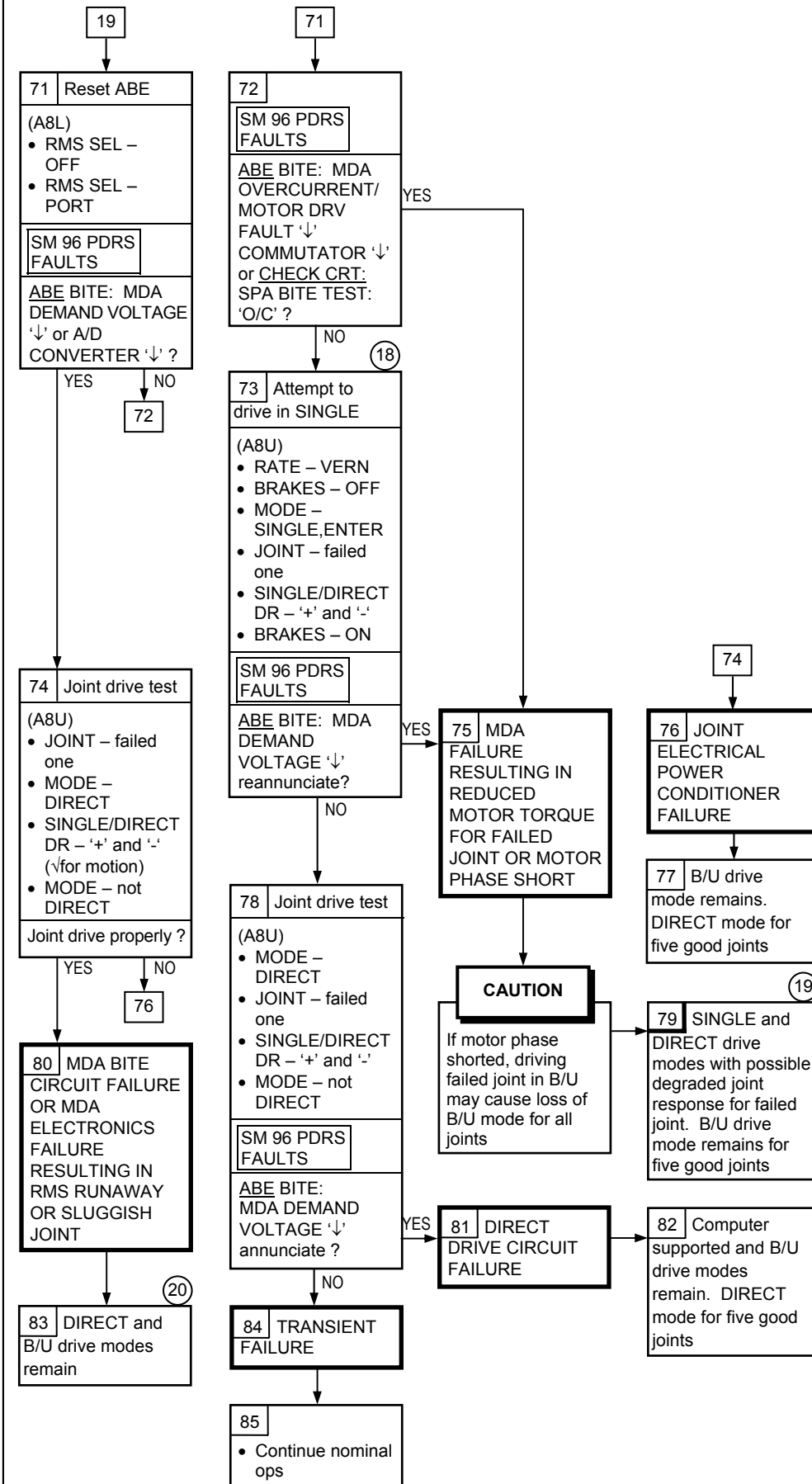
③ If any wrist joint data is unreliable, EE Auto mode may be lost

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)

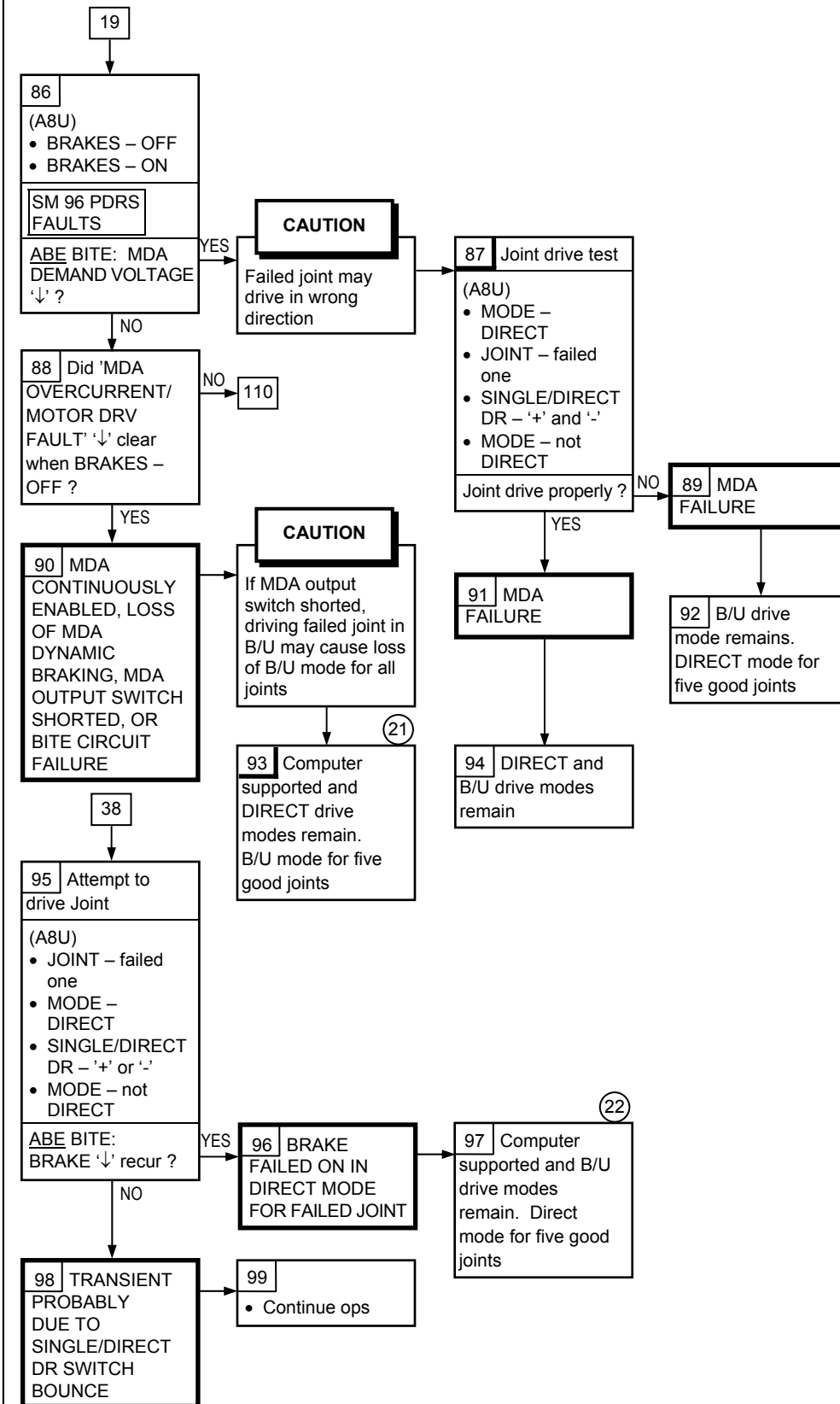


18 Removing brakes may result in reannunciation of failure and autobrakes

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

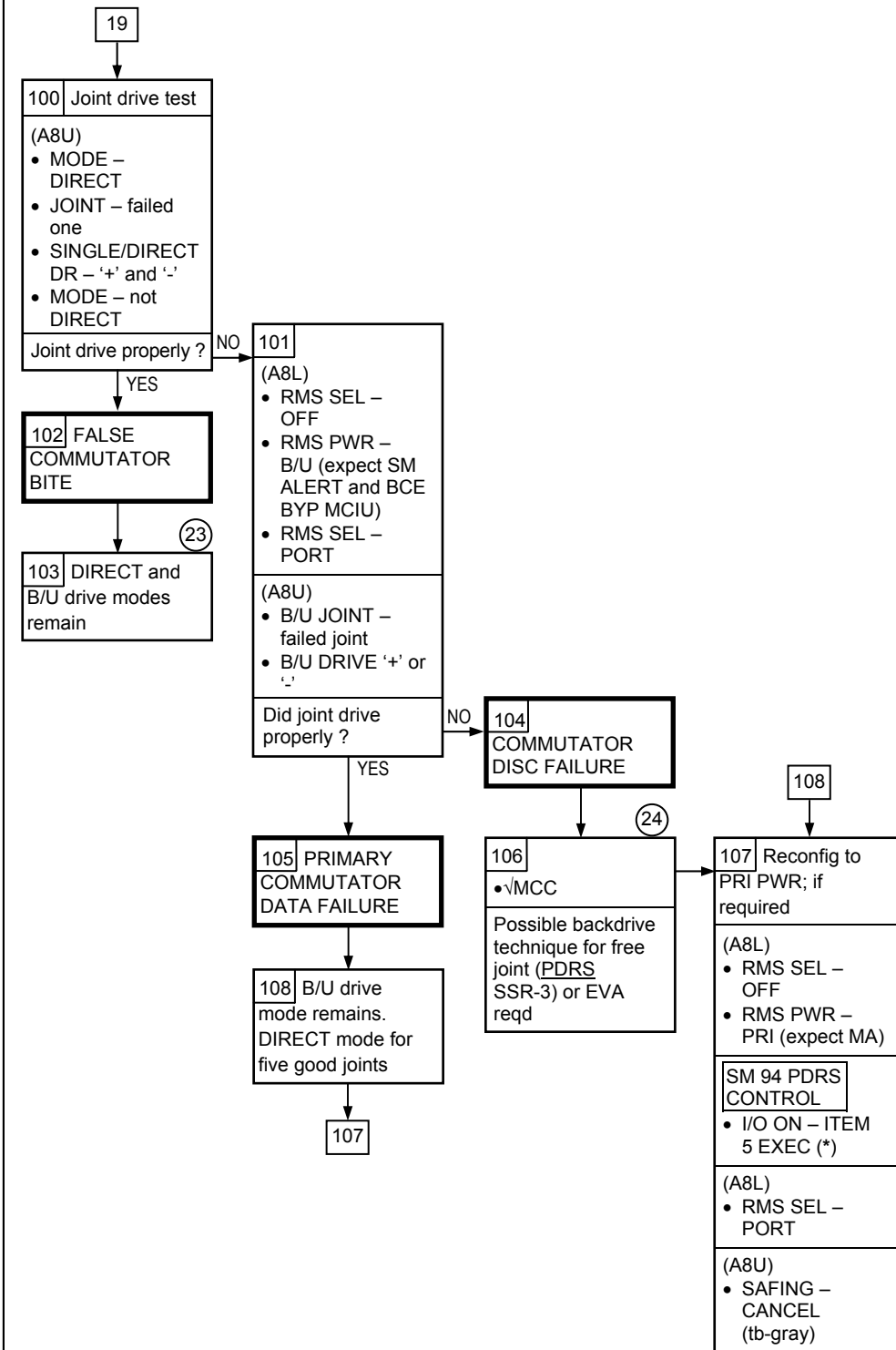
PDRS 12.1d (Cont)



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

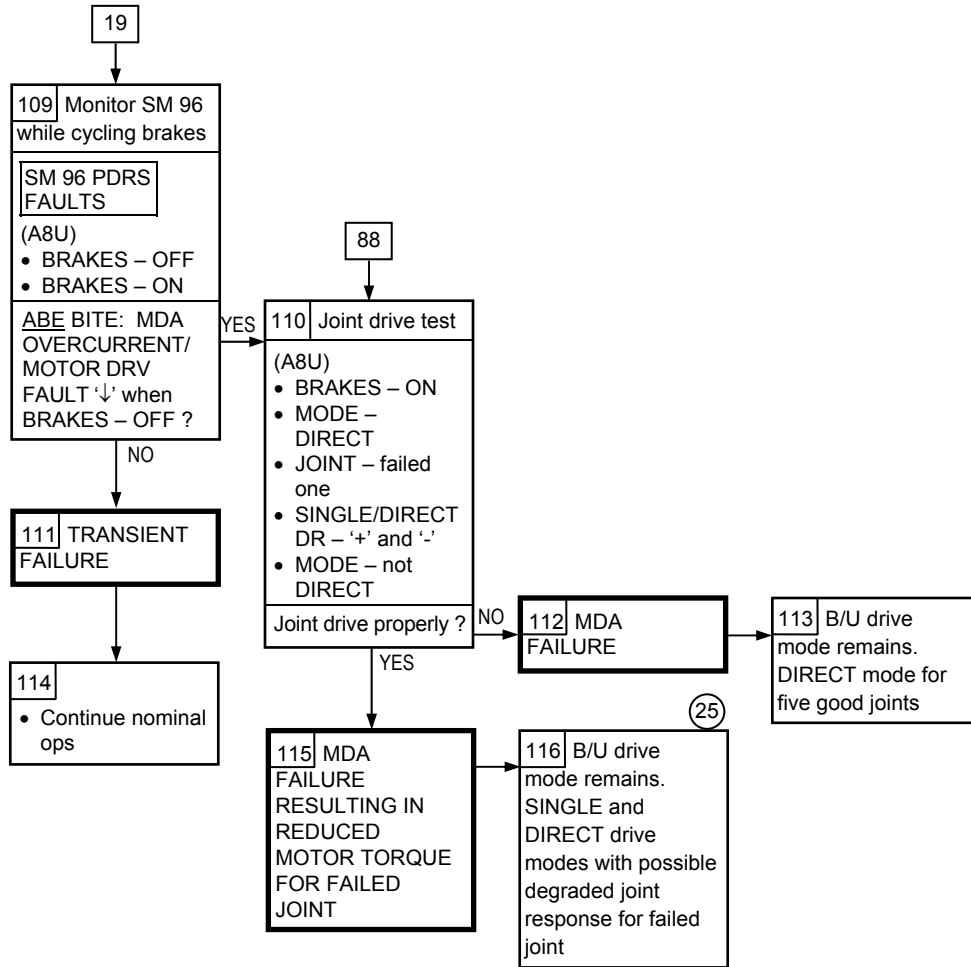
PDRS 12.1d (Cont)



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

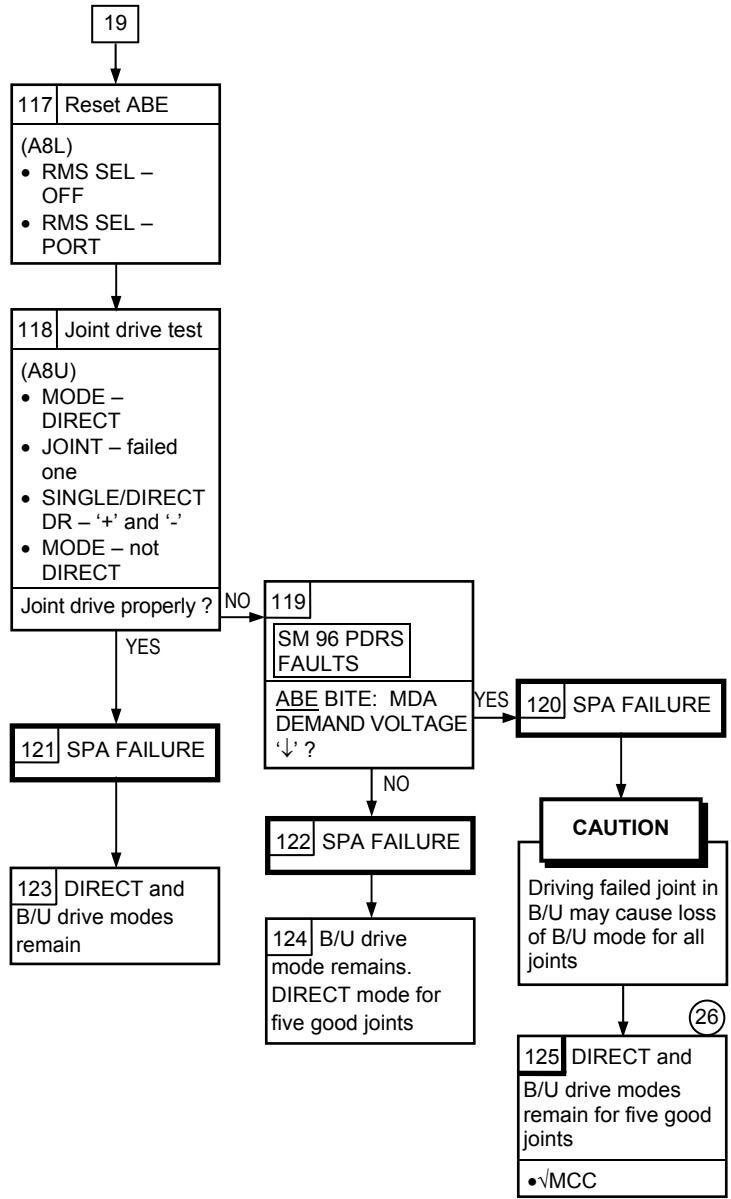
24 MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, required to regain computer supported modes for the backdrive technique

PDRS 12.1d (Cont)



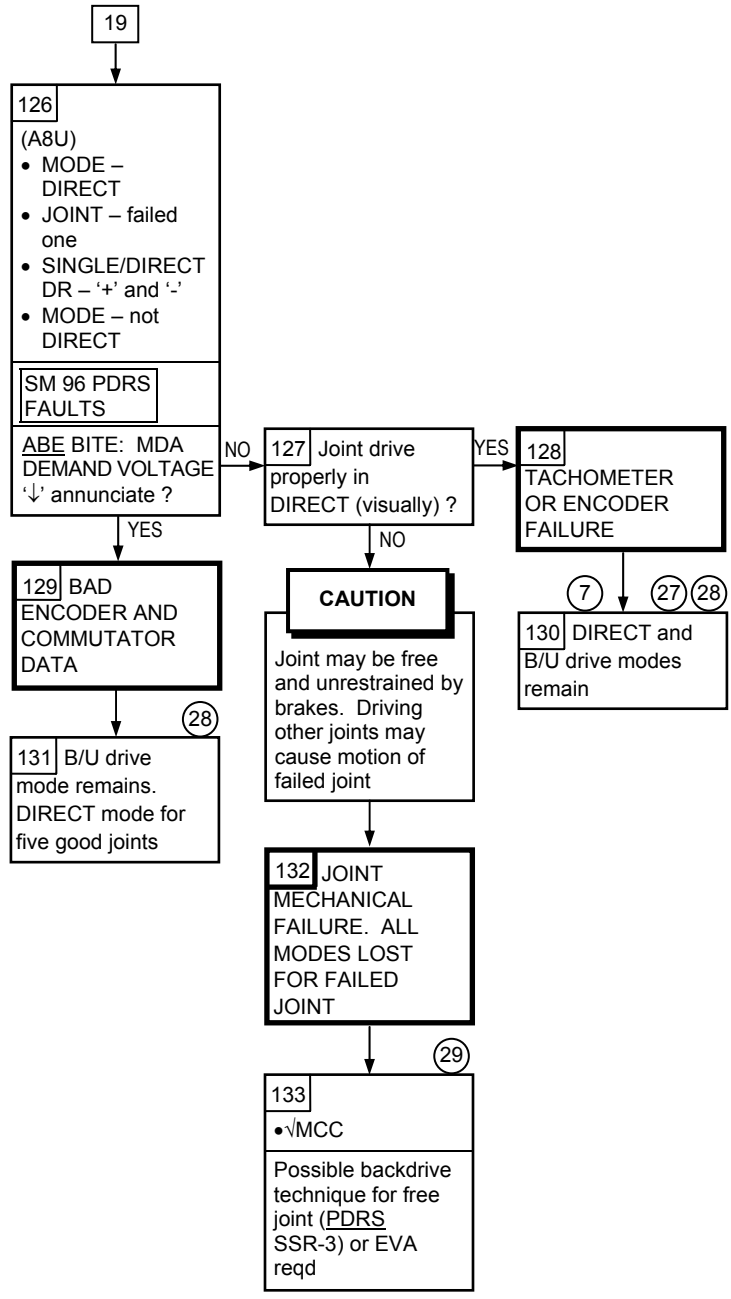
25 Subsequent MDA Demand Voltage BITE possible while driving failed joint

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

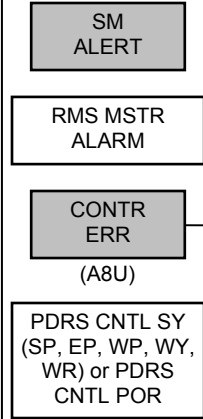
②⑦ For encoder failure, MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain SINGLE mode (on MCC GO). Position hold is not functional for failed joint. Subsequent TACH failure will be annunciated by CONTR ERR or TOTAL COMPENSATOR and protected by 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

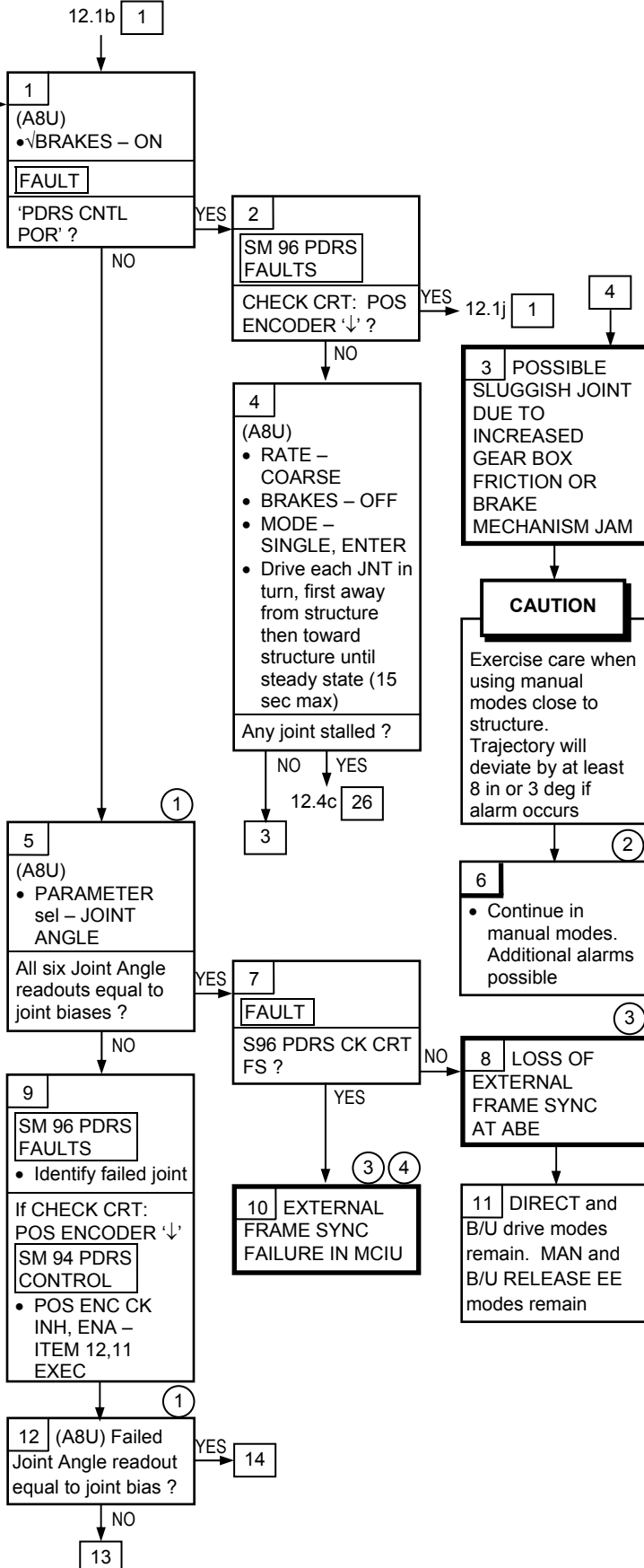
PDRS

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

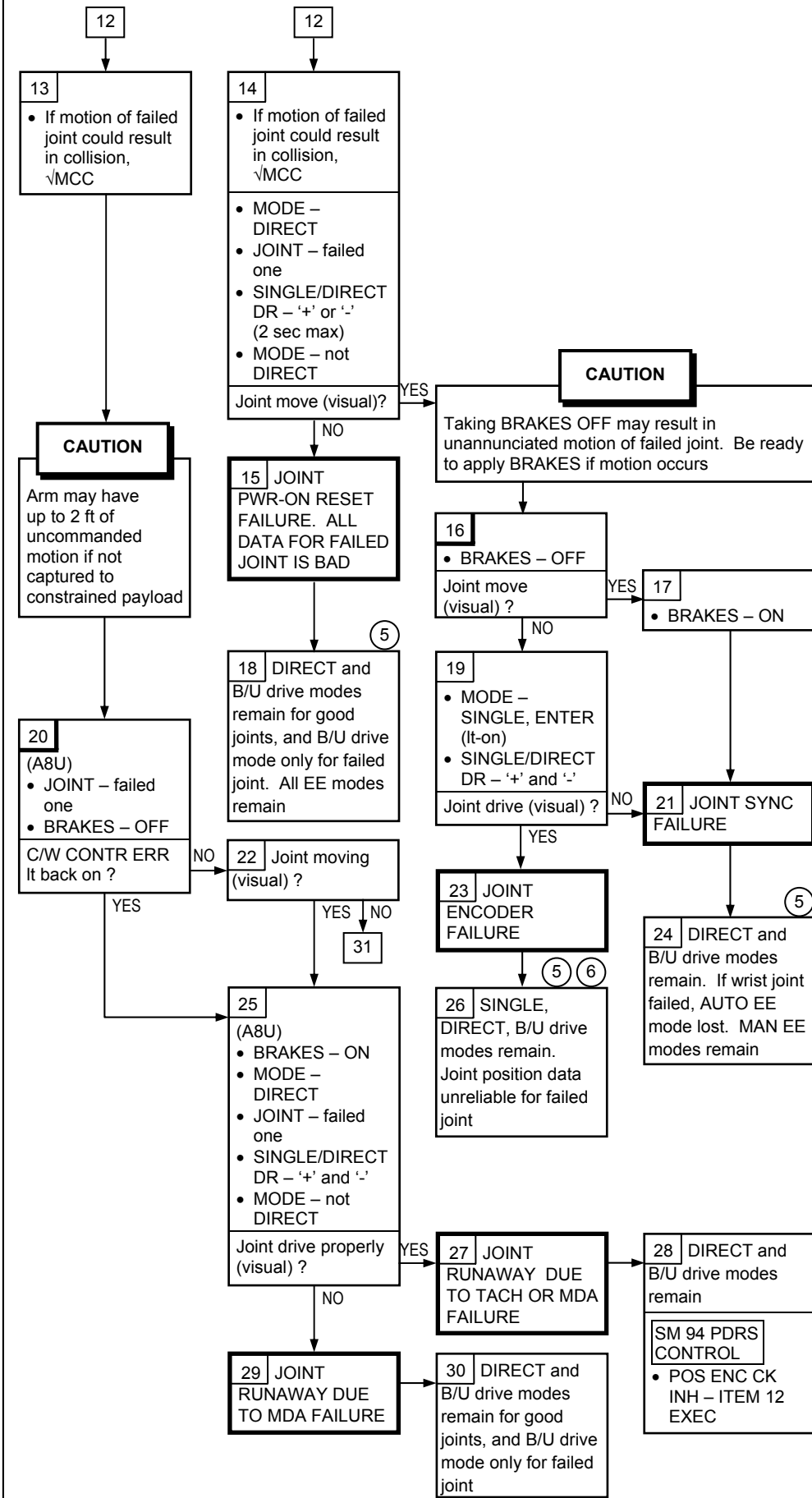
- SY +0.6
- SP +1.3
- EP -0.6
- WP -0.8
- WY +0.9
- WR +2.6

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)

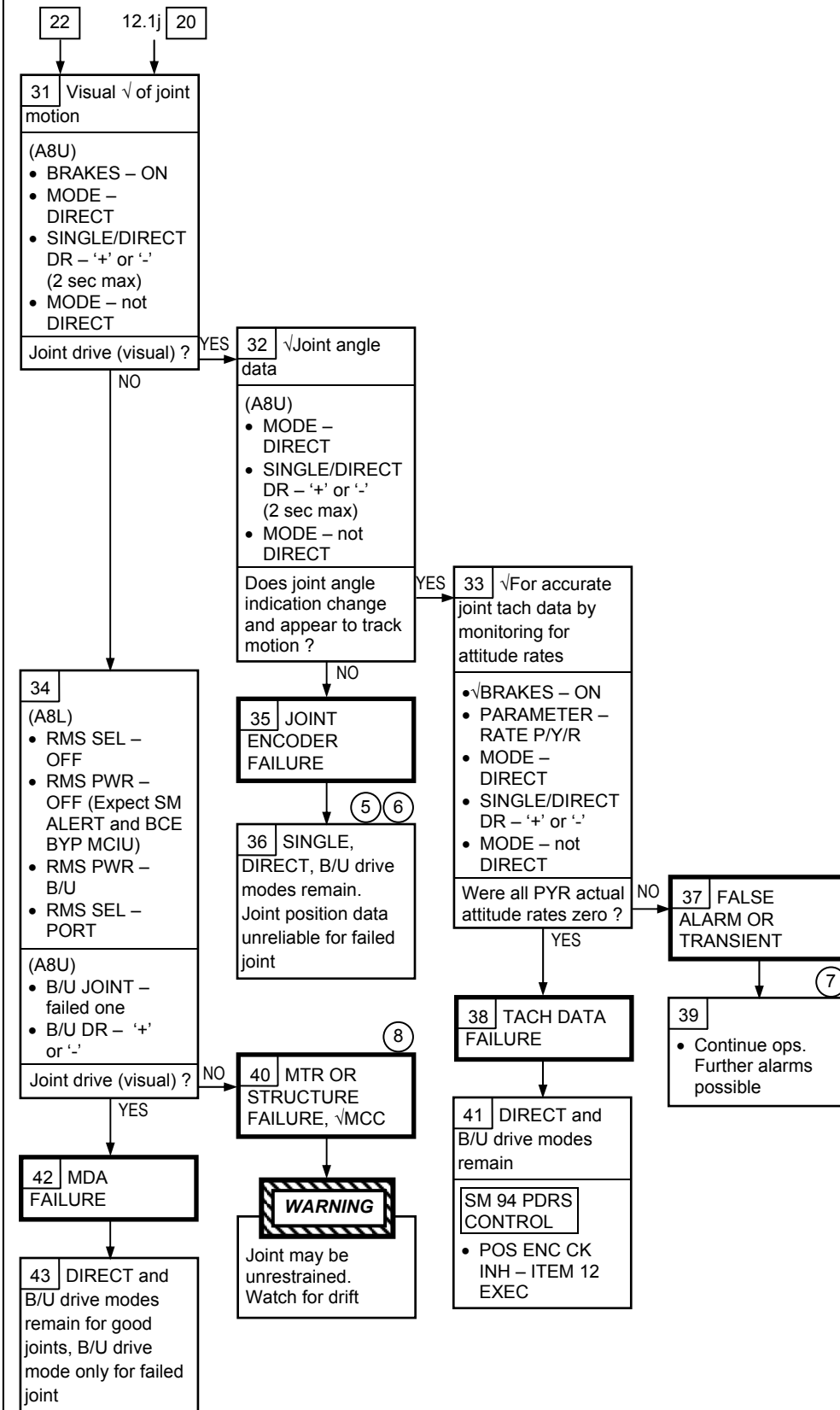
PDRS 12.1e (Cont)



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

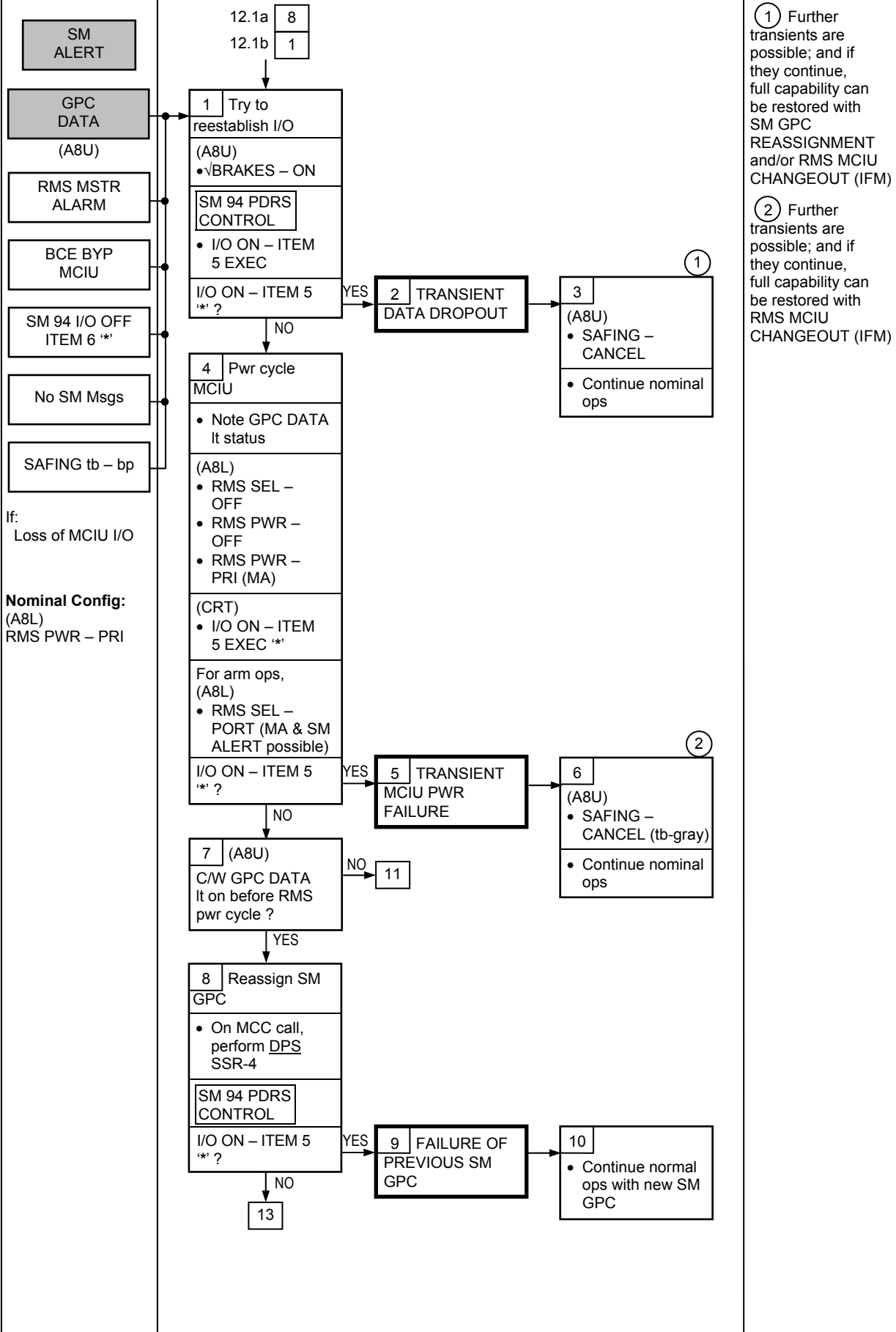
⑥ Position hold function will not work for failed joint

⑦ MCC can determine if fwd/backdrive flag failure is cause of false alarm

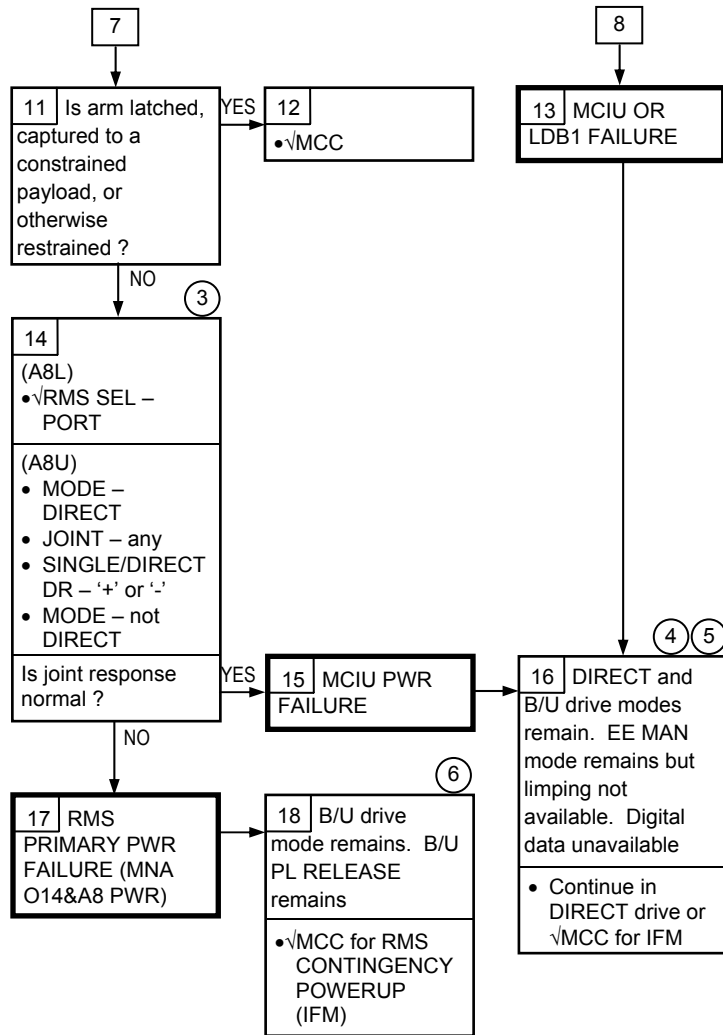
⑧ Whiplash technique or EVA may be reqd to cradle arm

PDRS

12.1f C/W GPC DATA LT OR BCE BYP MCIU



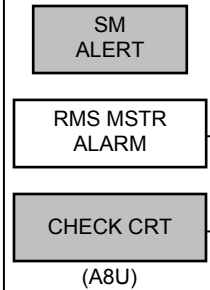
PDRS 12.1f (Cont)



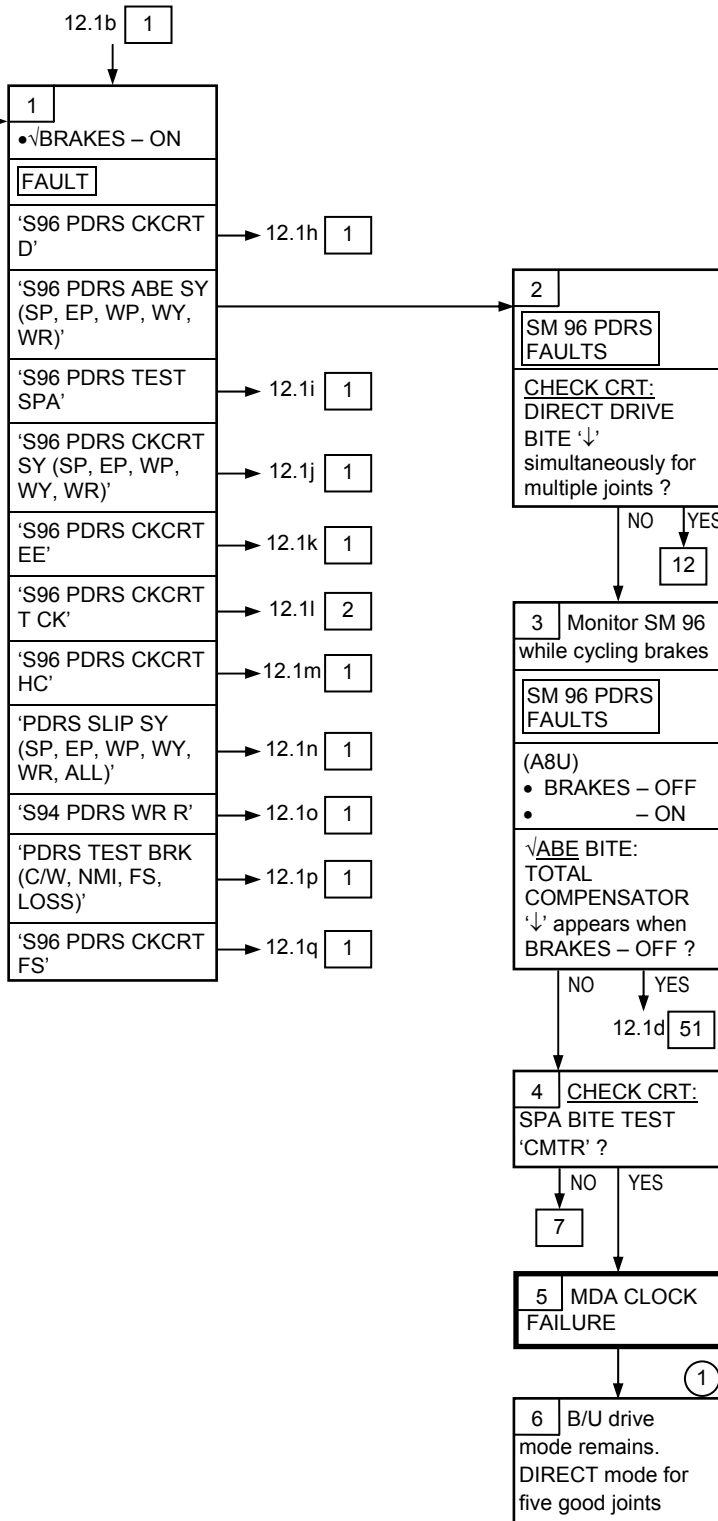
- ③ Mode It may not illuminate
- ④ Full capability may be restored with MCIU CHANGEOUT (IFM)
- ⑤ RSAD may be capable of displaying joint data
- ⑥ Primary pwr may be restored following IFM. Panel edge lighting may not be available

PDRS

12.1g C/W CHECK CRT LT

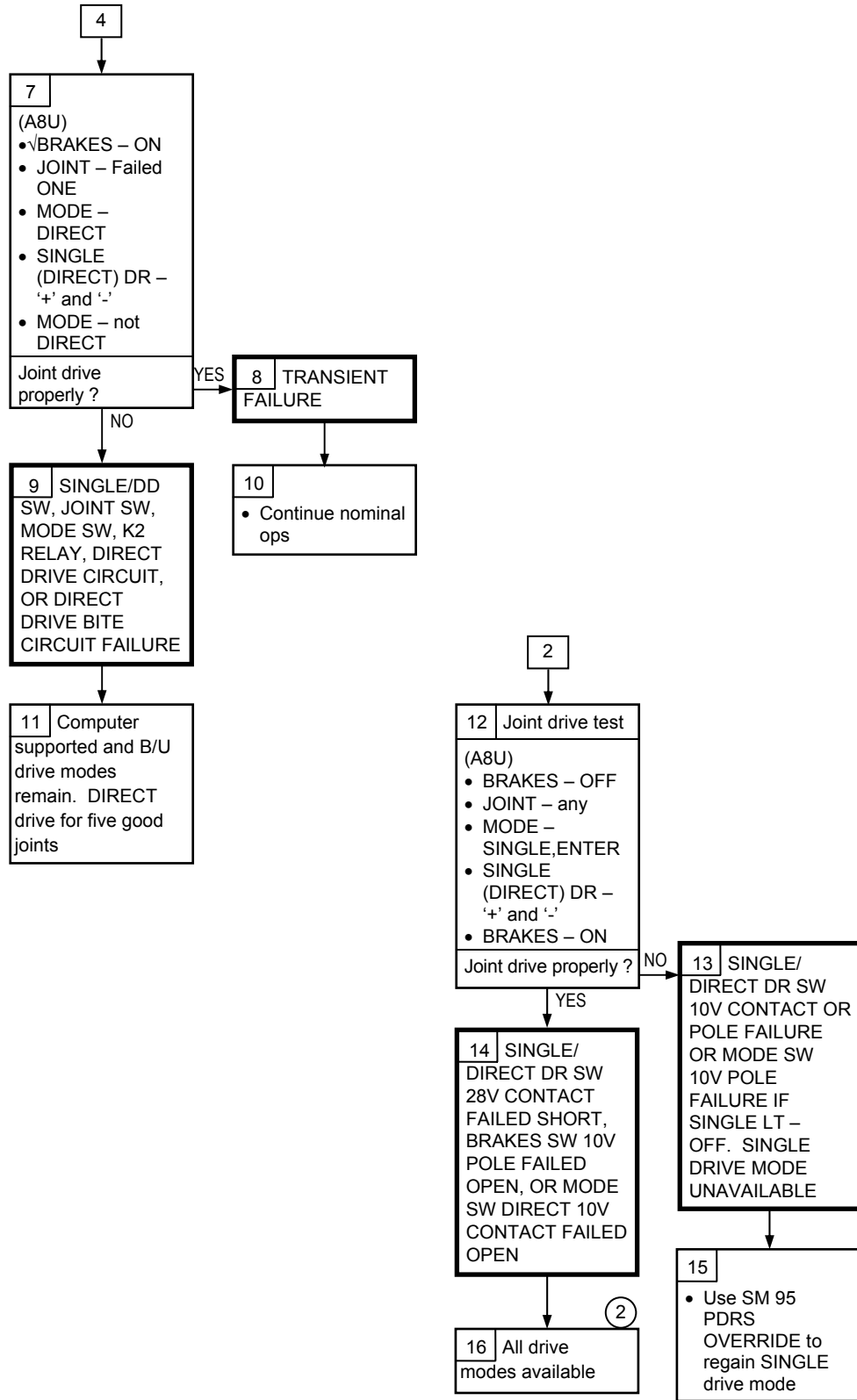


If:
 SPA Direct Drive circuit failure, SPA BITE Verification Failure, Position Encoder, D&C Comm. EE Fail, Thermistor Circuit, HC, Brake Slip, WR Range out of limits, MCIU BITE Verification Test circuit failure



① Computer supported modes available but subsequent commutator failure for same joint will not be announced or protected by autobrakes

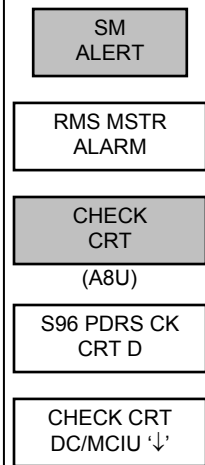
PDRS 12.1g (Cont)



② One failure away from uncommanded joint drive in DIRECT

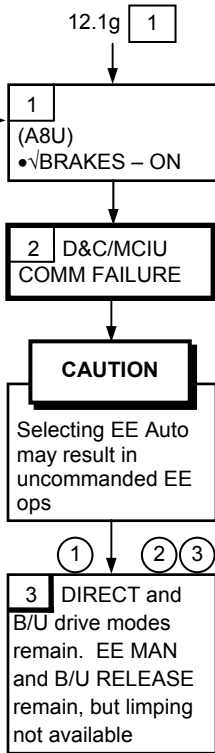
PDRS

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 '*'



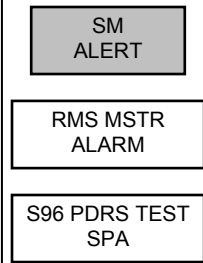
① Data may be unreliable on D&C pnl. ABE data on SM 169 still good

② Full capability may be restored with RMS MCIU CHANGEOUT (IFM). If problem is in D&C pnl, MCIU changeout will not restore capability

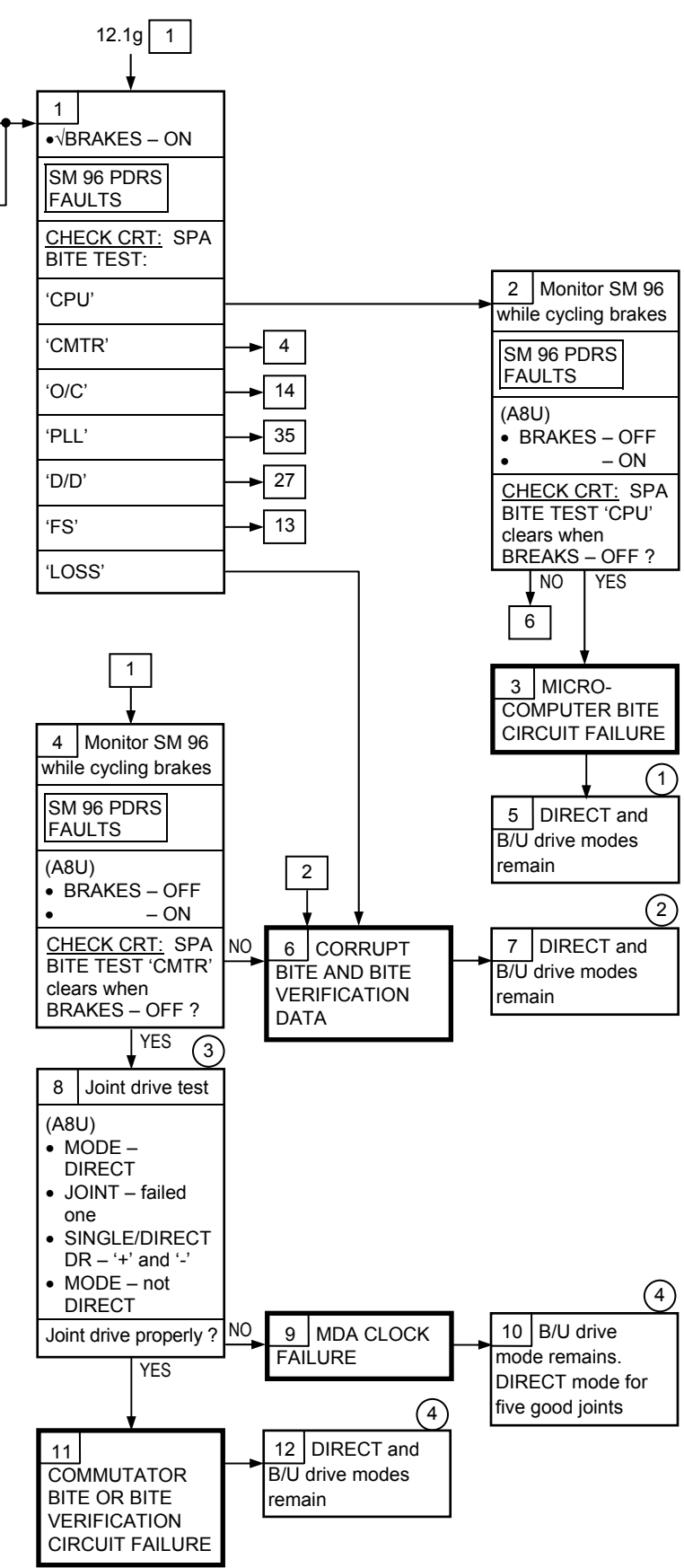
③ Possible PDRS SLIP msgs if driving in DIRECT (once per joint). Possible PDRS DERIG and PDRS RELEASE msgs when performing EE release

PDRS

12.1i C/W CHECK CRT LT – S96 PDRS TEST SPA



Nominal Config:
 (A8L)
 RMS PWR – PRI
 RMS SEL – PORT (CRT)
 SM 94 I/O ON – ITEM 5 (*)



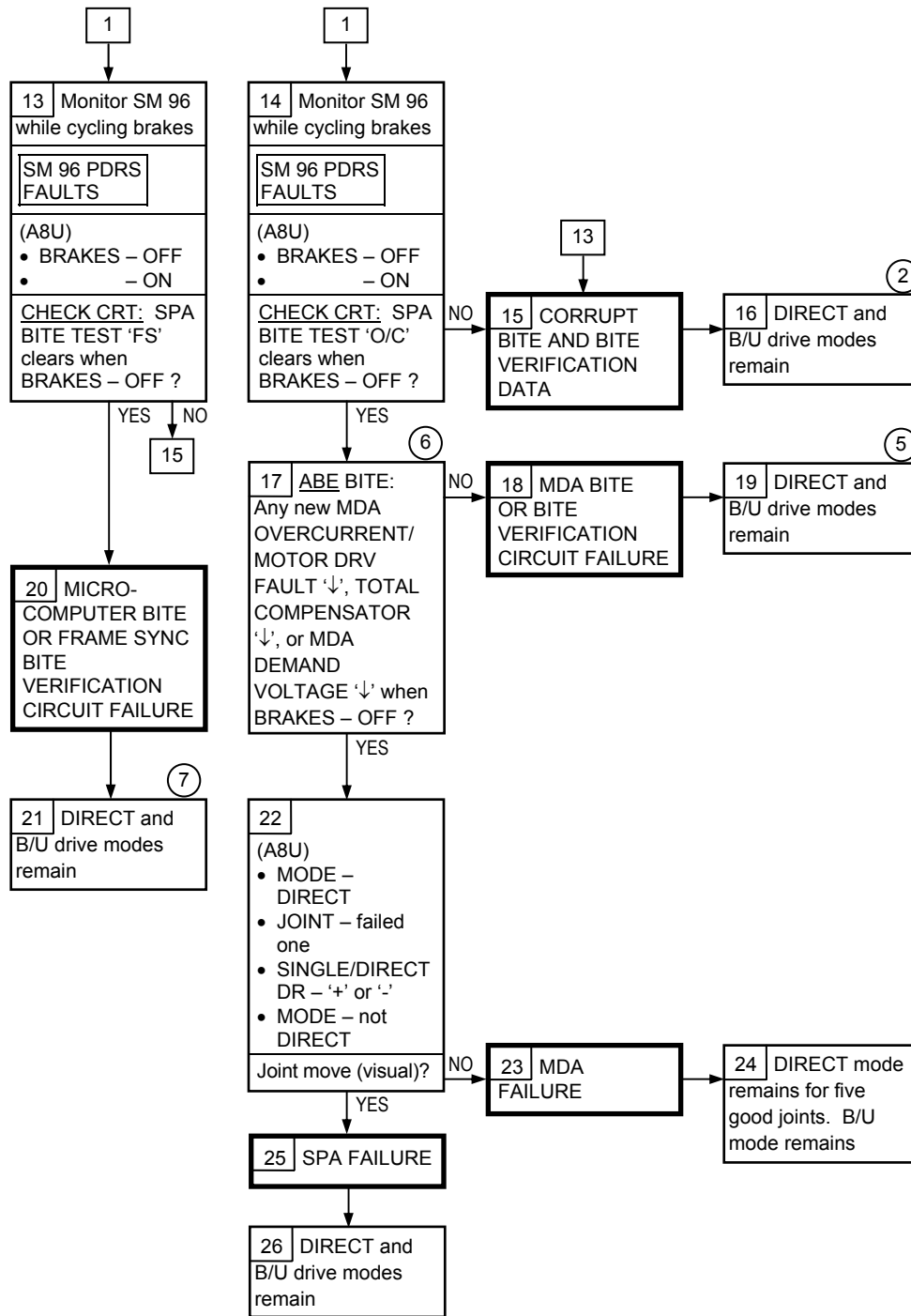
① For loss of microcomputer BITE, computer supported modes available but subsequent failure for same joint may not be annunciated or protected by autobrakes

② Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations

③ May receive CHECK CRT It and DIRECT DRIVE BITE '↓' when driving in Direct Mode. Cycle BRAKES sw to clear failure

④ Computer supported modes available but subsequent commutator failure for same joint may not be annunciated or protected by autobrakes

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

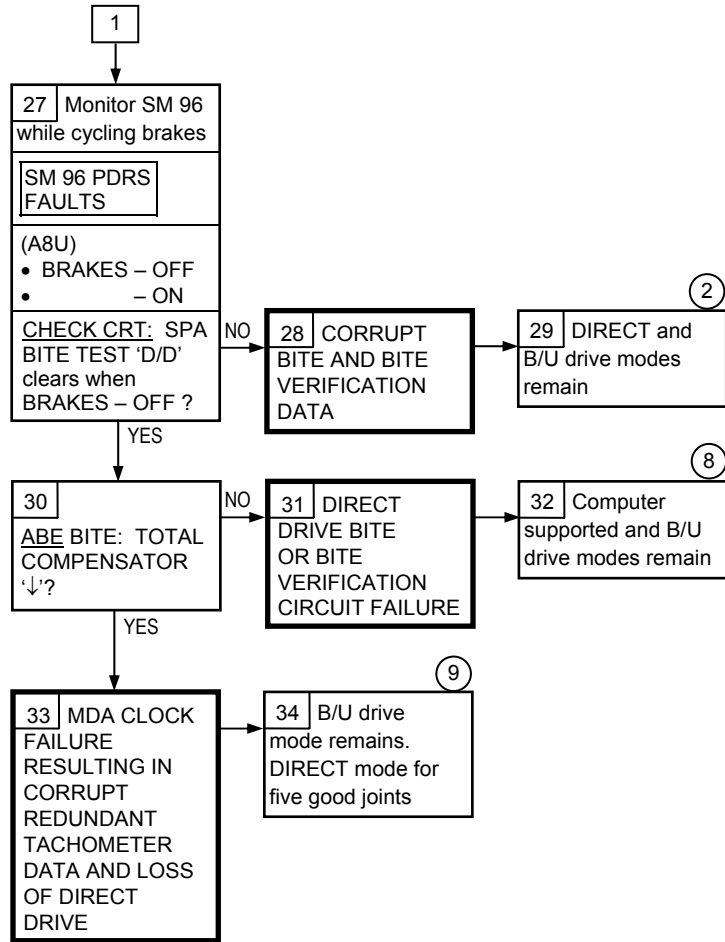
⑤ For MDA BITE circuit failure, computer supported modes available but subsequent MDA failure for same joint will not be annunciated or protected by autobrakes

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

PDRS

12.1i (Cont)

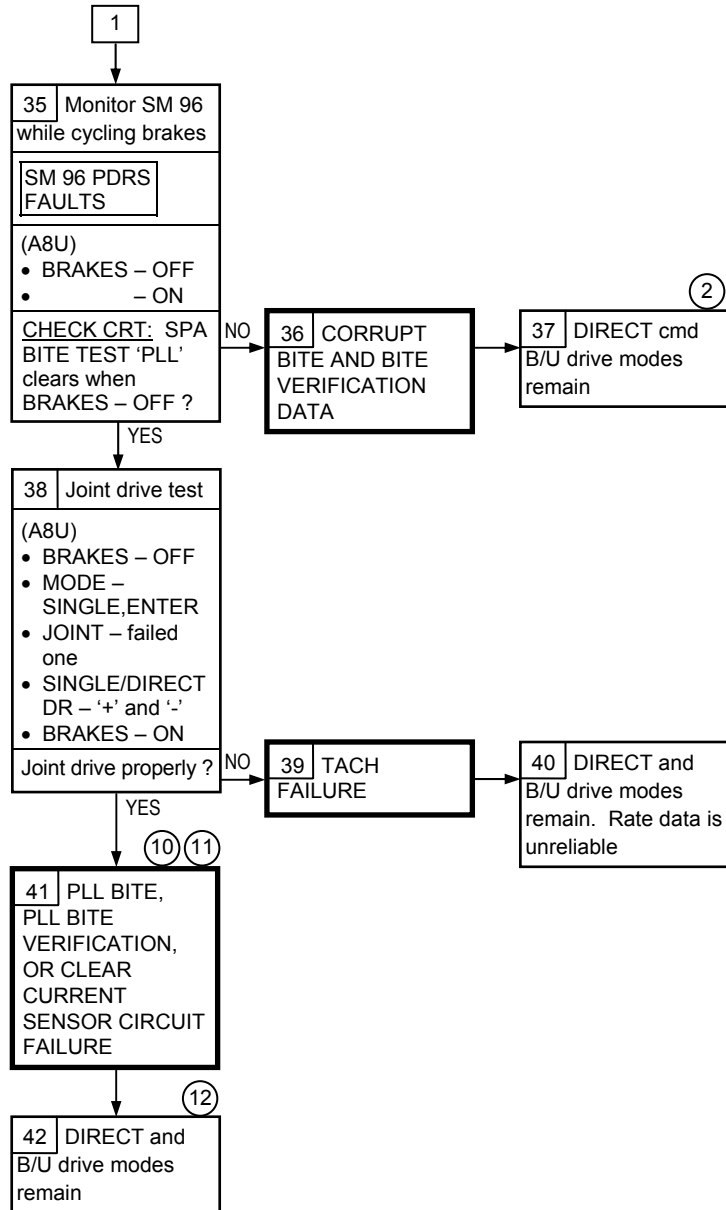


② Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations

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)



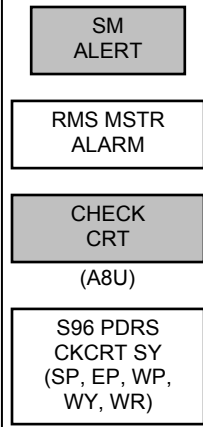
(2) Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations

(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

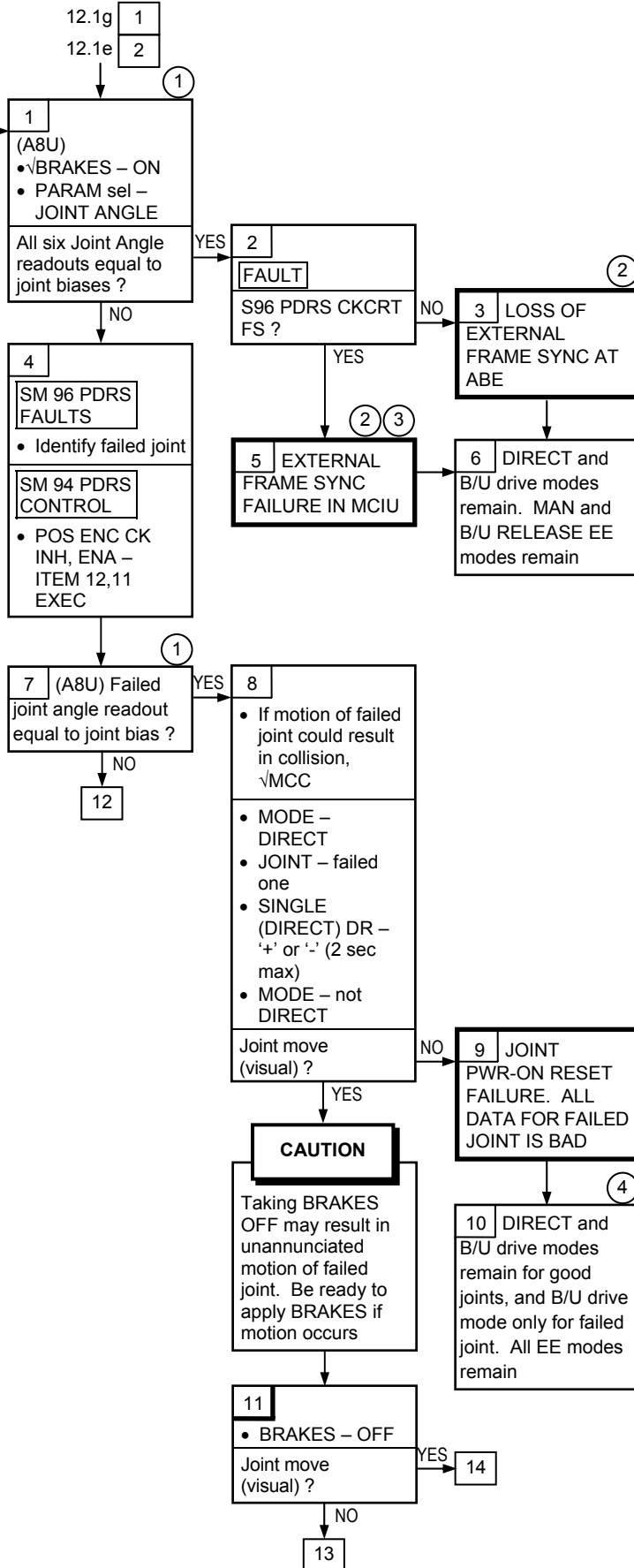
PDRS



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)

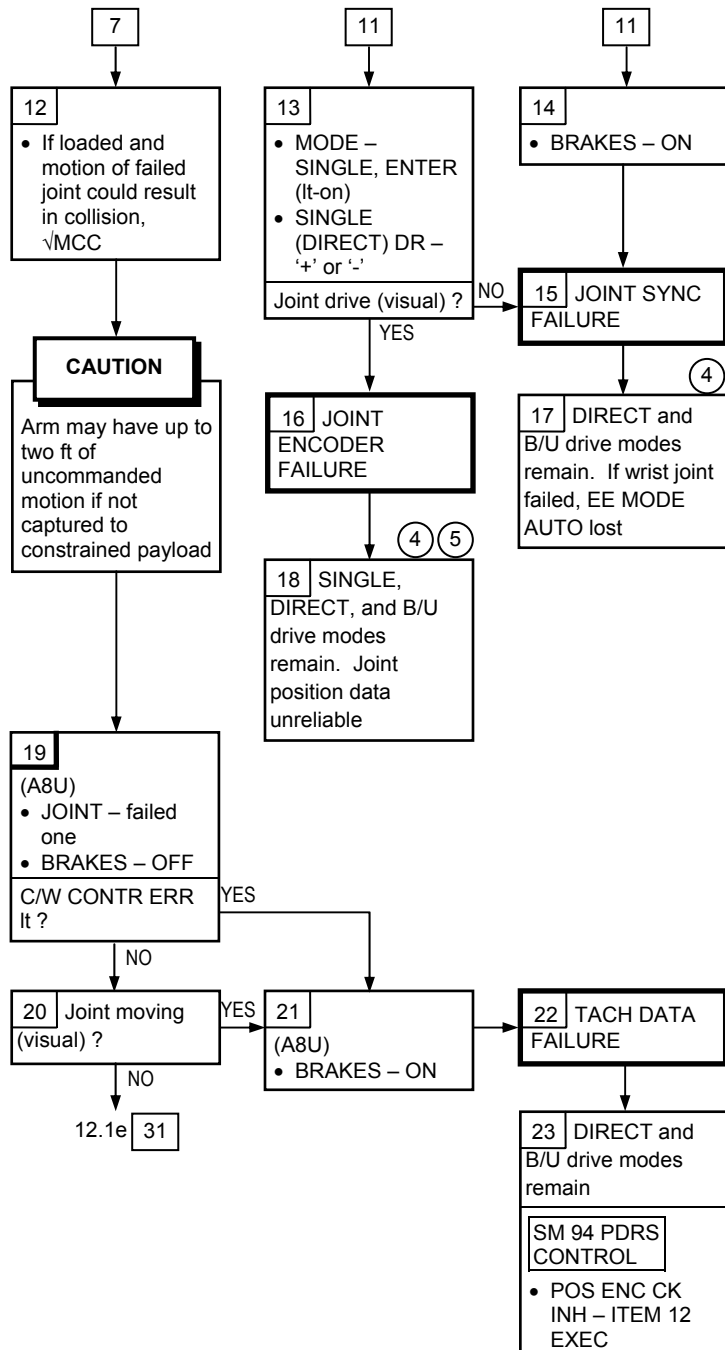


① Joint biases
DDT&E (201)

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)

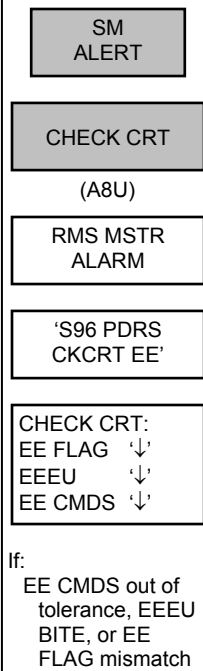


④ REACH LIMITs and SOFT STOPs annunciation not available for failed joint

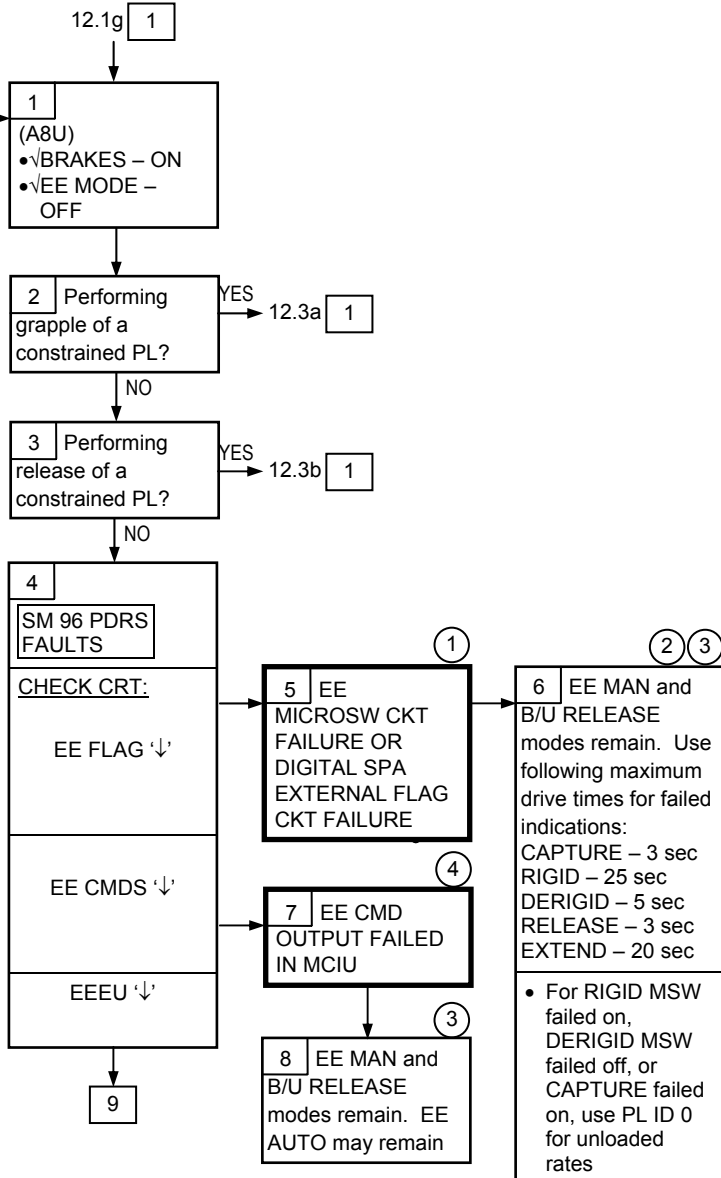
⑤ Position hold function will not work for failed joint

PDRS

**12.1k C/W CHECK CRT LT – S96 PDRS
CKCRT EE**

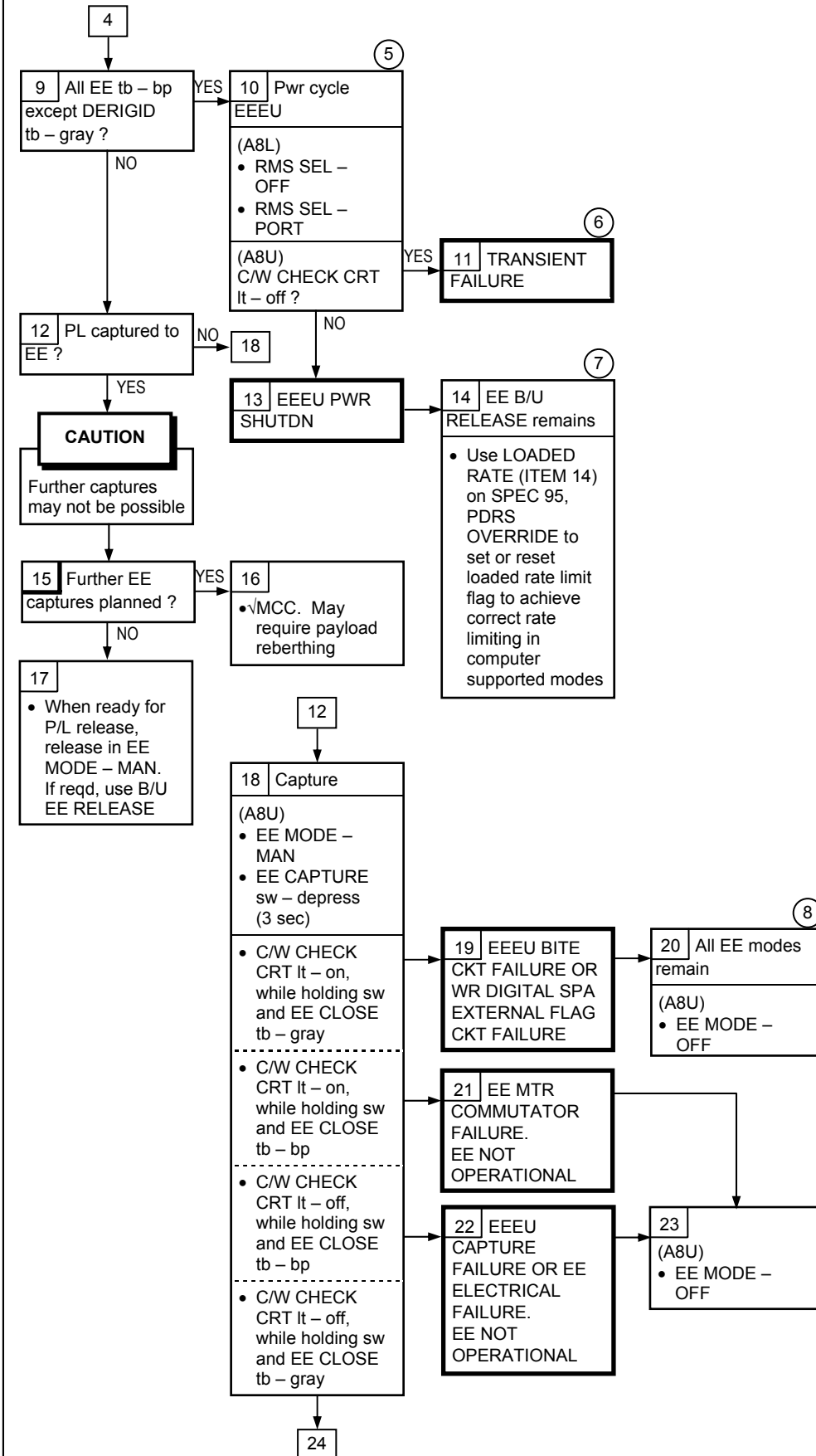


Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT



- 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)

PDRS 12.1k (Cont)



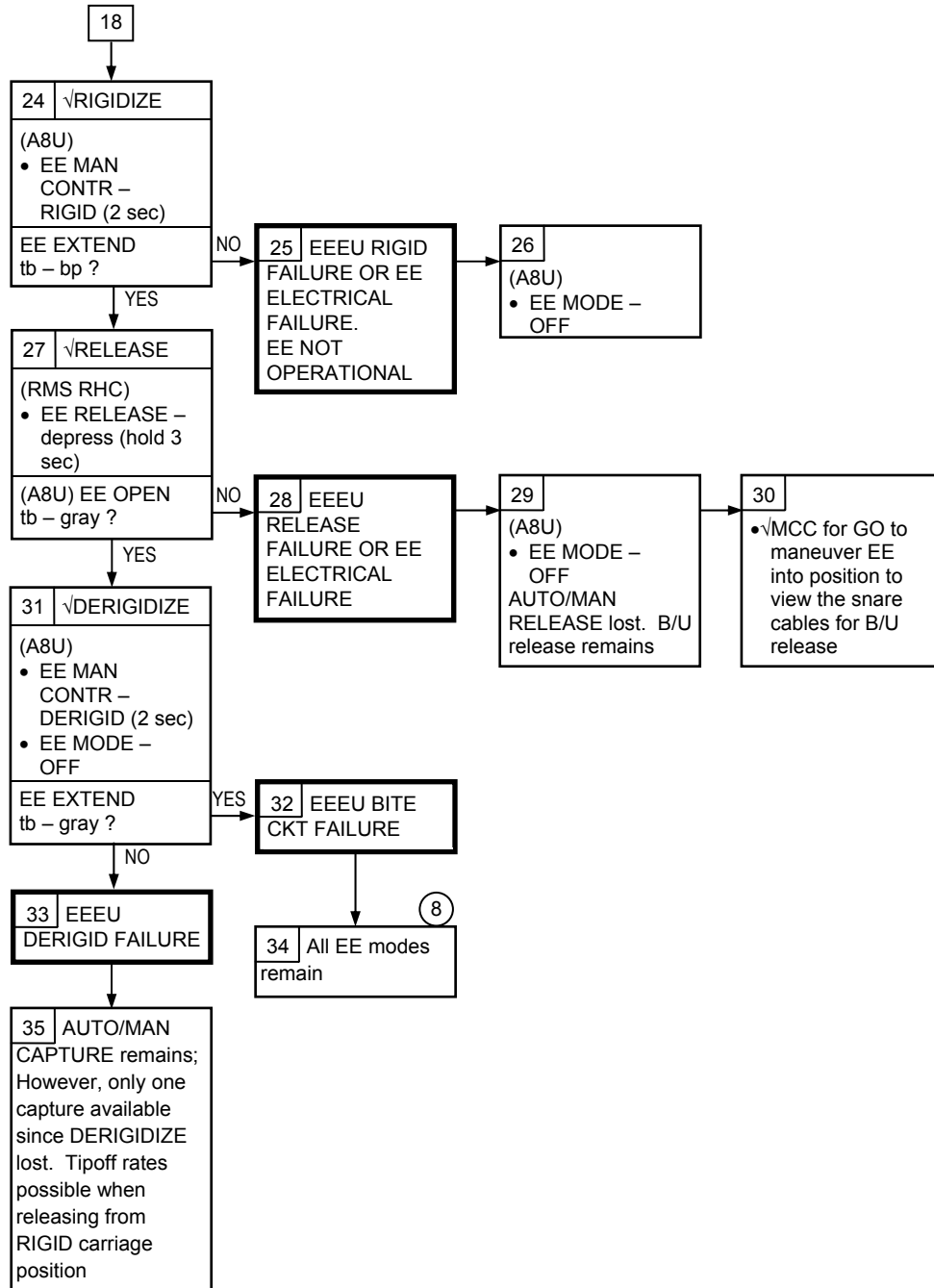
⑤ √WR roll range value. Deselecting and reselecting RMS may cause WR roll range value to be incorrect

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

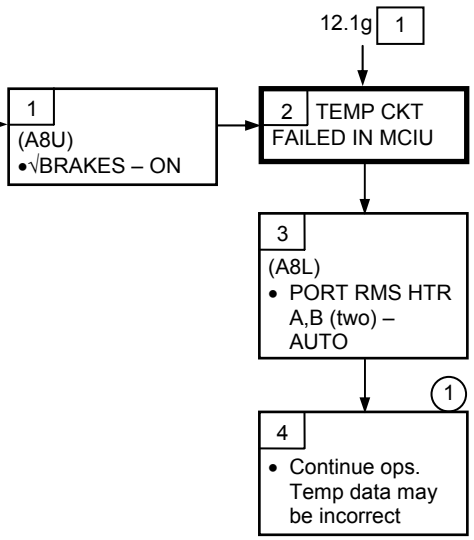
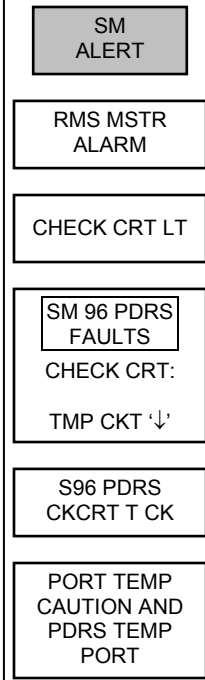
PDRS 12.1k (Cont)



⑧ EEEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg

PDRS

**12.11 C/W CHECK CRT LT – S96 PDRS
CKCRT T CK**



① MCC may TMBU temp limits to prevent nuisance alarms

If:
Thermistor circuit reference voltage fail

Nominal Config:
(A8L)
PORT RMS
HTR A(B) – AUTO

PDRS

**12.1m C/W CHECK CRT LT – S96 PDRS
CKCRT HC**

SM ALERT

RMS MSTR ALARM

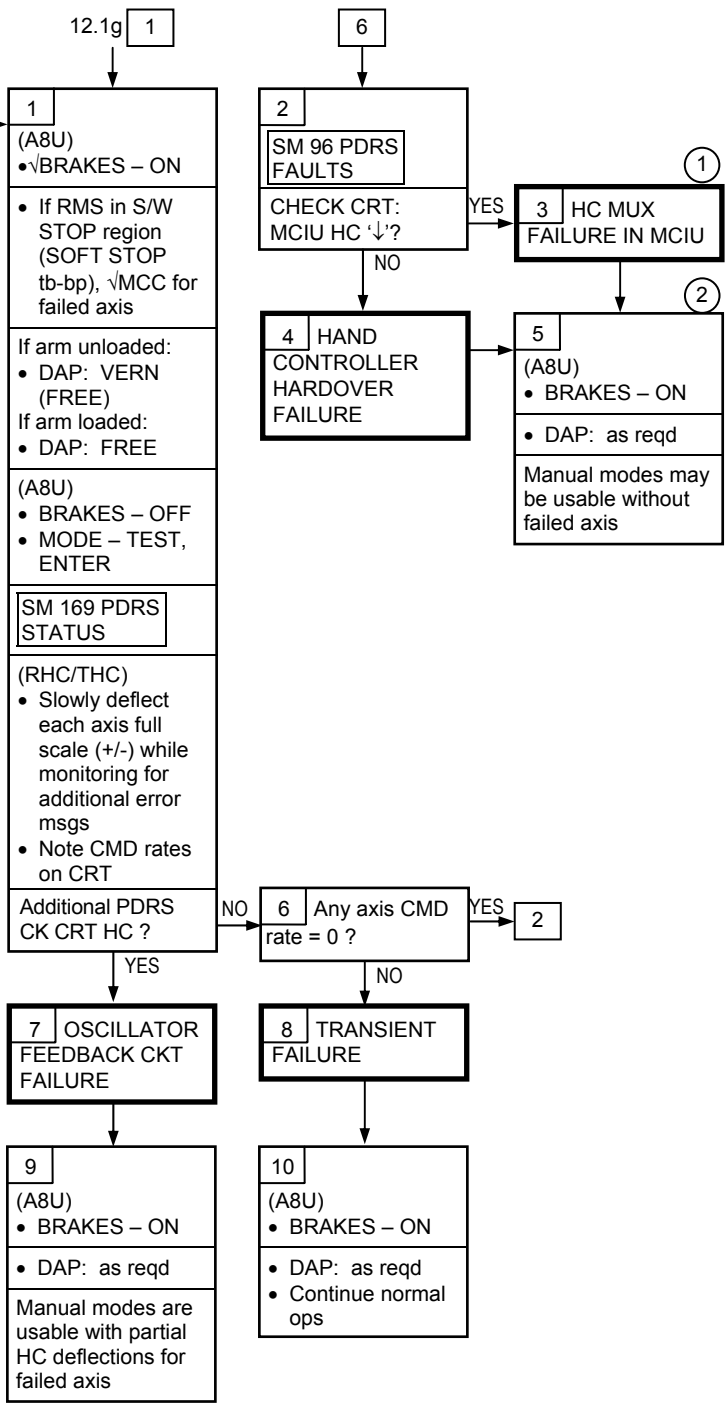
CHECK CRT (A8U)

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

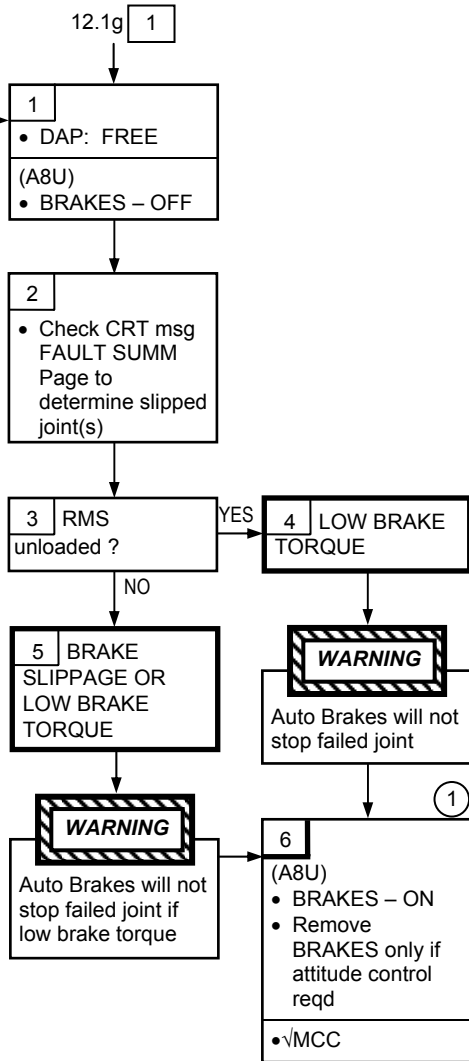
PDRS

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

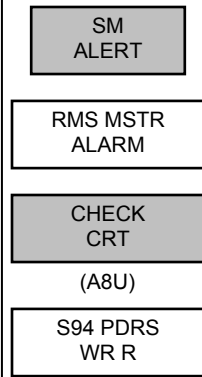
Nominal Config:
 (A8U)
 RMS SEL – PORT
 BRAKES – ON
 BRAKES tb – ON
 MODE – not DIRECT



① MCC can attempt to correlate jet activity with 'PDRS SLIP' msg or may recommend a joint drive test to ascertain brake health

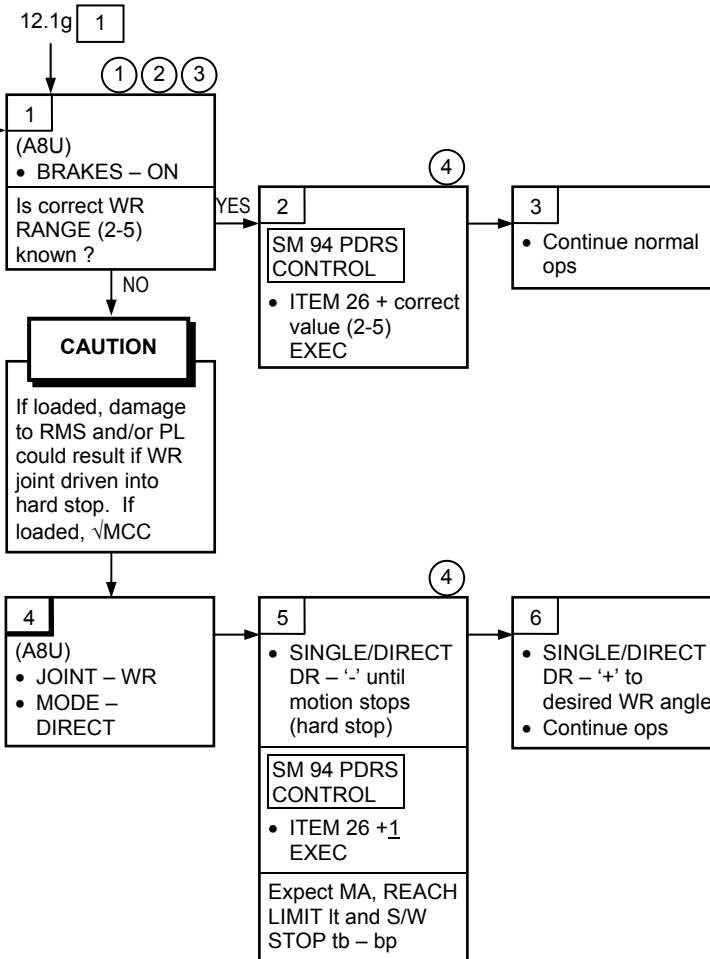
PDRS

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



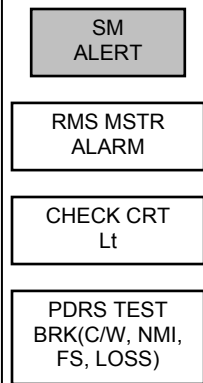
- ① MCC may be able to determine correct value
- ② Msg may result because of RMS deselect and reselect, driving WR in B/U, or SM major function move to another GPC
- ③

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

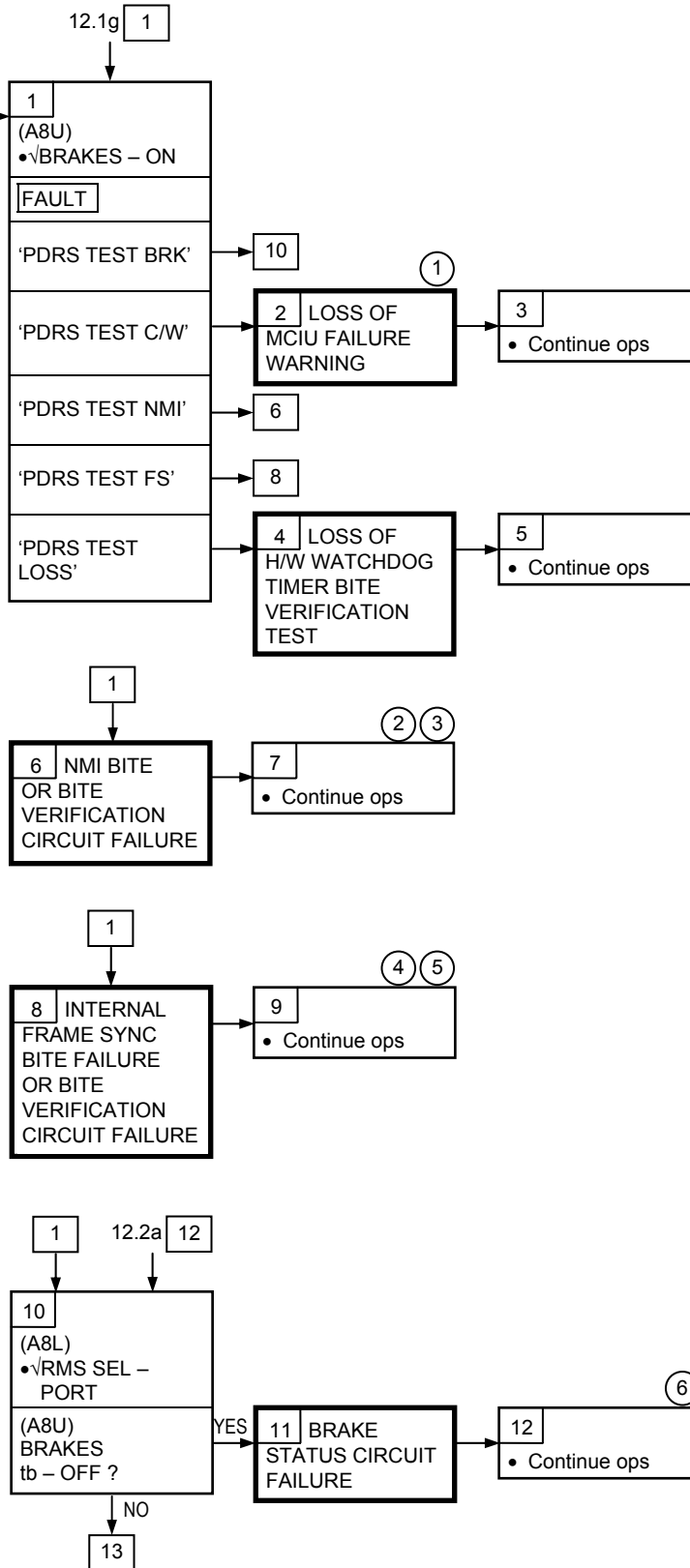
- ④ Expect CKCRT It and 'S96 PDRS CKCRT WR'. Clear with SM 94 PDRS CONTROL ITEM 12, 11

PDRS

12.1p C/W CHECK CRT LT – PDRS TEST BRK (C/W, NMI, FS, LOSS)

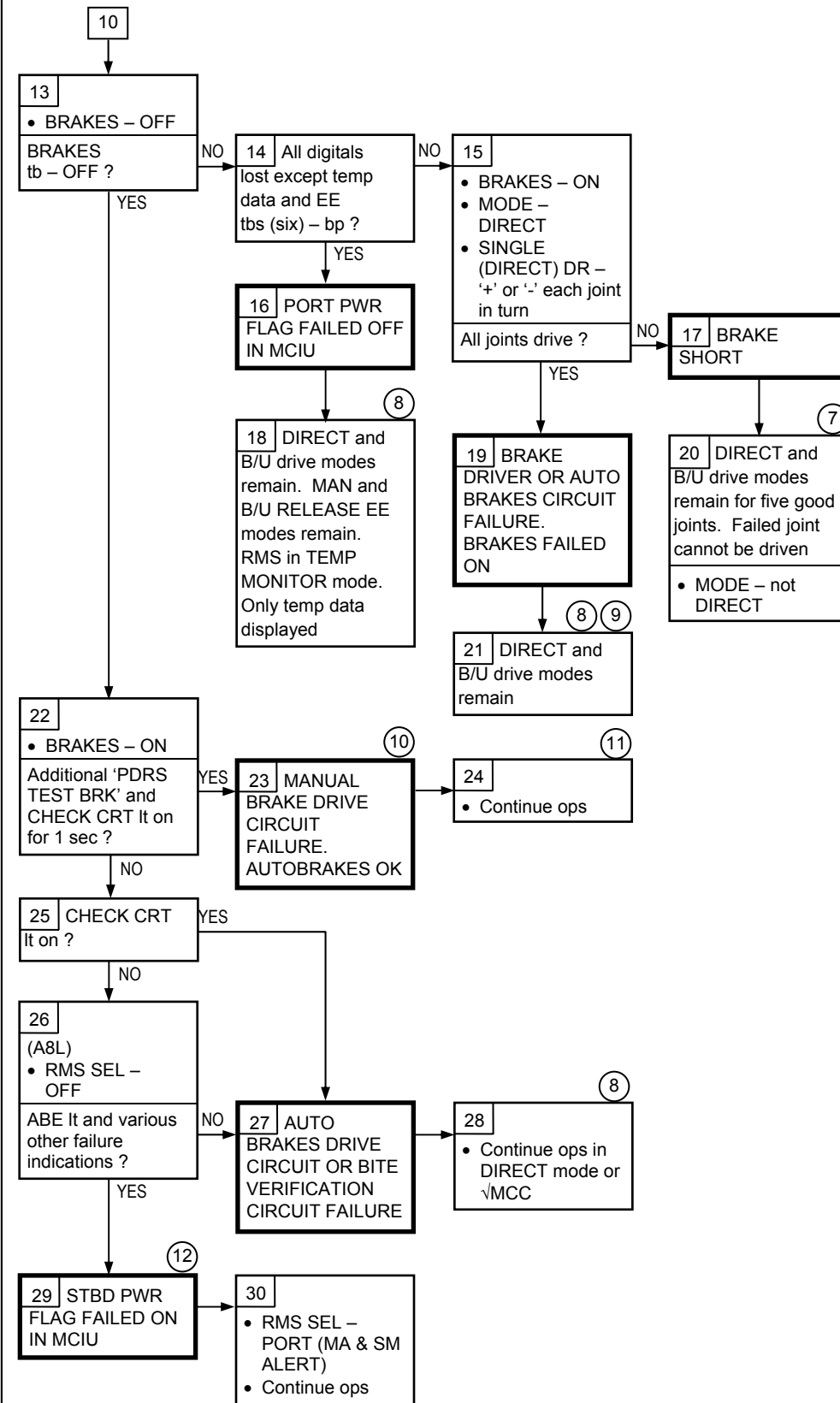


If: MCIU BITE Verification test circuit failure



- 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

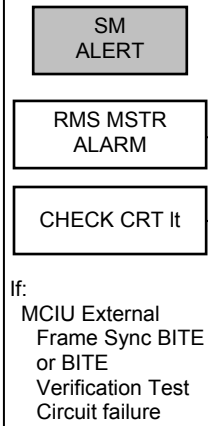
⑩ MCIU BITE verification test will apply brakes 1 sec after brake sw on

⑪ Failure will reannunciate with BRAKE sw transition from OFF to ON

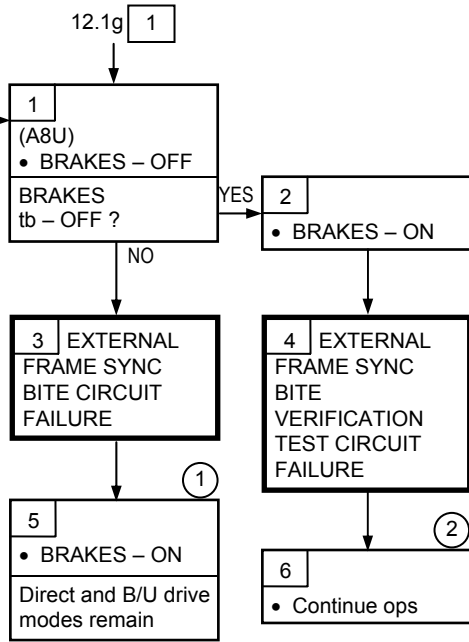
⑫ RMS temperature monitor mode not available

PDRS

**12.1q C/W CHECK CRT LT – S96 PDRS
CKCRT FS**

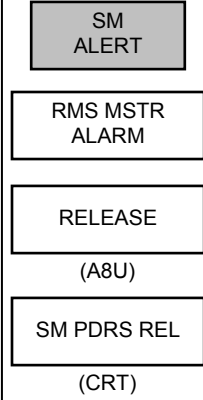


If:
MCIU External
Frame Sync BITE
or BITE
Verification Test
Circuit failure

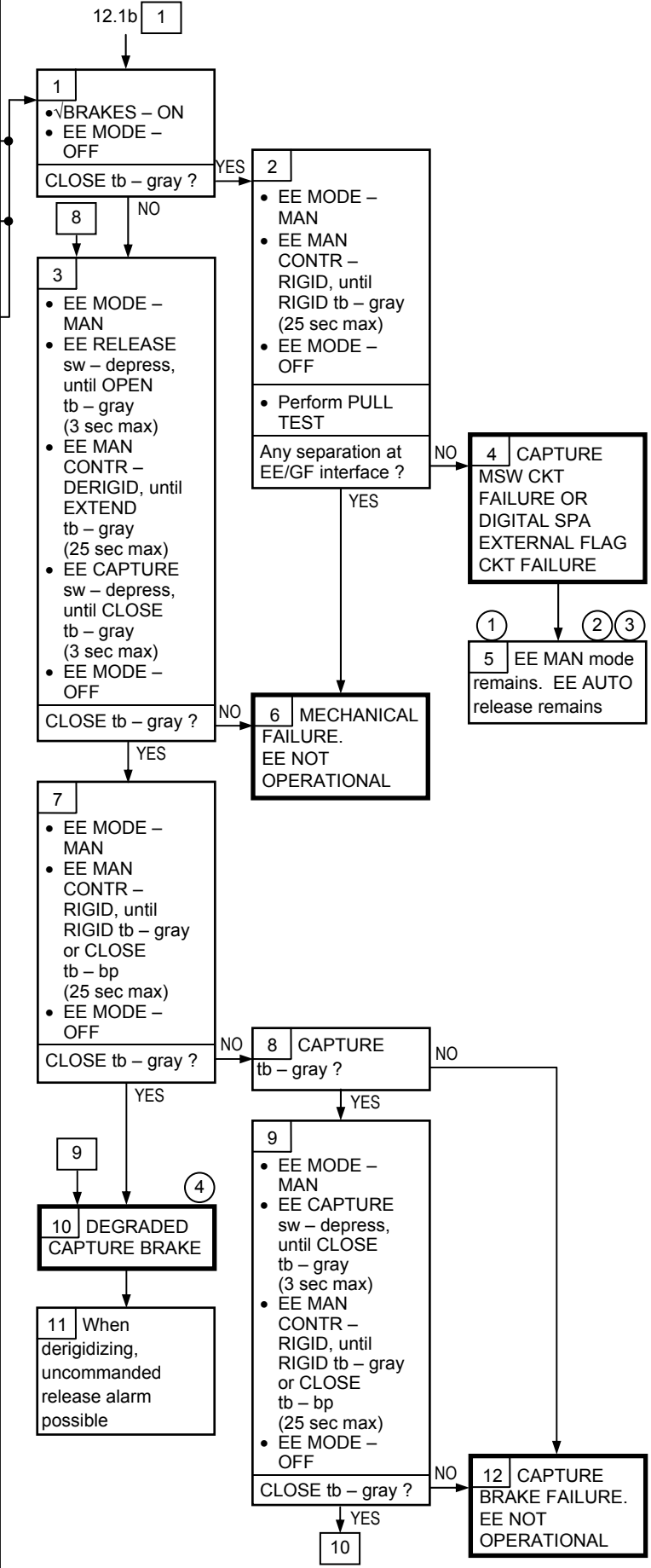


- ① Full capability will be restored with RMS MCIU CHANGEOUT (IFM)
- ② Auto brakes available for subsequent loss of External Frame Sync due to SPA detected loss of Frame Sync

PDRS



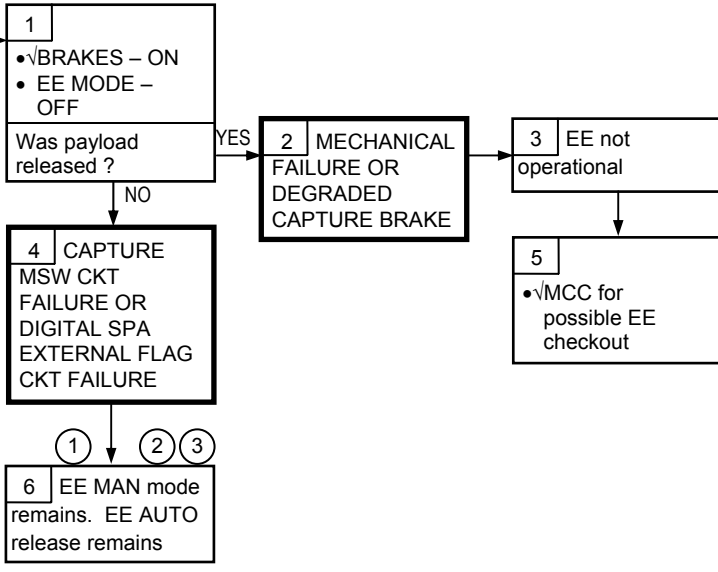
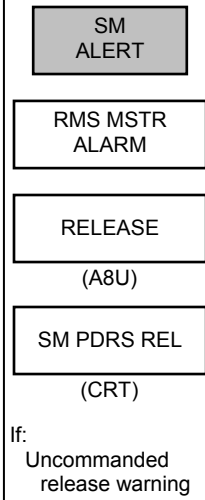
12.1r C/W RELEASE LT – PDRS REL



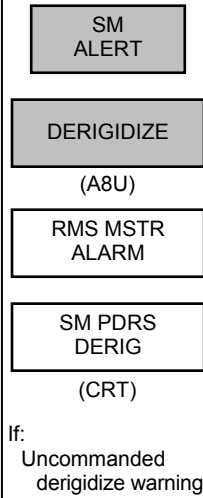
- ① Subsequent uncommanded release will not be annunciated
- ② RMS loaded rates can be set via SM 95 PDRS OVERRIDE
- ③ For digital SPA failure, EXTEND flag may be failed OFF causing EE motor to continue to drive until EE MODE - OFF during AUTO RELEASE
- ④ Rigidize brake is sufficient to hold EE drive train

PDRS

**12.1s C/W RELEASE LT – PDRS REL
(CUE CARD EXECUTED)**



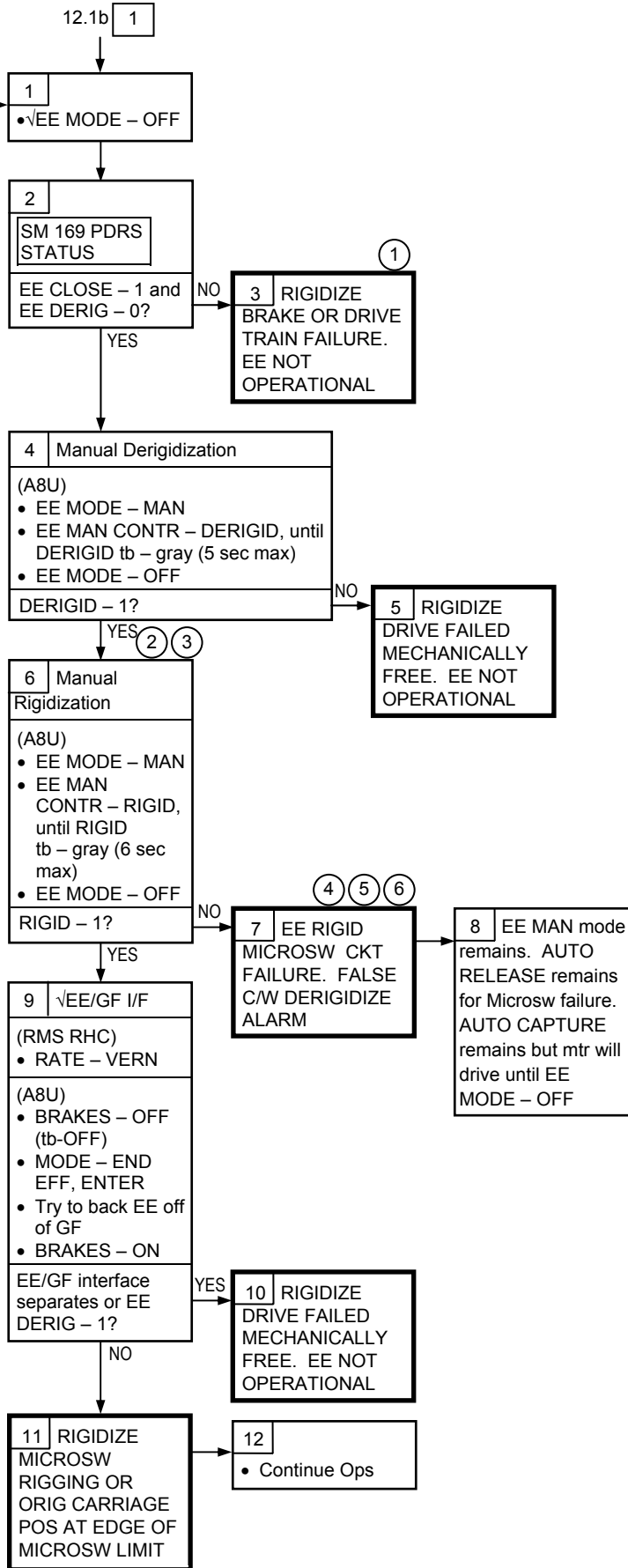
PDRS



If:
Uncommanded derigidize warning

Nominal Config:
PL is 6 DOF constrained

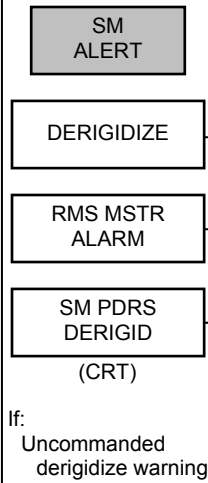
12.1t C/W DERIGIDIZE LT – PDRS DERIG



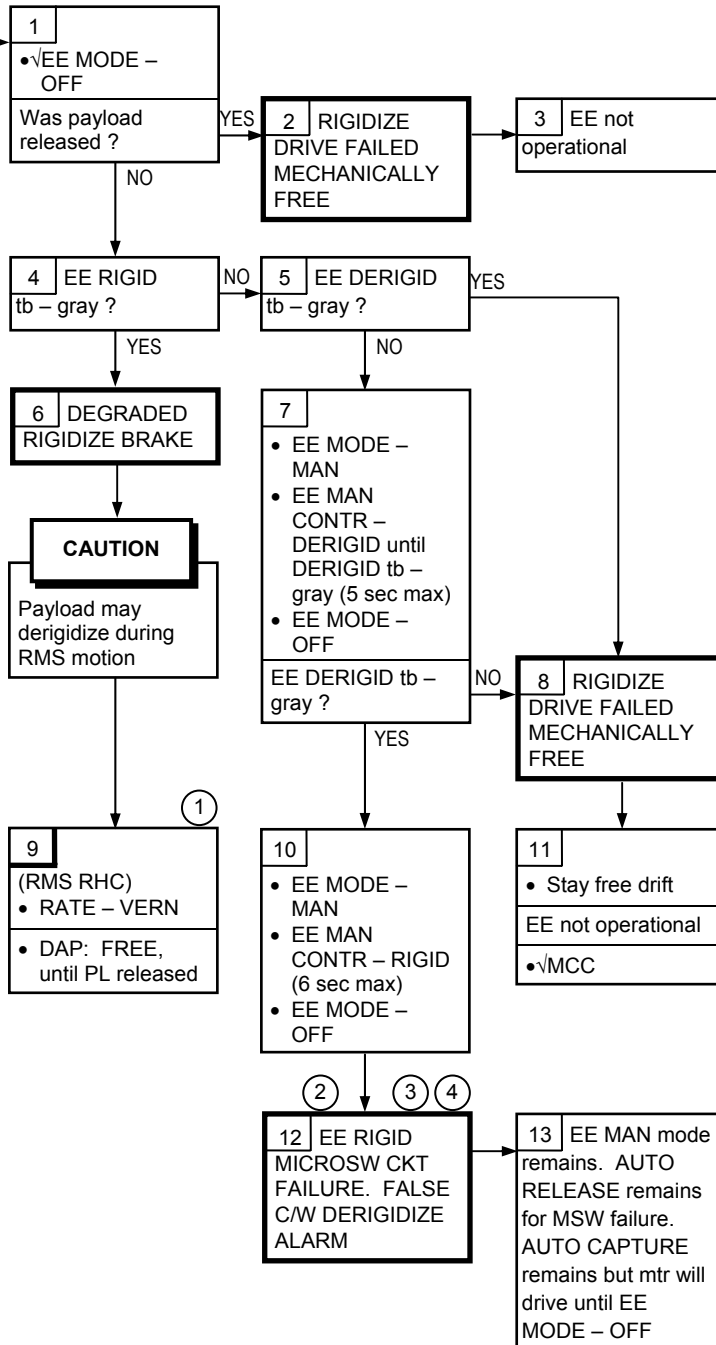
- ① Loss of Rigidize brake will cause motion of the snare drive mechanism
- ② RIGID CMD will reset C/W DERIGIDIZE check and extinguish light
- ③ Ground can verify that stall current occurs at the expected time
- ④ Further uncommanded derigidizations will not be annunciated
- ⑤ RMS loaded rates can be set via SM 95 PDRS OVERRIDE after next payload capture
- ⑥ Microsw ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

PDRS

12.1u C/W DERIGIDIZE LT – PDRS DERIG (CUE CARD EXECUTED)



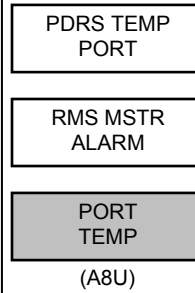
If: Uncommanded derigidize warning



- 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

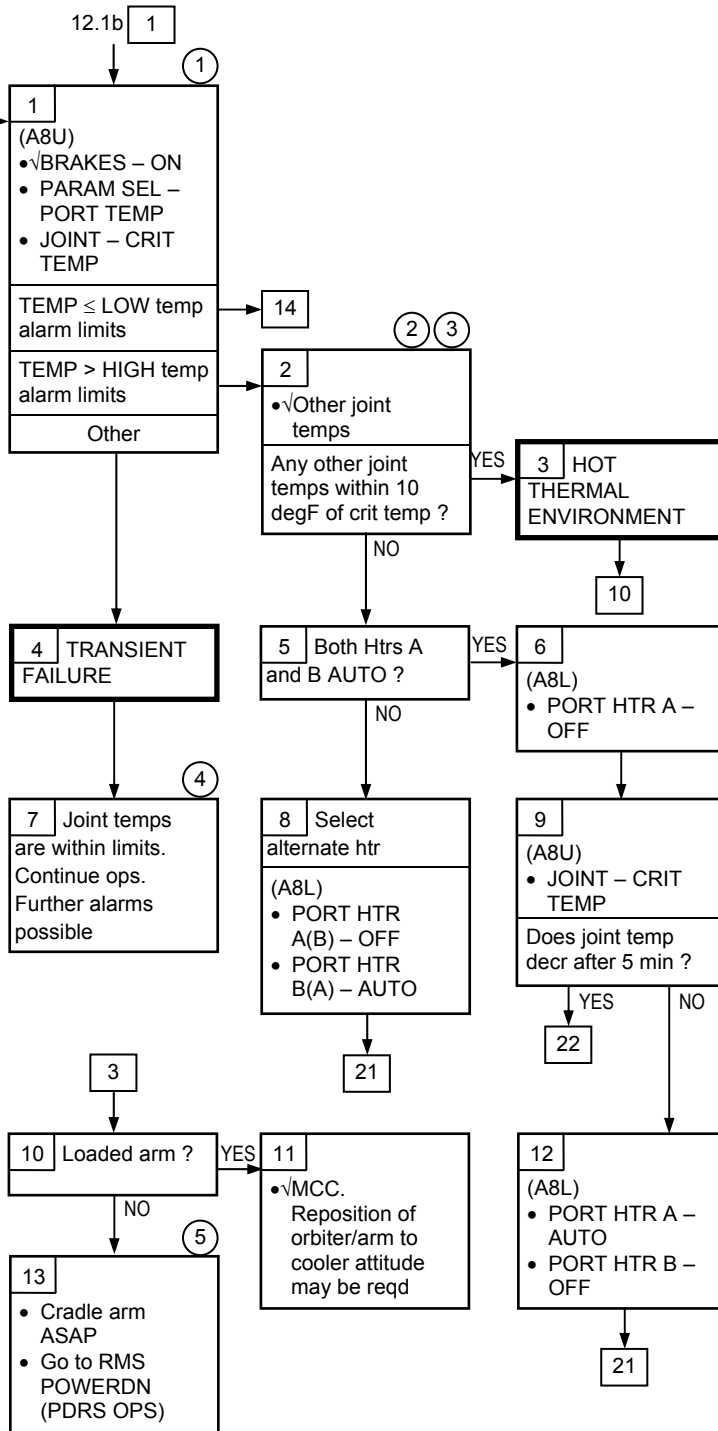
PDRS

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

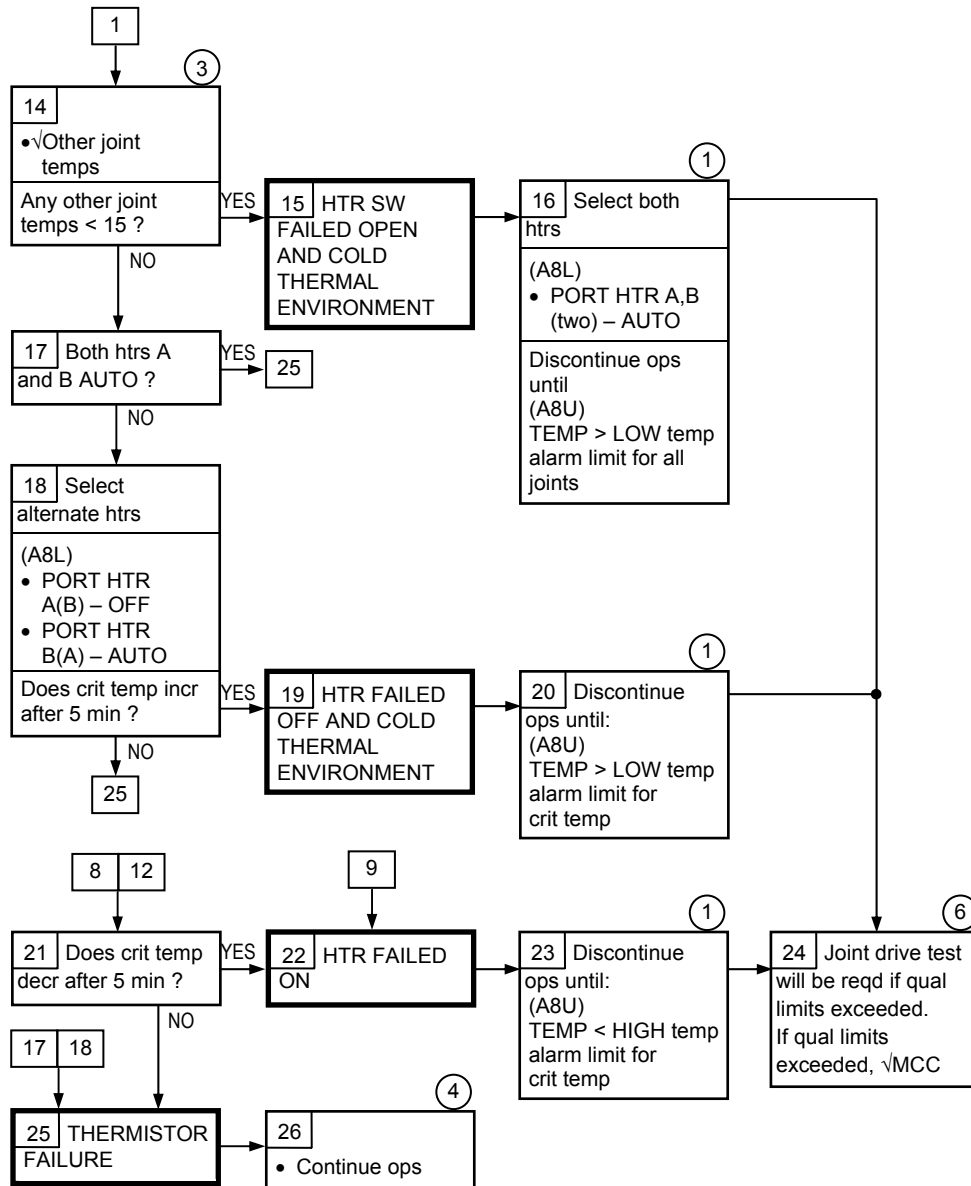
② Normally, joint temps vary between 15 degF and 60 degF

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

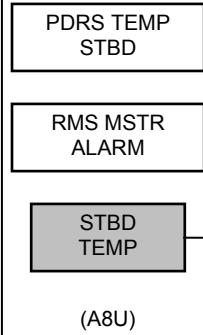
PDRS 12.1v (Cont)



- 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

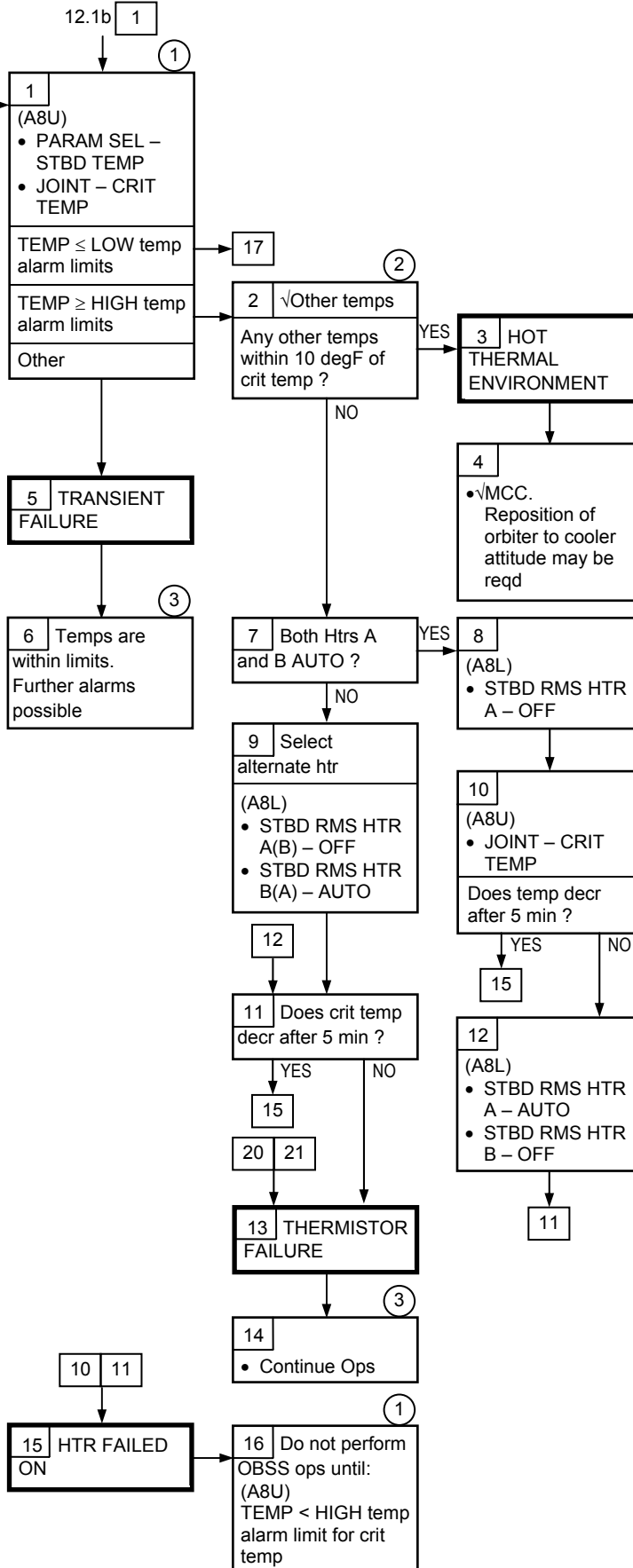
PDRS

12.1w C/W STBD TEMP LT - PDRS TEMP STBD



If: Temp exceeds alarm limits while OBSS berthed in Starboard MPMS

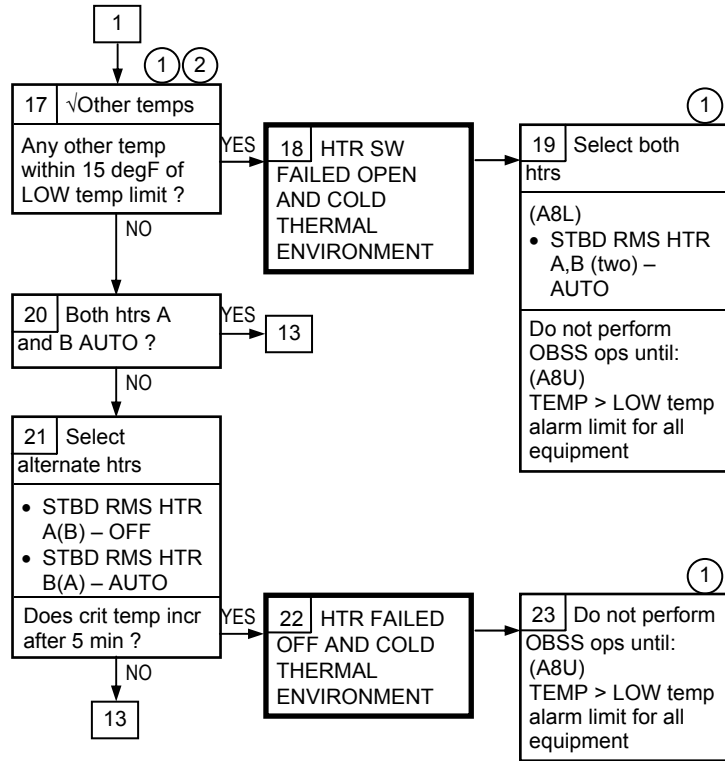
Nominal Config:
(A8L)
STBD RMS HTR A(B) – AUTO
or
STBD RMS HTR A,B (two) – AUTO



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

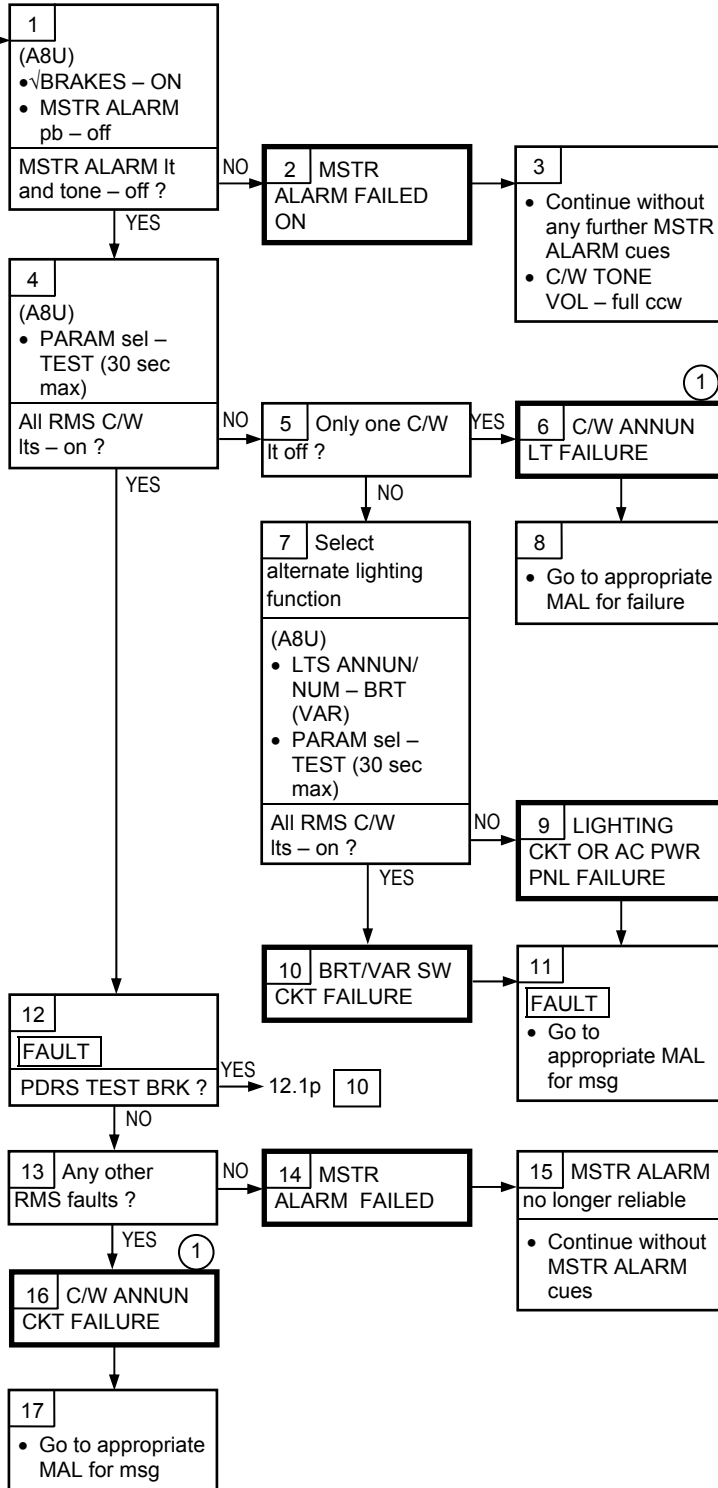
① C/W lt associated with fault msg will not illuminate

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

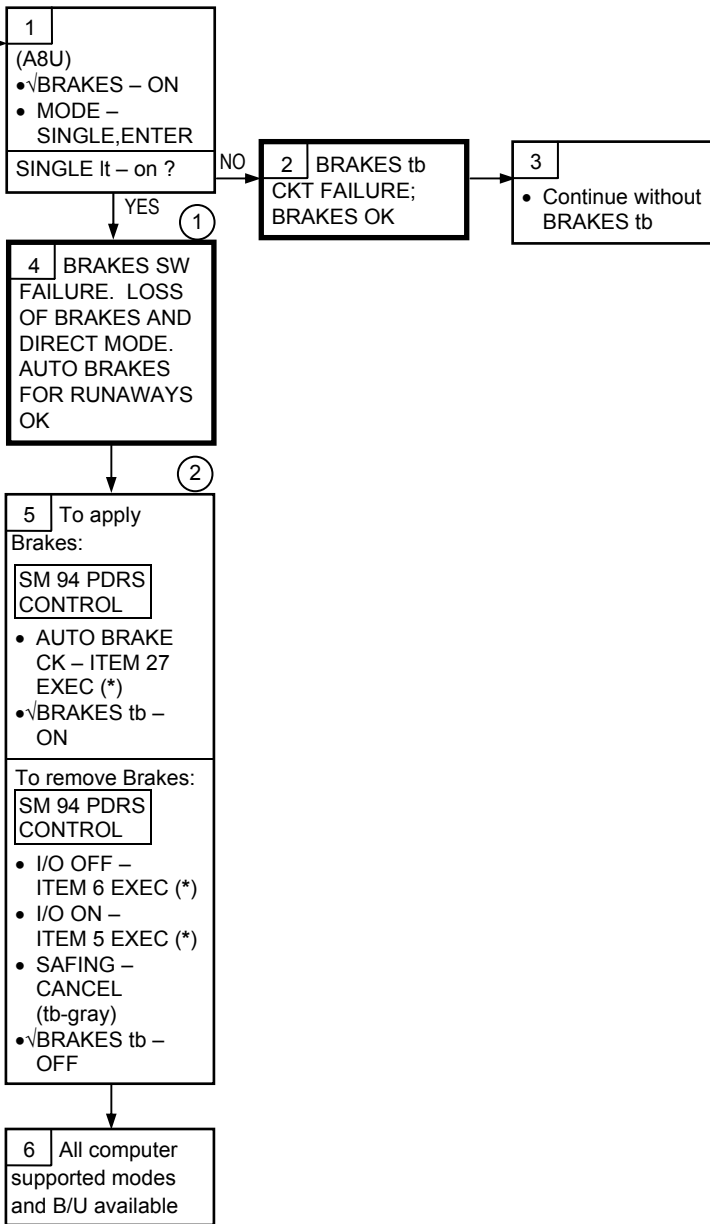
12.2

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 (*)



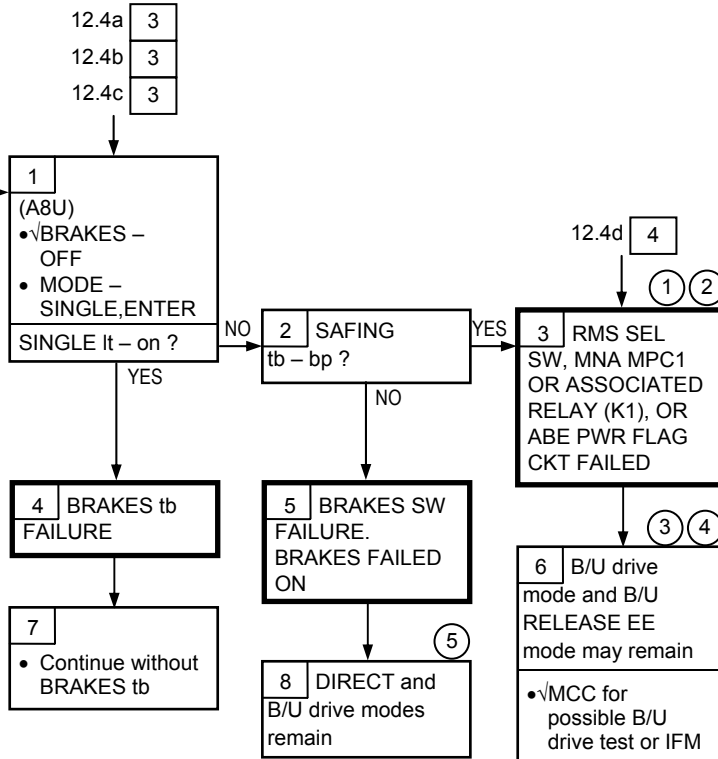
① RMS IFM D&C Kit available to regain DIRECT mode. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), AND PDRS SSR-4, RMS IFM D&C KIT

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

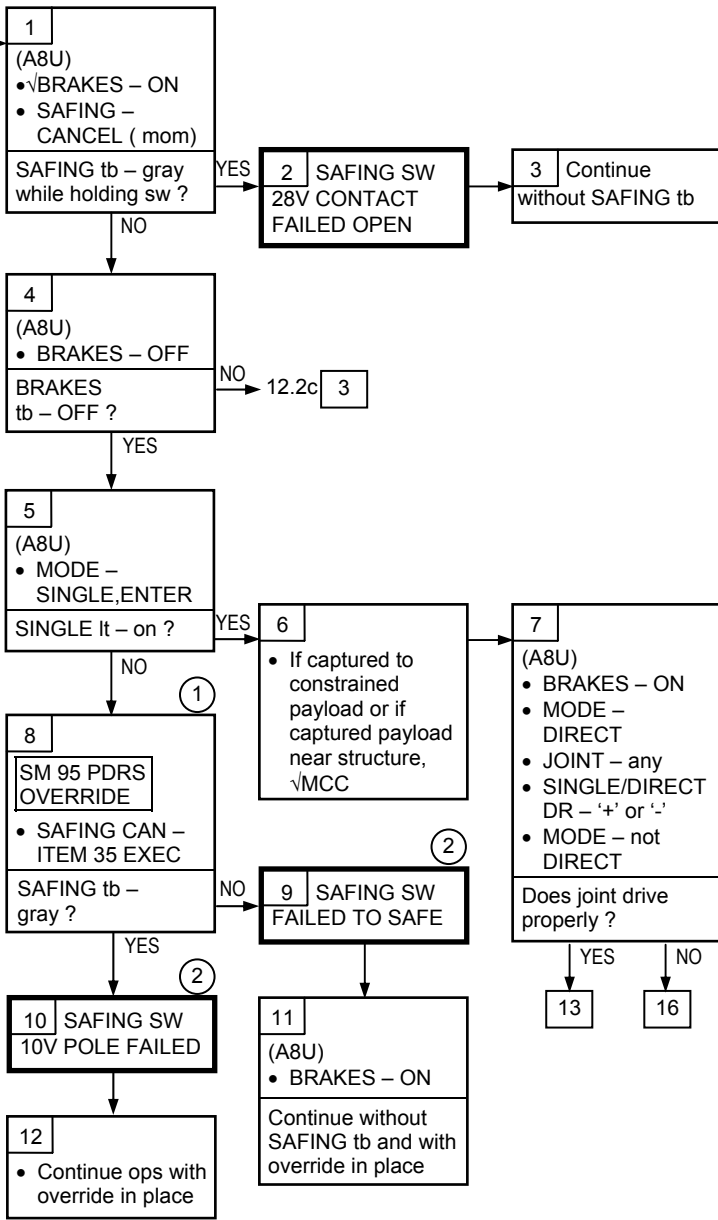
All RMS C/W
Its – Off

MASTER
ALARM – Off

No CRT SM
Msgs

No SM ALERT

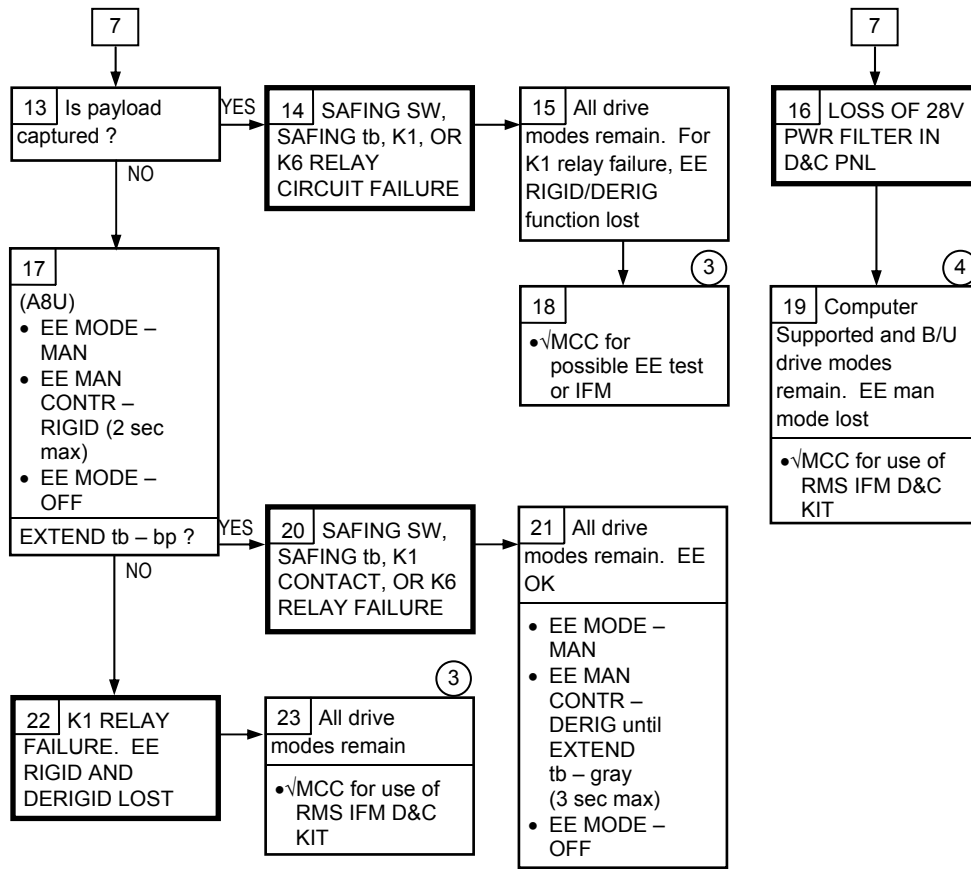
Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT



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

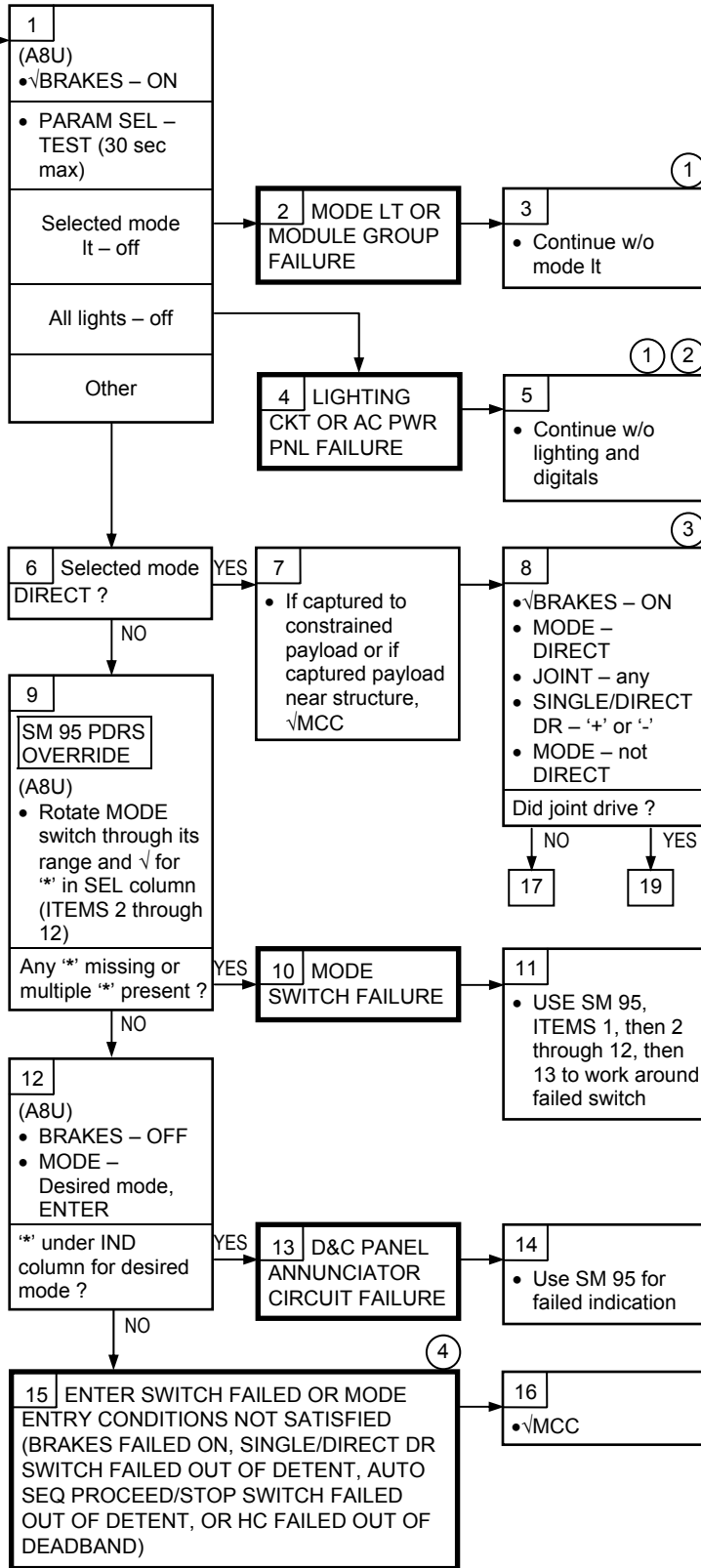
④ DIRECT drive, and EE MODE – MAN may be restored with RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

PDRS

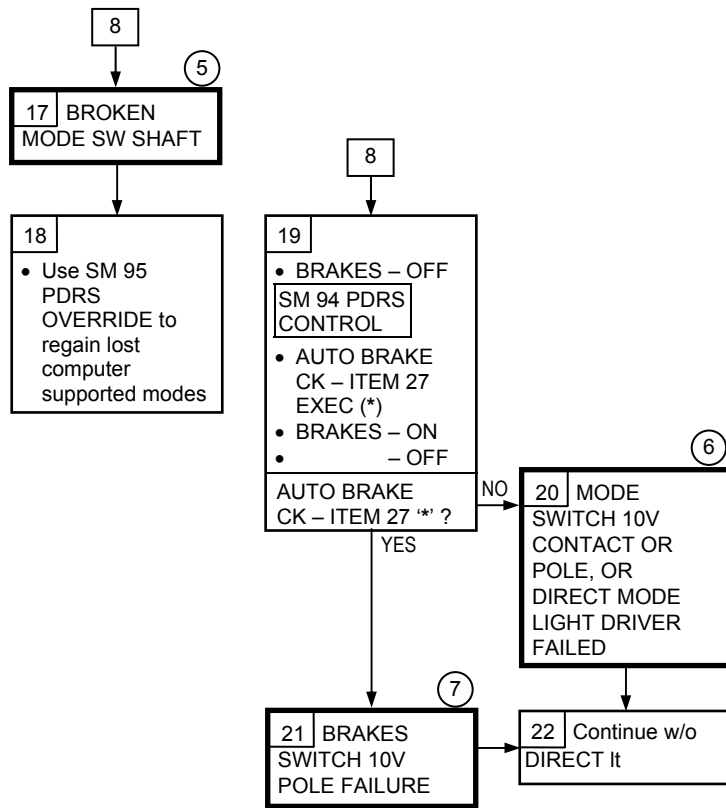
12.2g SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF

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

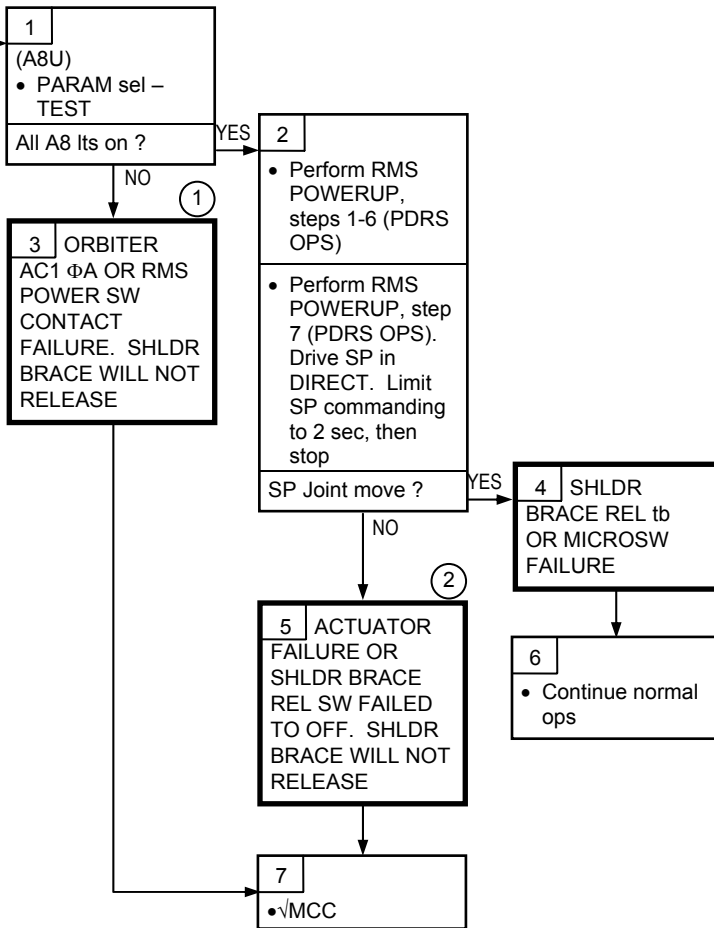
PDRS

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

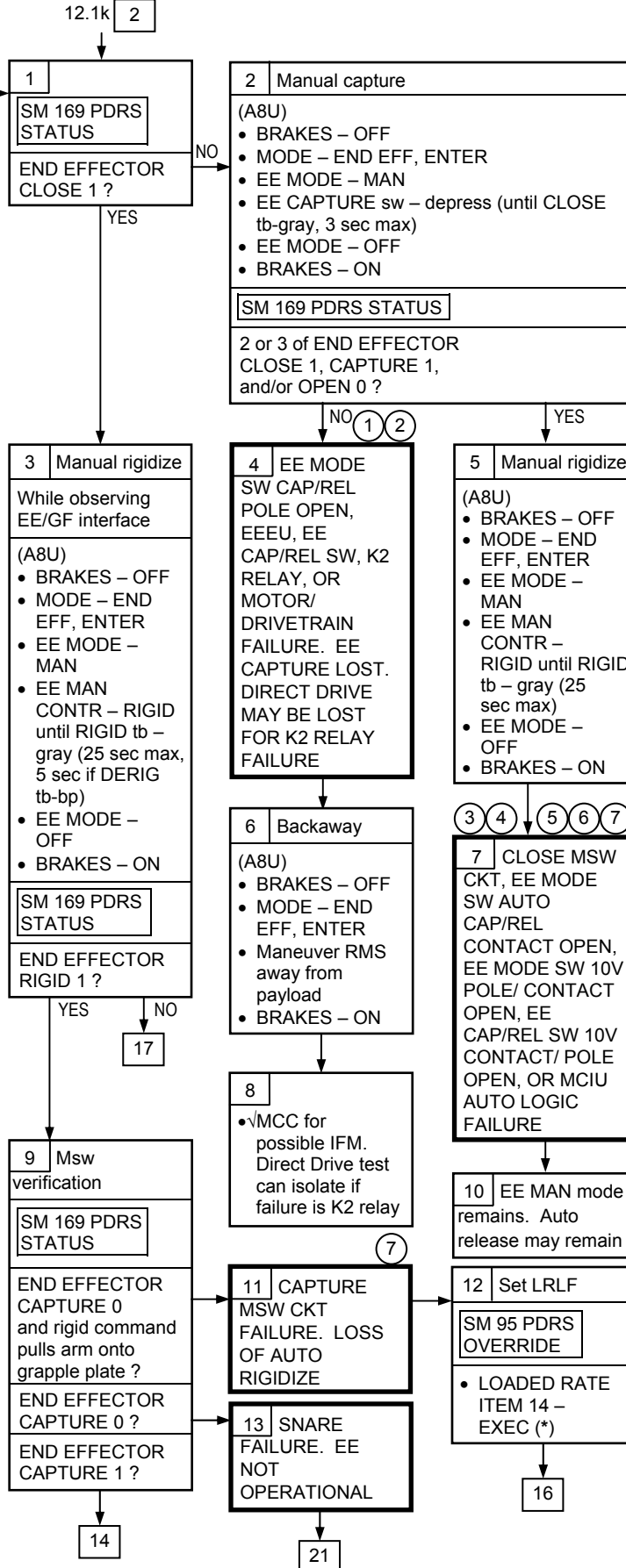
② If actuator failure, EVA possible to release shldr brace. If SW failure, RMS IFM D&C kit available to regain shldr brace

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

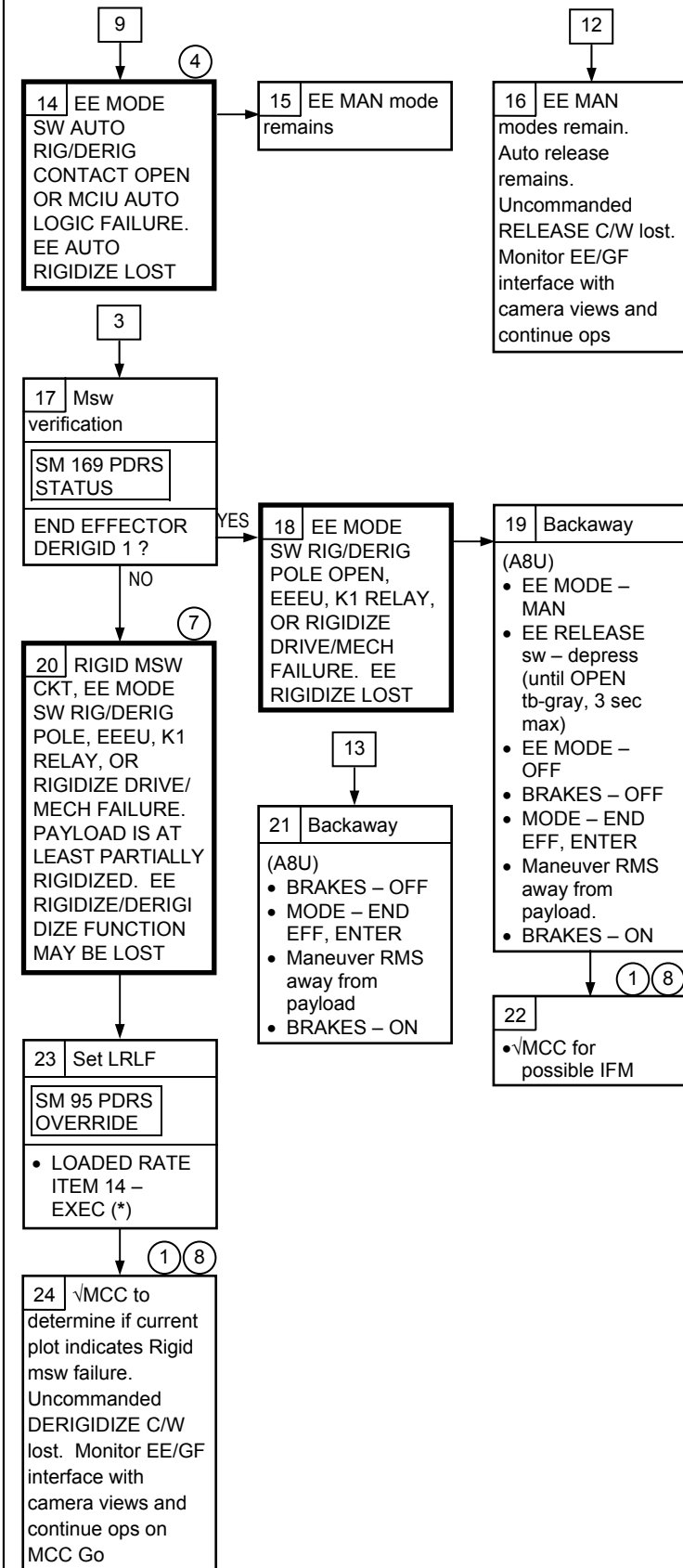
⑥ For EE Cap/Rel 10V pole failure, manual PL release will be accompanied by Uncommanded Release Warning

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

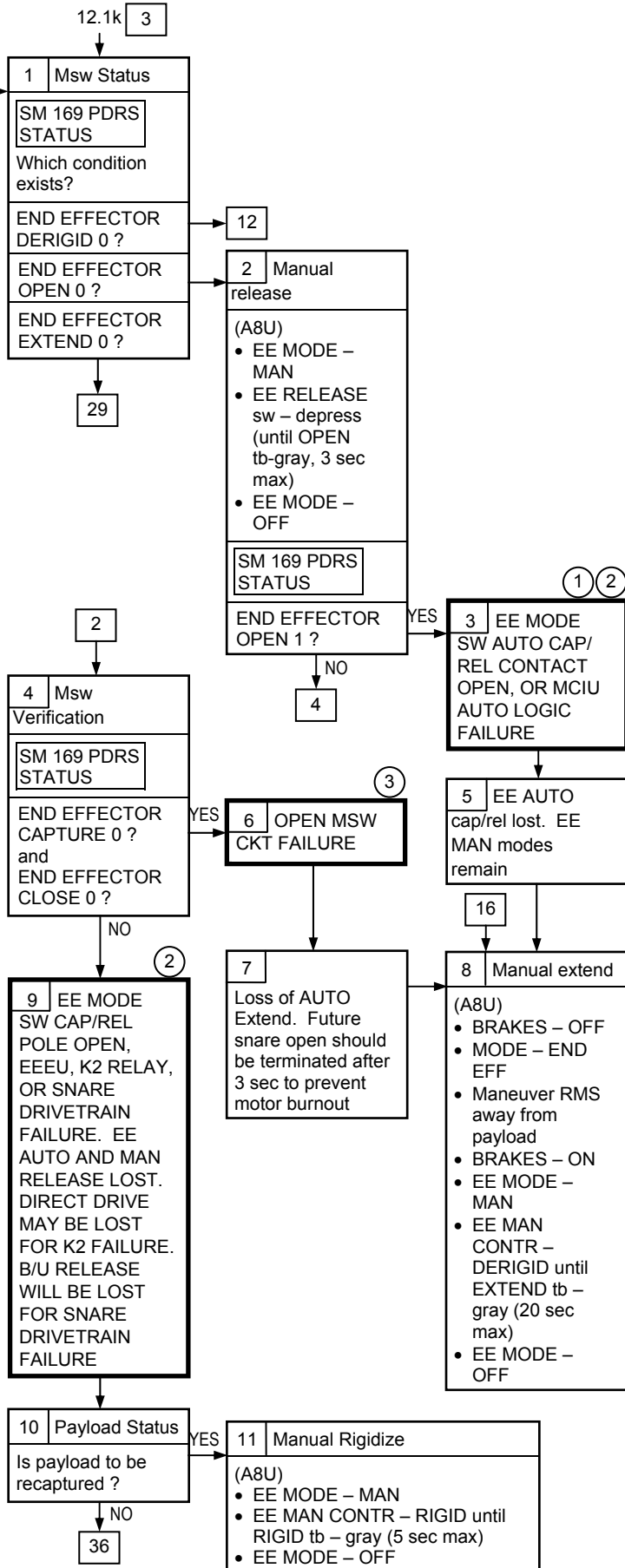
⑧ SAFING tb – bp is a good indication that K1 relay is failed

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)



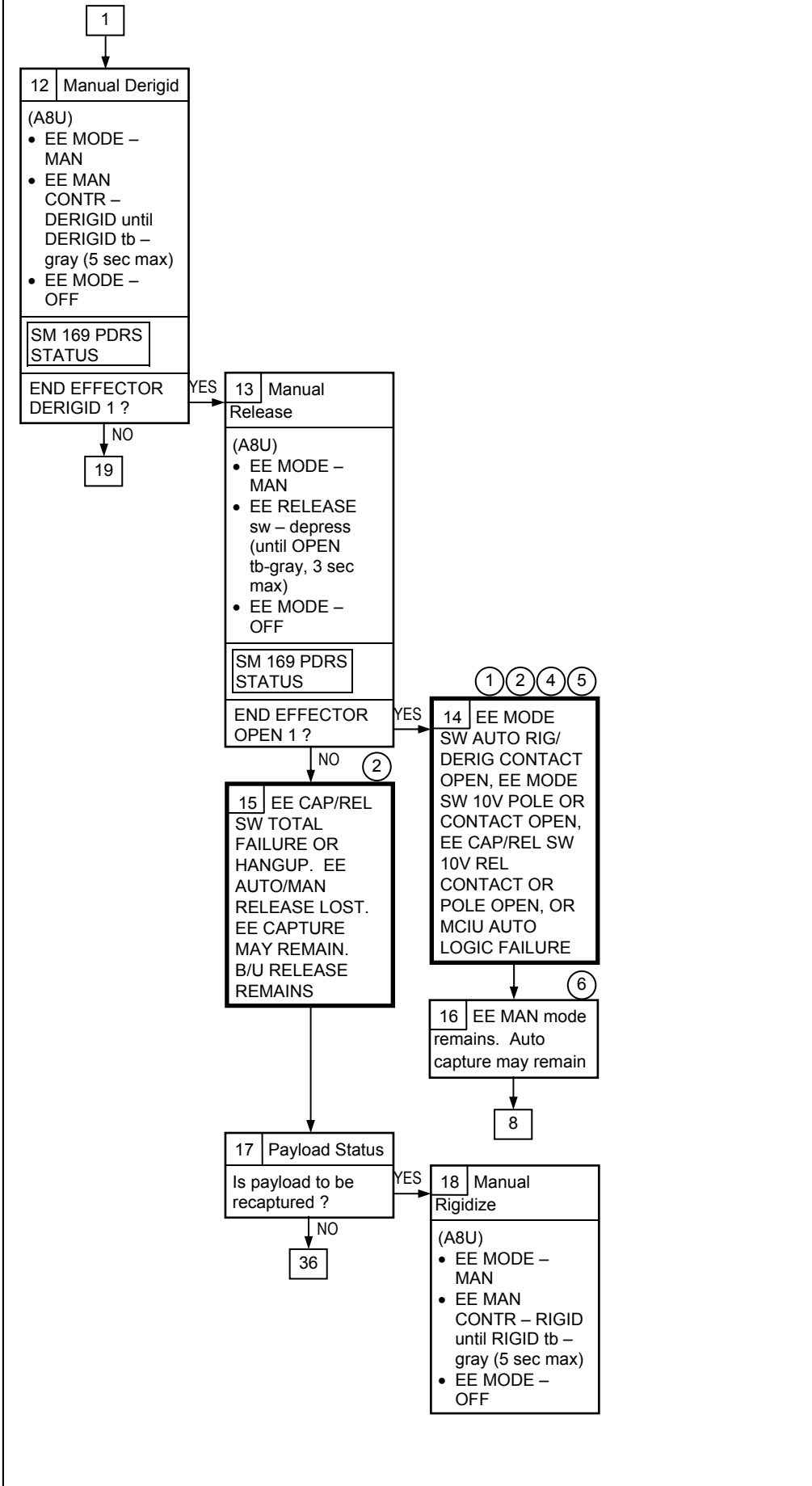
① MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMD5

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

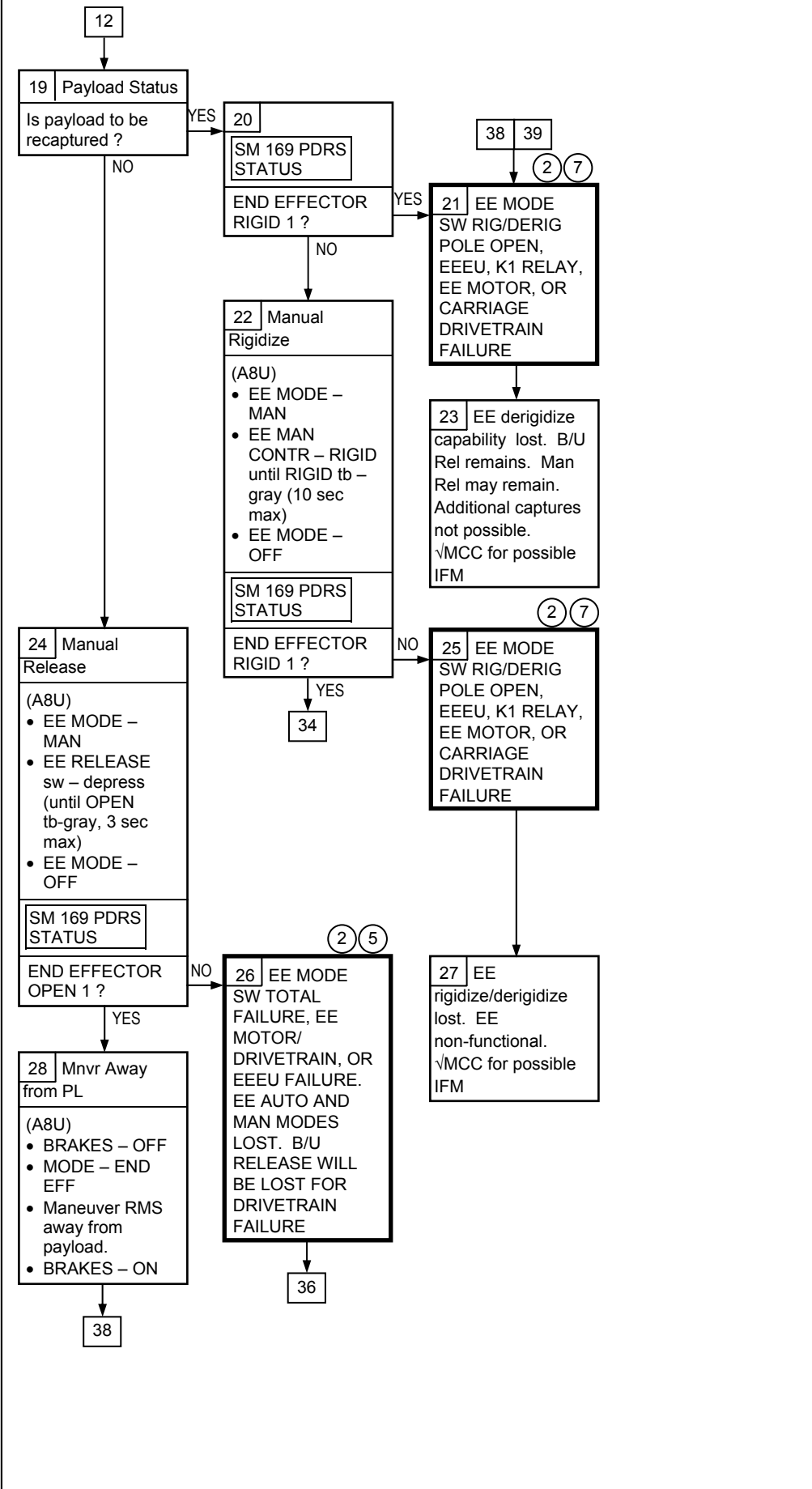
② RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

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)

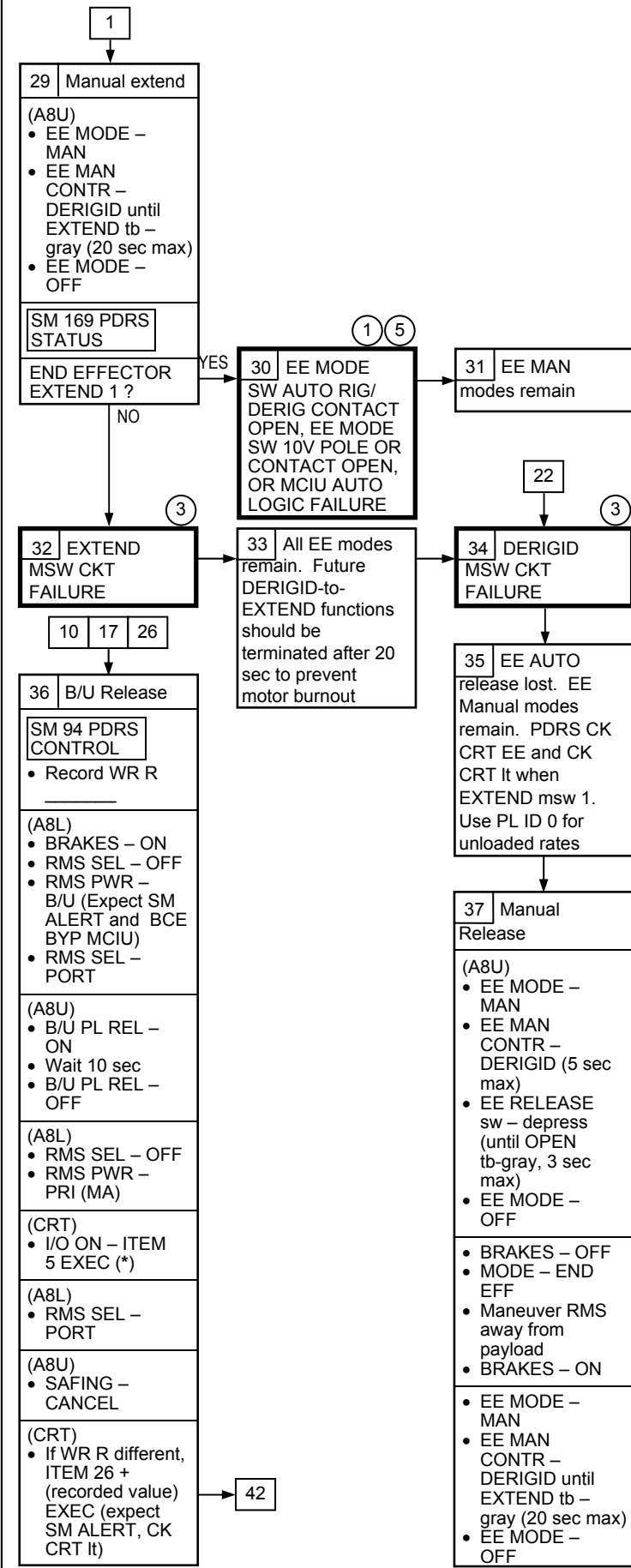


② RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

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)

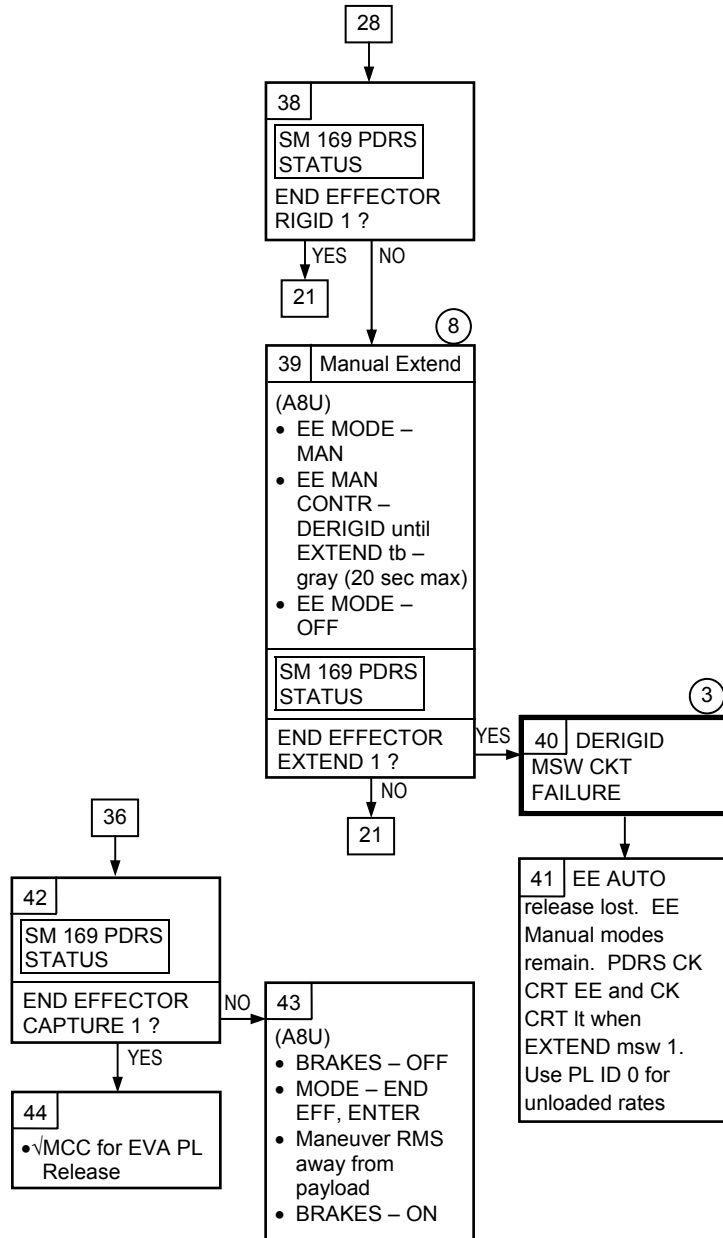


① MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

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

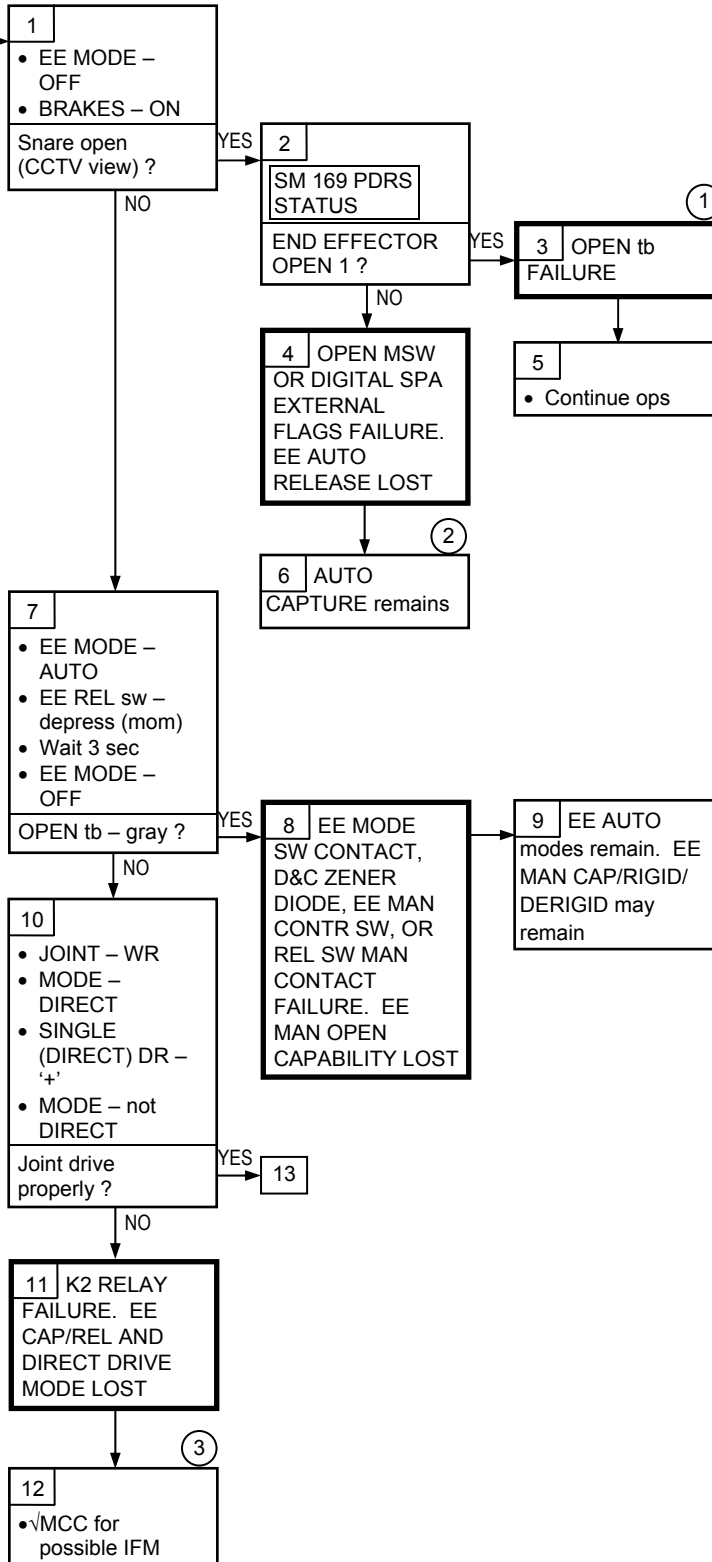
⑧ May receive 'S96 PDRS CKCRT EE' and down arrow by EE FLAG

PDRS

12.3e EE FAILS TO RELEASE IN EE MODE – MAN

EE OPEN
tb – bp

Nominal Config:
DAP: VERN(FREE)
(A8U)
SAFING tb – gray

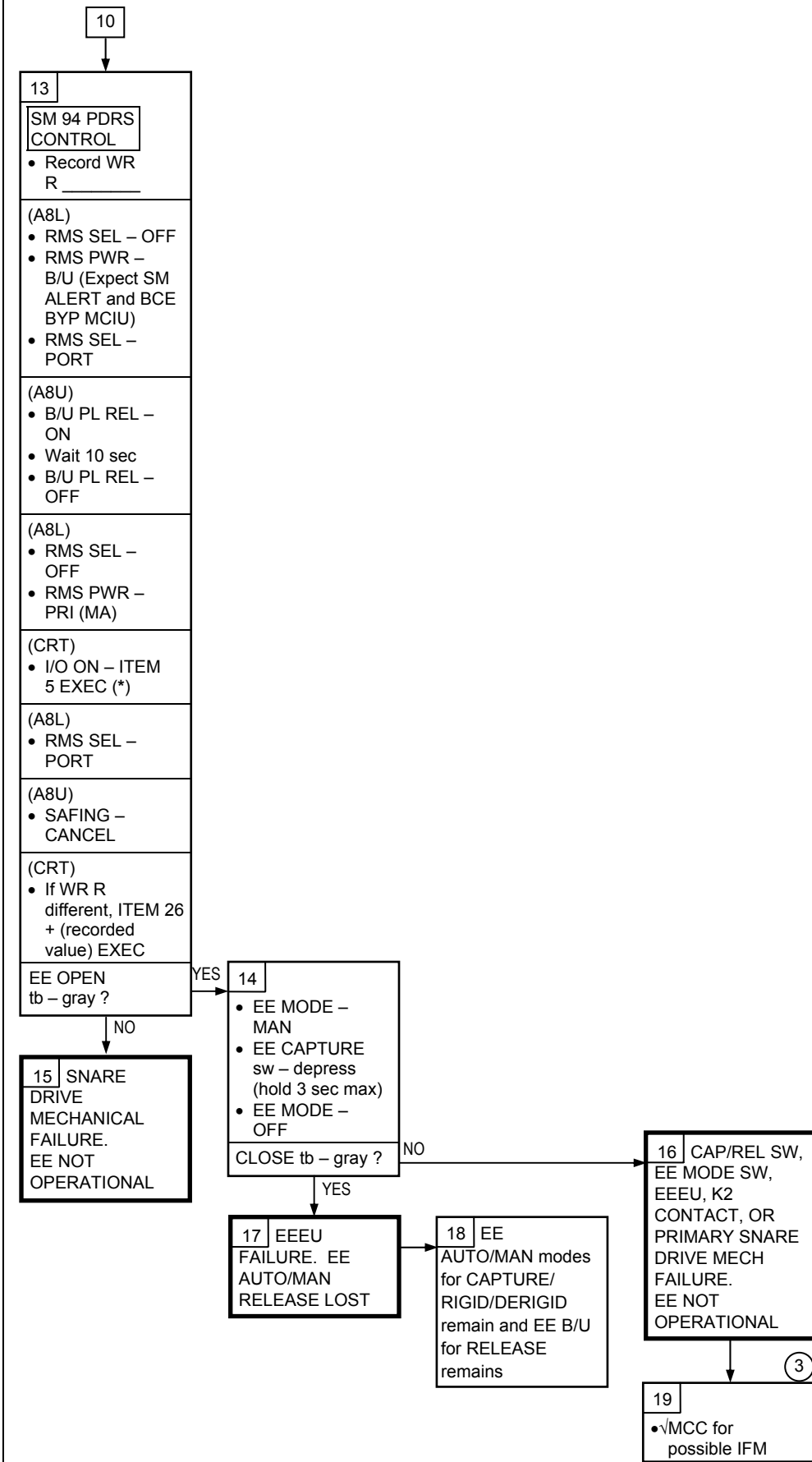


① For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb

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)



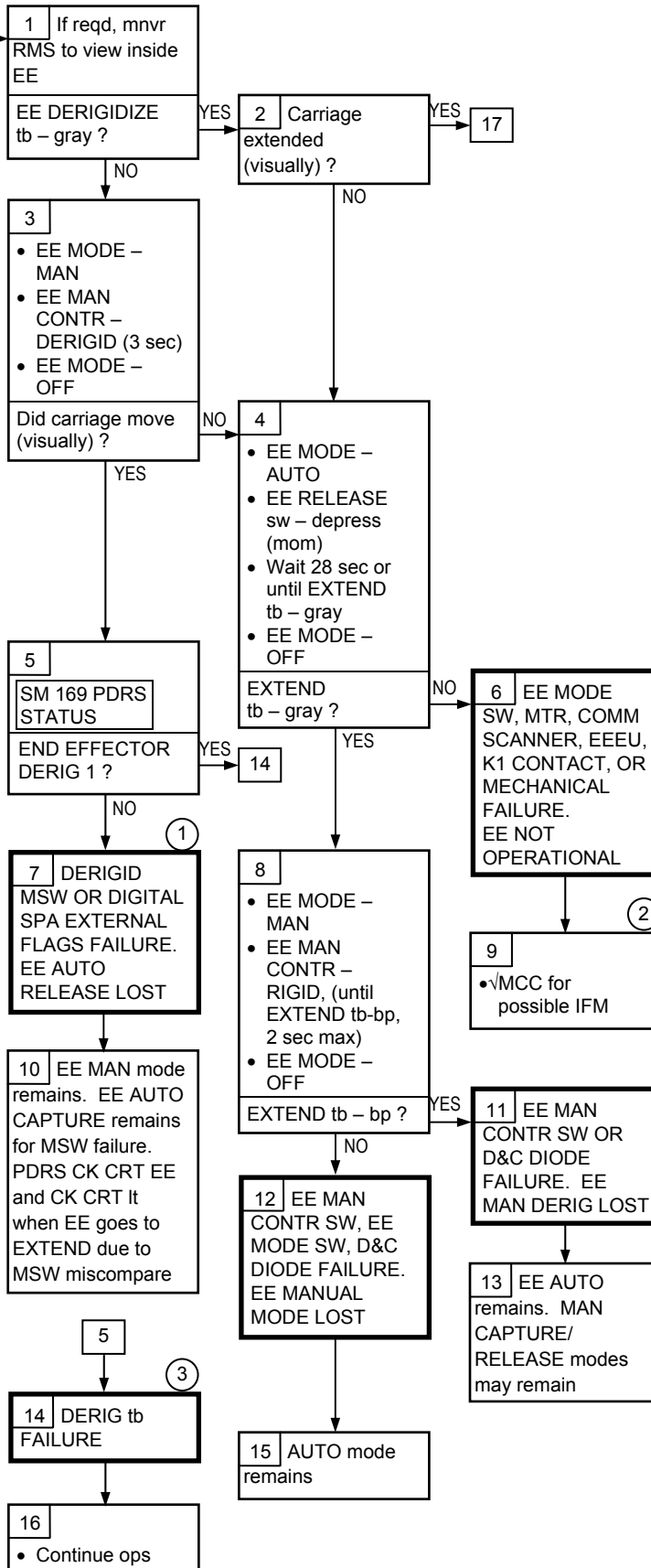
③ RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

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

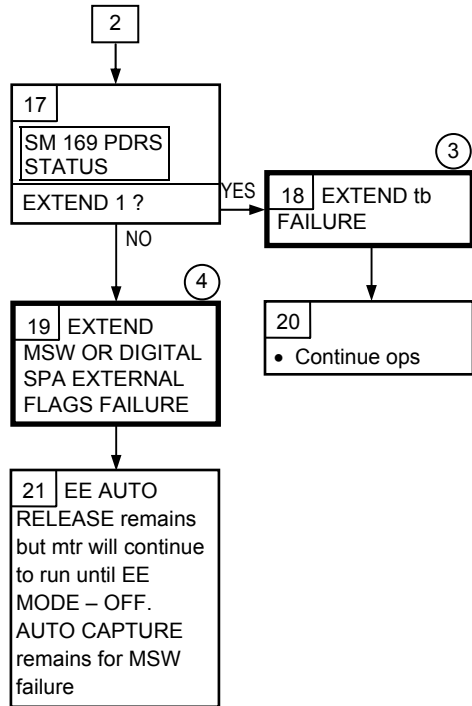


① For digital SPA failure, CLOSE flag may be failed ON

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

PDRS 12.3f (Cont)



③ For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb

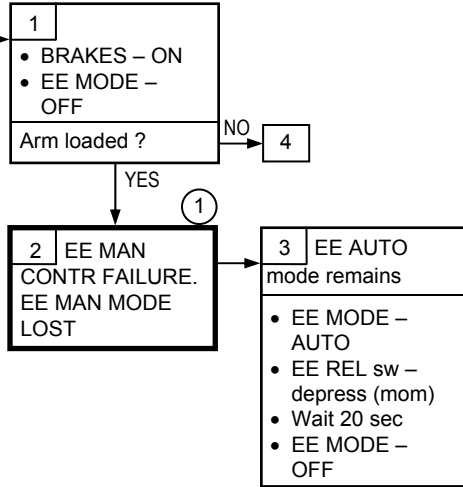
④ For digital SPA failure, CAPTURE flag may be failed OFF

PDRS

12.3g MULTIPLE EE tb ABNORMAL WHILE NO EE CMDS (EE MODE – AUTO OR MAN)

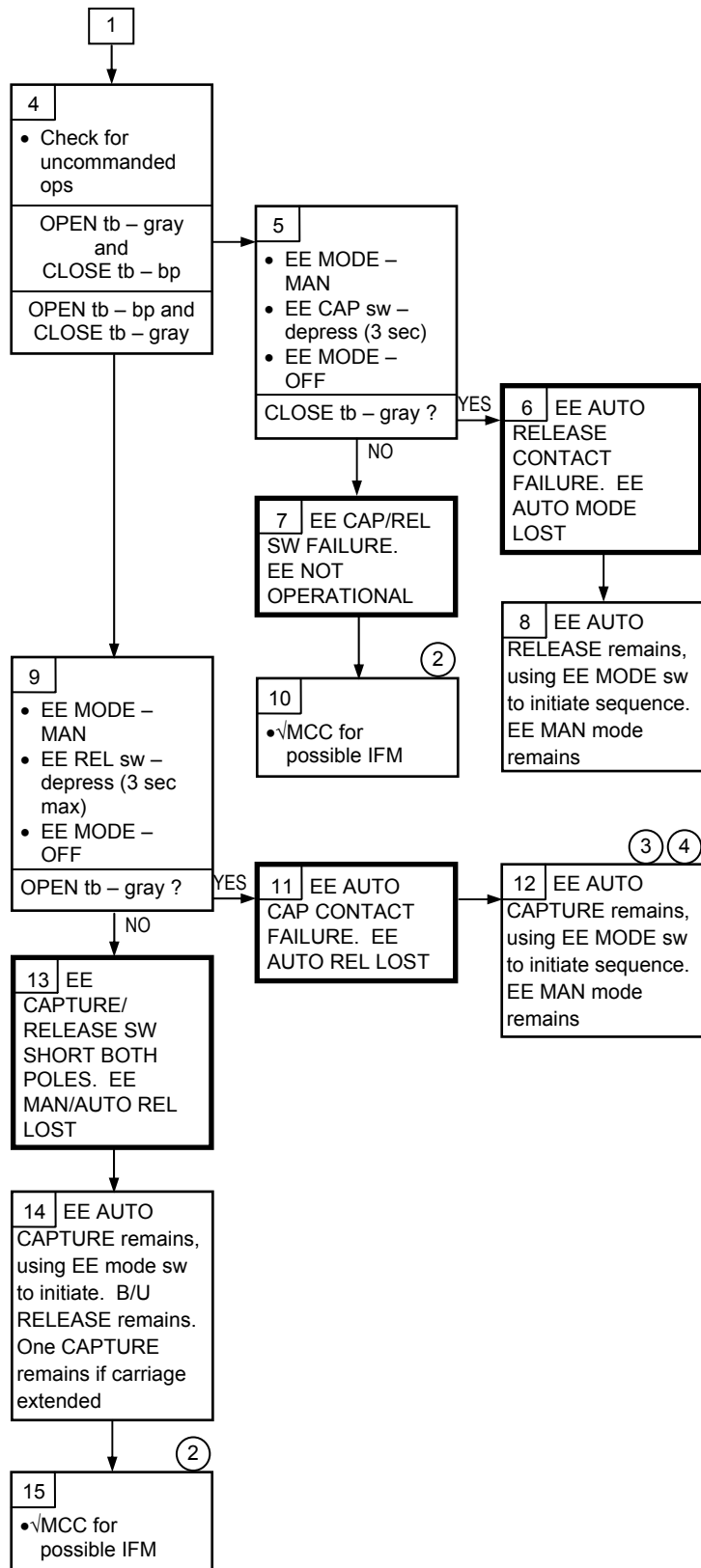
EE tb
Abnormal
While No EE
Commands

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

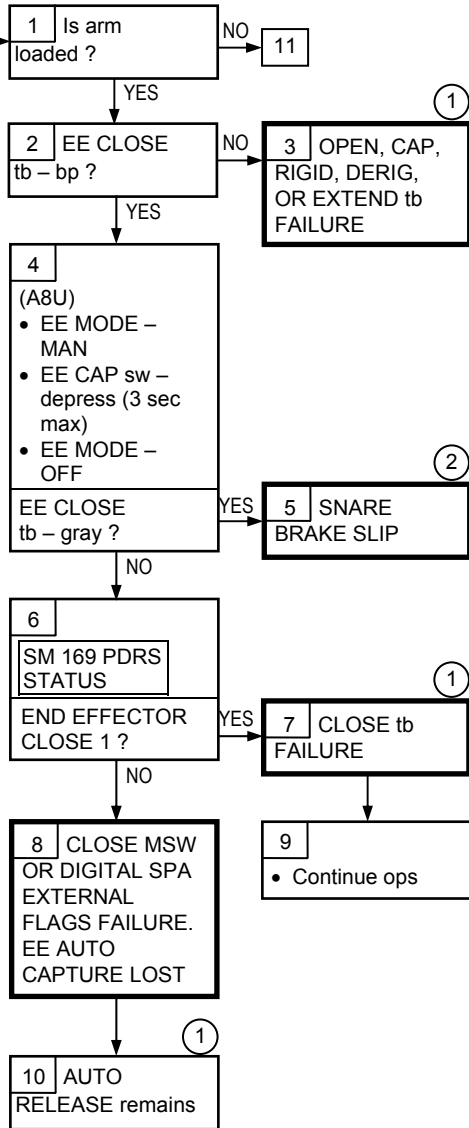
④ Uncommanded Release Warning is disabled

PDRS

12.3h EE tb ABNORMAL WHILE EE MODE OFF

EE tb Abnormal While EE MODE – OFF

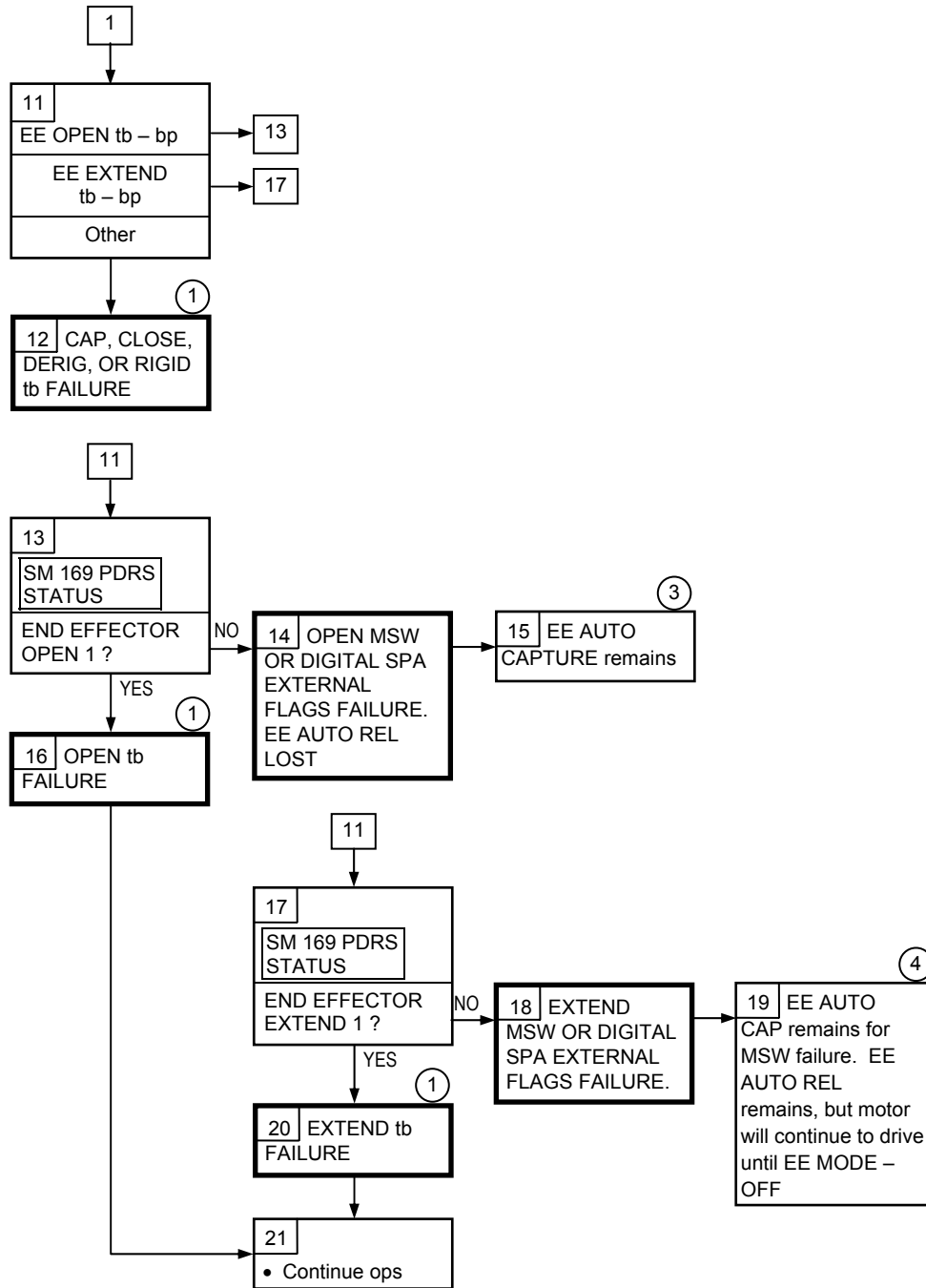
Nominal Config:
DAP: VERN(FREE)



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

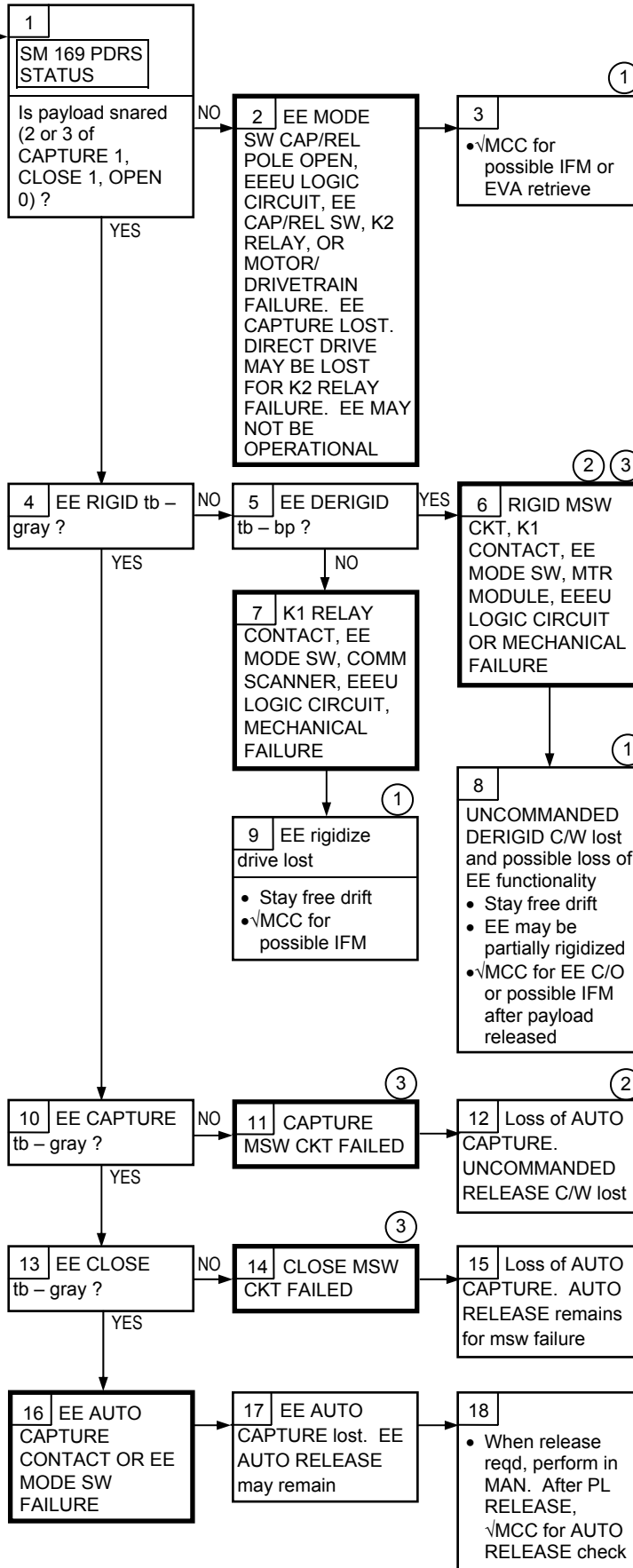
④ For digital SPA failure, CAPTURE flag may be failed OFF

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

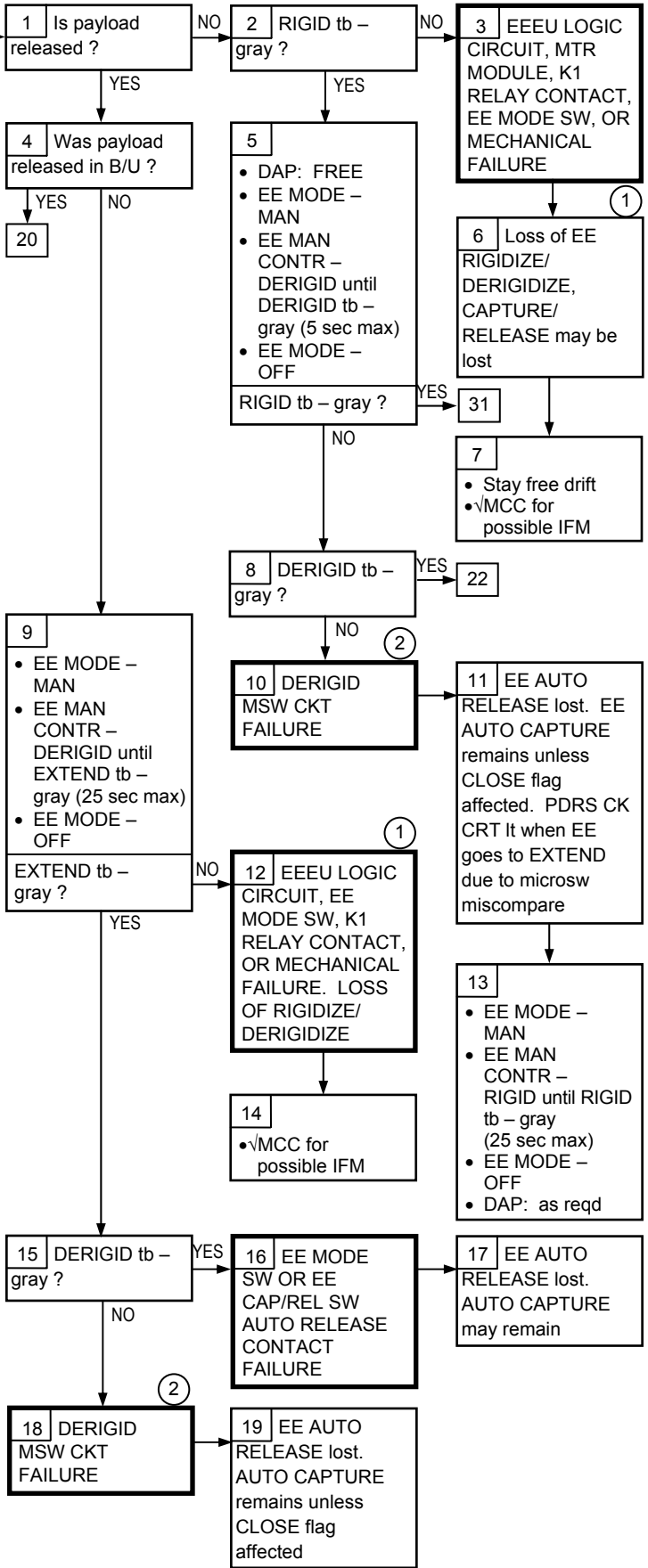
③ MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

PDRS

12.3j NO AUTO RELEASE (CUE CARD EXECUTED)

EE Fails to Derigidize or Release in AUTO

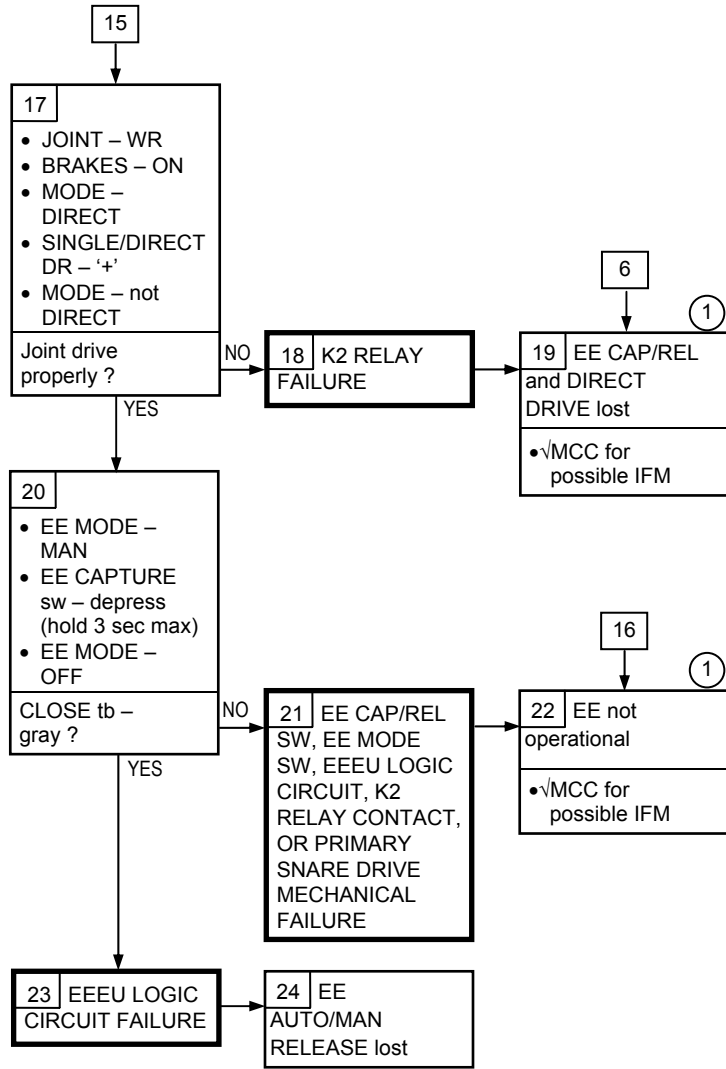
Nominal Config:
SAFING tb – gray



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 12.3k (Cont)



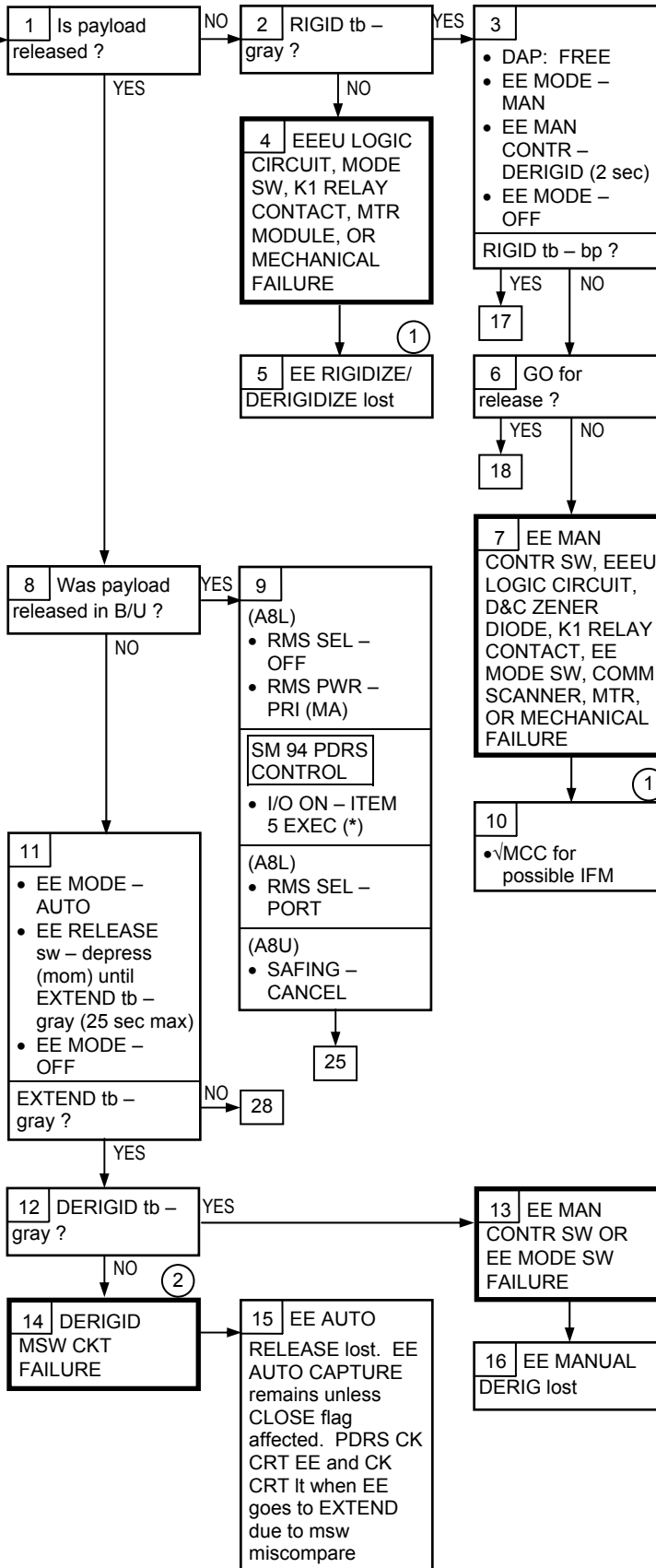
① RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

PDRS

12.3I NO MANUAL DERIGID (CUE CARD EXECUTED)

EE Fails to Derigidize in Manual, DERIGID tb – bp

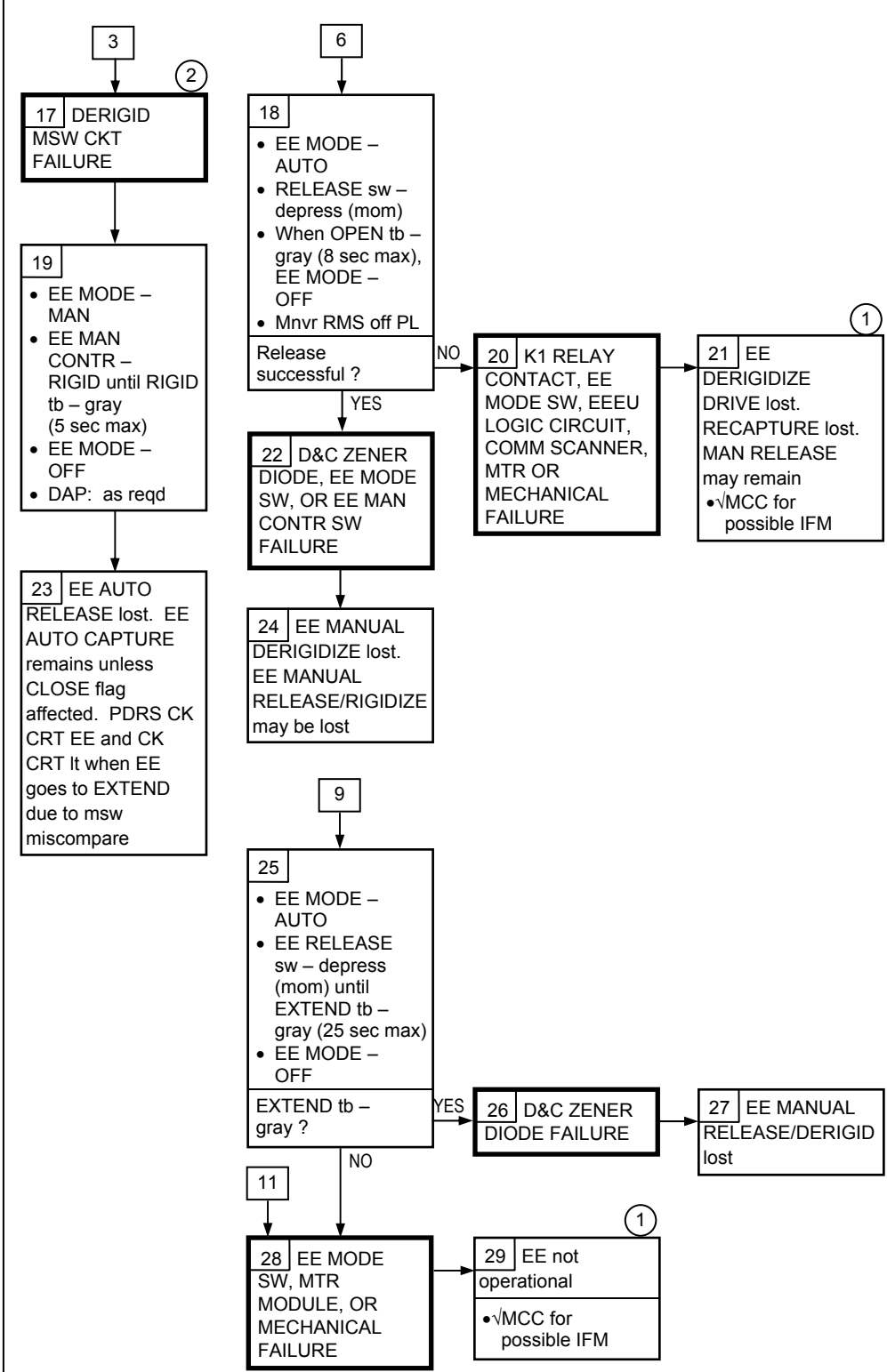
Nominal Config:
SAFING tb – gray



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

RMS OPS

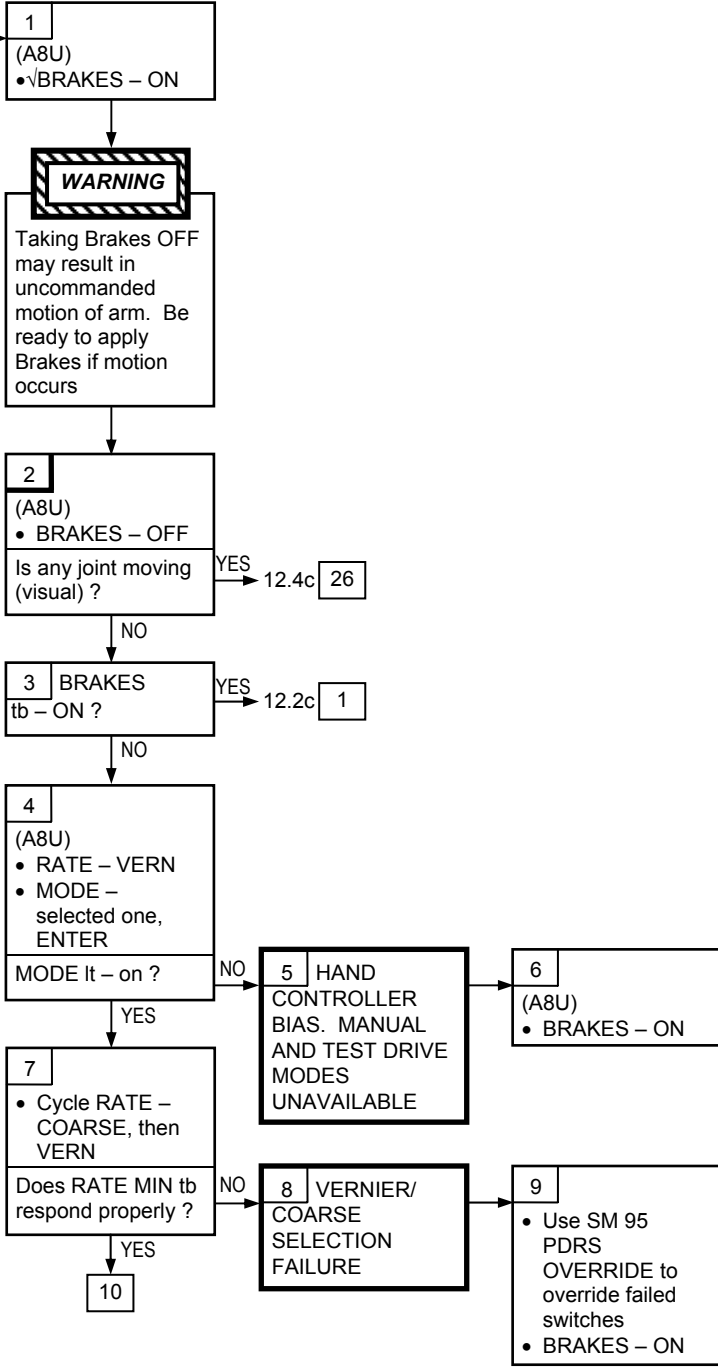
12.4

PDRS

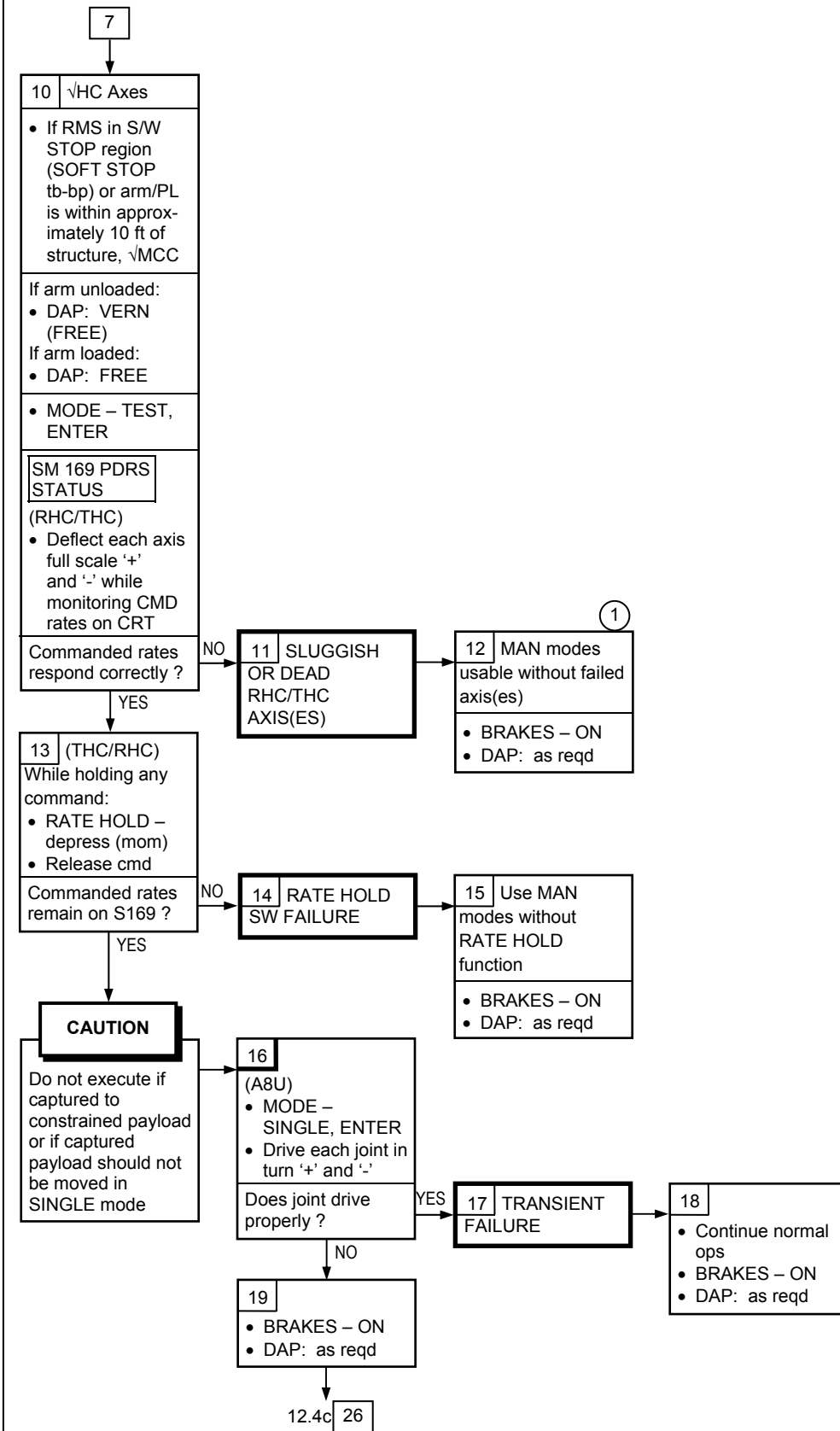
12.4a ARM RESPONSE ABNORMAL IN MANUAL MODES

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)



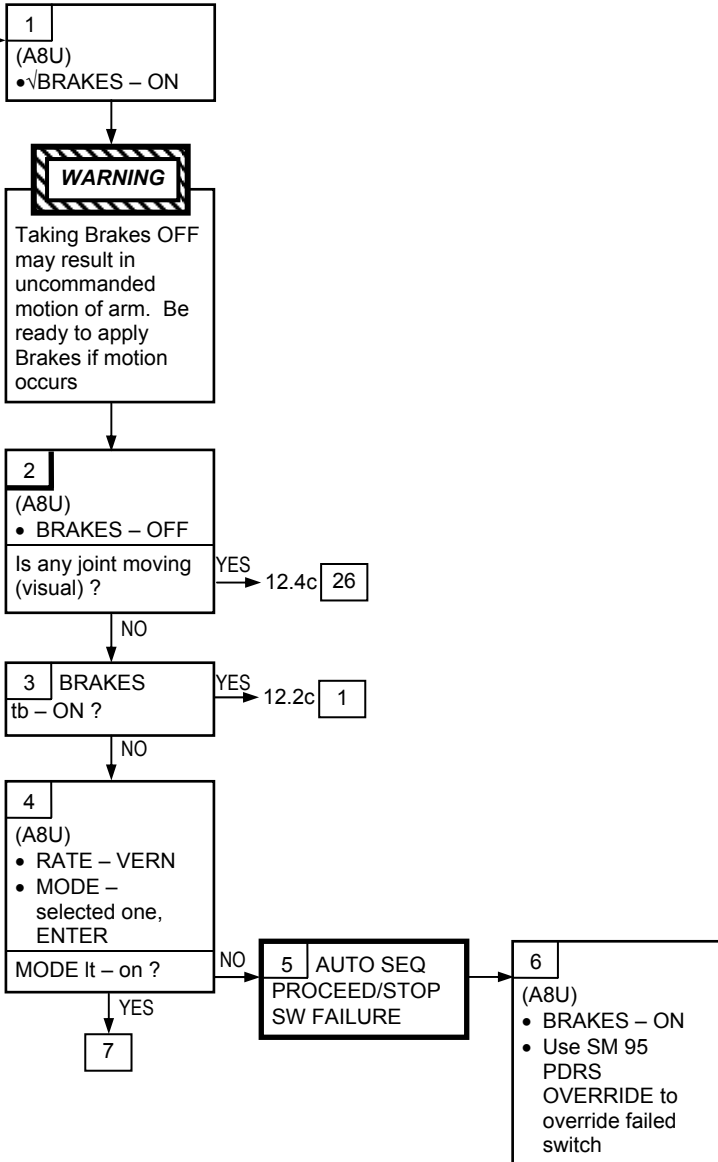
① Single HC axis failure workaround capability exists via SM 95 PDRS OVERRIDE

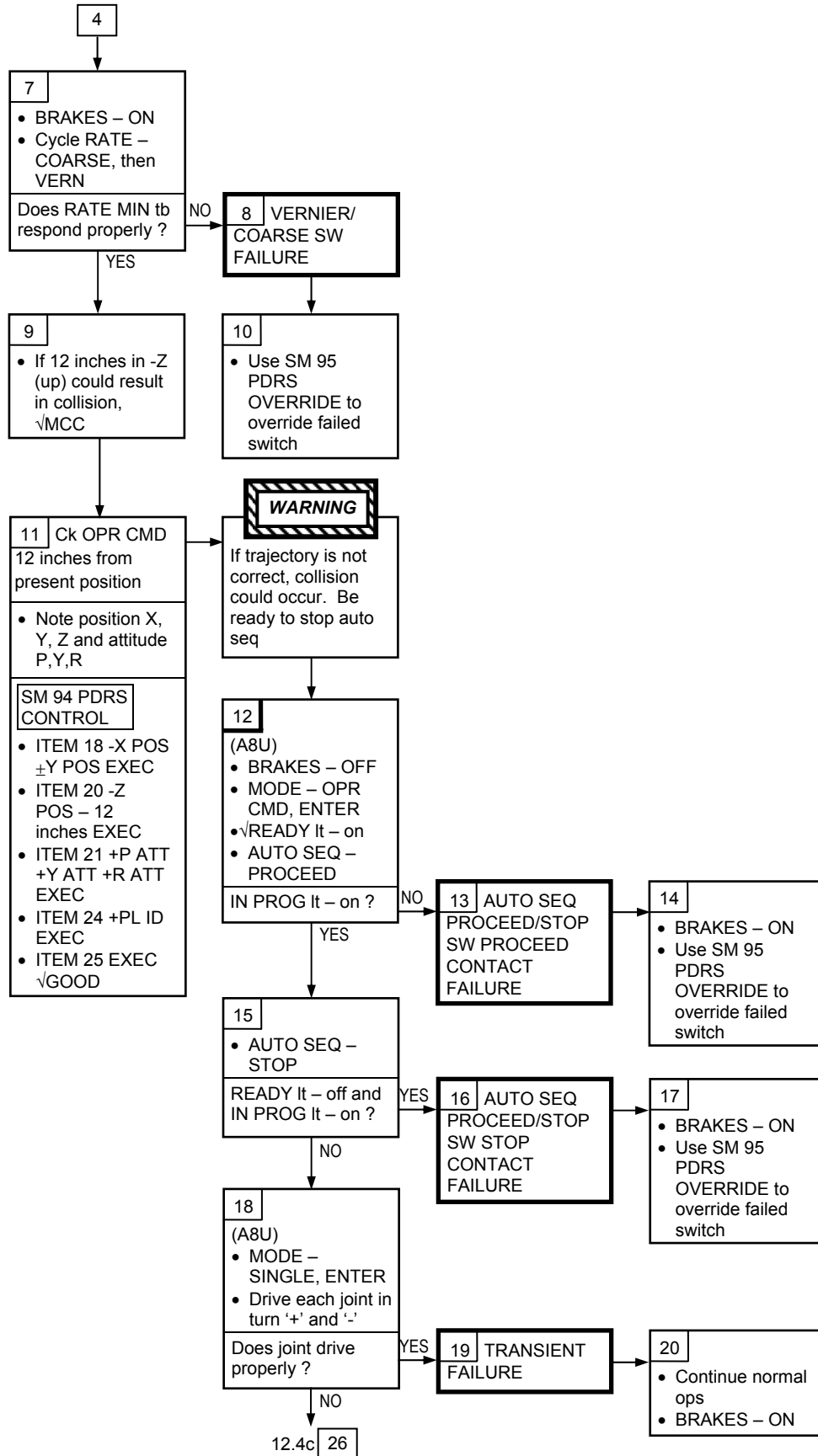
PDRS

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



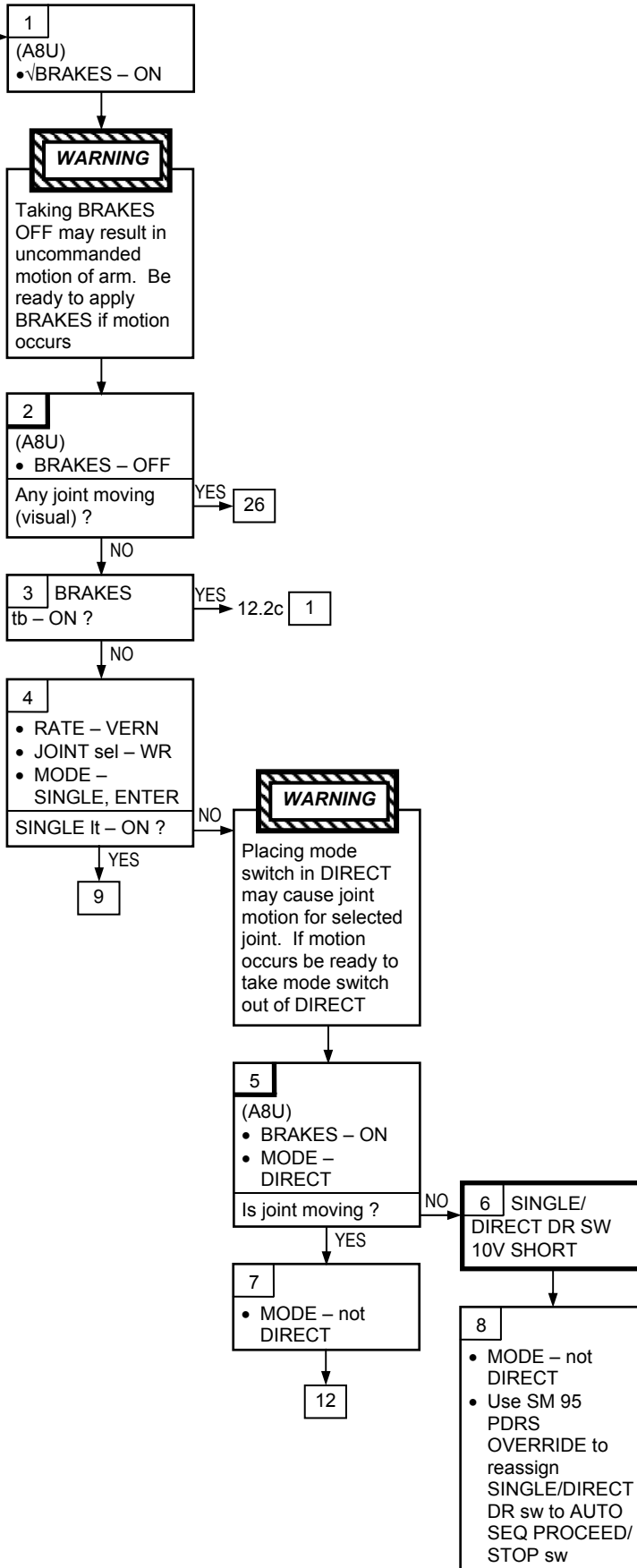


PDRS

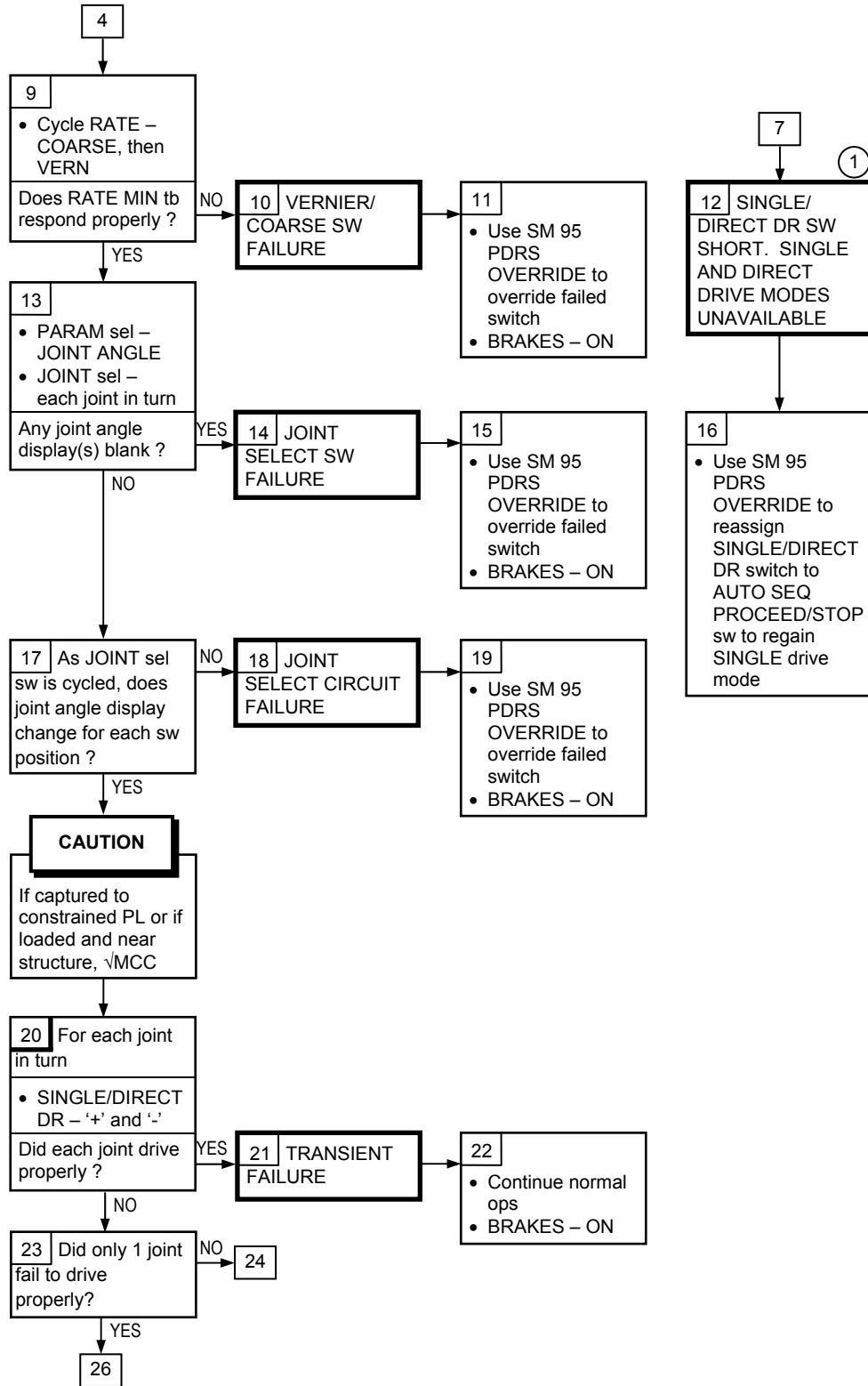
12.4c JOINT RESPONSE ABNORMAL IN SINGLE MODE

Joint Response Not Normal for Commands in Single Mode

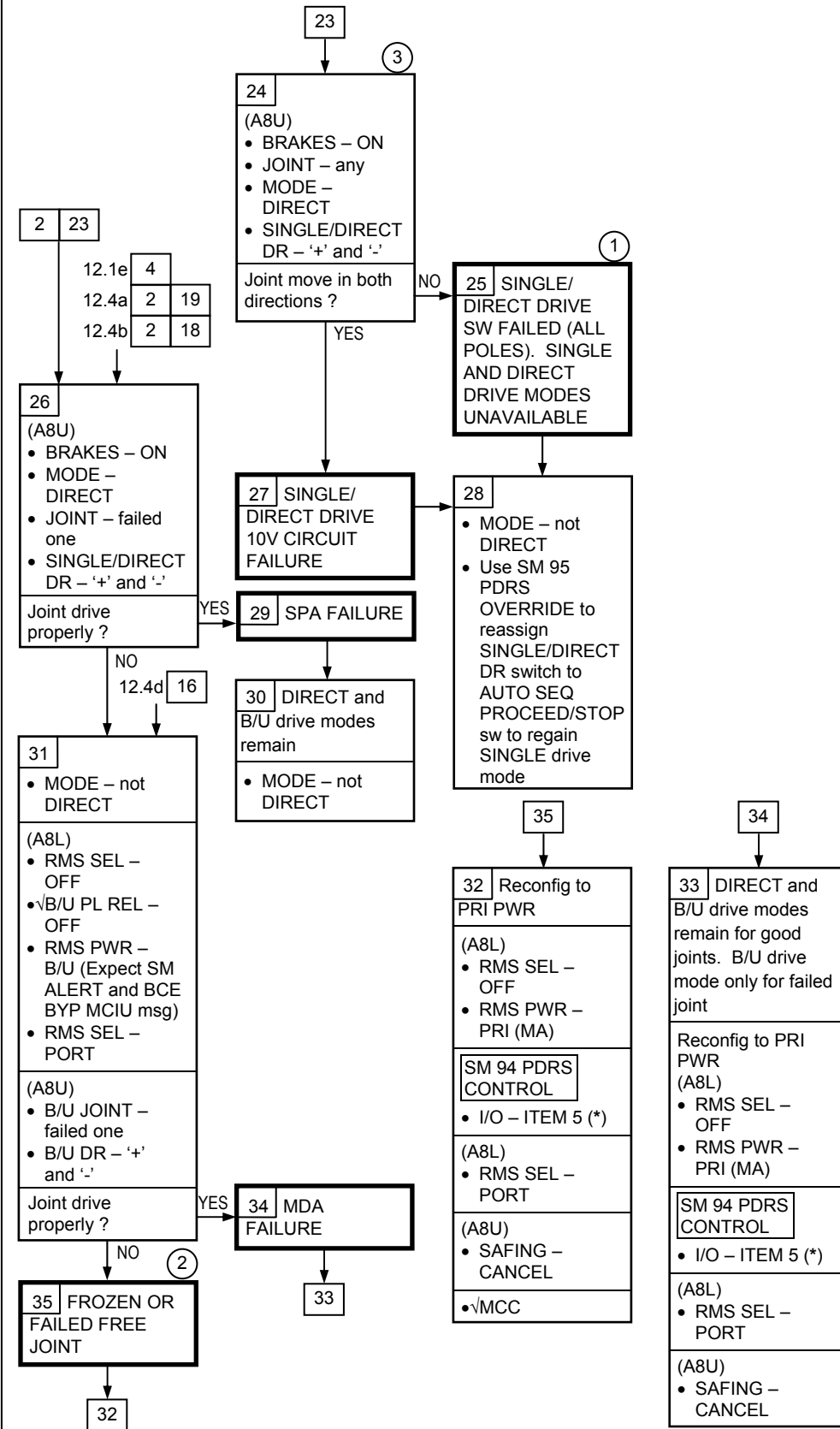
Nominal Config:
 (A8L)
 RMS PWR – PRI
 SEL – PORT
 (A8U)
 SAFING tb – gray
 EE MODE – OFF



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



① DIRECT mode can be regained with RMS IFM D&C KIT. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM), and PDRS SSR-4 RMS IFM D&C KIT

② BACKDRIVE TECHNIQUE – JOINT FREE, PDRS SSR-3 or EVA reqd to cradle arm for failed free joint

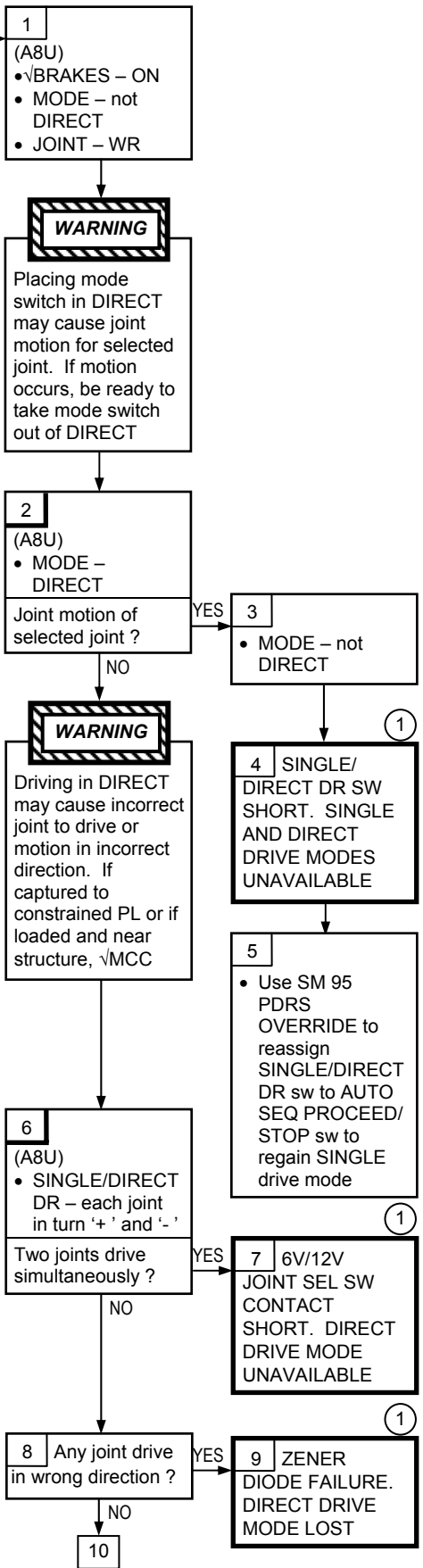
③ May receive CK CRT It and DIRECT DRIVE BITE ↓ for undriven joints

PDRS

12.4d JOINT RESPONSE ABNORMAL IN DIRECT MODE

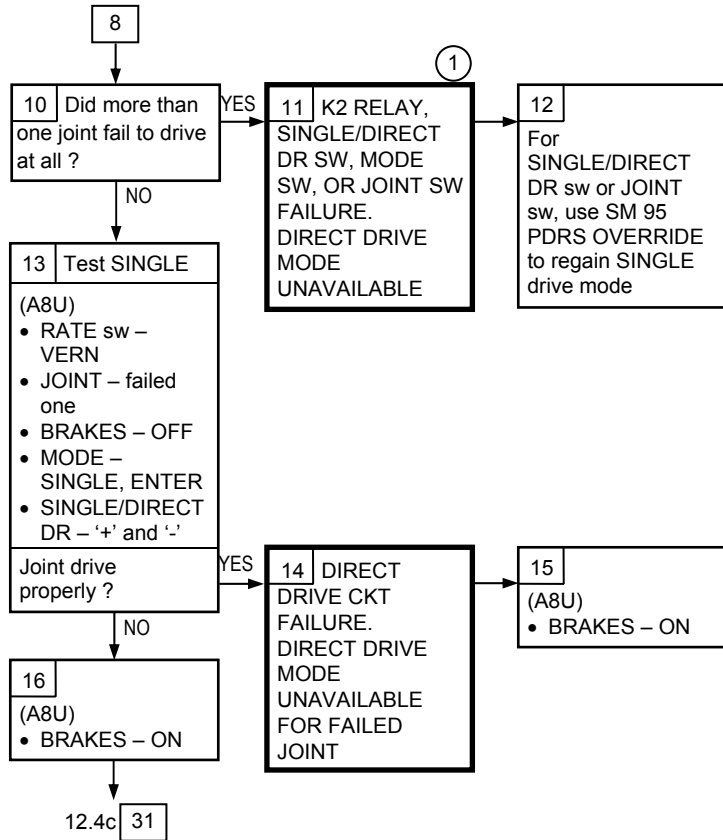
Joint Response Not Normal for Commands in Direct Mode

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

PDRS 12.4d (Cont)



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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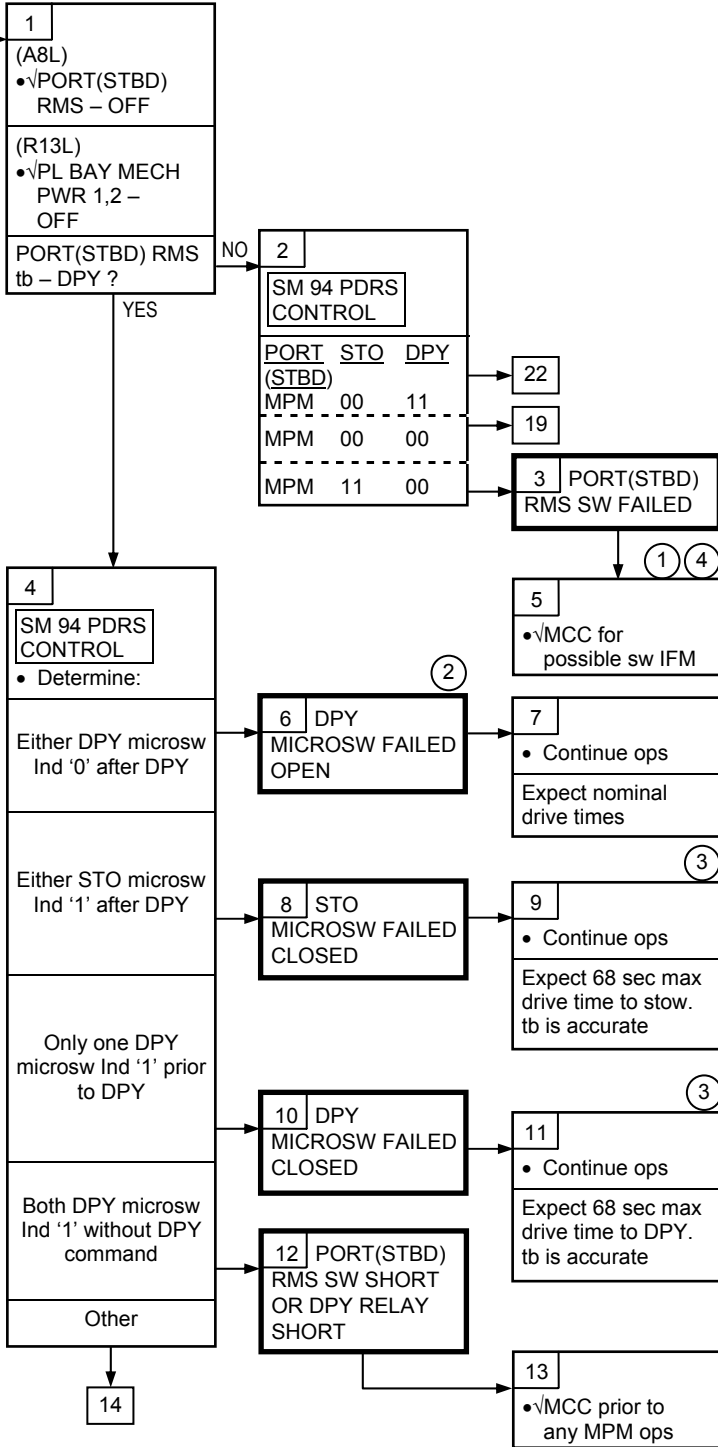
PDRS

12.5a MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

tb Not DPY
or
SM 94 PDRS CONTROL

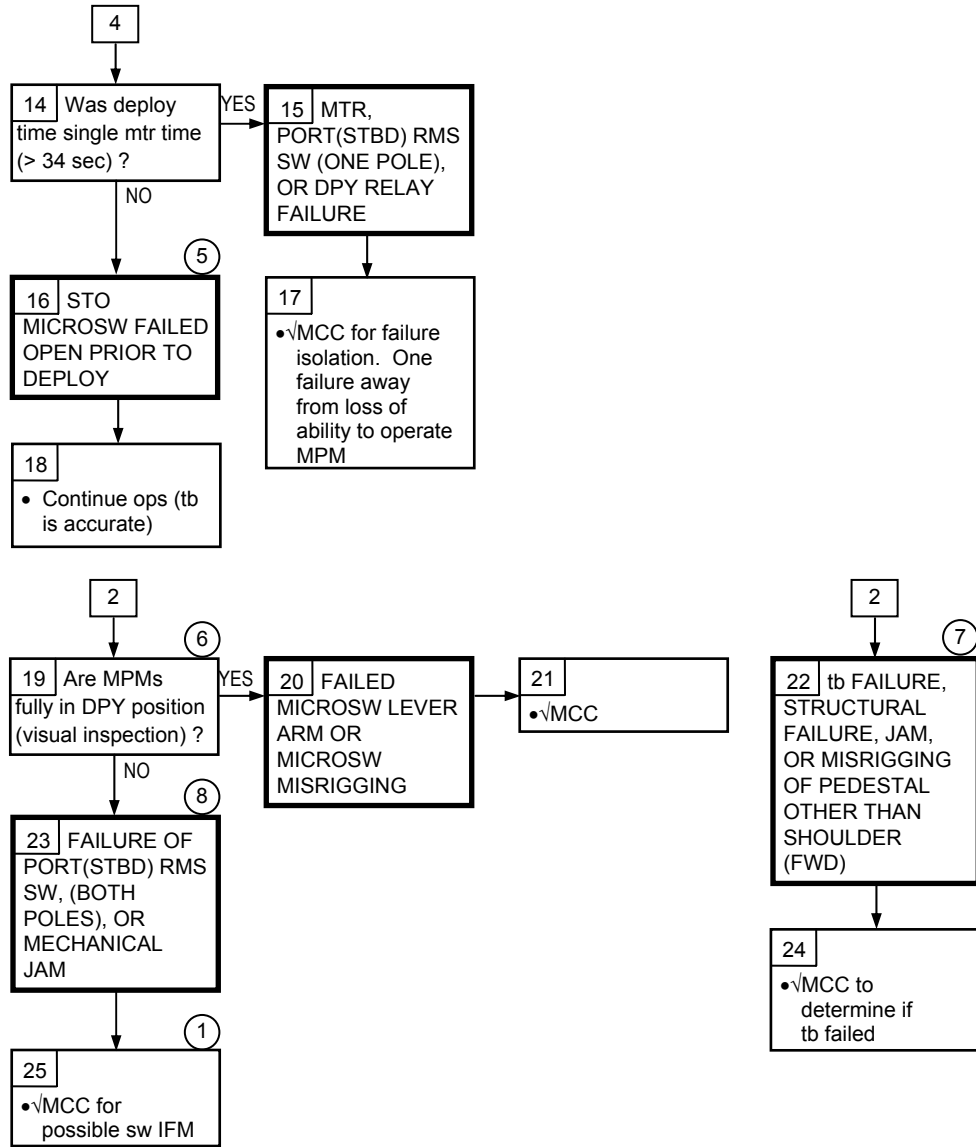
Microsw
DPY/STO Ind
Not Nominal
or
Single Mtr
Drive Time
(> 34 sec)

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

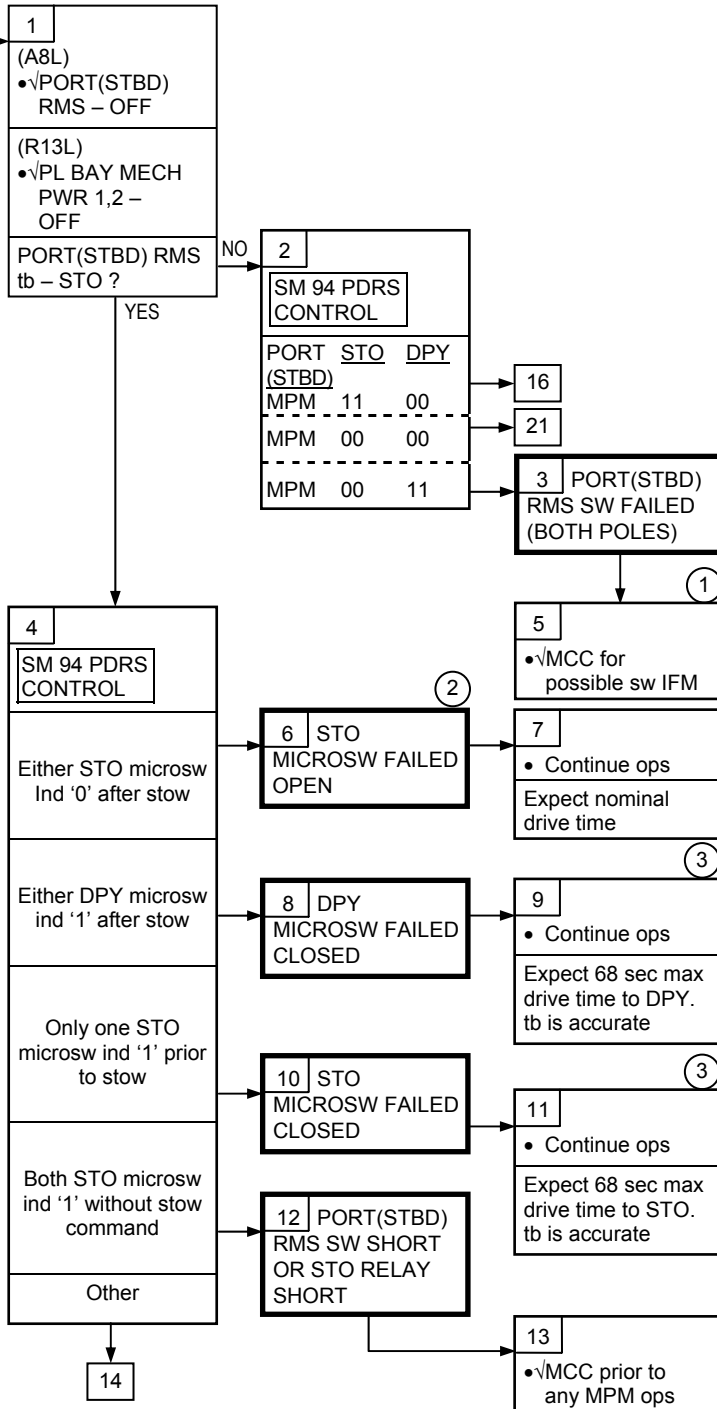
⑧ MCC can determine if switch is failed

PDRS

12.5b MPM STO – tb NOT STO, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

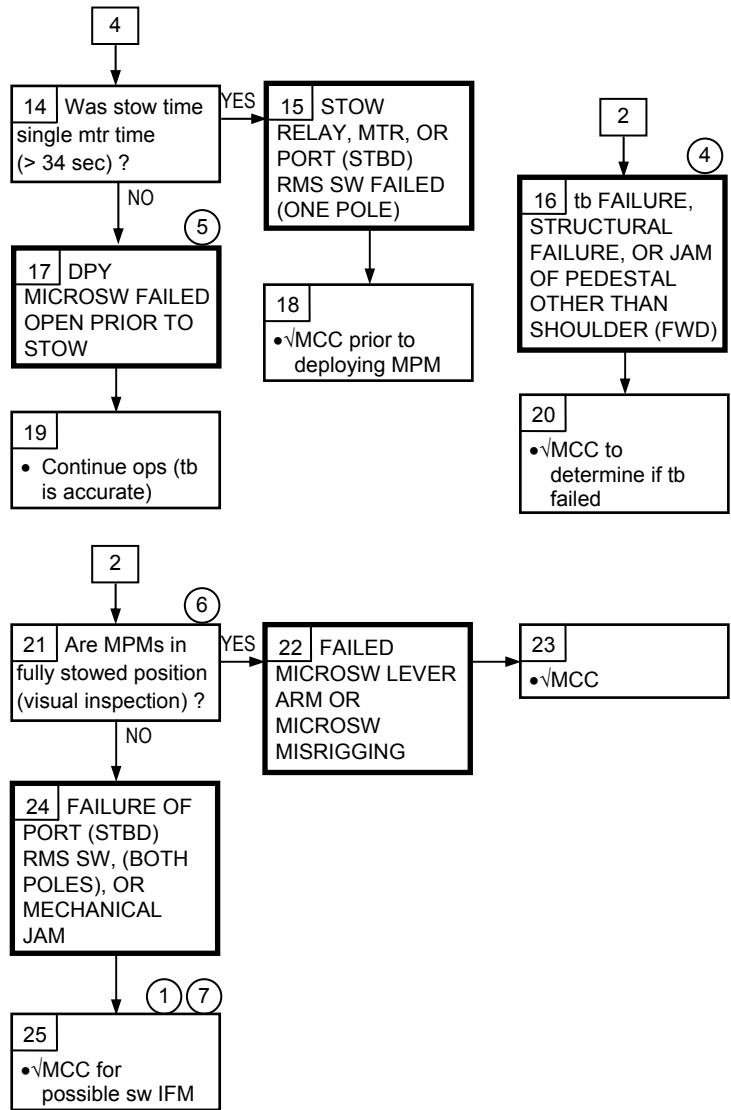
tb Not STO
or
SM 94 PDRS CONTROL
Microsw
DPY/STO Ind
Not Nominal
or
Single Mtr
Drive Time
(> 34 sec)

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

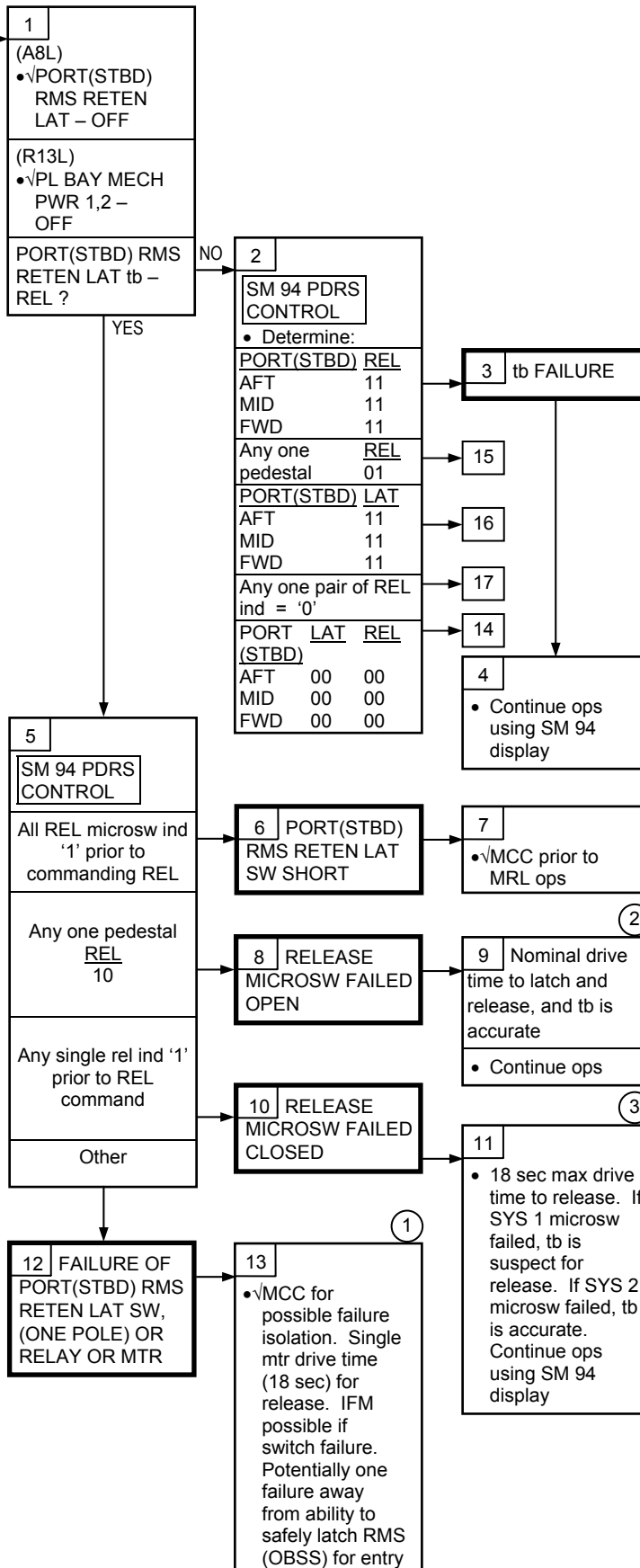
⑦ MCC can determine if switch is failed

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



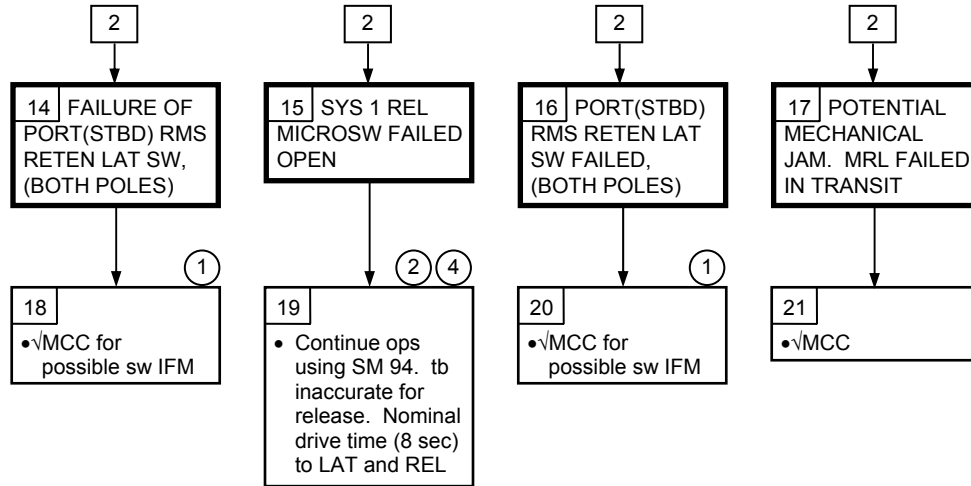
① Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

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

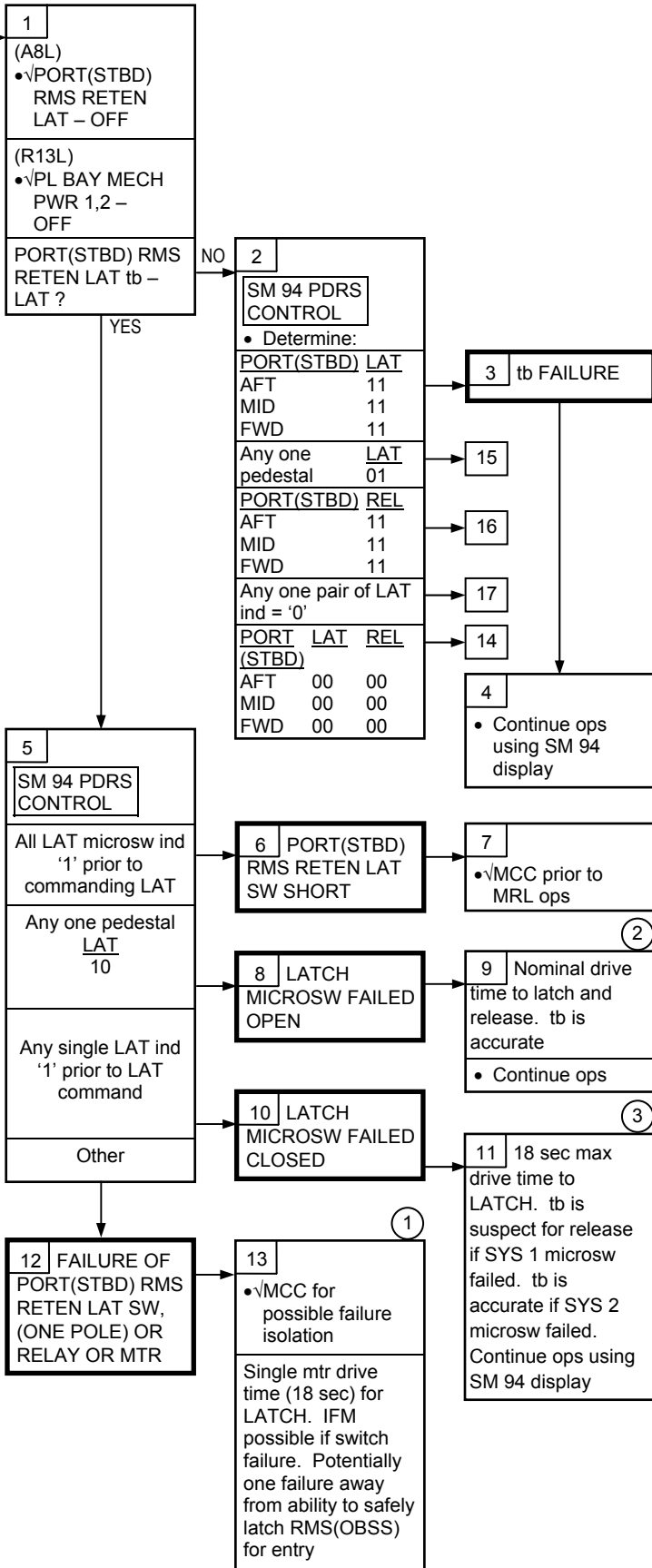
④ tb is activated by receiving all three microsw indications from SYS 1 only

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)

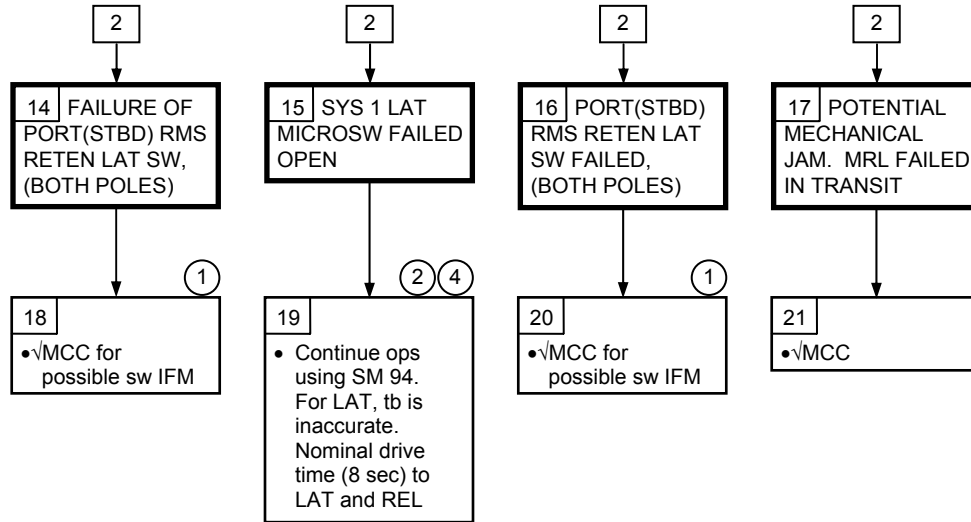
Nominal Config:
(MA73C:A)
MCA LOGIC
MNA MID 1 – ON
MNB MID 2 – ON
MNC MID 2 – ON
(MA73C:B)
MCA LOGIC
MNA MID 3 – ON
MNB MID 4 – ON
MNC MID 4 – ON
(MA73C:C)
cb MCA PWR
AC1 3Φ MID 1 – cl
AC2 3Φ MID 2 – cl
AC3 3Φ MID 2 – cl
(MA73C:D)
cb MCA PWR
AC1 3Φ MID 3 – cl
AC2 3Φ MID 4 – cl
AC3 3Φ MID 4 – cl



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)



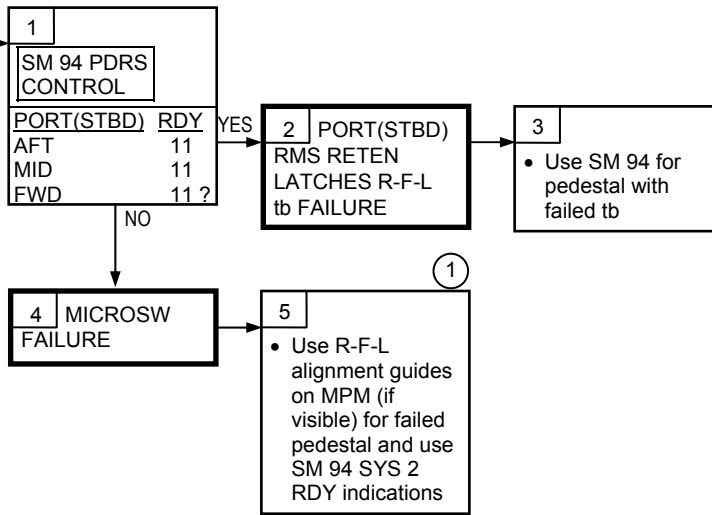
- ① Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE/LATCH) (IFM)
- ② One mtr will continue to drive when commanding LATCH until PORT(STBD) RMS RETEN LAT – OFF
- ④ tb is activated by receiving all three microsw indications from SYS 1 only

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



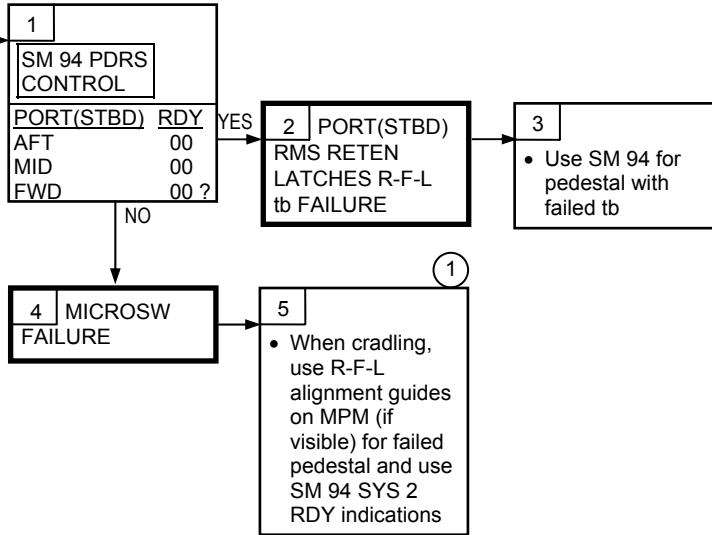
① Inaccurate tb because tb is driven by SYS 1 only

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. <u>INHIBIT MICROSWITCH</u>
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. <u>STOW(DEPLOY) MPM</u>
cb MCA PWR AC3 3Φ MID 4 – cl
PL BAY MECH PWR SYS 2 – ON | | |
| | <table border="1"> <tr> <td style="text-align: center;">CAUTION</td> </tr> <tr> <td style="text-align: center;">If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result</td> </tr> </table> | CAUTION | If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result |
| 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. <u>ENABLE BUS</u>
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. <u>INHIBIT MICROSWITCH</u>
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. <u>STOW(DEPLOY) MPM</u>
cb MCA PWR AC2 3Φ MID 2 – cl
PL BAY MECH PWR SYS 1 – ON | | |
| | <table border="1"> <tr> <td style="text-align: center;">CAUTION</td> </tr> <tr> <td style="text-align: center;">If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result</td> </tr> </table> | CAUTION | If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result |
| 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. <u>ENABLE BUS</u>
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;">WARNING 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

CAUTION
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 \geq -1 deg, go to step 3

Calculate IC: If EP > -65, IC = $-(2 \times EP)$
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 \geq -1 deg, go to step 3

If SP < $-(EP)$, reconfig SP:
MODE – DIRECT (It on)
DIRECT DR SP to: $-(2 \times EP)$ 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 (It 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 (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	FREE	0	+ 19.5

MODE – not DIRECT (It 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 (lt on)

DIRECT DR to cradle:

SY	SP	EP	WP	WY	WR
0	CURRENT VALUE	<u>+ 1 MA</u>	<u>+ 5</u>	FREE	0
	<u>0</u>	<u>0</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	0	FREE	+ 19.5

MODE – not DIRECT (lt 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

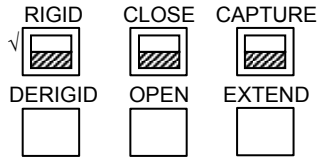
O19 DC UTIL PWR MNA – ON
 √No arm/payload motion
 DC UTIL PWR MNA – OFF

PDRS SSR-4 (Cont)

4. UNLOADED END EFFECTOR TEST (Reqd for End Effector ops, Direct Drive)

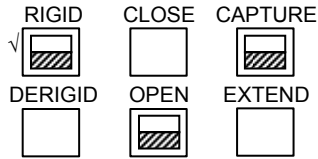
CAUTION
End Effector test must be completed within
2.5 min of DC UTIL PWR MNA sw – ON
or End Effector mtr burnout could occur

A8U √BRAKES – ON (tb-ON)
 √tb(s)



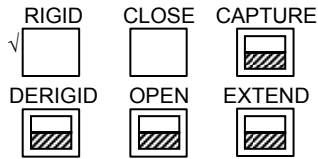
O19 DC UTIL PWR MNA – ON
 √No tb(s) change

D&C Kit EE CAPTURE/RELEASE sw – CAPTURE, until CLOSE tb – gray (3 sec max)



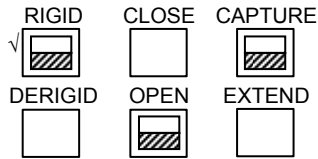
√No tb(s) change after capture

EE RIGID/DERIGID sw – RIGID, until RIGID tb – gray (25 sec max)



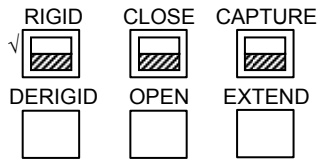
√No tb(s) change after rigidizing

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

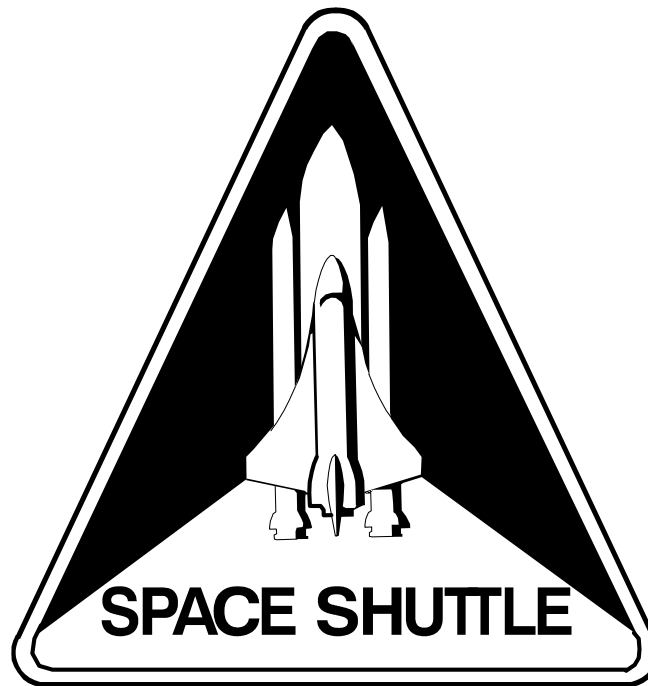
DC UTIL PWR MNA – OFF

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**