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Mission Operations Directorate
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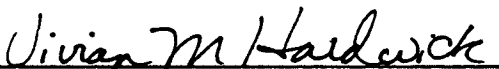
Lyndon B. Johnson Space Center
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098

MISSION OPERATIONS DIRECTORATE
MALFUNCTION PROCEDURES


GENERIC
 May 10, 1988

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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

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NOTE A

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

NOTE B

Refer to BFS FSM index for msg

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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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NOTE A

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

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The following Fault Msgs have no corresponding MAL procedures in this book: S86 HYD PRESS 1(2,3)

NOTE A
THE IDENTIFIED MAL REPRESENTS A SUPPORT PROCEDURE THAT IS ENTERED FROM OTHER PROCEDURES OR ON MCC CALL

BFS FSM INDEX

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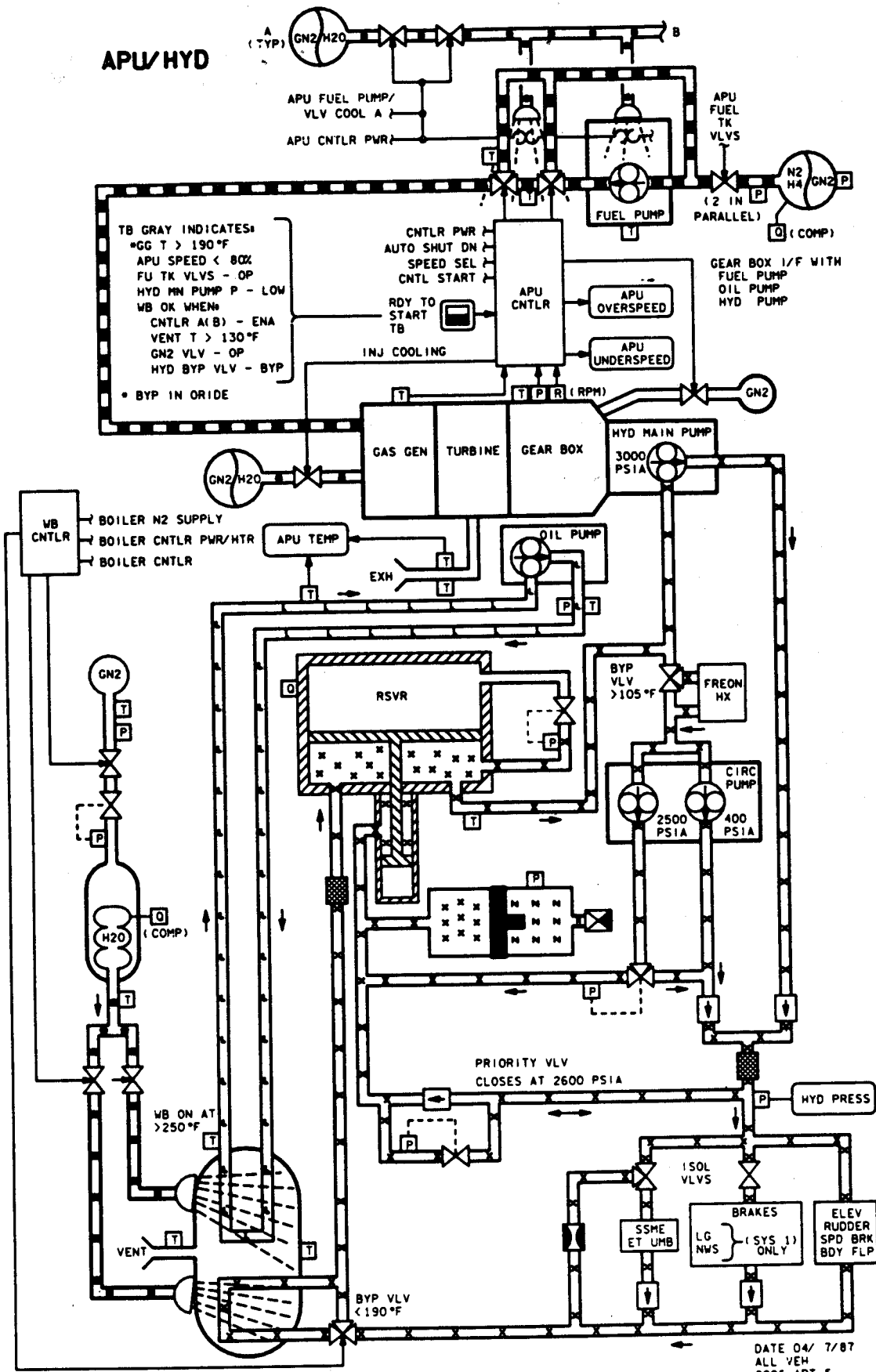
The following Fault Msgs have no corresponding MAL procedures in this book:

SM2 APU SPD HI 1(2,3)	SMO THRM HYD
SM2 APU SPD LO 1(2,3)	SM2 HYD PRESS 1(2,3)

APU/HYD

APU

1.1



TB GRAY INDICATES:
 *GG T > 190°F
 APU SPEED < 80%
 FU TK VLVS - OP
 HYD MN PUMP P - LOW
 WB OK WHEN:
 CNTLR A(B) - ENA
 VENT T > 130°F
 GN2 VLV - OP
 HYD BYP VLV - BYP
 • BYP IN ORIDE

GEAR BOX 1/F WITH
 FUEL PUMP
 OIL PUMP
 HYD PUMP

WB CNTLR
 BOILER N2 SUPPLY
 BOILER CNTLR PWR/HTR
 BOILER CNTLR

PRIORITY VLV
 CLOSSES AT 2600 PSIA

ISOL VLVS
 SSME ET UMB
 BRAKES
 LG NWS (SYS 1) ONLY
 ELEV RUDDER SPD BRK BDY FLP

DATE 04/ 7/87
 ALL VEH
 2206. ART. 5

APU

1.1

APU/HYD

1.1 APU

SM
ALERT

S86 FU TK
VLV APU

(BFS)

SM2 FU TK
VLV APU

If:
APU 1(2,3) FUEL
TK VLV T A(B)
< 45 deg F
> 160 deg F

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

1.1

SM 86 APU/HYD

APU FUEL TK VLV T
(TEMP > 160 deg)

1. ✓APU FUEL TK VLV - CL (pnl R2)
 2. Aff cb APU FU TK VLV ENA A(B) - op
- If temp still rising:
3. Aff APU HTR TK/FU LINE/H2O SYS A- OFF (AUTO)
 4. Aff APU HTR TK/FU LINE/H2O SYS B- AUTO (OFF)
 5. Go to MAL, APU/HYD, 1.1h **8**

APU/HYD

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

SM
ALERT

S86 APU/HYD
APU

If:
APU 1(2,3) FUEL
QTY < 50% or
APU 1(2,3) FUEL
TK P
< 110 psia
> 350 psia

(BFS)

SM2 APU 1(2,3)

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

Nominal Config:
(R2)
APU OPERATE
1(2,3) - OFF
APU FUEL TK VLV
1(2,3) - CL

1

SM 86 APU/HYD

• Match indications in chart to determine failure

(F8) APU FUEL PRESS ind - psia Pnl F8R Meter ①	(CRT) APU FU TK P psia	(CRT) APU FU OUT P psia	(CRT) APU FUEL QTY %	FAILURE
500	'↑' or 500 (H)	> 140	100	XDCR SHIFT OR FAILURE ②
< 110 and decr	'↓', and decr	decr	'↓' and decr	HYDRAZINE OR N2 LEAKING
0	0(L)	0	0	N2 LEAKED OUT
-50, steady	50 ↓	0	~0	HYDRAZINE LEAKED OUT
0	0(L)	> 140	0	XDCR SHIFT OR FAILURE ②

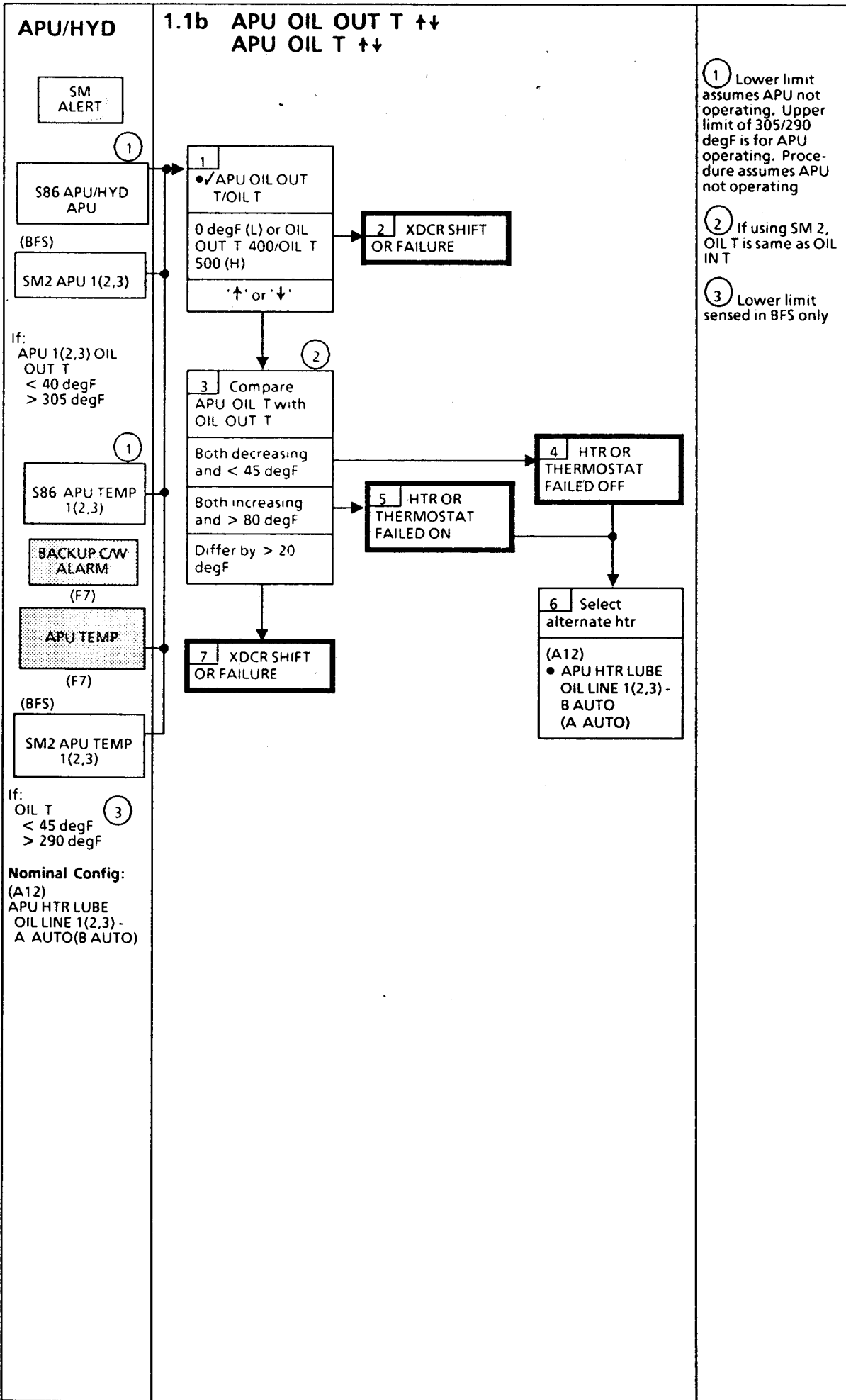
→ APU/HYD
SSR-4
APU FU TK P
XDCR FAIL-
URE WORK-
AROUND

→ APU/HYD
SSR-5
APU FUEL
LEAK

→ APU/HYD
SSR-4
APU FU TK P
XDCR FAIL-
URE WORK-
AROUND

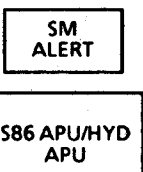
① Instr pwr must
be ON for meter
readout

② Puts qty com-
putation in error.
FU OUT P Xdcr may
be substituted in
fuel qty calculation

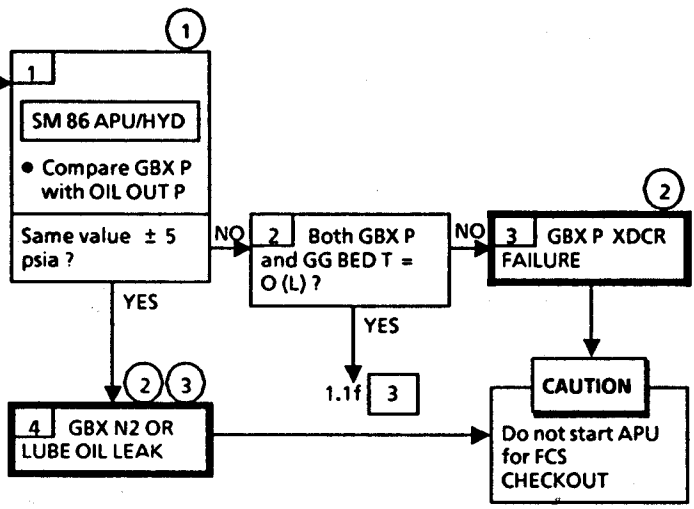


APU/HYD

1.1c GBX P ↓



If: APU 1(2,3) GBX P < 3 psia



- ① Assumes APU not operating
- ② Use (R2) APU OPER -START/ORIDE for APU start
- ③ Delay start until M = 7 due to possible limited APU lifetime. N2 vlv from GBX N2 Bottle opens to repress gearbox before APU startup

APU/HYD

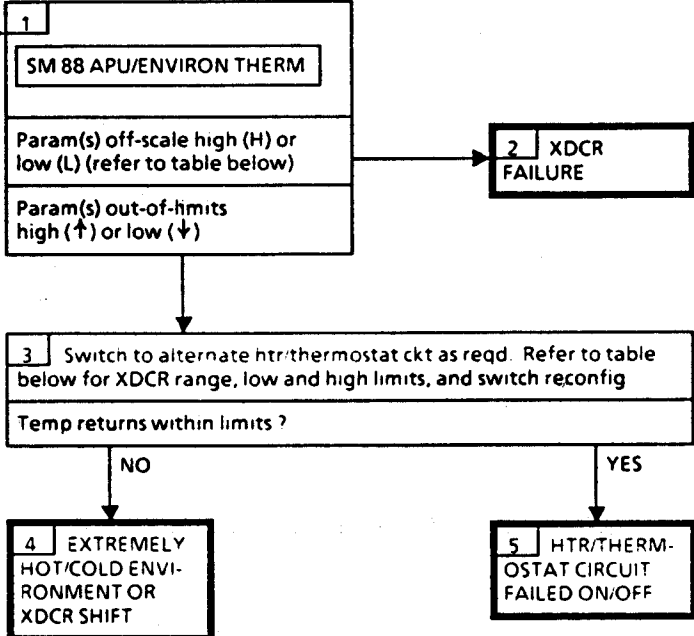
SM
ALERT

1
S88 THERMAL
APU

If:
Any APU temp on
APU/ENVIRON
THERM display
out-of-limits,
refer to SM FDA
THERMAL LIMITS
TABLE

Nominal Config:
(A12)
APU HTR GAS
GEN/FUEL PUMP
1,2,3 (three) -
A AUTO(B AUTO)
APU HTR TK/FU
LINE/H2O SYS
1A,2A,3A (three) -
OFF(AUTO)
1B,2B,3B - AUTO
(OFF)
(R2)
APU CNTLR PWR
1,2,3 (three) -
OFF
APU FUEL
PUMP/LV (2)
COOL A,B - OFF
(AUTO)

**1.1d TK SURF T ↓, TK HTR T ↑↑,
FEED LN T ↑↑, PUMP IN T ↑↑,
PUMP OUT T ↑↑, PUMP BYP LN T ↑↑,
H2O LN PRI T ↑↑, H2O LN SEC T ↑↑,
H2O LN INJ T ↑↑**



- 1 Msg available when SM operating only
- 2 Upper limit for maintaining Fuel Pump temp < 200 degF utilizing APU Fuel Pump/lv cooling sys. If limit exceeded, refer to APU/HYD 1.1g
- 3 If subsequent failure occurs in remaining htr ckt, activate both A,B Htrs and consult MCC
- 4 APU 2 H2O LN PRI and SEC SM FDA low limits are:
PRI - 44 degF
SEC - 42 degF
- 5 Refers to Xcdr range and not FDA limit

SM FDA THERMAL LIMITS TABLE

PARAM	XDCR RANGE degF	LOW LIMIT degF	HIGH LIMIT degF	SWITCHES
FUEL T				(A12)
TK SURF	0-160	45	-	APU HTR TK/FU LINE/H2O/SYS (3)
TK HTR	0-160	45	140	1A(2A,3A) - AUTO(OFF)
FEED LN	0-250	45	120	1B(2B,3B) - OFF(AUTO)
PUMP LN	0-250	45	120	
H2O LN PRI	0-160	38 (4)	110	(-75 to 175 SYS 3) (5)
SEC	-75-175	38	110	
INJ	-75-300	38	110	(190 SYS 2)
PUMP OUT	0-400	50	202 (3)	(A12)
BYP LN	0-400	60	180	APU HTR GAS GEN/FUEL PUMP 1(2,3) - B AUTO (A AUTO)

APU/HYD

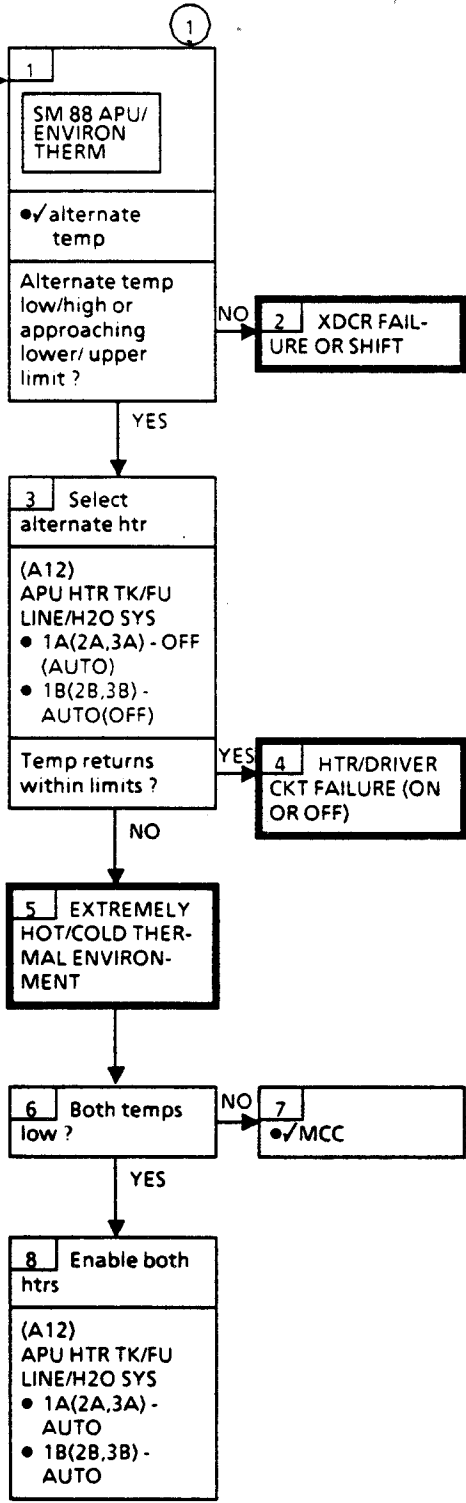
1.1e FU PUMP DRN LN T1(T2) ↑↓
FU TEST LN T1(T2) ↑↓

SM ALERT

S88 THERMAL APU

If:
APU FUEL T PUMP DRN LN 1(2,3)
< 45 degF
> 95 degF
APU FUEL T PUMP DRN LN 2 1(2,3)
< 45 degF (2)
> 140 degF (2)
or
APU FUEL T TEST LN 1 1(2,3)
< 40 degF
> 90 degF
APU FUEL T TEST LN 2 1(2,3)
< 40 degF
> 90 degF

Nominal Config:
(A12)
APU HTR TK/FU LINE/H2O SYS
1A,2A,3A (three) - AUTO(OFF)
1B,2B,3B (three) - OFF(AUTO)

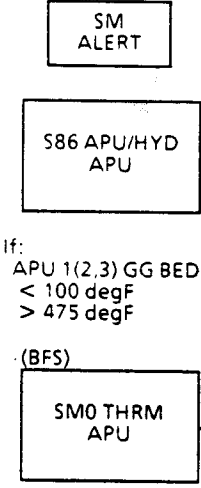


1 Because of Xdcr location, FU PUMP DRN LN T1 and T2 may not be equal. Generally, T2 will be higher than T1, which is more evident on SYS 2

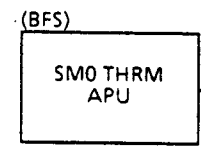
2 SYS 2 upper limit is 195 degF

APU/HYD

**1.1f GG BED T ++
INJ T + (BFS ONLY)**

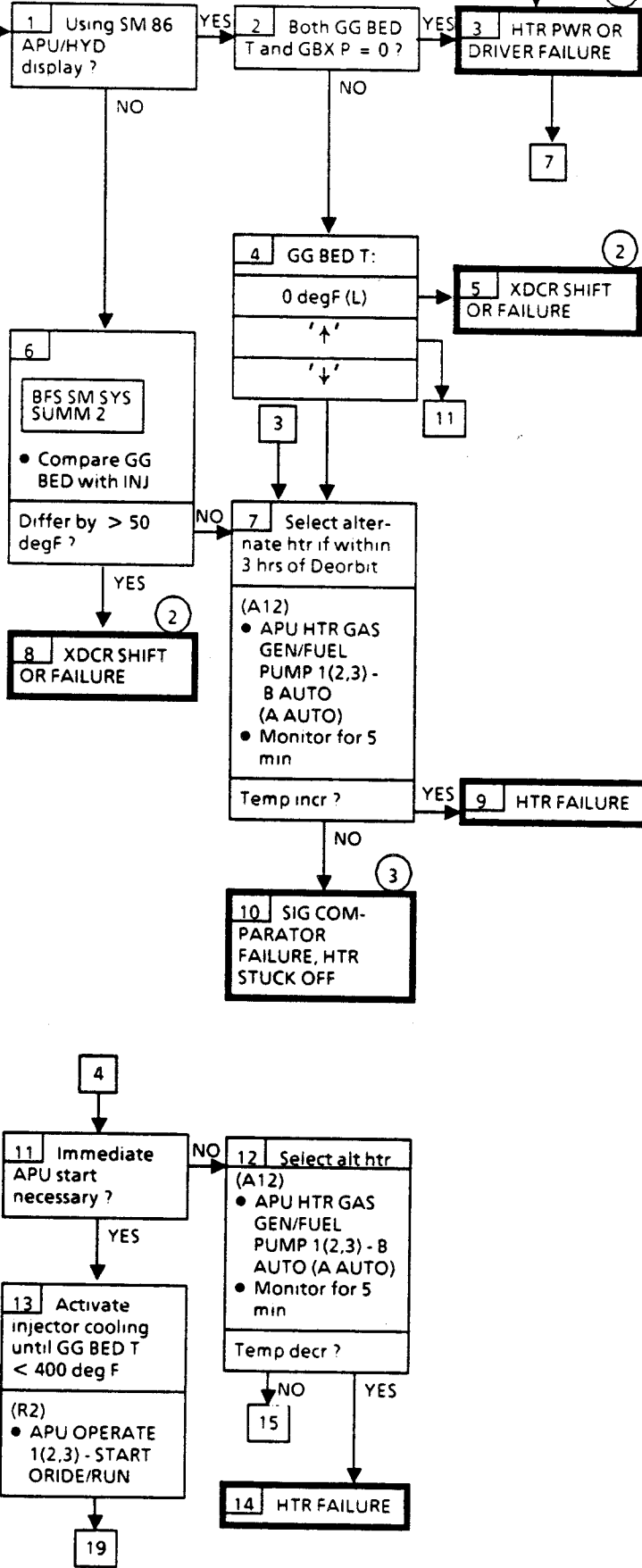


If:
APU 1(2,3) GG BED
< 100 degF
> 475 degF



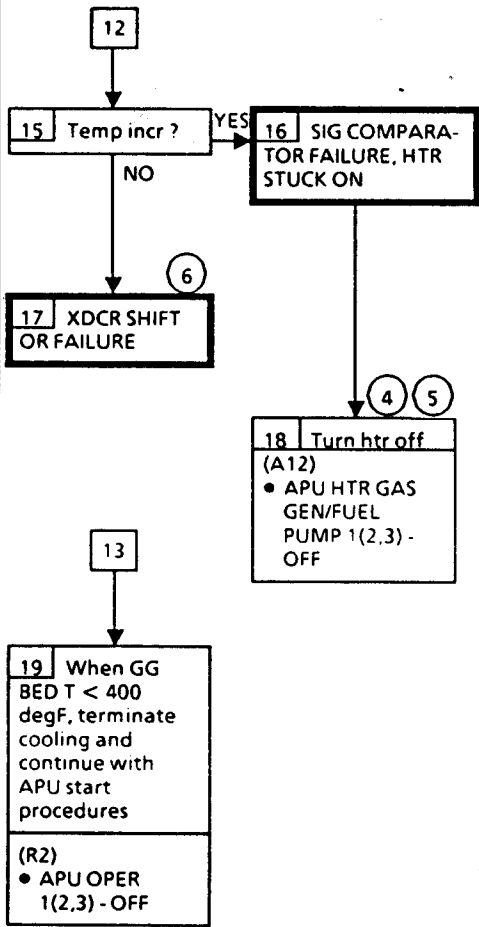
If:
APU 1(2,3) GG BED
< 258 degF
or INJ T
< 258 degF

Nominal Config:
(A12)
APU HTR GAS
GEN/FUEL PUMP
1(2,3) - A AUTO
(B AUTO)
(R2)
APU OPER
1(2,3) - OFF



- ① Htr pwr also drives signal Cond for both Xdcrs
- ② Failure of GG BED T XDCR will cause GG Htrs to remain ON. ✓ MCC for possible htr management. If GG BED T XDCR fails or shifts below 190 degF, APU START/ORIDE must be used for APU START
- ③ If GG Bed T falls below 190 deg F, APU START/ORIDE must be used for APU start

APU/HYD 1.1f (Cont)



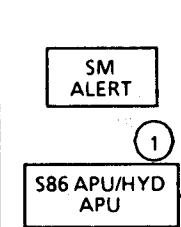
④ Will receive 'S86 APU/HYD APU' msg (GBX P = 0 when htr turned off)

⑤ ✓MCC for possible heater management

⑥ Failure of GG BED T XDCR high will cause GG htrs to remain off. MCC can monitor GG INJ T

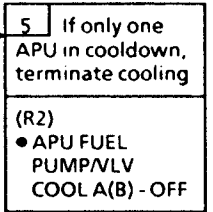
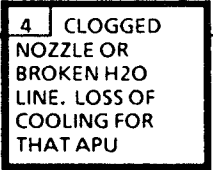
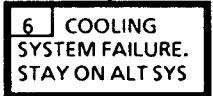
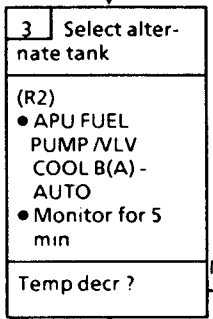
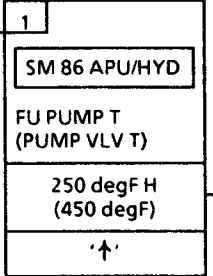
APU/HYD

**1.1g FU PMP T ↑
PUMP VLV T ↑**



If:
APU 1(2,3) FU
PMP T
> 200 degF or
PUMP VLV T
> 209 degF

Nominal Config:
(R2)
APU OPER
1(2,3) - OFF
APU CNTLR PWR
1(2,3) - OFF
APU FUEL PUMP/
VLV COOL A(B) -
AUTO

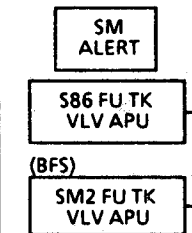


1 Assumes FU
Pump/vlv cooling
in use

2 Do not start
affected APU for
FCS checkout

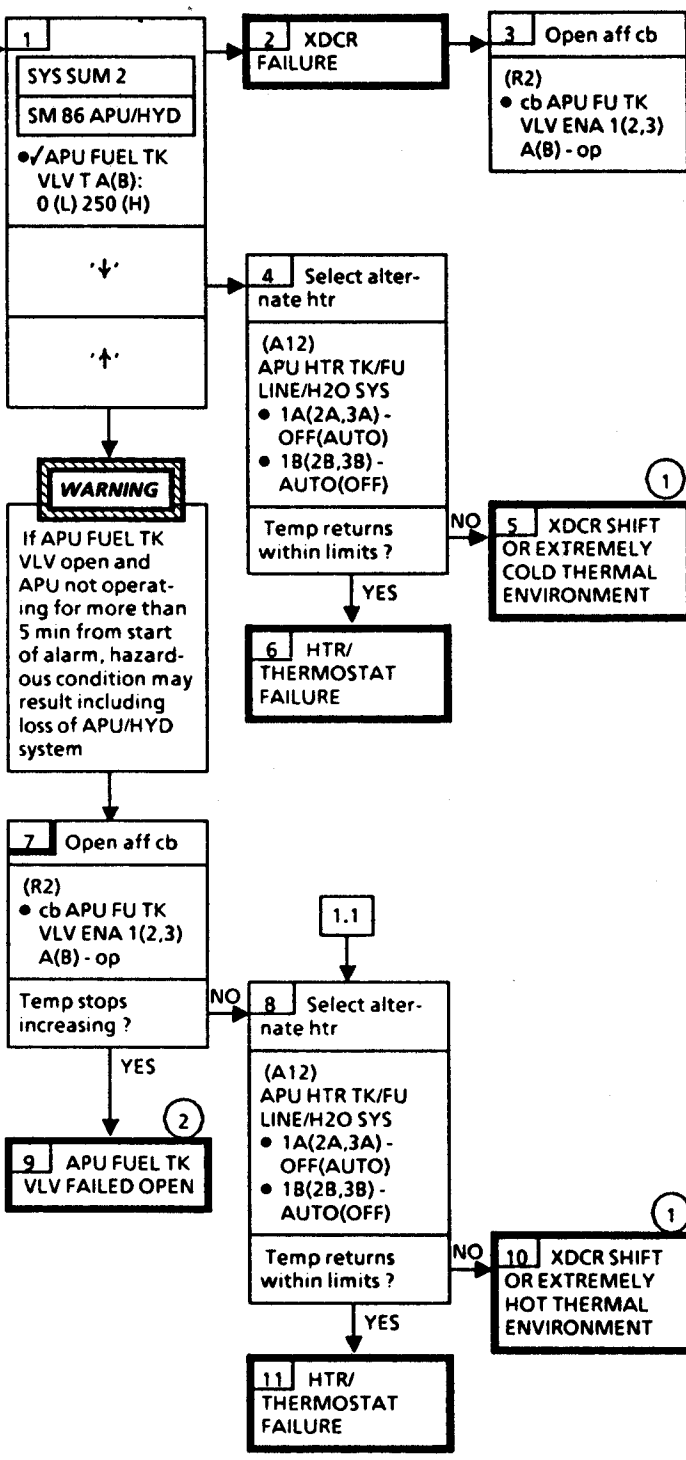
APU/HYD

1.1h FUEL TK VLV T ↑↓



If:
APU 1(2,3) FUEL TK VLV T A(B)
< 45 degF
> 160 degF

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

1.2 HYD

SM ALERT

S86 APU/HYD HYD

If: HYD 1(2,3) ACCUM P < 1930 psia
or: HYD 1(2,3) RSVR P < 45 psia

SM2 HYD ACCUM P 1(2,3)

If: HYD 1(2,3) ACCUM P < 1930 psia

Nominal Config:
(R2)
HYD MN PUMP PRESS 1,2,3 - NORM
HYD CIRC PUMP 1,2,3 - GPC(ON, OFF)
(R4)
HYD LG HYD ISOL VLV 1 GPC (tb-CL)
VLV 2,3 GPC (tb-OP or CL)
(A12)
HYD CIRC PUMP PWR1 - MNA
2 - MNB
3 - MNC

1.1

HYD ACCUM (RSVR) P LOW (ACCUM P < 1930) (RSVR P < 45)

1 2

SM 87 HYD THERMAL
SM 86 APU/HYD

1. HYD CIRC PUMP - ON

If aff HYD CIRC PUMP PRESS > 100:

2. Go to MAL, APU/HYD, 1.2a 1 >>

If aff HYD CIRC PUMP PRESS < 100:

3. HYD CIRC PUMP PWR - alt position (pnl A12)
4. Go to MAL, APU/HYD, 1.2a 8 >>

CAUTION

Pump may be damaged if APU started with HYD ACCUM PRESS zero

1 ACCUM P = 40 x RSVR P. FDA alarm for RSVR P is at 45 psia, equivalent to an ACCUM P of 1800 psia

2 Circ Pump Control software is designed to automatically turn Circ Pump on when accumulator pressure falls below 1960 psi. If Circ Pump SW was in GPC and pump did not come on, possible GPC command path failure

HYD

1.2

APU/HYD

1.2a RSVR P ↑, ACCUM P ↑

SM ALERT

S86 APU/HYD HYD

If: HYD 1(2,3) ACCUM P < 1930 psia and/or: HYD 1(2,3) RSVR P < 45 psia

SM 86 APU/HYD

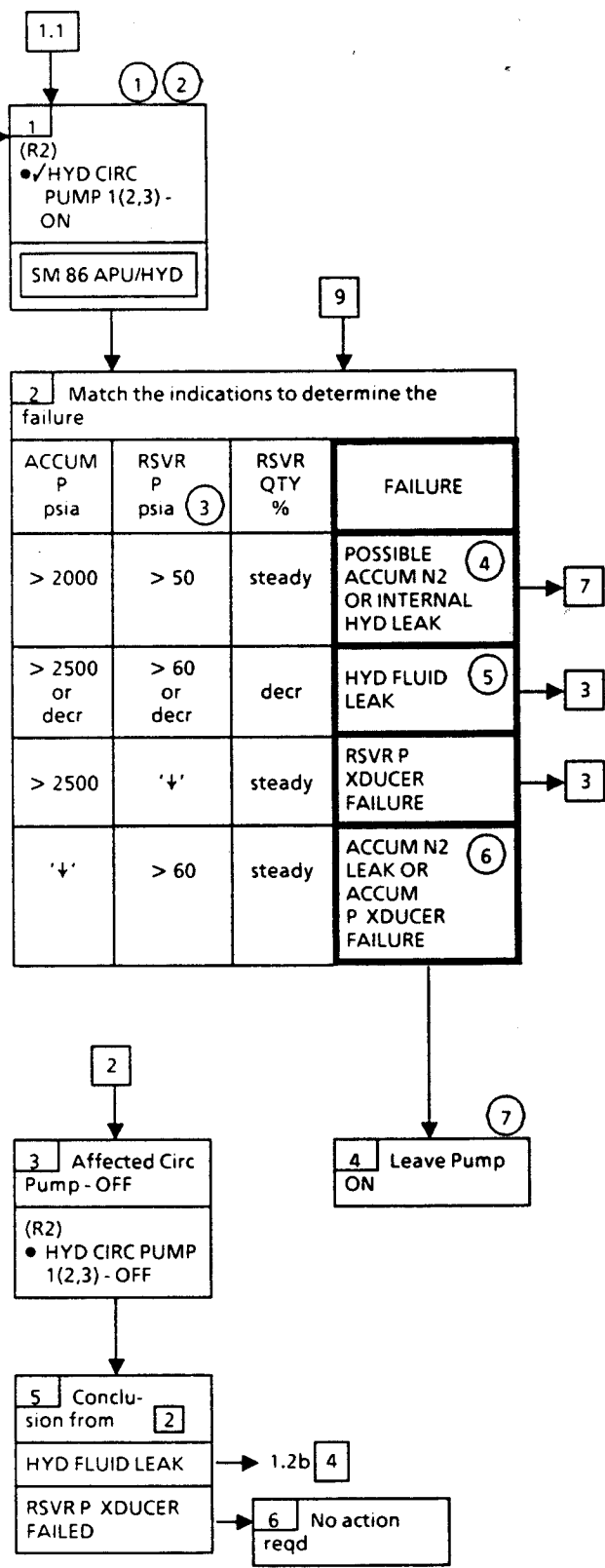
SM2 HYD ACCUM P 1(2,3)

If: HYD 1(2,3) ACCUM P < 1930 psia

Nominal Config:
(R2)
HYD MN PUMP PRESS (three) - NORM (LO)
HYD CIRC PUMP (three) - GPC (ON, OFF)

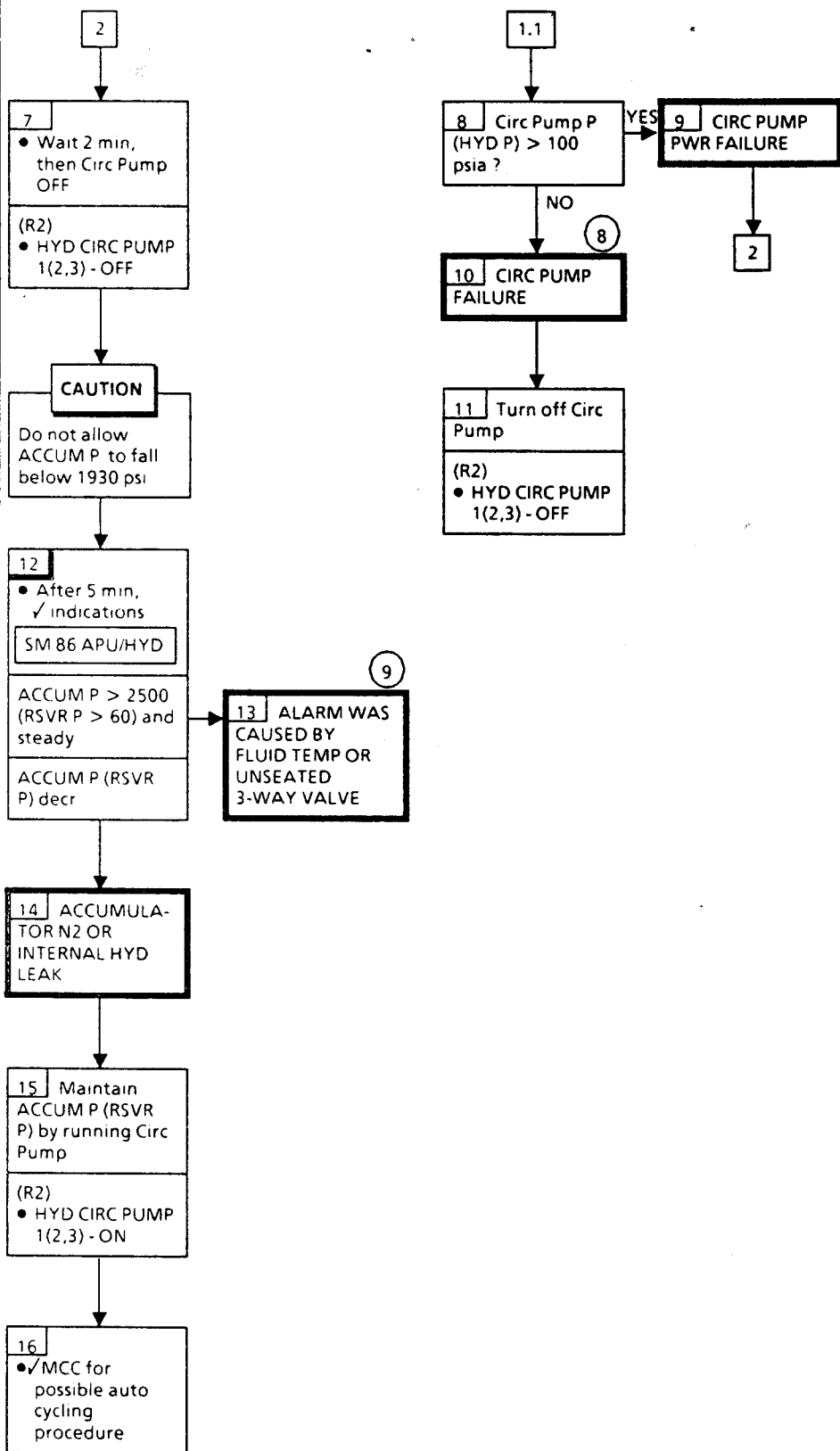
(R4)
HYD LG HYD ISOL VLV 1 - GPC (tb-CL)
VLV 2,3 - GPC (tb-OP or CL)

(A12)
HYD CIRC PUMP PWR1 - MNA
2 - MNB
3 - MNC



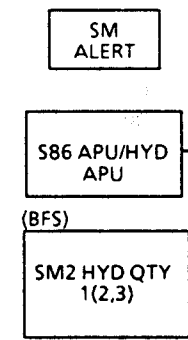
- ① ACCUM P is maintained automatically when Circ Pump switch is in GPC. At ACCUM P < 1960 psia, Circ Pump is commanded ON. If after 2 min, ACCUM P > 1960 psia Circ Pump is commanded OFF
- ② ACCUM P MGMT software is designed to turn on Circ Pump before pressure decay causes FDA alarm to ring, if Circ Pump sw is in GPC
- ③ RSVR P is equivalent to 1/40 x ACCUM P
- ④ Internal HYD leaks may occur through 3-way vlv (unloader vlv) and the Priority vlv
- ⑤ Hyd system may be lost for entry
- ⑥ Automatic GPC Accum pressure monitoring capability is lost if ACCUM P xdcr is failed
- ⑦ ✓MCC to determine xdcr failure

APU/HYD 1.2a (Cont)



8 Hydraulic system may be lost for entry

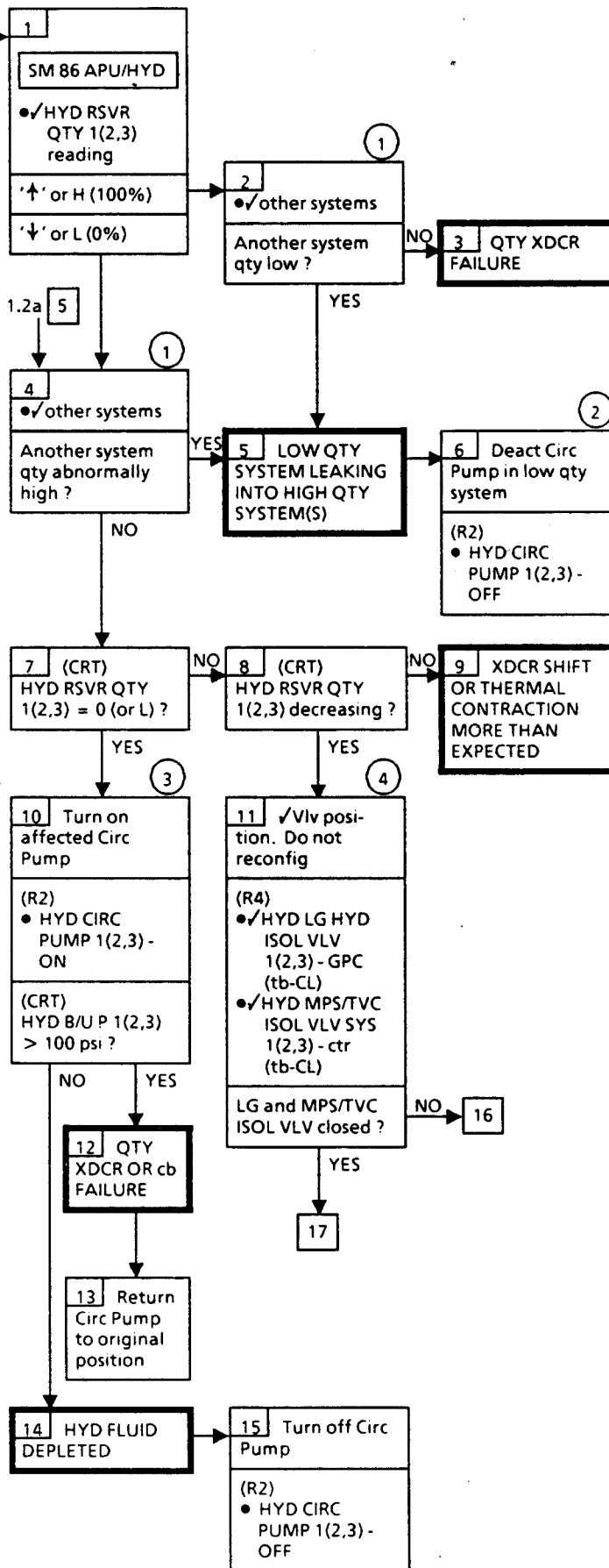
9 Accumulator leaks due to improperly sealed 3-way vlvs have been stopped on previous flights when Circ Pump operations allowed valve to reset



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

Nominal Config:
(L4:0)
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 (LO)
HYD CIRC PUMP
(three) - GPC
(ON,OFF)
BLR CNTLR/HTR
(three) - A
BLR PWR (three) -
OFF
BLR N2 SPLY
(three) - OFF
(R4)
HYD LG HYD ISOL
VLV 1 - GPC (tb-CL)
VLV 2,3 (two) -
GPC (tb-OP or CL)
HYD MPS/TVC ISOL
VLV SYS (three) -
ctr (tb-CL)



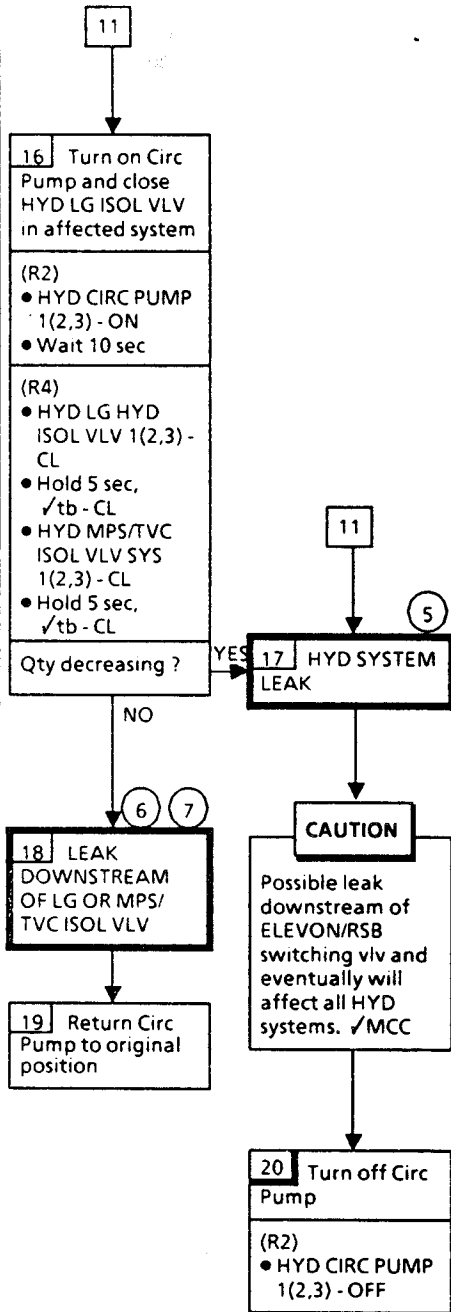
1 Normal operating qty approx 60%, but compare qty with previous reading

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

3 If BFS SM 2, use HYD PRESS 1(2,3)

4 Circ Pumps or APUs must be operating in order to operate HYD LG HYD ISOL VLV or HYD MPS/TVC VLV if reqd

APU/HYD 1.2b (Cont)

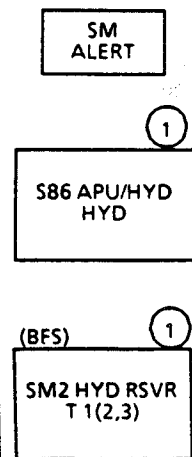


5 Hyd system may be lost for entry, depending on size of leak. Sys should remain OFF unless another system lost

6 Since GNC on entry SW will open HYD LG HYD ISOL VLV prior to landing, vlv must be reclosed

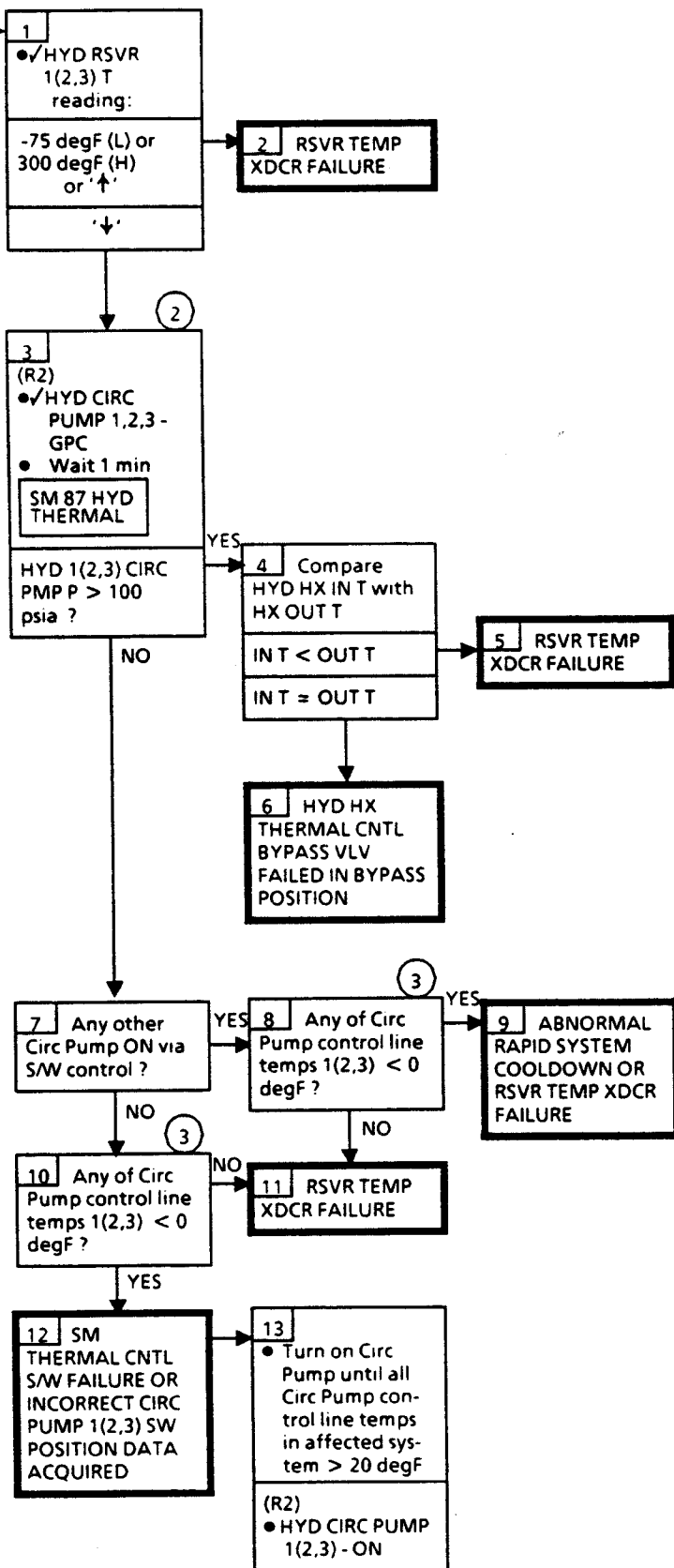
7 Do not operate MPS/TVC vlv in affected system for SSME HYD Repress prior to entry

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



If: HYD RSVR 1(2,3) T < 10 degF or > 230 deg F

Nominal Config: Refer to 1.2a



- ① Upper limit of 230 degF is for APU operating
- ② S/W control requires 1 min delay before Circ Pump start
- ③ The following Circ Pump Cntl ops Limits are set off-scale low and should be disregarded. All LG and following ELEVON lines:
LOB 2
LIB 1,2,3
RIB 1,2
ROB 3

APU/HYD

1.2d W/B N2 P ↑, W/B H2O QTY ↑, W/B REG P ↑↑

SM ALERT

S86 APU/HYD W/B

If:
 W/B 1(2,3) N2 P < 1800 psia or
 W/B 1(2,3) H2O QTY < 40% and BLR CNTLR/HTR 1(2,3) - A or
 BLR N2 SPLY 1(2,3) - OFF and W/B 1(2,3) REG P < 20 psia or > 33 psia

(BFS) **1**
 SM2 W/B QTY 1(2,3)

W/B 1(2,3) QTY < 20% and BLR CNTLR/HTR 1(2,3) - A

Nominal Config:

- (R2) BLR CNTLR/HTR 1(2,3) - A
- BLR N2 SPLY 1(2,3) - OFF (L4:0)
- cb AC2 φA BLR HYD BYP 1A - cl
- cb AC3 φA BLR HYD BYP 2A - cl
- cb AC1 φC BLR HYD BYP 3A - cl
- cb AC1 φA BLR HYD BYP 1B - cl
- cb AC2 φC BLR HYD BYP 2B - cl
- cb AC3 φC BLR HYD BYP 3B - cl

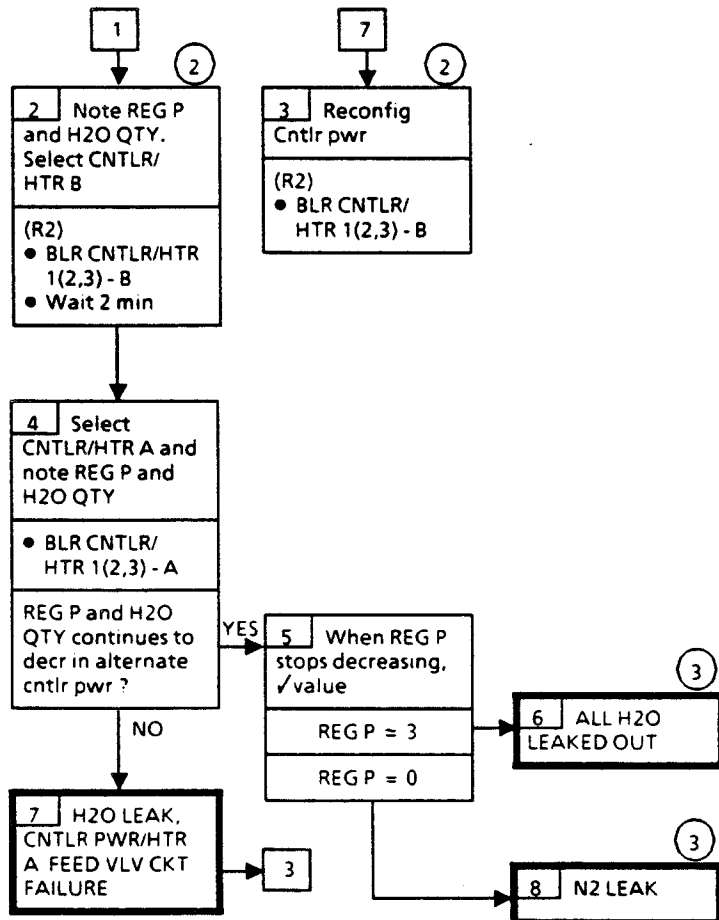
1

SM 86 APU/HYD

• Match indications in chart to determine failure

N2 T degF	N2 P psia	REG P psia	H2O QTY %	FAILURE
= 55 to 70	= 2400	0 (L)	BFS = 0 PASS = 100	REG P XDCR FAILED LOW
= 55 to 70	= 2400	< 20 ↓ and decreasing	PASS 60 ↓ (BFS 40 ↓) and decreasing	N2 OR H2O LEAK
= 55 to 70	= 2400	> 33 ↑	100	EXCESSIVE TEMPERATURE OR XDCR SHIFT
= 55 to 70	0 (L)	= 25	0 ↓	N2 P XDCR FAILED LOW
= 55 to 70	< 1800 ↓ and decreasing	= 25	decreasing	N2 TK LEAK
221 (H)	= 2400	= 25	= 30 ↓	N2 T XDCR FAILED HIGH

- 1 Only W/B H2O QTY available or limit sensed in BFS
- 2 Upon selection of Blr Cntrlr/Htr B, both REG P and H2O QTY will be lost resulting in FDA alarm
- 3 Possible loss of APU/HYD system for entry



APU/HYD

1.2e W/B BLR T ↑↑

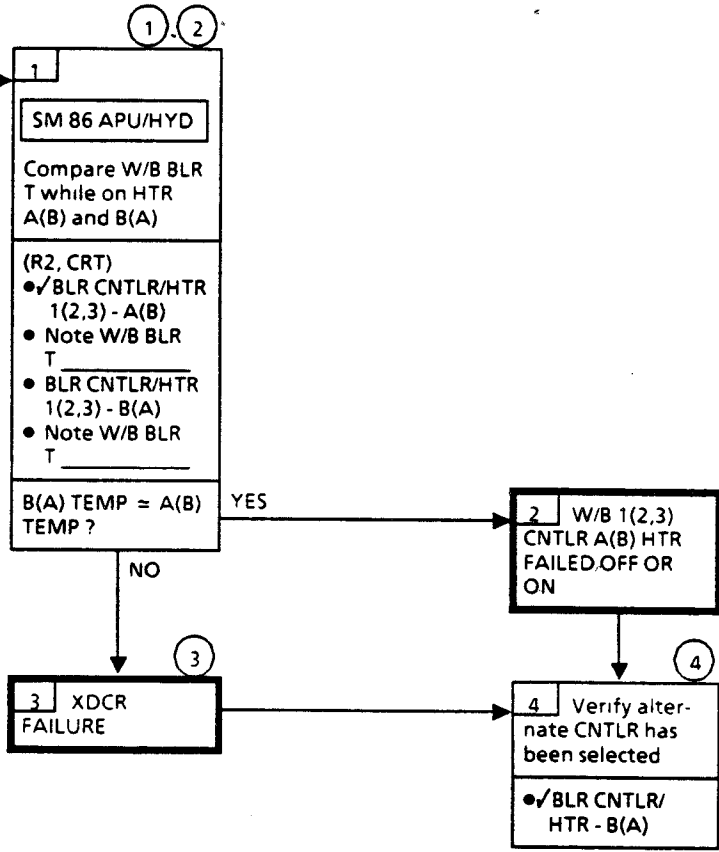
SM
ALERT

S86 APU/HYD
W/B

If:
(R2)
BLR CNTLR/HTR
1(2,3) - A(B)
and
W/B 1(2,3) BLR T
(A or B)
< 45 degF or
> 120 degF

Nominal Config:

(R2)
BLR CNTLR/HTR
1(2,3) - A
BLR N2 SPLY
1(2,3) - OFF
(L4:0)
cb AC2 φA BLR HYD
BYP 1A - cl
cb AC3 φA BLR HYD
BYP 2A - cl
cb AC1 φC BLR HYD
BYP 3A - cl
cb AC1 φA BLR HYD
BYP 1B - cl
cb AC2 φC BLR HYD
BYP 2B - cl
cb AC3 φC BLR HYD
BYP 3B - cl



① TEMP A displayed if W/B CNTLR A selected; TEMP B if CNTLR B selected. When W/B CNTLR B selected, APU/HYD W/B fault msg will occur, caused by W/B H2O QTY going to zero

② When new Cntlr selected, SM reset. If param still out-of-limits, SM msg reoccurs after: BLR T 2 min TK T 5 min

③ Select alternate Cntlr since failed Xdcr low or high k keeps Htr ON or OFF

④ CNTLR A for this system must be periodically selected to note tk temps and H2O qty

APU/HYD

1.2f W/B TK T ↓

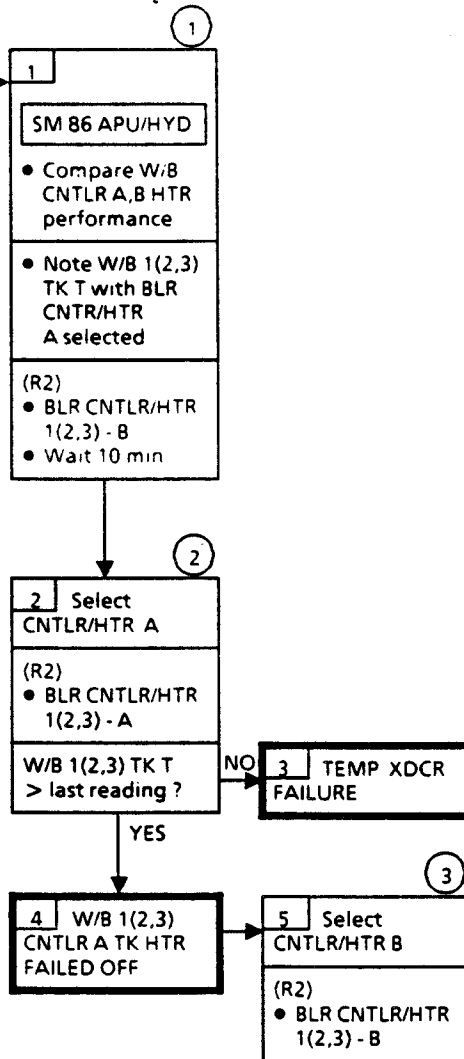
SM
ALERT

S86 APU/HYD
W/B

If:
(R2)
BLR CNTLR/HTR
1(2,3) - A
and
W/B 1(2,3) TK T,
< 40 degF

Nominal Config:

(R2)
BLR CNTLR/HTR
1(2,3) - A
BLR N2 SPLY
1(2,3) - OFF
(L4:0)
cb AC2 φA BLR HYD
BYP 1A - cl
cb AC3 φA BLR HYD
BYP 2A - cl
cb AC1 φC BLR HYD
BYP 3A - cl
cb AC1 φA BLR HYD
BYP 1B - cl
cb AC2 φC BLR HYD
BYP 2B - cl
cb AC3 φC BLR HYD
BYP 3B - cl



① Temp readout invalid with BLR CNTLR/HTR B selected. When W/B CNTLR/HTR B selected, 'S86 APU/HYD W/B' fault msg will occur, caused by W/B H2O QTY going to zero

② When new Cntrl selected, SM reset. If param still out-of-limits, SM msg reoccurs after:
BLR T 2 min
TK T 5 min

③ CNTLR A for this system must be periodically selected to note tk temps and H2O qty

SM
ALERT

S87 THERMAL
HYD

1.1

SM 87 HYD THERMAL

**HYD CIRC PUMP (PRESS LOW)
(PRESS < 100)**

CAUTION
Circ Pump - OFF within 60 sec
to avoid damage

1. HYD CIRC PUMP - OFF
2. When time permits go to MAL, APU/HYD, 1.3a **1**

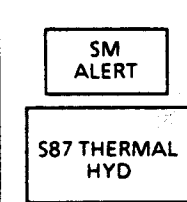
If:

(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:

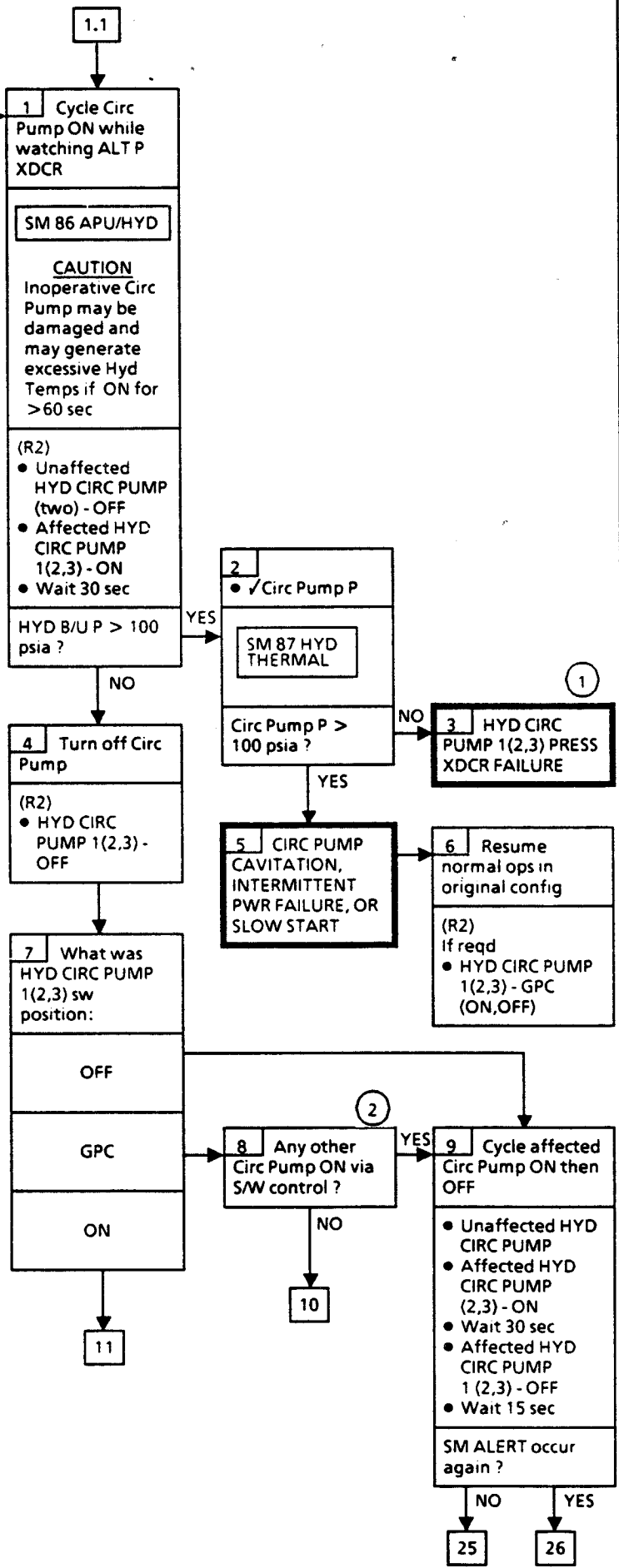
(R2)
HYD CIRC PUMP
1,2,3 - GPC(ON,
OFF)
(A12)
HYD CIRC PUMP
PWR 1 - MNA
2 - MNB
3 - MNC

**THERMAL
HYD
1.3**



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

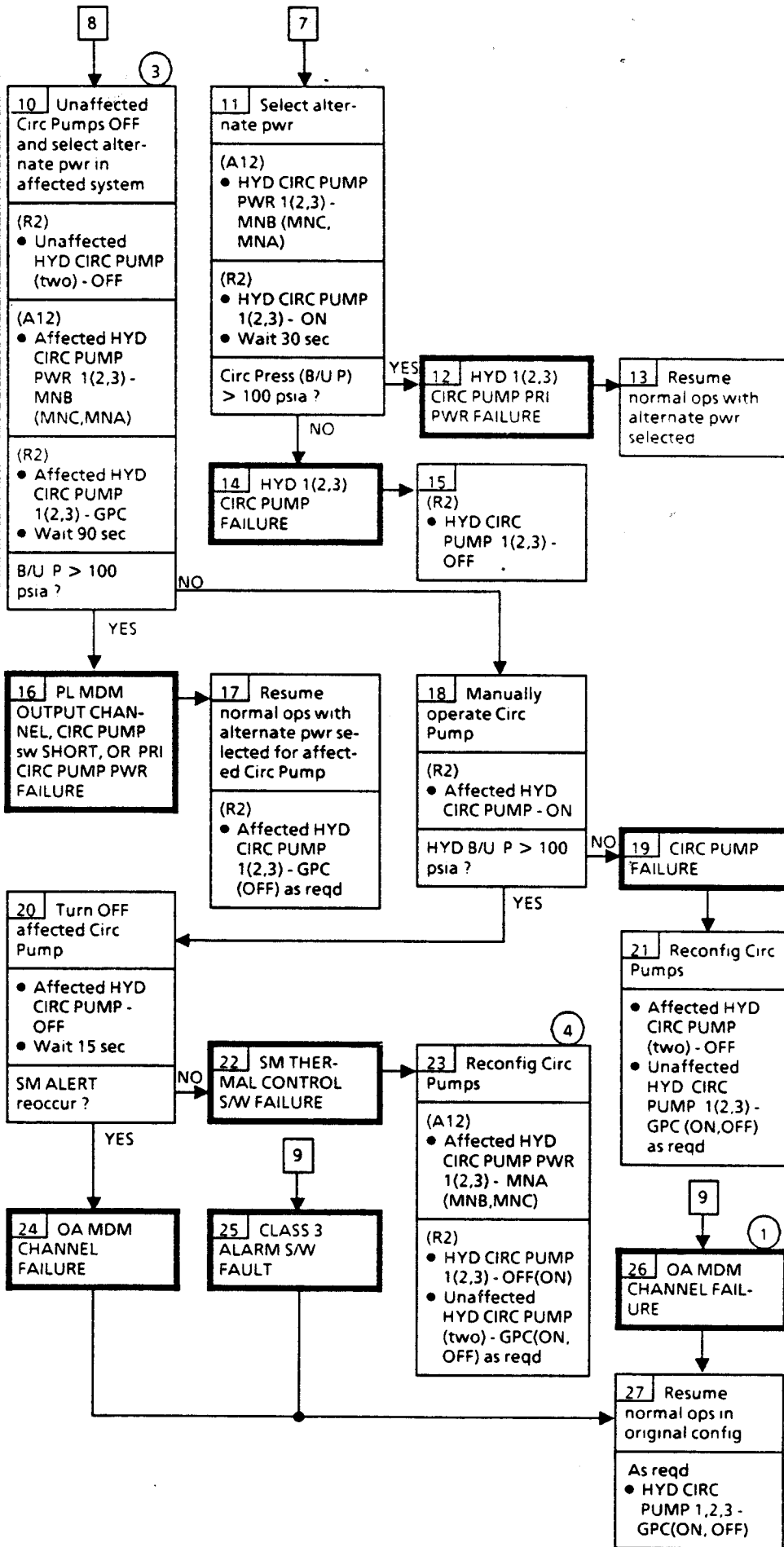
Nominal Config:
 (R2)
 HYD CIRC PUMP
 1,2,3 (three) -
 GPC (ON, OFF)
 (A12)
 HYD CIRC PUMP
 PWR 1 - MNA
 2 - MNB
 3 - MNC



① SM ALERT occurs everytime 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

② Unless S/W press threshold has been changed, SM Hyd thermal control S/W will not permit more than one Circ Pump to be ON at a time. Refer to APU/HYD SSR-2

APU/HYD 1.3a (Cont)



① SM ALERT occurs everytime 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

③ S/W requires 1 min delay before Circ Pump start. If Circ Pumps are in timer mode, delay will equal OFF-time in cycle. Allow 30 sec after expected ON command for B/U P to rise

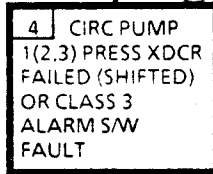
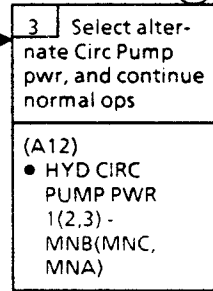
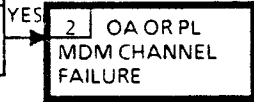
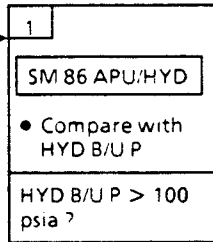
④ Cycle affected Circ Pump manually to maintain HYD fluid temp > 0 degF

SM
ALERT

S87 THERMAL
HYD

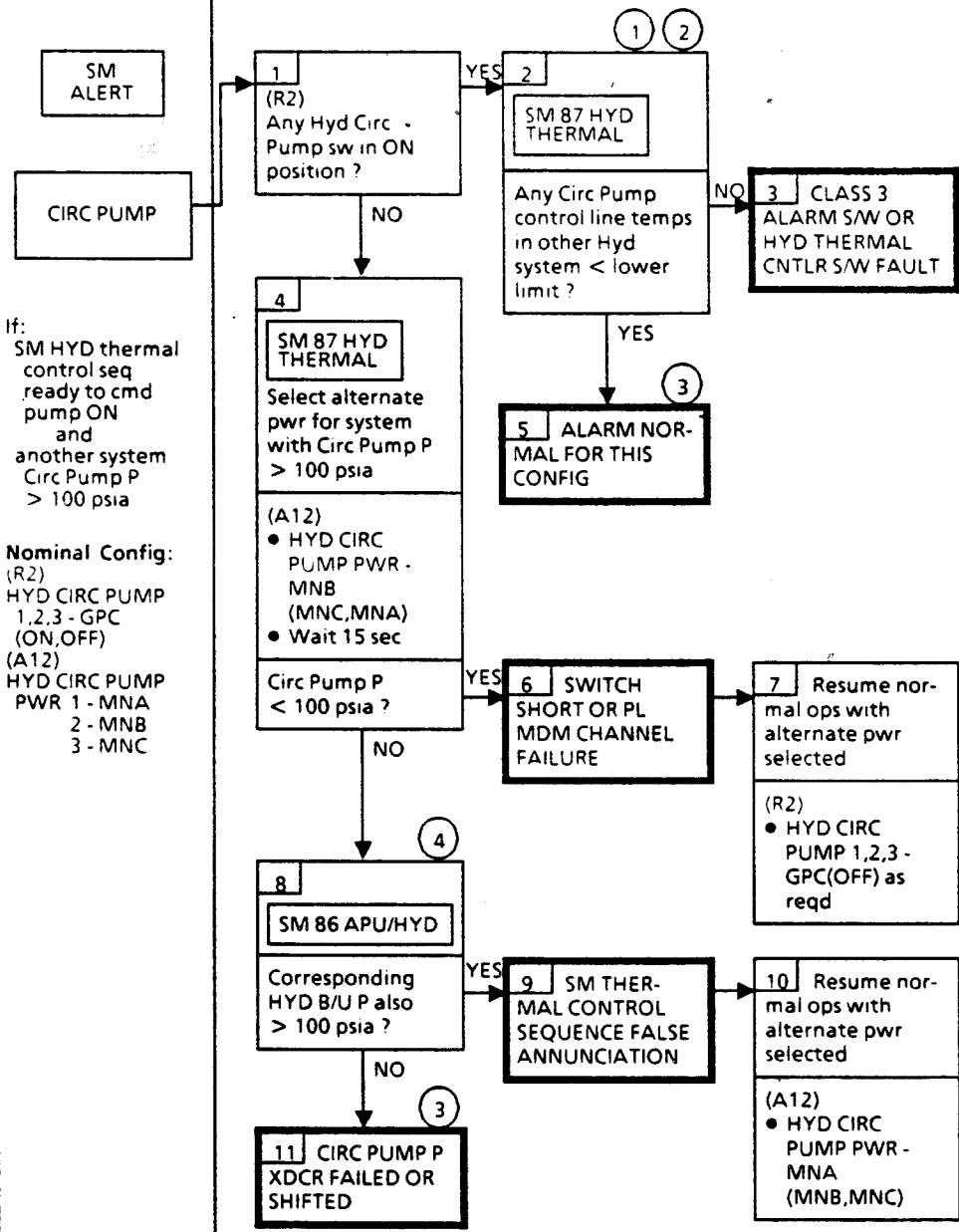
If:
(R2)
HYD CIRC PUMP
1(2,3) - GPC
and
SM S/W issued OFF
command
and
HYD 1(2,3) CIRC
PUMP P > 100
psia
or
HYD CIRC PUMP
1(2,3) - OFF
and
HYD 1(2,3) CIRC
PUMP P > 100
psia

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



① Action also
selects alternate
MDM for command
source

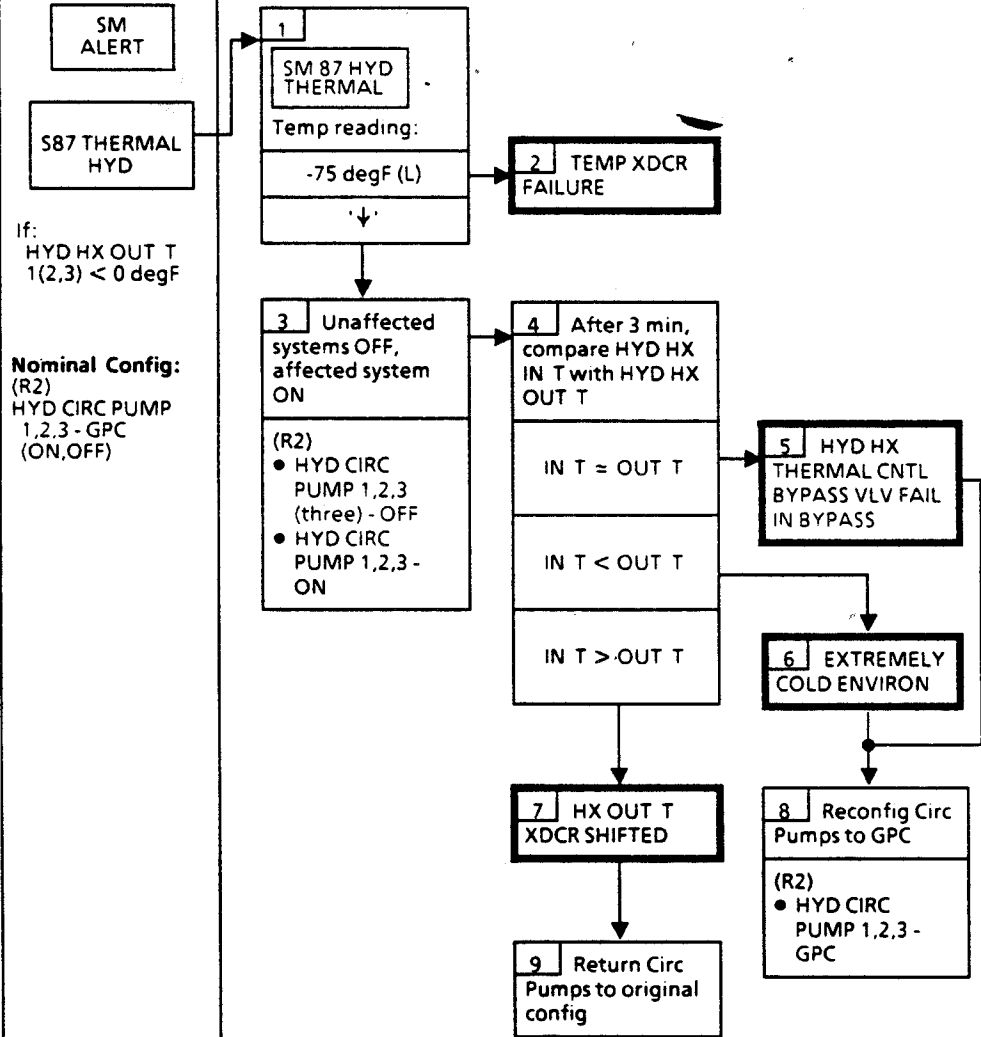
② FDA press
threshold for
affected system can
be changed via
Table Maintenance
to + 801 psia if
continued GPC Circ
Pump ops desired.
Refer to APU/HYD
SSR-1. Also perform
APU/HYD SSR-2 in
order to allow
normal GPC ops of
other two Circ
Pumps



If:
SM HYD thermal control seq ready to cmd pump ON and another system Circ Pump P > 100 psia

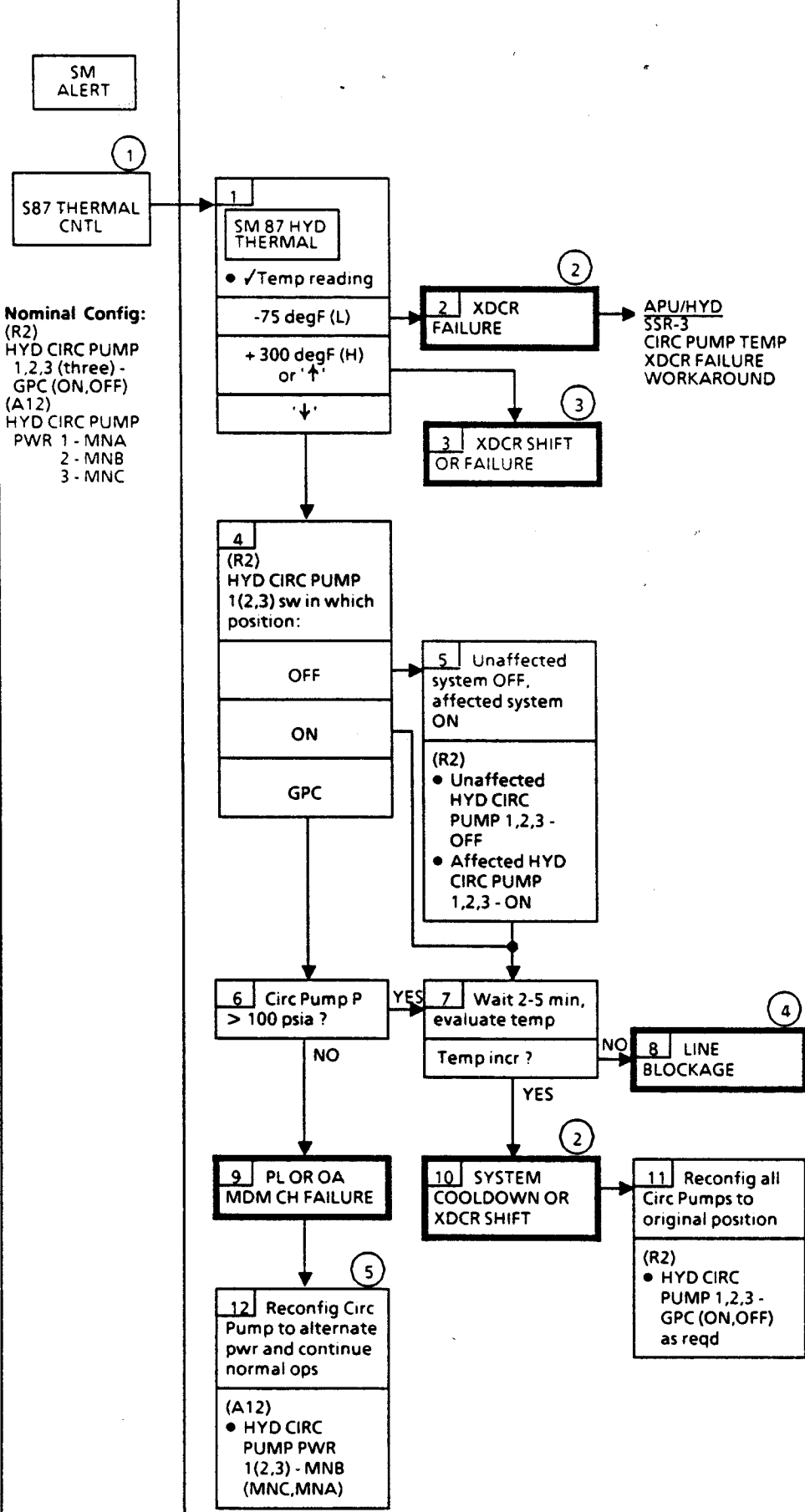
Nominal Config:
(R2)
HYD CIRC PUMP 1,2,3 - GPC (ON,OFF)
(A12)
HYD CIRC PUMP PWR 1 - MNA
2 - MNB
3 - MNC

- ① The following Circ Pump Cntl ops limits are set off-scale low and should be disregarded. ELEVON lines:
LOB 2
LIB 1,3
RIB 1,2
ROB 3
RD/SB FUS 3
BDY FLP PDU 1
BDY FLP FUS 2,3
L BRAKE FUS 3
R BRAKE WHL 2
All LG lines
- ② Refer to APU/HYD SSR-3, Table 1, for pump control constants lower limits
- ③ In order to continue GPC controlled ops of Circ Pump(s), S/W pressure threshold 0921742 (0921842, 0921942) for this system must be changed via Table Maintenance to + 800 psia. Refer to APU/HYD SSR-2
- ④ Hyd meter on Pnl F8 may be used for comparison



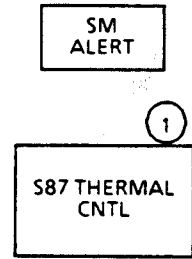
APU/HYD

1.3e LINE TEMPS: ELEVON, RD/SB, BDY FLP ↑↓

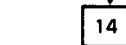
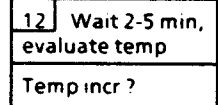
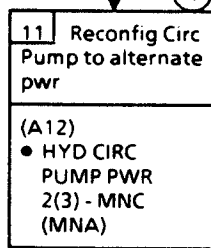
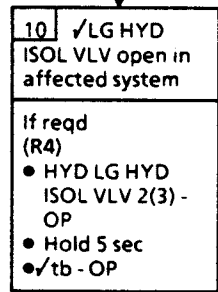
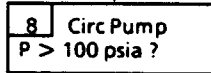
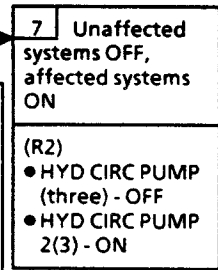
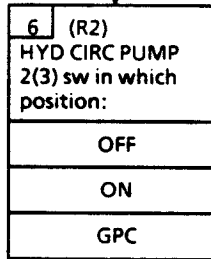
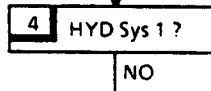
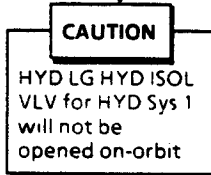
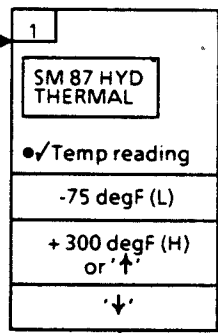


- ① Refer to APU/HYD SSR-3, Table T, for FDA limits
- ② Circ Pump S/W param limit can be inhibited to allow normal GPC controlled Circ Pump ops
- ③ If used as timer-mode control Xdcr, reinitialize timer-mode using another Xdcr
- ④ Crew judgment can isolate failure based on temp performance. If temps fixed or erratic, Xdcr probably failed; if slowly decreasing, line blocked
- ⑤ Action selects alternate MDM and should enable S/W ops; temp should also incr

1.3f LINE TEMPS: BRAKE, NLG, LMG, RMG ↑↑

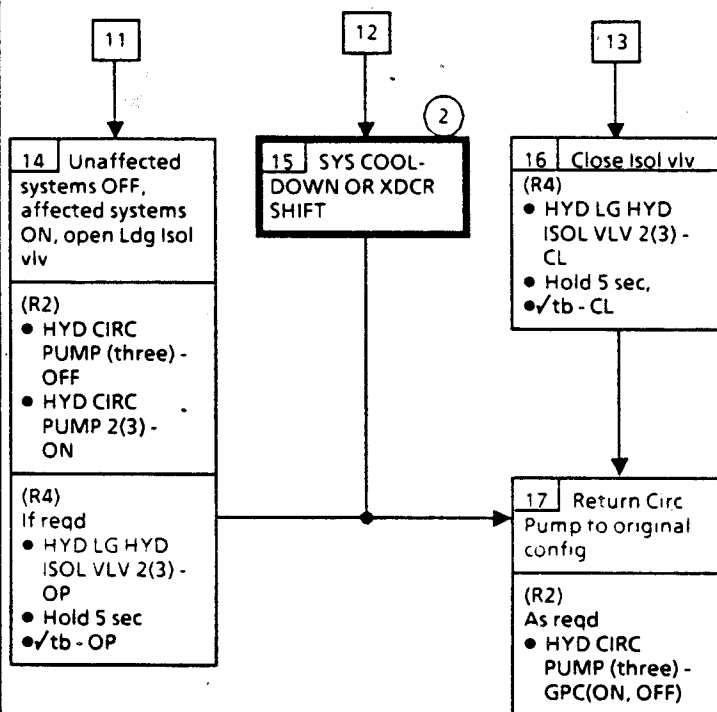


Nominal Config:
 (R2)
 HYD CIRC PUMP (three) - GPC (ON, OFF)
 (R4)
 HYD LG RET/CIRC VLV - GPC or CL
 HYD LG HYD ISOL VLV 1 - GPC (tb-CL)
 VLV 2,3 - GPC (tb-OP or CL)
 (A12)
 HYD CIRC PUMP PWR 1 - MNA
 PWR 2 - MNB
 PWR 3 - MNC



- ① Refer to APU/HYD SSR-3, Table 1, for FDA limits
- ② Circ Pump S/W param limit can be inhibited to allow normal GPC controlled Circ Pump ops. Refer to APU/HYD SSR-3
- ③ If used as timer-mode control Xdcr, reinitialize timer-mode using another Xdcr
- ④ Action selects alternate MDM and should enable S/W ops; temps should also incr
- ⑤ Crew judgment can isolate failure based on temp performance. If temp fixed or erratic, Xdcr probably failed; if slowly decreasing, line blocked

APU/HYD 1.3f (Cont)



② Circ Pump SAW param limit can be inhibited to allow normal GPC controlled Circ Pump ops. Refer to APU/HYD SSR-3

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 +0580137 EXEC

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

If Xdcr failed ↑ (high), ITEM 5 +801 EXEC

2. For Hyd Circ Pump 2 Press Xdcr failure:

SM 60 SM TABLE MAINT

ITEM 1 +0580237 EXEC

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

If Xdcr failed ↑ (high), ITEM 5 +801 EXEC

3. For Hyd Circ Pump 3 Press Xdcr failure:

SM 60 SM TABLE MAINT

ITEM 1 +0580337 EXEC

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

If Xdcr failed ↑ (high), ITEM 5 +801 EXEC

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

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 +0921742 EXEC

ITEM 17 +800 EXEC

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

SM 60 SM TABLE MAINT

ITEM 16 +0921842 EXEC

ITEM 17 +800 EXEC

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

SM 60 SM TABLE MAINT

ITEM 16 +0921942 EXEC

ITEM 17 +800 EXEC

APU/HYD
SSRs

APU/HYD SSR-3 CIRC PUMP XDCR FAILURE WORKAROUND

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

The accumulator pressure sensors have only a lower limit of 1960 psia as shown in the tables. The low limit for accumulator pressure should be changed to -110. Only one item entry is required for the accumulator 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	
	Low limit		High limit		Low limit degF	High limit degF
	ID Number	Value	ID Number	Value		
LINE TEMP NLG UPLK	0921700		0921701		-10	150
NLG MFUS 2	0921702		0921703		-50	150
NLG MFUS 1	0921704		0921705			
R BRAKE FUS 1	0921706		0921707		-50	250
RMG FUS	0921708		0921709		-50	150
R BRAKE WHL 1	0921710		0921711		-35	250
RMG UPLK	0921712		0921713		-35	150
LMG UPLK	0921714		0921715			
BDY FLP FUS 1	0921718	0°F	0921719	20°F	-10	150
BDY FLP PDU 1	0921720		0921721			
ELEV ROB 1	0921722	0°F	0921723	20°F	-10	250
ELEV RIB 1	0921724		0921725		-80*	250
ELEV LOB 1	0921728	0°F	0921729	20°F	-10	250
ELEV LIB 1	0921730		0921731		-80*	250
RD/SB FUS 1	0921736	0°F	0921737	20°F	-10	250
RD/SB PDU 1	0921738	-10°F	0921739	20°F	-15	250
HYD ACCUM P 1	0921740	1960 psi	NONE			1930 psi

*OFF-SCALE LOW

HYDRAULIC SYSTEM 2 PARAMS

Param Name	Pump SW Control Constants				FDA	
	Low limit		High limit		Low limit degF	High limit degF
	ID Number	Value	ID Number	Value		
LINE TEMP R BRAKE FUS 2	0921800	0°F	0921801	20°F	-10	250
L BRAKE FUS 2	0921802	0°F	0921803	20°F	-10	250
R BRAKE WHL 2	0921804		0921805			
L BRAKE WHL 2	0921806	0°F	0921807	20°F	-10	250
BDY FLP FUS 2	0921812		0921813			
BDY FLP PDU 2	0921814	-10°F	0921815	20°F	-15	250
ELEV ROB 2	0921816	0°F	0921817	20°F	-10	250
ELEV RIB 2	0921818		0921819		-80*	250
ELEV LOB 2	0921820		0921821		-80*	250
ELEV LIB 2	0921822	0°F	0921823	20°F	-10	250
RD/SB FUS 2	0921830	0°F	0921831	20°F	-10	250
RD/SB PDU 2	0921832	-10°F	0921833	20°F	-15	250
HYD ACCUM P 2	0921834	1960 psi	NONE			1930 psi

*OFF-SCALE LOW

APU/HYD SSR-3 (Cont)

HYDRAULIC SYSTEM 3 PARAMS

Param Name	Pump SW Control Constants				FDA	
	Low limit		High limit		Low limit degF	High limit degF
	ID Number	Value	ID Number	Value		
LINE TEMP R BRAKE FUS 3	0921900	0°F	0921901	20°F	-10	250
L BRAKE FUS 3	0921902		0921903			
R BRAKE WHL 3	0921904	0°F	0921905	20°F	-10	250
L BRAKE WHL 3	0921906	0°F	0921907	20°F	-10	250
BDY FLP FUS 3	0921912		0921913			
BDY FLP PDU 3	0921914	-10°F	0921915	20°F	-15	250
ELEV ROB 3	0921916		0921917		-80*	250
ELEV RIB 3	0921918	0°F	0921919	20°F	-10	250
ELEV LOB 3	0921920	0°F	0921921	20°F	-10	250
ELEV LIB 3	0921922		0921923		-80*	250
RD/SB FUS 3	0921928		0921929			
RD/SB PDU 3	0921930	-10°F	0921931	20°F	-15	250
HYD ACCUM P 3	0921932	1960 psi	NONE			1930 psi

*OFF-SCALE

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

Selection of alternate Xdcr for APU fuel comp

- For APU 1 QTY:

S60 TABLE MAINTENANCE

ITEM 16 +0922150 EXEC
 ITEM 17 +0 EXEC
 ITEM 16 +0922152 EXEC
 ITEM 17 +1 EXEC

- For APU 2 QTY:

S60 TABLE MAINTENANCE

ITEM 16 +0922250 EXEC
 ITEM 17 +0 EXEC
 ITEM 16 +0922252 EXEC
 ITEM 17 +1 EXEC

- For APU 3 QTY:

S60 TABLE MAINTENANCE

ITEM 16 +0922350 EXEC
 ITEM 17 +0 EXEC
 ITEM 16 +0922352 EXEC
 ITEM 17 +1 EXEC

APU/HYD SSR-5 APU FUEL LEAK (NONISOLATABLE)

Before proceeding, ✓MCC

- R2 1. Steam Vent Htr Activate
BLR PWR 1(2,3) - ON
✓CNTLR/HTR (three) - A
2. Display/DPS config
ASA (four) - ON
- O14:F
O15:F
O16:F
O17:F ATVC (four) - ON
F8 INST PWR - ON
C3 ✓FCS CH (four) - AUTO
O6 ✓MDM All FF and FA - ON
GNC I/O RESET - EXEC
O14:F ✓MMU 1,2 - ON
O15:F
- C3(A6U) Perform G2 TO G8 TRANSITION (ORB OPS, DPS), then:
✓DAP: A/AUTO/VERN

3. APU Prestart:

1: GNC, FCS/DED DIS C/O	2: SM 86 APU/HYD
-------------------------	------------------

- CRT2 ✓APU, HYD, WB status no '↑' or '↓' (except HYD B/U)
R4 ✓HYD LG RET/CIRC VLV - CL
- R2 Perform HYD THERM COND - TERM (ORB OPS, APU/HYD), then:
BLR N2 SPLY 1(2,3) - ON
✓PWR 1(2,3) - ON
✓CNTLR/HTR (three) - A
✓APU AUTO SHUTDN (three) - ENA
CNTLR PWR 1(2,3) - ON
HYD MN PUMP PRESS 1(2,3) - LO
✓APU SPEED SEL (three) - NORM
✓OPER (three) - OFF
✓FUEL TK VLV (three) - CL
✓cb APU FUEL VLV ENA (six) - cl
Inform MCC: READY FOR APU START

Wait for MCC GO

- R2 4. APU Start:
APU FUEL TK VLV 1(2,3) - OP
✓APU/HYD RDY 1(2,3) tb - gray
- * If tb - bp, *
* ✓MCC *

- 00:00 Start Event Timer
R2 APU OPER 1(2,3) - START/RUN
F8 ✓HYD PRESS 1(2,3) ind - low green
R2 ✓APU/HYD RDY 1(2,3) tb - bp

- * If APU did not start normally: APU OPER 1(2,3) - START ORIDE/RUN *
* (wait 3.5 min for APU start) *
* If still no start: APU AUTO SHUTDN - INH *
* If still no start: APU OPER 1(2,3) - OFF *
* FUEL TK VLV 1(2,3) - CL *

- R2 HYD MN PUMP PRESS 1(2,3) - NORM
F8 ✓HYD PRESS 1(2,3) ind - high green

- CRT1 5. Aerosurface Drive
SURF DR START - ITEM 10 EXEC (*)

NOTE

POS '↓' may be indicated until HYD system is warm

- C3 * If FCS CH failure ('↓' status), *
* reset affected FCS CH: *
* FCS CH 1(2,3,4) - ORIDE, then *
* - AUTO *

- CRT1 After APU - AUTO shutdn from fuel depletion:
SURF DR STOP - ITEM 11 EXEC (*)
✓Surfaces not moving

APU/HYD SSR-5 (Cont)

- R2 6. APU Shutdn: -
BLR PWR 1(2,3) - OFF
✓CNTLR/HTR (three) - A
APU OPER 1(2,3) - OFF
FUEL TK VLV 1(2,3) - CL
✓Shutdn (hyd press)
APU CNTLR PWR 1(2,3) - OFF
BLR N2 SPLY 1(2,3) - OFF
APU FUEL PUMP/VLV COOL A - AUTO
Perform HYD THERM COND - ENA (ORB OPS, APU/HYD), then
C3 DAP: A/AUTO/VERN
7. Display/DPS Reconfig:
Perform G8 TO G2 TRANSITION (ORB OPS, DPS), then
F8 INST PWR - OFF
O14:F ASA (four) - OFF
O15:F
O16:F
O17:F ATVC (four) - OFF

COMM

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COMM
2

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19	OF3.....	2-73
20	OF4.....	2-74
21	OL1.....	2-75
22	OL2.....	2-76
23	OR1.....	2-77
24	OR2.....	2-78
25	OM1.....	2-79
26	OM2.....	2-80
27	OA1.....	2-81
28	OA2.....	2-82
29	OA3.....	2-83

The following Fault Msg has no corresponding MAL procedure in this book:
TFL FAIL

COMM
2

COMM

2.1 AUDIO

①
Loss of Audio
on Single
Audio Panel

1.1
ICOM LOST
Try following until ICOM AUDIO regained:
1. AUD CNTL - sel alt if available
2. AUD CTR - 2
3. Plug into another ATU
4. Try another HDST/CCU
5. Go to MAL, COMM, 2.1a ①

Nominal Config:
(R15:A)
cb MNA AUD
MS/OS - cl
cb MNB AUD
MIDDECK SPKR - cl
(OV102)
cb MNB AUD
MIDDECK SPKR/
CCU - cl
cb MNC AUD
CTR 2 - cl
cb MNC AUD PS/
AIRLK - cl
(R15:F)
cb ESS 1BC AUD L -
cl
cb ESS 2CA AUD R -
cl
cb ESS 2CA
AUD CTR 1 - cl
(C3)
AUD CTR - 1

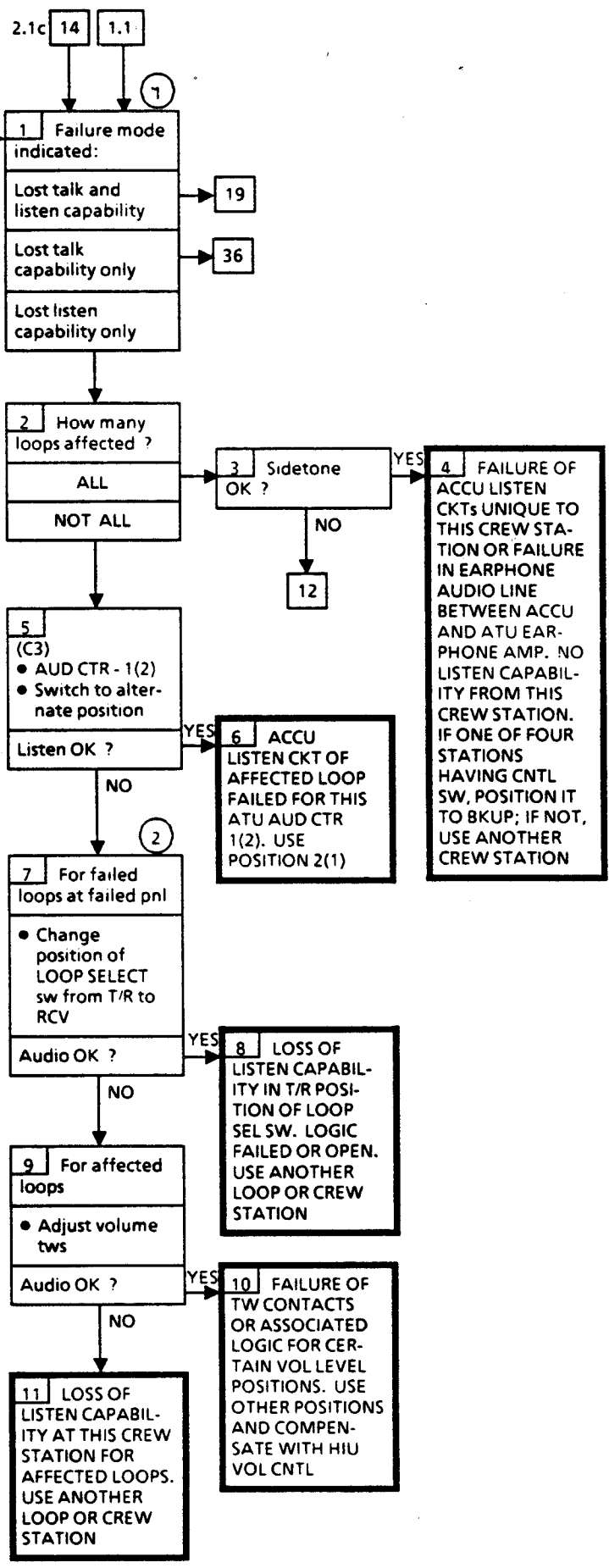
Individual Audio
Panels configured
as reqd

① Assumes that
operation of each
loop on affected
pnl was checked in
T/R mode

Loss of Audio on Single Audio Panel ¹

Nominal Config:
 (R15:A)
 cb MNA AUD MS/OS - cl
 cb MNB AUD MIDDECK SPKR - cl (OV102)
 cb MNB AUD MIDDECK SPKR/CCU - cl
 cb MNC AUD AUD CTR 2 - cl
 cb MNC AUD PS/AIRLK - cl
 (R15: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

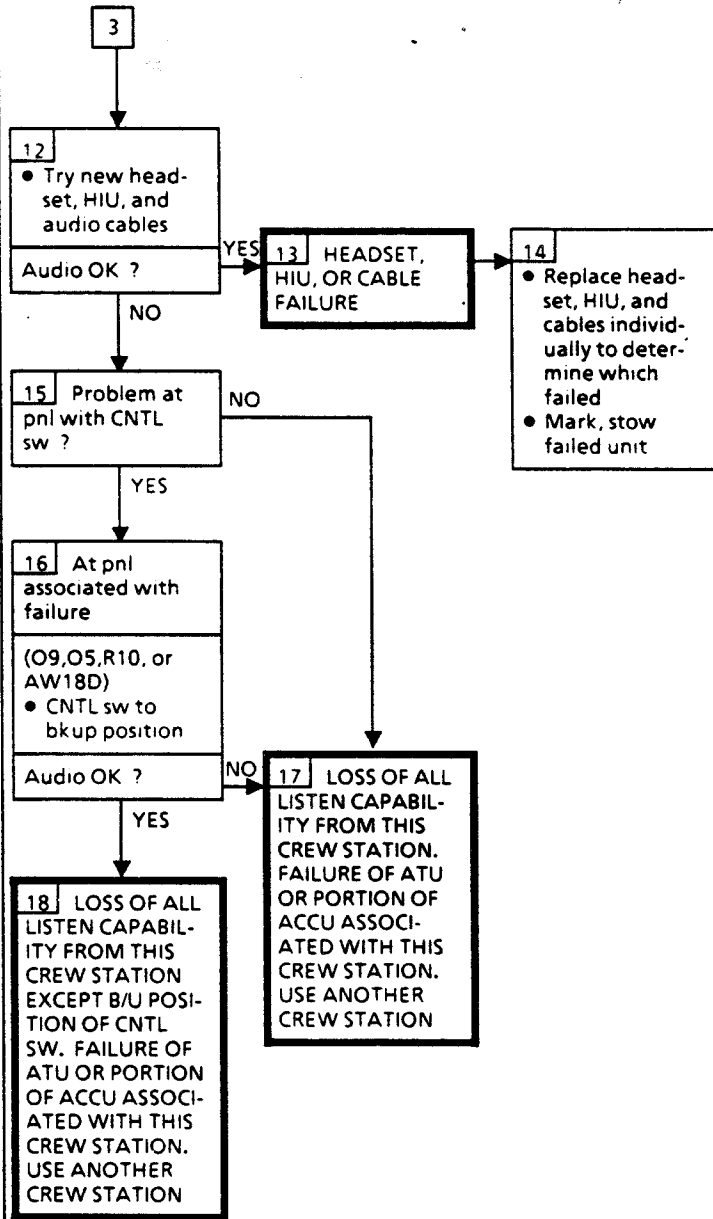
Individual Audio Panels configured as reqd



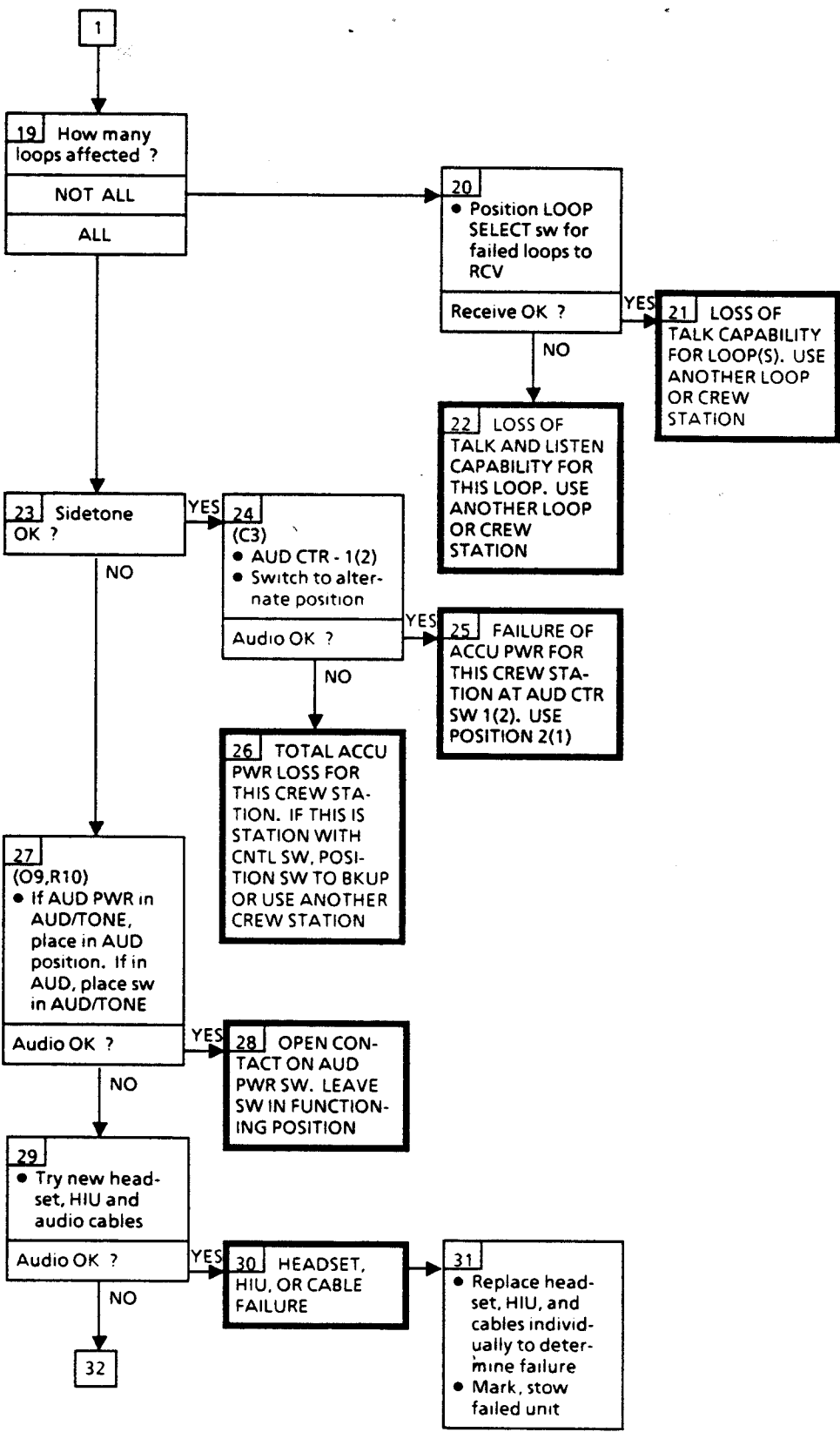
¹ Assumes that operation of each loop on affected pnl was checked in T/R mode

² Changes in switch position apply only to pnl/crew station affected by mal. Procedure applies exclusively to mals that affect only one crew station (Audio Terminal Unit)

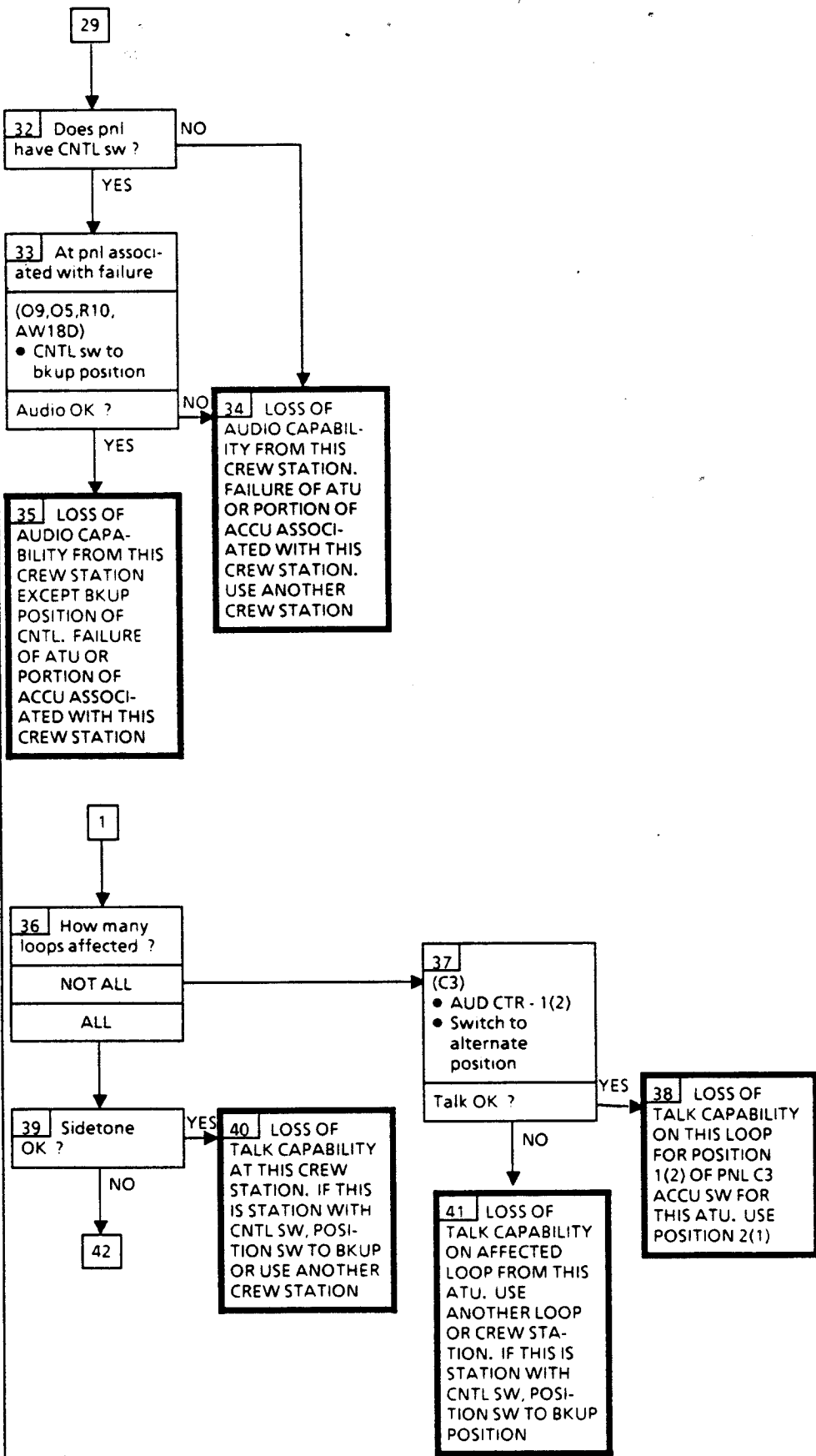
COMM 2.1a (Cont)



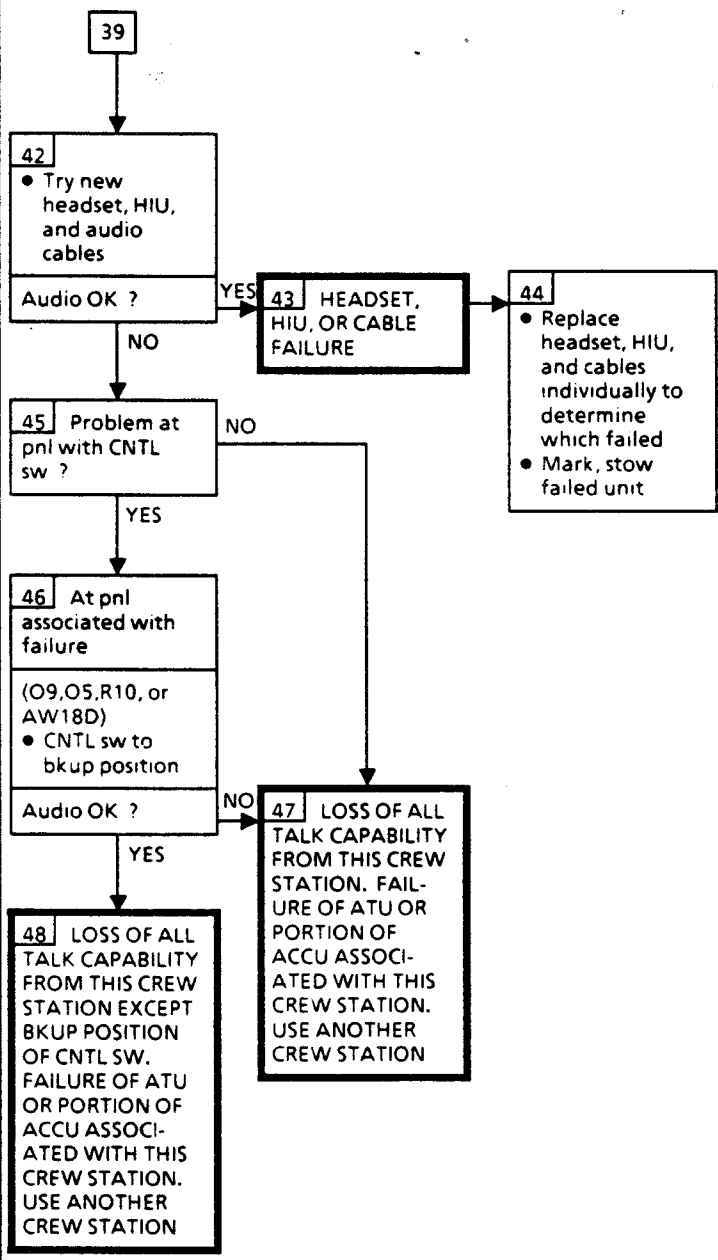
COMM 2.1a (Cont)



COMM 2.1a (Cont)



COMM 2.1a (Cont)

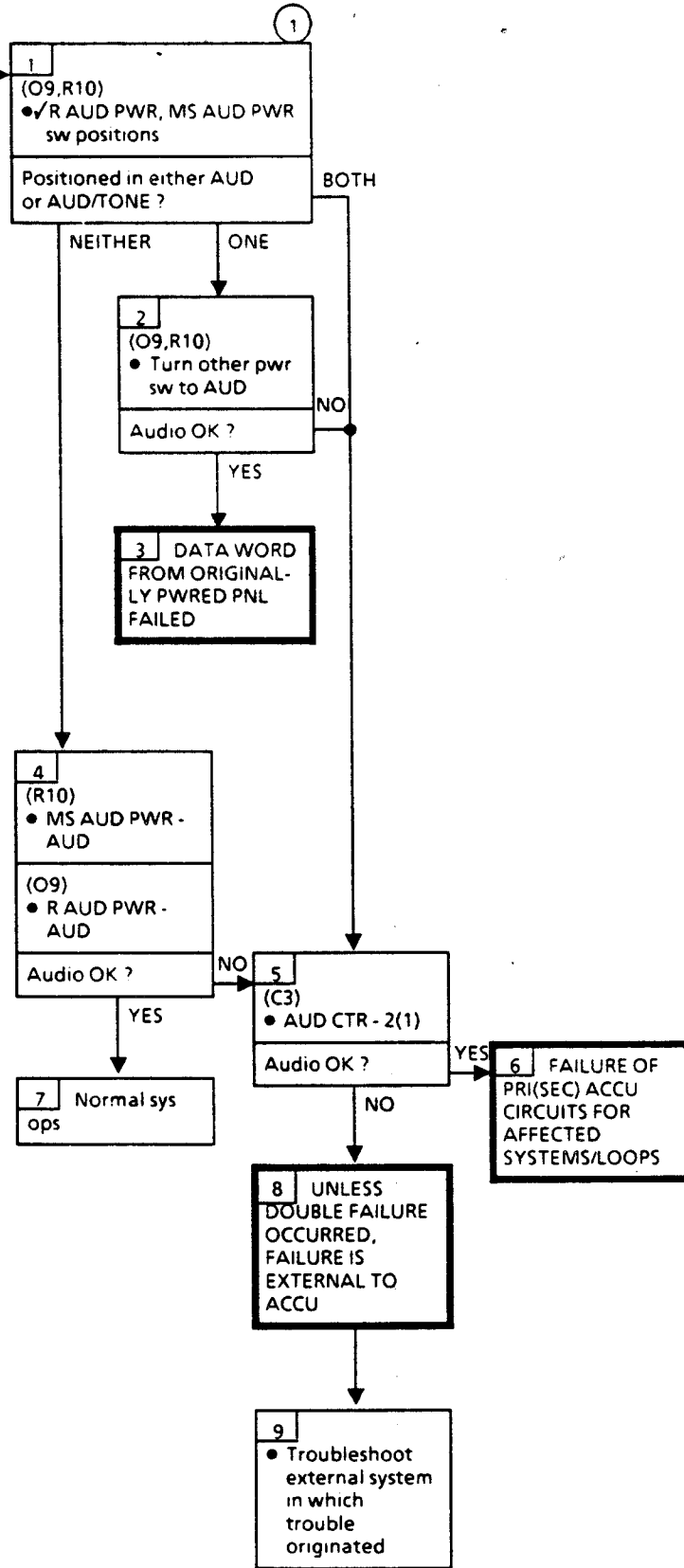


2.1b NO AUDIO
(MULTIPLE PNL OR OTHER SUBSYSTEM)

① MS or R AUDIO pnl must be pwrd to provide sub-system switch data to ACCU

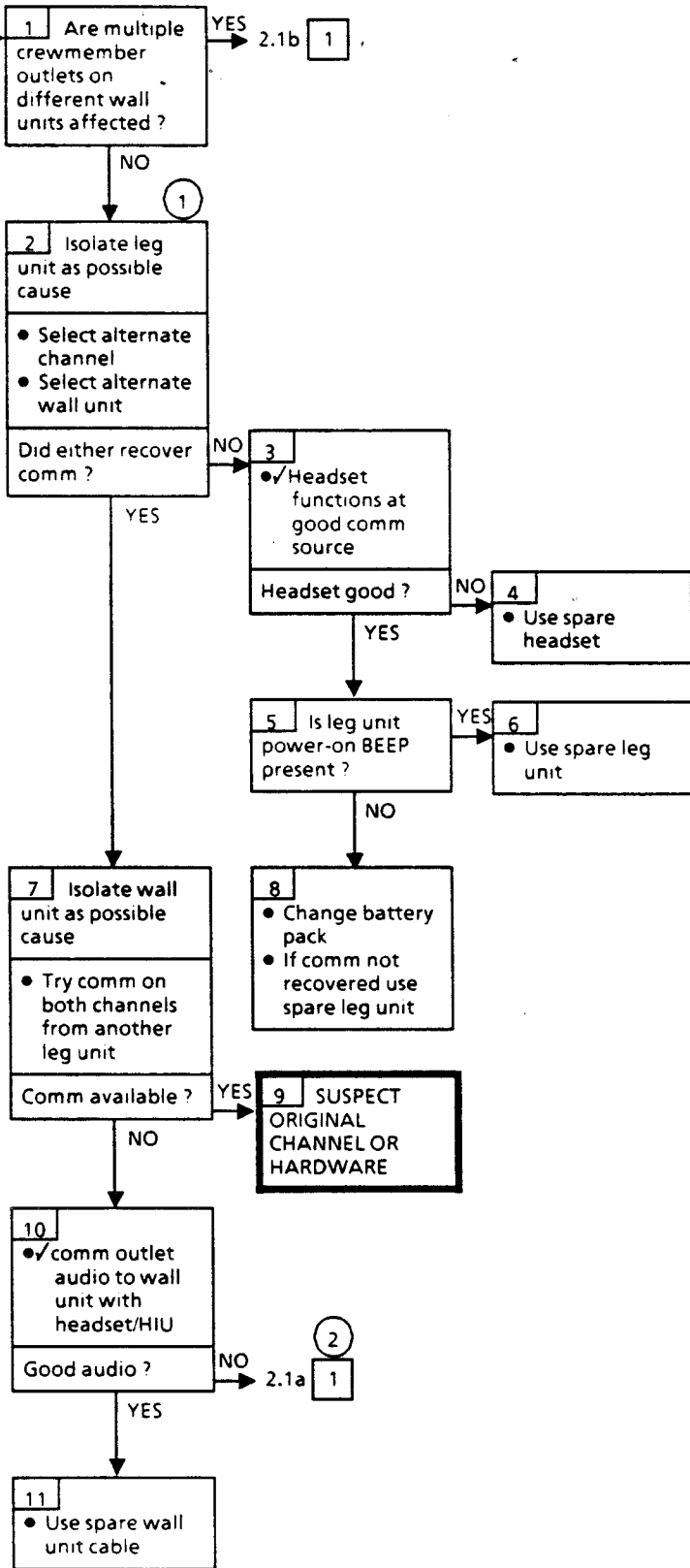
Loss of Audio Affecting More Than One Audio Pnl or One or More of the Following:

- 1) UHF Transceiver
- 2) NSP Audio
- 3) OPS Recorders
- 4) Payload Bay Outlets
- 5) Launch Umbilical Station
- 6) Audio Between Orbiter and Spacelab
- 7) Audio Between Orbiter and Vehicle at Docking Ring



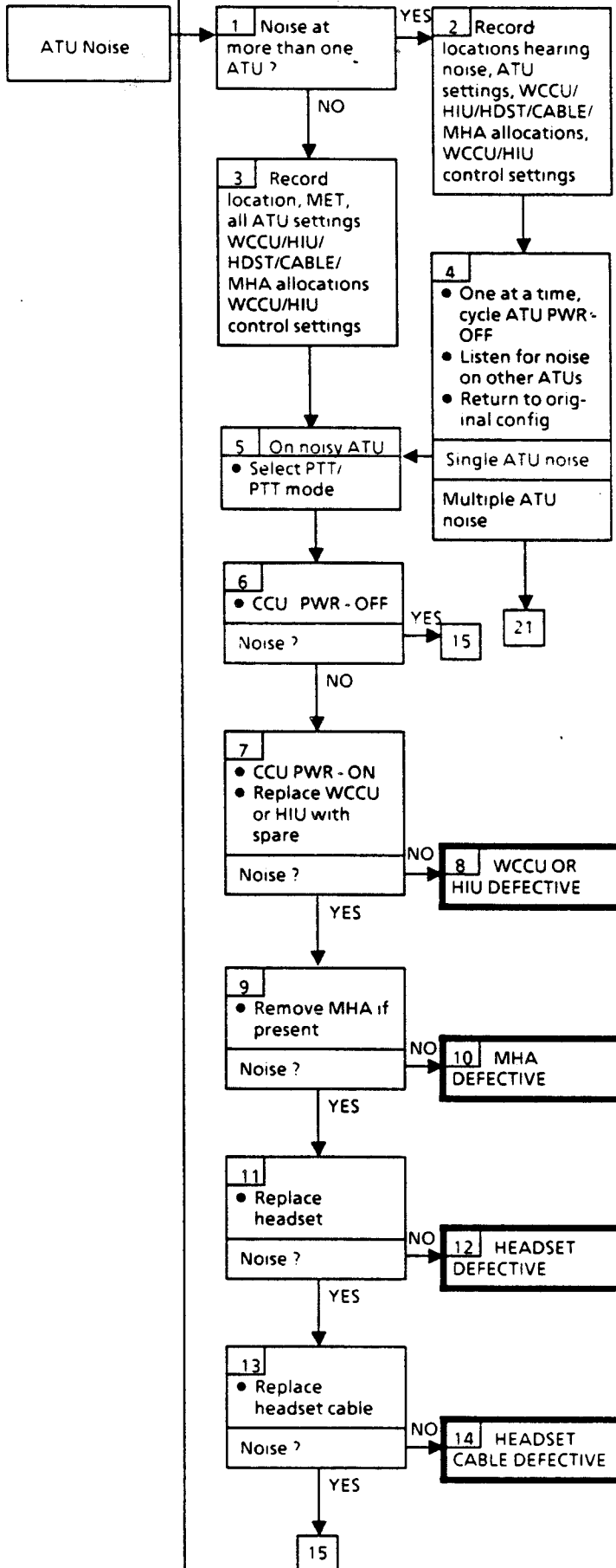
- Nominal Config:**
- ✓ ATU Config
 - ✓ Vol tw(five) - 5
 - CCU
 - ✓ Power - on (wall unit)
 - ✓ Green light - on
 - ✓ Rotary - both
 - ✓ Cable secure
 - ✓ Antenna secure (leg unit)
 - ✓ Channel select
 - ✓ Battery secure
 - ✓ Antenna secure

Audio Problem On Wireless

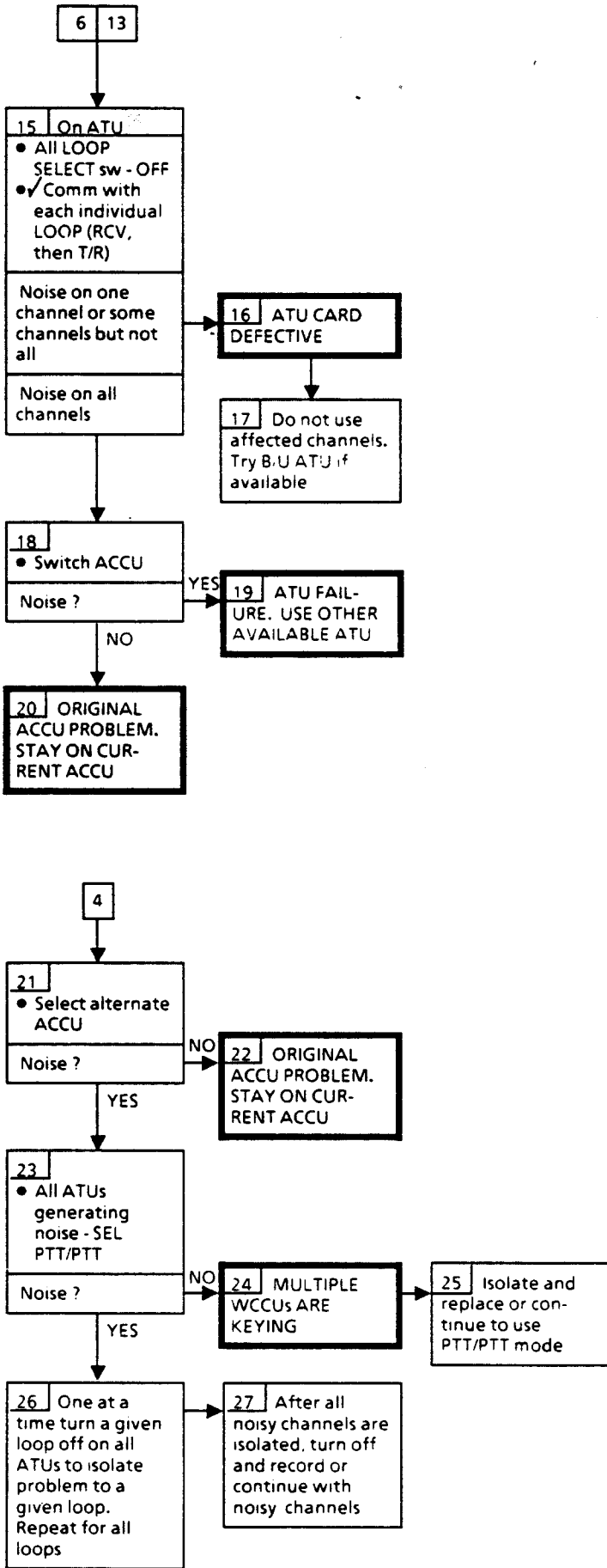


① When switching channels, only one leg unit can operate on given wall unit channel. Simultaneous use will cause loss of side tone

② If audio MAL does not recover comm outlet for wall unit, use alternate ATU with audio extension cable



COMM 2.1d (Cont)



NSP/S76
COMM

2.2

65

COMM

2.2a GCIL CONFIG: PNL ↓,
CAMR OVERTEMP: YES ↑,
KU GMBL, GYRO TEMP ↑

SM
ALERT

S76 COMM

Camr temp > 45
KU-BAND GMBL
temp > 180
GYRO temp > 180

1

SM 76 COMM/RCDR

Which param is out of tolerance:

GCIL CONFIG: PNL ↓

CCTV CAM OVER - TEMP: YES ↑

KU-BAND GMBL TEMP A ↑, B ↑
or GYRO TEMP ↑

2 Open Htr co

if LOS:
(R15:C)

- cb MNB KU ANT
HTR - op

if AOS:

- ✓MCC

3

(A3)

- ✓MON 1(2)
PWR - ON
- ✓MON 1(2)
DATA - ON
- ✓MON 1(2)
SOURCE - PNL

Select all camrs to
MON
(A7U)

- VID OUT pb -
MON 1(2) (all
camrs)
- VID IN pb - MON
1(2) (each camr)

Pwrdrn camrs with
temp > 45 deg C
(A7U)

- Aff TV CAMR
PWR - OFF

4

MOMENTARY OR
CONTINUOUS
LOSS OF PWR TO
GCIL, WHICH
CAUSED COMM
SYS CONFIG TO
REVERT TO THAT
INDICATED BY
sw ON PNL A1.
✓MCC for GCIL
STATUS

5

4

5 Is GCIL loss
permanent?

6 The
following
switches lost and
all functions now
in panel mode:
(C3) S-BD PM
CONTROL, (A1U)
KU-BD CNTRL,
(A1R) S-BD FM
CNTRL, (A1L) S-BD
PL CNTRL, (A7U)
TV PWR CNTRL
(only). The crew
must operate
these systems (No
MCC CMD capa-
bility now exists
for these systems)

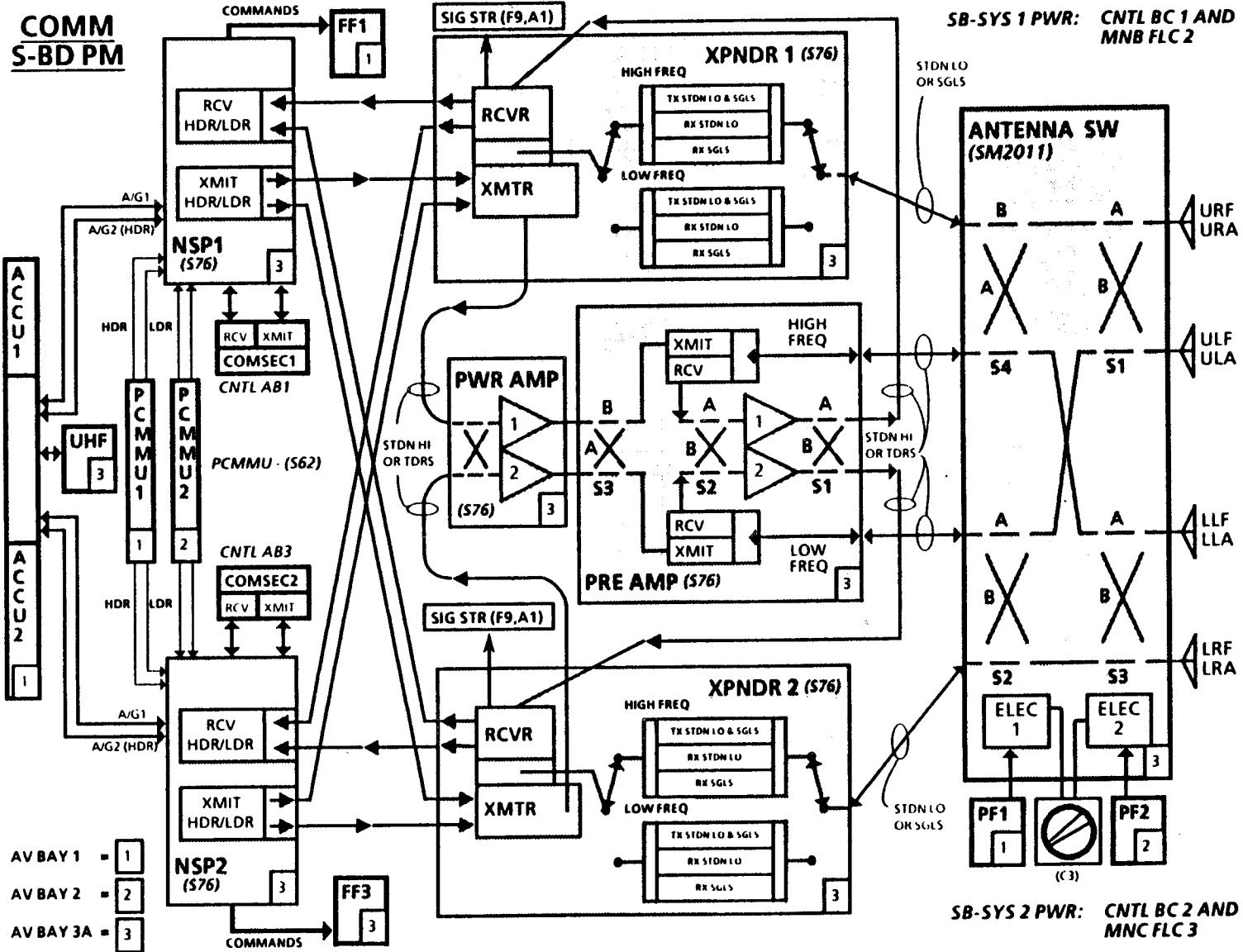
7 If GCIL loss
was momentary
(transient pwr
loss gives same
symptom) then
COMM SYS has
reverted to PNL
CONFIG but
control switches
and CMDs remain
functional

NSP/S76
COMM

2.2

2.3 S-BD/UHF

67



COMM S-BD PM TABLE

SITE ID	SITE TYPE	UPLINK DATA-RATE ENCRYPTED OR CLEAR	DOWNLINK DATA RATE		UHF	TV	COMMENTS
			ENCRYPTED	CLEAR			
MIL	STDN	HI/LO	HI/LO	HI/LO	•	•	
PDL	STDN	HI/LO	HI/LO	HI/LO			
BDA	STDN	HI/LO	HI/LO	HI/LO	•		
NHS	SGLS	HI/LO	HI/LO	HI/LO			
AGO	STDN	LO	LO	HI/LO			
DKR	STDN	LO	LO	HI/LO	•		
MAD	STDN	LO	LO	HI/LO			
ACN	STDN	LO	LO	HI/LO	•		
OAK	SGLS	HI/LO	HI/LO	HI/LO	•		
IOS	SGLS	HI/LO	HI/LO	HI/LO	•		
YAR	UHF				•		VOICE ONLY
CAN	STDN	LO	LO	HI/LO			
GWM	STDN	LO	LO	HI/LO	•		
GTS	SGLS	HI/LO	HI/LO	HI/LO			NO ID ON 2011
HAW	STDN	LO	LO	HI/LO	•	•	
HTS	SGLS	HI/LO	HI/LO	HI/LO			NO ID ON 2011
VDB	STDN	HI/LO	HI/LO	HI/LO	•	•	
VTS	SGLS	HI/LO	HI/LO	HI/LO			NO ID ON 2011
DFRF	STDN	HI/LO	HI/LO	HI/LO	•		NO ID ON 2011
GDS	STDN	LO	HI/LO	HI/LO		•	NO ID ON 2011

Loss of S-BD Voice (STDN Low Pwr, STDN High Pwr, TDRS or SGLS Mode)

Nominal Config:
 Switches selected to SYS 1 (Pnl Mode Backup)
 SYS 2 operating via CMD (Prime) (R10)
 MS AUD PWR - AUD/TONE (O9)
 R AUD PWR - AUD/TONE (R15:A)
 cb MNA AUD MS/OS - cl
 cb MNA UHF - cl
 cb MNC AUD CTR 2 - cl (R15:B)
 cb MNC UHF - cl
 cb ESS 2CA AUD R - cl
 cb ESS 2CA AUD CTR 1 - cl

1.1 **COMM LOST (Mult Pnls)** SM 76 COMM/RCDR

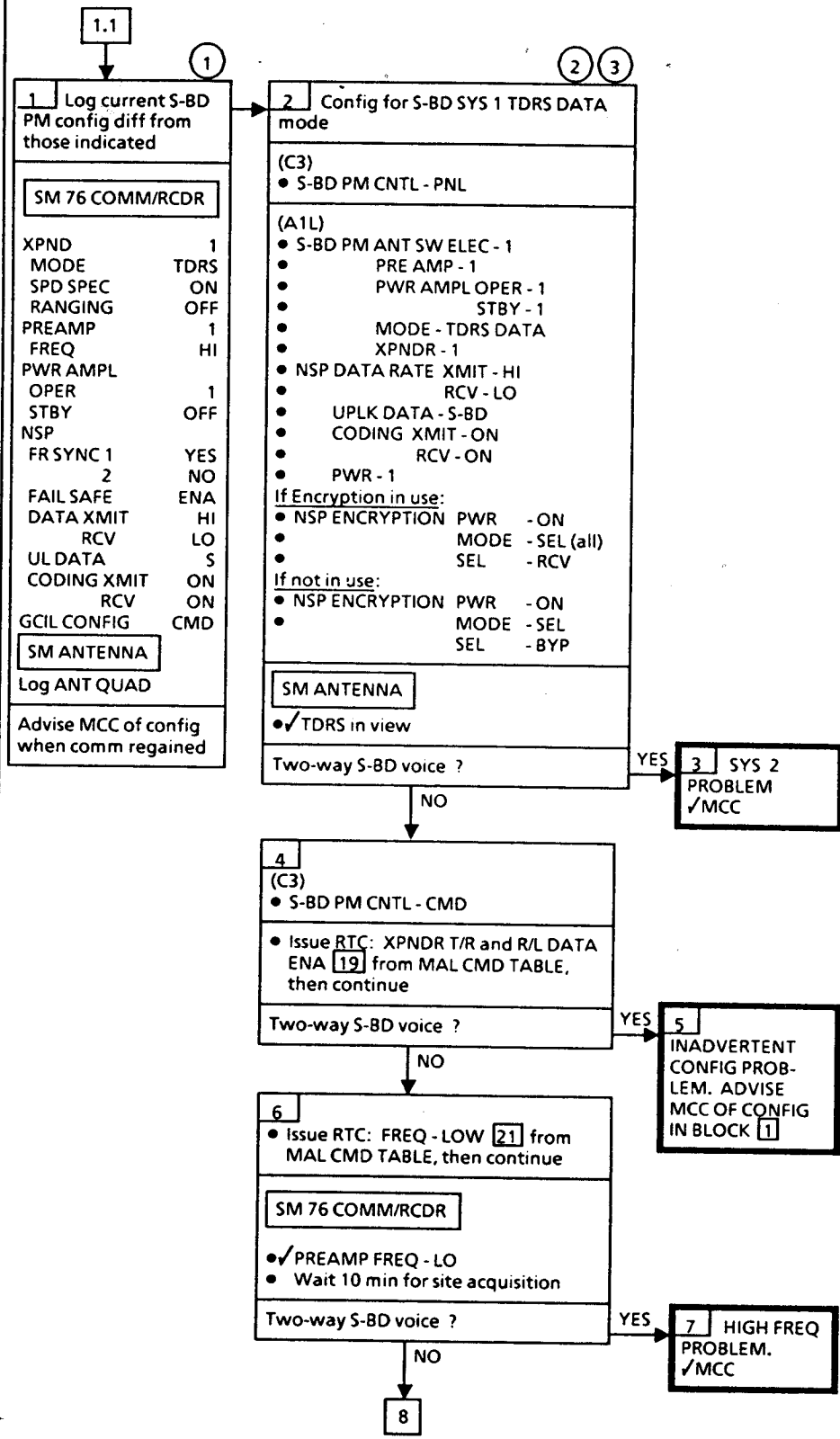
1. AUD CTR - 2
- If all ICOM and A/G failed (√3 ATUs):
2. √cb ACCU (two) - cl (pnl R15: A,F)
Go to step 7
3. Config pnl A1 for STDN or SGLS or TDRSS per site coverage

NOTE
 With 2 TDRS, STDN/SGLS not routinely providing on-orbit support between ascent and entry but available within 1-2 hours after WSGT outage

	STDN	SGLS	TDRS
PM MODE	STDN LO	SGLS	TDRS DATA
DATA RATE XMIT	HI	HI	HI
RCV	LO	HI	LO
CODING (two)	OFF	OFF	ON

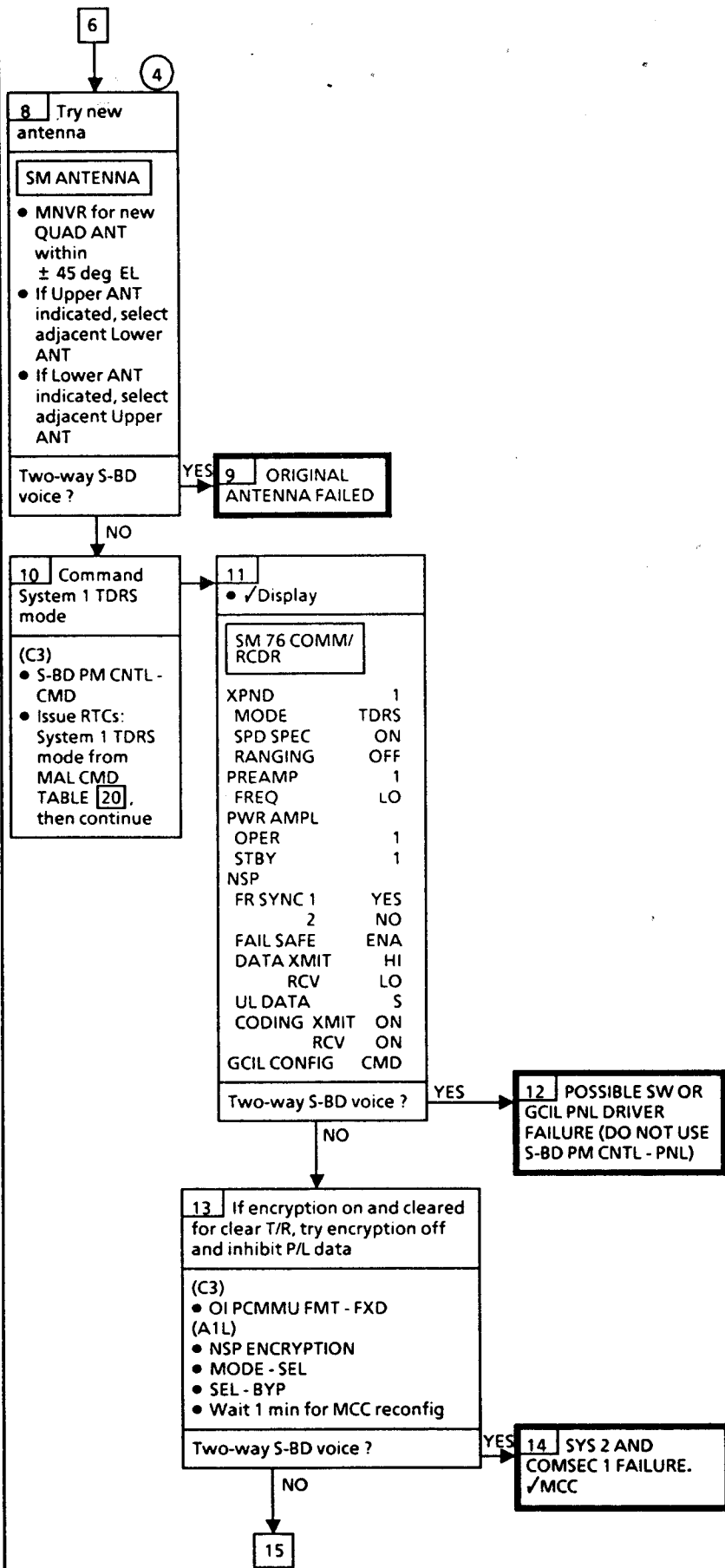
4. S-BD PM CNTL - PNL, then CMD to effect reconfig (pnl C3)
5. Sel best antenna; if no joy, return to GPC (When TDRS E/W coverage overlaps, assume W support)
6. Attempt UHF PRI, ALT, and G (say freq) per site coverage (30 sec reqd for site reconfig)
7. Confirm U/L CMD capability:
 - √Flashing U/L on GNC & SM CRTs
 - Acknowledge with: ITEM 9 + 999999
 - √Abort light cycling ON/OFF (MCC acknowledge)
 - √No flashing U/L
8. If confirmed: go to MAL, COMM SSR-1 >>
9. If no comm and no U/L CMD, go to MAL COMM 2.3a 1

COMM 2.3a NO S-BD VOICE: TDRS



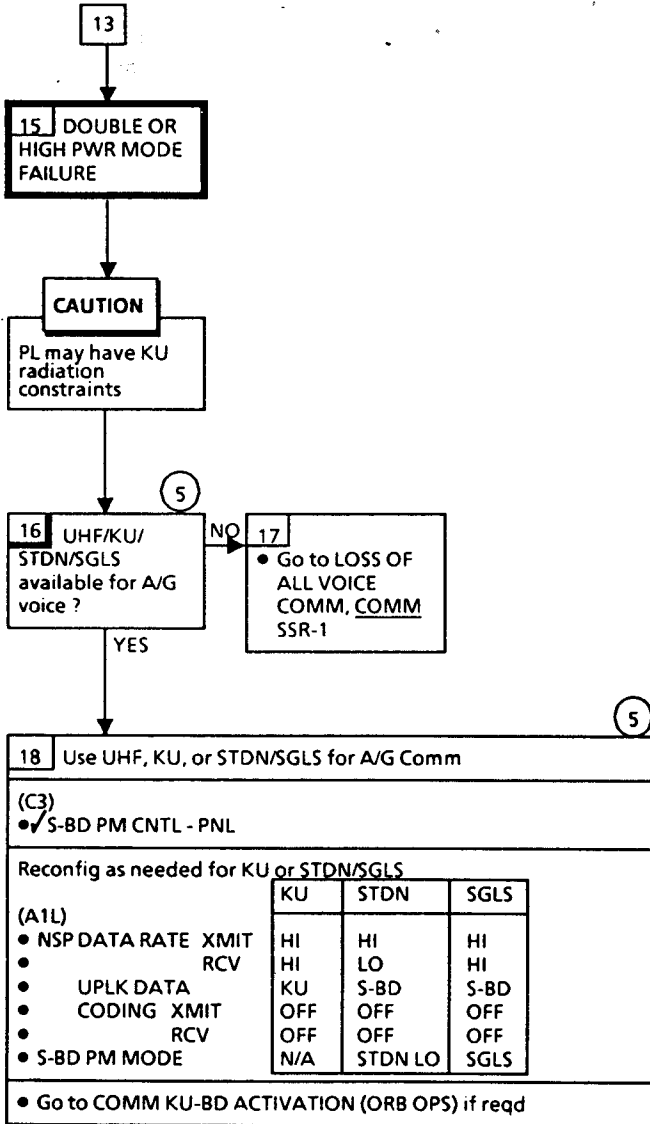
- ① Assumes SM, OPS 201
- ② PWR AMPL requires 180-sec time-out before full amplification takes place if not in STBY mode
- ③ When switching NSPs, Alert Tone and error msg 'BCE STRING 1 NSP' or 'BCE STRING 3 NSP' may occur. No I/O RESET reqd

COMM 2.3a (Cont)



4 Do not point Orbiter with Antenna attitude off Nose or Tail

5 UHF not secure



18 Use UHF, KU, or STDN/SGLS for A/G Comm

(C3)
• S-BD PM CNTL - PNL

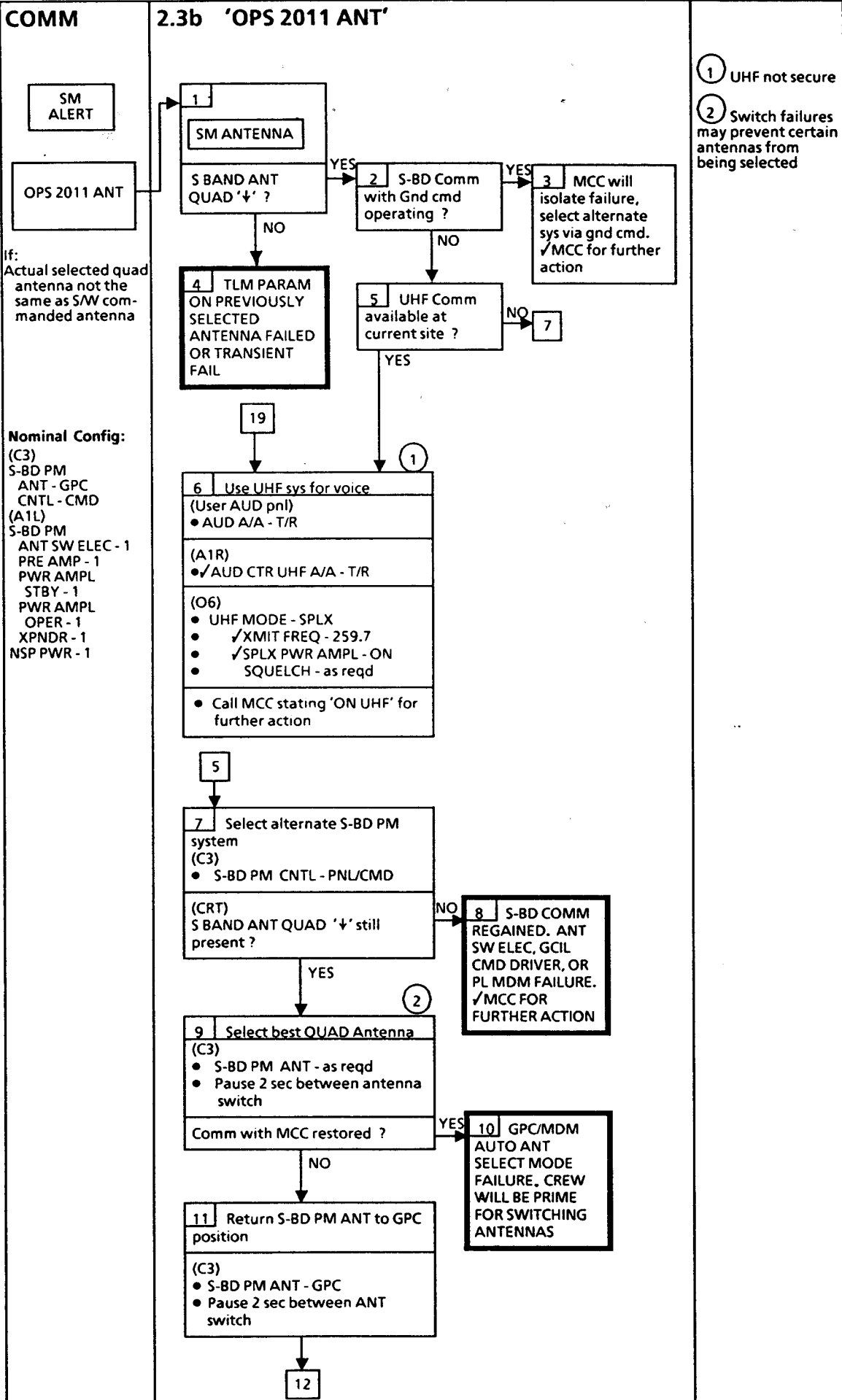
Reconfig as needed for KU or STDN/SGLS

	KU	STDN	SGLS
(A1L) • NSP DATA RATE XMIT	HI	HI	HI
• UPLK DATA RCV	HI	LO	HI
• CODING XMIT	KU	S-BD	S-BD
• S-BD PM MODE	OFF	OFF	OFF
	OFF	OFF	OFF
	N/A	STDN LO	SGLS

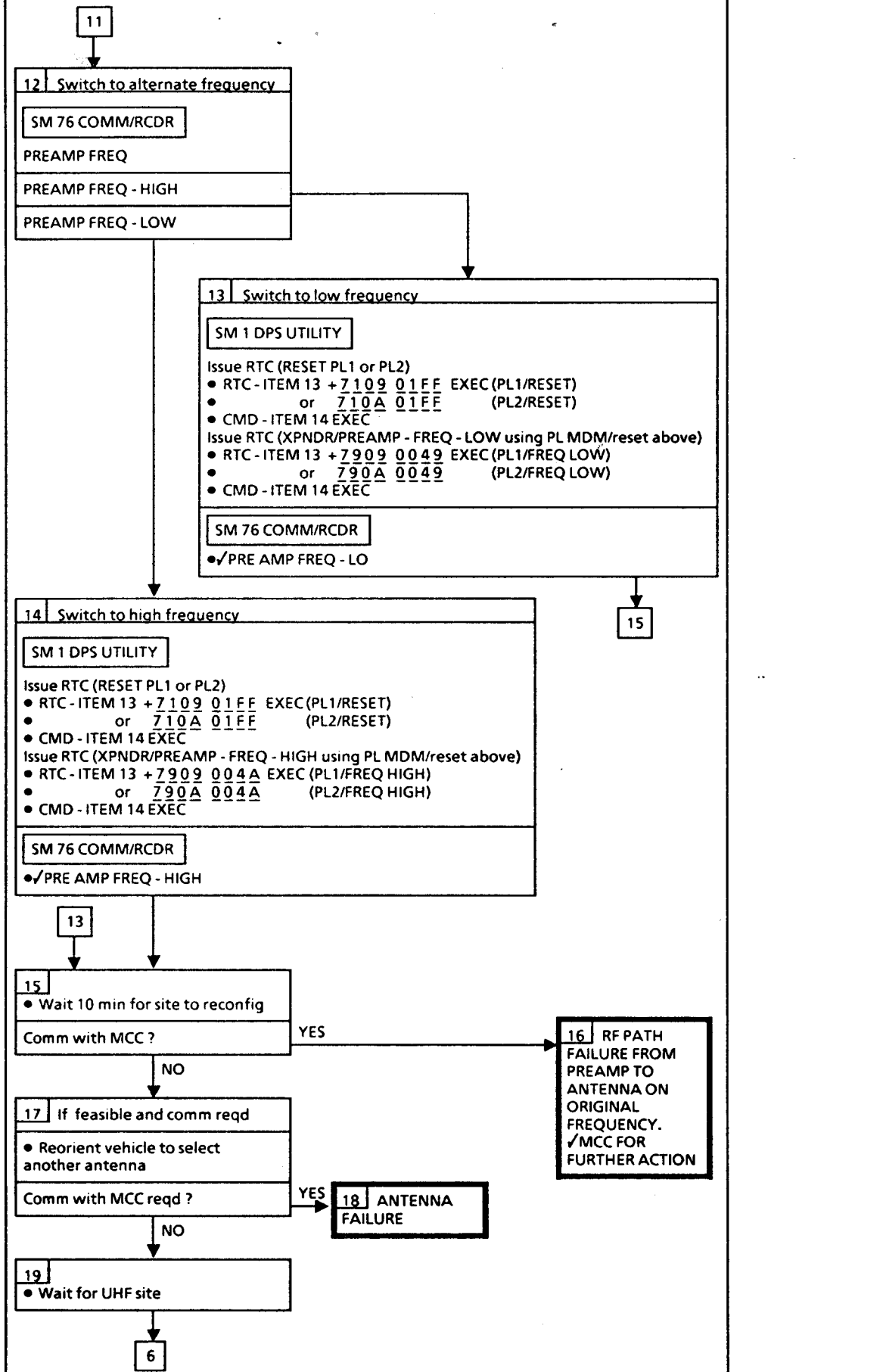
• Go to COMM KU-BD ACTIVATION (ORB OPS) if reqd

MAL CMD TABLE

19 XPNDR - T/R AND R/L DATA ENA	20 SYSTEM 1 TDRS MODE
<p>SM1 DPS UTILITY</p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> • RTC - ITEM 13+710901FF EXEC (PL1) or 710A01FF EXEC (PL2) • CMD - ITEM 14 EXEC <p>Issue RTC (S-BD XPNDR - T/R)</p> <ul style="list-style-type: none"> • RTC - ITEM 13+7909004B EXEC (PL1) or 790A004B EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (R/L DATA - ENA) • RTC - ITEM 13+79090048 EXEC (PL1) or 790A0048 EXEC (PL2) • CMD - ITEM 14 EXEC 	<p>SM1 DPS UTILITY</p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> • RTC - ITEM 13+710901FF EXEC (PL1) or 710A01FF EXEC (PL2) • CMD - ITEM 14 EXEC <p>Issue RTC (PWR AMP 1 OPR ON)</p> <ul style="list-style-type: none"> • RTC - ITEM 13+79090033 EXEC (PL1) or 790A0033 EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (TDRS S-BD MODE) • RTC - ITEM 13+790900F1 EXEC (PL1) or 790A00F1 EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (ANT ELEC SW1 ON) • RTC - ITEM 13+7909001F EXEC (PL1) or 790A001F EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (XPNDR 1 ON) • RTC - ITEM 13+7909003E EXEC (PL1) or 790A003E EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (PREAMP 1 ON) • RTC - ITEM 13+79090039 EXEC (PL1) or 790A0039 EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (NSP 1 ON) • RTC - ITEM 13+79090050 EXEC (PL1) or 790A0050 EXEC (PL2) • CMD - ITEM 14 EXEC <ul style="list-style-type: none"> • Issue RTC (RESET PL1 or PL2) above Issue RTC (DNLINK-HDR) • RTC - ITEM 13+79090053 EXEC (PL1) or 790A0053 EXEC (PL2) • CMD - ITEM 14 EXEC
<p>21 FREQ LOW</p> <p>SM1 DPS UTILITY</p> <p>Issue RTC (RESET PL1 or PL2)</p> <ul style="list-style-type: none"> • RTC - ITEM 13+710901FF EXEC (PL1) or 710A01FF EXEC (PL2) • CMD - ITEM 14 EXEC <p>Issue RTC (XPNDR/PREAMP FREQ - LOW)</p> <ul style="list-style-type: none"> • RTC - ITEM 13+79090049 EXEC (PL1) or 790A0049 EXEC (PL2) • CMD - ITEM 14 EXEC 	



COMM 2.3b (Cont)



Loss of UHF
Comm to
Ground
Station with
UHF

Nominal Config:
(R15:8)
cb MNA,
MNC UHF - cl
(O6)
UHF
MODE - SPLX
XMIT FREQ - 259.7
SPLX PWR AMP -
ON
SQUELCH - ON
(A1R)
AUD CTR UHF
A/A - T/R

1.2

UHF COMM LOST (Mult Pnls)

Attempt COMM recovery after each step:

1. UHF SQUELCH - OFF
2. AUD CTR - 2
3. UHF XMIT FREQ - 296.8
Call site stating 'on UHF',
wait 30 sec for site reconfig
4. If no COMM, wait until next S-BD site or go to MAL,
COMM, 2.3c 11

1

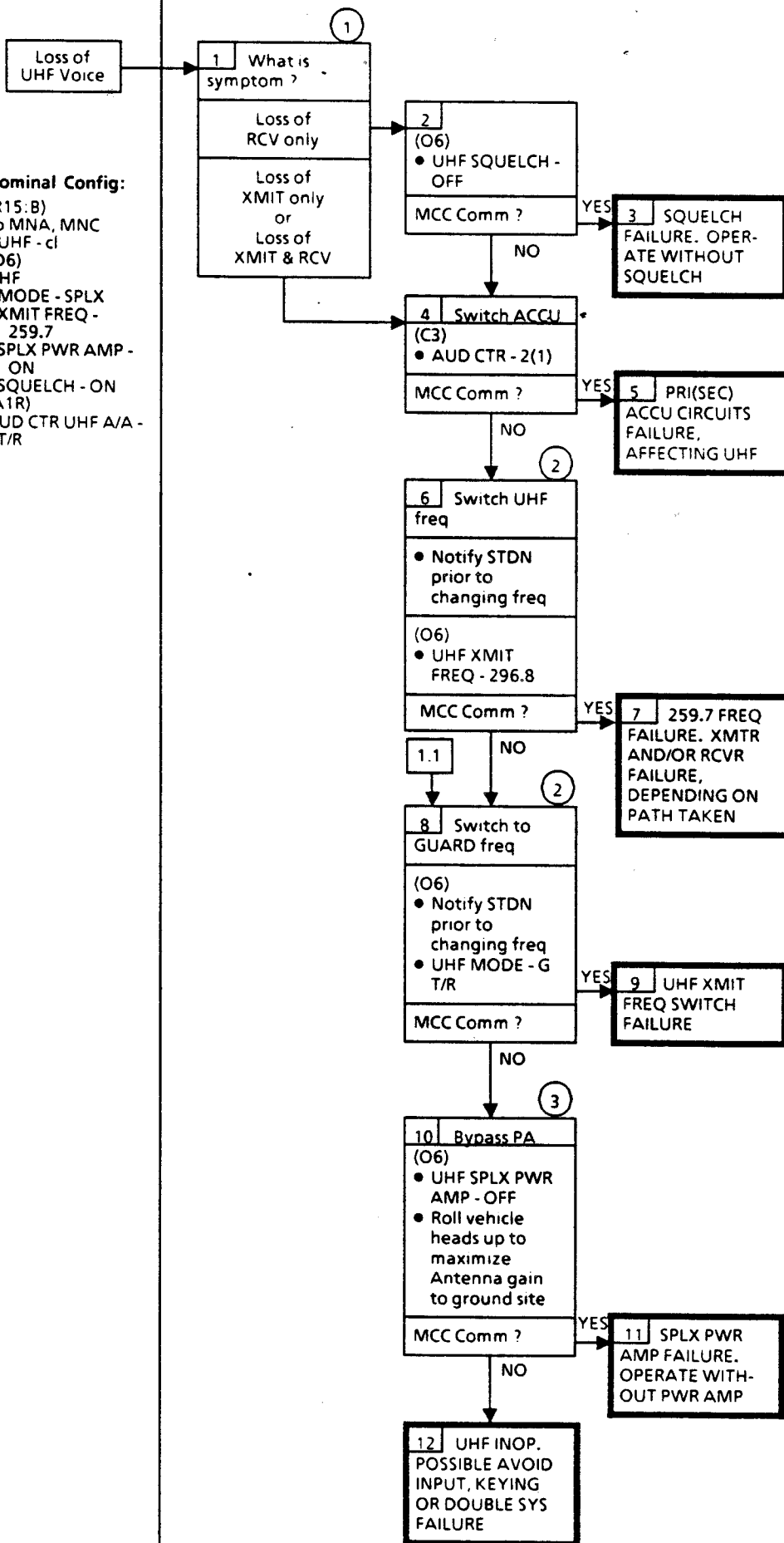
1 The following
gnd stations have
UHF capability:

- MIL
- GWM
- HAW
- YAR
- IOS
- ACN
- GDS
- DKR

Not all gnd stations
provide routine
on-orbit support

2.3c NO UHF VOICE (MULTI PNLS)

Nominal Config:
 (R15:B)
 cb MNA, MNC
 UHF - cl
 (O6)
 UHF
 MODE - SPLX
 XMIT FREQ -
 259.7
 SPLX PWR AMP -
 ON
 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 This step will severely limit UHF xmit range

COMM

2.4a NO MONITOR PICTURE

No Picture On Monitor 1(2)

Nominal Config:
 (R15:D)
 cb MNA TV C AFT
 BAY CAMR/PAN-TILT - cl
 CAMR HTR - cl
 PAN-TILT HTR - cl
 cb MNA TV CONTR UNIT - cl
 cb MNA TV MON 1 - cl
 cb MNB TV A FWD BAY CAMR/PAN-TILT - cl
 CAMR HTR - cl
 PAN-TILT HTR - cl
 cb MNB TV CONTR UNIT - cl
 cb MNB TV MON 2 - cl
 cb MNC TV B KEEL/ EVA CAMR/PAN-TILT - cl
 CAMR HTR - cl
 PAN-TILT HTR - cl
 cb MNC TV CAB - cl
 (R15:E)
 cb MNA D STBD RMS TV CAMR/ PAN-TILT - cl
 CMR HTR - cl
 PAN-TILT HTR - cl
 cb MNB RMS PORT RMS TV CAMR/ PAN-TILT - cl
 CAMR HTR - cl
 PAN-TILT HTR - cl
 (A7U)
 TV PWR CNTL - CMD
 TV PWR CONTR UNIT - MNA(MNB)
 TV SYNC - NORM
 TV DNLK - as reqd
 (A3)
 MON 1(2)
 SOURCE - PNL
 MODE - NORM
 SCAN - UNDER
 SYNC - INT
 DATA - as reqd
 X-HAIR - as reqd
 PWR - ON

1 Try other monitor

(A7U)

- Config Monitor 2(1) to Nominal Config
- VID OUT pb - MON 2(1)
- VID IN pb - same source selected as when problem occurred

Picture on monitor ?

2 MONITOR 1(2) FAILURE

3 Select test pattern

(A7U)

- VID OUT pb - MON 1(2)
- VID IN pb - TEST

Test pattern on monitor ?

4 Cycle Camr pwr

(A7U)

- VID OUT pb - MON 1
- VID IN pb - affected Camr

(A7U or O19, MO58F)

- (affected Camr) TV CAMR PWR - OFF
- Wait 10 sec
- (affected Camr) TV CAMR PWR - ON
- CAMR CMD ALC PEAK pb - PEAK

Picture on monitor ?

5 Switch SYNC GEN

(A7U)

- TV SYNC - REVERSE

Test pattern on monitor ?

6 SYNC GEN FAILURE

7 Try other pwr source for VCU

(A7U)

- TV PWR CNTL - PNL
- TV PWR CONTR UNIT - MNB (MNA)
- Wait 10 sec
- VID OUT pb - MON 1(2)
- VID IN pb - TEST

Test pattern on monitor ?

8 FAILED WIRE OR PWR RELAY IN VCU. USE ALTERNATE PWR SOURCE

9 ALC LOGIC LOCKUP IN CAMR. CONTINUE NORMAL OPS

10 VCU FAILURE, LOSS OF ALL TV

11

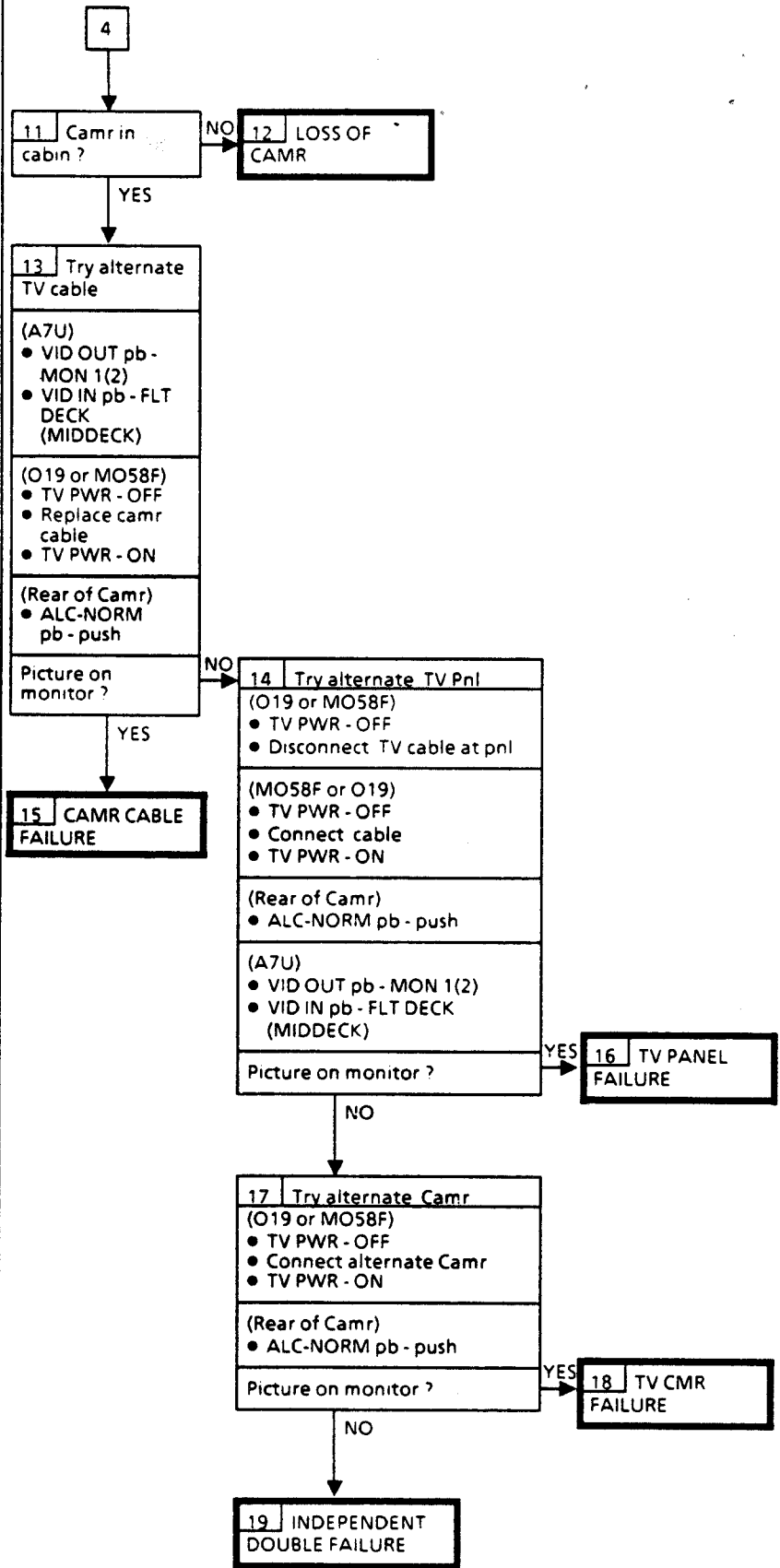
① All TV config will be lost. Camr must be repwr'd and all inputs reselected

TV

2.4

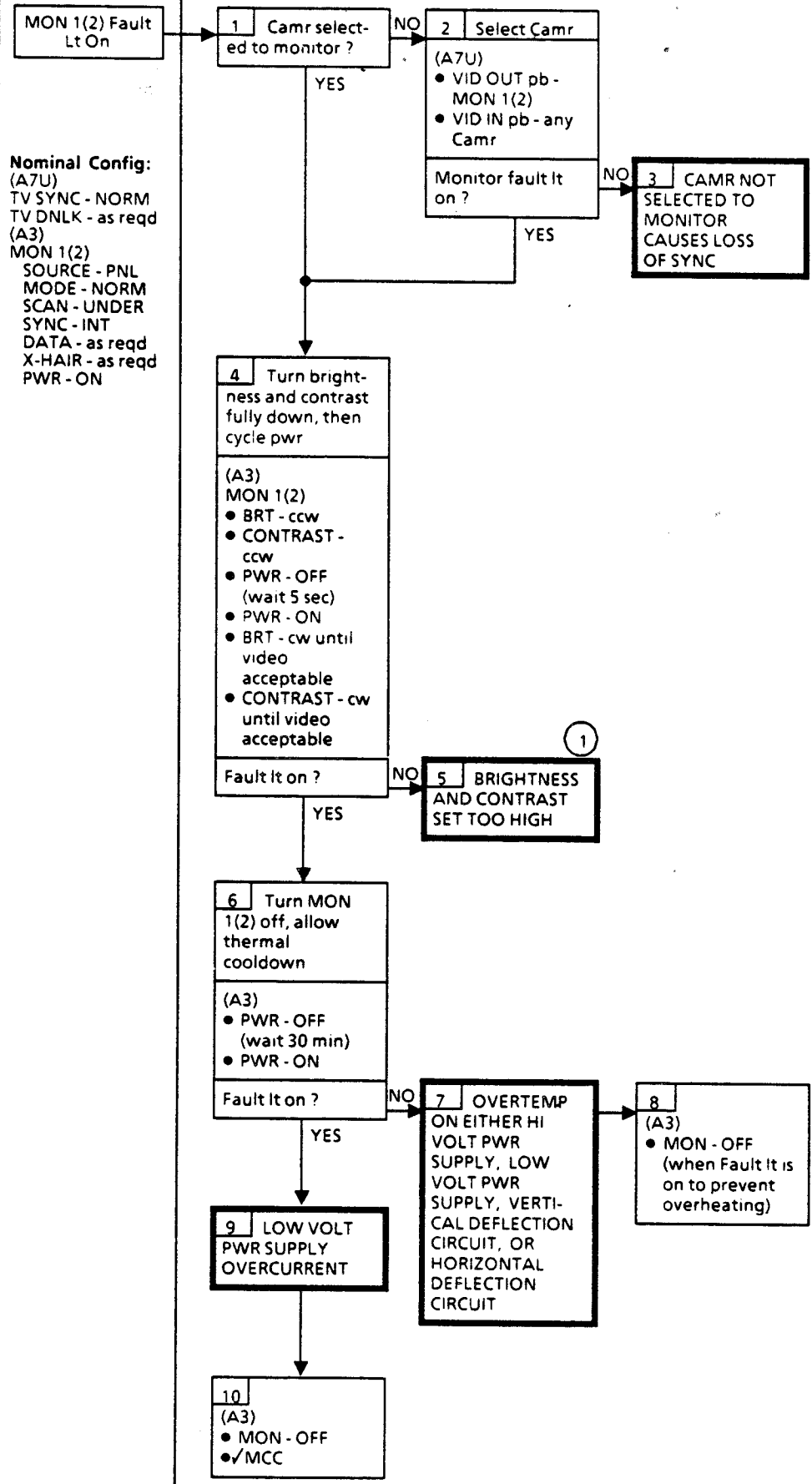
78

COMM 2.4a (Cont)



Nominal Config:
 (A7U)
 TV SYNC - NORM
 TV DNK - as reqd
 (A3)
 MON 1(2)
 SOURCE - PNL
 MODE - NORM
 SCAN - UNDER
 SYNC - INT
 DATA - as reqd
 X-HAIR - as reqd
 PWR - ON

① Continue normal ops



Port RMS TV Camr/Pan-Tilt cb opens

Nominal Config:
 (A7U)
 TV SYNC - NORM
 TV DNLK - as reqd
 (A3) (Monitor)
 SOURCE - PNL
 MODE - NORM
 SCAN - UNDER
 SYNC - INT
 DATA - as reqd
 X-HAIR - as reqd

1 ✓Wrist Camr
 (A7U)
 • TV CAMR PWR RMS - OFF
 • VID OUT pb - MON 1(2)
 • VID IN pb - RMS

2 Select Wrist Camr
 (A7U)
 • RMS CAMR PORT - WRIST

 (R15:E)
 • cb MNB RMS PORT RMS TV CAMR/PAN-TILT - cl
 • Wait 10 sec
 cb open ?

YES

NO

3 Turn on Camr pwr
 (A7U)
 • TV CAMR PWR RMS - ON
 • CAMR CMD ALC pb - PEAK

 Video on Monitor and cb closed ?

NO

YES

4 WRIST CAMR LOST

5 Wrist Camr operational. Wait for MCC OK to perform next step

1

6 ✓Elbow Camr
 (A7U)
 • TV CAMR PWR RMS - OFF

7 Select Elbow Camr
 (A7U)
 • RMS CAMR PORT - ELBOW

 (R15:E) (If necessary)
 • cb MNB RMS PORT RMS TV CAMR/PAN-TILT - cl
 • Wait 10 sec
 cb open ?

YES

NO

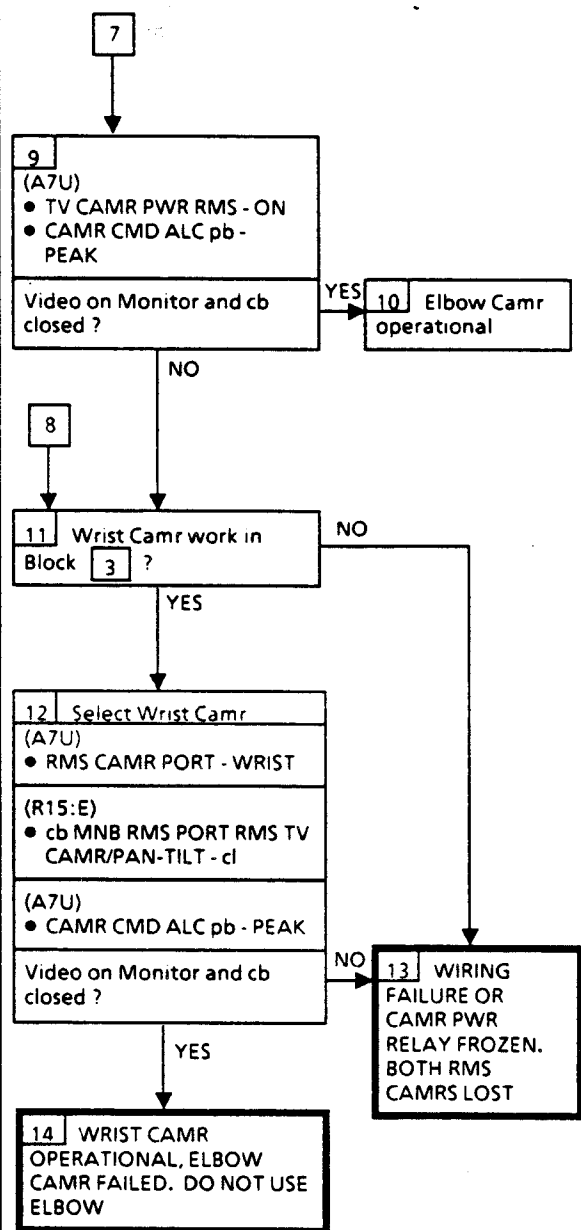
8 ELBOW CAMR LOST

9

11

1 Pwr routed to both Camrs at all times and switched inside Camrs. Short occurring in one Camr may cause loss of pwr to both Camrs on the RMS. Decision to proceed based on current spikes, if any, and importance of RMS Camrs to remainder of mission

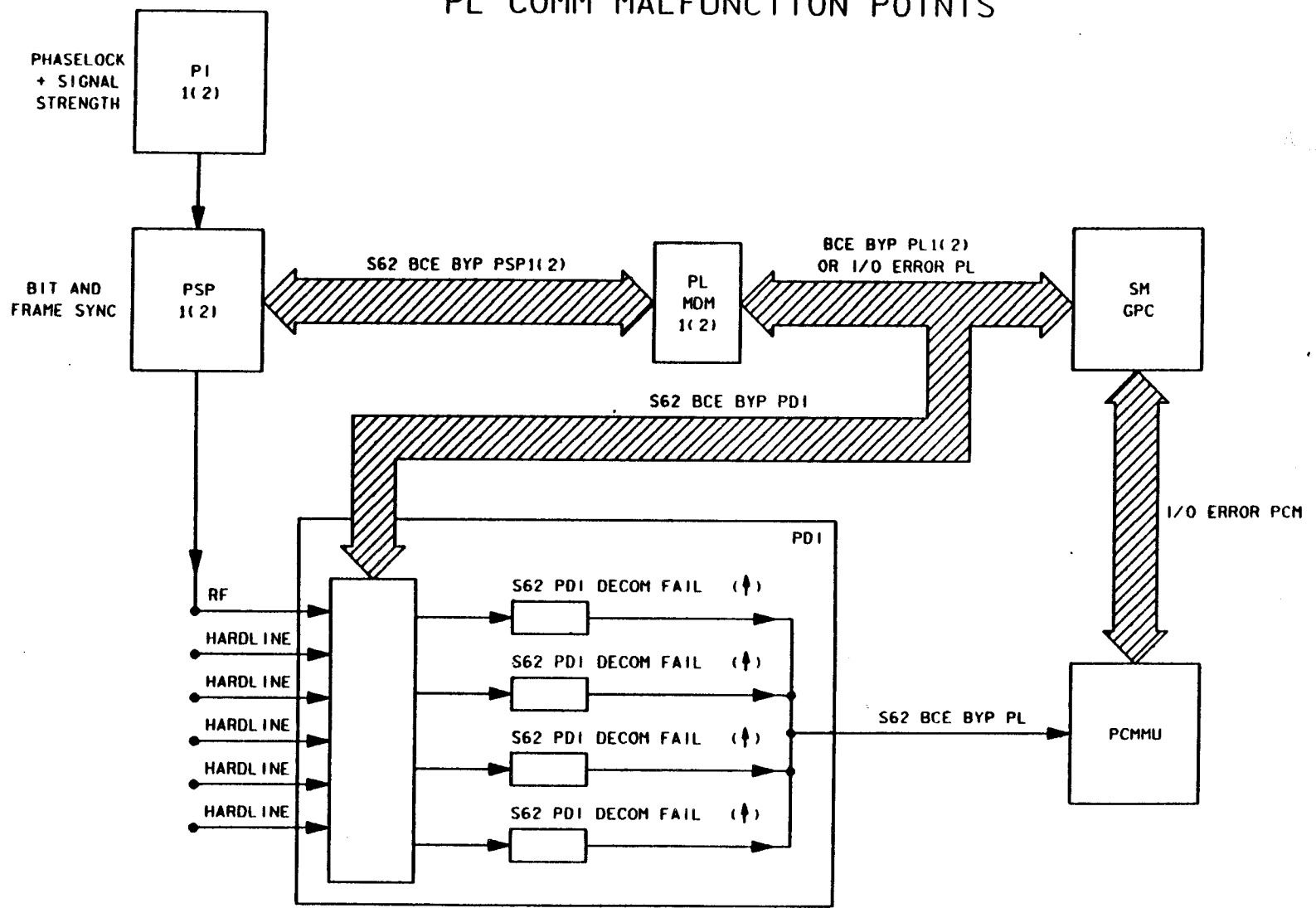
COMM 2.4c (Cont)



2.5

S62 BCE BYP

PL COMM MALFUNCTION POINTS



COMM/2.5:001a 03/21/88

83

2-38

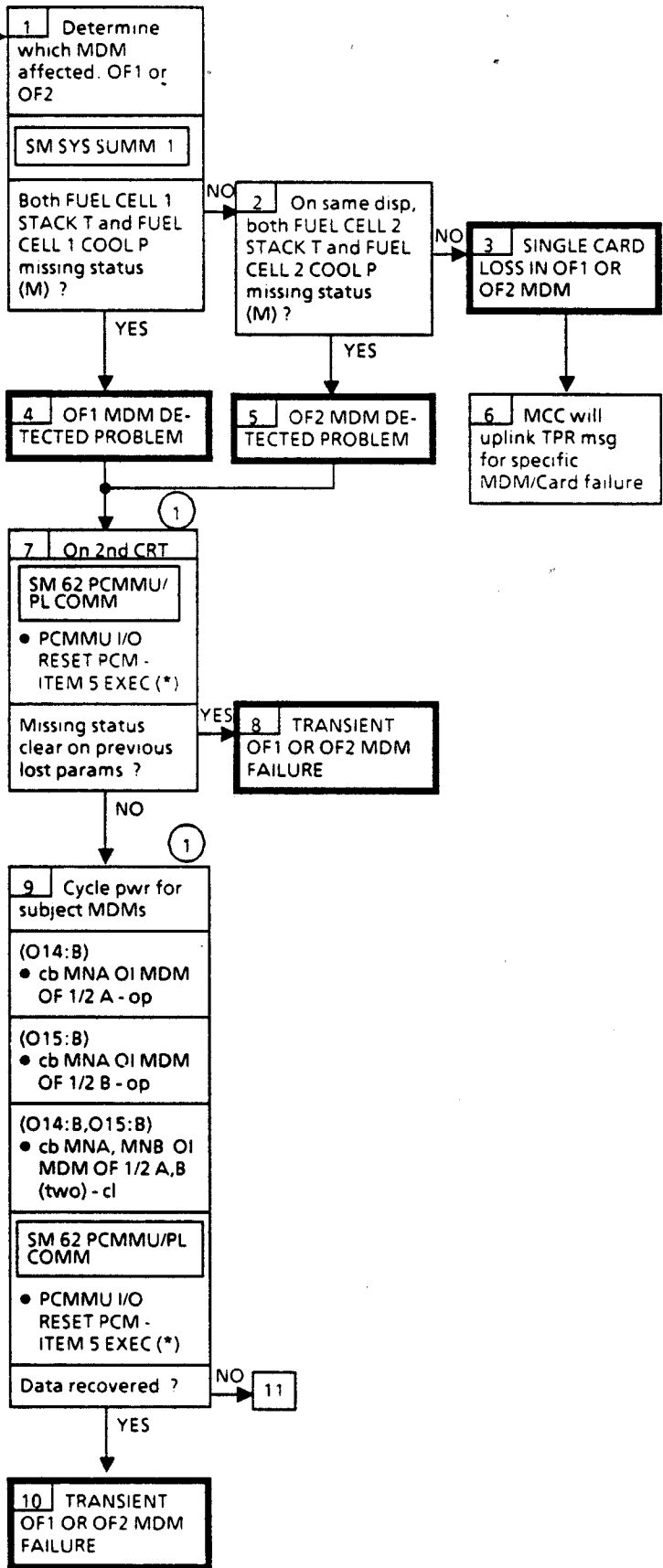
MAL/ALL/GEN

SM ALERT

S62 BCE BYP OFA

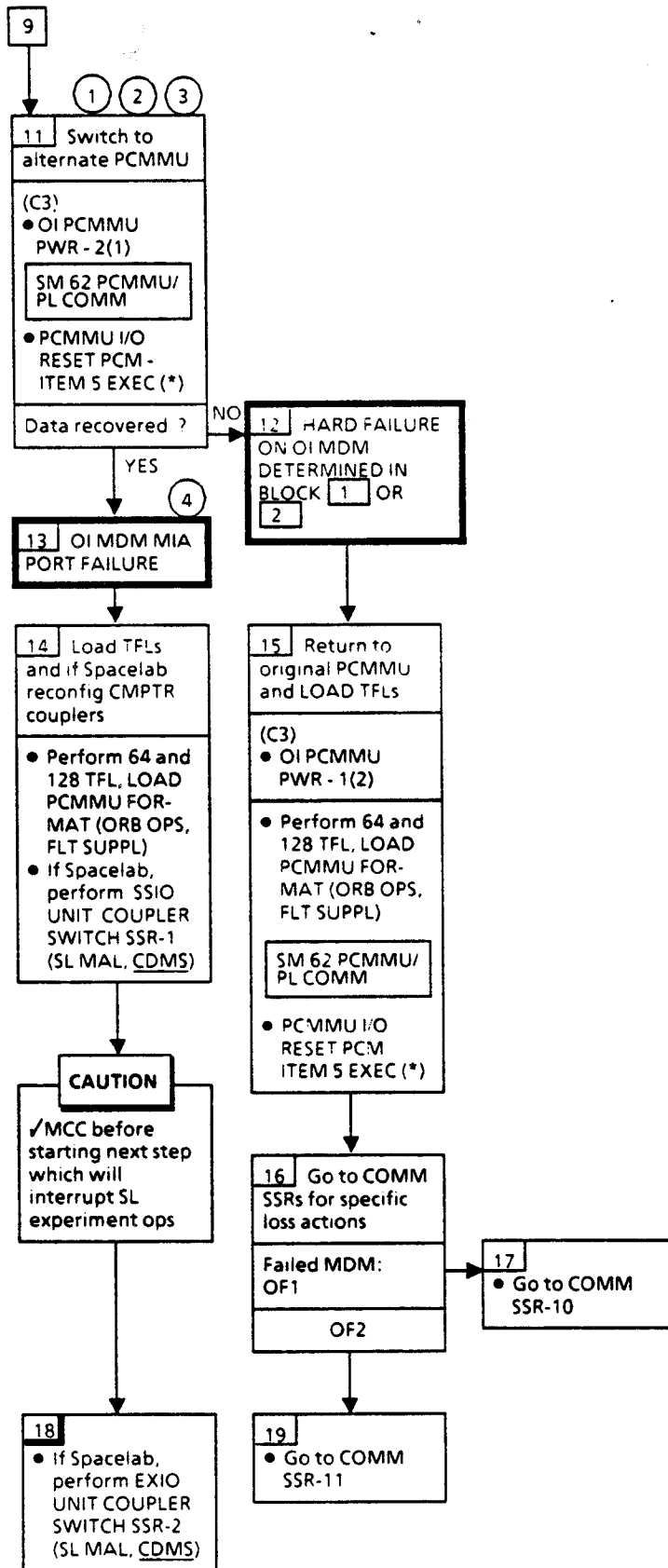
If:
OF1 or OF2 MDM
Card failure, or
Card failure in
OF1 or OF2, or
OF1/OF2 MDM
data path
PCMMU failure

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 previous OI failure, PDI not pwr'd ON, PDI not receiving payload data which is FDA'd, or if Space-lab and S/L CMPTRs not up or couplers misconfigured

COMM 2.5a (Cont)



- ① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwr'd ON, PDI not receiving payload data which is FDA'd, or if Spacelab and S/L CMPTRs not up or couplers misconfigured
- ② Advise MCC of PCMMU switch
- ③ If Spacelab, will cause loss of S/L data until S/L CMPTR couplers switched or original PCMMU selected
- ④ Full data recovered by PCMMU switch. Redundant path to OF1(2) MDM lost

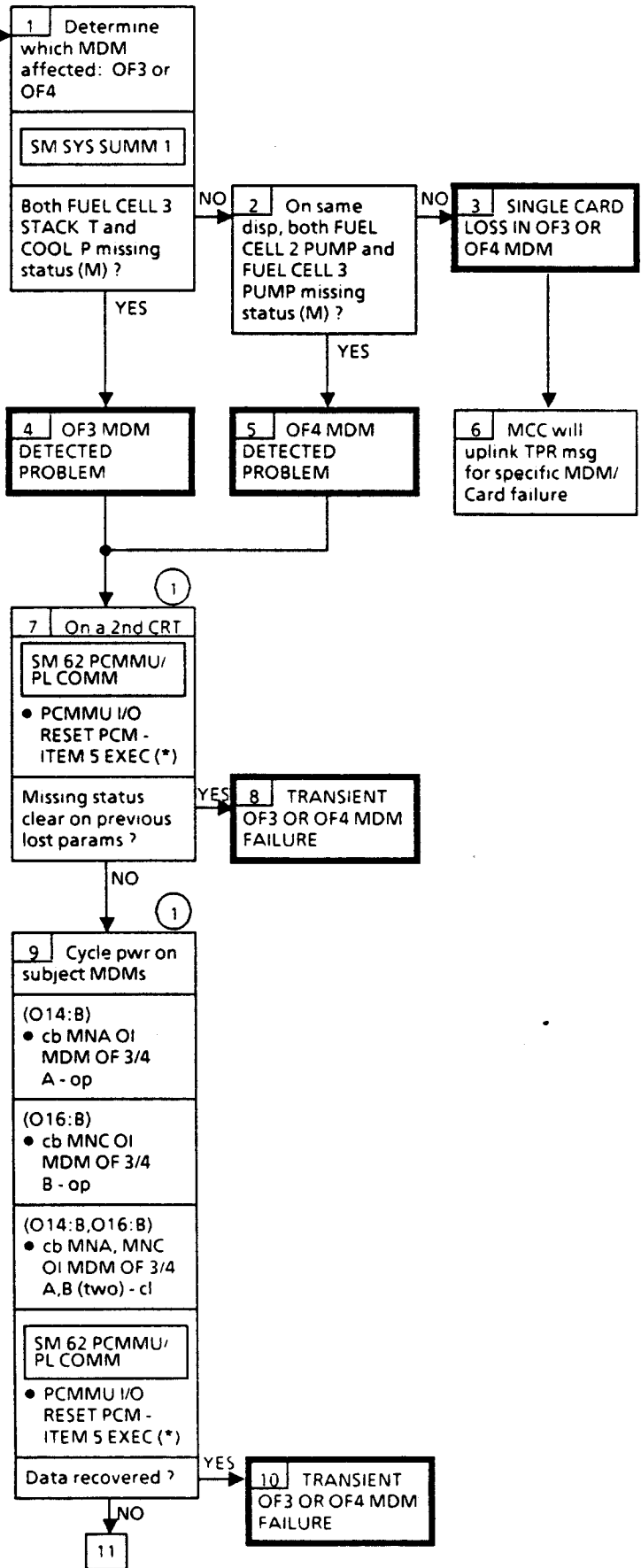
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwr'd ON, PDI not receiving payload data which is FDA'd, or if Space-lab and S/L CMPTRs not up or couplers misconfigured

SM ALERT

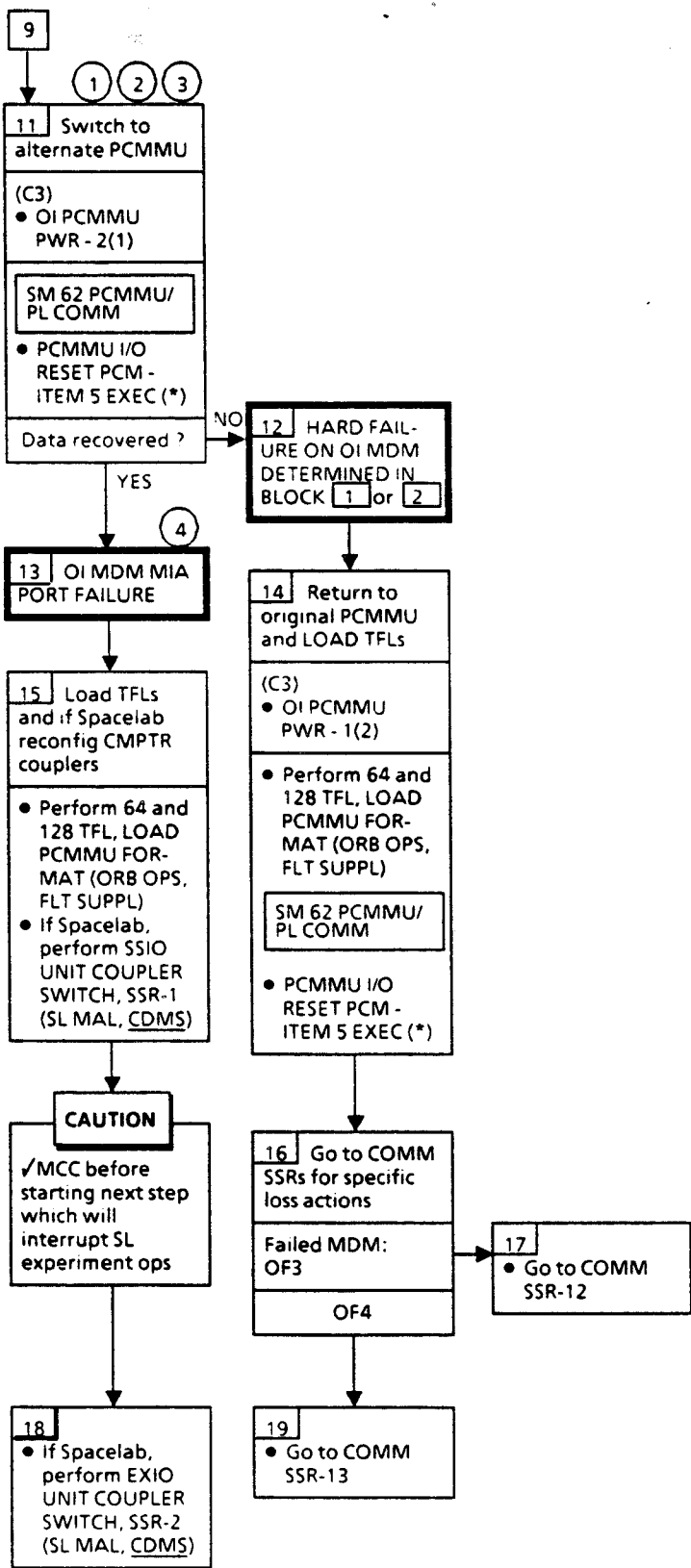
S62 BCE BYP OFB

If:
OF3 or OF4 MDM failure, or Card failure in OF3 or OF4, or OF1/OF2 MDM data path to PCMMU failure

Nominal Config:
(C3)
OI PCMMU PWR - 1
(O14:B,O15:B)
cb MNA,MNB
OI MDM OF 3/4
A,B (two) - cl



COMM 2.5b (Cont)



① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwr'd ON, PDI not receiving payload data which is FDA'd, or if Spacelab and S/L CMPTRs not up or couplers misconfigured

② Advise MCC of PCMMU switch

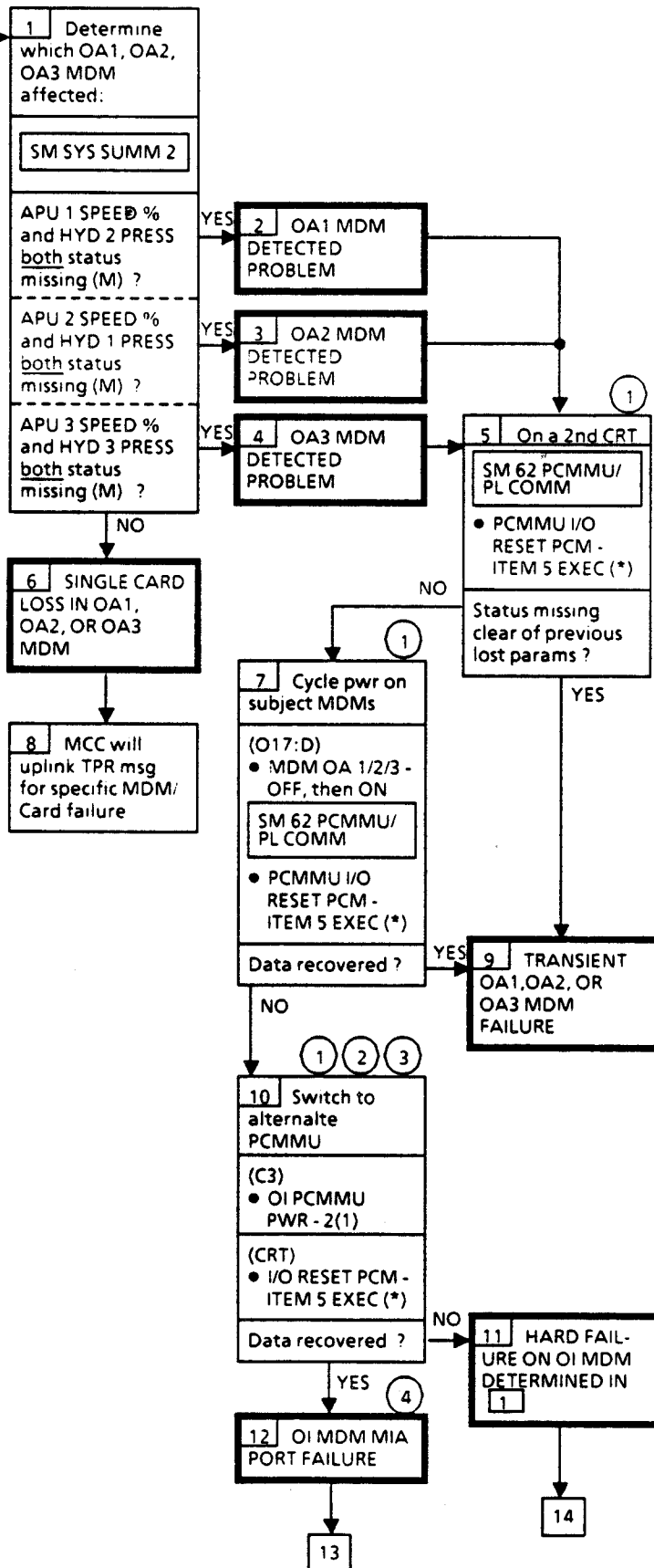
③ If Spacelab, will cause loss of S/L data until S/L CMPTR couplers switched or original PCMMU selected

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

SM ALERT
S62 BCE BYP OA

If:
OA1 or OA2 or
OA3 MDM 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



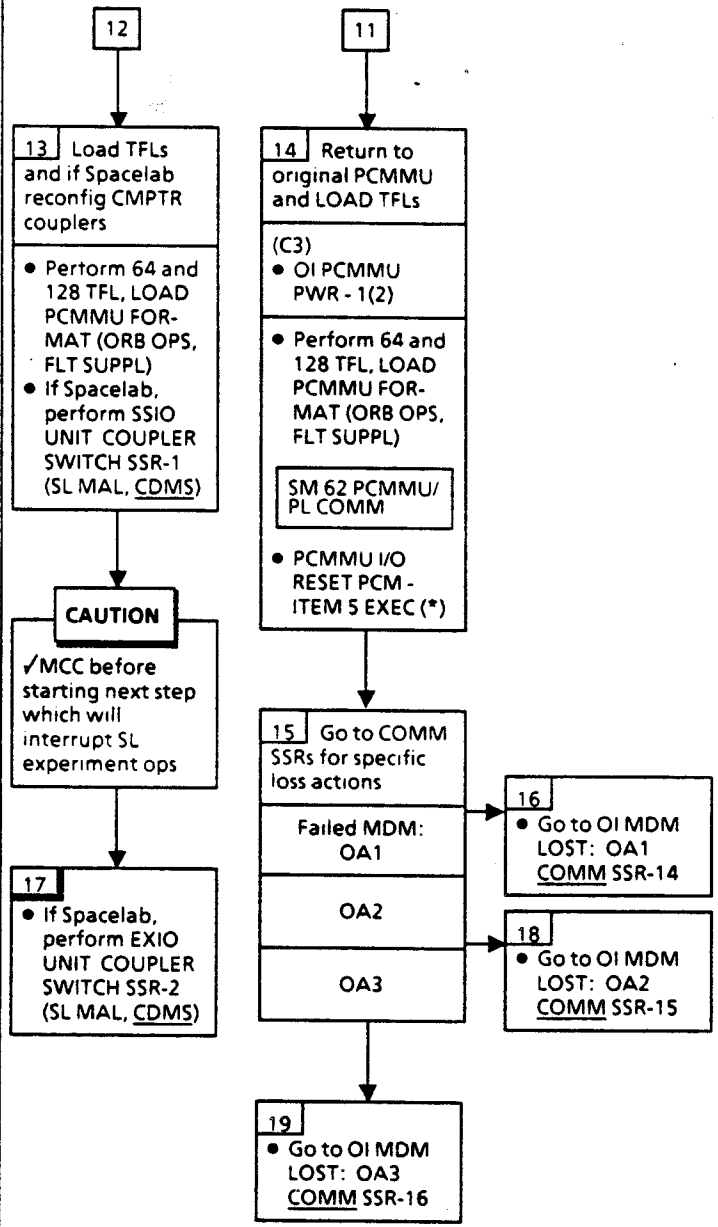
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwr'd ON, PDI not receiving payload data which is FDA'd, or if Spacelab and S/L CMPTRs not up or couplers misconfigured

② Advise MCC of PCMMU switch

③ If Spacelab, will cause loss of S/L data until S/L CMPTR couplers switched or original PCMMU selected

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

COMM 2.5c (Cont)



COMM

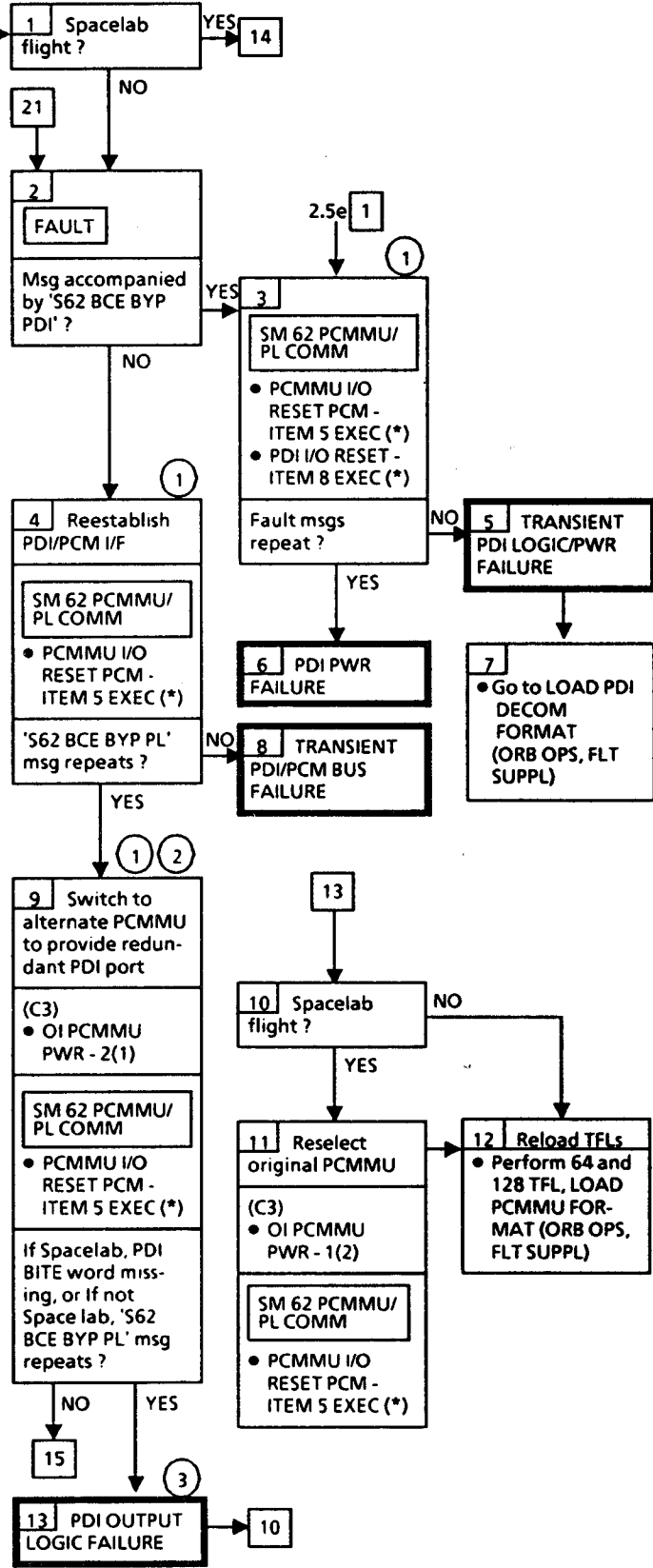
2.5d S62 BCE BYP PL

SM ALERT

S62 BCE BYP PL

If:
PDI port failure or PCMMU port failure or PDI to PCMMU data path failure or if S/L CMPTR failure, S/L CMPTR to PCMMU path failure or if PCMMU switched and S/L CMPTR couplers not switched

Nominal Config:
(C3)
OI PCMMU PWR - 1(2)
(A1L)
If PDI in use:
PL DATA INTLVR PWR - ON
(S/L)
S/L CMPTR couplers A if PCMMU 1 B if PCMMU 2



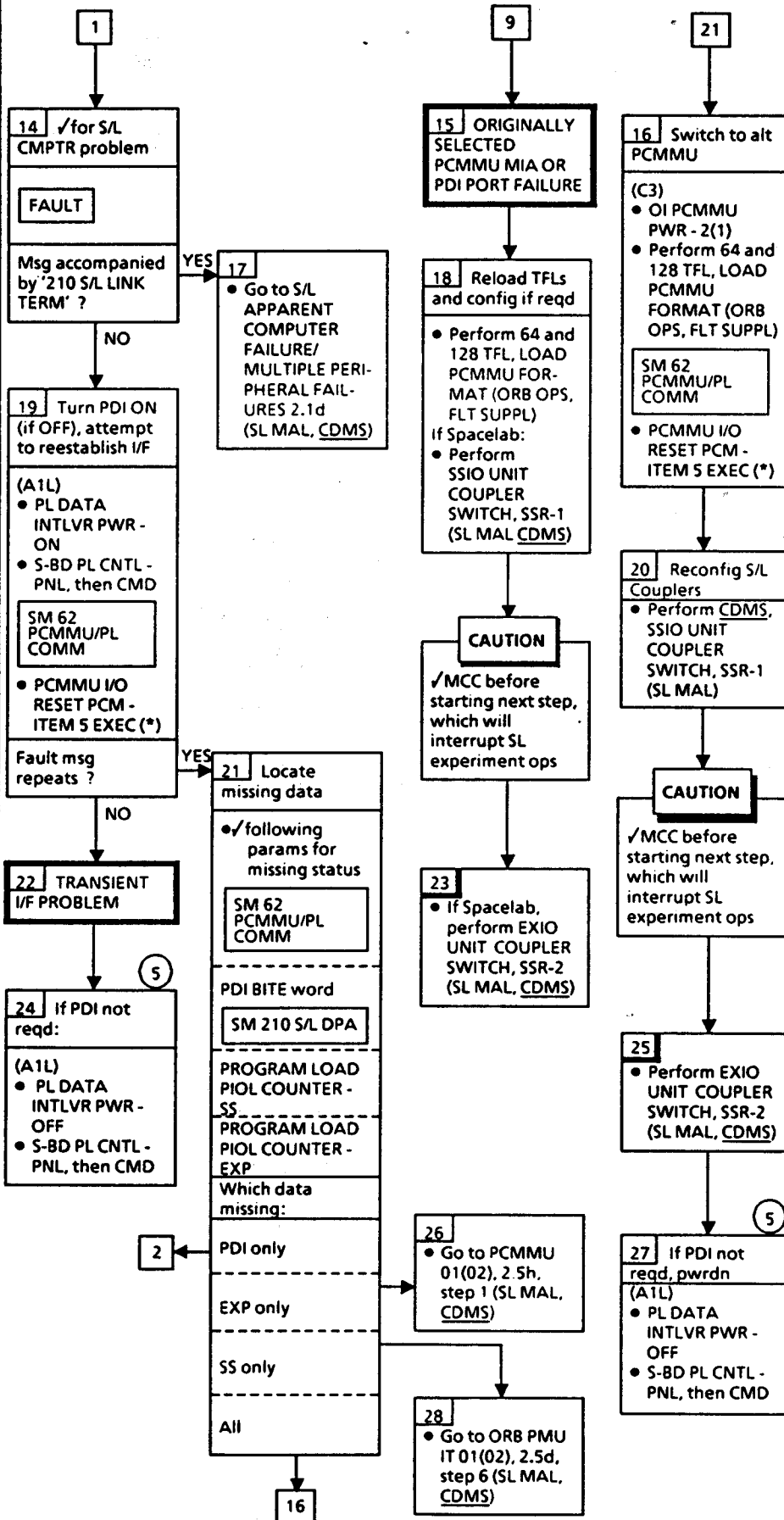
① I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwr'd ON, PDI not receiving payload data which is FDA'd, or if Spacelab and S/L CMPTRs not up or couplers misconfigured

② If Spacelab, consult MCC prior to switching PCMMUs, which will interrupt S/L ops

③ Internal PDI logic lockup may be cleared by PDI pwr cycle. However, all currently loaded formats will be lost

COMM 2.5d (Cont)

5 Causes 'S62 BCE BYP PL' msg



COMM

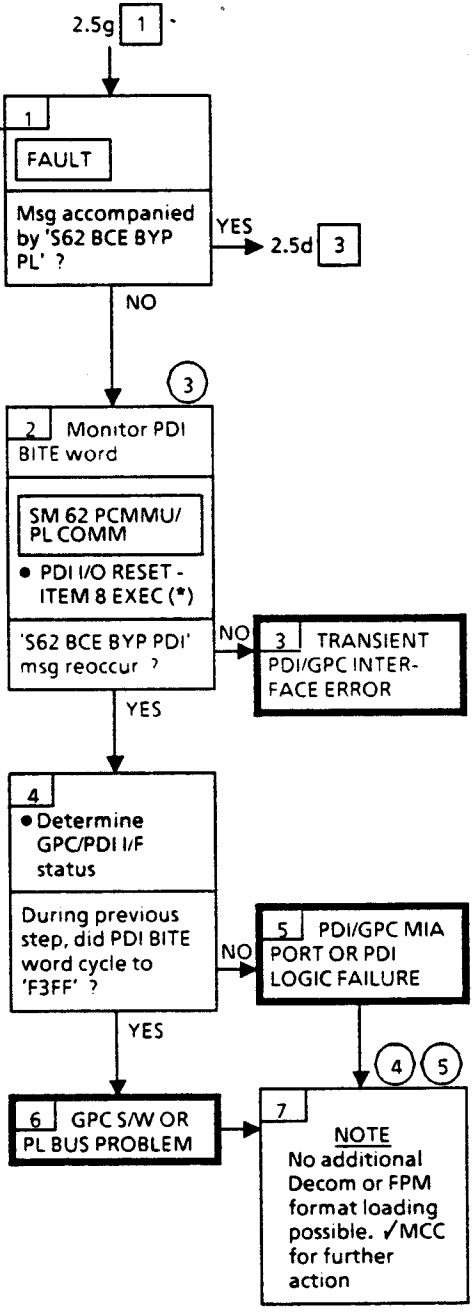
2.5e S62 BCE BYP PDI

SM ALERT

1 2
S62 BCE BYP PDI

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

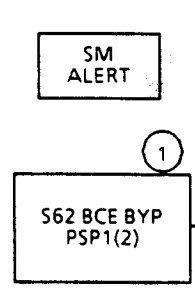
Nominal Config:
(A1L)
PL DATA INTVL R
PWR - ON



- 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 pwr'd off
- 3 PDI BITE word updates once every sec. Detected GPC I/F error will only be displayed for two sec
- 4 Internal PDI logic lockup may be cleared by PDI pwr cycle. However, this will cause loss of currently loaded formats. MCC can determine this condition. Do not cycle pwr without MCC direction
- 5 May be possible to clear if GPC MIA or GPC S/W with an SM GPC switch. /MCC for further action

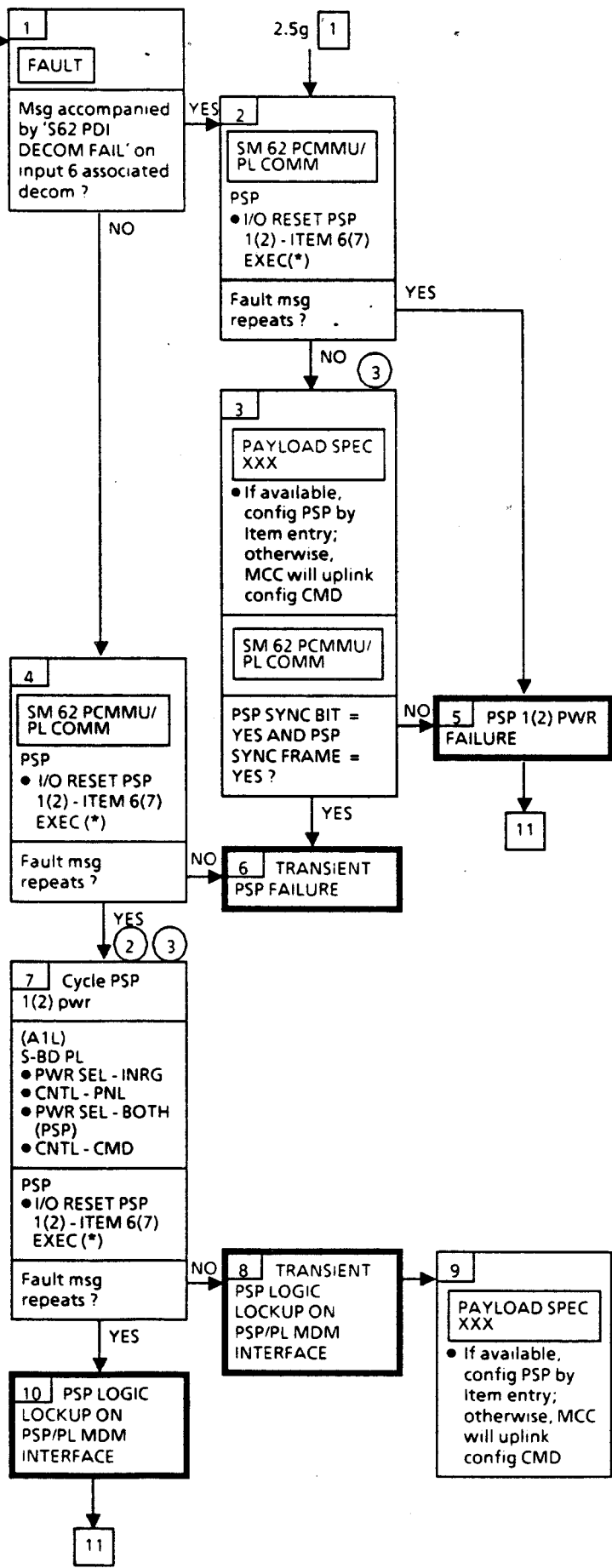
COMM

2.5f S62 BCE BYP PSP 1(2)



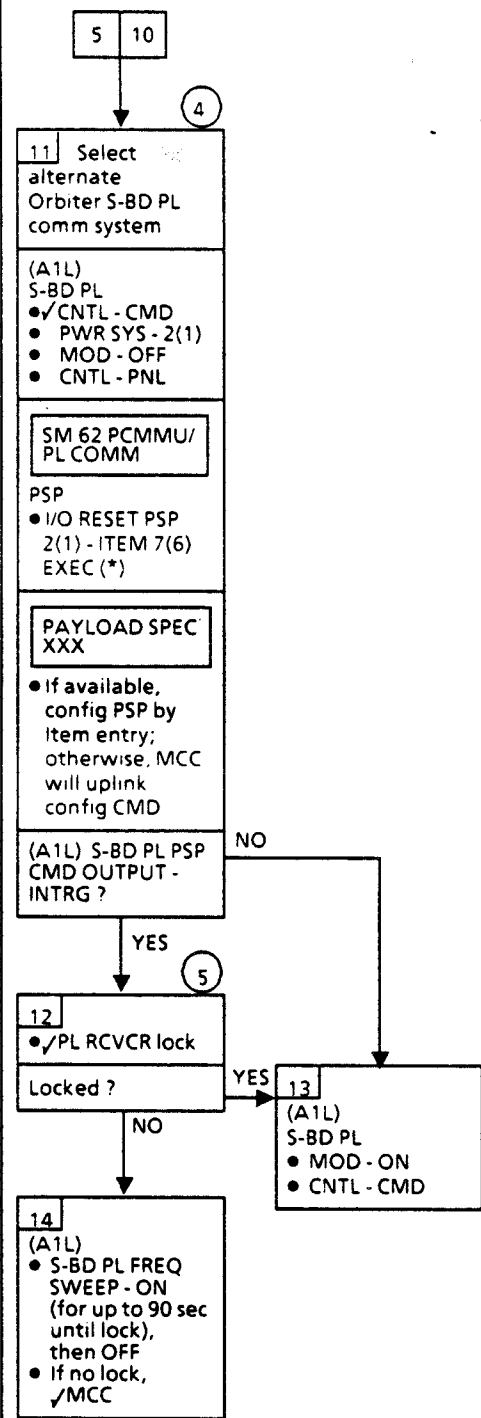
If:
PSP/PL MDM Inter-
face fails or
PSP pwrd off or
PSP pwr supply
failure

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



- 1 Msg occurs if PSP pwrd off
- 2 'S62 PDI DECOM FAIL' fault msg will occur during PSP pwr cycle
- 3 PSP config will be lost in next Block steps. If P/L SPEC item entry to reconfig PSP not available, wait for MCC to continue

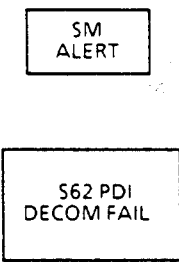
COMM 2.5f (Cont)



4 Selection of alternate S-BD P/L sys will cause temporary loss of RF to P/L

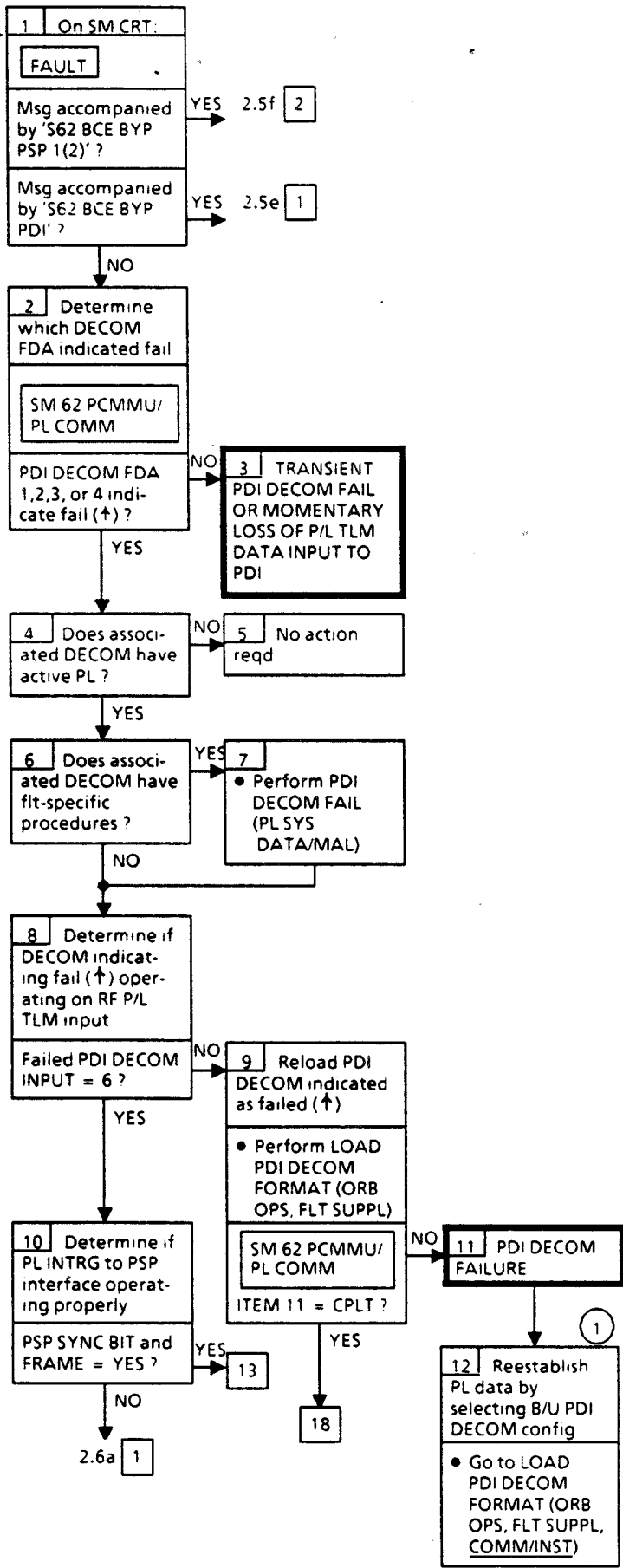
5 Indications of PL Rcvr lock vary with flight

① TFL loads not affected by switching from primary to B/U DECOM

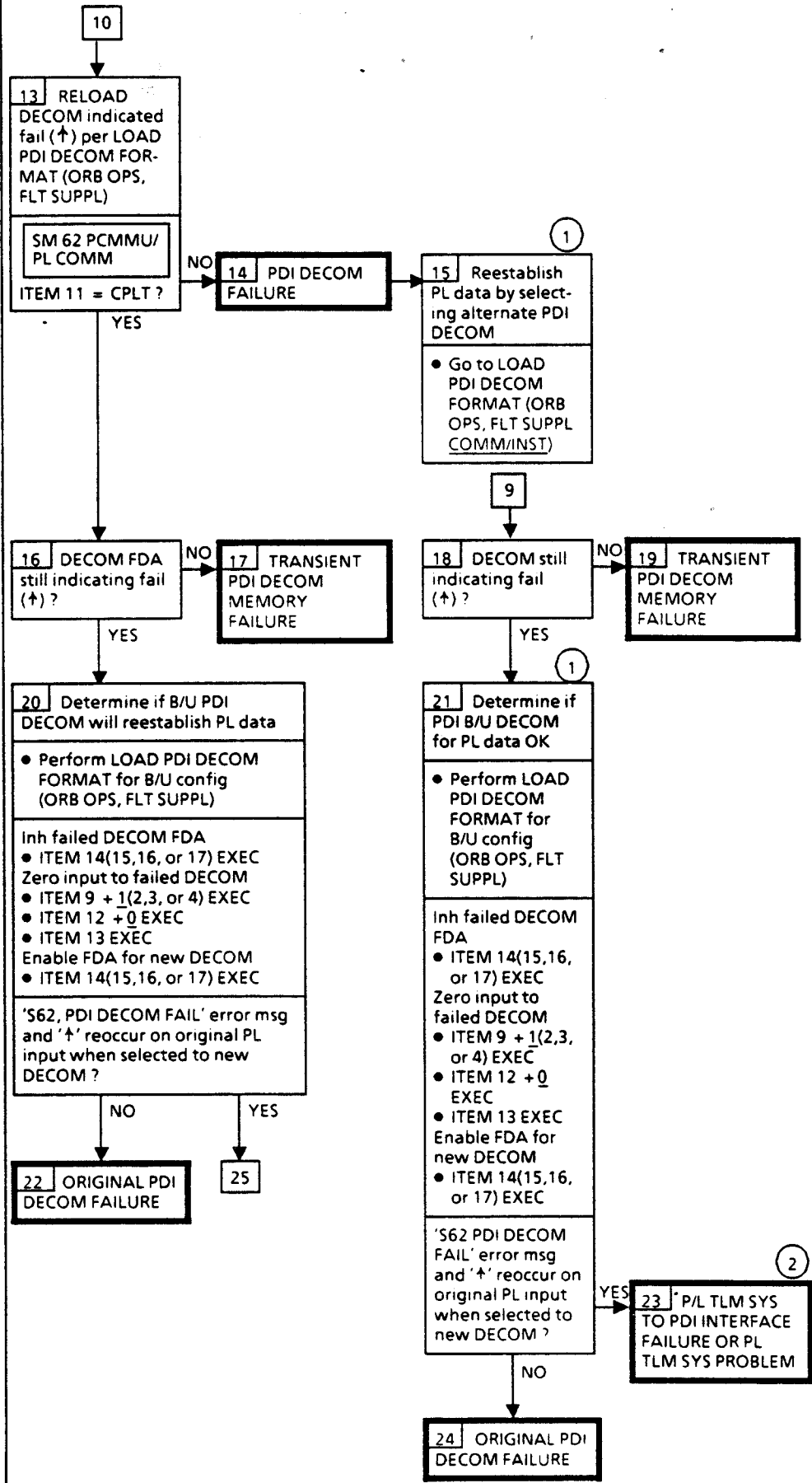


if:
PDI Decom fails,
or P/L to orbiter
PI RF link fails,
or P/L TLM
output to PDI
fails, or PSP/PDI
hardline failure

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)



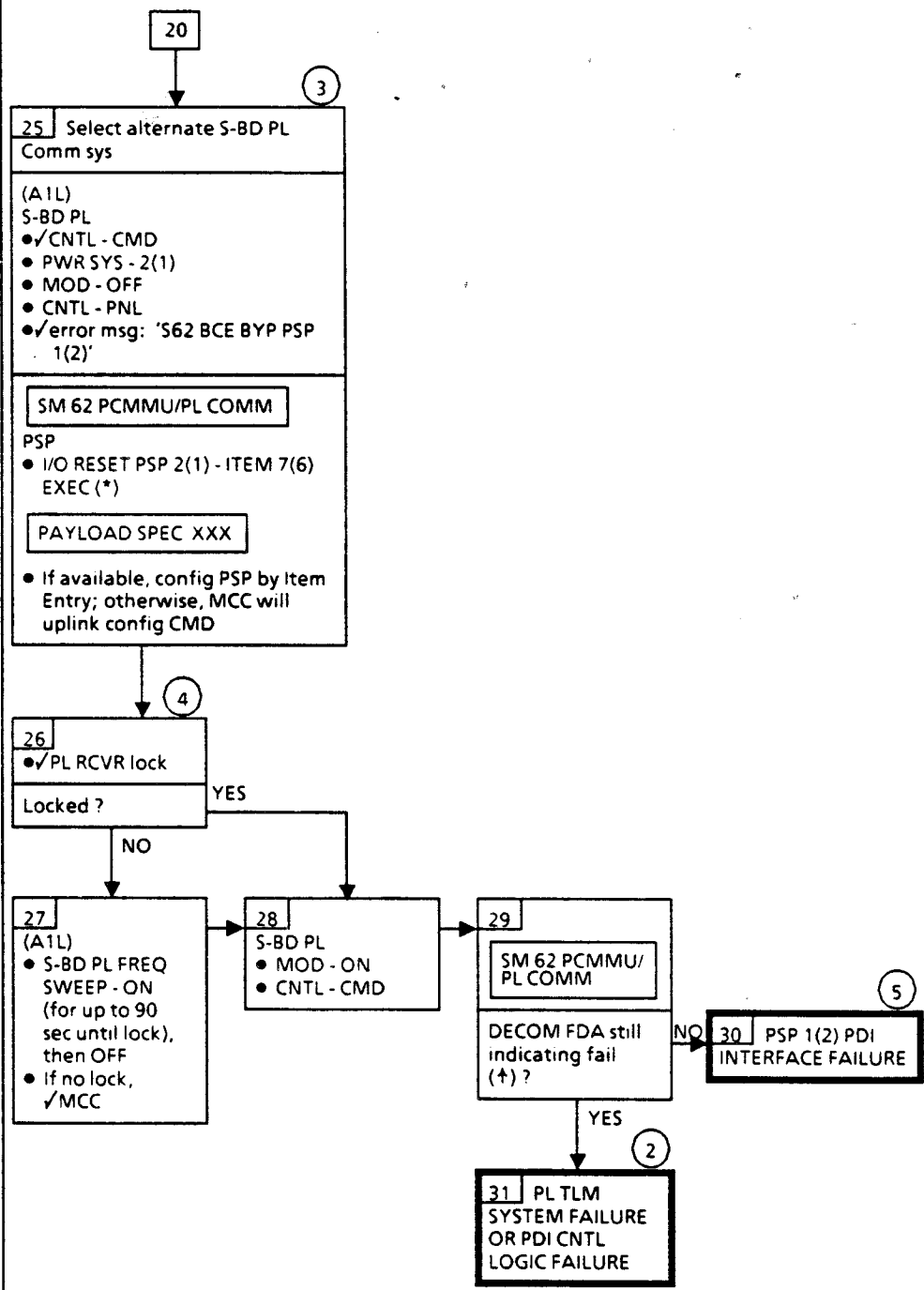
COMM 2.5g (Cont)



① TFL loads not affected by switching from primary to B/U DECOM reconfig

② ✓MCC

COMM 2.5g (Cont)



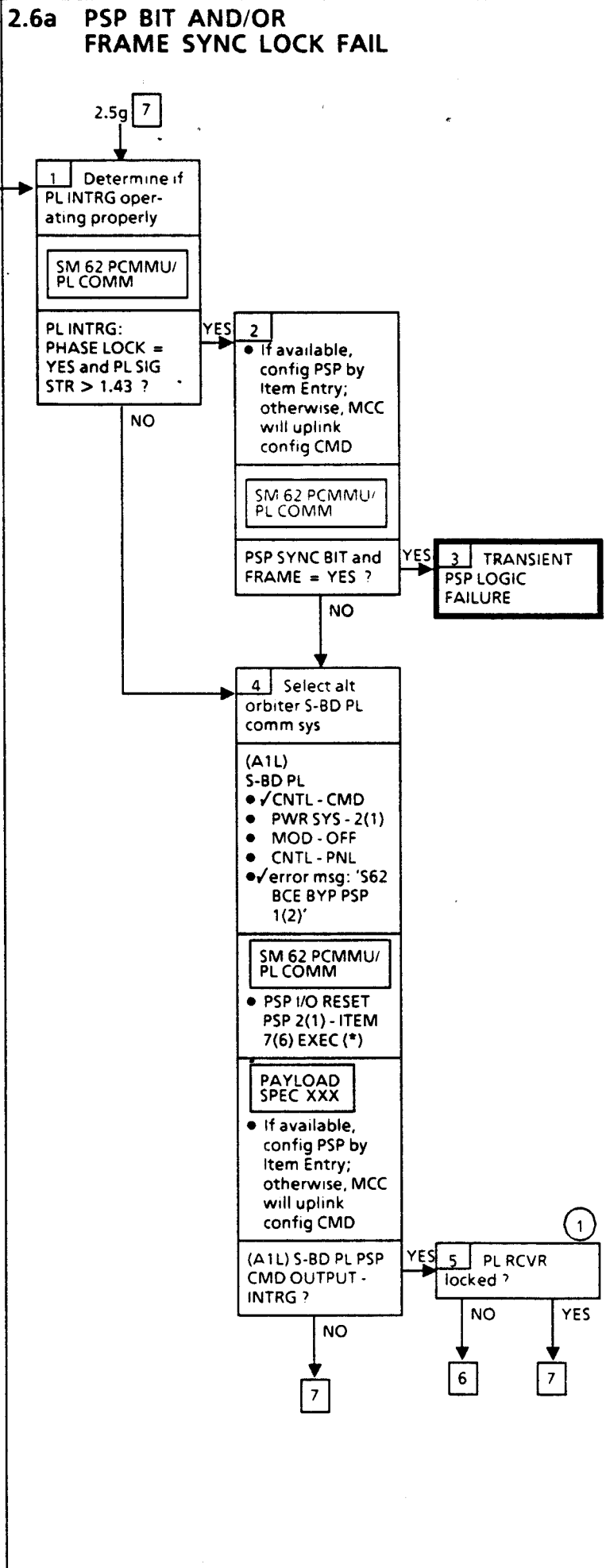
- ② ✓MCC
- ③ Selection of alternate S-BD PL sys will cause temporary loss of RF to PL
- ④ PL RCVR lock indications vary with flight
- ⑤ Original orbiter S-BD PL TLM sys lost

COMM

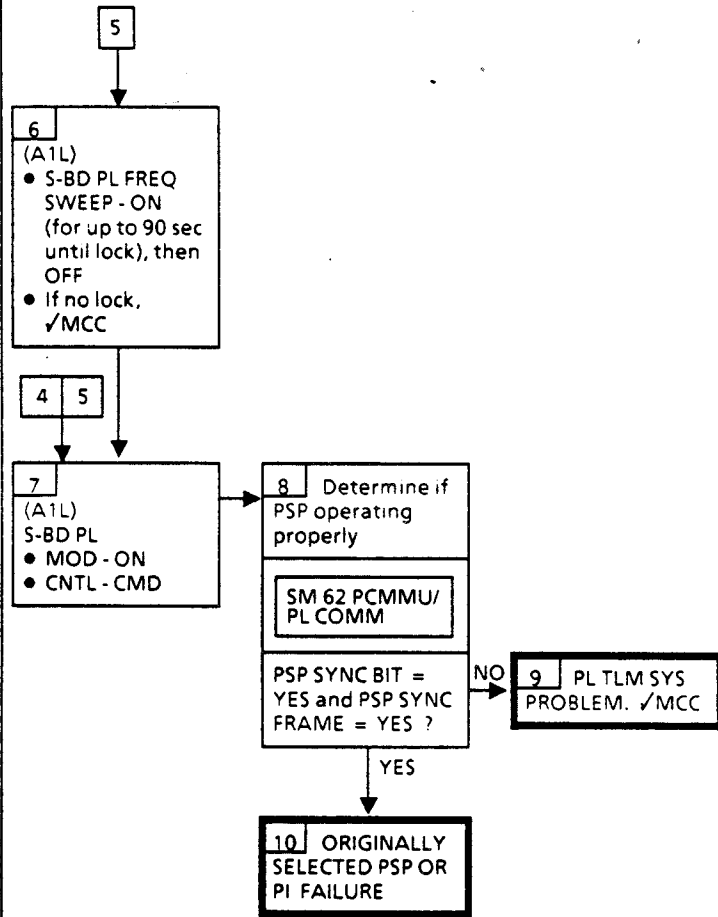
Unable to Obtain PSP Bit and/or Frame Sync Lock

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



OI DSC
2.7

COMM

2.7a OI DSC LOSS

1

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

1 Match param indicators on displays to determine failed DSC

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

OI DSC
2.7

Nominal Config:
(O14:B)
cb MNA OI SIG
COND OF 1/4 A-cl
(O15:B)
cb MNB OI SIG
COND OF 1/4 B-cl
(O15:B)
cb MNB OI SIG
COND OF 2/3 A-cl
(O16:B)
cb MNC OI SIG
COND OF 2/3 B-cl
(O14:B)
cb MNA OI SIG
COND OM 1/2 A-cl
(O15:B)
cb MNB OI SIG
COND 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

XXXX/XXX/078			SM	SYS	SUMM	1	XX	X	DDD/HH:MM:SS
						BFS	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	CNTL AB			OF1	OF1	OF1	
	2 OF1	OF3	BC			OF2	OF2	OF2	
	3 OF1	OF2	CA			OF3	OF3	OF3	
CABIN			ESS			OM2	OM2	OM1	
PRESS	OF2		AC						
dP/dT	OF3		VOLT			ΦA	OF1	OF2	OF3
PP02	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	CX S						
ΔV FC1	FC2	FC3	FUEL CELL						
SS1	XXS	XXS	AMPS			OM1	OM1	OM1	
SS2	XXS	XXS	REAC VLV			XXS	XXS	XXS	
SS3	XXS	XXS	STACK T			OM1	OM2	OM2	
TOTAL AMPS	XXXXS		EXIT T			OM1	OM2	OM2	
	KW	XXS	COOL P			OM1	OM2	OM2	
			PUMP			XXS	XXS	XXS	

(XX)

XXXX/XXX/079			SM	SYS	SUMM	2	XX	X	DDD/HH:MM:SS
						DDD/HH:MM:SS			
CRYO TK			1	2	3	4	5		
N2 PRESS	XXS	XXS	XXS			XXS			
O2 PRESS	XXXXS	XXXXS	XXXXS			XXXXS			
HTR T1	OM1	OM1	OM1			OM2	OF2		
T2	OM2	OM2	OF3			OF3	OF3		
APU	1	2	3	HYD	1	2	3		
TEMP EGT	OA1	OA2	OA3	PRESS	OA2	OA1	OA3		
B/U EGT	OA2	OA3	OA1	RSVRT	OA1	OA2	OA3		
OIL IN	OA1	OA2	OA3	QTY	OA1	OA2	OA3		
OUT	OA2	OA3	OA1						
SPEED X	OA1	OA2	OA3	W/B					
FUEL QTY	XXS	XXS	XXS	H2O QTY	XXS	XXS	XXS		
PMP LK P	OM2	OM2	OM2	BYP VLV	XXS	XXS	XXS		
OIL OUT P	OA1	OA2	OA3						
AV BAY				THERM CNTL	1	2			
TEMP	OF2	OF3	OF1	H2O PUMP P	OF2	OF3			
FAN ΔP	XXS	XXS	XXS	FREON FLOW	OF2	OF3			
				EVAP OUT T	OA2	OA3			

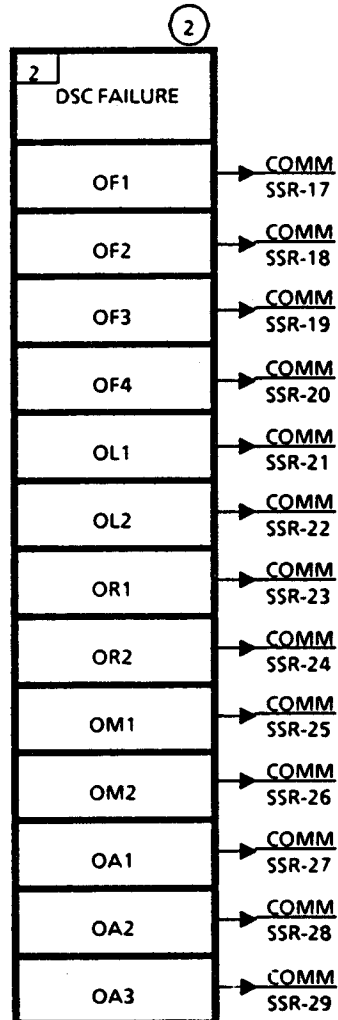
(XX)

COMM 2.7a (Cont)

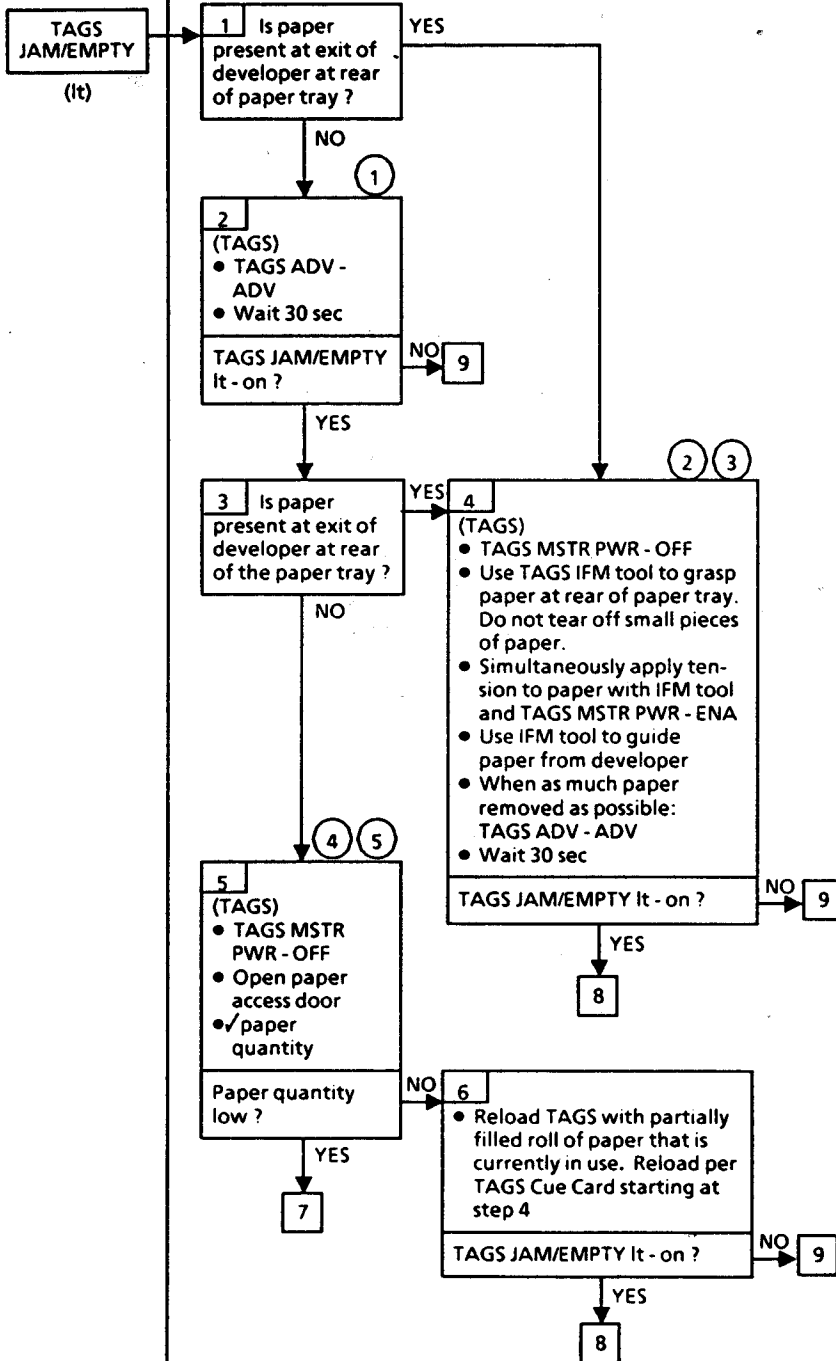
② Assumes particular DSC cb has been checked

XXXX/XXX/089	PRPLT	THERMAL	XX	X	DD	MM	MM	SS
POD	L	R						
OMS TK	OX OL2	OR2						
	FU OL1	OR1						
ENG I/F	OX OL1	OR1	XFD	OX	OA1	OA2	OA3	
	FU OL2	OR2		GMBL	LN	OA1	OA2	
	OX VLV	OL1	OR1	DRM	OX	OA3	OA3	
	FU INJ	OL1	OR1					
WEB KEEL	1 OL2	OR2						
	2 OL2	OR2						
Y	08 OL2	OR2	BLD	AFT	FUS	OA3	OA3	
	UP OL1	OR1		PL	BAY	OM1	OM2	
OX DRM PNL	1 OL1	OR1						
	2 OL1	OR1						
ENG COVER	OM1	OM2	FWD	RCS	FU	OX		
	SERV PNL	OL2	OR2	LINE	T1	OF2	OF4	
GSE SERV PNL	OL2	OR2			T2	OF4	OF2	
TEST HE/OX	1 OL1	OR1	AFT	RCS	L	R		
	2 OL2	OR2	MANF	1	OX	OL1	OR1	
			DRM	PNL	1	OL2	OR2	
					2	OL2	OR2	
			VERN	PNL	1	OL2	OR2	
					2	OL2	OR2	

(XX)



TAGS
2.8



① Each time ADV command is sent and S/W has detected TAGS JAM, S/W will attempt jam-clear routine that lasts about 30 sec and causes JAM/EMPTY It to flash. While clearing jam, paper should be removed from paper tray as paper appears

② If paper does not come out of hardcopier intact, pieces can be fitted together to determine that entire page has been removed

③ If TAGS MSTR PWR is taken to OFF while KU CNTL is in PNL, TAGS GCIL pwr driver will turn off. When pwr to TAGS is reqd then MSTR PWR - ENA followed by TAGS PWR - ON (mom) with KU CNTL in PNL

If KU CNTL is in CMD when MSTR PWR is taken to OFF then GCIL will hold its last state (nominally on) when MSTR PWR is taken back to ENA. Check TAGS PWR It to confirm status after MSTR PWR - ENA

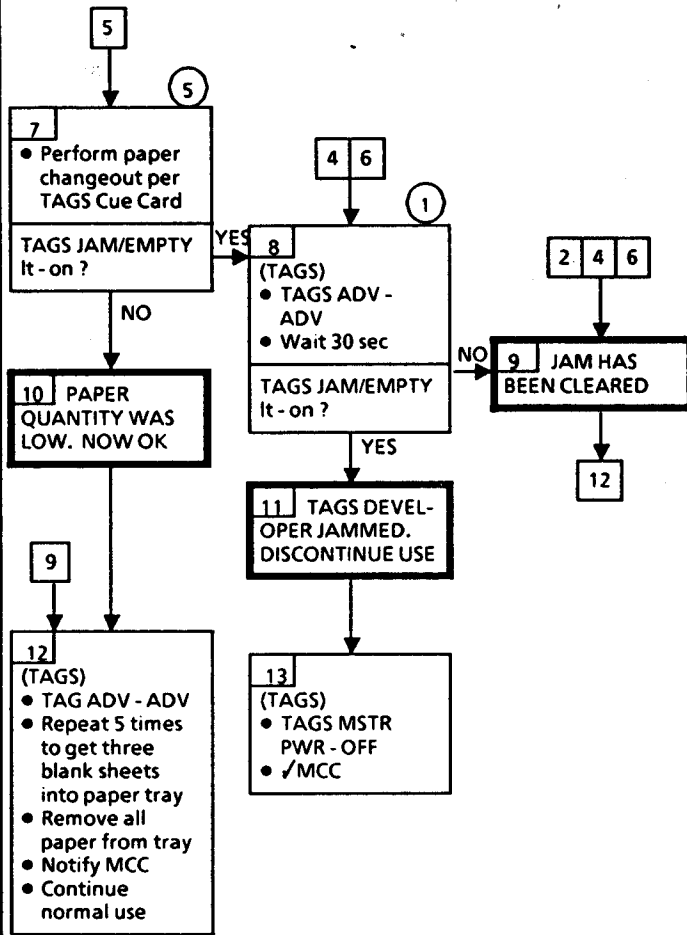
④ Paper Empty sensor may cause Jam/Empty It to light even with paper remaining on spool

⑤ TAGS paper is light sensitive. Perform this check in subdued light if possible

TAGS

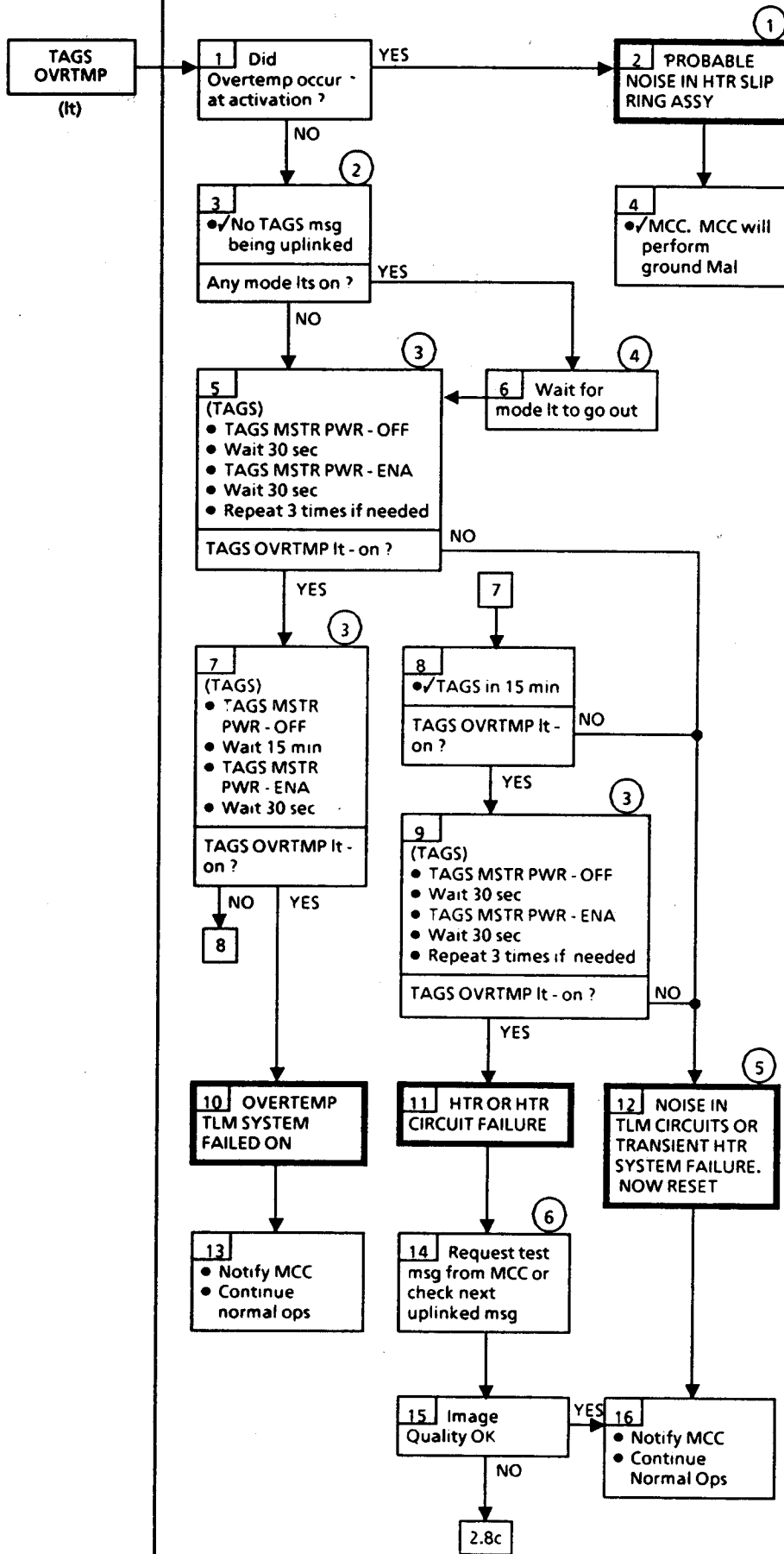
2.8

COMM 2.8a (Cont)



① Each time ADV command is sent and S/W has detected TAGS JAM, S/W will attempt jam-clear routine that lasts about 30 sec and causes JAM/EMPTY It to flash. While clearing jam, paper should be removed from paper tray as paper appears

⑤ TAGS paper is light sensitive. Perform this check in subdued light if possible



1 MCC will wait 10 min and try to reset overtemp by cycling pwr after developer has warmed

2 Any one of the four mode lts being on indicate uplink activity

3 If TAGS MSTR PWR is taken to OFF while KU CNTL is in PNL, TAGS GCIL pwr driver will turn off. When pwr to TAGS is reqd then MSTR PWR - ENA followed by TAGS PWR - ON (mom) with KU CNTL in PNL

If KU CNTL is in CMD when MSTR PWR is taken to OFF then GCIL will hold its last state (nominally on) when MSTR PWR is taken back to ENA. Check TAGS PWR It to confirm status after MSTR PWR - ENA

4 May require up to 17 min. No hazard exists from TAGS developer being overtemp for extended period of time

5 Slip rings may be noisy and cause false overtemp indications regardless of length of time TAGS has been powered

6 Acceptable image may be produced with as many as two htr/htr circuit failures

COMM SSR-1 LOSS OF ALL VOICE COMM

1. Install AUDIO CTR BYP CONNECTORS
Perform ACCU BYPASS CONNECTOR INSTALLATION (IFM, PROCEDURES) for CDR and PLT ATUs
- If still no COMM confirm CMD capability:
2. Verify Flashing U/L on both GNC and SM/BFS displays (✓AOS)
 3. Call SM SPEC 900, TEXT MSG INDEX, on CRT desired for text msgs
 4. MCC will acknowledge by removing Flashing U/L indications and cycling Abort light on/off
- If still no COMM but CMD Capability confirmed:
5. ✓OI PCMMU FORMAT - GPC (Pni C3)
 6. Load TFLs 161/103 (ORB OPS, Flt Supp)
 7. Expect text msgs on SM text displays beginning with SPEC 910 on CRT specified in Step 3 (MCC will call SPEC)
 8. Use Scratch Pad line(s) to inform MCC of no voice and for other msgs (MCC monitors all Scratch Pad lines)

NOTES

1. Avoid Mass Memory Activity (Roll-in SPECS, etc.) during text uplinks
2. For letters above F use ROW: COLUMN combinations below, i.e. 2B = N
3. Use "... " when msg requires > 1 Scratch Pad line (Expect ERR)

Standard Responses

		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				

- 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:
CRT ITEM 01 + 77(02) + 924(03) + 88(04)
Reference Msg 924; Don't Understand - Please Clarify

9. 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
10. Go to KU-BAND ACTIVATION (ORB OPS, COMM/INST) if Ku-Band not activated
11. Perform STD S-BD/KU-BD PNL CONFIG (ORB OPS, COMM/INST) for TDRS Ku-Band (for downlink TV)
12. Activate Cabin TV Camera and config S-Bd FM for TV to Ground Stations (MIL, GDS, HAW)

Perform TV/VTR Cue Card (TV SYS ACT, TV DNLK)
(A1) S-Band FM Data Source - TV
Control - PNL

MCC will attempt uplink via crew text and (if available) TAGS. Crew should use notebook and TV Camera to downlink questions or detailed responses. Check view of msg on monitor. Check Ku-Band coverage

If no uplink text or TAGS capability (CMD ok) and voice still cannot be established:
Perform NEXT DAY PLS

COMM SSRs

COMM SSR-1 (Cont)

If still no Comm, and CMD not confirmed via steps 2-4:

13. 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

Go to -ZLV nose-forward attitude until Deorbit Prep

OPS 202 PRO

GNC XXXX MNVR YYYY

If PEG 7 $\Delta V_s = 0$ and TIG in future, then Deorbit to PLS at TIG in target set

Otherwise:

Deorbit within next 13 hours if $H_p \geq 120$ nmi or within next 9 hours if $105 \leq H_p < 120$ of loss of voice and command according to following priorities:

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 uplinks 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 an OI MDM loss will have an 'M' displayed adjacent to them. Those params affected by DSC loss will have an 'L' displayed adjacent to them (Params displayed on a 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, ECLS SSR-3	Most PGS 1 measurements	② Buses will be untied for flight critical phases
(L1) • Monitor Cabin Fan flow by feel and streamers During sleep periods: • CABIN FAN A,B (two) - ON • AV BAY 3 FAN A,B (two) - ON • HUMIDITY SEP A,B (two) - ON If on IMU FAN A: • IMU FAN B(C) - ON • IMU FAN A - OFF	Cab Fan ΔP Av Bay 3 Fan ΔP Av Bay 3 Temp (MCC cannot assess) Hum Sep A,B (two) Speed Snsr Waste Qty 1 IMU Fan ΔP IMU Fan A Speed Snsr	③ If condensation in cabin, ✓MCC ④ WST TK will be dumped by time (~ 2%/min) to provide ullage to make EOM, MCC will provide the time
• Maintain LIOH Canister(s) change out schedule per cue card and CAP	PPCO2 (MCC cannot assess)	
	FC 1 pH Snsr	
(A12) • APU HTR TK/FU LINE/H2O SYS 1A,1B,2A,2B (four) - AUTO	APU Pump Temps (Htr mon)	
For 'M' Xdcrs on SM 87 HYD THERMAL display • Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3	HYD sys temps	
(R1) On MCC call: • MN BUS TIE (three) - ON (tb-ON)	FC1 SS1 ΔV FC2 SS3 ΔV FC3 SS2 ΔV	
(L1) If FLASH EVAP CNTLR PRI B enabled: • Perform FES RESTART ECLS, SSR-5, using PRI A	Most FES Feedline A Htr measurements	
(R15:C) • cb MNB KU ANT HTR - op	Ku Gyro temp monitoring	
• ✓MCC about performing WASTE H2O DUMP	Waste Qty 1	
4 • ✓MCC daily to update N2 qty for ORB PKT C/L Nomengraph	N2 Qty (two) 1,2	
(A14) • RCS/OMS HTR OMS CRSFD LINES (two) - AUTO	Partial insight into OMS CRSFD Line Htr ops	

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

ACTIONS	MEASUREMENT LOSS	NOTES
If on PCS SYS 2: • Perform RECONFIG TO ALT PCS SYS, ECLS SSR-3	Most PCS Sys 2 measurements	① Use interchanger flow to monitor H2O Loop 1 performance
(L1) • AV BAY 1 FAN (two) - ON • H2O PUMP LOOP 1 - ON • LOOP 2 - GPC	Av Bay 1 Fan ΔP Av Bay 1 Temp (MCC cannot assess) 1 Most H2O Loop 1 measurements	② Lowers H2O Loop 2 Pump Out P limit ③ Buses will be untied for flight critical phases
(R13U) • C/W PARAM SEL tw (three) - 115 • C/W LIMIT SET VALUE tw (three) - 0.65 volts • C/W LIMIT SET LIMIT - LOWER • C/W LIMIT SET FUNC - SET • C/W PARAM SEL tw - > 119		
• Do not don Biomed Electrodes	EGG 1,2 Telemetry	
(R12L) • SPLY H2O XOVR VLV - OP	Sply H2O Qty B Qty D	
(R1) On MCC call: • MN BUS TIE (three) - ON (tb-ON)	FC1 SS2 ΔV FC2 SS1 ΔV FC3 SS3 ΔV	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">SM 66 ENVIRONMENT</div> • Monitor AIRLK P and dP/dT for cabin integrity on-orbit	Cabin Press Snsr	
• Use N2 Qty 1 to infer Qty in 2	N2 Qty 2	
	FC2 pH Snsr	

**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 	Cabin dP/dT	<p>① Causes loss of FC Auto purge capability</p>
<p>(L1)</p> <ul style="list-style-type: none"> AV BAY 2 FAN (two) - ON 	Av Bay 2 Fan ΔP Av Bay 2 Temp (MCC cannot assess)	<p>② Avoids nuisance alarms</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) 	1 FC Purge Line temps	<p>③ SM 76 COMM display S-BD PM mode static, SM GPC will continue selecting ANT for the mode shown</p>
	FC3 pH Snsr	<p>④ For leak detection</p>
<p>SM 60 SM TABLE MAINT</p>	Antenna Select feedbacks	
<p>2 Inhibit S-BD ANT QUAD Alert:</p> <ul style="list-style-type: none"> Param ID - ITEM 1 + 0921049 EXEC INH - ITEM 10(15) EXEC 	HYD sys temps	
<ul style="list-style-type: none"> Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'M' Xdcrs on display 'SM 87 THERMAL' 	Most FES Feedline B Htr measurements	
<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 	S-BD PM mode	
<p>3 If Comm lost: (C3)</p> <ul style="list-style-type: none"> S-BD PM ANT - select best antenna per signal strength meter on pnl F9 	N2 Qty (two) 1,2	
<ul style="list-style-type: none"> ✓MCC daily to update N2 qty for ORB PKT C/L Nomengraph 	Supply H2O Noz T A,B (two)	
<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, ECLS SSR-9 	Waste H2O Noz T A,B (two)	
<ul style="list-style-type: none"> Terminate all WASTE H2O Dump operations through dump nozzle 	Supply H2O Qty C	
<p>SM 60 SM TABLE MAINT</p>		
<p>4</p> <ul style="list-style-type: none"> Set SUPPLY H2O Qty D (Param ID 0620544) LL 10% below tank qty and UL at 99% 	Partial insight into OMS CRSFD Line Htr ops	
<p>(A14)</p> <ul style="list-style-type: none"> RCS/OMS HTR OMS CRSFD LINES (two) - AUTO 		

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

ACTIONS	MEASUREMENT LOSS	NOTES
<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>FC Auto Purge Start discret es</p>	<p>① No SM alerts for CCTV overtemp</p>
<ul style="list-style-type: none"> • During CCTV camr ops, monitor CCTV Camr temps on Monitor 	<p>1 CCTV Camr overtemp discrete</p>	<p>② May get Antenna alerts when operating (C3) S-BD PM ANT sw (loss of position discrete to SM)</p>
<ul style="list-style-type: none"> • Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'M' Xdcrs on display SM 87 HYD THERMAL 	<p>HYD sys temps</p>	
<p>If Topping Evap enabled: (L1)</p> <ul style="list-style-type: none"> • TOP EVAP HTR DUCT - A/B 	<p>Fwd, Aft Topping Duct Htr measurements</p>	
<p>If High Load Evap enabled: (L1)</p> <ul style="list-style-type: none"> • HI LOAD DUCT HTR - A/B 	<p>Hi Load Outbd Duct Htr measurements</p>	
	<p>2 S-BD Quad Ant Sel 1/2 - GPC</p>	

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

ACTIONS	MEASUREMENT LOSS	NOTES
<p>(A12)</p> <ul style="list-style-type: none"> ● Cycle APU HTR TK/FU LINE/H2O SYS 1A,1B - AUTO (12 min), OFF (48 min) 	<p>APU sys temps (htr MON)</p>	<p>① GPC capability to monitor HYD Accumulator pressure lost for sys 1</p>
<ul style="list-style-type: none"> ● Perform Circ Pump Seq procedures for Circ Pump 1, CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1 and SIMULTANEOUS CIRC PUMP ON/GPC OPERATION, APU/HYD SSR-2 	<p>HYD sys pressures, and seq discretes</p>	<p>② Loss of fuel injector temperature is no-go for non-critical on-orbit burns. The engine will be used for deorbit</p>
<ul style="list-style-type: none"> ● Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'M' Xdcrs on display SM 87 HYD THERMAL 	<p>1 HYD sys temps HYD sys 1 Accumulator pressure</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>	
<p>(A14)</p> <ul style="list-style-type: none"> ● RCS/OMS HTR OMS CRSFD LINES (two) - AUTO 	<p>Partial insight into OMS CRSFD Line Htr ops</p>	
<p>2 LOMS no-go for on-orbit burns</p>	<p>L OMS Fu Inj T</p>	

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
(R2) If < 3 hrs since APU shutdn: • APU FUEL PUMP/MLV COOL (two) - AUTO	APU Fuel Pump temps	② GPC capability to monitor HYD Accumulator pressure lost for sys 2
(A12) • Cycle APU HTR TK/FU LINE/H2O SYS 2A,2B - AUTO (12 min), OFF (48 min) • APU HTR TK/FU LINE/H2O SYS 3A,3B - AUTO	APU sys temps (Htr mon)	③ Loss of fuel injector temperature is no-go for non-critical on-orbit burns. The engine will be used for deorbit
• Perform Circ Pump Seq procedures for Circ Pump 2, CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1 and SIMULTANEOUS CIRC PUMP ON/GPC OPERATION APU/HYD SSR-2	HYD sys pressures, and seq discretes	
• Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'M' Xdcrs on display SM 87 HYD THERMAL	2 HYD sys temps HYD sys 2 Accumulator pressure	
(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	

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

ACTIONS	MEASUREMENT LOSS	NOTES
<p>(A14)</p> <ul style="list-style-type: none"> RCS/OMS HTR OMS CRSFD LINES - A AUTO, B AUTO 	<p>OMS/RCS Htr monitoring temps</p>	<p>① GPC capability to monitor HYD Accumulator pressure lost for sys 3</p>
<p>(A12)</p> <ul style="list-style-type: none"> Cycle APU HTR TK/FU LINE/H2O SYS 3A,3B - AUTO (12 min), OFF (48 min) 	<p>APU sys temps (Htr mon)</p>	
<ul style="list-style-type: none"> Perform Circ Pump Seq procedures for Circ Pump 3, CIRC PUMP PRESS XDCR FAILURE WORKAROUND <u>APU/HYD SSR-1</u> and <u>SIMULTANEOUS CIRC PUMP ON/GPC OPERATION APU/HYD SSR-2</u> 	<p>HYD sys pressures, and seq discretes</p>	
<ul style="list-style-type: none"> Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-3</u>, for 'M' Xdcrs on display SM 87 HYD THERMAL 	<p>1 HYD sys temps HYD sys 3 Accumulator pressure</p>	

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

ACTIONS	MEASUREMENT LOSS	NOTES
<p>If on PCS Sys 1:</p> <ul style="list-style-type: none"> Perform RECONFIG TO ALT PCS SYS, <u>ECLS SSR-3</u> 	<p>Most PCS 1 measurements</p>	<p>① Turn on both Cabin Fans for sleep</p>
<p>1 (L1)</p> <ul style="list-style-type: none"> Monitor Cabin Fan by feel and streamers During sleep periods: CABIN FAN A,B (two) - ON 	<p>Cab Fan ΔP</p>	<p>② C/W channels 14,34,54,104,114 also lost; but high limit-sensed only</p>
<p>2 (R13U)</p> <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 	<p>PPO2 A Cab Fan ΔP</p>	<p>③ WST TK will be dumped by time (= 2%/min) to provide ullage to make EOM, MCC will provide the time</p>
<ul style="list-style-type: none"> Use display SM 76 COMM/RCDR for PL RCDR status 	<p>(A1R) PL Rcdr Mode tb lost logic</p>	
<p>(R15:C)</p> <ul style="list-style-type: none"> cb MNB KU ANT HTR - op 	<p>Ku Gyro temp monitoring</p>	
<p>3</p> <ul style="list-style-type: none"> MCC about performing WASTE H2O DUMP 	<p>Waste Qty 1</p>	
	<p>Sply H2O Qty A</p>	

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

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 F3,4 jets</p> <ul style="list-style-type: none"> ● F3L ITEM 10 EXEC (*) ● F4R ITEM 14 EXEC (*) ● F3U ITEM 18 EXEC (*) ● F3D ITEM 24 EXEC (*) ● F4D ITEM 28 EXEC (*) ● F3F ITEM 32 EXEC (*) <ul style="list-style-type: none"> ● Reselect auto deselected jets (2) <p>Override Manf vlv status to CL for F3,4</p> <p>Manifolds:</p> <p>OVRD MANF VLVS</p> <ul style="list-style-type: none"> ● F3 ITEM 42 EXEC (CL) ● F4 ITEM 43 EXEC (CL) 	<p>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</p>	<p>① (O3) FWD RCS OXID He TK PRESS and FWD RCS FUEL PRPLT TK PRESS ind on meter is lost</p> <p>② Auto overpressure lost for Fwd RCS Oxidizer Dual Reg failure</p> <p>③ C/W param 24,64,84 also lost, but high limit-sensed only</p>
<p>(O8)</p> <ul style="list-style-type: none"> ● FWD RCS MANF ISOL 5 - CL (tb-CL), then GPC 		
<ul style="list-style-type: none"> ● Perform , LOSS OF VERNIER (ORB OPS, RCS) 		
<p>GNC SYS SUMM 2</p> <ul style="list-style-type: none"> ● Monitor FWD RCS He ΔP for leaks. If FWD RCS leak suspected, secure sys and call MCC 	<p>2 Fwd RCS Tk and Manf Press and Qty (Fwd leak detection)</p>	
<p>If on PCS SYS 2:</p> <ul style="list-style-type: none"> ● Perform RECONFIG TO ALT PCS SYS, ECLS SSR-3 	<p>Most PCS 2 measurements</p>	
<p>(R13U)</p> <ul style="list-style-type: none"> ● C/W PARAM SEL tw (three) - 004 ● C/W PARAM - INH ● C/WPARAM SEL tw (three) - 016 ● C/W PARAM - INH ● C/WPARAM SEL tw (three) - 044 ● C/W PARAM - INH ● C/WPARAM SEL tw (three) - 105 ● C/W PARAM - INH ● C/WPARAM SEL tw (three) - 106 ● C/WPARAM - INH ● C/WPARAM SEL tw (three) - > 119 	<p>3 Cab Press</p> <p>FRCS Fu Tk UII P</p> <p>PPO2 B</p> <p>H2O Pump P1</p> <p>Freon Flow 1</p>	
<ul style="list-style-type: none"> ● Use display SM 76 COMM/RCDR for Ops RCDRS status 	<p>(A1R) Ops Rcdrs 1(2) Mode tb (two) logic</p>	
<p>(R12L)</p> <ul style="list-style-type: none"> ● SPLY H2O XOVR VLV - OP 	<p>Sply H2O Qty B,D</p>	
<p>SM 66 ENVIRONMENT</p> <ul style="list-style-type: none"> ● Monitor AIRLK P and dP/dT for cabin integrity on-orbit 	<p>Cabin Press Snsr</p>	

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

ACTIONS	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">SM 66 ENVIRONMENT</div> <ul style="list-style-type: none"> ● Monitor CABIN PRESS for cabin leaks on-orbit 	
(R13U) <ul style="list-style-type: none"> ● 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 	

MEASUREMENT LOSS	
	Cabin dP/dT
2	H2O Pump P2
	Freon Flow 2

NOTES
① FWD RCS quantities in PASS and BFS lost
② C/W params 51,71,94 are also lost, but high limit-sensed only

116

**COMM SSR-20
O/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 (*) <ul style="list-style-type: none"> • Reselect auto deselected jets (2) <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 (O3) FWD RCS OXID PRPLT TK PRESS and FWD RCS FUEL He TK PRESS ind on meter is lost</p> <p>③ Auto overpressure protection lost for Fwd RCS Fuel Dual Reg failure</p>
<p>GNC SYS SUMM 2</p> <ul style="list-style-type: none"> • Monitor FWD RCS He ΔP for leaks. If FWD RCS leak suspected, secure sys and call MCC 	<p>3 Fwd RCS TK and Manf Press and Qty (Fwd leak detection)</p>	
<p>(R13U)</p> <ul style="list-style-type: none"> • C/WPARAM SEL tw (three) - 006 • C/WPARAM - INH • C/WPARAM SEL tw (three) - > 119 	<p>Fwd RCS OX Tk ULL P</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: 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 (*) • Reselect auto deselected jets (2) <p>Override Manf vlv status to CL for L1,2 Manifolds:</p> <p>OVRD MANF VLVS</p> <ul style="list-style-type: none"> • L1 ITEM 40 EXEC (CL) • L2 ITEM 41 EXEC (CL) 	<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 (O3) L RCS OXID PRPLT, OXID He TK PRESS and L OMS FUEL He TK PRESS ind on meter is lost</p> <p>③ Auto overpressure protection lost for L RCS Oxidizer Dual Reg failure</p> <p>④ Loss of fuel injector temp is no-go for non-critical 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>3 Left RCS Tank and Manf Press and Qty (leak detection lost)</p>	
<p>GNC SYS SUMM 2</p> <ul style="list-style-type: none"> • Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC 		
<ul style="list-style-type: none"> • During sleep Xfeed from R RCS: • Perform XFEED: R RCS to L RCS (ORB PKT, RCS) 		
<p>(R13U)</p> <ul style="list-style-type: none"> • C/WPARAM SEL tw (three) - 017 • C/WPARAM - INH • C/W PARAM SEL tw (three) - 036 • C/WPARAM - INH • C/W PARAM SEL tw (three) - 056 • C/WPARAM - 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: 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>Override Manf vlv status to CL for L3,4 Manifolds: OVRD MANF VLVS</p> <ul style="list-style-type: none"> • L3 ITEM 42 EXEC (CL) • L4 ITEM 43 EXEC (CL) 	<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 (O3) L RCS FUEL He TK PRESS and L OMS OXID TK PRESS, QTY and (F7) L OMS PC, N2 TK PRESS ind on meters lost</p> <p>3 Auto overpressure protection lost for L RCS Fuel Dual Reg failure</p>
<p>GNC SYS SUMM 2</p> <p>2</p> <ul style="list-style-type: none"> • Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC <p>During sleep Xfeed from R RCS:</p> <ul style="list-style-type: none"> • Perform XFEED: R RCS To L RCS RCS, 10.1 1.10 	<p>3 Left RCS TK and Manf Press and Qty (leak detection lost)</p>	
<ul style="list-style-type: none"> • 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>L OMS PC</p>	
<p>2</p> <p>(R13U)</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 FU 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
O/DSC LOST: OR1**

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 R1,2 jets</p> <ul style="list-style-type: none"> • R2R ITEM 10 EXEC (*) • R1R ITEM 14 EXEC (*) • R2U ITEM 18 EXEC (*) • R1U ITEM 20 EXEC (*) • R2D ITEM 26 EXEC (*) • R1A ITEM 30 EXEC (*) <ul style="list-style-type: none"> • Reselect auto deselected jets (2) <p>Override Manf vlv status to CL for R1,2 Manifolds:</p> <p>OVRD MANF VLVS</p> <ul style="list-style-type: none"> • R1 ITEM 40 EXEC (CL) • R2 ITEM 41 EXEC (CL) 	<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</p> <p>② (O3) R RCS OXID He TK PRESS and R OMS FUEL He TK PRESS ind on meter lost</p> <p>③ Auto overpressure protection lost for R RCS Oxidizer Dual Reg failure</p> <p>④ Loss of fuel injector temp is no-go for non-critical on-orbit burns. Engine will be used for deorbit</p>
<p>(O7)</p> <ul style="list-style-type: none"> • AFT R RCS MANF ISOL 5 - CL (tb - CL), then GPC <ul style="list-style-type: none"> • Perform LOSS OF VERNIER (ORB OPS, RCS) 		
<p>GNC SYS SUMM 2</p> <ul style="list-style-type: none"> • Monitor R RCS He ΔP for leaks. If R RCS leak suspected, secure sys and call MCC <p>During sleep Xfeed from L RCS:</p> <ul style="list-style-type: none"> • Perform XFEED: R RCS to L RCS RCS, 10.1 1.10 	<p>3 Right RCS Tk and Manf Press and Qty (leak detection lost)</p>	
<p>(R13U)</p> <ul style="list-style-type: none"> • 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>R RCS OX ULL pressure</p> <p>R OMS Fu Tk ULL pressure</p> <p>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 (*) <ul style="list-style-type: none"> • Reselect auto deselected jets (2) <p>Override Manf vlv status to CL for R3, 4 Manifolds:</p> <p>OVRD MANF VLVS</p> <ul style="list-style-type: none"> • R3 ITEM 42 EXEC (CL) • R4 ITEM 43 EXEC (CL) 	<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 (O3) R RCS FUEL He TK PRESS and ROMS OXIDE, QTY and (F7) ROMS Pc, N2 TK PRESS ind on meter is lost</p> <p>③ Auto overpressure protection lost for R RCS fuel dual reg failure</p>
<p>GNC SYS SYMM 2</p> <p>2</p> <ul style="list-style-type: none"> • Monitor R RCS He ΔP for leaks. If R RCS leak suspected, secure sys and call MCC <p>During sleep Xfeed from L RCS</p> <ul style="list-style-type: none"> • Perform XFEED: L RCS TO R RCS RCS 10.1 1.11 	<p>3 Right RCS Tank and Manf Press and Qty (leak detection lost)</p>	
<p>2</p> <ul style="list-style-type: none"> • 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>R OMS PC</p>	
<p>(R13U)</p> <p>2</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>2 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	
(A14)	<ul style="list-style-type: none"> • RCS/OMS HTRS CRSFD LINES (two) - AUTO
When reqd:	<ul style="list-style-type: none"> • Perform FUEL CELL PURGE - MANUAL (ORB OPS, <u>EPS</u>) (Cue Card) (Assume SM 2 not available when using cue card)
(A12)	<ul style="list-style-type: none"> • APU HTR TK/FU LINE/H2O (six) - AUTO
(R13U)	<ul style="list-style-type: none"> • C/W PARAM SEL tw (three) - 062 • C/W PARAM - INH • C/W PARAM SEL tw (three) - > 119
	<ul style="list-style-type: none"> • Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, <u>APU/HYD SSR-3</u> for 'L' Xdcrs on display SM 87 HYD THERMAL
If FLASH EVAP CNTLR PRI B enabled:	<ul style="list-style-type: none"> • Perform FES RESTART <u>ECLS, SSR-5</u>, using PRI A
	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> MCC daily to update N2 qty for ORB PKT C/L Nomengraph

2

MEASUREMENT LOSS	
	OMS/RCS Htr monitoring temps
1	FC Purge Line temps
	APU Pump temps (Htr mon)
	FC1 Stack temp
	HYD sys temps
	Most FES Feedline A Htr measurements
	N2 Qty (two) 1,2

NOTES	
1	Causes loss of FC Auto purge capability
2	C/W params 1,21,41 are lost also, but high limit-sensed only

COMM SSR-26
OI DSC LOST: OM2

ACTIONS	MEASUREMENT LOSS	NOTES
<p>(A14)</p> <ul style="list-style-type: none"> ● RCS/OMS HTR OMS CRSFD LINES - A AUTO, B AUTO 	<p>OMS/RCS Htr monitoring temps</p>	<p>① C/W params 11,31, 61,72,82 are lost also, but high limit-sensed only</p>
<p>(R13U)</p> <ul style="list-style-type: none"> ● 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) - > 119 	<p>FC 2,3 Stack Temp</p>	<p>② GPC capability to monitor HYD Accumulator pressure lost for all 3 systems</p> <p>③ Causes loss of FC Auto purge capability</p>
<ul style="list-style-type: none"> ● Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND. APU/ HYD SSR-3, for 'L' Xdcrs on display SM 87 HYD THERMAL 	<p>2 HYD sys temps HYD sys 1,2,3 Accumulator pressures</p>	
<p>When reqd:</p> <ul style="list-style-type: none"> ● Perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS) (Cue Card) (assumes SM 2 not available when using Cue Card) 	<p>3 FC Purge Line temps</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>If Topping Evap enabled: (L1)</p> <ul style="list-style-type: none"> ● TOP EVAP HTR DUCT - A/B 	<p>Fwd, Aft Topping Duct Htr measurements</p>	
<p>If High Load Evap enabled: (L1)</p> <ul style="list-style-type: none"> ● HI LOAD DUCT HTR - A/B 	<p>HI Load Outbd Duct Htr measurements</p>	
<ul style="list-style-type: none"> ●/MCC daily to update N2 qty for ORB PKT C/L Nomengraph 	<p>N2 Qty (two) 1,2</p>	

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

ACTIONS	MEASUREMENT LOSS	NOTES
<p>(A14) ● RCS/OMS HTR OMS CRSFD LINES (two) - A AUTO (B AUTO)</p>	<p>OMS/RCS Htr monitoring temps</p>	<p>① CW params 11,31, 61,72,82 are lost also, but high limit-sensed only</p>
<p>(R2) If < 3 hrs since APU shutdn, ● APU FUEL PUMP/VLV COOL A,B (two) - AUTO</p>	<p>APU Fuel sys temps</p>	
<p>(A12) ● Cycle APU HTR TK/FU LINE/H2O SYS 1A,1B - AUTO (12 min), OFF (48 min)</p>	<p>APU temps (Htr mon)</p>	
<p>● Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD 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, APU/HYD SSR-1 for Circ Pump 1</p>	<p>HYD Circ Pump 1 press</p>	
<p>(R13U) ● 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) - 099 ● C/W PARAM - INH ● C/W PARAM SEL tw (three) - > 119</p>	<p>APS He Tk P C MPS He REG P C HYD B/U P 1</p>	
<p>If High Load Evap enabled (L1) ● HI LOAD DUCT HTR - A/B</p>	<p>Hi Load Inbd Duct Htr measurement</p>	

1

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

ACTIONS	MEASUREMENT LOSS	NOTES
<p>(A14)</p> <ul style="list-style-type: none"> ● RCS/OMS HTR-OMS CRSFD LINES - A AUTO, B AUTO <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>OMS/RCS Htr monitoring temps</p>	<p>① C/W params 18,48,69 are lost also, but high limit-sensed only</p>
<p>(A12)</p> <ul style="list-style-type: none"> ● Cycle APU HTR TK/FU LINE/H2O SYS 2A,2B - AUTO (12 min), OFF (48 min) ● APU HTR TK/FU LINE/H2O SYS 3A, 3B - AUTO 	<p>APU sys temps (htr MON)</p>	
<ul style="list-style-type: none"> ● Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'L' Xdcrs on display SM 87 HYD THERMAL 	<p>HYD sys temps</p>	
<ul style="list-style-type: none"> ● Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1, for Circ Pump 2 	<p>HYD Circ Pump 2 press</p>	
<p>(R13U)</p> <ul style="list-style-type: none"> ● 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) - 109 ● C/W PARAM - INH ● C/W PARAM SEL tw (three) - >119 	<p>EVAP OUT T 1</p> <p>MPS He Tk P L</p> <p>MPS He REG P L</p> <p>HYD B/U P 2</p>	
<p>(O7)</p> <ul style="list-style-type: none"> ● AFT R RCS MANF ISOL 5 - CL (tb-CL), then GPC 	<p>Jet injector temps (Jet leak RM detection)</p>	
<ul style="list-style-type: none"> ● Perform LOSS OF VERNIER (ORB OPS, RCS) 		

**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
(A12) ● Cycle APU HTR TK/FU LINE/H2O SYS 3A, 3B - AUTO (12 min), OFF (48 min)	APU Fuel sys temps	② Recoverable by TMBU
● Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1, for Circ Pump 3	HYD Circ Pump 3 press	
1 (R13U) ● C/W PARAM SEL tw (three) - 029 ● C/W PARAM - INH PARAM SEL tw (three) - 059 ● C/W PARAM - INH PARAM SEL tw (three) - 117 ● C/W PARAM - INH PARAM SEL tw (three) - > 119	MPS He Tk P R MPS He REG P R EVAP OUT T 2	
● Perform CIRC PUMP TEMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for 'L' xdcrs on display SM 87 HYD THERMAL	HYD sys temps	
	2 APU 3 Fuel Qty (Meter and CRT)	

CREW SYSTEMS

<u>3.1</u>	<u>WCS</u>		
3.1a	LOW OR NO AIRFLOW - URINAL.....		3-4
3.1b	- COMMODE.....		3-6

<u>3.2</u>	<u>OWDA</u>		
3.2a	OWDA FAILS TO DISCONTINUE DISPENSING WATER.....		3-8
3.2b	TO DISPENSE WATER.....		3-9

CREW SYS

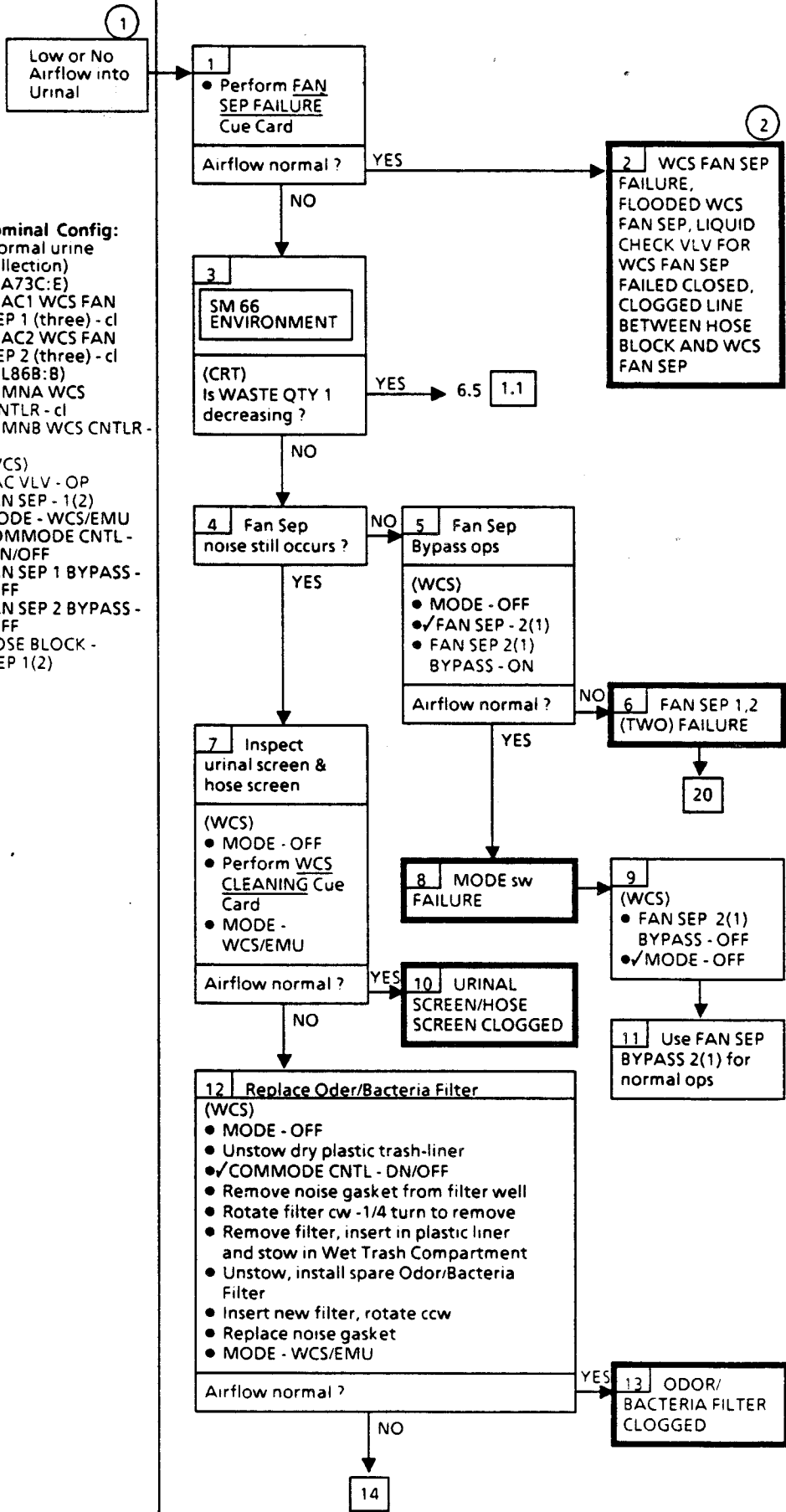
WCS

3.1

CREW SYS

3.1a LOW OR NO AIRFLOW - URINAL

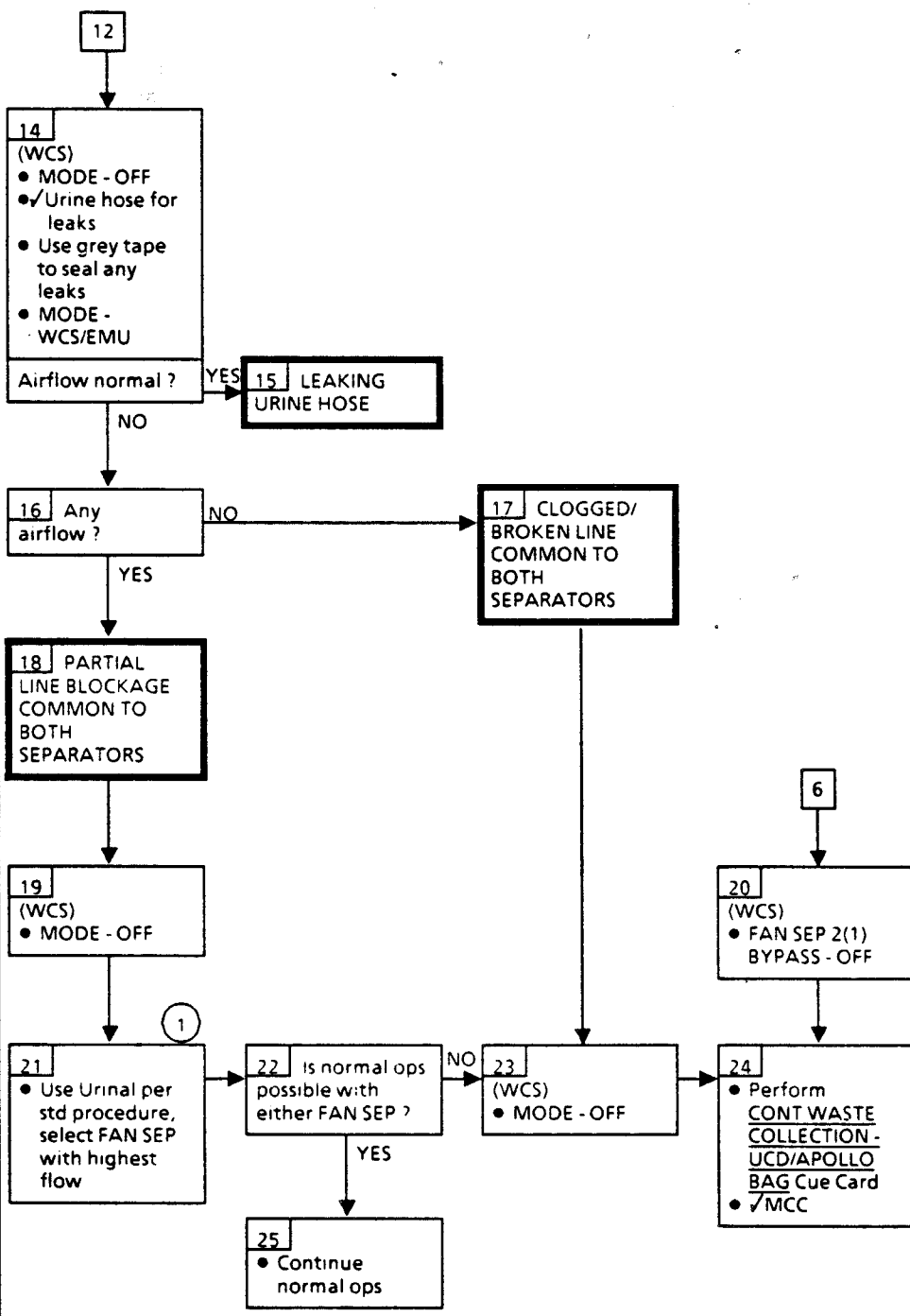
Nominal Config:
 (Normal urine collection)
 (MA73C:E)
 cb AC1 WCS FAN SEP 1 (three) - cl
 cb AC2 WCS FAN SEP 2 (three) - cl
 (ML86B:8)
 cb MNA WCS CNTLR - cl
 cb MNB WCS CNTLR - cl
 (WCS)
 VACVLV - OP
 FAN SEP - 1(2)
 MODE - WCS/EMU
 COMMODE CNTL - DN/OFF
 FAN SEP 1 BYPASS - OFF
 FAN SEP 2 BYPASS - OFF
 HOSE BLOCK - SEP 1(2)



1 Possible to have low airflow and to continue operating in normal mode

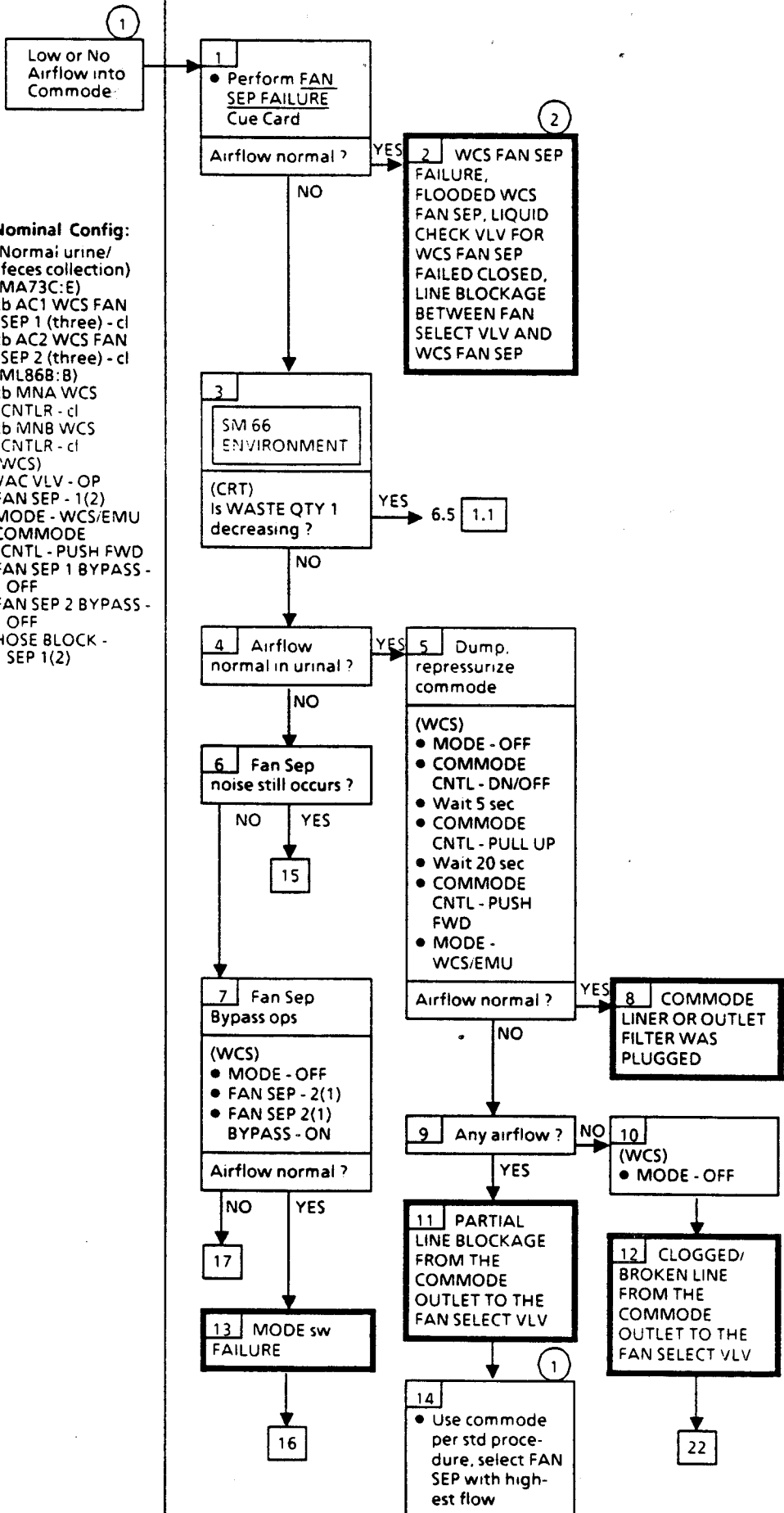
2 /MCC to determine exact failure

CREW SYS 3.1a (Cont)



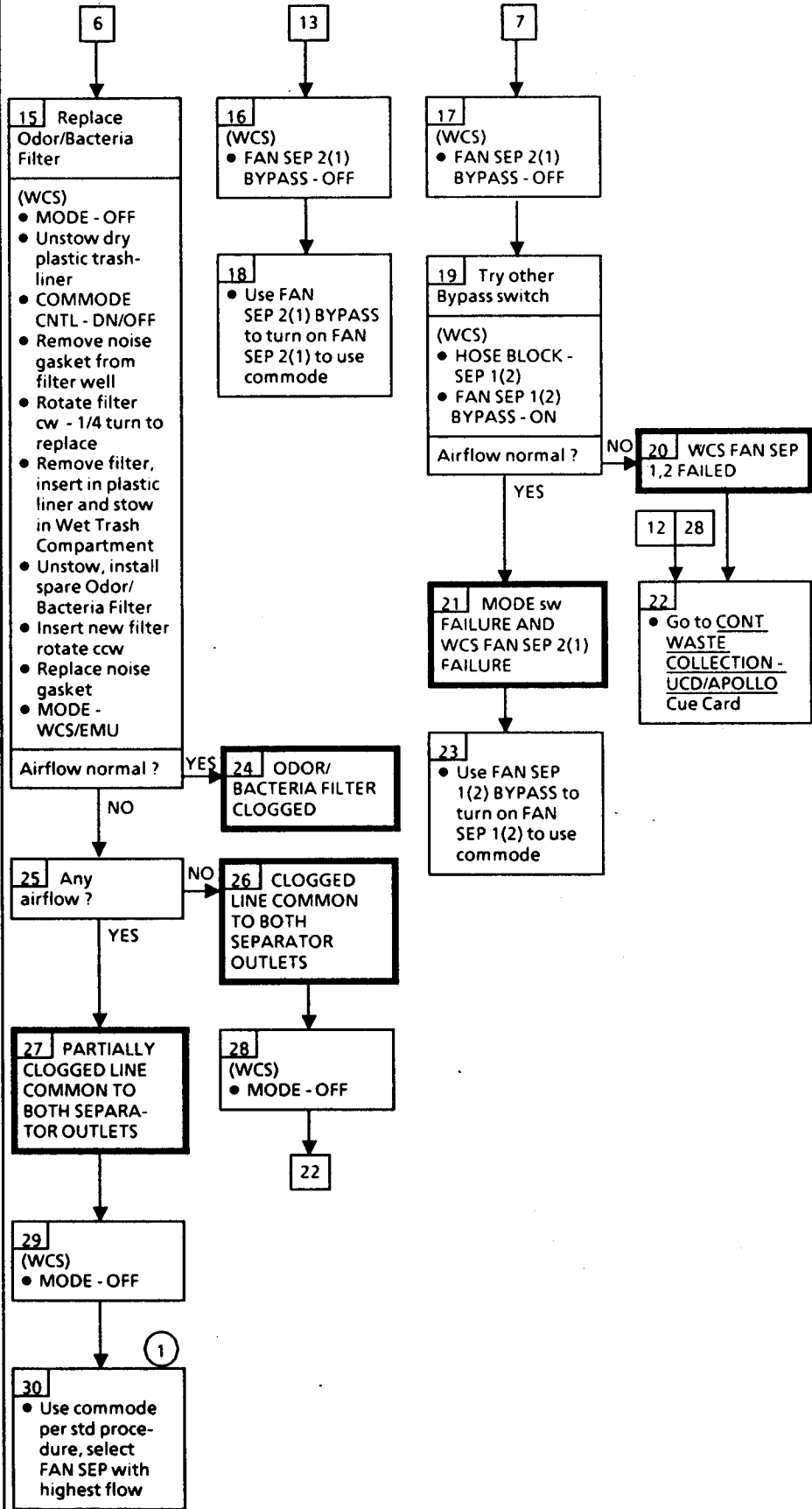
① Possible to have low airflow and to continue operating in normal mode

Nominal Config:
 (Normal urine/
 feces collection)
 (MA73C:E)
 cb AC1 WCS FAN
 SEP 1 (three) - cl
 cb AC2 WCS FAN
 SEP 2 (three) - cl
 (ML868:B)
 cb MNA WCS
 CNTLR - cl
 cb MNB WCS
 CNTLR - cl
 (WCS)
 VAC VLV - OP
 FAN SEP - 1(2)
 MODE - WCS/EMU
 COMMODE
 CNTL - PUSH FWD
 FAN SEP 1 BYPASS -
 OFF
 FAN SEP 2 BYPASS -
 OFF
 HOSE BLOCK -
 SEP 1(2)



① Possible to have low airflow and to continue operating in normal mode
 ② ✓MCC to determine exact failure

CREW SYS 3.1b (Cont)



① Possible to have low airflow and to continue operating in normal mode

OWDA

3.2

131

OWDA

3.2

CREW SYS

3.2a OWDA FAILS TO DISCONTINUE DISPENSING WATER

OWDA Fails to Discontinue Dispensing Water

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - OP
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (MO30F)
 DC UTIL PWR
 MNC - ON
 (OWDA)
 AMBIENT/CHILLED
 WTR vlv - AMB
 (CHD)
 PWR - depress
 ✓PWR light - on

1 (OWDA)
 • AMBIENT/
 CHILLED WTR
 vlv - OFF

2 ✓electronics
 • PWR - depress
 • ✓PWR light off
 • AMBIENT/
 CHILLED WTR
 vlv - AMB(CHD)

Any water dispensed?

3 SOLENOID VALVE FAILED OPENED

4 • AMBIENT/
 CHILLED WTR
 vlv - OFF

5
 • Insert a drink container into OWDA
 • PWR - depress,
 ✓PWR light - on
 • H2O Volume sw - 8
 • FILL - depress
 • ✓FILL light - on

Correct amount of water dispensed?

7 TRANSIENT ELECTRONICS SYSTEM FAILURE

6 Continue use of OWDA

• Rehydrate food packages by turning AMBIENT/CHILLED WTR vlv from OFF to AMB(CHD), then
 • AMBIENT/CHILLED WTR vlv - OFF when rehydration complete (visually estimate water quantity)

8 OWDA CONTROL ELECTRONICS FAILURE

9 • PWR - depress
 • ✓PWR light - off

10 Perform bypass water rehydration

• AMBIENT/CHILLED WTR vlv - AMB(CHD)
 • Rehydrate food packages by using BY-PASS vlv
 • Visually estimate water quantity

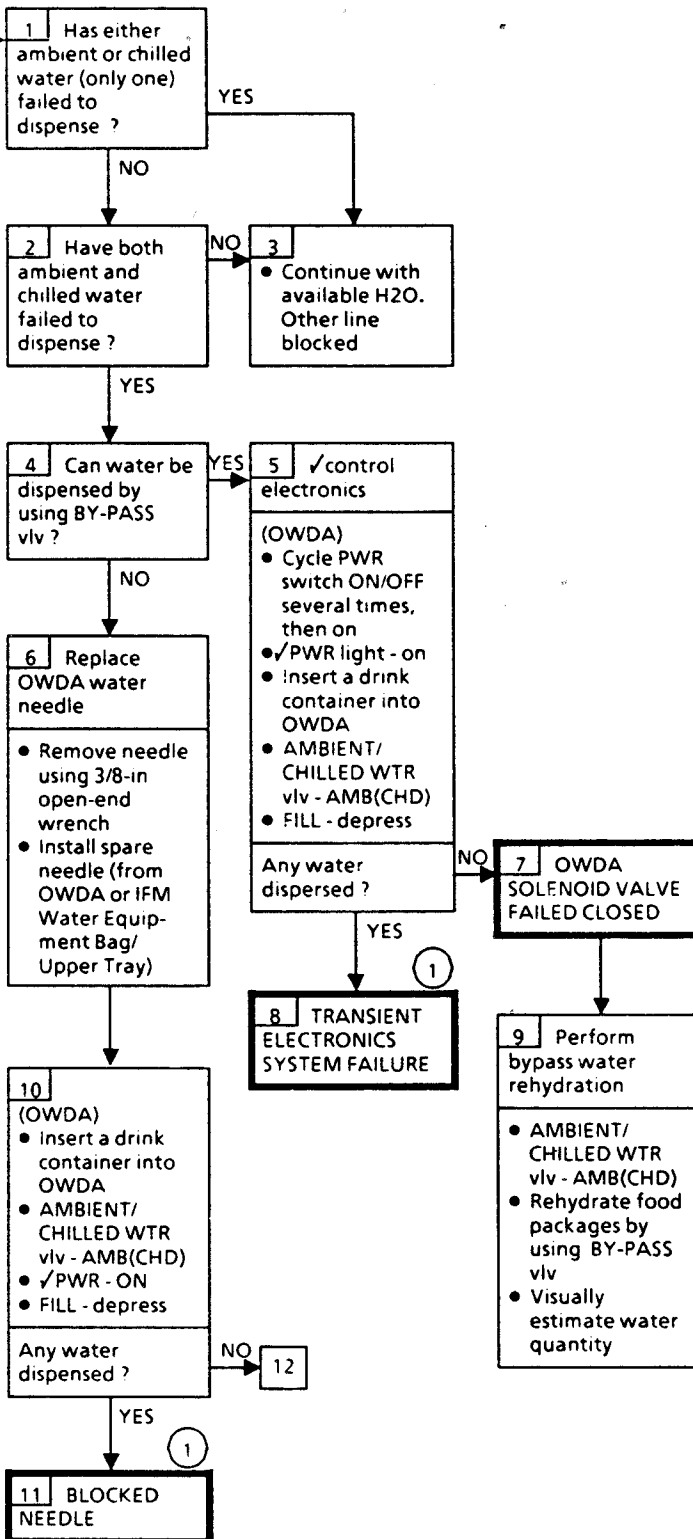
1 Use towel or dry wipe to absorb residual water from leak. If excessive amount, perform IFM FREE FLUID DISPOSAL procedures

2 Continue nominal ops

① Continue nominal use of OWDA

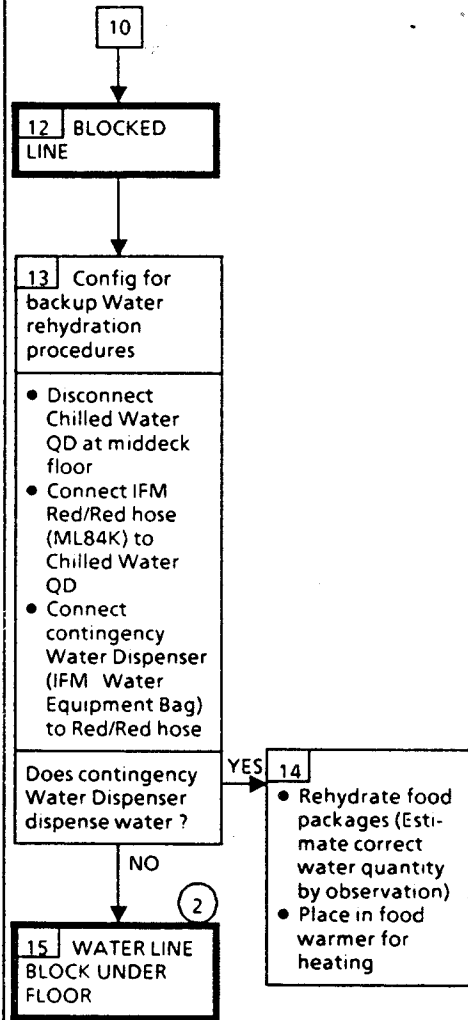
OWDA Fails to Dispense Water

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - OP
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (MO30F)
 DC UTIL PWR MNC -
 ON
 (OWDA)
 AMBIENT/CHILLED
 WTR vlv -
 AMB(CHD)
 PWR - depress
 ✓PWR Light - on

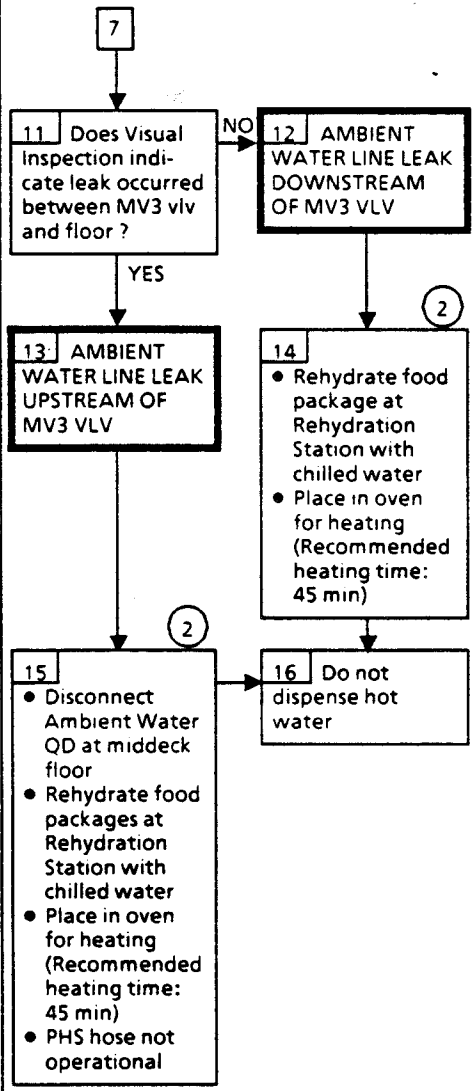


CREW SYS 3.2b (Cont)

② ✓MCC,
describe failure



CREW SYS 3.2b (Cont)

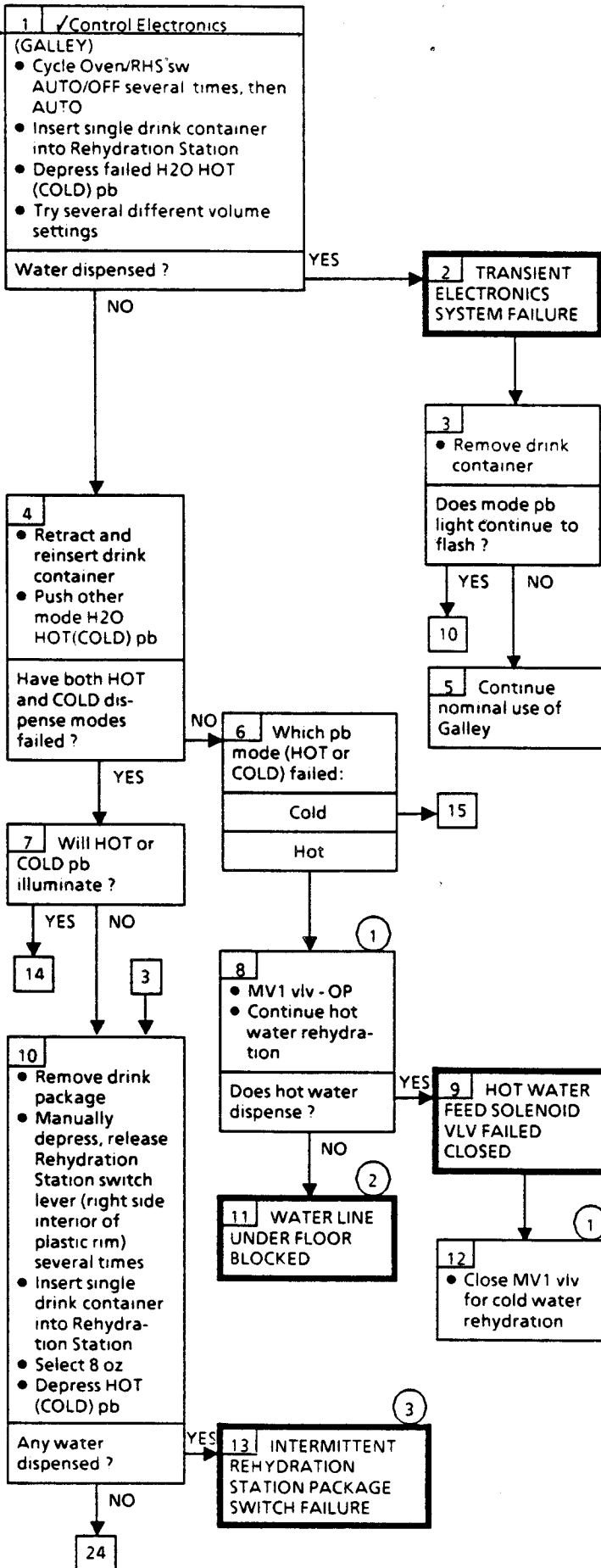


② Use towel or dry wipe to absorb residual water from leak. If excessive amount of water, perform FREE FLUID DISPOSAL (IFM)

3.2c GALLEY H2O DISPENSER FAILS TO DISPENSE WATER

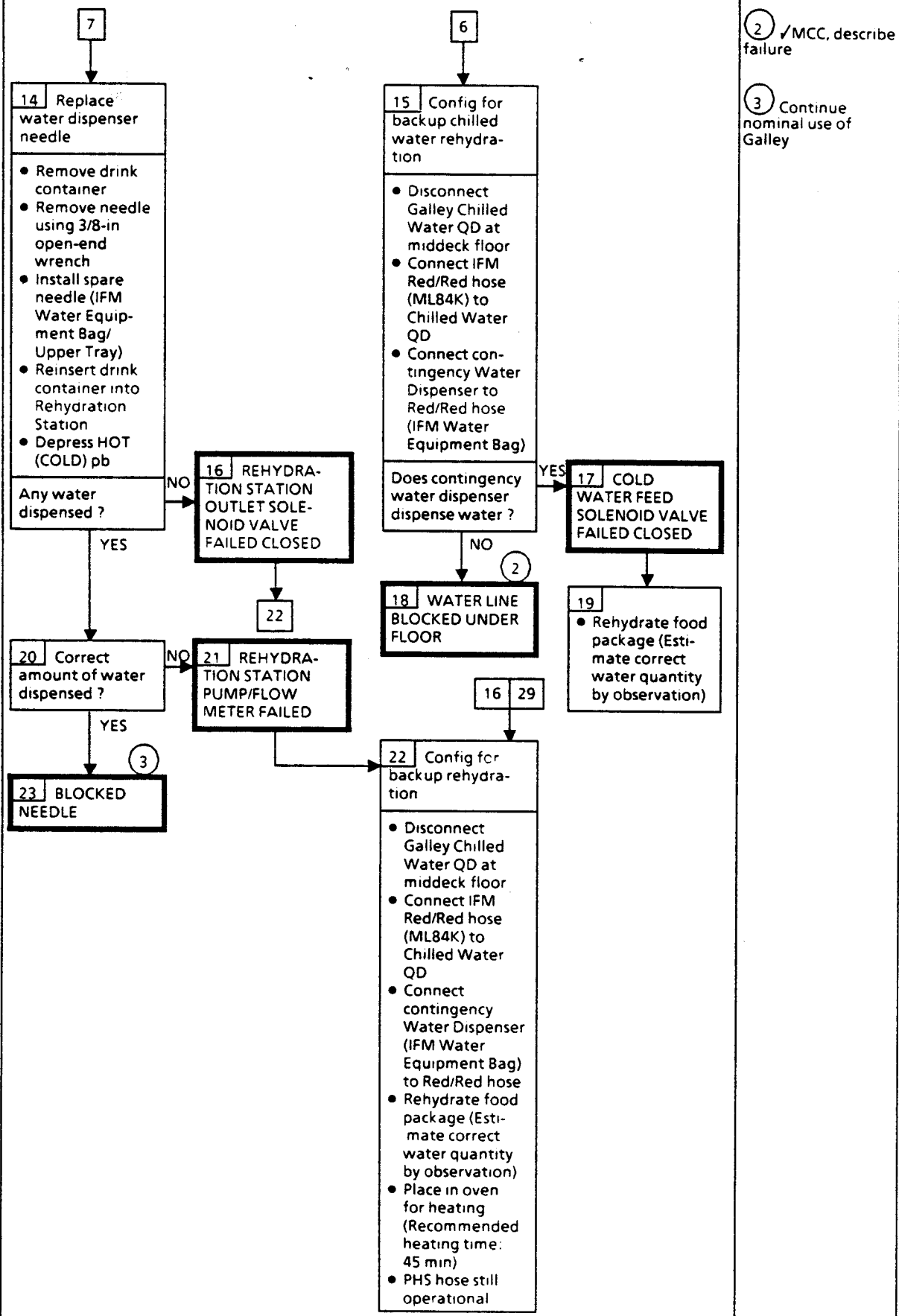
Galley H2O Dispenser Fails to Dispense Water

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - OP
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (ML86B:B)
 cb MNA GALLEY
 OVEN - cl
 cb MNB GALLEY H2O
 Htr - cl
 (GALLEY)
 MV3 vlv - ON
 Oven/RHS - AUTO
 H2O Heaters - AUTO



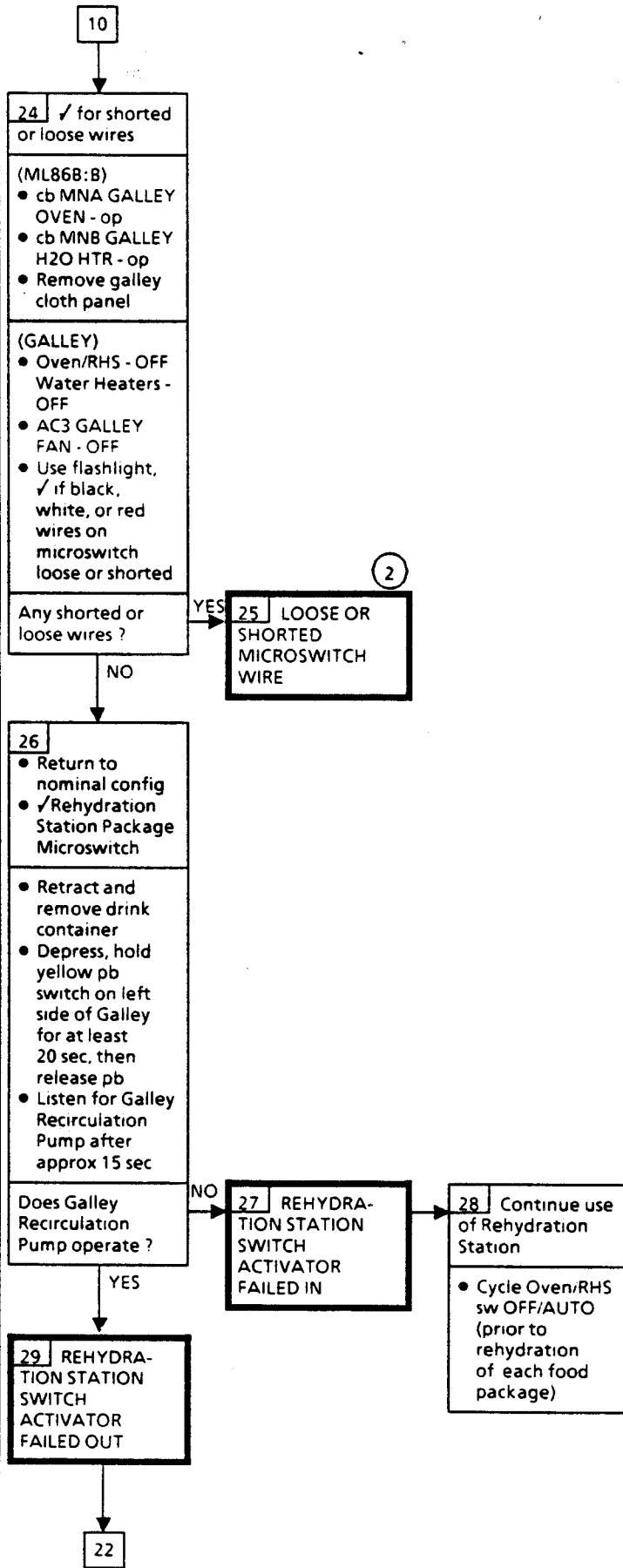
- ① MV1 vlv located behind Telfon cloth pnl; behind metal ridge at top of compartment
- ② √MCC, describe failure
- ③ Continue nominal use of Galley

CREW SYS 3.2c (Cont)



CREW SYS 3.2c (Cont)

② ✓MCC, describe failure

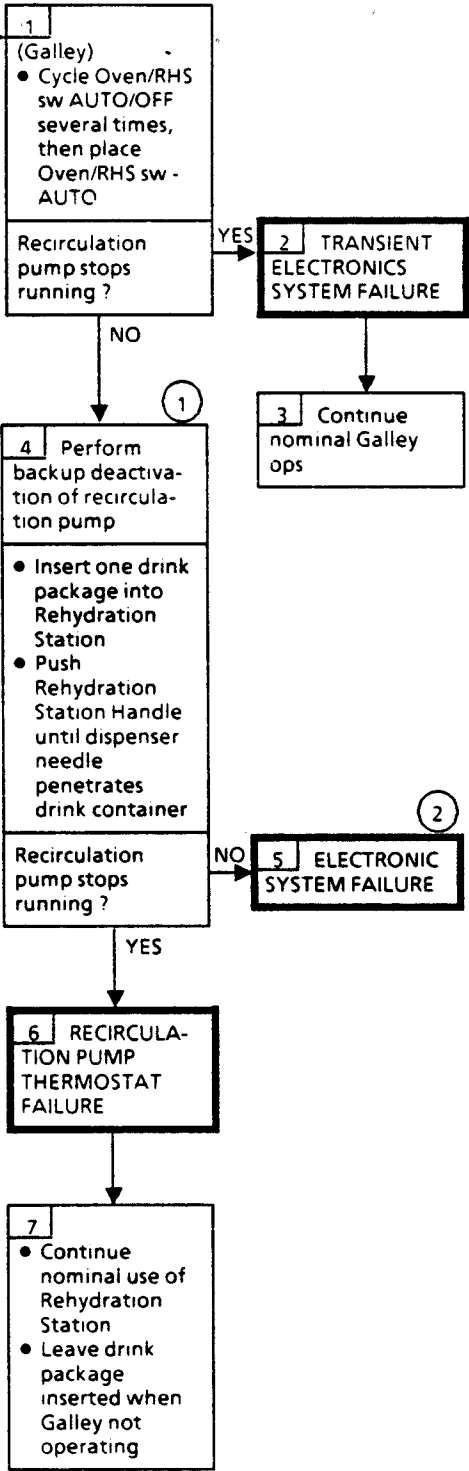


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3.2d GALLEY HOT WATER RECIRCULATION PUMP ON > 1 HR

Galley Hot Water Recirculation Pump Runs Longer Than One Hour

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY SPLY VLV - OP (ML86B:A)
 cb MNC SPLY H2O GALLEY SPLY - cl (ML86B:B)
 cb MNA GALLEY OVEN - cl
 cb MNB GALLEY H2O HTR - cl (GALLEY)
 MV3 vlv - ON
 Oven/RHS - AUTO
 H2O Heaters - AUTO



1 Food package in port prevents normal recirculation pump operation

2 ✓MCC

OWDA

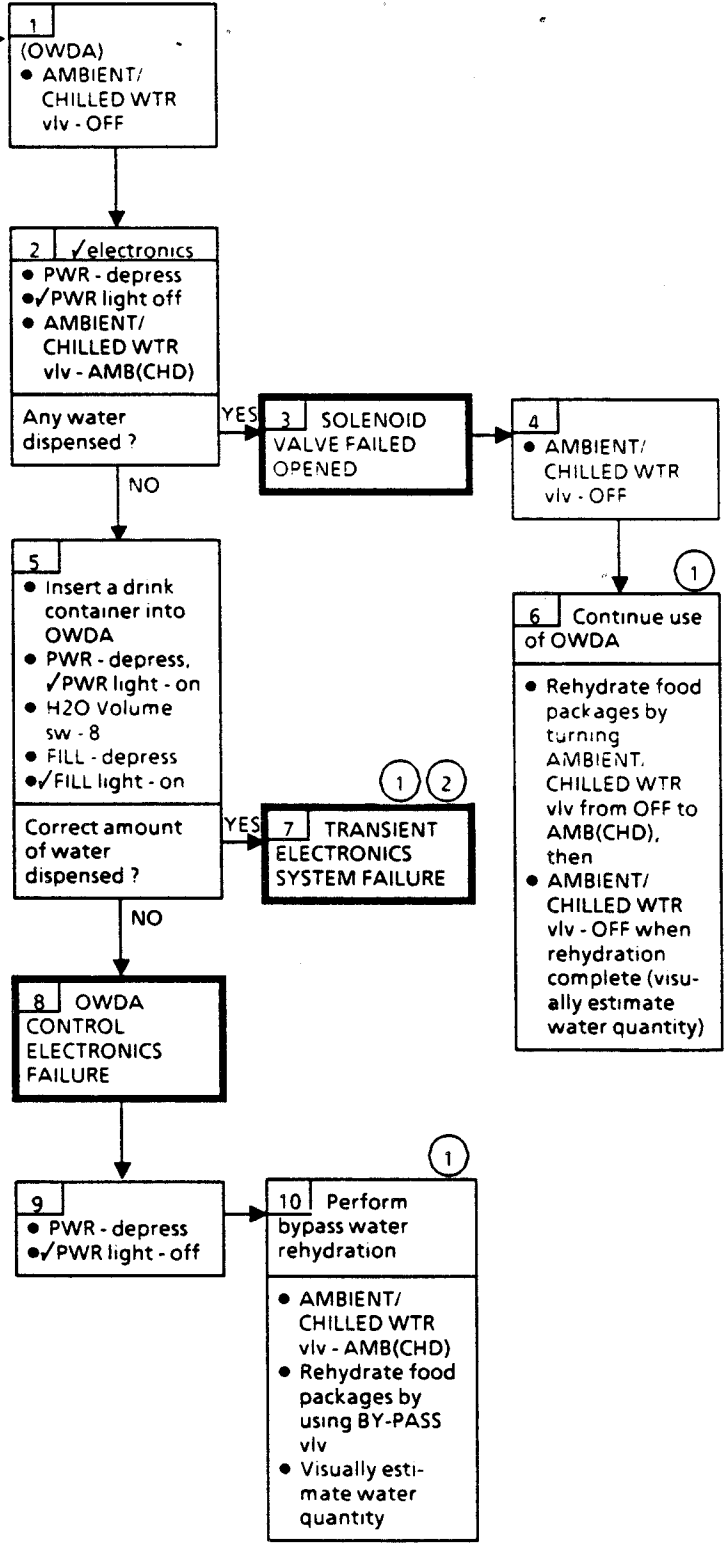
3.3

CREW SYS

3.3a OWDA FAILS TO DISCONTINUE DISPENSING WATER

OWDA Fails to Discontinue Dispensing Water

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - OP
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (MO30F)
 DC UTIL PWR
 MNC - ON
 (OWDA)
 AMBIENT/CHILLED
 WTR vlv - AMB
 (CHD)
 PWR - depress
 ✓PWR light - on



① Use towel or dry wipe to absorb residual water from leak. If excessive amount, perform IFM FREE FLUID DISPOSAL procedures

② Continue nominal ops

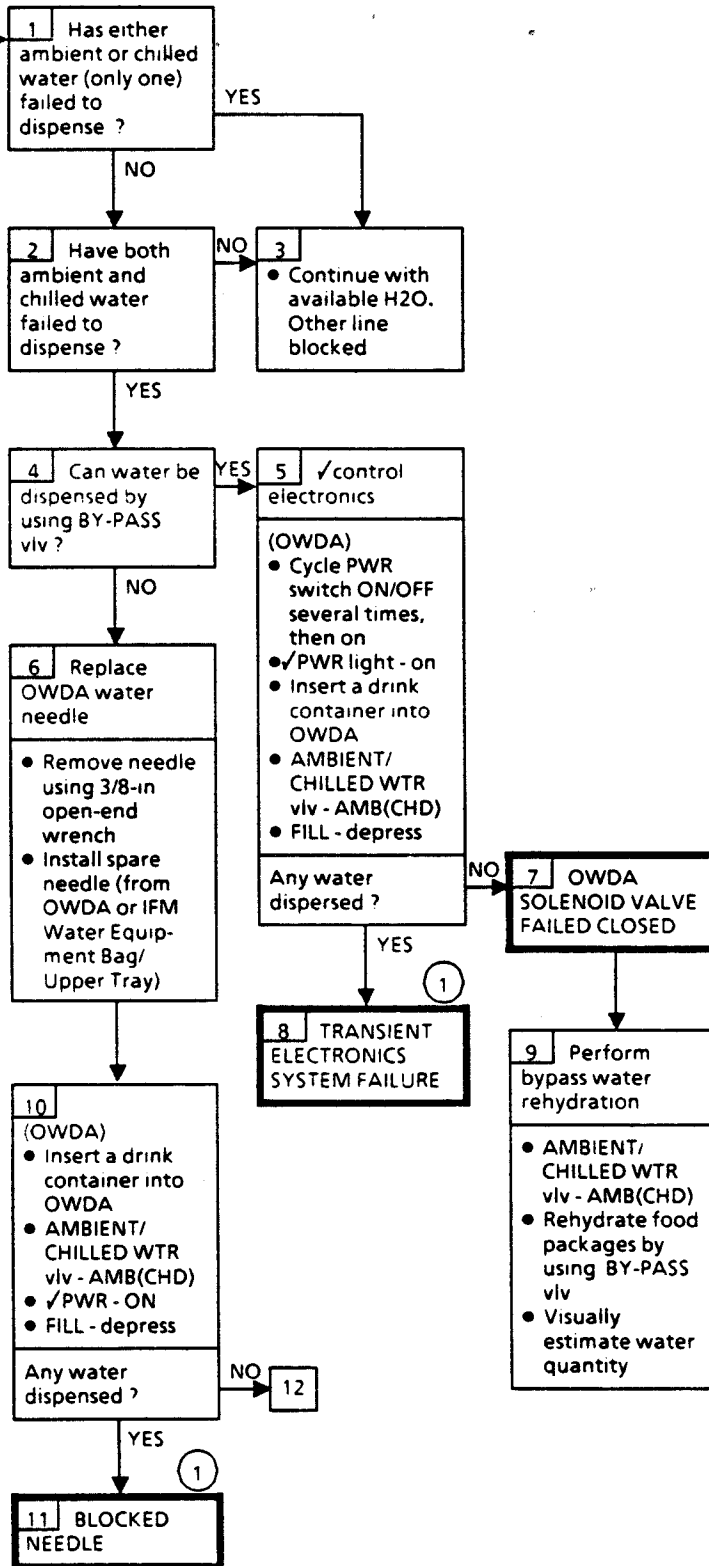
OWDA

3.3

① Continue nominal use of OWDA

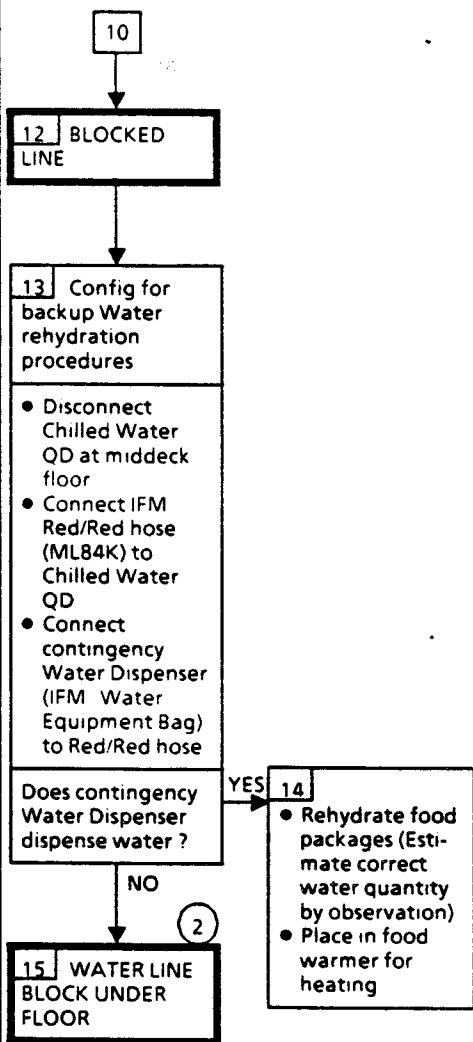
OWDA Fails to Dispense Water

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - OP
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (MO30F)
 DC UTIL PWR MNC -
 ON
 (OWDA)
 AMBIENT/CHILLED
 WTR vlv -
 AMB(CHD)
 PWR - depress
 ✓PWR Light - on



CREW SYS 3.3b (Cont)

② ✓MCC,
describe failure



C/W

<u>4.1</u>	<u>PRIMARY C/W</u>	
4.1a	PRIMARY C/W.....	4-4
4.1b	ALL ANNUN LTS ON EXCEPT BACKUP C/W ALARM.....	4-7
4.1c	NONRESETTABLE MA LT OR TONE.....	4-8
4.1d	PRI C/W SYS ANNUNCIATES FALSE ALARM.....	4-11
<u>4.2</u>	<u>OTHER C/W</u>	
4.2a	NONRESETTABLE BACKUP C/W ALARM LT.....	4-22
4.2b	MA LT & C/W TONE - NO ANNUN LT.....	4-23
4.2c	KLAXON - NO RAPID dP/dT.....	4-27
4.2d	SIREN - NO SMOKE DETN LT.....	4-29
4.2e	PRI C/W SYS FAILS TO ANNUNCIATE OUT-OF-LIMIT PARAM.....	4-30

C/W
4

4.1

C/W

4.1a PRIMARY C/W

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 ltg sys
operational
Smoke detn sys
operational

PRIMARY C/W (F7)

1 MSTR ALARM lts, C/W tone tripped ?

2 PRIMARY C/W ANNUN LT FAILED ON

3 All annun lts except BACKUP C/W ALARM on ?

4 BACKUP C/W ALARM lts on ?

5 Cycle C/W Sys B pwr
(O13:C)
• cb ESS 2CA C/W B - op (MA), then cl
F2(F4,A7U)
• MSTR ALARM pb - off
(F7) C/W PRI C/W lts - off ?

6 C/W SYS B FAILURE

7 TRANSIENT PROBLEM IN C/W SYS B

8 C/W Sys B pwrn
(O13:C)
• cb ESS 2CA C/W B - op (MA)
Capabilities remaining:
Backup C/W limit sensing
Primary C/W limit sensing
C/W Sys A Alarm (MA lts, ACCU tone, MIDDECK SMU byp tone and annun lts)
Items lost:
(F2,F4,A7U,MO52J)
Two of four bulbs in each MA lts
(F7)
Backup C/W Alarm Annun lts cannot be reset
(MO58F)
Sleep station hdst tones
(MO29J)
Emer tones to dedicated speaker coil
Other loss:
Siren for (L1) SMOKE DETN B SNSRS
NOTE
Bkup C/W Alarms must be MSG RESET to prevent masking of subsequent backup C/W alarms

12

1 To extinguish PRIMARY C/W lts, remove bulbs or select (C3) C/W MODE - ACK

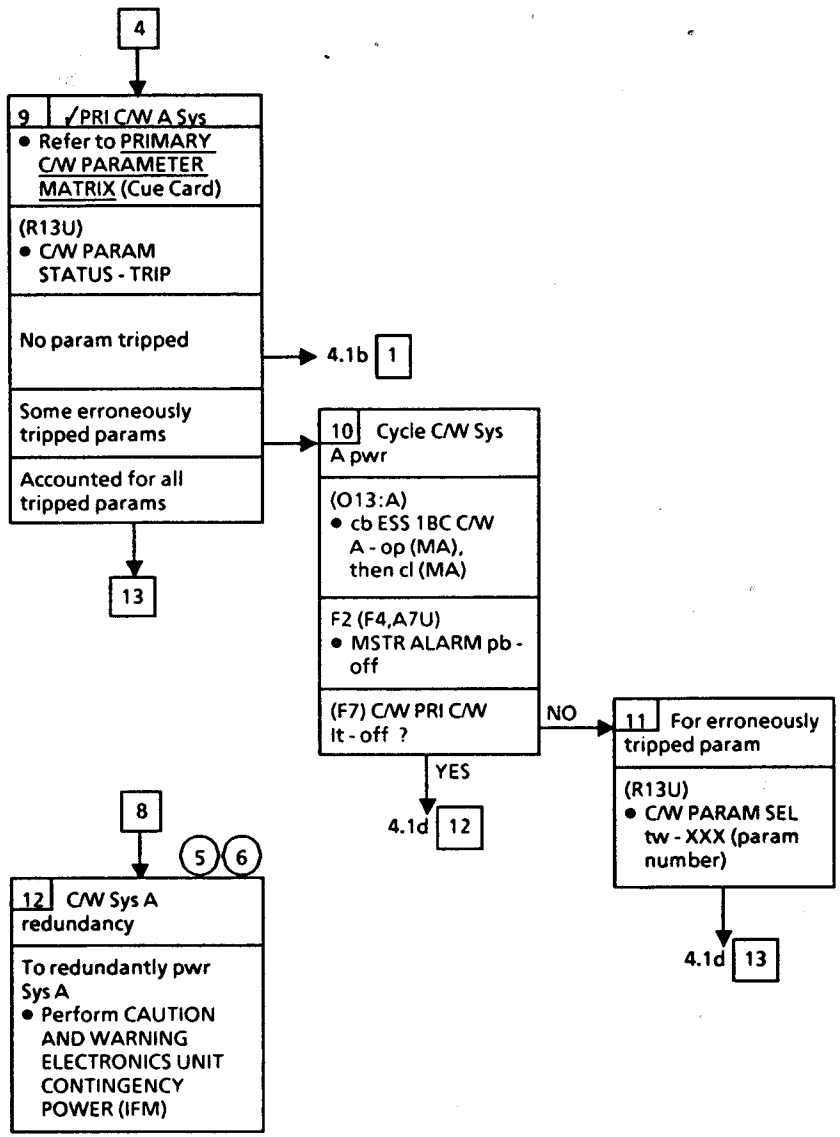
2 BACKUP C/W ALARM lts is not accompanied by fault msg and cannot be MSG RESET

3 All four bulbs in each MA lts will illuminate during lamp test

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

5 Until C/W IFM cables installed, loss of ESS 1BC DA 1 would not generate aural alarm so that Fuel Cell 1 could be safed. FSMs must be continually monitored

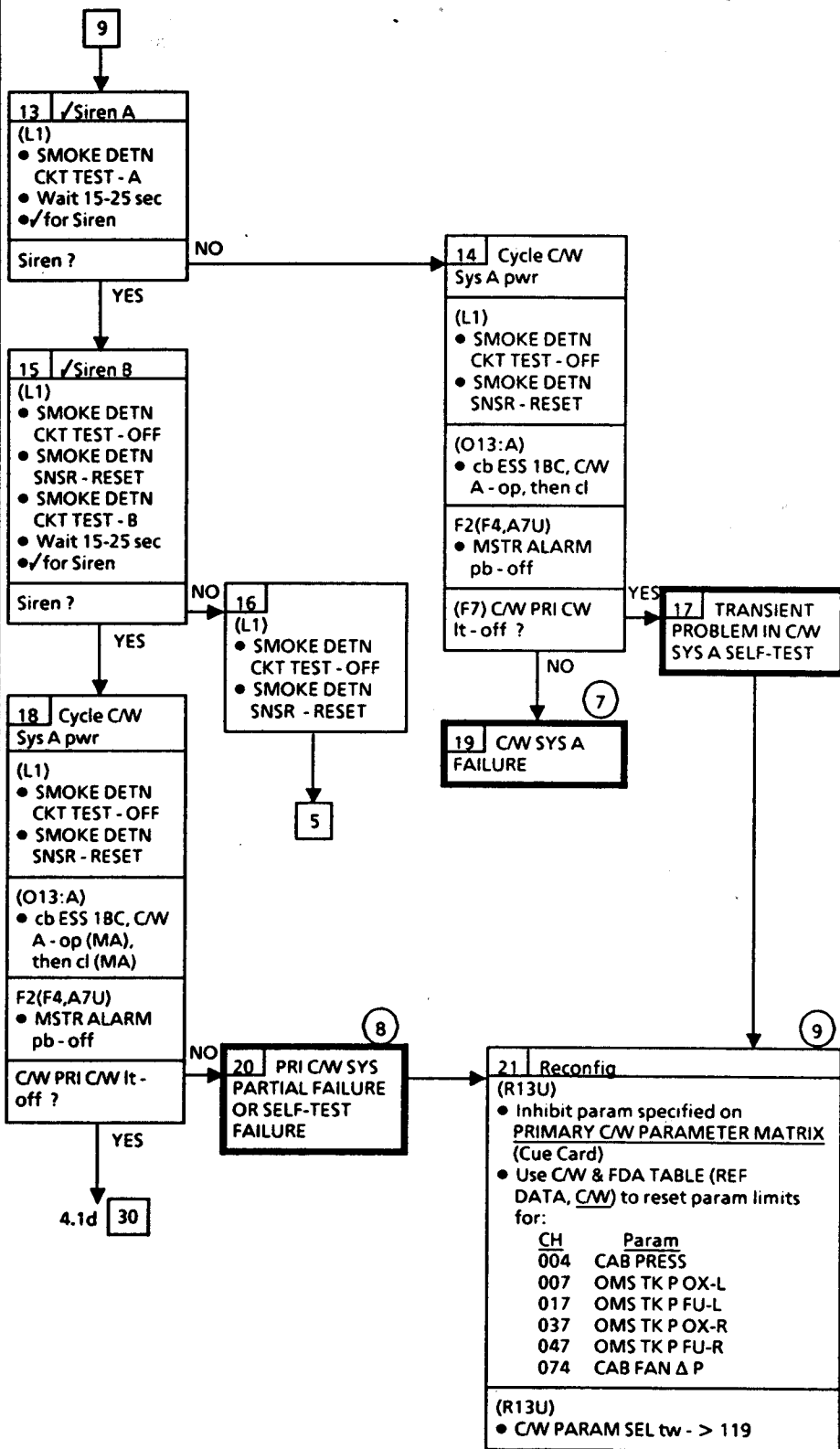
C/W 4.1a (Cont)



5 Until C/W IFM cables installed, loss of ESS 1BC DA1 would not generate an 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

C/W 4.1a (Cont)



7 For any nuisance alarms that cannot be inhibited, use 4.1b 5 to pwrn PRI C/W or use 4.1c 26 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

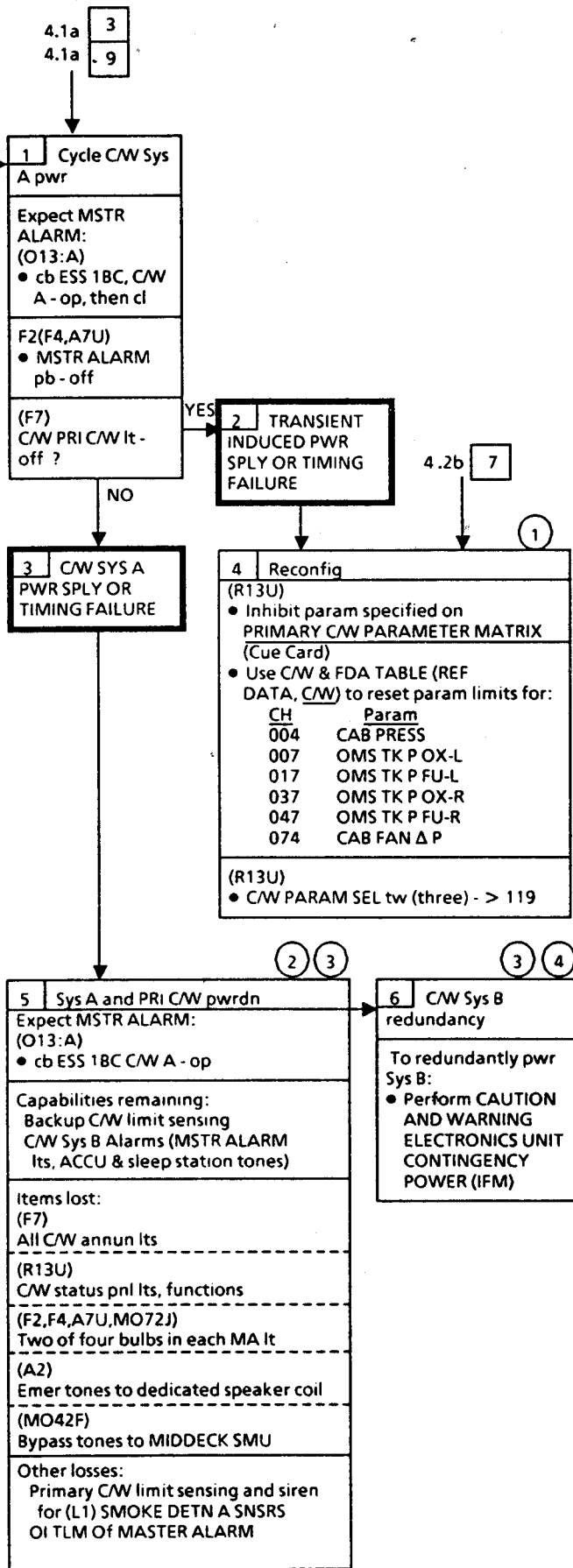
C/W

All Annun Lts On except Backup C/W Alarm

(F7)

Caused by:
C/W Sys A pwr supply failure

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

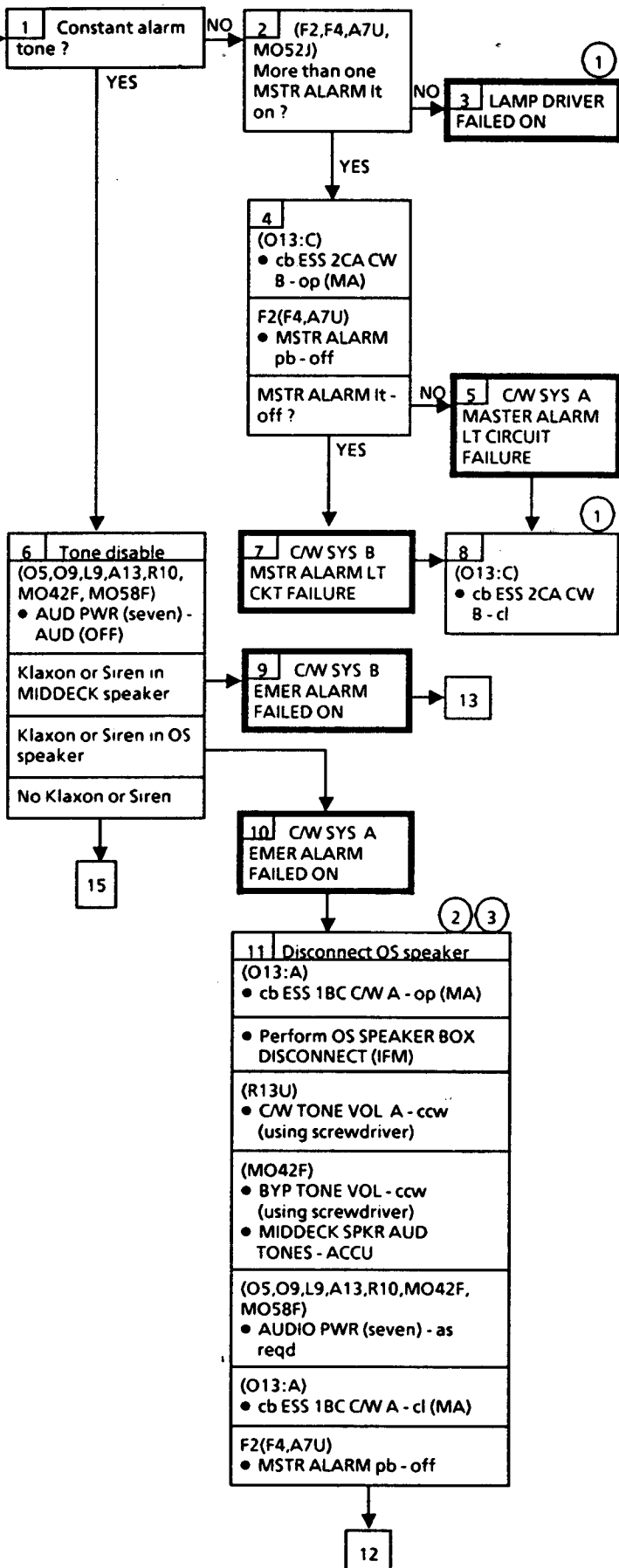


- ① All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed
- ② All four bulbs in each MA It will illuminate during lamp test
- ③ Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed 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

4.1c NONRESETTABLE MA LT OR TONE

MSTR ALARM
(Cannot be reset by depressing any MSTR ALARM pb)

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

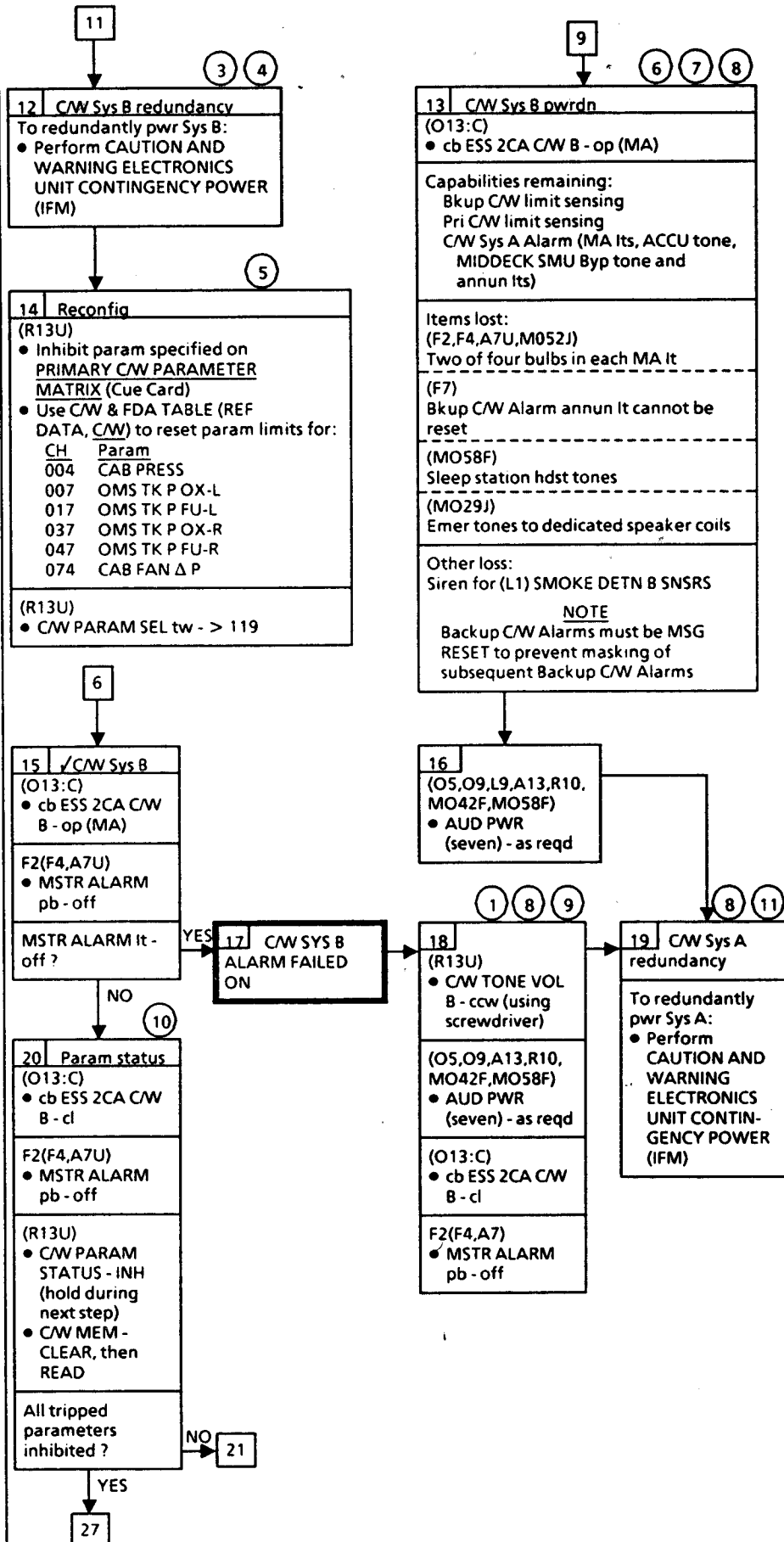


① Illuminated MA lit bulbs are mounted in sealed assy

② PRI CW limit sensing and (F7) annun will still be functional

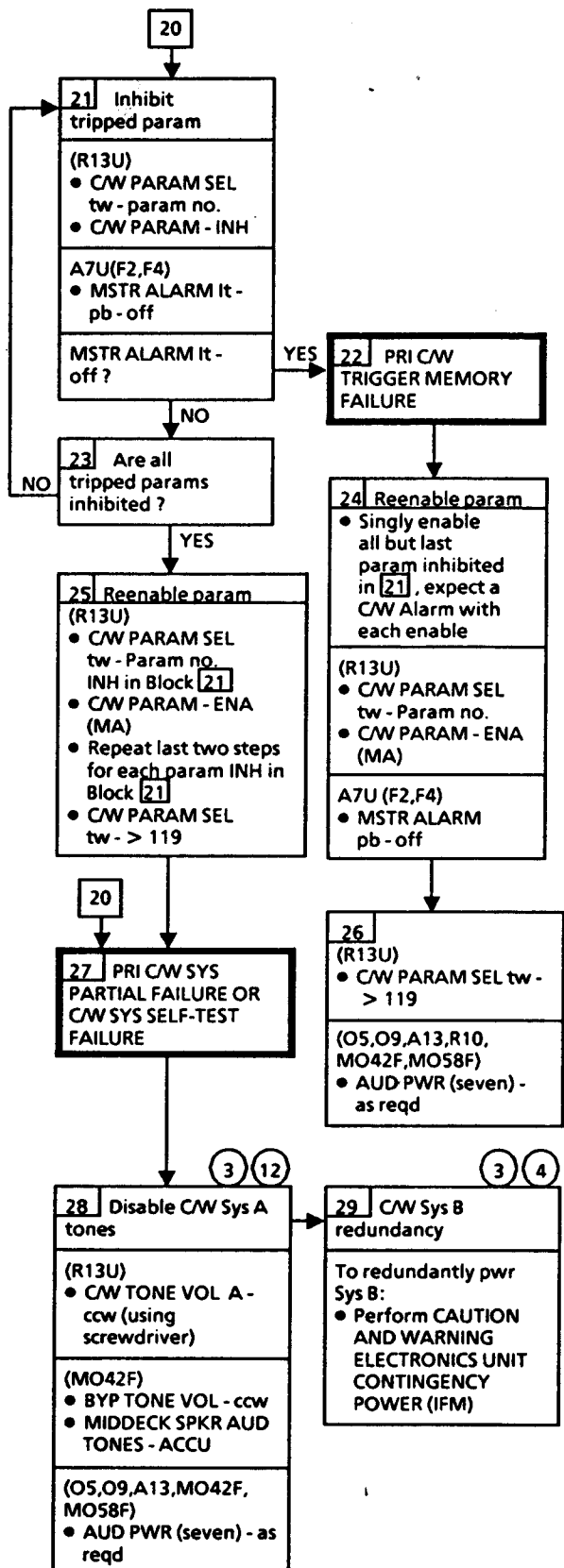
③ Until CW IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

C/W 4.1c (Cont)



- ① Illuminated MA It bulbs are mounted in sealed assy
- 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
- ⑤ All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed
- ⑥ All four bulbs in each MA It will illuminate during lamp test
- ⑦ To extinguish (F7) PRIMARY C/W and BACKUP C/W ALARM lts, remove bulbs or select (C3) C/W MODE - ACK
- ⑧ 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
- ⑨ Lost C/W Sys B alarm tones except for emer tones in Middeck speaker. Sleep Station HdSt has constant tone
- ⑩ Additional lts which light during C/W MEM - READ indicate tripped params that are not inhibited
- ⑪ Redundancy can be verified by opening cb ESS 1BC C/W A (O13:A) and receiving alarm tones

CW 4.1c (Cont)



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

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

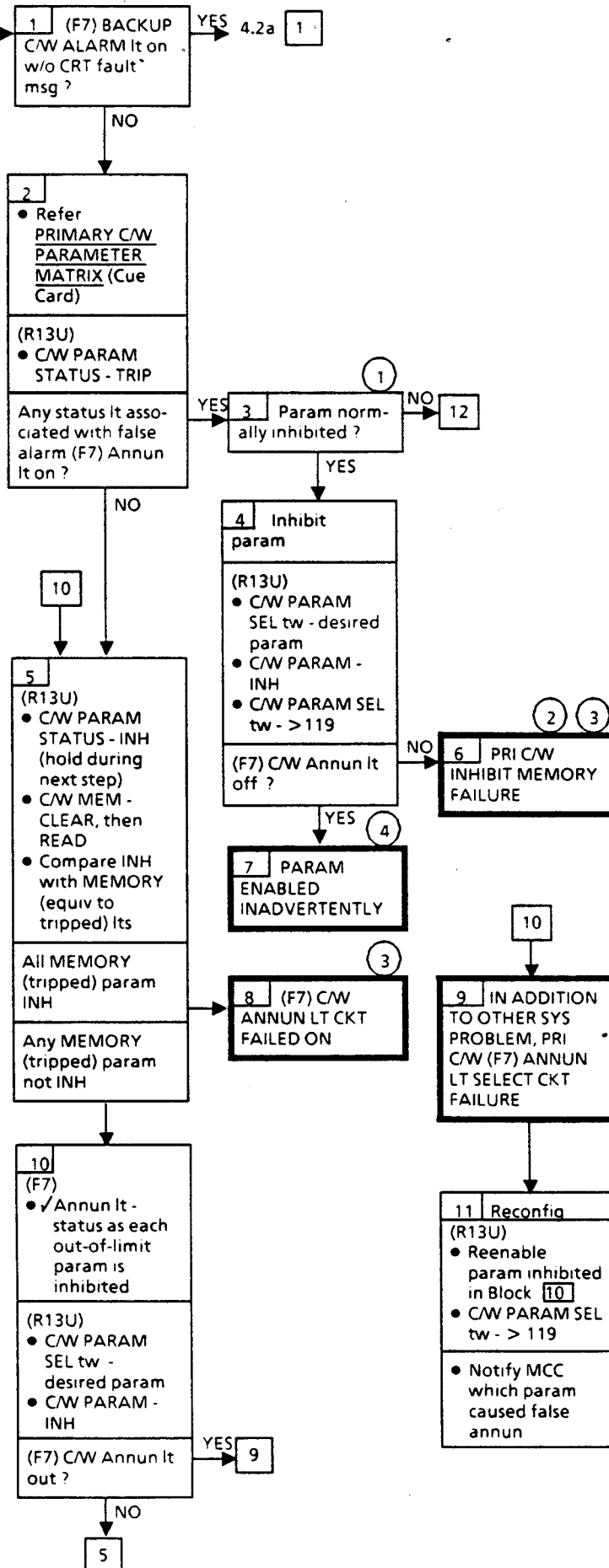
12 Should still have PRI C/W limit sensing with (F7) Annun Its and emer tone alarms via OS speaker

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



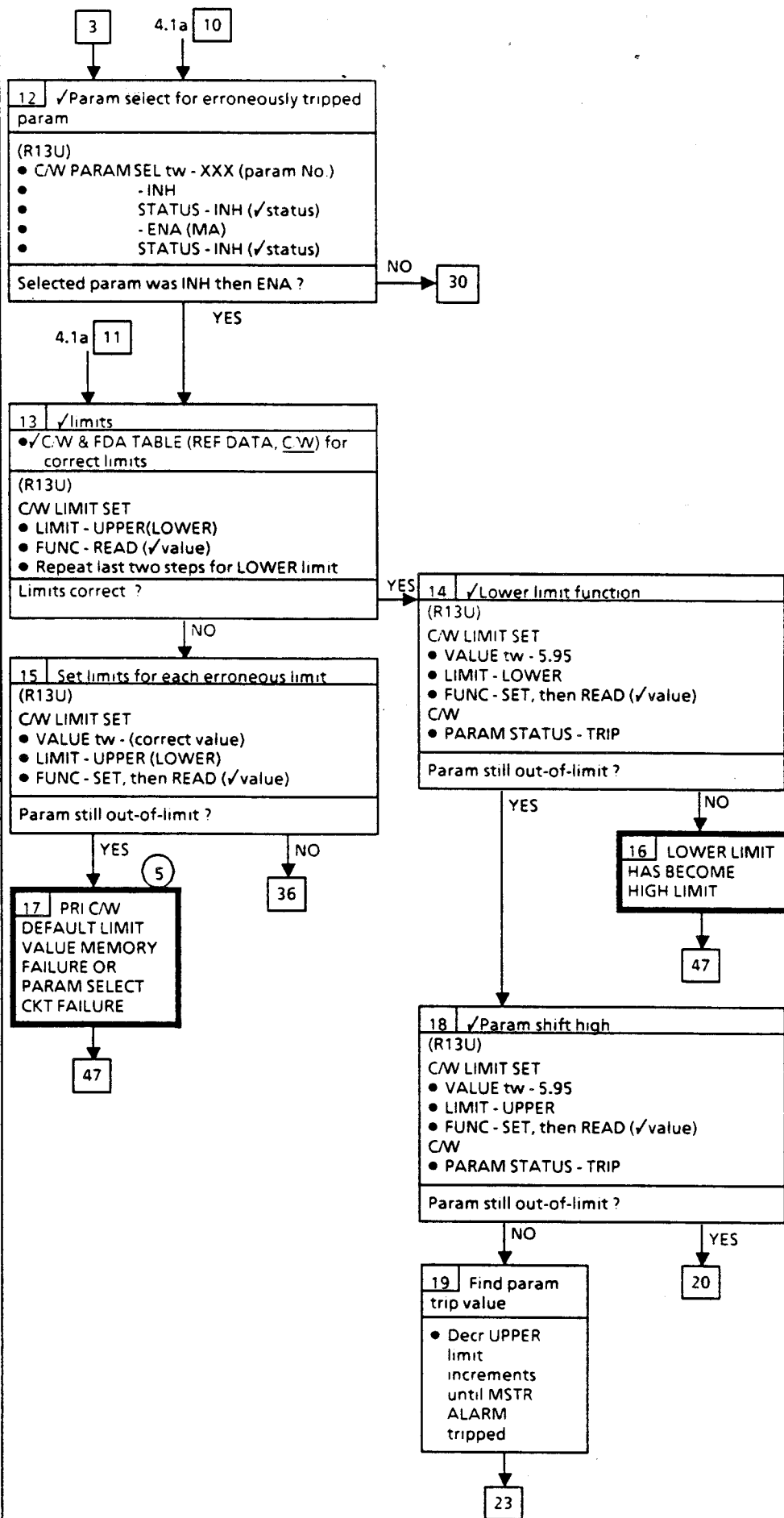
1 The correct param inhibit status can be ✓ using PRIMARY C/W PARAMETER MATRIX Cue Card

2 Depending on param value, it may be extinguished by changing limits

3 To disable lts, remove illuminated bulbs or select (C3) C/W MODE - ACK

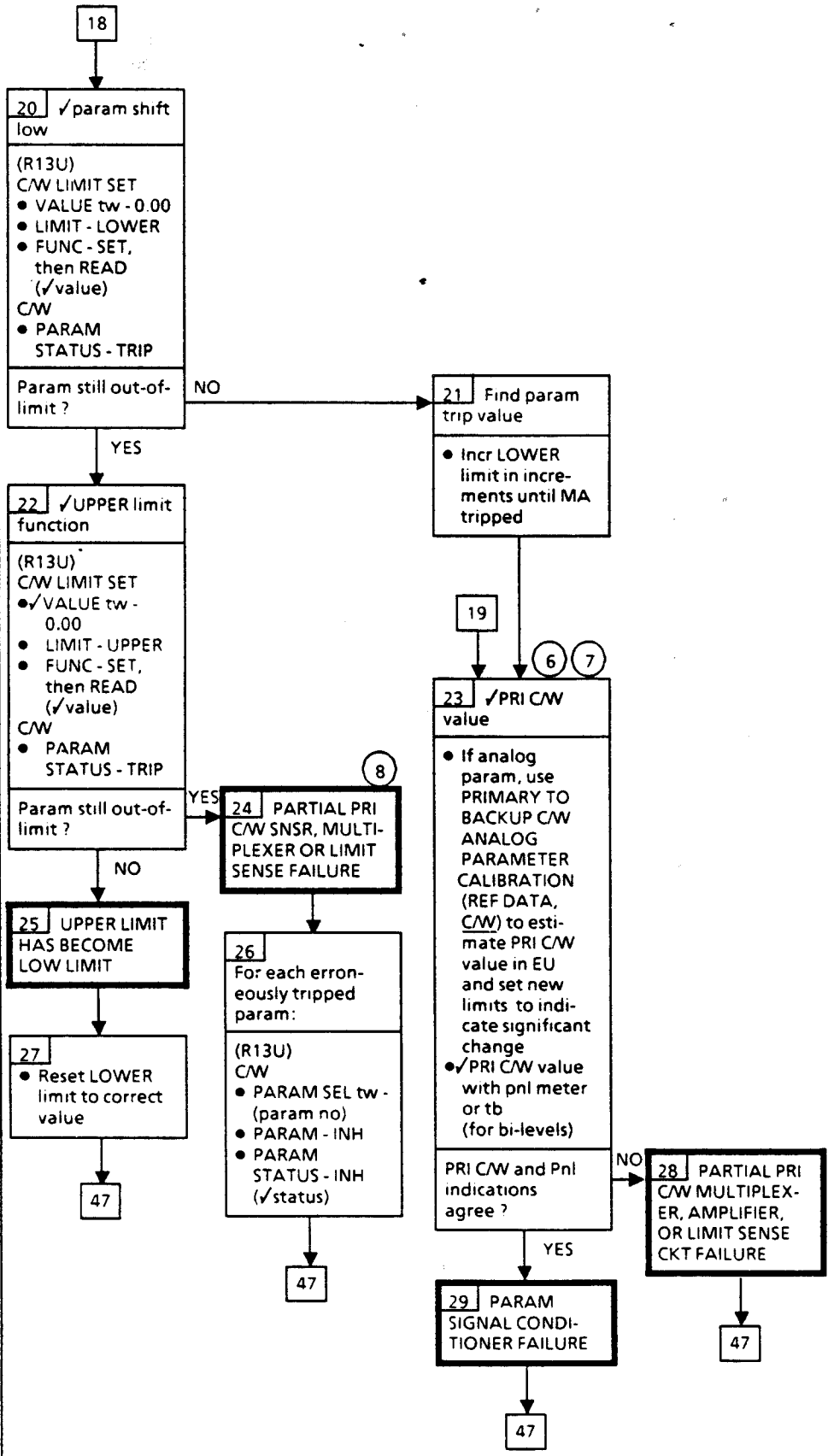
4 Prior to changing any param limit value, ✓ param select capability with an INH/ENA capability verification using procedure in Block 12

C/W 4.1d (Cont)



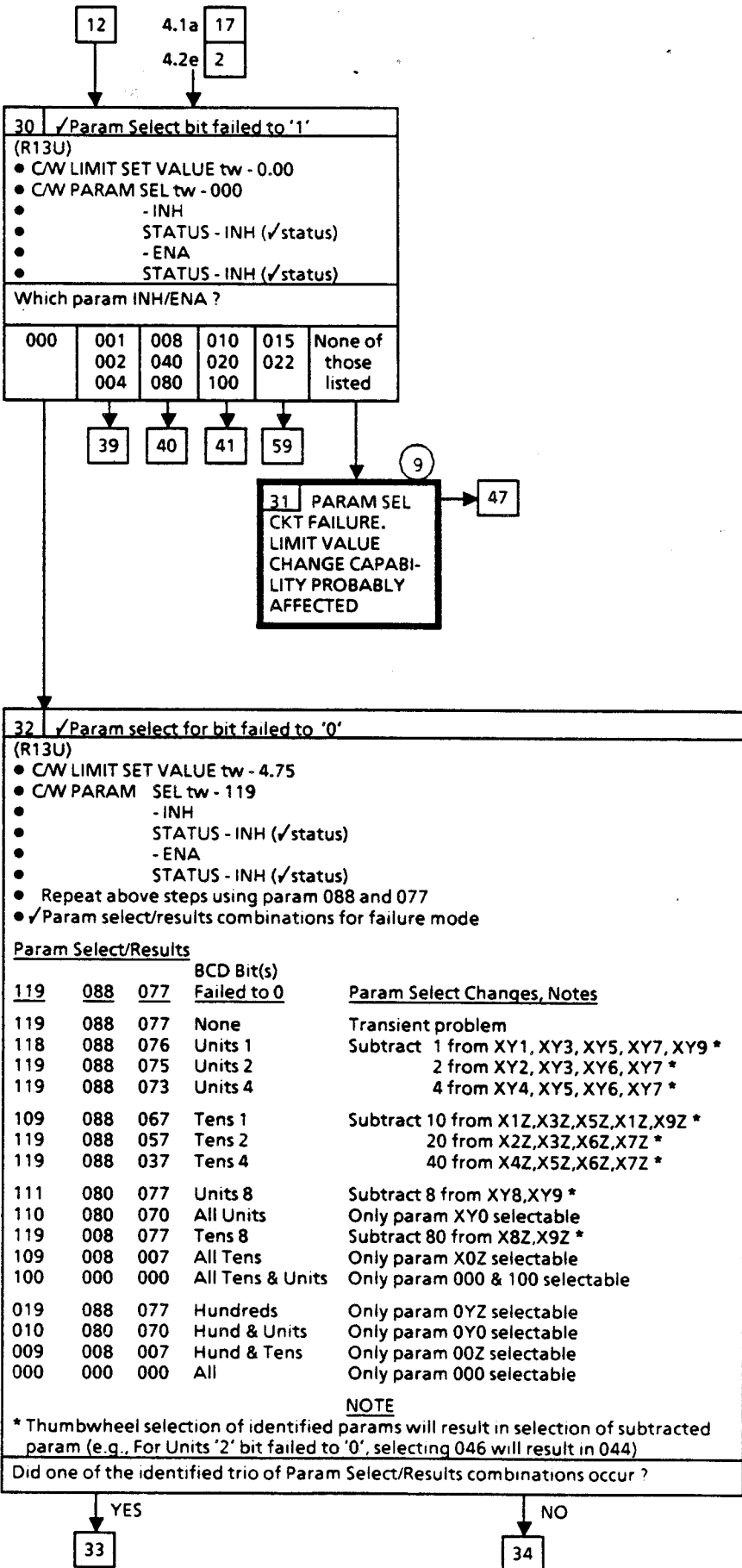
5 Prior to changing any param limit value, ✓param select capability with INH/ENA capability verification using procedure in Block 12

C/W 4.1d (Cont)



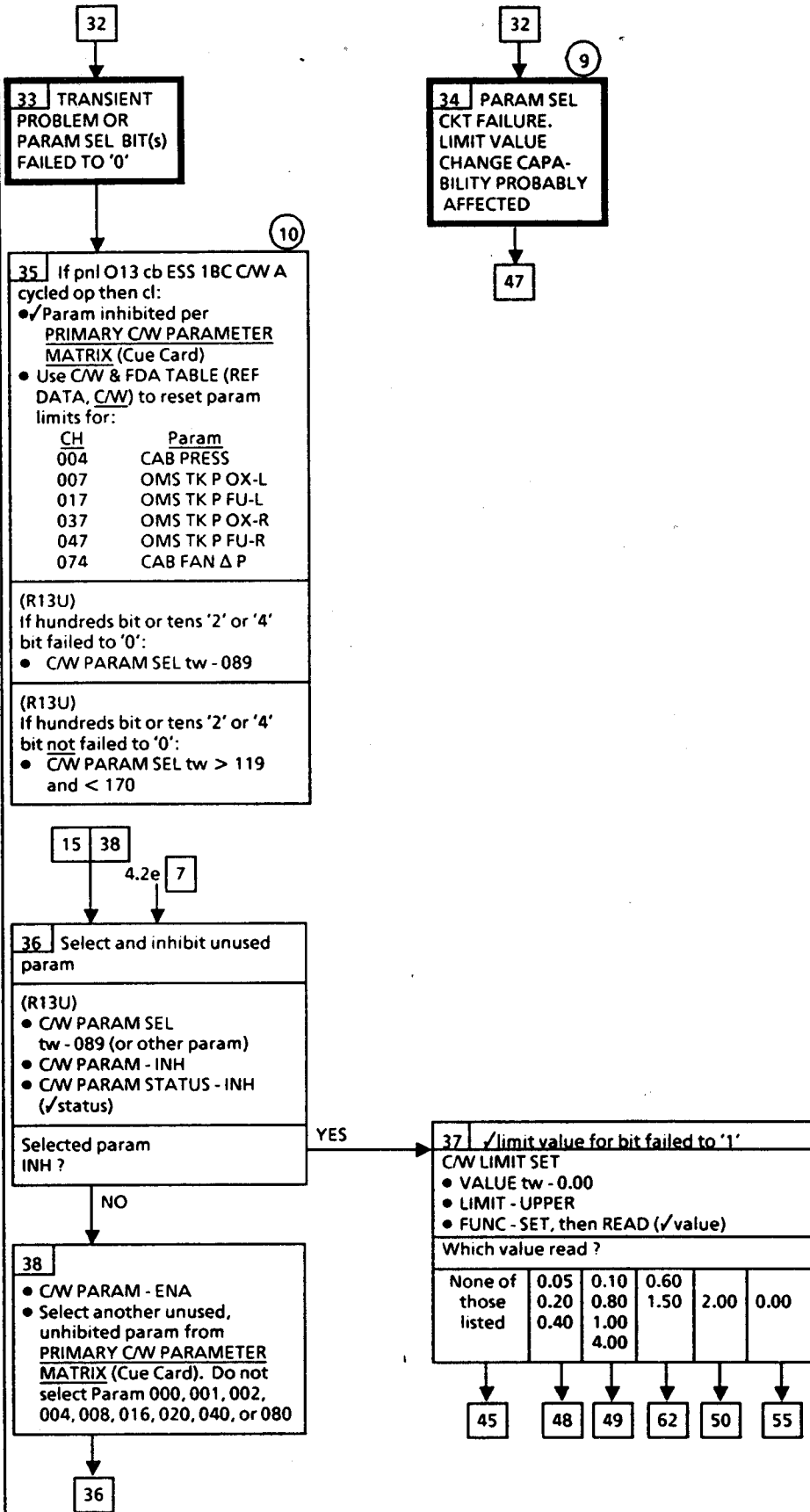
- ⑥ Notify MCC of change in PRI C/W param and limit values
- ⑦ Bi-level params are identified in NOTES column of C/W & FDA TABLE (REF DATA, C/W)
- ⑧ If pnl indicator and PRIMARY C/W param values agree, snsr output failed

CW 4.1d (Cont)



9 Prior to changing param limit, ✓ 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

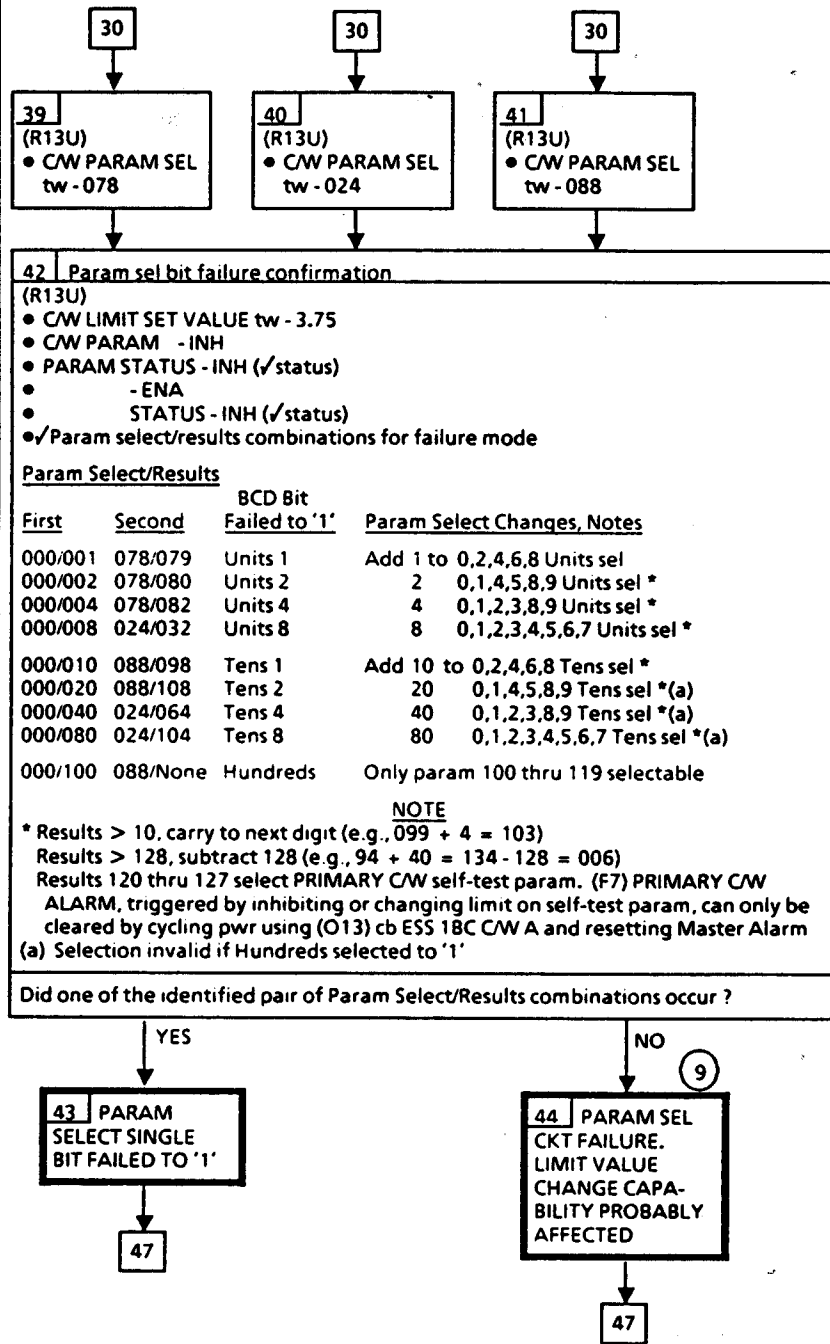
C/W 4.1d (Cont)



9 Prior to changing param limit, ✓ 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

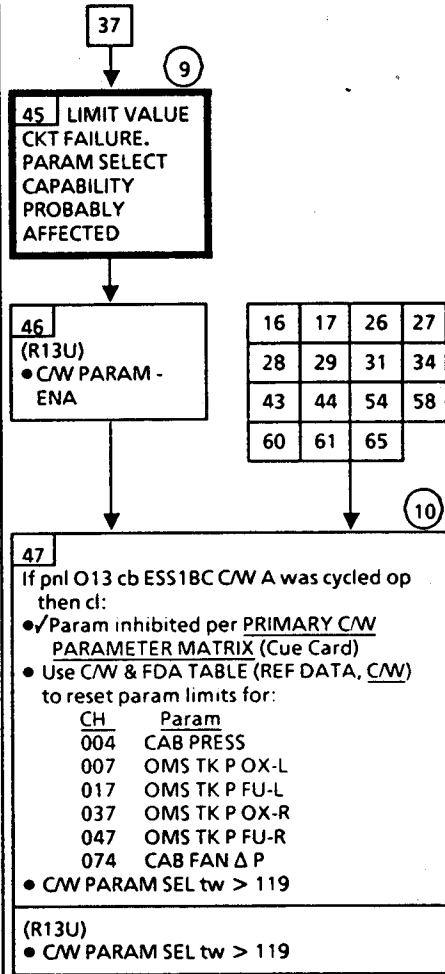
10 All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS1BC C/W A closed

C/W 4.1d (Cont)



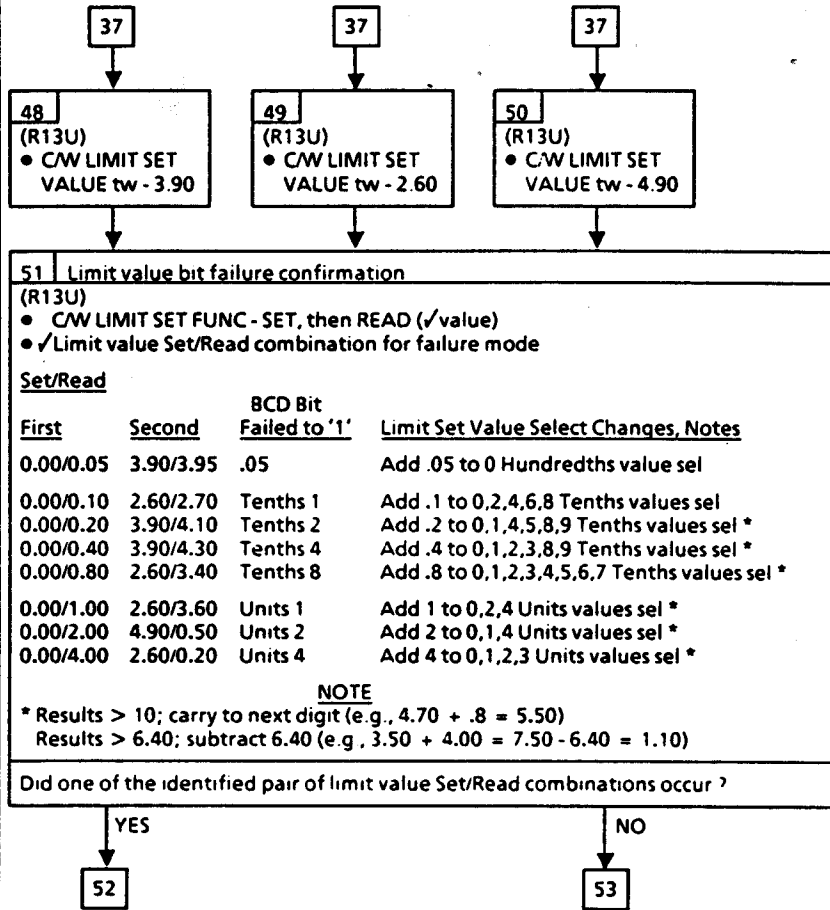
9 Prior to changing param limit, ✓ desired param and an unused param are selectable using two INH/ENA cycles. (See procedure in Block 12.) then ✓ desired limit value change capability on unused param

C/W 4.1d (Cont)



9 Prior to changing param limit, ✓ 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

10 All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS1BC C/W A closed



C/W 4.1d (Cont)

37

9

45 LIMIT VALUE
 CKT FAILURE:
 PARAM SELECT
 CAPABILITY
 PROBABLY
 AFFECTED

46
 (R13U)
 • C/W PARAM -
 ENA

16	17	26	27
28	29	31	34
43	44	54	58
60	61	65	

10

47
 If pnl O13 cb ESS1BC C/W A was cycled op then cl:
 • ✓ Param inhibited per PRIMARY C/W PARAMETER MATRIX (Cue Card)
 • Use C/W & FDA TABLE (REF DATA, C/W) to ✓ param limits for:

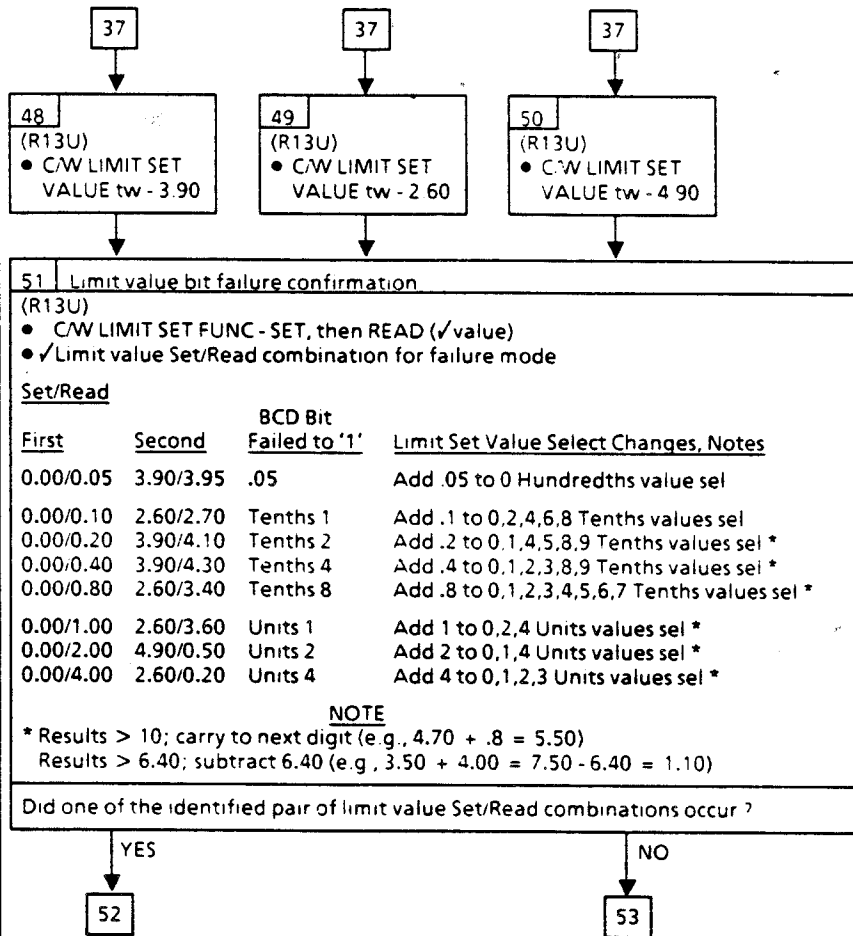
CH	Param
034	CAB PPO2 A
044	CAB PPO2 B
099	HYD B/U P 1
109	HYD B/U P 2
119	HYD B/U P 3

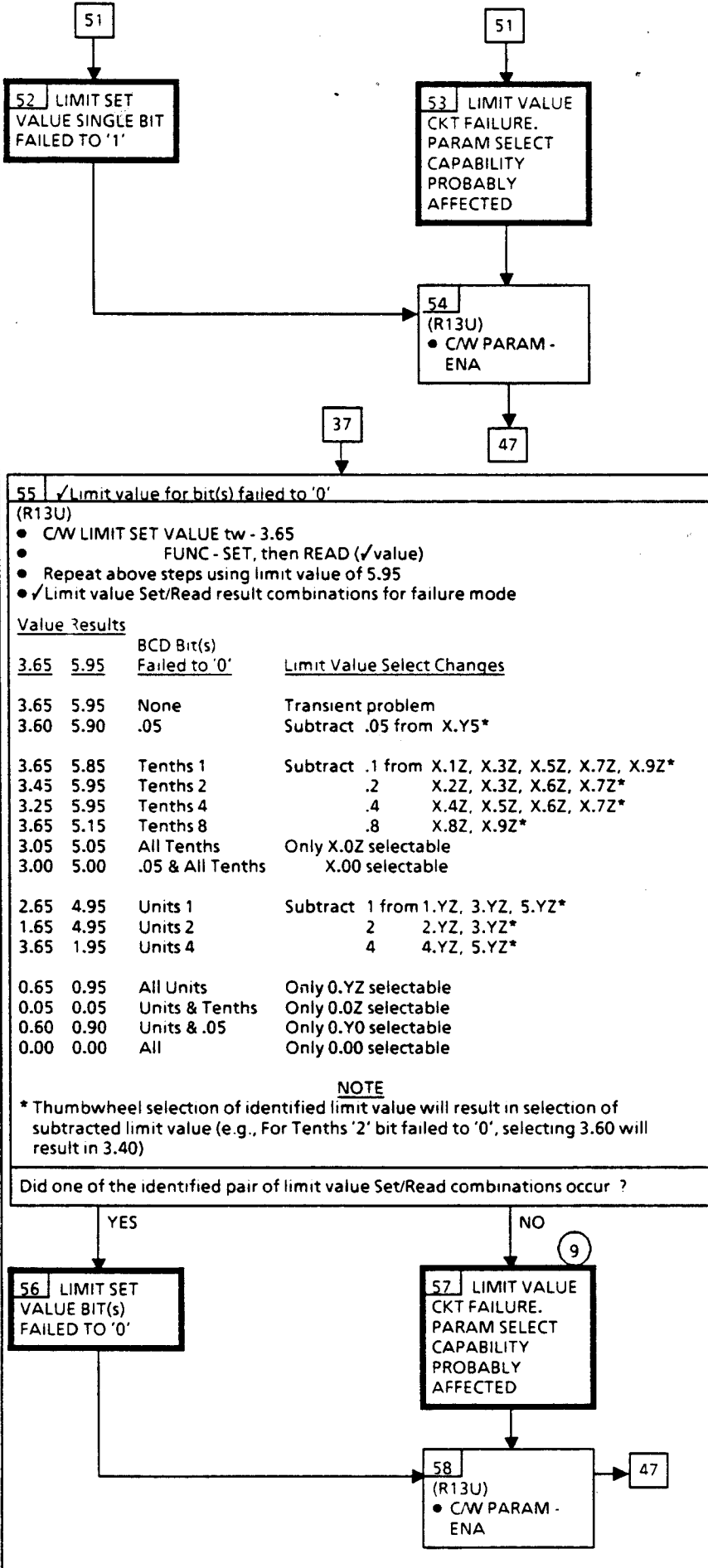
• C/W PARAM SEL tw > 119

(R13U)
 • C/W PARAM SEL tw > 119

9 Prior to changing param limit, ✓ 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

10 All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS1BC C/W A closed





9 Prior to changing param limit, ✓ 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

55 ✓ Limit value for bit(s) failed to '0'
(R13U)

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

Value	Results	BCD Bit(s)	Limit Value Select Changes
3.65	5.95	Failed to '0'	
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 ?

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

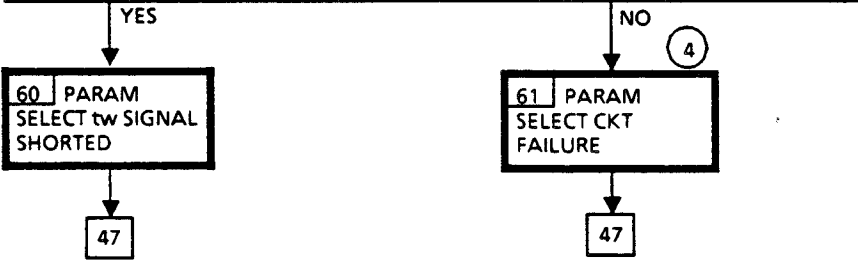
000	099	055	tw Bit Shorted	Param Select Changes, Notes
015	099	055	Units 1	Param XY1, XY3, XY5, XY7, XY9 selectable*
015	105	065	Units 2	XY2, XY3, XY6, XY7 selectable*
015	105	055	Units 4	XY4, XY5, XY6, XY7 selectable*
015	099	065	Units 8	XY8, XY9 selectable*
022	099	055	Tens 1	Param X1Z, X3Z, X5Z, X7Z, 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 ?



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

37

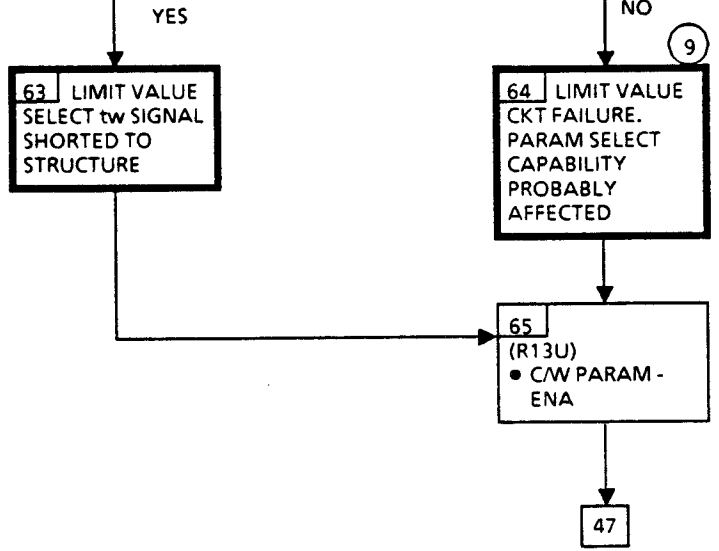
62 ✓ For limit value tw signal short
(R13U)

- 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	Limit Value Select Changes, Notes
000	3.60	2.50	Shorted	
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*(a)
1.50	3.60	2.50	Tenths 4	Value X.4Z, X.5Z, X.6Z, X.7Z selectable*(a)
1.50	4.50	3.50	Tenths 8	Value X.8Z, X.9Z selectable*(a)

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 ?



9 Prior to changing param limit, ✓/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

OTHER C/W
4.2

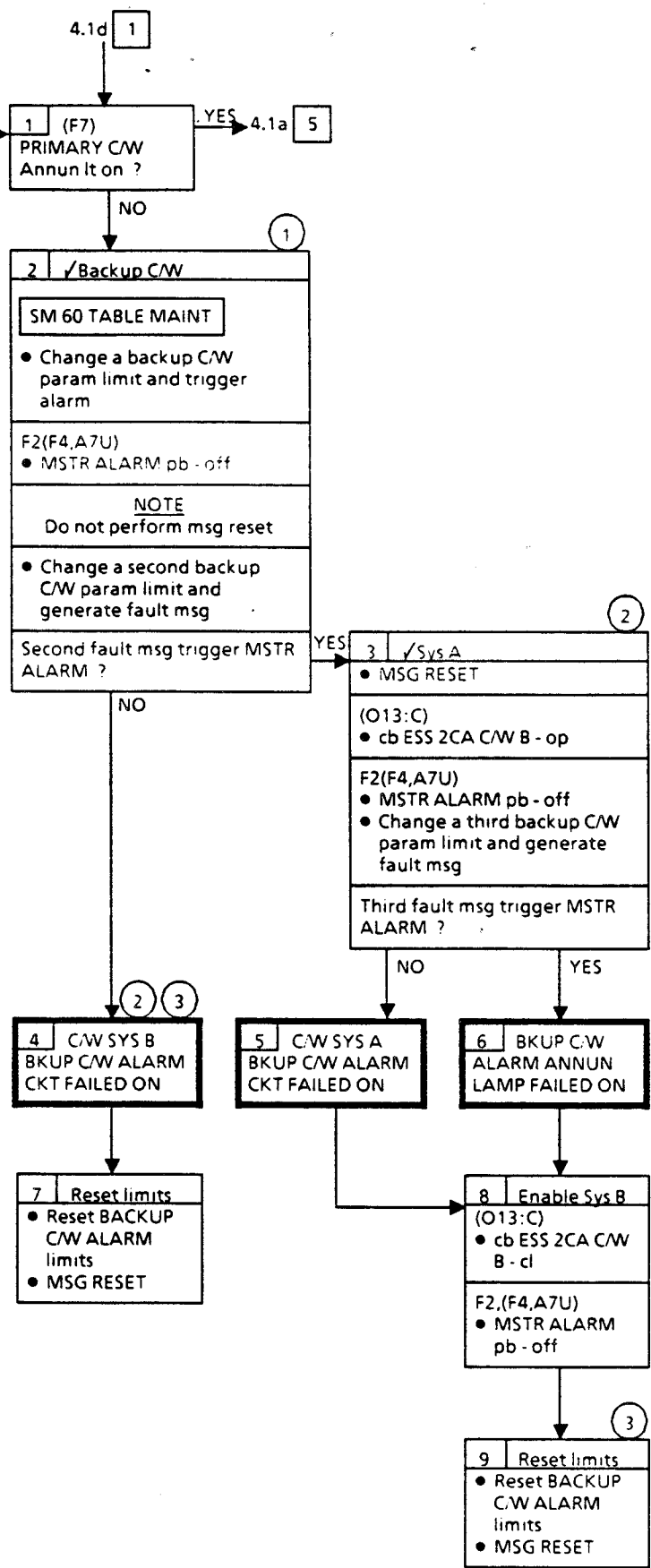
4.2a NONRESETTABLE BACKUP C/W ALARM LT

OTHER C/W
4.2

BACKUP C/W ALARM

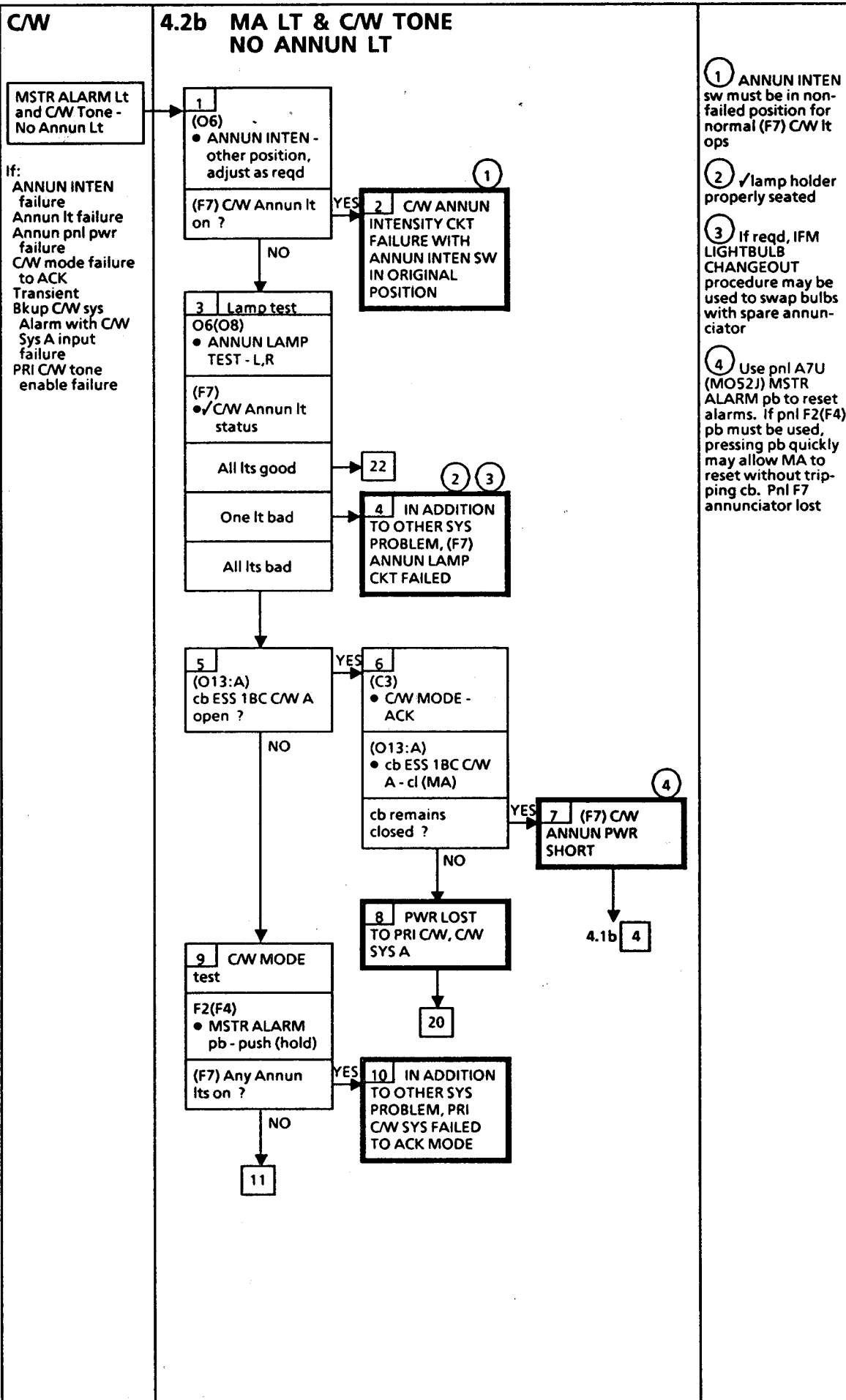
Light on but msg reset does not extinguish light

If:
Annun lt driver failed on C/W Sys A(B)
Backup C/W Alarm ckt failed on C/W Sys B pwr sply failure

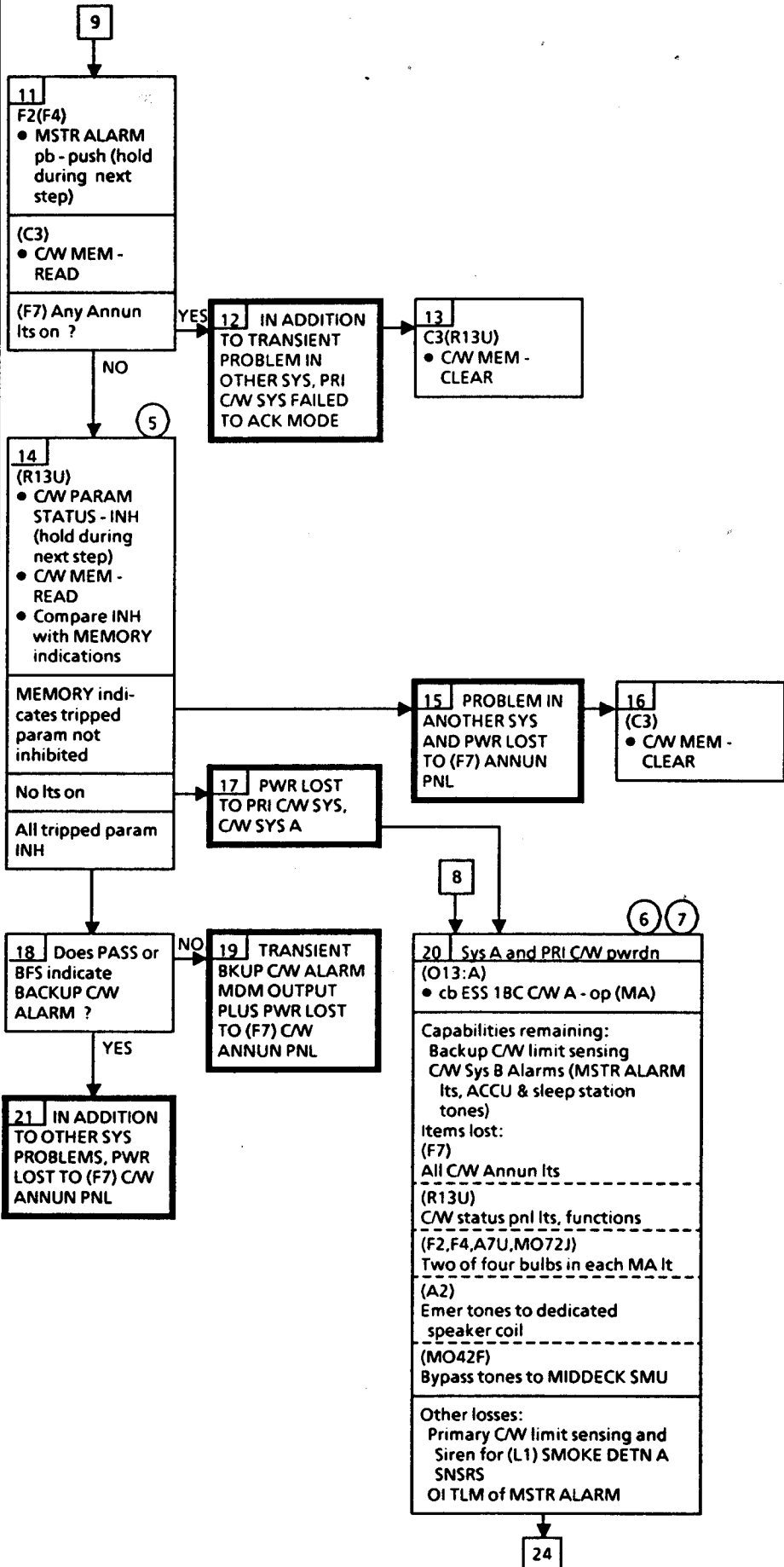


- ① Usable on-orbit inactive Backup C/W Alarm params include:
APU Exhaust Gas Temp
 Sys 1 - 0460140
 Sys 2 - 0460240
 Sys 3 - 0460340

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

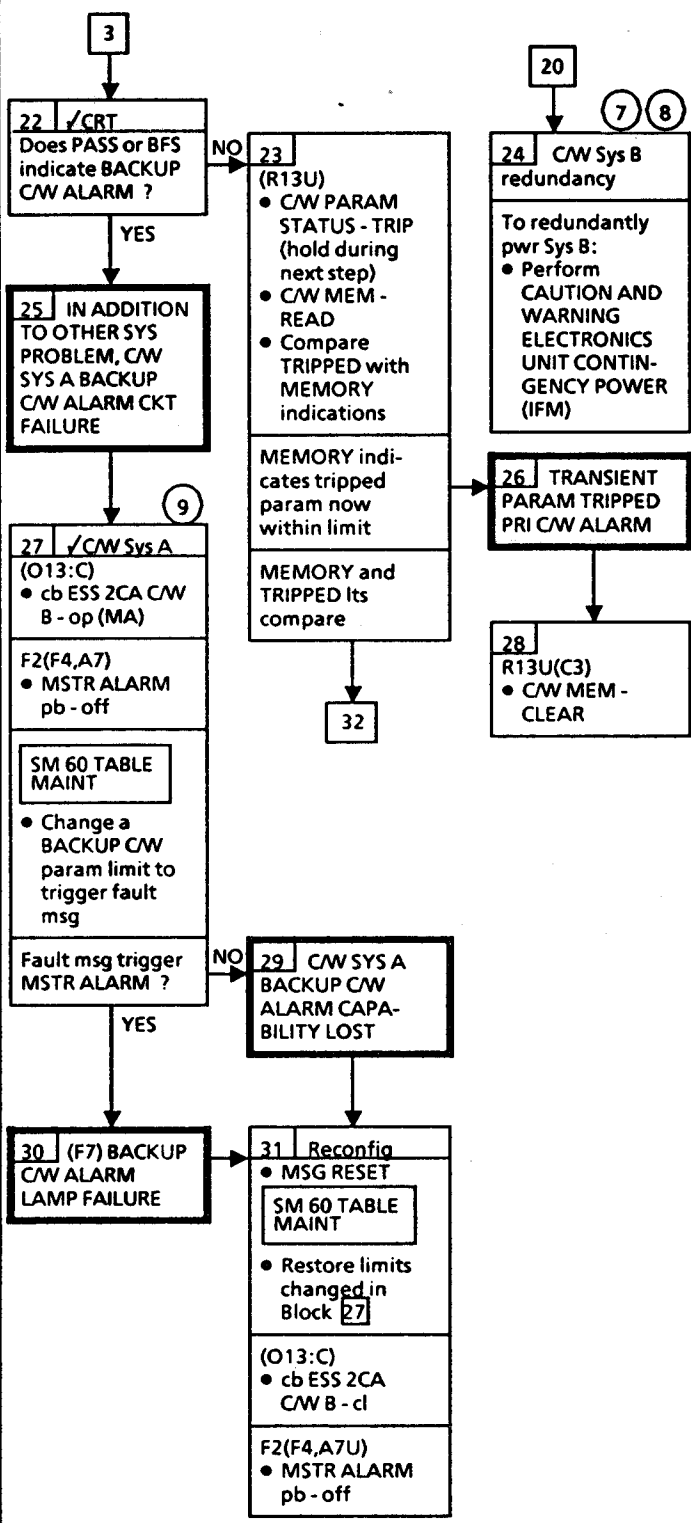


CW 4.2b (Cont)



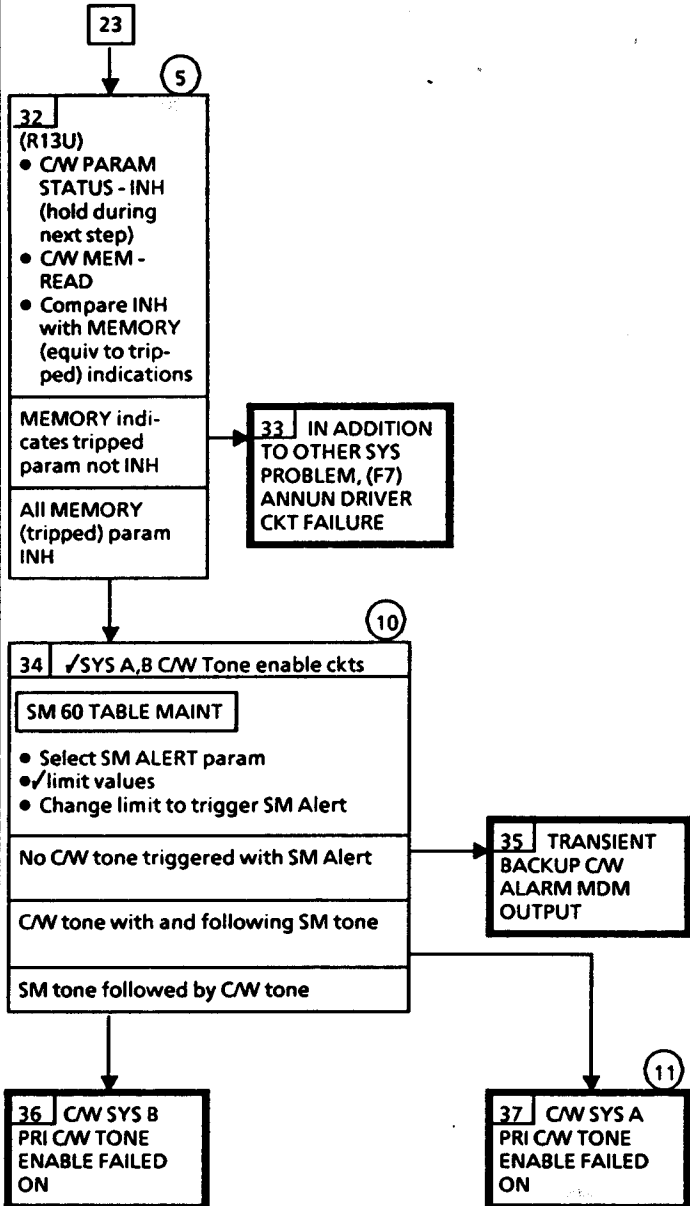
- 5 Additional Its which light during CW MEM - READ indicate tripped params that are not inhibited
- 6 All four bulbs in each MA It will illuminate during lamp test
- 7 Until CW IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs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

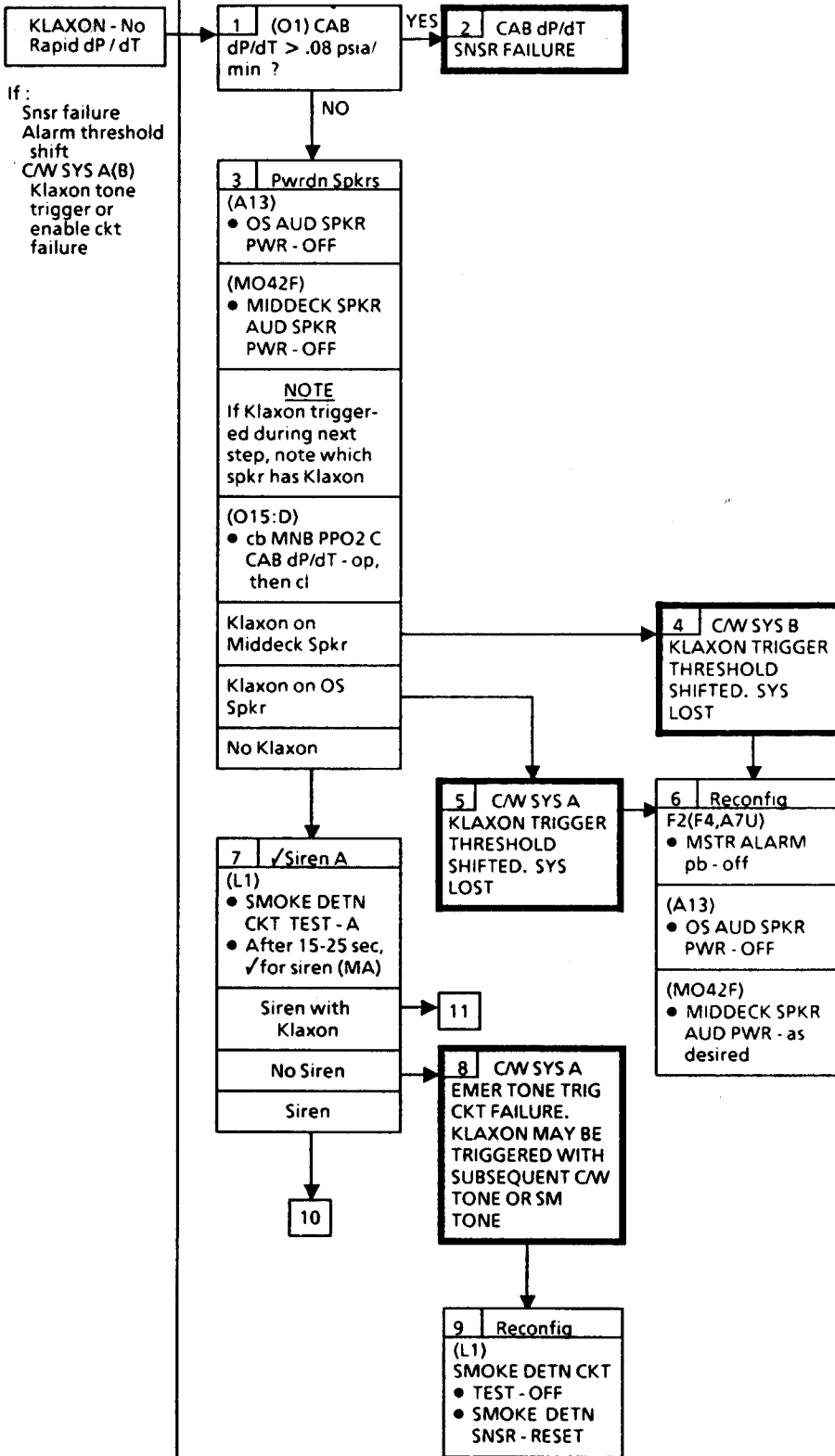


5 Additional lts which light during C/W MEM - READ indicate tripped params that are not inhibited

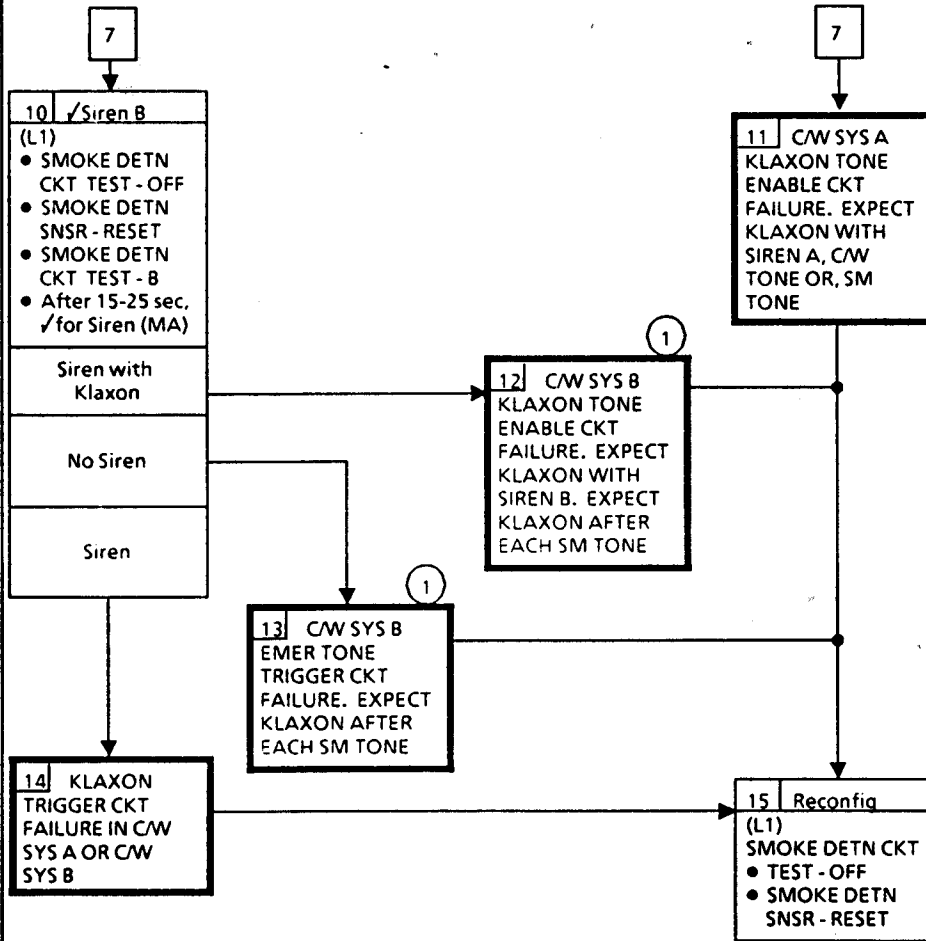
10 Usable SM ALERT params include:
 FC H2O LNT
 Sys 1 - 0450412
 Sys 2 - 0450281
 Sys 3 - 0450381
 FC H2O VLV T
 Sys 1 - 0450412
 Sys 2 - 0450422
 Sys 3 - 0450432

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

4.2c KLAXON - NO RAPID dP/dT



C/W 4.2c (Cont)



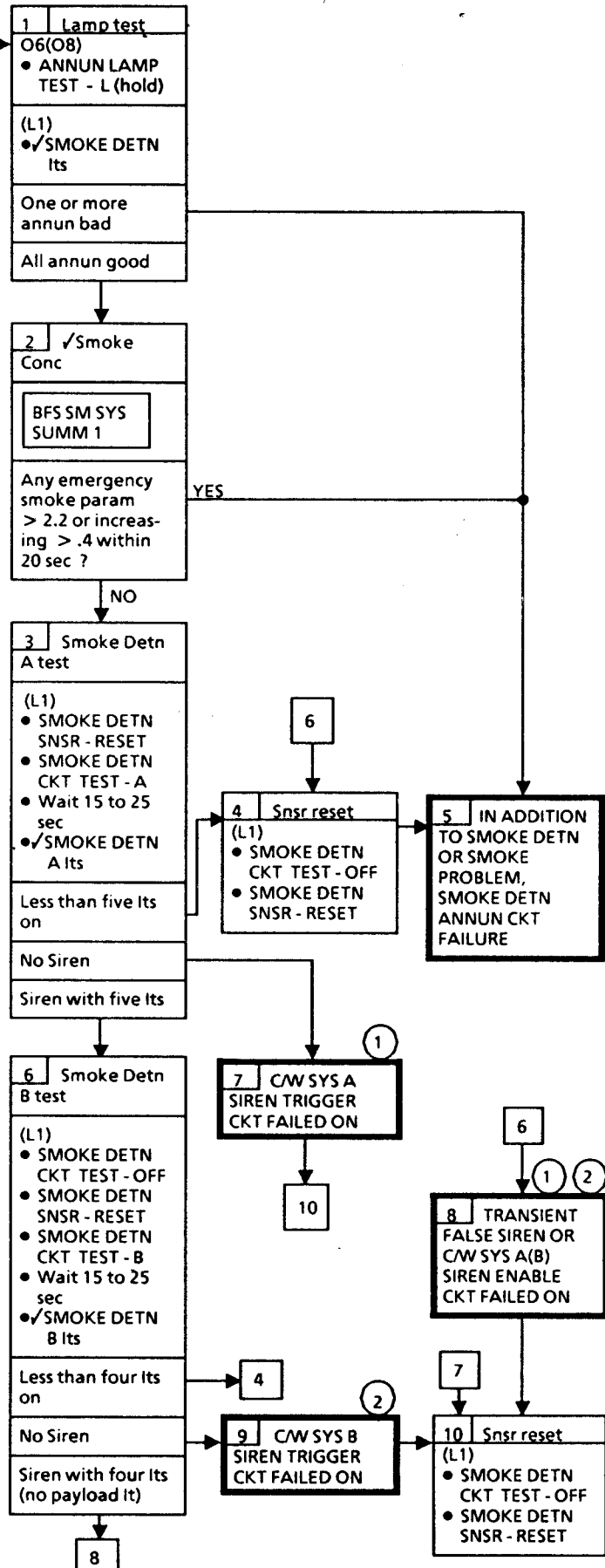
① ACCU VOX selects C/W Sys A over C/W Sys B tone. If C/W Sys A tone not present, expect Klaxon with C/W tone

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



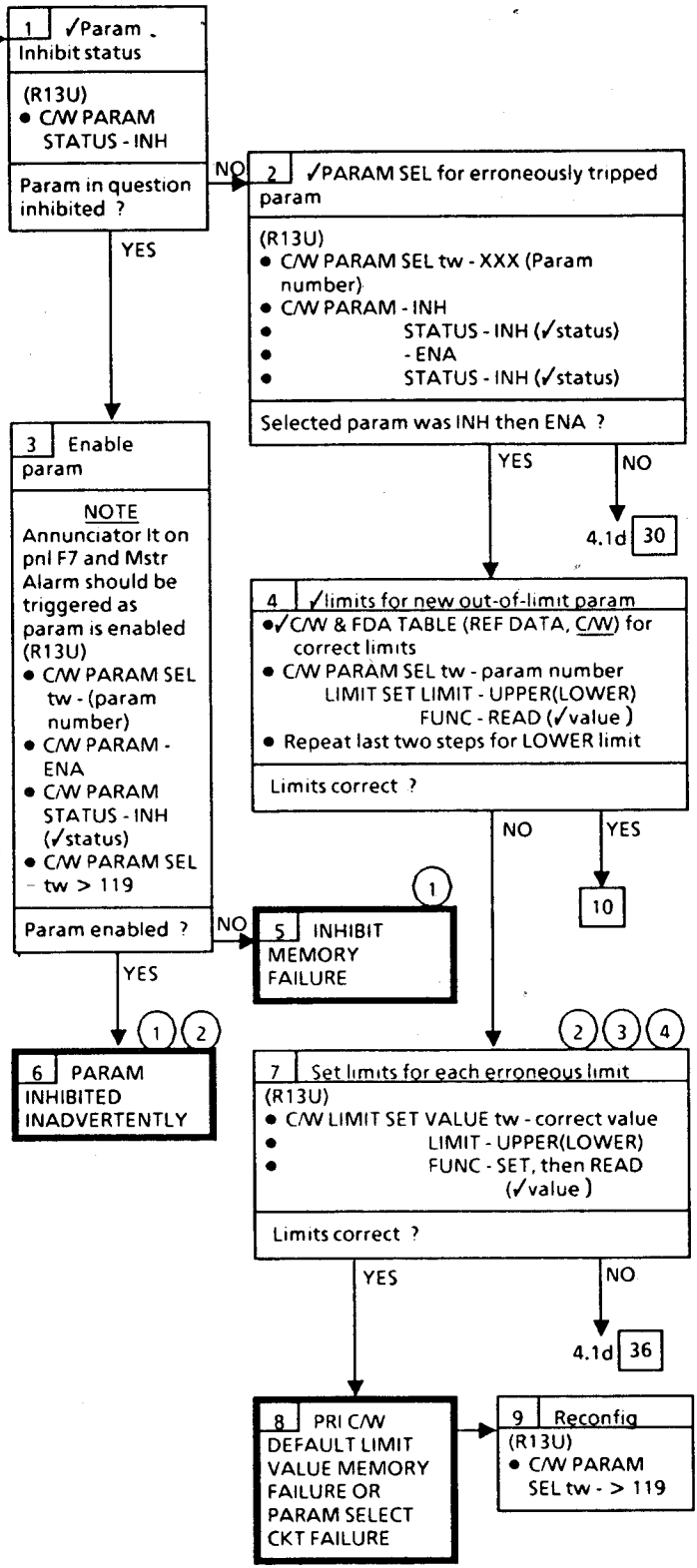
- ① If C/W Sys A failed, Siren may occur with Klaxon, C/W tone, or SM tone
- ② If C/W Sys B failed, Siren may occur with Klaxon or after SM tone. Since ACCU VOX selects C/W Sys A over C/W Sys B tone, expect Siren with C/W tone if C/W Sys A tone not present

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

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

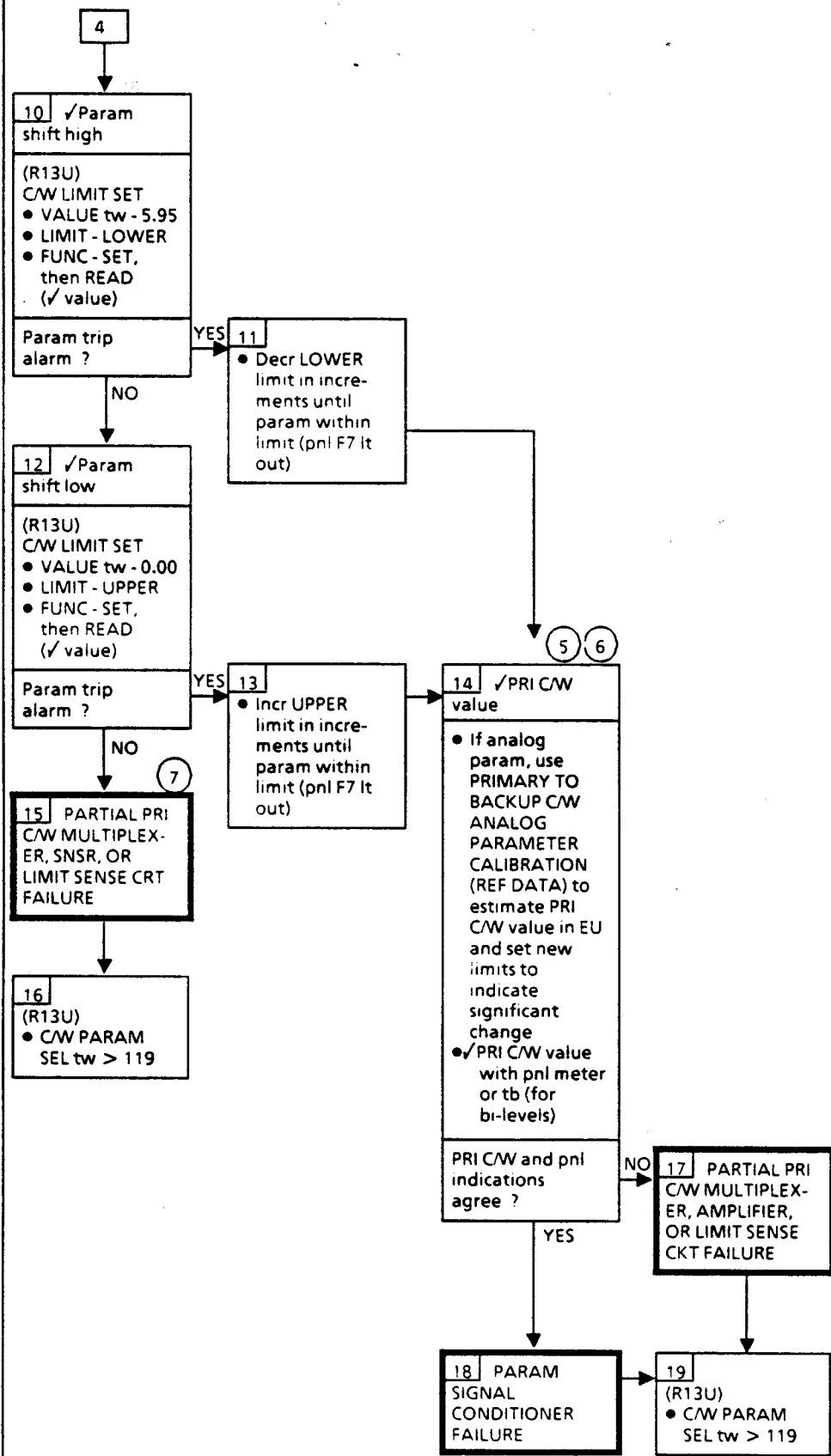
C/W Alarm triggered by Backup C/W Sys

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



- ① Correct Param Inhibit status can be using PRIMARY C/W PARAMETER MATRIX (Cue Card)
- ② Prior to changing any limit value, ✓PARAM SEL capability with an INH/ENA capability verification using procedure in Block 2
- ③ If time permits, ✓all enabled param limits
- ④ Limits entered from pnl R13 use different memory than default limits

C/W 4.2e (Cont)



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

DPS

COMPUTER DATA BUS NETWORK..... 5-3

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1.2 PASS SM GPC FAIL..... 5-4

1.3 GNC GPC (1ST FAIL)..... 5-5

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1.5 BFS ENGAGE..... 5-7

1.6 PASS GPC BITE 1(2,3,4)..... 5-7

1.7 SUMWORD ICC 1(2,3,4)..... 5-7

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OUTPUT..... 5-28

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1.1 DUAL CRT COMMANDERS..... 5-36

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FRP-2 TWO GNC GPC FAIL..... 5-60

FRP-3 BFS GPC FAIL RECOVERY (ENTRY)..... 5-63

FRP-4 PASS RECOVERY AFTER BFS ENGAGE

(ASCENT/ORBIT/ENTRY)..... 5-65

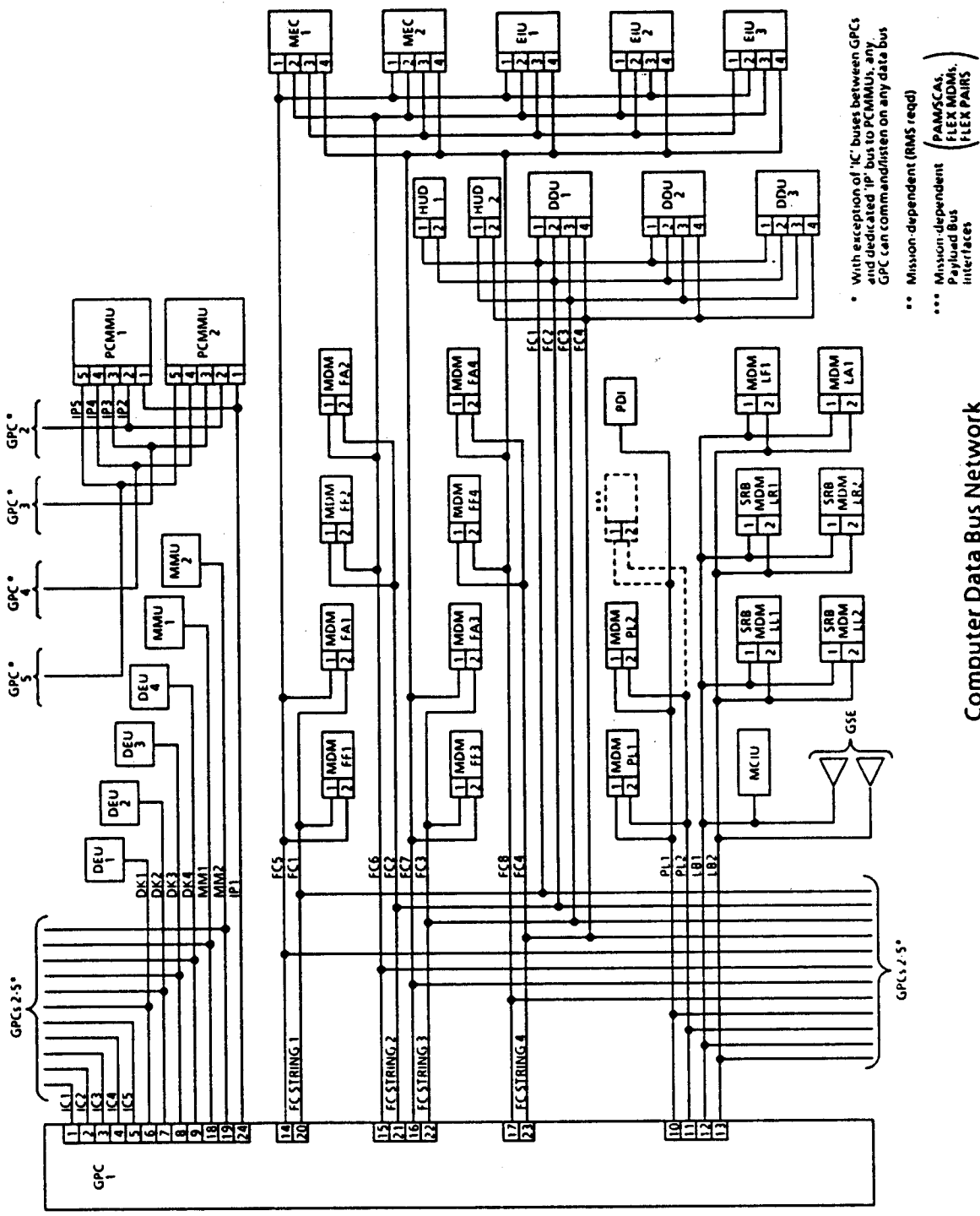
GPC FRP-5	PL9 ASSIGNMENT (DEU IPL-PASS OR MMU READ/WRITE).....	5-77
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The following Fault Msgs have no corresponding MAL procedures in this book:

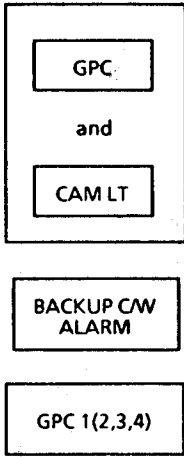
BCE STRG 1(2,3,4) PASS, BFS
 BCE BYP KU
 # 3 DEU
 GPC 5
 GPC CONF
 GPC POWER (BFS)
 ILLEGAL ENTRY
 ITEM RJCT
 PL ALERT
 PL C/W
 PL MSG
 SUM WORD
 TFL FAIL
 TIME TONE



Computer Data Bus Network

GPC

5.1



If:
 Fail-to-sync
 Force fail-to-sync

IOP or CPU
 detected h/w
 errors
 Illegal BCE Xmtr
 failed ON
 Redun set GPC
 internal pwr
 problem

Assumptions:
 QUIT = NO GPC
 FUNCTION

Nominal Config:
 Dual GNC Ops
 (O6)
 GPC PWR 1,2,4
 (three) - ON
 GPC PWR 3 - OFF
 GPC OUTPUT 1,2,3
 (three) - NORM
 4 - TERM
 GPC MODE 1,2,4
 (three) - RUN
 3 - HALT

Single GNC Ops
 (O6)
 GPC PWR 1,4
 (two) - ON
 GPC PWR 2,3
 (two) - OFF
 GPC OUTPUT 1,2,3
 (three) - NORM
 4 - TERM
 GPC MODE
 1,4 (two) - RUN
 2,3 (two) - HALT
 Appropriate AV
 BAY FAN - ON

1.1

ALL CRTs ASSIGNED TO FAILED GPC

CAUTION
 If GPC/CRT key used to assign CRT 1,2, or 3 to
 BFS, deassign to avoid dual commanders

1. If no active GNC GPC, go to FD GPC ACTIVATE, 1.4 >>
 2. Failed GPC MODE - STBY (tb-bp), HALT
 3. CRT1,2,3 MAJ FUNC - PL
 4. FD: GPC PWR - ON
 MODE - STBY, RUN (tb-RUN)
 5. CRT1,2,3 MAJ FUNC - as desired
 6. If G2FD used: go to step 8.
 7. **GNC 0 GPC MEMORY** - assign FD GPC, strings,
 CRTs 1,2,3, and MMUs to MC 3. ✓PL 1/2 deassigned
 If FD GPC not needed, recover lost major function:
 8. FD: GPC MODE - STBY (tb-bp), HALT
 PWR - OFF
- If GNC GPC failed, go to PASS GNC GPC (1ST FAIL), 1.3 >>
 If SM GPC failed, go to PASS SM GPC FAIL, 1.2

1.2

PASS SM GPC FAIL

1

1. ✓MMU 2 PWR - ON
 2. If failure is CS split and GPC config is 1 GNC
 and 1 SM, go to MAL, DPS, 5.1a 6
 3. Perform PL/DPS RECONFIG (PL SYS/SL MAL)
 4. SM: GPC MODE - STBY (tb-bp), HALT
 5. PL1,2 MDM PWR (two) - OFF, ON
 6. **GNC 1 DPS UTILITY**
 UL CNTL ENA - ITEM 36 EXEC (*)
 ✓CKPT RETRV ENA - ITEM 12 EXEC (*)
 7. If redundant GNC GPCs required
 | G3FD: ✓GPC MODE - HALT
 | PWR - ON
 | MODE - STBY (tb-RUN), RUN
 If redundant GNC GPCs not required
 | If in dual GNC OPS
 | If GNC 202:
 | GNC OPS 201 PRO
 | or Assign lowest ID GNC GPC strings, CRTs, and
 | MMUs in current MC (✓PL 1/2 and LB1
 | deassigned) and delete other GNC GPC from
 | target set. GNC, OPS XXX PRO
 | If in simplex GNC OPS
 | G2FD: ✓GPC MODE - HALT
 | PWR - ON
 | MODE - STBY (tb-RUN), RUN
 8. TGT GPC OUTPUT - TERM
 9. CRT X MAJ FUNC - SM
 GPC/CRT tgt GPC/X EXEC
 10. **SM 0 GPC MEMORY** - assign tgt GPC CRTs, MMUs,
 PL1/2, and LB1 in MC 4(5)
 Tgt GPC CRT: SM OPS 201(401) PRO
 11. **SM 1 DPS UTILITY**
 UL CNTL AUTO - ITEM 35 EXEC (*)
 CKPT RETRV ENA - ITEM 12 EXEC (*)
 12. If PLBD OPS, (pnl R13L) PL BAY DR SYS 1,2 (two) - ENA
 13. If RMS is powered:
SM 94 PDRS CONTROL (MA, GPC DATA lt - on)
 I/O ON - ITEM 5 EXEC (*)
 (ABU) SAFING - CANCEL (tb-bp)
 ✓GPC DATA lt - off
- NOTE**
 If RMS is uncradled, WR RANGE (ITEM 26)
 may need to be updated
14. Reinitiate PL OPS
 15. When time permits, go to MAL, DPS, GPC FRP-1

1 Go to MAL,
 DPS, 5.1a 1 if aid
 in interpreting fail
 indications is reqd

1.3

PASS GNC GPC (1ST FAIL)

①

NOTE

If Group B(C) LOW LEVEL (MSN EXT) pwr dn config, MMU2 - ON

1. If no active GNC GPC, go to FD GPC ACTIVATE, **1.4** >>
- If failure is CS split and GPC config is 1 GNC and 1 SM, go to MAL, DPS, 5.1a **6** >>
- If RS split (CS Intact) but both GPCs appear functional (✓CRTs, dedicated displays, MODE tb), retain GPC with two IMUs
2. Aff GPC MODE - STBY (tb-bp), HALT
 3. If FF1 PWR CYCLED, then:
GNC 21 IMU ALIGN IMU 1 - desel (caged)
 4. Reassign failed GPC CRTs: GPC/CRT as reqd
 5. If redundant GNC GPCs reqd
G3FD: ✓GPC MODE - HALT
 ✓OUTPUT - NORM
or
 PWR - ON
 MODE - STBY (tb-RUN), RUN
CRT X MAJ FUNC - PL
GPC/CRT - G3FD GPC/X EXEC
If redundant GNC GPCs not reqd
GNC 0 GPC MEMORY - assign downlist to remaining GNC GPC:
ITEM 44 + X EXEC
 6. If GNC OPS 202:
GNC OPS 201 PRO
 7. If RNDZ NAV enabled:
DAP: Free drift
GNC UNIV PTG
CNCL - ITEM 21 EXEC (*)
 8. Assign GNC GPC(s), strings, CRTs, and MMUs to current MC (✓PL1/2 and LB1 deassigned) GNC, OPS XXX PRO
 9. If RNDZ NAV reqd:
Perform RNDZ NAV RECOVERY (RNDZ, RNDZ NAV RECOVERY)
 10. When time permits, go to MAL, DPS, GPC FRP-1

① Go to MAL, DPS, 5.1a **1** if aid in interpreting fail indications is reqd

1.4

FD GPC ACTIVATE

If ops transition failure, go to MAL, DPS,
5.2a (5.2b) as reqd >>

1. Failed GNC GPC(s) MODE - STBY, HALT
- If G2FD activation:
 2. ✓G2FD: GPC MODE - HALT
 ✓OUTPUT - NORM
 PWR - ON
 MODE - STBY (tb-RUN), RUN
 3. CRT X MAJ FUNC - GNC
 or GPC/CRT - G2FD/X EXEC
 4. If G2FD activation fails:
 G2FD GPC MODE - STBY, then HALT
 Go to step 10
 5. GNC 0 GPC MEMORY - assign tgt GPC (G2FD),
 all strings, CRTs, and MMUs in MC 2
 ✓PL1/2 and L1,2 deassigned
 DOWNLIST GPC - ITEM 44 + (G 2 F D) EXEC
 G2FD CRT: GNC, OPS 201 PRO
 6. ✓Vern RJD - ON
 DAP: A/AUTO/VERN
 7. GNC 2 TIME
 TRY - ITEM 34 EXEC
 8. If no comm at AOS, sel best S-BD PM ANT
 9. Go to MAL, DPS, GPC FRP-1 >>
- If G3FD activation:
 10. If SM GPCs self-fail (diagonal) CSM It ON:
 Checkpoint Retrieve Disable
SM 1 DPS UTILITY ITEM 12 (No *)
 SM: GPC MODE - STBY (tb-bp), RUN (tb-RUN)
 SM, OPS 201(401) PRO
 11. RGAs (four) - ON
 12. ✓G3FD: GPC MODE - HALT
 ✓OUTPUT - NORM
 PWR - ON
 MODE - STBY (tb-RUN), RUN
 13. CRT X MAJ FUNC - GNC
 GPC/CRT - G3FD/X EXEC
 14. If G3FD activation fails:
 G3FD GPC MODE - STBY, then HALT
 Go to BFS ENGAGE, 1.5
 15. GNC 0 GPC MEMORY - assign tgt GPC (G3FD),
 all strings, CRTs, and MMUs in MC 3
 ✓PL1/2 and L1,2 deassigned
 DOWNLIST GPC - ITEM 44 + (G 3 F D) EXEC
 G3FD CRT: GNC, OPS 301 PRO
 16. DAP: free drift
 17. ✓PRI RJDs (eight) - ON
 18. SM 2 TIME
 TRY - ITEM 34 EXEC
 19. If RMS is powered and step 10 performed.
SM 94 PDRS CONTROL (MA, GPC DATA It - on)
 I/O ON - ITEM 5 EXEC (*)
 (A8U) SAFING - CANCEL (tb-bp)
 ✓GPC DATA It - off
 20. SM 62 PCMMU/PL COMM
 PCMMU
 FMT
 SEL FXD - ITEM 1 EXEC **
 21. If no comm at AOS, sel best S-BD PM ANT
 22. Go to MAL, DPS, GPC FRP-2

1.5

BFS ENGAGE

1. RGAs (four) - ON
2. BFS: GPC PWR - ON
MODE - STBY (tb-RUN)
OUTPUT - B/U
3. SM: GPC OUTPUT - NORM
4. BFC CRT DISP - ON
5. FLT CNTLR PWR - ON
6. ✓ Pri RJDs (eight) - ON
7. BFS - ENGAGE

NOTE

BFS will take PL
buses from SM GPC

8. BFS: GNC, OPS 301 PRO
(RCS jet fail-offs may occur)
9. OI PCMMU FORMAT - FIXED
10. If no comm at AOS, sel best S-BD PM ANT
11. Go to MAL, DPS, GPC FRP-4

1.6

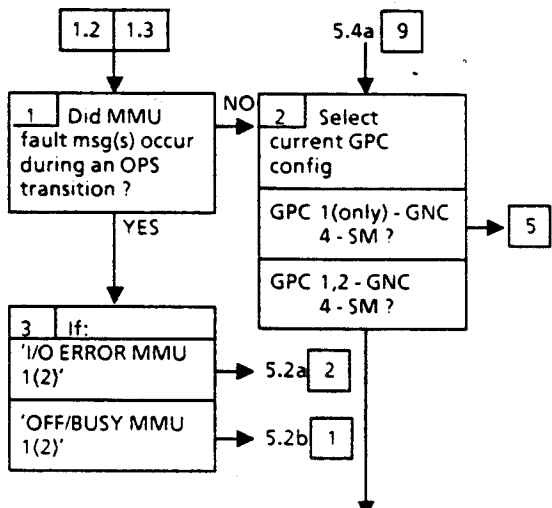
PASS GPC BITE 1(2,3,4)

1. If SM GPC annunciates BITE:
Go to PASS SM GPC FAIL, **1.2** >>
2. If single GNC GPC (RS ≥ 1) annunciates BITE:
Go to PASS GNC GPC (1ST FAIL), **1.3** >>
3. If all GNC GPCs (RS ≥ 2) annunciate BITE:
If cyclic logging of BITE:
| Go to FD GPC ACTIVATE, **1.4** >>
If non-cyclic logging of BITE:
When time permits, go to
MAL, DPS, SSR-2

1.7

SUMWORD ICC 1(2,3,4)

- If CS = 2
When time permits
1. Go to MAL, DPS, SSR-2 >>
- If only one GPC annunciates:
Consider annunciating GPC failed
2. Go to PASS SM (GNC) GPC FAIL **1.2** (**1.3**) >>
- If annunciates against SM GPC:
(prior to adding GPC to redundant set)
3. Go to PASS SM GPC FAIL, **1.2** >>
- If annunciates against single GNC GPC:
4. Go to PASS GNC GPC (1ST FAIL), **1.3**



4 Match indications to charts, determine failure

CAM	GPC to which DEU assigned	DEU state or msgs	MODE tb change of state	OUTPUT tb change of state	FAILURE
	1 2 4	Big X GPC 1 24 GPC 1 24	1 RUN to bp	1 GR to bp	GPC 1 PWR FAIL → 1.3
	1 2 4	GPC 2 14 Big X GPC 2 14	2 RUN to bp	2 GR to bp	GPC 2 PWR FAIL → 1.3
	1 2 4	GPC 4 12 GPC 4 12 Big X	4 RUN to bp	NONE	GPC 4 PWR FAIL → 1.2
	1 2 4	GPC 2 1 GPC 1 2	NONE	NONE	GPC 1,2 RS FTS → 1.3
	1 2 4	GPC 2 1 GPC 4 1 GPC 1 24 GPC 1 24	NONE	NONE	GPC 1 CS FTS → 1.3
	1 2 4	Big X GPC 1 24 GPC 1 24	1 RUN to bp	1 GR to bp	GPC 1 S/W HALT → 1.3
	1 2 4	GPC 2 14 GPC 1 2 GPC 4 2 GPC 2 14	NONE	NONE	GPC 2 CS FTS → 1.3

(Continued next page)

4 (Cont) Match indications to charts, determine failure					
CAM	GPC to which DEU assigned	DEU state or msgs	MODE to change of state	OUTPUT to change of state	FAILURE
	1 2 4	GPC 2 14 Big X GPC 2 14	2 RUN to bp	2 GR to bp	GPC 2 S/W HALT
	1 2 4	GPC 4 12 GPC 4 12 GPC 1 4 GPC 2 4	NONE	NONE	GPC 4 CS FTS
	1 2 4	GPC 4 12 GPC 4 12 Big X	4 RUN to bp	NONE	GPC 4 S/W HALT
*	1 2 4	Big X Big X GPC 1 4 GPC 2 4	1 RUN to bp 2 RUN to bp	1 GR to bp 2 GR to bp	GPC 1,2 S/W HALT (GENERIC S/W ERROR)
	1 2 4	Big X GPC 1 24 GPC 1 24	NONE	NONE	GPC 1 QUILTS
	1 2 4	GPC 2 14 Big X GPC 2 14	NONE	NONE	GPC 2 QUILTS
	1 2 4	GPC 4 12 GPC 4 12 Big X	NONE	NONE	GPC 4 QUILTS
	1 2 4	Big X Big X GPC 1 4 GPC 2 4	NONE	NONE	GPC 1,2 QUIT

→ 1.3

→ 1.2

→ 1.2

→ 1.4

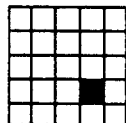
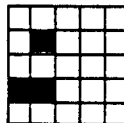
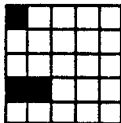
→ 1.3

→ 1.3

→ 1.2

→ 1.4

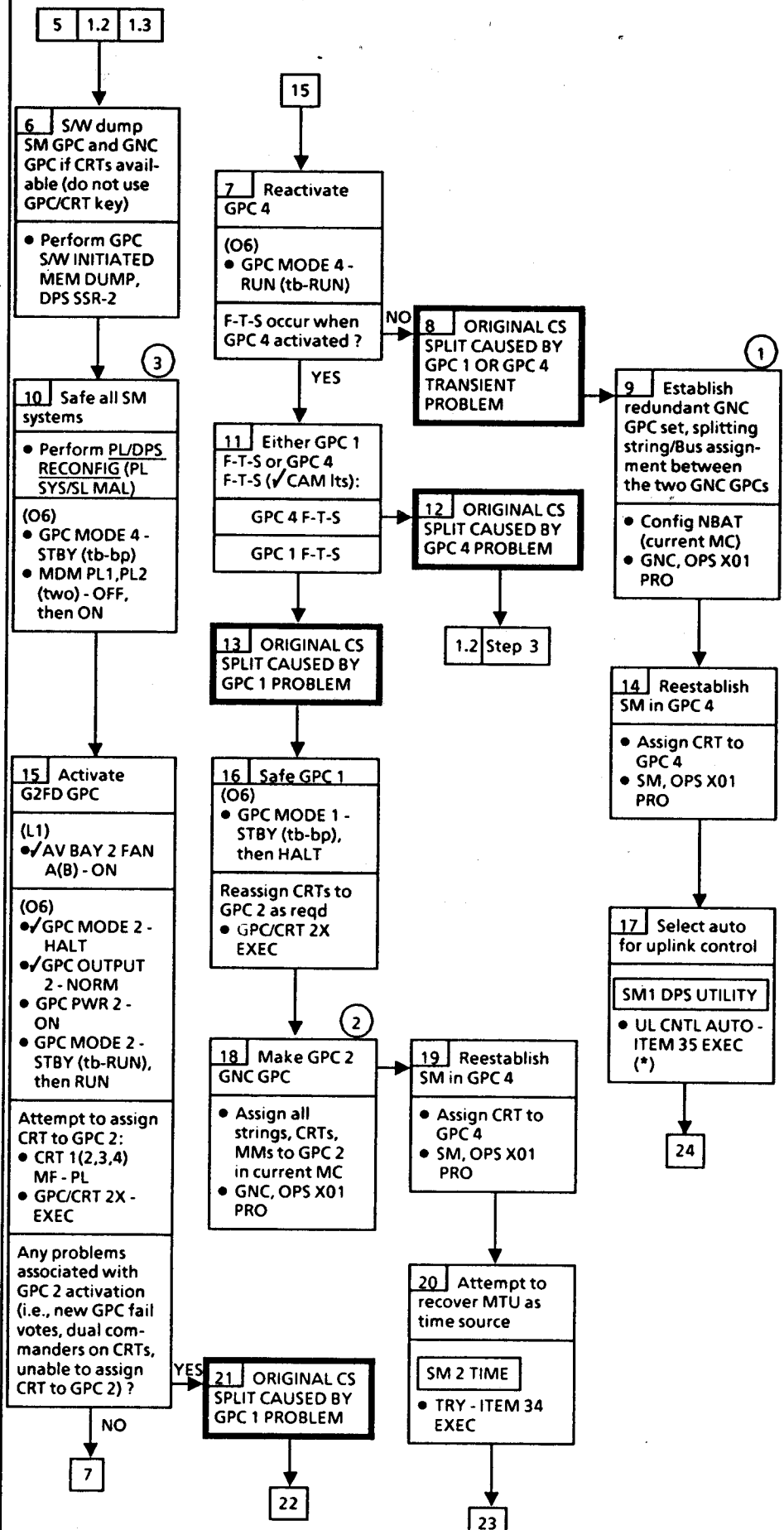
* Because of a race condition, any one of these patterns may appear





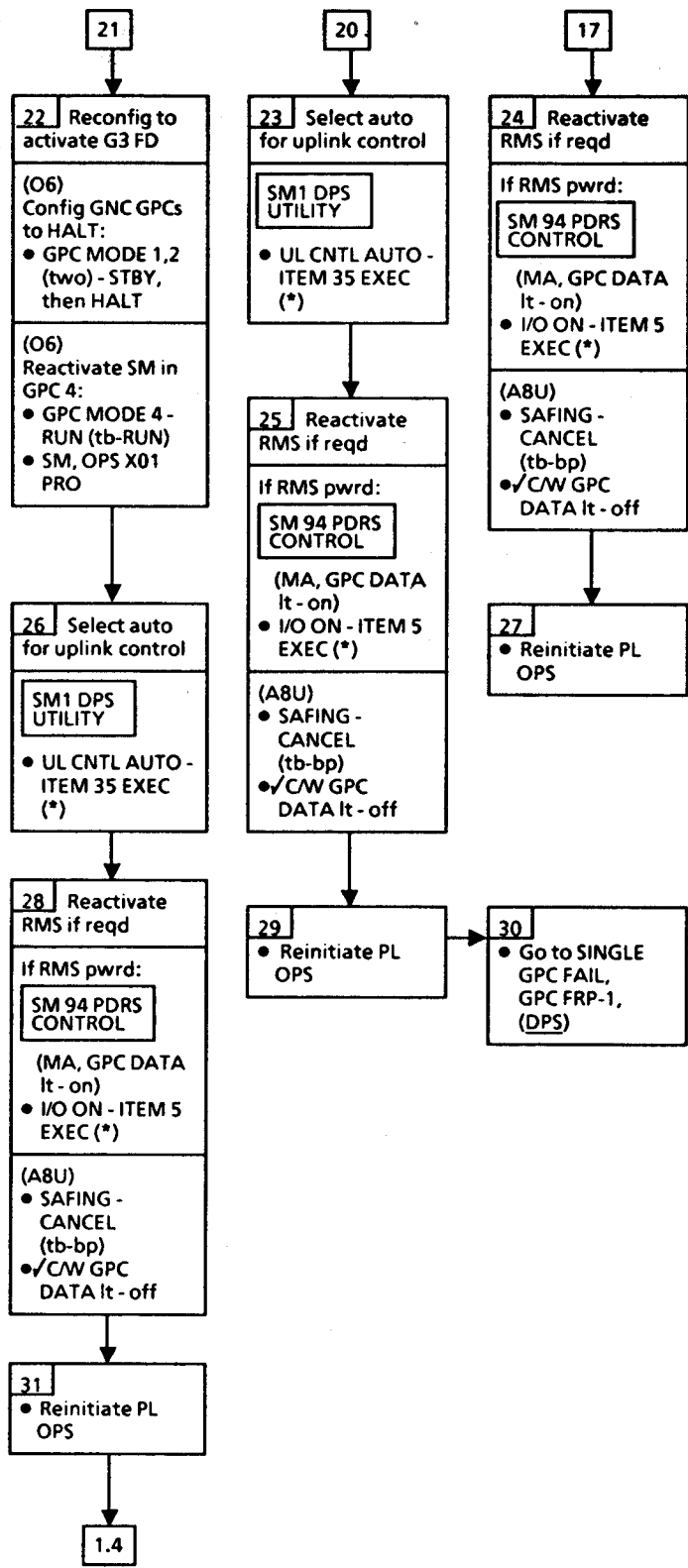
5 Match indications to charts, determine failure					
CAM	GPC to which DEU assigned	DEU state or msg	MODE to change of state	OUTPUT to change of state	FAILURE
	1 4	Big X GPC 1 4	1 RUN to bp	1 GR to bp	GPC 1 PWR FAIL → 1.4
	1 4	GPC 4 1 Big X	4 RUN to bp	NONE	GPC 4 PWR FAIL → 1.2
	1 4	Big X GPC 1 4	1 RUN to bp	1 GR to bp	GPC 1 S/W HALT → 1.4
	1 4	GPC 4 1 Big X	4 RUN to bp	NONE	GPC 4 S/W HALT → 1.2
	1 4	Big X GPC 1 4	NONE	NONE	GPC 1 QUILTS → 1.4
	1 4	GPC 4 1 Big X	NONE	NONE	GPC 4 QUILTS → 1.2
	1 4	GPC 4 1 GPC 1 4	NONE	NONE	GPC 1,4 CS FTS → 6

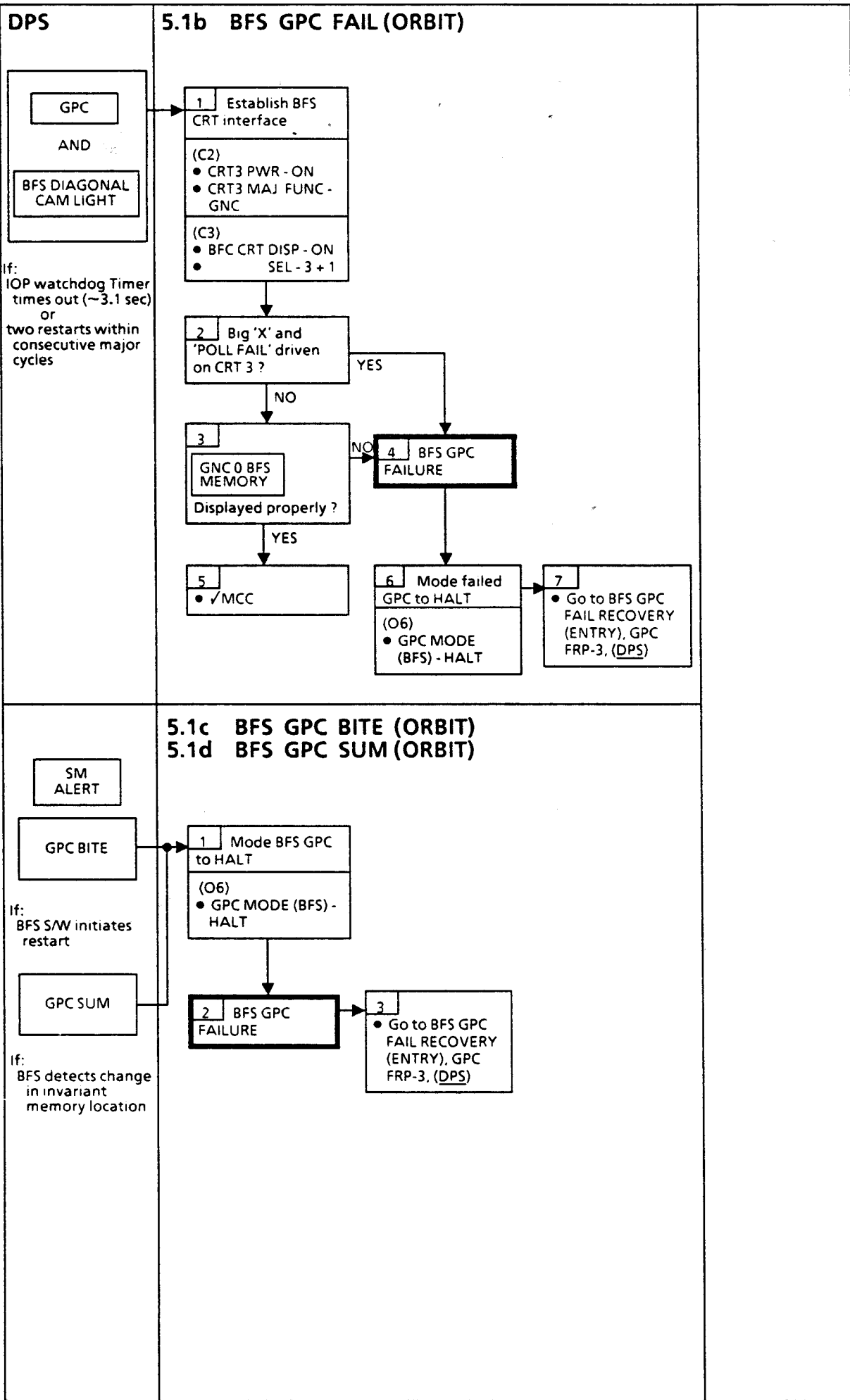
DPS 5.1a (Cont)

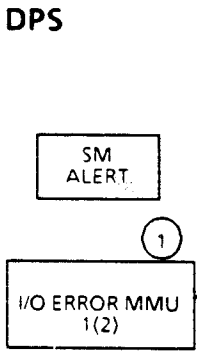


- ① If single GNC config reqd, on MCC call make GPC 1 G2FD
- ② MCC will uplink State Vector. If no comm at AOS, sel best antenna
- ③ For IPS mission, loss of SM will generate SL MDM loss of link and SV loss msgs. As a result, IPS resolver hold operations will have to be initiated

DPS 5.1a (Cont)





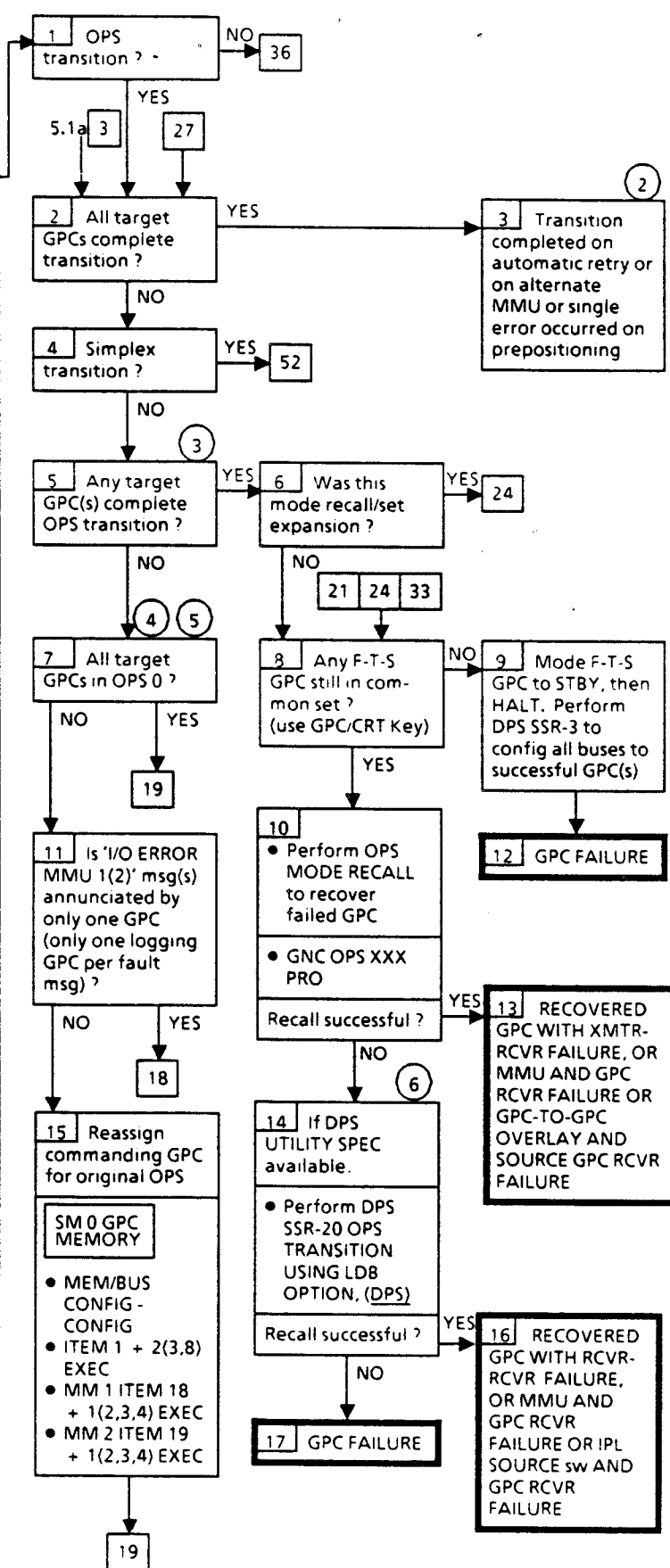


If:
CHECKSUM, I/O transient, BCE failure, MMU failure, or source GPC failure

During:
Display roll-in DEU IPL, OPS transition SM checkpoint TFL/DFL MM patch

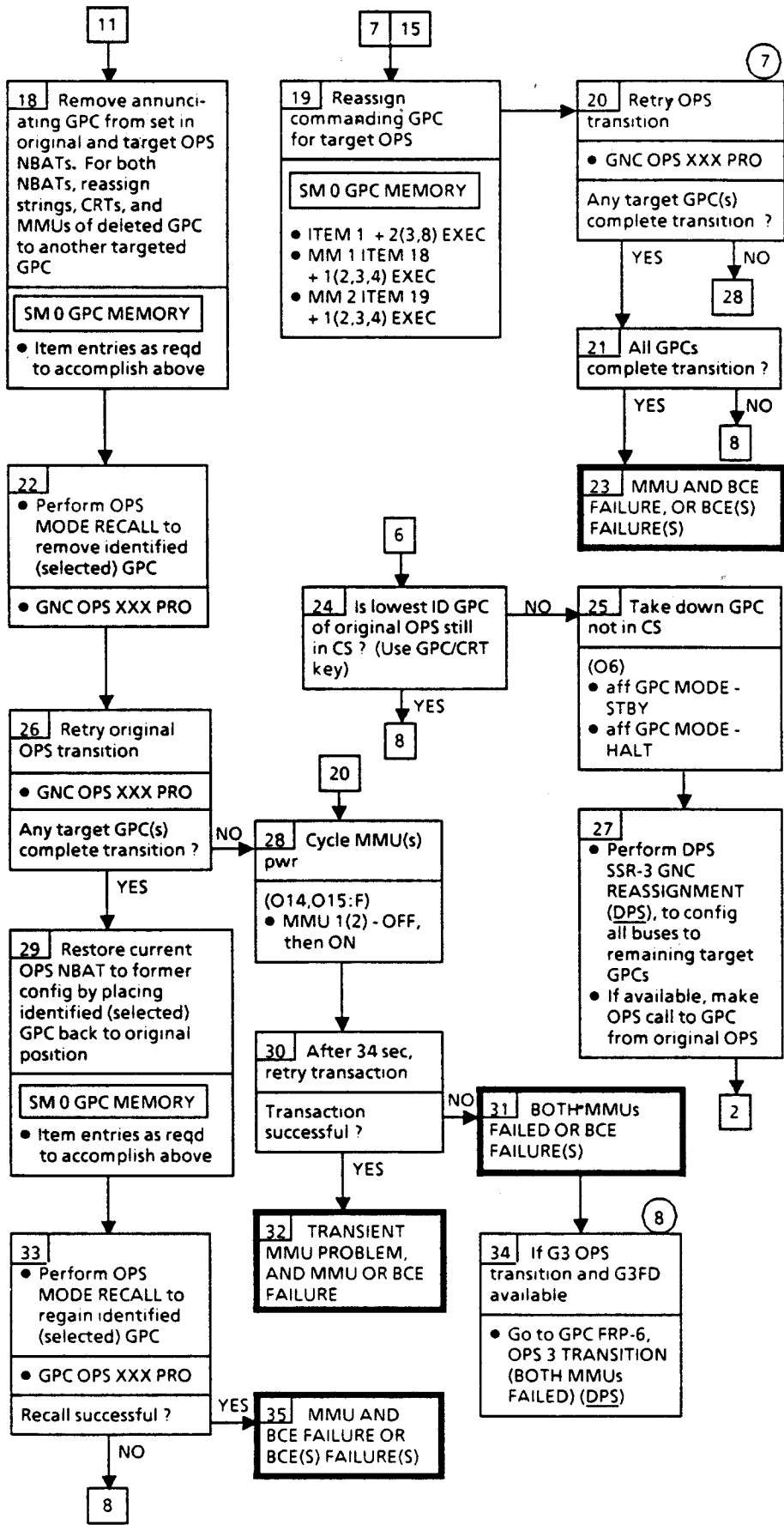
Nominal Config:
(O14:F)
MMU 1 - ON
(O15:F)
MMU 2 - ON
(O6)
IPL SOURCE - OFF

5.2a I/O ERROR MMU 1(2)



- ① Procedure assumes nominal NBAT with both MMUs available and assigned for use
- ② Health of affected MMU can be verified by a GNC OPS transition (with MCC concurrence) or SM roll-in request
- 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, CRTs are still assigned per new OPS NBAT. Any CRTs 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 If SPEC not available, GPC may be recoverable using R/W to select LDB option

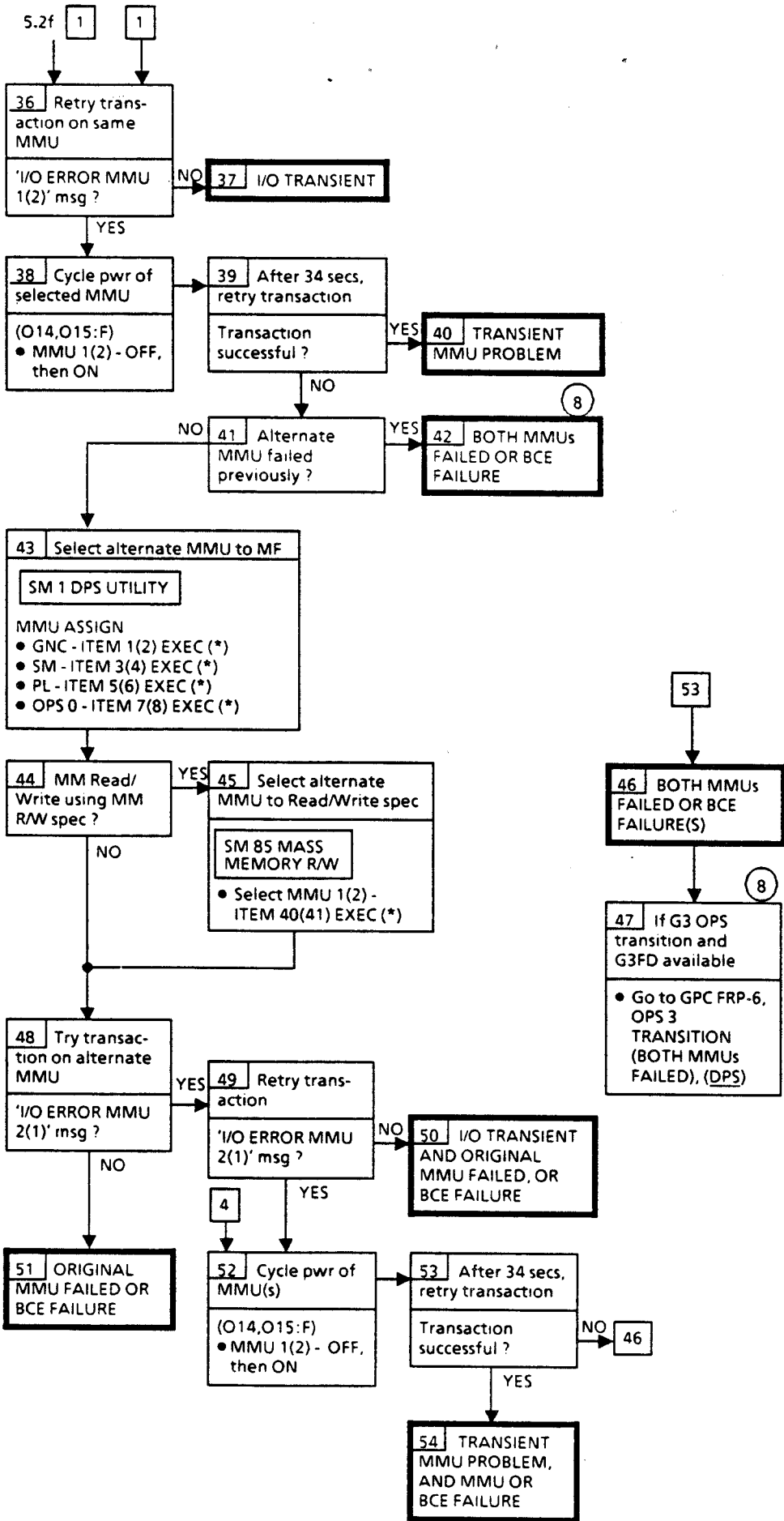
DPS 5.2a (Cont)



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

8 Recovery from OPS transition failure may be possible. ✓MCC about use of DPS SSR-11, SET UP FOR OPS 3 OVERLAY UPLINK; or use of DPS SSR-10, SELECT ALTERNATE PASS S/W COPY ON MMU W/O IPL

DPS 5.2a (Cont)



8 Recovery from OPS transition failure may be possible. ✓MCC about use of DPS SSR-11, SET UP FOR OPS 3 OVERLAY UPLINK; or use of DPS SSR-10, SELECT ALTERNATE PASS S/W COPY ON MMU W/O IPL

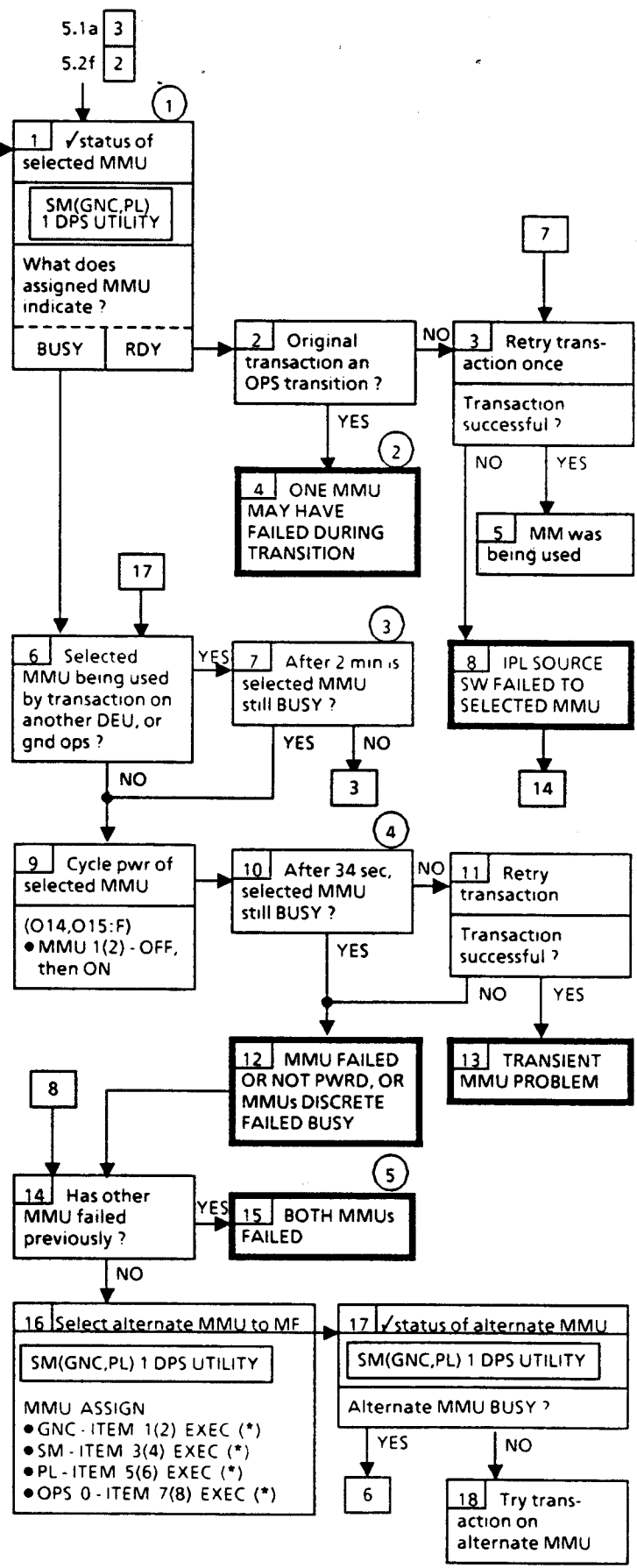
5.2b OFF/BUSY MMU 1(2)

SM ALERT

OFF/BUSY MMU 1(2)

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

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



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

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

5 If G3 OPS transition and G3FD available, go to OPS 3 TRANSITION (BOTH MMUs FAILED), GPC FRP-6. If G3 OPS transition and G3FD not available, contact MCC before performing DPS SSR-11, SET UP FOR OPS 3 OVERLAY UPLINK

Event Timer Fail

If:
Event Timer
Fwd (Aft)
failure

Nominal Config:
(O15:B)
cb MNB EVENT
TIMER FWD - cl
(O14:B)
cb MNA EVENT
TIMER AFT - cl

1 | Test lamps
(C2, A6U)
• EVENT TIMER
MODE - TEST

Does '8' appear in all
digits ?

NO

2 | LAMP
ELEMENT FAILURE

YES

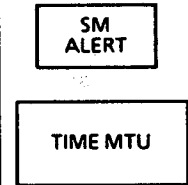
1

3 | MTU SYNC
SIGNAL FAILURE

1 Event timer
will continue to
function on
internal osc

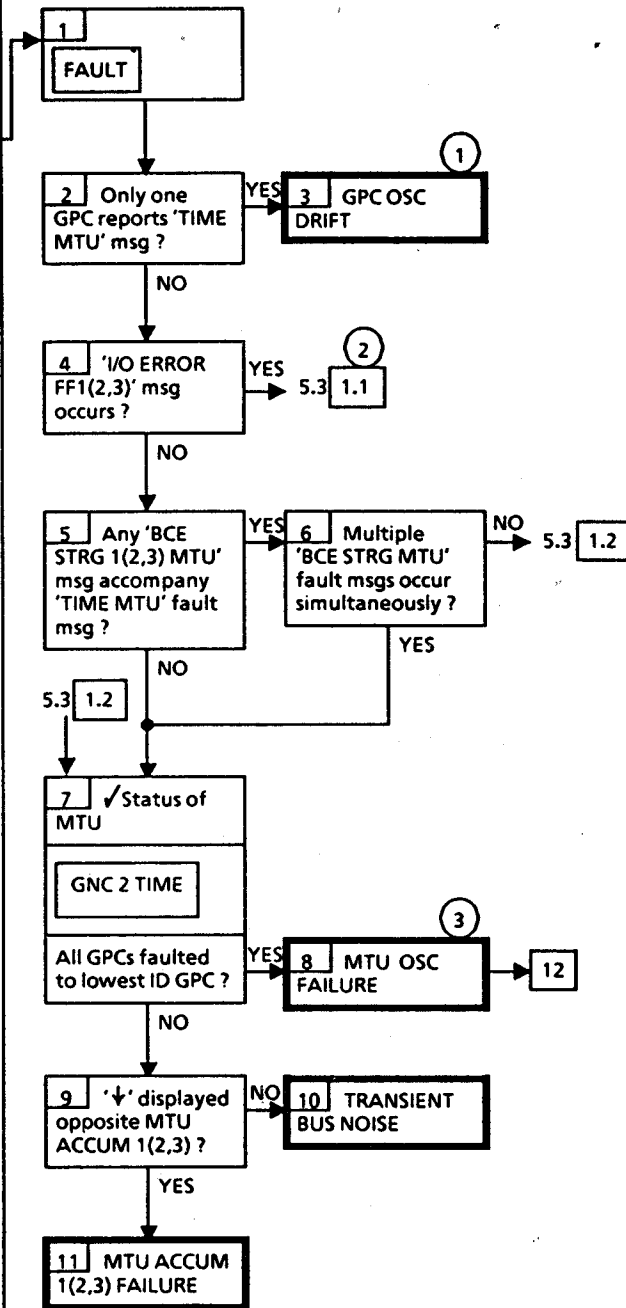
DPS

5.2d 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

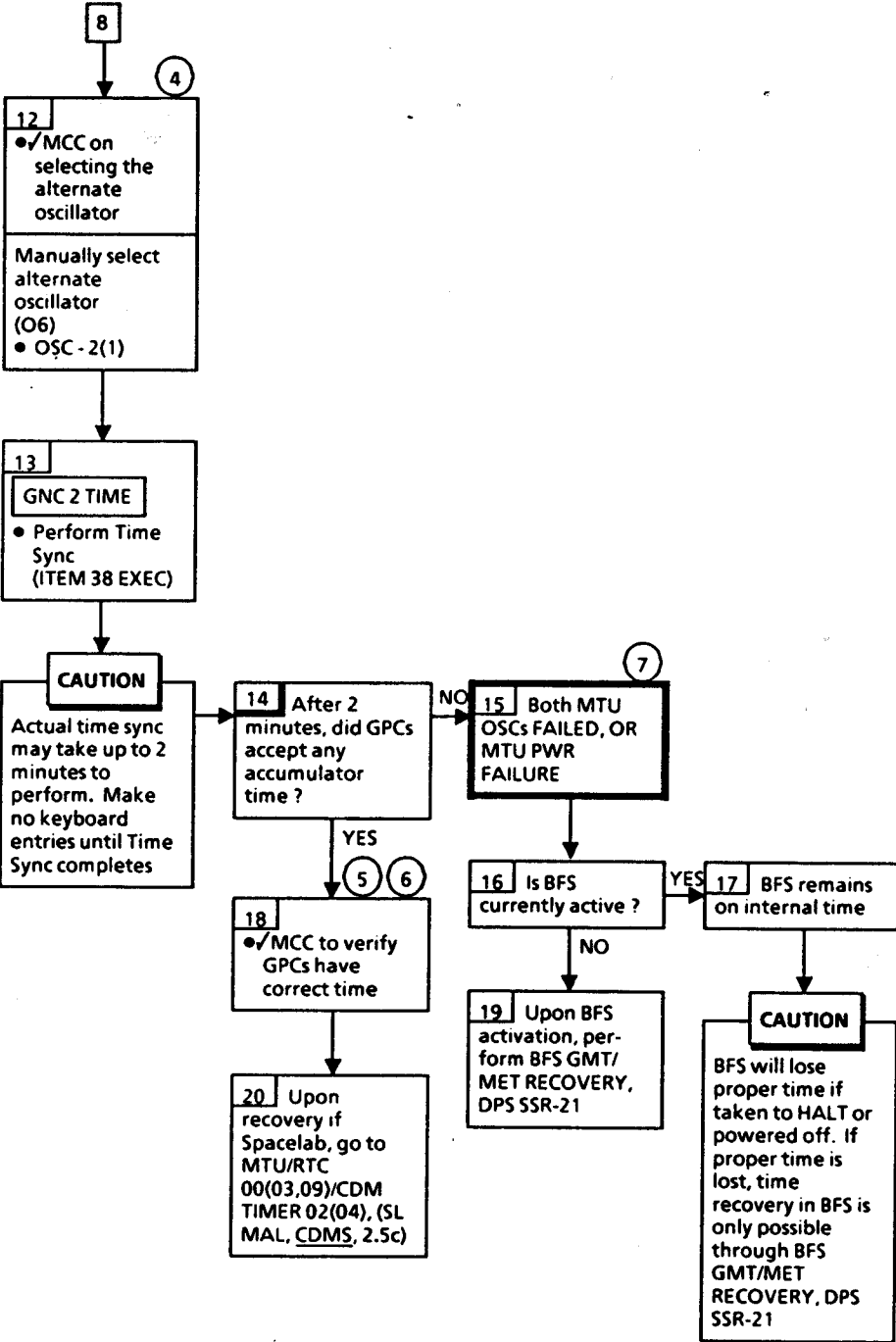


① Excessive drift of GPC oscillator will cause GPC MY TIME to be selected and loss-of-sync may occur

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)



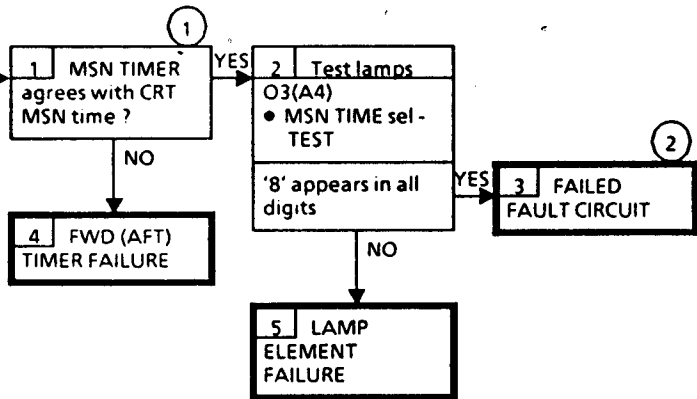
- ④ Crew cannot tell which oscillator is currently selected
- ⑤ MTU GMT and MET may have errors. D&C Timers are invalid until time is corrected. Action will extinguish any lit on D&C timers and reenable MTU sync signals
- ⑥ '+' on any remaining accumulators does not indicate problem. As long as GPCs accepted some accumulator time, time will update properly
- ⑦ GPCs will remain on internal time

5.2e MSN TIMER FAIL

Msn Timer Fail

If:
MSN Timer Fwd (Aft) failure

Nominal Config:
(O15:8)
cb MNB MSN
TIMER AFT - cl
(O14:8)
cb MNA MSN
TIMER FWD - cl
(O16:8)
cb MNC AUX
TIMING BUFF - cl



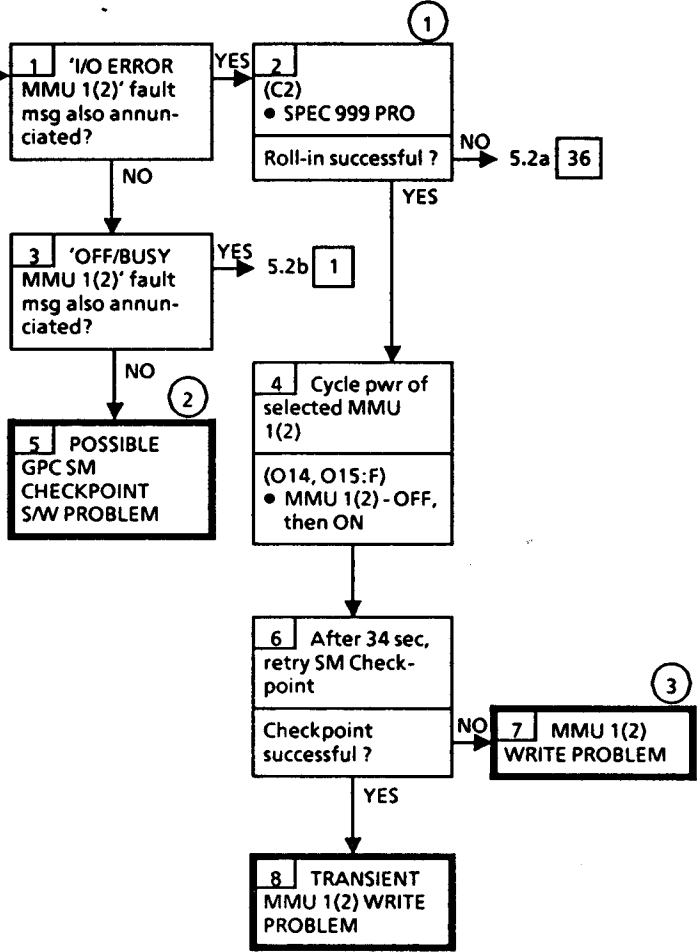
(1) For Aft MSN Timer, problem may be associated with Orbiter Timing Buffer

(2) MSN Timer continues to function

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

③ Affected MMU may be used for any tape read transaction including OPS transitions, TFL loads, and SM roll-in displays

MDM
5.3

DPS

5.3 MDM

SM ALERT

1 2
I/O ERROR
FF1 (2,3,4)

1 2
I/O ERROR
FA1 (2,3,4)

If data path fail as follows:
MDM fail
BCE XMTR fail
BCE RCVR fail
IOP fail

SM ALERT

1 2 7

BCE STRG
1(2,3,4) A*
B*
C**
D**
TAC
MTU
IMU
ADTA
STKR
MLS
NSP
* FF MDMs
** FA MDMs

If all active GNC GPC(s) detect I/O errors caused by:
MDM fail
MDM/LRU interface fail
Equipment not powered up
ADTA | MLS
IMU | MTU
STKR | NSP

Nominal Config:
(O6)
MDM FA1,2,3,4 - ON
MDM FF1,2,3,4 - ON

1.1 FF(FA) MDM I/O ERROR

1. I/O RESET
If recovered >>
- If OMS burn, continue post burn
2. If simo 'I/O ERR' msgs for mult MDMs, (Poss GPC problem):
√MCC/restring as reqd >>
3. If FF: √ADI (aff string)
If ADI 'OFF' flag (GPC problem), go to step 9
4. GNC 1 DPS UTILITY port mode aff STRG
If recovered >>
If alt msg on aff string (GPC problem), go to step 9
If any other:
5. Aff MDM - OFF, ON (FF: may cage IMU)
6. I/O RESET
If recovered >>
7. If FF:
GNC 21 IMU ALIGN aff IMU - des
8. Reselect original ports
If recovered: resel IMU if desel >>
If not, go to MAL, DPS, 5.3a 13 >>
9. If time permits restringing (with poss F-T-S), go to MAL, DPS, 5.3a 1 >>
If not, sel desired FF/FA MDM
10. GNC 1 DPS UTILITY port mode as reqd
11. If FF MDM not chosen:
GNC 21 IMU ALIGN aff IMU - des

1.2 BCE STRG X (NO 'MDM OUTPUT' MSG)

- If IMU:
1. GNC 21 IMU ALIGN - desel IMU
 2. √OPER/STBY mode
If OPER, go to step 4
- or
- NOTE
If > 3 min since 'IMU' msg occurred (poss undetect IMU cage), upon IMU recovery, √att ANG prior to 'resel if IMU'
- or
- If STBY, go to MAL, DPS, 5.3b 1 >>
- If NSP:
3. √UPLINK sw - ENA
- If MTU:
If mult 'STRG MTU' msgs, go to MAL, DPS, 5.2d 7 >>
4. I/O RESET
If recovered: resel if IMU >>
 - If OMS burn, continue post-burn
 5. GNC 1 DPS UTILITY port mode aff STRG
If recovered: resel if IMU >>
 6. Cycle MDM - OFF, ON (FF: may cage IMU)
NOTE
Cycle FF if 'A' or 'B' msg, FA if 'C' or 'D'
 7. I/O RESET (√DAP)
If recovered: resel if IMU >>
 8. Reselect original ports
If NSP:
If AOS: √MCC >>
or If LOS/no comm: √next site config per STD S-BD/KU - BD PNL CONFIG (ORB OPS, COMM/INST) >>
If IMU: √MCC >>
If any other, go to MAL, DPS, 5.3b 15

1 GPC outputs to MDMs not terminated as a result of fault msgs: 'I/O ERROR' 'BCE STRG'

2 If CAM lts or 'GPC' fault msg indicates an F-T-S GPC accompanied 'MDM OUTPUT' fault msg, situation caused by BCE RCVR (IOP input data path hardware failure). Go to MAL, DPS, 5.1 1.3

4 If OMS Preburn and time permits, attempt data path recovery

5 Mal assumes multiple I/O errors caused by common failure mode. If non-simultaneous 'I/O ERROR FF (FA)' msgs occurred prior to I/O RESET then treat each fault one at a time

6 MDM pwr should not be off > 1 sec to avoid caging IMU (typically, IMUs go to standby within 2 to 6 sec)

7 Same MDM/IOP single-point failure can cause both 'MDM OUTPUT' and 'BCE STRG' msgs. Annunciation of 'MDM OUTPUT' fault msg may be delayed up to 5 sec after 'BCE STRG' msg caused by low monitor rate and I/O RESETs. If both msgs, go to MAL, DPS, 5.3 1.3

8 Ignore resulting 'I/O ERROR' msg when MDM pwr cycled. With pwr cycle, RCS RM will deselect comm-faulted jets until data path recovered

9 Swap NSPs to recover OPS RCDRs in case failure js NSP

MDM
5.3

SM
ALERT

1 2

MDM OUTPUT
FF1(2,3,4)

1 2

MDM OUTPUT
FA1(2,3,4)

If data path fail
as follows:
MDM fail
BCE XMTR fail
BCE RCVR fail
IOP fail

Nominal Config:
(06)
MDM FA1,2,3,4 - ON
MDM FF1,2,3,4 - ON

1.3

FF(FA) MDM OUTPUT

FAULT

1. I/O RESET
If no 'MDM OUTPUT' re-annun >>
If single 'MDM OUTPUT' msg:
2. GNC 1 DPS UTILITY port mode

If no 'MDM OUTPUT' annun >>
If not recovered:
3. Go to MAL, DPS, 5.1 1.3

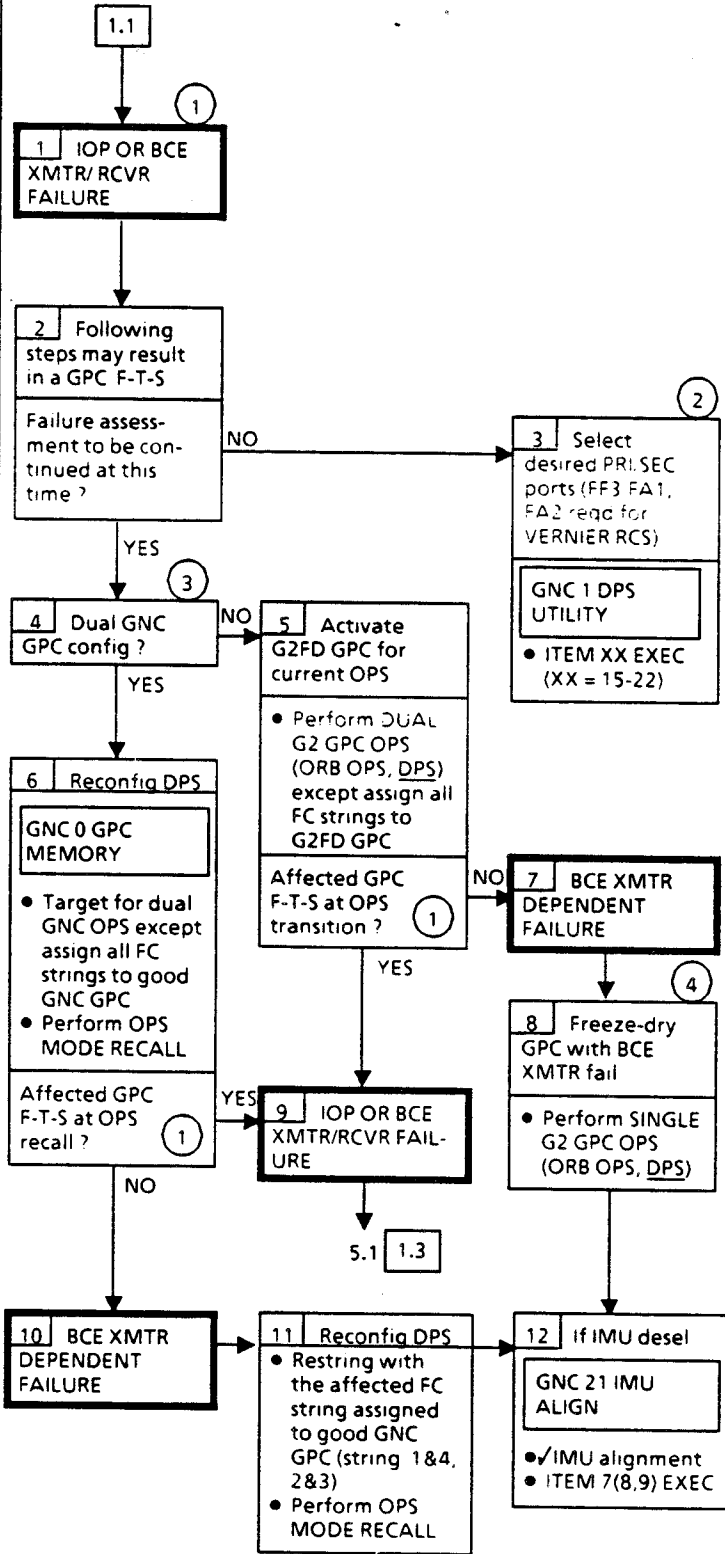
NOTE

If dual GNC OPS and 'MDM OUTPUT'
msg(s) annun by:
Redundant set - failed GPC is
the one commanding aff strings.
Single GNC GPC - failed GPC is
the one annunciating fault msg(s)

1 GPC outputs to MDMs not terminated as a result of fault msg 'MDM OUTPUT'

2 If CAM Its or 'GPC' fault msg indicates an F-T-S GPC accompanied 'MDM OUTPUT' fault msg, situation caused by BCE RCVR (IOP input data path hardware failure). Go to MAL, DPS, 5.1 1.3

DPS 5.3a I/O ERROR



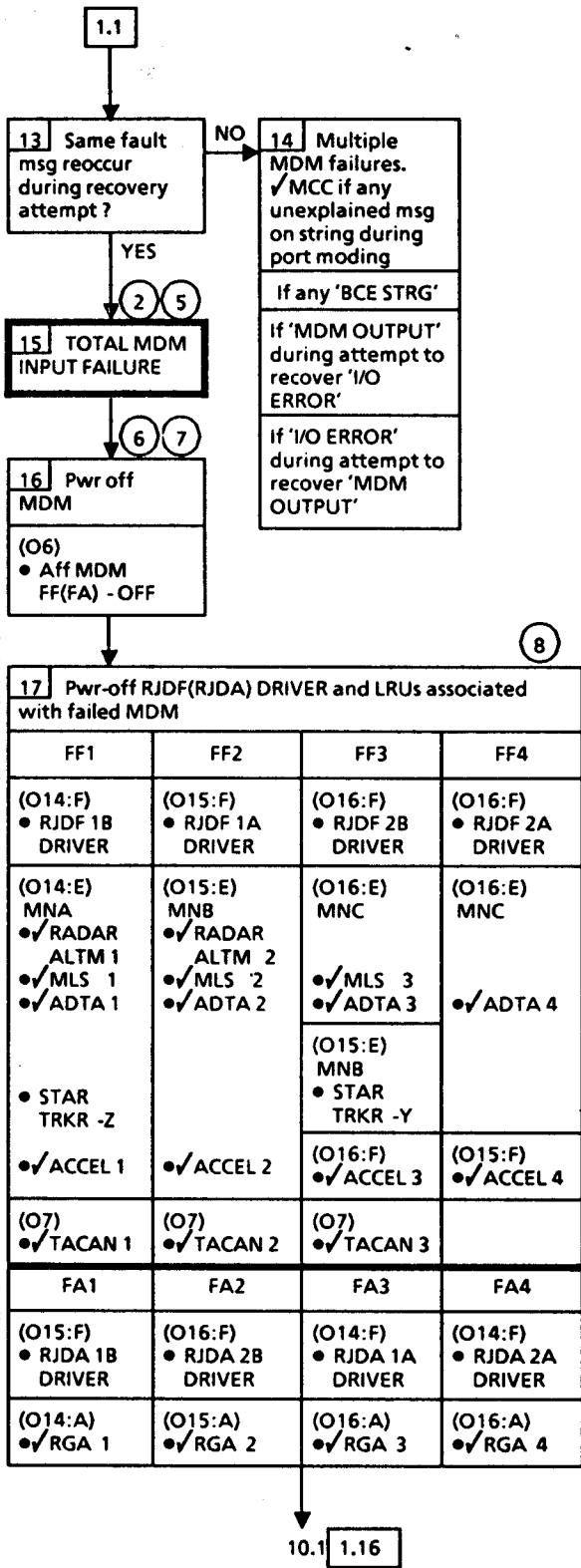
1 Mult MDM or GPC failures indicated if 'I/O ERROR' msg reoccurs after restraining with no F-T-S at Blocks 5 or 6. ✓ MCC

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

DPS 5.3a (Cont)



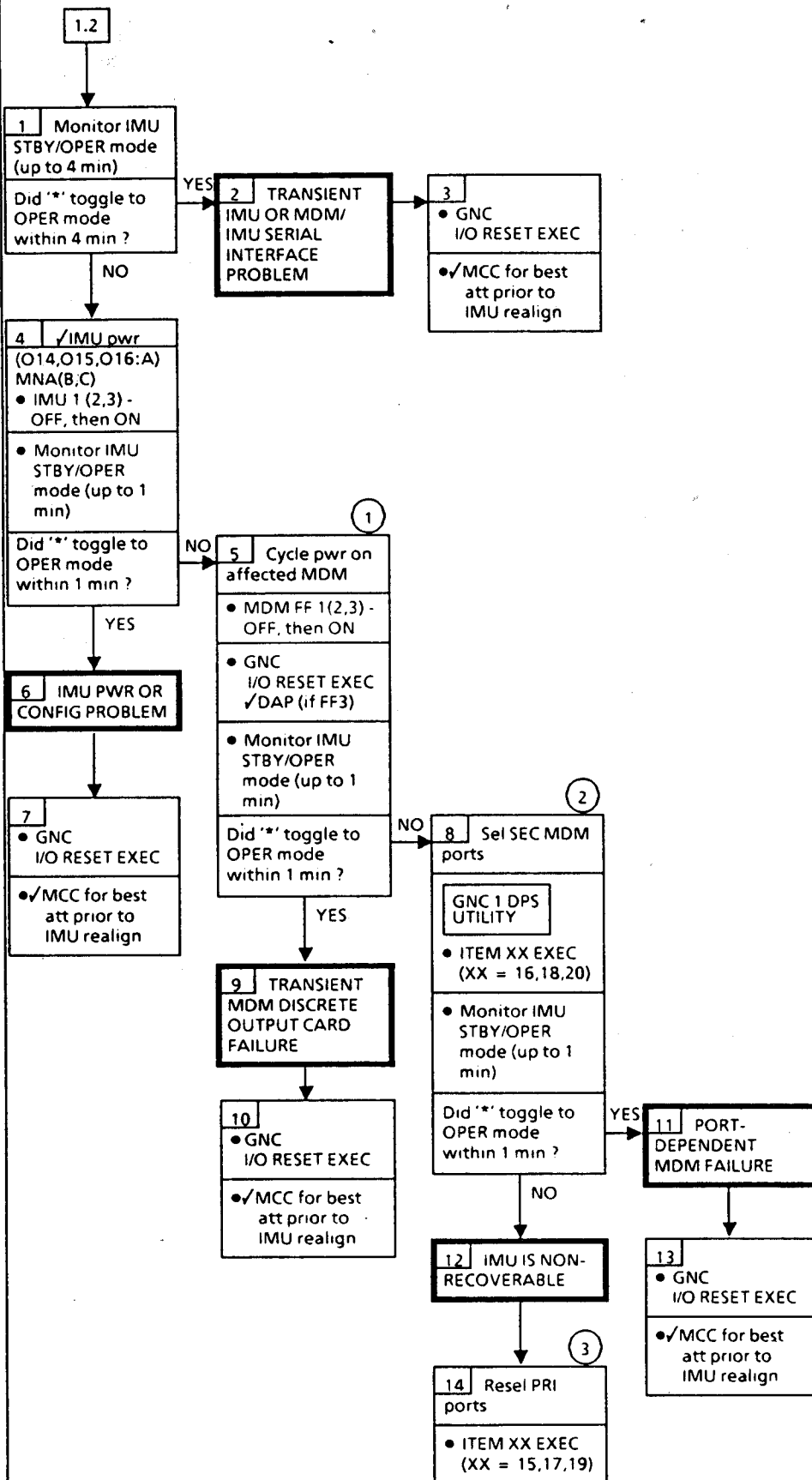
2 Go to MDM (REF) for summary of data lost on non-recovered MDM

5 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

6 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

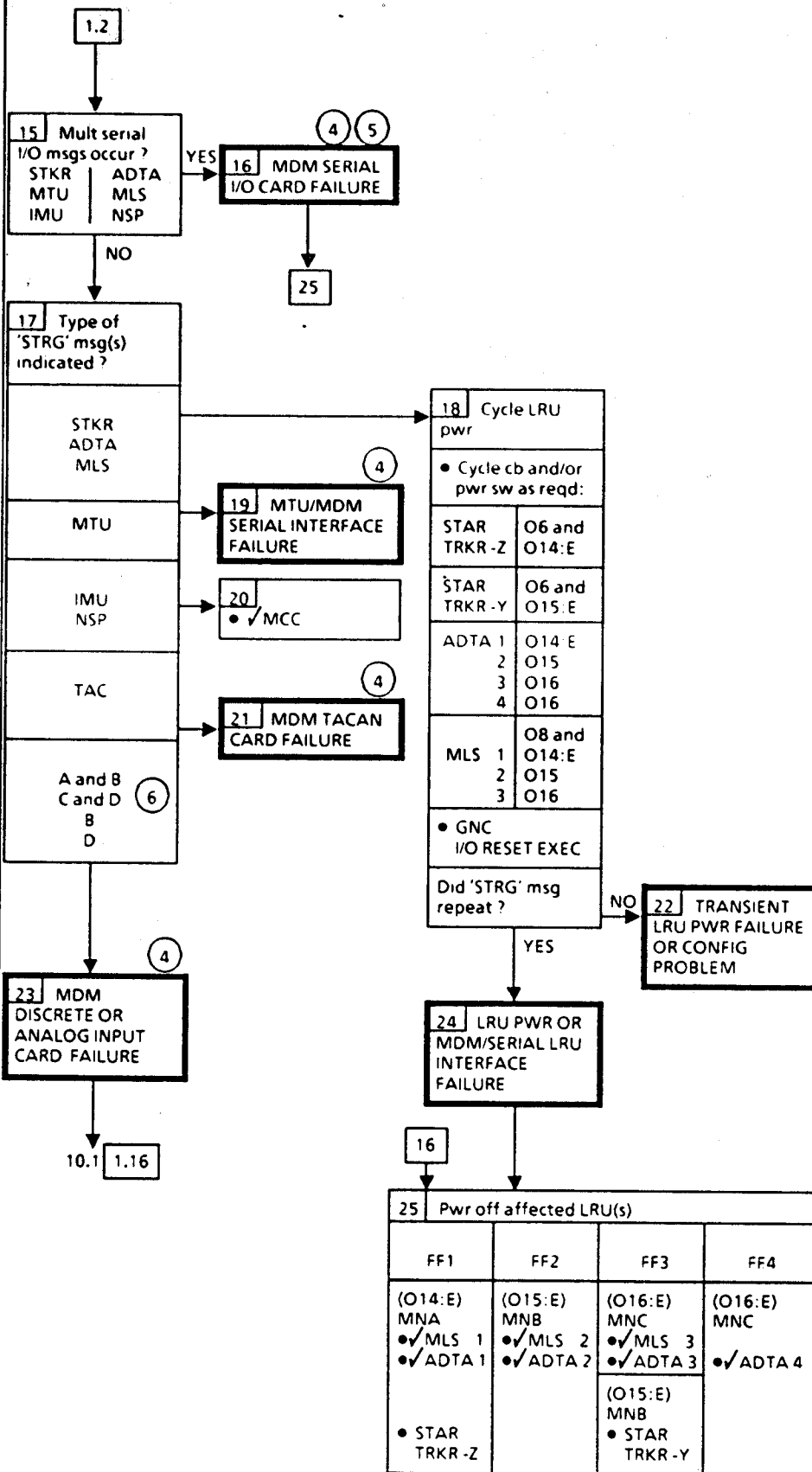
7 If failed MDM is FF1, FF2, or FF3, MDM may be candidate for MDM CHANGEOUT (IFM). ✓MCC

8 ✓MCC regarding powering off associated IMU



- ① If VERNIER RCS sel and FF3 pwr cycled, DAP will downmode to free drift at MDM pwr cycle. Crew action reqd to resel DAP
- ② Following MDM port moding, if either 'I/O ERROR' or 'MDM OUTPUT' fault msg occurs, mode MDM ports back to PRI and ✓MCC
- ③ ✓MCC regarding powering off associated IMU

DPS 5.3b (Cont)



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

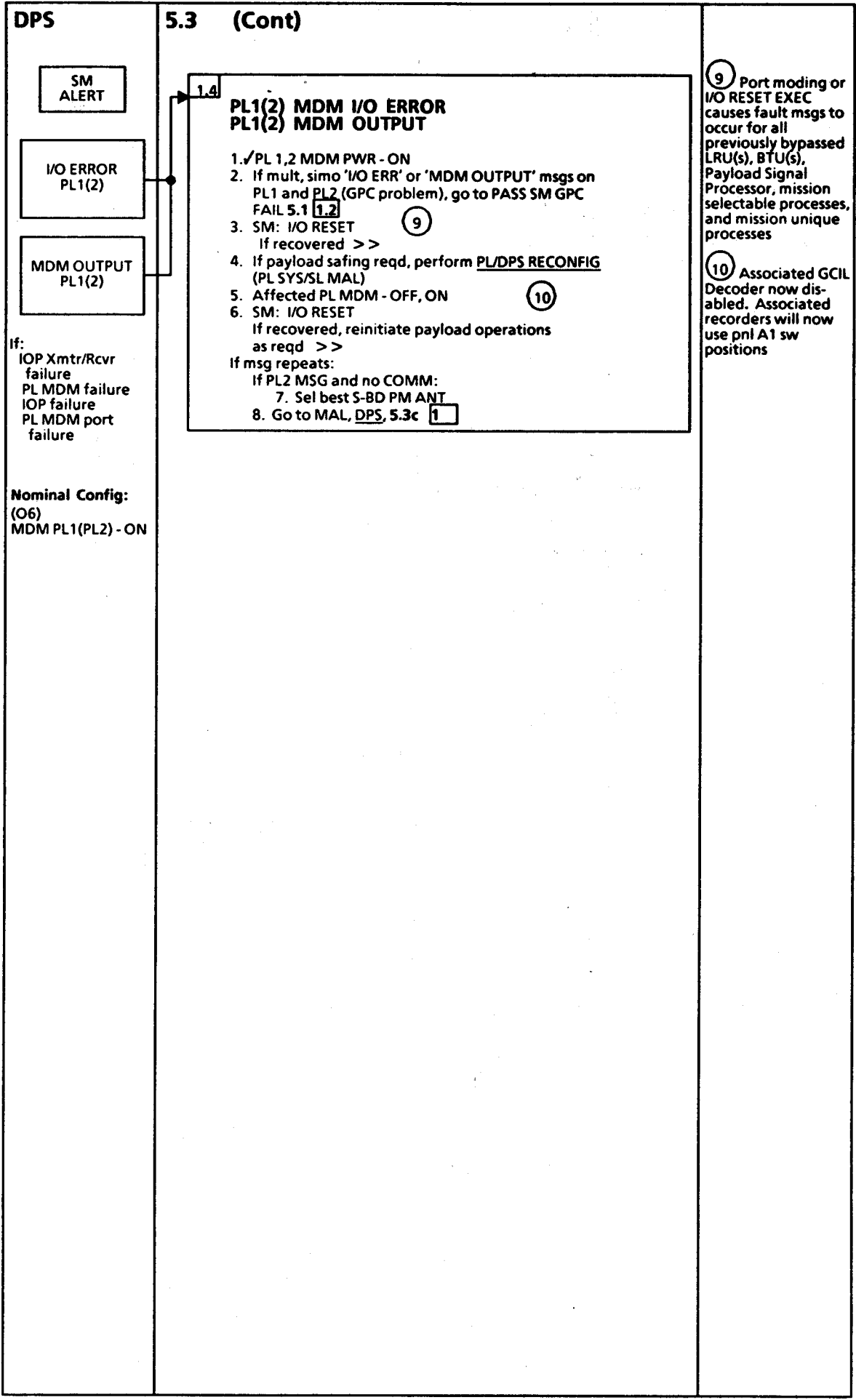
5 Total serial I/O card failures may result in single or multiple 'BCE STRG' msgs:

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

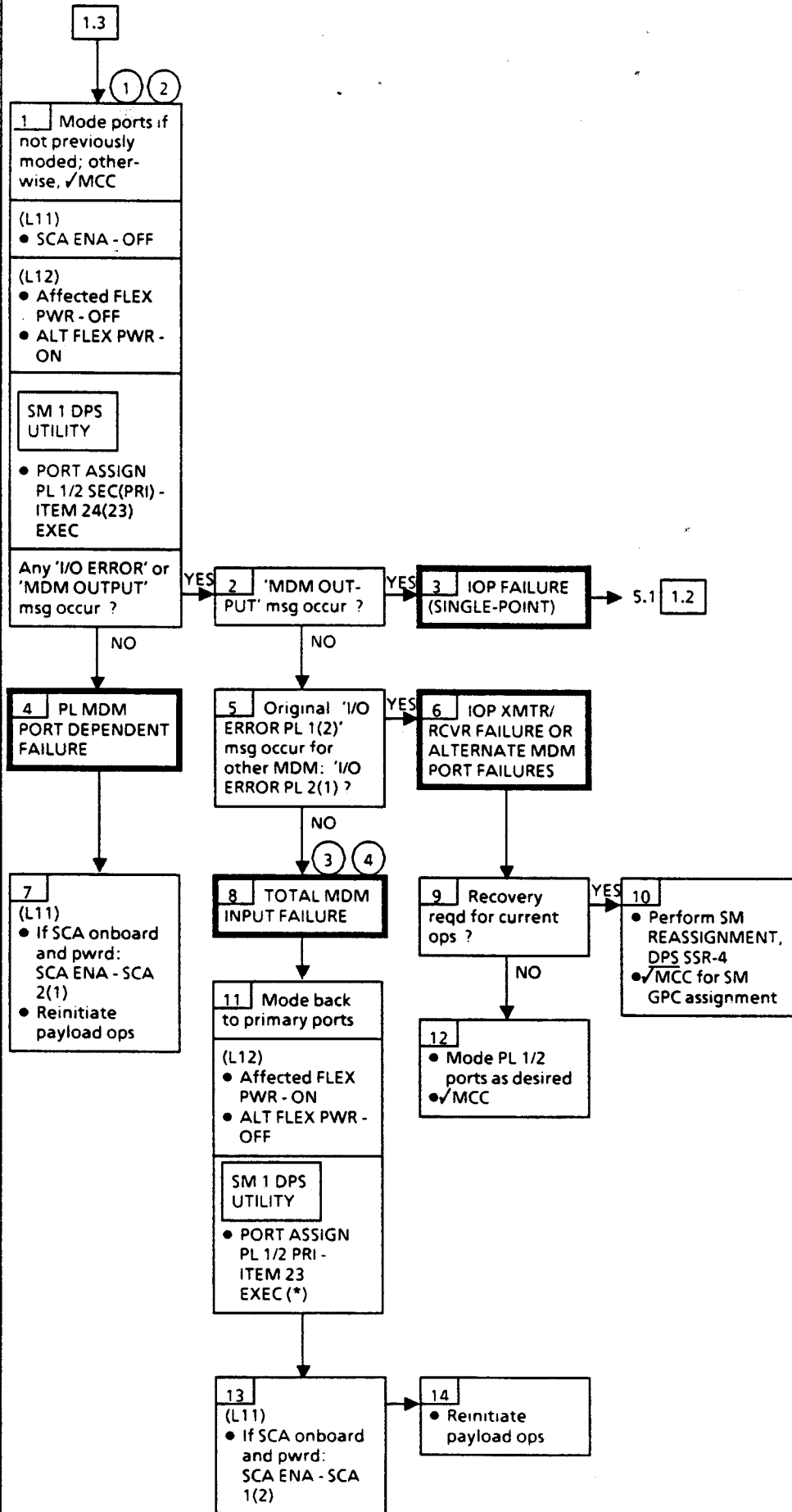
6 'BCE STRG A(C)' msgs will always occur in combination with 'BCE STRG B(D)' msg (MDM card failure) or in combination with 'I/O ERROR' msg or 'MDM OUTPUT' msg (IOP or total MDM failure)

25 Pwr off affected LRU(s)

FF1	FF2	FF3	FF4
(O14:E) MNA • ✓MLS 1 • ✓ADTA 1	(O15:E) MNB • ✓MLS 2 • ✓ADTA 2	(O16:E) MNC • ✓MLS 3 • ✓ADTA 3	(O16:E) MNC • ✓ADTA 4
• STAR TRKR -Z		(O15:E) MNB • STAR TRKR -Y	



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



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

2 GPC polling switches to alternate Sequence Control Assembly (SCA) with payload bus port moding

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

4 If PL2 and no comm at AOS, sel best ant

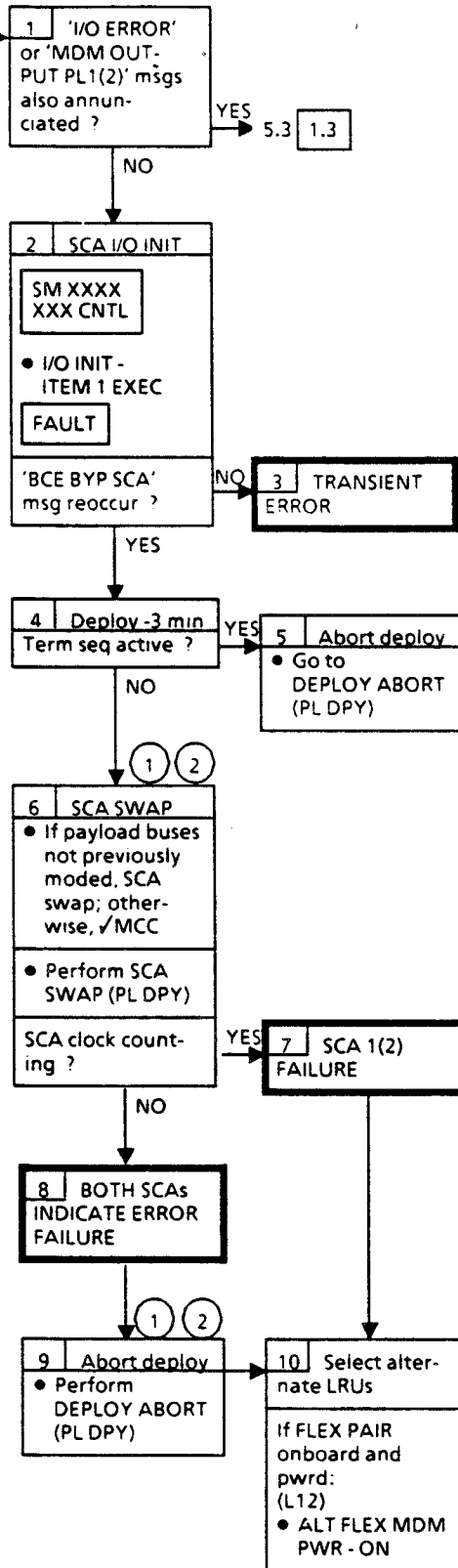
SM ALERT

(1)

BCE BYP SCA

If SM GPC detects:
SCA failure
IOP failure
BCE XMTR/RCVR failure

Nominal Config:
(L12)
SCA PWR - ON
SCA ENA - SCA 1(2)
(R1)
PRI PL PWR MNC - ON



(1) Assumes crew knows which SCAs are active and is able to monitor SCA/PAM status via appropriate spec/disp. I/O RESET EXEC or port moding causes 'BCE BYP SCA' fault msg to occur for SCAs which are not pwr'd

(2) Port moding or I/O RESET EXEC causes fault msg(s) to occur for all previously bypassed LRUs, BTUs, mission selectable processes, and mission unique processes. GPC polling switches to alternate SCA with payload bus port moding. Crew must manually enable other SCA per SCA SWAP procedure

DPS

5.3e I/O ERROR FLEX

SM ALERT

I/O ERROR FLEX

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

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

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

YES 5.3 1.3

NO

2 Try reset

FAULT
• SM I/O RESET EXEC

'I/O ERROR FLEX' msg reoccur ?

NO 3 TRANSIENT ERROR

YES

4 If payload safing actions reqd, perform PL/DPS RECONFIG (PL SYS/SL MAL)

5 Cycle MDM pwr

(L12)
• MDM FLEX - OFF, then ON
• SM I/O RESET EXEC

'I/O ERROR FLEX' msg reoccur ?

YES 6 This FLEX MDM part of a FLEX pair ?

NO 7 FLEX MDM FAILURE OR PALLET ELECTRICAL FAILURE

NO

8 TRANSIENT MDM FAILURE

10 • Reinitiate payload ops

YES 1 2

9 Mode Ports if payload buses not previously mod-ed; otherwise, /MCC

(L12)
• Affected FLEX PWR - OFF
• AIt FLEX PWR - ON

(L12)
• SCA ENA - OFF

SM1 OPS UTILITY

• PORT ASSIGN STRING PL 1/2 SEC(PRI) - ITEM 24(23) EXEC (*)

'I/O ERROR FLEX' msg reoccur ?

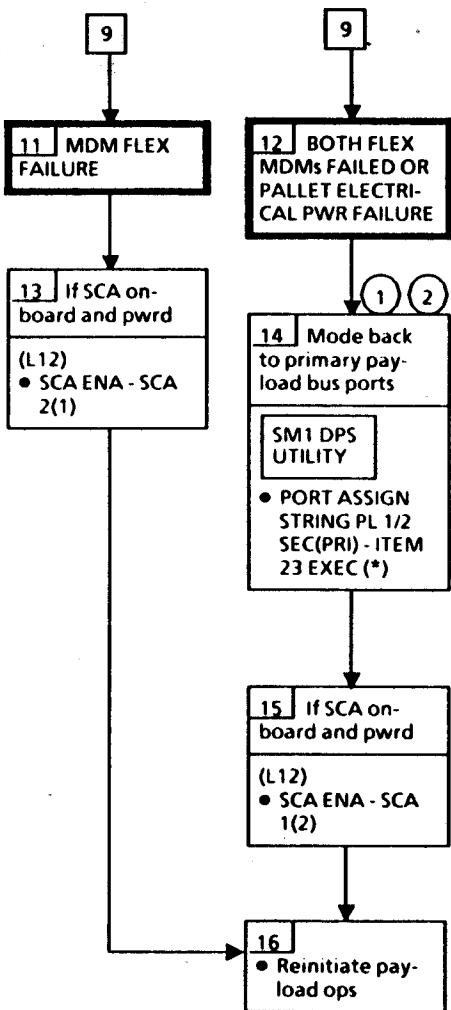
YES 12

NO 11

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

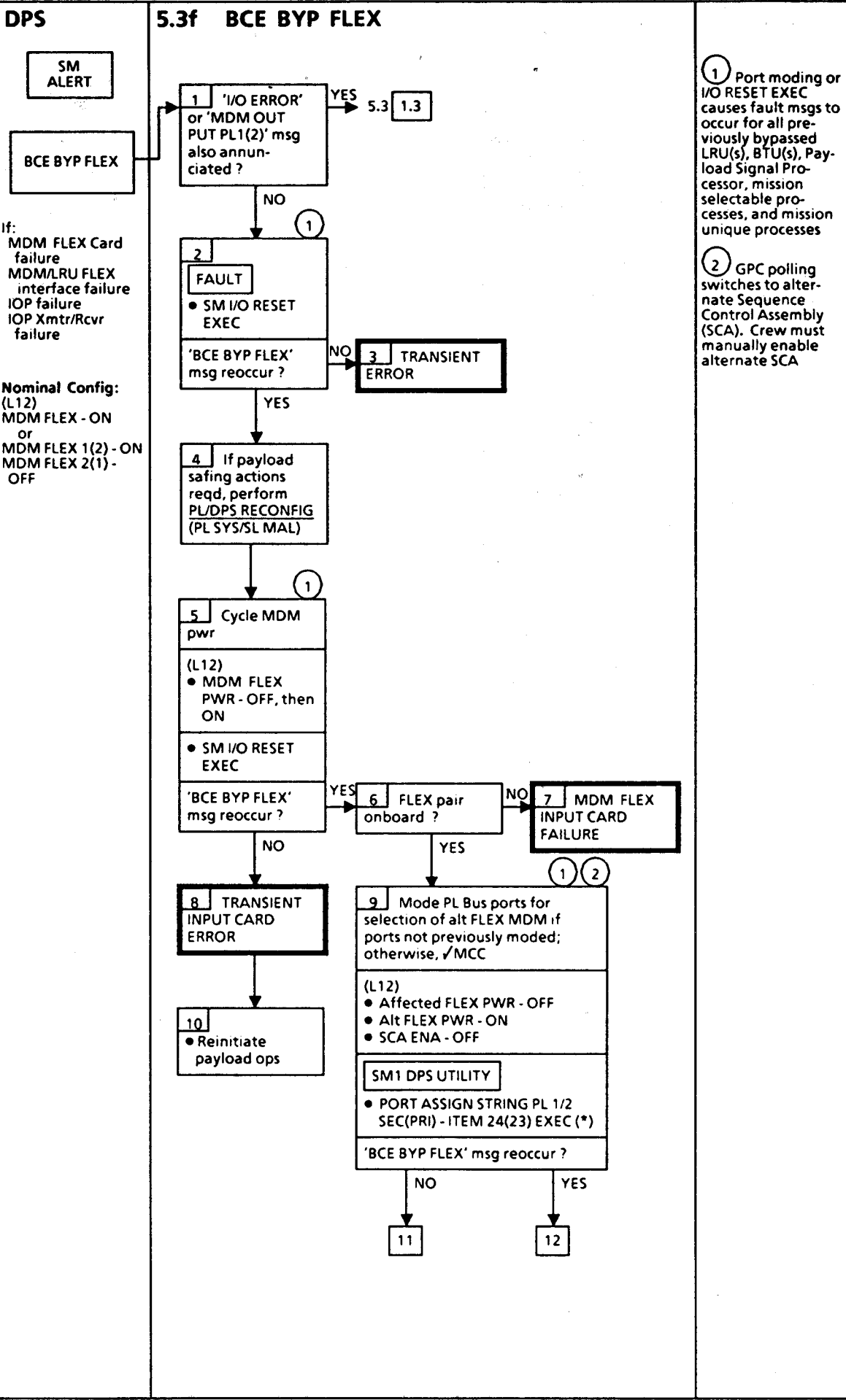
2 GPC polling switches to alternate Sequence Control Assembly (SCA). Crew must manually enable other SCA

DPS 5.3e (Cont)

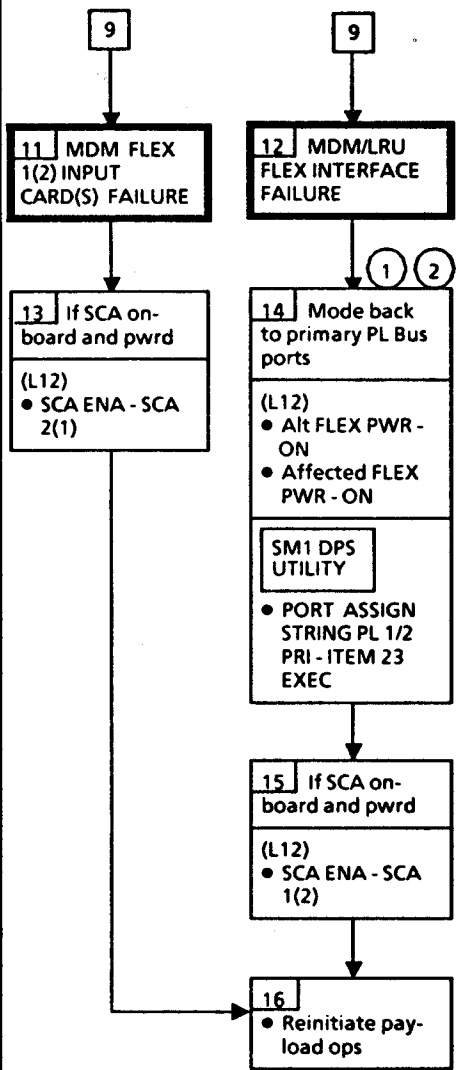


① Port moding and I/O RESET EXEC causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes

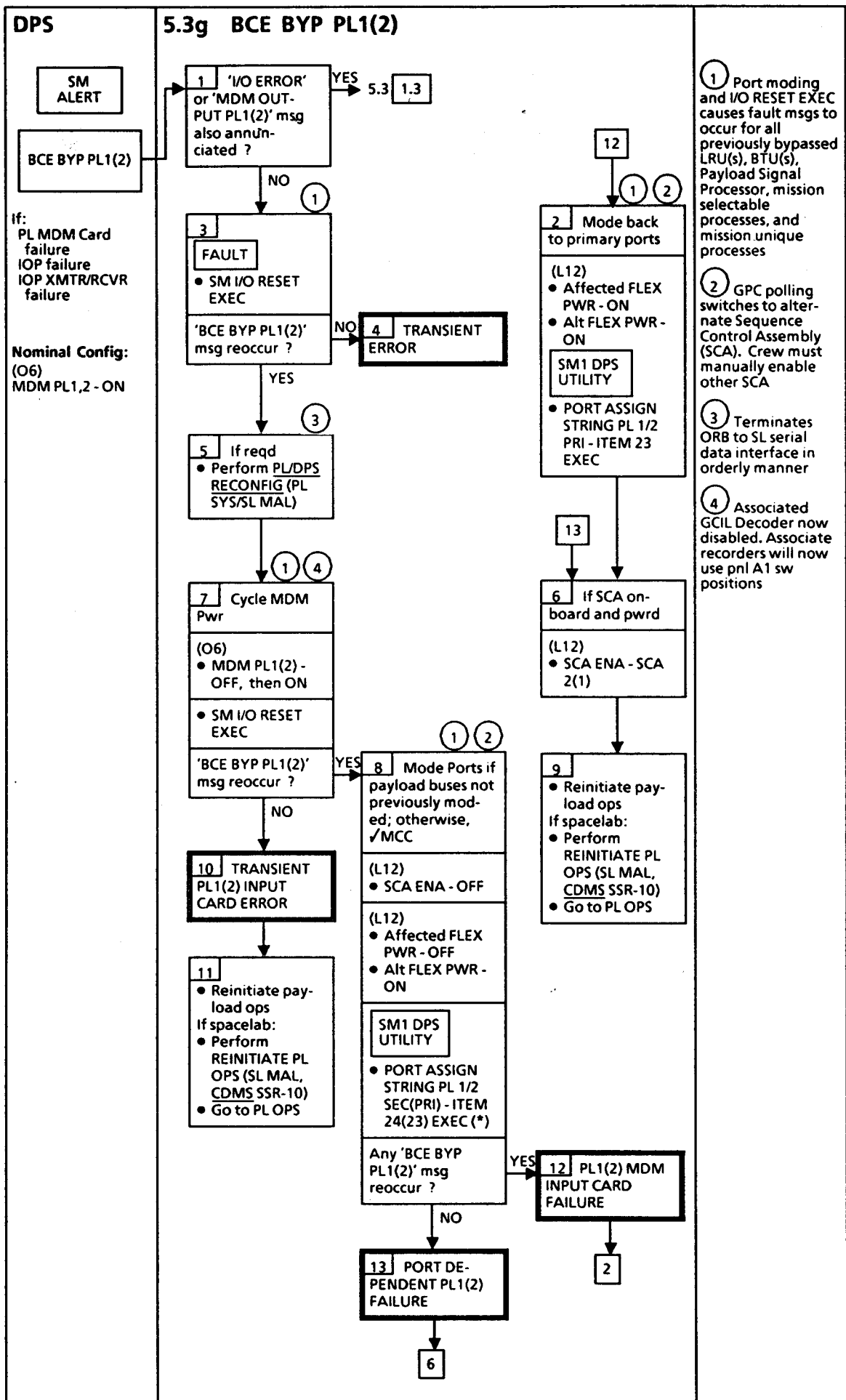
② GPC polling switches to alternate Sequence Control Assembly (SCA). Crew must manually enable other SCA



DPS 5.3f (Cont)



- ① Port moding or I/O RESET EXEC causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes
- ② GPC polling switches to alternate Sequence Control Assembly (SCA). Crew must manually enable alternate SCA



Dual Commanders on CRT 1(2,3)

If:
Procedural error
BFC CRT SEL
discrete failure
GPC hdw or s/w
error

Nominal Config:
(C2)
CRT1,2 PWR -
ON(OFF)
CRT 3 PWR - OFF
(R12L)
CRT 4 - ON(OFF)
(For CRTs 1,2,4:
two of three will
remain ON as reqd)

1.1

DUAL CRT COMMANDERS ① ②

1. If aff CRT assigned to BFS via BFC sw:
BFC CRT DISP - OFF, then go to step 3
2. BFC CRT DISP - ON
SEL - aff CRT
3. If reqd to clean up display:
Aff CRT PWR - OFF,ON

①

BFC CRT SEL
DSCRT FAIL AT
GPC IOP, GPC
HDW OR S/W
ERROR OR
PROCEDURAL
ERROR

②

CAUTION

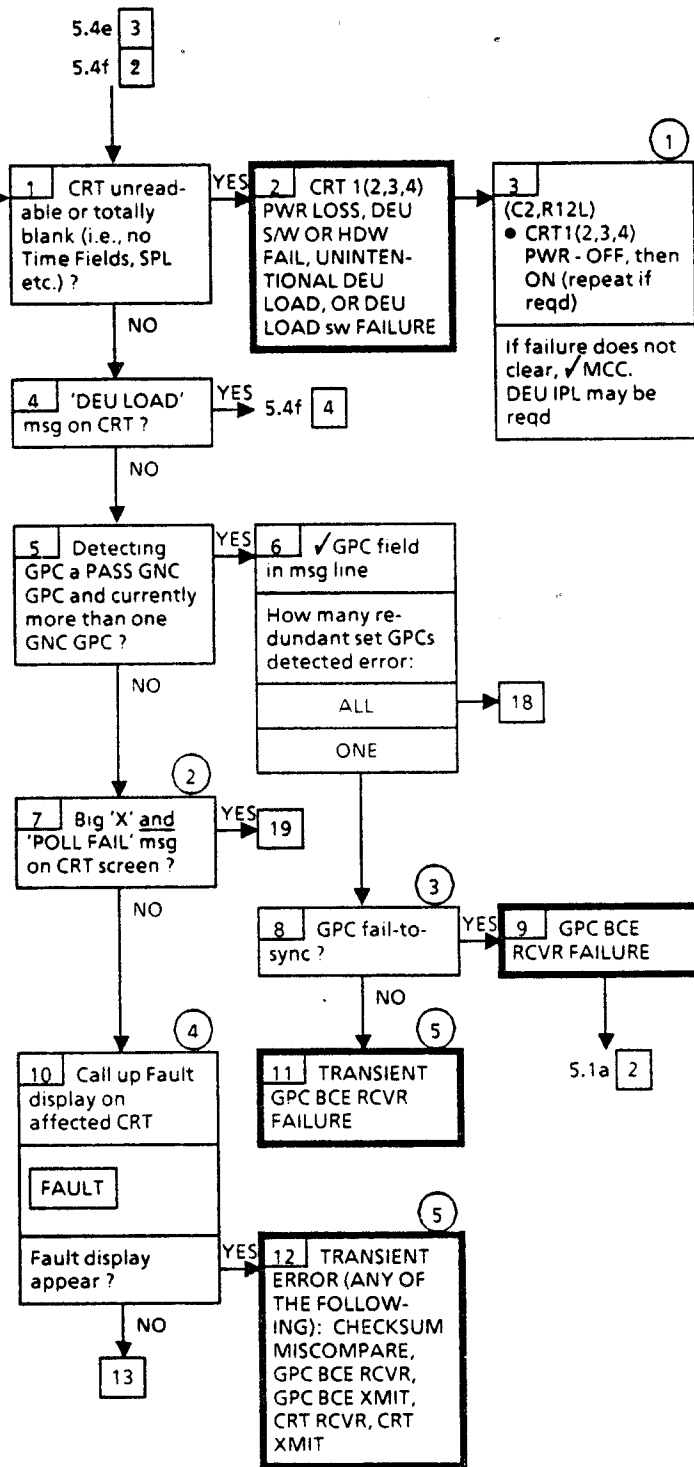
Dual command-
ers can cause
redundant set
fail-to-sync.
'I/O ERROR CRT
1(2,3,4)' msg
may be annun-
ciated for this
problem

SM
ALERT

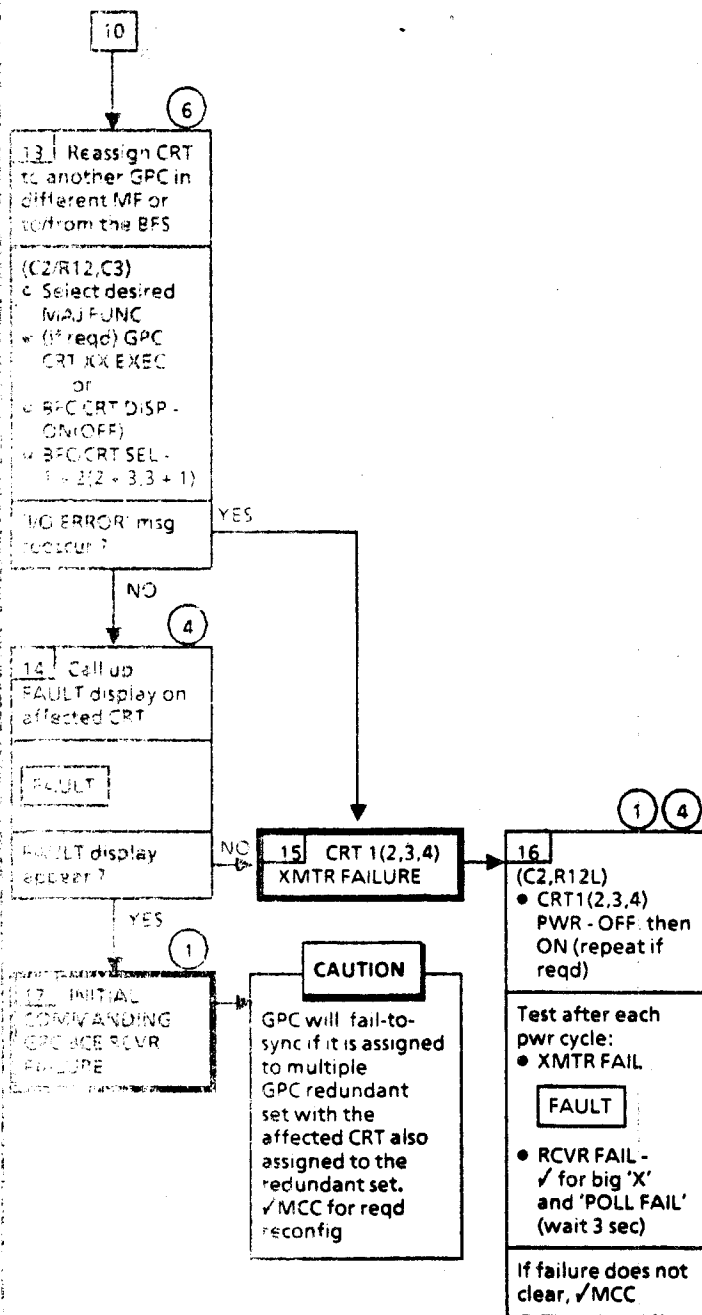
I/O ERROR
CRT 1(2,3,4)

If:
Checksum
miscompare
GPC BCE 6(7,8,9)
Rcvr failure
GPC BCE 6(7,8,9)
Xmtr failure
CRT 1(2,3,4) Rcvr
failure
CRT 1(2,3,4) Xmtr
failure
CRT 1(2,3,4) pwr
loss
DEU S/W or HDW
failure
Unintentional
DEU load
DEU load sw
failure

Nominal Config:
(C2)
CRT1,2 PWR -
ON/OFF
CRT3 PWR - OFF
(R12L)
CRT4 PWR -
ON(OFF)
(For CRTs 1,2,4 two
of three will
remain ON as
reqd)

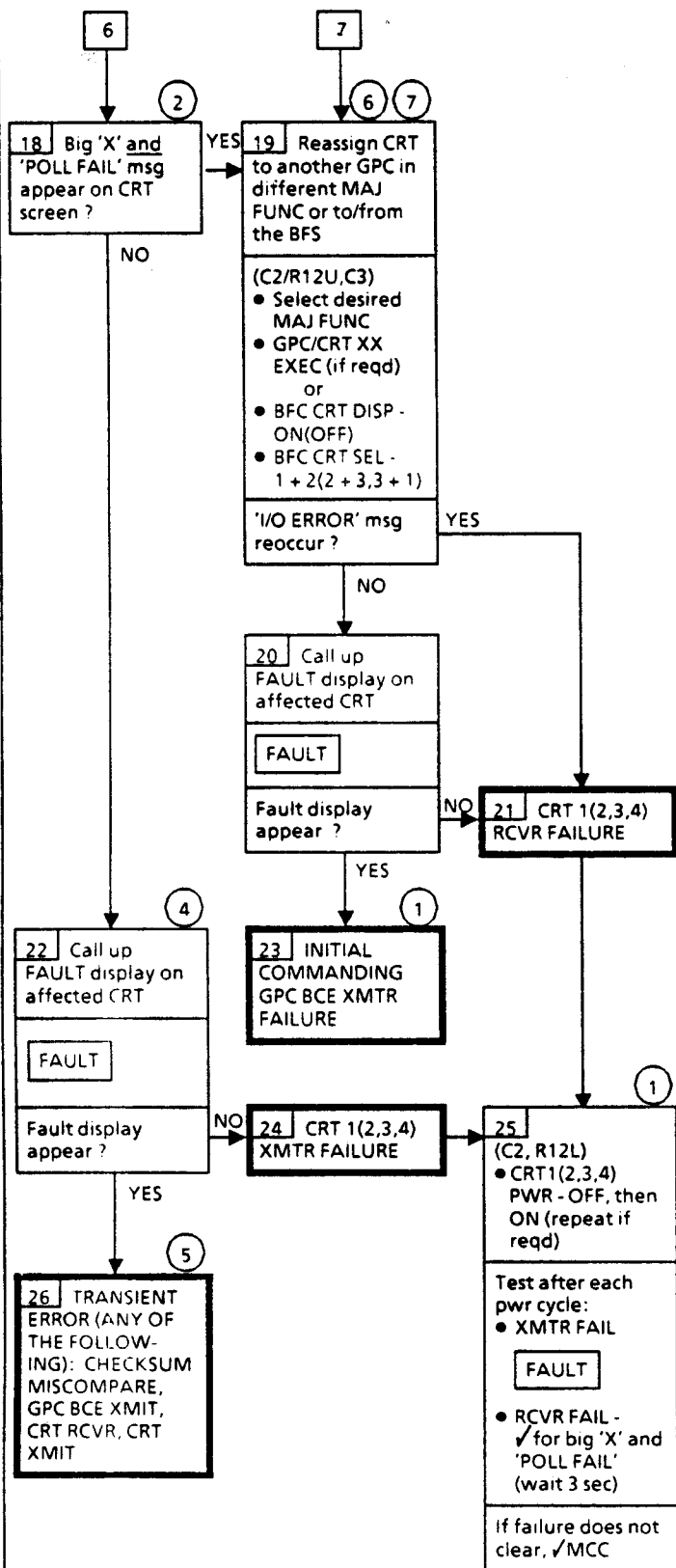


- ① If failure does not clear, any SPEC or ROLL IN DISP called on the CRT will remain counted against 2 SPEC/ROLL IN DISP LIMIT. SPEC/ROLL IN DISP can be released via an OPS transition
- ② Both big 'X' and 'POLL FAIL' msg appear for complete data path failure. Appearance of only one msg indicates either GPC or DEU internal S/W or HDW error has occurred. Contact MCC
- ③ GPC will fail-to-sync after two consecutive non-universal I/O errors
- ④ This sequence initiates kybd msg with known results in order to GPC/DEU interface
- ⑤ Any kybd entry just prior to I/O ERROR CRT 1(2,3,4) msg may have to be reentered

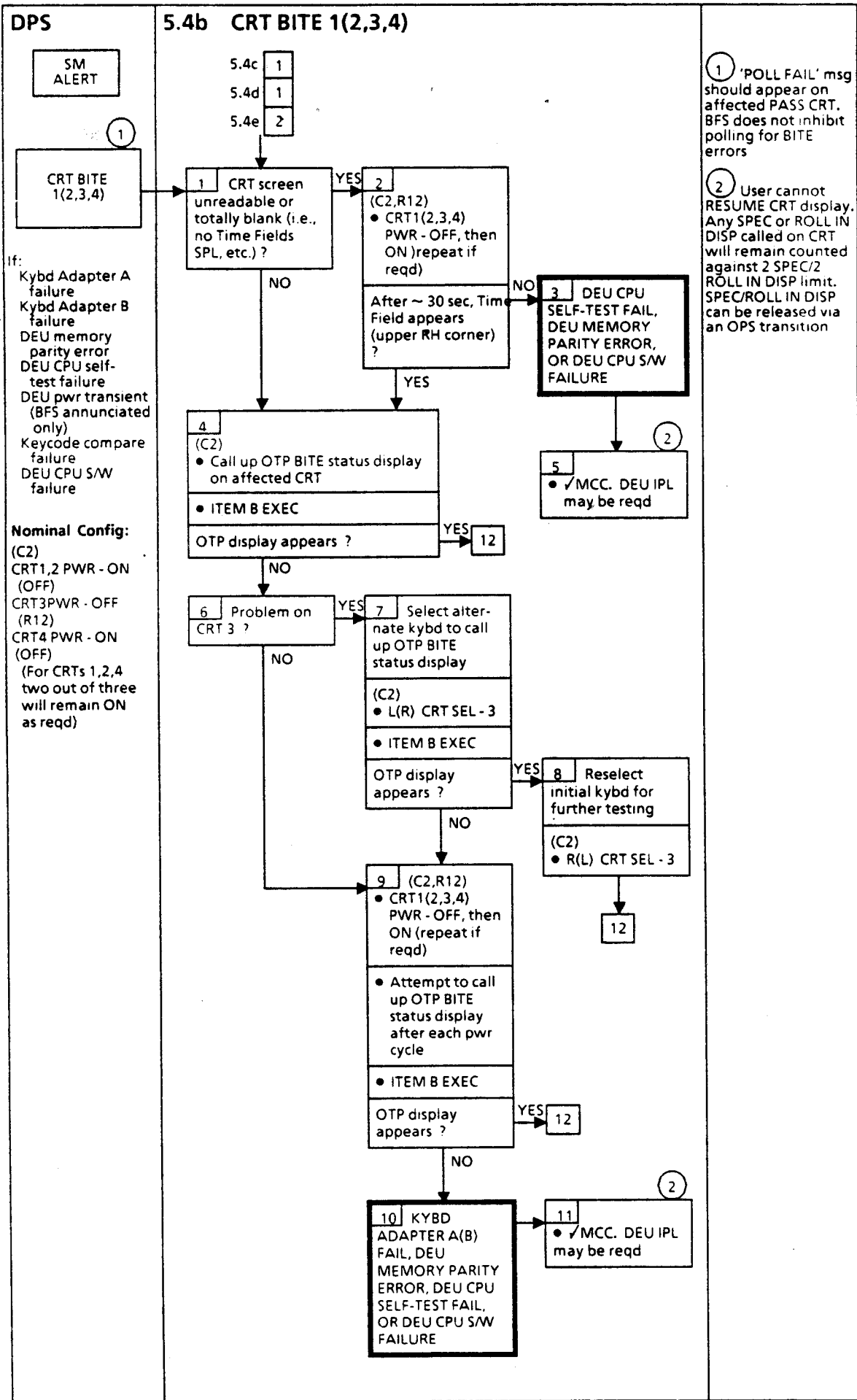


- ① If failure does not clear, any SPEC or ROLL IN DISP called on the CRT will remain counted against 2 SPEC/ROLL IN DISP LIMIT. SPEC/ROLL IN DISP can be released via an OPS transition
- ④ This sequence initiates kybd msg with known res lfts in order to ✓GPC/DEU interface
- ⑥ GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry

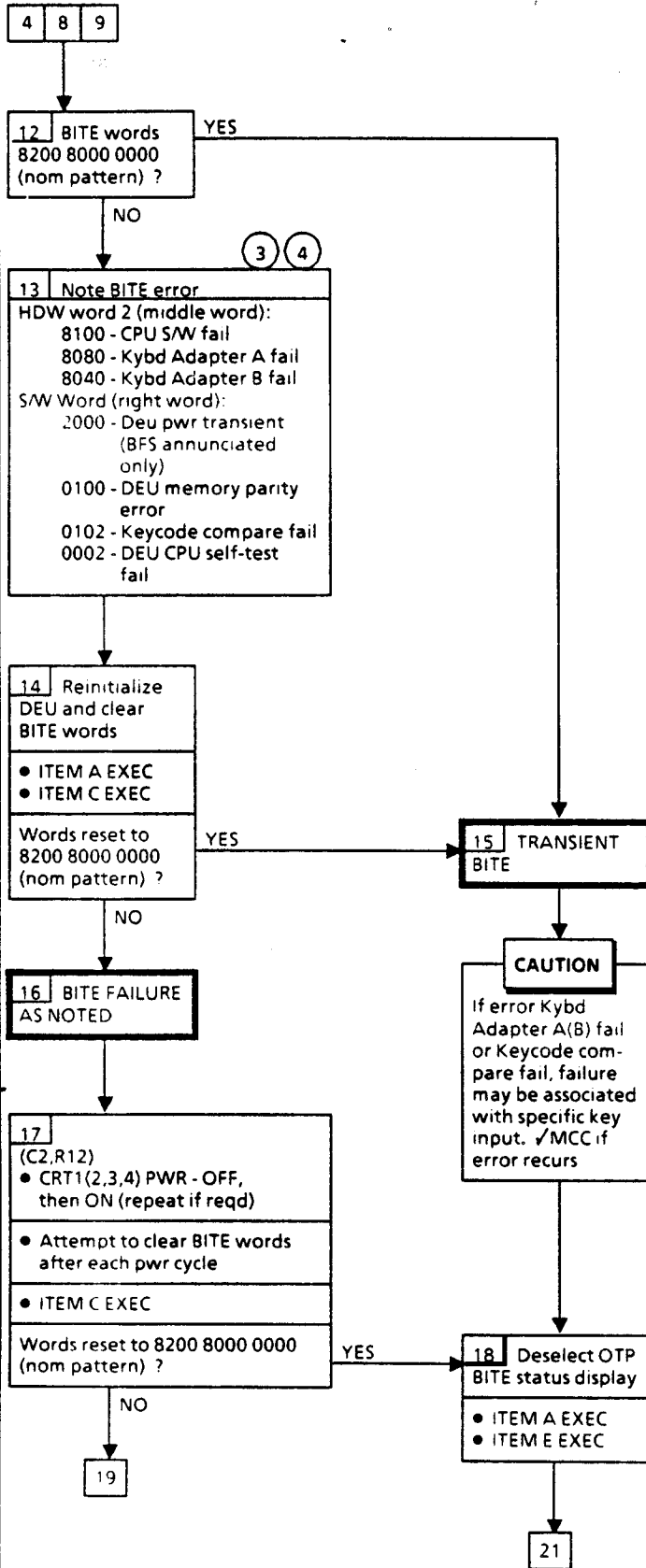
DEFECT
IN
ORIGINAL



- ① If failure does not clear, any SPEC or ROLL IN DISP called on the CRT will remain counted against 2 SPEC/ROLL IN DISP LIMIT. SPEC/ROLL IN DISP can be released via an OPS transition
- ② Both big 'X' and 'POLL FAIL' msg appear for complete data path failure. Appearance of only one msg indicates either GPC or DEU internal SAW or HDWR error has occurred. Contact MCC
- ④ This sequence initiates kybd msg with known results in order to ✓ GPC/DEU interface
- ⑤ Any kybd entry just prior to 'I/O ERROR CRT 1(2,3,4)' msg may have to be reentered
- ⑥ GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry
- ⑦ Reassignment to another redundant set GPC may result in fail-to-sync

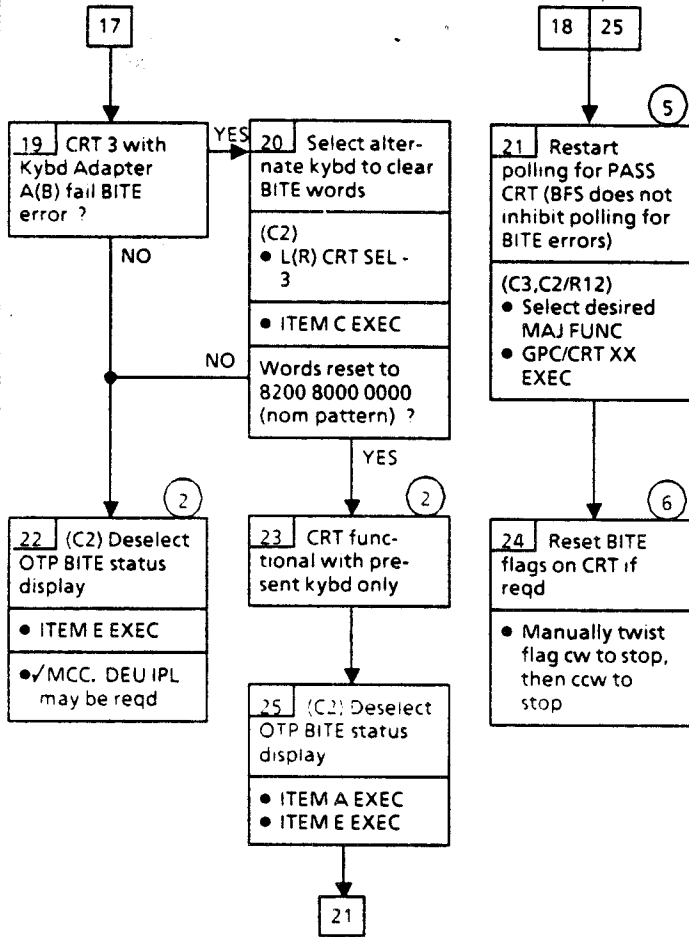


DPS 5.4b (Cont)



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

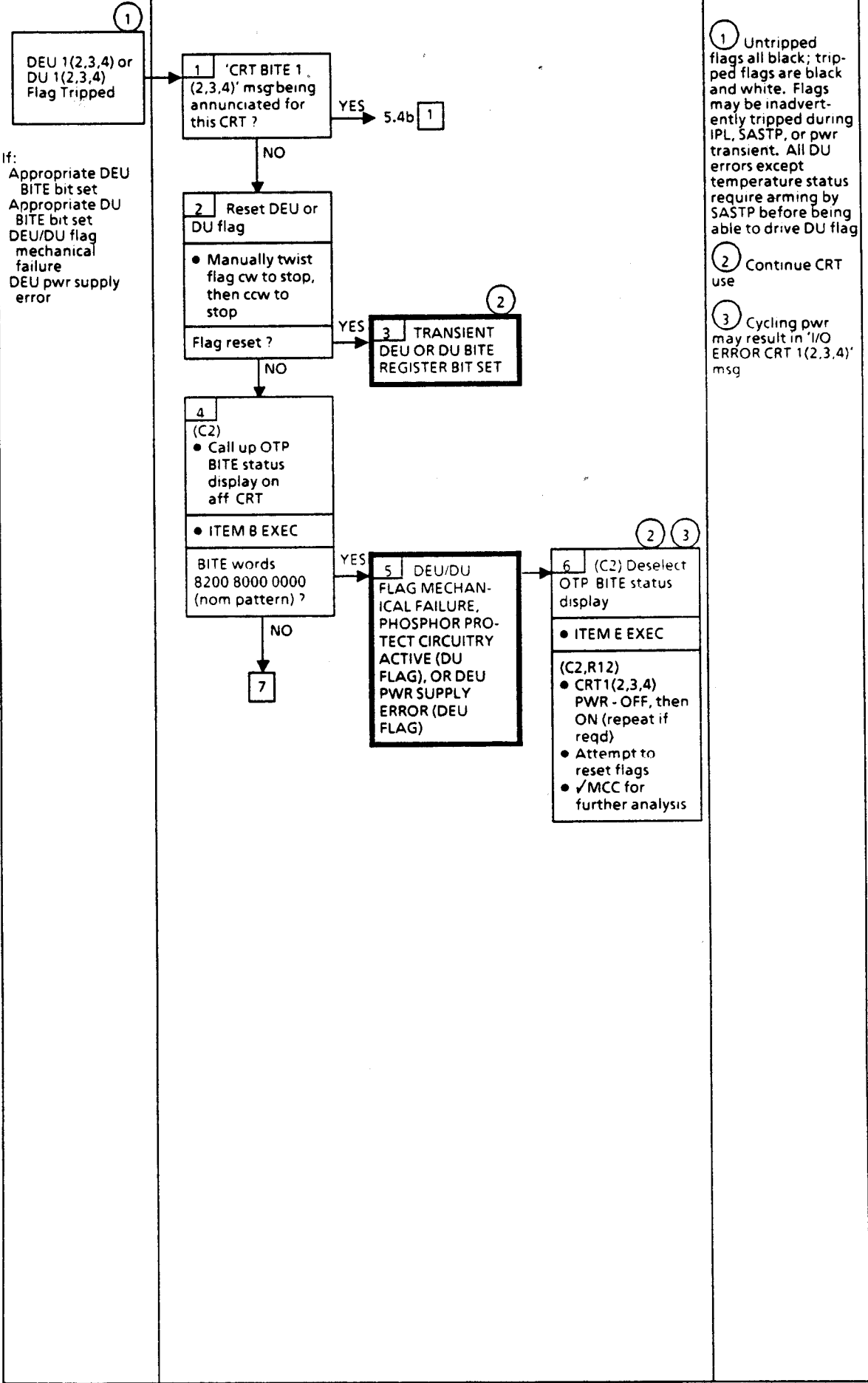
4 Probability exists for getting memory parity error when MF sw for affected CRT is moved from one position to another (i.e., GNC to SM) (SMS DO23)



② User cannot RESUME CRT display. Any SPEC or ROLL IN DISP called on CRT will remain counted against 2 SPEC/2 ROLL IN DISP limit. SPEC/ROLL IN DISP can be released via an OPS transition

⑤ GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, deassign CRT first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC CRT kybd entry

⑥ DEU flag tripped for CPU S/W fail, DEU memory parity error, or Kybd Adapter A/B fail errors. Continue CRT use



1 Untripped flags all black; tripped flags are black and white. Flags may be inadvertently tripped during IPL, SASTP, or pwr transient. All DU errors except temperature status require arming by SASTP before being able to drive DU flag

2 Continue CRT use

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

DPS 5.4c (Cont)

4

4

7 Note which BITE bit error set

BITE WORDS	FAILURE	FLAG TRIPPED
HEX CODE	BITE STATUS WORD 1 (left word)	
C200	IPL performed	---
A200	IPL error	DEU
9200	IPL circuit check error	---
8A00	Symbol generator intensity parity error	DEU
8600	Symbol generator sine-cosine parity error	DEU
8300	Symbol generator/character generator parity	DEU
8280	Oscillator error	DEU
8244	Analog zero deflection error (SASTP)	DEU
8224	Analog non-zero deflection error (SASTP)	DEU
8214	Analog pulse test fail (SASTP)	DEU
8208	Circle oscillator error	DEU
8202	Symbol generator display wrap error (SASTP)	DEU
8201	Symbol generator refresh error	DEU
BITE STATUS WORD 2 (middle word)		
C000	DU deflection status	DU
A000	DU video status	DU
9000	DU phosphor protect status (not Flt units)	DU
8400	DU filament current status	DU
8200	DU temperature status	DU
8020	MIA echo check error	DEU
8012	MIA parity error	---
800A	MIA manchester error	---
8006	MIA bit count error	---
8001	DU power supply error	DU

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

9 (C2) Deselect OTP BITE status display

- ITEM E EXEC
- Resume specs on affected CRT, pwr unit OFF, and ✓MCC

10 (C2,R12)
• CRT1(2,3,4) PWR - OFF, then ON (repeat if reqd)
BITE words 8200 8000 0000 ?

11 TRANSIENT NONCRITICAL BITE AS NOTED

12 NONCRITICAL BITE AS NOTED

13 (C2) Deselect OTP BITE status display

- ITEM E EXEC
- ✓MCC for further analysis

14 (C2) Deselect OTP BITE status display

- ITEM E EXEC
- Reset DEU(DU) flag
- Manually twist flag cw to stop, then ccw to stop

2 Continue CRT use

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

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

5 Unit is force air-cooled via cabin fans. User should ✓ proper cabin fan ops

5.4d ABNORMAL SPL RESPONSE FROM KYBD INPUT

Abnormal SPL Response From Keyboard Input

If:
 Kybd failure:
 Key jammed
 Key failed open circuit
 Key shorted to ground
 DEU kybd Adapter A(B) mal
 L(R) CRT SEL Switch mal

1 CRT BITE 1(2,3,4) and 'POLL FAIL' msg being annunciated for this CRT?

YES → 5.4b 1

NO ↓

2 Isolate CRT via GPC/CRT (if fwd kybd, ✓ both affected CRTs)

- GPC/CRT OX EXEC
- ✓ Individual keystrokes
- ITEM 1 + 2 3 4 5 6 7 8
- ITEM 9 - A B C D E F EXEC

FAULT SUMM	RESUME
SYS SUMM	ACK (no SPL interface)
GPC: CRT	MSG RESET (no SPL interface)
I/O RESET	CLEAR
OPS	
SPEC O PRO	

3 Failure occurs on aft DEU/CRT?

NO ↓ 8

YES → 4

4 All keystrokes show abnormal SPL response?

NO ↓ 5

YES ↓ 6

5 JAMMED KEY, KEY FAILED OPEN CIRCUIT, OR DEU KYBD ADAPTER A MAL

6 JAMMED KEY, KEY SHORTED TO GROUND, OR DEU KYBD ADAPTER A MAL

7 (R12)

- CRT4 PWR - OFF, then ON (repeat if reqd)
- Test kybd after each pwr cycle. If key appears to be jammed, attempt to free. If fault does not clear, continue use of CRT for monitoring. Reassign CRT to desired GPC

(R12,C2)

- Select desired MAJ FUNC (isolated CRT)
- GPC/CRT X4 EXEC
- ✓ MCC. KEY changeout may be reqd

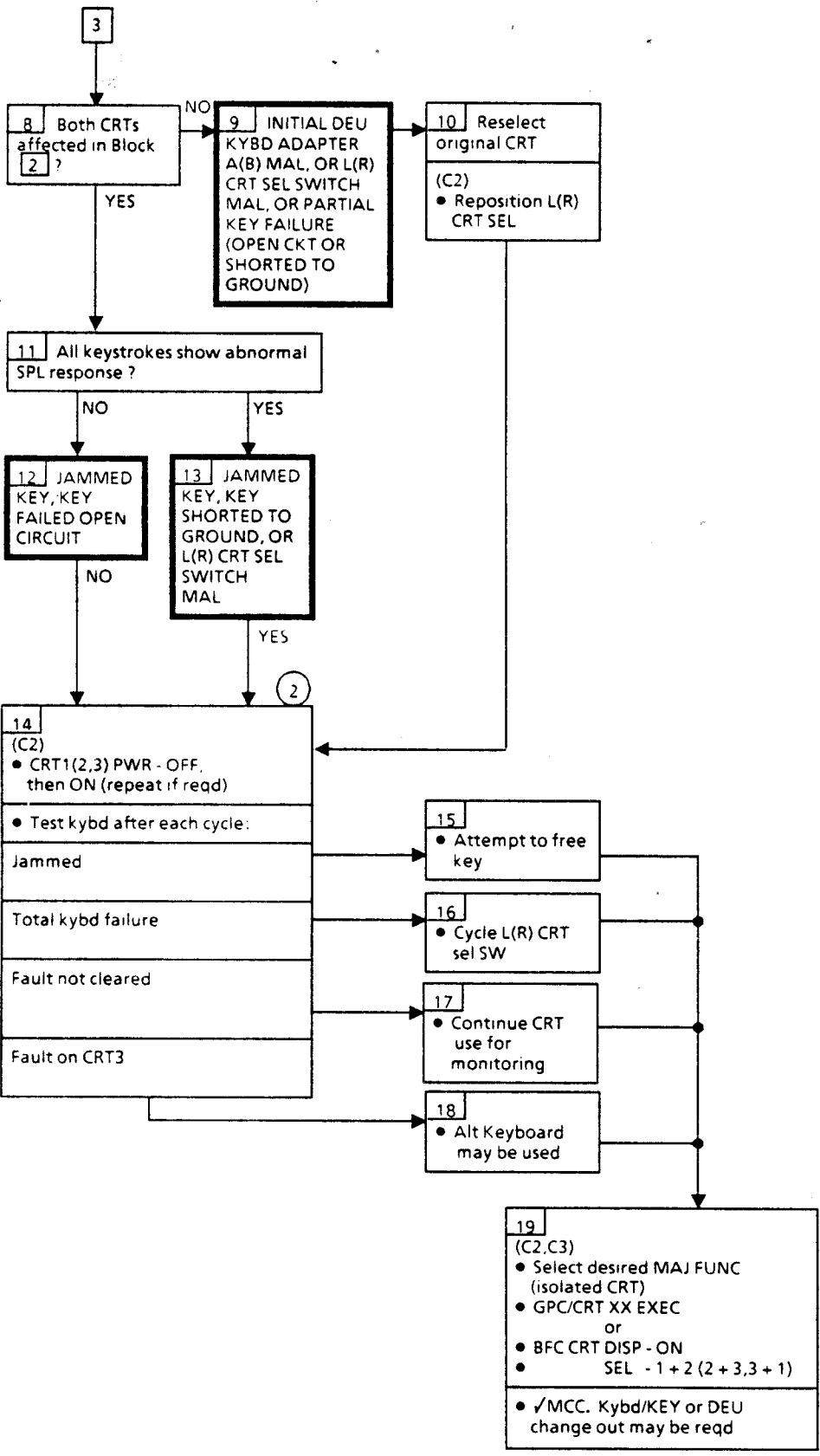
1 Abnormal means keystroke does not appear on SPL or wrong keystroke appears. User should always ✓ CRT SEL sw position if applicable and repeat keystroke sequence prior to performing this procedure to eliminate user error and transients

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

3 SPEC key also displays freeze function. Therefore, big 'X' will be removed upon depression of SPEC key and will reappear 3 sec after next keystroke. MSG RESET and ACK have no SPL interface. User should attempt to ✓ these keys work properly when CRT assigned to GPC or contact MCC for downlist verification

4 During kybd checkout, take note of multiple keystroke: SPL anomalies and report

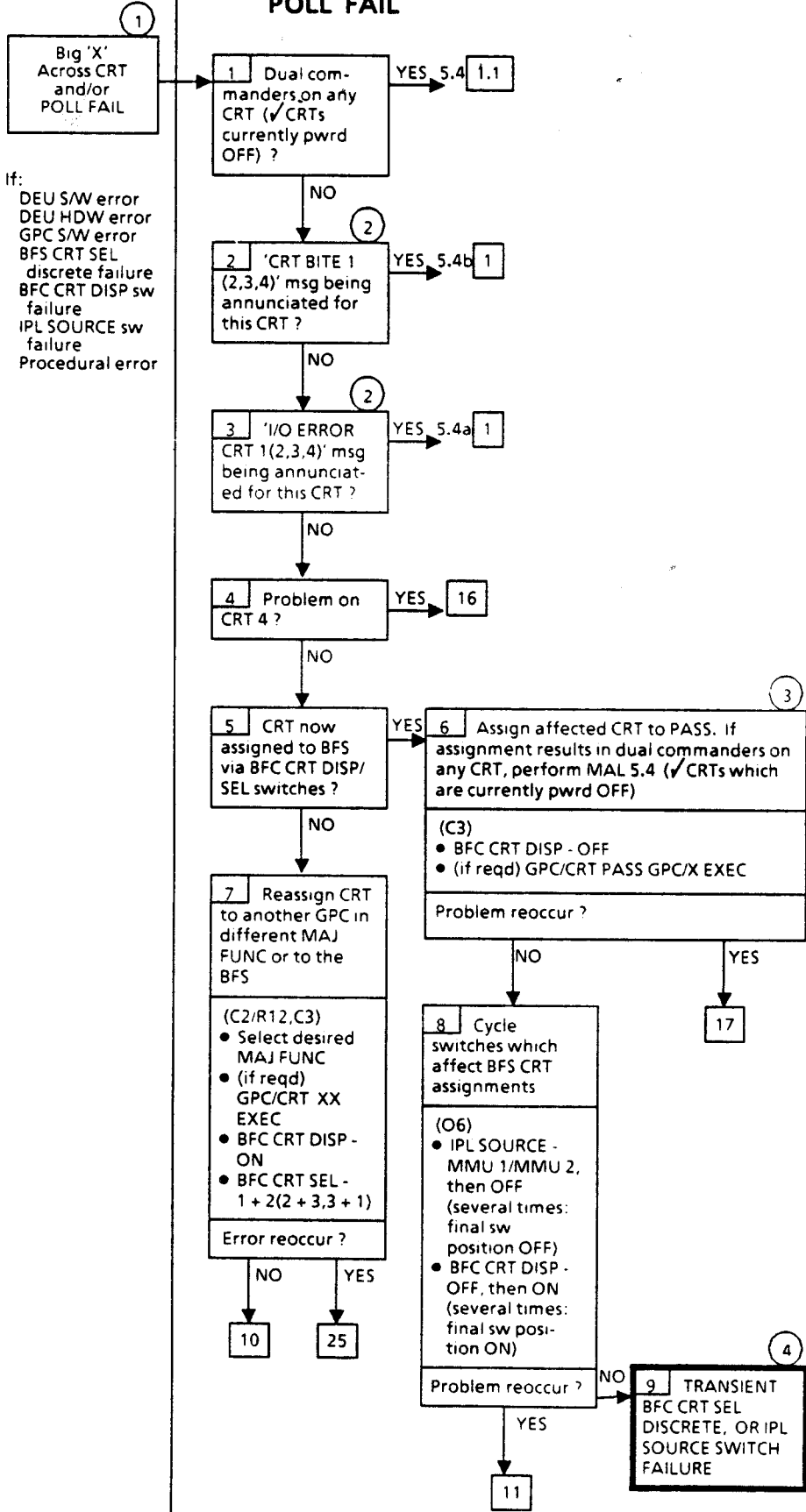
DPS 5.4d (Cont)



② GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always assign CRT first. BFC CRT DISPLAY/ SELECT sw will override any GPC/ CRT kybd entry

5.4e BIG 'X' ACROSS CRT AND/OR POLL FAIL

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

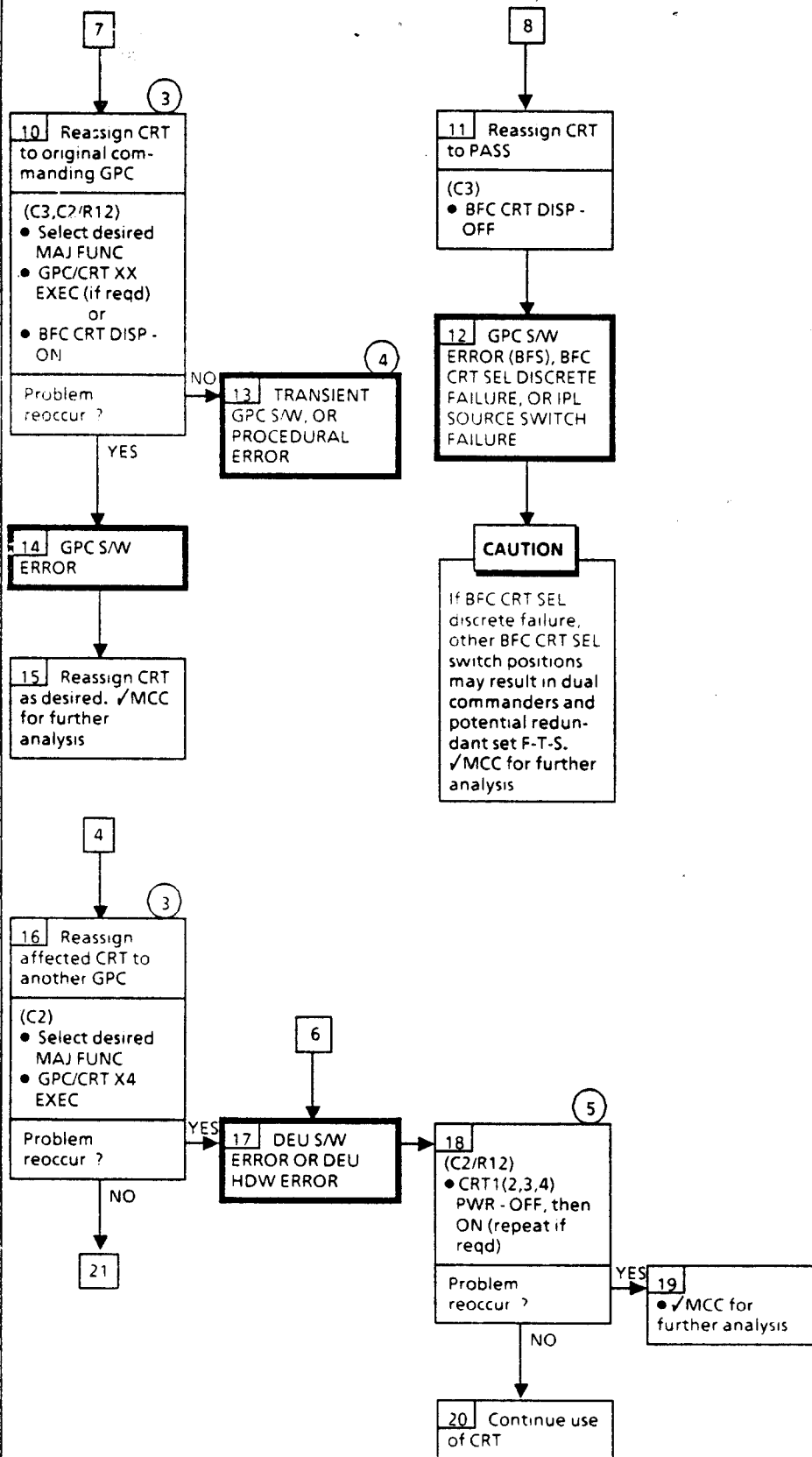


1 Big 'X' appears when DEU does not receive display update commands for 3 sec. POLL FAIL appears when DEU does not receive poll or time update commands for 3 sec

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

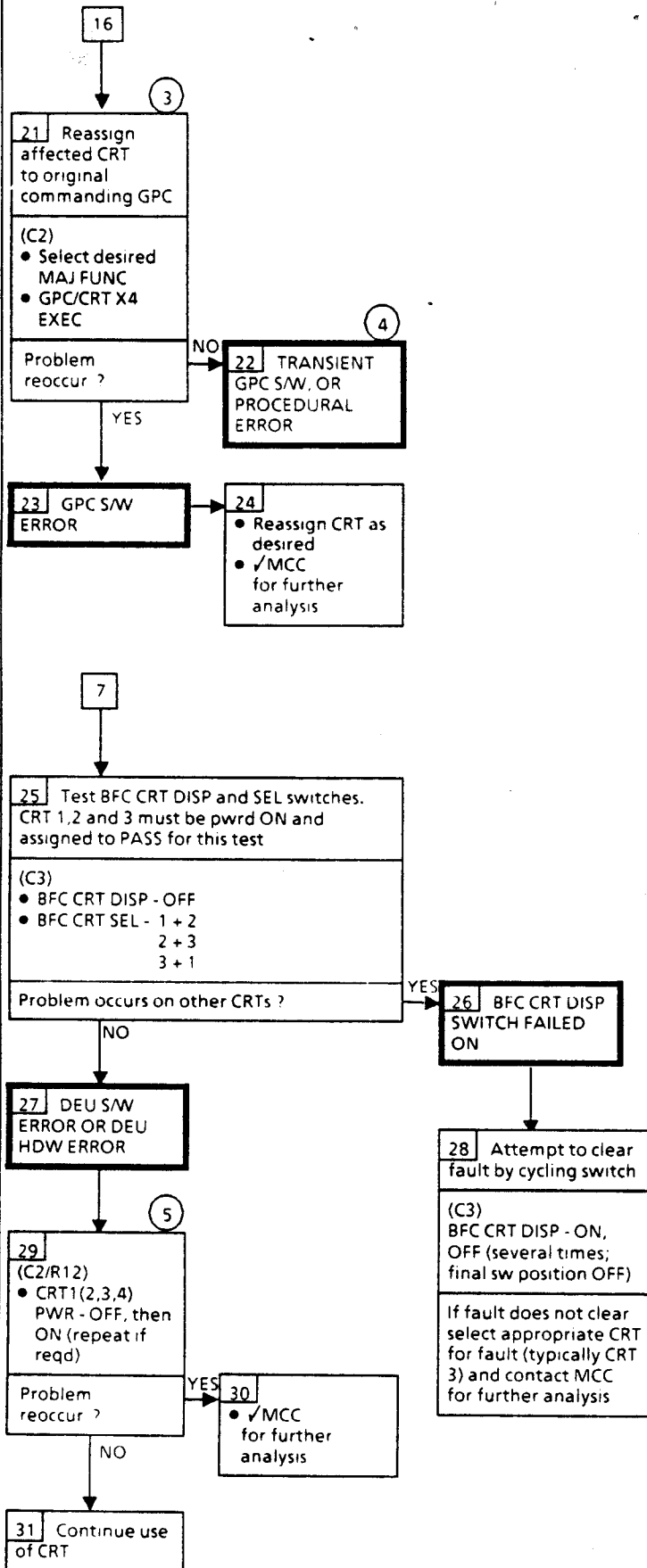
3 GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to, from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry

4 Continue use of CRT



- ③ GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/ from BFS, always deassign CRT first. BFC CRT DISPLAY/ SELECT sw will override any GPC/ CRT kybd entry
- ④ Continue use of CRT
- ⑤ Cycling pwr may result in I/O ERROR CRT 1(2,3,4) msg

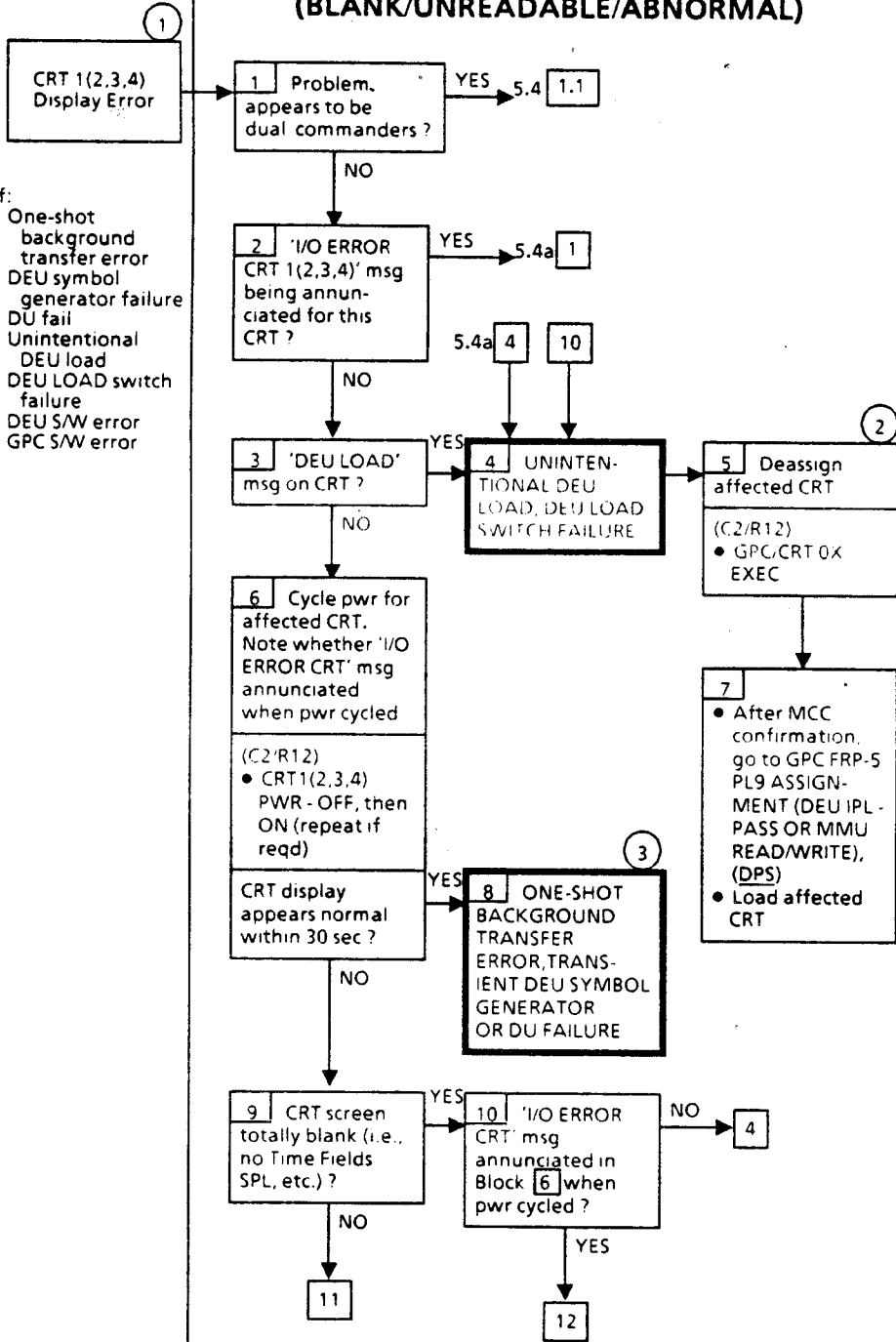
DPS 5.4e (Cont)



- 3 GPC/CRT key input must be made on kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/from BFS, always deassign CRT first. BFC CRT DISPLAY/ SELECT sw will override any GPC/ CRT kybd entry
- 4 Continue use of CRT
- 5 Cycling pwr may result in I/O ERROR CRT 1(2,3,4) msg

5.4f CRT DISPLAY ERROR (BLANK/UNREADABLE/ABNORMAL)

If:
 One-shot background transfer error
 DEU symbol generator failure
 DU fail
 Unintentional DEU load
 DEU LOAD switch failure
 DEU S/W error
 GPC S/W error

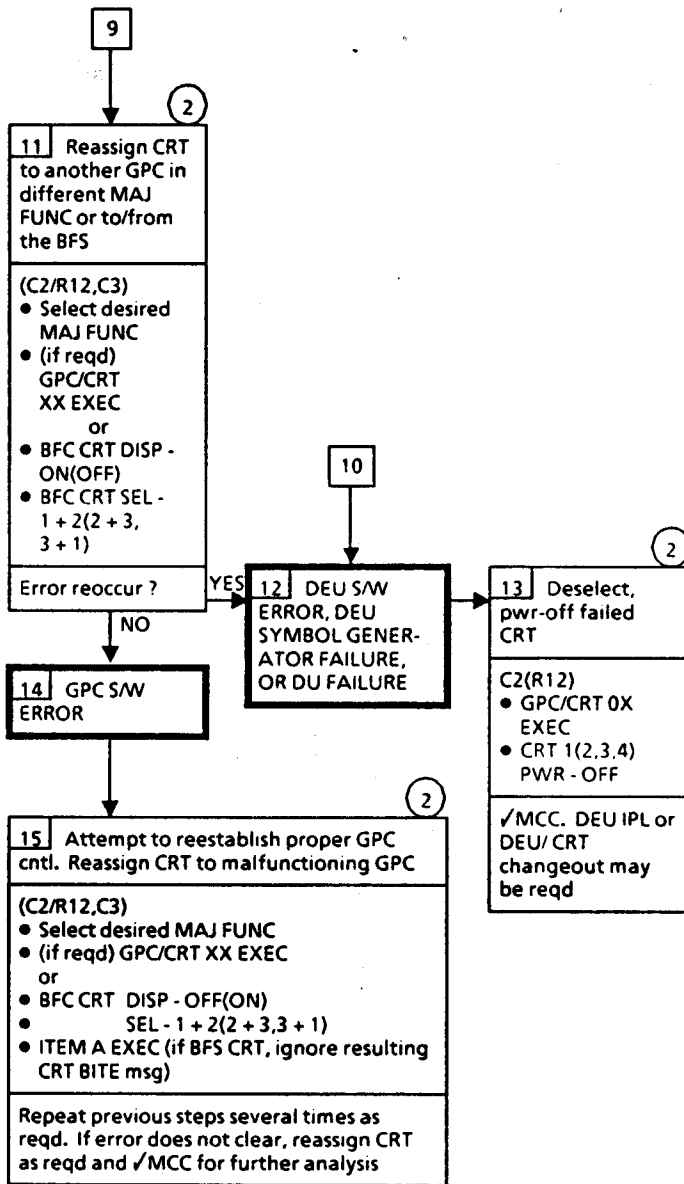


① If screen blank, verify that BRIGHTNER cntl on CRT adjusted properly. If only time fields, SPL, msg line on CRT and assigned to BFS, ✓ CRT MF sw not in PL

② GPC/CRT key input must be made of kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/ from BFS, always deassign CRT first. BFC CRT DISPLAY SELECT sw will override any GPC CRT kybd entry

③ Continue use of CRT

DPS 5.4f (Cont)



② GPC/CRT key input must be made of kybd with active GPC interface. Always use PASS kybd to avoid dual commanders. If assigning CRT to/ from BFS, always deassign CRT first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry

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)
O1 PCMMU
PWR - 1
FORMAT - GPC

1

SM 62 PCMMU/PL COMM

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

'I/O ERROR PCM' msg reoccur ?

NO

2 TRANSIENT SM GPC OR OI SYSTEM INTER-FACE PROBLEM

5.5c 3

YES

3 If BFS not pwr'd, activate BFS to ✓ param status

(O6)
For BFS GPC:

- ✓ GPC MODE - HALT
- GPC PWR - ON
- MODE - STBY

4 ✓ for missing params

(C3)

- BFC CRT DISP - ON
- BFC CRT SEL - as req'd

BFS SYS SUMM 1,2

ALL params on these displays missing ?

YES

5 PCMMU 1(2) FAILURE

NO

6 SM GPC/PCMMU DATA PATH FAILURE

7 Switch to alternate PCMMU

(C3)

- O1 PCMMU PWR - 2(1)

SM 62 PCMMU/PL COMM

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

I/O ERROR PCM msg reoccur ?

NO

10

8

- ✓ MCC

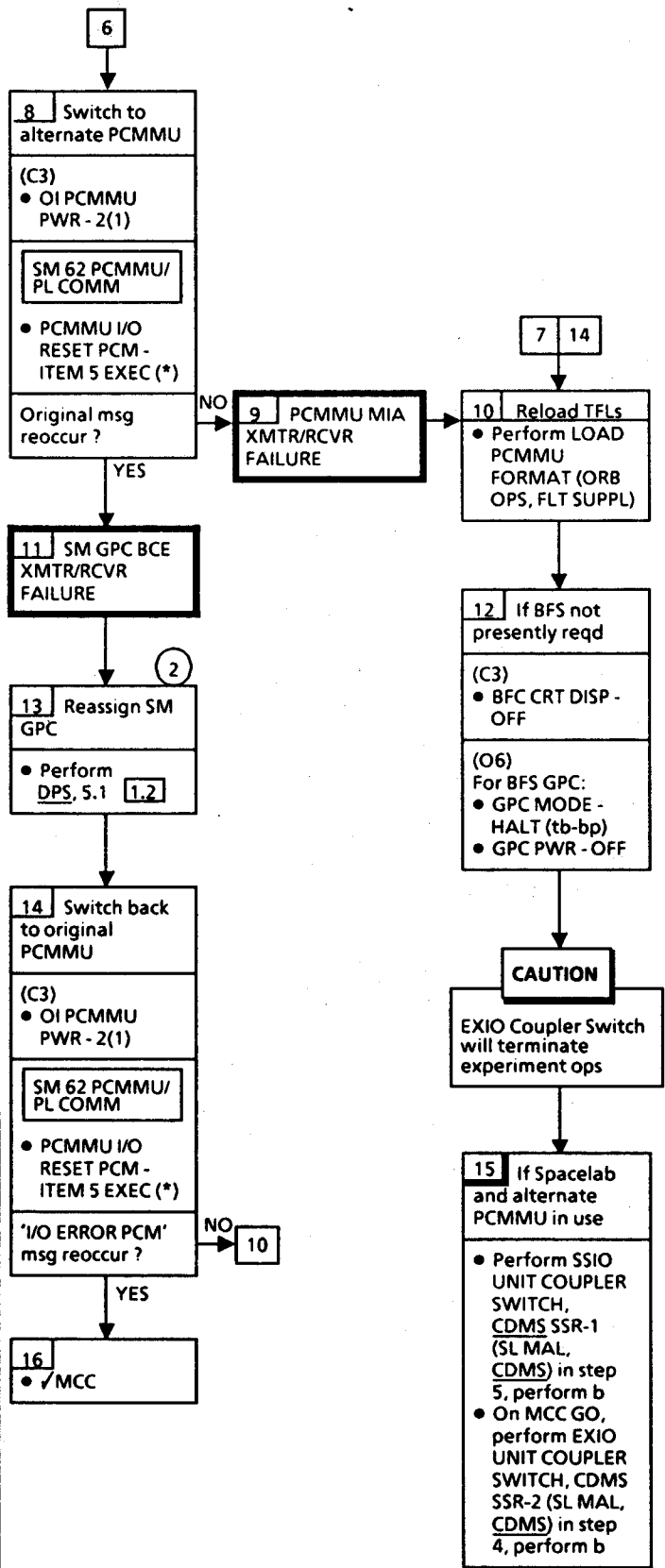
① Because of differences between PASS/BFS S/W implementation, ignore any BFS 'I/O ERROR PCM' fault msg

PCMMU

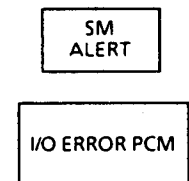
5.5

226

DPS 5.5a (Cont)

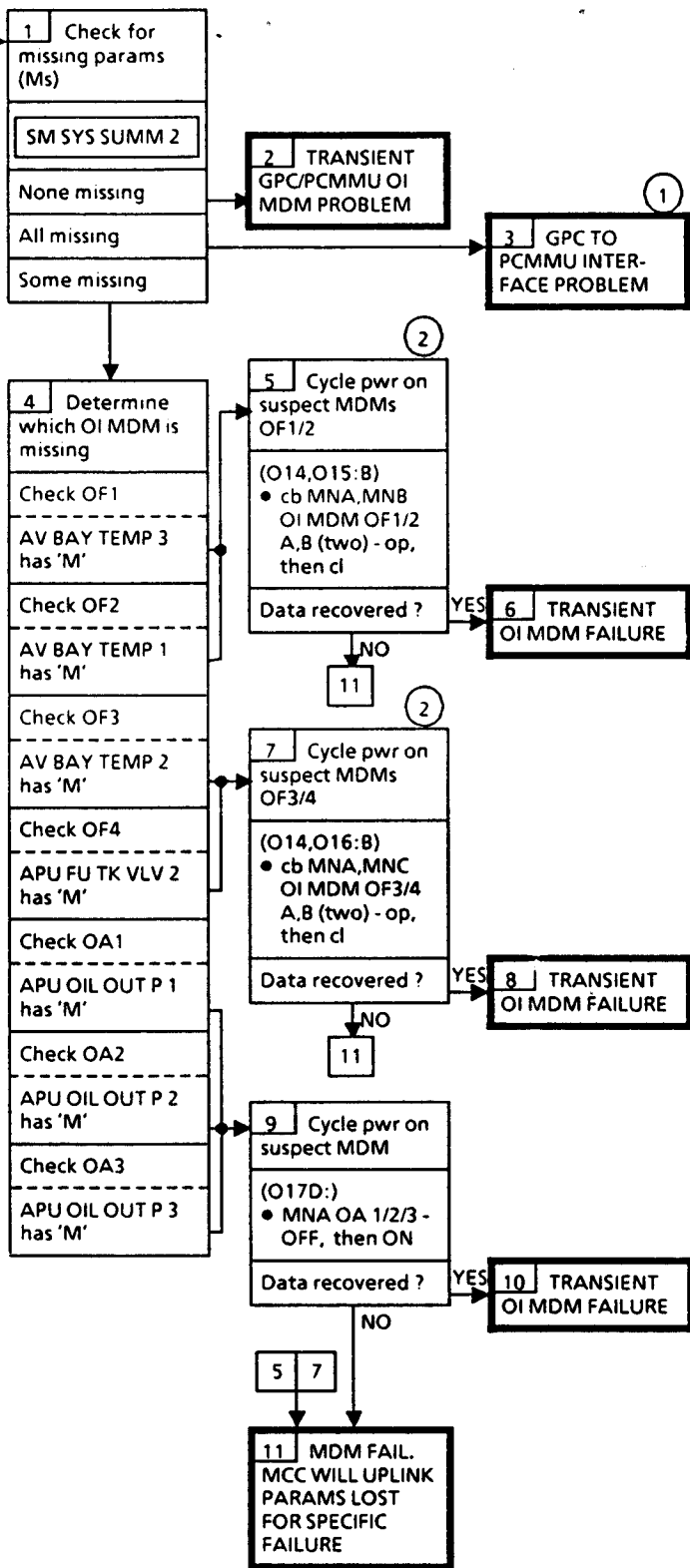


② BFS fault disp may be utilized for SM monitoring until PASS SM GPC reassigned



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

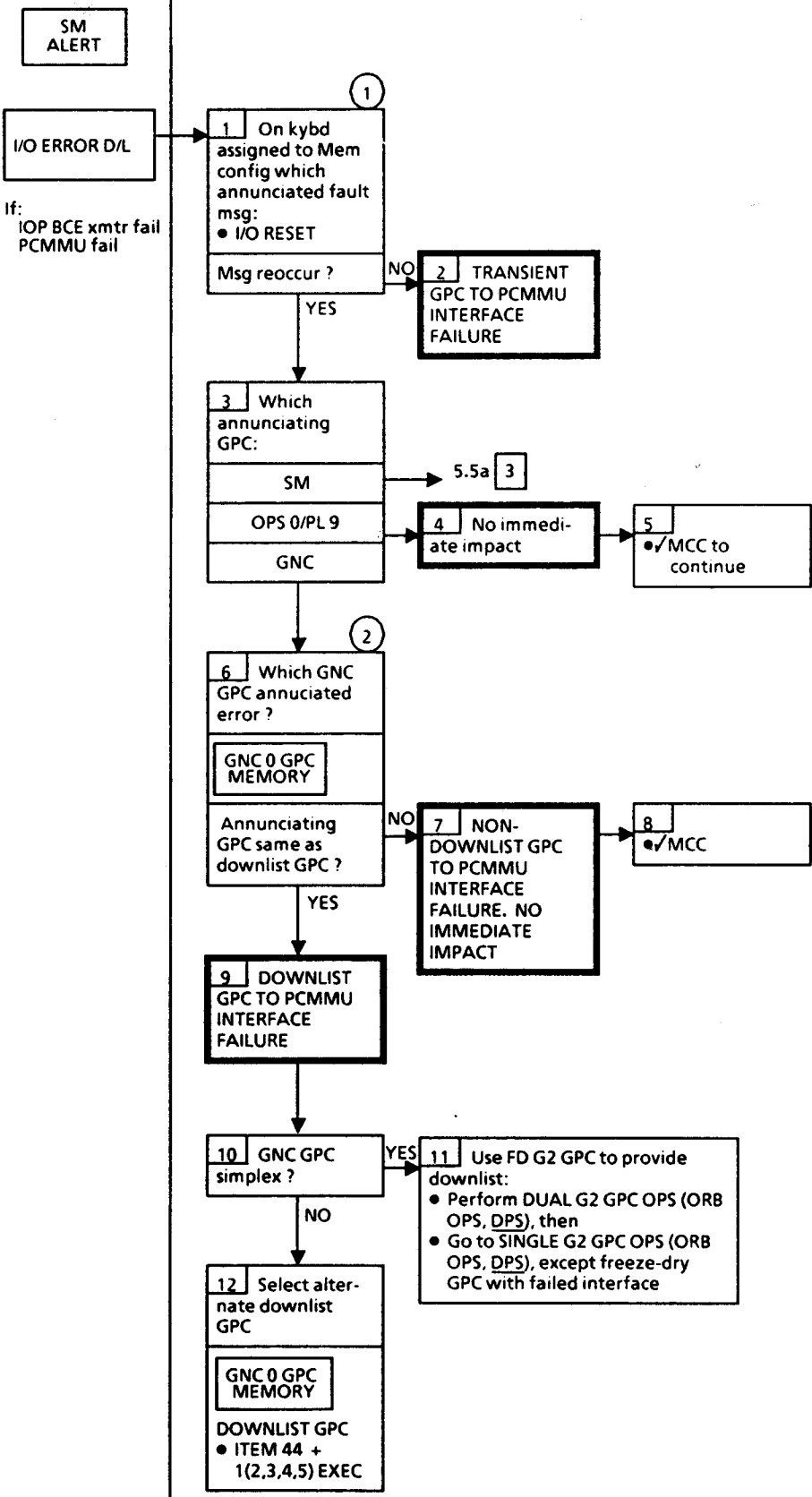


① ✓MCC regarding PCMMU switch. Selection of alternate PCMMU may preclude MCC viewing LDR telemetry

② Do not cycle open cb. ✓MCC

DPS

5.5c I/O ERROR D/L



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

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

GPC FRP

NOMINAL CONFIGURATIONS

GPC FRP

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

ORBIT Config (G8)					
GPC OPS	1 G8	2 G8	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	OFF NORM HALT	ON TERM RUN	OFF NORM HALT
CONFIG GPC	8 12000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
STR 2	2	0	3		
STR 3	1	0	3		
STR 4	2	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
CRT 2	2	0	3		
CRT 3	0	4	3		
CRT 4	2	4	0		
L 1	0	4	0		
L 2	0	0	0		
MM 1	1	4	3		
MM 2	2	4	3		

ORBIT Config (G3)					
GPC OPS	1 G2	2 G2	3 G3FD	4 SM	5 BFS3
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	ON NORM STBY	ON TERM RUN	ON NORM STBY
CONFIG GPC	3 12000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
STR 2	2	0	3		
STR 3	2	0	3		
STR 4	1	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
CRT 2	2	4	3		
CRT 3	0	0	3		
CRT 4	2	4	0		
L 1	0	4	0		
L 2	0	0	0		
MM 1	1	4	3		
MM 2	2	4	3		

ORBIT Config (G2) single GNC GPC					
GPC OPS	1 G2	2 G2FD	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM RUN
CONFIG GPC	2 10000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
STR 2	1	0	3		
STR 3	1	0	3		
STR 4	1	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
CRT 2	1	4	3		
CRT 3	0	0	3		
CRT 4	1	4	0		
L 1	0	4	0		
L 2	0	0	0		
MM 1	1	4	3		
MM 2	1	4	3		

NOMINAL CONFIGURATIONS (Cont)

ENTRY Config					
GPC OPS	1 G3	2 G3	3 G3	4 G3	5 BFS3
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON BKUP RUN
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				

GPC FRP-1 SINGLE GPC FAIL

OBJECTIVE

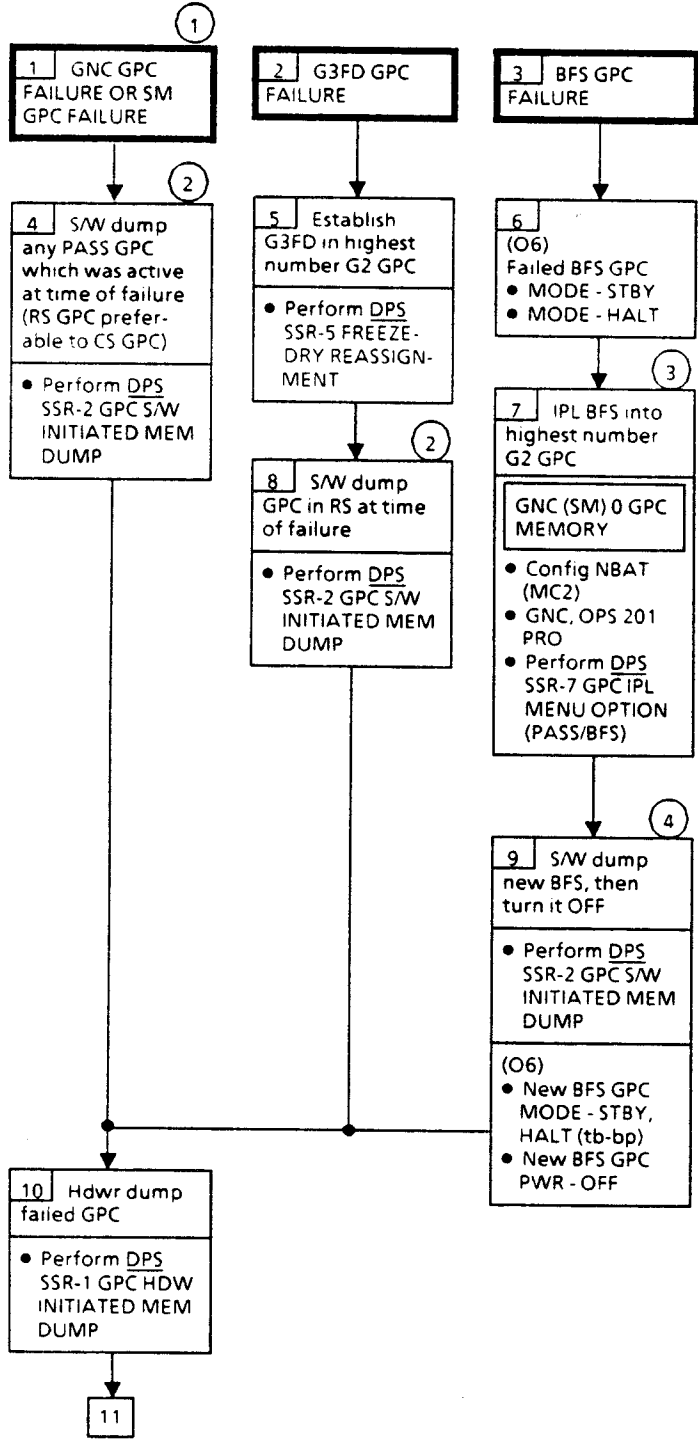
To recover all on-orbit memory configs, i.e., G2, SM, G3FD, and BFS; then attempt recovery of failed GPC and make it redundant G2(G2FD)

SCOPE

Procedure designed to handle any single GPC failure occurring during Ascent/Orbit

ASSUMPTIONS

Procedure assumes PKT C/L procedure performed for single G1, G2, or SM GPC failure. Procedure also assumes Post Insertion procedure done for single G1 GPC failure. BFS (orbit) and G3FD GPC failures enter this procedure directly



① If failure was simplex GNC GPC, following uplinks may be reqd upon recovery:

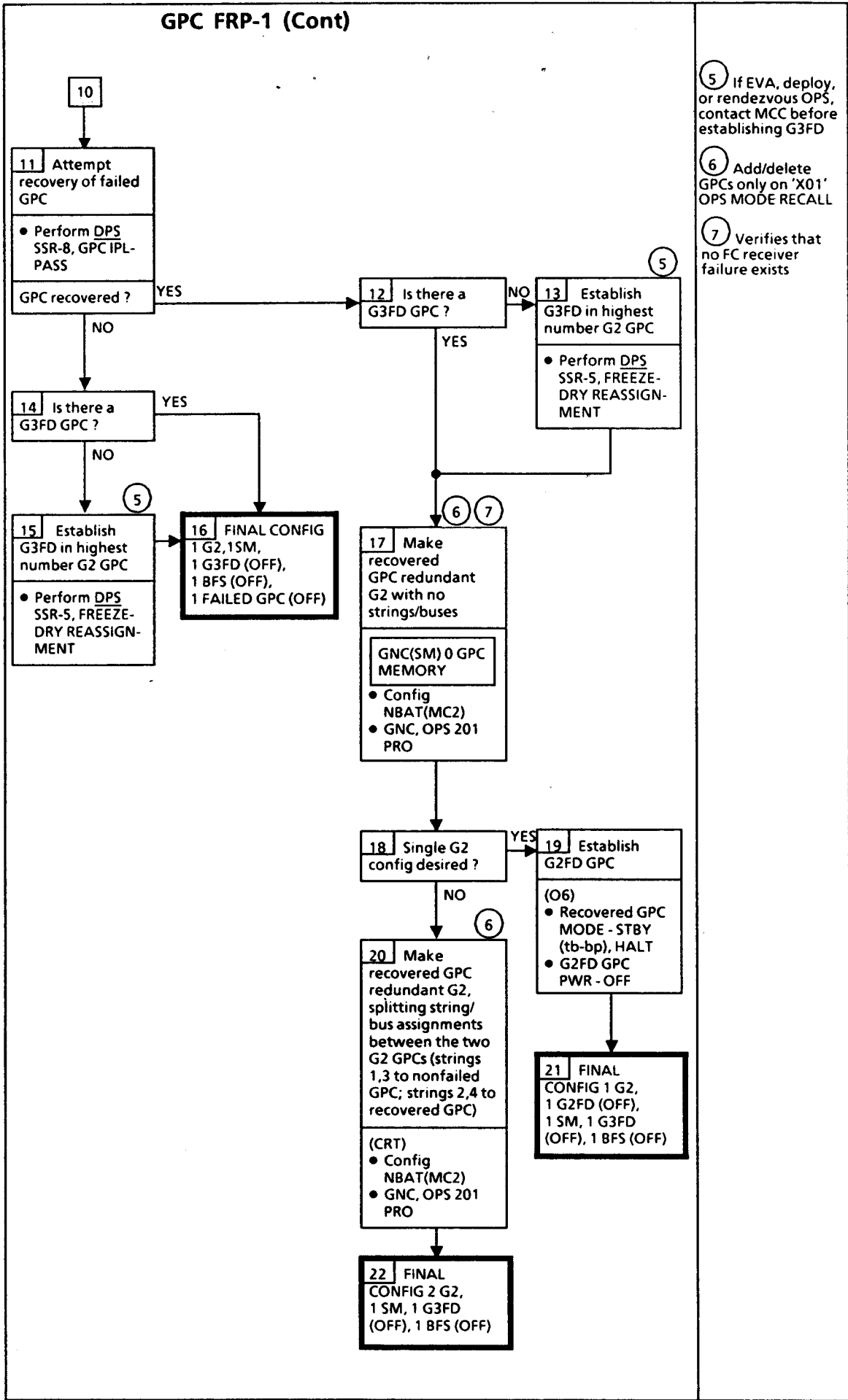
- state vector
- ADI quaternions
- IMU gyro bias
- IMU accel bias

② S/W dump to obtain sync trace log (used for MCC troubleshooting)

③ Reminder: highest number G2 GPC must have all strings/buses deassigned

④ S/W dump to verify BFS S/W integrity

GPC FRP-1 (Cont)



5 If EVA, deploy, or rendezvous OPS, contact MCC before establishing G3FD

6 Add/delete GPCs only on 'X01' OPS MODE RECALL

7 Verifies that no FC receiver failure exists

GPC FRP-2 TWO GNC GPC FAIL

OBJECTIVE

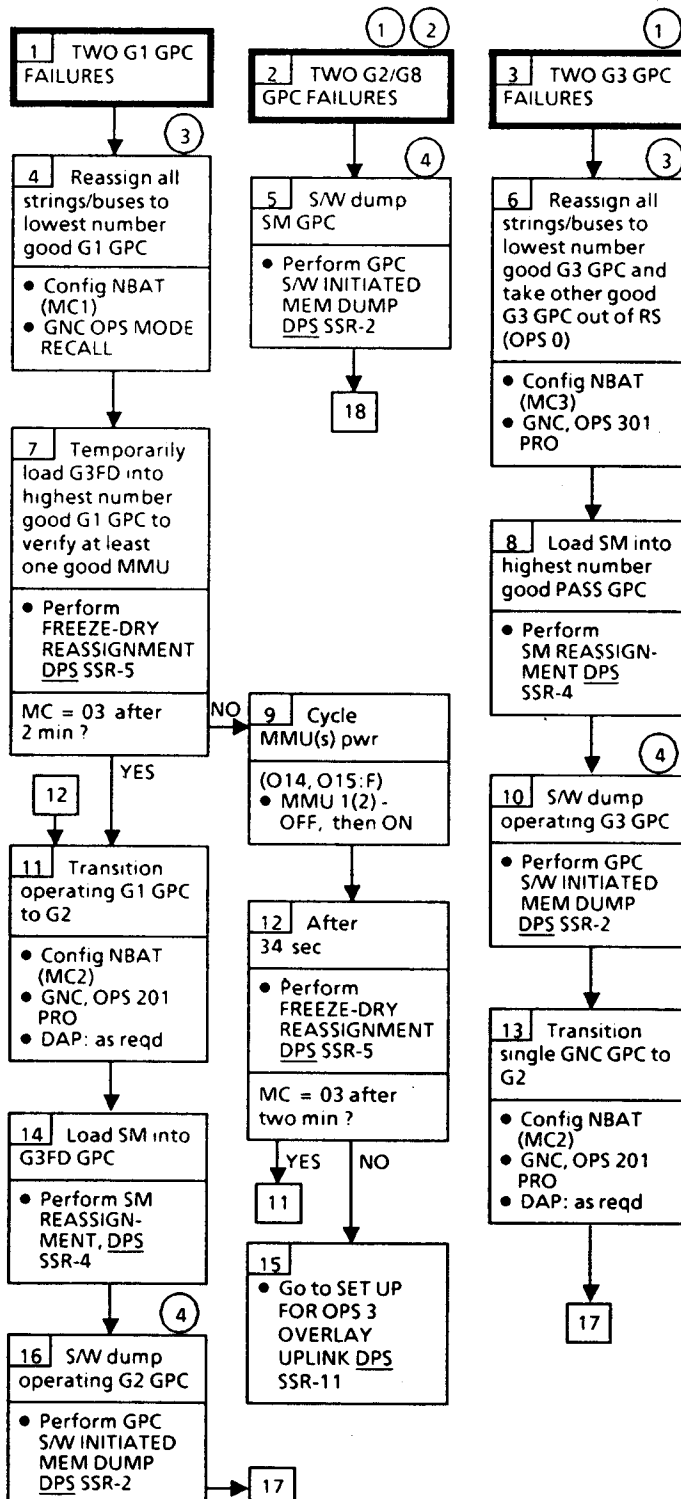
To establish minimum reqd on-orbit memory configs (G2, SM) in remaining two good PASS GPCs, to attempt recovery of failed GPCs, and to optimize final config for orbit or entry as desired

SCOPE

Procedure designed to handle any two GNC GPC failures (G1, G2/8, or G3 pre-TIG)

ASSUMPTIONS

Procedure assumes PASS GNC GPC 1st and 2nd FAIL procedures completed in G1 and G3 cases. PASS GNC GPC 1st FAIL and FD GPC ACTIVATE (G3FD) assumed completed in G2, G8, or G3/SM cases



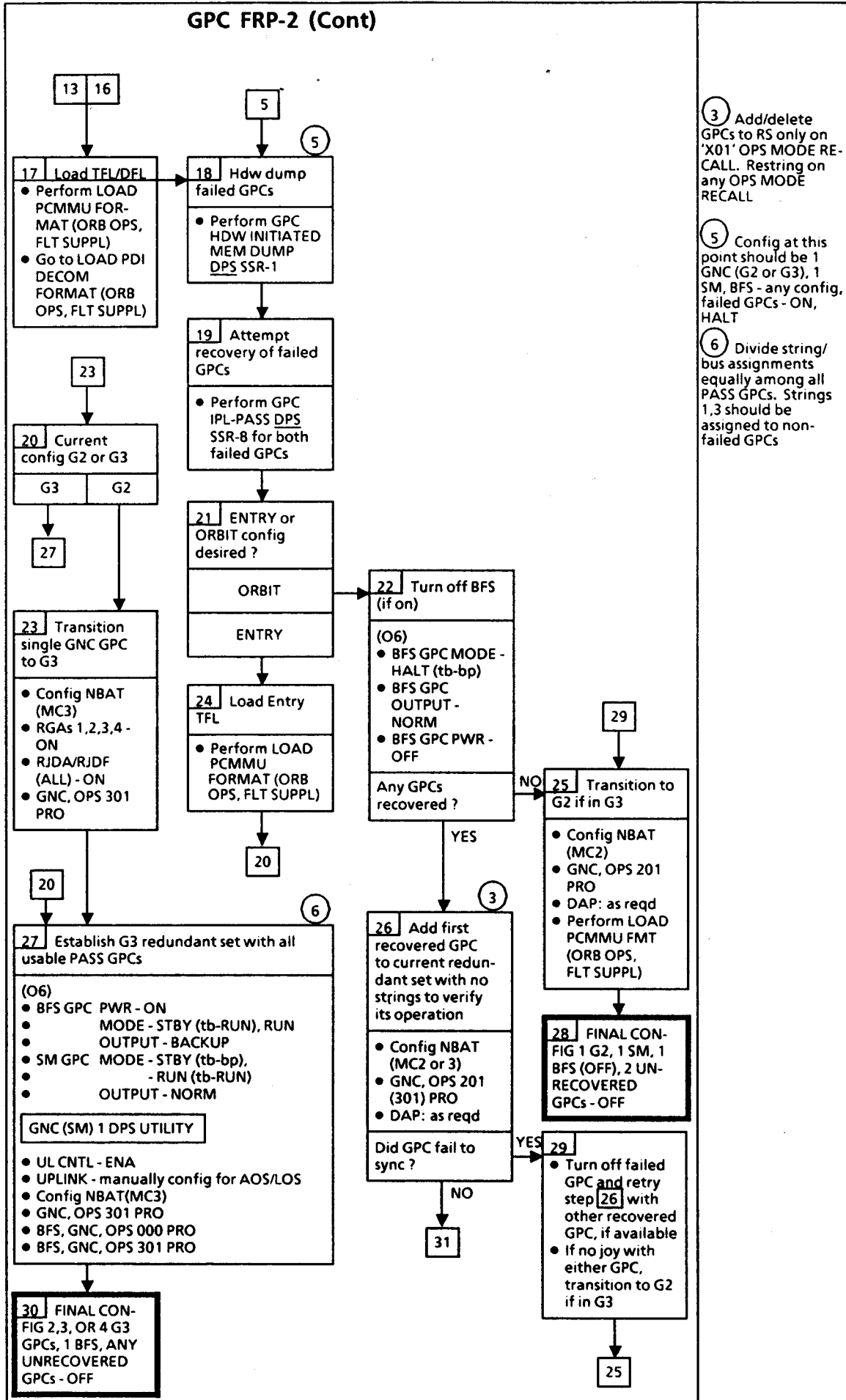
① Two G3 GPCs failed in G3/SM config should enter Block ②

② Following uplinks may be reqd upon recovery:
 • State Vector
 • ADI quaternions
 • IMU gyro bias
 • IMU accel bias

③ Add/delete GPCs to RS only on 'X01' OPS MODE RECALL. Restricting on any OPS MODE RECALL

④ S/W dump to obtain sync trace log (used for MCC troubleshooting)

GPC FRP-2 (Cont)

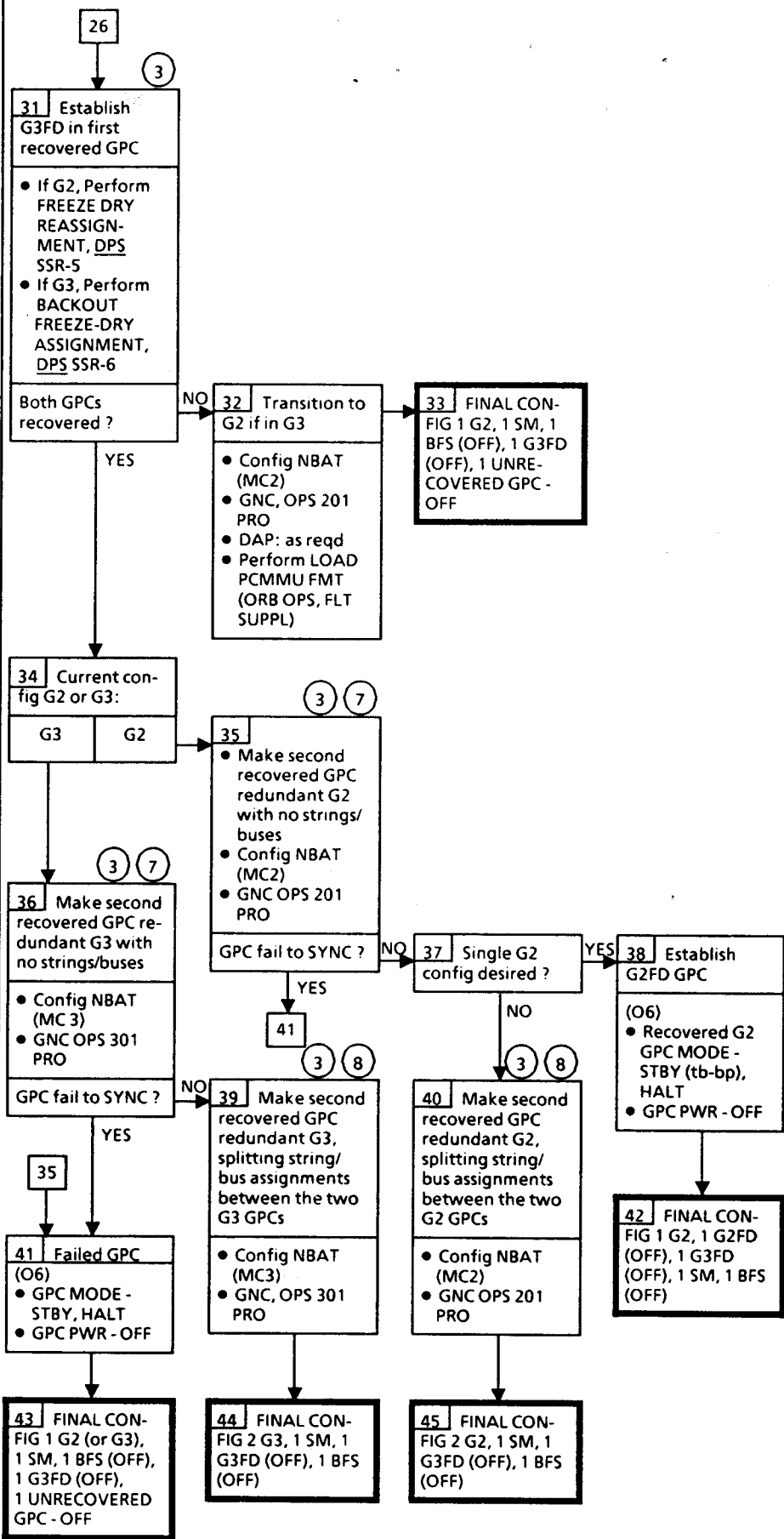


3 Add/delete GPCs to RS only on 'X01' OPS MODE RECALL. Restricting on any OPS MODE RECALL

5 Config at this point should be 1 GNC (G2 or G3), 1 SM, BFS - any config, failed GPCs - ON, HALT

6 Divide string/bus assignments equally among all PASS GPCs. Strings 1,3 should be assigned to non-failed GPCs

GPC FRP-2 (Cont)



- ③ Add/delete GPCs to RS only on 'X01' OPS MODE RECALL. Restring on any OPS MODE RECALL
- ⑦ Verifies that no FC receiver failure exists
- ⑧ Strings 1,3 should be assigned to non-failed GPC

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 GPC FRP-1 SINGLE GPC FAIL, (DPS)

INITIAL CONFIG FRP-3					
GPC OPS	1 G3	2 G3	3 G3	4 G3	5 -
POWER OUTPUT MODE	ON NORM RUN	ON BKUP 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. Prepare to establish BFS in one of the current GNC GPCs
 • Perform GNC REASSIGNMENT (G3) SSR-3
- b. Establish new BFS in GPC 2
 • Perform GPC IPL - MENU OPTION (PASS/BFS) SSR-7
- C2 • BFS CRT - GNC, OPS 301 PRO
- O6 • GPC OUTPUT - BKUP
 • MODE - RUN

GPC 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

GPC FRP-3 (Cont)

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

Final Config for GPC 5 Not Recovered					
GPC OPS	1	2	3	4	5
	G3	BFS	G3	G3	-
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
 - Perform GNC REASSIGNMENT (G3) SSR-3

GNC 50 HORIZ SIT -√PASS R/W sel

Final Config for GPC 5 Recovered					
GPC OPS	1	2	3	4	5
	G3	BFS3	G3	G3	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				

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 after completion of FRP:

- State Vector
- IMU desired REFSMMAT (reqd prior to performing GNC REFERENCE RECOVERY, GNC FRP-1)
- 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)

- a. Config GPCs
- O6 • PASS GNC GPCs MODE - HALT
- BFS GPC MODE - RUN
- C2 If BFS not in 301,
- BFS CRT - GNC, OPS 301 PRO
- b. If SM GPC currently active:
- If SM GPC OUTPUT - TERM:
- SM GPC OUTPUT - NORM
- BFS ENGAGE pb - push (reset engage discretes)
- O1 If SM GPC's self-fail CAM It on,
- Perform PL/DPS RECONFIG (PL SYS/SL MAL)
- SM 1 DPS UTILITY**
- C2 CHECKPOINT RETRIEVE DISABLE
- CKPT RETRV ENA -
- ITEM 12 EXEC (no*)
- O6 • SM GPC MODE - STBY, then RUN
- C2 • CRT - SM, OPS X01 PRO
- Go to step f
- c. Attempt recovery of one GPC (begin with GPC 4 and proceed in descending order until a GPC is successfully IPL'd)
- Perform GPC IPL - PASS DPS SSR-8
- d. For first successfully IPL'd GPC, establish SM GPC
- Perform SM REASSIGNMENT DPS SSR-4 →
- e. Select MET as MISSION TIME:
- SM 2 TIME**
- C2 • MISSION TIME MET - ITEM 2 EXEC
- f. Hardware dump the remaining failed GPCs (if step c performed, do not dump IPL'd GPCs)
- Perform GPC HDW INITIATED MEM DUMP DPS SSR-1
- Repeat last step for each GPC DPS SSR-1
- BFS ENGAGE pb - push (reset engage discretes)
- g. Attempt recovery of each dumped GPC
- Perform GPC IPL-PASS DPS SSR-8
- Repeat for each dumped GPC DPS SSR-8
- If 1 PASS GPC, perform steps h-i
- If 2 PASS GPCs, perform steps j-m
- If 3 PASS GPCs, perform steps n-r
- If 4 PASS GPCs, perform steps s-x
- h. One PASS GPC, config for ENTRY
- Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)
- Perform GNC REASSIGNMENT (G3) DPS SSR-3 →
- GNC 21 IMU ALIGN**
- C2 Select IMUs 1,2,3 to OPERATE:
- IMU OPER 1,2,3 - ITEM 4,5,6 EXEC
- (* will not appear until DISENGAGE step)
- Deselect two IMUs leaving one IMU selected:
- IMU DES 2,3 (1,3; 1,2) - ITEM 8,9(7,9; 7,8) EXEC
- (* indicates deselection)
- Perform Maneuver to attitude for subsequent COAS alignment STAR PAIRS PAD/CUE CARD (ORB ORB OPS, FLT SUPPL, GNC)

		GPC IPL'd			
		4	3	2	1
CONFIG GPC		4(5) 00040	4(5) 00300	4(5) 02000	4(5) 10000
STR 1		0	0	0	0
2		0	0	0	0
3		0	0	0	0
4		0	0	0	0
PL 1/2		4	3	2	1
CRT 1		4	3	2	1
2		4	3	2	1
3		4	3	2	1
4		0	0	0	0
L 1		4	3	2	1
2		0	0	0	0
MM 1		4	3	2	1
2		4	3	2	1

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

NOTE

Establish an inertial attitude which will simplify maneuver to second star

GPC FRP-4 (Cont)

- i. After MCC confirmation
 - BFC DISENGAGE - DISENGAGE
 - ASAP post - disengage
 - DAP CNTL: MAN
 - DAP ROT: DISC/DISC/DISC
- C2
 - BFS CRT - I/O RESET EXEC
 - ADI ATT - REF
 - ATT REF pb - push
 - Perform GNC FRP - 1, IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D (GNC)

NOTE

BFS DISENGAGE can be ✓ by single BFS CRT (as selected by BFS CRT SELECT sw pnl C3), BFS GPC OUTPUT tb - bp (pnl O6), and BFC It - off (pnl F2/F4). BFS must be in RUN to turn BFC It off

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

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

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

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

GPC FRP-4 (Cont)

- j. Two PASS GPCs establish single G3 config in lowest number GPC
- C3
- OI PCMMU FORMAT - FXD
 - Perform GNC - REASSIGNMENT DPS SSR-3 →
- GNC 21 IMU ALIGN**
- Select IMUs 1,2,3 to OPERATE:
 - IMU OPER 1,2,3 - ITEM 4,5,6 EXEC (* will not appear until DISENGAGE step)
 - Deselect two IMUs leaving one IMU selected:
 - IMU DES 2,3 (1,3;1,2) - ITEM 8,9(7,9;7,8) EXEC (* indicates deselection)
 - Maneuver to attitude for subsequent COAS alignment (ORB OPS FS, GNC)
- k. After MCC confirmation
- F6
- BFC - DISENGAGE
- ASAP post: disengage
- C3
- DAP CNTL: MAN
- C2
- DAP ROT: DISC RATE/DISC RATE
 - BFS CRT - I/O RESET EXEC

CONFIG	GPCs Recovered		
	1,2 1,3 1,4	2,3 2,4	3,4
	3 10000	3 02000	3 00300
STR 1	1	2	3
2	1	2	3
3	1	2	3
4	1	2	3
PL 1/2	0	0	0
CRT 1	1	2	3
2	1	2	3
3	1	2	3
4	0	0	0
L 1	0	0	0
2	0	0	0
MM 1	1	2	3
2	1	2	3

NOTE

BFS DISENGAGE can be ✓ by single BFS CRT (as selected by BFC CRT SEL sw pnl C3), BFS GPC OUTPUT tb - bp (pnl O6), and BFC It - off (pnl F2/F4). BFS must be in RUN to turn BFC It off

- Perform GNC FRP - 1 IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D (GNC)
- If ORBIT config desired, go to step m

- l. Entry config desired, establish dual G3 config
- Perform SM CHECKPOINT INITIATE Cue Card
 - Perform LOAD PCMMU FORMAT (ENTRY) (ORB OPS, FLT SUPPL)
 - Perform GNC REASSIGNMENT
- DPS SSR-3 →

CONFIG GPC	GPCs Recovered					
	1,4	2,4	3,4	2,3	1,3	1,2
	3 10040	3 02040	3 00340	12300	10300	12000
STR 1	1	2	3	2	1	1
2	4	4	4	3	3	2
3	4	4	4	3	3	2
4	1	2	3	2	1	1
PL 1/2	1	2	3	2	1	1
CRT 1	1	2	3	2	1	1
2	4	4	4	3	3	2
3	1	2	3	2	1	1
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	2	1	1
2	4	4	4	3	3	2

GPC FRP-4 (Cont)

I. (Cont)

Final Config for Two GPCs Recovered and Entry Desired											
GPCs 1,4 Recovered						GPCs 2,4 Recovered					
GPC OPS	1	2	3	4	5	GPC OPS	1	2	3	4	5
	G3	-	-	G3	BFS3		-	G3	-	G3	BFS3
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON NORM RUN	ON BKUP RUN	POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	OFF NORM HALT	ON NORM RUN	ON BKUP RUN
CONFIG GPC	3 10040					CONFIG GPC	3 02040				
STR 1	1					STR 1	2				
2	4					2	4				
3	4					3	4				
4	1					4	2				
PL 1/2	1					PL 1/2	2				
CRT 1	1					CRT 1	2				
2	4					2	4				
3	4					3	4				
4	0					4	0				
L 1	0					L 1	0				
2	0					2	0				
MM 1	1					MM 1	2				
2	4					2	4				
GPCs 3,4 Recovered						GPCs 2,3 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	OFF NORM HALT	ON NORM RUN	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 00340					CONFIG GPC	3 02300				
STR 1	3					STR 1	2				
2	4					2	3				
3	4					3	3				
4	3					4	2				
PL 1/2	3					PL 1/2	2				
CRT 1	3					CRT 1	2				
2	4					2	3				
3	4					3	3				
4	0					4	0				
L 1	0					L 1	0				
2	0					2	0				
MM 1	3					MM 1	2				
2	4					2	3				

GPC FRP-4 (Cont)

I. (Cont)

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

- m. Orbit config desired, establish single G2
- BFS CRT - GNC, OPS 000 PRO
 - BFS GPC MODE - HALT (tb-bp)
 - OUTPUT - NORM
 - PWR - OFF
 - SM GPC OUTPUT - TERM
 - GPC/CRT 03 EXEC
 - GPC/CRT GNC GPC/4 EXEC
 - Perform GNC REASSIGNMENT (G3 to G2)
 - Perform LOAD PCMMU FORMAT LOAD (ORB OPS, FLT SUPPL)
 - If appropriate, perform LOAD PDI DECOM FORMAT (ORB OPS, FLT SUPPL)
 - Reselect MTU accumulator
- SM(GNC) 2 TIME
- MTU ACCUM 1(2,3) TRY - ITEM 34(35,36)

NOTE

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

SSR-3 →	CONFIG GPC	GPCs Recovered		
		1,4	2,4	3,4
		1,3	2,3	3,4
		1,2	2,3	3,4
		10000	02000	00300
	STR 1	1	2	3
	2	1	2	3
	3	1	2	3
	4	1	2	3
	PL 1/2	0	0	0
	CRT 1	1	2	3
	2	1	2	3
	3	0	0	0
	4	1	2	3
	L 1	0	0	0
	2	0	0	0
	MM 1	1	2	3
	2	1	2	3

GPC FRP-4 (Cont)

m. (Cont)

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

GPC FRP-4 (Cont)

m. (Cont)

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

n. Three PASS GPCs, establish redundant set

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

GNC 21 IMU ALIGN

Select IMUs 1,2,3 to OPERATE:

- IMU OPER 1,2,3 - ITEM 4,5,6 EXEC (* will not appear until DISENGAGE step)

Deselect two IMUs leaving one IMU selected:

- IMU DES 2,3 (1,3; 1,2) - ITEM 8,9(7,9; 7,8) EXEC (* indicates deselection)

- Maneuver to attitude for subsequent COAS alignment
STAR PAIRS PAD/CUE CARD (ORB OPS, FLT SUPPL, GNC)

o. After MCC confirmation

- BFC DISENGAGE - DISENGAGE (F6)
- ASAP post - disengage
 - DAP CNTL pb - MAN
 - DAP ROT: DISC RATE/DISC RATE/DISC RATE
- BFS CRT - I/O RESET EXEC

F6

C2

C2

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

NOTE

BFS DISENGAGE can be ✓ by single BFS CRT as selected by BFC CRT SEL sw, (pnl C3), BFS GPC OUTPUT tb - bp (pnl O6), and BFC It - OFF (pnl F2/F4). BFS must be in RUN to turn BFC It off

- Perform GNC FRP-1, IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D (GNC)

GPC FRP-4 (Cont)

- p. Then config for ORBIT
- BFS CRT - GNC, OPS 000 PRO
 - BFS GPC OUTPUT - NORM
 - MODE - STBY
 - MODE - HALT (tb-bp)
 - PWR - OFF
- C2 GPC/CRT 03 EXEC
- O6 GPC/CRT SM GPC/4 EXEC
- Perform GNC REASSIGNMENT (G3 to G2)..... SSR-3 →
 - SM GPC OUTPUT - TERM
 - Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)
 - If appropriate, perform LOAD PDI DECOM FORMAT (ORB OPS, FLT SUPPL)
 - Reselect MTU accumulator
- SM(GNC) 2 TIME
- C2 ● MTU ACCUM 1(2,3) TRY - ITEM 34(35,36) EXEC

CONFIG GPC	GPCs Recovered		
	1,2,3 1,2,4	1,3,4	2,3,4
2	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

NOTE

Down arrows will remain for accumulators not selected by GPC driving SPEC. If try not successful, do not perform TIME SYNC. Continue with procedures and contact MCC

- Reinitiate PL OPS
- On MCC go, perform steps q-r

- q. Prepare for freeze-dry GPC
- Perform GNC REASSIGNMENT..... SSR-3 →

CONFIG GPC	GPCs Recovered	
	1,2,4 1,3,4 1,2,3	2,3,4
2	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

- r. Then freeze-dry GPC
- Perform FREEZE-DRY REASSIGNMENT..... SSR-5 →

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

GPC FRP-4 (Cont)

r. (Cont)

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

Final Config for GPCs 1,3,4 Recovered					
GPC OPS	1 G2	2 -	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON TERM RUN	OFF NORM HALT
CONFIG GPC	2 10000	4(5) 00040	3(FD) 03000		
STR 1	1	0	3		
2	1	0	3		
3	1	0	3		
4	1	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
2	1	4	3		
3	0	0	3		
4	1	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	3		
2	1	4	3		

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

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

GPC FRP-4 (Cont)

- s. Four PASS GPCs, establish G3 redundant set
 ● Perform GNC REASSIGNMENT.(G3)..... DPS SSR-3 →

GNC 21 IMU ALIGN

- Select IMUs 1,2,3 to OPERATE:
 ● IMU OPER 1,2,3 - ITEM 4,5,6 EXEC
 (* will not appear until DISENGAGE STEP)
 Deselect two IMUs leaving one IMU selected:
 ● IMU DES 2,3 (1,2) - ITEM 8,9(7,8) EXEC (* indicates deselection)
 ● Maneuver to attitude for subsequent COAS alignment STAR PAIRS
 PAD/CUE CARD (ORB OPS, FLT SUPPL, GNC)

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

- t. After MCC confirmation
 ● BFC - DISENGAGE
 ● ASAP post - disengage:
 ● DAP CNTL pb - MAN
 ● DAP ROT: DISC RATE/DISC RATE/DISC RATE
 C2 ● BFC CRT - I/O RESET EXEC

NOTE

BFS DISENGAGE can be ✓ by single BFS CRT as selected by BFC CRT
 SELECT sw (pnl C3), BFS GPC OUTPUT tb - bp (pnl O6), and BFC
 It - off (pnl F2/F4). BFS must be in RUN to turn BFC It off

- Perform GNC FRP-1, IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D (GNC)

- u. Then prepare to freeze-dry a GPC
 ● Perform GNC REASSIGNMENT (G3)..... DPS SSR-3 →

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

- v. Then freeze-dry a GPC
 ● Perform BACKOUT FREEZE-DRY ASSIGNMENT..... DPS SSR-3 →

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

GPC FRP-4 (Cont)

- w. Then config for ORBIT
- C2 ● BFS CRT - GNC OPS 000 PRO
 - O6 ● BFS GPC OUTPUT - NORM
 - MODE - STBY
 - MODE - HALT
 - PWR - OFF
 - C2 GPC/CRT 03 EXEC
 - GPC/CRT 44 EXEC
 - O6 ● Perform GNC REASSIGNMENT (G3 to G2) SSR-3 →
 - SM GPC OUTPUT - TERM
 - Reselect MTU accumulator
 - SM(GNC) 2 TIME
 - MTU ACCUM 1(2,3) TRY - ITEM 34(35,36) EXEC

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

NOTE

If try is not successful, do not perform TIME SYNC.
Continue with procedures and ✓MCC

- Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)
- If single GNC GPC config desired, perform step x
- Reinitiate PL OPS

Final Config 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	OFF NORM HALT	ON TERM RUN	OFF NORM HALT
CONFIG GPC	2 12000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
2	2	0	3		
3	1	0	3		
4	2	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
2	2	4	3		
3	0	0	3		
4	2	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	3		
2	2	4	3		

GPC FRP-4 (Cont)

- x. Establish single GNC GPC config
- Perform GNC REASSIGNMENT (G2)..... SSR-3
 - GPC MODE 2 STBY (tb-bp), then HALT
 - PWR 2 OFF

CONFIG GPC	2 12000
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

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

GPC FRP-5 PL9 ASSIGNMENT (DEU IPL-PASS OR MMU READ/WRITE)

NOTE

Procedure assumes nominal ORBIT config

- a. Prepare for PL9 assignment
- Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL, COMM/INST)
- If GPC 2 pwrd OFF:
- O6 • ✓/GPC MODE 2 - HALT
- L1 • ✓/AV BAY 2 FAN A(B) - ON
- O6 • GPC PWR 2 - ON
- GPC MODE 2 - STBY (tb-RUN), then RUN
 - If reqd, perform GNC REASSIGNMENT (G2) SSR-3 →

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

- b. Establish PL9 in GPC 2
- C2 • CRT X MAJ FUNC - PL
(where X = 1,2,3, or 4 as appropriate)
- GPC/CRT 2 X EXEC

X: PL 0 GPC MEMORY

- CONFIG - ITEM 1 + 6 EXEC
- Assign desired GPC, CRTs, and MMs to GPC 2
- PL, OPS 901 PRO

CONFIG GPC	6
	02000
STR 1	0
2	0
3	0
4	0
PL 1/2	0
CRT 1	2
2	2
3	0
4	2
L 1	0
2	0
MM 1	2
2	2

- c. Perform DEU IPL-PASS/BFS, DPS SSR-9
or MMU Dump Read/Write as desired

GPC FRP-5 (Cont)

- d. Reassign GNC to current PL9 GPC
- CRT - PL, OPS 000 PRO
 - Perform GNC - REASSIGNMENT (G2) SSR-3
 - Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL, COMM/INST)
 - If single GNC GPC config desired, perform step e

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

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

- e. Establish single GNC GPC config
- Perform GNC REASSIGNMENT (G2) SSR-3
- O6
- GPC MODE 2 - STBY (tb-bp), then HALT
 - PWR 2 - OFF
- L1
- Put AV BAY 2 FAN A(B) into pre-FRP-5 config

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

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-5 PL9 ASSIGNMENT (DEU IPL-PASS OR MMU READ/WRITE)

NOTE

Procedure assumes nominal ORBIT config

- a. Prepare for PL9 assignment
- Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL, COMM/INST)
 - If GPC 2 pwrd OFF:
 - O6 • ✓GPC MODE 2 - HALT
 - GPC PWR 2 - CN
 - L1 • ✓AV BAY 2 FAN A(B) - ON
 - O6 • GPC MODE 2 - STBY (tb-RUN), then RUN
 - If reqd, perform GNC REASSIGNMENT (G2) SSR-3 →

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

- b. Establish PL9 in GPC 2
- C2 • CRT 1(2,3,4) MAJ FUNC - PL
(where X = 1,2,3, or 4 as appropriate)
- GPC/CRT 2 X EXEC
- X: PL 0 GPC MEMORY
- CONFIG - ITEM 1 + 6 EXEC
 - Assign desired GPC, CRTs, and MMs to GPC 2
 - PL, OPS 901 PRO

CONFIG GPC	6 02000
STR 1	0
2	0
3	0
4	0
PL 1/2	0
CRT 1	2
2	2
3	0
4	2
L 1	0
2	0
MM 1	2
2	2

- c. Perform DEU IPL-PASS/BFS, DPS, SSR-9
or MMU DUMP READ/WRITE as desired

GPC FRP-5 (Cont)

- d. Reassign GNC to current PL9 GPC
- CRT - PL OPS 000 PRO
 - Perform GNC - REASSIGNMENT (G2) SSR-3 →
 - Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL, COMM/INST)
 - If single GNC GPC config desired, perform step e

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

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

- e. Establish single GNC GPC config
- Perform GNC REASSIGNMENT (G2) SSR-3 →
 - GPC MODE 2 - STBY (tb-bp), then HALT
 - PWR 2 - OFF
- O6
- L1 • Put AV BAY 2 FAN A(B) into pre-FRP-5 config

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

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

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GPC FRP-6 OPS 3 TRANSITION (BOTH MMUs FAILED)

NOTE

Procedure assumes the initial config shown. This config is established by attempting OPS transition with GPC 1,2. The appropriate MMU MAL procedures have been performed

Initial Config					
GPC OPS	1	2	3	4	5
	G2/G8/0	G2/G8/0	G3FD	SM	BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	OFF NORM HALT	ON TERM RUN	** **
CONFIG GPC	2 12000	4(5) 00040	3(FD) 00300	8* 12000 (10000)	
STR 1	1	0	3	1(1)	
2	2	0	3	2(1)	
3	1	0	3	1(1)	
4	2	0	3	2(1)	
PL 1/2	0	1	0	0(0)	
CRT 1	1	1	3	1(1)	
2	2	4	3	2(1)	
3	2	4	3	0(0)	
4	0	0	0	2(1)	
L 1	0	4	0	0(0)	
2	0	0	0	0(0)	
MM 1	1	1	3	** (1)	
2	2	4	3	** (1)	

- a. Bring up freeze-dry GPC
- O6 • Freeze-dry GPC PWR - ON
 - GPC MODE - STBY (tb-RUN), then RUN
 - C2 • CRT3 MAJ FUNC - PL
 - GPC.CRT 33 EXEC

* Applies only if procedure is entered from GNC OPS 8 with 1 or 2 GNC GPCs
 ** Implies switch positions and/or entered values do not matter

b. Config ENTRY

NOTE

For following GNC reassignment, ✓OPS call made on CRT which is assigned to one of the original GNC GPCs

- Perform GNC REASSIGNMENT (G2/G8/0 to G3) SSR-3
- O6 • ✓BFS GPC PWR - ON
- ✓MODE - STBY
- C2 • CRT - GNC, OPS 301 PRO
- O6 • GPC OUTPUT - B/U
- MODE - RUN

c. Select fixed PCMMU format

- C3 • ✓OI PCMMU FORMAT - GPC

X: SM 62 PCMMU/PL COMM

(where X = 1,2,3, or 4 as appropriate)

- CRT X PCMMU FMT SEL FXD - ITEM 1 EXEC (*)

d. Enable uplink control

X: SM1 DPS UTILITY

- UL CNTL ENA - ITEM 36 EXEC (*)
- UPLK - manually config to AOS/LOS

e. ✓Auto TFL load enabled on BFS

3: BFS 0 BFS MEMORY

- ✓TFL ENA - ITEM 29 (*)

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

GPC FRP-5 (Cont)

NOTE

SM GPC will be transitioned to OPS 3 at approximately TIG-50:00 using Step f

- f. Expand G3 redundant set (approximately TIG-50:00)
 - SM CRT - SM, OPS 000 PRO
 - SM GPC OUTPUT - NORM
 - Perform GNC REASSIGNMENT SSR-3

GNC 53 HORIZ SIT - ✓PASS appropriate RUNWAY SEL

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

Final Config OPS 3 Both MMUs Failed					
GPC OPS	1 G3	2 G3	3 G3	4 G3	5 .. BFS3
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM RUN	ON NORM BKUP RUN
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				

**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 (or redundant G2) functions are placed into uncooled Av Bay GPCs and powered off. If BFS is moved, new BFS GPC will be dumped to provide good BFS for Entry

For Ascent, this FRP assumes PWRDN, LOSS OF AV BAY FANS procedure (ASC PKT) has been accomplished

If ORBIT config is G3 (OMS/RCS burns) or G8 (FCS C/O), substitute for G2 where appropriate. Major mode 301 assumed if no OPS 3

	Perform steps
ASCENT (G1)	a-h
ORBIT (G2,G8,G3/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	-	BFS1		G1	-	G1	G1	BFS
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	ON NORM RUN	OFF NORM HALT	ON BKUP RUN	POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	ON NORM RUN	ON NORM RUN	OFF BKUP HALT
CONFIG GPC	1 12340					CONFIG GPC	1 12340				
STR 1	2					STR 1	1				
2	3					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	3				
3	3					3	4				
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	BFS1
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	OFF NORM HALT	ON NORM RUN	ON BKUP RUN
CONFIG GPC	1 12340				
STR 1	1				
2	2				
3	4				
4	4				
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)

- a. Perform FREEZE-DRY REASSIGNMENT SSR-5 →
- Freeze Dry GPC MODE - STBY (tb-bp), HALT
 - PWR - OFF
- b. Secure BPS (Av Bay 1,3 only)
- C2 • BPS CRT GNC OPS 000 PRO
 - O6 • GPC MODE - HALT (tb-bp)
 - OUTPUT - NORM
 - PWR - OFF
 - C2 • BPS CRT DISH - OFF

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

- c. Establish TEST P-2
- C3 • GPC MODE - STBY
 - Perform GPC REASSIGNMENT (G1 to G2) SSR-3 →

		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. Establish TEST P-3
- C3 • GPC MODE - FORMAT - PGM
 - Perform GPC REASSIGNMENT SSR-4 →
 - Freeze Dry GPC MODE - HALT (tb-bp), HALT
 - PWR - OFF (TERM in SSR-4)

		Av Bay	
		1	2,3
CONFIG	GPC	4(5)	4(5)
		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)

- e. If Av Bay 2, Reassign BFS
 Perform GPC IPL MENU OPTION (PASS/BFS)(GPC 3,BFS) SSR-7
 Dump BFS:
 • Perform GPC SW INITIATED MEM DUMP SSR-2
 O6 • GPC 3 MODE - STBY,HALT
 • ✓OUTPUT - NORM
 • PWR - OFF
 Re-IPL GPC 5:
 • Perform GPC IPL - PASS SSR-8
 O6 • GPC 5 MODE - STBY (tb-bp),HALT
 • OUTPUT - NORM
 • PWR - OFF
- f. Perform LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)
- g. Config LRU switches

<u>Av Bay 1</u>	<u>Av Bay 2</u>	<u>Av Bay 3</u>
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	
:E cb MNC ADTA 3 - op	:E cb MNC ADTA 4 - op	
O7 TACAN 1 MODE - OFF	O7 TACAN 2 MODE - OFF	
O8 MLS 1 - OFF	O8 MLS 2,3 (two) - OFF	
L4:P cb AC3 φA LG SNSR 1 - op		

- h. Config CRTs.
 C2 • GPC/CRT 03 EXEC
 • GPC/CRT GNC GPC/4 EXEC
 • CRT3 PWR - OFF
- At deorbit prep, perform PDP, LOSS OF TWO AV BAY FANS, CONTINGENCY DELTA, DEORBIT PREP
 Final Config matrices at end of FRP

ORBIT

- i. ORBIT procedure assumes nominal ORBIT DPS config. If less than two hours from deorbit burn, perform LOSS OF AV BAY FANS (ENT PK.T, PWRDN)
- If Av Bay 3, perform step p only
 If GPC 2 currently in HALT,
 O6 • GPC PWR 2 - ON
 • MODE 2 - STBY (tb-RUN), then RUN
- If Av Bay 1,
 • Perform GNC REASSIGNMENT SSR-3
- j. Single G2 GPC ops
 • Perform GNC REASSIGNMENT (G2)

SSR-3 →	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="2">Av Bay 1</th> <th colspan="2">Av Bay 2</th> </tr> <tr> <th>CONFIG GPC</th> <th>2</th> <th>CONFIG GPC</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>STR 1</td> <td>2</td> <td>STR 1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> <td>2</td> <td>1</td> </tr> <tr> <td>3</td> <td>2</td> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>2</td> <td>4</td> <td>1</td> </tr> <tr> <td>PL 1/2</td> <td>0</td> <td>PL 1/2</td> <td>0</td> </tr> <tr> <td>CRT 1</td> <td>2</td> <td>CRT 1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> <td>2</td> <td>1</td> </tr> <tr> <td>3</td> <td>0</td> <td>3</td> <td>0</td> </tr> <tr> <td>4</td> <td>2</td> <td>4</td> <td>1</td> </tr> <tr> <td>L 1</td> <td>0</td> <td>L 1</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> <td>2</td> <td>0</td> </tr> <tr> <td>MM 1</td> <td>2</td> <td>MM 1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> <td>2</td> <td>1</td> </tr> </tbody> </table>	Av Bay 1		Av Bay 2		CONFIG GPC	2	CONFIG GPC	2	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	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>CONFIG GPC</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>STR 1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>2</td> </tr> <tr> <td>PL 1/2</td> <td>0</td> </tr> <tr> <td>CRT 1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>0</td> </tr> <tr> <td>4</td> <td>2</td> </tr> <tr> <td>L 1</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> </tr> <tr> <td>MM 1</td> <td>1</td> </tr> <tr> <td>2</td> <td>2</td> </tr> </tbody> </table>	CONFIG GPC	2	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
Av Bay 1		Av Bay 2																																																																																								
CONFIG GPC	2	CONFIG GPC	2																																																																																							
STR 1	2	STR 1	1																																																																																							
2	2	2	1																																																																																							
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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																																																																																							
CONFIG GPC	2																																																																																									
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																																																																																									

GPC FRP-7 (Cont)

If Av Bay 1:

- Perform SM CHECKPOINT INITIATE Cue Card
- Perform PL/DPS RECONFIG (PL SYS/SL MAL)

- O6 • SM GPC MODE - STBY (tb-bp), RUN (tb-RUN)
 • GPC OUTPUT 4 - NORM

If OPS 2/8,

- BFS GPC PWR - ON
- MODE - RUN (during LOS for CW tones)
- - STBY (during AOS for gnd comm mgmt)

If no Comm at next AOS select best antenna

If OPS 3,

- BFS GPC PWR - ON
- MODE - RUN

k. If time insufficient for complete reconfig:

Av Bay 1

- O6 GPC 1,4 MODE - STBY (tb-bp), HALT
 PWR - OFF

Av Bay 2

- GPC 2 MODE - STBY (tb-bp), HALT
 PWR - OFF
 ✓ 5 MODE - HALT (tb-bp)
 PWR - OFF

Then, perform step p, and ✓ MCC

i. Establish freeze-dry GPC (Av Bay 1 - GPC 1; Av Bay 2 - GPC 2)

If OPS 2/8,

- Perform FREEZE-DRY REASSIGNMENT SSR-5 →

If OPS 3,

- Perform BACKOUT FREEZE-DRY ASSIGNMENT ... SSR-6 →

- O6 • FD GPC MODE - HALT
 • PWR - OFF

Av Bay 1

Av Bay 2

	CONFIG GPC	3(FD) 10000		CONFIG GPC	3(FD) 02000
STR	1	1	STR	1	2
	2	1		2	2
	3	1		3	2
	4	1		4	2
PL 1/2		0	PL 1/2		0
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

m. Reassign GPC 3

- O6 • ✓ GPC MODE 3 - HALT
 • PWR 3 - ON

If Av Bay 1,

- O6 • GPC MODE 3 - STBY (tb-RUN), then RUN
 • Perform SM REASSIGNMENT SSR-4 →

• Reinitiate PL OPS

- O6 • BFS GPC MODE - HALT (tb-bp)
 • PWR - OFF

If Av Bay 2,

- Perform GPC IPL MENU OPTION (PASS/BFS) (GPC 3, BFS) ... SSR-7

If time permits, or G2FD GPC desired,

- Perform GPC IPL - PASS (GPC 5) SSR-8

	CONFIG GPC	4(5) 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 G2FD GPC desired

- Perform GNC REASSIGNMENT (G2) SSR-3 →

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

- Deassign G2FD GPC from MC 2 NBAT (Do not perform OPS MODE RECALL) →

	Av Bay	
	1	2
CONFIG GPC	2 02000	2 10000
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. Turn off GPCs in failed Av Bay

- Av Bay 1**
- O6 ✓ GPC 1 MODE - HALT
 - ✓ PWR - OFF
 - GPC 4 MODE - STBY (tb-bp), HALT
 - PWR - OFF

- Av Bay 2**
- ✓ GPC 2 MODE - HALT
 - ✓ PWR - OFF
 - GPC 5 MODE - STBY (tb-bp), HALT
 - PWR - OFF

p. 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
 - O8 ✓ MLS 1 - OFF
 - L4:P ✓ cb AC3 φA LG SNSR 1 - op

- 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
 - O8 ✓ MLS 2,3 (two) - OFF
 - L4:P ✓ cb AC2 φA LG SNSR 2 - op

- Av Bay 3**
- O6 ✓ GPC 3 MODE - HALT
 - ✓ PWR - OFF
 - O13:A cb ESS 1BC C/W A - op
 - O7 ✓ TACAN 3 MODE - OFF

At deorbit prep, go to LOSS OF AV BAY AIR COOLING (DEORB PREP, CONTINGENCY DELTAS)

GPC FRP-7 (Cont)

- q. If Av Bay 2, S/W dump BFS/GPC
 - Perform GPC S/W INITIATED MEM DUMP (BFS) SSR-2
- O6 • GPC 3 MODE - STBY, HALT (tb-bp)
 - PWR - OFF
- C3 • ✓OI PCMMU FORMAT - GPC

X: SM 62 PCMMU/PL COMM

CRT Format:
PGM - ITEM 2 EXEC (*)

Final Config
(ASCENT and ORBIT no G2FD GPC)

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

Av Bay 3					
GPC OPS	1 G2	2 G2	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	ON NORM RUN	OFF NORM HALT	ON TERM RUN	OFF NORM HALT
CONFIG GPC	2 12000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
2	2	0	3		
3	1	0	3		
4	2	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
2	2	4	3		
3	0	0	3		
4	2	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	3		
2	2	4	3		

GPC FRP-7 (Cont)

Final Config
(ORBIT with G2FD GPC)

Av Bay 1					Av Bay 2						
GPC OPS	1 G3FD	2 G2	3 SM	4 G2FD	5 BFS	GPC OPS	1 G2	2 G3FD	3 BFS	4 SM	5 G2FD
POWER OUTPUT MODE	OFF NORM HALT	ON NORM RUN	ON TERM RUN	OFF NORM HALT	OFF NORM HALT	POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON TERM RUN	OFF NORM HALT
CONFIG GPC	2 02000	4(5) 00300	3(FD) 10000			CONFIG GPC	2 10000	4(5) 00040	3(FD) 02000		
STR 1	2	0	1			STR 1	1	0	2		
2	2	0	1			2	1	0	2		
3	2	0	1			3	1	0	2		
4	2	0	1			4	1	0	2		
PL 1/2	0	3	0			PL 1/2	0	4	0		
CRT 1	2	3	1			CRT 1	1	4	2		
2	2	3	1			2	1	4	2		
3	0	0	1			3	0	0	2		
4	2	3	0			4	1	4	0		
L 1	0	3	0			L 1	0	4	0		
2	0	0	0			2	0	0	0		
MM 1	2	3	1			MM 1	1	4	2		
2	2	3	1			2	1	4	2		

Av Bay 3					
GPC OPS	1 G2	2 G2FD	3 G3FD	4 SM	5 BFS
POWER OUTPUT MODE	ON NORM RUN	OFF NORM HALT	OFF NORM HALT	ON TERM RUN	OFF NORM HALT
CONFIG GPC	2 10000	4(5) 00040	3(FD) 00300		
STR 1	1	0	3		
2	1	0	3		
3	1	0	3		
4	1	0	3		
PL 1/2	0	4	0		
CRT 1	1	4	3		
2	1	4	3		
3	0	0	3		
4	1	4	0		
L 1	0	4	0		
2	0	0	0		
MM 1	1	4	3		
2	1	4	3		

GPC FRP-9 SPARE GPC CHECKOUT

OBJECTIVE

To verify complete operation of the installed spare GPC

SCOPE

Procedure is designed to handle checkout of spare GPC in any of the five slots for cases where 3 or 4 good GPCs exist, excluding the installed spare GPC

ASSUMPTIONS

Procedure assumes DPS reconfig has been performed and one of the following on-orbit configs exist:

- 2 G2 GPCs, 1 SM GPC, 1 BFS GPC and the installed spare GPC
- or
- 1 G2 GPC, 1 G3FD GPC, 1 SM GPC, 1 BFS GPC and the installed spare GPC
- or
- 1 G2 GPC, 1 SM GPC, 1 BFS GPC, and the installed spare GPC

Procedure also assumes all strings, CRTs, and MMUs are assigned per NBATs for MC2 dual/single G2 OPS, at least one MMU functional, and BFS function will not be loaded into the spare GPC

- a IPL spare GPC
 - Perform GPC IPL-MENU OPTION (PASS/BFS) (IPL MENU OPTION - PASS only) SSR-7
 - b Checkout spare GPC. Wait for MCC coverage before performing the following steps
- O6 ●✓GPC MODE 1(2,3,4,5) - RUN (tb remains RUN)
- ✓GPC OUTPUT discrettes:
- O6 ● GPC OUTPUT (changed-out GPC) - TERM (tb-bp)
 - - NORM (tb-gray)
 - IPL SOURCE - MMU 2(1) (select MMU not used for IPL) wait 5 sec, then
 - - OFF
 - C3 ●✓BFC CRT DISP - OFF
 - If BFS currently in RUN,
 - O6 ● BFS GPC MODE 1(2,3,4,5) - STBY
 - If BFS currently in STBY
 - BFS GPC MODE 1(2,3,4,5) - RUN (wait 5 sec), then
 - - STBY
 - If BFS currently OFF
 - BFS GPC PWR 1(2,3,4,5) - ON
 - MODE 1(2,3,4,5) - STBY
 - BFS GPC MODE 1(2,3,4,5) - RUN (wait 5 sec), then
 - - STBY
- Proceed at this point with or without MCC coverage
- ✓CRT interfaces by assigning each CRT to changed-out GPC
(Do not assign all CRTs to changed-out GPC at once):
- C2 CRT 1(2,3,4) MAJ FUNC - PL
 - GPC/CRT XY EXEC
 - ✓ Y: PL 0 GPC MEMORY
- CRT 1(2,3,4) MAJ FUNC - GNC (SM) as desired

GPC FRP-9 (Cont)

Y: PL 1 DPS UTILITY

- O14 ✓MMU Interface:
- O15 ✓MMU 1 - ON
- 2 - ON
- ✓CRT assigned to spare GPC
- CRT ✓MMU 1 - RDY
- 2 - RDY
- O14 1 - OFF
- CRT ✓MMU 1 - BSY
- O14 1 - ON (wait 34 sec)
- CRT ✓MMU 1 - RDY
- O15 2 - OFF
- CRT ✓MMU 2 - BSY
- O15 2 - ON (wait 34 sec)
- CRT ✓MMU 2 - RDY

If checkout not successful, ✓MCC

- c. If checkout successful enter ENTRY config
 - Perform G2/GB to G3 TRANS. SSR-18
 - BFS CRT - GNC, OPS 301 PRO
- O6 d. If available, config G3FD GPC
 - ✓G3FD GPC MODE 1(2,3,4,5) - HALT
 - G3FD GPC PWR 1(2,3,4,5) - ON
 - MODE 1(2,3,4,5) - STBY (tb-RUN), then RUN

NOTE

If GPC 5 was replaced then assign it the string corresponding to slot currently housing BFS function (i.e., if BFS function is now in GPC 2s slot assign GPC 5 string 2, etc.); otherwise, a PASS GPC was replaced and nominal stringing is appropriate. For a 3 GPC ENTRY config, assign 1&4 to same GPC. For temporary G3 config, leave S2 GPC up and running

- e. Config NBAT for MC3 transition. Assign string to changed-out GPC
 - Perform GNC REASSIGNMENT (G3) SSR-3

GPC FRP-9 (Cont)

- f. If retaining G3 config, go to GPC REPLACEMENT steps 9-11 (IFM) >>
- g. Perform on-orbit config using spare GPC as one of the RS G2 GPCs
(If 5 GPCs or DUAL G2, GPCs not reqd)
 - Perform BACKOUT FREEZE-DRY ASSIGNMENT (if reqd) SSR-6
 - Perform G3 to G2/G8 TRANS SSR-19
 - BFS CRT - GNC, OPS 000 PRO
 - BFS GPC MODE 1(2,3,4,5) - STBY, then HALT (tb-bp)
 - PWR 1(2,3,4,5) - OFF
- C3
O6
- h. Final on-orbit GPC configs:
 - 5 good GPCs - 2 GNC 2 GPCs, 1 G3FD GPC, 1 SM GPC and BFS GPC
 - 4 good GPCs - 2 GNCs, 1 SM GPC, and BFS GPC or,
1 GNC 2 GPC, 1 G3FD GPC, 1 SM GPC and BFS GPC
 - 3 good GPCs - 1 GNC 2 GPC, 1 SM GPC, and BFS GPC
- i. • Go to GPC REPLACEMENT steps 9-11 (IFM)

DPS SSR-1 GPC HDW INITIATED MEM DUMP

DPS SSR

NOTE

If no SM, dump must be performed AOS

- O6 1. ✓GPC PWR 1(2,3,4,5) - ON
OUTPUT 1(2,3,4,5) - TERM
MODE 1(2,3,4,5) - HALT

- MO42F 2. GPC MEM DUMP - 1(2,3,4,5)

3. SM 76 COMM/RCDR

NOTE

If all verification steps below are not met, do not proceed. ✓MCC

✓OPS RCDR 1(2) MODE - RCDA

✓OPS RCDR 1(2) TAPE - RUN

✓NSP DATA XMIT - HI

or

✓NSP DATA XMIT - LO and
NSP ENCRYPTION MODE - SEL

A1L

4. SM 62 PCMMU/PL COMM

✓TFL is compatible with dump using LOAD PCMMU FORMAT table (ORB OPS, FLT SUPPL). If not, ✓MCC

SM 76 COMM/RCDR

5. If OPS RCDR 1(2) DIR - FWD and TAPE - 5% to 60%, or
If OPS RCDR 1(2) DIR - REV and TAPE - 40% to 95%, OK to perform dump
If % tape outside limits, wait until within limits to perform dump

Record: OPS RCDR _____ TRK _____
 % TAPE _____ MET _____
(Voice to gnd when AOS)

6. If PASS:
Select failed GPC X as downlister (avoids downlist contention)

SM(GNC) 0 GPC MEMORY

DOWNLIST GPC - ITEM 44 + X EXEC

- O6 7. GPC MODE 1(2,3,4,5) - STBY (starts dump)
Wait: Double dump of PASS GPC complete after 3 min, single dump of BFS complete after 6.5 min

- O6 GPC MODE 1(2,3,4,5) - HALT (stops dump)
OUTPUT 1(2,3,4,5) - NORM

8. If PASS:
Select lowest ID GNC GPC X as downlister

SM(GNC) 0 GPC MEMORY

DOWNLIST GPC - ITEM 44 + X EXEC

- MO42F 9. GPC MEM DUMP - OFF

- C3 10. If in FXD format, go back to soft formats:

✓OI PCMMU FORMAT - GPC

SM 62 PCMMU/PL COMM

✓FMT PGM - ITEM 2 (*) >>

If reqd, load TFL best suited to current GPC config:
LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)

DPS SSR-2 GPC S/W INITIATED MEM DUMP

NOTE

If no SM, dump must be performed AOS

1. **SM 76 COMM/RCDR**

NOTE

If all verification steps below are not met, do not proceed. ✓MCC

- ✓OPS RCDR 1(2) MODE - RCDA
- ✓OPS RCDR 1(2) TAPE - RUN

If NSP DATA XMIT - HI, use HDR in all tables and steps below

If NSP DATA XMIT - LO, use LDR in all tables and steps below

OK to perform dump if OPS RCDR 1(2) TAPE % is as follows:

DIR	HDR	LDR
FWD	5% to 65%	5% to 35%
REV	35% to 95%	65% to 95%

If % tape outside limits, wait until within limits to perform dump

2. **SM 62 PCMMU/PL COMM**

- ✓TFL is compatible with dump using LOAD PCMMU FORMAT table (ORB OPS, FLT SUPPL)
- If not, ✓MCC.

3. If PASS:

- a. On CRT assigned to GPC to be dumped,

GNC(SM,PL) 0 GPC MEMORY

If GNC GPC to be dumped, ✓ DOWNLIST GPC - ITEM 44 = GNC GPC to be dumped
If OPS 0/PL9 GPC to be dumped, OPS 0 ENA - ITEM 49 EXEC (*)

- b. MEMORY DUMP (setup):

START ID - ITEM 40 + 0 0 0 0 EXEC
 NUMBER WDS - ITEM 41 + 2 1 2 9 2 EXEC
 WDS/FRAME - ITEM 42 + X X X EXEC
 (HDR - 128 if G1/G3, 112 if G2/G8, 32 if OPS 0/PL9, 48 if SM)
 (LDR - 64 if G1/G3, 56 if G2/G8, 16 if OPS 0/PL9, 24 if SM)

SM 76 COMM/RCDR

Record: OPS RCDR _____ TRK _____
 % Tape _____ MET _____

(Voice to ground when AOS)

- c. MEMORY DUMP (start):

GNC(SM,PL) 0 GPC MEMORY

DUMP - ITEM 43 EXEC (ITEM 40,41 entries begin counting)

Dump complete when ITEM 40,41 blank

Dump time (in mins):

Rate	GNC	SM	OPS 0/PL9
HDR	1.5	4	6
LDR	3	9	18.2

If GNC GPC was dumped,

✓DOWNLIST GPC - ITEM 44 = lowest id GNC GPC

If OPS 0/PL9 GPC was dumped,

OPS 0 ENA - ITEM 49 EXEC (no *)

- d. Perform step 5.

DPS SSR-2 (Cont)

4. If BFS:

a. MEMORY DUMP (setup):

GNC 0 BFS MEMORY

START ID - ITEM 21 + 00000 EXEC
NUMBER WDS - ITEM 22 + 212992 EXEC
WDS/FRAME - ITEM 23 + X X EXEC (HDR-32, LDR-16)
On PASS SM CRT:

SM 76 COMM/RCDR

Record: OPS RCDR _____ TRK _____

% Tape _____ MET _____

(Voice to ground when AOS)

b. MEMORY DUMP (start):

GNC 0 BFS MEMORY

DUMP - ITEM 24 EXEC (ITEM 21, 22 entries begin counting)
Dump complete when ITEM 21,22 blank (after 6.5 min - HDR, 18.2 min - LDR)

C3

c. Perform step 5

5. If dump performed because of GPC failure that came from DPS GPC FRP-1,2:
Remain in current TFL for HDW dump >>

If not dumping because of GPC failure:

If in FXD format, go back to soft formats:

✓OI PCMMU FORMAT - GPC

C3

SM 62 PCMMU/PL COMM

✓FMT PGM - ITEM 2 (*) >>

If reqd, load TFL best suited to current GPC config:
LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)

DPS SSR-3 GNC REASSIGNMENT

- O6 1. If target GPC PWR - OFF,
✓target GPC MODE - HALT
- L1 2. Target GPC PWR - ON, OUTPUT - NORM, MODE - STBY (tb-RUN), RUN
✓Appropriate AV BAY FAN - ON
3. If SM GPC being deleted:
Perform PL/DPS RECONFIG (PL SYS/SL MAL)
Perform SM CHECKPOINT INITIATE Cue Card
- SM(GNC) 1 DPS UTILITY
- UL CNTL
ENA - ITEM 36 EXEC (*)
C3 UPLK - manually config for AOS/LOS
4. ✓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,R12L 5. 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, 6. If G3, RGAs 1,2,3,4 - ON
O15, ✓RJDA/RJDF (all) - ON
O16
- C2,R12L 7. Using CRT commanded by a current redundant set GNC GPC,
CRT MAJ FUNC - GNC
C3 ✓BFC CRT DISP - OFF
8. GNC, OPS X X X PRO (✓DAP)
XXX = 106 if G1, 201 if G2, 301 if G3, 801 if G8
- ✓ GNC (Major Mode Display)
9. If PASS and BFS in G1(G3) and BFS not engaged,
BFS CRT - I/O RESET EXEC
10. ✓Appropriate DAP mode selected
11. GNC 0 GPC MEMORY
DOWNLIST GPC - ITEM 44 + X EXEC
X = GNC GPC

DPS SSR-4 SM REASSIGNMENT

1. If target GPC PWR - OFF
✓target GPC MODE - HALT
- O6 L1 2. Target GPC PWR - ON, OUTPUT - NORM, MODE - STBY (tb-RUN), RUN
✓Appropriate AV BAY FAN - ON
3. 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's strings, CRTs, MMs
✓PL 1/2 deassigned from G2/G3/G8
GNC, OPS XXX PRO [where x = 201(801,301)]
DOWNLIST GPC - ITEM 44 + X EXEC (X = nontargeted GNC GPC)
O6 GPC MODE (tgt) - STBY (tb-bp)
- RUN (tb-RUN)
- O6 4. If SM GPC currently active:
Perform PL/DPS RECONFIG (PL SYS/SL MAL)
Perform SM CHECKPOINT INITIATE Cue Card
SM GPC OUTPUT - NORM
MODE - STBY (tb-bp), RUN (tb-RUN)
5. If Spec available (not available in G1/G3 or OPS 0 from G1/G3)
SM(GNC) 1 DPS UTILITY
UL CNTL
ENA - ITEM 36 EXEC (*)
C3 UPLK - manually config for AOS/LOS
If checkpoint previously done, CKPT RETRV ENA - ITEM 12 EXEC (*)
- C2, R12L 6. Desired CRT MAJ FUNC - SM
If desired CRT not currently assigned to target GPC, GPC/CRT target GPC/desired CRT EXEC
7. **SM 0 GPC MEMORY**
CONFIG - ITEM 1 + 4(5) EXEC
Assign desired GPC, PL 1/2, CRTs, MMs
- C2 8. SM, OPS 201(401) PRO
✓ **SM ANTENNA**
- O6 9. If BFS pwr ON:
if BFS engaged, BFS MODE - RUN
not engaged, BFS MODE - STBY
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
11. If TFL 183/188/204/208, reload TFLs, LOAD PCMMU FORMAT (ORB OPS, FLT SUPPL)
12. If RMS onboard and MCIU pwr, turn on MCIU I/O and cancel safing
SM 94 PDRS CONTROL (MA, C/W GPC DATA It - on)
RMS PWR
I/O ON - ITEM 5 EXEC (*)
A8U SAFING - CANCEL (tb-bp if arm deselected)
✓C/W GPC DATA It - off
- O6 13. If permanent SM GPC being established
if BFS not engaged
Target SM GPC OUTPUT - TERM
O6 **SM(GNC) 1 DPS UTILITY**
UL CNTL
AUTO - ITEM 35 EXEC (*)
C3 UPLK - ENA
Reinitiate PL OPS

DPS SSR-5 FREEZE-DRY REASSIGNMENT

- O6 1. ✓ Target freeze-dry GPC PWR - ON, OUTPUT - NORM, and MODE - RUN
2. If target GPC not in OPS 0:
Reassign target GPC's 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 [where X = 201 (801, 301)]
GPC MODE (tgt) - STBY (tb-bp)
- RUN (tb-RUN)
- C2 3. If CRT not assigned to target GPC:
Desired CRT MAJ FUNC - PL
GPC/CRT target GPC/desired CRT EXEC
4. **PL 0 GPC MEMORY**
- DOWNLIST GPC - ITEM 44 + X EXEC (X = active GNC GPC)
STORE MC:
CONFIG - ITEM 45 + 3 EXEC
GPC - ITEM 46 + X EXEC (X = target GPC)
STORE - ITEM 47 EXEC (Store complete when MC = 3)
5. Config G3 NBAT for freeze-dried GPC:
CONFIG - ITEM 1 + 3 EXEC
Assign freeze-dried GPC, all strings, CRTs 1,2,3, and MMs
- O6 6. GPC MODE (FD GPC) - STBY (tb-bp), HALT
PWR (FD GPC) - OFF

DPS SSR-6 BACKOUT FREEZE-DRY ASSIGNMENT

1. Reassign freeze-dry GPC's strings to other GPCs (if reqd)
- SM(GNC) 0 GPC MEMORY**
- CONFIG - ITEM 1 + 3 EXEC
Assign strings, CRTs, and MMs to other GPCs
GNC, OPS 301 PRO
2. Config G3 NBAT for freeze-dry process:
- SM(GNC) 0 GPC MEMORY**
- CONFIG - ITEM 1 + 3 EXEC
Assign target GPC, all strings, CRTs 1,2,3, and both MMs to freeze-dry GPC
- O6 3. GPC MODE (FD GPC) - STBY (tb-bp), HALT
PWR (FD GPC) - OFF
4. Clean up G3 NBAT following freeze-dry process:
- SM(GNC) 0 GPC MEMORY**
- CONFIG - ITEM 1 + 3 EXEC
Assign GPCs, strings, CRTs, and MMs
RESUME

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

- O6 1. ✓GPC MODE (GPC to be IPL'd) - HALT (tb-bp)
PWR 1(2,3,4,5) - ON (cycle PWR OFF, then ON for failed GPC)
2. 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
- O6 3. IPL SOURCE - MMU 1(2)
OUTPUT 1(2,3,4,5) - NORM (tb-bp)
IPL 1(2,3,4,5) pb - push (tb-IPL, then bp within 2 min)
- If no response:
✓GPC MODE - HALT (tb-bp)
PWR 1(2,3,4,5) - OFF, then ON
IPL SOURCE - MMU 2(1)
IPL pb - 1(2,3,4,5) push (tb-IPL, then bp within 2 min)

NOTE

If GPC not successfully IPL'd following MCC confirmation,
place IPL SOURCE - OFF, GPC MODE - HALT, and GPC PWR - OFF
4. When tb - bp:
C2 CRT 3(1,2) PWR - ON
C3 BFC CRT DISP - ON
SEL - 3 + 1(1 + 2, 2 + 3) (Expect big 'X', POLL FAIL on CRT)
O6 DEU LOAD 3(1,2) - LOAD
GPC MODE 1(2,3,4,5) - STBY (tb remains bp, expect CAM diagonal for 1 sec and Master Alarm)
✓GPC IPL MENU displayed (within 2 min). If not, return to dashed box above and continue from that point
5. On IPL MENU:
✓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 are 0
- | | Nominal Codes |
|-------------------------|----------------------------------|
| 1. ERROR/MSG CODE _____ | ✓203 (GPCIPL XX.XX.XX.XX LOADED) |
| 2. ERROR/MSG CODE _____ | ✓208 (DCP XX.XX.XX.XX LOADED) |
| 3. ERROR/MSG CODE _____ | |
| 4. ERROR/MSG CODE _____ | |
| 5. ERROR/MSG CODE _____ | |
- NOTE
- If ERROR/MSG CODEs 130 (no DEU poll response) and/or 149 (DEU BITE error) are received in addition to the two nominal codes, ignore and continue. For any other codes received, STOP. ✓MCC
6. If PASS GPC IPL desired:
- a. Load copy 1 of PASS from MM,
ITEM 1 EXEC (*) (MODE tb-RUN within 2 min) (Expect big 'X', POLL FAIL on CRT)
 - b. When tb - RUN,
GPC MODE 1(2,3,4,5) - RUN (tb remains RUN)
✓OUTPUT 1(2,3,4,5) - NORM (tb-gray)
BFC CRT DISP - OFF
IPL SOURCE - OFF
Desired CRT MAJ FUNC - PL
GPC/CRT IPL'd GPC/desired CRT EXEC
✓ **PL 0 GPC MEMORY** driven by IPL'd GPC
- C3
O6
C2,R12

DPS SSR-7 (Cont)

7. If BFS GPC IPL:
- a. If orbit config, on MCC go:
Select fixed PCMMU format:
✓C3 OI PCMMU FORMAT - GPC
 X: SM 62 PCMMU/PL COMM
CRT FORMAT: FXD - ITEM 1 EXEC (*)
 - b. All RGAs - ON
✓All strings, CRTs, MMs, assigned to current GNC GPCs in MC3
PASS, GNC OPS 301 PRO
 - c. Load BFS software, ITEM 2 EXEC (*)
 - d. When 'BFS XX.XX.X.XX.XX LOADED' appears (within 2 min):
MSG RESET pb - push
 - O6 e. When 'BFS XX.XX.X.XX.XX LOADED_SET MMU SEL SW TO OFF' appears (within 2 min):
IPL SOURCE - OFF
 - O6 f. ✓GPC MODE tb - RUN, GNC 0 BFS MEMORY appears (within 15 sec)
 - g. If entry config: BFS/GNC, OPS 301 PRO >>
 - h. When time permits, on MCC go:
BFS, GNC, OPS 301 PRO
BFS, GNC, OPS 000 PRO
PASS, GNC, OPS 201 PRO
All RGAs - OFF
 - i. Select program PCMMU FORMAT
✓C3 OI PCMMU FORMAT - GPC
 X: SM 62 PCMMU/PL COMM
CRT FORMAT: PGM - ITEM 2 EXEC

**DPS SSR-8
GPC IPL-PASS**

- O6 1. ✓ GPC PWR 1(2,3,4,5) - ON
If off-diagonal CAM lts on (✓ failed GPC PWR-ON), execute error log reset:
- GNC 0 GPC MEMORY**
- ERR LOG RESET - ITEM 48 EXEC
Repeat for SM, PL, OPS 0 as applicable
- C3 2. BFC CRT DISP - OFF (BFS will default to CRTs 1,2 if engaged)
- O6 3. IPL SOURCE - MMU 1(2)
GPC OUTPUT 1(2,3,4,5) - NORM (tb-bp)
MODE 1(2,3,4,5) - HALT (tb-bp)
4. ✓ GPC PWR 1(2,3,4,5) - ON (cycle PWR OFF, ON for failed GPC but NOT for BFS engage case)
IPL 1(2,3,4,5) pb - push (tb-IPL, then bp within 2 min)
5. When tb - bp or 2 min
GPC MODE 1(2,3,4,5) - STBY (tb-RUN within 2 min, expect CAM diagonal for 1 sec and Master Alarm)
6. When tb - RUN or 2 min-determine if IPL'd GPC can drive CRT:
If BFS engaged:
- C3 a. BFC CRT DISP - ON
✓SEL - 3 + 1
- b. If BFS commanding CRT2,
BFS CRT - GPC/CRT 02 EXEC
- RHC c. If IPL'd GPCs pwr cycled,
BFS ENGAGED pb - push (Reset engage discretes in BFC)
- C2 d. CRT2 MAJ FUNC - PL
- O6 e. GPC MODE 1(2,3,4,5) - RUN (tb remains RUN)
✓OUTPUT 1(2,3,4,5) - NORM (tb-bp)
- f. If another PASS GPC active, on CRT2
GPC/CRT IPL'd GPC/2 EXEC
- ✓ **2: PL 0 GPC MEMORY** driven by IPL'd GPC
- If BFS not engaged:
- O6 a. GPC MODE1(2,3,4,5) - RUN (tb remains RUN)
✓OUTPUT 1(2,3,4,5) - NORM (tb-gray)
- C2,R12 b. Desired CRT MAJ FUNC - PL
- c. GPC/CRT IPL'd GPC/desired CRT EXEC
- d. ✓ **PL 0 GPC MEMORY** driven by IPL'd GPC
- O6 7. If GPC CANNOT drive CRT:
GPC MODE 1(2,3,4,5) - HALT
PWR - OFF
If first IPL attempt:
IPL SOURCE - MMU 2(1)
- C3 BFS CRT DISP - OFF
Go to step 4 and proceed (one time only)
- O6 8. IPL SOURCE - OFF

**DPS SSR-9
DEU IPL-PASS/BFS**

NOTE

Procedure assumes active PASS kybd available, functional PASS GPC in 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	

- C2/R12L 1. ✓CRT1(2,3,4) PWR - ON
CRT1(2,3,4) MAJ FUNC - PL
- C3 2. ✓DEU not assigned to BFS via BFC CRT DISP/SEL switches
On active PASS kybd,
C2/R12L GPC/CRT 0/1(2,3,4) EXEC
O6 DEU 1(2,3,4) LOAD - LOAD (repeat if reqd)
✓DEU LOAD msg appears on CRT
- C2/R12L 3. If no response:
O6 CRT1(2,3,4) PWR - OFF, then ON
DEU 1(2,3,4) LOAD - LOAD (repeat if reqd)
- C2/R12L 3. When DEU LOAD msg appears on CRT, on active PASS/BFS kybd:
O6 GPC/CRT POST IPL OPS 0 (PL9, BFS) GPC/1(2,3,4) EXEC
4. ✓'IPL COMPLETE' msg followed by active display on CRT (GPC MEMORY for POST IPL OPS 0, MASS MEMORY RW for PL9, or blank display with active time fields for BFS)
- C2/R12L 4. If no response or 'IPL INCOMPLETE' msg appears on CRT:
O6 CRT1(2,3,4) PWR - OFF, then ON
DEU 1(2,3,4) LOAD - LOAD (repeat if reqd)
- C2/R12L 5. When active display appears,
O6 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

**DPS SSR-10
SELECT ALTERNATE PASS S/W COPY ON MMU W/O IPL**

NOTE

✓Procedure performed on GPCs which are targeted as MMU commanders for reqd OPS transition. For memory addresses, refer to REF DATA, FLT SUPPL, MAL ADD; DPS

SM(GNC) 0 GPC MEMORY

1. READ/WRITE
✓DATA 20*
✓HEX 27*
2. If G2 transition:
ADD ID - ITEM 28 + (1) _____ EXEC
- ITEM 30 + (2) _____ EXEC
✓ACTUAL = 2884
= 2D00
DESIRED - ITEM 29 + 3 0 8 4 EXEC
- ITEM 31 + 3 5 0 0 EXEC
WRITE - ITEM 25 EXEC
✓ACTUAL = DESIRED

DPS SSR-10 (Cont)

3. If G3 transition:
ADD ID - ITEM 28 + (3) ----- EXEC
 - ITEM 30 + (4) ----- EXEC
✓ACTUAL = 29C0
 = 2E00
DESIRED - ITEM 29 + 3 1 C 0 EXEC
 - ITEM 31 + 3 6 0 0 EXEC
WRITE - ITEM 25 EXEC
✓ACTUAL = DESIRED
4. If S2 transition:
ADD ID - ITEM 28 + (5) ----- EXEC
 - ITEM 30 + (6) ----- EXEC
✓ACTUAL = 1BA0
 = 1C00
DESIRED - ITEM 29 + 1 3 A 0 EXEC
 - ITEM 31 + 1 4 0 0 EXEC
WRITE - ITEM 25 EXEC
✓ACTUAL = DESIRED
5. If S4 transition:
ADD ID - ITEM 28 + (5) ----- EXEC
 - ITEM 30 + (7) ----- EXEC
✓ACTUAL = 1BA0
 = 1D00
DESIRED - ITEM 29 + 1 3 A 0 EXEC
 - ITEM 31 + 1 5 0 0 EXEC
WRITE - ITEM 25 EXEC
✓ACTUAL = DESIRED

DPS SSR-11 SET UP FOR OPS 3 OVERLAY UPLINK

NOTE

For memory addresses, refer to (REF DATA, FLT SUPPL, MAL ADD; DPS)

If current GNC OPS is G2:
Before performing this SSR, do steps 1-4, DPS SSR-5,
and expect freeze-dry attempt to fail

- O6 1. ✓Freeze-dry GPC MODE - RUN, GPC in OPS 0
- C2 2. If CRT not assigned to freeze-dry GPC:
Desired CRT MAJ FUNC - PL
GPC/CRT desired CRT EXEC
3. Assign OPS 0 GPC to toggle buffer 1:
 PL 0 GPC MEMORY
DOWNLIST GPC - ITEM 44 + X EXEC
Where X = FD GPC ID
4. Enable OPS 3 Bootstrap program:
 PL 0 GPC MEMORY
✓DATA 20*
✓HEX 27*
ADD ID - ITEM 28 + (1) ----- EXEC
✓ACTUAL = 0000
DESIRED - ITEM 29 + 0 0 0 1 EXEC
WRITE - ITEM 25 EXEC
✓ACTUAL = DESIRED
5. Notify MCC Bootstrap Enable is complete

DPS SSR-11 (Cont)

6. Upon MCC confirmation that uplink complete, disable Bootstrap:

PL 0 GPC MEMORY

✓DATA 20*
 ✓HEX 27*
 ADD ID - ITEM 28 + (2) ----- EXEC
 ✓ACTUAL = 0001
 ADD ID - ITEM 30 + X X X X X EXEC
 ✓ACTUAL = 0000
 DESIRED - ITEM 29 + 0 0 0 0 EXEC
 - ITEM 31 + 0 0 0 6 EXEC

 GPC 1 GPC 2 GPC 3 GPC 4 GPC 5
 XXXXX = (3) (4) (5) (6) (7)
 WRITE - ITEM 25 EXEC
 ✓ACTUAL = DESIRED
 (Ignore possible 'SUMMWORD ICC' msg)

7. Reset MC identifier flags:

BIT SET - ITEM 22 EXEC
 ADD ID - ITEM 28 + (8) ----- EXEC
 ✓ACTUAL = XXX0
 DESIRED - ITEM 29 + 0 0 0 8 EXEC
 WRITE - ITEM 25 EXEC
 ✓ACTUAL = DESIRED
 (Address is ICC flag, data might reset prior to display)
 DATA - ITEM 20 EXEC
 ADD ID - ITEM 28 + (9) ----- EXEC
 ✓ACTUAL = 0000
 ADD ID - ITEM 30 + (10) ----- EXEC
 ✓ACTUAL = 8000
 DESIRED - ITEM 29 + 0 0 0 3 EXEC
 - ITEM 31 + 0 0 0 0 EXEC
 WRITE - ITEM 25 EXEC
 ✓ACTUAL = DESIRED

8. When AOS, perform memory dump:

PL 0 GPC MEMORY

START ID - ITEM 40 + 0 0 0 0 0 EXEC
 NUMBER WDS - ITEM 41 + 2 1 2 9 9 2 EXEC
 WDS/FRAME - ITEM 42 + 3 2 EXEC
 DUMP - ITEM 43 EXEC
 (✓ITEM 40,41 begin counting)
 Dump complete when ITEM 40,41 blank (after 6.5 min)

9. If current GNC OPS is G2 and G3 not immediately desired >>

10. Config for G3:

PL 0 GPC MEMORY

✓STORE MC = 03

 CONFIG - ITEM 1 + 3 EXEC
 Assign target GPCs, strings, PL, CRTs, MMs per desired Entry config
 ✓RGAs - ON
 ✓RJDAs - ON
 ✓ASAs - ON

O14,
O15,
O16

C3

11. After confirmation from MCC,
O1 PCMMU FORMAT - FXD
GNC, OPS 301 PRO

12. Reselect GPC 1 prime downlist:

GNC 0 GPC MEMORY

DOWNLIST GPC - ITEM 44 + 1 EXEC

DPS SSR-12 CRT CHECKOUT

NOTE

✓Affected CRT is not assigned to BFS via BFC CRT DISP/SEL sw.
If CRT does not show anticipated indications, do not proceed.
✓MCC for further analysis

- C2
1. GPC/CRT 0/1(2) EXEC (on active PASS KYBD)
CRT (changed out) PWR - ON
✓Following appears on CRT within 30 sec (adjust BRT on CRT if reqd):
Time Fields (upper RH corner)
Big 'X'
'POLL FAIL' (lower RH corner)
 2. ITEM B EXEC (OTP BITE status display)
if BITE words other than normal
(8200, 8000, 0000), record BITE words

 3. ITEM C EXEC (Reset BITE words)
✓Normal BITE words:

8200 8000 0000
 4. ITEM E EXEC (deselect OTP)
 5. ITEM A EXEC (reinitializes DEU)
 6. Assign CRT as reqd:
Select desired MAJ FUNC
GPC/CRT desired GPC/CRT EXEC (on active PASS KYBD)
- F7
7. Reset DEU/DU BITE flags on CRT (if reqd)

DPS SSR-13 KYBD CHECKOUT

NOTE

✓Affected CRTs are not assigned to BFS via BFC CRT DISP/SEL sw.
If CRTs do not show anticipated indications, do not proceed. ✓MCC
for further analysis

1. IF LEFT KYBD CHANGED OUT:
 - L4:R a. cb AC3 Φ B INST L/CTR - cl
 - C2 b. GPC/CRT 03 EXEC (on active PASS KYBD)
 - c. CRT3 PWR - ON
 - ✓Following appears on CRT within 30 sec (adjust BRT on CRT if reqd):
 - Time Fields (upper RH corner)
 - Big 'X'
 - 'POLL FAIL' (lower RH corner)
 - d. L CRT SEL - 3
 - e. Perform KEYSTROKE CHECKOUT (step 3)
 - f. Assign CRT as reqd:
 - C2 Select desired MAJ FUNC
 - GPC/CRT desired GPC/3 EXEC (on active PASS KYBD)
 - C2 g. GPC/CRT 01 EXEC (on active PASS KYBD)
 - C2 h. CRT1 PWR - ON
 - ✓Following appears on CRT within 30 sec (adjust BRT on CRT if reqd):
 - Time Fields (upper RH corner)
 - Big 'X'
 - 'POLL FAIL' (lower RH corner)
 - i. L CRT SEL - 1
 - j. Perform KEYSTROKE CHECKOUT (step 3)
 - k. Assign CRT as reqd:
 - C2 Select desired MAJ FUNC
 - GPC/CRT desired GPC/1 EXEC (on active PASS KYBD)
 - F7 l. Reset DEU/DU BITE flags on CRTs 1,3 (if reqd)

2. IF RIGHT KYBD CHANGED OUT:
 - L4:R a. cb AC1 Φ A INST R - cl
 - C2 b. GPC/CRT 03 EXEC (on active PASS KYBD)
 - C2 c. CRT3 PWR - ON
 - ✓Following appears on CRT within 30 sec (adjust BRT on CRT if reqd):
 - Time Fields (upper RH corner)
 - Big 'X'
 - 'POLL FAIL' (lower RH corner)
 - d. R CRT SEL - 3
 - e. Perform KEYSTROKE CHECKOUT (step 3)
 - f. Assign CRT as reqd:
 - C2 Select desired MAJ FUNC
 - GPC/CRT desired GPC/3 EXEC (on active PASS KYBD)
 - C2 g. GPC/CRT 02 EXEC (on active PASS KYBD)
 - C2 h. CRT2 PWR - ON
 - ✓Following appears on CRT within 30 sec (adjust BRT on CRT if reqd):
 - Time Fields (upper RH corner)
 - Big 'X'
 - 'POLL FAIL' (lower RH corner)
 - i. R CRT SEL - 2
 - j. Perform KEYSTROKE CHECKOUT (step 3)
 - k. Assign CRT as reqd:
 - C2 Select desired MAJ FUNC
 - GPC/CRT desired GPC/2 EXEC (on active PASS KYBD)
 - F7 l. Reset DEU/DU BITE flags on CRTs 2,3 (if reqd)

DPS SSR-13 (Cont)

3. KEYSTROKE CHECKOUT:

- a. ITEM B EXEC (OTP BITE status display)
If BITE words other than normal
(8200, 8000, 0000), record BITE words

CRT 3: _ _ _ _

CRT 1/2: _ _ _ _

- b. ITEM C EXEC (Reset BITE words)

✓Normal BITE words:

8200 8000 0000

- c. ✓Individual keystrokes appear on SPL except as noted:

ITEM 1 + <u>2 3 4 5</u> : <u>6 7 8</u>	OPS
ITEM 9 - <u>A B C D E F</u> EXEC	SPEC 0 PRO
FAULT SUMM	RESUME
SYS SUMM	ACK (no SPL interface)
GPC/CRT	MSG RESET (no SPL interface)
I/O RESET	CLEAR (clears SPL)

- d. ✓Normal BITE words:

8200 8000 0000

- e. ITEM E EXEC (deselect OTP)
f. ITEM A EXEC (reinitializes DEU)

DPS SSR-14 DEU CHECKOUT

NOTE

✓CRT 1(2,3) is not assigned to BFS via BFC CRT DISPLAY/SELECT sw. If unit does not check out properly, do not proceed. If discrepancy appears to be interfering with GPC functions, turn unit OFF. ✓MCC for further analysis

- C2 1. GPC/CRT 0/1(2,3) EXEC (on active PASS KYBD)
CRT1(2,3) PWR - ON
✓Following appears on CRT within 30 sec (adjust BRT on CRT if reqd):
Time Fields (upper RH corner)
Big 'X'
'POLL FAIL' (lower RH corner)
2. Keyboard Interface Test (if DEU 3, test both kybds):
L(R) CRT SEL - 1(2,3)
ITEM B EXEC (OTP BITE status display)
If BITE words other than normal
(8200, 8000, 0000), record BITE words

Left KYBD: _____
Right KYBD: _____
3. ITEM C EXEC (Reset BITE words)
✓Normal BITE pattern:
8200 8000 0000
4. ✓Individual keystrokes appear on SPL except as noted:
- | | |
|---------------------------|------------------------------|
| ITEM 1 + 2 3 4 5 : 6 7 8 | OPS |
| ITEM 9 - A B C D E F EXEC | SPEC 0 PRO |
| FAULT SUMM | RESUME |
| SYS SUMM | ACK (no SPL interface) |
| GPC/CRT | MSG RESET (no SPL interface) |
| I/O RESET | CLEAR (clears SPL) |
5. ✓Normal BITE words:
8200 8000 0000
6. ITEM E EXEC (deselect OTP)
7. ITEM A EXEC (reinitializes DEU)
- C2 8. Assign CRT 1(2,3) to PASS GPC:
Select desired MAJ FUNC
GPC/CRT desired GPC/1(2,3) EXEC (on active PASS KYBD)
✓OPS display appears on CRT
If any other display appears:
RESUME (✓OPS display appears on CRT)
FAULT (✓FAULT display appears)
RESUME (✓OPS display appears on CRT)
- C2 CRT1(2,3) MAJ FUNC - GNC, SM, PL (✓proper response for each sw position)
L(R) CRT SEL - 3(1,2) (✓proper kybd assignment)
- F7 Reset DEU/DU BITE flags on CRT 1(2,3) (if reqd)
9. Return to DEU CHANGEOUT and DEU CABLE SWAP (IFM)

DPS SSR-15 FC MDM CHECKOUT

1. GNC 21 IMU ALIGN
✓Affected IMU deselected:
If FF 1 - ✓DES: ITEM 7 (*)
FF 2 - ✓DES: ITEM 8 (*)
FF 3 - ✓DES: ITEM 9 (*)
2. ✓Affected RJDF pwrd OFF:
O14:F If FF 1 - ✓RJDF 1B F1 DRIVER - OFF
O15:F FF 2 - ✓RJDF 1A F2 DRIVER - OFF
O16:F FF 3 - ✓RJDF 2B F4 DRIVER - OFF

DPS SSR-15 (Cont)

NOTE

If unexpected fault msgs occur for affected MDM, record fault msg and continue to RJDF power-up, then STOP and ✓MCC. If RCS 'JET FAIL' msgs occur associated with powered-off RJDF Manfs, ignore and continue

- 06 3. MDM FF1(FF2, FF3) - ON
- FAULT**
- GNC CRT - I/O RESET EXEC
Observe fault msgs for affected MDM:
✓No 'I/O ERROR FF1(2,3)'
✓No 'MDM OUTPUT FF1(2,3)'
✓No unexpected 'BCE STRG 1(2,3)' msg
4. **SM 1 DPS UTILITY**
- Select SEC ports on affected MDM:
PORT ASSIGN SEC - ITEM 16(18,20) EXEC (*)
5. **FAULT**
- Observe fault msgs for affected MDM:
✓No 'I/O ERROR FF1(2,3)'
✓No 'MDM OUTPUT FF1(2,3)'
✓No unexpected 'BCE STRG 1(2,3)' msg
6. **SM 1 DPS UTILITY**
- Reselect PRI ports on affected MDM:
PORT ASSIGN SEC ITEM 15(17,19) EXEC (*)
7. Pwr ON affected RJDF:
- | | | | |
|-------|------------------|-------------|------|
| O14:F | If FF 1: RJDF 1B | F1 (two) | - ON |
| O15:F | If FF 2: RJDF 1A | F2 (two) | - ON |
| O16:F | If FF 3: RJDF 2B | F4/F5 LOGIC | - ON |
| | | F4 DRIVER | - ON |
8. **GNC 23 RCS**
- For all jets which have failed during MDM CHECKOUT,
RCS FWD - ITEM 1 EXEC
JET RESET - ITEM 45 EXEC
Reselect deselected jets
JET RESET - ITEM 45 EXEC
✓No 'JET FAIL' fault msgs occur
9. Return to MDM CHANGEOUT (IFM)
After completion of MDM changout ✓MCC for IMU recovery, additional MDM/LRU checkout, and potential MDM FF 4 utilization/checkout

DPS SSR-16 PL MDM CHECKOUT

NOTE

One or more of the following fault msgs may be annunciated at I/O RESET or port moding steps:

'I/O ERROR FLEX'
'BCE BYP FLEX'
'BCE BYP SCA'
'BCE BYP KU'
'S62 BCE BYP PSP1(2)'
'S62 BCE BYP PL'
'S62 BCE BYP PDI'

If unexpected fault msg occurs for affected MDM, record fault msg and continue

- O6
1. MDM PL1, PL2 - ON
 FAULT
SM CRT - I/O RESET EXEC
Observe fault msgs for affected MDMs:
✓No 'I/O ERROR PL1(2)'
✓No 'MDM OUTPUT PL1(2)'
 2. SM1 DPS UTILITY
Select SEC ports on affected MDMs:
PORT ASSIGN SEC - ITEM 24 EXEC (*)
 FAULT
Observe fault msgs for affected MDMs:
✓No 'I/O ERROR PL1(2)'
✓No 'MDM OUTPUT PL1(2)'
 SM1 DPS UTILITY
 3. Reselect PRI ports on affected MDMs.
PORT ASSIGN SEC - ITEM 23 EXEC (*)
 4. Return to MDM CHANGEOUT (IFM)
✓MCC for additional MDM/LRU checkout

DPS SSR-17 MTU YEAR-END ROLLOVER RECOVERY

NOTE

Complete procedure immediately. Procedure recovers MTU faultdown caused by year-end rollover occurring at one second past GMT 365:23:59:59 and again at one second past GMT 366:23:59:59 (375:23:59:59, 376:23:59:59)

1. SM(GNC) 2 TIME (not available in G1/G3 or OPS 0 from G1/G3)
✓Down arrows on MTU ACCUM 1,2,3 and GMT Day 1
✓GPC GMT reflect day 366 (367)
✓All active GPCs reflect GPC GMT source
TIME SYNC - ITEM 38 EXEC

NOTE

MTU ACCUM 1,2,3 will reflect 000:00:0X:XX until TIME SYNC complete (1-2 min)

2. ✓MTU ACCUM 1,2,3 aligned to GPC GMT
✓All active GPCs reflect an MTU ACCUMULATOR time source

**DPS SSR-18
G2/G8 TO G3 TRANS**

- O14, 1. RGA (four) - ON
O15, ✓ Pri RJDs (eight) - ON
O16
- GNC 0 GPC MEMORY
- C2 2. Assign current G2 GPCs, strings, CRTs, and MMUs to MC 3
✓ PL1/2 deassigned
GNC, OPS 301 PRO
3. SM 62 PCMMU/PL COMM
- PCMMU
FMT
SEL FXD - ITEM 1 EXEC '**

**DPS SSR-19
G3 TO G2/G8 TRANS**

- C2 1. ✓ GNC, OPS 301 PRO
2. SM 62 PCMMU/PL COMM
- PCMMU
FMT
SEL PGM - ITEM 2 EXEC '**
- GNC 0 GPC MEMORY
3. If no G3 FD and one reqd:
- a. Assign all strings, CRTs, MMUs to remaining GNC GPCs
b. GNC, OPS 301 PRO
c. Assign all strings, CRTs, MMUs to target FD GPC
d. ✓ PL1/2 deassigned from target FD GPC
O6 e. FD GPC MODE - STBY (tb-bp), HALT
f. FD GPC PWR - OFF
g. Reassign MMUs in MC 3 to current GPC
- C2 4. ✓ MC 2 NBAT
GNC, OPS 301 PRO
5. If reqd, reconfig star trackers
- GNC 22 S TRK/COAS CNTL
- a. S TRK -Y, -Z: STAR TRK - ITEM 3,4 EXEC '**
- GNC 21 IMU ALIGN
- b. Resume
- GNC 0 GPC MEMORY
6. If reqd, ✓ MC 8 NBAT GNC, OPS 801 PRO
- O14, 7. If remaining in orbit config:
O15, RGA (four) - OFF
O16 As reqd, RJD(s) - OFF

**DPS SSR-20
OPS TRANSITION USING LDB OPTION**

1. Deassign LDBs from SM and GNC:
 - SM(GNC) 0 GPC MEMORY
 - If SM GPC active:
 - Config - ITEM 1 + 4(5) EXEC
 - Launch 1/2 - ITEM 16 + 0 + 0 EXEC
 - If LDBs assigned:
 - Launch 1/2 - ITEM 16 + 0 + 0 EXEC
 - GNC, OPS 201(301,801) PRO

 2. RMS PWR - OFF

 3. ✓ MEC 1 - OFF (wait 2 sec)
MEC 2 - OFF

 4. SM(GNC) 1 DPS UTILITY
 - MMU SOURCE/BUS
 - GPC/LDB - ITEM 11 EXEC (*)

 5. SM(GNC) 0 GPC MEMORY
 - ✓ NBAT
 - GNC, OPS 201(301,801) PRO

 6. When transition complete:
 - If DPS UTILITY available (SPEC not available in G1/G3)
 - SM(GNC) 1 DPS UTILITY
 - MMU SOURCE/BUS
 - GPC/MMU ITEM 9 EXEC (*)
 - If SM GPC active:
 - SM(GNC) 0 GPC MEMORY
 - or
 - Reassign LDBs to SM GPC.
 - Config - ITEM 1 + 4(5) EXEC
 - Launch 1 - ITEM 16 + 1 EXEC
 - SM, OPS 201(401) PRO
 - RMS PWR - ON (if reqd)
- If DPS UTILITY not available, do not attempt any OPS Transition.
G-MEM will be reqd to access MMUs before any future OPS Transition can be possible (✓MCC)

DPS SSR-21 BFS GMT/MET RECOVERY

Proper procedure execution requires all of the following:

- 1) Presence of a PASS driven CRT with acceptable GMT/MET
- 2) Presence of a BFS driven CRT with keyboard input capability
- 3) BFS time (GMT and/or MET) is in error beyond acceptable limits
- 4) Communications with the MCC

For memory addresses, refer to REF DATA, FLT SUPPL, MAL ADD, DPS

NOTE

Before proceeding, ✓MCC to obtain desired future GMT and record corresponding time data words in step 2 (items A, B, C) and desired future GMT in step 4 (data words A, B, C are in hex, total microsecond format)

X: GNC BFS MEMORY

1. ✓DATA - ITEM 1 (*)
✓HEX - ITEM 8 (*)
2. ADD ID: ITEM 9 + (1) _____ + (A) _____ EXEC
ITEM 11 + (2) _____ + (B) _____ EXEC
ITEM 13 + (3) _____ + (C) _____ EXEC
3. Arm write mechanism:

CAUTION

DO NOT PERFORM THE 'EXEC' UNTIL STEP 4

WRITE - ITEM 6

4. Record desired future GMT: _____ : _____ : _____ : _____
Days Hrs Mns Secs

Y: GNC 2 TIME

Select GMT: ITEM 1 EXEC

On PASS CRT: Monitor GMT
When PASS GMT = desired future GMT - 1 sec.
On BFS CRT:
EXEC

5. Ground will verify that BFS GMT updated correctly
6. Reselect MET as displayed time:

Y: GNC 2 TIME

Select MET: ITEM 2 EXEC

7. If BFS MET update reqd, perform following after BFS is in OPS 3:

NOTE

BFS must be in OPS 3 before MET update can be successfully performed.
If BFS is not in OPS 3, ✓MCC before proceeding.

✓MCC to obtain desired future MET and record corresponding time data words in step 7b (items D, E, F) and desired future MET in step 7d (data words D, E, F are in hex, total microsecond format)

X: GNC BFS MEMORY

- a. ✓DATA - ITEM 1 (*)
✓HEX - ITEM 8 (*)

DPS SSR-21 (Cont)

- b. ADD ID: ITEM 9 + (4) _____ + (D) _____ EXEC
ITEM 11 + (5) _____ + (E) _____ EXEC
ITEM 13 + (6) _____ + (F) _____ EXEC

c. Arm write mechanism:

CAUTION

DO NOT PERFORM THE 'EXEC' UNTIL STEP 7d

WRITE - ITEM 6

d. Record desired future MET: _____ : _____ : _____ : _____
Days Hrs Mns Secs

On PASS CRT: Monitor MET
When PASS MET = desired future MET - 1 sec.
On BFS CRT:
EXEC

e. Ground will verify that BFS MET updated correctly

NOTE

BFS must be kept in OPS 3 in order to ensure a valid and continuous update of MET

ECLS

ECLS
6

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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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NOTE A

THE IDENTIFIED MAL REPRESENTS A SUPPORT PROCEDURE THAT IS ENTERED FROM OTHER PROCEDURES OR ON MCC CALL

NOTE B

REFER TO BFS FSM INDEX FOR MSG
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ECLS FRP

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

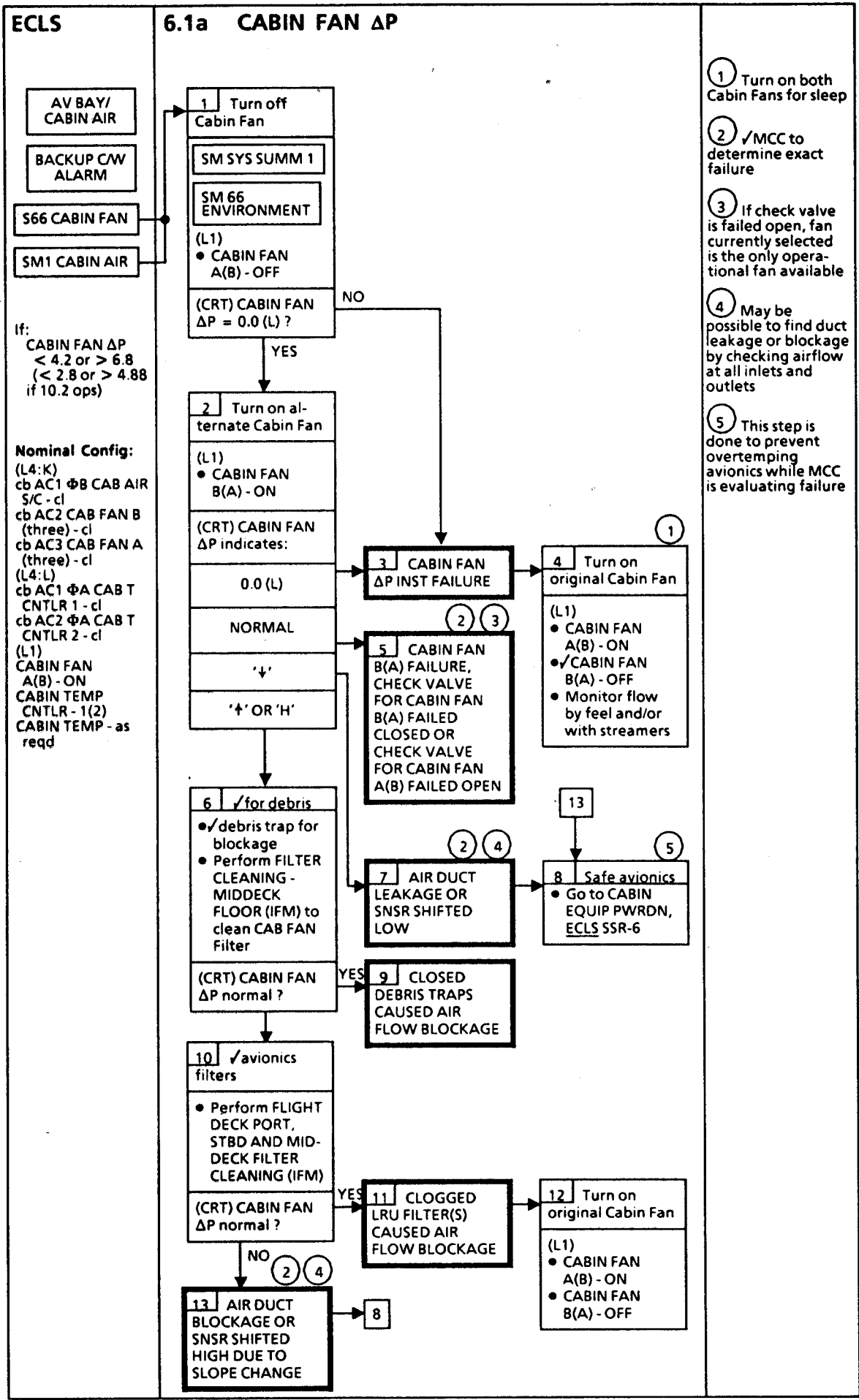
- S66 CABIN HX T
- S66 CABIN PPCO2

BFS FSM INDEX

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6.4f	'SMO THRM FRN'	- ACCUM QTY ↓.....	6-86
6.4g	'SMO THRM EVAP'	- EVAP TEMP HI LOAD INBD (OUTBD) DUCT (NOZ) ↑↓.....	6-87
6.4h		- EVAP TOPPING DUCT T FWD(AFT), L(R).....	6-88
6.4i		- EVAP TOPPING L(R) NOZ ↑↓.....	6-89
6.4j		- EVAP FDLN TEMP FWD (MID, AFT, TOP, HI LOAD, ACCUM) ↑↓.....	6-90
6.4k	'SMO THRM FRN'	- RAD IN T ↑ (BFS) ↑↓.....	6-91
6.4q	'SM2 H2O PUMP P 1(2)'	- H2O PUMP OUT P ↑↓ 1(2) (BFS).....	6-106
<u>6.5</u>	<u>SPLY H2O</u>		
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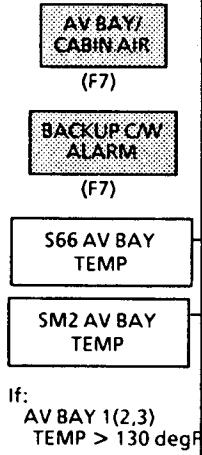
The following Fault Msgs have no corresponding Mal procedures in this book:

- SM1 CABIN HX T
- SM2 TEMP



ECLS

6.1b AV BAY TEMP

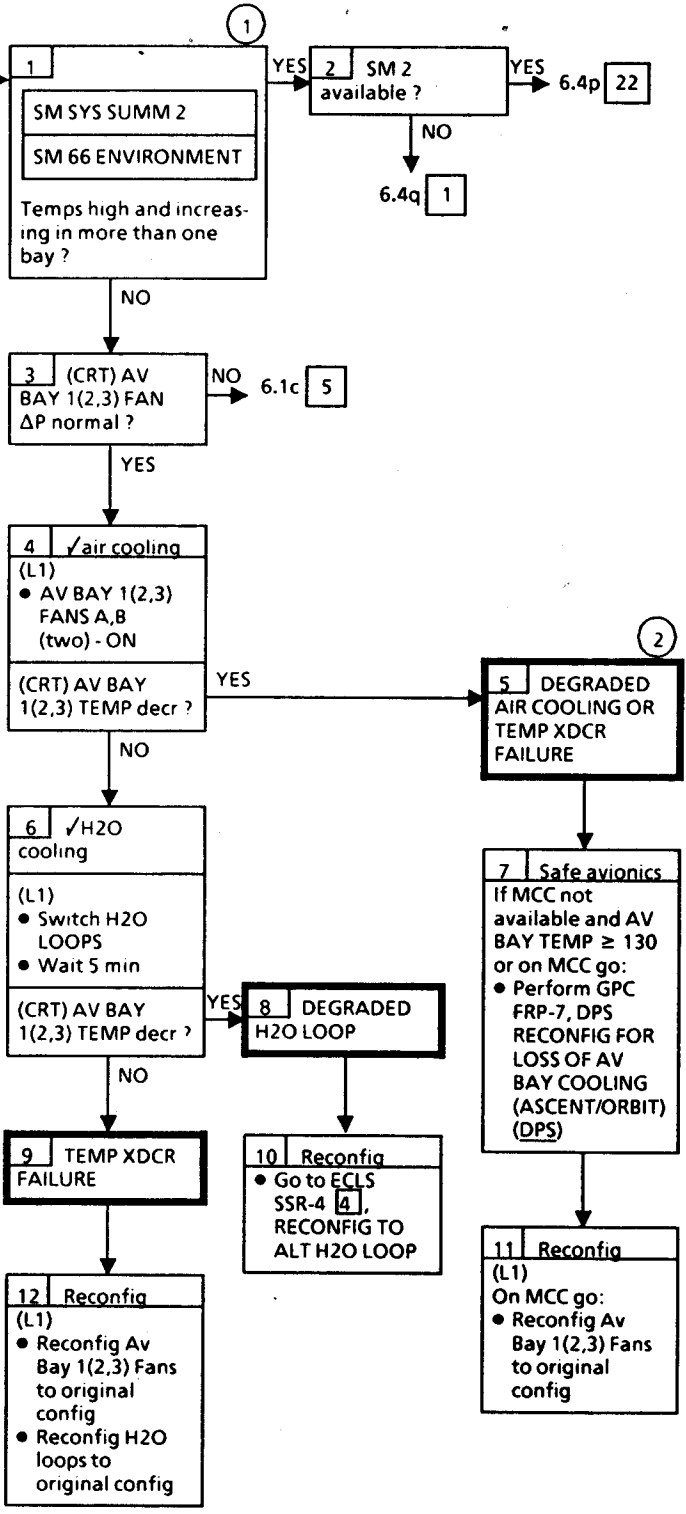


If:
AV BAY 1(2,3)
TEMP > 130 degF

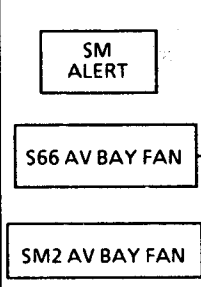
Nominal Config:

- (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 6.4l

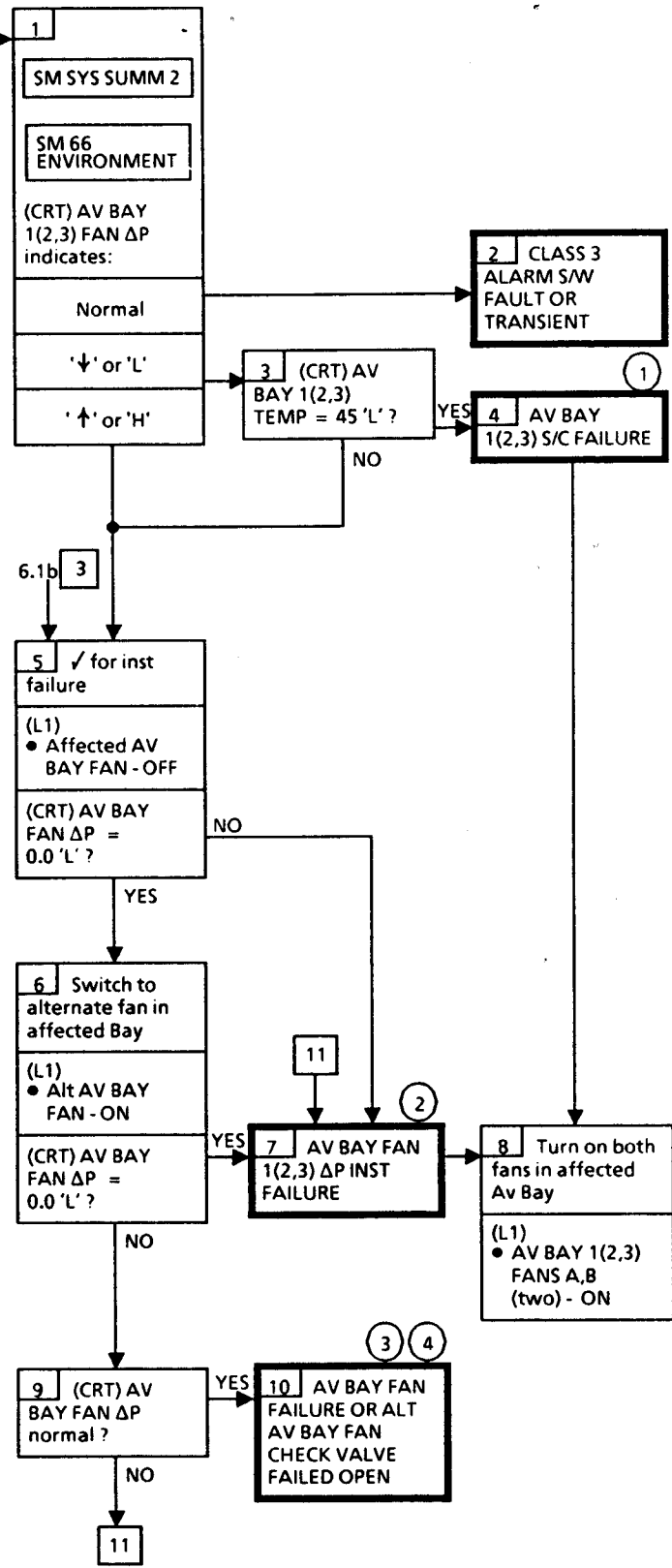


① Temps can be read from meter on pnl O1
② ✓MCC to determine exact failure



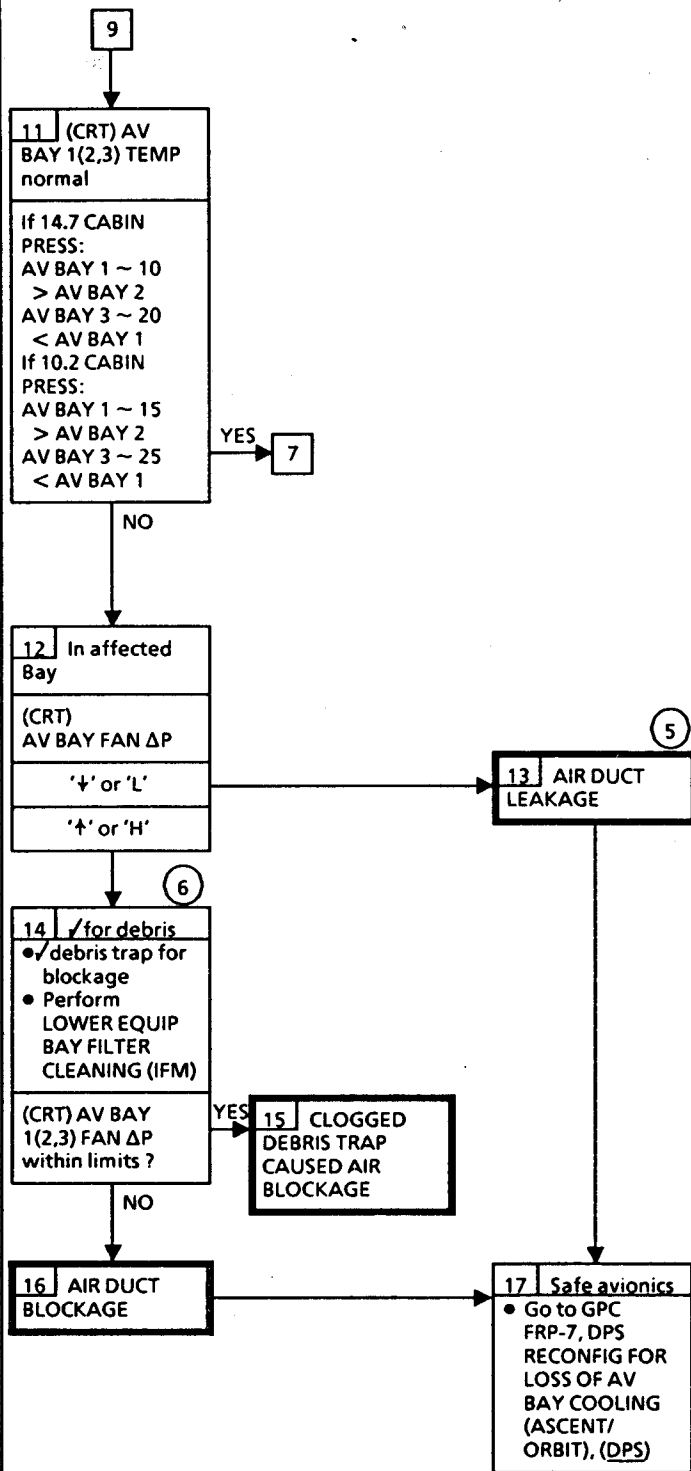
If:
 AV BAY 1(2) FAN ΔP < 1.45 or > 4.0 (3.0 if 10.2 ops)
 AV BAY 3 FAN ΔP < 2.15 or > 4.50 (3.6 if 10.2 ops)

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 it
- 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 is indication of fan failure or duct leakage between fan and HX
- ③ ✓MCC to determine exact failure
- ④ If check valve failed open, fan currently selected for that AV BAY is the only operational fan available

ECLS 6.1c (Cont)



5 /MCC about checking AV Bay duct integrity after completing next step

6 /MCC about performing pwrdn of a affected Bay before performing AV Bay filter cleaning

SM ALERT

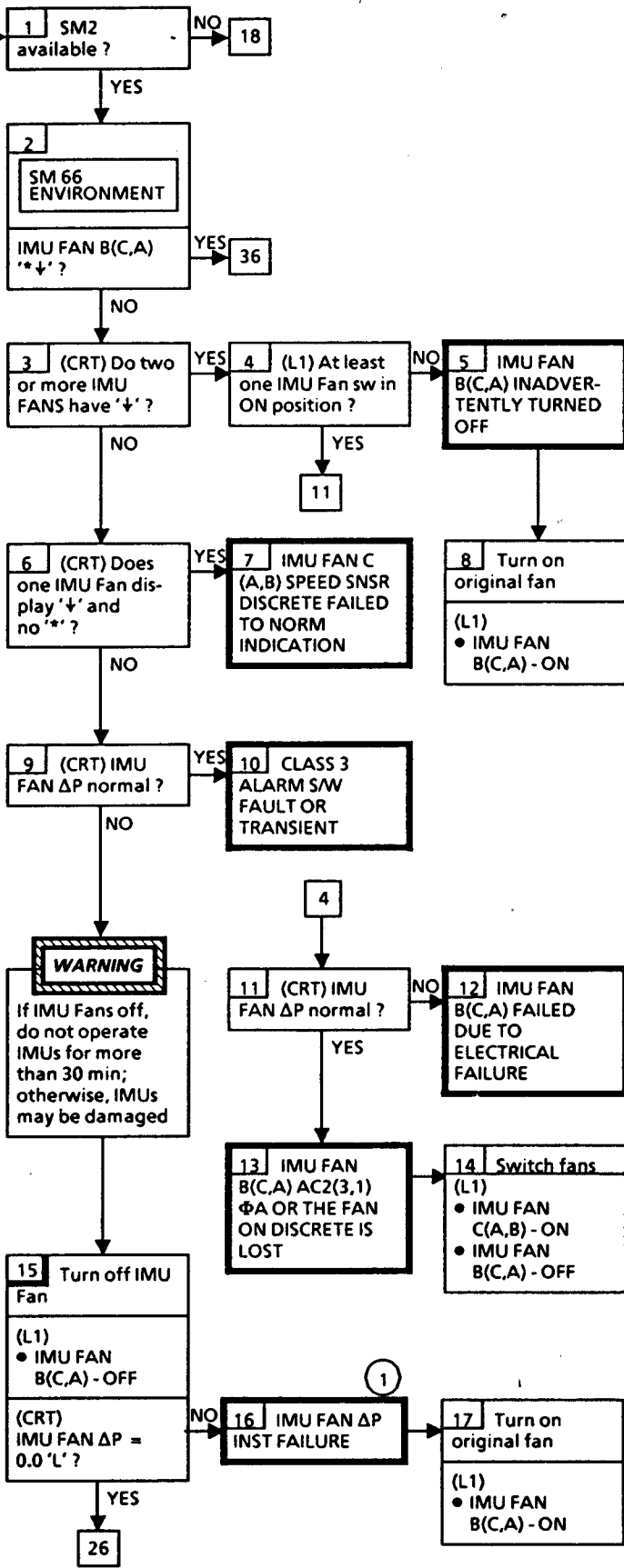
S66 CABIN IMU

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

SM1 CABIN IMU

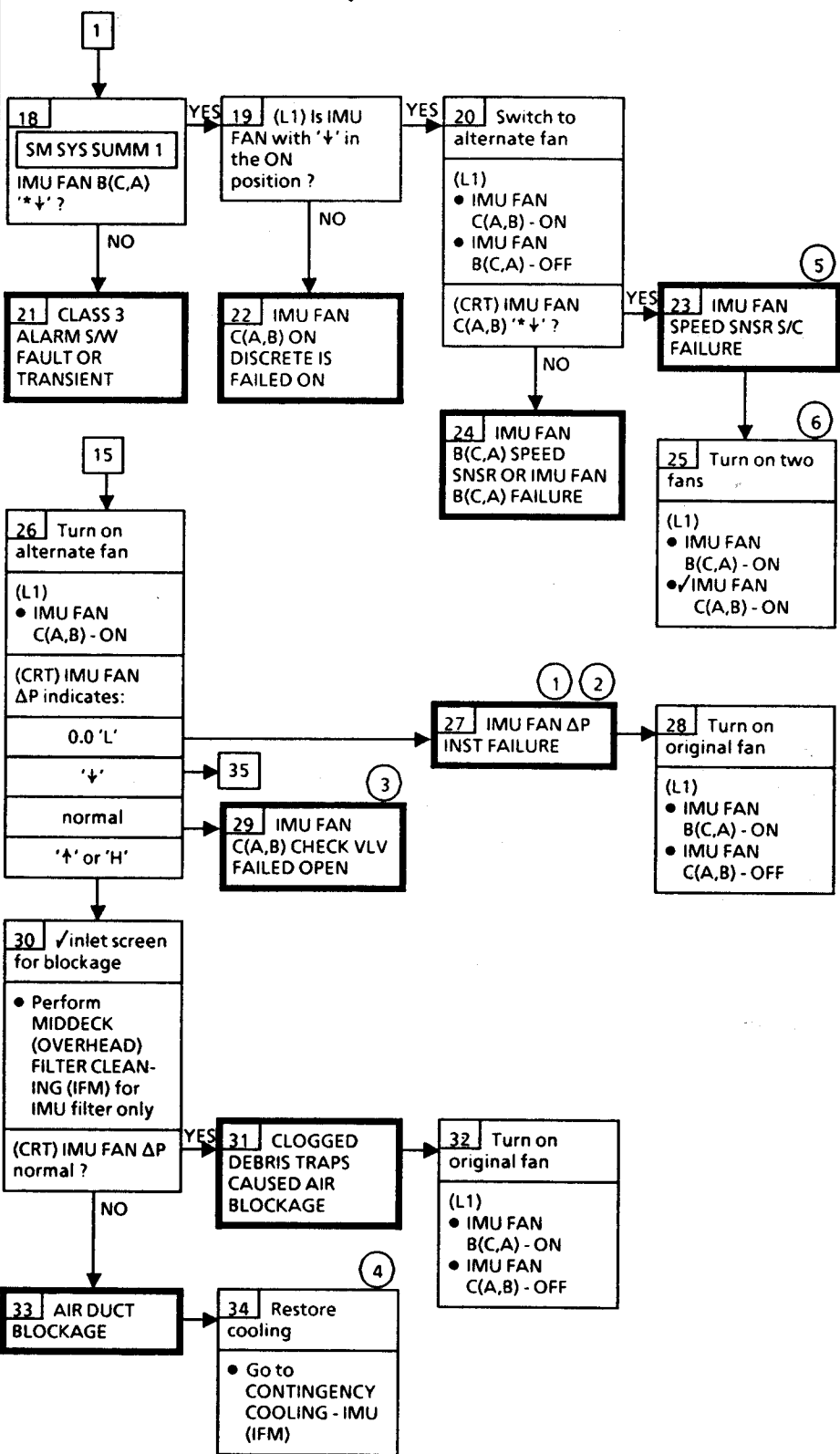
IMU FAN Underspeed

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



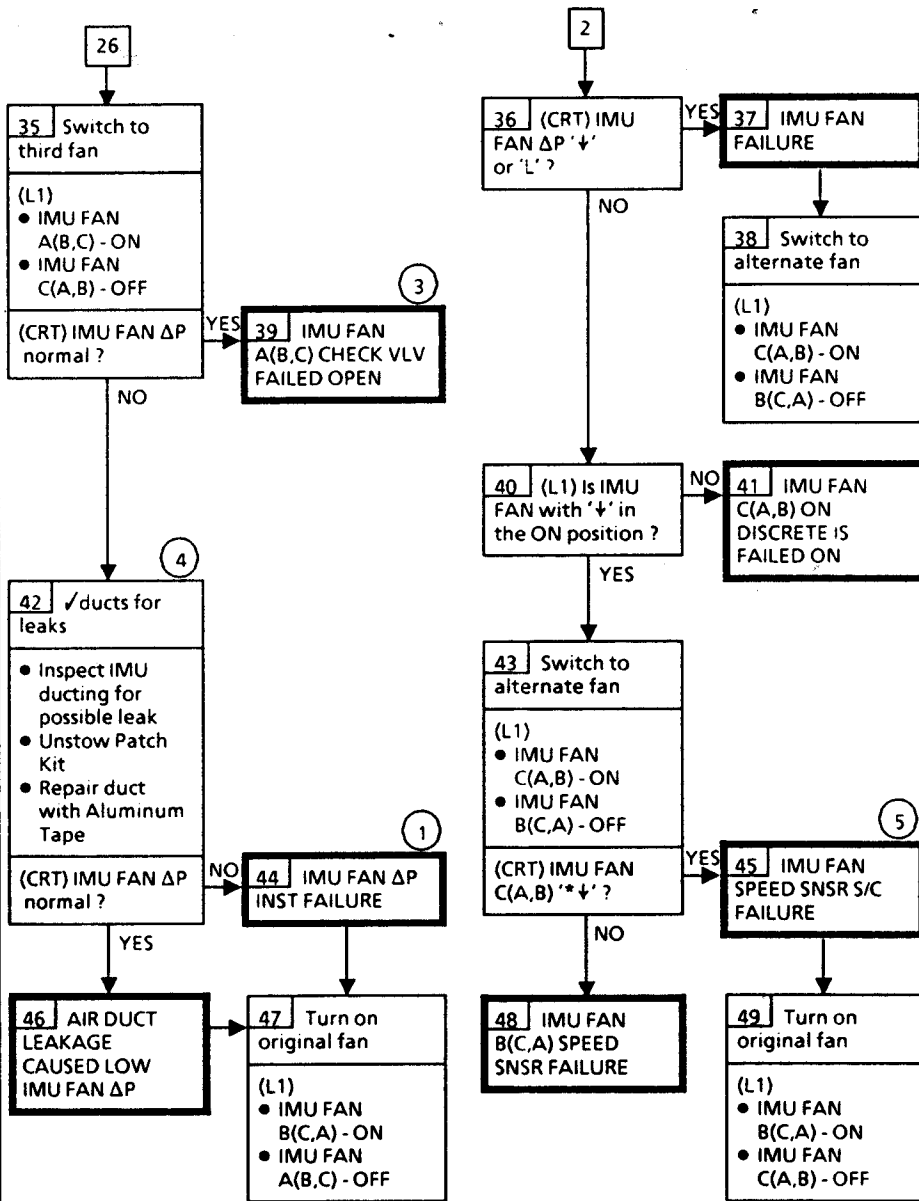
① Monitor Speed Sensor 'Δ' for fan failure if IMU ΔP is lost

ECLS 6.1d (Cont)



- ① Monitor Speed Sensor '↓' for fan failure if IMU ΔP is lost
- ② If cb MNA OI H2O BYP LOOP 1 SNSR - op, ✓MCC before attempting to reset it
- ③ Fan currently selected is the only operational fan available
- ④ ✓MCC for proper IMU config and ops
- ⑤ If cb AC3 ΦB S/C IMU FAN - op, ✓MCC before attempting to reset
- ⑥ When SM2 available, use IMU FAN ΔP to monitor fan performance and turn off second IMU Fan

ECLS 6.1d (Cont)

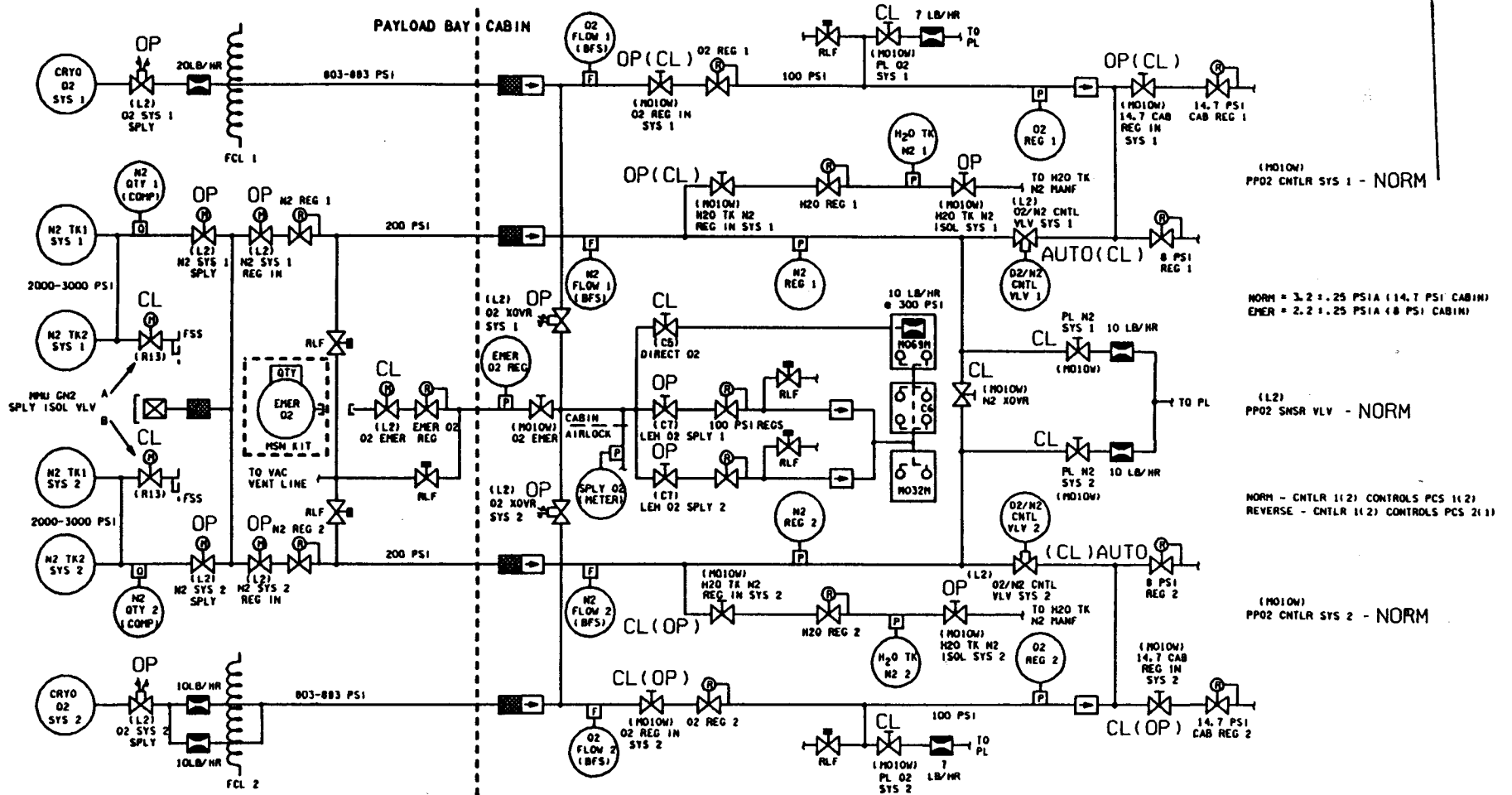


- ① Monitor Speed Sensor '↓' for fan failure if IMU ΔP is lost
- ③ Fan currently selected is the only operational fan available
- ④ ✓MCC for proper IMU config and ops
- ⑤ If cb AC3ΦB S/C IMU FAN - op, ✓MCC before attempting to reset

PRESSURE CONTROL SYSTEM
ORBIT

300

PAYLOAD BAY CABIN



(M010W)
PP02 CNTLR SYS 1 - NORM

NORM = 3.2 ± .25 PSIA (14.7 PSI CABIN)
EMER = 2.2 ± .25 PSIA (8 PSI CABIN)

(L2)
PP02 SNSR VLV - NORM

NORM - CNTLR (12) CONTROLS PCS (12)
REVERSE - CNTLR (12) CONTROLS PCS (21)

(M010W)
PP02 CNTLR SYS 2 - NORM

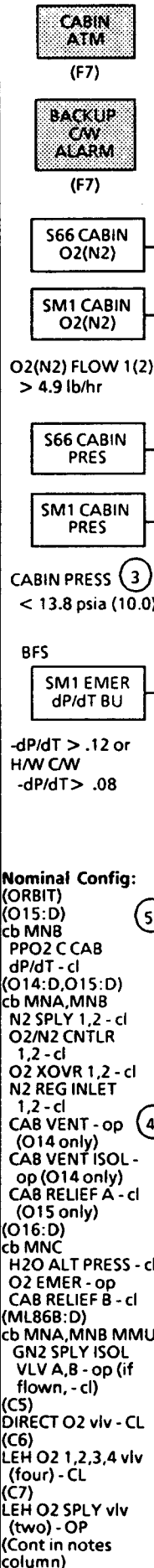
6-12

MAL/ALL/GEN 5

DATE 12/06/88

185360418, ART. 2

ECLS



6.2 CABIN ATM

1.1 O2(N2) FLOW HIGH/CAB P LOW/dP/dT **SM SYS SUMM 1**

WARNING

PPO2 > 2.5 psia (safe)
 < 2.5 psia LES suit & helmet config reqd (see step 4)

WARNING

If, after alarm, O2(N2) flow > 1.0:
 assume flow rate exceeds 5.0 lb/hr (OSH)

WARNING

Maintain O2 concentration below 37.8%

If S/L Tunnel open: C(P) go to O2(N2) FLOW HIGH/CAB P LOW/dP/dT (TEMP 4-17)
 MS go to SL MAL, ASCS, 3.4g

1. 14.7 CAB REG INLET SYS 1,2 vlv (two) - CL (pnl MO10W)
- If decay rate (-dP/dT) exceeds 0.33:
 2. DIRECT O2 vlv - OP
 3. O2 REG INLET SYS 1,2 vlv (two) - CL (pnl MO10W)
 4. Don LES suit and helmet, open LEH O2 valves (pnl C6, MO32M, MO69M), close visors, suit O2 - ON
- If dP/dT positive or zero:
 5. Go to MAL, ECLS, 6.2a [1] >>
 6. CAB RELIEF A - CL (tb-CL) (pause)
 7. B - CL (tb-CL)
 8. ✓CAB VENT ISOL - ctr (tb-bp)
 9. ✓VENT - ctr (tb-bp)
 10. ✓VAC VENT ISOL VLV BUS SEL - MNA (pnl ML31C)
 11. CNTL - CL (tb-CL)
 12. If dP/dT zero: Go to MAL, ECLS, 6.2c [1] >>
 13. Close inner airlock hatch
 14. Remove Inner Airlock Hatch EQUAL vlv caps (two)
 15. EQUAL vlv (two) - OFF
- If dP/dT positive or zero (A/L leak: Possible loss of EVA capability)
 16. CAB RELIEF (two) - ENA (tb - ENA) (if not leaking)
 17. 14.7 CAB REG INLET SYS 1(2) vlv - OP (CL) (pnl MO10W)
 18. O2 REG INLET SYS 1(2) vlv - OP (CL)
 19. VAC VENT ISOL VLV CNTL - OP (tb-OP) (If not leaking) (pnl ML31C) >>
 20. Inner A/L hatch EQUAL vlv (two) - NORM
 21. Log dP/dT _____, CAB P _____; MET _____
 22. Use nomograph to find latest possible TIG, Tmax, then:
 23. Sel TIG (SPOC or wx tpr msg) < Tmax:

Selected TIG	_____	MET
(-) Present time	_____	MET
(=) Time to TIG	_____	
 24. ✓DIRECT O2 vlv - OP (pnl C5), using O2 concentration plot, manually manage DIR O2 vlv between PPO2 = 2.5 psia and O2 concentration = 37.8%
 If PPO2 ≤ 2.5 psia and
 If O2 concentration < 37.8%,
 then DIRECT O2 vlv - OP (pnl C5)
 If O2 concentration > 37.8%,
 then DIRECT O2 vlv - CL (pnl C5)
 Repeat steps as necessary
 25. O2/N2 CNTLR VLV SYS 1,2 (two) - OP
 26. ✓O2 SYS 1,2 SPLY (two) - OP (tb-OP)
 27. ✓XOVR SYS 1,2 (two) - OP
 28. O2 REG INLET SYS 1,2 vlv (two) - CL (pnl MO10W)

(Continued)

1 2

① Procedure may be performed using meter readouts on pnl O1

② Two crew personnel reqd to perform procedure

③ Use number in parenthesis for 10.2 psia Cabin ops

④ FD1 EZ CAP, cb MNA CAB VENT and MNA CAB VENT ISOL opened

⑤ PCS activated MET 3:00. Systems switched at mid flight

- Nominal Config:**
 (ORBIT Cont)
 (L1)
 H2O ALT PRESS - CL (L2)
 CAB RELIEF A,B - ENA (tb-ENA)
 CAB VENT ISOL - CL (tb-bp) (4)
 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
 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
 O2 REG INLET SYS 1 (SYS 2) - OP (CL)
 PLO2 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)
 (WCS)
 VAC VLV - OP

1 2

1.1

(Cont)

- 29. ✓ LEH O2 SPLY vlv (two) - OP (pnl C7)
- 30. If PPO2 < 2.5: Don LES suit and helmet, open LEH O2 valves (pnl C6, MO32M, MO69M), close visors and suit O2 - ON
- 31. O2 TK 1,2 HTR A,B (four) - AUTO
- 32. Reconfig C/W parameters:

PARAMETER NAME	CW C/W	H/W C/W LO V (LO EU)	ENA/INH
CABIN PPO2 A	34	2.50(2.50)	
B	44	2.50(2.50)	
N2 FLOW 1	54		INH
2	64		INH

- 33. If time permits, perform CAB LEAK SEALING (IFM)
- 34. Go to LOSS OF CAB PRESS (ORB PKT, PWRDN)
On MCC call:
 - 35. 14.7 CAB REG INLET SYS 1(2) vlv - OP (pnl MO10W)
 - 36. O2 REG INLET SYS 1(2) vlv - OP(CL)
- 37. Once CAB P = 8.0 ± 0.2 psi, reconfig C/W parameters:

PARAMETER NAME	C/W CH	H/W LO V	C/W (LO EU)	HI V (HI EU)
CABIN PPO2 A	34			2.95 (2.95)
B	44			2.95 (2.95)
CAB P	4	OV102 1.95(7.73) OV103 1.90(7.64) OV104 1.90V(7.73)		

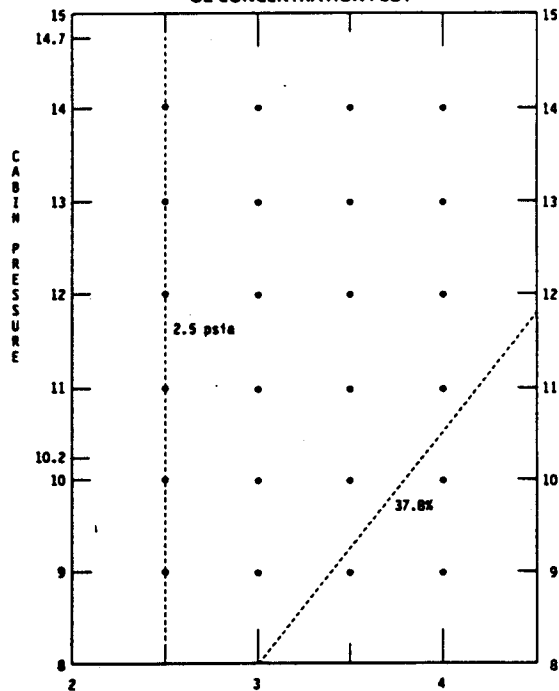
and:
Manage DIRECT O2 vlv as follows:
If PPO2 ≤ 2.50,
then DIRECT O2 vlv - OP (pnl C5)
If PPO2 > 2.95,
then DIRECT O2 vlv - CL (pnl C5)
Repeat steps as necessary

1 Procedure may be performed using meter readouts on pnl O1

2 Two crew personnel reqd to perform procedure

Nominal Config:
(MO32M)
LEH O2 5(6) - CL
(If ≥ FD2, BLEED ORIFICE installed;
LEH O2 5 - OP (MO69M)
LEH O2 7(8) - CL

O2 CONCENTRATION PLOT

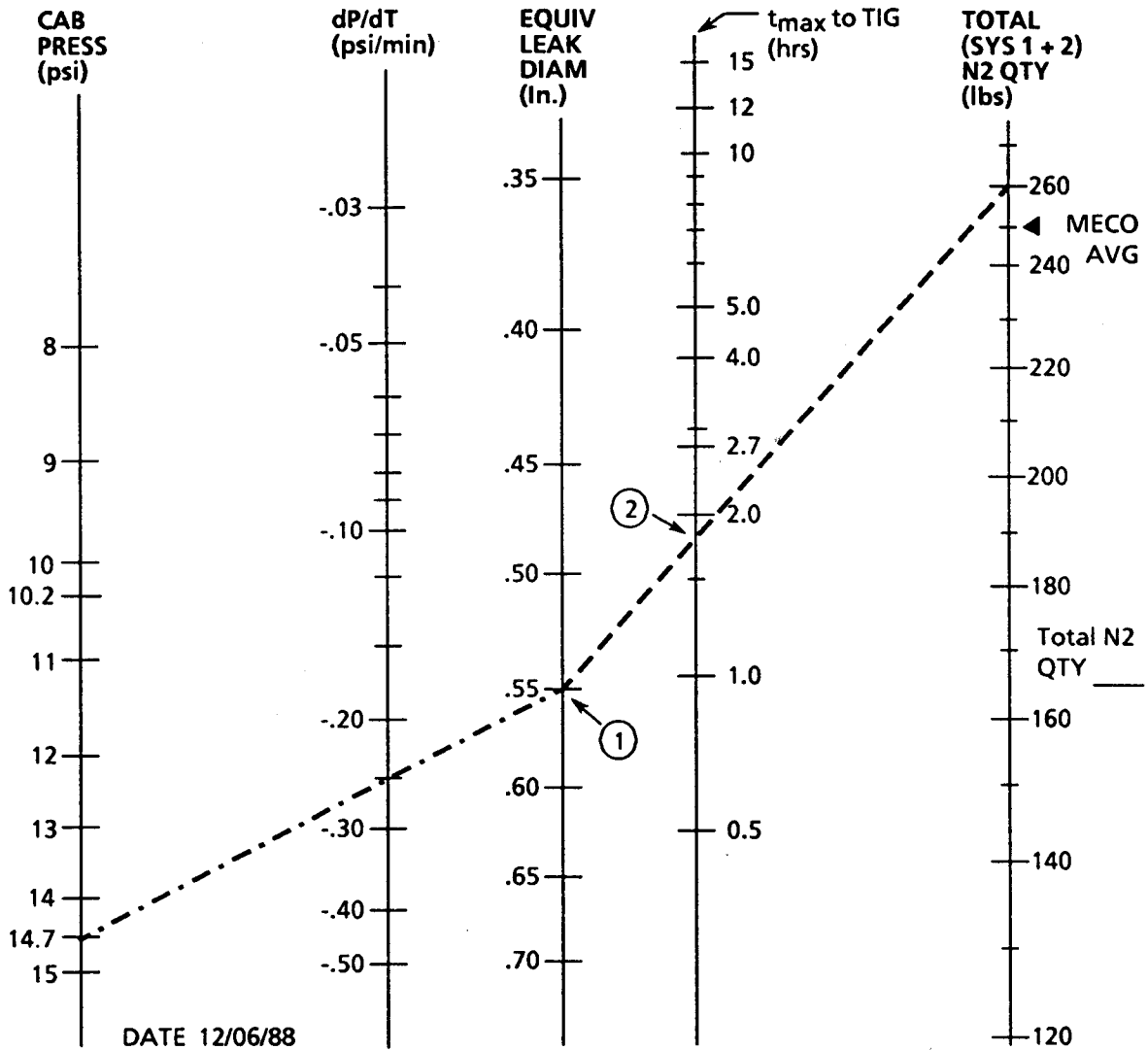


1 PLOT THE INTERSECTION OF CABIN PRESS & PPO2

2 2.5 psia PPO2 PROTECTS MINIMUM PHYSIOLOGICAL PPO2 LEVEL @ 8 psi; 37.8% PROTECTS 40% O2 CONCENTRATION @ 8 psi

SM 66 ENVIRONMENT

CAB PRESS LEAK NOMOGRAPH



① Use CAB PRESS and dP/dT to determine EQUIV LEAK DIAM

② Use EQUIV LEAK DIAM and SM 66 ENVIRONMENT total SYS 1 + 2 N2 QTY to determine t_{max} to TIG

③ Perform before cabin reaches 8 psi

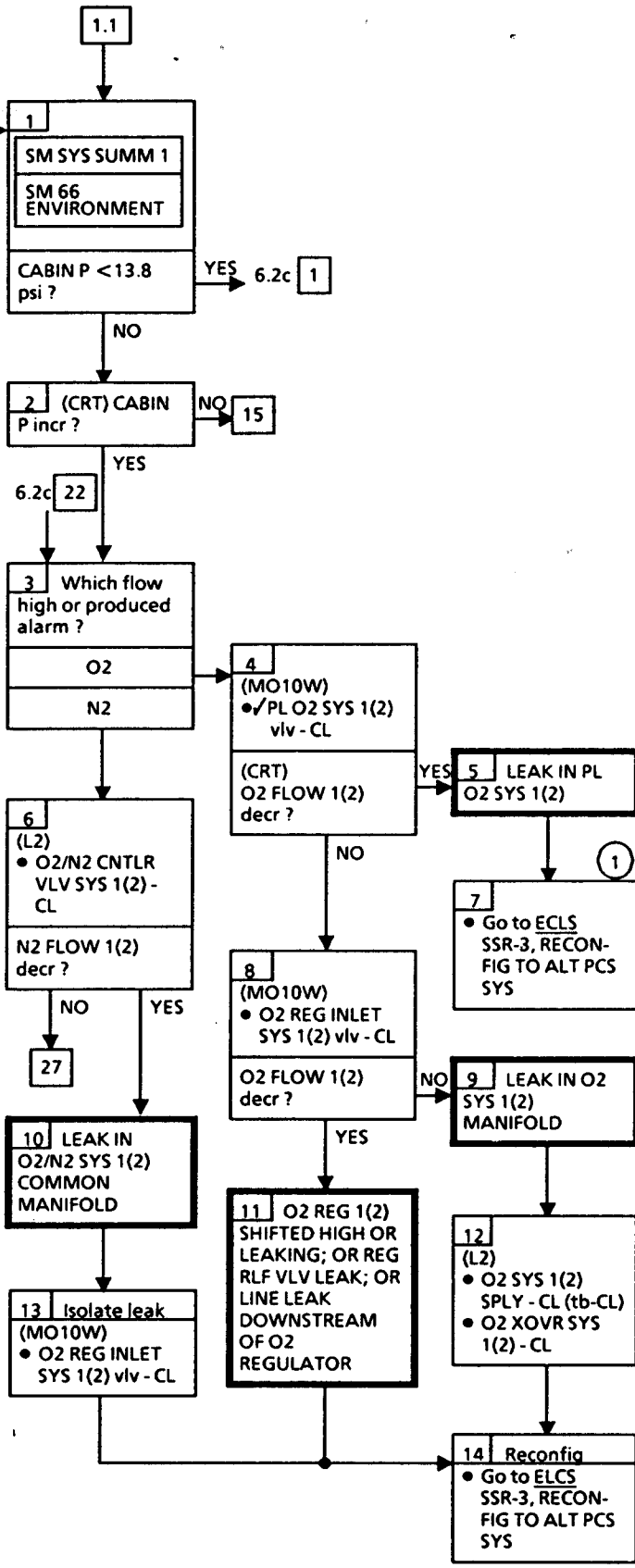
Time leak check made ___ : ___ : ___ MET
 (+) T max to TIG (nomog) ___ : ___ : ___
 (=) Latest possible TIG ___ : ___ : ___ MET

① Only perform this step if Spacelab is being flown

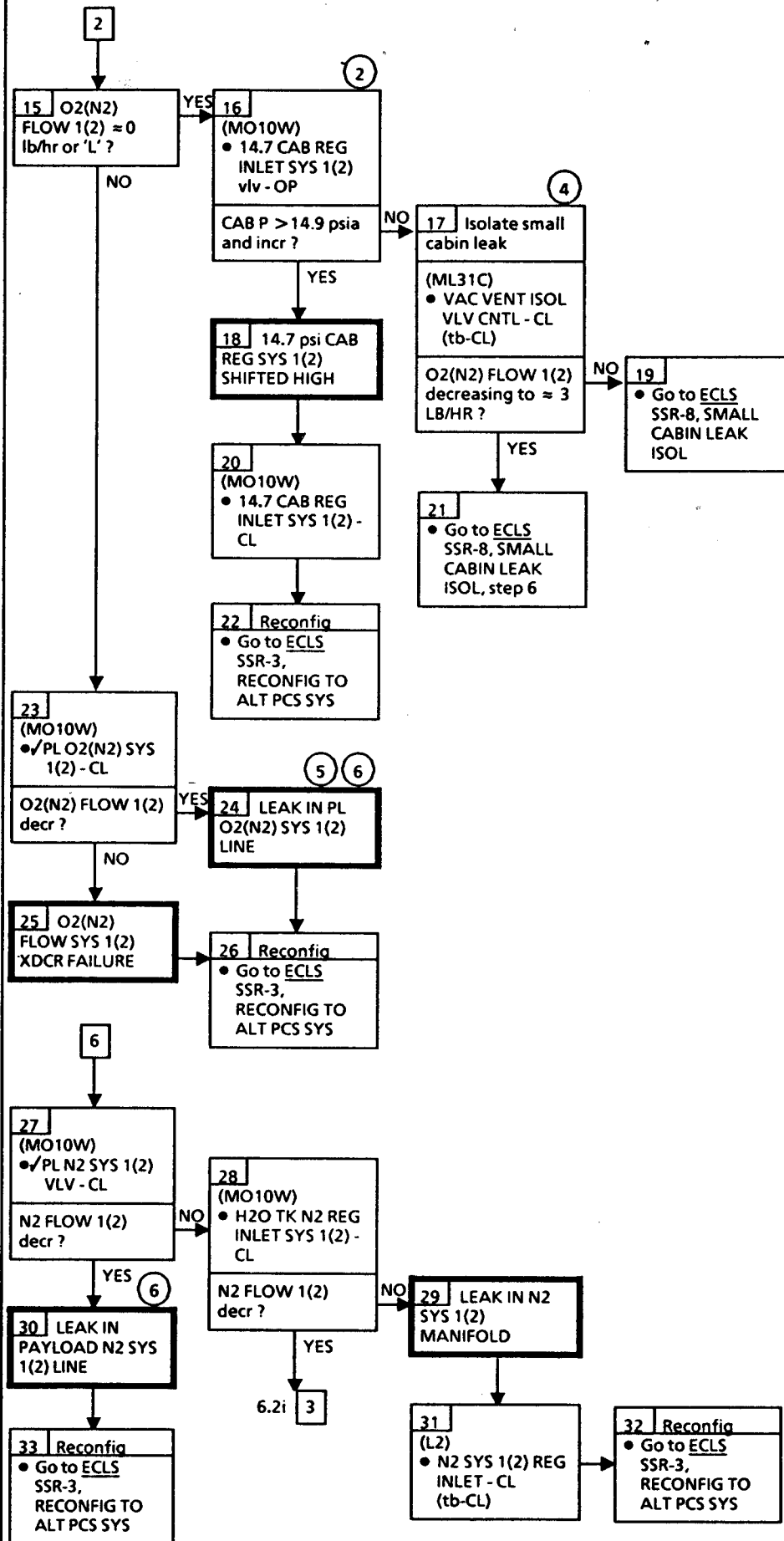
CABIN ATM
 BACKUP C/W ALARM
 S66 CABIN O2(N2)
 SM1 CABIN O2(N2)

O2(N2) FLOW > 4.9 lb/hr

Nominal Config: (ORBIT)
 Refer to 6.2



ECLS 6.2a (Cont)



2 May take several minutes to see a change in cabin pressure

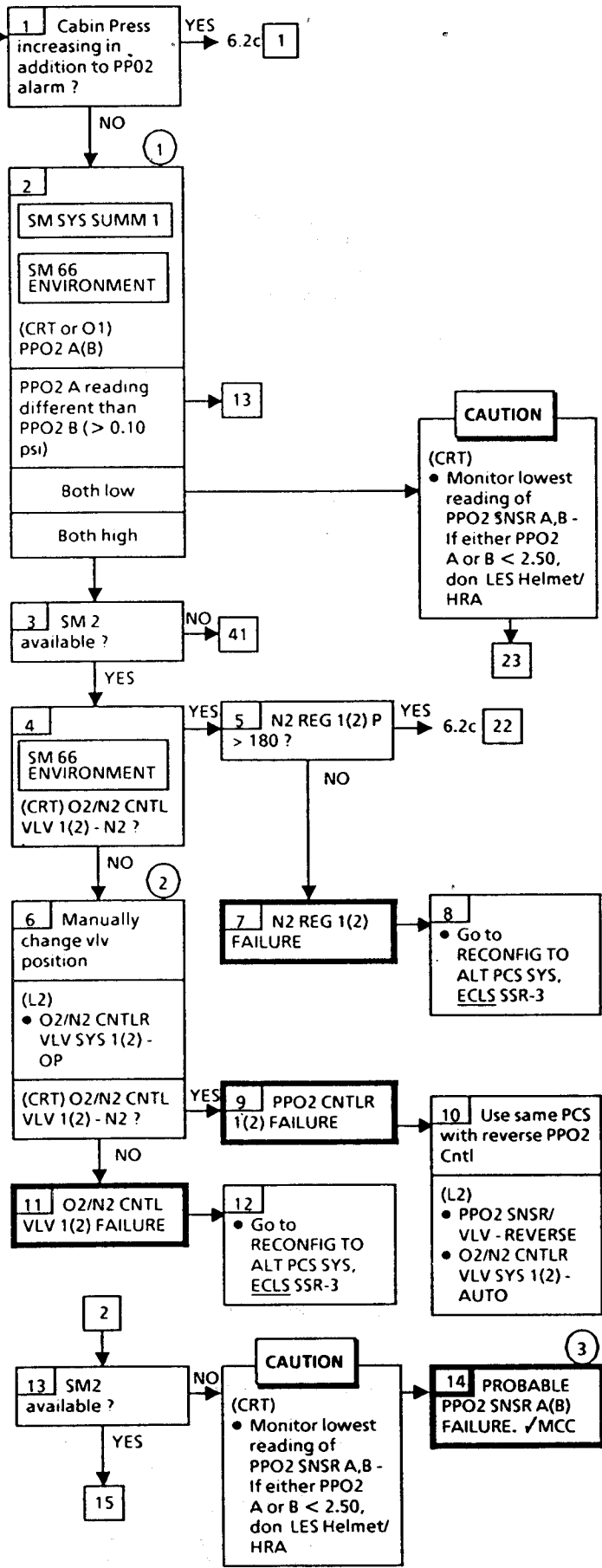
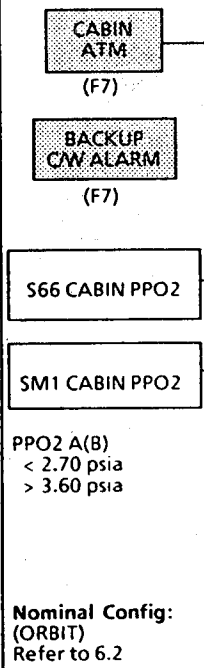
4 Vacuum vent isolation vlv orifice flows approx 3.0 ± 0.25 lb/hr when closed. If leak rate is less than 3.25 lb/hr, then leak could still be in vacuum vent line

5 Only perform next step (for O2) if Spacelab is being flown

6 Only perform reconfiguration if PL N2 being used by payload

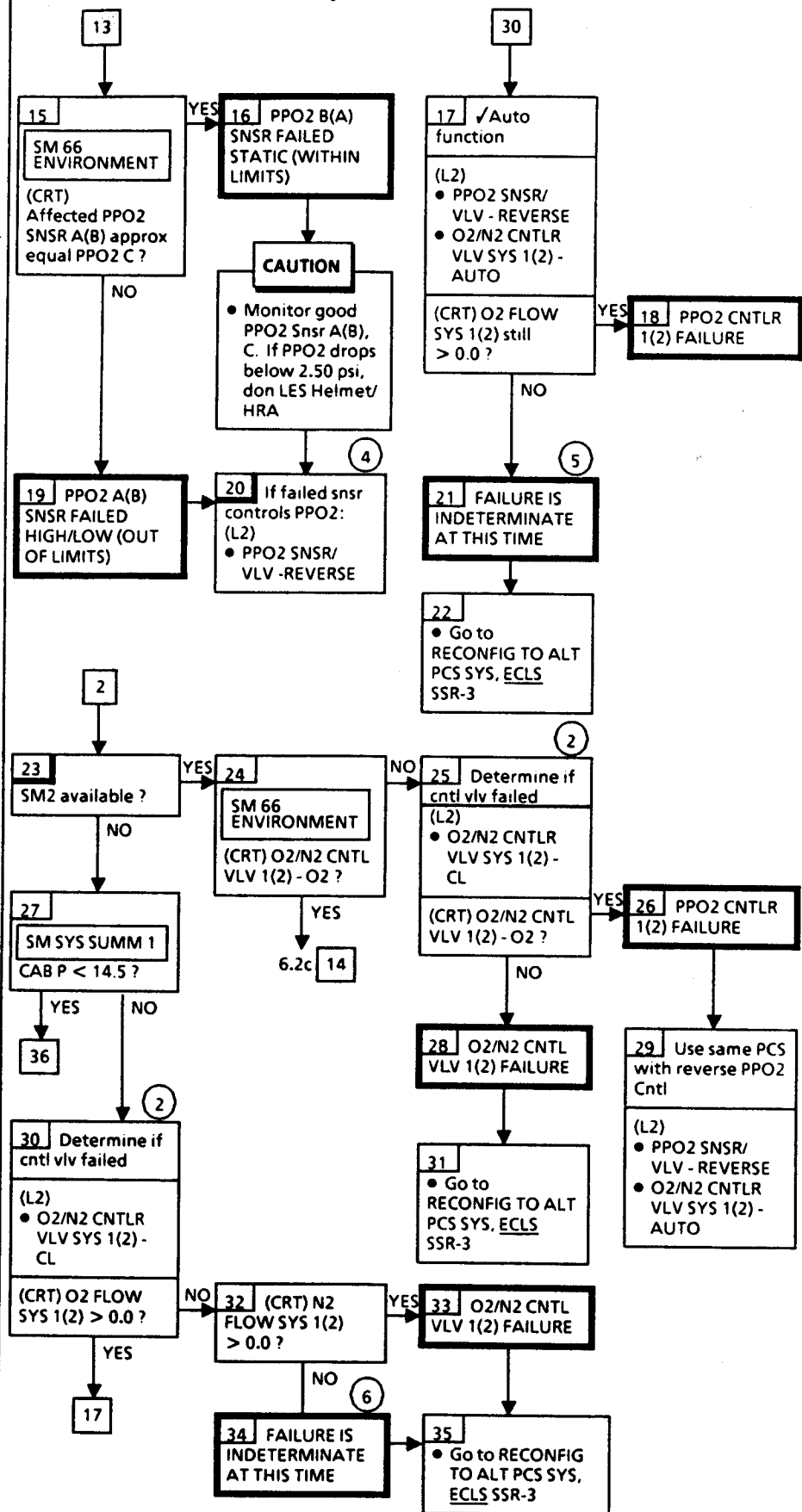
ECLS

6.2b PPO2 ++



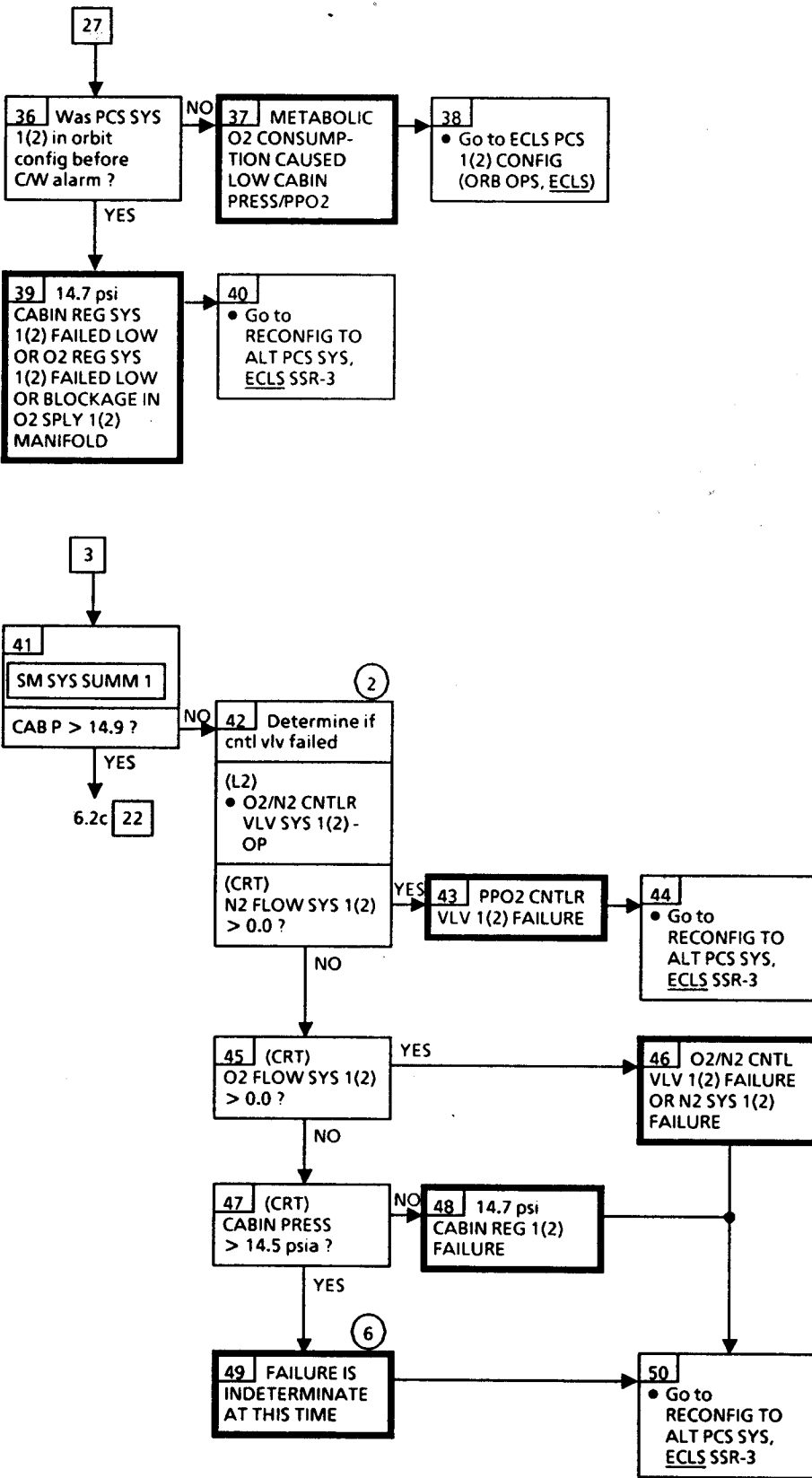
- ① If prior to performing on-orbit PCS config, low PPO2 could be caused by PCS 14.7 psi CABIN REGS - CL. After PCS config for Orbit Ops only one system active with PPO2 A tied to PCS 1 and PPO2 B tied to PCS 2
- ② O2/N2 CNTL flows N2 in OP position, and O2 in CL position
- ③ Only MCC can determine exact failure. Suspect snsr yielding alarm. MCC will determine whether to go to REVERSE on PPO2 SNSR/VLV

ECLS 6.2b (Cont)



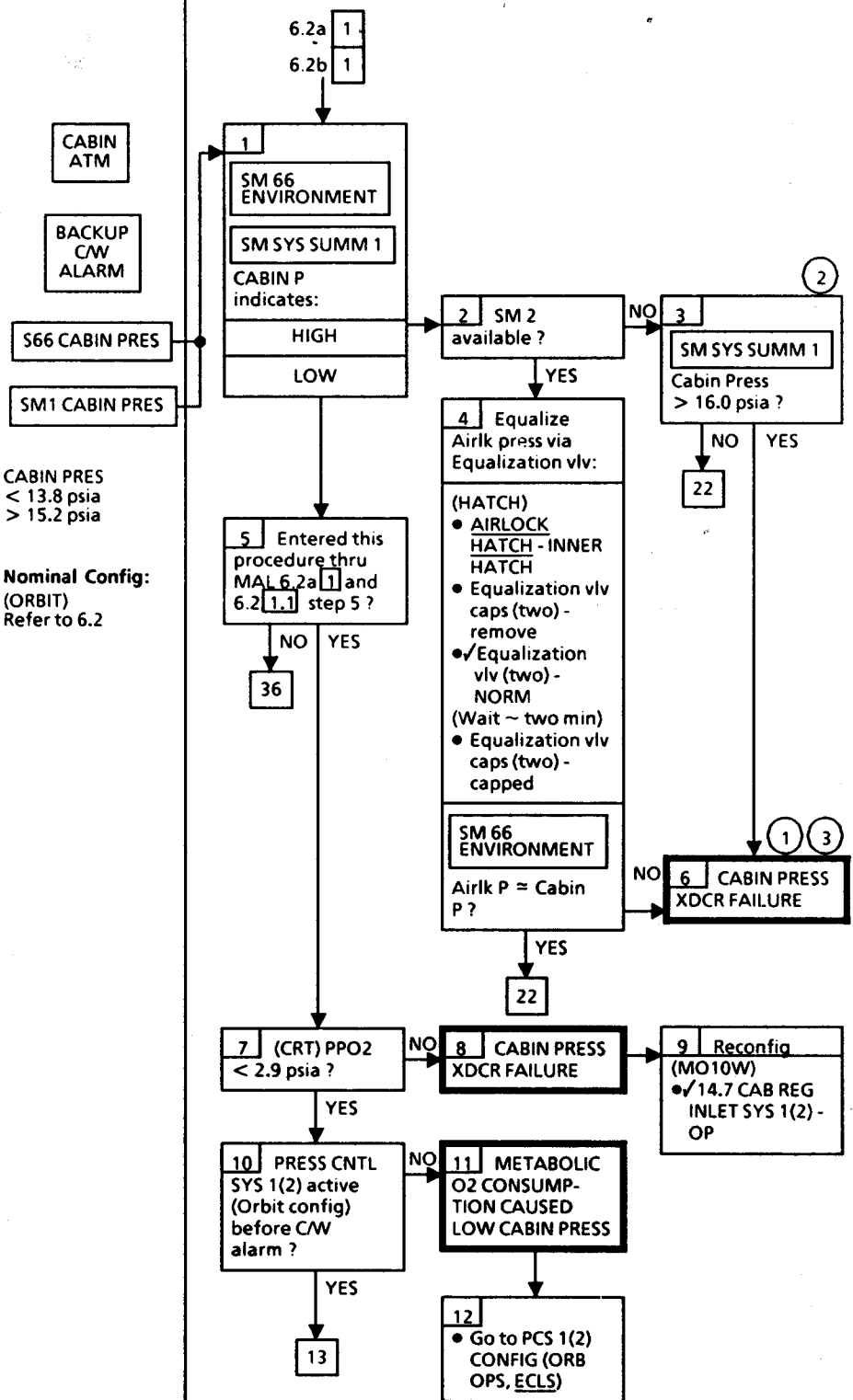
- ② O2/N2 CNTL flows N2 in OP position, and O2 in CL position
- ④ Monitor systems performance on reverse sensor. If the reverse sensor does not control PPO2 properly, ✓MCC regarding Manual Cabin ATM Management
- ⑤ Either Cabin P is within no flow region on cabin regulator, or lost AUTO function on O2/N2 CNTL VLV. ✓MCC for further troubleshooting of that system
- ⑥ Cabin P is within no flow region on cabin regulator. ✓MCC for further troubleshooting of that system

ECLS 6.2b (Cont)



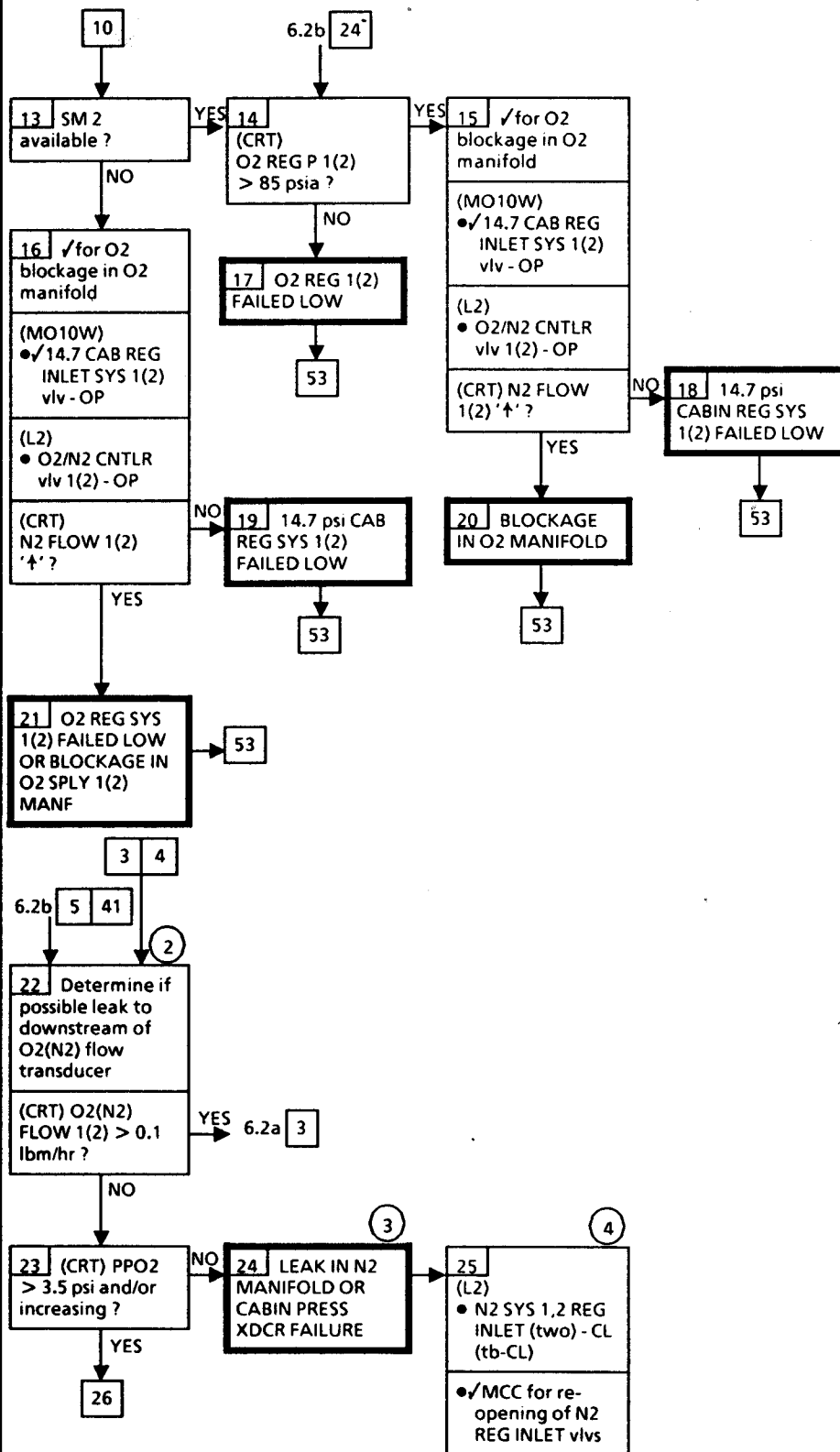
② O2/N2 CNTL flows N2 in OP position, and O2 in CL position

⑥ Cabin P is within no flow region on cabin regulator. ✓MCC for further troubleshooting of that system



- ① ✓MCC to determine exact failure. Suspect sns r yielding alarm
- ② Cabin Press Relief Vlv crack at 15.5 psid. Full flow at 16.0 psid
- ③ Unless failure is a linear shift of transducer reading, loss of cabin pressure ducer causes loss of BFS BU dP/dT software computation

ECLS 6.2c (Cont)

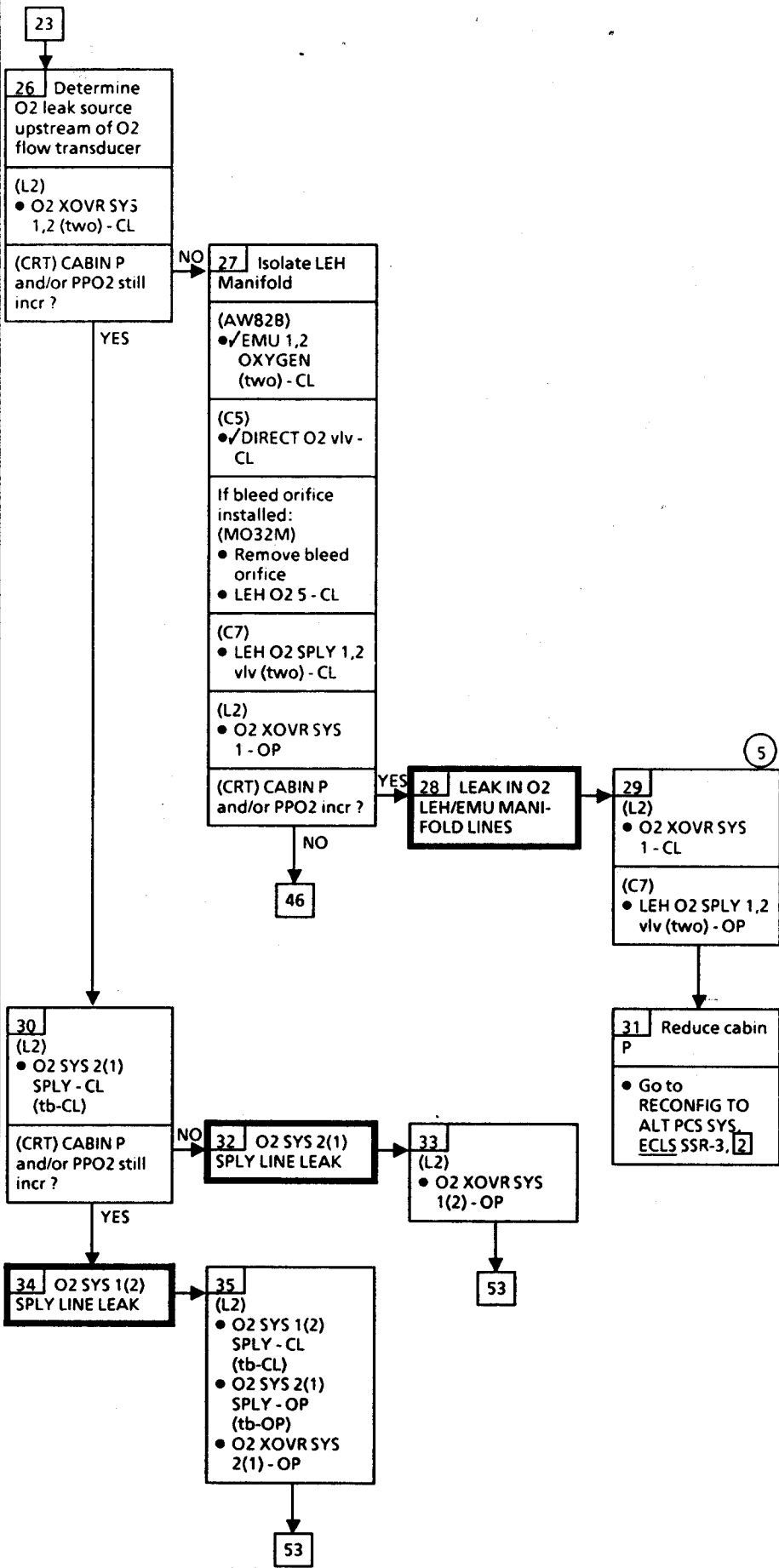


2 Cabin Press Relief vlv cracks at 15.5 psid. Full flow at 16.0 psid

3 If Airlk P equaled Cabin P in Block 4, then failure is leak in N2 Manf. If Airlk P unavailable (no SM2), N2 Manf leak must be assumed until confirmed by MCC

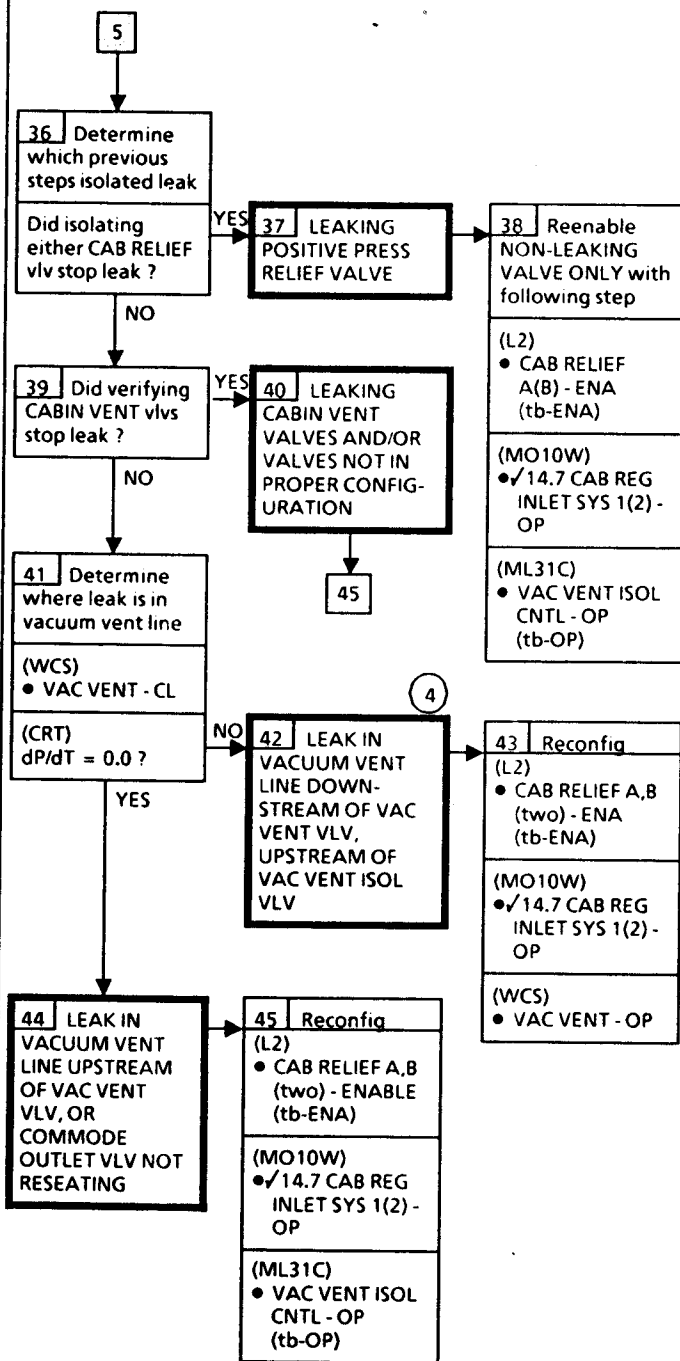
4 If N2 needed, opening the N2 REG INLETS could feed possible leak into cabin

ECLS 6.2c (Cont)



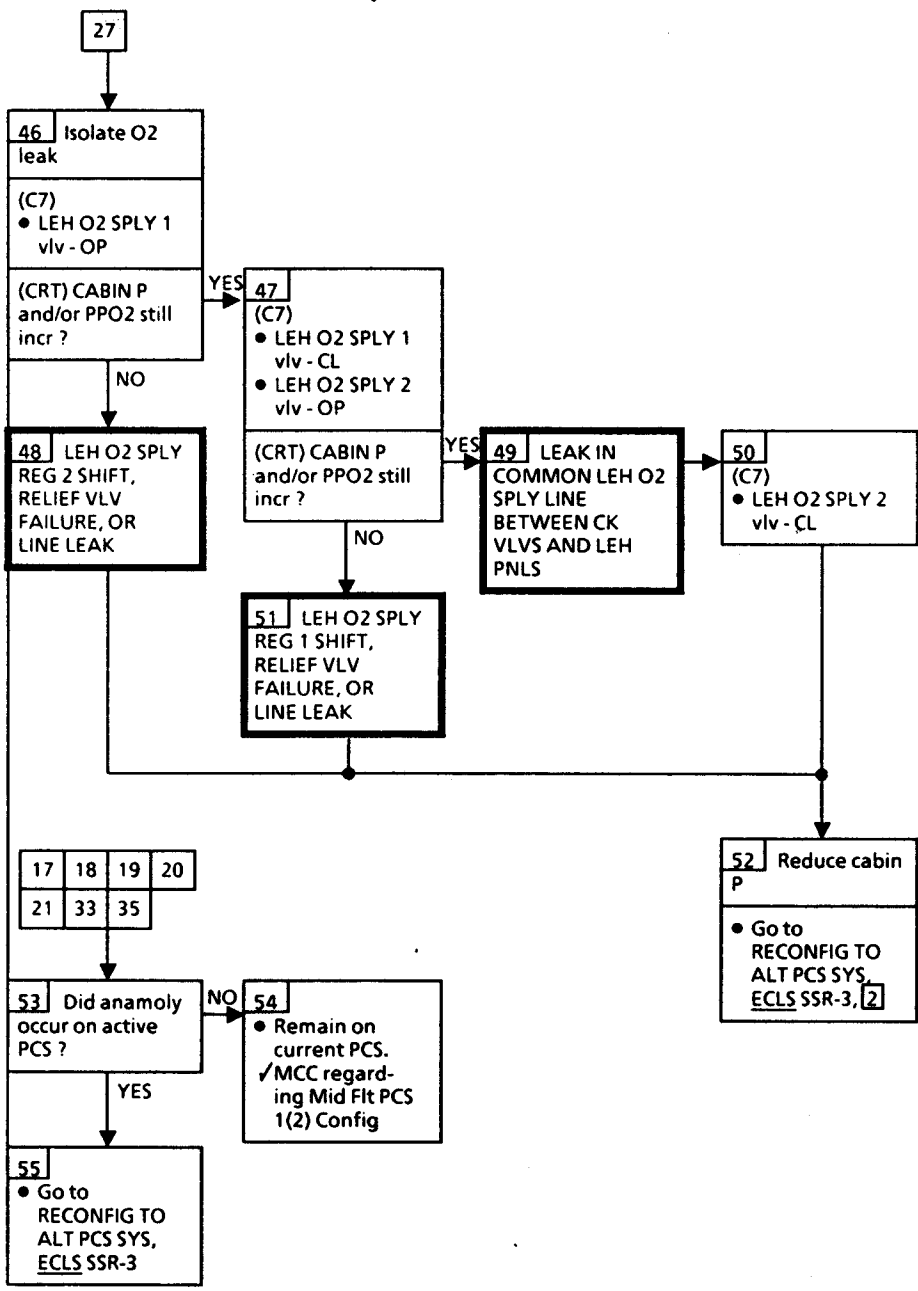
⑤ O2 XOVR vlvs must be re-opened to supply oxygen to the LEH O2 vlvs, the EMU O2 vlvs, or the DIRECT O2 vlv. ✓MCC before taking this action

ECLS 6.2c (Cont)



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

ECLS 6.2c (Cont)



① If Payload N2 line in use, ✓MCC for further isolation

SM ALERT

S66 CABIN

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

Nominal Config:
(ORBIT)
Refer to 6.2

1

SM 66 ENVIRONMENT

Compare with alternate N2 REG P XDCR

(MO10W)

- N2 XOVER vlv - OP

(CRT)

N2 REG P 1(2) agrees with N2 REG P 2(1) ?

NO

2 N2 REG P 1(2) XDCR FAILURE

YES

3

(L2)

- N2 SYS 1(2) REG INLET - CL (tb-CL)
- O2/N2 CNTLR VLV SYS 1(2) - CL

(MO10W)

- N2 XOVER vlv - CL
- H2O TK N2 REG INLET SYS 1 (SYS 2) vlv - CL
- ✓PL N2 SYS 1 (SYS 2) vlv - CL

(CRT)

N2 REG P 1(2) stabilize ?

NO

5 N2 LINE LEAK

YES

7 N2 REG 1(2) SHIFTED

①

4

(MO10W)

- N2 XOVER vlv - CL

6 Did anomaly occur on active PCS ?

NO

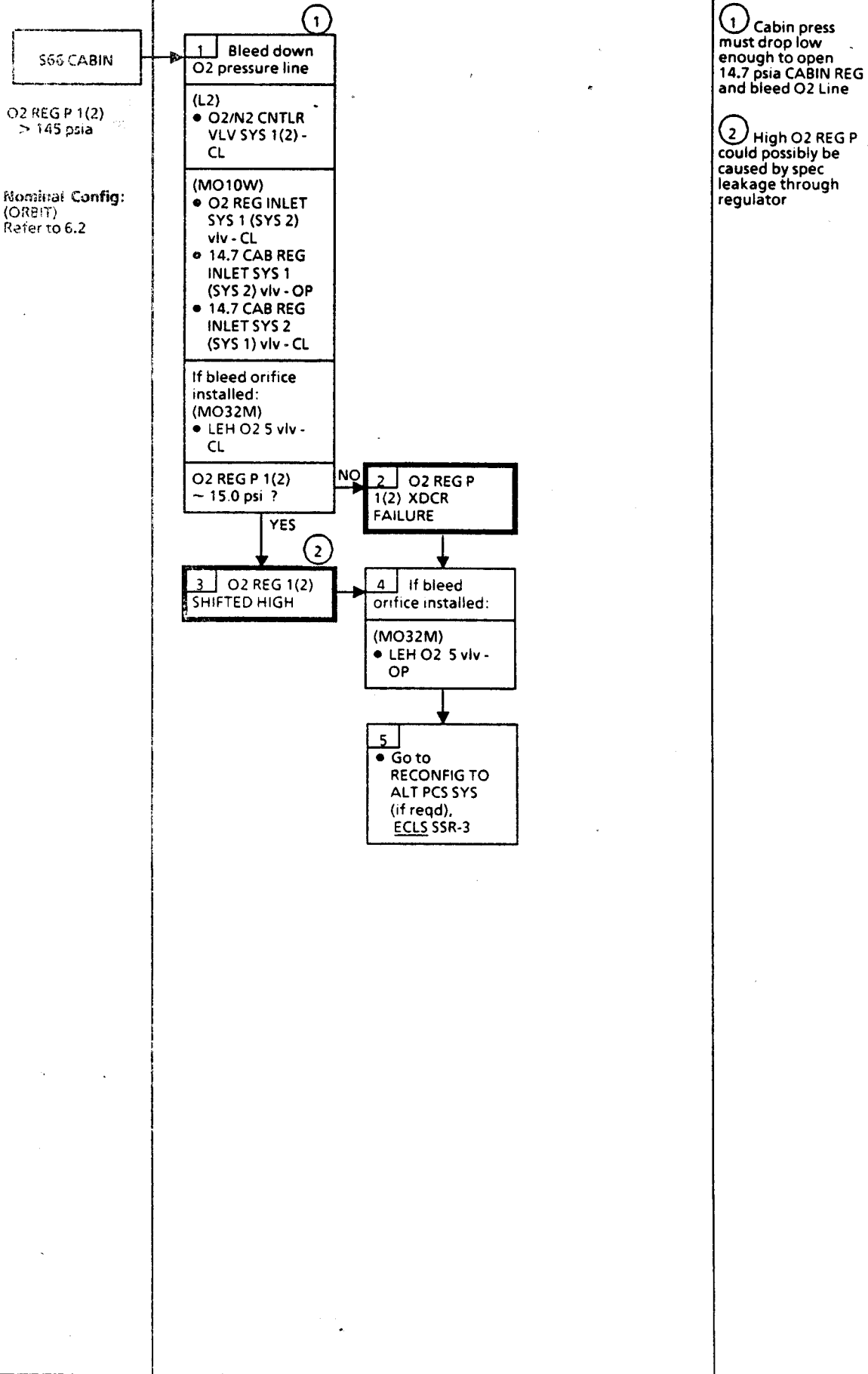
8 Remain on current PCS

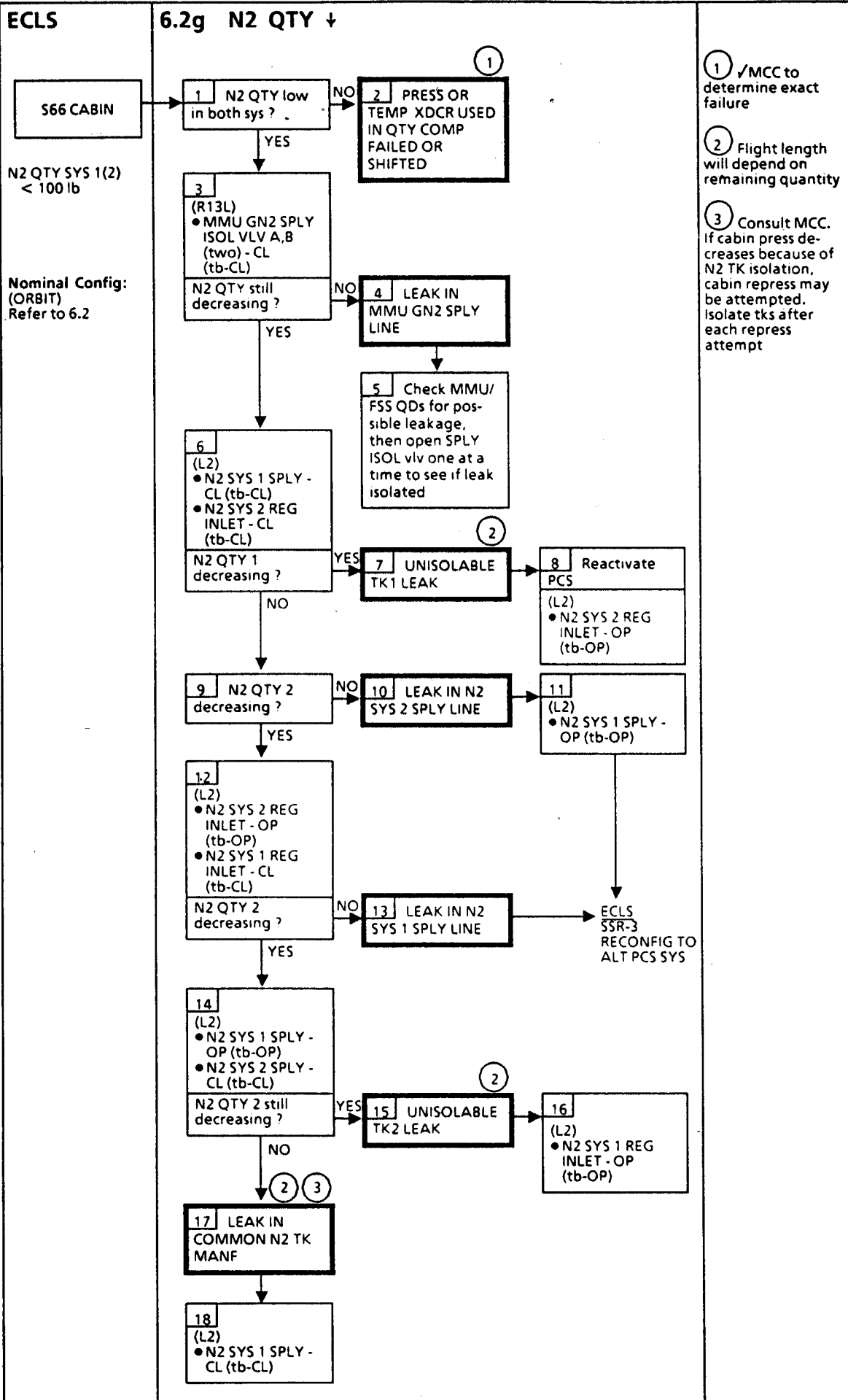
- ✓MCC regarding mid-flight PCS 1(2) config

YES

9

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

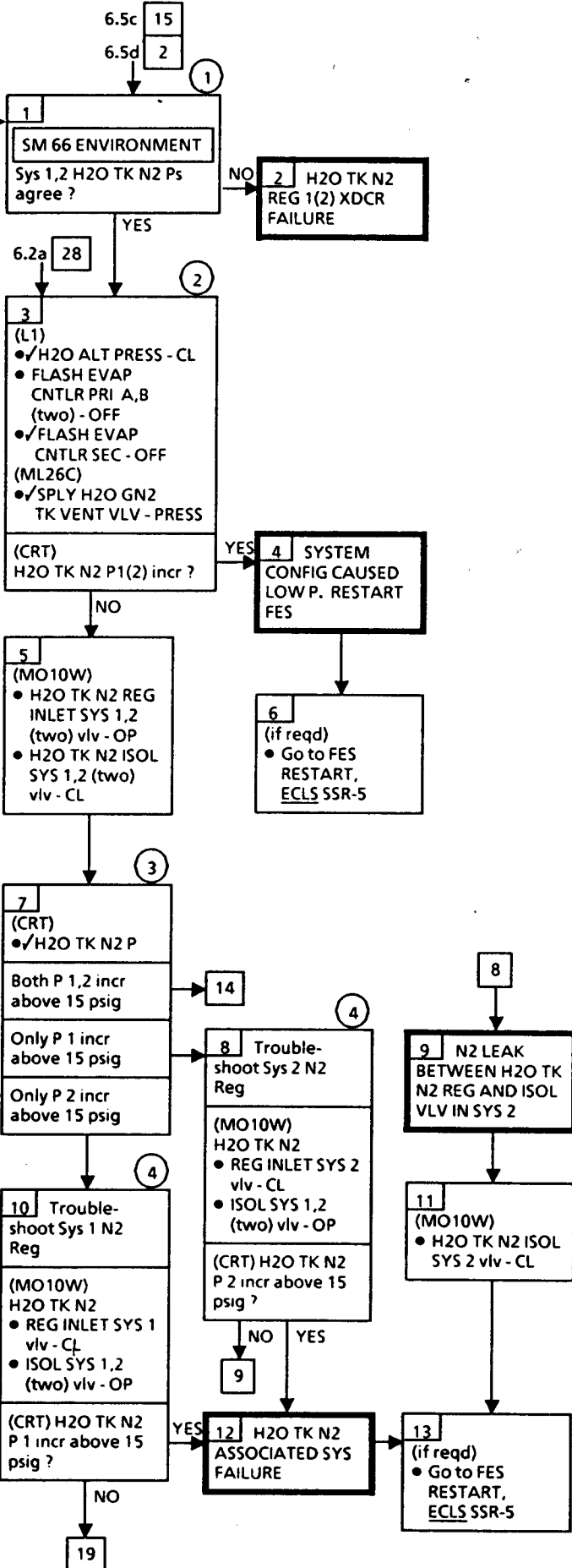




H2O TK N2 P1(2) < 13.0 psig

Nominal Config: (ORBIT) Refer to 6.2

S66 CABIN



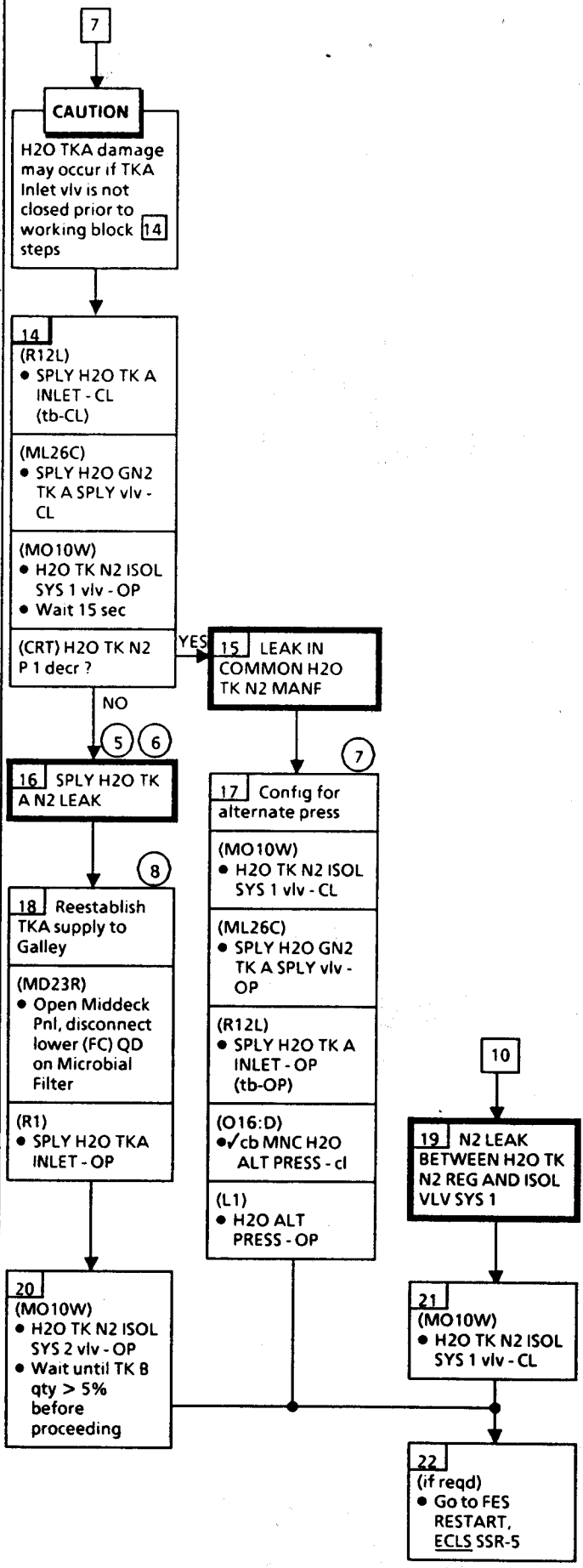
1 CRT label 'H2O TK N2 P' is really H2O REG 1(2) P not actual 'TK N2 PRESS'

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

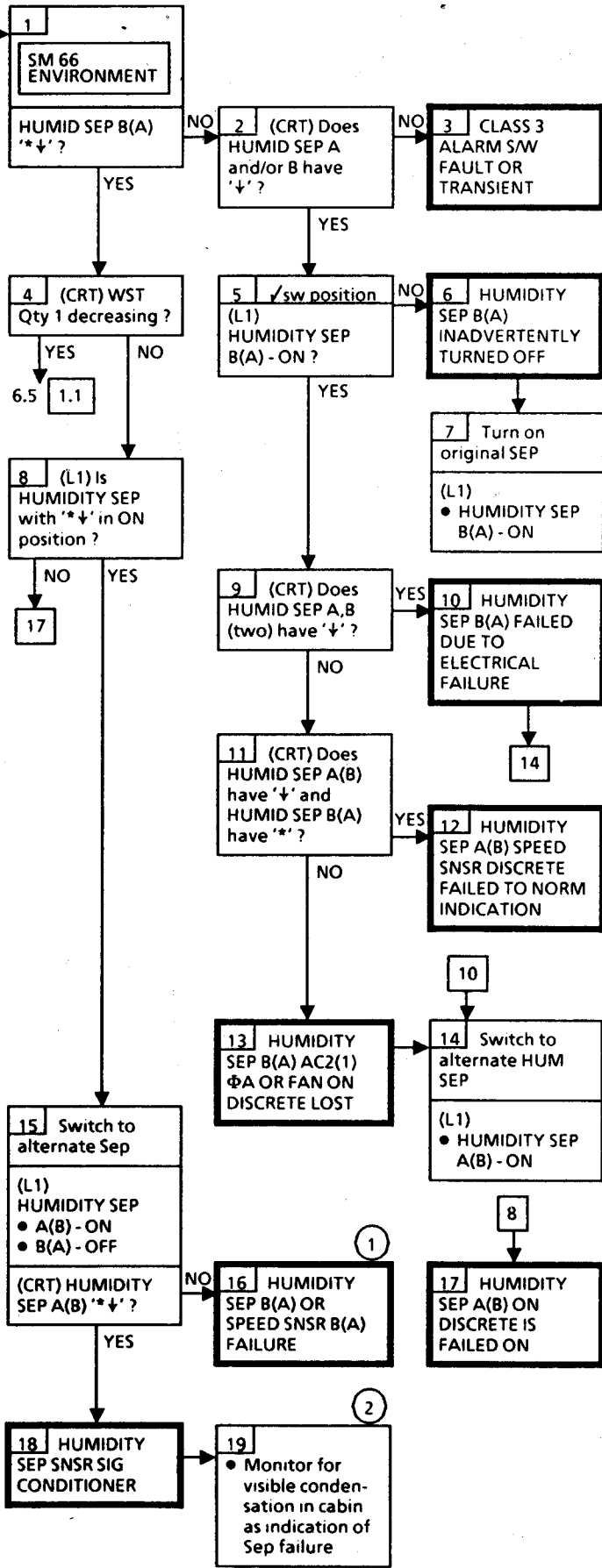
ECLS 6.2i (Cont)



- 5 SPLY H2O dumps may need to be scheduled more frequently depending upon FLASH EVAP usage
- 6 SPLY H2O in TK A is not available without feeding this N2 leak
- 7 SPLY H2O will only be available at FCP production rate
- 8 Allows utilization of TK A H2O. Only TKs B,C,D will fill FCP H2O. To fill TKA, QD must be remated

S66 CABIN
HUMIDITY SEP A(B) underspeed

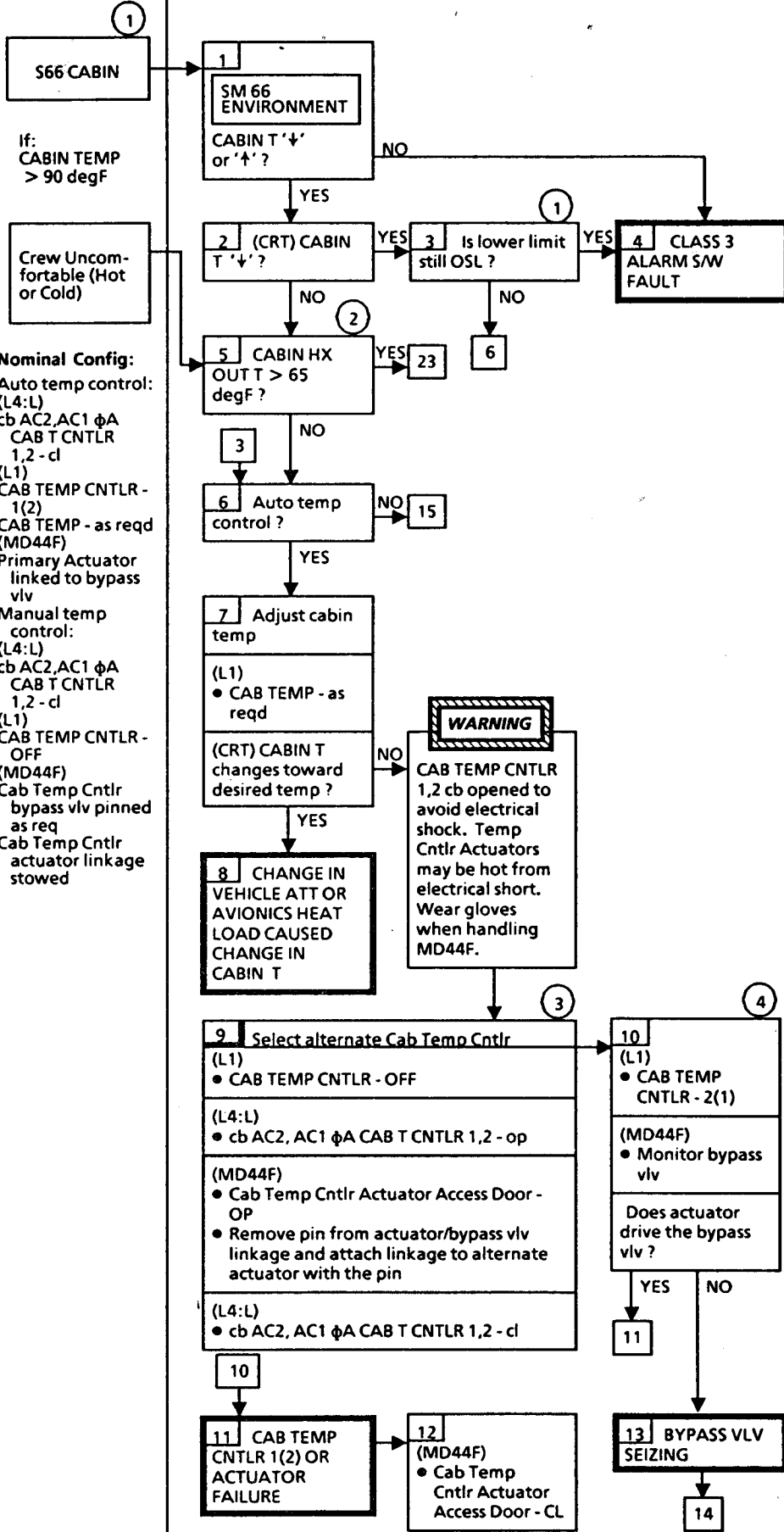
Nominal Config:
(L4:J)
cb AC1 HUM SEP A (three) - cl
cb AC2 HUM SEP B (three) - cl
cb AC3 ΦA SIG CONDOR HUM SEP - cl
(L1)
HUMIDITY SEP B(A) - ON



① ✓MCC to determine exact failure
② MCC only has indication of relative humidity

ECLS

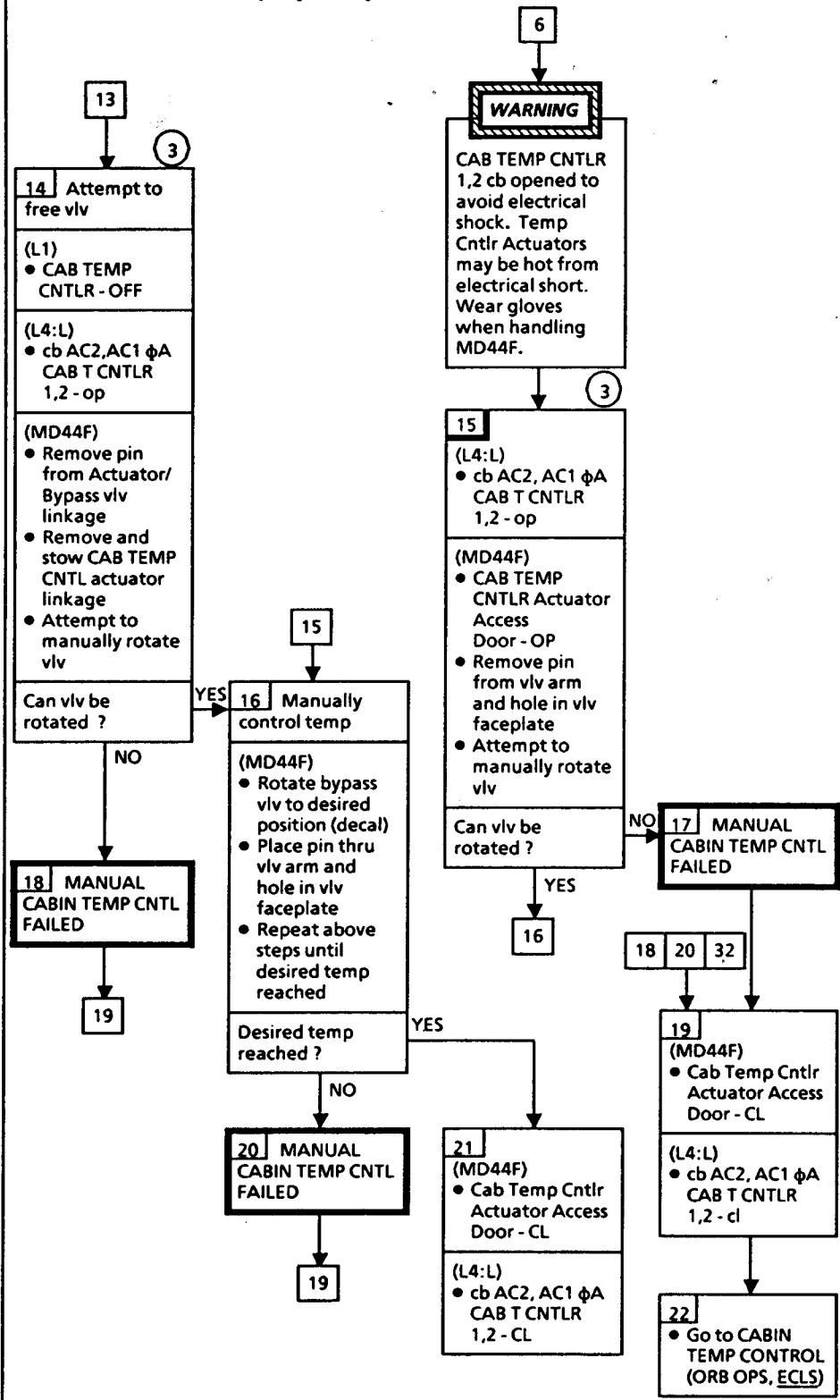
6.2k CABIN T ↑↑
6.2i CREW UNCOMFORTABLE (HOT OR COLD)



Nominal Config:
 Auto temp control:
 (L4:L)
 cb AC2, AC1 φA
 CAB T CNTLR
 1,2 - cl
 (L1)
 CAB TEMP CNTLR - 1(2)
 CAB TEMP - as reqd
 (MD44F)
 Primary Actuator linked to bypass vlv
 Manual temp control:
 (L4:L)
 cb AC2, AC1 φA
 CAB T CNTLR
 1,2 - cl
 (L1)
 CAB TEMP CNTLR - OFF
 (MD44F)
 Cab Temp Cntrl bypass vlv pinned as req
 Cab Temp Cntrl actuator linkage stowed

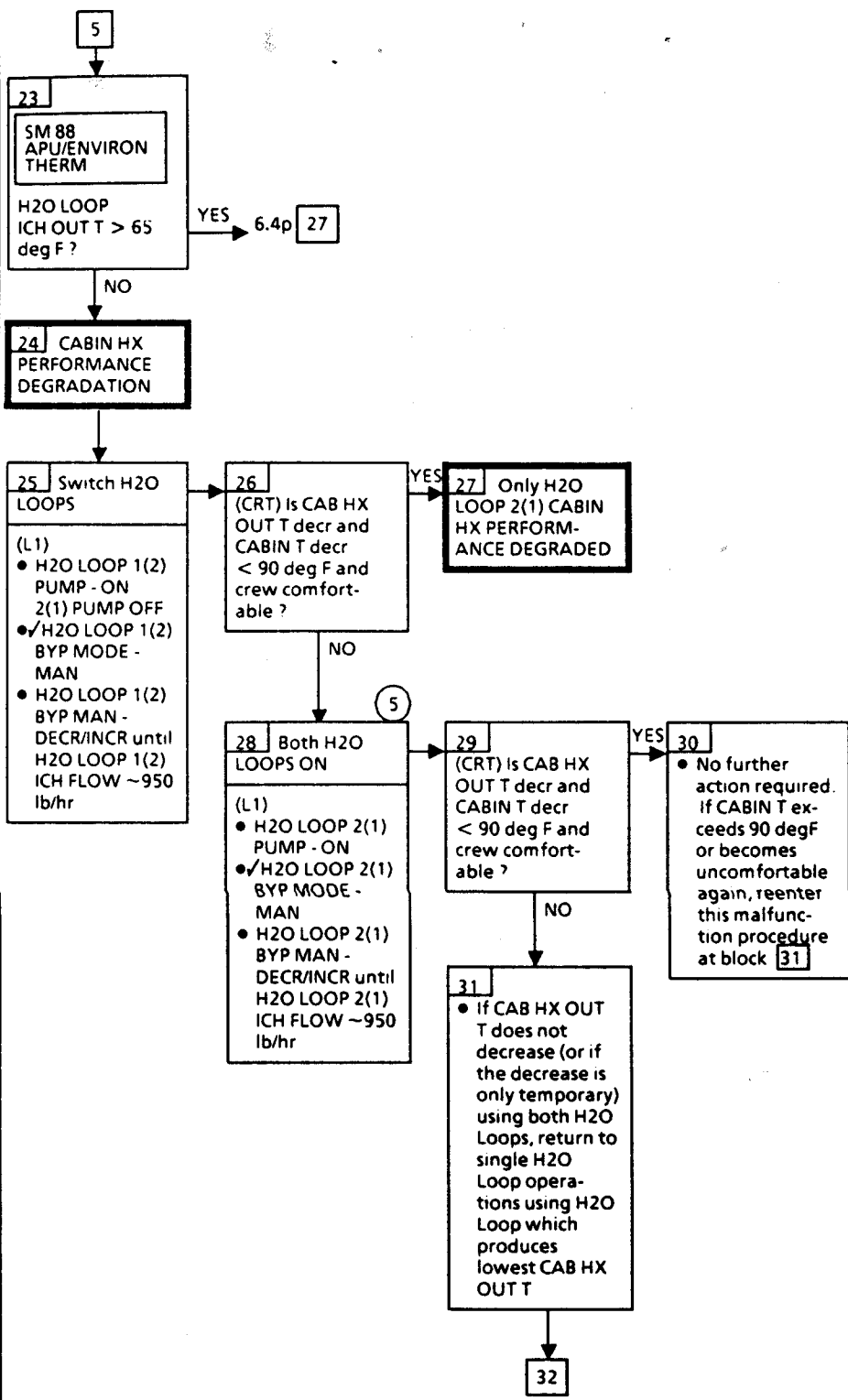
- ① CABIN TEMP lower alarm limit is normally OSL
- ② For the CABIN HX OUT T low case, other sensors will react and sound alarm before any noticeable change in cabin temperature occurs, therefore it is not pursued in this procedure
- ③ When CAB T CNTLR 1 cb opened, CAB T and CAB HX OUT T drop to 45 degF (pwr removed from sig cond)
- ④ Two crew members reqd to perform this procedure

ECLS 6.2k,l (Cont)



③ When CAB T CNTLR 1 cb opened, CAB T and CAB HX OUT T drop to 45 degF (pwr removed from sig cond)

ECLS 6.2k,1 (Cont)



5 Having both H2O Loops On reduces efficiency of H2O LOOP/FREON LOOP INTERCHANGER and may impact temperatures in other areas cooled by H2O LOOPS

31

WARNING

CAB TEMP CNTLR
1,2 cb opened to
avoid electrical
shock. Temp
Cntlr Actuators
may be hot from
electrical short.
Wear gloves
when handling
MD44F

3 6

32 Pin Cab
Temp Cntlr vlv
FULL COOL

(L1)

- If Auto Temp Cntl, CAB TEMP CNTLR - OFF

(L4:L)

- cb AC2, AC1 ϕ A CAB TEMP CNTLR 1,2 - op

(MD44F)

- Cab Temp Cntlr Actuator Access Door - OP
- Remove pin from vlv arm and hole in vlv faceplate, or if Auto Temp Cntl, remove pin from actuator/bypass vlv linkage
- Rotate bypass vlv to FULL COOL position
- Place pin thru vlv arm and hole in vlv faceplate
- If Auto Temp Cntl, remove and stow CAB TEMP CNTL actuator linkage

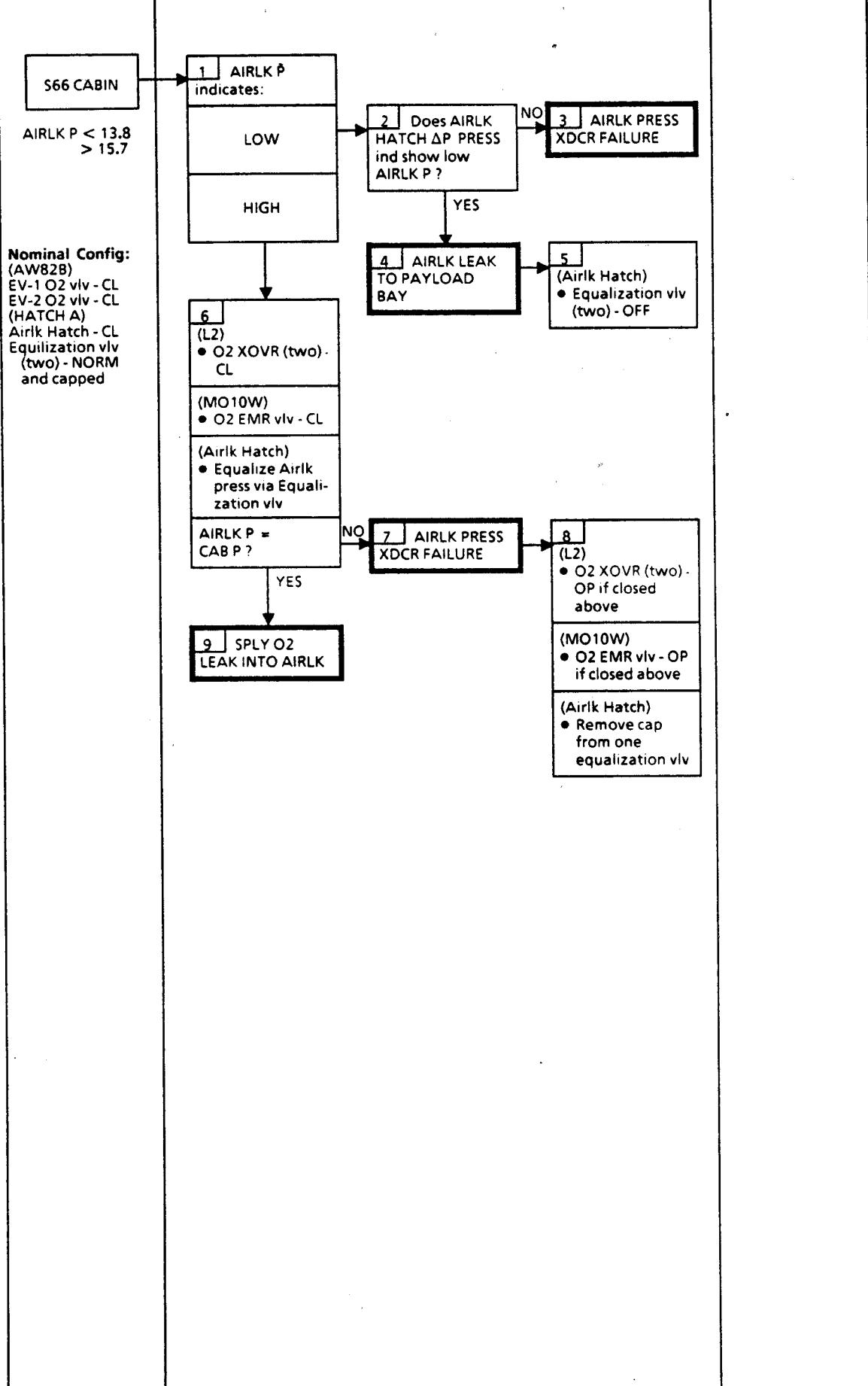
19

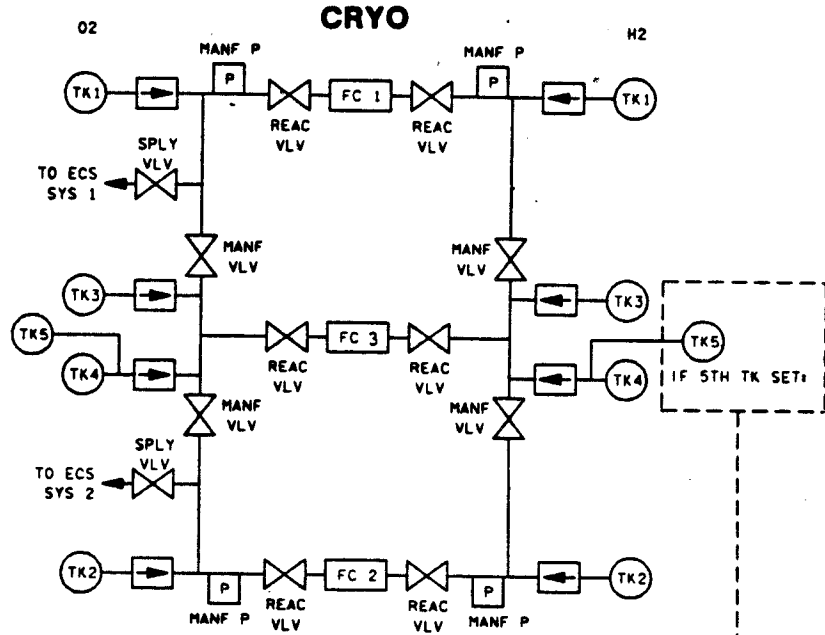
3 When CAB T CNTLR 1 cb opened CAB T and CAB HX OUT T drop to 45 deg F (pwr removed from sig cond)

6 Upon completion of this block, crew will be configured for manual temp control

ECLS

6.2m AIRLK P ↑↑





O2/H2 HTR LOSS (3 OR 4 TK SETS)									
BUS LOSS	PAIRED				PAIRED				
	TK1		TK2		TK3		TK4		
	A	B	A	B	A	B	A	B	
MNA DA1	A/M		AUTO	A/M	A/M	A/M	AUTO	A/M	
MNB DA2			A/M	A/M	A/M	A/M	A/M	A/M	
MNC DA3	AUTO	A/M	A/M		A/M		A/M	A/M	
CNTL AB1		MAN			MAN				
CNTL AB2		A/M			A/M				
CNTL BC1			MAN				MAN	A/M	
CNTL BC2			A/M				A/M		
CNTL BC3			MAN				MAN		MAN
CNTL CA1	MAN						MAN		
CNTL CA2	A/M						A/M		
CNTL CA3				A/M					A/M
ESS 1BC	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
ESS 2CA	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
ESS 3AB									

* AUTO OPERATION REGAINED IF BOTH A AND B HTR SW OF OTHER PAIRED TANK IS NOT IN AUTO

O2/H2 HTR LOSS (5 TK SETS ONLY)												
BUS LOSS	PAIRED				PAIRED				PAIRED			
	TK1		TK2		TK3		TK4		TK5			
	A	B	A	B	A	B	O2	H2A	H2B	O2	H2A	H2B
MNA DA1	A/M		AUTO	A/M	A/M	A/M	AUTO	AUTO	A/M	A/M	AUTO	A/M
MNB DA2			A/M	A/M	A/M	A/M	A/M	A/M	A/M	A/M	A/M	A/M
MNC DA3	AUTO	A/M	A/M		A/M		A/M	A/M			A/M	A/M
CNTL AB1		MAN			MAN							
CNTL AB2		A/M			A/M							
CNTL BC1			MAN				MAN	MAN			MAN	MAN
CNTL BC2			A/M				A/M	A/M			A/M	A/M
CNTL BC3			MAN				MAN	MAN			MAN	MAN
CNTL CA1	MAN						MAN					
CNTL CA2	A/M						A/M					
CNTL CA3				A/M								A/M
ESS 1BC	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	A/M	A/M	AUTO	AUTO
ESS 2CA	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
ESS 3AB												

* AUTO OPERATION REGAINED IF BOTH A AND B HTR SW OF OTHER PAIRED TANKS ARE NOT IN AUTO. TK1 PAIRED WITH TK2, AND TK3 PAIRED WITH TK4/5
A/M = AUTO AND MANUAL LOSS

2749. ART, 1

CRYO TABLE A

CRYO HEATER SWITCH PROCEDURAL NOMENCLATURE

OXYGEN

HEATER SET	OV-103, OV-104	OV-102 4 TK SET	OV-102 5 TK SET
O2 TK 1 A	(R1) O2 TK 1 HTR A	(R1) O2 TK 1 HTR A	(R1) O2 TK 1 HTR A
B	O2 TK 1 HTR B	O2 TK 1 HTR B	O2 TK 1 HTR B
O2 TK 2 A	O2 TK 2 HTR A	O2 TK 2 HTR A	O2 TK 2 HTR A
B	O2 TK 2 HTR B	O2 TK 2 HTR B	O2 TK 2 HTR B
O2 TK 3 A	O2 TK 3 HTR A	O2 TK 3 HTR A	O2 TK 3 HTR A
B	O2 TK 3 HTR B	O2 TK3 HTR B	O2 TK 3 HTR B
O2 TK 4 A	(A11) CRYO TK 4 HTR O2 A	(A11) CRYO TK4/5 HTR O2 TK 4	(A11) CRYO TK4/5 HTR O2 TK 4
B	CRYO TK 4 HTR O2 B	CRYO TK4/5 HTR O2 TK 5	N/A
O2 TK 5 A	N/A	N/A	CRYO TK4/5 HTR O2 TK 5
B	N/A	N/A	N/A

HYDROGEN

HEATER SET	OV-103, OV-104	OV-102 4 TK SET	OV-102 5 TK SET
H2 TK 1 A	(R1) H2 TK 1 HTR A	(R1) H2 TK 1 HTR A	(R1) H2 TK 1 HTR A
B	H2 TK 1 HTR B	H2 TK 1 HTR B	H2 TK 1 HTR B
H2 TK 2 A	H2 TK 2 HTR A	H2 TK 2 HTR A	H2 TK 2 HTR A
B	H2 TK 2 HTR B	H2 TK 2 HTR B	H2 TK 2 HTR B
H2 TK 3 A	H2 TK 3 HTR A	H2 TK 3 HTR A	H2 TK 3 HTR A
B	H2 TK 3 HTR B	H2 TK3 HTR B	H2 TK 3 HTR B
H2 TK 4 A	(A11) CRYO TK 4 HTR H2 A	(A11) CRYO TK4/5 HTR H2 TK 4/5A	(A11) CRYO TK4/5 HTR H2 TK 4/5A
B	CRYO TK 4 HTR H2 B	CRYO TK4/5 HTR H2 TK 4/5B	CRYO TK4/5 HTR H2 TK 4/5B
H2 TK 5 A	N/A	N/A	CRYO TK4/5 HTR H2 TK 4/5A
B	N/A	N/A	CRYO TK4/5 HTR H2 TK 4/5B

ECLS

6.3 CRYO

O2 PRESS
(F7)

BACKUP C/W
ALARM

P < 540 psia

S68 CRYO O2
PRES

SM2 CRYO O2
PRES

H2 PRESS
(F7)

BACKUP C/W
ALARM

P < 153 psia

S68 CRYO H2
PRES

SM2 CRYO H2
PRESS

SM
ALERT

S68 CRYO O2

O2 TK P < 575
(htrs in off/on)
O2 TK P < 740
(htr in auto)
O2 MANF P < 200

S68 CRYO H2

H2 TK P < 165
(htrs in off/on)
H2 TK P < 189.8
(htr in auto)
H2 MANF P < 150

1.1

CRYO O2(H2) LEAK
(3 or more tank sets flown)

SM 68 CRYO SYSTEM
SM SYS SUMM 2

1 2

If only one TK aff and TK P/P disagree:

1. Go to MAL, ECLS, 6.3g(b) for P low or 6.3h(c) for TK P low >>
2. Reconfig TK HTRS A,B - ON (not AUTO) in TK(s) with P < 740 (190)

If all TK Ps in a common manf or the only TK P in an isolated manf < 740(190) and still decr:

3. O2(H2) MANF VLV TK 1,2 (two) - CL
4. Reconfig TK HTRS A,B - AUTO in TK(s) with incr P
5. Aff MN BUS TIE, EPS (CUE CARD) 3

If O2 TK 1(2) aff:

6. O2 SYS 1(2) SPLY VLV - CL, then:
If O2 TK 1(2) P now incr: (PCS leak)
7. O2 TK 1(2) HTRS A,B (two) - AUTO
MANF VLV TK 1,2 (both) - OP >>

8. Aff FC SHUTDN, EPS (CUE CARD)
If aff TK P incr: (FC leak)

9. MANF VLV TK 1,2 (two) - OP (ASAP if FC3)
 10. Aff TK HTRS A,B (two) - AUTO >>
- If aff TK P not incr within 2 min: (MANF or TK leak)
11. Aff TK HTRS A,B (two) - OFF
If TK 1(2) aff and TK P/MANF P diverging: (TK leak)
 12. MANF VLV TK 1(2) - OP
 13. Go to MAL, EPS SSR-6, FC POWERUP >>
If TK 3(4,5) aff or TK P/MANF P tracking:
(MANF leak) >>

If any one TK P and connected MANF P diverging or Δ > 50:

14. O2(H2) MANF VLV TK 1,2 (two) - op
15. Aff TK HTRS A,B (two) - OFF (TK leak or blockage) 4
16. Other TK HTRS - AUTO >>

If neither of the above and all TK Ps now steady or incr:
(small leak or Htr fail)

CAUTION
Do not allow P to exceed 920(260)

17. Go to MAL, ECLS, 6.3a 1, CRYO O2(H2) LEAK

1 Htr contr P on/off ranges with tolerances incl
O2 TK 1/2:
803 - 854 psia
O2 TK 3/4/5:
832 - 882 psia
H2 TK 1/2:
200 - 226 psia
H2 TK 3/4/5:
217 - 243 psia

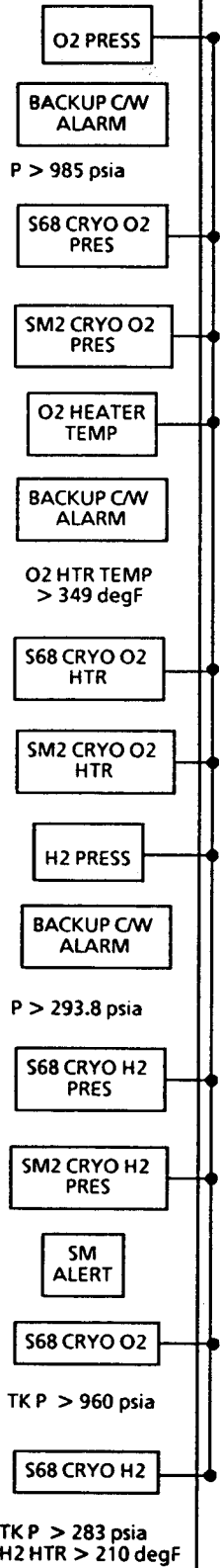
2 Tk 4/5 act as one tank

3 TK1 = MNA
TK2 = MNB
TK3(4,5) = MNC

4 MCC may recommend activating htrs and depleting tk

ECLS

6.3 CRYO

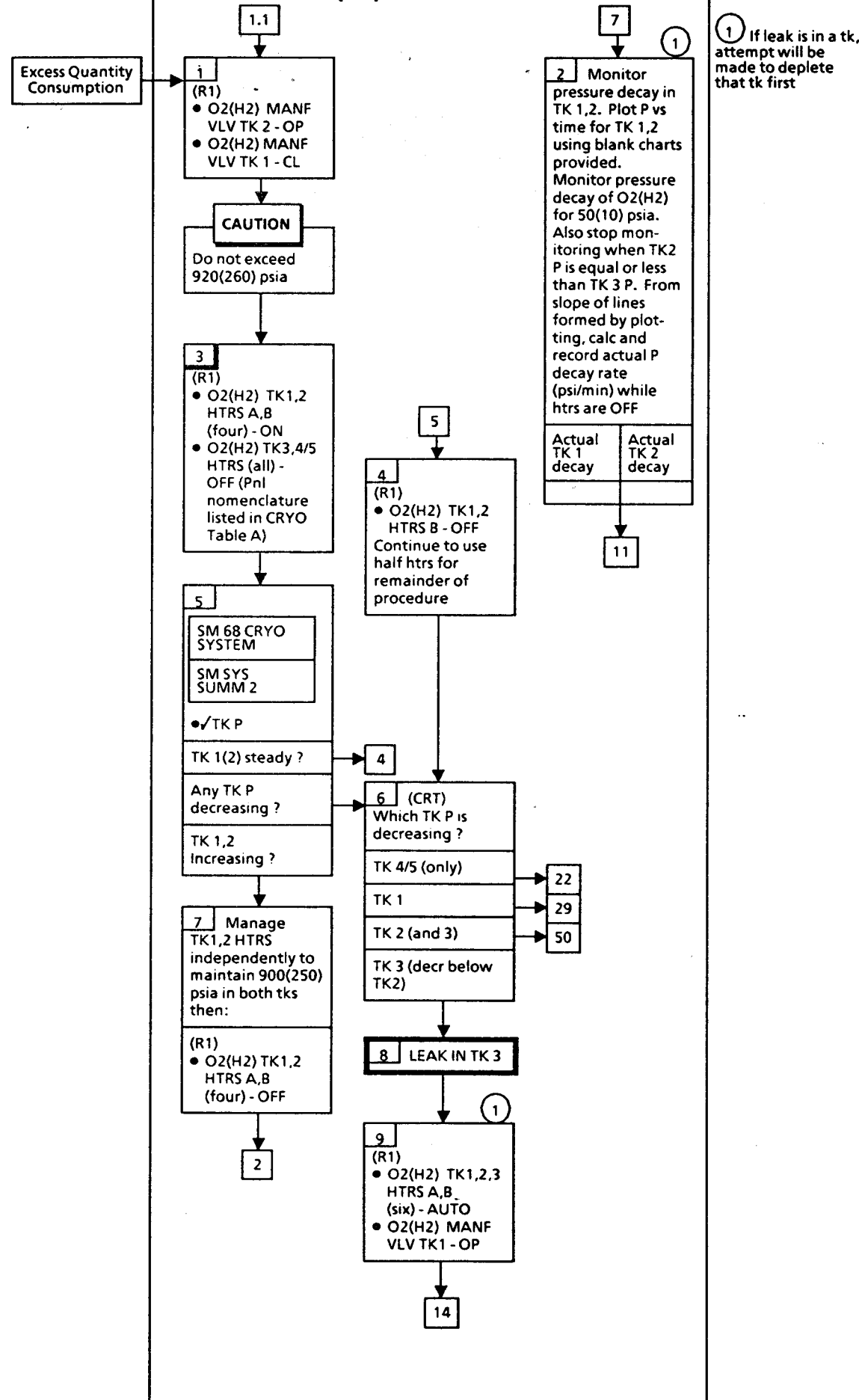


1.2

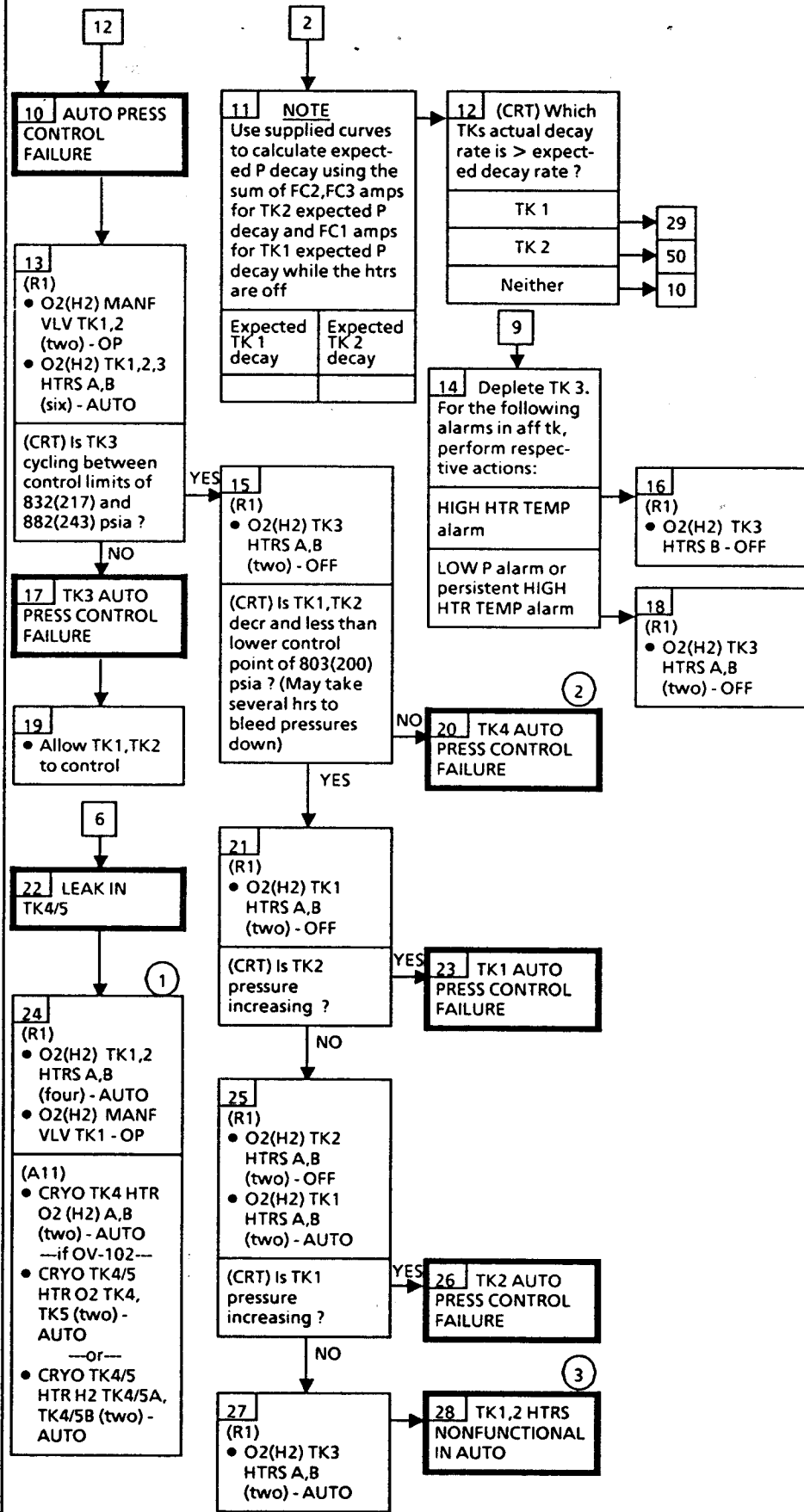
CRYO O2(H2) PRESS/TEMP HIGH SM SYS SUMM 2

1. Affected O2(H2) TK HTR (two) - OFF
2. If SM ALERT ONLY, go to MAL, ECLS, 6.3h (O2 TK P) or 6.3c (H2 TK P), or 6.3f (H2 HTR T)
 - If O2 PRESS (C/W), go to MAL, ECLS, 6.3g
 - If H2 PRESS (C/W), go to MAL, ECLS, 6.3b
 - If O2 HTR TEMP, go to MAL, ECLS, 6.3i

6.3a CRYO O2(H2) LEAK

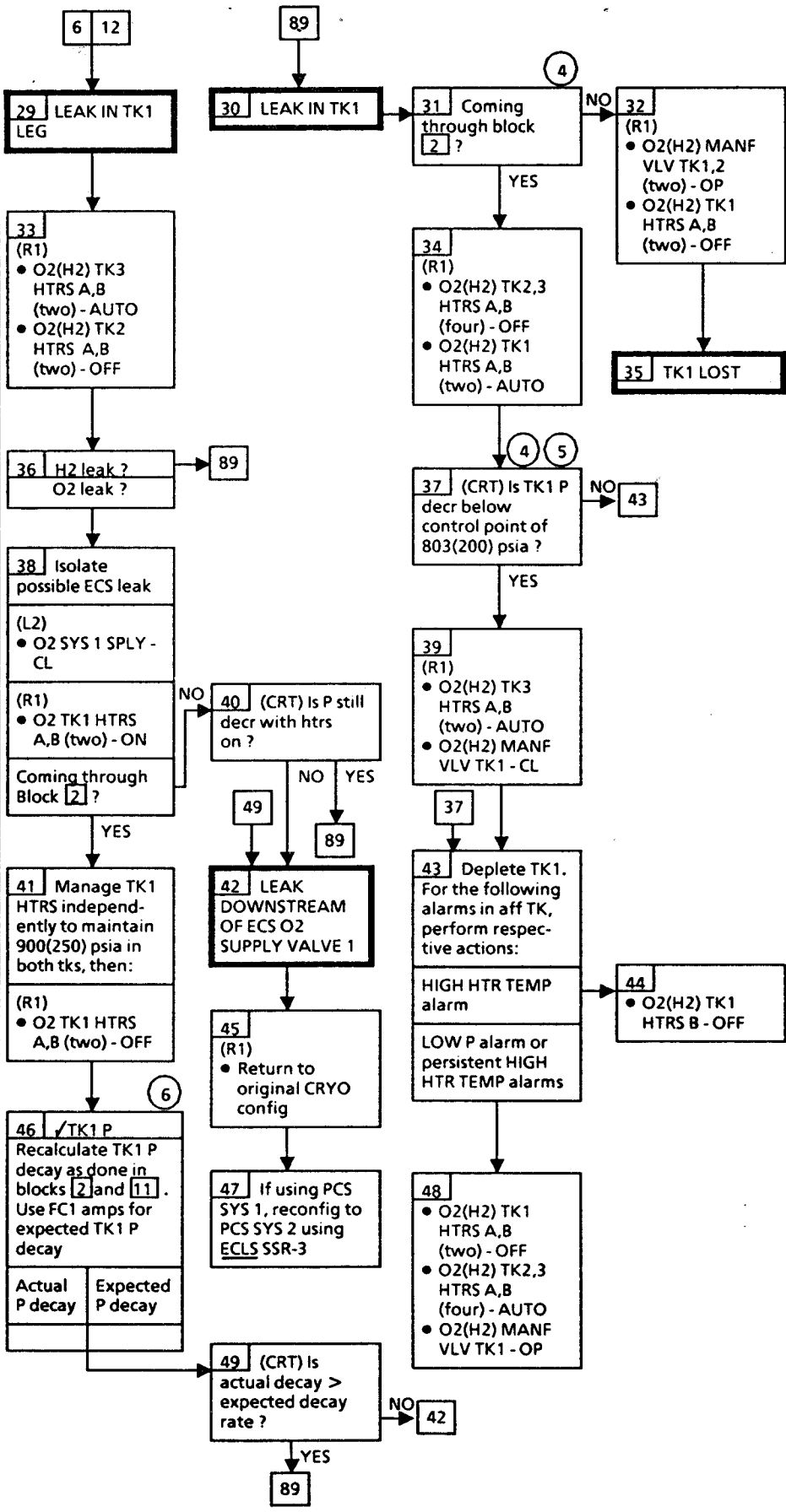


ECLS 6.3a (Cont)



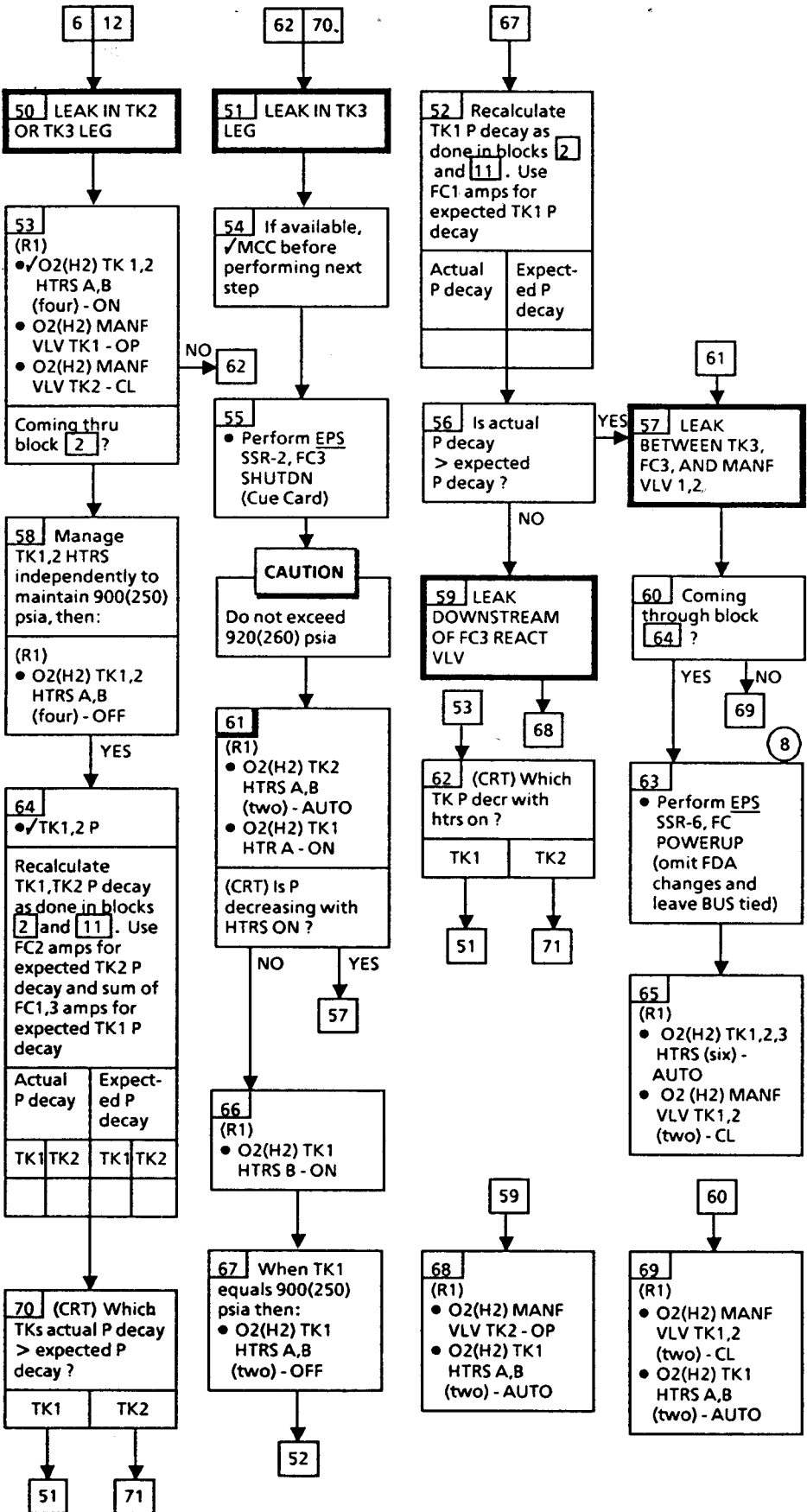
- ① If leak is in a tk, attempt will be made to deplete that tk first
- ② Since TK1,2,3 controllers are working properly, TK4 htr logic must be failed, thus preventing TK3 from operating
- ③ ✓MCC if problems with TK3 occur, refer to ECLS SSR-1 for manual htr ops in TK1,2

ECLS 6.3a (Cont)



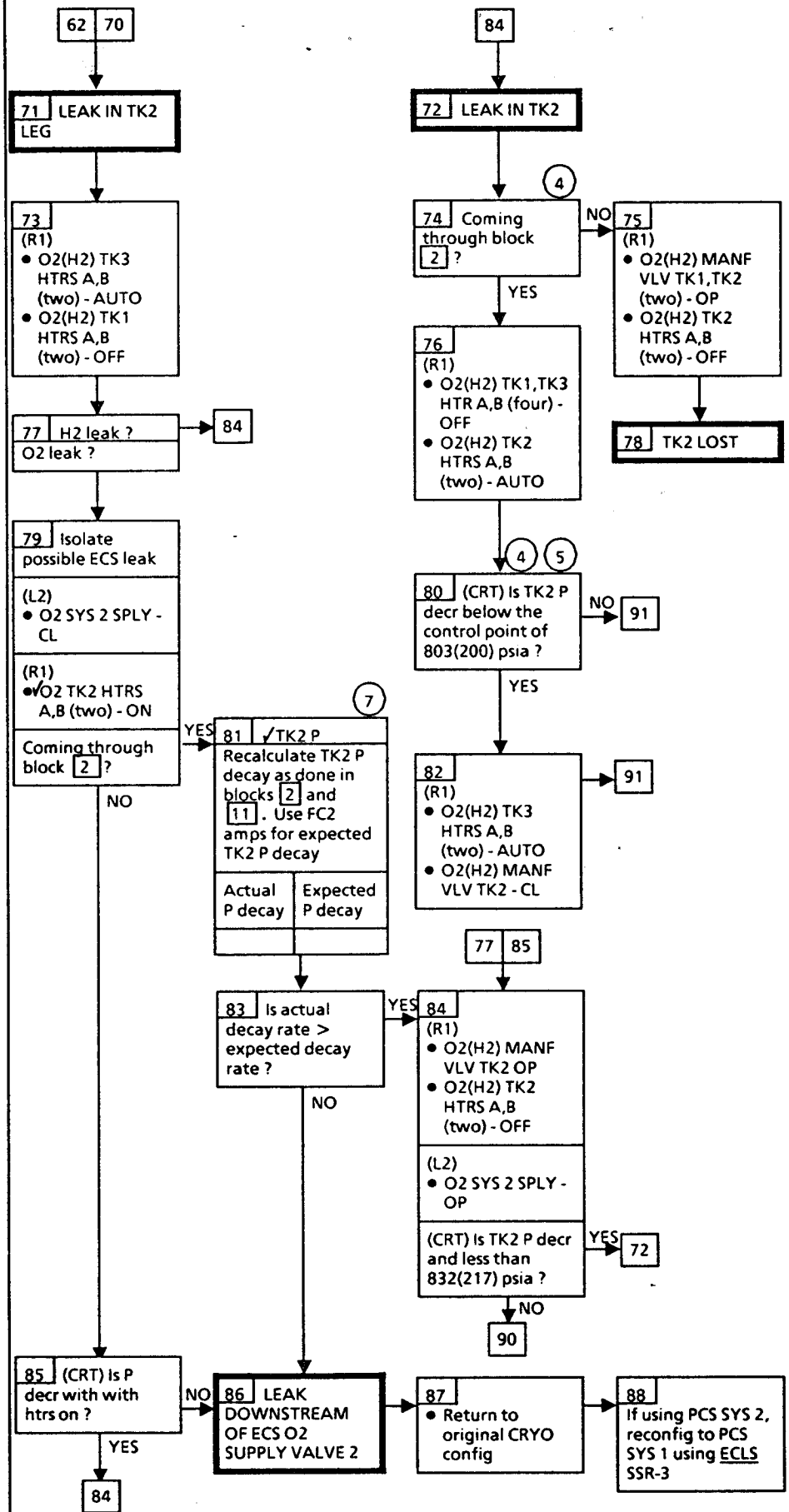
- 4 If leak is in a tk, attempt will be made to deplete that tk first. If tk cannot sply all fuel cells and leak then tk will be reconfigured to sply one or two fuel cells
- 5 Htr contr P on/off ranges with tolerances incl O2 TK1/2: 803 - 854 psia
O2 TK3/4/5: 832 - 882 psia
H2 TK1/2: 200 - 226 psia
H2 TK3/4/5: 217 - 243 psia
If TK1 and 2 htrs are both in AUTO, then both TK Ps must be below control point for either htr to cycle on
- 6 Ensure that FC amps have not changed more than 20%. Recalculate from curve if necessary

ECLS 6.3a (Cont)



7 If leak is in manifold or fuel cell, then leaking leg may be isolated and fuel cell used for orbit. Fuel cell may be considered lost and shutdown for entry

ECLS 6.3a (Cont)

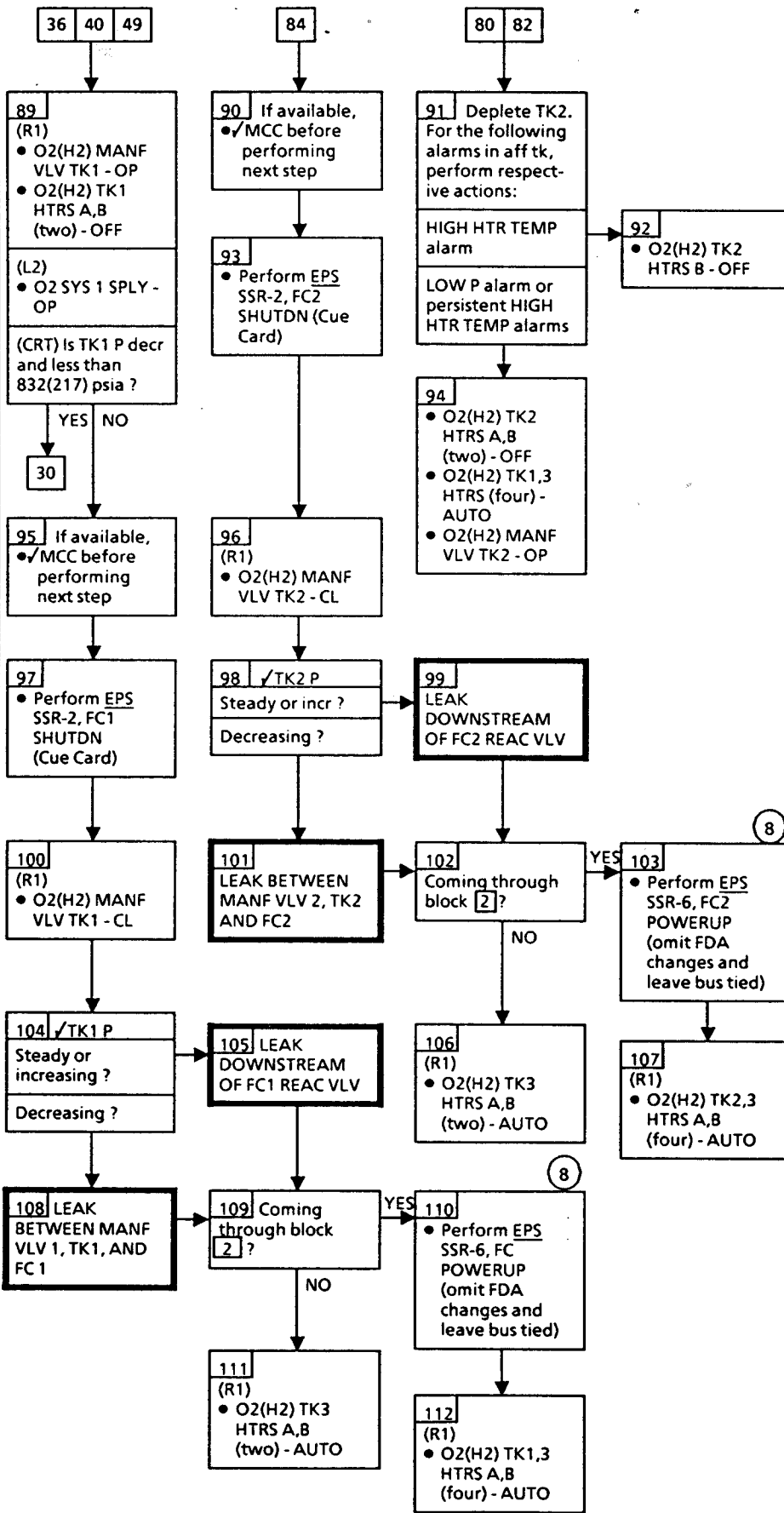


4 If leak is in a tk, attempt will be made to deplete that tk first. If tk unable to sply all fuel cells and leak then tk will be reconfigured to sply one or two fuel cells

5 Htr contr P on/off ranges with tolerances incl
 O2 TK1/2: 803 - 854 psia
 O2 TK3/4/5: 832 - 882 psia
 H2 TK1/2: 200 - 226 psia
 H2 TK3/4/5: 217 - 243 psia
 If TK1 and 2 htrs are both in AUTO, then both TK Ps must be below control point for either htr to cycle on

6 Ensure that FC amps have not changed more than 20%. Recalculate from curve if necessary

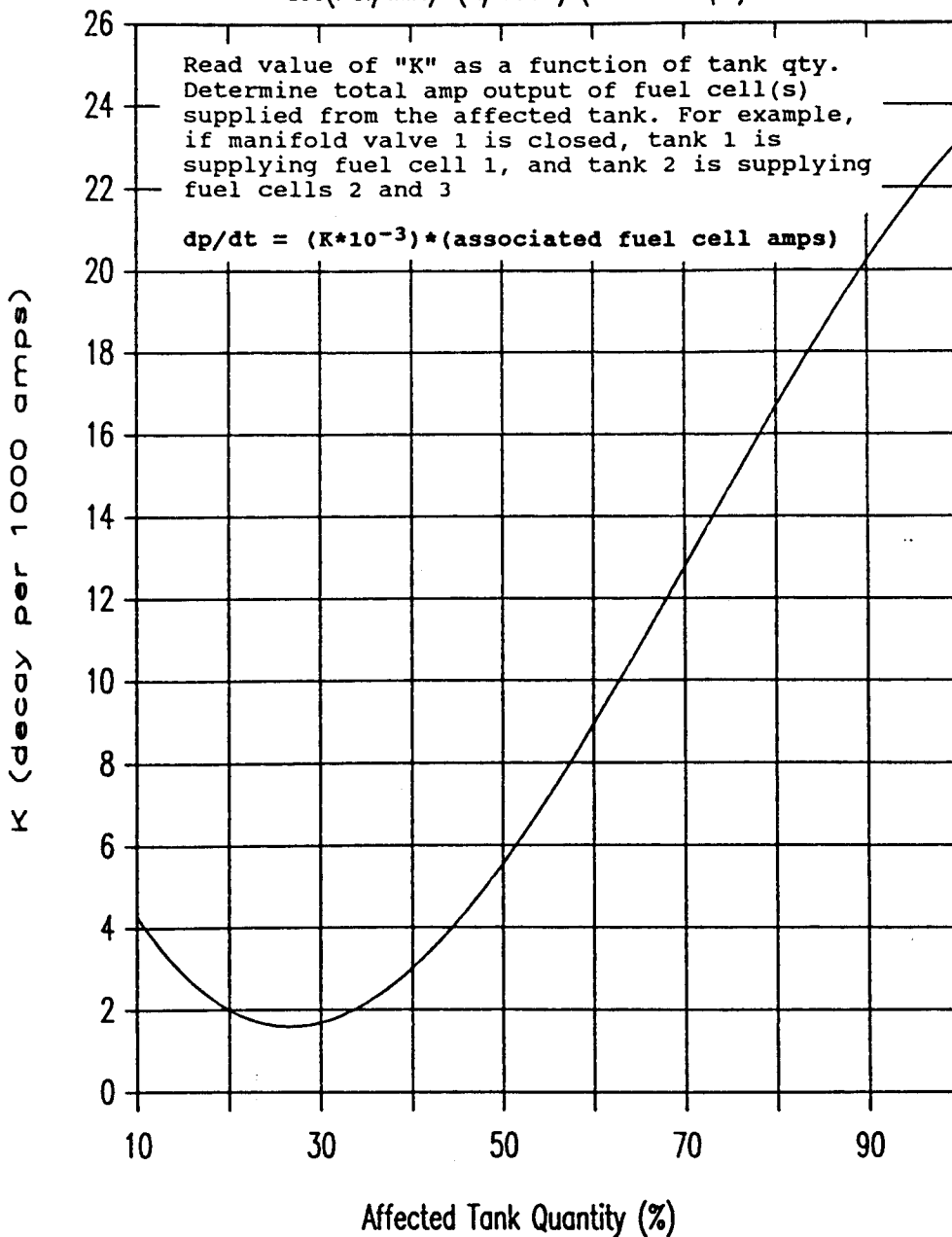
ECLS 6.3a (Cont)



8 If leak is in manifold or fuel cell, then leaking leg may be isolated and FC used for orbit. The FC will be considered lost and shutdn prior to entry

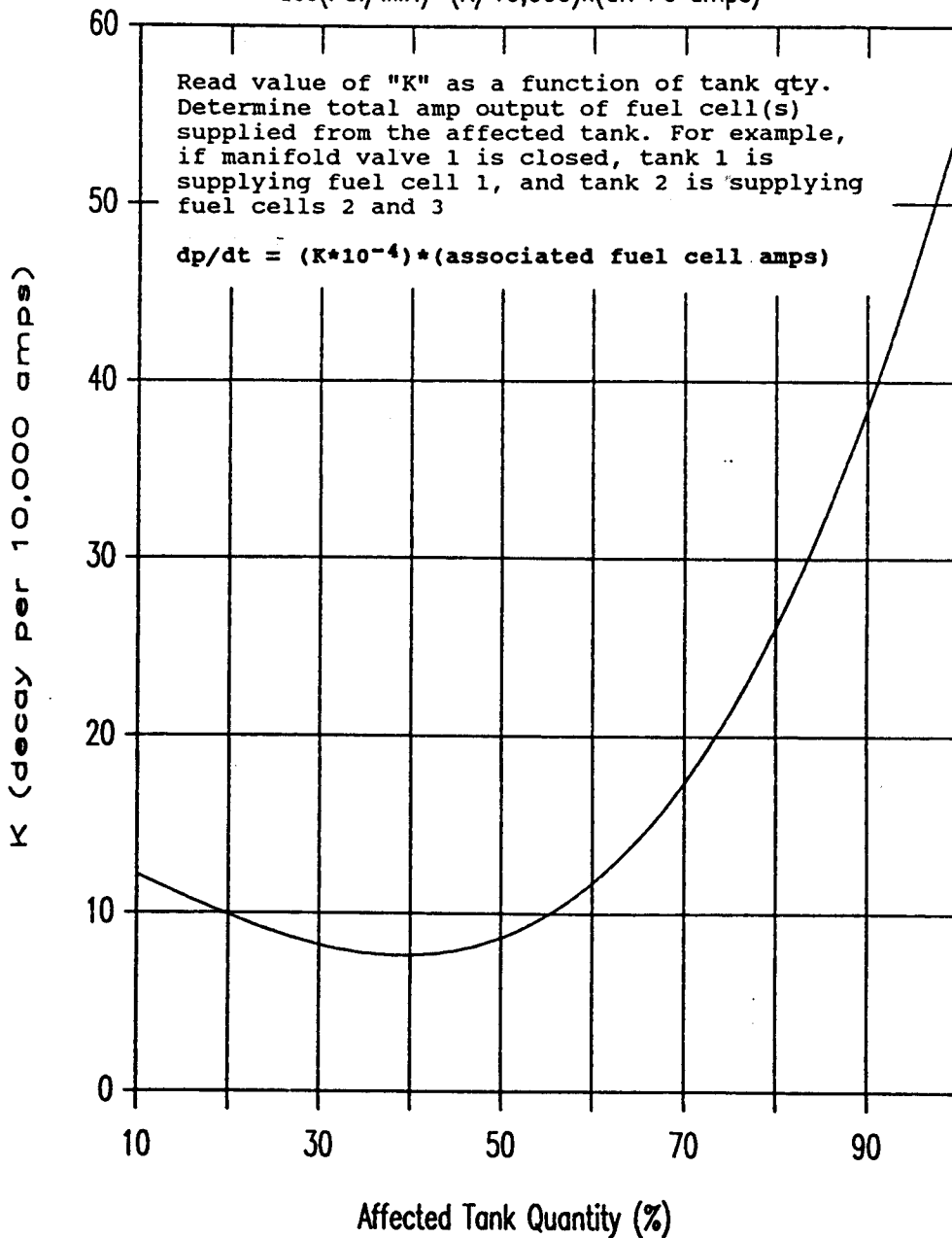
NORMAL O2 PRESS DECAY RATE

$$\text{dec(PSI/MIN)} = (K/1000) \times (\text{aff FC amps})$$

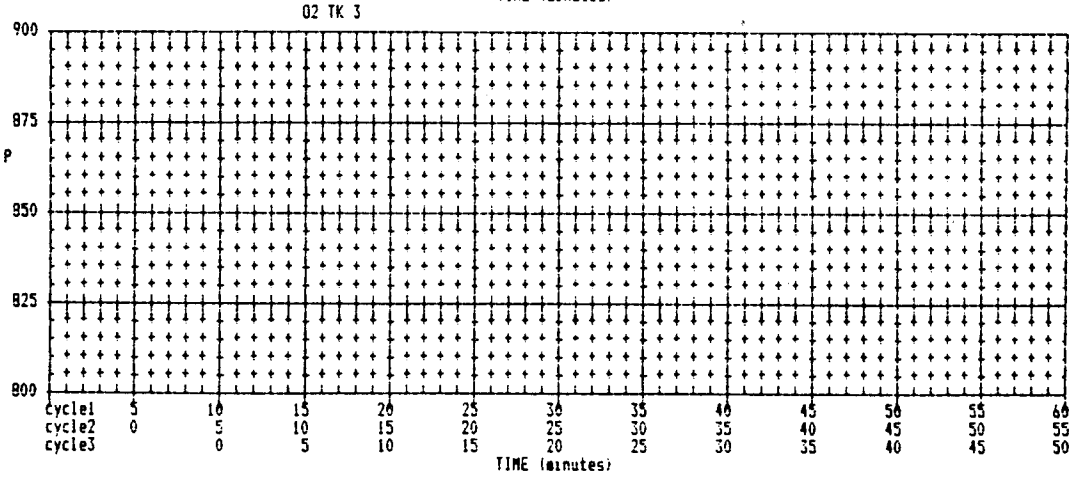
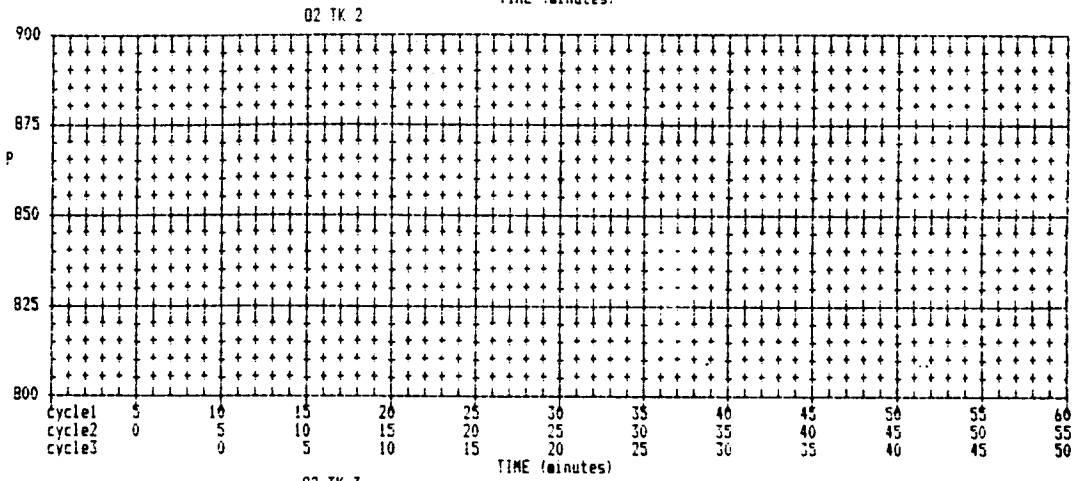
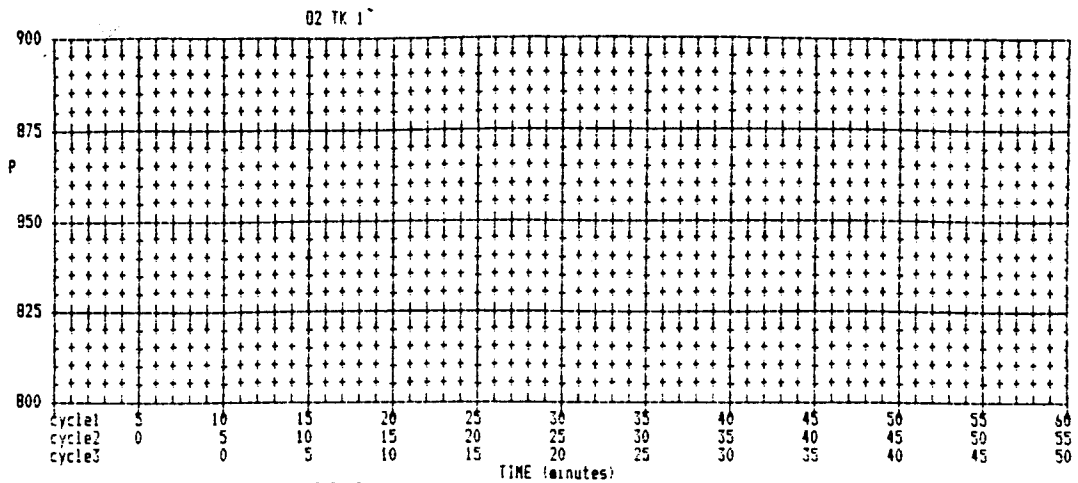


NORMAL H2 PRESS DECAY RATE

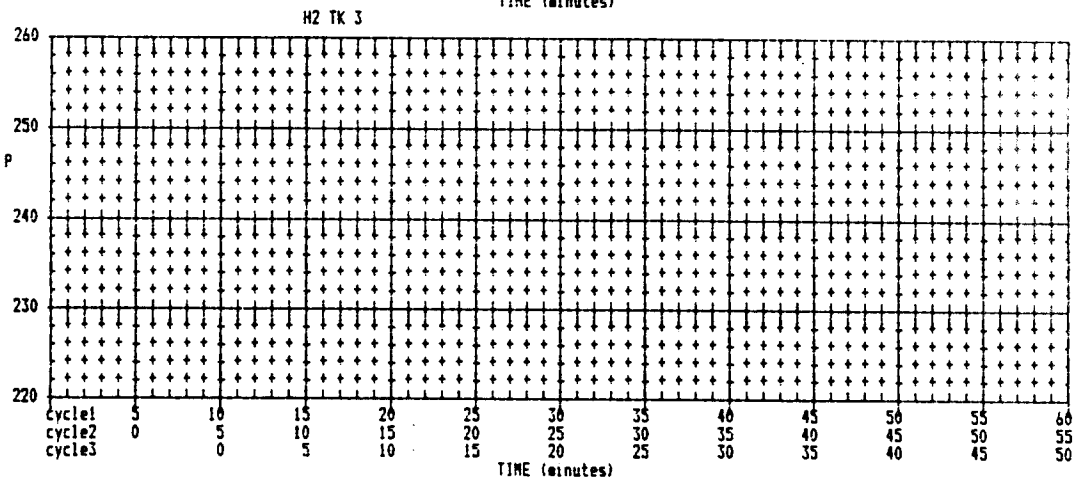
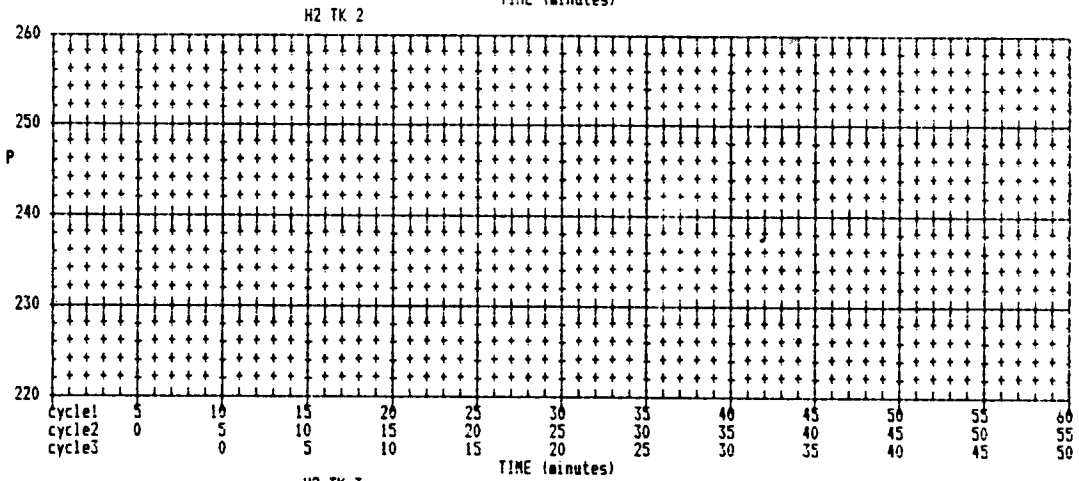
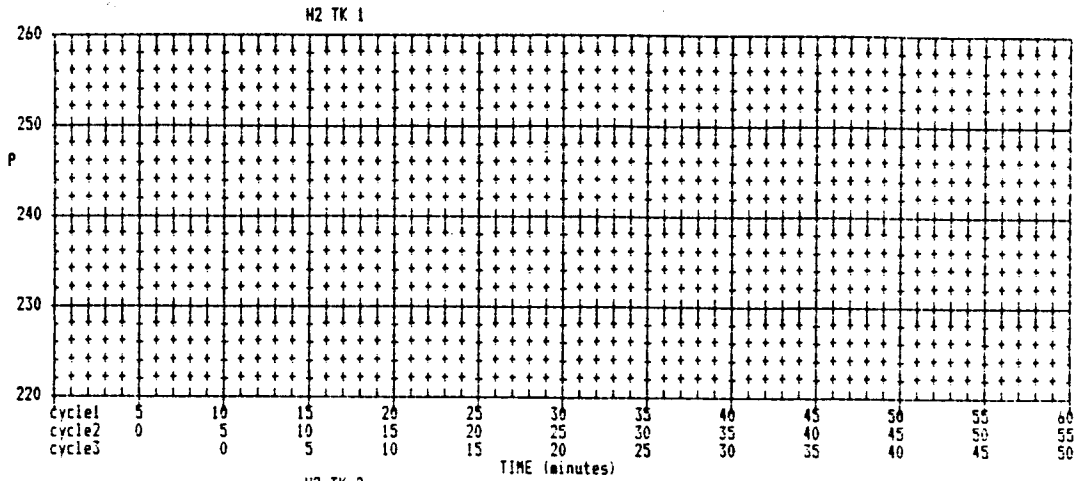
$$\text{dec(PSI/MIN)} = (K/10,000) \times (\text{aff FC amps})$$



Cryogenic Oxygen actual pressure decay charts.
 Multiple time cycles allow comparison of decay rates before and after corrective action.

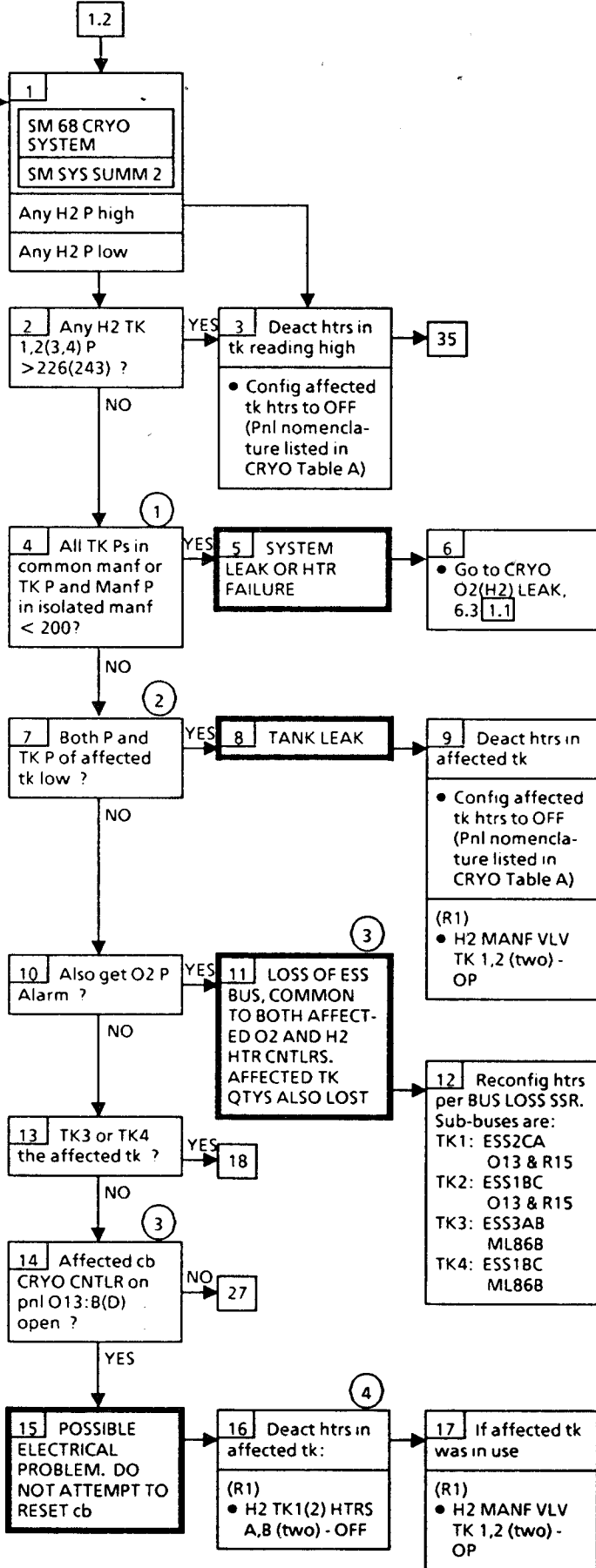


Cryogenic Hydrogen actual pressure decay charts.
 Multiple time cycles allow comparison of decay rates before and after corrective action.



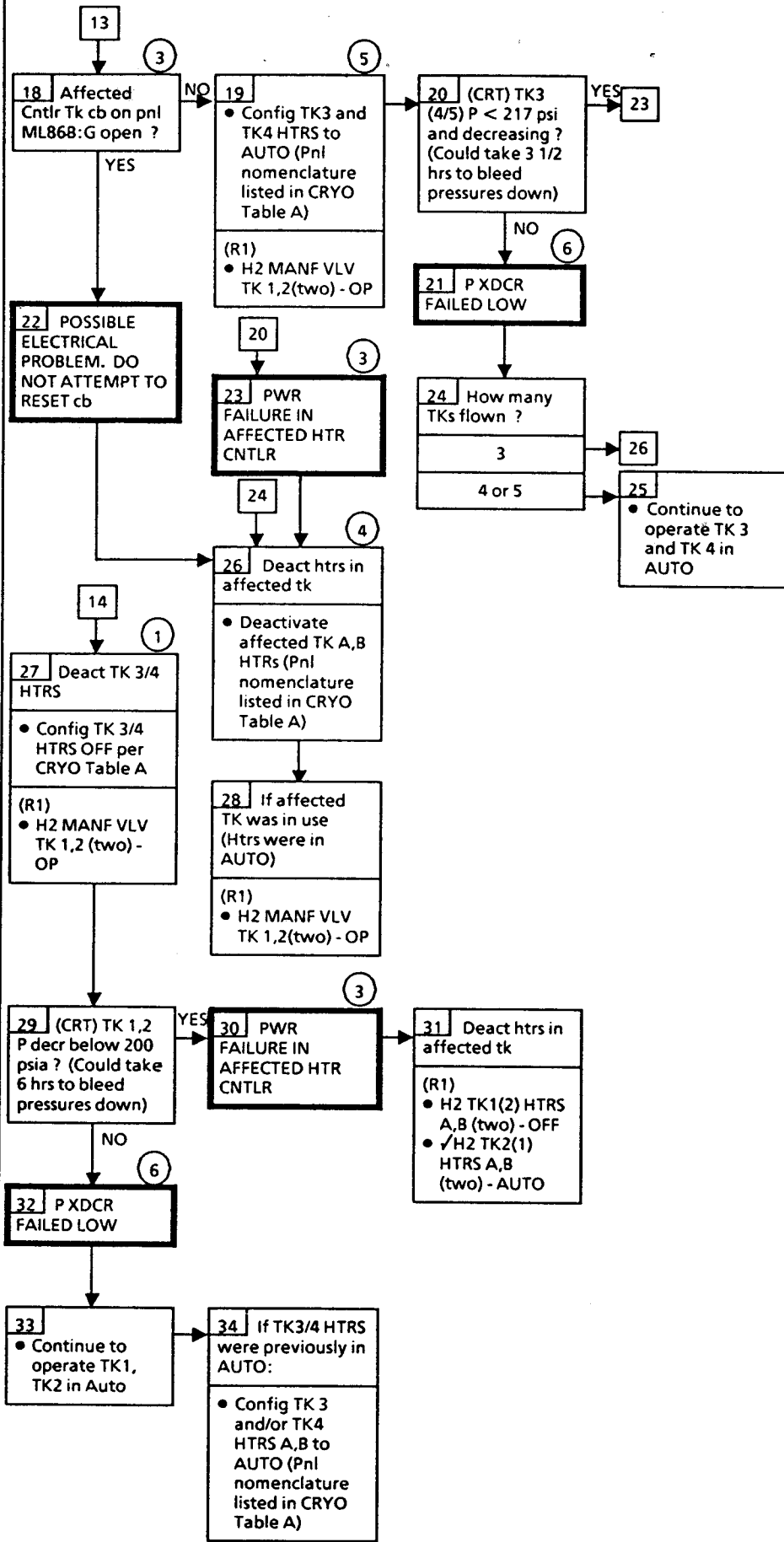
If:
H2 P
> 293.8 psia
< 153 psia

Nominal Config:
(O13:D)
cb ESS 2CA CRYO
CNTLR H2 TK1 -cl
cb ESS 2CA CRYO
QTY H2 TK1 -cl
(O13:B)
cb ESS 1BC CRYO
CNTLR H2 TK2 -cl
cb ESS 1BC CRYO
QTY H2 TK2 -cl
(ML86B:G)
cb ESS 3AB CRYO
CNTLR H2 TK3 -cl
cb ESS 3AB CRYO
QTY H2 TK3 -cl
cb ESS 1BC CRYO
CNTLR H2 TK4 -cl
cb ESS 1BC CRYO
QTY H2 TK4 -cl



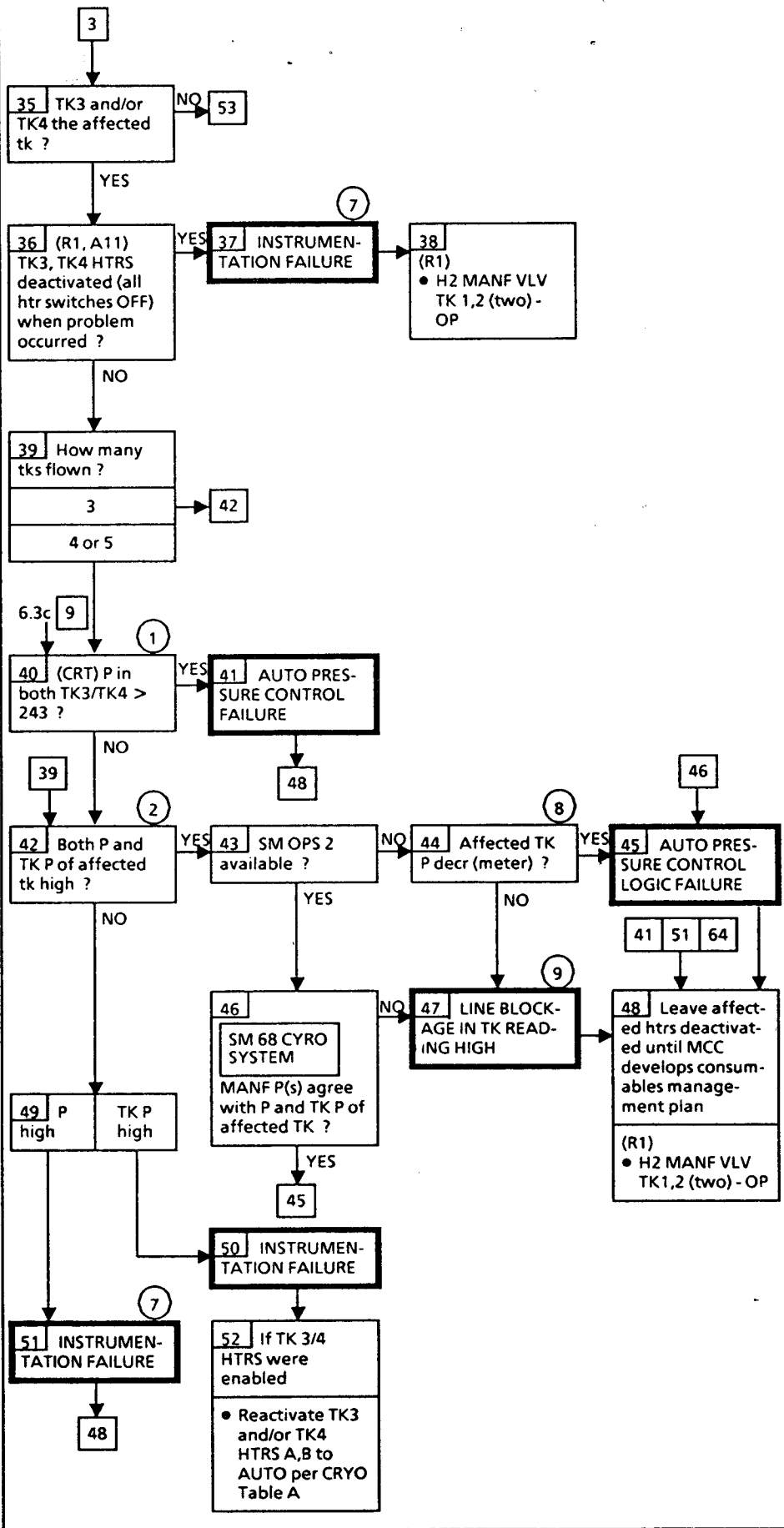
- ① H2 TK auto control pressures: TK 1/2: 200-226 TK 3/4: 217-243
- ② If SM OPS 2 not available, substitute pnl meter reading for TK P. Use SM SYS SUMM 2 H2 PRESS for P
- ③ Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low (145 psia) and loss of Auto capability
- ④ MCC will recommend new mgmt scheme

ECLS 6.3b (Cont)



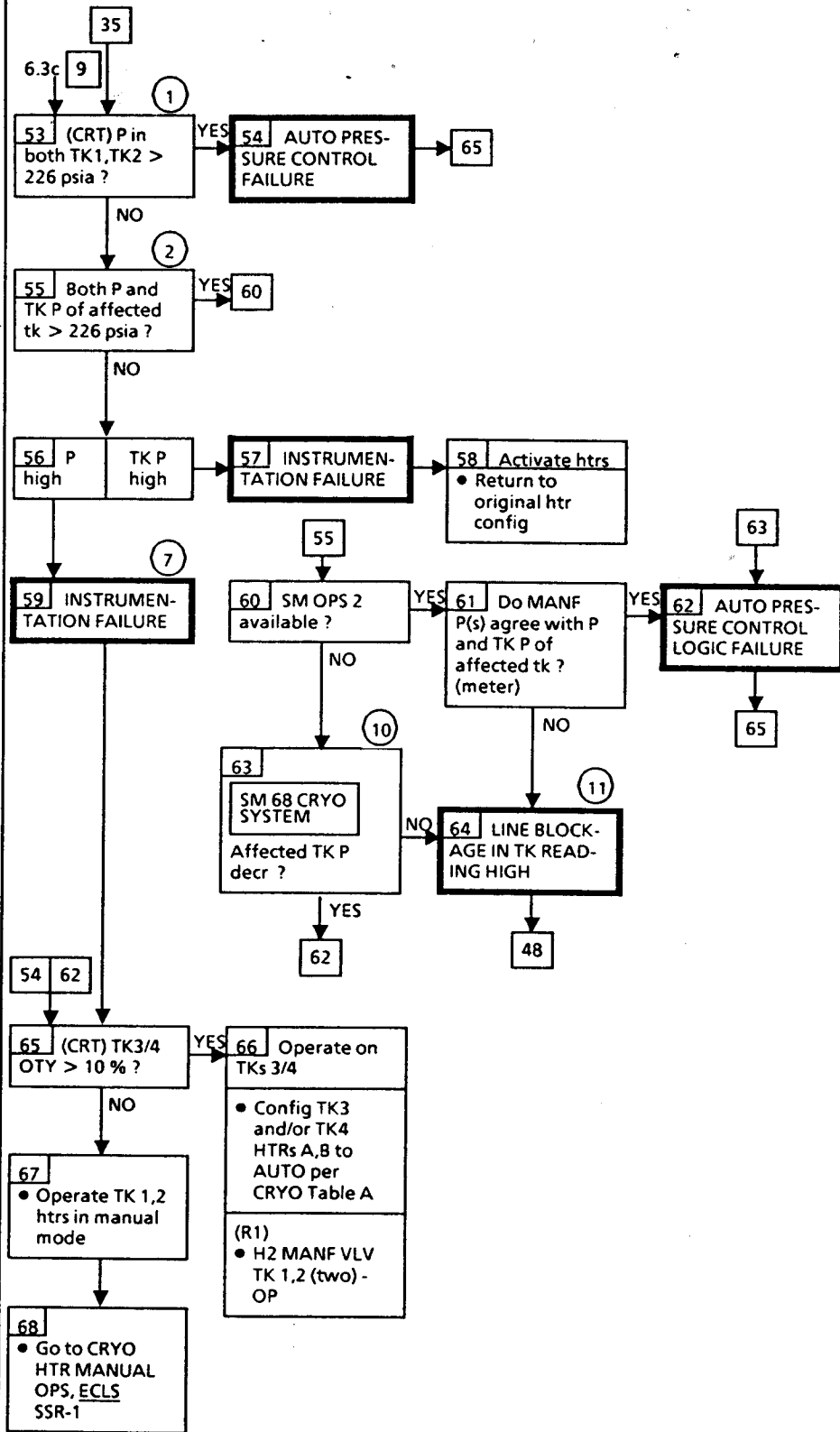
- ① H2 TK auto control pressures: TK 1/2: 200-226 TK 3/4: 217-243
- ③ Loss of ESS bus, cb failed open, or loss of htr cntrl results in P Xdcr reading off-scale low (145 psia) and loss of Auto capability
- ④ MCC will recommend new mgmt scheme
- ⑤ If TK 3 or TK 4 htrs operating, TK 1/2 HTRS should not have to cycle due to higher operating PRESS in TKS 3/4. If one of TK 3 or TK 4 HTR controllers are failed and affected tk htrs are in auto, other tk htrs in TK pair will not function in auto
- ⑥ If only P Xdcr failed low, continue Auto ops if affected TK can be used in TK pair. Auto cycling determined only by P in other logic paired tk. TK 1,2 are paired and TK 3,4 are paired through htr Auto logic

ECLS 6.3b (Cont)



- ① H2 TK auto control pressures: TK 1/2: 200-226 TK 3/4: 217-243
- ② If SM OPS 2 not available, substitute pnl meter reading for TK P. Use SM SYS SUMM 2 H2 PRESS for P
- ⑦ Failure of P Xdcr high will prevent AUTO htr ops
- ⑧ Once htrs are deactivated in tk with high P, the P should decr to normal value
- ⑨ Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack

ECLS 6.3b (Cont)



- ① H2 TK auto control pressures:
TK 1/2: 200-226
TK 3/4: 217-243
- ② If SM OPS 2 not available, substitute pnl meter reading for TK P. Use SM SYS SUMM 2 H2 PRESS for P
- ⑦ Failure of P Xdcr high will prevent AUTO htr ops
- ⑧ Once htrs are deactivated in tk with high P, the P should decr to normal value
- ⑨ Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack

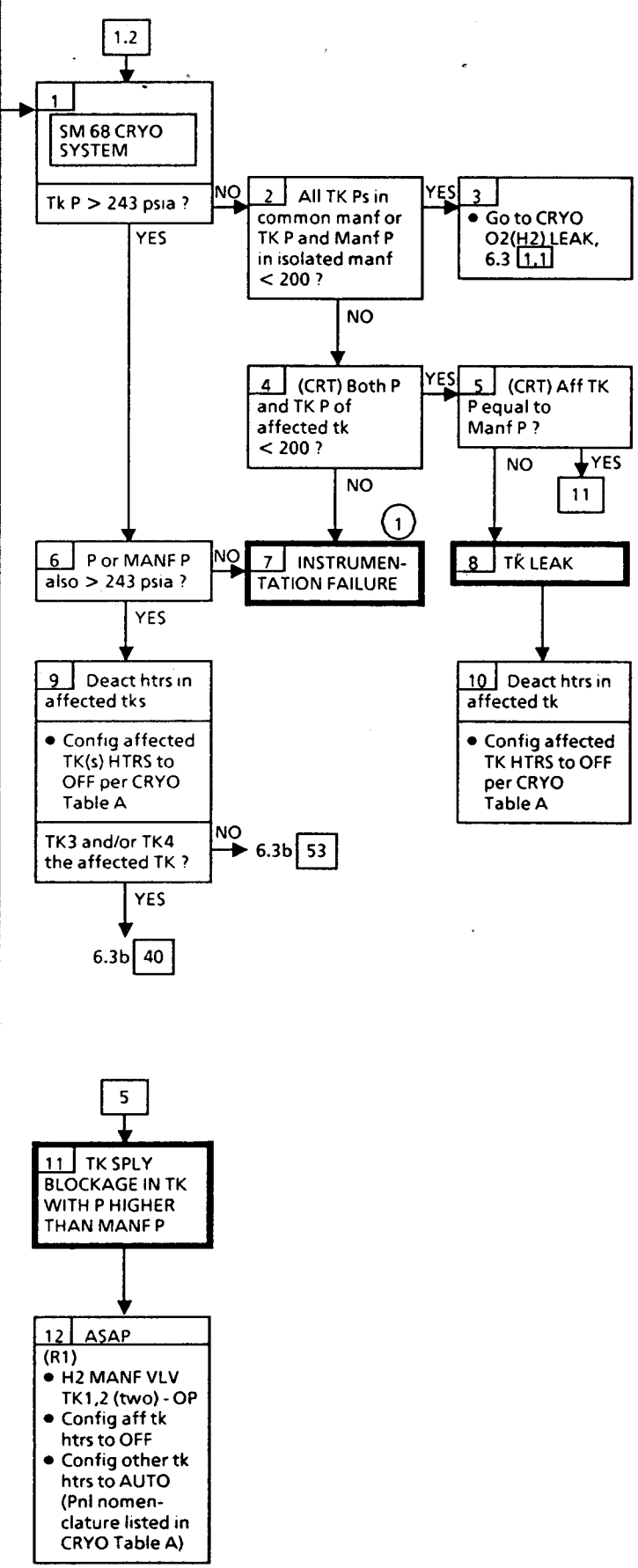
① AUTO HTR OPS still available with failure of this xdcr

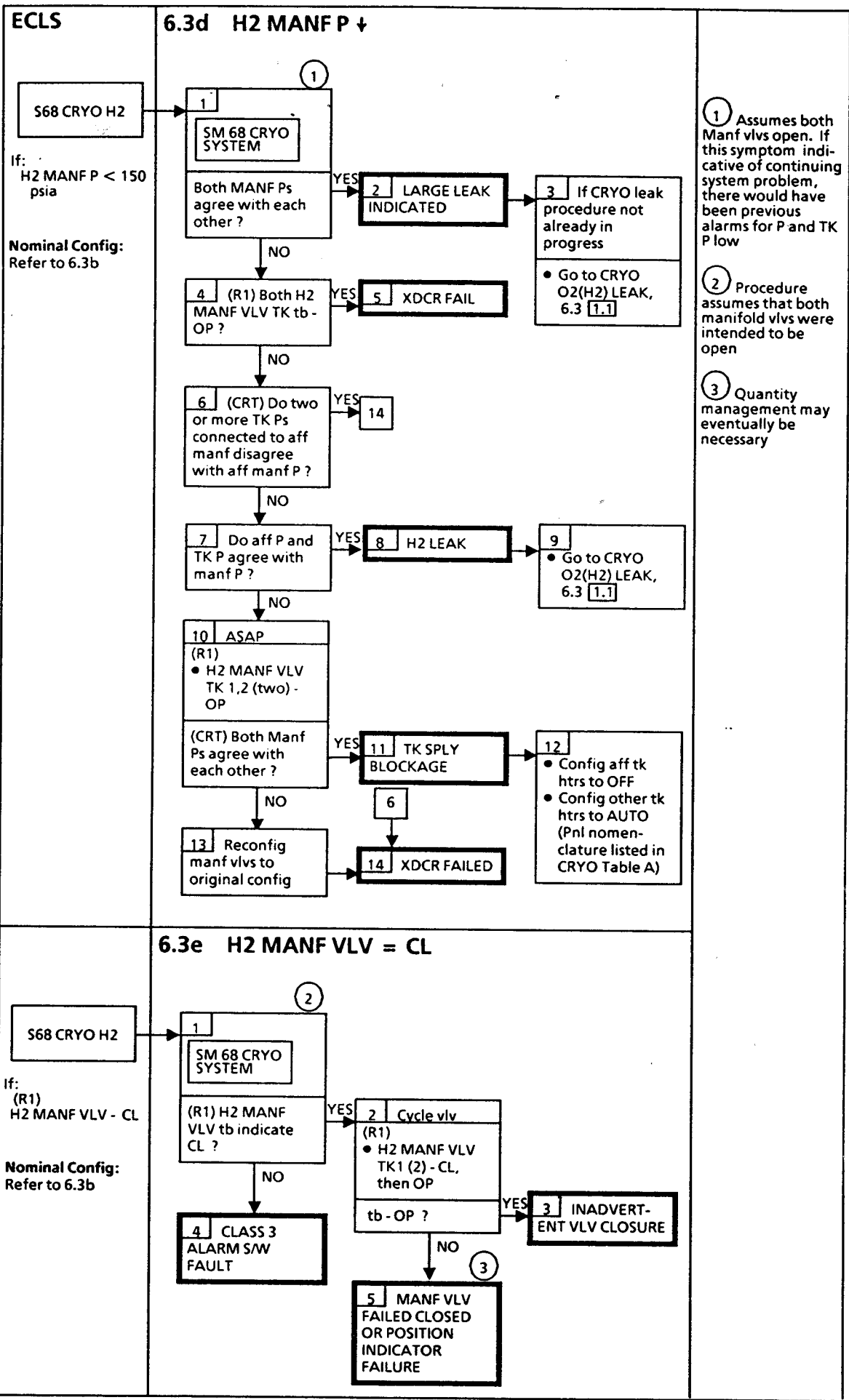
SM ALERT

S68 CRYO H2

If:
H2 TK P
> 283 psia
< 165 psia (htrs in OFF or ON)
< 189.8 (AUTO)

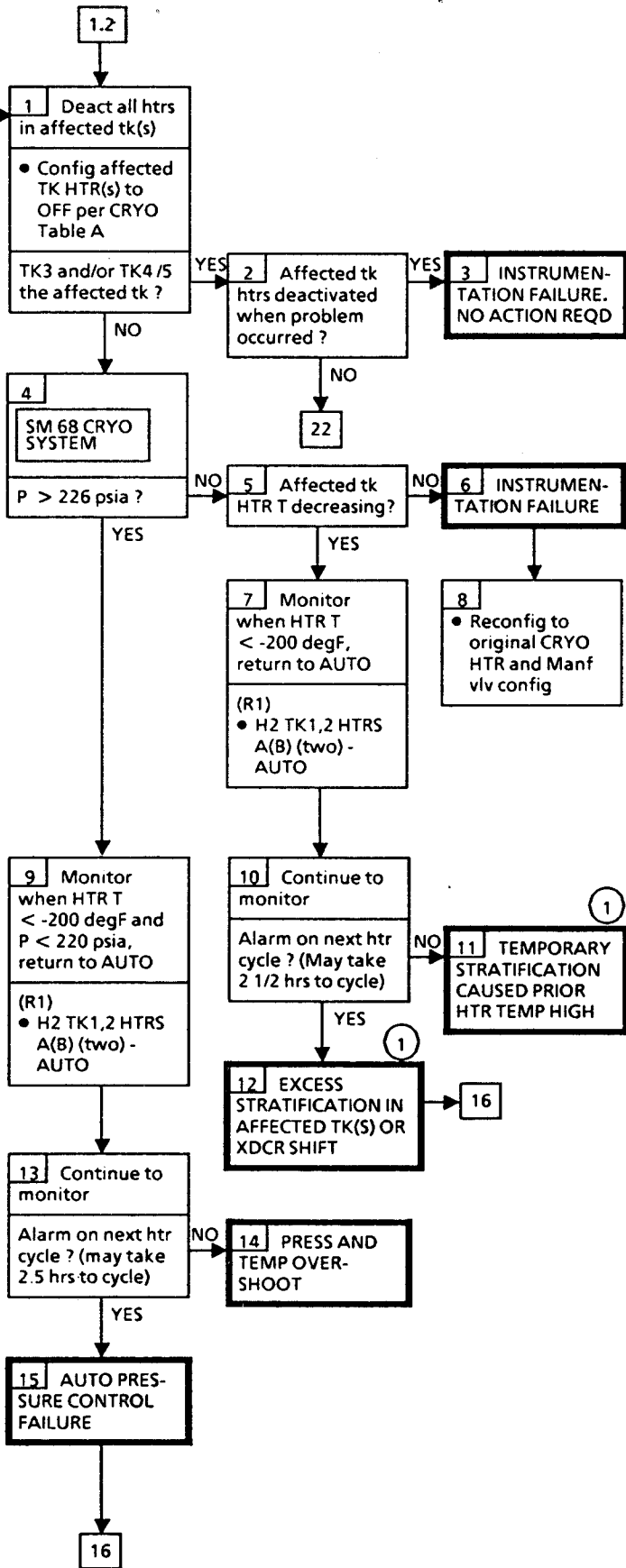
Nominal Config:
Refer to 6.3b





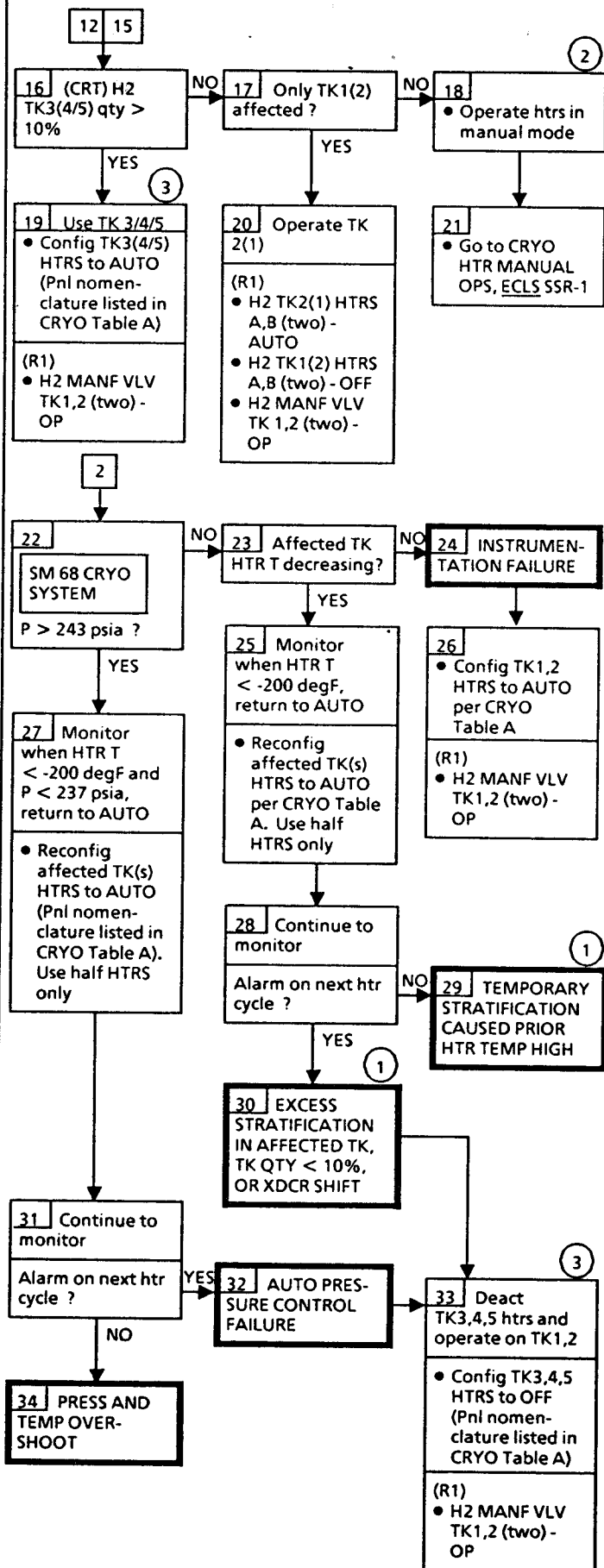
- ① Assumes both Manf vlvs open. If this symptom indicative of continuing system problem, there would have been previous alarms for P and TK P low
- ② Procedure assumes that both manifold vlvs were intended to be open
- ③ Quantity management may eventually be necessary

SM ALERT
 S68 CRYO H2
 If:
 H2 HTR T
 > 210 degF
 Nominal Config:
 Refer to 6.3b



① Stratification normally occurs when htrs are operating for long periods of time and during periods of attitude holds

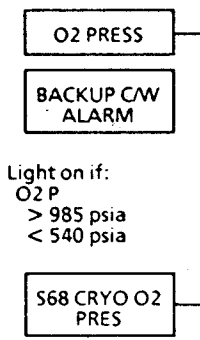
ECLS 6.3f (Cont)



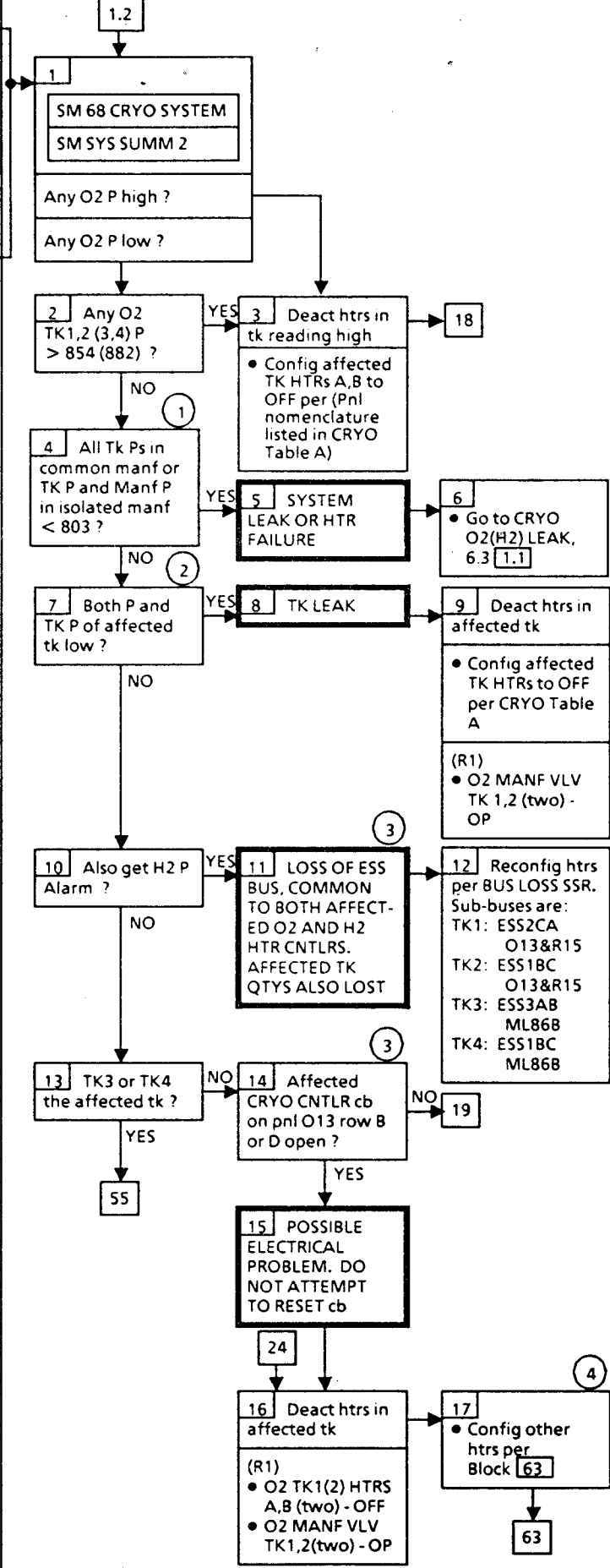
- ① Stratification normally occurs when htrs are operating for long periods of time and during periods of attitude holds
- ② If additional temperature alarm occurs while htrs are activated, deactivate htrs until low press alarm sounds
- ③ MCC will determine CRYO mgmt plan

ECLS

6.3g CRYO O2 PRES

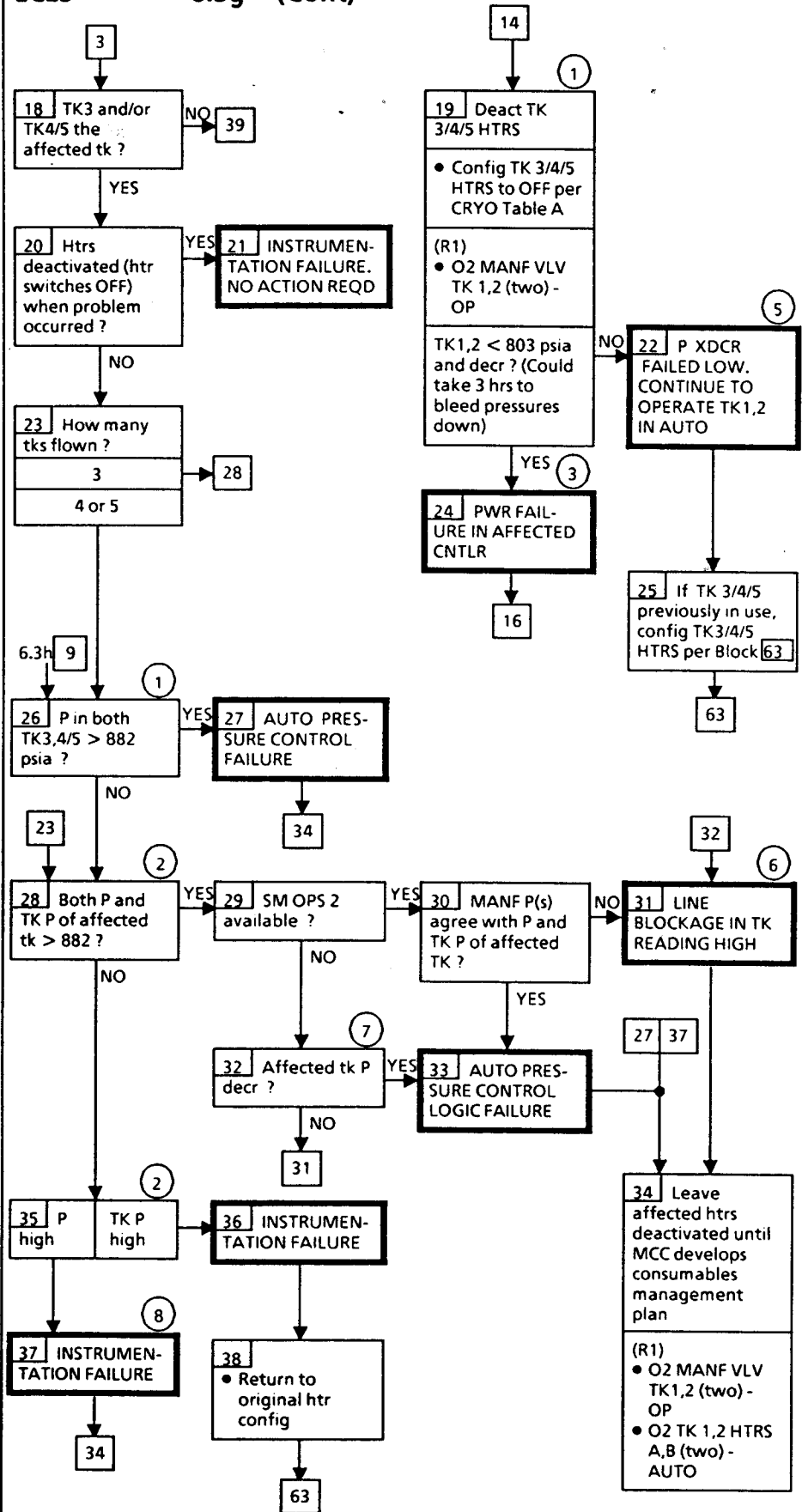


Nominal Config:
(O13:D)
cb ESS 2CA CRYO CNTLR O2 TK1 - cl
cb ESS 2CA CRYO QTY O2 TK1 - cl
(O13:B)
cb ESS 1BC CRYO CNTLR O2 TK2 - cl
cb ESS 1BC CRYO QTY O2 TK2 - cl
(ML86B:G)
cb ESS 3AB CRYO CNTLR O2 TK3 - cl
cb ESS 3AB CRYO QTY O2 TK3 - cl
cb ESS 1BC CRYO CNTLR O2 TK4 - cl
cb ESS 1BC CRYO QTY O2 TK4 - cl
(O14:C)
cb MNA CRYO O2 HTR TK1 SNSR 1 - cl
(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 CRYO O2 HTR TK3 SNSR 1 - cl
cb MNB CRYO O2 HTR TK3 SNSR 2 - cl
cb MNB CRYO O2 HTR TK4 SNSR 1 - cl
cb MNC CRYO O2 HTR TK4 SNSR 2 - cl



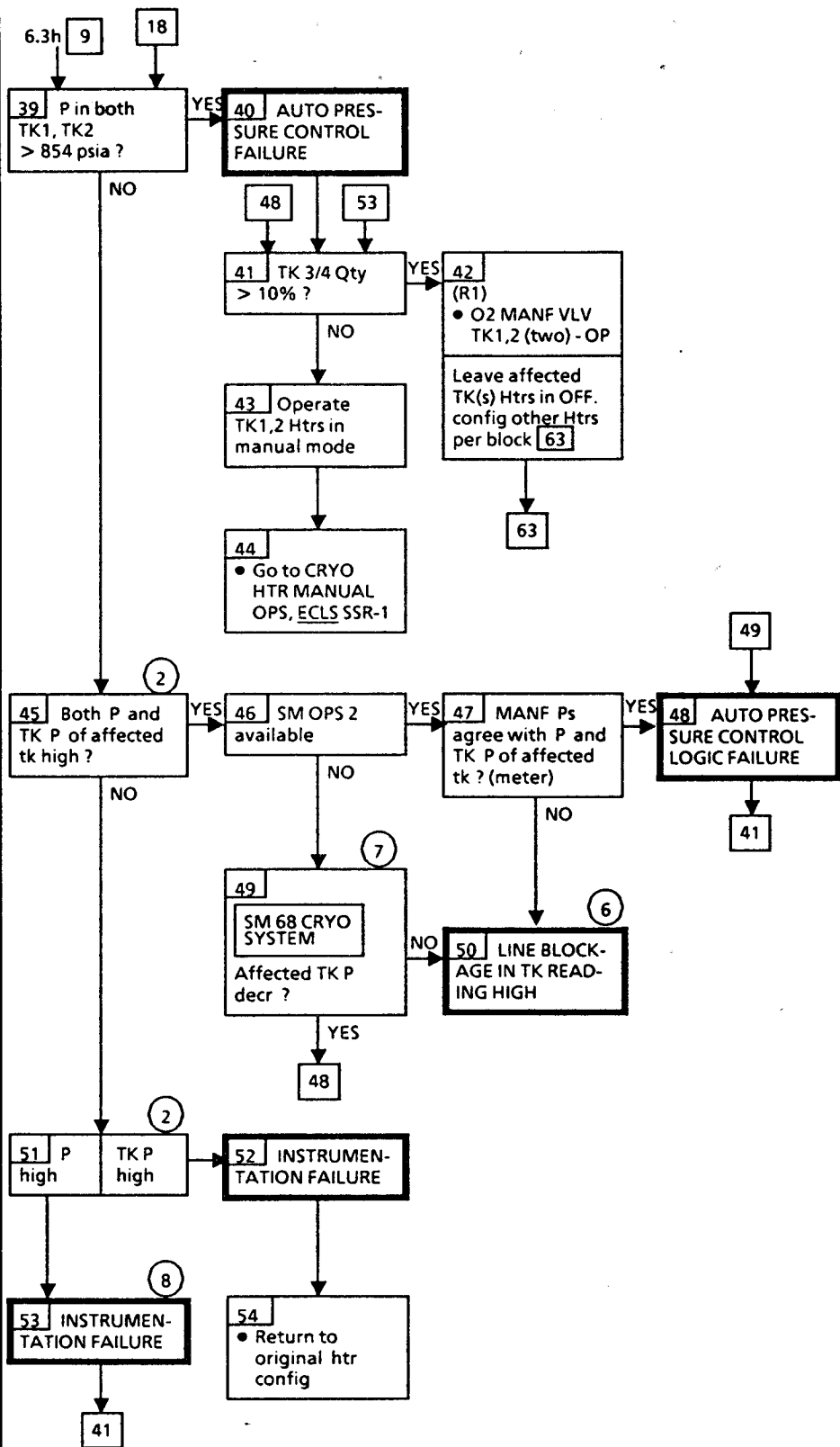
- ① O2 TK CONTROL Ps
TK 1/2: 803-854
TK 3/4: 832-882
- ② If SM OPS 2 not available, substitute pnl meter reading for TK P. Use SM SYS SUM 2 O2 PRESS for P
- ③ Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low (515 psia) and loss of Auto capability
- ④ MCC will recommend new CRYO mgmt plan

ECLS 6.3g (Cont)



- ① O2 TK CONTROL Ps TK1/2: 803-853 TK3/4: 832-882
- ② If SM OPS 2 not available, substitute pnl meter reading for TK P. Use SM SYS SUMM 2 O2 PRESS for P
- ③ Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low (515 psia) and loss of Auto capability
- ④ Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack
- ⑤ If only P Xdcr failed low, continue Auto ops. Auto cycling determined only by P in other logic paired tk. TK 1,2 are paired and TK 3,4 are paired through htr Auto logic
- ⑥ Once htrs are deactivated in tk with high P, the P should decr to normal value
- ⑦ Failure of P Xdcr high will prevent Auto Htr ops

ECLS 6.3g (Cont)



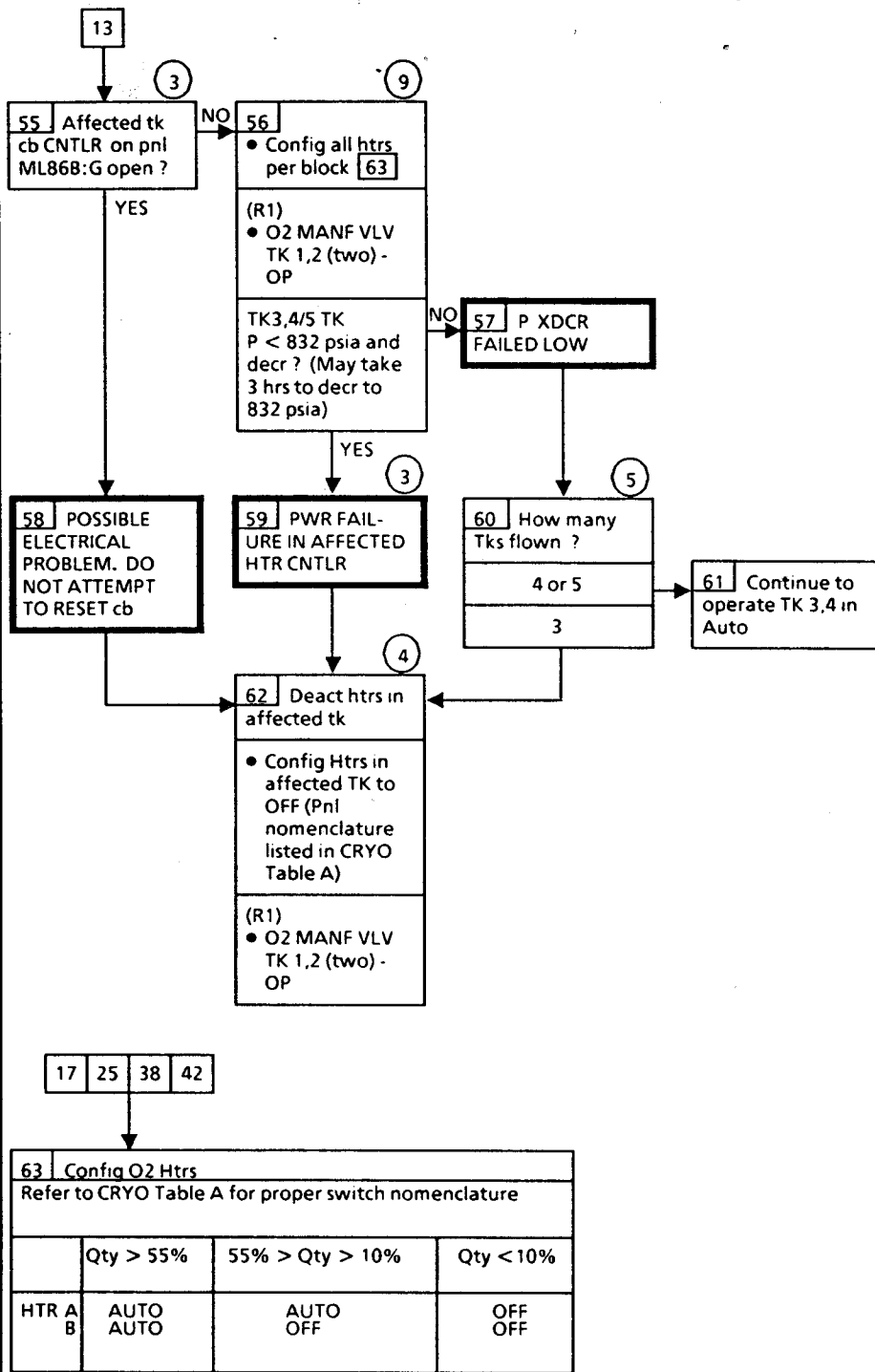
2 If SM OPS 2 not available, substitute pnl meter reading for TK P. Use SM SUMM 2 O2 PRESS for P

6 Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack

7 Once htrs are deactivated in tk with high P, the P should decr to normal value

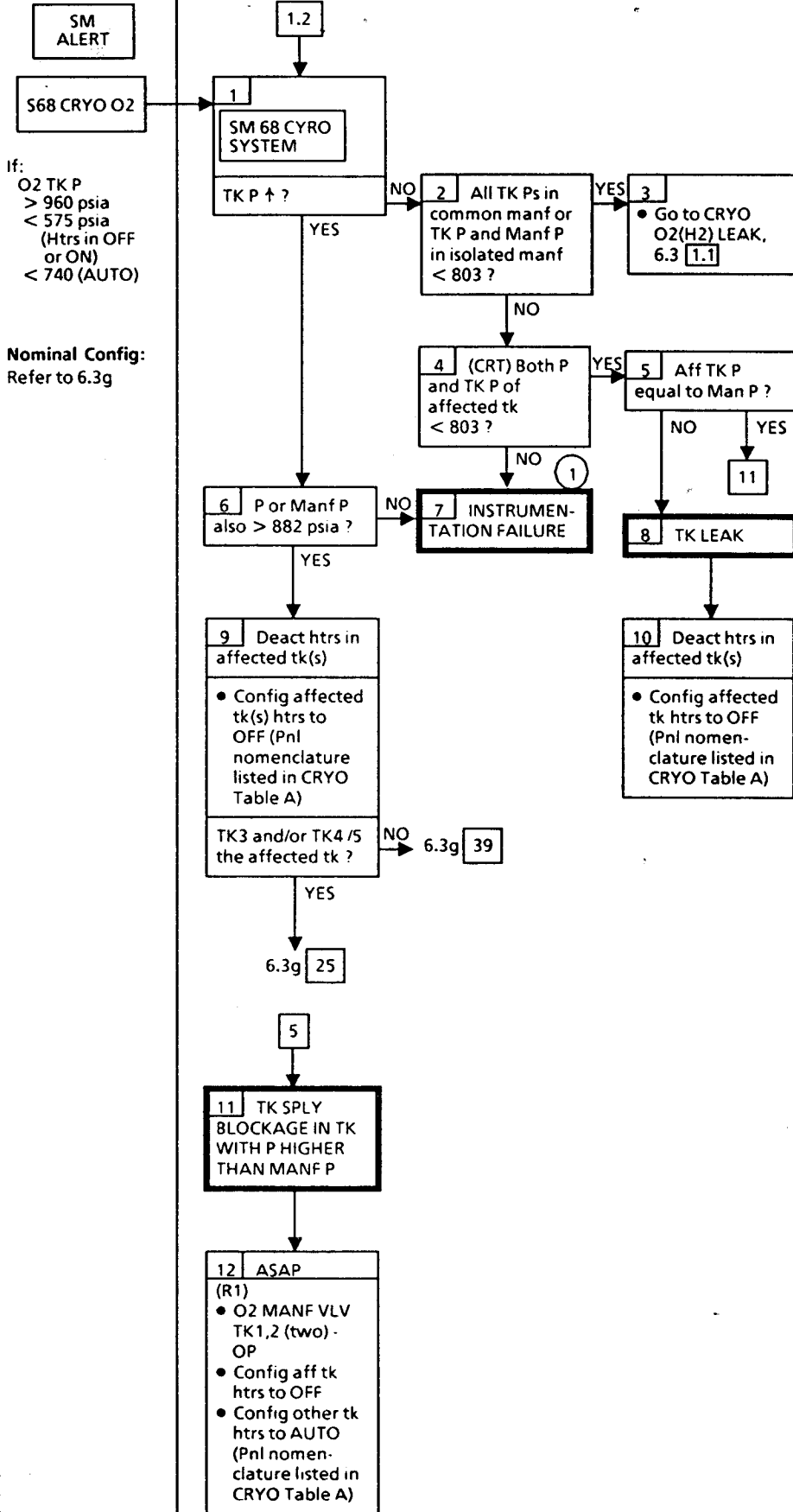
8 Failure of P Xdcr high will prevent Auto Htr ops

ECLS 6.3g (Cont)



- ③ Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low (515 psia) and loss of Auto capability
- ④ MCC will recommend new CRYO mgmt plan
- ⑤ If only P Xdcr failed low, continue Auto ops. Auto cycling determined only by P in other logic paired tk. TK 1,2 are paired and TK 3,4 are paired through htr Auto logic
- ⑥ If TK 3 or 4 HTRS operating, TK 1/2 Htrs should not cycle due to higher operating pressure in TKs 3 and 4. If either TK 3 or TK 4 HTR controller is failed and affected TK HTRS are in auto, other TK HTRS in the TK pair will not function in auto

① AUTO HTRS OPS still available with failure of this xdcr

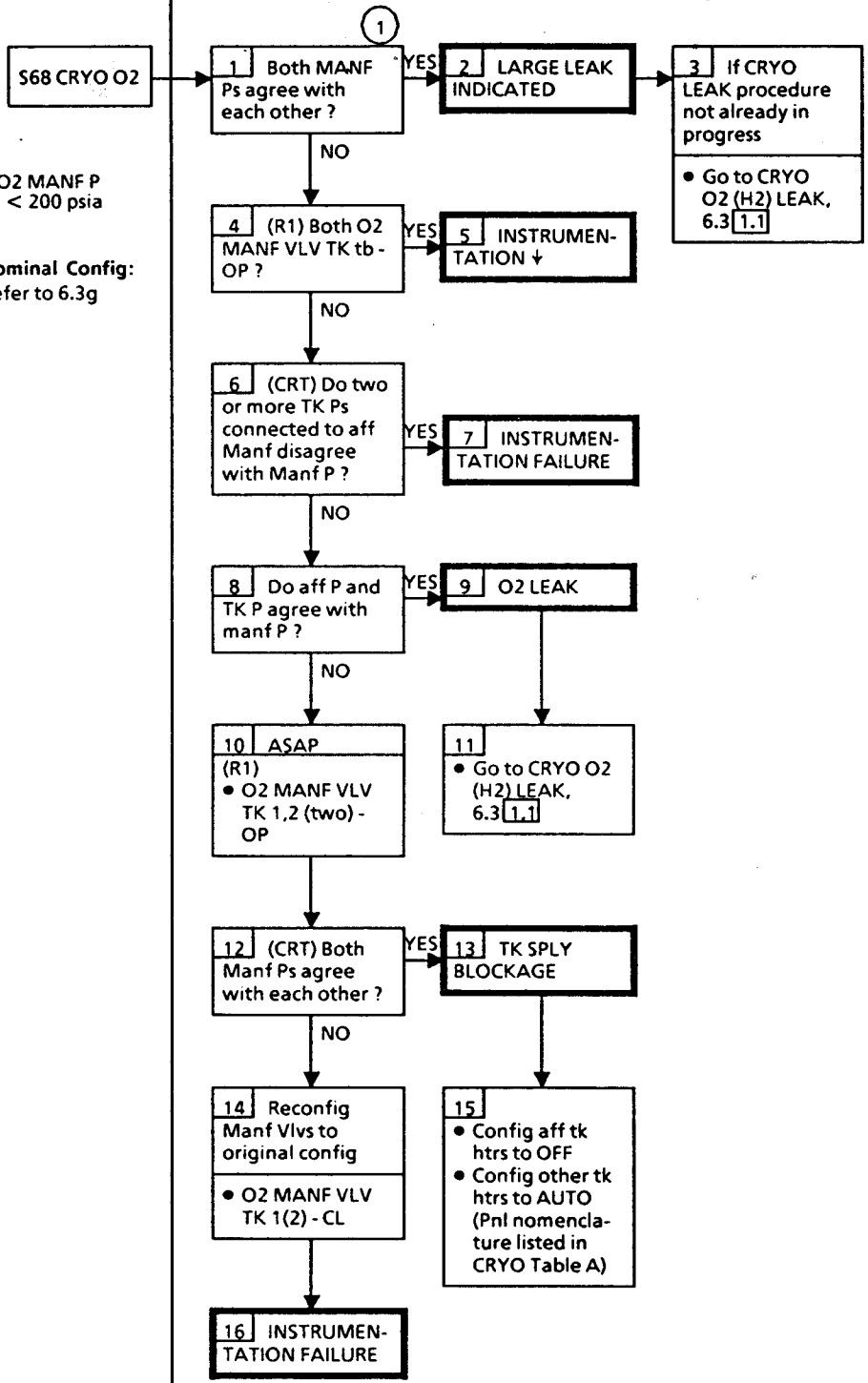


If:
O2 TK P
> 960 psia
< 575 psia
(Htrs in OFF or ON)
< 740 (AUTO)

Nominal Config:
Refer to 6.3g

If:
O2 MANF P
< 200 psia

Nominal Config:
Refer to 6.3g



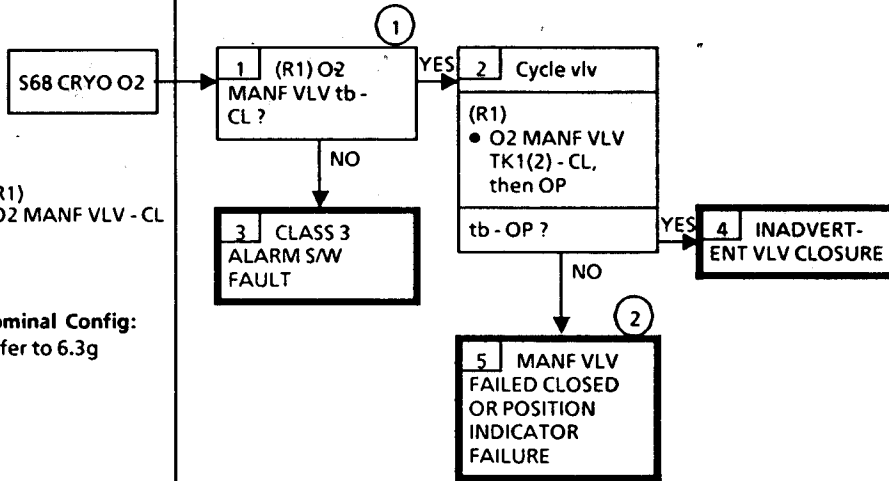
① Assumes both Manf vlvs are open. If indicative of continuing system problem, there would have been previous alarms for P and TK P low

ECLS

6.3j O2 MANF VLV = CL

If:
(R1)
O2 MANF VLV - CL

Nominal Config:
Refer to 6.3g



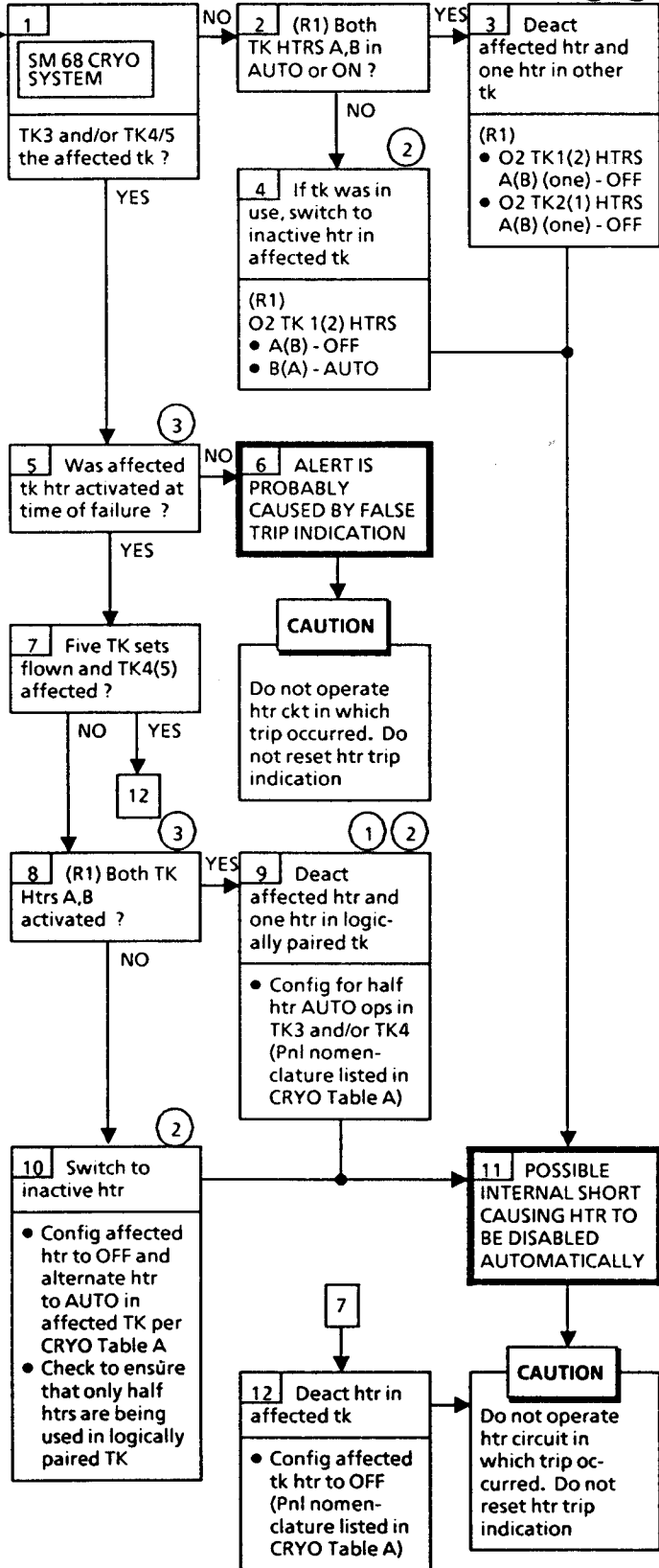
1 Procedure assumes that both manifold vlvs were intended to be open

2 Quantity management may eventually be necessary

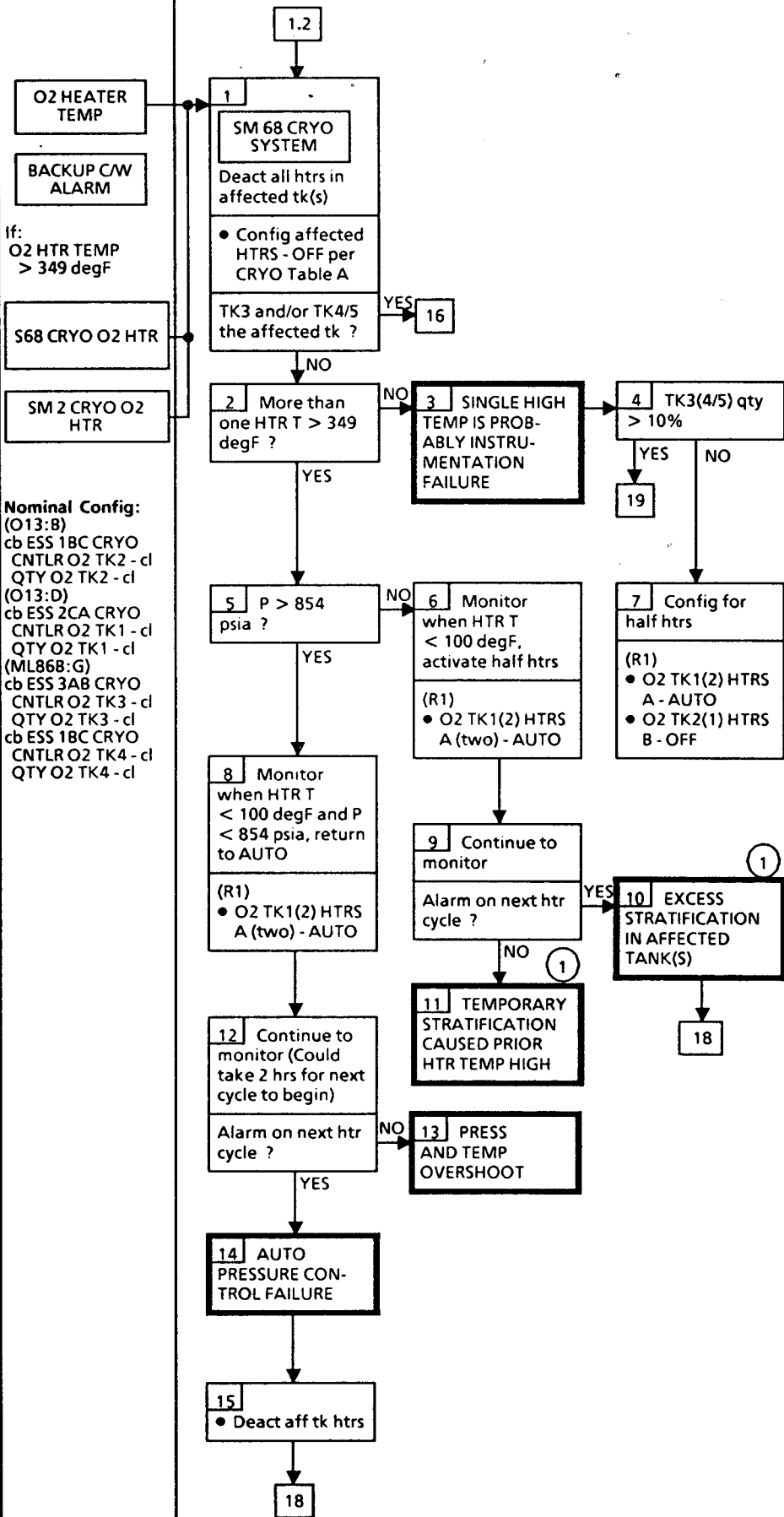
SM ALERT

S68 CRYO O2

If: HTR CUR SNSR = ↓ (tripped)



- ① If all Snsrs in tk (or one A and one B Snsr) indicate tripped, deactivate all htrs in affected tk and open manf vlvs. Do not reconfig htrs in other tk
- ② Unless htr pwr in both tks is approx equal, pressurization rates will not be equal and quantity imbalance will eventually result
- ③ Use CRYO Table A to determine which htr sets were active



If:
O2 HTR TEMP > 349 degF

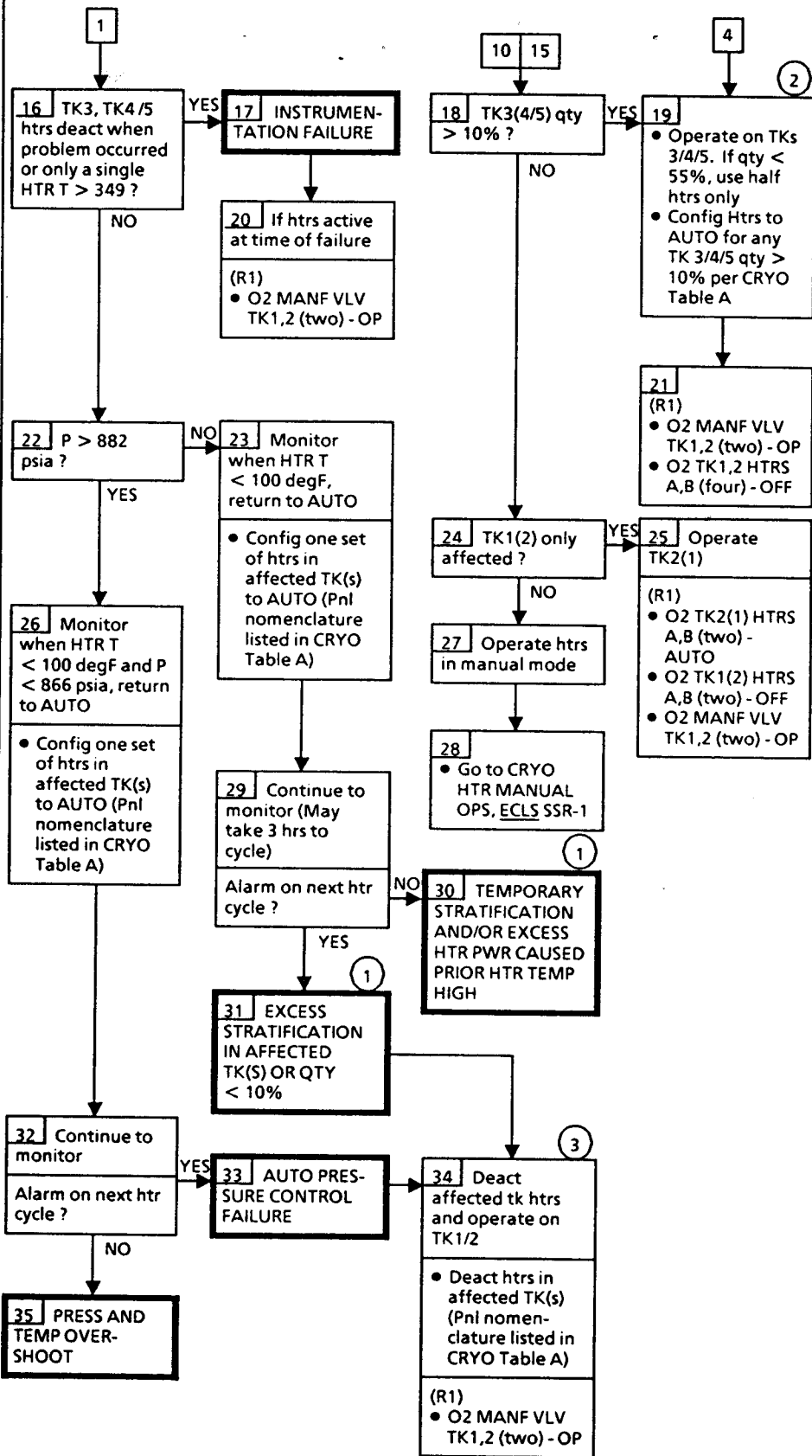
S68 CRYO O2 HTR

SM 2 CRYO O2 HTR

Nominal Config:
(O13:B)
cb ESS 1BC CRYO CNTLR O2 TK2 - cl
QTY O2 TK2 - cl
(O13:D)
cb ESS 2CA CRYO CNTLR O2 TK1 - cl
QTY O2 TK1 - cl
(ML86B:G)
cb ESS 3AB CRYO CNTLR O2 TK3 - cl
QTY O2 TK3 - cl
cb ESS 1BC CRYO CNTLR O2 TK4 - cl
QTY O2 TK4 - cl

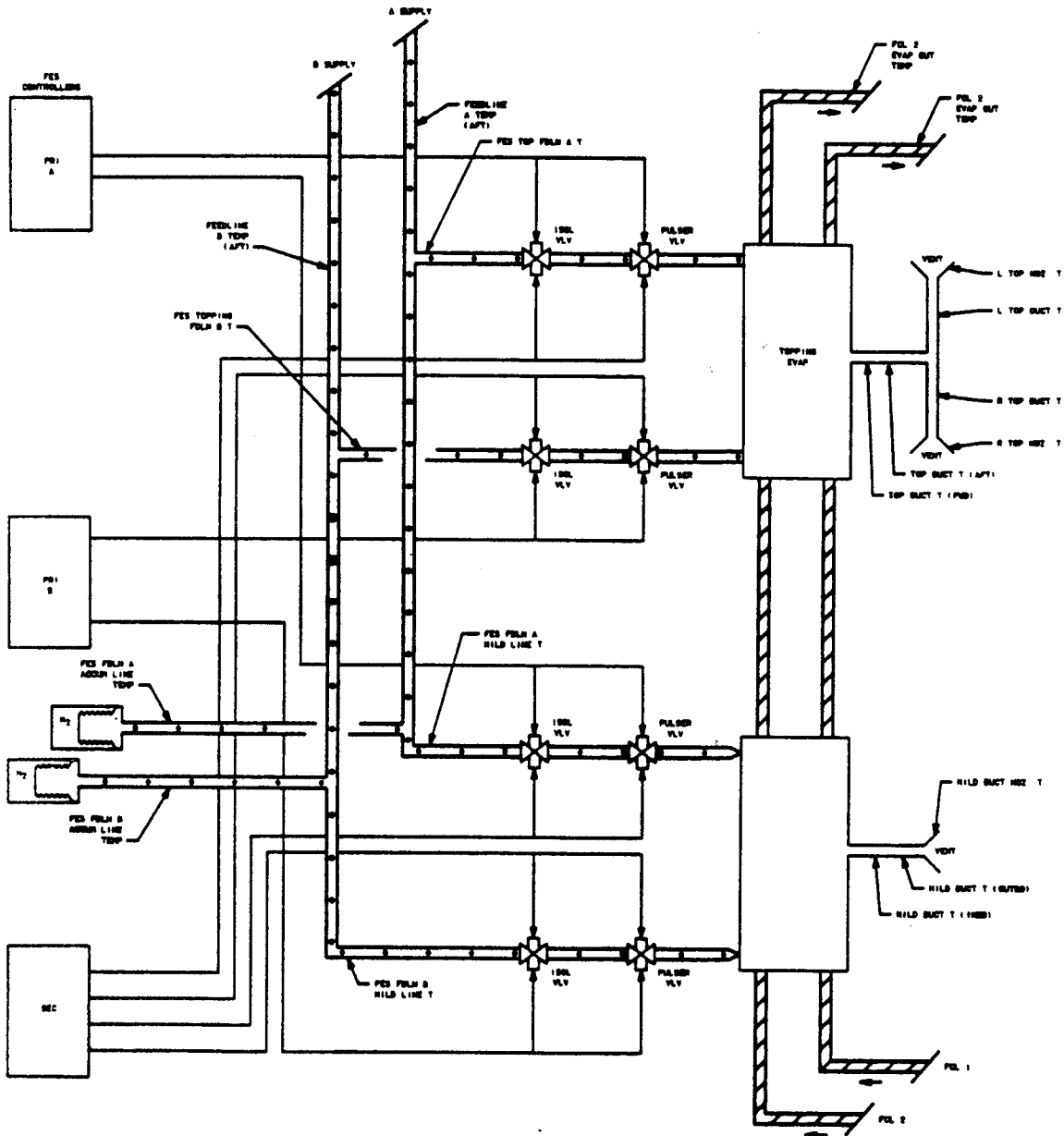
① Stratification normally occurs when htrs are operating for long periods of time and during periods of attitude holds

ECLS 6.3I (Cont)



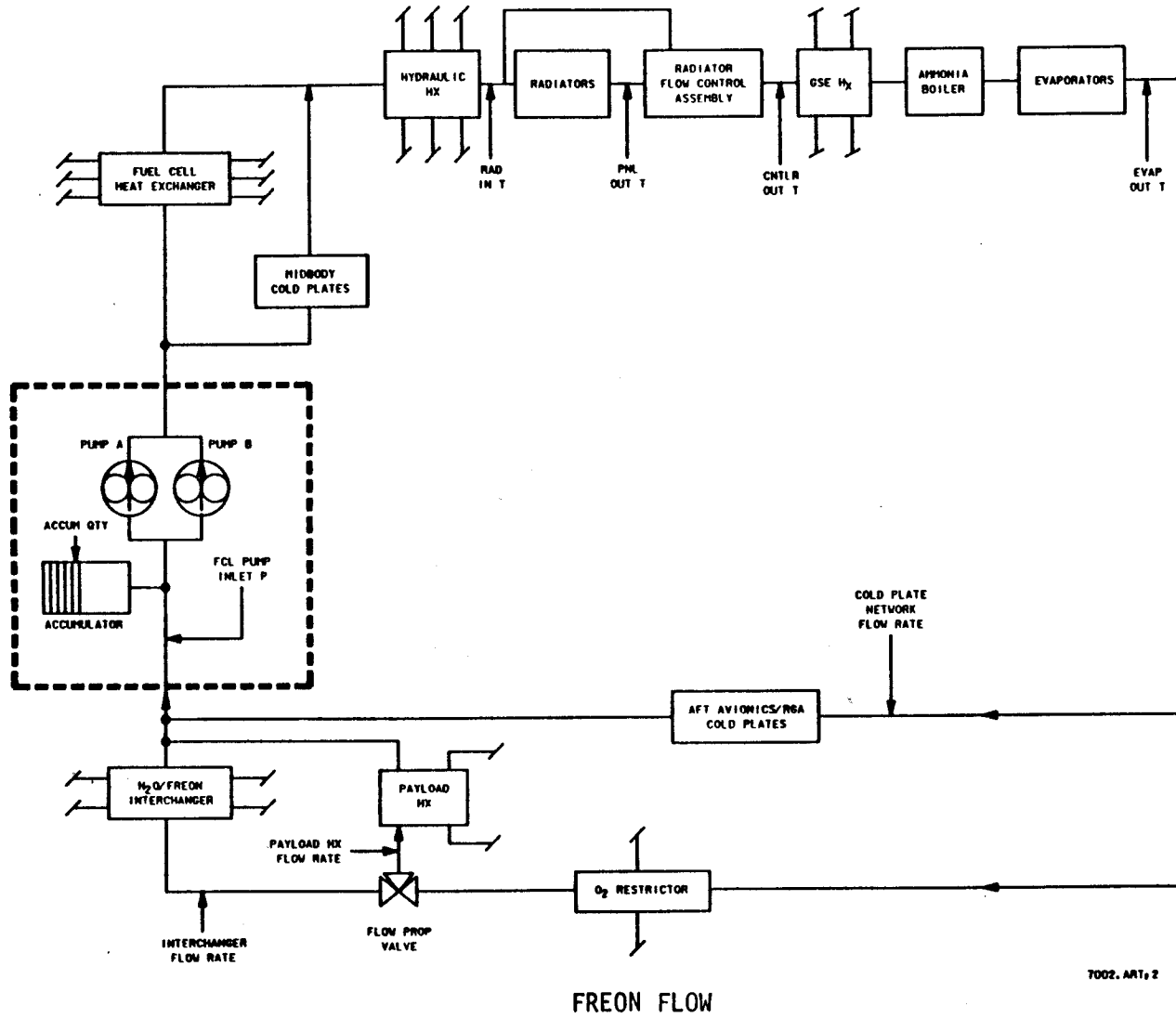
- ① Stratification normally occurs when htrs are operating for long periods of time and during periods of attitude holds
- ② Allow TK 3/4 to control for now and let MCC evaluate
- ③ MCC will determine CRYO mgmt

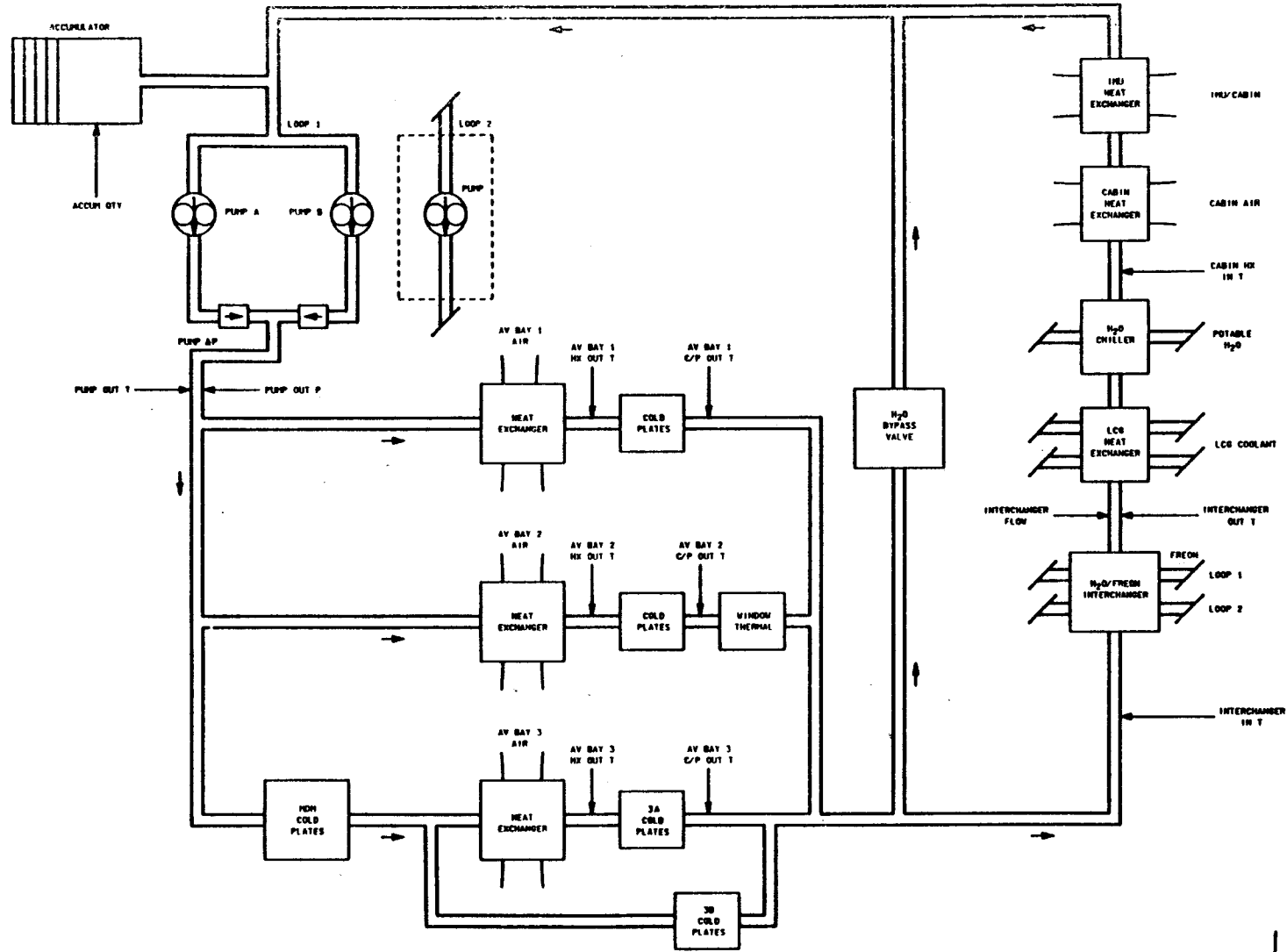
**FREON/H₂O
LOOP**



EVAPORATORS

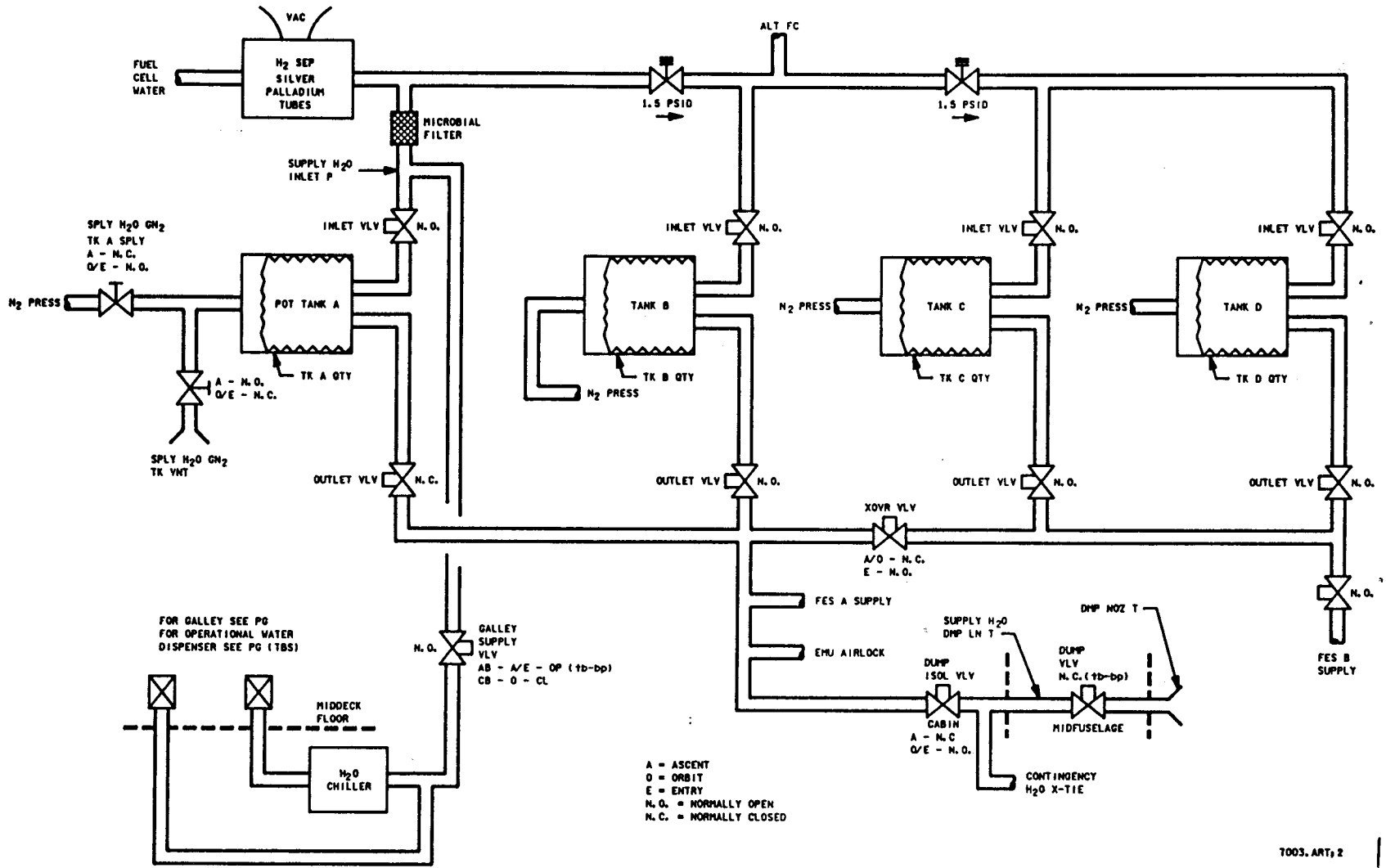
7000.001.0





H2O LOOPS

T004, ART. 3



SUPPLY H2O STORAGE

ECLS

6.4 FREON/H2O LOOP

FREON LOOP
(F7)

BACKUP C/W ALARM
(F7)

Lights on if:
EVAP OUT T < 32 degF
> 65 degF
FREON FLOW < 1200 lb/hr

PASS, BFS

S88 EVAP OUT T 1(2)

PASS, BFS

SM2 EVAP OUT T 1(2)

EVAP OUT T < 32 degF
> 65 degF

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:P)
cb AC1 φA RAD
CNTLR 1B - cl
cb AC1 φB RAD
CNTLR 2B - cl
cb AC2 φB RAD
CNTLR 2A - cl
cb AC3 φB RAD
CNTLR 2A - 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

(Cont in notes column)

1.1 EVAP OUT T HIGH SM 88 APU/ENVIRON THERM
SM SYS SUMM 2

If temp high in only one loop, N/A (sensor fail) >>

If PLBD open and RADs in use, go to MAL, ECLS, 6.4a 1 >>

If PLBD closed or if PLBD open in RAD BYP:

1. FLASH EVAP CNTLR PRI A(B) - OFF
PRI B(A) - ON (wait 30 sec)

If EVAP OUT T decr (PRI A(B) CNTL lost) >>

If EVAP OUT T not decr: (PRI A & B CNTL lost)

2. FLASH EVAP CNTLR PRI B(A) - OFF
SEC - ON (Hi-Load Evap ena)
3. Minimize Itg (wait 30 sec)

If EVAP OUT T decr

4. If in deorbit prep:
 - ✓ TACAN MODE (three) - OFF
 - ✓ RADAR ALTM (two) - OFF
 - ✓ MLS (three) - OFF
 - TOP EVAP HTR NOZ (two) - OFF
 - DUCT - OFF >>
5. If not in deorbit prep >>

If EVAP OUT T not decr:

6. HI LOAD EVAP - OFF (Topping ena)
7. MSTR MAD5 PWR - OFF (wait 30 sec)

If EVAP OUT T decr

8. If in deorbit prep:
 - Go to LOSS OF HI LOAD EVAP (OPCL, PWRDN) >>
9. If not in deorbit prep >>

For deorbit prep:
Go to LOSS OF HIGH LOAD EVAP (OPCL, PWRDN) >>

If EVAP OUT T not decr (FES lost):
Establish RAD flow (CDR: step 11)
If closed, OPEN PLB DOORS; CDR and MS perform steps simo

CDR: L1 10. RAD BYP VLV MODE (two) - AUTO
CNTLR LOOP (two) - AUTO A(B)
(wait 90 sec)
BYP VLV tb (two) - RAD

✓ RAD CNTLR OUT T - NORM

11. HI LOAD DUCT HTR - OFF (pnl L1)
TOP EVAP HTR NOZ (two) - OFF
DUCT - OFF
FLASH EVAP CNTLR SEC - OFF

MS: R13L 12. PL BAY DR SYS 1,2 (two) - ENA
SM 63 PL BAY DOORS
AC PWR ON - ITEM 1 EXEC
AUTO MODE SEL - ITEM 3 EXEC
PBD SW BYPASS - ITEM 14 EXEC
PBD OPEN - ITEM 15 EXEC

13. Monitor CRT for proper seq
After doors open,
14. PBD STOP - ITEM 16 EXEC
AC PWR OFF - ITEM 2 EXEC
15. PL BAY DR SYS 1,2 (two) - DISABLE

For deorbit prep:

16. Go to LOSS OF FES (DEORB PREP) (OPCL, PWRDN)

Nominal Config:

(Cont):
(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
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)

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

S88 EVAP OUT
T 1(2)

1.2

EVAP OUT T LOW

SM 88 APU/ENVIRON THERM
SM SYS SUMM 2SM 2 EVAP
OUT T 1(2)

If temp low in only one loop, N/A (SNSR fail) >>

1. H2O PUMP LOOP 1,2 (two) - ON
2. FLOW PROP VLV (two) - ICH (tb-ICH)
3. Activate PL H2O LOOP(s) (if applicable)

If FREON LOOP RAD OUT T LOW, go to FREON LOOP

RAD OUT T LOW, 6.4 1.4 step 5 >>

4. RAD CNTLR OUT T - HIGH
5. FLASH EVAP CNTLR PRI A(B) - OFF
 PRI B(A) - OFF
 SEC - OFF
6. NH3 CNTLR (two) - OFF (Wait 60 sec)

If EVAP OUT T incr:

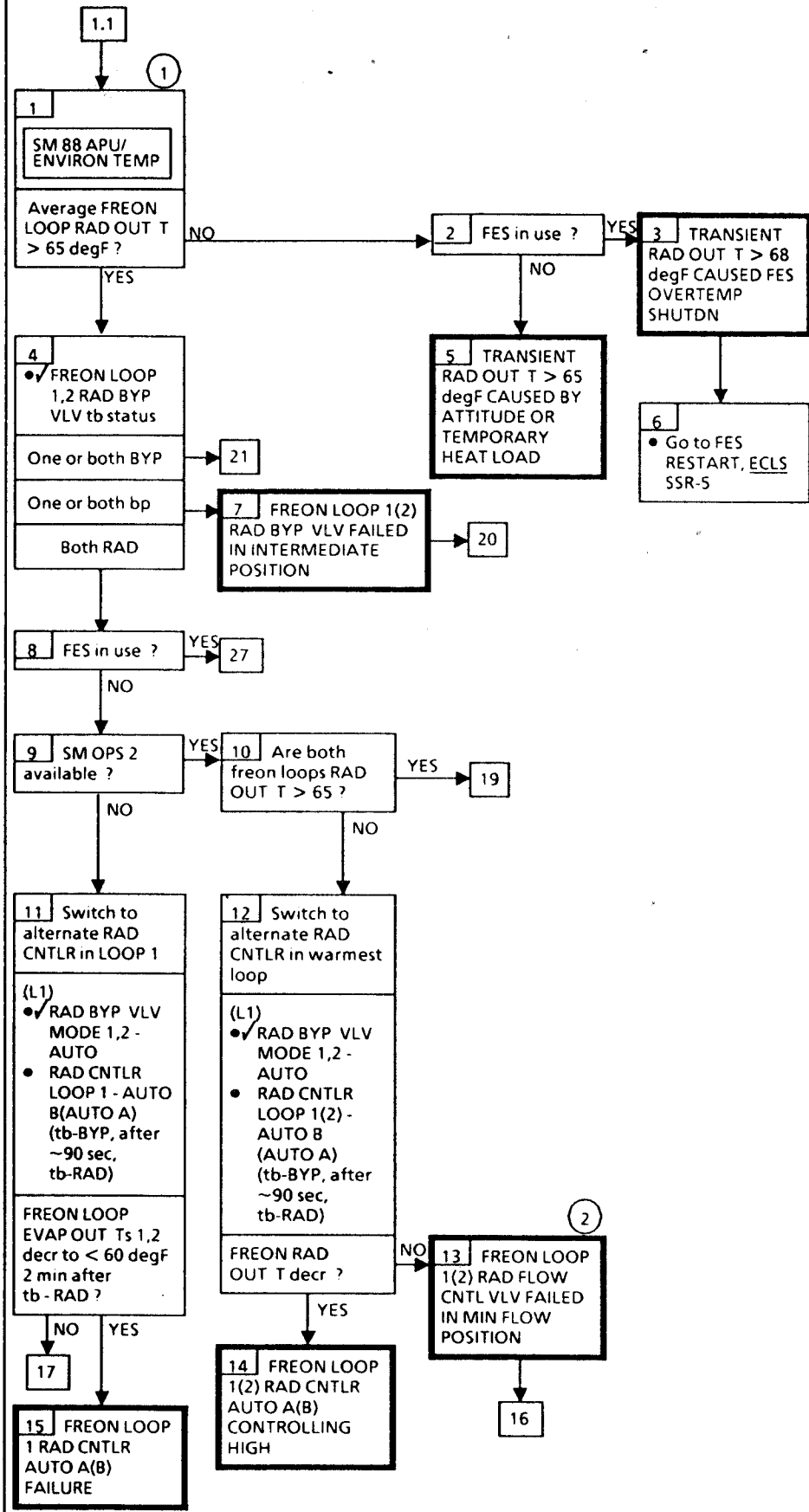
7. Go to MAL, ECLS, 6.4a 42

If EVAP OUT T not incr:

8. FREON PUMP LOOP 2 - OFF
O2 SYS 2 SPLY VLV - CL (tb - CL)
9. Go to MAL, ECLS, 6.4a 42

ECLS

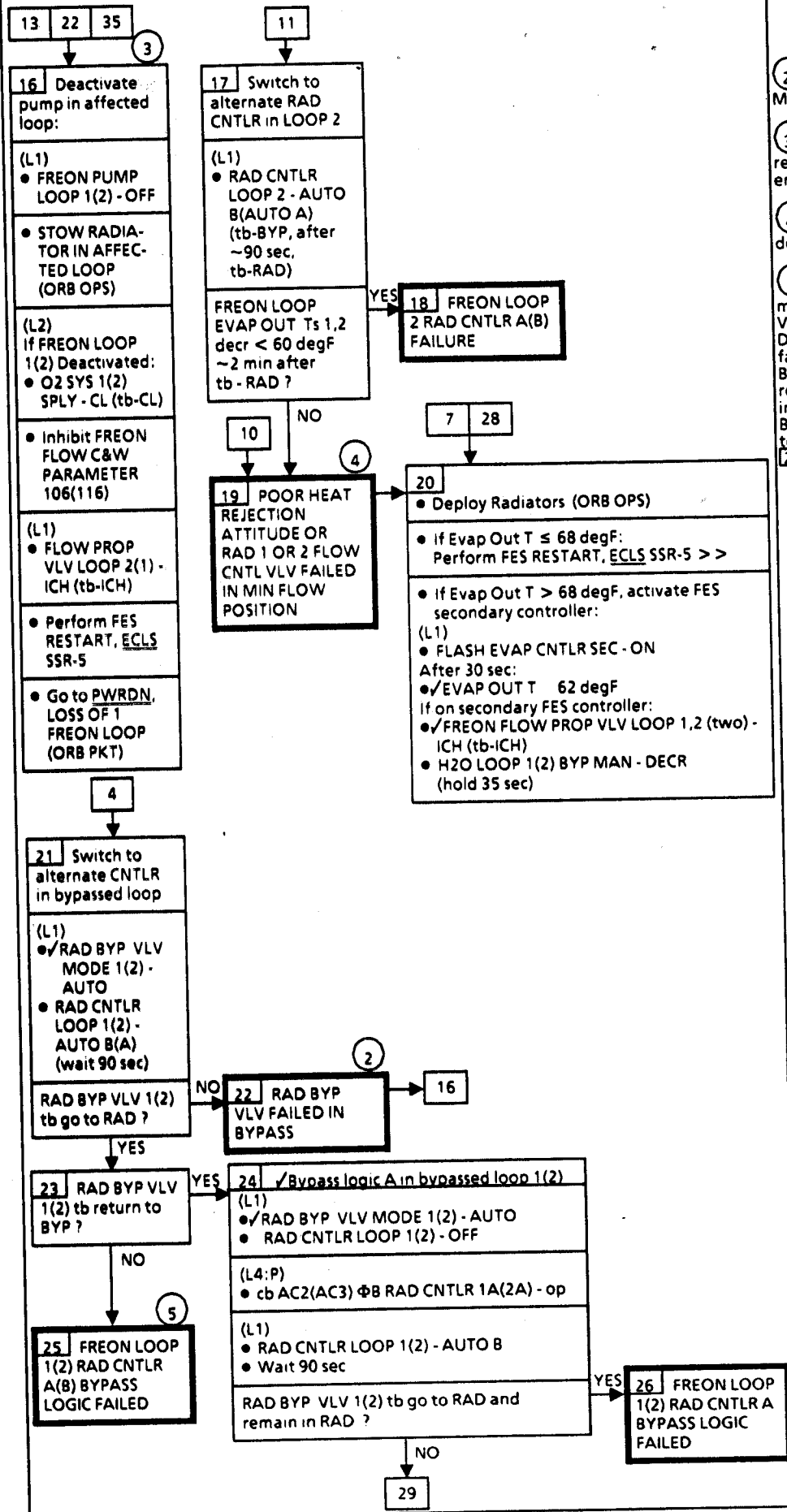
6.4a EVAP OUT T ↑↑



① If OPS 2 not available, use EVAP OUT T

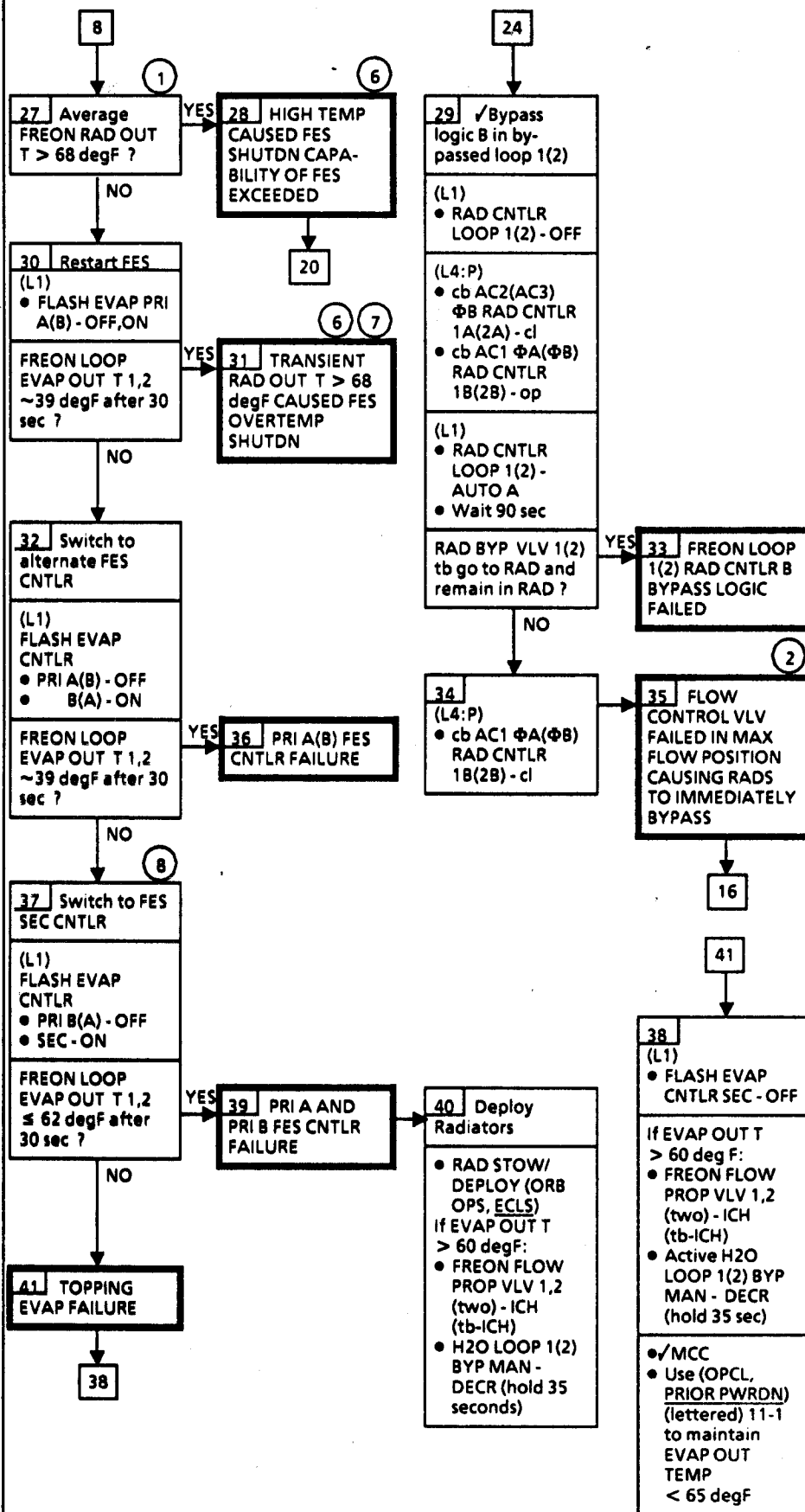
② Loss of RFCA - MDF flight

ECLS 6.4a (Cont)



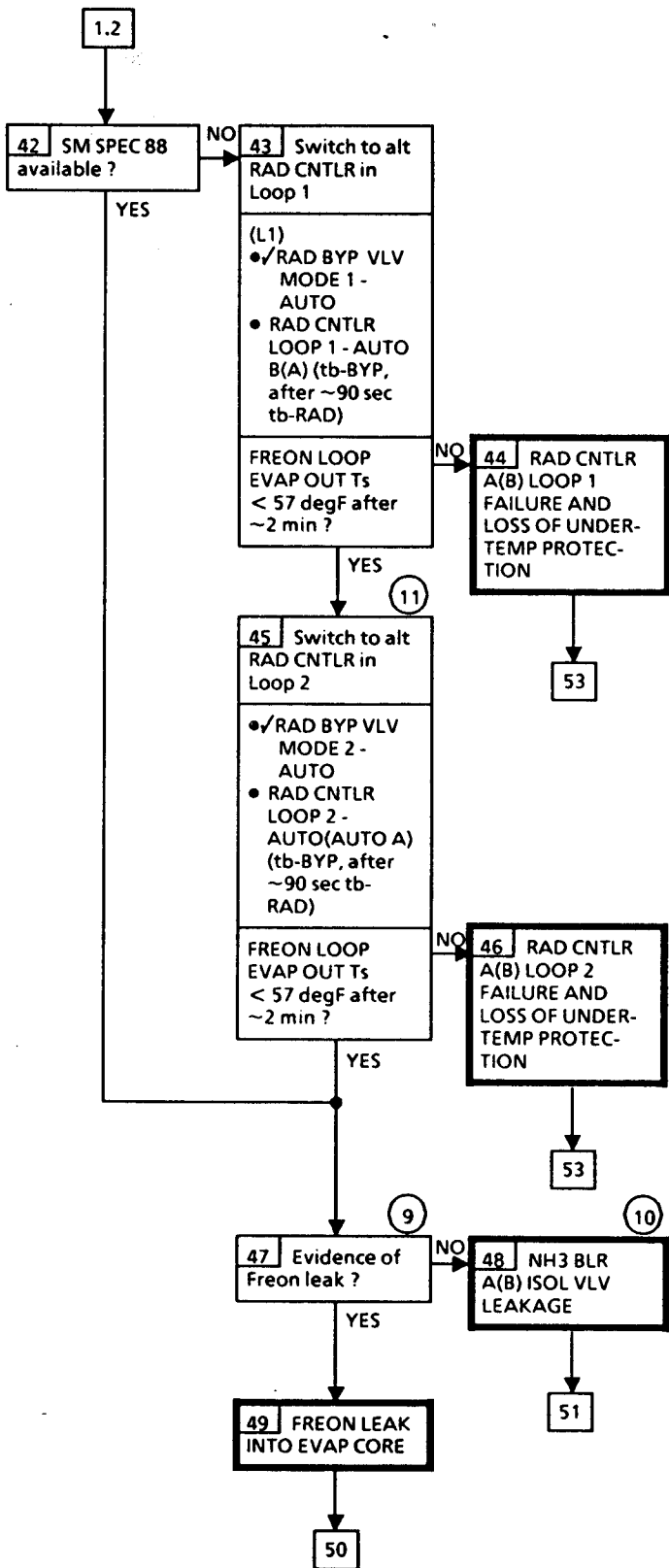
- ② Loss of RFCA - MDF flight
- ③ Loop will be reactivated for entry
- ④ ✓MCC to determine failure
- ⑤ Continue to monitor RAD BYP VLV tb position. Depending upon failure mode, RAD BYP VLV may not return to BYP immediately. If RAD BYP VLV tb returns to BYP, go to Block 24

ECLS 6.4a (Cont)



- ① If OPS 2 not available, use EVAP OUT T
- ② Loss of RFCA - MDF flight
- ③ If RAD OUT T > 65 degF not explainable by attitude, troubleshoot Radiators. Go to block 12
- ④ Expect same transient on next daylight pass if same attitude
- ⑤ 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)

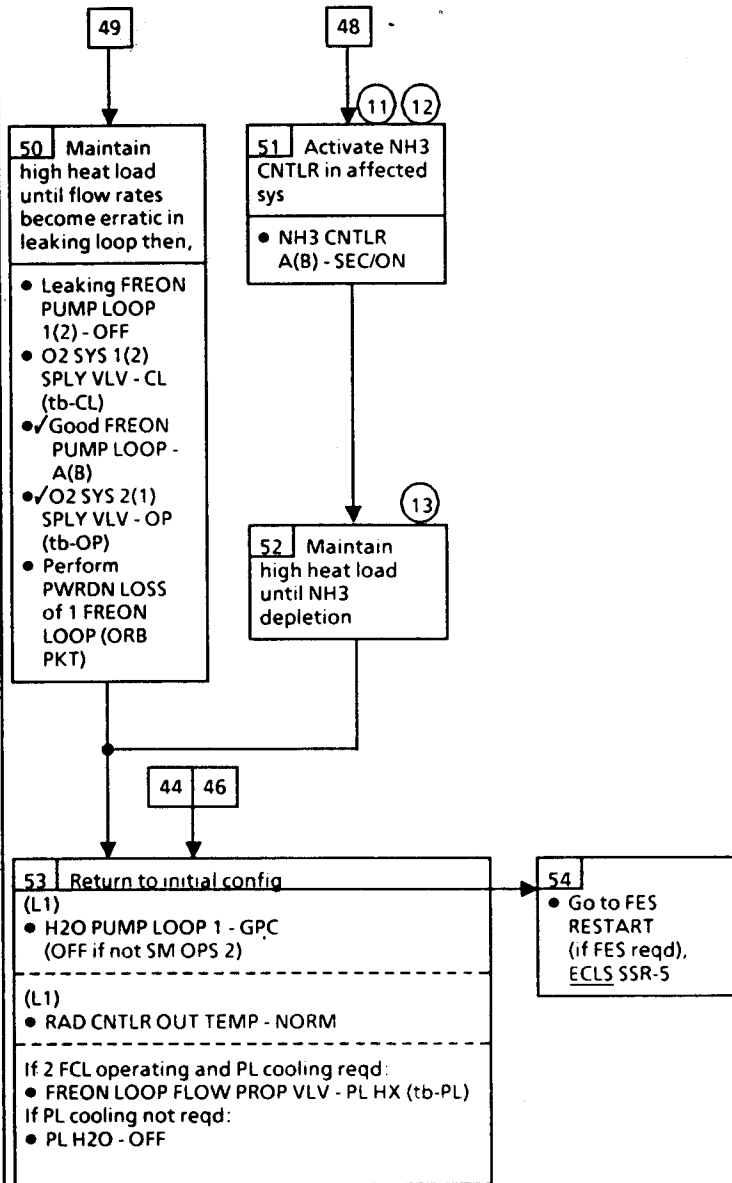


9 As loops cool, ACCUM QTYs in both loops will decr simultaneously. Leakage evident by ACCUM QTY differences > 10%

10 Requires MCC to ✓ NH3 leakage

11 If FCL 2 is turned OFF, 45 is not reqd

ECLS 6.4a (Cont)



- ①① Requires MCC to ✓ NH3 leakage
- ①② Activation of CNTLR will attempt to control NH3 flow
- ①③ NH3 depletion indicated by EVAP OUT T increasing

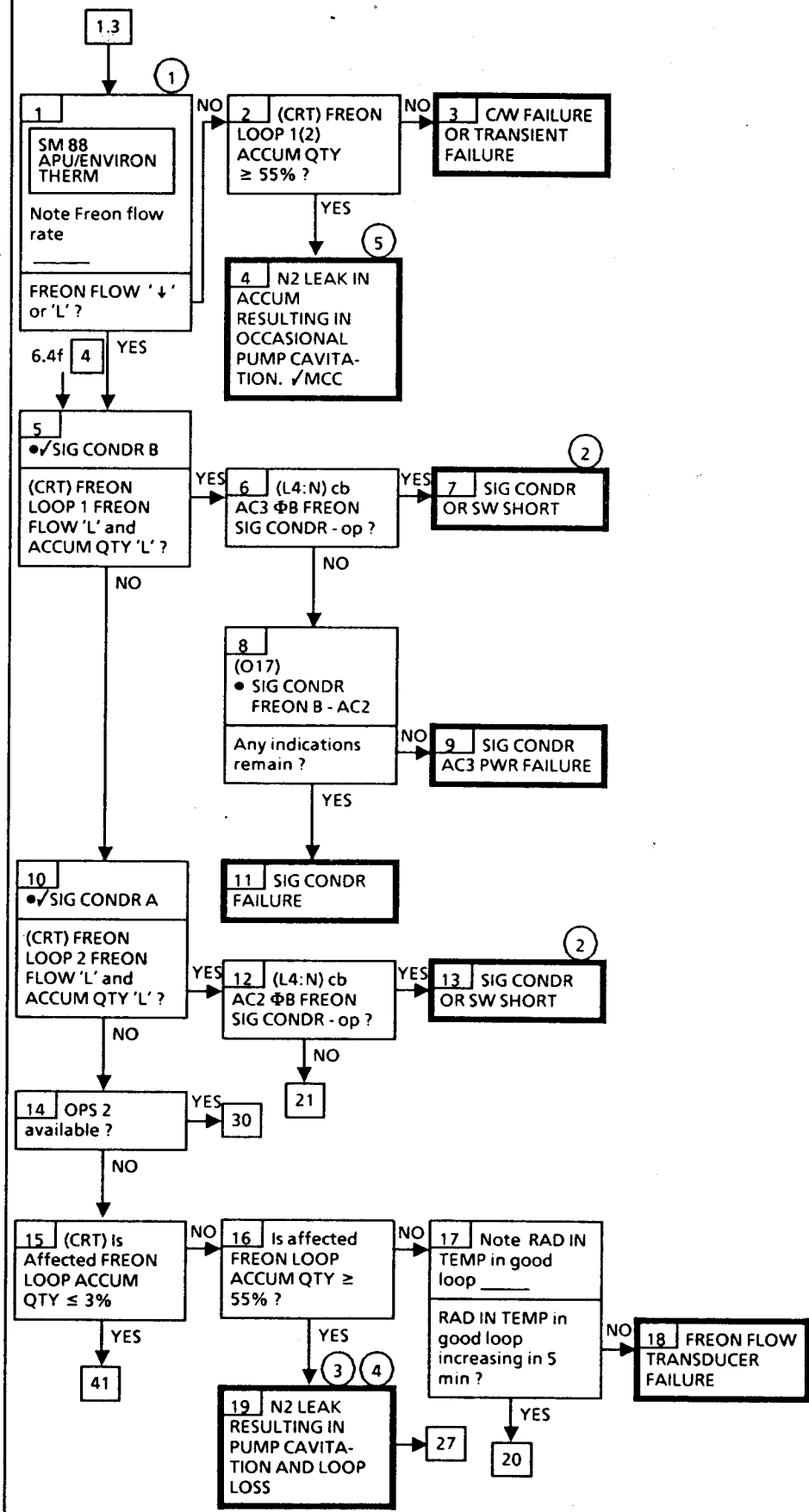
FREON
LOOPBACKUP C/W
ALARMLights on if:
EVAP OUT T
< 32 degF
> 65 degF
FREON FLOW
< 1200 lb/hrSM
ALERTS88 FREON
FLOW 1(2)SM2 FREON
FLOW 1(2)If:
(L1)
FLOW PROP VLV
LOOP 1(2) - ICH
FREON FLOW
< 1950 lb/hr
FLOW PROP VLV
LOOP 1(2) - PL
FREON FLOW
< 1300 lb/hr

1.3

FREON FLOW LOW

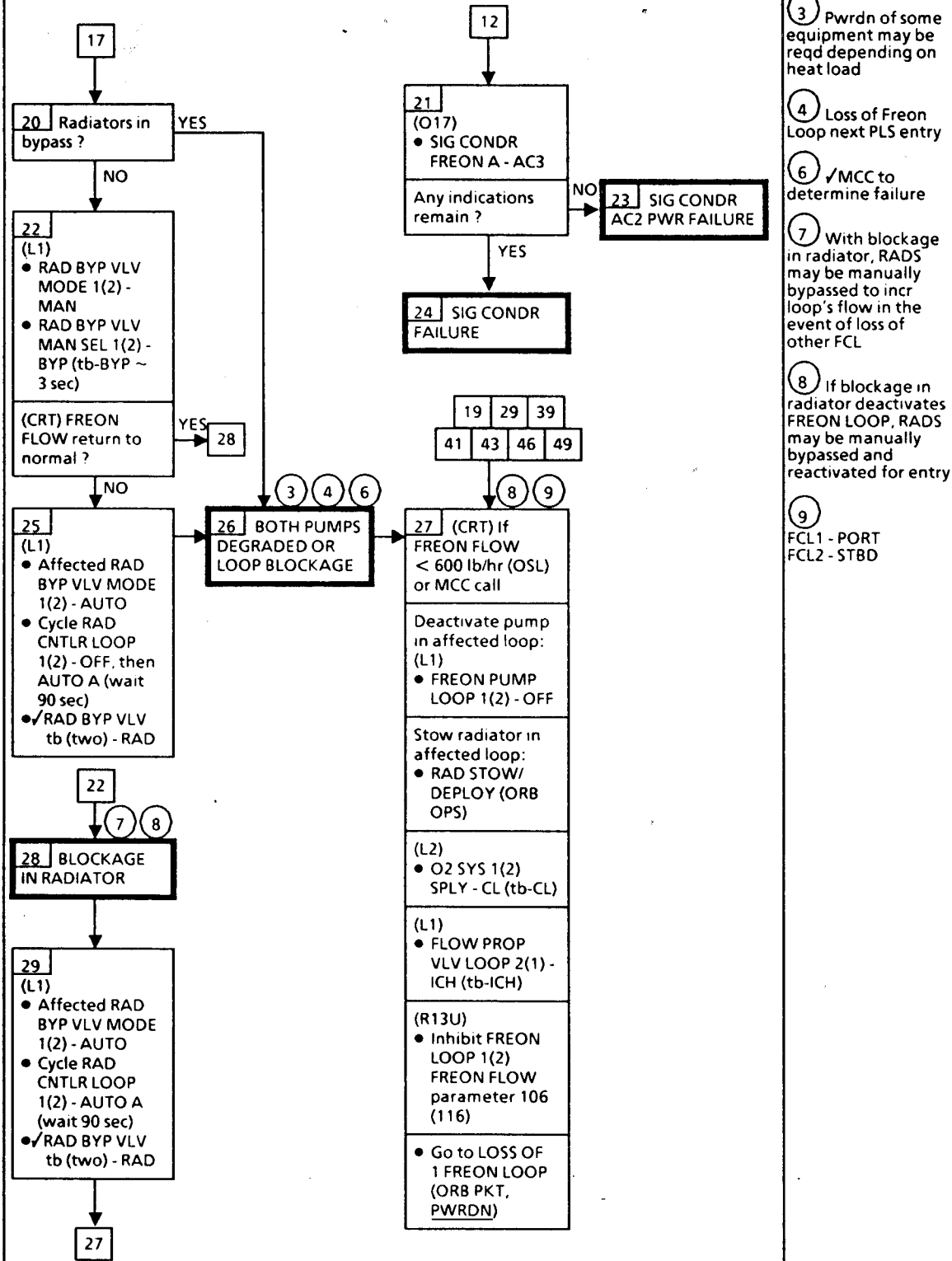
SM 88 APU/ENVIRON THERM
SM SYS SUMM 2

1. Switch pumps in aff loop(s)
If flow still low in only one loop:
2. Go to MAL, ECLS, 6.4b 1 >>
- If flow still low in both loops:
3. FLOW PROP VLV LOOP 1,2 (two) - ICH (tb-ICH)
If not in OPS 2:
Prepare to deorbit:
 4. FREON PUMP LOOP 1(2) (two) - OFF
 5. √O2 SYS 1,2 SPLY VLV (two) - OP (tb-OP)
 6. MSTR MADDS PWR - OFF
 7. FC PURGE HTR - ON (pnl R12)
VLV (three) - OP
 8. Go to LOSS OF 2 FREON LOOPS (ORB PKT,
PWRDN) >>
- If in OPS 2:
If AFT cp FLOW in both loops < 200 lb/hr:
Prepare to deorbit:
 9. If AFT cp FLOW < 100 lb/hr:
FREON PUMP LOOP 1,2 (two) - OFF
 10. √O2 SYS 1,2 SPLY VLV (two) - OP (tb-OP)
 11. MSTR MADDS PWR - OFF
 12. FC PURGE HTR - ON
VLV (three) - OP
 13. Go to LOSS OF 2 FREON LOOPS (ORB
PKT, PWRDN) >>
- If AFT cp FLOW in either loop > 200 lb/hr:
14. Go to MAL, ECLS, 6.4b 1 >>



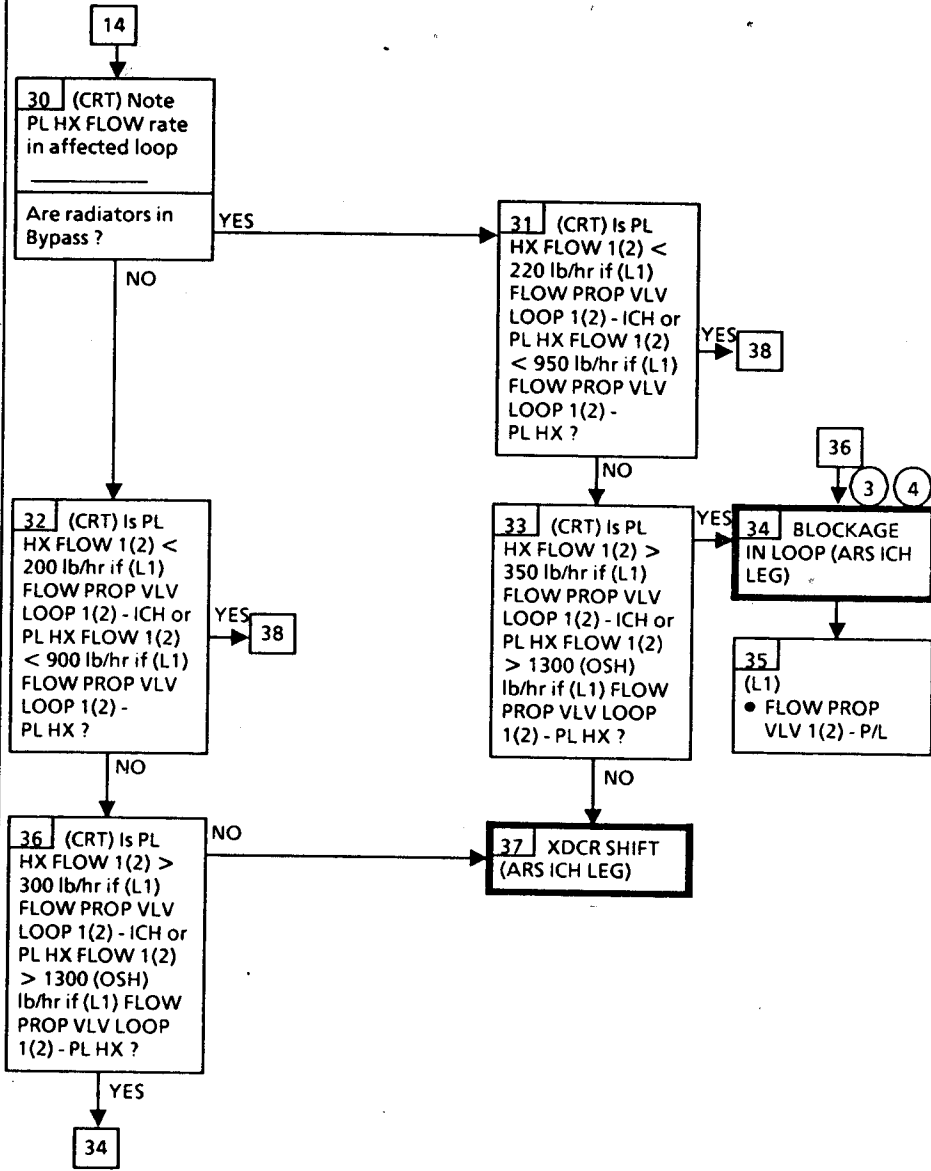
- ① FREON FLOW meter on pnl O1 may be used as alternate
- ② ✓MCC. Do not operate FREON SIG CONDR sw(s) on pnl O17
- ③ Pwrn of some equipment may be reqd depending on heat load
- ④ Loss of Freon Loop next PLS entry
- ⑤ If cavitation occurs frequently, loop is lost

ECLS 6.4b (Cont)



- 3 Pwrdsn of some equipment may be reqd depending on heat load
- 4 Loss of Freon Loop next PLS entry
- 6 ✓MCC to determine failure
- 7 With blockage in radiator, RADS may be manually bypassed to incr loop's flow in the event of loss of other FCL
- 8 If blockage in radiator deactivates FREON LOOP, RADS may be manually bypassed and reactivated for entry
- 9 FCL1 - PORT FCL2 - STBD

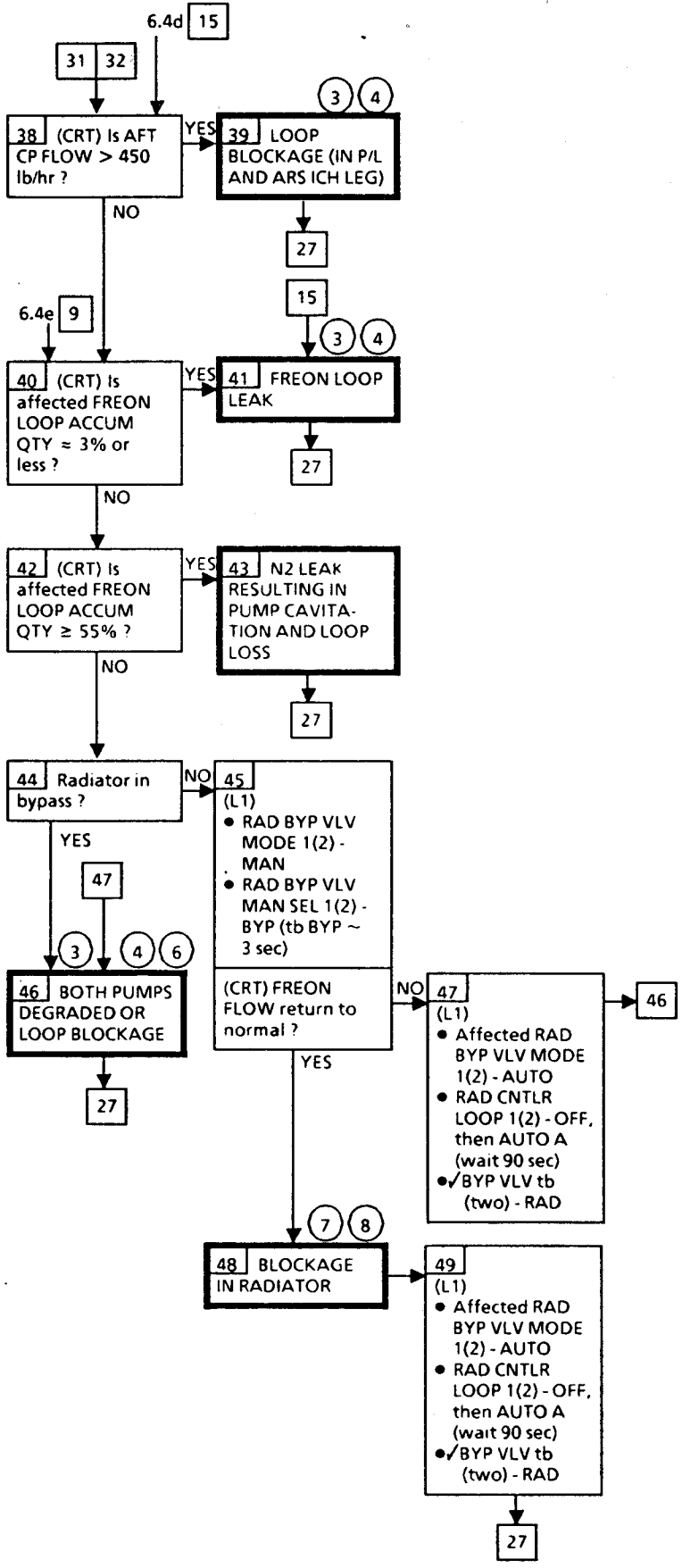
ECLS 6.4b (Cont)



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

4 Loss of Freon Loop next PLS entry

ECLS 6.4b (Cont)



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

4 Loss of Freon Loop next PLS entry

6 ✓MCC to determine failure

7 With blockage in radiator RADS may be manually bypassed to incr loop's flow in the event of loss of the other FCL

8 If blockage in radiator deactivates FREON LOOP, RADS may be manually bypassed and reactivated for entry

S88 THERMAL
FRNIf:
RAD OUT T
< 32 degF

1.4

FREON LOOP RAD
OUT T LOWSM 88 APU/ENVIRON THERM
SM SYS SUMM 2

If EVAP OUT T not decr after 60 sec, N/A reqd (SNSR fail) >>

1. H2O PUMP LOOP 1,2 (two) - ON
2. ✓ FLOW PROP VLV LOOP (two) - ICH (tb-ICH)
3. Activate PL H2O LOOP(s) (if applicable)
4. FLASH EVAP CNTLR PRI A(B) - OFF
 - ✓ PRI B(A) - OFF
 - ✓ SEC - OFF

5. RAD CNTLR OUT TEMP - HI
6. ✓ Aff RAD BYP VLV MODE 1(2) - AUTO
CNTLR LOOP 1(2) - alt CNTLR

If aff RAD BYP VLV tb - BYP (90 sec), then RAD, and if RAD
OUT T stabilizes $\geq 57^{\circ}\text{F}$:

7. Go to MAL, ECLS, 6.4c **6** >>

If aff RAD BYP VLV tb remains in RAD, and RAD OUT T $\geq 57^{\circ}\text{F}$
after 90 sec:

8. Go to MAL, ECLS, 6.4c **8** >>

If aff RAD BYP VLV tb - BYP (90 sec), then RAD and if RAD
OUT T stabilizes $< 57^{\circ}\text{F}$:If EVAP OUT T $\leq 32^{\circ}\text{F}$:

9. Aff RAD BYP VLV MODE 1(2) - MAN
MAN SEL 1(2) - BYP (3 sec)

10. Go to MAL, ECLS, 6.4c **1** >>

If EVAP OUT T $> 32^{\circ}\text{F}$:

11. Go to MAL, ECLS, 6.4c **2** >>

If aff RAD BYP VLV remains in RAD, and RAD OUT T $< 57^{\circ}\text{F}$:If EVAP OUT T $\leq 32^{\circ}\text{F}$:

12. Aff RAD BYP VLV MODE 1(2) - MAN
MAN SEL 1(2) - BYP (3 sec)

If RAD BYP VLV tb - RAD:

13. Aff FREON PUMP LOOP 1(2) - OFF
- If FREON LOOP 1(2) deactivated:
14. O2 SYS 1(2) SPLY VLV - CL (tb-CL)

15. Go to MAL, ECLS, 6.4c **9** >>

If RAD BYP VLV tb - BYP:

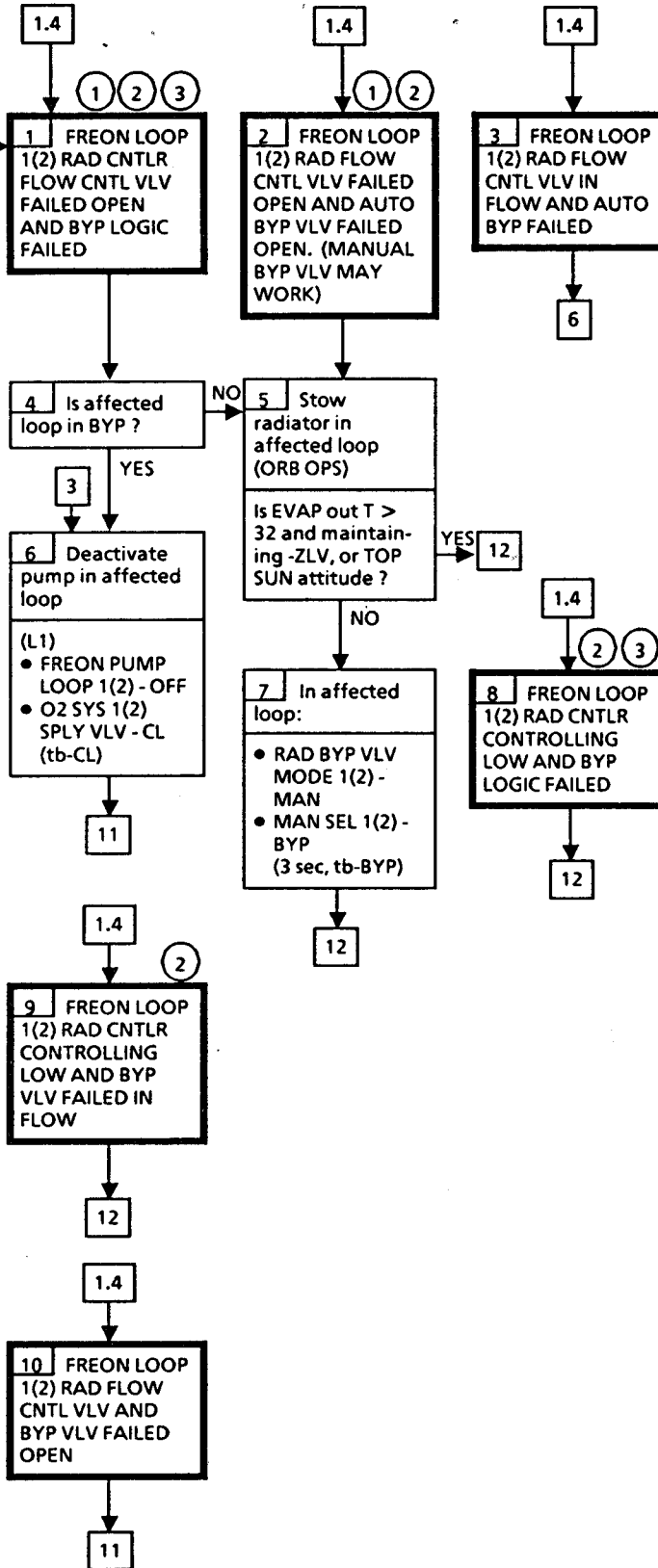
16. Go to MAL, ECLS, 6.4c **3** >>

If EVAP OUT T $> 32^{\circ}\text{F}$:

17. Go to MAL, ECLS, 6.4c **2** >>

S88 THERMAL FRN

RAD OUT < 32 deg F

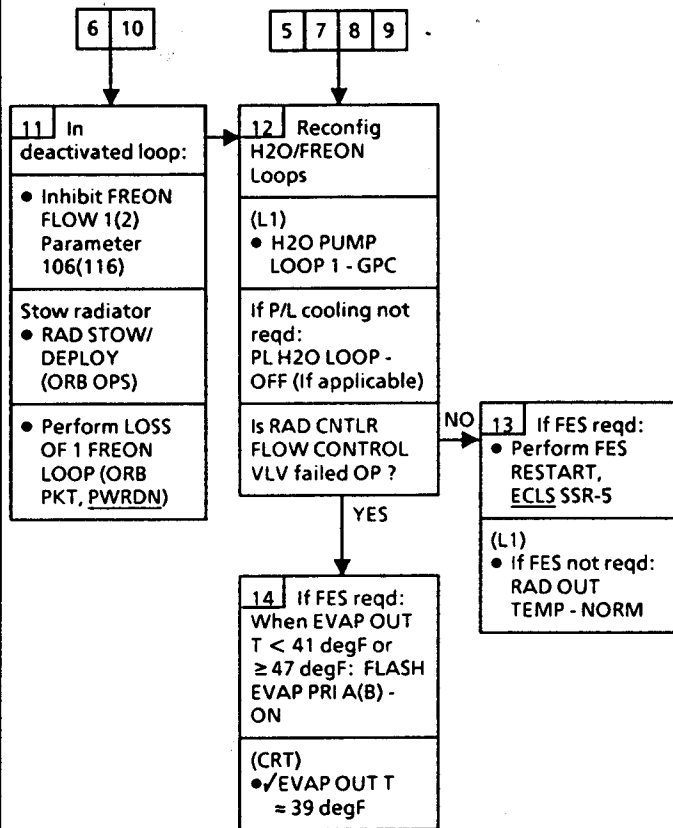


1 Attitude change may cause EVAP OUT T < 32 deg F if loop is not bypassed

2 Undertemp bypass protection lost

3 EVAP OUT T ↑ may occur due to RAD reactivation

ECLS 6.4c (Cont)



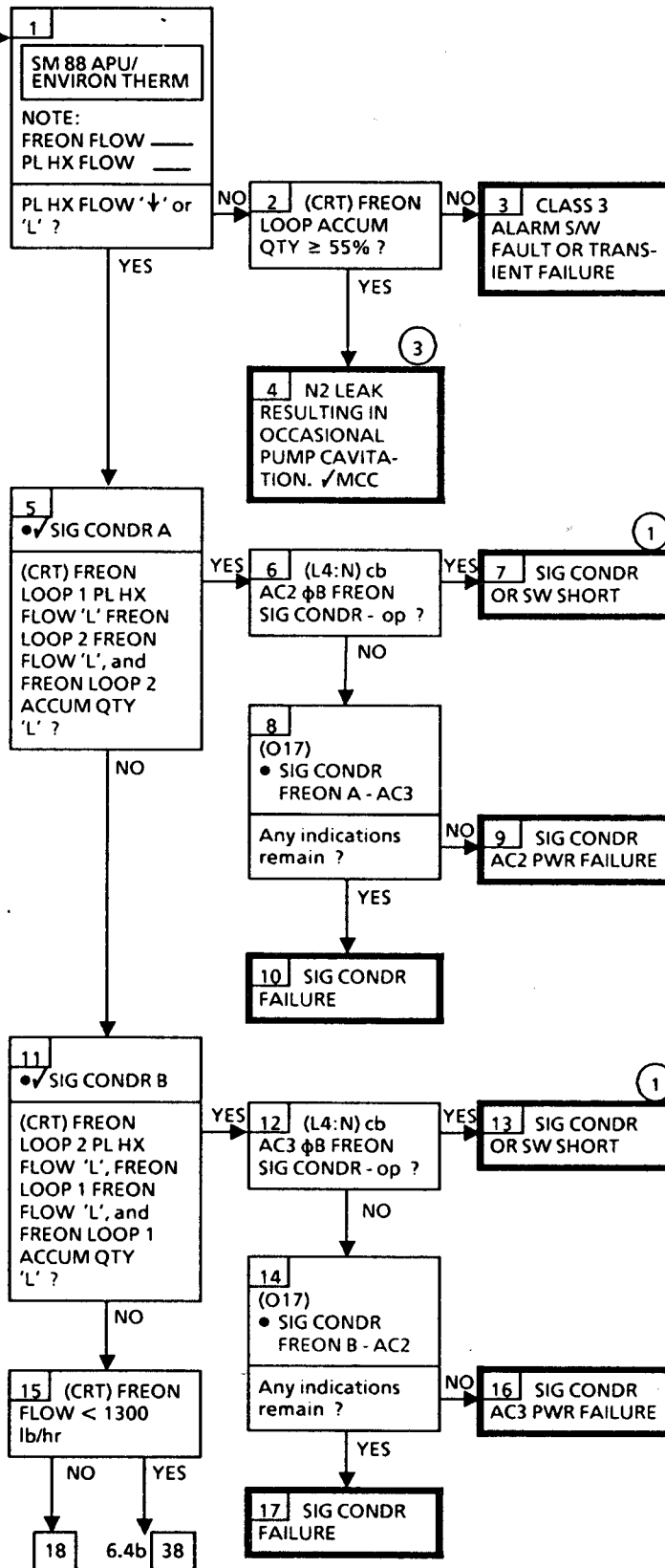
ECLS

6.4d FRN FLOW PROP VLV PL HX FLOW ↓

S88 THERMAL FRN

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

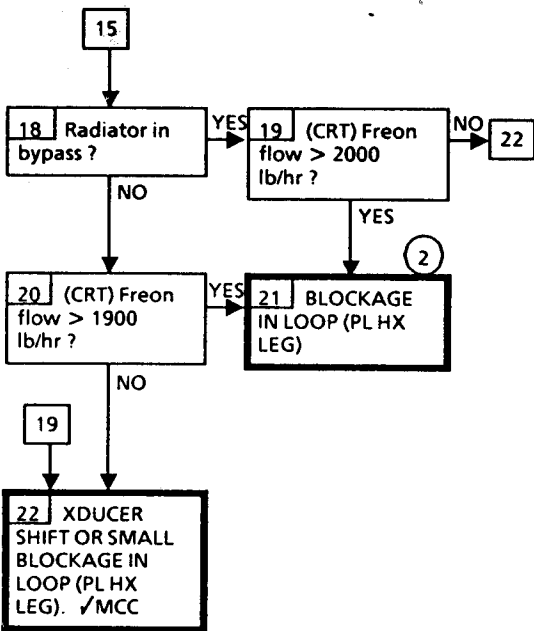
With FLOW PROP
VLV-ICH
PL HX FLOW is
TMBU - OSL



① ✓MCC. With Sig Condr or sw short, do not operate FREON SIG CONDR sw(s) on pnl O17

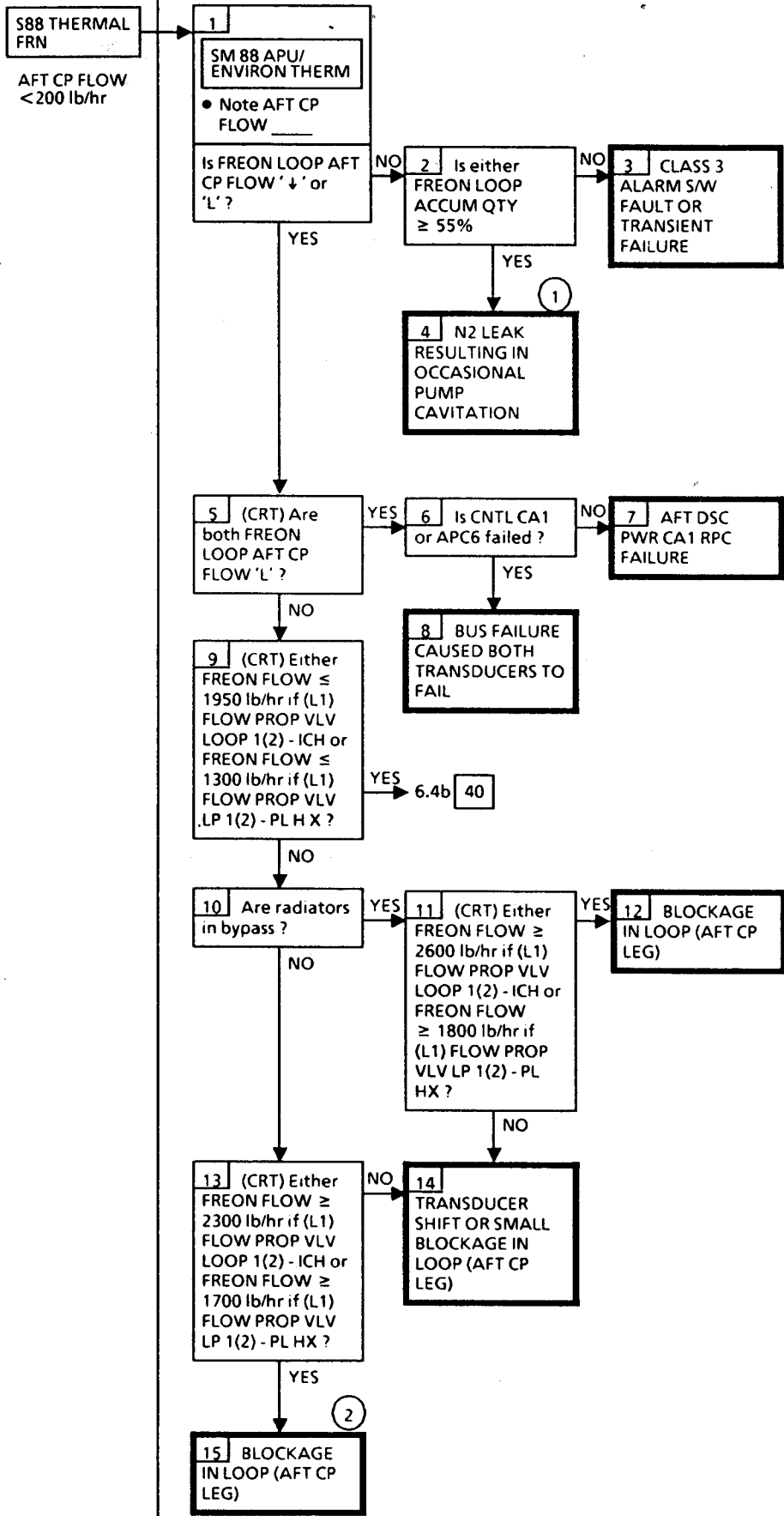
③ N2 leak across FCL accum bellows can cause cavitations of pump. Frequent cavitation = loop loss

ECLS 6.4d (Cont)



② Pwrn of some equipment may be reqd depending on heat load and amount of blockage

6.4e AFT COLDPLATE FLOW ↓



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

② Loss of FCL definition next PLS entry

6.4f ACCUM QTY ↓

S88 THERMAL FRN

SMO THRM FRN

ACCUM QTY < 12%

1

SM 88 APU/ ENVIRON THERM

- Note FREON LOOP 1(2) ACCUM QTY

FREON LOOP ACCUM QTY < 12% ?

2 CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE

3 (CRT) FREON LOOP ACCUM QTY 'L' (-11)

'↓' and stable

'↓' and decr

4 (CRT) FREON FLOW 'L' ?

5 SNSR FAILURE

6.4b 5

6 SNSR DRIFT/BIAS LOW

7 FREON LOOP 1(2) LEAK

8

- Monitor Loop Accum qty. When qty ~ 3% go to next step

9 Deactivate pump in leaking Loop: (L1)

- FREON PUMP LOOP 1(2) - OFF

(L2)

- O2 SYS 1(2) SPLY - CL (tb-CL)

Stow Radiator in affected loop:

- RAD STOW/ DEPLOY (ORB OPS)

(L1)

- FLOW PROP VLV LOOP 2(1) - ICH (tb-ICH)

(R13U)

- Inhibit FREON LOOP 1(2) FREON FLOW param 106(116)

- Go to LOSS OF 1 FREON LOOP (ORB PKT, PWRDN)

- ① Loss of 1 freon loop = next PLS entry
- ② FCL1 = PORT FCL2 = STBD

ECLS

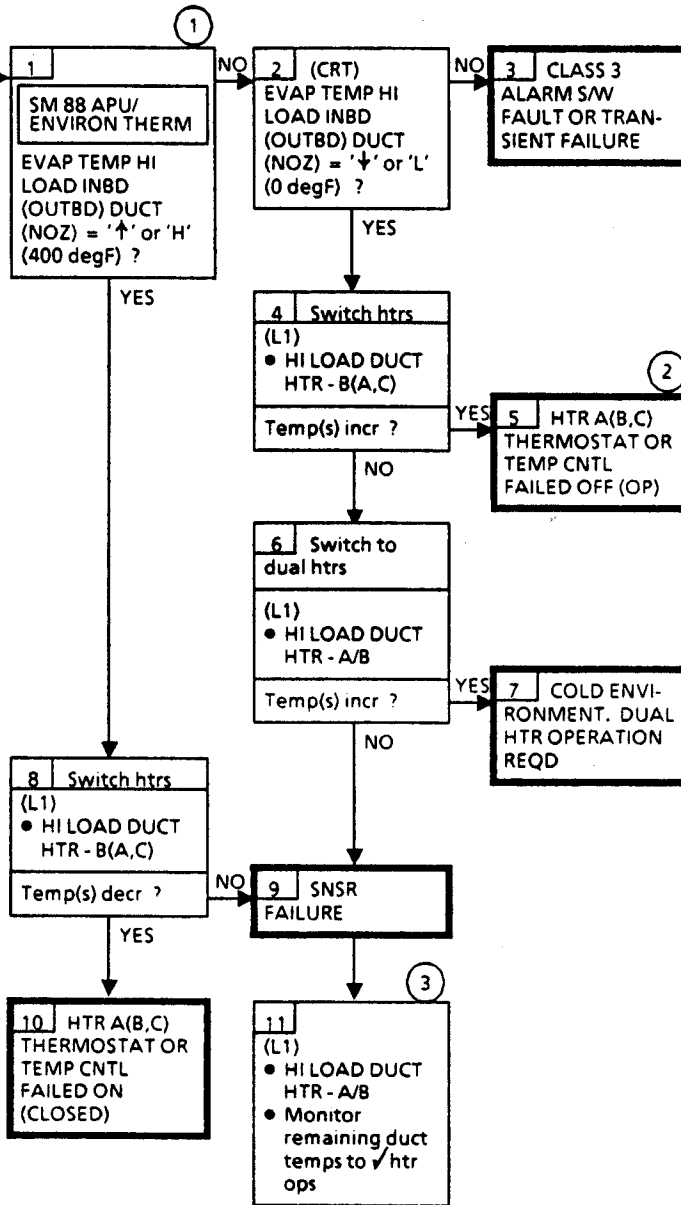
6.4g EVAP TEMP HI LOAD INBD (OUTBD) DUCT(NOZ) ↑↑

S88 THERMAL EVAP

SM 0 THRM EVAP

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 HILO EVAP still operational. If inbd/outbd duct htr failed HILO 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) ++

S88 THERMAL EVAP

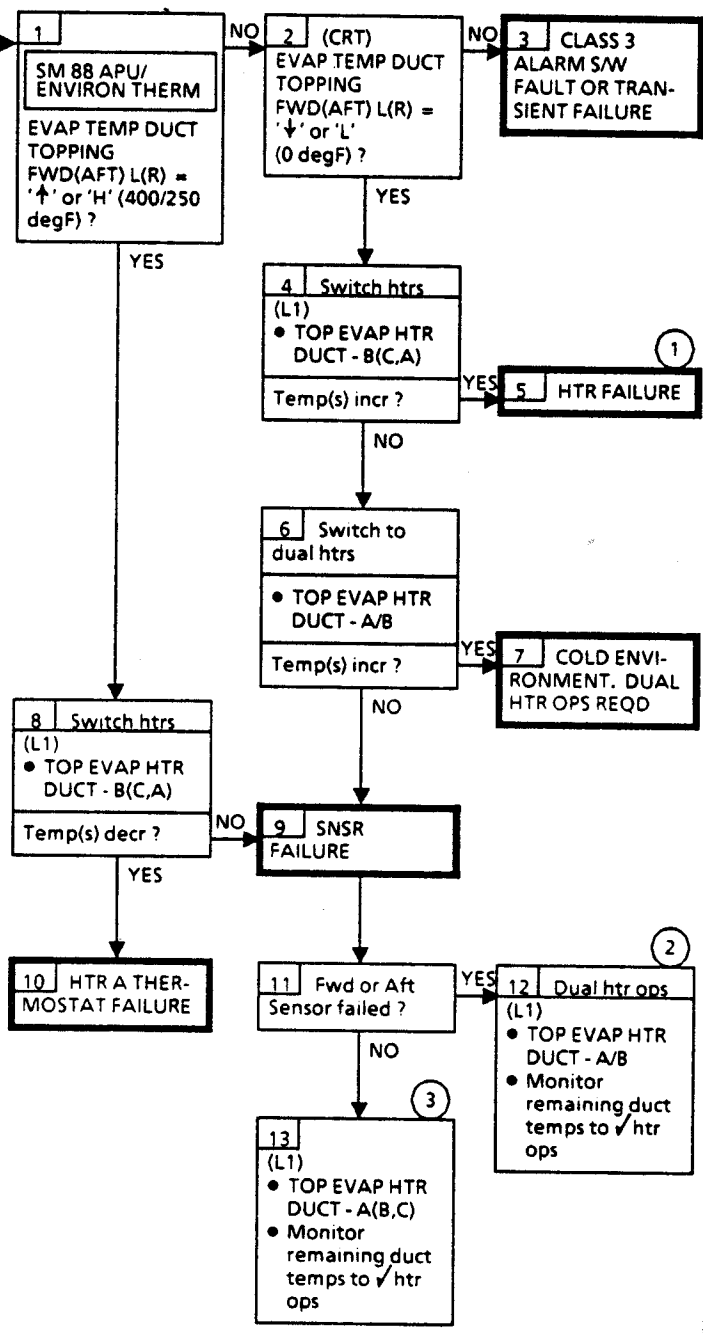
SM 0 THRM EVAP

S88/BFS SM 0:

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

S88 ONLY:

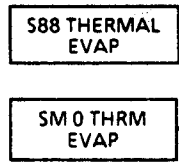
	degF
L	> 245
L	< 50
R	> 245
R	< 50



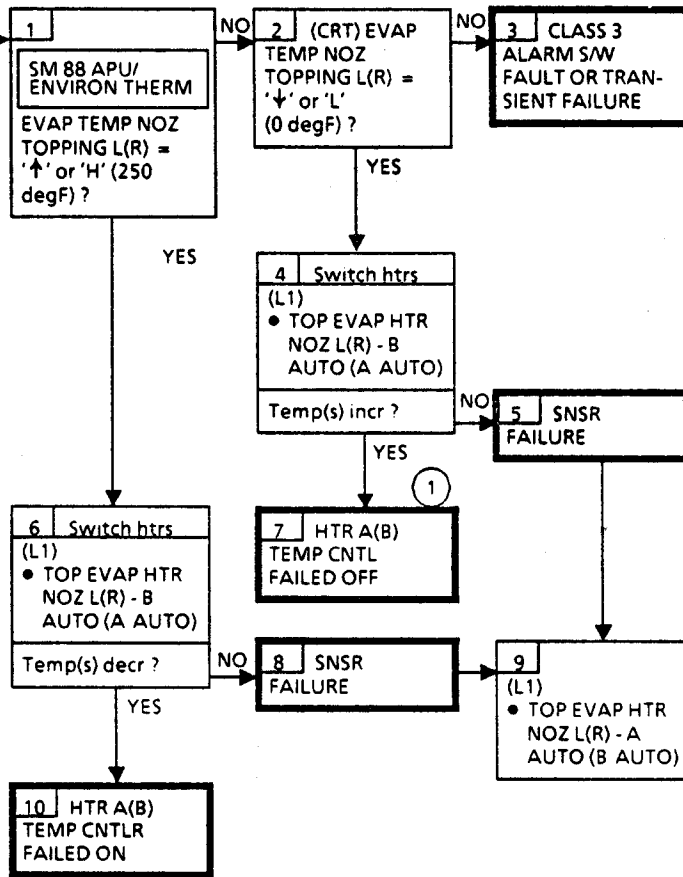
- 1 Topping FES still operational if left, right htrs failed. Loss of Fwd or Aft Htr could result in duct freezing and eventual loss of topping FES
- 2 If instr loss is on either Fwd or Aft Duct, then dual htr ops is reqd as these htrs are considered mandatory
- 3 If instr loss is on either left, right duct, then only single htr ops is reqd

ECLS

6.4i EVAP TOPPING L(R) NOZ ↑↑



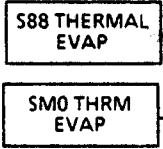
L(R) NOZ
> 245 degF
< 40 degF



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) ↑↓

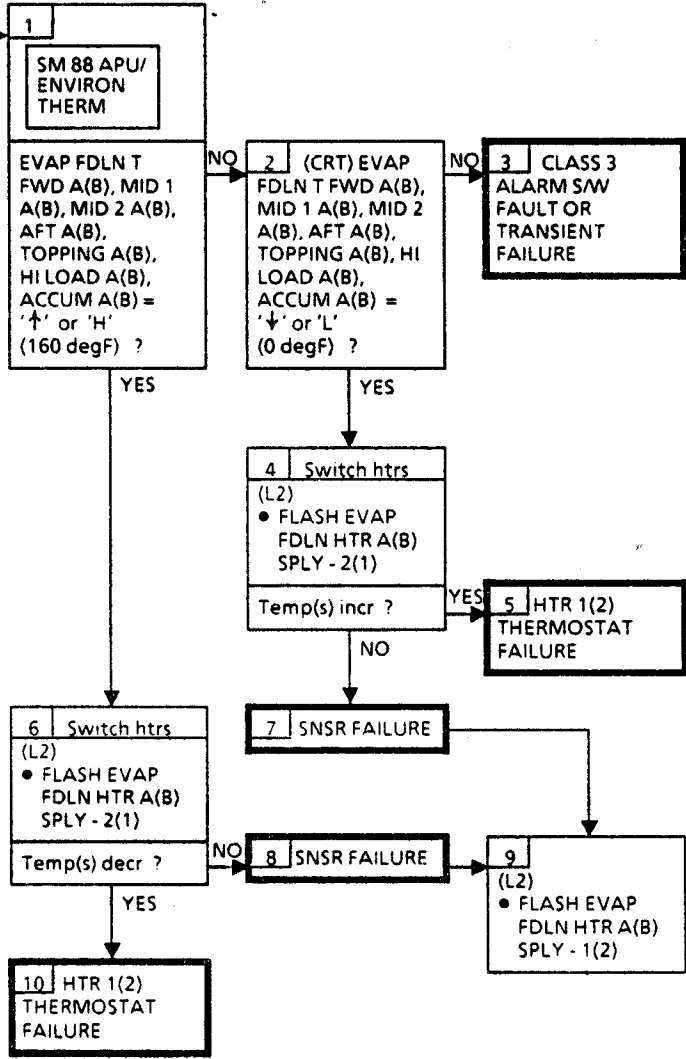


S88/BFS SM 0

	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

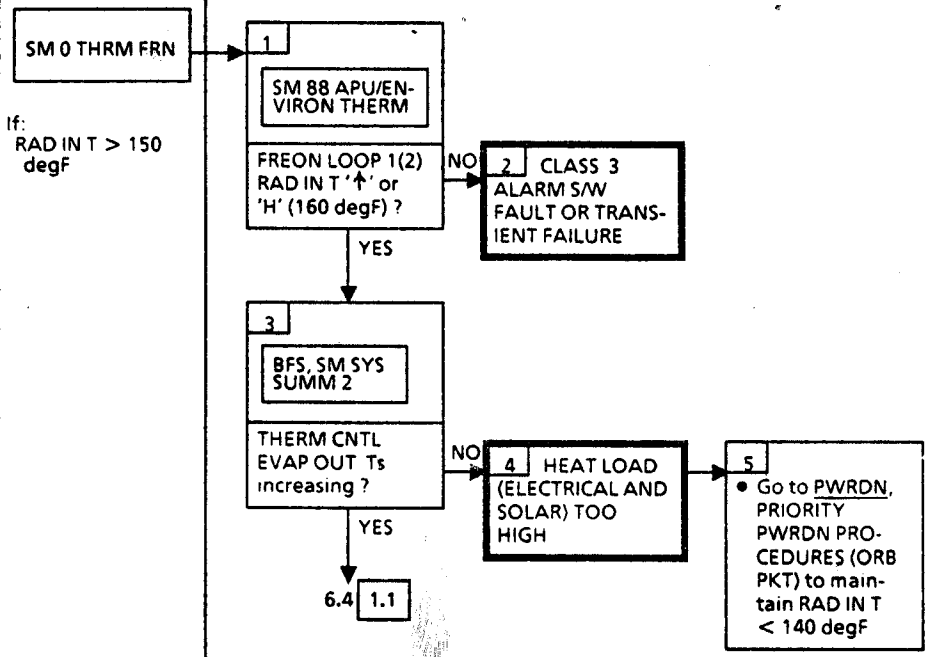
S88 only

	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

6.4k RAD INT ↑ (BFS)



If:
RAD IN T > 150 degF

ECLS

6.4I H2O PUMP P 1(2) ++

H2O LOOP

Light on if:
H2O LOOP 1(2)
PUMP OUT P
< 19.5(45) psia
> 79.5(81) psia

BACKUP CW
ALARM

S88 H2O PUMP
P 1(2)

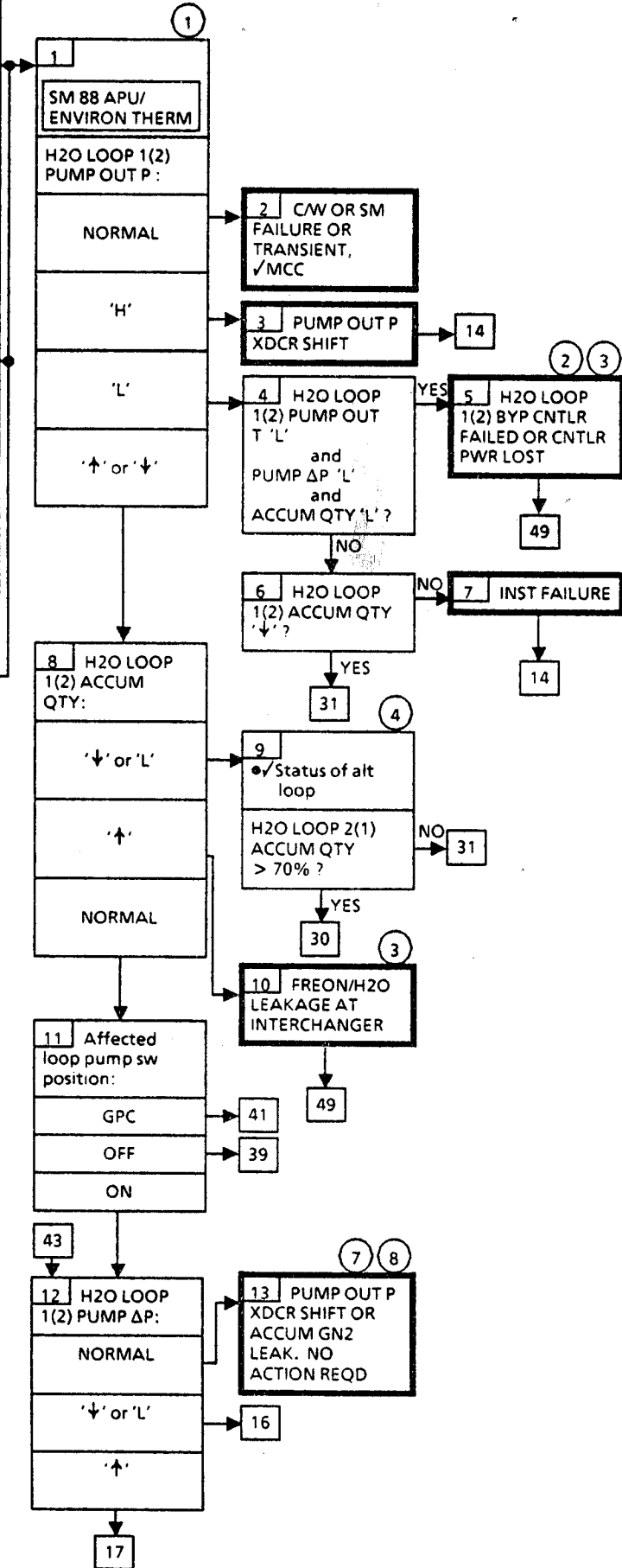
Light on if:
H2O LOOP 1(2)
PUMP OUT P
< 19.5(45) psia
> 79.5(81) psia

SM
ALERT

S88 H2O PUMP
P 1(2)

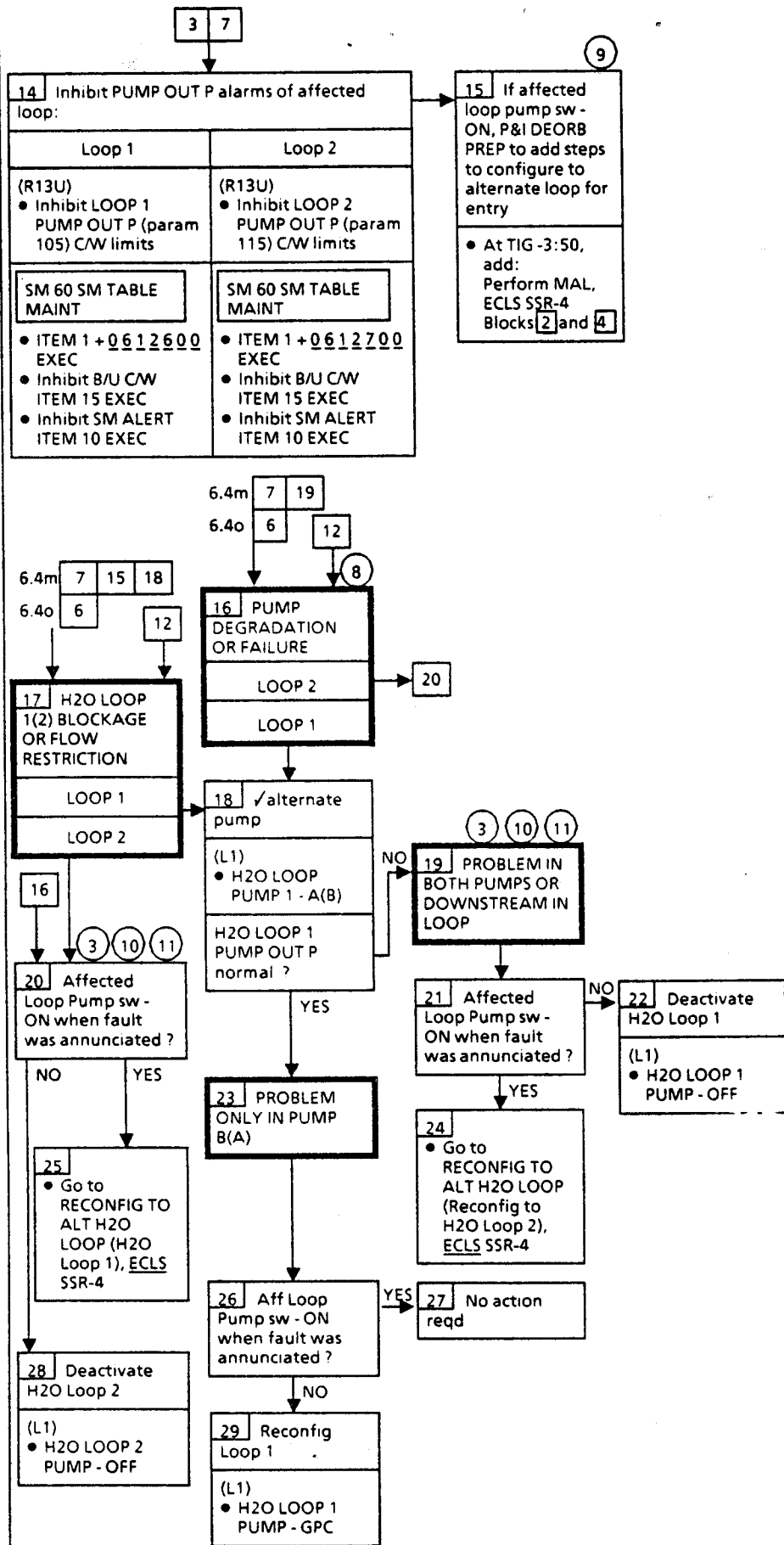
Light on if:
H2O LOOP 1(2)
PUMP OUT P
< 50 psia
> 75 psia
or
< 20 psia
(inactive loop)

Nominal Config:
(L4:F)
H2O LOOP PUMP
cb AC1 φA, φB, φC
1A/2 - cl
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
(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 1,2 BYP
MODE - MAN



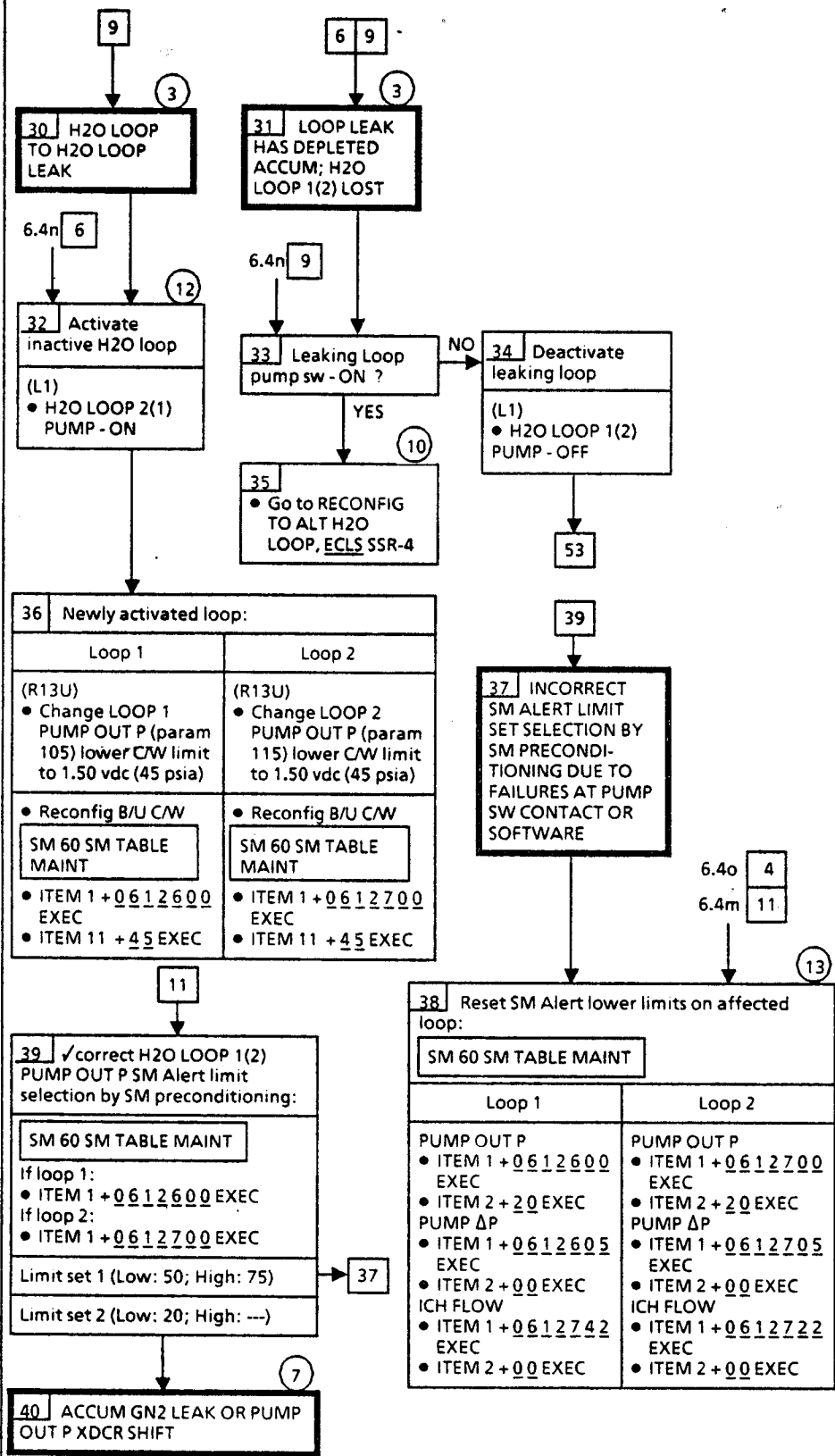
- ① Meter on pni O1 is alternate readout source
- ② √MCC about reset cb
- ③ Possible next PLS, √MCC
- ④ Normal accum quantities are about 45, 55 for H2O loop 1, H2O loop 2 respectively
- ⑤ Preconditioning will select this limit set if (L1) H2O PUMP LOOP 1(2) - ON, or H2O PUMP LOOP 1(2) - GPC and GPC-ON signal present
- 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

ECLS 6.4I (Cont)



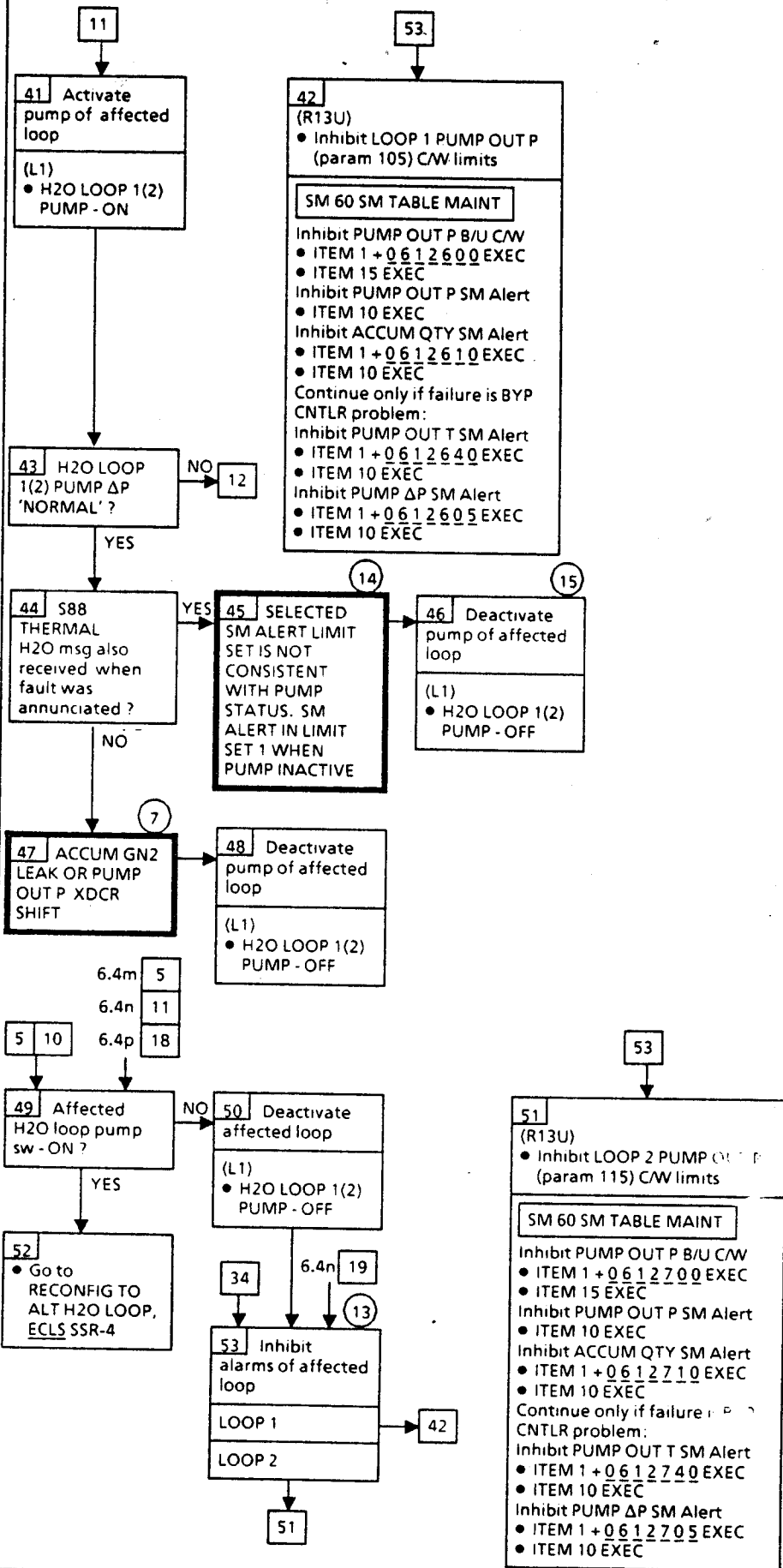
- 3 Possible next PLS, /MCC
- 8 If repeated occurrence (same loop), /MCC for possibilities of ruptured bellows causing GN2 recharge and H2O mix, or stuck bellows
- 9 Only PUMP OUT P is available on board while in BFS
- 10 If both loops are failed:
(L1) H2O PUMP LOOP 1,2 - OFF, then go to PW:RDN, LOSS OF 2 H2O LOOPS (ORB PKT)
- 11 As pumps utilize H2O flow for active cooling, extreme or total blockage will result in overheating and failure of the pump within min

ECLS 6.4l (Cont)



- ③ Possible next PLS, ✓ MCC
- ⑦ For GN2 leak from accum, PUMP OUT P will reach cabin press in the inactive loop and cabin press plus PUMP ΔP for active loop
- ⑩ If both loops are failed:
(L1)
H2O PUMP LOOP 1,2 - OFF, then go to PWRDN, LOSS OF 2 H2O LOOPS (ORB PKT)
- ⑫ Operation of both H2O loops will prevent loss of H2O to alt loop
- ⑬ Crew may opt to have MCC manage software limits via TMBU

ECLS 6.41 (Cont)



7 For GN2 leak from accum, PUMP OUT P will reach cabin press in the inactive loop and cabin press plus PUMP ΔP for active loop

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

14 Possible causes are: PL - MDM failure or pump switch GPC position failure resulting in pump not receiving GPC pump - ON cmd or; SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM Alert limits

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

ECLS

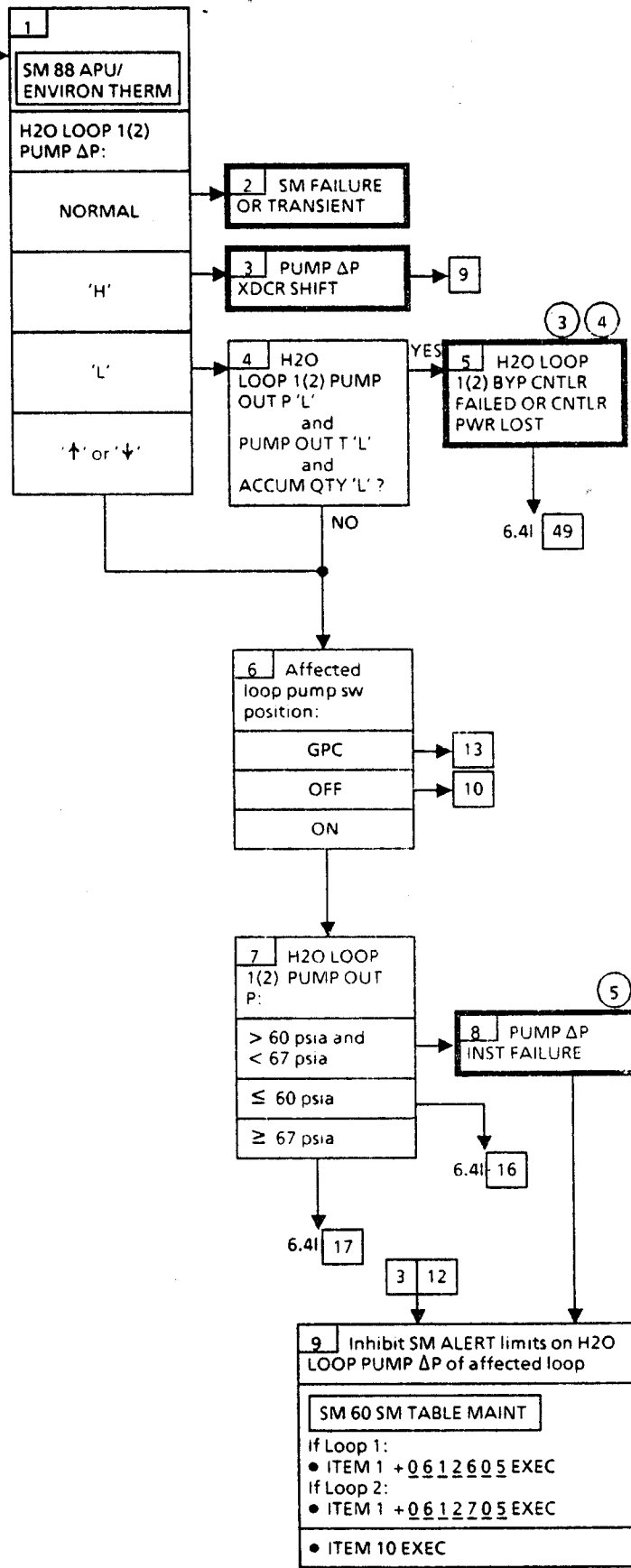
6.4m H2O PUMP ΔP 1(2) ↑↑

SM ALERT

S88 THERMAL H2O

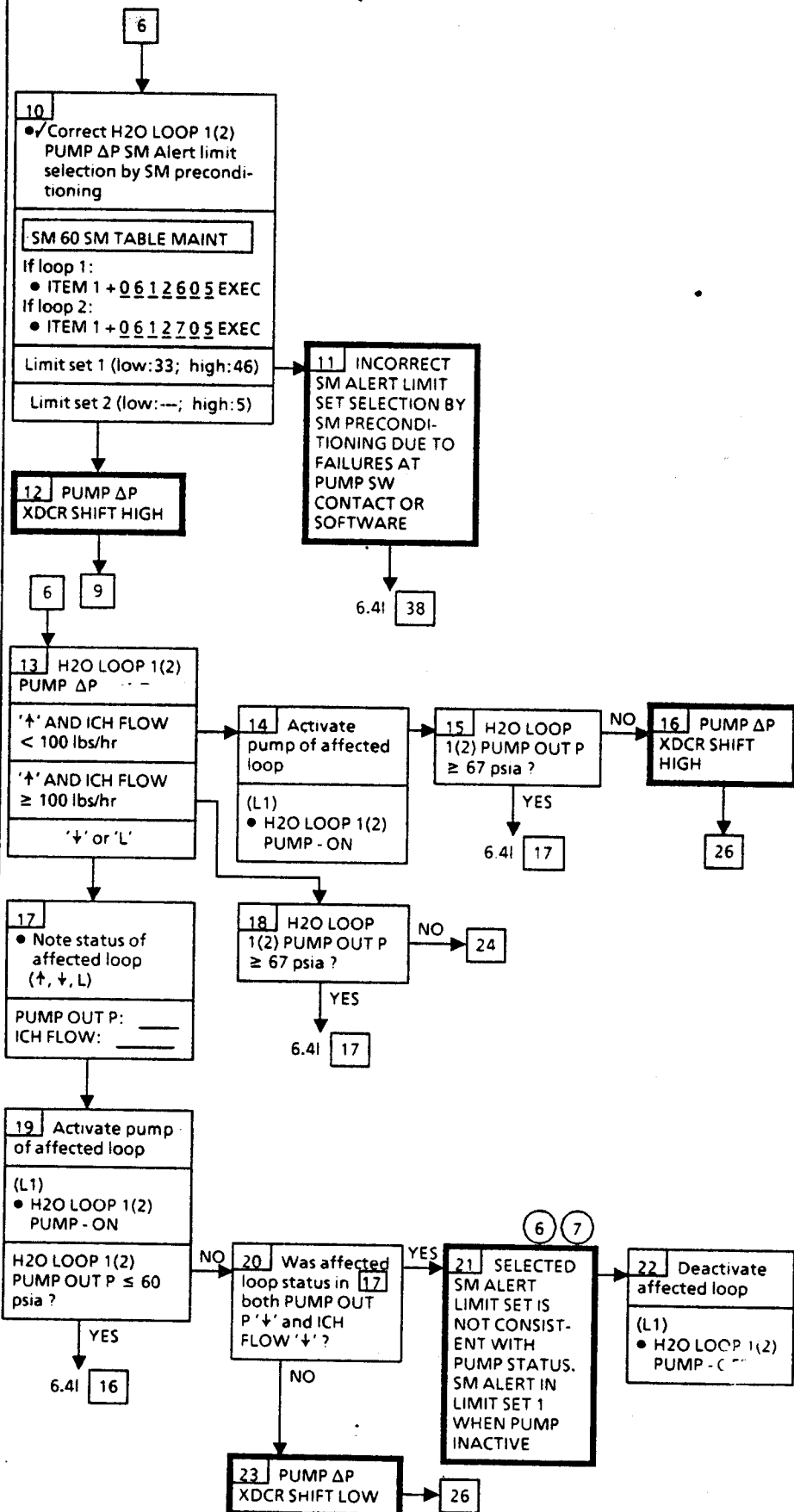
Light on if:
 H2O LOOP 1(2)
 PUMP ΔP
 < 33 psid (1)
 > 46 psid
 or
 > 5 psid (2)
 (inactive loop)

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
- ④ Possible next PLS, ✓MCC
- ⑤ Loss of CNTRL CA1 will cause SM preconditioning software to select wrong limit set and generate ΔP↑ on activated loop 2. H2O Loop 2 is still good

ECLS 6.4m (Cont)

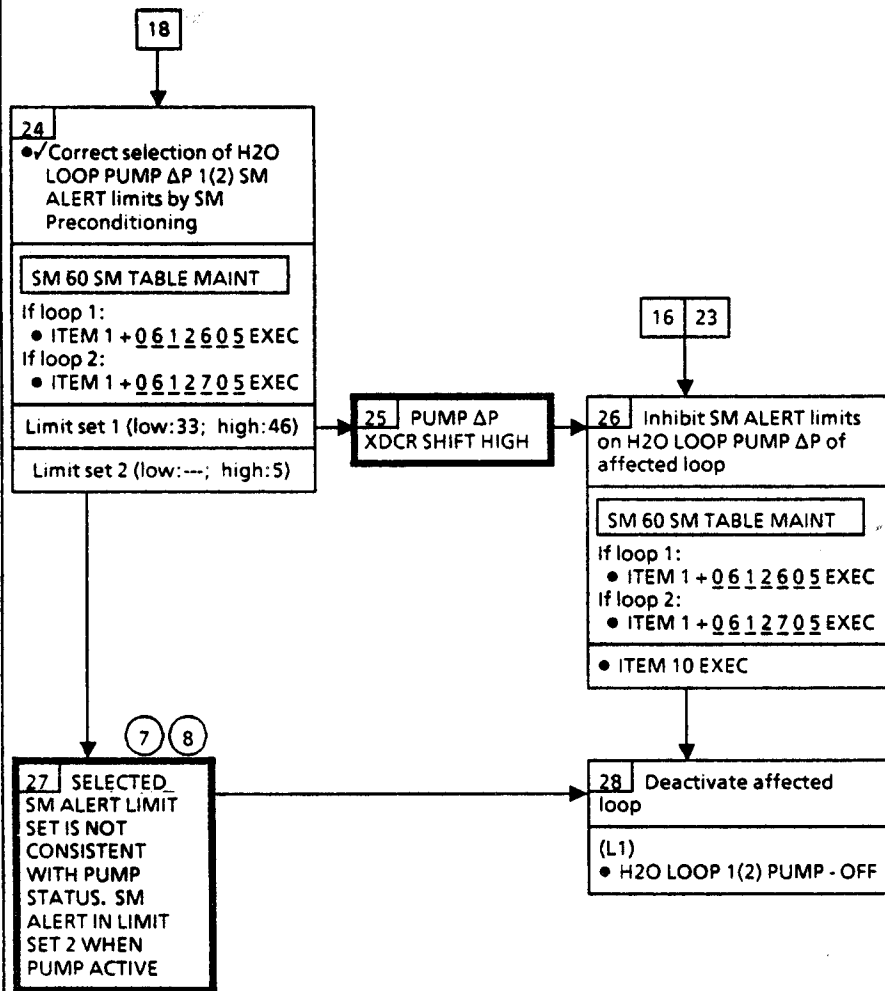


6 Possible causes:
 PL-MDM failure or pump switch GPC position failure resulting in pump not receiving GPC PUMP - ON CMD; or
 VI preconditioning failure (pump switch contact or software) causing selection of incorrect SM Alert limits

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

390

ECLS 6.4m (Cont)



⑦ Pump function sw ON position still available with full cooling capability

⑧ Possible causes are: 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

ECLS

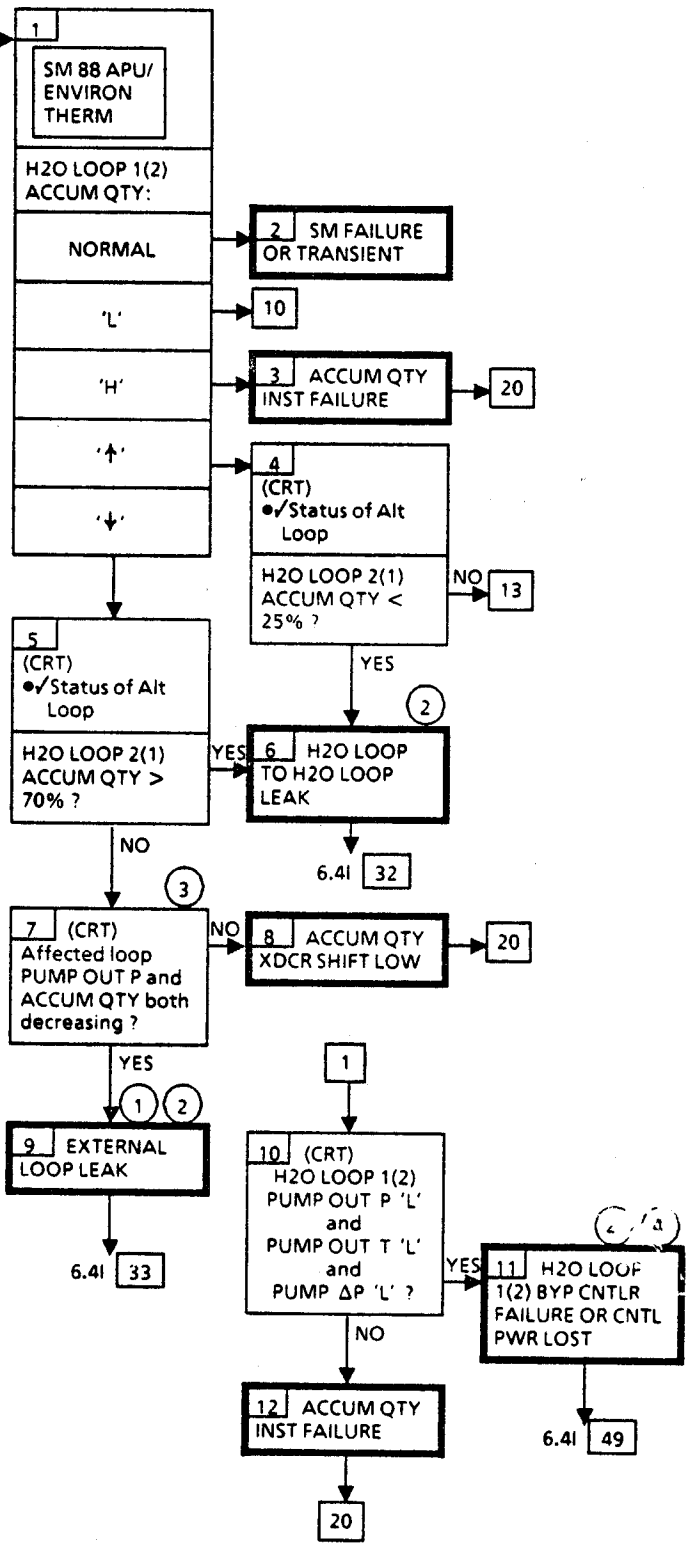
6.4n H2O ACCUM QTY 1(2) ↑↓

SM ALERT

S88 THERMAL H2O

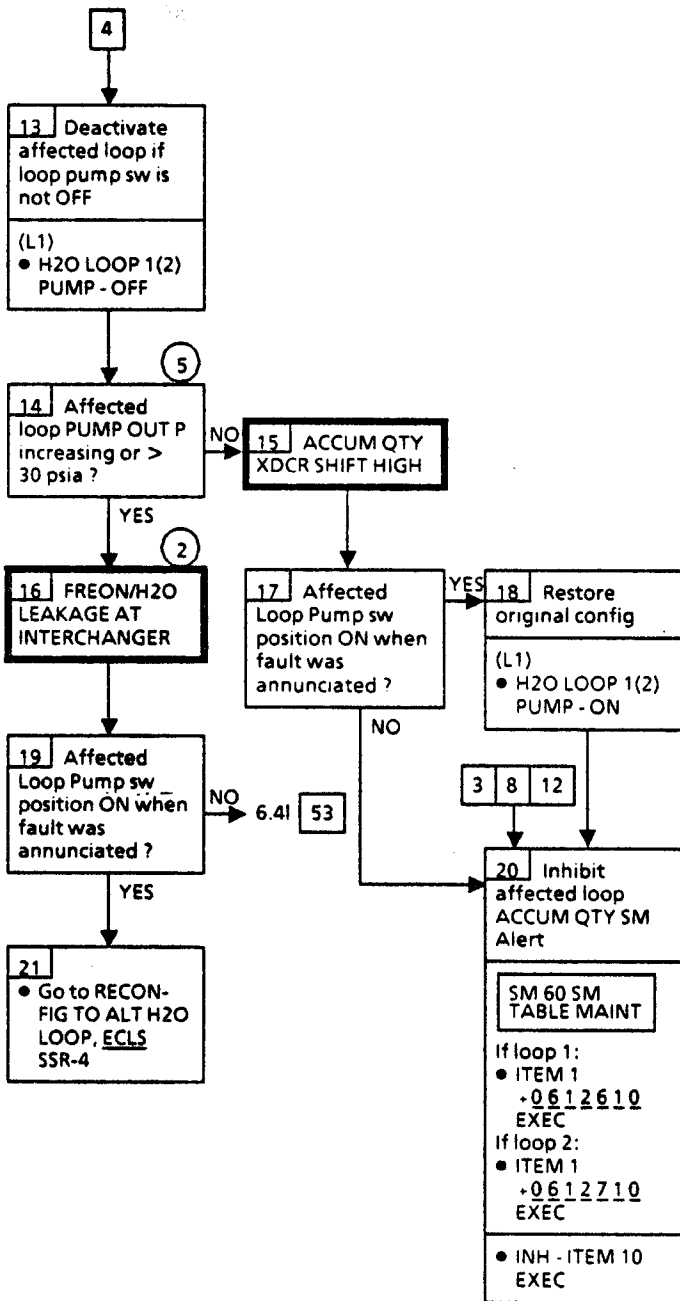
H2O LOOP 1(2) ACCUM QTY < 20% > 80%

Nominal Config: Refer to 6.4l



- ① If both loops failed: (L1) H2O PUMP LOOP 1,2 - OFF, then go to PWRDN, LOSS OF 2 H2O LOOPS (ORB PKT)
- ② Possible next .S. ✓MCC
- ③ For normal water loop charge, approximately one psia change in PUMP OUT P is observed for every 10 pct change in ACCUM QTY
- ④ ✓MCC about reset cb
Loop 1: (L1) 5 AC3ΦA H2O CNTLR 1
Loop 2: (L4) cb AC1ΦA H2O CNTLR 2

ECLS 6.4n (Cont)



② 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 a FCL/H2O inter-loop leakage failure. This PUMP OUT P will eventually reach equilibrium with FCL pressure at the interchanger, which is greater than 60 psia normally

ECLS

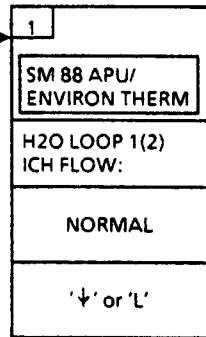
6.4o H2O ICH FLOW 1(2) +

SM ALERT

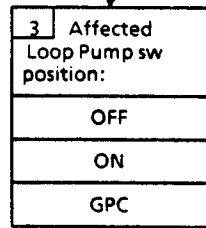
S88 THERMAL H2O

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

Nominal Config: Refer to 6.4i

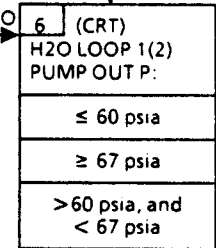
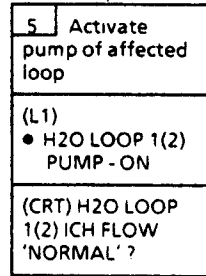


2 SM FAILURE OR TRANSIENT

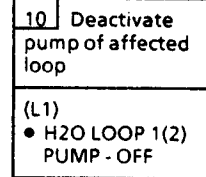
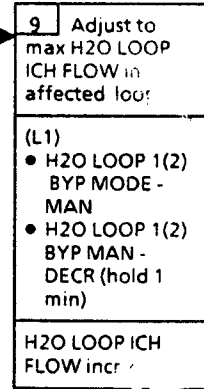
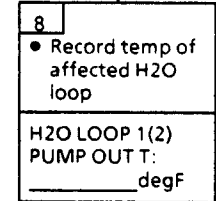


4 INCORRECT SM ALERT LIMIT SELECTION BY SM PRECONDITIONING DUE TO FAILURE AT PUMP SW CONTACT OR SOFTWARE

6.4i 38



7 SELECTED SM ALERT IS NOT CONSISTENT WITH PUMP STATUS. SM ALERT IN LIMIT SET 1 (LOW: 550) WHEN PUMP INACTIVE



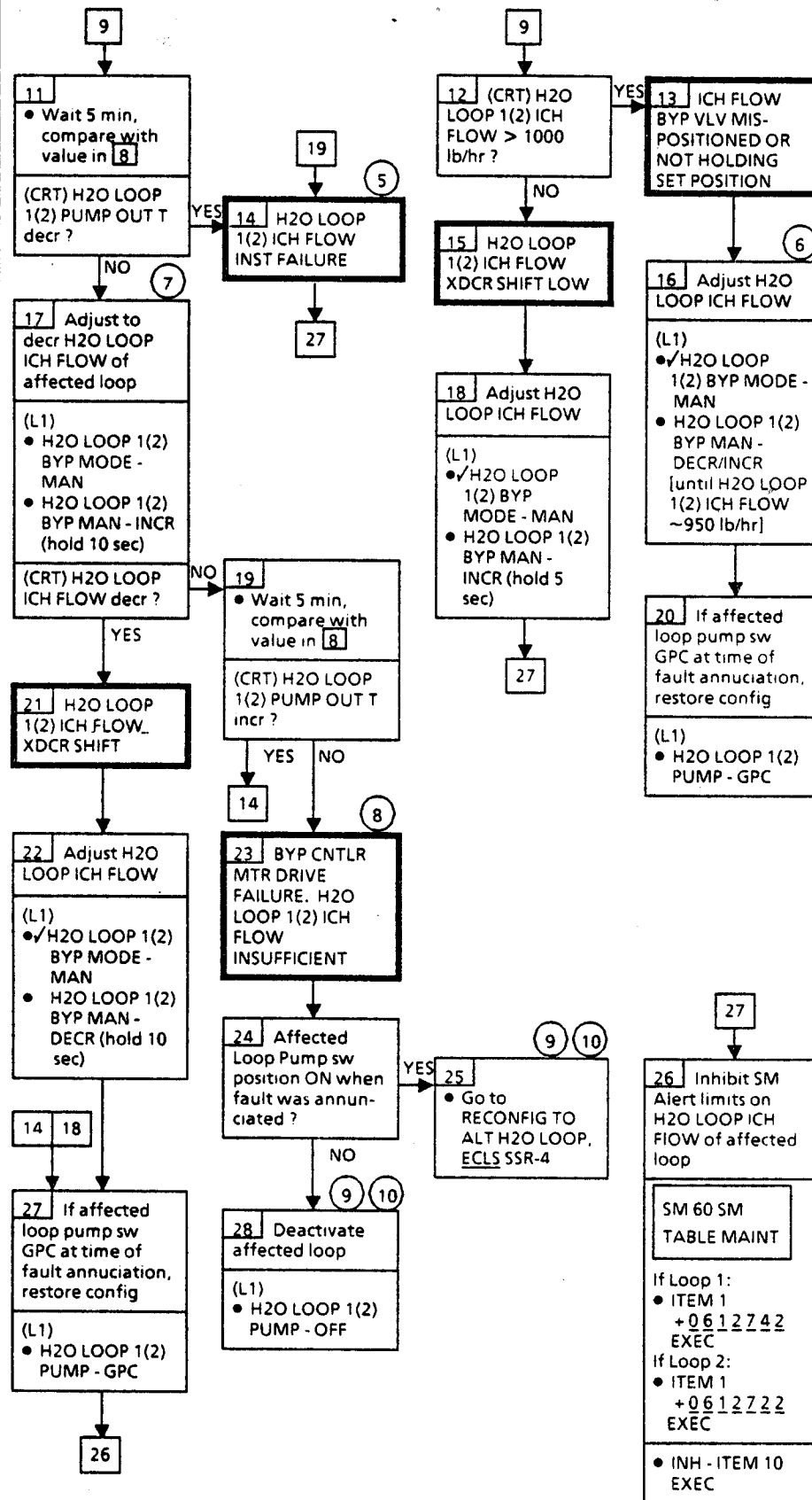
1 Preconditioning will select this limit set if H2O PUMP LOOP 1(2) - ON; or H2O PUMP LOOP 1(2) - GPC and GPC - ON signal present

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

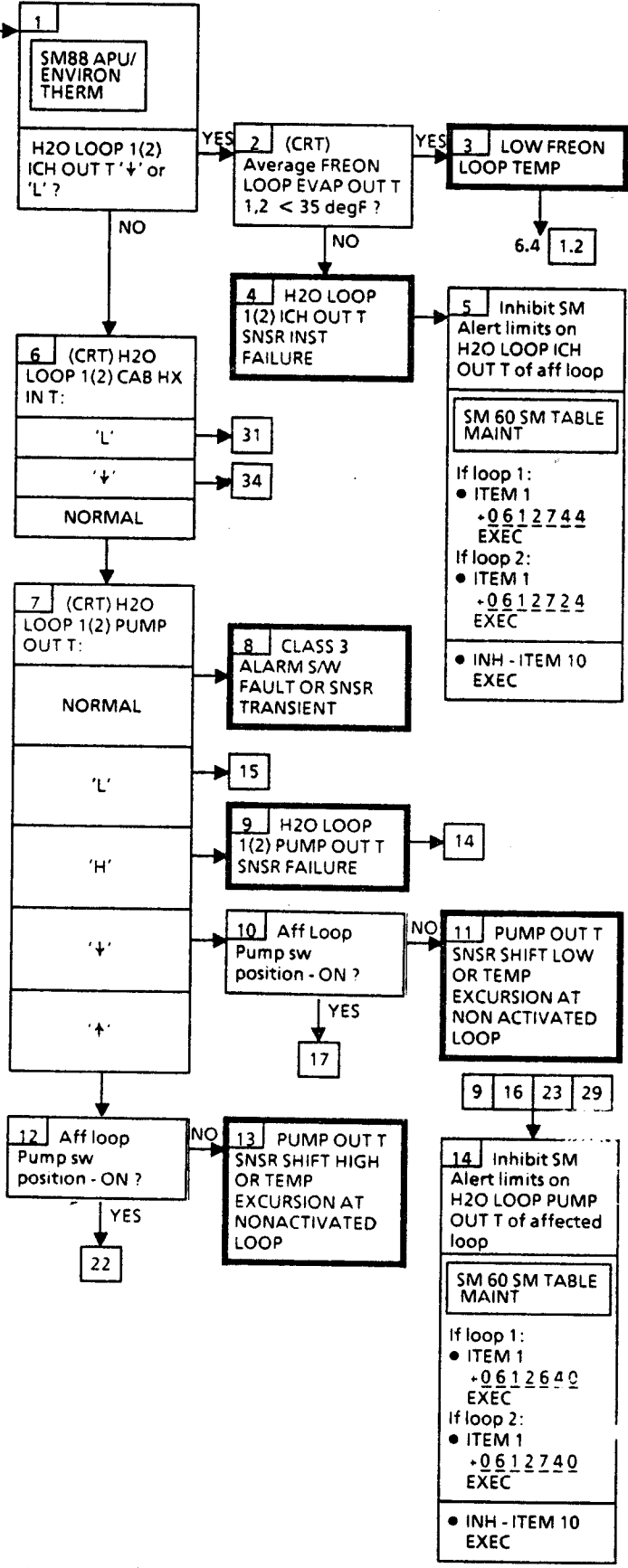
ECLS

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

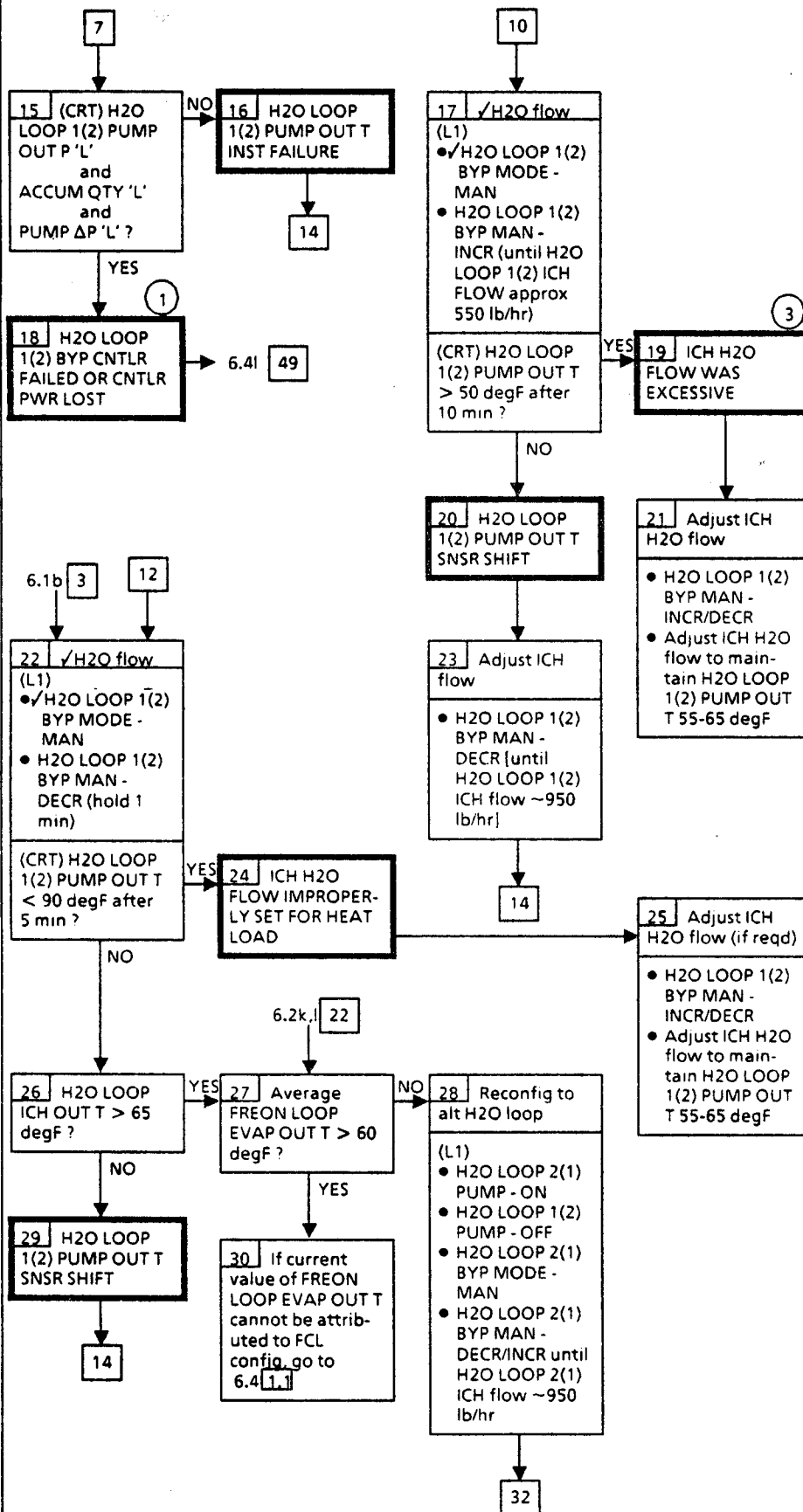
SM ALERT
S88 THERMAL H2O

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 degF

Nominal Config:
Refer to 6.4i



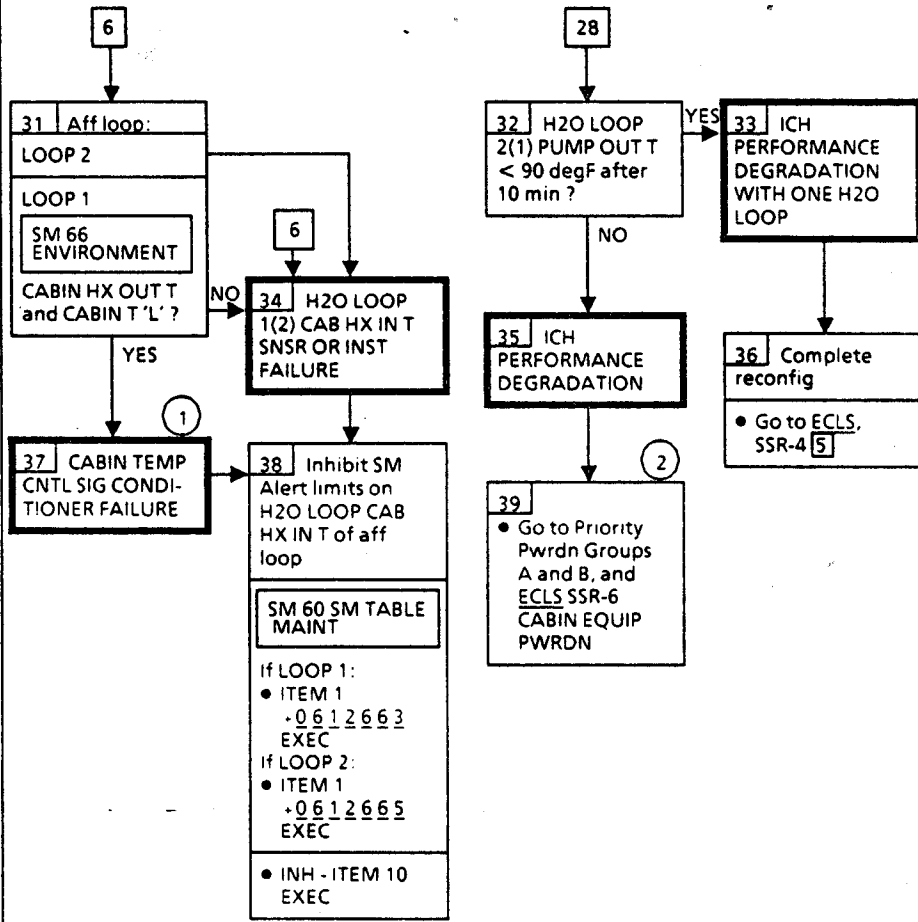
ECLS 6.4p (Cont)



① ✓MCC about reset cb
 LOOP 1:
 (L4) cb AC3ΦA H2O CNTLR 1
 LOOP 2:
 (L4) cb AC1ΦA H2O CNTLR 2

③ Small xdcr shift low combined with low heat load on loop may lead to same conclusion. Heat load/ flowrate analysis reqd to identify exact cause. ✓MCC

ECLS 6.4p (Cont)



① ✓MCC about reset cb (pnl L4)
 LOOP 1:
 cb AC3ΦA H2O CNTLR 1
 LOOP 2:
 cb AC1ΦA H2O CNTLR 2

② ✓MCC for further pwrDn reqd and water loop flowrate management

ECLS

6.4q H2O PUMP OUT P 1(2) ↑↑ (BFS)

H2O LOOP

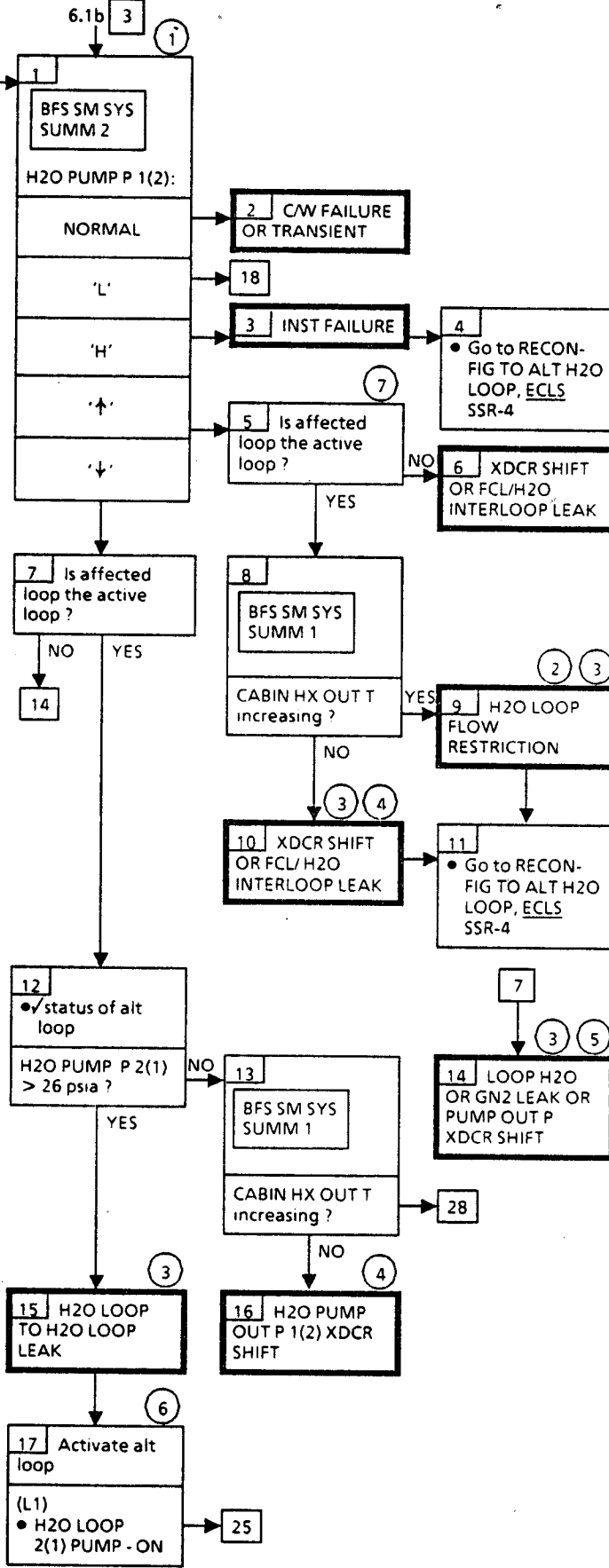
Light on if:
H2O PUMP P 1(2)
< 19.5(45) psia
> 79.5(81) psia

BACKUP CW ALARM

SM2 H2O PUMP P 1(2)

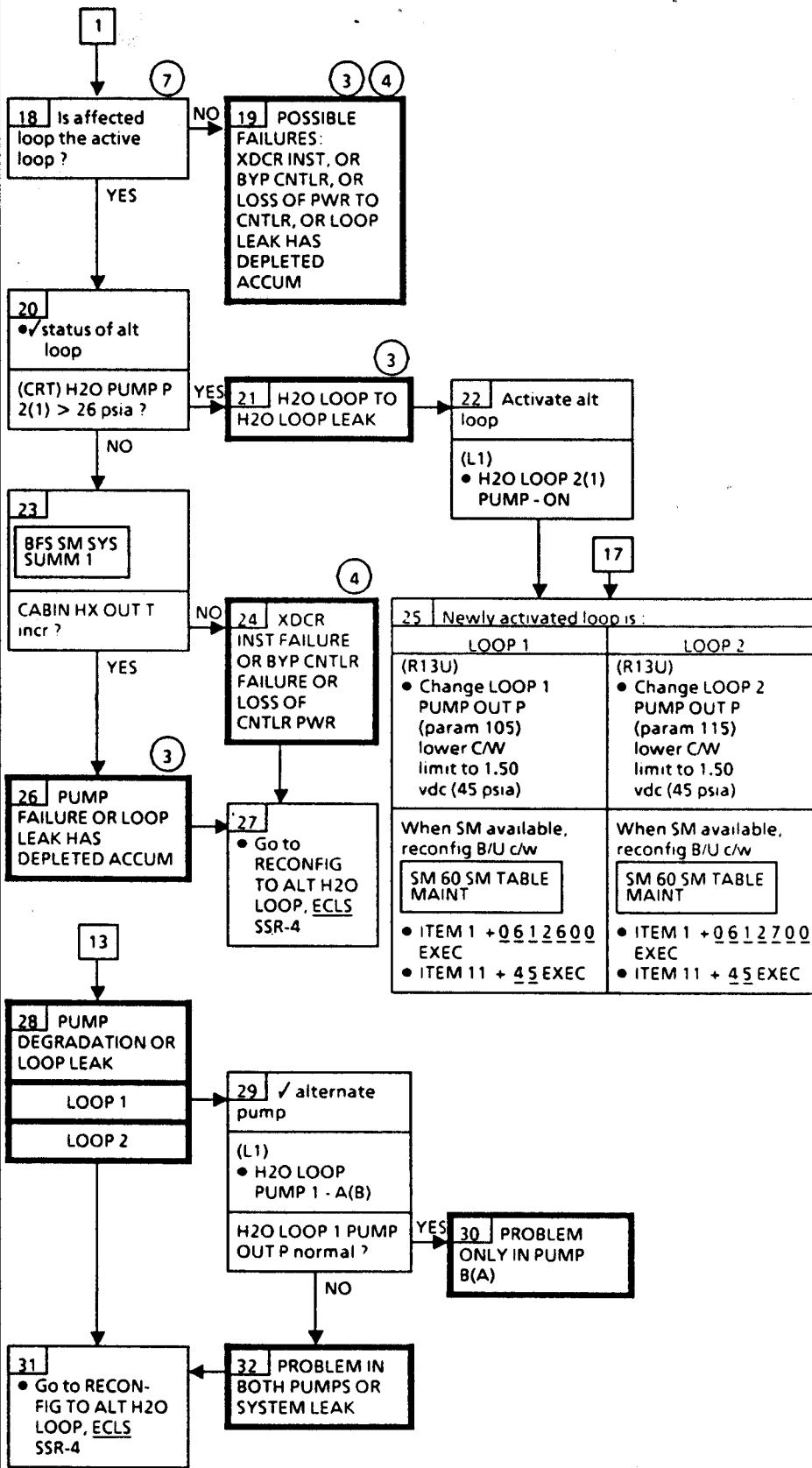
Light on if:
H2O LOOP P 1(2)
PUMP OUT P
< 19.5(45) psia
> 79.5(81) psia

Nominal Config:
Refer to 6.4l



- ① Meter on pnl O1 is alternate readout source
- ② If both loops are failed: (L1) H2O PUMP 1,2 - OFF Go to PWRDN, LOSS OF H2O LOOPS (ORB PKT)
- ③ Possible next PLS. ✓MCC
- ④ ✓MCC for verification
- ⑤ For GN2 leak from accum of inactive loop, PUMP OUT P will reach cabin press
- ⑥ Ops of both H2O loops is reqd to prevent pump cavitation in the leaking loop
- ⑦ Loop 2 pump is activated anytime the sw is placed in GPC when BFS has control of the payload buses

ECLS 6.4q (Cont)



- ③ Possible next PLS. ✓MCC
- ④ ✓MCC for verification
- ⑦ Loop 2 pump is activated anytime sw is placed in GPC when BFS has control of payload buses

6.5 SPLY H2O

ECLS

6.5 SPLY H2O

SM ALERT

S66 H2O

If: 1

TK A qty < 25%
 TK B (C,D) qty
 < TMBU limit
 WASTE H2O TK1
 qty < TMBU
 limit
 H2O SPLY PRESS
 > 40.0 psia or
 < 10.0 psia

Nominal Config:
 (ML86B:A)
 cb MNA SPLY H2O
 TKA INLET - cl
 TKB OUTLET - cl
 cb MNA H2O LINE
 HTR A - op(cl)
 cb MNA WASTE
 H2O DUMP
 VLV/NOZ HTR - cl
 cb MNB SPLY H2O
 TKB INLET - cl
 TKC OUTLET - cl
 DUMP ISOL - cl
 B SPLY ISOL VLV -
 cl
 cb MNB H2O LINE
 HTR B - op(cl)
 cb MNC SPLY H2O
 TKA OUTLET - cl
 TKC INLET - cl
 DUMP VLV/NOZ
 HTR - cl
 XOVR VLV - cl
 GALLEY SPLY - cl
 (ML86B:B)
 cb MNA WASTE
 H2O
 TK1 VLV - cl
 H2O
 DUMP ISOL - cl
 cb MNA
 VAC VENT ISOL
 VLV - cl
 cb MNB WASTE
 H2O
 TK1 DRAIN - op
 cb MNB
 VAC VENT NOZ
 HTR - cl
 cb MNB
 VAC VENT ISOL
 VLV - cl
 cb MNA SPLY
 H2O TKD OUTLET -
 cl
 cb MNB SPLY
 H2O TKD INLET -
 cl
 (O16:D)
 cb MNC H2O ALT
 PRESS - cl
 (ML26C)
 SPLY H2O GN2
 TKA SPLY vlv - OP
 SPLY H2O GN2
 TK VENT vlv - PRESS
 (R12L)
 SPLY H2O
 TKA INLET - OP
 (tb-OP)
 (Cont in notes
 column)

1.1 H2O TK QTY LOW AND DECR SM 66 ENVIRONMENT

1. If only one of TKC or D, go to MAL, ECLS, 6.5b 1 >>
2. If PLBD open, FLASH EVAP CNTLR PRI A, B - OFF
3. H2O TK N2 ISOL vlv (two) - CL (pnl MO10W)
4. If only TKA, go to MAL, ECLS, 6.5a 1 >>

NOTE

Expect audible vent and SM 66 H2O alert for
 WASTE H2O PRESS ↓ when performing the
 next step

5. SPLY H2O GN2 TK VENT vlv - VENT (ML26C)
 ✓SPLY H2O GN2 TKA SPLY vlv - OP
6. When WASTE PRESS ~ 0 2
 psig (1-2 min):
 Go to MAL, ECLS, 6.5a 32 for TK B 3
 6.5a 52 for TK C, D
 6.5a 72 for WASTE

1.2 H2O FREE IN CAB

1. CAB FAN (two) - OFF
 2. IMU FAN (three) - OFF
- CAUTION**

Do not operate IMUs without
 IMU FANs for more than 30 min
3. FLT CNTLR PWR (three) - OFF
 4. cb DDU (six) - op
 5. Minimize CRT use:
 If CRT currently ON, turn OFF within
 30 min. Otherwise, allow 3 min OFF
 prior to each 1 min ON (Max ON = 1 hr)
 6. Minimize Itg
 7. Go to FREE FLUID DISPOSAL (IFM)
 to remove free water

1.3 H2O SPLY PRESS HIGH SM 69 FUEL CELLS
SM 66 ENVIRONMENT

- If multiple FC H2O LN T and FC H2O VLT T
 converging or within 5 degF of each other:
1. ✓SPLY H2O TKA,TKB,TKC INLET (three) - OP (tb-OP)
 If H2O SUPPLY QTY B ≥ 95:
 2. SPLY H2O XOVR - OP (tb-OP)
 If H2O SUPPLY PRESS decr or < 40 >> 4
 If H2O SUPPLY PRESS not decr or ≥ 40:
 3. RAD CNTLR OUT TEMP - HI
 4. When EVAP OUT T ~ 50 then,
 FLASH EVAP CNTLR PRI B - ON (pnl O1)
 5. Go to MAL, ECLS, 6.5d 4 >>
 - If H2O SUPPLY QTY B < 95:
 6. Go to MAL, ECLS 6.5d 7 >>
- If multiple FC H2O LN T and FC H2O VLV T
 not converging or within 5 degF of each other:
 7. Go to MAL, ECLS, 6.5d 11

1.4 H2O SPLY PRESS LOW SM 66 ENVIRONMENT

- If H2O SUPPLY QTY A ≤ 5:
1. SPLY H2O TKA INLET - CL (tb-CL)
 2. H2O HTR - OFF (GALLEY)
 3. H2O TK N2 ISOL VLV (two) - CL (pnl MO10W)
 4. SPLY H2O GALLEY SPLY VLV - CL (tb-CL)
 5. Go to MAL, ECLS, 6.5a 1 >>
- If H2O SUPPLY QTY A > 5:
 If H2O SUPPLY QTY A decr:
 6. Go to 6.5 1.1 H2O TK QTY LOW AND DECR >>
 If H2O SUPPLY QTY A not decr:
 7. Go to MAL, ECLS, 6.5d 1

1 TK C Qty Xdcr
 used to sense for
 leaks in Tks C,D.
 TK D qty limit
 nominally OSL

2 H2O TK empty
 when < 5%

3 Time varies
 with H2O TK N2
 ullage

4
TKB/C CHECK
 VLV FAILURE

Nominal Config:
 (Cont)
 SPLY H2O
 TKA OUTLET - CL
 (tb-CL)
 TKB,C INLET,
 OUTLET - OP
 (tb-OP)
 XOVR VLV - CL
 (tb-CL)
 DUMP ISOL VLV -
 OP (tb-OP)
 DUMP VLV - CL
 (tb-bp)*
 DUMP VLV ENA/
 NOZ HTR - OFF
 GALLEY SPLY VLV -
 OP (tb-OP)
 B SPLY ISOL VLV -
 OP (tb-OP)
 (ML31C)
 WASTE H2O
 TK1 DRAIN VLV -
 CL (tb-bp)
 TK1 VLV - OP
 (tb-OP)
 DUMP ISOL VLV -
 OP (tb-OP)
 DUMP VLV - CL
 (tb-bp)*
 DUMP VLV ENA/
 NOZ HTR - OFF
 VAC VENT NOZ
 HTR - ON
 ISOL VLV CNTL -
 OP (tb-OP)
 ISOL VLV BUS
 SEL - MNA
 SPLY H2O TKD
 INLET - OP
 (tb-OP)
 OUTLET - OP
 (tb-OP)

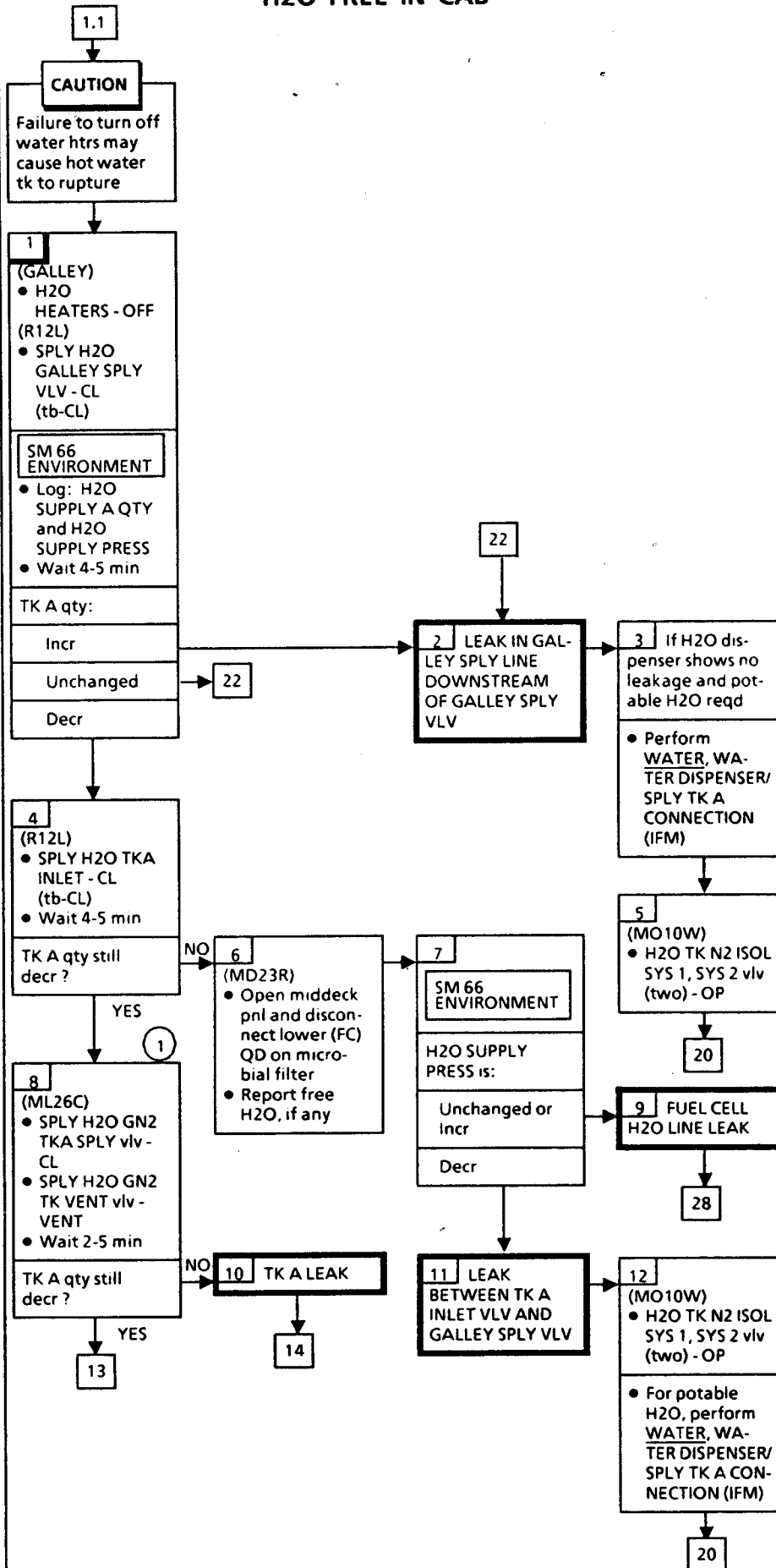
*Talkback will be
 bp when DUMP
 VLV ENA/NOZ
 HTR - OFF

SPLY H2O
 6.5
 401

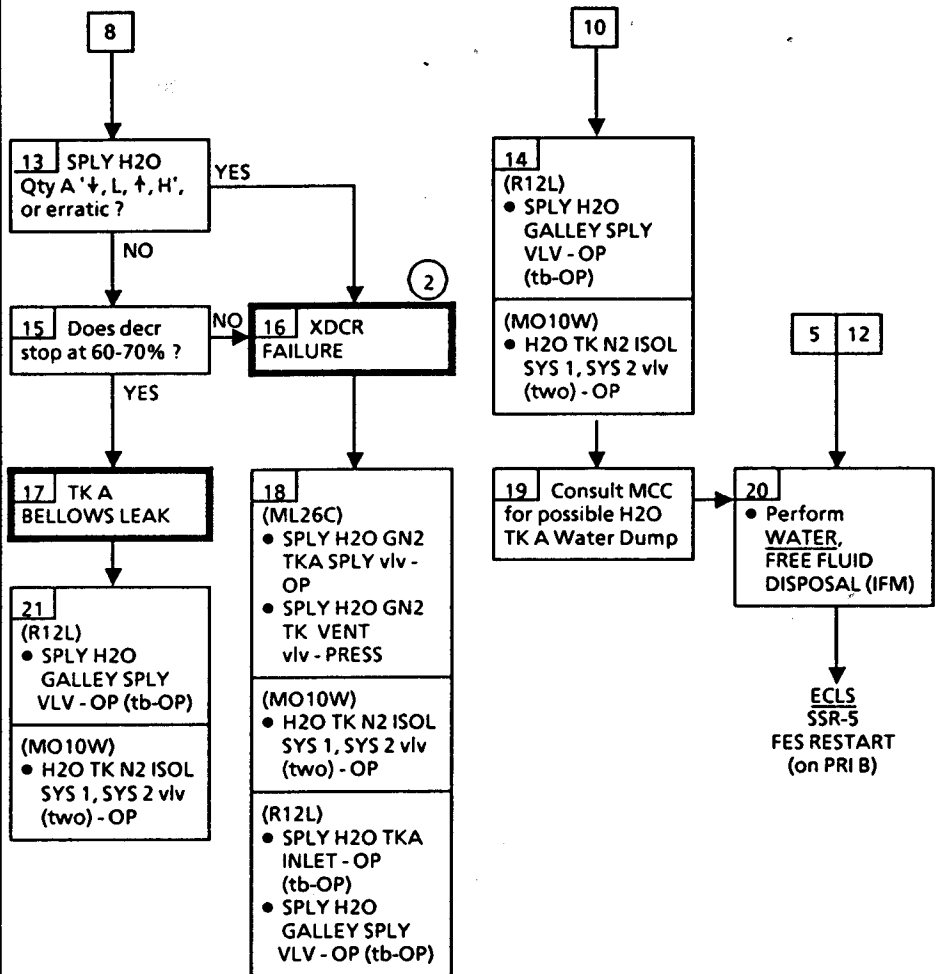
ECLS

6.5a H2O TK QTY + H2O FREE IN CAB

① Time varies with H2O TK qty

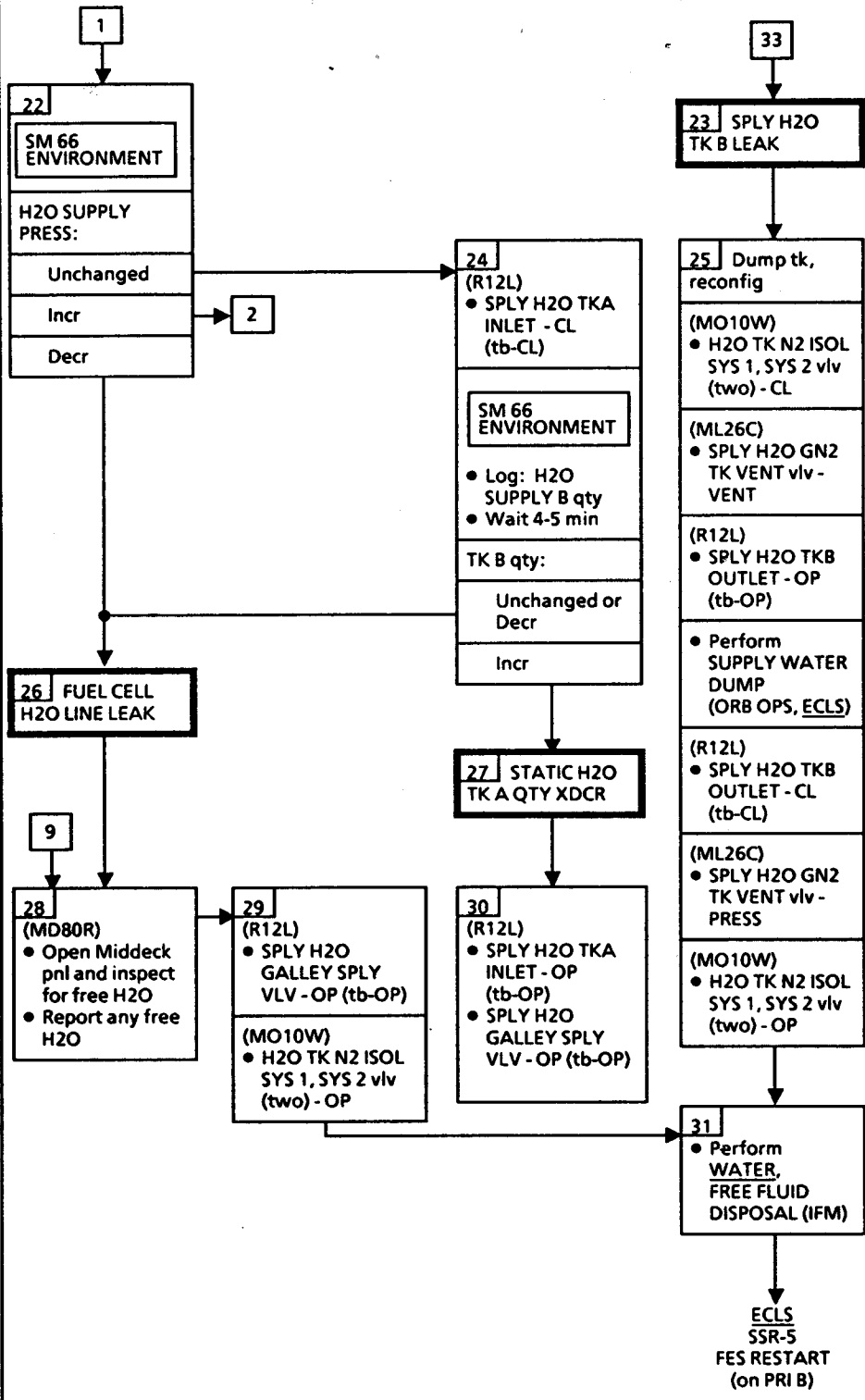


ECLS 6.5a (Cont)

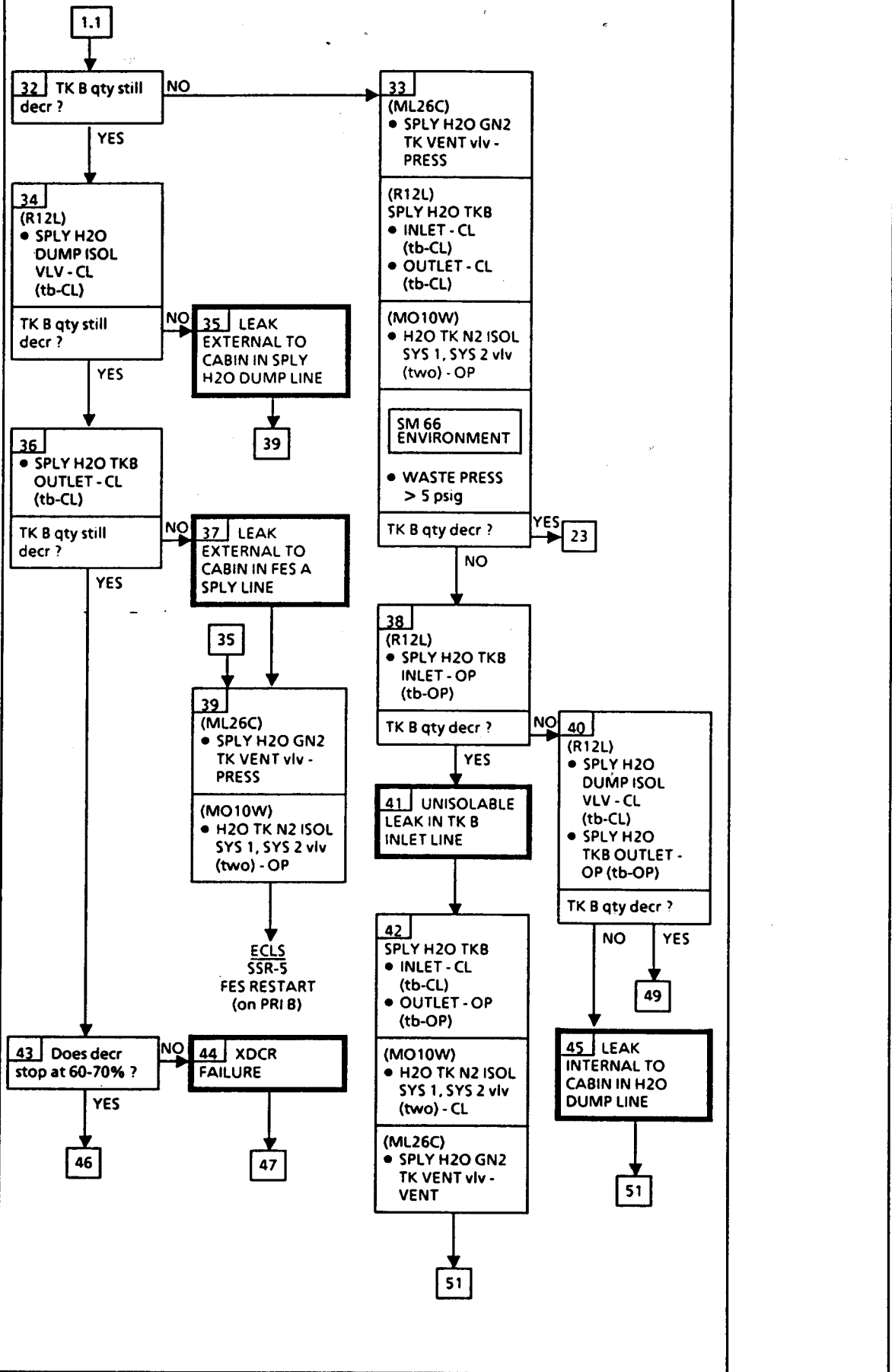


② TK A may be assumed full when TK B begins to fill

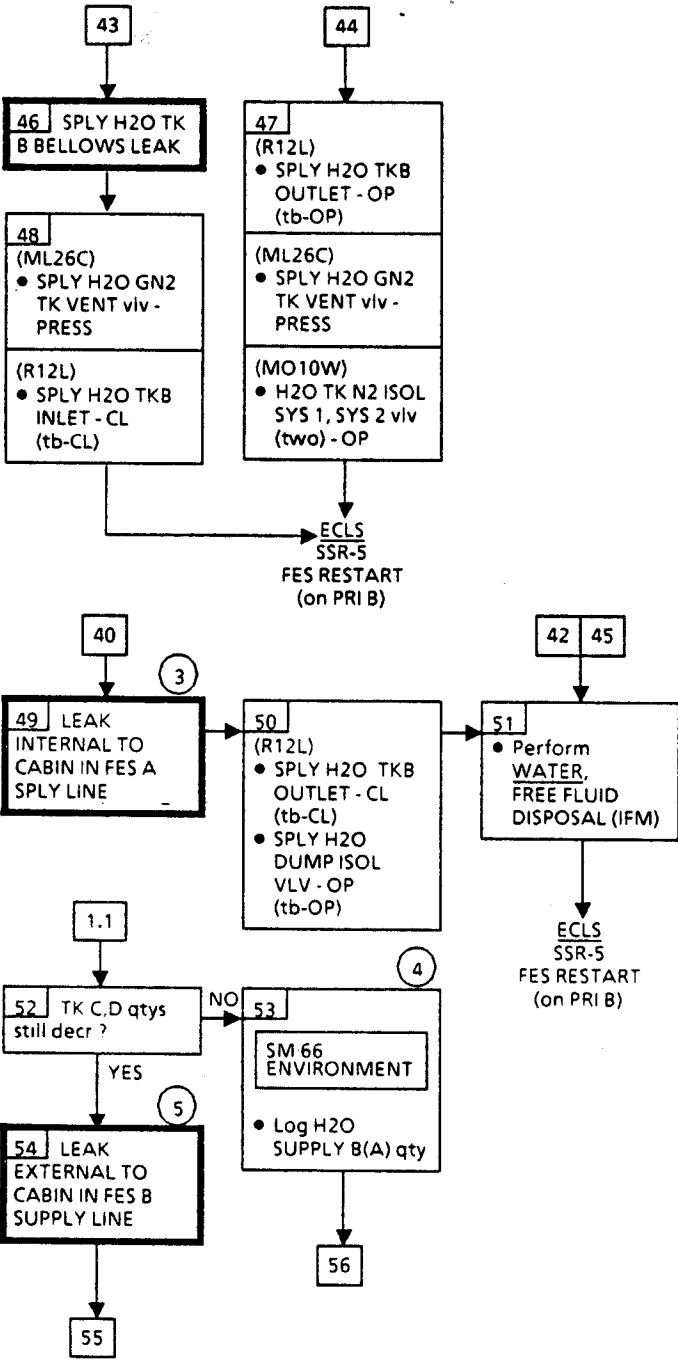
ECLS 6.5a (Cont)



ECLS 6.5a (Cont)

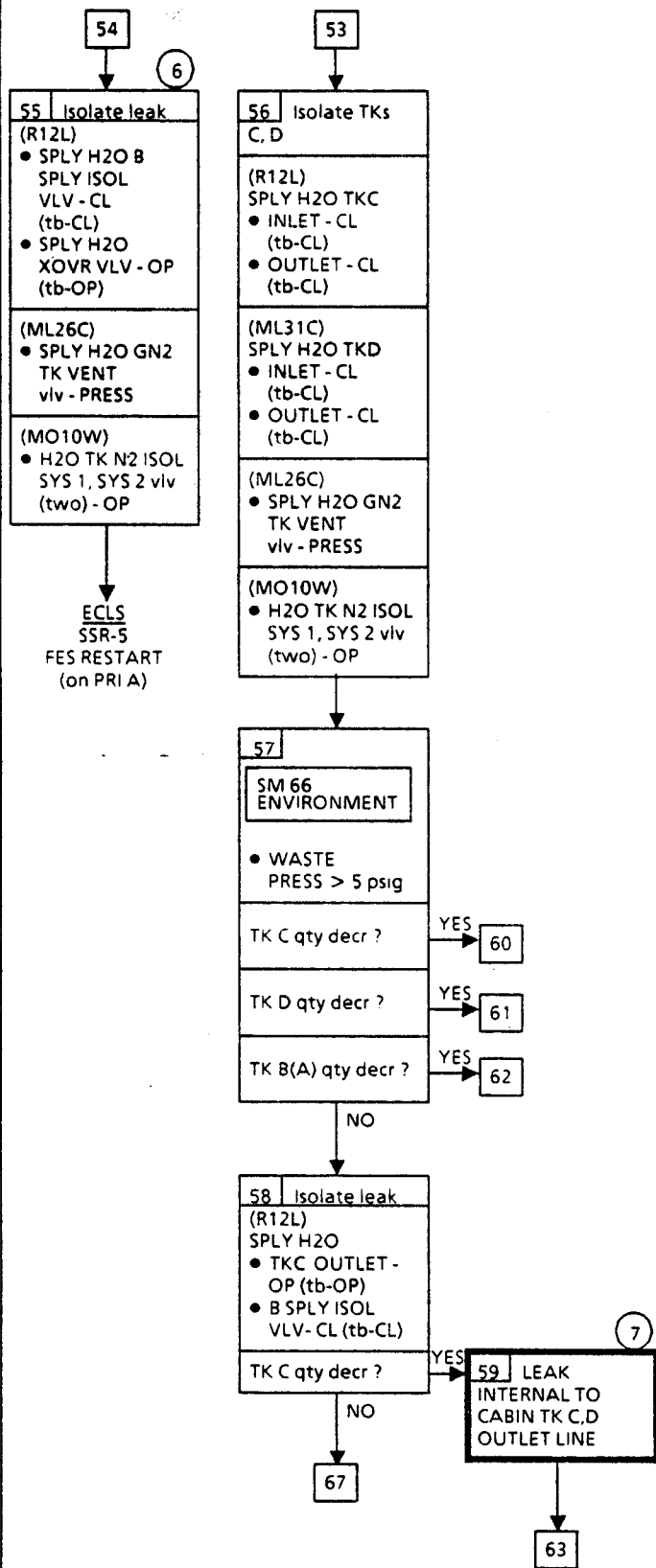


ECLS 6.5a (Cont)



- ③ FES PRI A SPLY line and H2O Dump line lost
- ④ Use TK A if TK B empty
- ⑤ FES Pri B and B SPLY line lost

ECLS 6.5a (Cont)

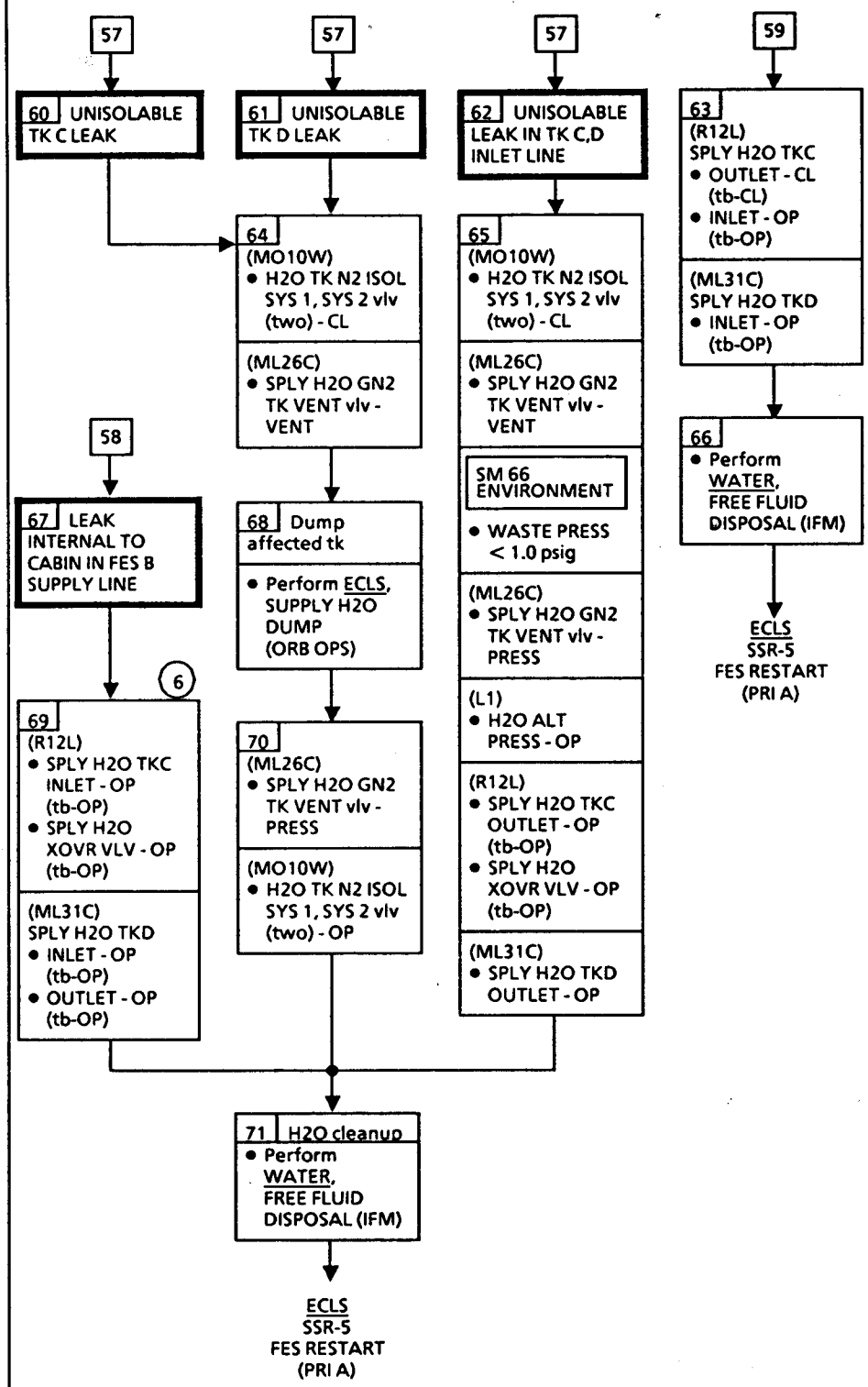


6 All SPLY H2O available to FES PRI A and SEC Cntrls

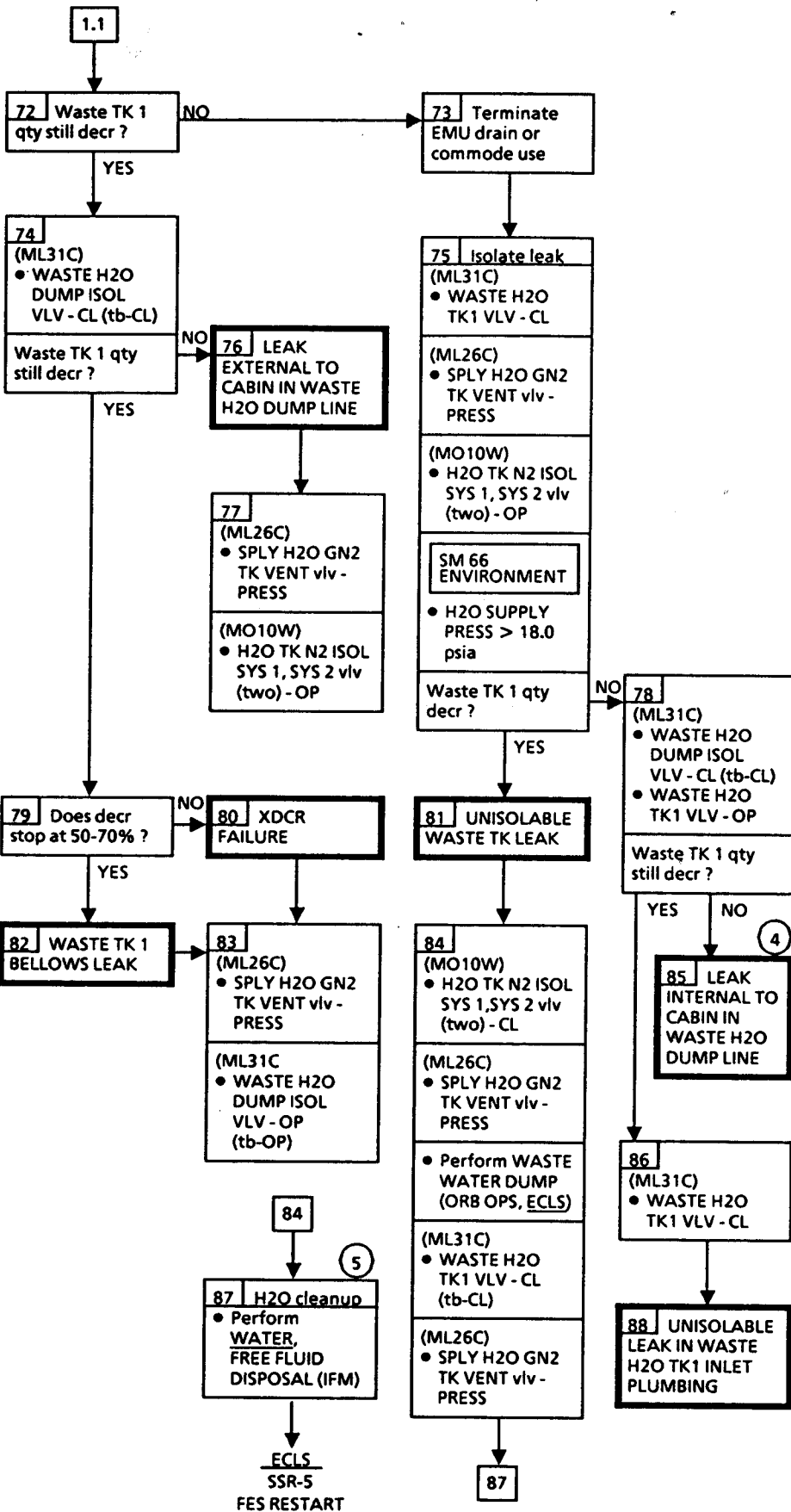
7 SPLY H2O TK C,D FES Pri B, and SPLY B line lost

ECLS 6.5a (Cont)

⑥ All SPLY H2O available to FES PRI A and SEC Cntrs



ECLS 6.5a (Cont)



- ④ Use TK A if TK B empty
- ⑤ ✓MCC for WCS and Hum Sep management

ECLS

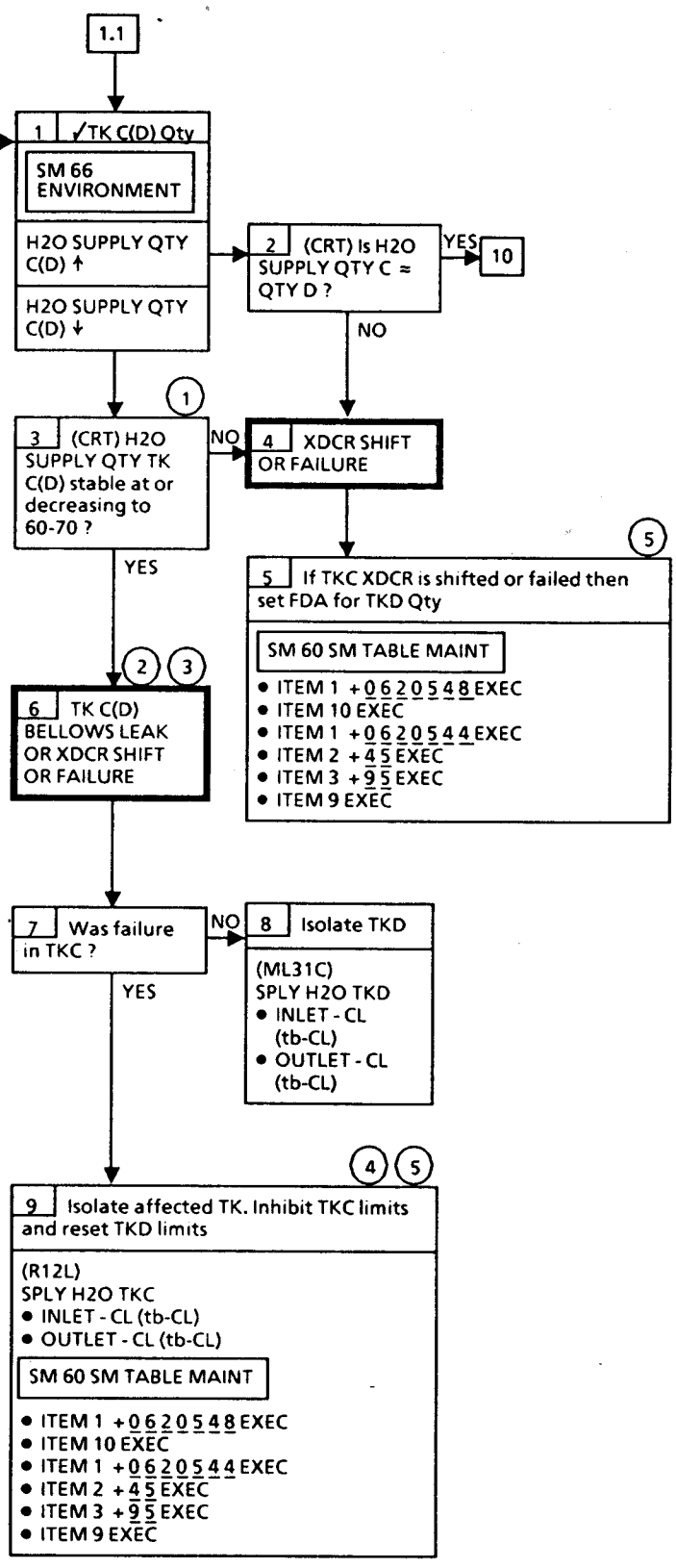
6.5b H2O TK QTY C(D) ↑↓

SM ALERT

S66 H2O

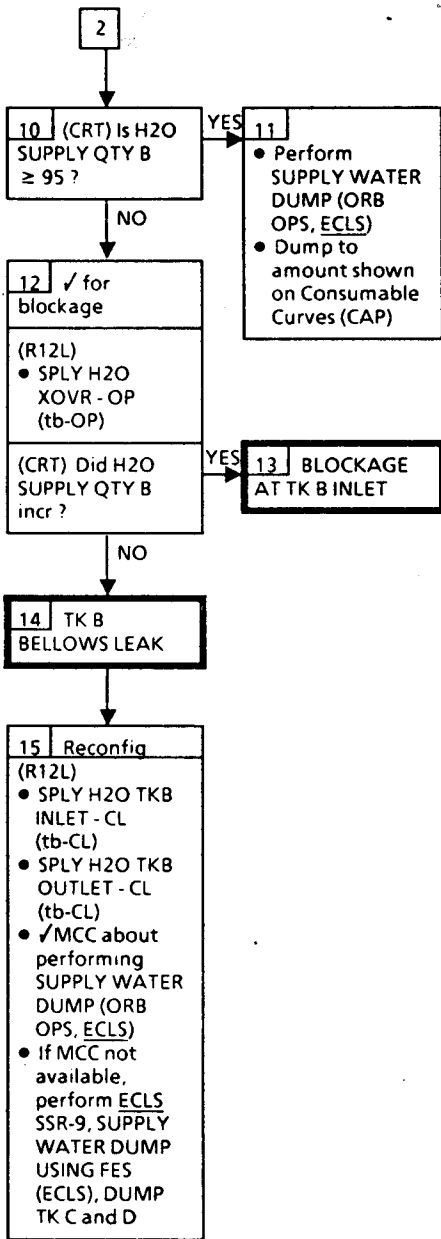
If:
TKC QTY < 45
or > 99%
TKD qty
< OSL or
> OSH

Nominal Config:
Refer to 6.5



- ① Supply H2O TKC,TKD qty will normally be equal because of qty equalization with both outlets and inlets open on both tks and Xover vlv closed
- ② With bellow leak failure, Tk is lost. H2O in tk may contain GN2 gas. H2O from affected tk should not be used in FES
- ③ Neutral point of bellows is 60-70%. Xdcr shift into this range can only be determined by MCC. If MCC is not available assume failure is a bellows leak
- ④ Normal config requires only one of TKC or TKD to have qty monitoring. If TKC qty lost, TKD must have qty monitoring established
- ⑤ Crew may opt to have MCC make SAW limit changes via TMBU

ECLS 6.5b (Cont)



ECLS

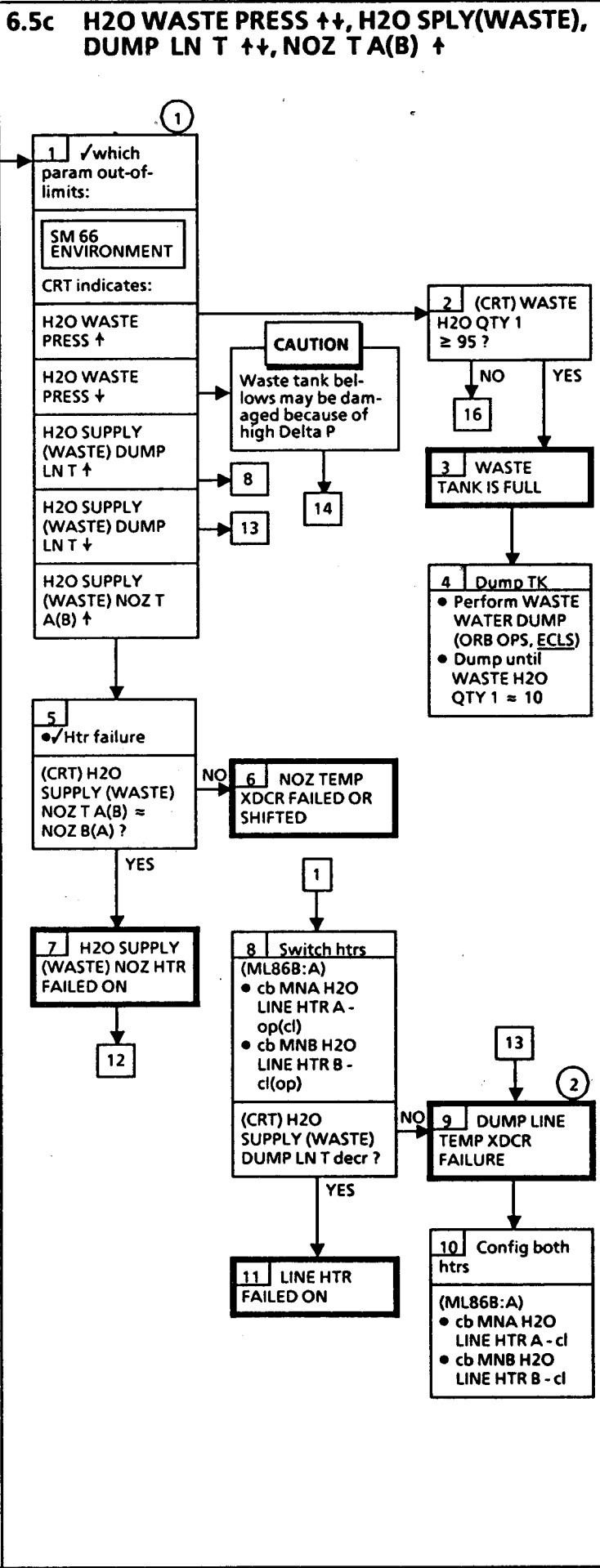
SM ALERT

S66 H2O

If:
 H2O SUPPLY DUMP LN T < 45 or > 125 degF
 H2O SUPPLY NOZ T A(B) > 250 degF

If:
 H2O WASTE PRESS < 13 or > 22 psig
 H2O WASTE DUMP LN T < 45 or > 125 degF
 H2O WASTE NOZ T A(B) > 250 degF

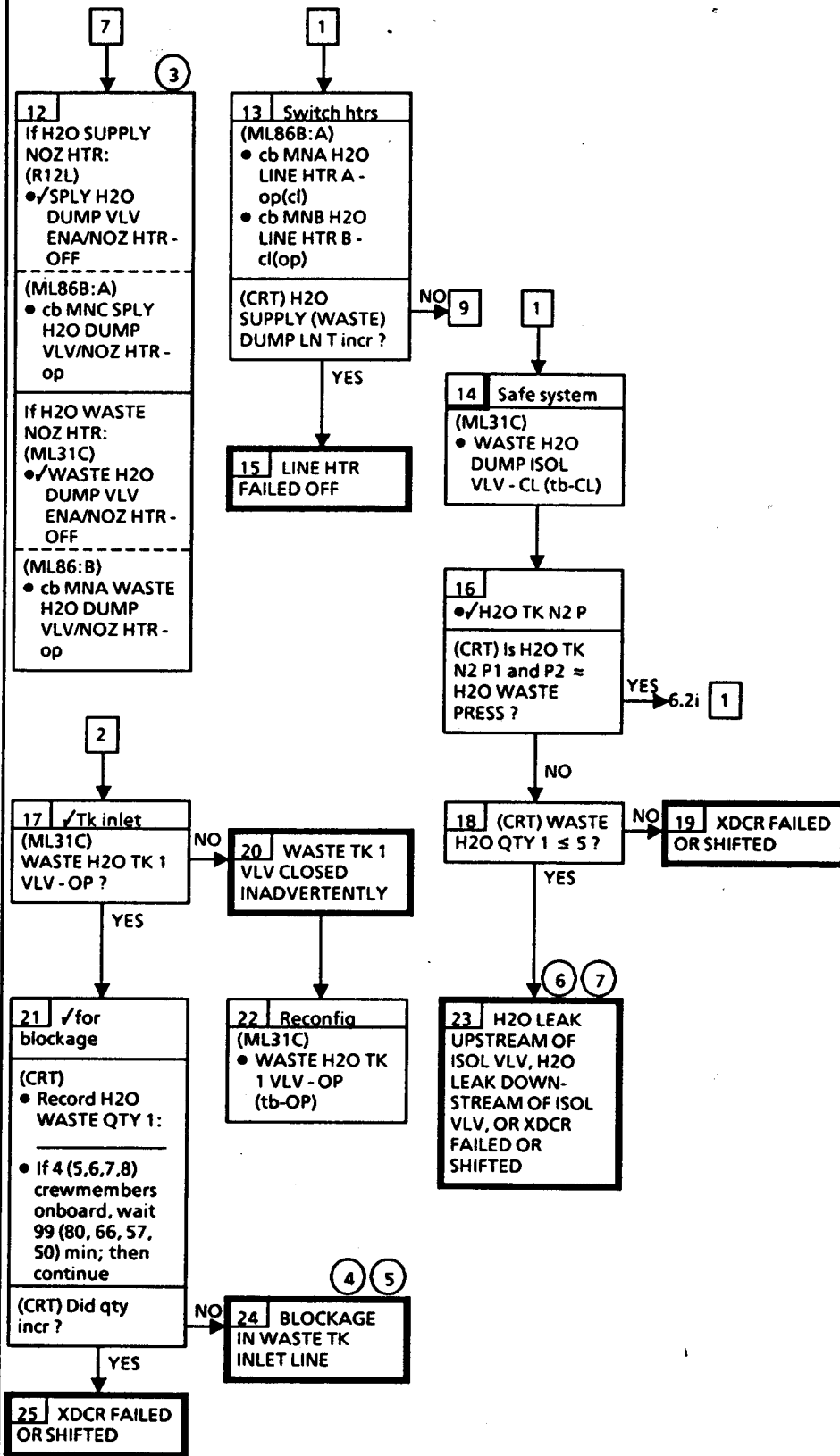
Nominal Config:
 Refer to 6.5



① CRT label 'H2O WASTE PRESS' is same as 'WASTE LIQUID PRESSURE' on SSSH 6.5

② If temperature xdcr is OSH, ✓MCC before doing next step

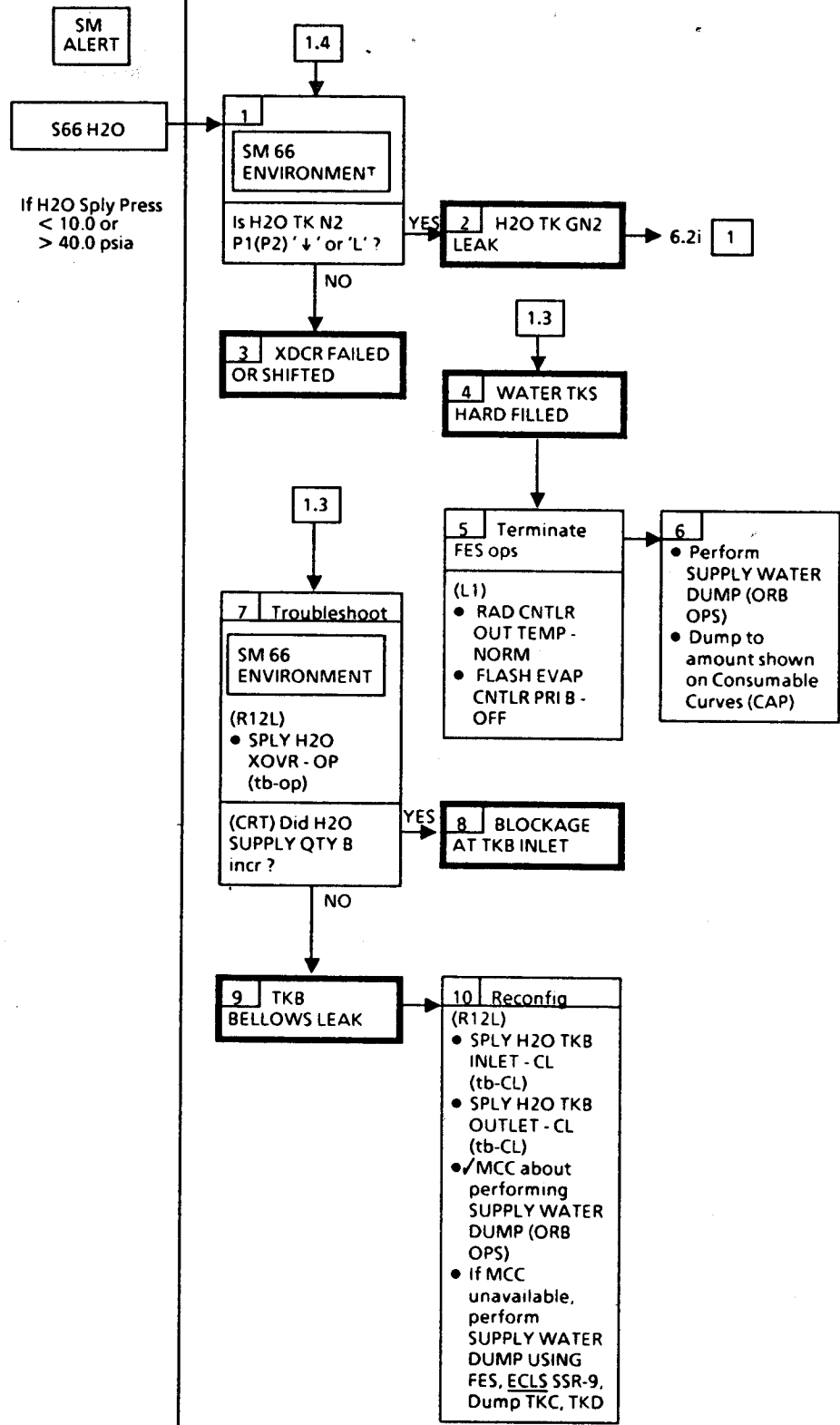
ECLS 6.5c (Cont)



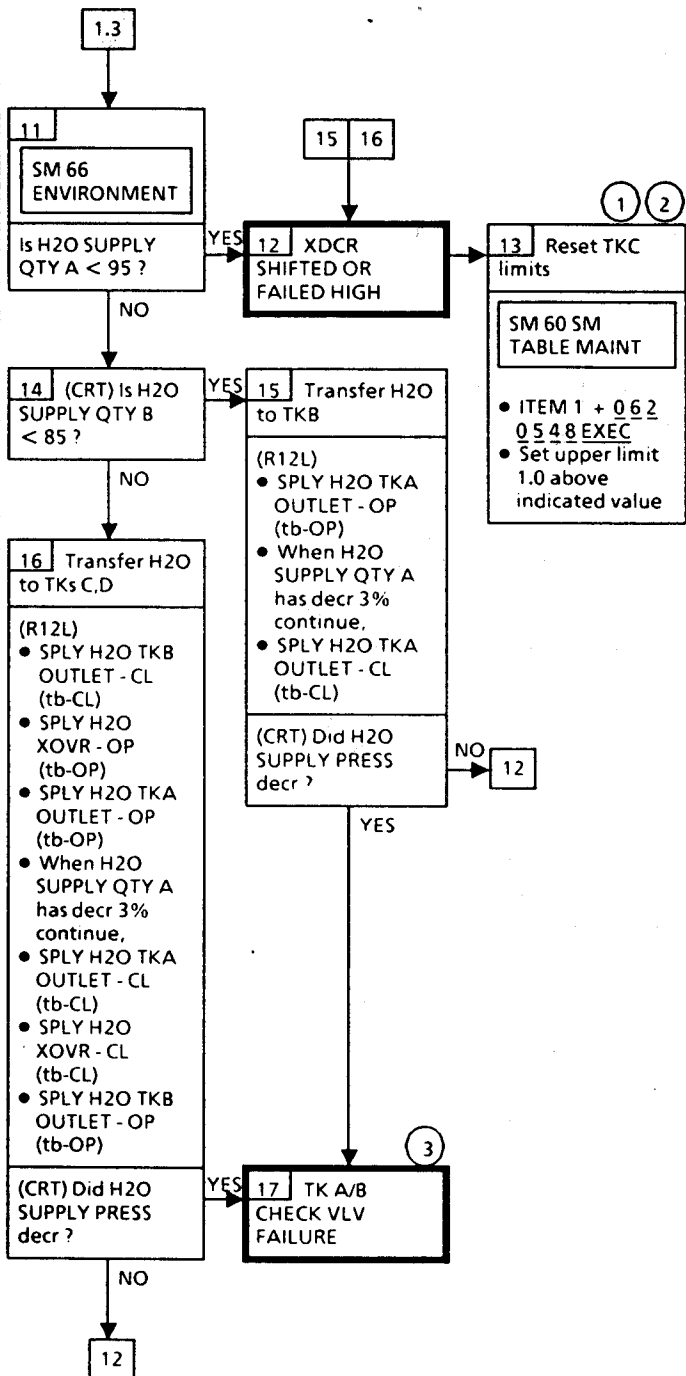
- ③ Dump system is not lost. MCC will update ORB OPS DUMP procedure
- ④ /MCC on how to store condensate from humidity separator
- ⑤ /MCC about attempting waste water dump to remove object blocking waste tank inlet
- ⑥ /MCC about looking for H2O below middeck floor
- ⑦ MCC may be able to determine exact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

ECLS

6.5d H2O SPLY PRESS ↑↑

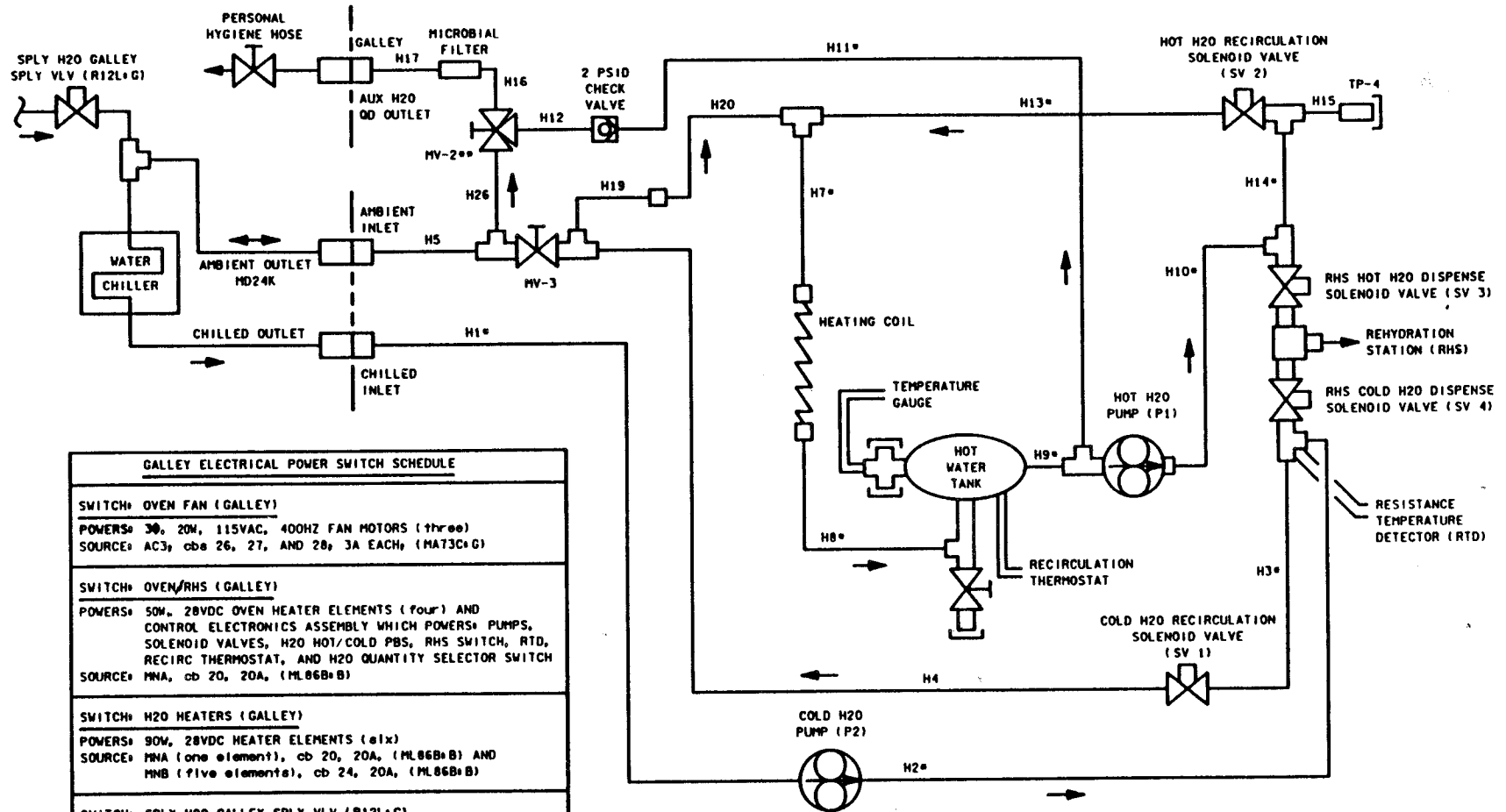


ECLS 6.5d (Cont)



- ① Reset TKC limit to detect next worst case failure (blockage at TKB inlet)
- ② Crew may opt to have MCC make S/W limit change via TMBU
- ③ Alternate FC relief path will be operating when TKA is ≥ 95

416



GALLEY ELECTRICAL POWER SWITCH SCHEDULE	
SWITCH:	OVEN FAN (GALLEY)
POWERS:	30, 20N, 115VAC, 400HZ FAN MOTORS (three)
SOURCE:	AC3, cbs 26, 27, AND 28, 3A EACH, (M73C:G)
SWITCH:	OVEN/RHS (GALLEY)
POWERS:	50W, 28VDC OVEN HEATER ELEMENTS (four) AND CONTROL ELECTRONICS ASSEMBLY WHICH POWERS: PUMPS, SOLENOID VALVES, H2O HOT/COLD PBS, RHS SWITCH, RTD, RECIRC THERMOSTAT, AND H2O QUANTITY SELECTOR SWITCH
SOURCE:	MNA, cb 20, 20A, (ML86B:B)
SWITCH:	H2O HEATERS (GALLEY)
POWERS:	90W, 28VDC HEATER ELEMENTS (six)
SOURCE:	MNA (one element), cb 20, 20A, (ML86B:B) AND MNB (five elements), cb 24, 20A, (ML86B:B)
SWITCH:	SPLY H2O GALLEY SPLY VLV (R12L:G)
POWERS:	SPLY H2O GALLEY SPLY VLV
SOURCE:	MNC, cb 15, 3A, (ML86B:A)

*INSULATED HOSE. THE INSULATION COVERS THE HOSE LABELS ON INSULATED HOSE.
 **MV-2 VLV SHOULD BE LEFT TURNED TO FULL COLD POSITION. HOT WATER CANNOT BE ACCESSED THRU MV-2 BECAUSE THE HOT WATER PRESSURE IS TOO LOW TO OPEN THE CHECK VALVE

ORBITER GALLEY PLUMBING DIAGRAM

7005.ART, 3

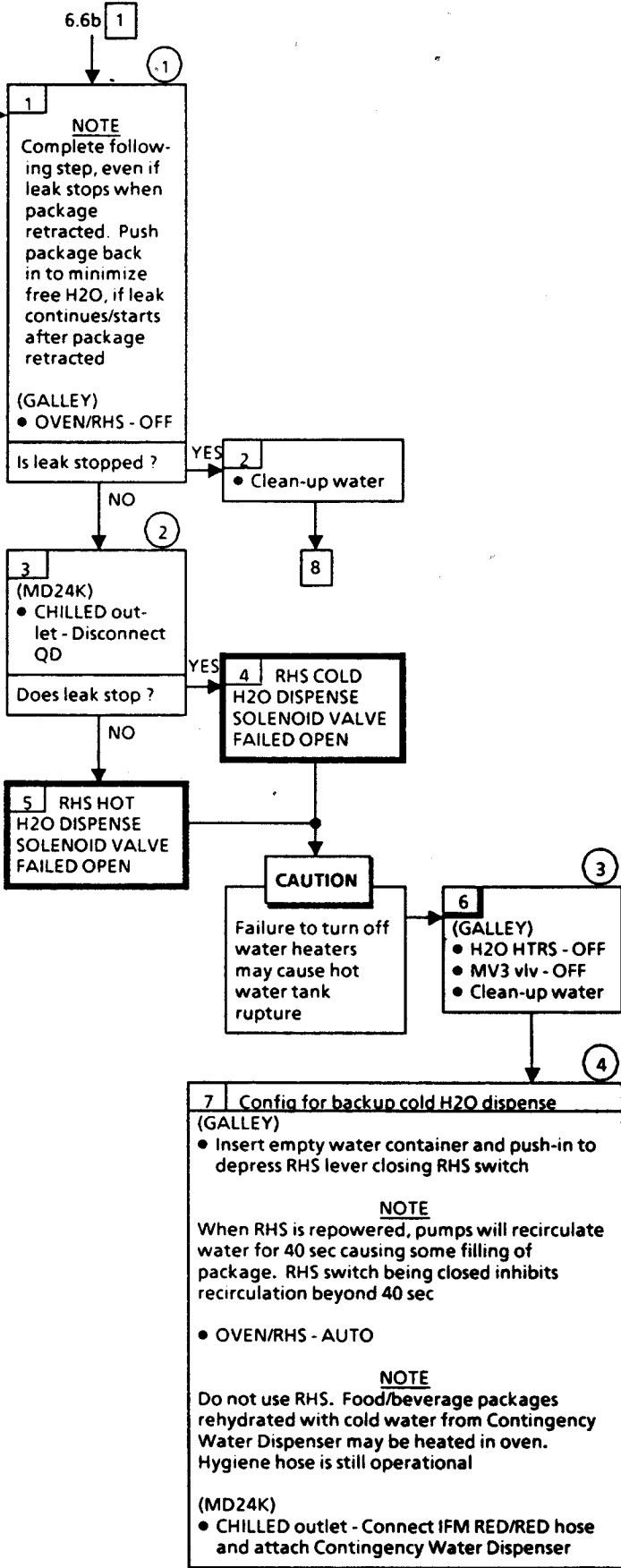
6-122

MAL/ALL/GEN 1

6.6a GALLEY H2O LEAK THRU RHS NEEDLE

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - op
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (ML86B:B)
 cb MNA GALLEY
 OVEN - cl
 cb MNB GALLEY
 H2O HTR - cl
 (MA73C:G)
 cb AC3 GALLEY
 FAN ΦA, ΦB, ΦC
 (three) - cl
 (GALLEY)
 MV3 vlv - ON
 MV2 vlv - COLD
 OVEN/RHS - AUTO
 H2O HTRS - AUTO
 OVEN FAN - OFF

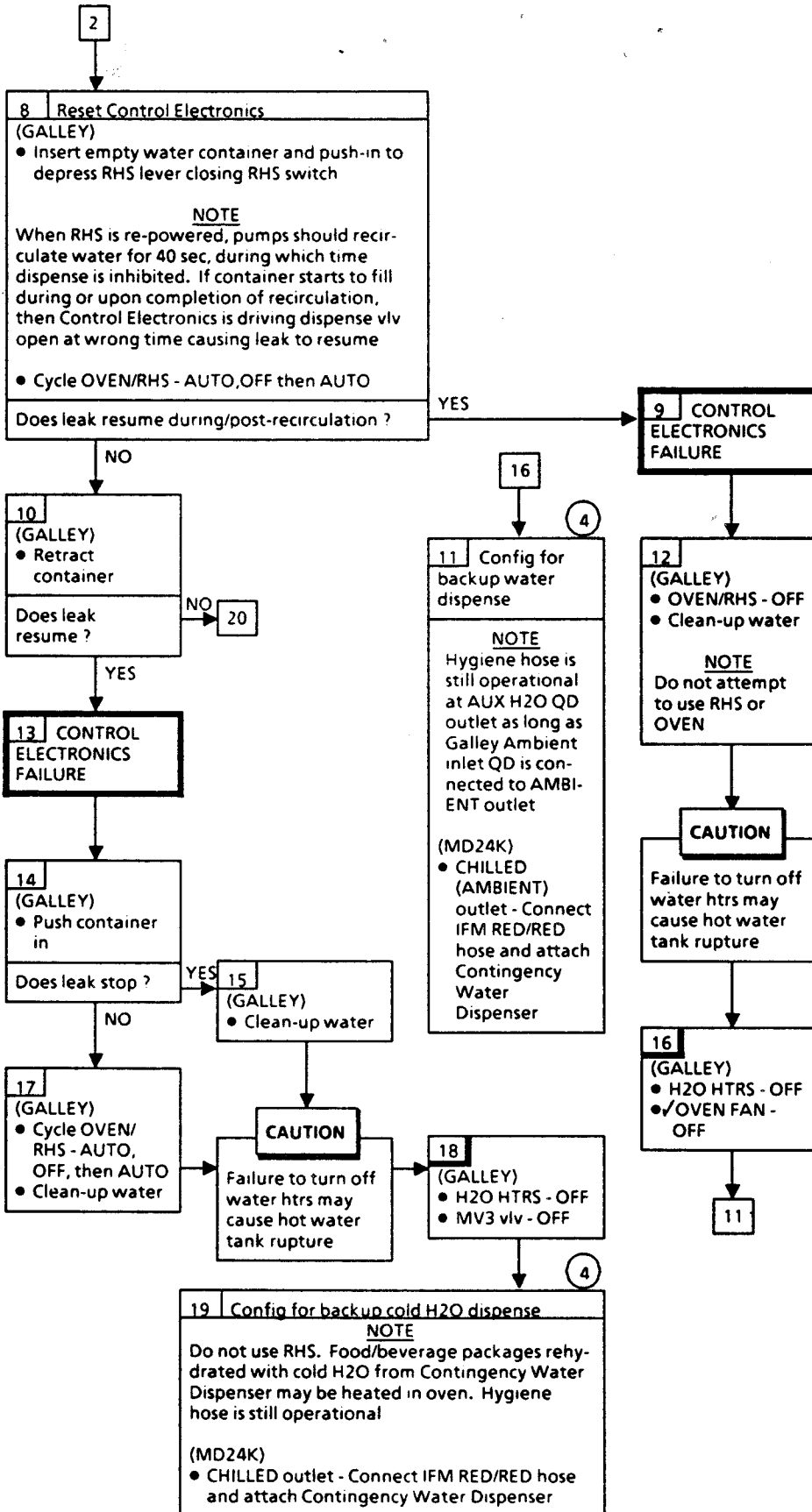
Galley H2O Leak thru RHS Needle



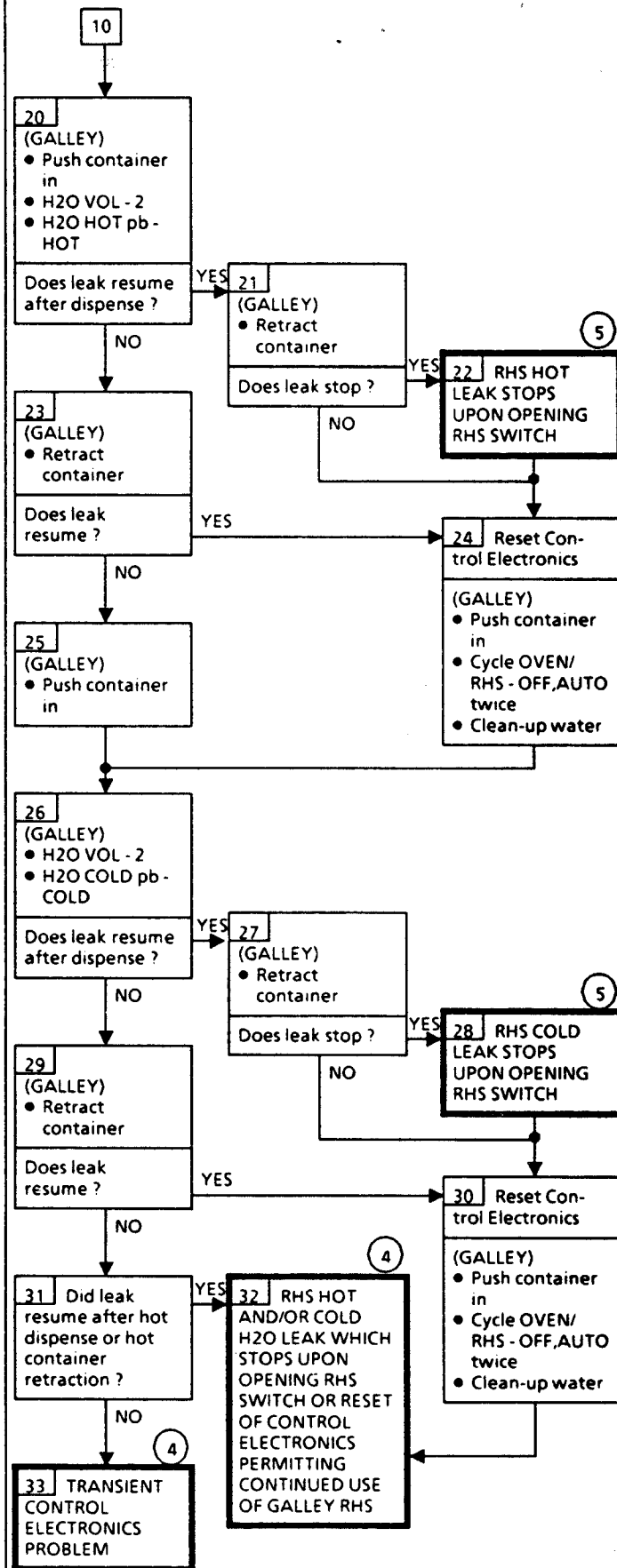
- ① When pwr is turned off, pump will stop and spring loaded dispense vlv will return to normally closed position unless vlv has failed open due to jamming or piece-part failure. If leak starts not in conjunction with dispense cycle, then Control Electronics failure must be driving vlv open. Line pressure will force water flow out dispense needle, if dispense vlv is open, even if pump is not running. Water under pressure will flow thru stopped pump
- ② Slow leak may continue until line pressure bleeds down even after leak is isolated from water supply
- ③ Both hot and cold dispense are lost because leak will resume during recirculation with either dispense vlv failed open
- ④ Advise MCC

ECLS 6.6a (Cont)

4 Advise MCC



ECLS 6.6a (Cont)



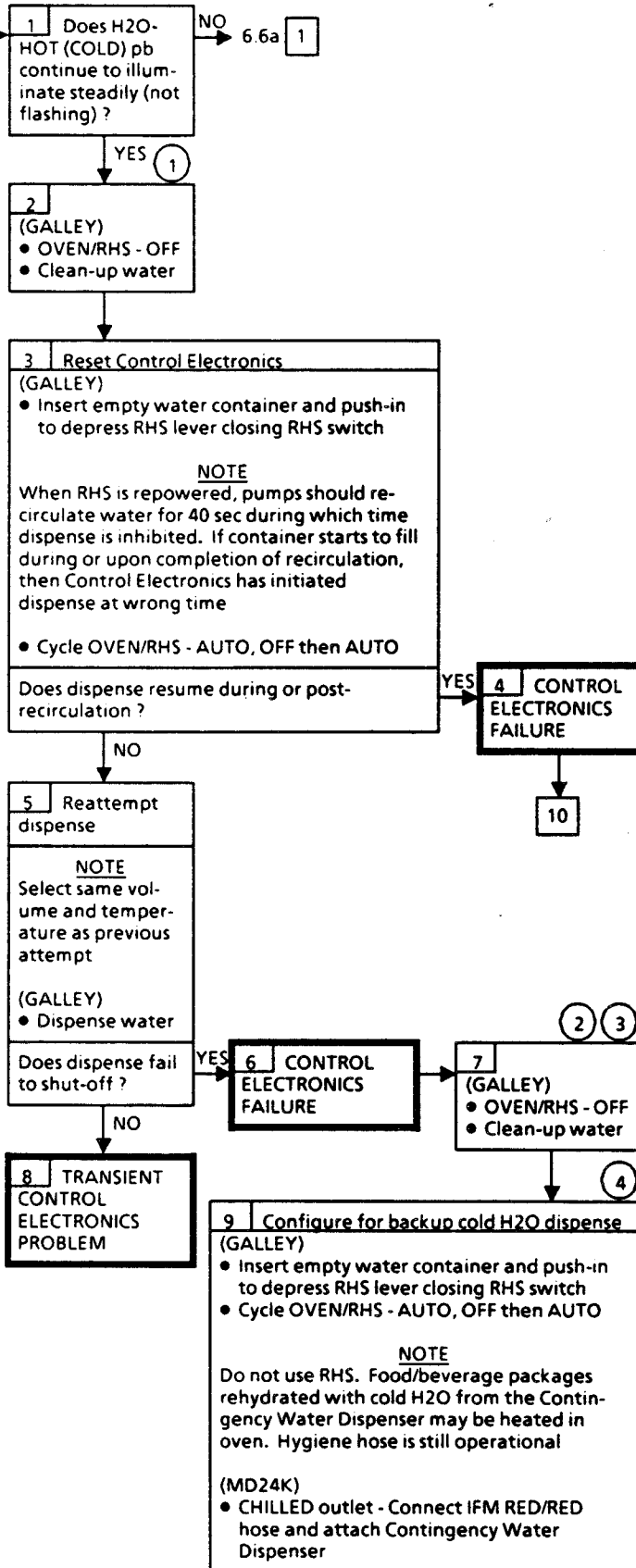
4 Advise MCC

5 Opening RHS switch sends signal to Control Electronics that permits reinitiating dispense (pb light stops flashing) and inhibits dispense until RHS switch is closed again by pushing in a food/beverage package. Faulty Control Electronics could react by closing dispense vlv held open after pump is stopped as part of an incomplete dispense shut-off cycle

6.6b GALLEY RHS H2O DISPENSE FAILS TO SHUT-OFF

Galley RHS H2O Dispense Fails To Shut-off

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - op
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (ML86B:B)
 cb MNA GALLEY
 OVEN - cl
 cb MNB GALLEY
 H2O HTR - cl
 (MA73C:G)
 cb AC3 GALLEY
 FAN ΦA, ΦB, ΦC
 (three) - cl
 (GALLEY)
 MV3 vlv - ON
 MV2 vlv - COLD
 OVEN/RHS - AUTO
 H2O HTRS - AUTO
 OVEN FAN - OFF



1 When pwr is turned off, pump will stop and spring loaded dispense vlv will return to normally closed position. For unpowered vlv to be failed open in conjunction with failure of Control Electronics to shut-off dispense cycle would be a double failure not addressed by Galley Mal Procedures

2 Advise MCC

3 Instead of initiating backup cold H2O dispense, crew may elect to manually control RHS dispense volume by resetting Control Electronics (OVEN/RHS - OFF, AUTO twice) to terminate the dispense cycle when food/beverage package has filled to desired level determined visually

4 With Galley inlet QD disconnected from CHILLED outlet, Cold H2O Pump will not be able to keep Resistance Temperature Detector below 60 degF by recirculation. Pump will run 20 sec every five min. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with recirculation path blocked will not damage pump

2 Advise MCC

4

10
(GALLEY)
• OVEN/RHS - OFF
• Clean-up water

NOTE
Do not attempt to use RHS or OVEN

CAUTION

Failure to turn off water heaters may cause hot water tank rupture

11
(GALLEY)
• H2O HTRS - OFF
• ✓OVEN FAN - OFF

2

12 Config for backup water dispense

NOTE
Hygiene hose is still operational at AUX H2O QD outlet as long as Galley Ambient inlet QD is connected to AMBI-ENT outlet

(MD24K)
• CHILLED (AMBIENT) outlet - Connect IFM RED/RED hose and attach Contingency Water Dispenser

6.6c GALLEY H2O LEAK NOT THRU RHS NEEDLE

Galley H2O Leak NOT thru RHS Needle

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - op
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (ML86B:B)
 cb MNA GALLEY
 OVEN - cl
 cb MNB GALLEY
 H2O HTR - cl
 (MA73C:G)
 cb AC3 GALLEY
 FAN φA, φB, φC
 (three) - cl
 (GALLEY)
 MV3 vlv - ON
 MV2 vlv - COLD
 OVEN/RHS - AUTO
 H2O HTRS - AUTO
 OVEN FAN - OFF

CAUTION
 Failure to turn off water heaters may cause hot water tank rupture

1

(GALLEY)

- H2O HEATERS - OFF
- MV3 vlv - OFF (MD24K)
- CHILLED outlet - Disconnect QD

NOTE
 Dispensing water is reqd to permit prompt verification of leak isolation particularly for small leak where it could take some time for trapped line pressure to bleed down

(GALLEY)

- H2O VOL - 4
- Insert empty water container, push-in to depress RHS lever closing RHS switch
- H2O HOT pb - HOT
- Retract drink pkg, push pkg back in
- H2O COLD pb - COLD
- OVEN/RHS - OFF

Does leak continue ?

2 LEAK UPSTREAM OF HYGIENE HOSE/ AUX H2O QD OUTLET AND MV3

CAUTION
 Failure to turn off water heaters may cause hot water tank rupture

3

(GALLEY)

- ✓H2O HTRS - OFF (MD24K)
- AMBIENT outlet - Disconnect QD (GALLEY)
- Open Hygiene hose valve to bleed down line pressure catching water in a towel

Does leak continue ?

4

(GALLEY)

- Clean-up water (MD24K)
- AMBIENT outlet - Connect Hygiene hose
- CHILLED outlet - Reconnect Galley Chilled inlet QD

NOTE
 Do not use RHS to dispense hot water. Food/beverage packages rehydrated with cold water may be heated in oven

(GALLEY)

- OVEN/RHS - AUTO

1 Unless MV2 - COLD, leak between MV2 and check vlv will be fed from both sides of MV3

2 Hot recirculation will be continuous when hot water Recirculation Thermostat temperature drops below 145 degF. Cold H2O Pump will attempt to recirculate for 20 sec every five min once cold H2O temp at Resistance Temperature Detector exceeds 60 degF. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF

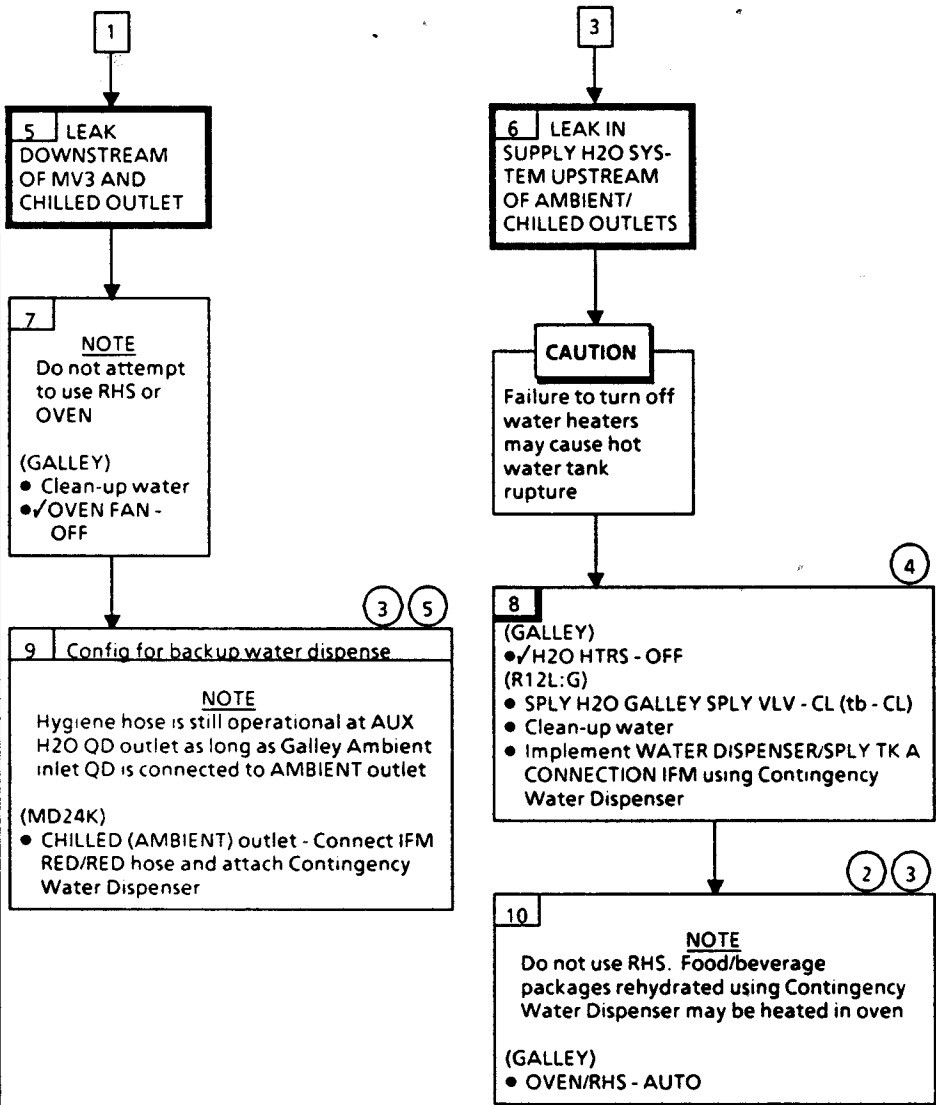
3 Advise MCC

NO
5

YES
6

NO
2 3

ECLS 6.6c (Cont)



② Hot recirculation will be continuous when hot water Recirculation Thermostat temperature drops below 145 degF. Cold H2O Pump will attempt to recirculate for 20 sec every five min once cold H2O temp at Resistance Temperature Detector exceeds 60 degF. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF

③ Advise MCC

④ Assumes leak is downstream of SPLY H2O GALLEY SPLY vlv because it is unlikely that any other Supply H2O System leak will be detected at Galley. If leak persists, then go to Sply H2O Mals and reactivate Galley RHS if water is restored

⑤ Both hot and cold dispense are lost because leak will resume during recirculation regardless of which side (hot or cold) of system is leaking

ECLS

6.6d GALLEY RHS FAILS TO DISPENSE OR DISPENSES LESS THAN SELECTED VOLUME

Galley RHS Fails to Dispense/Dispenses Less than Selected Volume

Nominal Config:

- (R12L:G)
- SPLY H2O GALLEY
- SPLY VLV - op
- (ML86B:A)
- cb MNC SPLY H2O
- GALLEY SPLY - cl
- (ML86B:B)
- cb MNA GALLEY
- OVEN - cl
- cb MNB GALLEY
- H2O HTR - cl
- (MA73C:G)
- cb AC3 GALLEY
- FAN ΦA,ΦB,ΦC
- (three) - cl
- (GALLEY)
- MV3 vlv - ON
- MV2 vlv - COLD
- OVEN/RHS - AUTO
- H2O HTRS - AUTO
- OVEN FAN - OFF

1 Check for blockage in - Supply H2O Galley Supply Line

(GALLEY)

- ✓MV2 vlv - COLD
- Verify water flow thru Hygiene hose at AUX H2O QD outlet

Does H2O flow at normal rate ?

2 SUPPLY H2O GALLEY SUPPLY LINE IS NOT BLOCKED

CAUTION

Failure to turn off water heaters may cause hot water tank rupture.

4 (GALLEY)

- H2O HTRS - OFF (MD24K)
- CHILLED outlet - Connect IFM RED/RED hose, attach Contingency Water Dispenser
- Dispense H2O using Contingency Water Dispenser

Does H2O dispense at normal rate ?

5 (MD24K)

- AMBIENT outlet - Connect Hygiene hose
- ✓Water flow at Hygiene hose

Does H2O flow at normal rate ?

6 BLOCKAGE IN SUPPLY H2O GALLEY SUPPLY LINE

7 BLOCKAGE IN AMBIENT H2O LINE UPSTREAM OF THE AMBIENT OUTLET

8 BLOCKAGE IN LINE BETWEEN AMBIENT OUTLET AND MV3

9 Hygiene hose is not operational

10 Hygiene hose is operational

3 NOTE

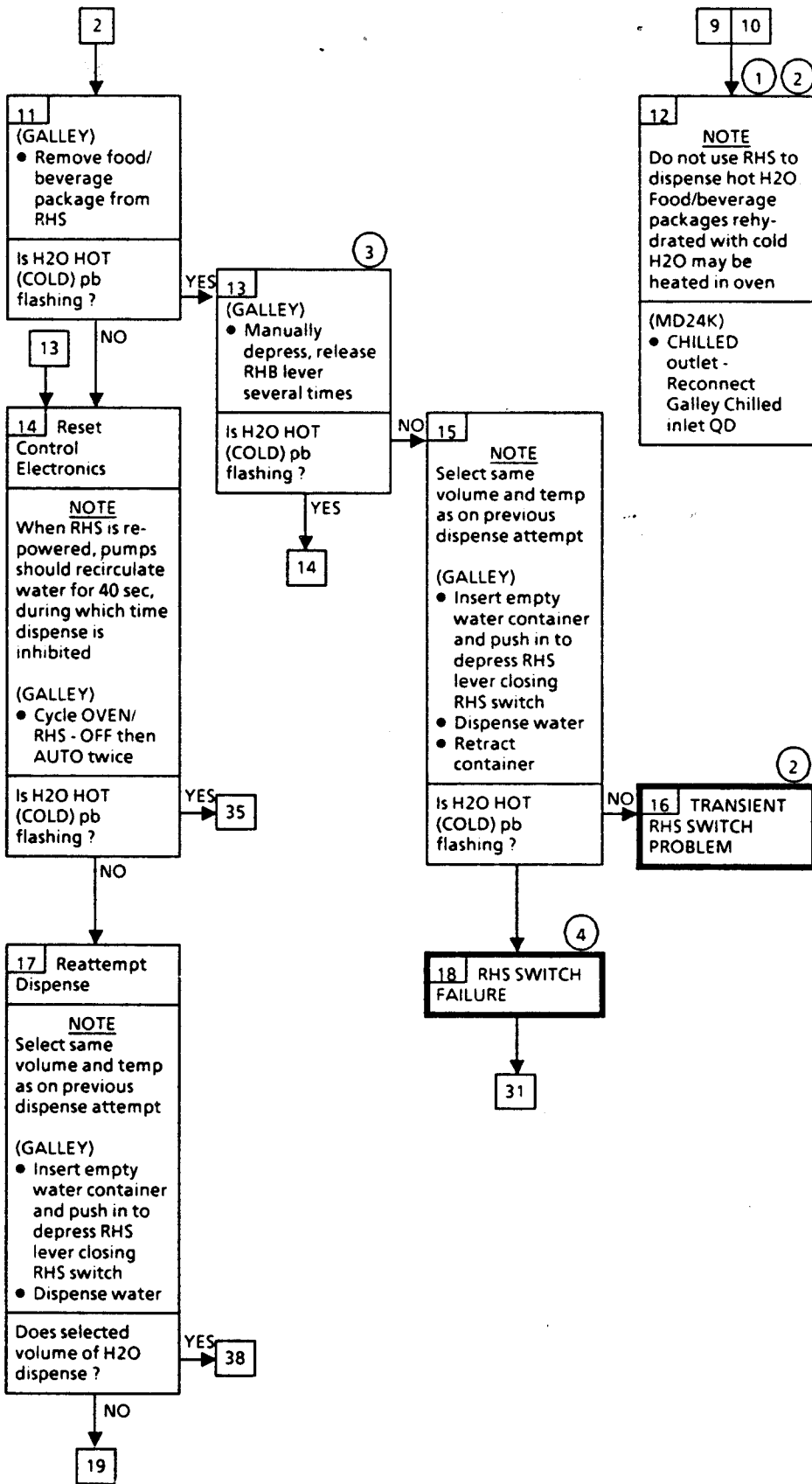
Do not use RHS. Food/beverage packages rehydrated with Contingency Water Dispenser may be heated in oven. Hygiene hose is not operational

- Go to WATER DISPENSER/ SPLY TK A CONNECTION IFM using Contingency Water Dispenser

1 With H2O HTRS - OFF, hot water recirculation will be continuous once hot water Recirculation Thermostat temp drops below 145 degF. With ambient water flow path interrupted; cold water recirculation path is blocked. Cold H2O Pump will attempt to recirculate for 20 sec every five min once cold H2O temp at Resistance Temp Detector exceeds 60 degF. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with recirculation path blocked will not damage pump

2 Advise MCC

ECLS 6.6d (Cont)



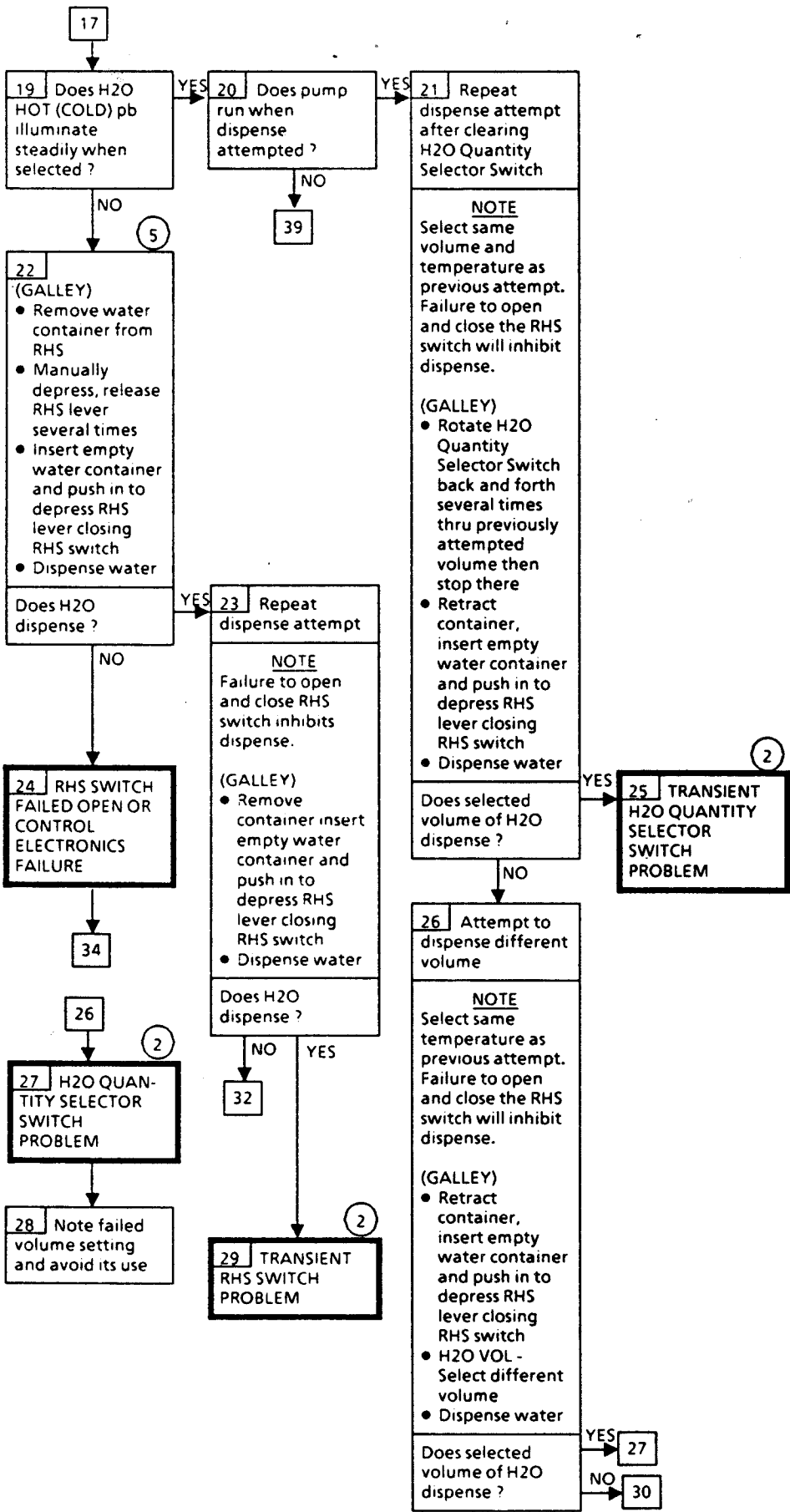
① With H2O HTRS - OFF, hot water recirculation will be continuous once hot water Recirculation Thermostat temp drops below 145 degF. With ambient water flow path interrupted, cold water recirculation path is blocked. Cold H2O Pump will attempt to recirculate for 20 sec every five min once cold H2O temp at Resistance Temp Detector exceeds 60 degF. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with recirculation path blocked will not damage pump

② Advise MCC

③ RHS switch is closed when depressed and open when released. If spring loaded switch mechanism binds upon package retraction, switch remains closed and Control Electronics senses package is still pushed in which inhibits dispense

④ Crew may elect to continue use of RHS by manually resetting RHS switch. This process may prove to be unreliable, however, because pushing in switch by hand has been shown to cause damage to mechanism due to switch being pushed in farther than normal and tending to bind upon release

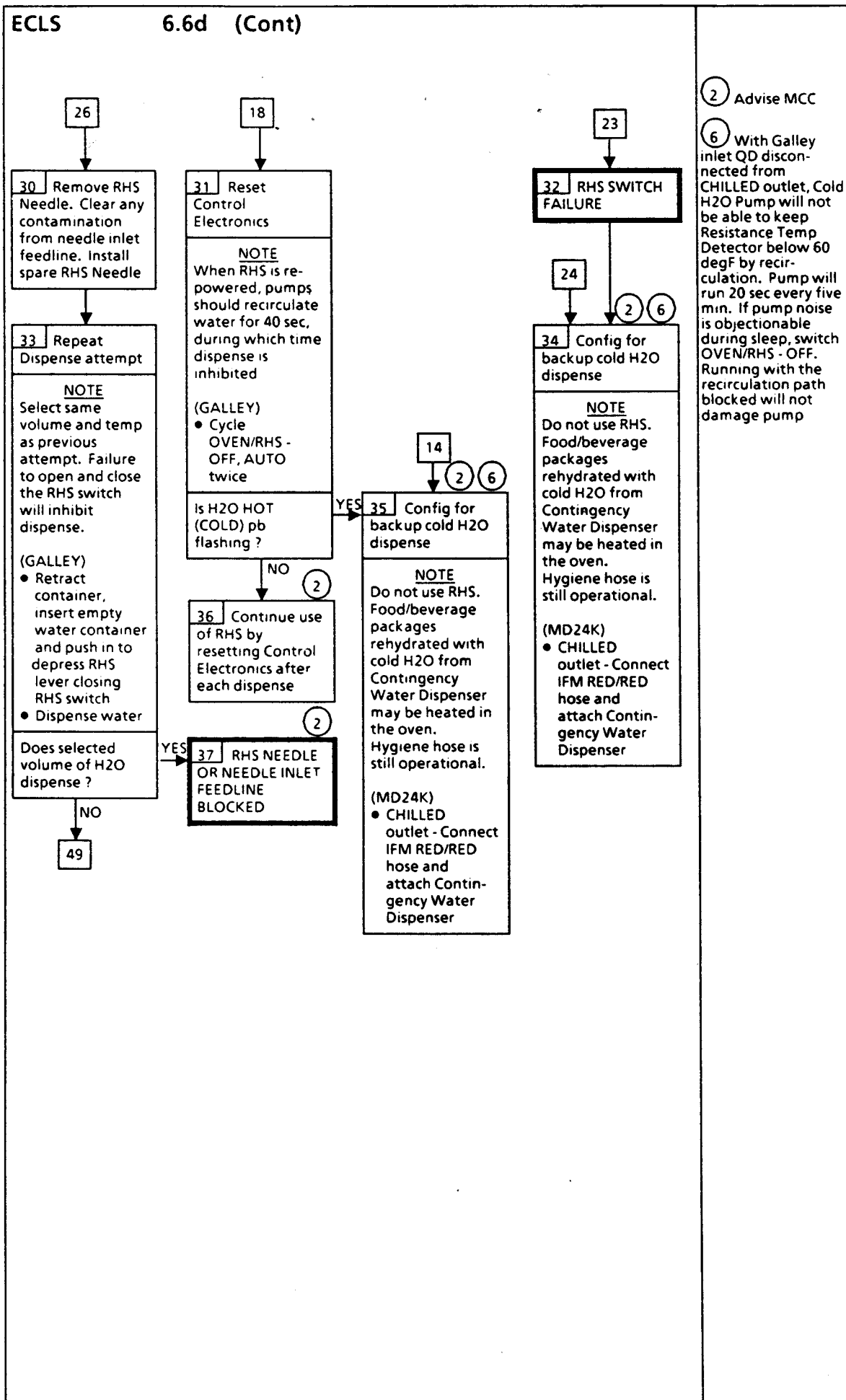
ECLS 6.6d (Cont)



2 Advise MCC

5 If RHS switch fails to close when RHS lever is pushed in by the food/beverage package, Control Electronics senses that there is no package in place and inhibits dispense

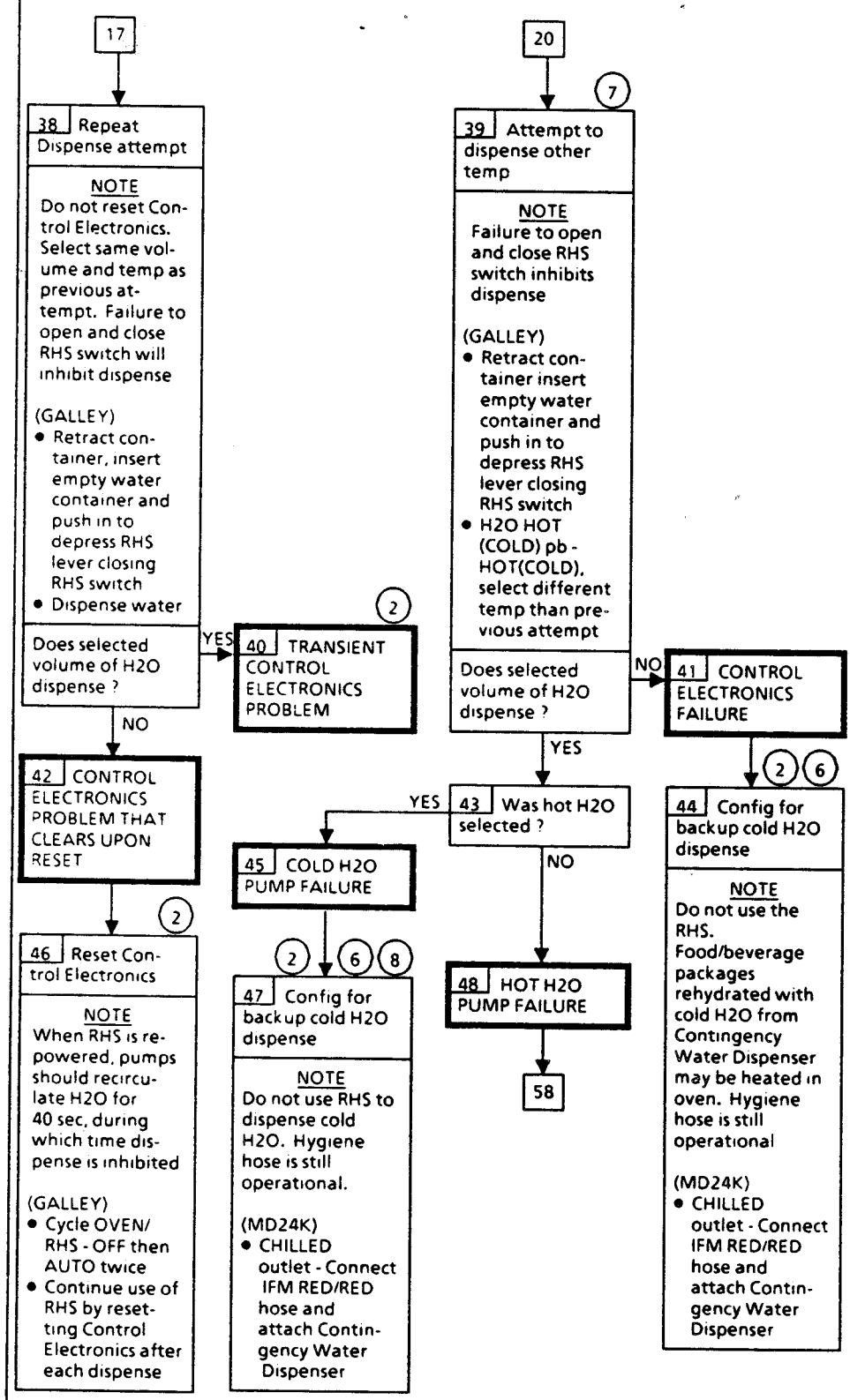
ECLS 6.6d (Cont)



2 Advise MCC

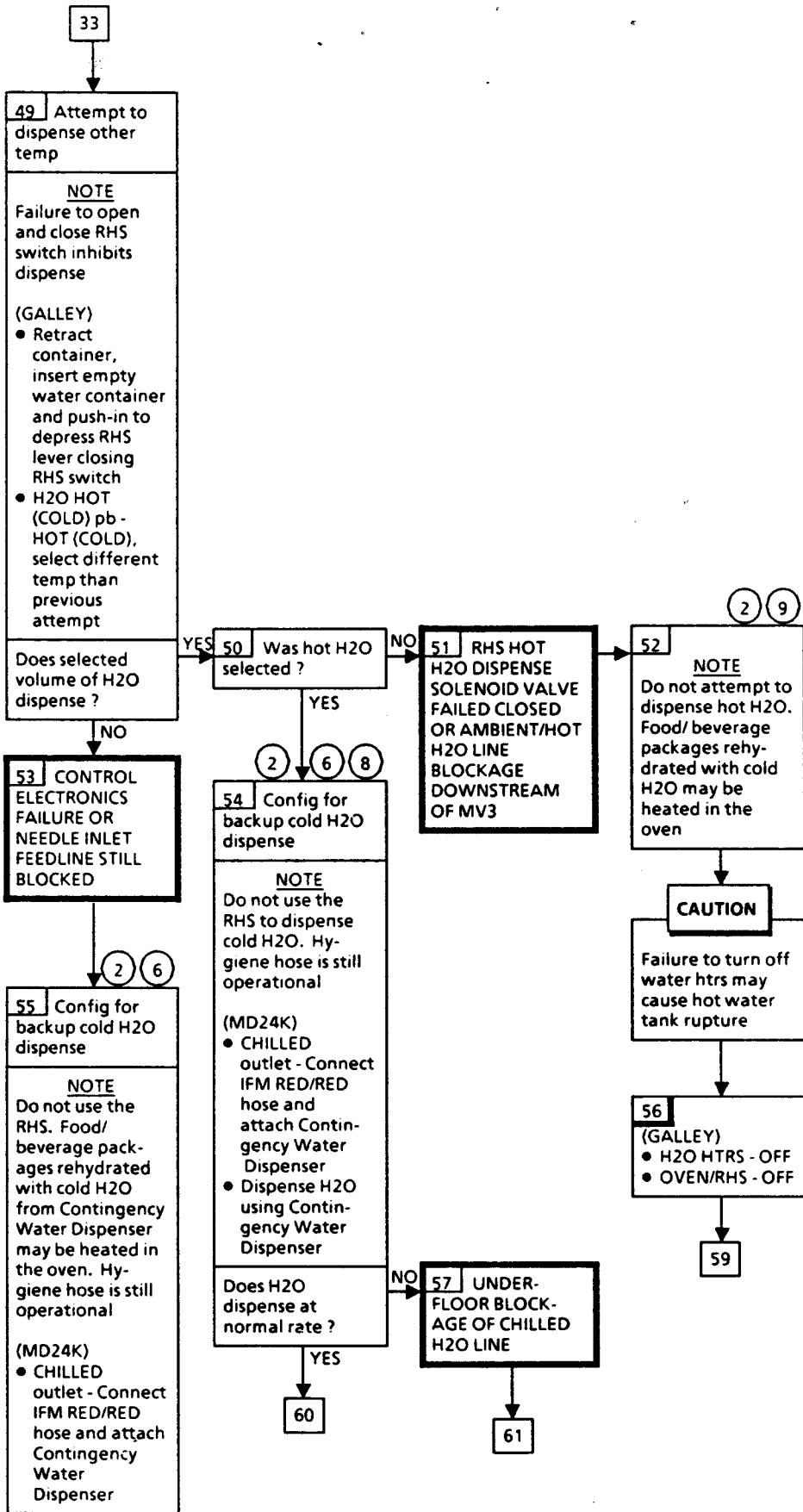
6 With Galley inlet QD disconnected from CHILLED outlet, Cold H2O Pump will not be able to keep Resistance Temp Detector below 60 degF by recirculation. Pump will run 20 sec every five min. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with the recirculation path blocked will not damage pump

ECLS 6.6d (Cont)

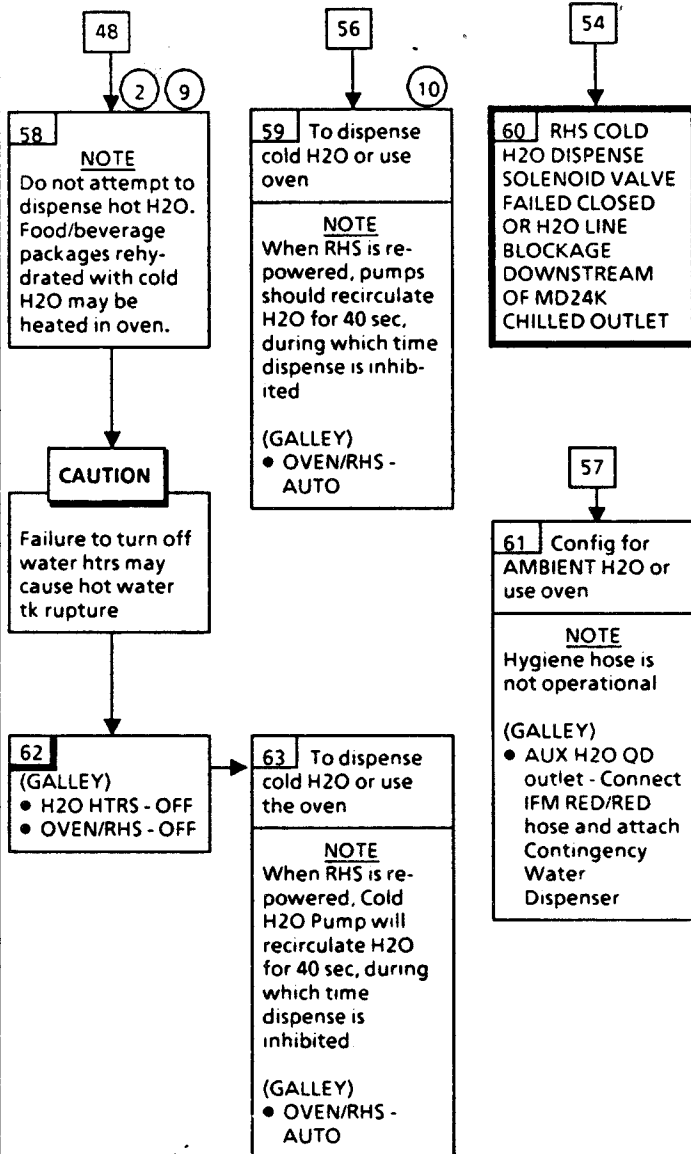


- ② Advise MCC
- ⑥ With Galley inlet QD disconnected from CHILLED outlet, Cold H2O Pump will not be able to keep Resistance Temp Detector below 60 degF by recirculation. Pump will run 20 sec every five min. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with recirculation path blocked will not damage the pump
- ⑦ If Galley pump is failed, line pressure should force some water to flow into container while dispense viv is held open during timed dispense cycle --tests show that 80% of qty selected will dispense
- ⑧ If OVEN/RHS - OFF during sleep, switch OVEN/RHS - AUTO early to insure hot water at RHS. About one hour is reqd to heat water from ambient temperature (70 degF)

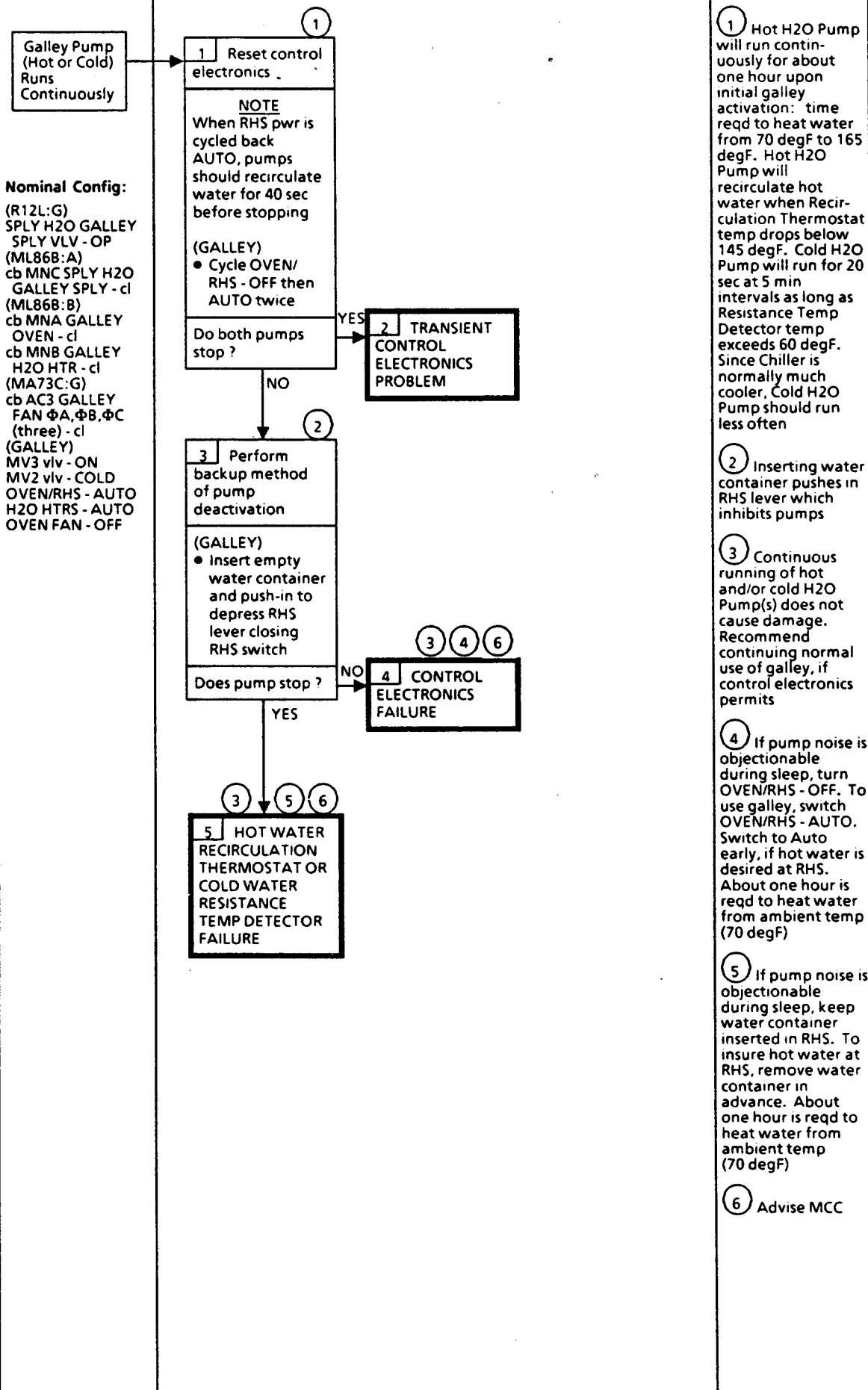
ECLS 6.6d (Cont)



- 2 Advise MCC
- 6 With Galley inlet QD disconnected from CHILLED outlet, Cold H2O Pump will not be able to keep Resistance Temp Detector below 60 degF by recirculation. Pump will run 20 sec every five min. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with recirculation path blocked will not damage the pump
- 8 If OVEN/RHS - OFF during sleep, switch OVEN/RHS - AUTO early to insure hot water at RHS. About one hour is reqd to heat water from ambient temp (70 degF)
- 9 Crew may elect to connect the Galley Chilled inlet QD to AMBIENT outlet to reduce heating time. To retain chilled H2O dispense, use IFM RED/RED hose to connect Contingency Water Dispenser to CHILLED outlet. In this config, note (6) also applies



- 2 Advise MCC
- 9 Crew may elect to connect Galley Chilled inlet QD to AMBIENT outlet to reduce heating time. To retain chilled H2O dispense, use IFM RED/RED hose to connect the Contingency Water Dispenser to CHILLED outlet. In this config, note (6) also applies
- 10 Hot H2O Pump will run continuously while OVEN/RHS - AUTO, once Recirculation Thermostat drops below 145 degF, unless inhibited by dispense. Running continuously with or without blocked recirculation path will not damage pump. If cold H2O recirculation path thru AMBIENT outlet is blocked, Cold H2O Pump will run without damage for 20 sec every five min while OVEN/RHS - AUTO, unless inhibited by dispense



Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY
 SPLY VLV - OP
 (ML86B:A)
 cb MNC SPLY H2O
 GALLEY SPLY - cl
 (ML86B:B)
 cb MNA GALLEY
 OVEN - cl
 cb MNB GALLEY
 H2O HTR - cl
 (MA73C:G)
 cb AC3 GALLEY
 FAN ΦA, ΦB, ΦC
 (three) - cl
 (GALLEY)
 MV3 vlv - ON
 MV2 vlv - COLD
 OVEN/RHS - AUTO
 H2O HTRS - AUTO
 OVEN FAN - OFF

1 Hot H2O Pump will run continuously for about one hour upon initial galley activation: time reqd to heat water from 70 degF to 165 degF. Hot H2O Pump will recirculate hot water when Recirculation Thermostat temp drops below 145 degF. Cold H2O Pump will run for 20 sec at 5 min intervals as long as Resistance Temp Detector temp exceeds 60 degF. Since Chiller is normally much cooler, Cold H2O Pump should run less often

2 Inserting water container pushes in RHS lever which inhibits pumps

3 Continuous running of hot and/or cold H2O Pump(s) does not cause damage. Recommend continuing normal use of galley, if control electronics permits

4 If pump noise is objectionable during sleep, turn OVEN/RHS - OFF. To use galley, switch OVEN/RHS - AUTO. Switch to Auto early, if hot water is desired at RHS. About one hour is reqd to heat water from ambient temp (70 degF)

5 If pump noise is objectionable during sleep, keep water container inserted in RHS. To insure hot water at RHS, remove water container in advance. About one hour is reqd to heat water from ambient temp (70 degF)

6 Advise MCC

6.6f GALLEY RHS DISPENSES MORE THAN SELECTED VOLUME

1 Advise MCC

Galley RHS Dispenses More Than Selected Volume

Nominal Config:
 (R12L:G)
 SPLY H2O GALLEY SPLY VLV - op (ML86B:A)
 cb MNC SPLY H2O GALLEY SPLY - cl (ML86B:B)
 cb MNA GALLEY OVEN - cl
 cb MNB GALLEY H2O HTR - cl (MA73C:G)
 cb AC3 GALLEY FAN φA, φB, φC (three) - cl (GALLEY)
 MV3 vlv - ON
 MV2 vlv - COLD
 OVEN/RHS - AUTO
 H2O HTRS - AUTO
 OVEN FAN - OFF

1 Reset Control Electronics and re-attempt dispense

NOTE
 When RHS is repowered, pumps should recirculate water for 40 sec, during which time dispense is inhibited

(GALLEY)
 • Cycle OVEN/ RHS - OFF then AUTO twice
 • Insert empty water container and push in to depress RHS lever closing RHS switch

NOTE
 Select same volume and temp as previous attempt

• Dispense water

Does more than selected volume dispense ?

YES

3 Repeat dispense attempt after clearing H2O Quantity Selector Switch

NOTE
 Select same volume and temp as previous attempt. Failure to open and close RHS switch will inhibit dispense

(GALLEY)
 • Rotate H2O Quantity Selector Switch back and forth several times thru previously attempted volume, then stop there
 • Retract container, insert empty water container and push in to depress RHS lever closing RHS switch
 • Dispense water

Does more than selected volume dispense ?

YES 8

NO 1

7 TRANSIENT H2O QUANTITY SELECTOR SWITCH PROBLEM

NO

2 Repeat dispense attempt

NOTE
 Do not reset Control Electronics. Select same volume and temp as previous attempt. Failure to open and close RHS switch will inhibit dispense

(GALLEY)
 • Retract container, insert empty water container and push-in to depress RHS lever closing RHS switch
 • Dispense water

Does more than selected volume dispense ?

YES

NO 1

6 TRANSIENT CONTROL ELECTRONICS PROBLEM

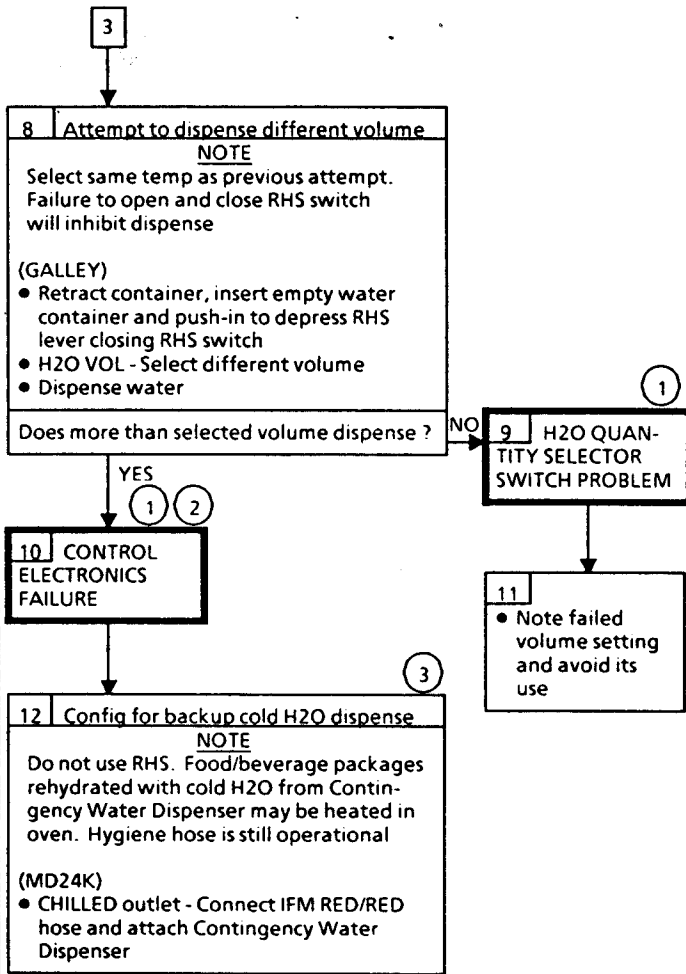
4 CONTROL ELECTRONICS PROBLEM THAT CLEARS UPON RESET

5 Reset Control Electronics

NOTE
 When RHS is repowered, pumps should recirculate H2O for 40 sec, during which time dispense is inhibited

(GALLEY)
 • Cycle OVEN/ RHS - OFF then AUTO twice
 • Continue use of RHS by resetting Control Electronics after each dispense

ECLS 6.6f (Cont)



- ① Advise MCC
- ② Instead of deactivating RHS and initiating backup cold H2O dispense, crew may elect to manually control RHS dispense volume by resetting Control Electronics (OVEN/RHS - OFF then AUTO twice) to terminate dispense cycle when food/drink package has filled to desired level determined visually
- ③ With Galley inlet QD disconnected from CHILLED outlet, Cold H2O Pump will not be able to keep Resistance Temperature Detector below 60 degF by recirculation. Pump will run 20 sec every five min. If pump noise is objectionable during sleep, switch OVEN/RHS - OFF. Running with recirculation path blocked will not damage the pump

ECLS SSR

ECLS SSR-1 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	0451410	0452410

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

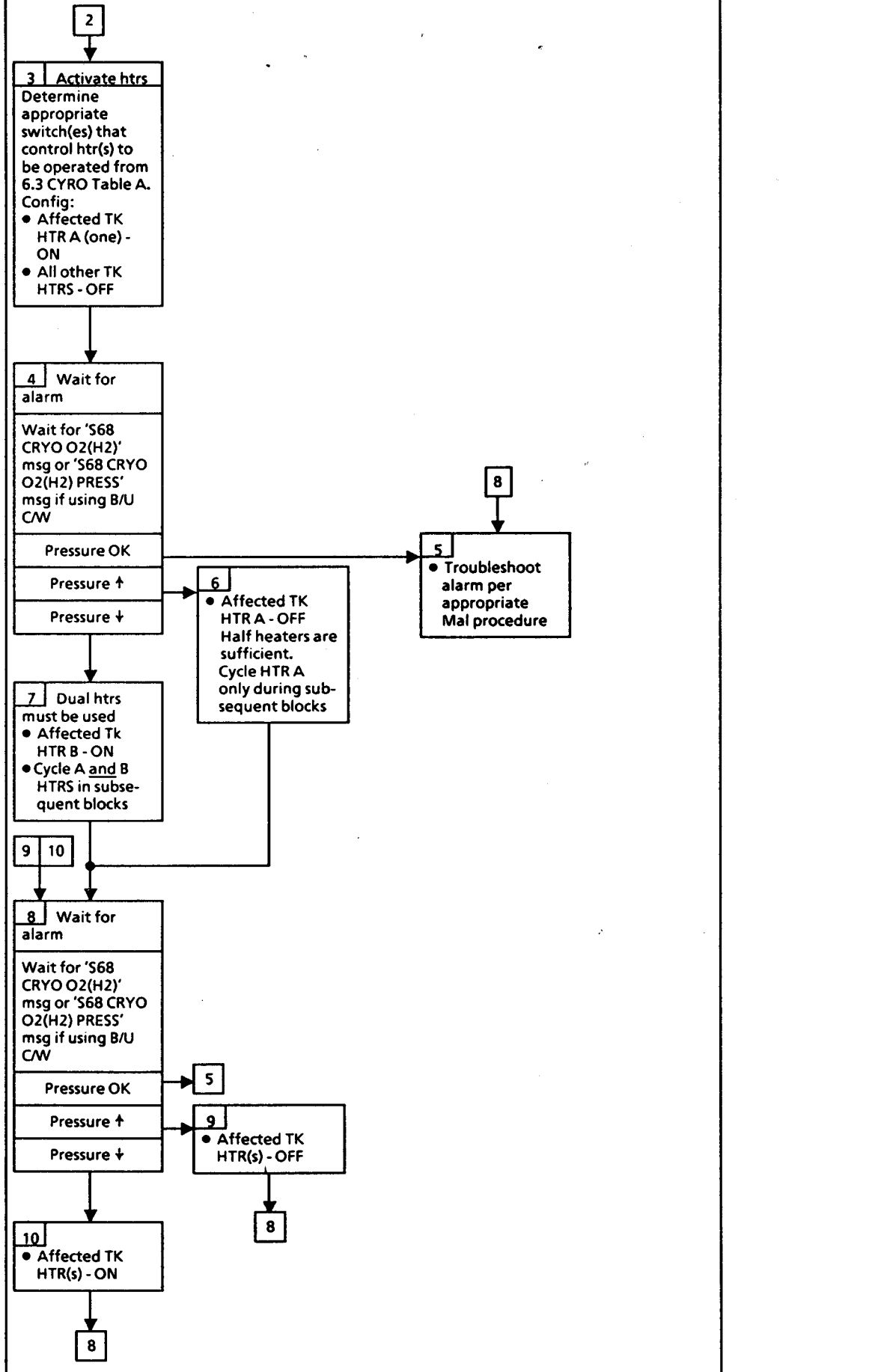
3 This procedure assumes that both manifold vlvs are open

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

ECLS SSR-1 (Cont)



ECLS SSR-2 FES CORE FLUSH PROCEDURE

NOTE

Procedure used to deice or to remove contamination from either topping or hi-load core by flowing warm freon through core. Core problems are evident by failure of any controller to start FES. ✓MCC for flush method and length of time reqd to warm core

- L1
1. ✓FLASH EVAP CNTLR PRI A,B (two) - OFF
✓SEC - OFF
 2. ✓TOP EVAP HTR DUCT - A(B)
✓HTR NOZ (two) - A AUTO (B AUTO)

If HI LOAD EVAP is to be flushed,

3. HI LOAD DUCT HTR - A/B

SM 88 APU/ENVIRON THERM

Wait at least 20 min or until HI LOAD DUCT Ts > 150 degF

4. HI LOAD EVAP - ENA

If rapid flush reqd, bypass radiators

5. RAD BYP VLV MODE (two) - MAN
6. MAN SEL (two) - BYP (3 sec)
✓tb (two) - BYP

7. After one min read note below then, go to step 10

If RAD BYPASS not desired, set RADS to HIGH

8. RAD CNTLR OUT TEMP - HI
✓OUT T LOOP 1,2 increasing to ~57 degF
9. Wait for time specified by MCC, read note below then go to step 10

NOTE

While performing the following steps, monitor TOPPING or HI LOAD DUCT TEMPS and EVAP OUT T. If radiators are bypassed, high temps can be expected. Successful flush will be indicated by EVAP OUT temps stable at ~62 degF (~39 degF if RAD HIGH set point is used) when FLASH EVAP CNTLR is activated. Secondary cue is a very rapid decrease in duct temps

If RADS bypassed,

10. FLASH EVAP CNTLR SEC - ON

If RAD OUT T in HIGH

11. FLASH EVAP CNTLR PRI A - ON
12. Monitor for EVAP OUT T decrease
If no decrease or if temp erratic after 30 sec,
 13. FLASH EVAP CNTLR SEC (PRI A) - OFF
 14. After 30 sec, repeat steps 10(11) and 12 as directed by MCC
If not successful, go to step 15

If EVAP OUT T decreases to ~62(~39) degF, ice has cleared, then,

Return to nominal config:

15. ✓RAD OUT T - NORM

If rads bypassed,

RAD BYP VLV MODE (two) - AUTO
CNTLR LOOP (two) - AUTO A
After 90 sec, ✓RAD BYP VLV tb (two) - RAD

16. FLASH EVAP CNTLR SEC (PRI A) - OFF
17. HI LOAD EVAP - OFF
18. HI LOAD DUCT HTR - OFF
19. If FES is reqd and Topping Evap operational, go to FES RESTART,
ECLS SSR-5 >>

If TOPPING EVAP not operational,

20. TOPPING DUCT HTR - OFF
NOZ HTR (two) - OFF

If HI LOAD EVAP not operational,

21. For deorbit, go to LOSS OF HI LOAD EVAP (ORB PKT, PWRDN) >>

ECLS SSR-3 RECONFIG TO ALT PCS SYS (AUTO OPS)

① Use this procedure for complete reconfig of Auto PCS. Some sws may be already in desired position

Loss of PCS Sys 1(2) O2 or N2

①

1 Reconfig to alternate system

(L2)

ATM PRESS CONTROL

- O2/N2 CNTLR VLV SYS 1(2) - CL
- 2(1) - AUTO

(O1)

- O2/N2 FLOW SEL - SYS 2(1) O2
- PPO2 SEL - SNSR B(A)

(MO10W)

- 14.7 PSI CABIN REG INLET SYS 2(1) - OP
- 1(2) - CL
- H2O TK N2 REG INLET SYS 2(1) - OP
- 1(2) - CL
- O2 REG INLET SYS 2 (SYS 1) - OP
- SYS 1 (SYS 2) - CL

(CRT)

- ✓N2 REG P 2(1) 185-240 psia
- ✓O2 REG P 2(1) 90-110 psia

If CABIN PRESS ≤ 15.2 psia >>

6.2c 61
6.2c 68

2 If CABIN PRESS > 15.2 psia

(MO13Q)

- MIDDECK FLOODS AIRLK 2 - ON/OFF

(Inner Hatch)

- EQUAL vlv caps (two) - remove, stow
- EQUAL 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' *
 - * AIRLK DEPRSS 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 O2(N2) FLOW'
 - 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

3

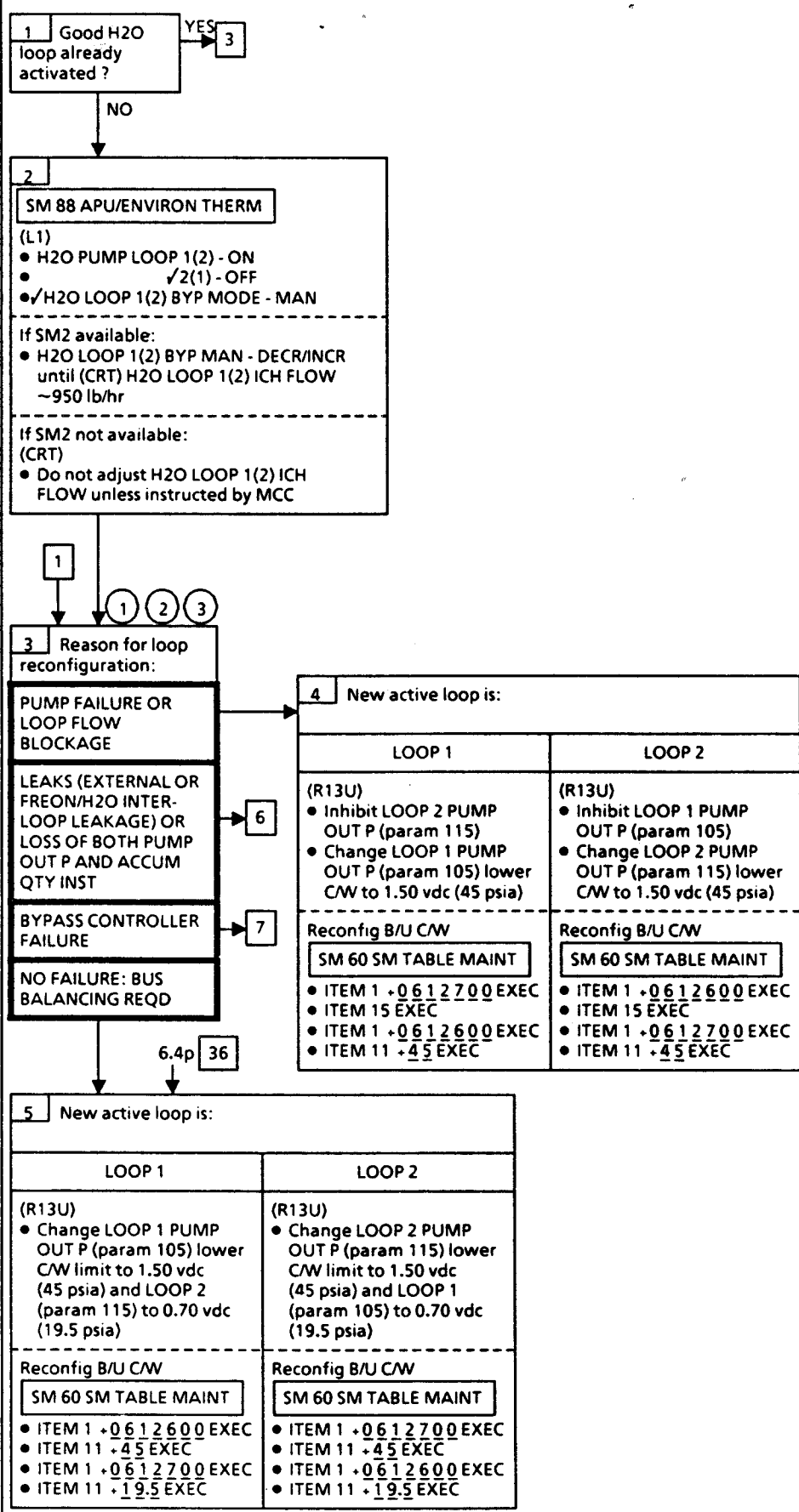
ECLS SSR-3 (Cont)

2



3	Reconfig from Cabin Depress
(AW82B)	<ul style="list-style-type: none">• AIRLK DEPRESS vlv - CL and capped
(O15:D)	<ul style="list-style-type: none">• cb MNB PPO2 C CAB dP/dT - cl
(Inner Hatch)	<ul style="list-style-type: none">• If reqd, rotate vent duct and stow on AIRLK wall• If reqd, close HATCH• EQUAL vlv - Norm and capped
(MO13Q)	<ul style="list-style-type: none">• MIDDECK FLOODS AIRLK 2 - OFF/ON

ECLS SSR-4 RECONFIG TO ALT H2O LOOP



- ① Procedure assumes initial C/W and B/U C/W for PUMP OUT P set at 19.5 for inactive loop and 45 for active loop
- ② Loss of bypass controller results in loss of all instrumentation in affected loop except flow and some temperatures
- ③ With loss of PUMP OUT P and ACCUM QTY instrumentation, Freon/H2O interloop leakage is not detectable. Affected loop should not be used unless reqd

ECLS SSR-4 (Cont)

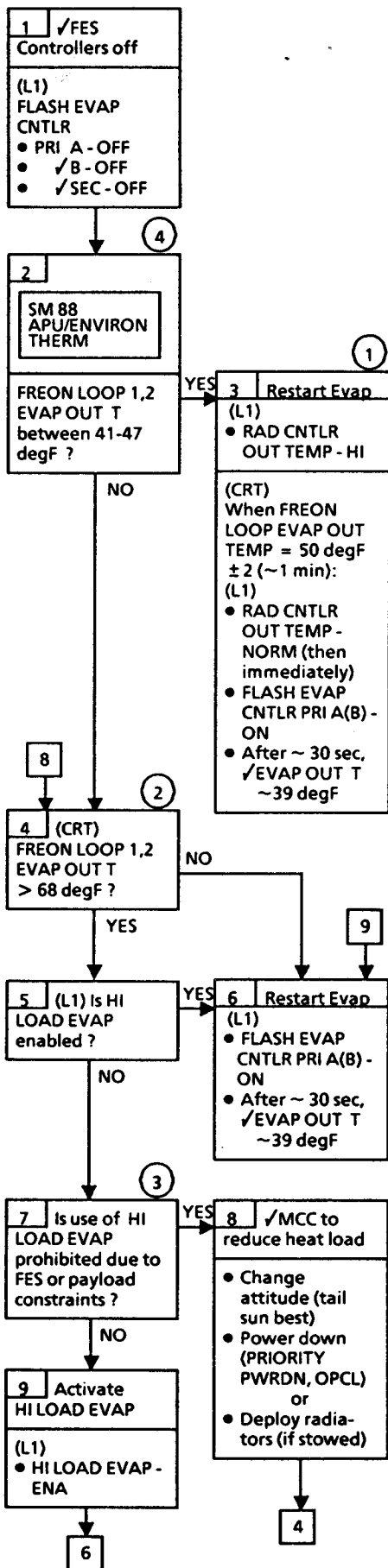
3

6 New active loop is:	
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 • ITEM 1 +0612600 EXEC • ITEM 11 +45 EXEC • ITEM 1 +0612700 EXEC • ITEM 15 EXEC	Reconfig B/U C/W SM 60 SM TABLE MAINT • ITEM 1 +0612700 EXEC • ITEM 11 +45 EXEC • ITEM 1 +0612600 EXEC • ITEM 15 EXEC
Inhibit Loop 2 SM Alerts • ITEM 10 EXEC • ITEM 1 +0612710 EXEC • ITEM 10 EXEC	Inhibit Loop 1 SM Alerts • ITEM 10 EXEC • ITEM 1 +0612610 EXEC • ITEM 10 EXEC

3

7 New active loop is:	
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 • ITEM 1 +0612600 EXEC • ITEM 11 +45 EXEC • ITEM 1 +0612700 EXEC • ITEM 15 EXEC	Reconfig B/U C/W SM 60 SM TABLE MAINT • ITEM 1 +0612700 EXEC • ITEM 11 +45 EXEC • ITEM 1 +0612600 EXEC • ITEM 15 EXEC
Inhibit Loop 2 SM Alerts • 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 • 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 To ensure positive FES restart, RADs are placed in HIGH to impose a load on FES

② TOPPING EVAP will overtemp shutdn when inlet temp exceeds ~68 degF and HI LOAD not activated

③ Heat load beyond capability of topping evap

④ Prior flight experience has demonstrated that FES shutdns are most likely in this temp range

ECLS SSR-6 CABIN EQUIP PWRDN

C2 CRT (three) PWR - OFF

F7/F8/A6U: FLT CNTLR PWR (three) - OFF
F6/F8 INST PWR (two) - OFF

O14:E cb MNA DDU L,AFT (two) - op
O15:E cb MNB DDU L,R (two) - op
O16:E cb MNC DDU R,AFT (two) - op

L1 CAB TEMP - COOL(as reqd, WARM)
Minimize ltg
W1-10 Install Window Shades (ten)

O19 TV PWR - OFF
A3 MON 1,2 - OFF
R11 VTR PWR - OFF

MO39M MIDDECK COMM CCU PWR - OFF
MO42F SPKR AUD SPKR PWR - OFF
PWR - OFF

MO58F MIDDECK CCU AUD PWR - OFF
GALLEY DC PWR BUS A - OFF
B - OFF

MA73C:G cb AC3 GALLEY FAN (three) - op
or
Food Warmer - OFF, ✓light - off
All middeck lts - off

ECLS SSR-7 FLASH EVAPORATOR CHECKOUT

NOTE

Procedure used to check all components

PRETEST SETUP

- a. ✓ Rad flow, PLBD opened
- L1 b. FLASH EVAP TOP DUCT HTR - A(B)
NOZ (two) - AUTO A(B)
- If HI LOAD EVAP to be activated:
FLASH EVAP HI LOAD DUCT HTR - A(B)
Wait = 45 min before activating HI LOAD
- L2 c. FLASH EVAP FDLN HTR A SPLY - 1(2)
B SPLY - 1(2)
- R12L 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, then AUTO A(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(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(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, then AUTO A(AUTO B)
After 90 sec, ✓tb (two) - RAD |
| | 8. | After 2 min, HI LOAD EVAP - OFF |
- f. PRIMARY CNTLR A,B, TOPPING, STARTUP FROM STBY CHECKOUT
- | | | |
|-----|-----|--|
| | 1. | Perform FES RESTART, ECLS SSR-5, using A CNTLR |
| CRT | 2. | ✓RAD OUT T ~ 39 degF (FES to STBY)
Pwrndn 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 B - OFF, then 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 B - OFF |

ECLS SSR-8 SMALL CABIN LEAK ISOL

NOTE

Automatic cabin pressure control is done with one 14.7 psi cabin pressure regulator opened continuously. Manual cabin pressure control is done with one 14.7 psi cabin pressure regulator opened as reqd.

Monitor for drop in cabin pressure over 1 hour following execution of each step. If MCC available, they may be able to provide shorter interval of time to monitor each step based on observed leak rate. Leak is assumed to be isolated if cabin pressure does not drop over course of 1 hour

SM 66 ENVIRONMENT OR **SM SYS SUMM 1**

1. If in manual cabin pressure control, go to step 3
- MO10W 2. 14.7 psi CAB REG INLET SYS 1(SYS 2) vlv - CL
3. Log current cabin pressure and current MET after each of the following steps
- L2 4. CAB RELIEF A - CL
5. CAB RELIEF A - ENA
B - CL
- WCS 6. CAB RELIEF B - ENA
COMMODE CNTL - PULL UP
7. COMMODE CNTL - DN/OFF
VAC VLV - CL
- ML31C 8. VAC VLV - OP
✓VAC VENT ISOL - OP
- AIRLOCK HATCH 9. If airlock hatch is open, close hatch Equalization vlv (two) - OFF, capped
10. Equalization vlv (two) - NORM, capped
Firmly push covers of NEG PRESS RELIEF vlv (two) (below side hatch)
11. If time permits, go to CABIN LEAK SEALING (IFM)

ECLS SSR-9 SUPPLY WATER DUMP USING FES

NOTE

If PASS SM avail, monitor tank quantity; otherwise, monitor dump time provided by MCC

Approximately 16%/hr FES water used by this method

Crew may reset SM alert limits to annunciate end of dump if desired

If Tk A to be dumped, set Tk B Qty LL to -10 to preclude nuisance alarm

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
H2O SUPPLY QTY A	0620410	25.0	
B	0620420	10.0	
C	0620548	75.0	99.0

1. DUMP PREP

- R12L ✓ SPLY H2O XOVR VLV tb - CL
If TK C and/or D to be dumped:
Open SPLY H2O TK C(D) OUTLET, INLET vlv on tank that will not be dumped (if applicable)

2. DUMP INITIATION

- L1 RADIATOR CNTLR OUT T - HIGH
IF FES not activated,
O1 When EVAP OUT T ~ 50degF
FLASH EVAP CNTLR PRI A- ON (if TK A and/or B to be dumped)
B- ON (if TK C and/or D to be dumped)
After one minute,
✓ EVAP OUT T ~ 39 degF

3. DUMP TERMINATION

- L1 RADIATOR CNTLR OUT T - NORM, then immediately
FLASH EVAP CNTLR PRI A(B) - OFF, then ON
After one min
O1 ✓ EVAP OUT T ~39 degF
If FES not reqd,
L1 FLASH EVAP CNTLR PRI A(B) - OFF

4. TANK RECONFIG

- Open SPLY H2O TK C,D OUTLET, INLET vlv except on any failed tank (external leak):
SPLY H2O TKC OUTLET-OP (tb-OP)
INLET - OP (tb-OP)
ML31C TKD OUTLET-OP (tb-OP)
INLET - OP (tb-OP)

If H2O SUPPLY QTY limits were reset to annunciate end of dump, leave limits at annunciation value

**ECLS SSR-10
H2O PUMP OPS VIA GPC**

To provide continuous H2O pump ops in GPC

1. Reset pump cycling constants

SM 60 SM TABLE MAINTENANCE

ITEM 16 + 920641 EXEC
17 + 999999 EXEC
16 + 920640 EXEC
17 + 1 EXEC

2. Perform SM CHECKPOINT INITIATE (ORB OPS, DPS)
- L1 3. ✓ H2O PUMP LOOP 1(2) - GPC
4. SM OPS 000 PRO
5. SM OPS 201 PRO
6. **SM 88 APU/ENVIRON THERM**
✓ H2O LOOP PUMP OUT P 1(2) - 61-69

ECLS SSR-11 FES FEEDLINE PURGE

NOTE

Procedure provides evacuation of H₂O from the FES Feedlines in the event of dual htr failures or htr deactivation during a major pwrn. If a SPLY H₂O dump reqd, perform dump before performing this procedure

- L1 1. FLASH EVAP CNTLR PRI A - OFF
 ✓B - OFF
 ✓SEC - OFF
- R12L 2. ✓SPLY H₂O B SPLY ISOL VLV - OP
 ✓TKA,TKB,TKC,TKD OUTLET - CL, tb - CL
 XOVR VLV - OP, tb - OP
 ✓DUMP ISOL VLV - CL, tb - CL
 ✓DUMP VLV - CL, tb - CL
3. Unstow (top drawer of IFM container):
 Water Noz (B)
 Water QD Adapter (Y-R)
- WCS 4. Connect Water Nozzle to Y-R Water QD Adapter
 Connect Adapter to Cont H₂O X-TIE POR QD
- R12L 5. SPLY H₂O DUMP ISOL VLV - OP, tb - OP
- L1 6. RAD CNTLR OUT TEMP - HI
- O1 7. When EVAP OUT T ~50 degF,
L1 FLASH EVAP CNTLR PRI A - ON
8. When EVAP OUT T again ~50 degF,
 FLASH EVAP CNTLR PRI A - OFF, then ON
9. Repeat steps 7,8 until EVAP OUT T remains at ~57 degF,
 then FLASH EVAP CNTLR PRI A - OFF
10. Repeat steps 7 thru 9 using FLASH EVAP CNTLR PRI B
11. TOP EVAP DUCT HTR - OFF
 HTR NOZ (two) - OFF
 FLASH EVAP FDLN HTR (two) - OFF
- R12L 12. SPLY H₂O DUMP ISOL VLV - CL, tb - CL
13. Disconnect, stow QD and Nozzle

ECLS SSR-12 AV BAY FIRE RECOVERY/RECONFIG

NOTES

- 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).
- The following Reference Table identifies location of equipment to ensure SFT for entry:

Essential Equipment	Av Bay 1	Av Bay 2	Av Bay 3A
ANTISKID	X	X	
AUD CTR	1,2		
BRAKES	X	X	
COMM			X
C/W			X
O1 MDM	OF1	OF2	OF3
O1 DSC	OF1	OF2	OF3
PL MDM	PL1	PL2	
Minimum Equip reqd for SFT	Av Bay 1	Av Bay 2	Av Bay 3A
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	1	2	3
2 of 3 FMCAs	1	2	3
3 of 5 GPCs	1,4	2,5	3

- Perform recovery if smoke concentration < 15 and decreasing. Monitor smoke concentration during recovery.
- Valid smoke detection requires the aff Av Bay fan operating.
- Use alternate pwr supply or equipment, if possible.
- Perform with MCC coverage, if possible.
- FRCS dump will be 2 jet dump only

CAUTION

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

- C3
- COMM RECOVERY (FOR AV BAY 1 ONLY)**
 - AUD CTR - 1
If Voice comm not restored:
 - AUD CTR - 2
 - If Voice comm still not restored:
 - AUD CTR - OFF
 - Perform MAL, COMM, SSR-1
 - O1 MDM RECOVERY**
 - If Av Bay 1 or 2 affected:
 - cb MNA O1 MDM OF 1/2 A - cl
 - If cb not reset then:
 - cb MNB O1 MDM OF 1/2 B - cl
 - If Av Bay 3A affected:
 - cb MNA O1 MDM OF 3/4 A - cl
 - If cb not reset then:
 - cb MNC O1 MDM OF 3/4 B - cl
 - SM 62 PCMMU/PL COMM
 - PCMMU I/O RESET PCM - ITEM 5 EXEC (*)

ECLS SSR-12 (Cont)

C. OI DSC RECOVERY

- O14:B If Av Bay 1 affected:
 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

D. 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

- L4:G If Av Bay 1 affected:
 1. cb AC2 Φ A, Φ B, Φ C (three) AV BAY 1 FAN B - cl
SM 67 ELECTRIC
 Note AC2 AMPS
 L1 2. AV BAY 1 FAN B - ON
 If AC AMPS not incr 0.5-0.9 amps/ Φ or
 AV BAY 1 FAN Δ P < 1.45 or > 4.0
 3. AV BAY 1 FAN B - OFF
 If MCC not available, unpower Av Bay 1 >>
 L4:H If Av Bay 2 affected:
 4. cb AC3 Φ A, Φ B, Φ C (three) AV BAY 2 FAN B - cl
SM 67 ELECTRIC
 Note AC3 AMPS
 L1 5. AV BAY 2 FAN B - ON
 If AC AMPS not incr 0.5-0.9 amps/ Φ or
 AV BAY 2 FAN Δ P < 1.45 or > 4.0
 6. AV BAY 2 FAN B - OFF
 If MCC not available, unpower Av Bay 2 >>
 L4:H If Av Bay 3A affected:
 7. cb AC1 Φ A, Φ B, Φ C (three) AV BAY 3 FAN B - cl
SM 67 ELECTRIC
 Note AC1 AMPS
 L1 8. AV BAY 3 FAN B - ON
 If AC AMPS not incr 0.5-0.9 amps/ Φ or
 AV BAY 3 FAN Δ P < 2.15 or > 4.50
 9. AV BAY 3 FAN B - OFF
 If MCC not available, unpower Av Bay 3 >>

E. COMM RECOVERY (FOR AV BAY 3A ONLY)

- A1L If Comm not working:
 1. S-BD PL CNTL - PNL
 PWR SYS - 1(2)
 PL DATA INTLVR PWR - ON
 S-BD PM CNTL - PNL
 NSP ENCRYPTION MODE - SEL
 SEL -BYP
 S-BD PM ANT SW ELEC - 1
 PRE-AMP - 1
 PWR AMPL STBY - 1
 OPER - 1
 XPNDR - 1
 NSP PWR - 1
 ✓ENCRYPTION PWR - OFF
 2. Perform MAL, COMM, 2.3a
 A1L If comm not restored:
 3. S-BD PL CNTL - PNL
 PWR SYS - OFF
 PL DATA INTLVR PWR - OFF
 S-BD PM CNTL - PNL
 ANT SW ELEC - OFF
 PRE-AMP - OFF
 PWR AMPL STBY - OFF
 OPER - OFF
 XPNDR - OFF
 NSP PWR - OFF
 ✓ENCRYPTION PWR - OFF

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. Master Alarm pb - OFF
- O13:A 3. cb ESS 1BC C/W A - cl (MA)
- F2(F4,A7) 4. Master 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

If AC Bus is suspect go to step 13

- 1. Isolate 3Φ bus per table

NOTE

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

(L4,MA73C) cb - open all (3Φ,ΦA, ΦB,ΦC) on aff AC bus		
Number of cb to open:		
BUS	L4	MA73C
AC1 3Φ	1	4
ΦA	16	5
ΦB	16	4
ΦC	13	5
AC2 3Φ	0	9
ΦA	15	5
ΦB	16	4
ΦC	13	5
AC3 3Φ	1	7
ΦA	15	3
ΦB	16	3
ΦC	12	3

SM 67 ELECTRIC

- O13:A(C,E) 2. cb ESS 1BC (2CA,3AB) AC1(AC2,AC3) SNSR - cl
- R1 3. Aff AC BUS SNSR - OFF

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:
4. cb aff AC CONTR Φ A - cl
Aff INV PWR - ON
INV/AC BUS - ON
- CRT ✓Aff AC VOLTS > 110 and < 120
 ✓Aff AC AMPS < 1
 If AC VOLTS, AMPS limits exceeded:
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:
8. cb ESS 1BC(2CA,3AB) AC1(AC2,AC3) SNSR - op
- O13:A(C,E) If any phase recovered:
9. Aff AC BUS SNSR - AUTO
 10. For recovered phases, all single Φ cbs - cl
- If all 3 Φ s recovered:
11. All 3 Φ cbs - cl
- If 2 or 3 Φ s recovered:
12. Perform FC POWERUP, MAL, EPS, SSR-6
 13. Perform aff AC Bus Loss Actions, MAL, EPS, SSR (assume shorted Φ), if reqd

I. GPC RECOVERY

NOTE

3 of 5 GPCs reqd for single fault tolerance

If requirement not met:

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

J. FF MDM

NOTE

3 of 4 FF MDMs reqd for single fault tolerance.
MDM FF2 is reqd for FRCS dump

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

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

K. PL MDM RECOVERY

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

L. ADTA, AA, MLS, TACAN

NOTE

3 of 4 ADTAs reqd for single fault tolerance
3 of 4 AAs reqd for single fault tolerance
2 of 3 MLSS reqd for single fault tolerance
2 of 3 TACANs reqd for single fault tolerance

If requirement not met:

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

NOTE

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

M. FMCA

NOTE

2 of 3 FMCAs reqd for single fault tolerance

If requirement not met (confirmed by MCC):

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

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 SET UP completed, go to CABIN REPRESS

SET UP

- L2 O2/N2 CNTLR VLV SYS 1 - OP
SYS 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
- MO32M ✓LEH O2 5 vlv - CL
Insert O2 Bleed Orifice Assembly into LEH O2 5 QD
LEH O2 5 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 CABIN O2' 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' *
 - * *
 - * **NOTE** *
 - * Expect possible 'S66 CABIN N2' C&W alarm *
 - * during execution of next step *
 - * *
- MO10W * 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 *

- MO10W When O2 FLOW SYS 2 < 1.0, or CABIN PRESS > 14.7,
14.7 CAB REG INLET SYS 2 vlv - CL

- MO10W 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

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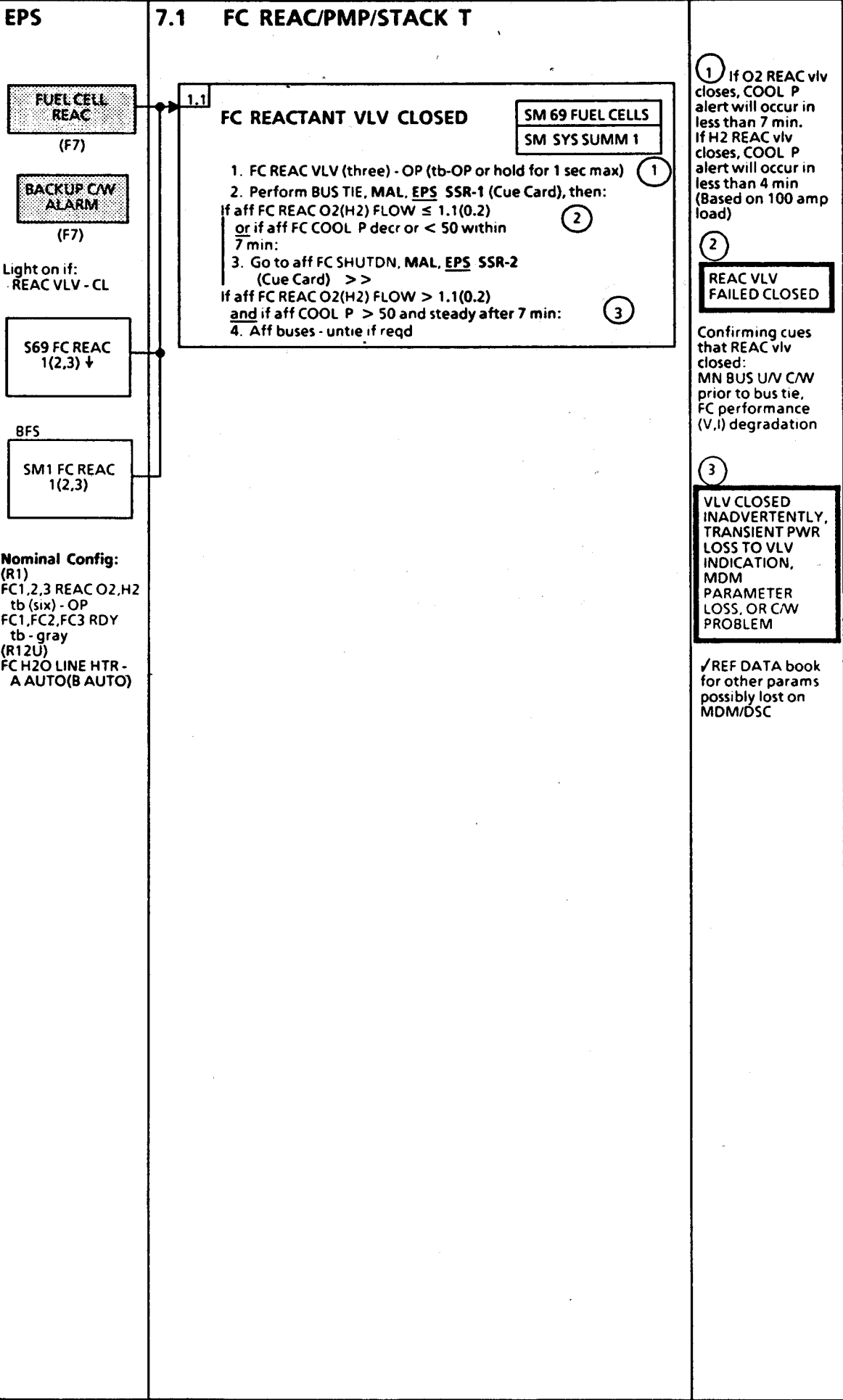
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FC REAC/
PMP/STACK T

7.1



FUEL CELL PUMP (F7)

BACKUP CRY ALARM (F7)

if: FC COOL PUMP ΔP < 2 ± 1 psid

S69 FC PUMP 1(2,3) ↓

BFS SM1 FC 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:A) FC1 CNTLR - ON (O15:A) FC2 CNTLR - ON (O16:A) FC3 CNTLR - ON (R12U) FC H2O LINE HTR - A AUTO (B AUTO)

1,2

FC COOLANT PUMP ΔP LOW

SM 69 FUEL CELLS SM SYS SUMM 1

If other 3Φ AC motors aff and AC VOLTS OK: Go to 3Φ AC MOTORS STOPPED 7.5 1.3 >>

1. Aff cb FC PUMP (three) - cl (pnl L4:C) FC - START (10 sec or ΔP tb-gray) 1

If FC EXIT T > 170 and not decr, or H2 PUMP < 0.3 or > 0.6, or RDY tb - bp (30 sec after start) 2 3 4

2. Go to FC SHUTDN, MAL, EPS, SSR-2 (Cue Card) 5

If FC H2 PMP STATUS norm, FC EXIT T norm, and RDY tb - gray (SNSR Fail) >> 6

1 If cbs were popped and will reset, continue with procedure. If cbs will not reset, then:

COOLANT, H2 PUMP PWR LOSS

2 If FC COOLANT PMP ΔP ↓ and FC EXIT T ↑ then:

COOLANT PUMP FAILURE

3 If RDY tb - bp 30 sec after start initiated, ECU lost and pump can be regained by IFM, although Preflight Test Bus would have to be pwr'd

4 Range given is for normal 3Φ ops. FC Pumps can start and run on two phases AC pwr. See EPS 7.1a Table A

5

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

Admittance of Cryo unconditioned reactants into FC Dual Gas Reg may cause seat/seal failure, and loss of pressure regulation. FC may overheat, loosening tie rods. This combination may cause O2/H2 to vent, possible into mid-body area

6

COOLANT PMP ΔP SENSOR FAILURE

S69 FUEL CELL

1.3

SM 69 FUEL CELLS

SM SYS SUMM 1

FC1(2,3) H2 PUMP †

If other 3 Φ AC motors affected, and AC VOLTS OK:
Go to 3 Φ AC MOTORS STOPPED >>

If FC COOLANT PUMP Δ P tb - bp:

- 1. Go to FC COOLANT PUMP Δ P LOW >>

If FC H2 PUMP between 0.8 and 2.0 or between 3.0 and 4.6

- 2. Perform BUS TIE (Cue Card), then:
- 3. Go to MAL, EPS, 7.1c **1**

If FC H2 PUMP between 2.0 and 3.0 or > 4.6

- 4. Note AC1 (2,3) Φ A,B,C AMPS, then:
- 5. Perform FC SHUTDN (Cue Card), then:
- 6. Go to MAL, EPS, 7.1c **7**

Nominal Config:

(L4:C)

cb AC1 Φ A, Φ B, Φ C

FC1 PUMPS

(three) - cl

cb AC2 Φ A, Φ B, Φ C

FC2 PUMPS

(three) - cl

cb AC3 Φ A, Φ B, Φ C

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 Δ P tb

(three) - gray

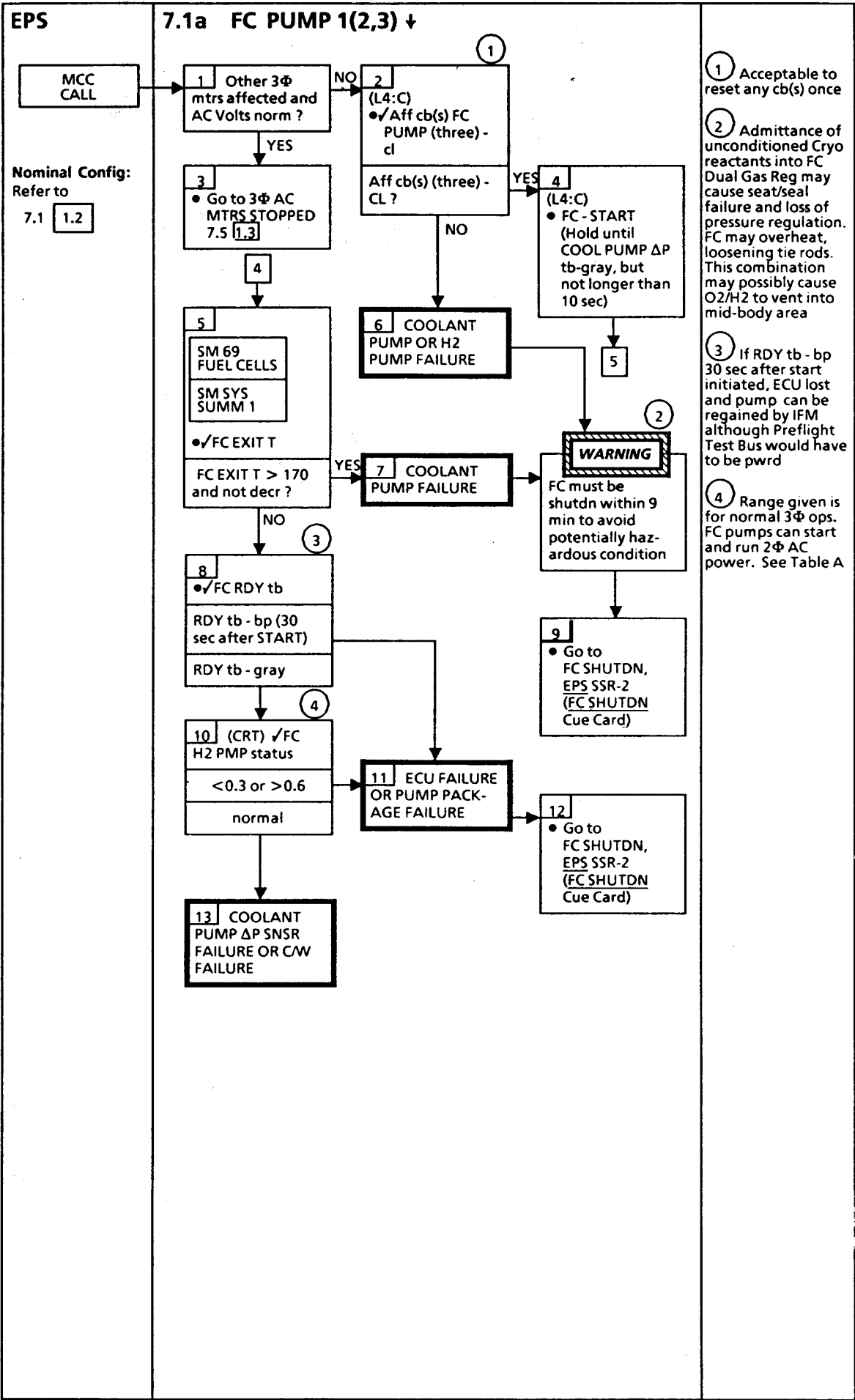


Table A

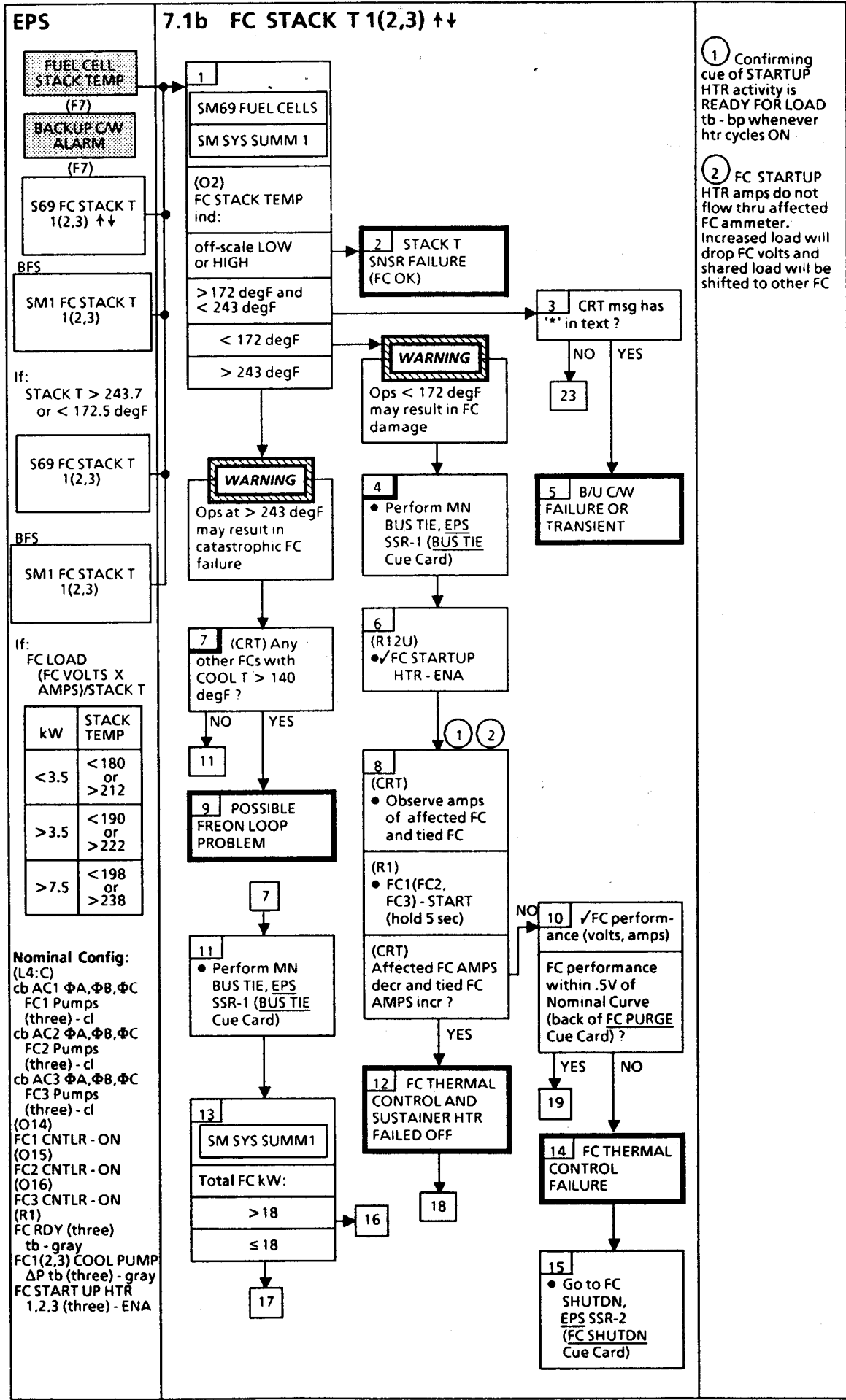
FC PUMP PACKAGE POWER RANGES

3-PHASE OPERATION

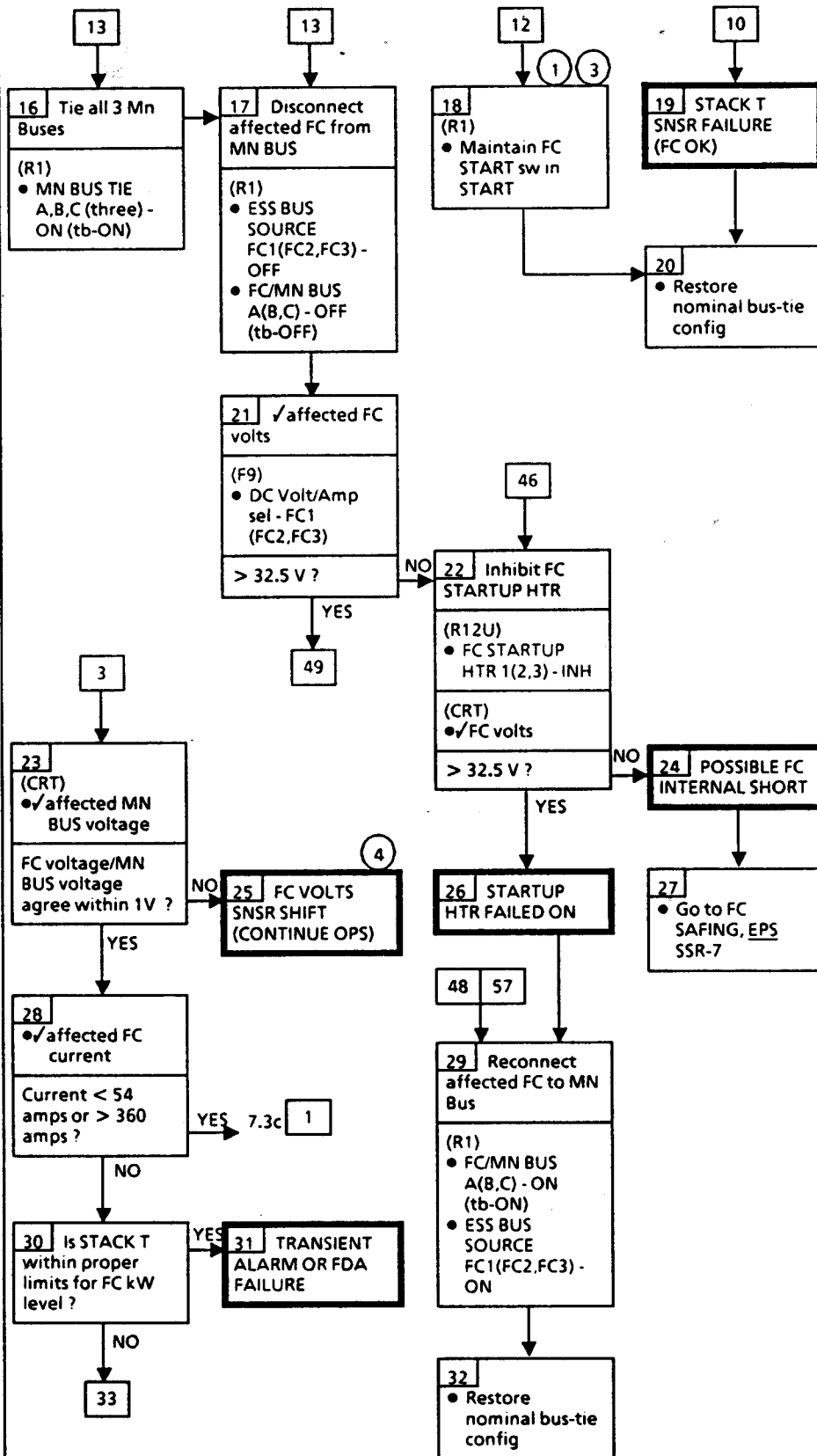
LOAD	COOLANT PUMP	H2 PUMP	
	AMPS/PHASE	AMPS/PHASE	VOLTS
NORMAL	0.51	0.3	0.28 - 0.65
OVERLOAD		0.5	> 0.8
STALL	1.0	1.2	2.2

2-PHASE OPERATION

LOAD	COOLANT PUMP	H2 PUMP	
	AMPS/PHASE	AMPS/PHASE	VOLTS
NORMAL (open motor winding)	0.62	0.45	3.15 - 3.5
NORMAL (1 Φ cb open)	0.62	0.45	4.15 - 4.5
STALL	1.0	1.3	4.8



EPS 7.1b (Cont)

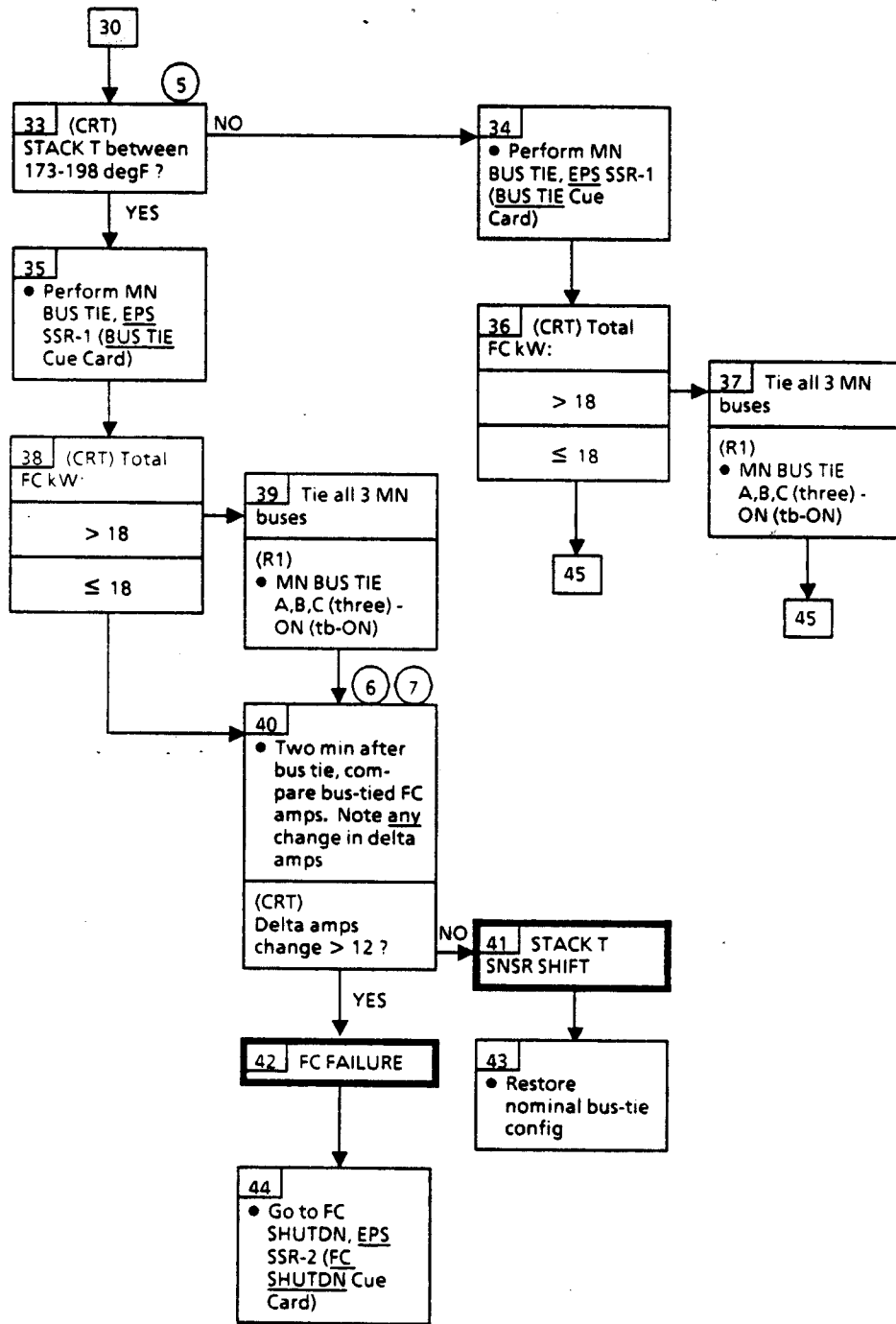


① Confirming cue of STARTUP HTR activity is READY FOR LOAD tb - bp whenever htr cycles ON

③ FC STARTUP HTR may be used to cntl STACK T to acceptable temp by holding or maintaining FC START sw in START

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

EPS 7.1b (Cont)

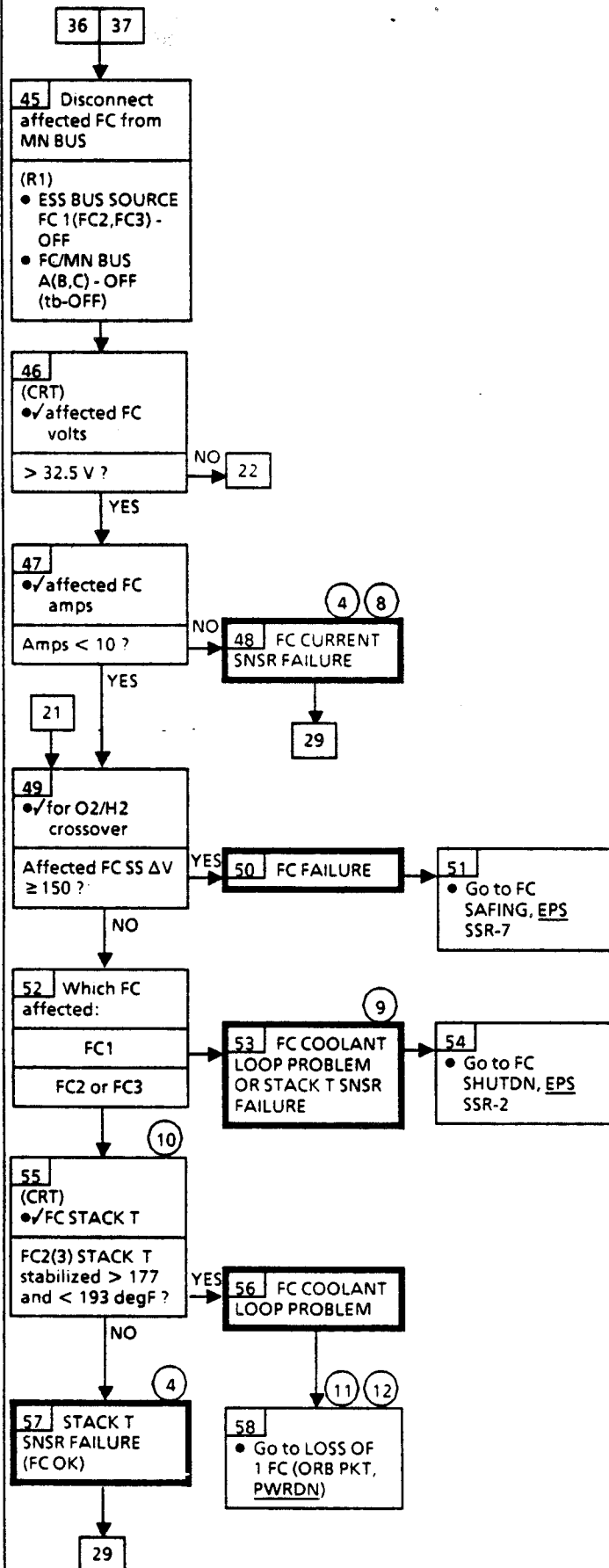


5 This is the temp range that could result in low stack temp SM ALERT

6 Depending on load, may take several hours for performance change. Do not purge this FC for five hours

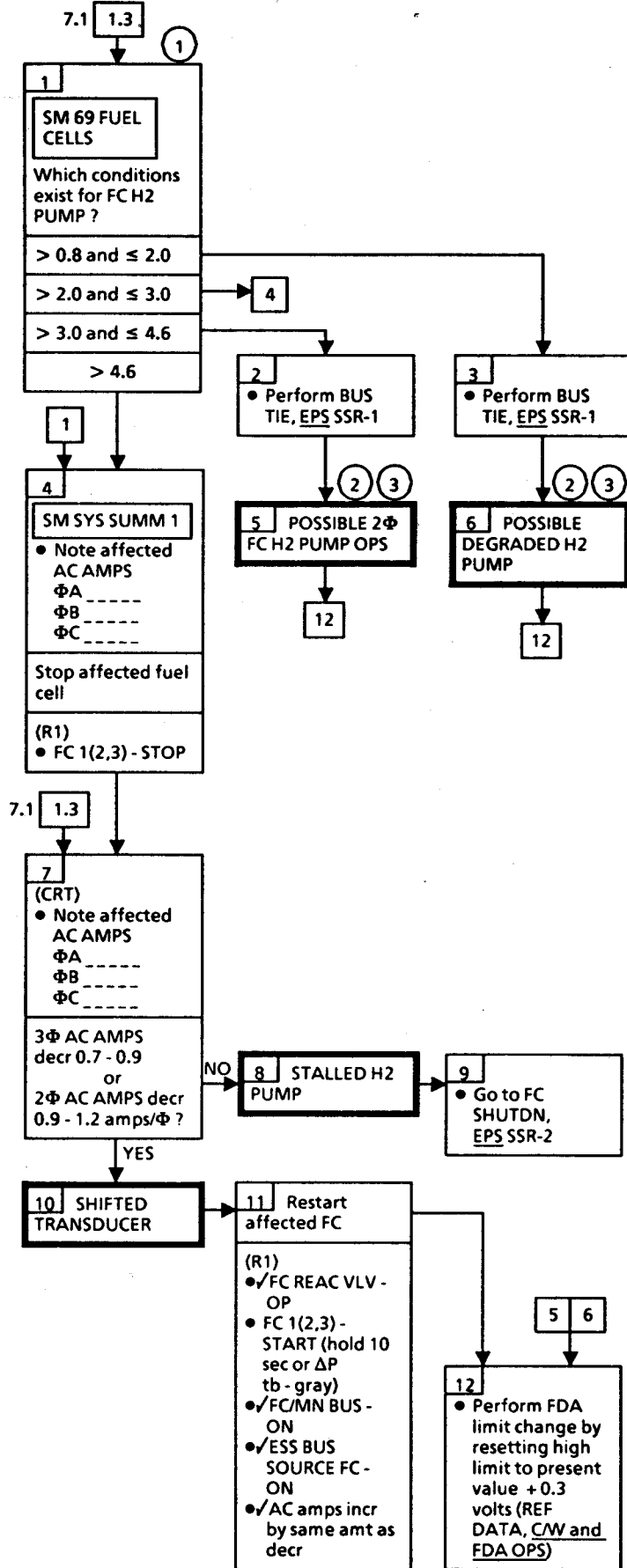
7 With FCs thermally stabilized, a 12 amp change in delta amps would indicate approximately 3% change in KOH concentration. High concentration (indicated by improved performance) > 48% can allow O2/H2 cross-over. Low concentration (indicated by degraded performance) < 26% indicates flooding

EPS 7.1b (Cont)



- ④ Loss of correct precondition check for STACK T FDA Class 3 limit set based on kW for this FC
- ⑧ Loss of GPC AUTO PURGE SEQ for this FC if FC Flowmeter checks enabled on this flight
- ⑨ FC may be restarted if MCC analysis determines failure to be STACK T XDCR
- ⑩ FC sustaining heater maintaining stack temp
- ⑪ After cool-down, FC may be usable on cyclic basis or with extensive vehicle pwrdn
- ⑫ Leave FC in STBY mode. MCC analysis may determine later need for FC shutdn

7.1c H2 PUMP +



- ① Normal H2 Pump range 0.28 - 0.65 volts
- ② If degradation of H2 pump worsens, FC should be shutdn 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)

7.2 FC PURGE

EPS

7.2a FC PURGE 1(2,3)

FC PURGE 1(2,3)

If:
During GPC Auto Purge Sequence, FC O2 or H2 FLOW < or > expected for commanded purge vlv position. These cks have been overridden because of faulty flow meters

1 Flow cks negated for this Flt ?

YES

2 LOSS OF AUTO PURGE SEQ

3
• Go to FUEL CELL PURGE - MANUAL (ORB OPS, EPS)

NO

4 ✓ Reactant flows on all FCs

SM 69 FUEL CELLS

NOTE
Purge status determined by comparing FLOW O2 and FLOW H2 with calculated reactant flows as follows:
O2 FLOW x 47.5 = AMPS (± 50)
H2 FLOW x 377 = AMPS (± 68)
If FC purging,
FLOW O2 should indicate ~ 3.3 lb/hr (max) > calculated flow and
FLOW H2 should indicate ~ 0.6 lb/hr (max) > calculated flow

More than one FC PURGE 1(2,3) Alert set ?

NO

15

YES

5 Any FCs indicate purge flow ?

YES

6 Allow AUTO seq to terminate purge flows

NO

7 Activate man FC Purge Htrs
(R12U)
• FC PURGE HTR - ON

8 Attempt manual purge (one at a time) of FCs that set alarm
Manual purges successful ?

NO

9 PURGE LINE BLOCKED

YES

10 AUTO PURGE SEQ FAILED ON THESE FCs

13
• For future purges, go to FUEL CELL PURGE - MANUAL (ORB OPS, EPS)

11 Which line blocked:
H2
O2

12 FC should be able to support mission without H2 purge

14
• Reduce loading on FCs. Possible early mission termination

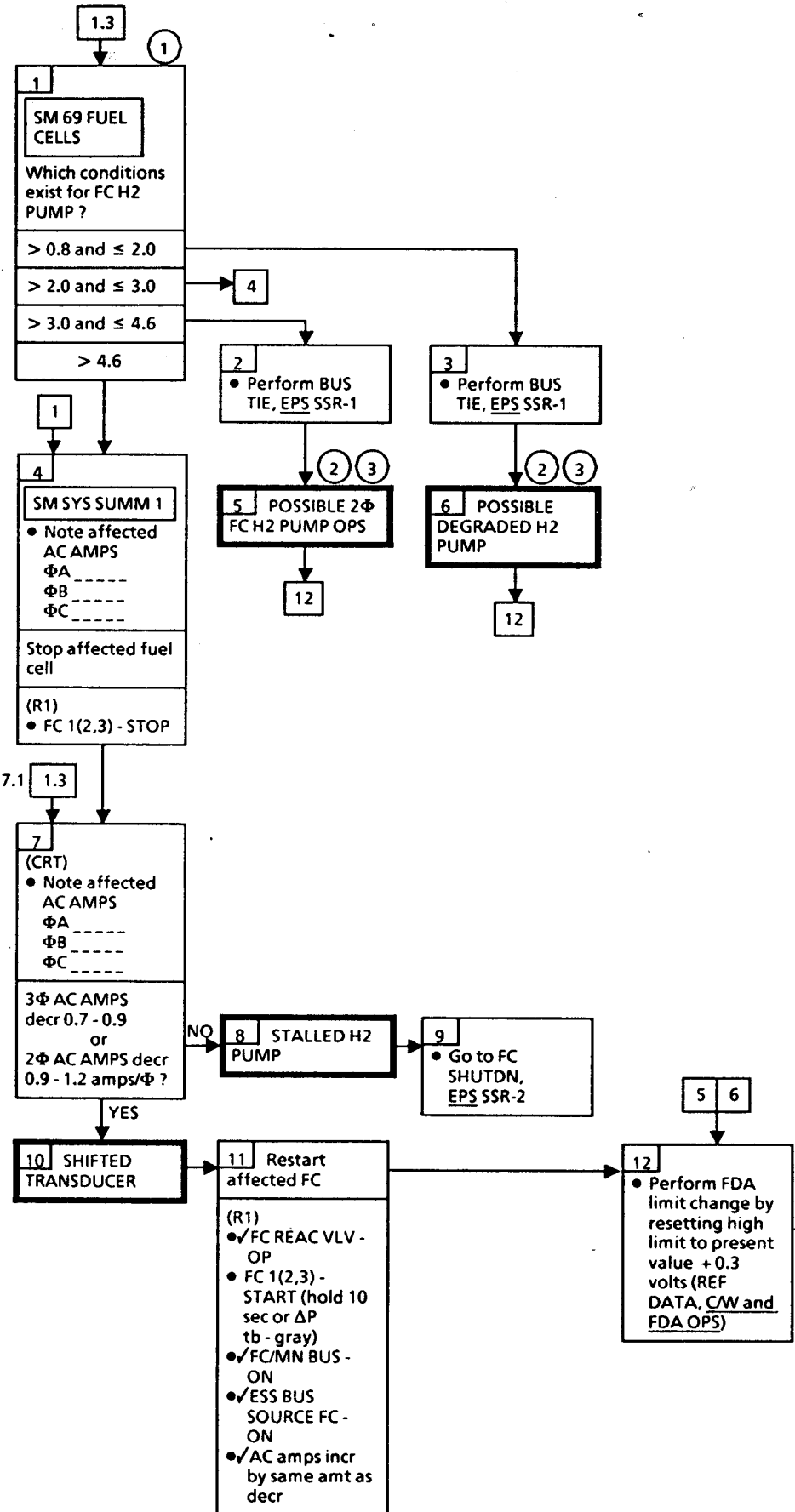
1 FC Purge Htr should be turned off three hours prior to entry. Expect FC PURGE SEQ Alarm when manual FC Purge Htrs activated

2 ✓ MCC for pwrdn

FC PURGE

7.2

EPS 7.1c H2 PUMP +



- ① Normal H2 Pump range 0.28 - 0.65 volts
- ② If degradation of H2 pump worsens, FC should be shutdn 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))

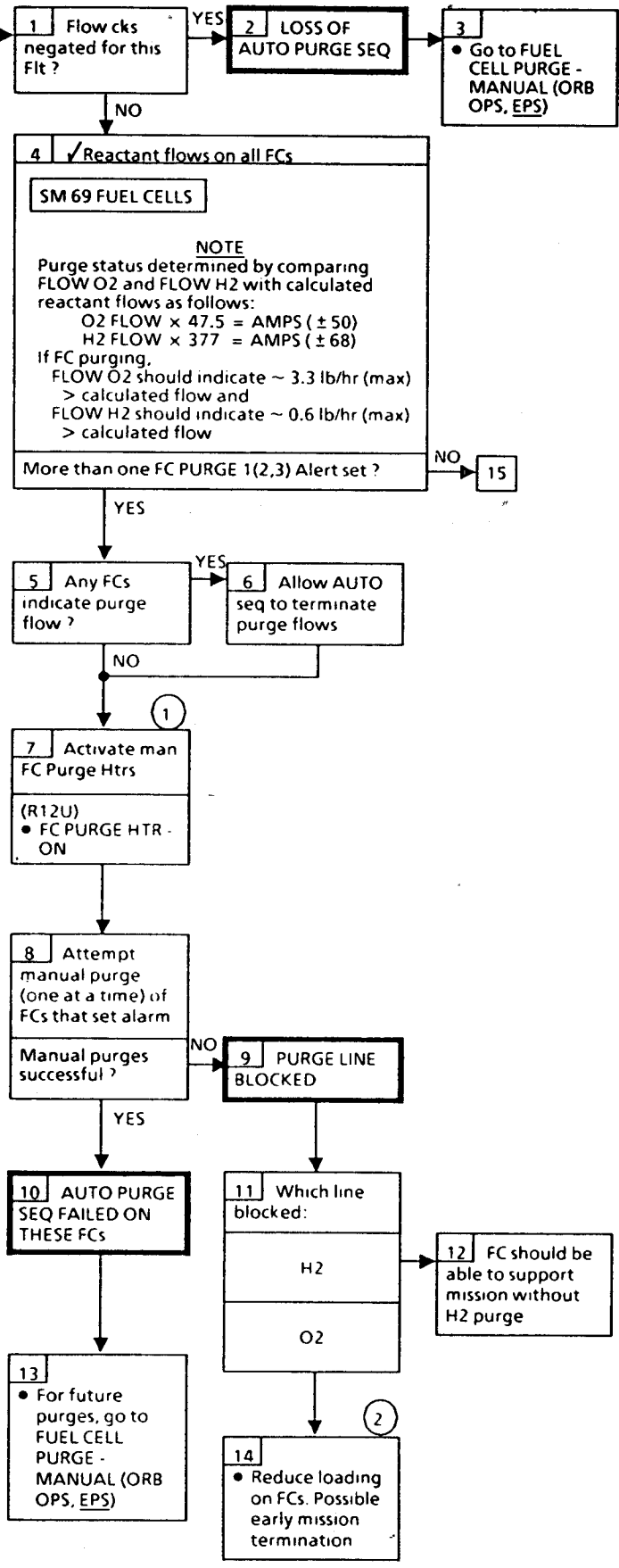
FC PURGE

7.2

7.2a FC PURGE 1(2,3)

FC PURGE 1(2,3)

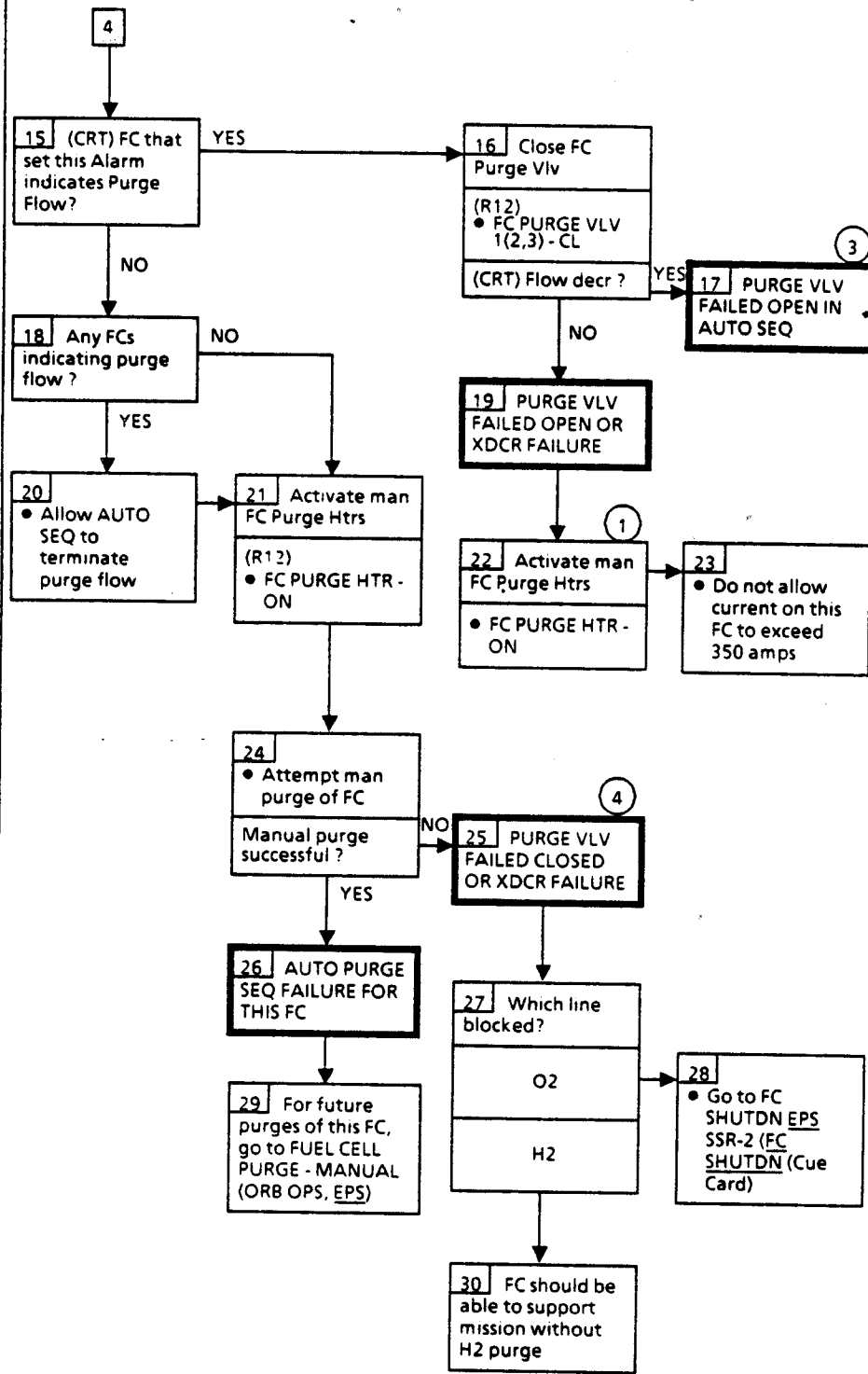
If: During GPC Auto Purge Sequence, FC O2 or H2 FLOW < or > expected for commanded purge vlv position. These cks have been overridden because of faulty flow meters



- ① FC Purge Htr should be turned off three hours prior to entry. Expect FC PURGE SEQ Alarm when manual FC Purge Htrs activated
- ② ✓MCC for pwrdrn

FC PURGE 7.2

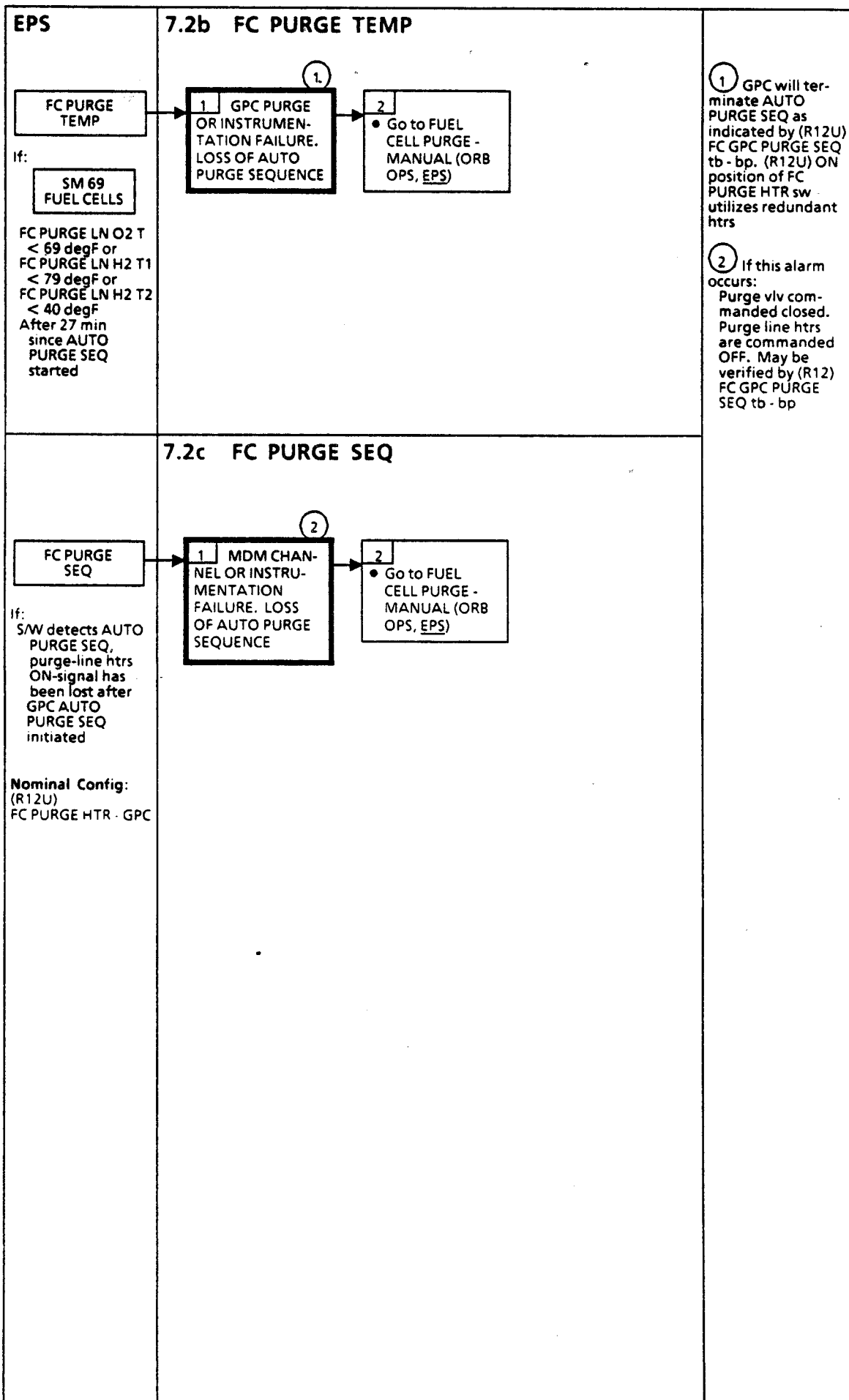
EPS 7.2a (Cont)



1 FC Purge Htr should be turned off three hours prior to entry. Expect FC PURGE SEQ Alarm when manual FC Purge Htrs activated

3 For Purge Vlv failed open, GPC terminates Auto Purge Seq but will leave GPC Purge Line Htr on for 30 min

4 For failed-close Purge Vlv, GPC terminates purge vlv open commands to that FC and will attempt to purge next FC selected for auto purge



EPS

7.3 FUEL CELL

SM
ALERT

S69 FUEL CELL

If:
pH high

1.1

FC pH HIGH or H2O LINE pH HIGH

SM SYS SUMM 1

SM 66 ENVIRONMENT

If FC1 (2,3) pH ↓ :

 If aff FC SS 1(2,3) ΔV ≥ 150 or H2O LINE pH ↓ :

 1. Perform FC SAFING, EPS, SSR-7, then:

 2. Go to FC/H2O LINE pH HIGH, EPS, 7.3a **11** > >

 If aff FC SS 1(2,3), ΔV < 150 and no H2O LINE pH ↓ :

 3. Go to step 5

If H2O LINE pH ↓ :

 If any FC SS 1(2,3) ΔV ≥ 150 or FC1(2,3) pH ↓ :

 4. Go to step 1

 If all FC SS 1(2,3) ΔV < 150 and no FC1(2,3) pH ↓ :

 5. If Flash Evap enabled:

 FLASH EVAP CNTLR PRI A - OFF

 PRI B - ON

 SEC (two) - B SPLY, OFF

 6. SPLY H2O TKA INLET - CL (tb-CL)

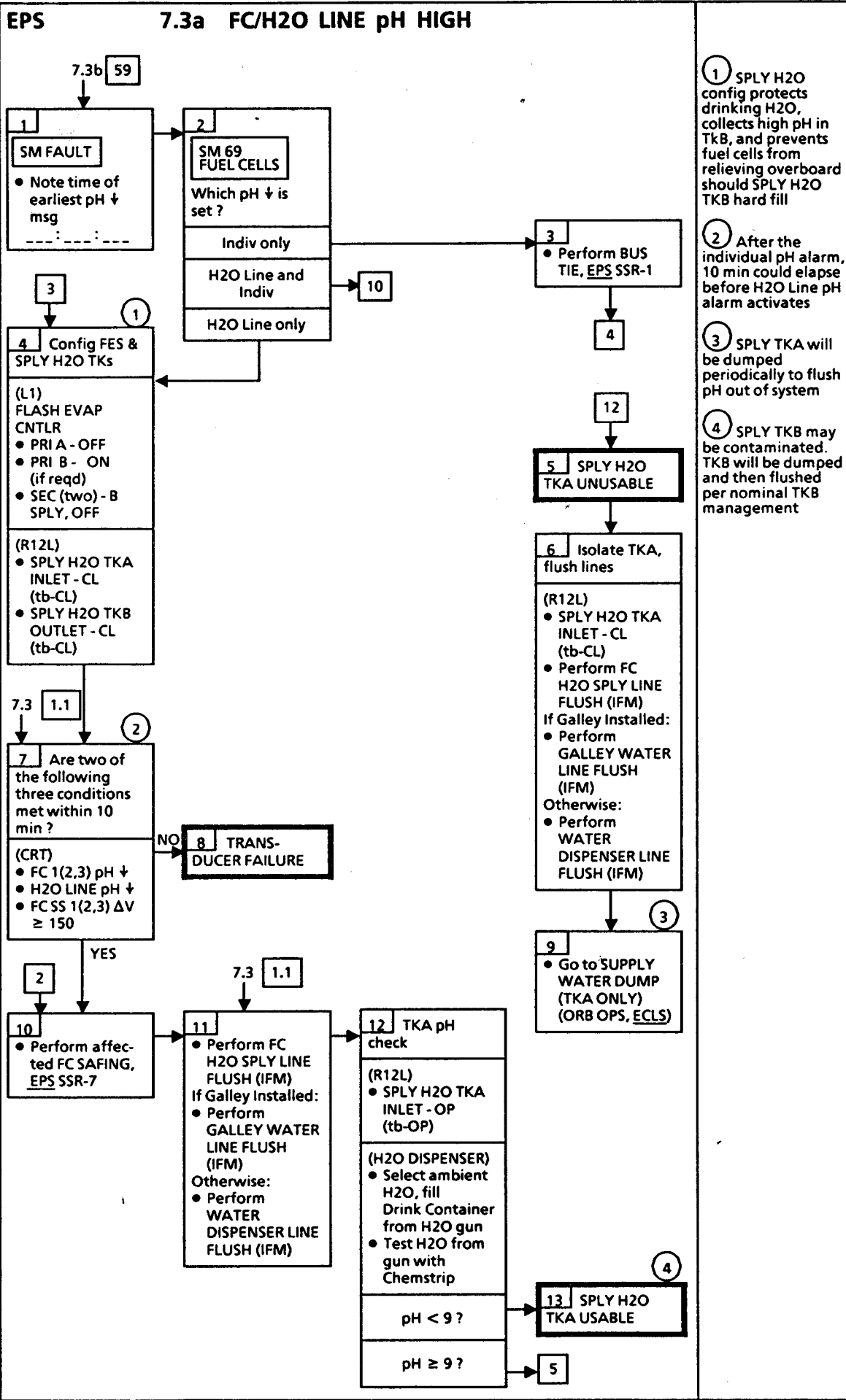
 TKB OUTLET - CL (tb-CL)

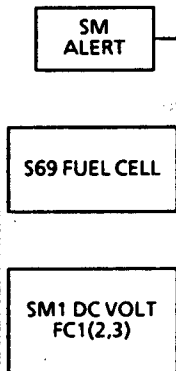
 7. Go to FC/H2O LINE pH HIGH, EPS, 7.3a **7**

FUEL CELL

7.3

474





If:
Volts < 27.5 V
> 32.5 V

Nominal Config:
(R1)
FC1,2,3 REAC (three) - ctr
tb (six) - OP (tb-OFF)
PL PRI FC3 - OFF (tb-OFF)
PL PRI MNB - OFF (tb-OFF)
PL PRI MNC - ON (tb-ON)
(R12U)
FC H2O LINE HTR - A AUTO(B AUTO)

1	
SM69 FUEL CELLS	
Any of these conditions met?	
FC VOLTS	FC AMPS
LOW < 26.6	HIGH or LOW Δ > 50
LOW < 27.5	
HIGH > 32.5	LOW < 20
HIGH > 32.5	
None are met	

1	2	7.3c 1	9
		7.3c 15	
		7.3j 11	

5 Affected Bus tied?

3 CW FAULT OR TRANSIENT

2 FC1(FC2,FC3) AMPS > 440?

4 (CRT) FC and MN Bus volts differ by > 1V?

6 Untie Buses
NOTE
If each tied MN BUS pwr'd by its FC and FC amps differ > 50, FC with lowest amps has internal short (R1)
• MN BUS TIE A(B,C) - OFF (tb-OFF)
• MN BUS TIE B(C,A) - OFF (tb-OFF)

7 FC VOLTS SNSR FAILED

8 TIED BUS DEVELOPED SHORT

9 Affected FC connected to PRI Payload Bus?

EPS BUS SSR-10 LOSS
SSR-30
SSR-50

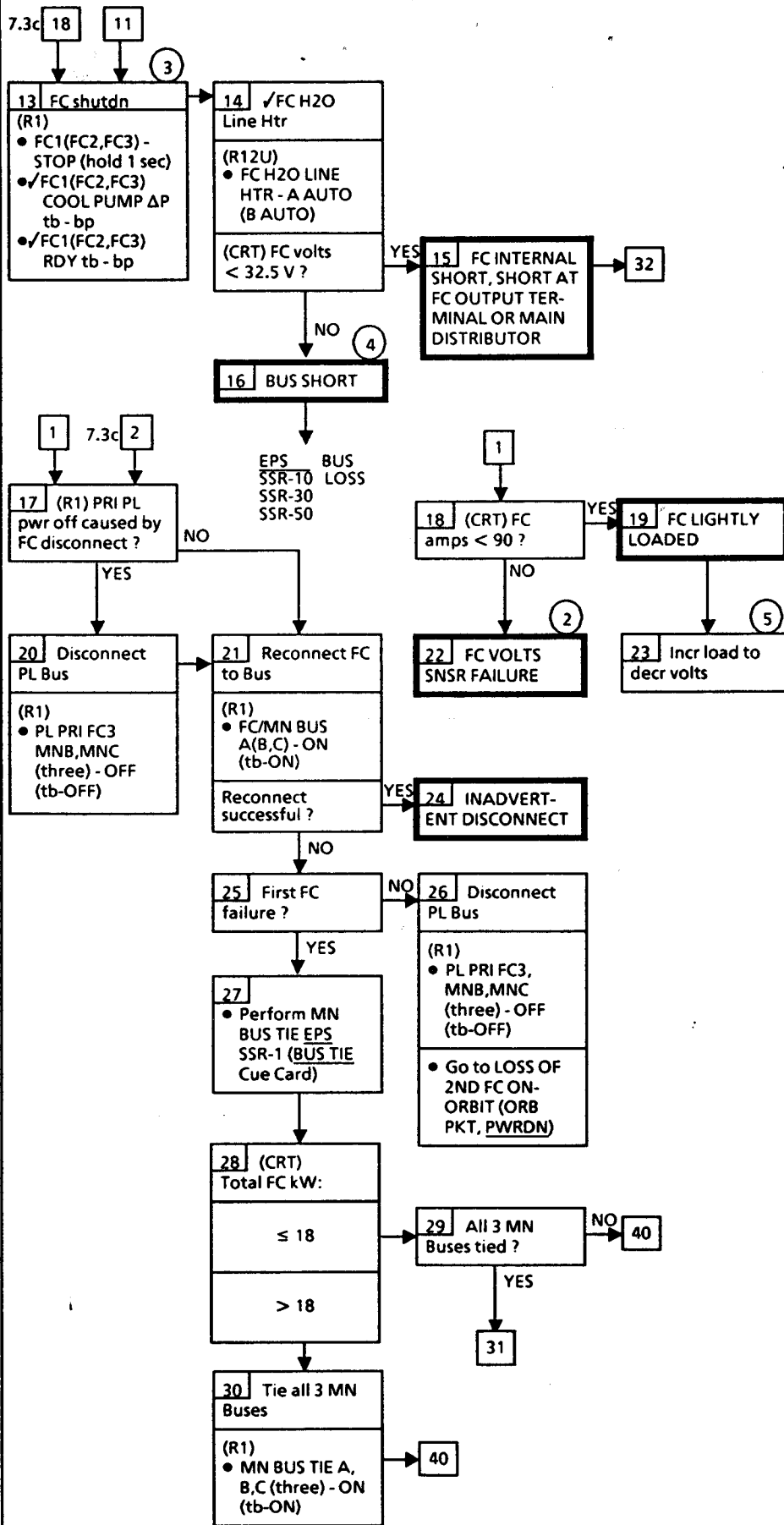
10 PL disconnect
(R1)
• PL PRI (three) - OFF (tb-OFF)
(CRT) Affected FC volts, amps OK?

11 Disconnect FC
(R1)
• ESS BUS SOURCE FC1 (FC2,FC3) - OFF
• FC/MN BUS A(B,C) - OFF (tb-OFF)

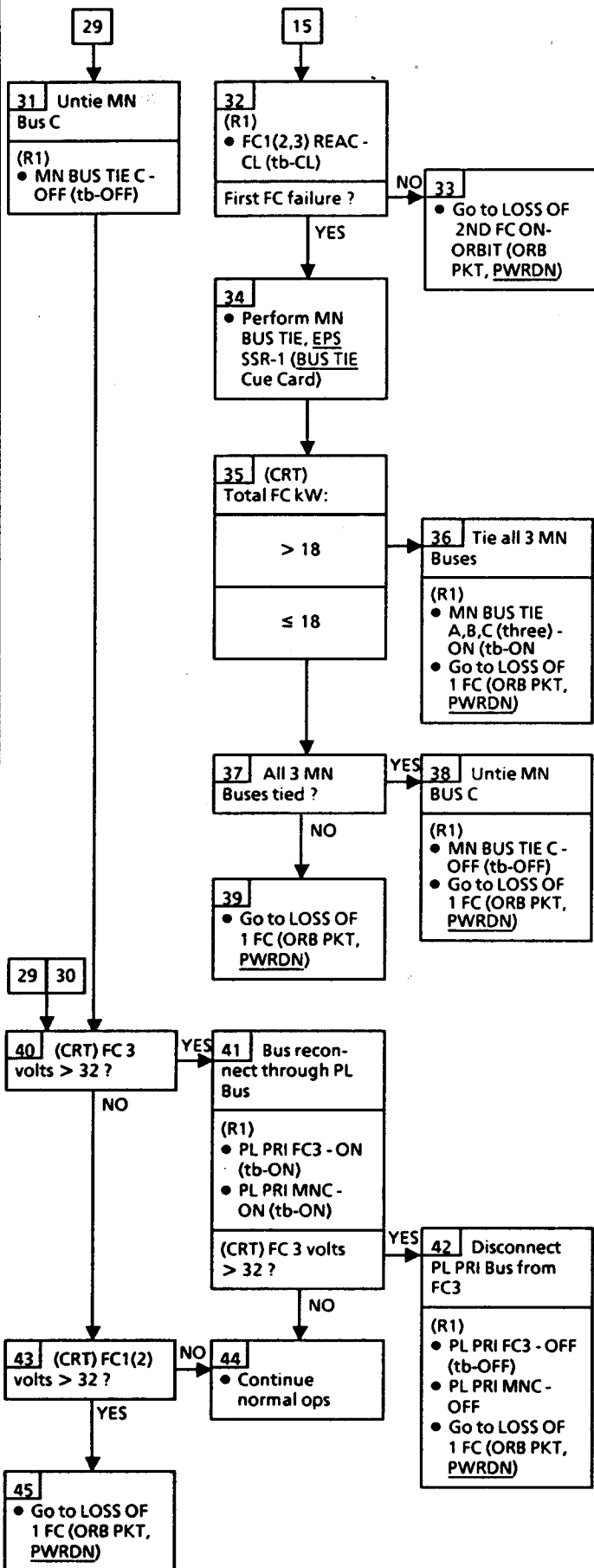
12 PAYLOAD SHORT

- ① FC amps up to 450 may be expected if FC pwr's MN Bus plus PRI P/L Bus
- ② Loss of GPC performance monitor routine for this FC

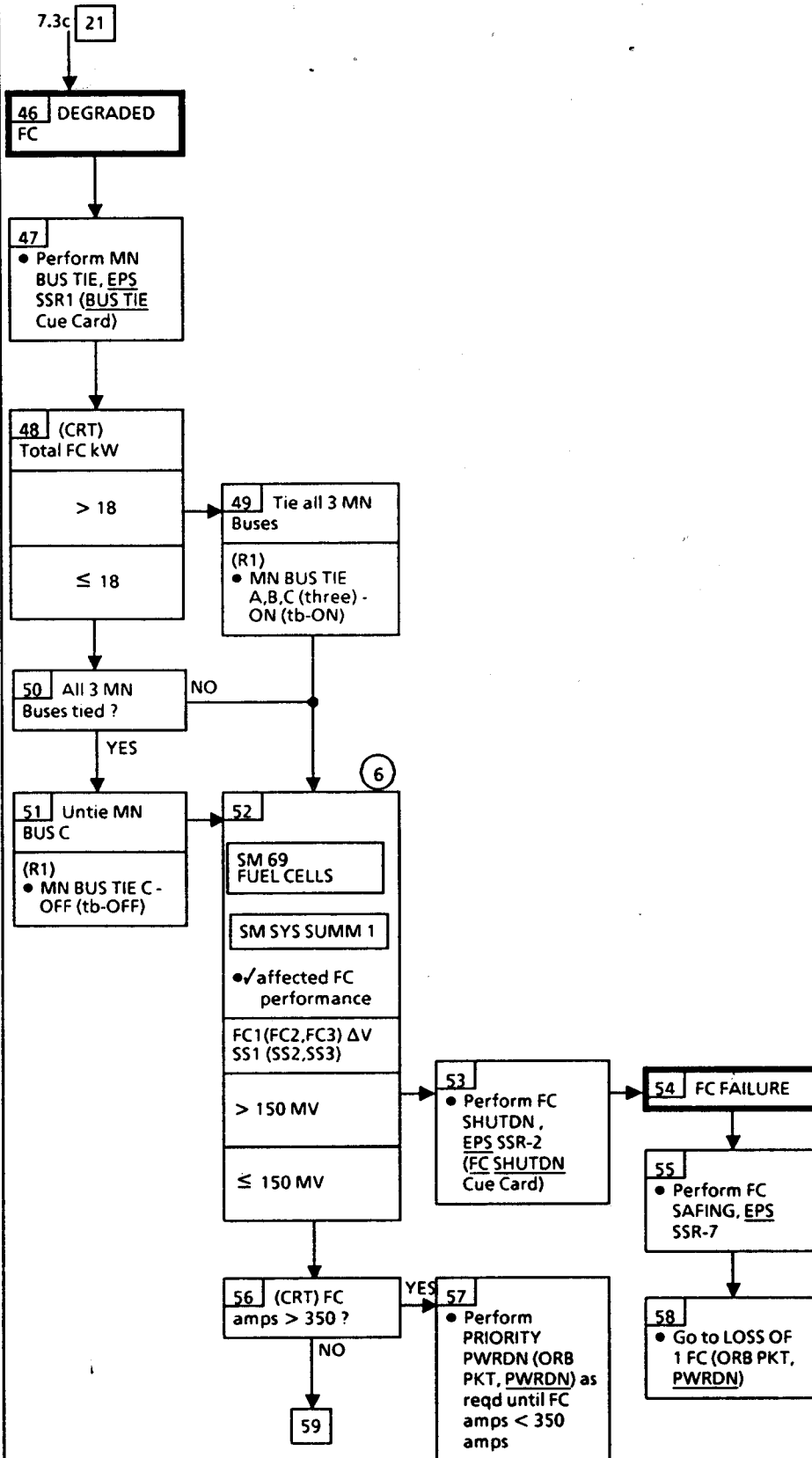
EPS 7.3b (Cont)



- ② Loss of GPC performance monitor routine for this FC
- ③ Expect C/W FC Pump
- ④ If MNC Bus shorted, after performing Bus Loss Actions and installing AC Power Transfer Cable, FC3 can be restarted and connected to MNB Bus via payload primary bus
- ⑤ ✓MCC for pwrup

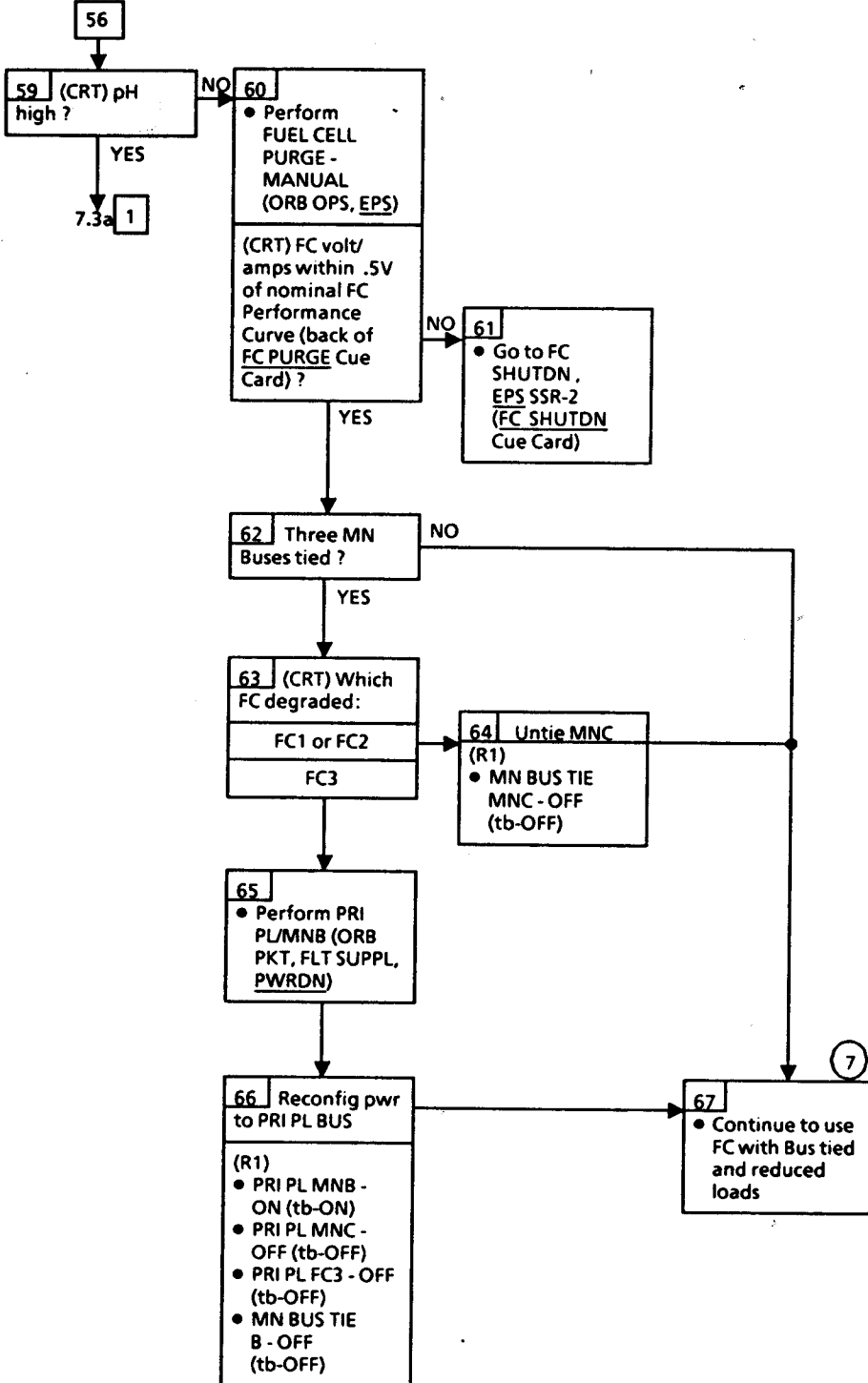


EPS 7.3b (Cont)



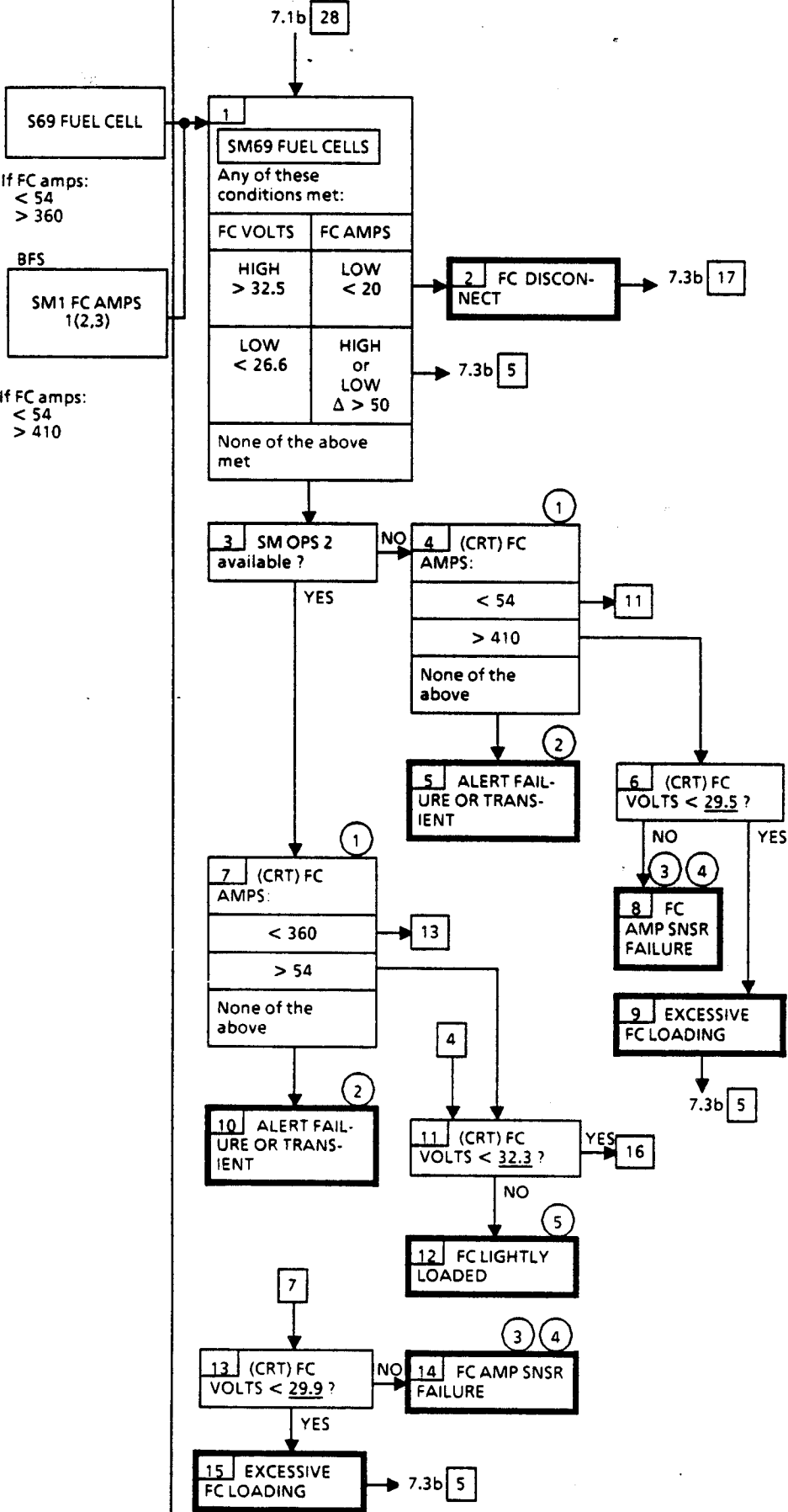
6 Normal ops of FC Cell Performance Monitor (CPM) may be confirmed by observing SS ΔVs for up to 8 min. If affected FC CPM ΔVs go to ~50 MV for < 4 sec, then CPM OK.

EPS 7.3b (Cont)



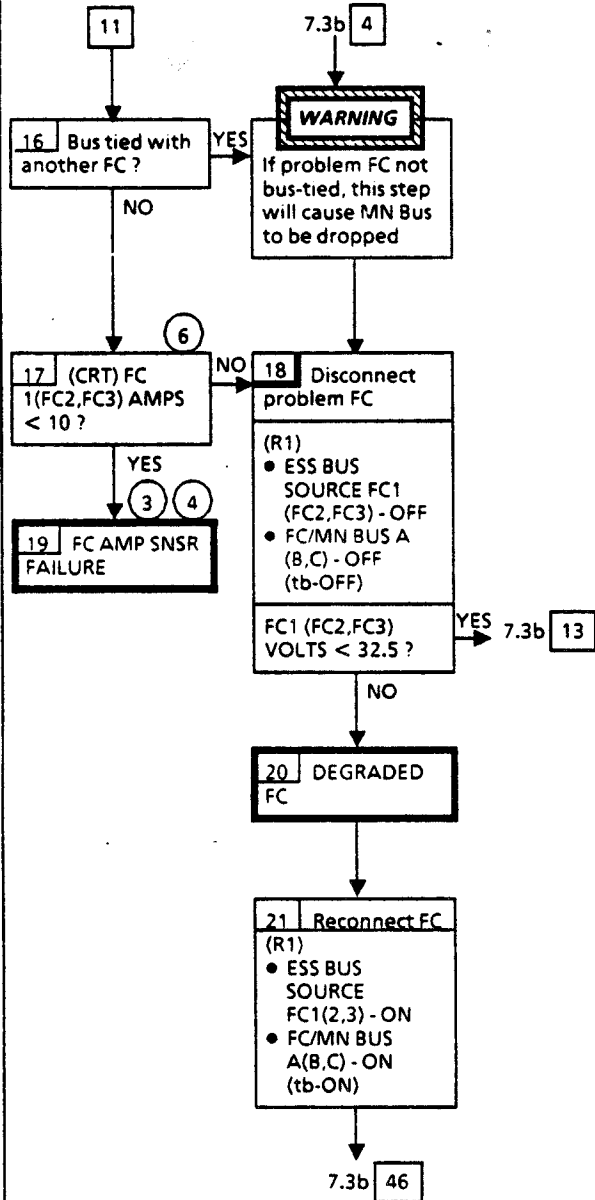
7 MCC analysis reqd before increasing loads on FC

7.3c FUEL CELL AMPS + +



- ① Pnl F9 ammeter reads shunt without signal conditioning
- ② If bus short caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications
- ③ If in SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:
 $O_2 \text{ FLOW} \times 47.5 = \text{AMPS} (\pm 50)$
 $H_2 \text{ FLOW} \times 377 = \text{AMPS} (\pm 68)$
- ④ Loss of GPC V-i-T FDA performance monitor for this FC. If FC Auto Purge flow checks enabled on this fit, Auto Purge capability lost
- ⑤ ✓MCC for powerup

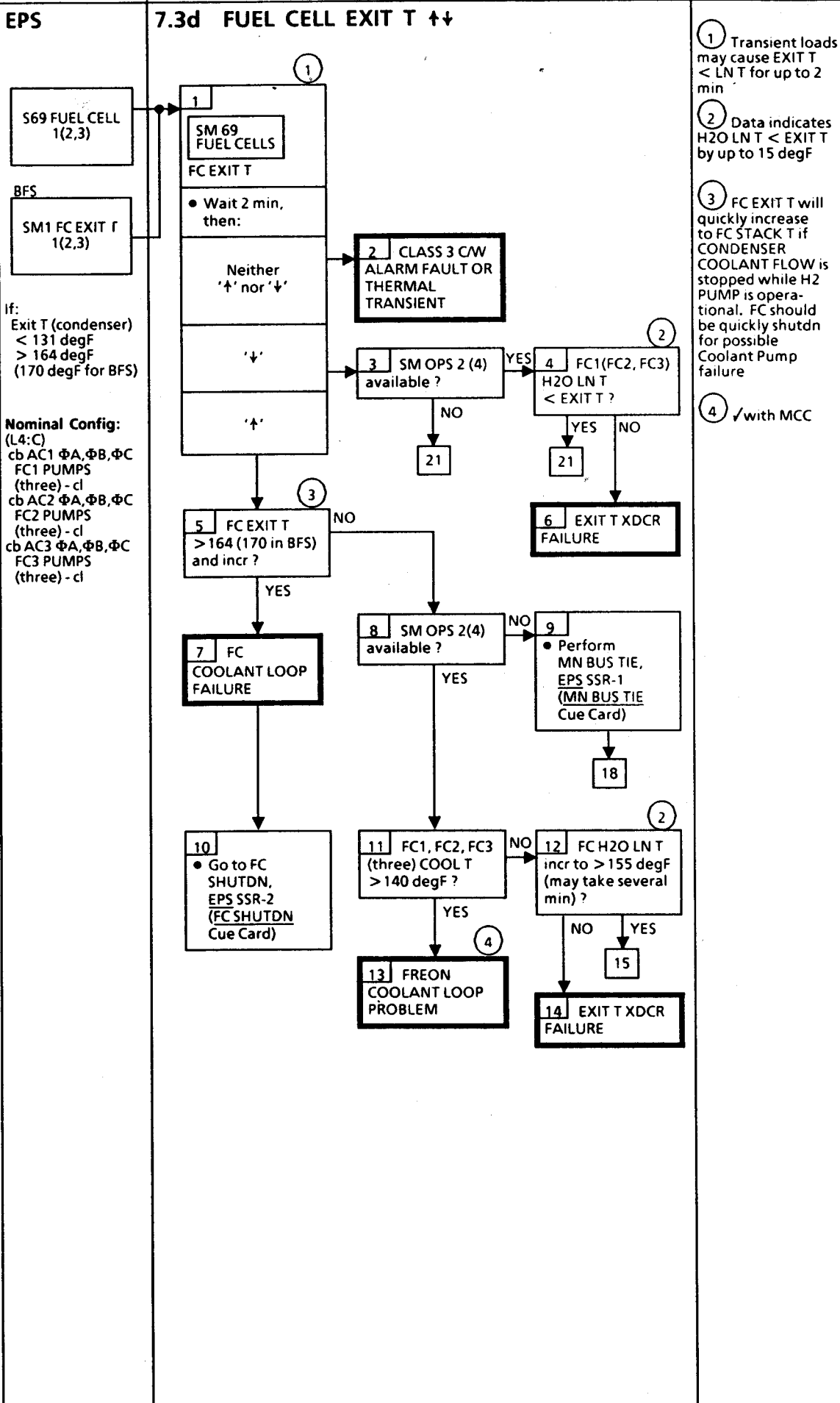
EPS 7.3c (Cont)



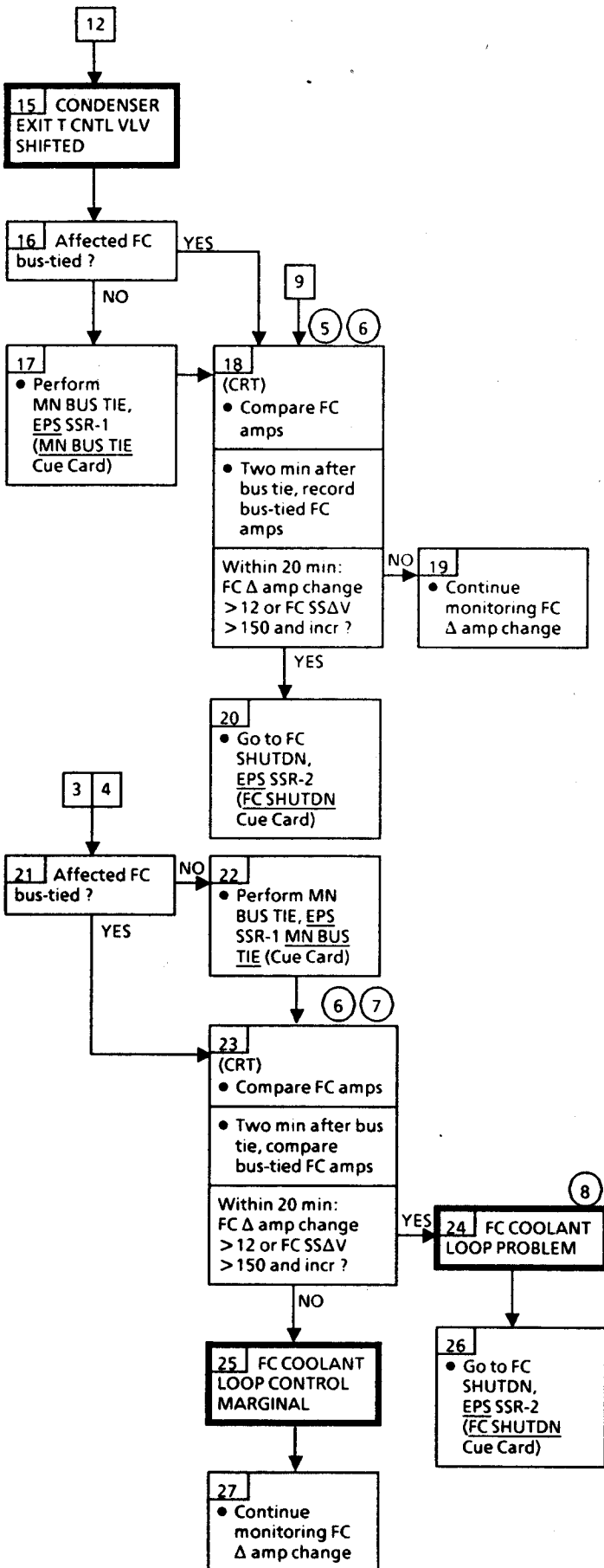
3 If in SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:
 $O_2 \text{ FLOW} \times 47.5 = \text{AMPS} (\pm 50)$
 $H_2 \text{ FLOW} \times 377 = \text{AMPS} (\pm 68)$

4 Loss of GPC V-I-T FDA performance monitor for this FC. If FC Auto Purge flow checks enabled on this flt, Auto Purge capability lost

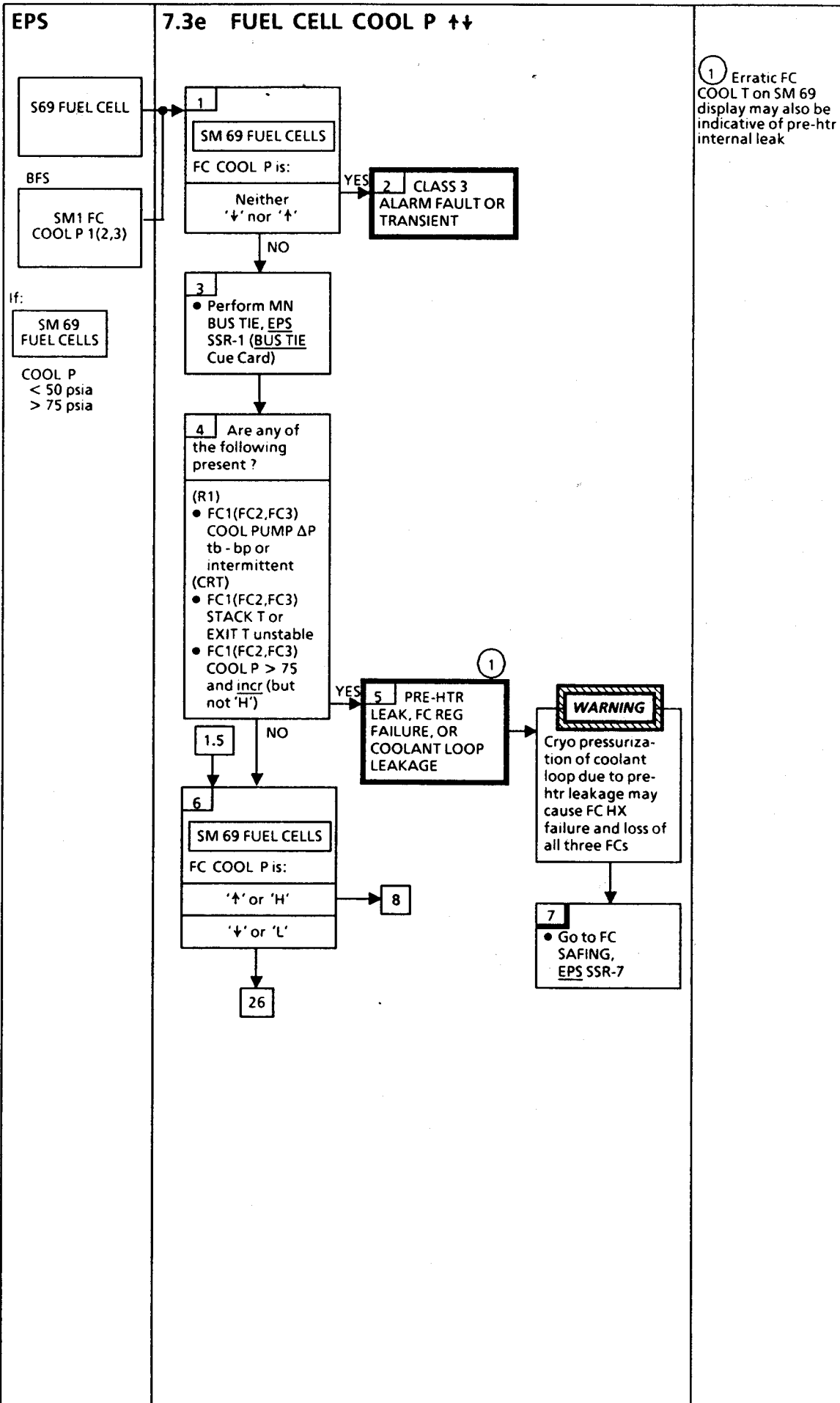
6 Unless bus tied with another source, single bus loads will cause FC AMPS > 10



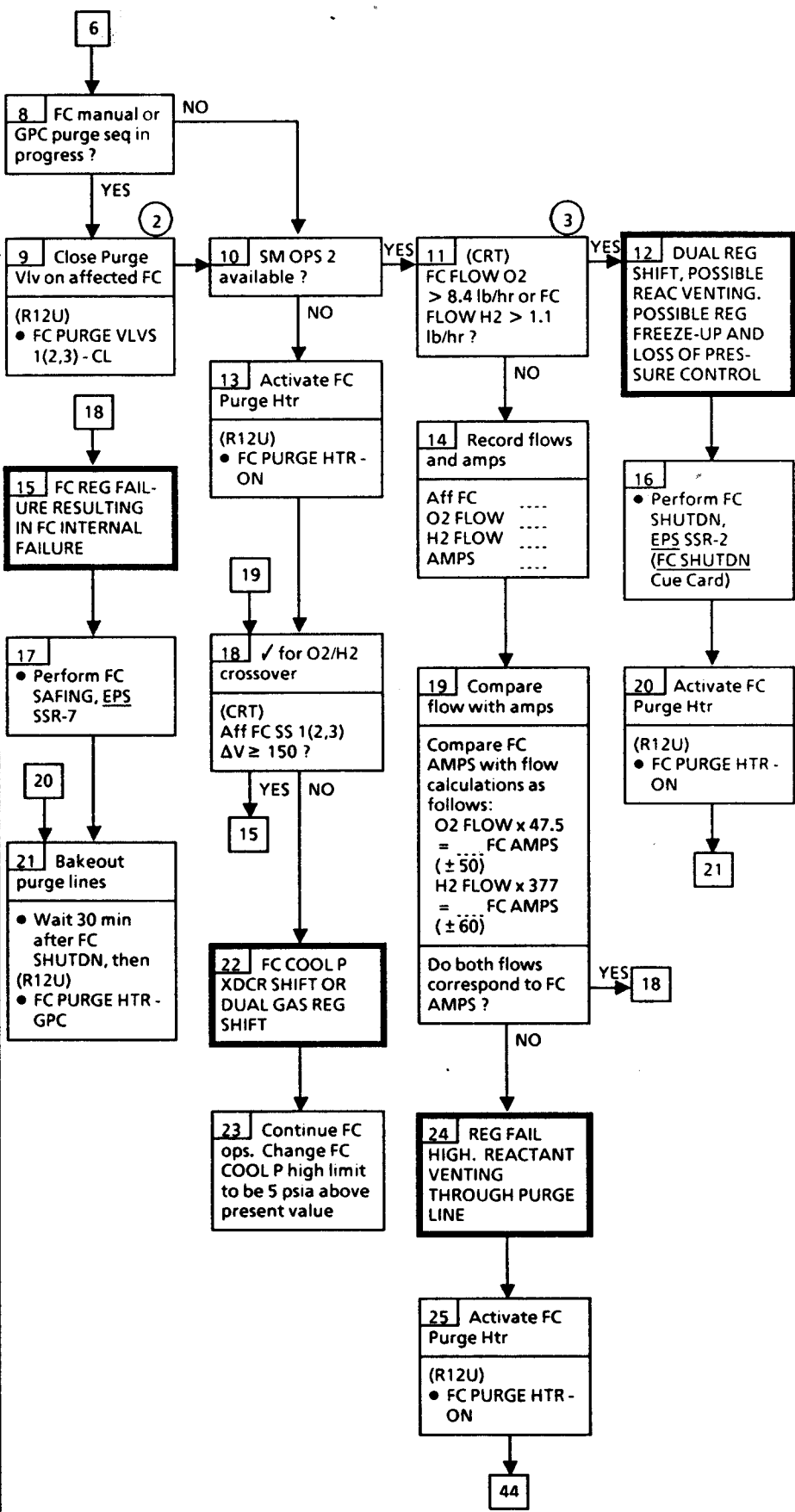
EPS 7.3d (Cont)



- 5 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
- 6 With FC thermally stabilized, a delta amp change of 12 indicates approximately 3% change in KOH concentration. Nominal KOH concentration is approximately 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
- 7 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.
- 8 Depending on extent of failure after cooldown, FC may be usable in cyclic mode



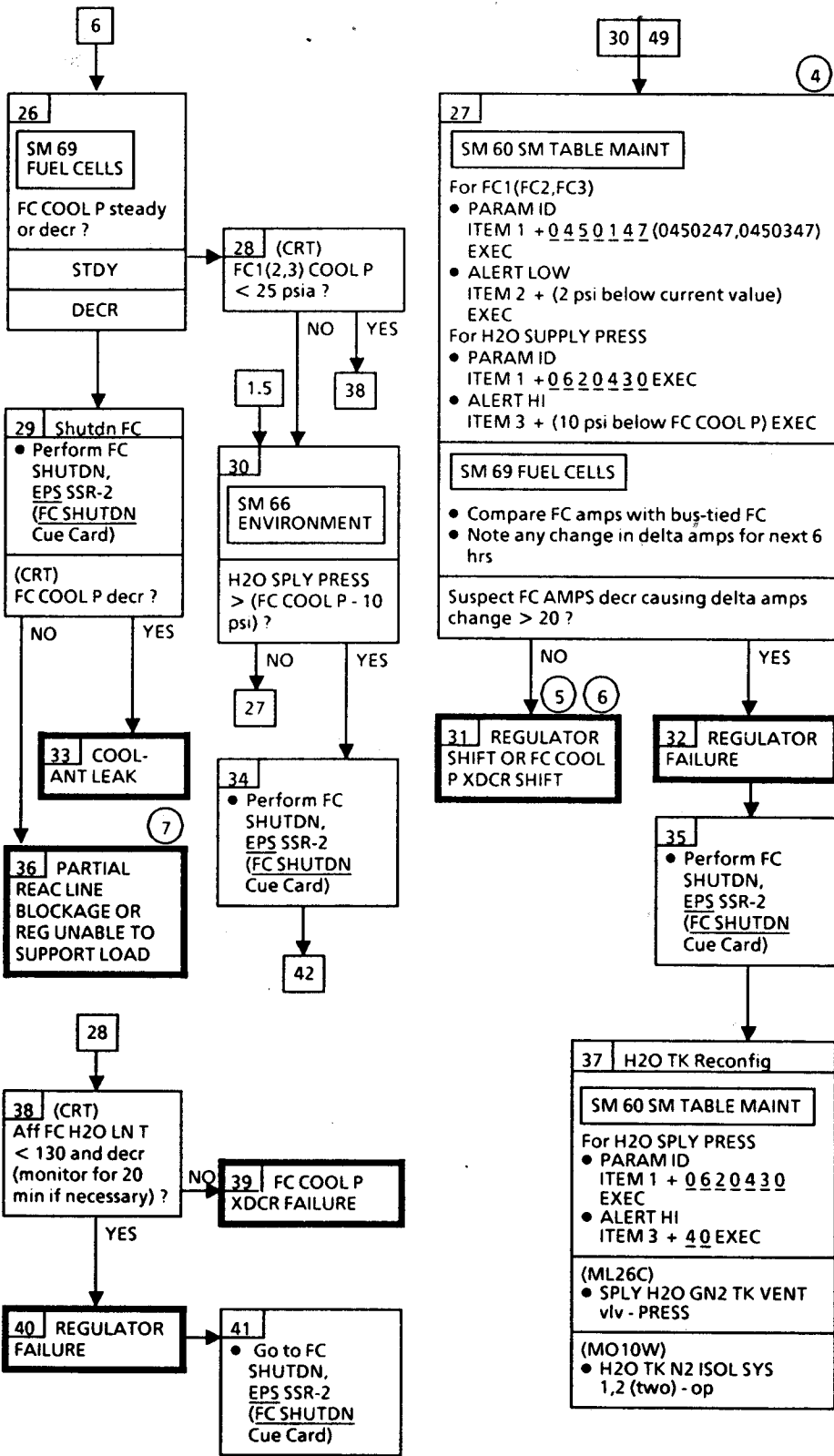
EPS 7.3e (Cont)



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)



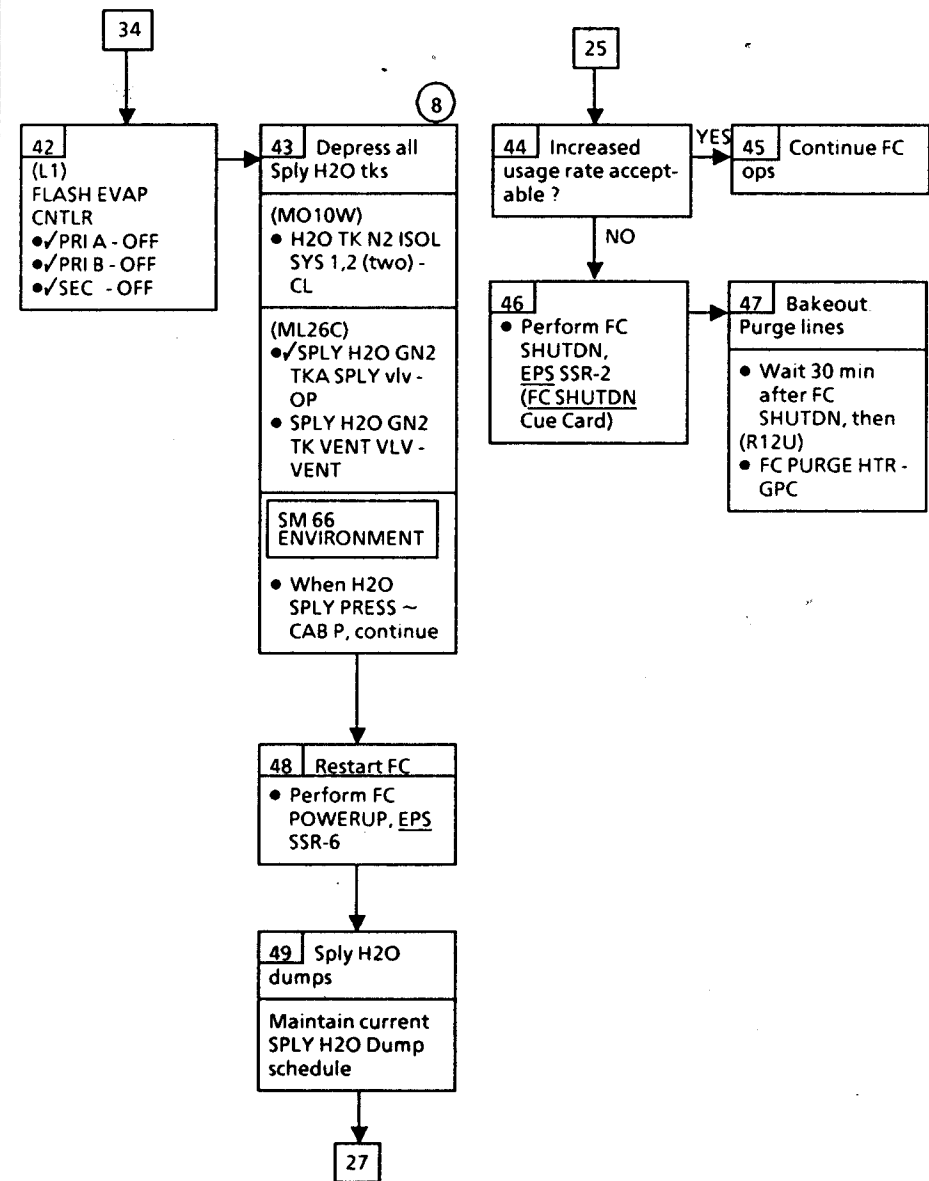
④ Possible KOH in O2 sys. Do not purge suspect FC until nominal performance at this pressure demonstrated for at least 6 hrs

⑤ Drop in FC volts vs amps performance that corresponds to new pressure would indicate Regulator shift. If reqd, update FC V-I Curve (back of FC PURGE Cue Card) with new nominal data after next purge

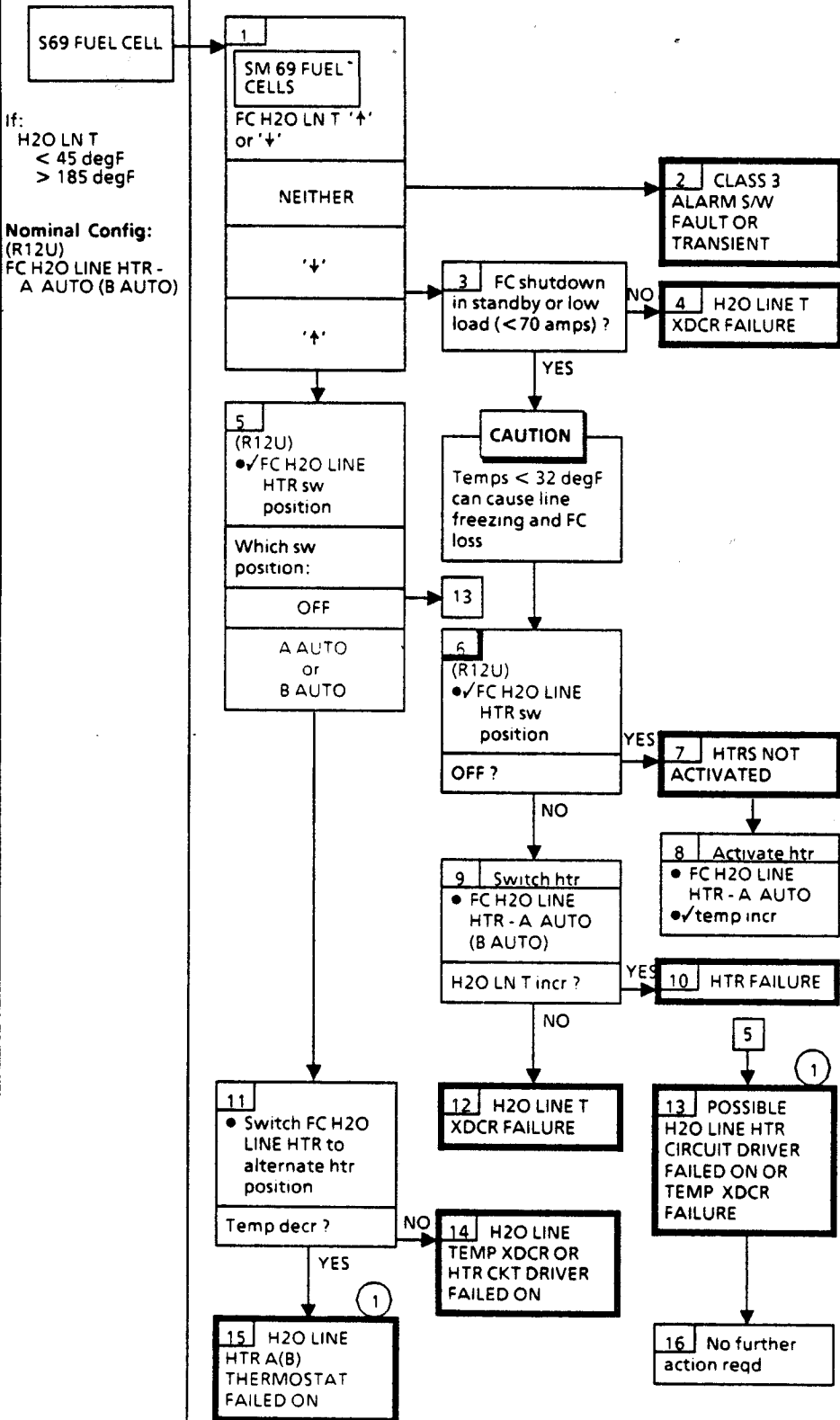
⑥ For Regulator shift, future FC ops would depend on SPLY H2O TK QTY, FES ops requirement, and FC loads. Suspect FC can be open circuited and saved for entry

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



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

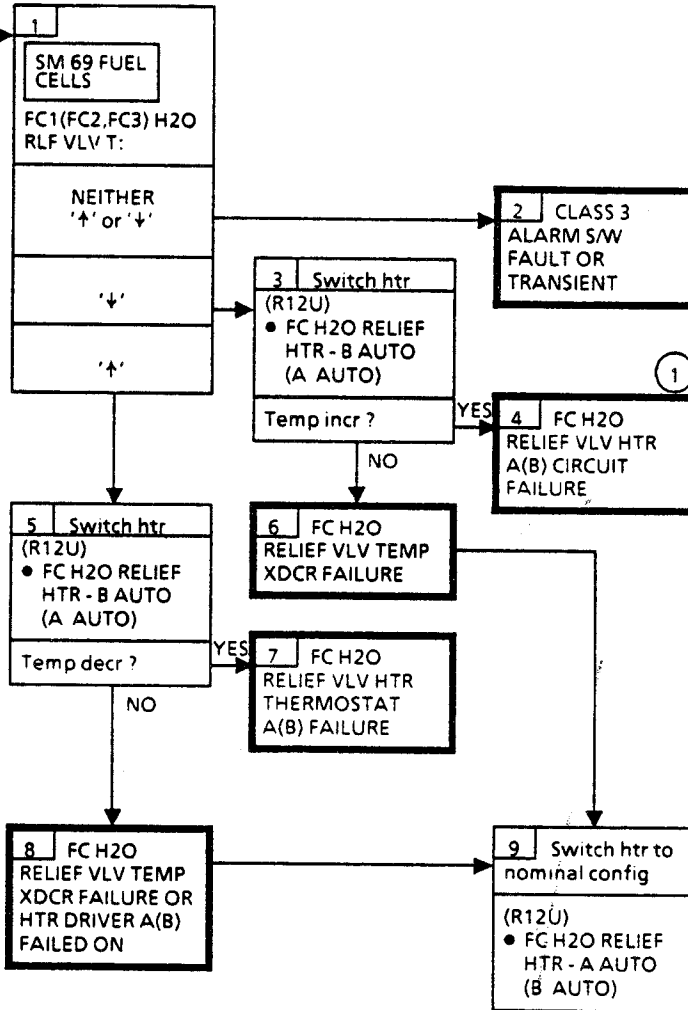
EPS

7.3g FUEL CELL H2O RLF VLV T ++

S69 FUEL CELL

If:
FC H2O RLF VLV T
< 60 degF
> 150 degF

Nominal Config:
(R12U)
FC H2O RELIEF
HTR - A AUTO
(B AUTO)



① Switching htrs isolated failed circuit

EPS

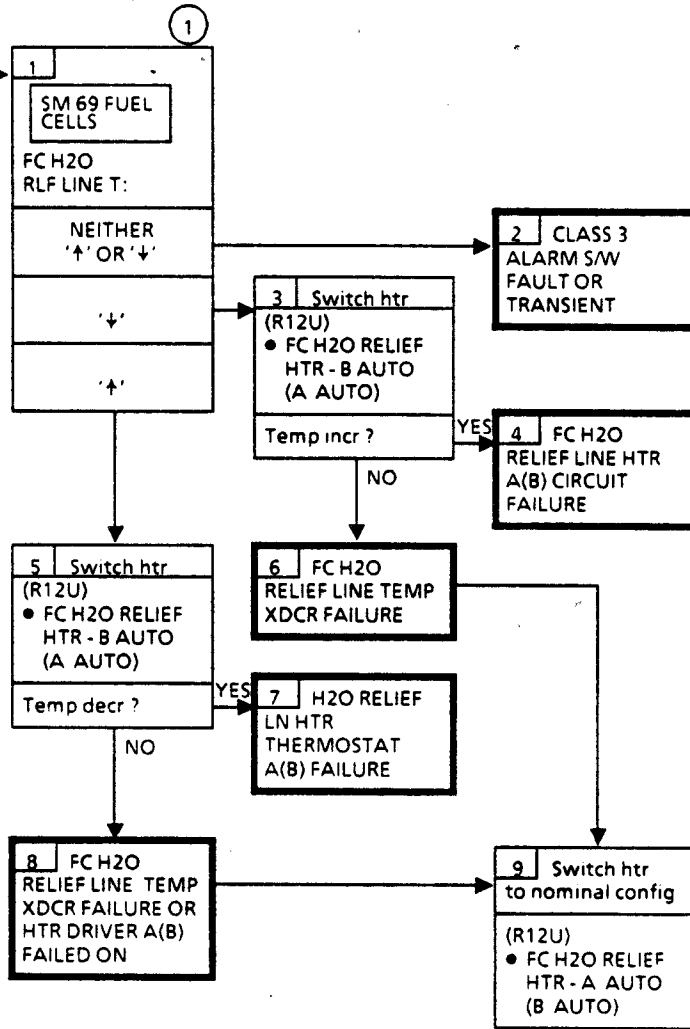
7.3h FUEL CELL H2O RLF LN T ↑↑

① H2O RLF LINE T normally < 125 deg F

S69 FUEL CELL

If:
FC H2O RLF LINE T < 60 degF
> 150 degF

Nominal Config:
(R12U)
FC H2O RELIEF
HTR - A AUTO
(B AUTO)



EPS

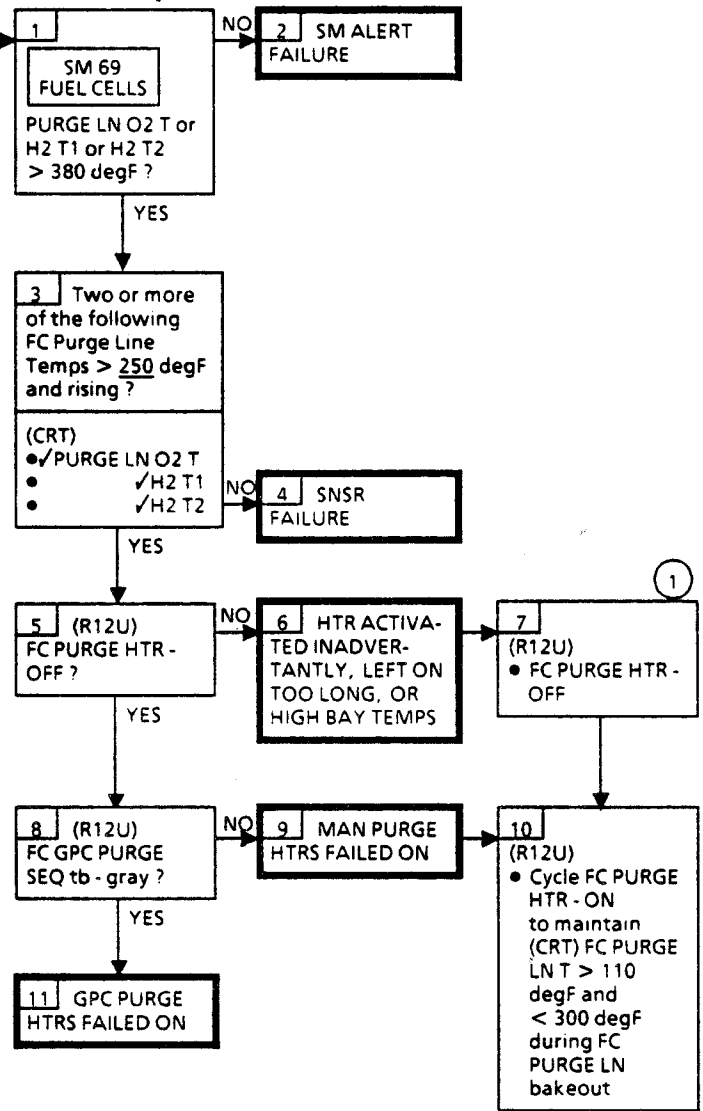
7.3i FUEL CELL O2(H2) PURGE LN T ↑

S69 FUEL CELL

If:

SM 69 FUEL CELLS

FC PURGE LN O2 T > 380 degF
or
FC PURGE LN H2 T1 > 380 degF
or
FC PURGE LN H2 T2 > 380 degF



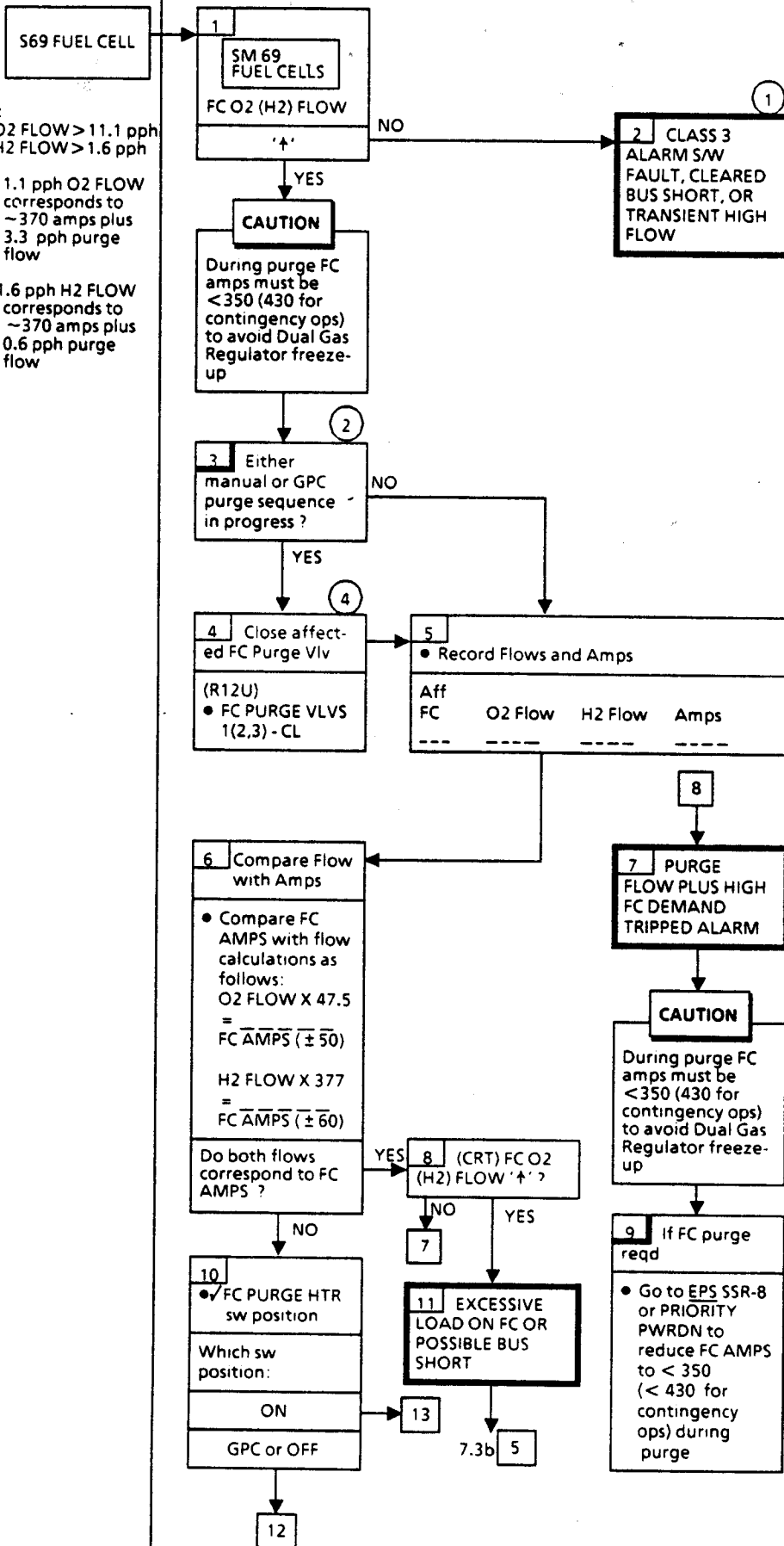
① If GPC AUTO PURGE in progress expect FC PURGE SEQ msg

7.3j FUEL CELL O2(H2) FLOW ↑

If:
 O2 FLOW > 11.1 pph
 H2 FLOW > 1.6 pph

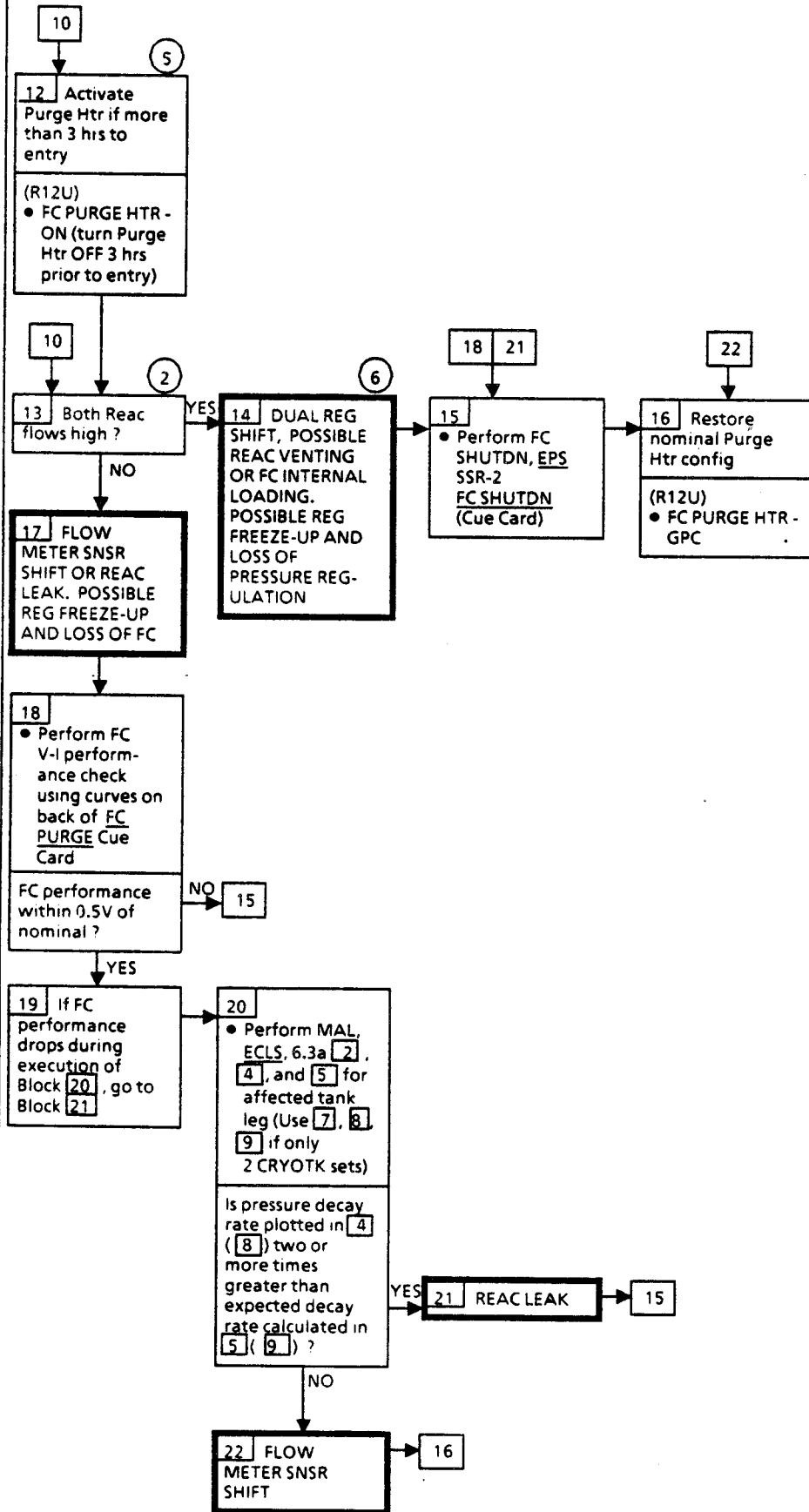
11.1 pph O2 FLOW corresponds to ~370 amps plus 3.3 pph purge flow

1.6 pph H2 FLOW corresponds to ~370 amps plus 0.6 pph purge flow



- 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 flow-meter previously failed, assume both flows high
- ④ 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)



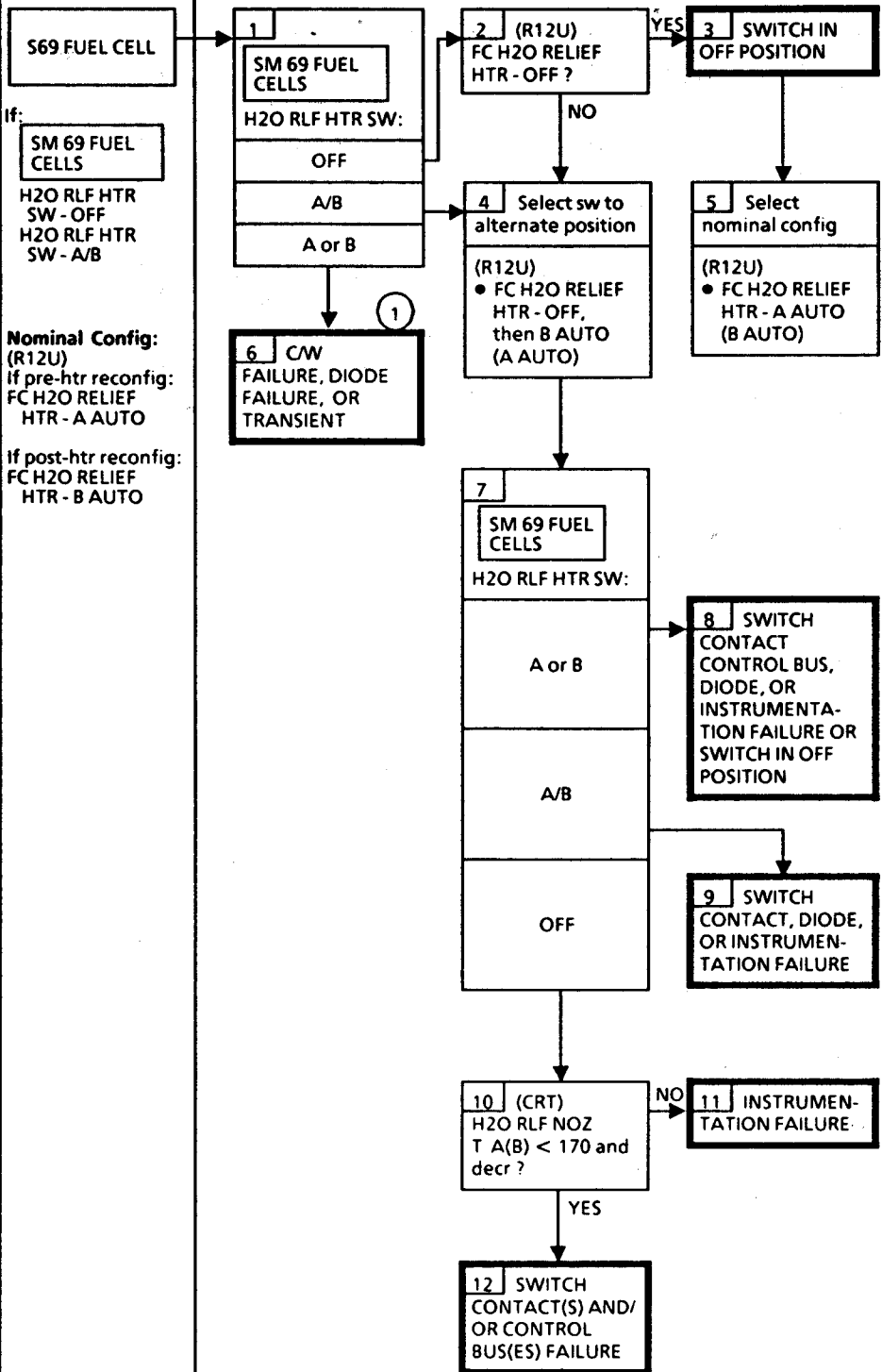
② If FC purge in progress, alarm may have tripped because of normal load plus purge flow. If one flow-meter previously failed, assume both flows high

⑤ Turning htrs off prevents excessive heat during entry and possible htr element damage

⑥ Reactant venting indication: Cool P ≥ 66 psia

⑦ ✓MCC To determine if leak exists

⑧ If problem exists, pressure decay rate will be 2-3 times expected rate



① Diode failure would be indicated if an A/B alarm occurred during nozzle htr ops. Alt htr could be selected to eliminate alarms

If:
SM 69 FUEL CELLS
H2O RLF HTR SW - OFF
H2O RLF HTR SW - A/B

Nominal Config: (R12U)
If pre-htr reconfig: FC H2O RELIEF HTR - A AUTO
If post-htr reconfig: FC H2O RELIEF HTR - B AUTO

S69 FUEL CELL

BFS

SM1 FC DELTA V 1(2,3)

If:
FC1(2,3) SSΔV
1(2,3) > 150 mv

1.2

FC DELTA V 1(2,3)

SM SYS SUMM 1
SM 69 FUEL CELLS

1. Perform BUS TIE, EPS SSR-1 (Cue Card), then:
If aff FC pH ↓ (H2O LINE pH ↓) or FC ΔV incr:
 2. Perform FC SAFING, EPS SSR-7, then:
 3. If pH ↓, go to FC/H2O LINE pH HIGH, EPS 7.3 1.1 >>
- If no aff FC pH ↓ (H2O LINE pH ↓) and FC ΔV not incr:
 4. Two min after bus tie, record ΔAMPS between affected and tied FC and monitor for 20 min
- If change in ΔAMPS > 12 or FC ΔV incr:
 5. Go to FC SAFING, EPS SSR-7 >>
- If change in ΔAMPS ≤ 12 and FC ΔV not incr:
 6. Remain bus tied to monitor FC performance

S69 FUEL CELL H2O

1.3

SM 69 FUEL CELLS
SM 66 ENVIRONMENT

FC H2O RLF NOZ TEMP ↑↑

If:
H2O RLF NOZ T A(B)
< 150 deg F
> 425 deg F

Nominal Config:
(R12U)
FC H2O RELIEF HTR - A AUTO (B AUTO) (R12L)
SPLY H2O TKA, TKB, TKC INLET (three) - OP (tb-OP)

If H2O RLF NOZ T A and B < 150:
If more than 1 FC H2O LNT and H2O VLV T converging or within 5 degF of each other (Mult FCs relieving):
1. ✓SPLY H2O TKA,TKB,TKC INLET (three) - OP (tb-OP) (pnl R12L)
2. SPLY H2O TKA OUTLET - OP (tb-OP)
When TKA QTY within 5% of TKB:
3. SPLY H2O TKA OUTLET - CL (tb-CL)
If SPLY H2O TKB QTY > 90%:
4. Perform SPLY H2O DUMP (ORB OPS, ECLS) (TKB to 70%), then:
If multiple FC overboard H2O relief continues: >> ①
If 1 FC H2O LNT and H2O VLV T converging or within 5 degF of each other (Single FC Relieving):
6. Go to BUS TIE EPS, SSR-1 (Cue Card) >>
If no FC H2O LNT and H2O VLV T converging (HTR inop, NOZ frozen, or switch failure):
7. FC H2O RELIEF HTR - A AUTO (B AUTO) (pnl R12U) >>
If H2O RLF NOZ T A and B (both) > 425 (HTR fail on):
8. FC H2O RELIEF HTR - OFF (pnl R12U) >>
If any of the following conditions are met:
H2O RLF NOZ T A < 150 and B ≥ 170 (A xdcr fail) >> ②
B < 150 and A ≥ 170 (B xdcr fail) >> ②
A or B (one only) >425 (xdcr fail) ③

① With multiple FCs relieving overboard, both primary and alternate H2O paths to ECLSS H2O TKs are lost

② B XDCR fail low will cause nozzle htr to operate on A system overtemp logic. Control band for this failure is 270 - 288. A XDCR fail low will not affect normal htr ops, but will only disable A system overtemp logic

③ High failure of XDCR A or B will prevent any nozzle htr ops. Alternate FC H2O path to ECLSS H2O TKs remain

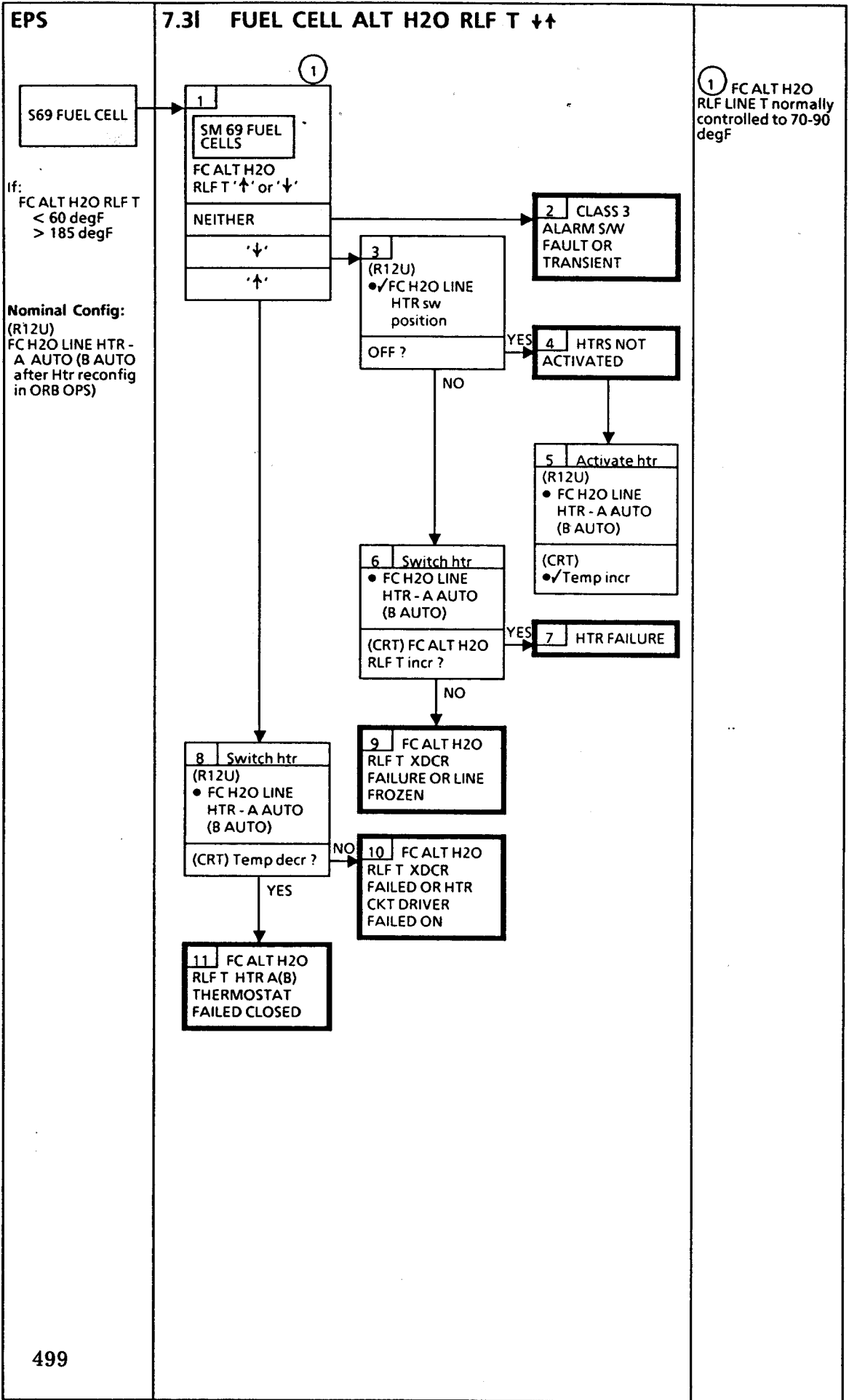
1.4

FC COOL P

SM 69 FUEL CELLS

SM 66 ENVIRONMENT

1. Perform BUS TIE (Cue Card)
- If: COOL P > 75, incr, and not 100 (H), or
COOL PUMP ΔP tb - bp/intermittent, or
STACK/EXIT T unstable, or
FCSS 1(2,3) $\Delta V \geq 150$, or
FC FLOW O₂(H₂) $\geq 8.4(1.1)$
 2. Go to FC SAFING >>
- If FC COOL P < 25 or > 75 and stdy:
 3. Go to MAL, EPS, FC COOL P $\uparrow \downarrow$ 7.3e **6** >>
- If FC COOL P between 25 and 50:
 - If FC COOL P < (SPLY H₂O TK P + 10):
 4. Perform FC SHUTDN (Cue Card)
 5. Go to MAL, EPS, FC COOL P $\uparrow \downarrow$ 7.3e **60**



EPS

7.4 DC VOLTAGE

SM ALERT

S67 CNTL/ESS V

BFS

SM1 CNTL/ESS V

Light on if:
CNTL AB1(2,3)
(BC1,2,3)
(CA1,2,3)
< 24.5 vdc
or
ESS 1BC(2CA,3AB)
< 25.0 vdc

Nominal Config:
(R1)
ESS BUS SOURCE
MN B/C(C/A,A/B) -
ON
FC1(FC2, FC3) - ON
(R15:B)
cb MNA CNTL BUS
BC1/2/3 - cl
cb MNB CNTL BUS
CA1/2/3 - cl
cb MNC CNTL BUS
AB1/2/3 - cl
(O14:B)
cb MNA MNC
CONTR - cl
(O15:B)
cb MNB MNA
CONTR - cl
(O16:B)
cb MNC MNB
CONTR - cl

1.1

ESS BUS VOLTS LOW SM SYS SUMM 1

If verified by F9 voltmeter: ① ②

1. Aff ESS BUS SOURCE MN - OFF, ON

If bus regained: ③

2. Aff FC - START (10 sec or ΔP tb - gray) >> ④

If bus not regained: ⑤

3. Perform FC SHUTDN, MAL, EPS SSR-2(4) (Cue Card) [FC/MN BUS A(B,C) and MN BUS TIE A(B,C) tbs lost], then: ⑥
4. Go to aff BUS LOSS IMMEDIATE ACTIONS, MAL, EPS SSR-9

1.2

CNTL BUS VOLTS LOW SM SYS SUMM 1

1. ✓BUS LOSS ID
2. Perform BUS LOSS IMMEDIATE ACTIONS, MAL, EPS SSR-9, then:

If pwr reqd (< 3 sec) for crit function:

3. Hold crit function sw
4. For CNTL BUS AB(BC,CA) VOLTS LOW, CNTL BUS PWR MNA(MNB,MNC) - RESET

① F9 meter uses different transducer than CRT parameter

② If neither CNTL nor ESS VOLTS confirmed low by F9 meter

TRANSIENT OR DPS PROBLEM

③ SHORTED MAIN BUS SOURCE RPC TRIPPED. SHORT NOW CLEARED

④ (O13,R15,ML86B) ESS BUS cbs may have tripped. If open cbs found, do NOT reset. ✓MCC

⑤ SHORT ON ESS 1BC (2CA, 3AB). BUS IS LOST

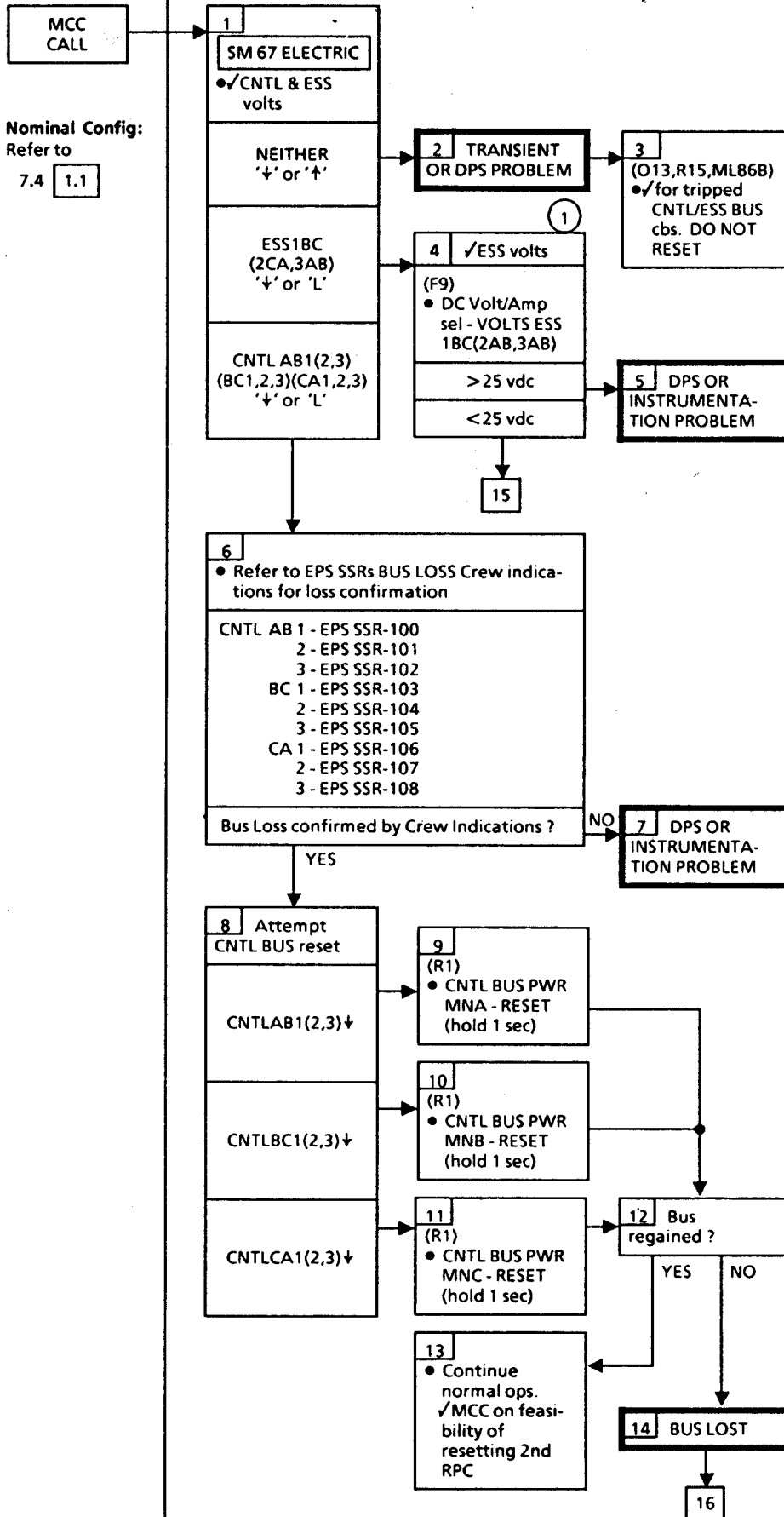
⑥ TIME CRITICAL
FC must be shutdn within 9 min to avoid potentially hazardous condition

DC VOLTAGE

7.4

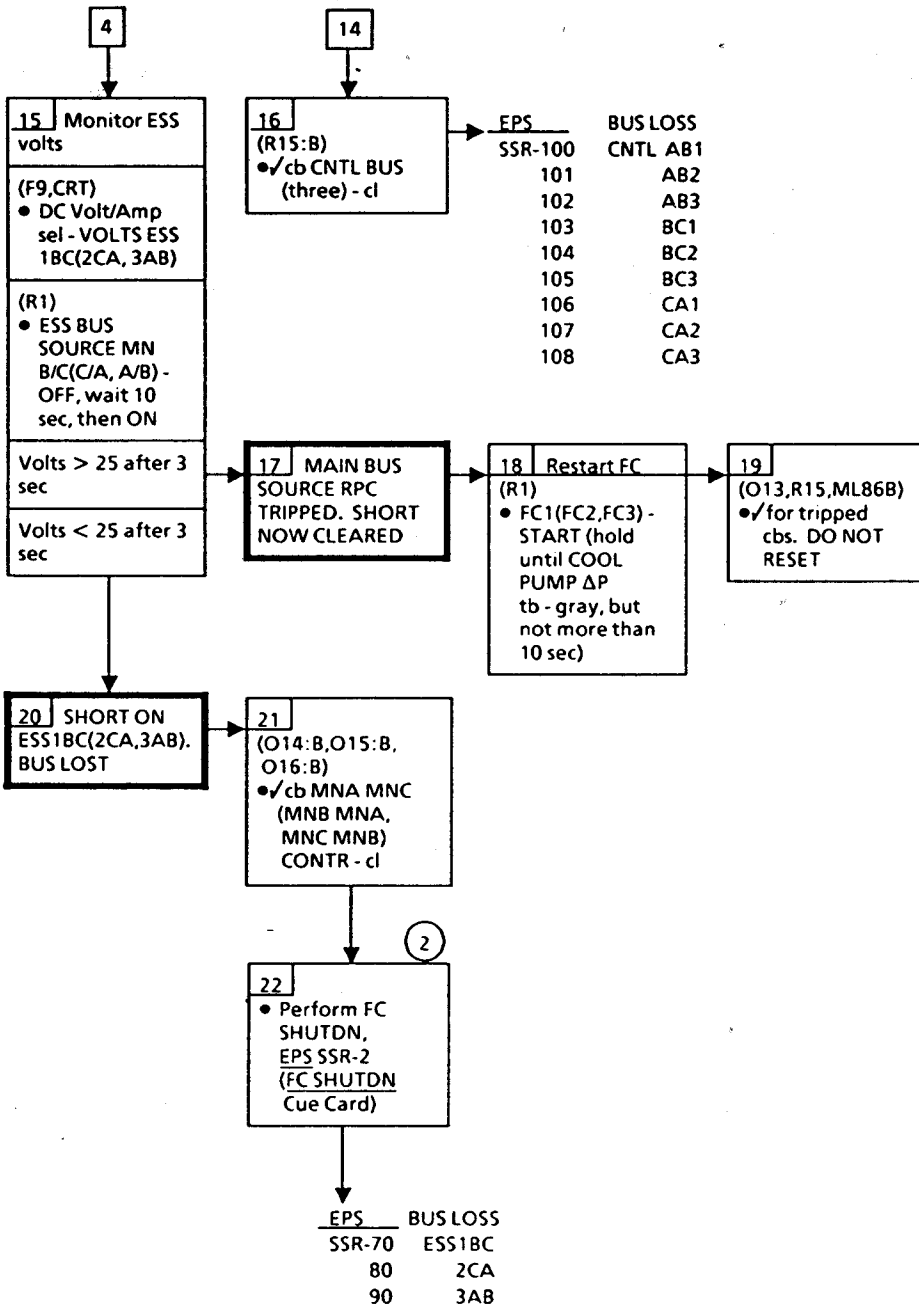
500

① F9 meter uses different transducer than S67 param



Nominal Config: Refer to 7.4 1.1

EPS 7.4a (Cont)



②
* TIME CRITICAL *
Fuel cell must be shutdown within 9 min of bus loss to avoid potentially hazardous conditions

MAIN BUS UNDERVOLT
(F7)

Light on if:
MNA(B,C) BUS
volts < 26.4
(L) vdc

**BACKUP CWV
ALARM**
(F7)

**SM
ALERT**

**S67 MAIN BUS V
A(B,C)**

**SM1 MAIN BUS B
A(B,C)**

If:
MNA(B,C) BUS
volts
< 27 vdc
> 32 (H) vdc

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

1.3

MN BUS UNDERVOLTS FC VOLTS

SM SYS SUMM 1

If MN VOLTS < 26.4, FC VOLTS < 26.6, FC AMPS > 480 (2 of 3):
(SHORT OR DEGRADED FC)

1. MSTR MADS PWR - OFF

If aff FC/MN BUS bus tied:

2. Untie Buses

If short eliminated and MN BUS not powered after untie:

3. Go to aff MN BUS LOSS ACTION
(MN BUS or TIE BUS SHORT) >>

If short eliminated and all MN BUSES powered after untie
(TIE BUS SHORT) >>

If short not eliminated, then:

If aff FC/MN BUS connected to PL PRI BUS:

4. PL PRI (three) - OFF (tb-OFF)

If short eliminated (PRI PL SHORT):

5. If a MN BUS not powered, perform BUS TIE, EPS SSR-1 (Cue Card)

6. Go to PL PWRDN (OPCL TEMP 10-89) >>

7. Aff EPS BUS SOURCE FC - OFF
FC/MN BUS - OFF (tb-OFF)

If aff FC VOLTS < 32 (FC SHORT):

8. Aff FC REAC VLV - CL (tb-CL)

9. Go to FC SHUTDN (Do not stop FC until COOL P < 15
and STACK T < 243) >>

If FC VOLTS ≥ 32 (BUS SHORT):

DO NOT BUS TIE TO SHORTED BUS

10. Go to aff MN BUS LOSS ACTIONS, EPS SSR-9 >>
If MN VOLTS < 26.4 and FC VOLTS > 32 and FC AMPS < 20:
(FC DISCONNECT)

11. MSTR MADS PWR - OFF

If PL PRI BUS power lost due to FC disconnect:

12. PL PRI (three) - OFF (tb-OFF)

13. Aff FC/MN BUS - ON (tb-ON)

If PL PRI disconnect in step 12:

14. Perform PL PWRDN (ORB PKT, TEMP 10-89) then:

If FC3 aff:

15. PL PRI FC3 - ON (tb-ON)

MNC - ON (tb-ON)

If first FC problem:

16. Perform BUS TIE, EPS SSR-1 (Cue Card)

If aff FC VOLTS still > 32:

17. Go to FC SHUTDN (ORB PKT) >>

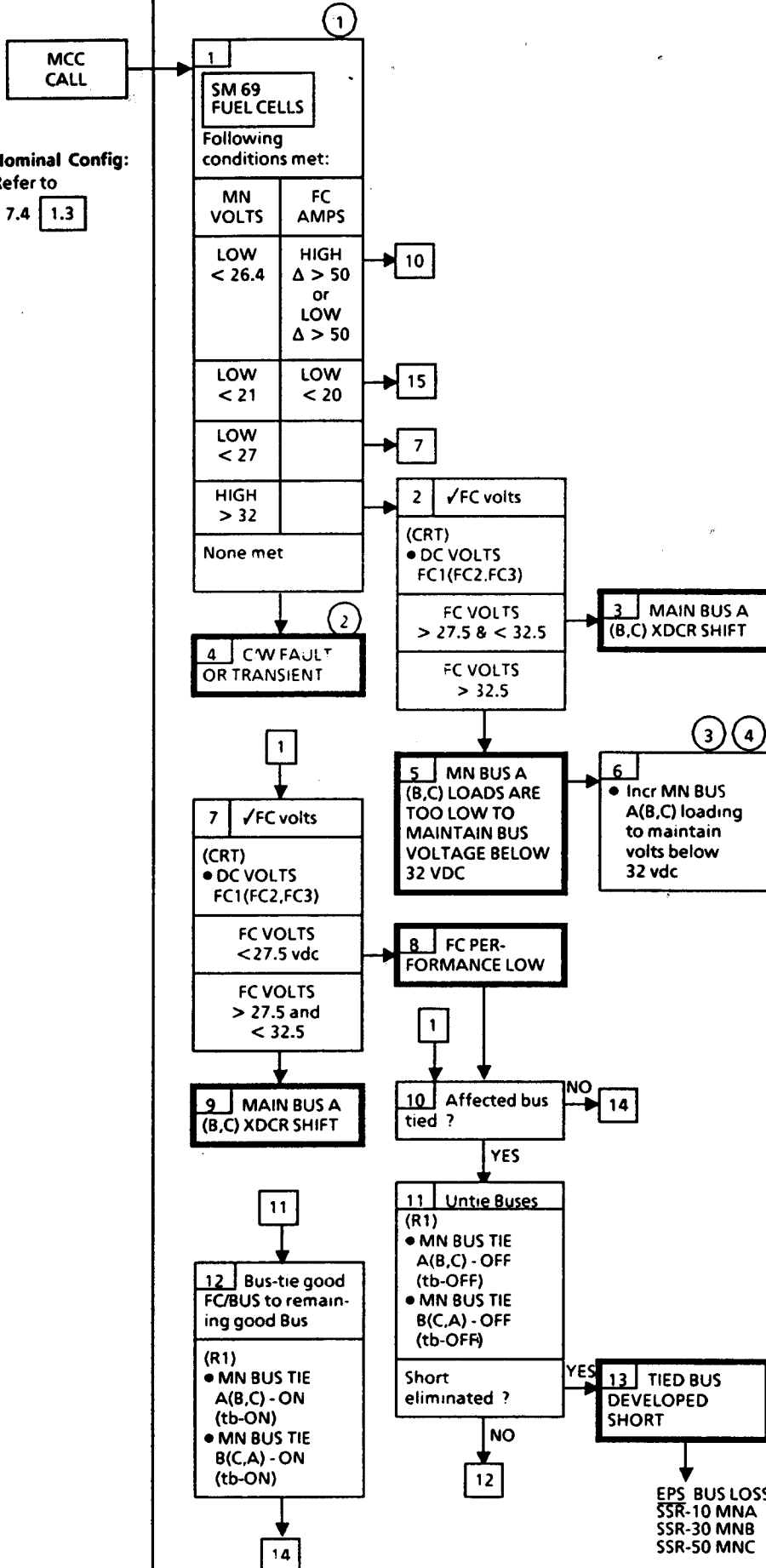
If second FC failure and aff MN BUS not recovered:

18. PL PRI (three) - OFF (tb-OFF)

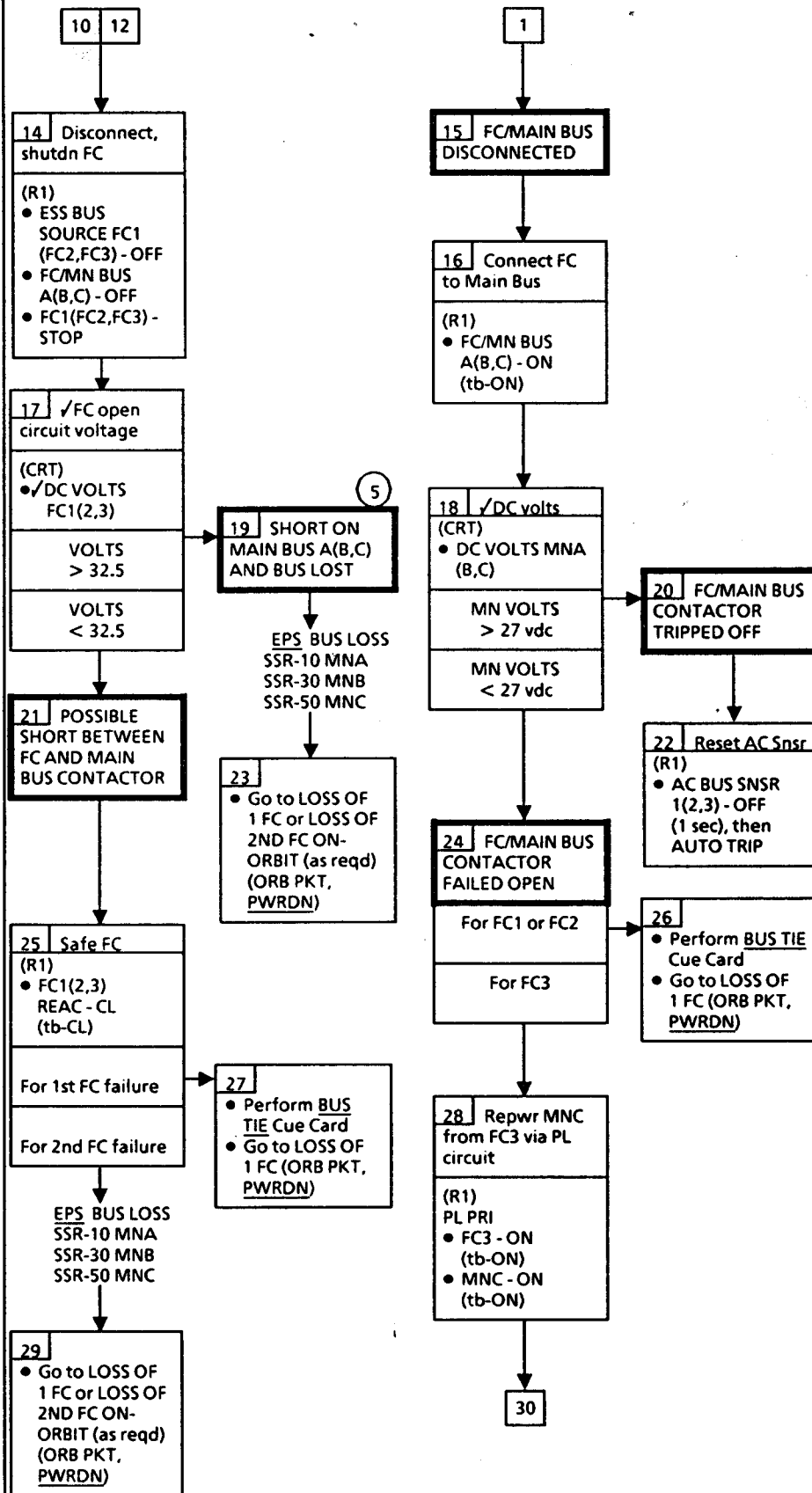
19. Go to 2nd FC SHUTDN (ORB PKT)

7.4b MAIN BUS V A(B,C) ↑↑

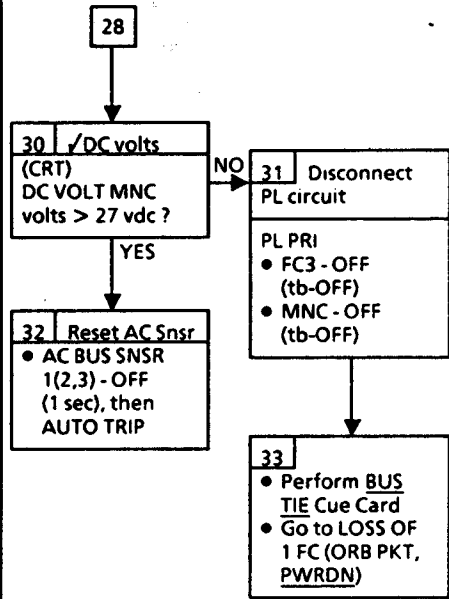
Nominal Config:
Refer to
7.4 1.3



EPS 7.4b (Cont)



5 Short on MN BUS causes FC loss. For lost of MNC, however, FC3 pumps can be powered with AC Transfer Cable and FC3 pwr can then be supplied to MN BUS B through PL pwr contactors



AC VOLTAGE
(F7)

Light on if:
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)

**S67 AC
VOLTS 1(2,3)**

BFS

**SM1 AC
VOLTS 1(2,3)**

Light on if:
AC Φ voltage
< 108 vac for
1-3 sec
or
> 123 vac for
1-3 sec

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 AC 1
SNSR - cl
(O13:C)
cb ESS 2CA AC2
SNSR - cl
(O13:E)
cb ESS 3AB AC3
SNSR - cl

1.1

AC VOLTS

SM 67 ELECTRIC
SM SYS SUMM 1

If AC OVERLOAD alarm, go to AC OVERLOAD, **1.2** >>

If all AC VOLTS between 110 and 123:

1. Go to MAL, **EPS, 7.5a 6** >>

If single Φ AC VOLTS > 123 or between 10 and 110:

(Confirm with F9 meter) **1**

If aff INV/AC BUS tb - ON (Inverter lost):

2. Aff cb AC CONTR - cl
INV/AC BUS - OFF (tb-OFF)
INV PWR - OFF (tb-OFF)
cb AC CONTR - op

If other Φ AC VOLTS < 110 or AC AMPS > 14, go to step 6

3. Perform aff **BUS LOSS IMMEDIATE ACTIONS,**
MAL, EPS, SSR-9, then go to
MAL, EPS, 7.5a 27 >>

If aff INV/AC BUS tb - OFF (O/V, Unannun OVLD, or SNSR prob):

4. Perform aff **BUS LOSS IMMEDIATE ACTIONS,**
MAL, EPS, SSR-9, then go to
MAL, EPS, 7.5a 35 >>

If multi Φ AC VOLTS < 110:

If aff INV/AC BUS tb - ON:

If all AC AMPS < 1 (FPC Bus lost):

5. Go to aff **BUS LOSS IMMEDIATE ACTIONS,**
MAL, EPS, SSR-9 >>

If any AC AMPS > 14 (Unannun OVLD): **2**

6. Aff cb AC CONTR (three) - cl
INV/AC BUS - OFF (tb-OFF)
INV PWR - OFF (tb-OFF)
cb AC CONTR (three) - op

7. Perform aff **BUS LOSS IMMEDIATE ACTIONS,**
MAL, EPS, SSR-9, then go to
MAL, EPS, 7.5b 2 >>

If aff INV/AC BUS tb - OFF:

8. Aff cb AC CONTR (three) - cl
AC BUS SNSR - OFF
INV/AC BUS - ON (tb-ON)

If any AC AMPS > 14 (Unannun OVLD): **2**

9. Go to step 6 **3**

If all AC AMPS < 14 (SNSR prob):

10. Aff AC BUS SNSR - MONITOR **4**
cb AC CONTR (three) - op >>

1

IF CRT AND
METER DO NOT
AGREE, INSTRU-
MENTATION
FAILURE

2

AC BUS SHORT
AND AC BUS
SNSR OVLD
ALARM FAILED

3

AC BUS SNSR
1(2,3) FAILED
CAUSING AUTO
TRIP ON MULTI-
PLE PHASES

4

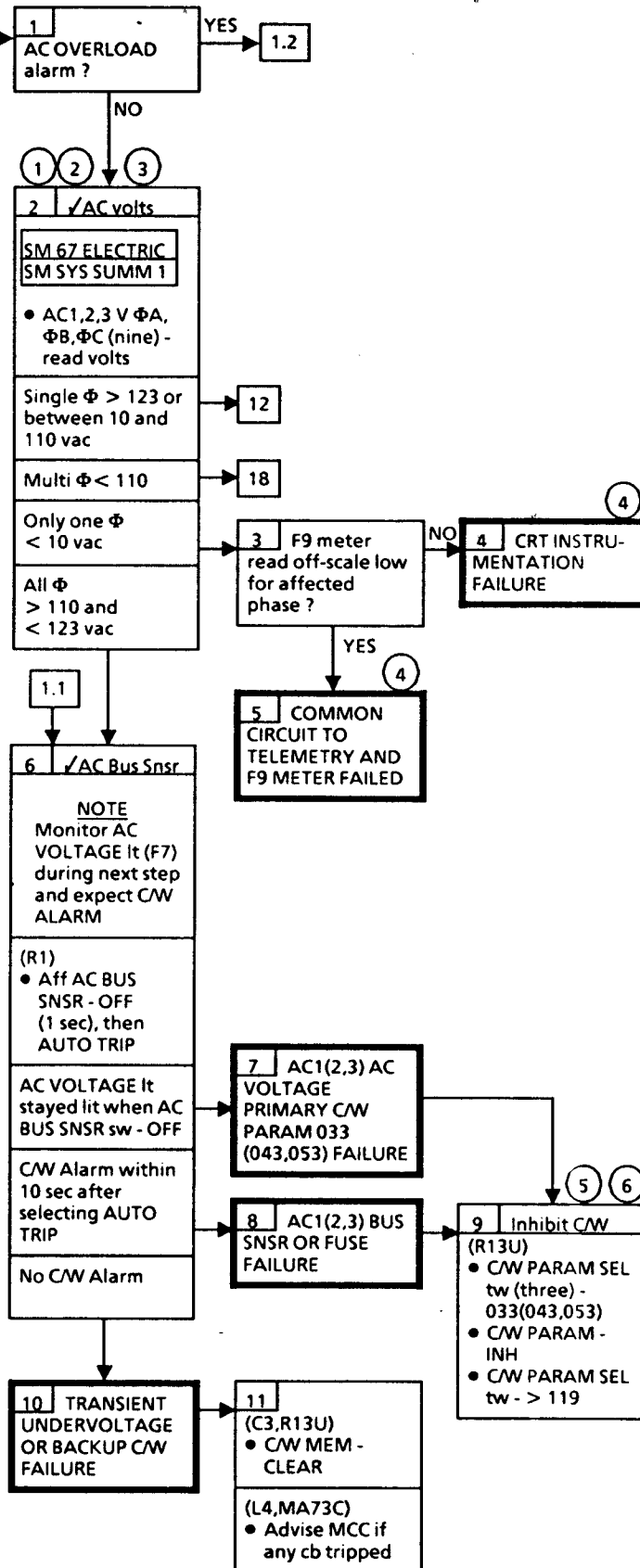
LOST AC1(2,3) AC
VOLTAGE
PRIMARY C/W
ALARM AND
AUTO TRIP
CAPABILITY

Still have backup
C/W AC Voltage
sensing. To inhibit
C/W:
(R12U)
• C/W PARAM SEL
tw - 033(043,053)
• C/W PARAM - INH
• C/W PARAM SEL
tw - > 119
C/W AC OVERLOAD
sensing may still be
available

7.5a AC VOLTS 1(2,3) ++

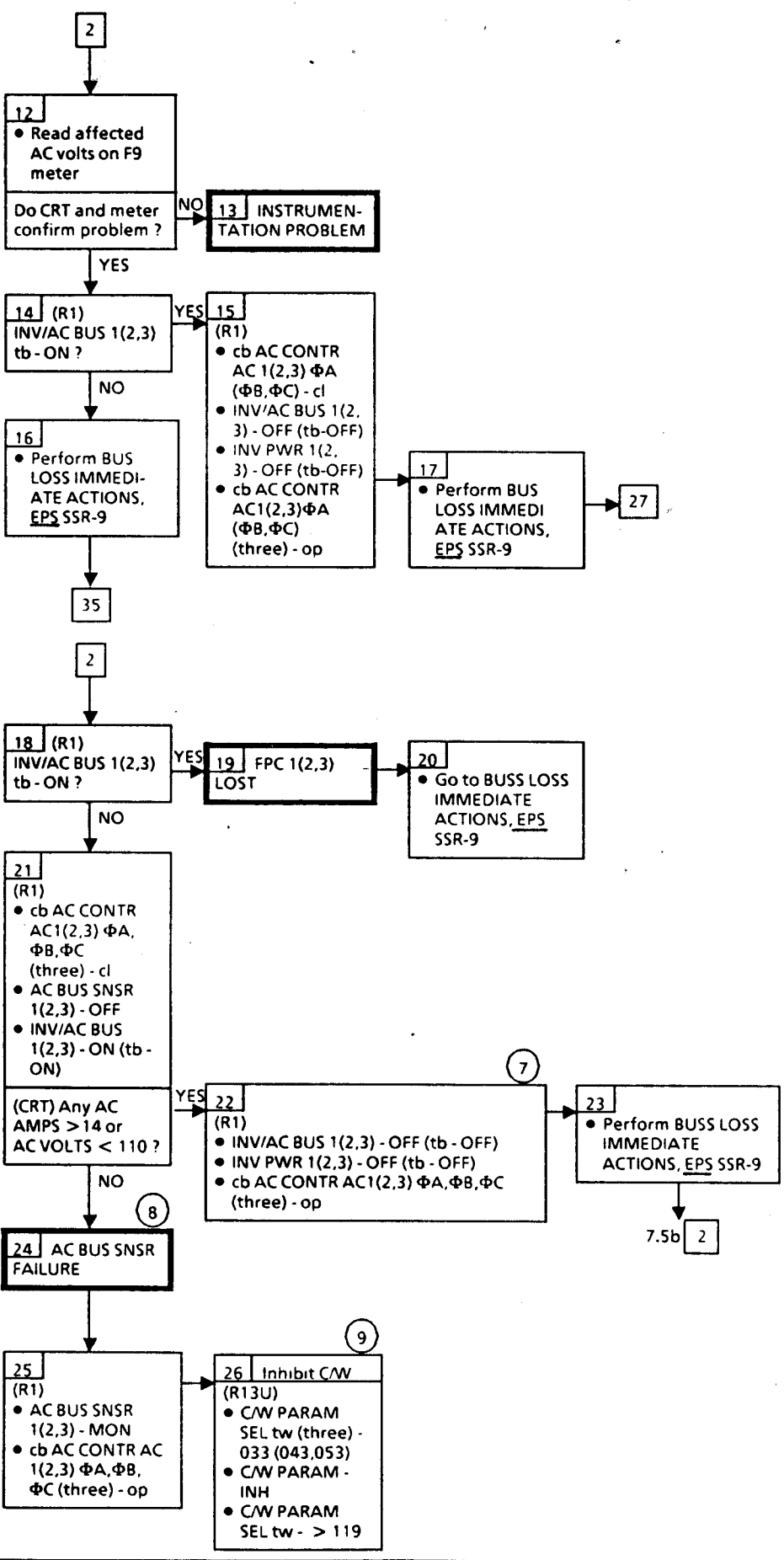
MCC CALL

Nominal Config:
Refer to
7.5 1.1



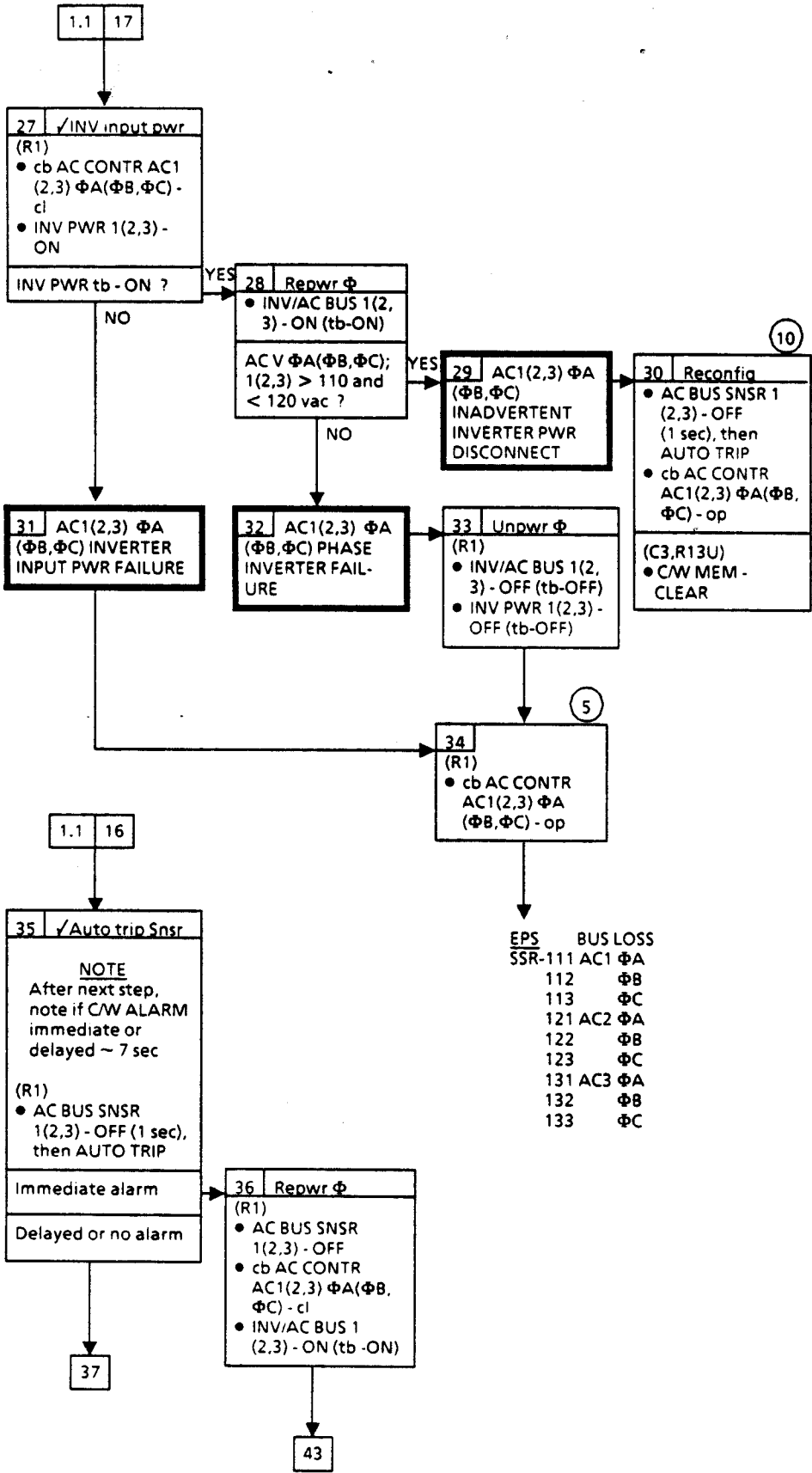
- ① AC bus voltage can be read on pni F9
- ② Transformer action of 3 Φ mtr loads will cause single phase that has been disconnected from its inverter to have voltage > 10 and < 110 vac
- ③ To preclude damaging equipment, the lower limit for equipment specifications (110 volts ac) is used in lieu of AC lower alarm limit (108 volts ac). This limit change is not necessary for the upper limit due to AUTO TRIP function
- ④ Still have primary C/W AC Voltage alarm capability. Backup C/W lost for affected phase
- ⑤ Lost AC1(2,3) AC VOLTAGE primary C/W alarm capability. Still have AUTO TRIP and Backup C/W AC voltage sensing
- ⑥ If inhibit does not extinguish light, remove bulb if desired

EPS 7.5a (Cont)



- 7 AC BUS short and AC BUS SNSR OVLD alarm not operational
- 8 AC BUS SNSR 1(2,3) failed causing auto trip on multiple phases
- 9 Lost AC 1(2,3) AC VOLTAGE primary C/W alarm and AUTO TRIP capability. Still have Backup C/W AC voltage sensing

EPS 7.5a (Cont)



5 Lost AC1(2,3) AC VOLTAGE primary C/W alarm capability. Still have AUTO TRIP and Backup C/W AC voltage sensing

10 Nominal config may be restored if reqd

EPS	BUS LOSS
SSR-111	AC1 ΦA
112	ΦB
113	ΦC
121	AC2 ΦA
122	ΦB
123	ΦC
131	AC3 ΦA
132	ΦB
133	ΦC

EPS 7.5a (Cont)

35

37 Isolate Φ for possible overvolt
 • cb - open all AC1(2,3) Φ A(Φ B, Φ C)
 cbs (including 3 Φ ganged cb)

Panel	L4		MA73C	
	1 Φ	3 Φ	1 Φ	3 Φ
AC1 Φ A	16	1	5	4
Φ B	16	1	4	4
Φ C	13	1	5	4
AC2 Φ A	15	0	5	9
Φ B	16	0	4	9
Φ C	13	0	5	9
AC3 Φ A	15	1	3	7
Φ B	16	1	3	7
Φ C	12	1	3	7

38 (R1)
 • cb AC CONTR AC1(2,3) Φ A(Φ B, Φ C) - cl
 • AC BUS SNSR 1(2,3) - OFF

NOTE
 After next step, if AC Amps > 14 or Volts < 110 or > 123 Vac, place INV/AC BUS 1(2,3) - OFF immediately

• INV/AC BUS 1(2,3) - ON (tb-ON)

41 (CRT) AC AMPS > 14
 (CRT) AC VOLTS < 110 or > 123 Vac ?

39 AC1(2,3) Φ A (Φ B, Φ C) PHASE INVERTER FAILURE

40 (L4,MA73C)
 • cb - close all cbs opened in Block 37

41 UNANNUNCIATED OVERLOAD

42 Pwrdsn Inverter (R1)
 • INV/AC BUS 1(2,3) tb - OFF
 • INV PWR 1(2,3) - OFF (tb-OFF)
 • cb AC CONTR AC1(2,3) Φ A(B,C) - op

NOTE
 Expect C/W AC VOLTAGE alarm ~ 7 sec after next step

• AC BUS SNSR 1(2,3) - AUTO TRIP

43 $\sqrt{3}$ Snsr monitor

NOTE
 Bus disconnect and/or C/W ALARM may occur after next step

(R1)
 • AC BUS SNSR 1(2,3) - MONITOR

Bus disconnect and C/W ALARM → 47

C/W ALARM only → 47

No C/W ALARM → 45

44 Reconfig (L4,MA73C)
 • cb - close all except single Φ loads and Cabin Fan on failed Φ

Bus	no. cb	Row
(L4)		
AC1 3 Φ	1	B
Φ A(B,C)	10	C,D,E,F,G,H,I,J,M,N
AC2 Φ A(B,C)	9	C,D,E,F,G,H,I,J,M
AC3 3 Φ	1	B
Φ A(B,C)	8	C,D,E,F,G,H,I,M
(MA73C)		
AC1 3 Φ	4	C,D
Φ A(B,C)	4	E,G,H,I
AC2 3 Φ	9	C,D,E,F,G
Φ A(B,C)	4	E,G,H,I
AC3 3 Φ	7	C,D,E,F,G
Φ A(B,C)	3	G,H,I

45 NOTE
 Next step may cause AC BUS disconnect and C/W AC VOLTAGE alarm

(R1)
 • AC BUS SNSR 1(2,3) - OFF (1 sec), then AUTO TRIP

Bus disconnected? NO → 50
 YES → 49

46 AC1(2,3) BUS VOLTAGE SNSR FAILED. FALSE OVERVOLT ALARM

53

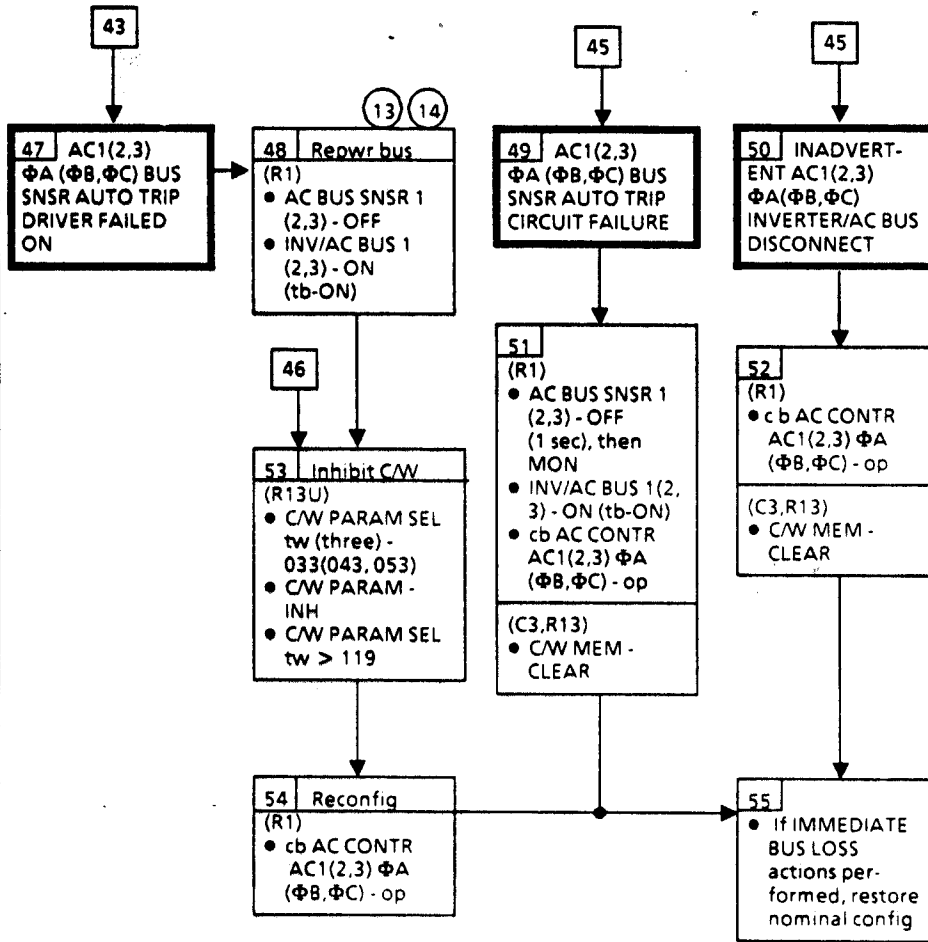
- EPS BUS LOSS
- SSR-111 AC1 Φ A
 - 112 Φ B
 - 113 Φ C
 - 121 AC2 Φ A
 - 122 Φ B
 - 123 Φ C
 - 131 AC3 Φ A
 - 132 Φ B
 - 133 Φ C

11 Pri L4 cb UTILITY PWR is 3 Φ

12 Removing single Φ loads permits lighter loaded motors to support heavier loaded motors by coupling energy via unpowered Φ . Cabin fan on two Φ s cannot support additional single Φ loads. All three cbs must be closed to start cabin fan but unpowered Φ cb should be open while running

13 Lost AC1(2,3) AC VOLTAGE primary C/W alarm and AUTO TRIP capability. Still have Backup C/W AC voltage sensing

EPS 7.5a (Cont)



13 Lost AC 1(2,3) AC VOLTAGE primary C/W alarm and AUTO TRIP capability. Still have Backup C/W AC voltage sensing

14 Lost AC1(2,3) OVLD AUTO TRIP and C/W alarm capability

AC OVERLOAD
(F7)

BACKUP C/W ALARM
(F7)

S67 AC OVLD
1(2,3) ↓

BFS

SM1 AC OVLD
1(2,3)

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

Nominal Config:
(R1)
cb AC CONTR AC1,
AC2, AC3 ΦA, ΦB,
ΦC (nine) - op
AC BUS SNSR 1, 2, 3
(three) - AUTO
TRIP
(O13:A)
cb ESS 1BC AC1
SNSR - cl
(O13:C)
cb ESS 2CA AC2
SNSR - cl
(O13:E)
cb ESS 3AB AC3
SNSR - cl

AC OVERLOAD

SM 67 ELECTRIC
SM SYS SUMM 1

If all AC VOLTS between 110 and 123, and AMPS < 14:
1. Go to MAL, EPS, 7.5b 49 >>
2. Aff AC BUS SNSR - OFF

If single Φ:
3. Aff cb AC CONTR - cl
INV/AC BUS - ON (tb-ON)
If AC VOLTS < 110 or AC AMPS > 14 (OVLD):
4. Aff INV/AC BUS - OFF (tb-OFF) ①
INV PWR - OFF (tb-OFF)
cb AC CONTR - op
If other Φ VOLTS B < 110 or AMPS > 14:
5. Go to step 6 ②
6. Aff AC BUS SNSR - AUTO TRIP ②
7. Go to aff BUS LOSS IMMEDIATE ACTIONS, MAL,
EPS SSR-9 >>
If AC VOLTS, AMPS normal (SNSR prob):
8. Go to MAL, EPS, 7.5b 36 >>

If multi Φ (Bus short):
9. Aff cb AC CONTR (three) - cl
INV/AC BUS - OFF (tb-OFF)
INV PWR - OFF (tb-OFF)
cb AC CONTR (three) - op
10. Perform aff BUS LOSS IMMEDIATE ACTIONS, MAL,
EPS SSR-9, then:
11. Go to MAL, EPS, 7.5b 2

①
**AC1(2,3) ΦA
(ΦB, C) INVERTER
FAILED OR
BUS SHORT
REMOVED
WITH INVERTER**

②
**LOST AC1(2,3) AC
VOLTAGE
PRIMARY C/W
ALARM
CAPABILITY**

Still have AUTO
TRIP and B/U
C/W AC VOLTAGE
alarm capability

EPS

7.5b AC OVLD 1(2,3) +

MCC CALL

Nominal Config:
Refer to
7.5 1.2

1 | \sqrt{AC} volts

SM 67 ELECTRIC

BFS, SM SYS
SUMM 1

- AC V Φ A, Φ B, Φ C; 1,2,3 (nine) - read

All $\Phi \geq 110$ vac → 51

Any $\Phi < 110$ vac

1.2

2 | Isolate 3 Φ bus
(L4, MA73C)

- cb - open all (3 Φ Φ A, Φ B, Φ C) on failed bus

Number of cb to open:

BUS	L4	MA73C
AC1 3 Φ	1	4
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

① AC volts can be read on pnl F9

② Pnl L4 cb UTILITY PWR is 3 Φ

3 | \sqrt{short}

(R1)

- cb AC CONTR AC1 (AC2, AC3) Φ A, Φ B, Φ C (three) - cl
- INV PWR 1(2,3) - ON (tb-ON)
- INV/AC BUS 1(2,3) - ON (tb-ON)

(CRT)

- Read AC amps on all Φ s

(R1)

- INV/AC BUS 1(2,3) - OFF (tb-OFF)

All $\Phi \leq 1$ amp → 19

3 $\Phi > 1$ amp → 4

2 $\Phi > 1$ amp → 7

1 $\Phi > 1$ amp → 6

4 | AC1(2,3)
3 Φ BUS SHORT

5 | Reconfig

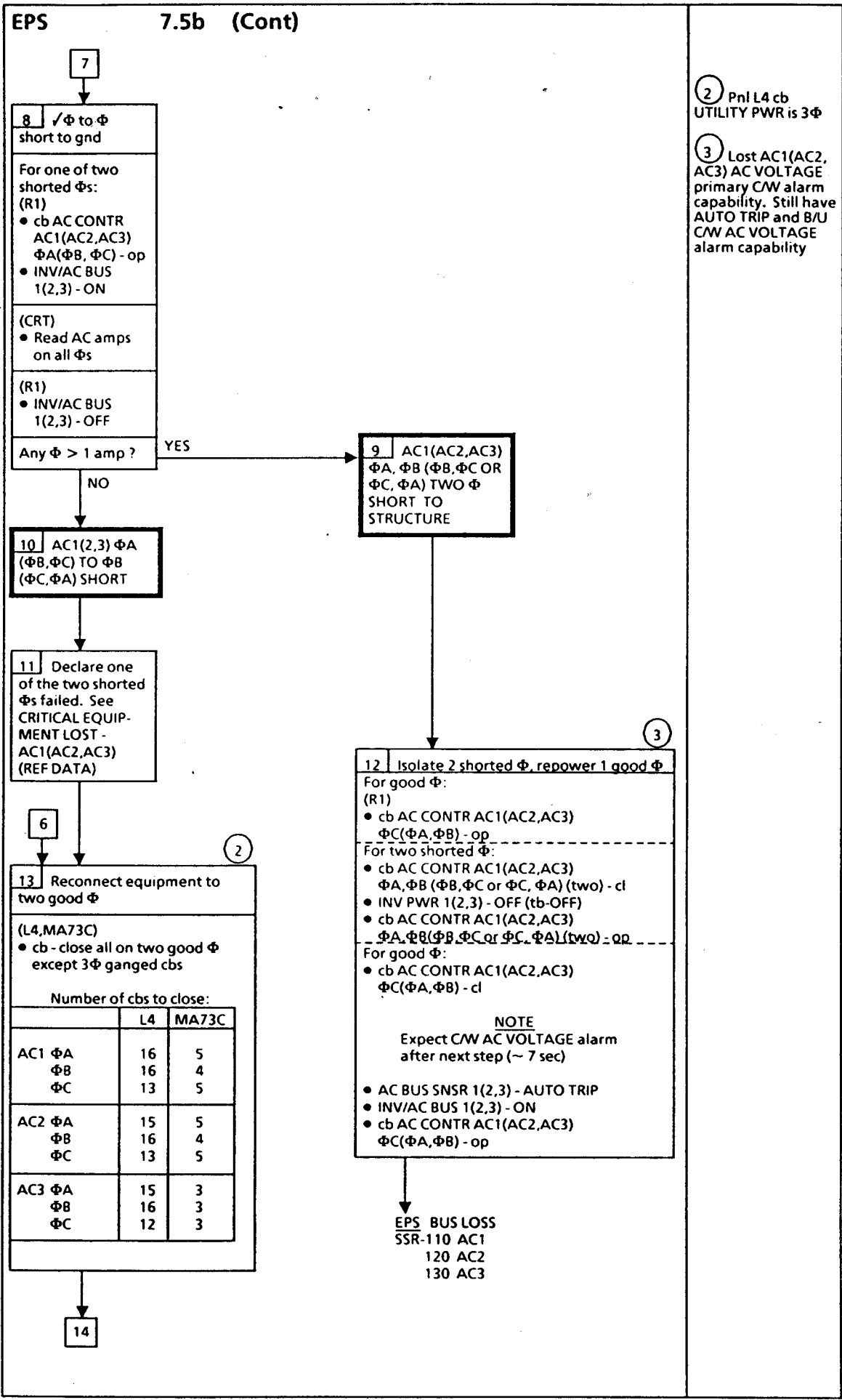
(R1)

- INV PWR 1(2,3) - OFF (tb-OFF)
- cb AC CONTR AC1 (AC2, AC3) Φ A, Φ B, Φ C (three) - op

6 | AC1(AC2, AC3) Φ A (Φ B, Φ C) SHORT

7 | 2 Φ SHORT

EPS BUS LOSS
SSR-110 AC1
120 AC2
130 AC3



EPS 7.5b (Cont)

13

4

14 Repwr 2 good Φ

(R1)
For two good Φ

- cb AC CONTR AC1(AC2,AC3) Φ B, Φ C(Φ C, Φ A or Φ A, Φ B) (two) - op

For shorted Φ :

- \checkmark cb AC CONTR AC1(AC2,AC3) Φ A(Φ B, Φ C) - cl
- INV PWR 1(2,3) - OFF (tb-OFF)
- cb AC CONTR AC1(AC2,AC3) Φ A(Φ B, Φ C) - op

For two good Φ :

- cb AC CONTR AC1(AC2,AC3) Φ B, Φ C (Φ C, Φ A, or Φ A, Φ B) (two) - cl

NOTE
After next step, expect
CW AC VOLTAGE alarm

- AC BUS SNSR 1(2,3) - AUTO TRIP
- INV/AC BUS 1(2,3) - ON
- cb AC CONTR AC1(AC2,AC3) Φ B, Φ C (Φ C, Φ A or Φ A, Φ B) (two) - op
- \checkmark FC1(2,3) REAC - OP (tb-OP)
- FC1(FC2,FC3) - START (max 10 sec)
- \checkmark FC1(FC2,FC3) COOL PUMP Δ P tb - gray

16

5

15 AC1 PKT C/L backout

If Φ A good:
(O6)
• LTG PNL L/CTR - as reqd -
(O8)
• LTG PNL R INST - as reqd

If Φ B good:
(O6)
• LTG PNL LQVHD - as reqd -
(O8)
• LTG PNL NUMERIC - as reqd

If Φ C good:
(O7)
• TACAN 1 MODE - as reqd

If Φ A, Φ C good:
(L4)
• cb UTILITY PWR AC1 - cl

If ASC PKT C/L AC1(2 or 3 Φ)
FAILED BUS LOSS ACTION
performed:
(L2)
• FLASH EVAP FDLN HTR SPLY
(two) - as reqd -
(O7)
• TACAN MODE 2,3 (two) - as
reqd

50

16 Reconnect FC

(R1)

- When FC1(FC2,FC3) RDY tb - gray:
- FC/MN BUS A(B,C) - ON (tb-ON)
- FC/MN BUS A(B,C) - ON (tb-ON)
- ESS BUS SOURCE FC1(FC2,FC3) - ON
- MN BUS TIE A(B,C) - OFF (tb-OFF)
- B(C,A) - OFF (tb-OFF)

AC BUS with failed Φ ?

AC1	AC2	AC3
-----	-----	-----

EPS	BUS LOSS
SSR-111	AC1 Φ A
112	Φ B
113	Φ C

15

18 AC2 PKT C/L backout

If Φ A good:
(O8)
• LTG PNL R OVHD - as reqd

If Φ B good:
(O6)
• LTG INST QVHD - as reqd -
(O8)
• LTG PNL R - as reqd -
(O17:C)
• SIG CONDR FREON A - AC2(AC3)

If Φ C good:
(O7)
• TACAN 2 MODE - as reqd -
(A6)
• OS LTG NUMERIC - as reqd

If ASC PKT C/L AC2(2 or 3 Φ)
FAILED BUS LOSS ACTION
performed:
(L2)
• FLASH EVAP FDLN HTR SPLY (two) - as
reqd -
(O7)
• TACAN MODE 1,3 (two) - as reqd

5

17 AC3 PKT C/L backout

If Φ A good:
no reconfig reqd

If Φ B good:
(O6)
• LTG PNL L/CTR - as reqd
(R10)
• MS LTG PNL - as reqd -
(O17:C)
• SIG CONDR FREON B -
AC3(AC2)

If Φ C good:
(O7)
• TACAN 3 MODE - as reqd -
(A6)
• OS LTG PNL - as reqd

If ASC PKT C/L AC3(2 or 3 Φ)
FAILED BUS LOSS ACTION
performed:
(L2)
• FLASH EVAP FDLN HTR A,B
SPLY (two) - as reqd -
(O7)
• TACAN MODE 1,2 (two) -
as reqd

516

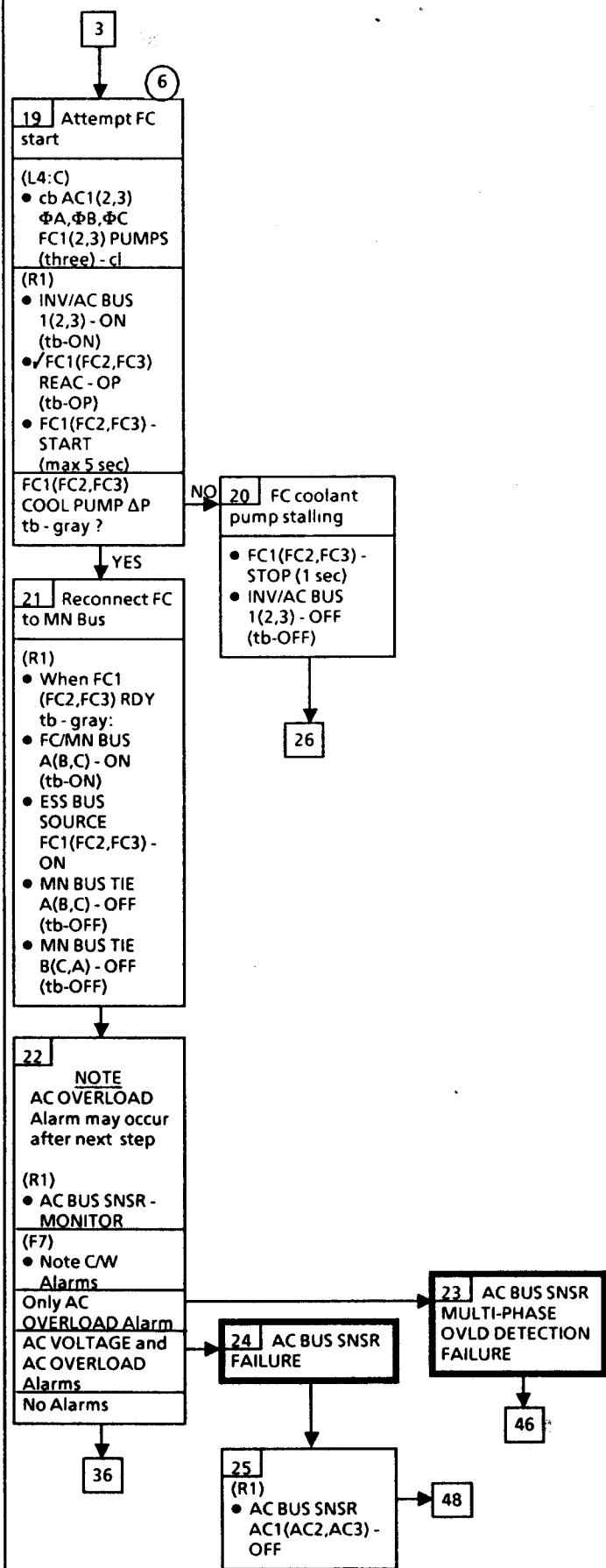
EPS	BUS LOSS
SSR-121	AC2 Φ A
122	Φ B
123	Φ C

EPS	BUS LOSS
SSR-131	AC3 Φ A
132	Φ B
133	Φ C

4 If failed bus is AC2(3), CABIN FAN B(A) may not start on remaining two phases

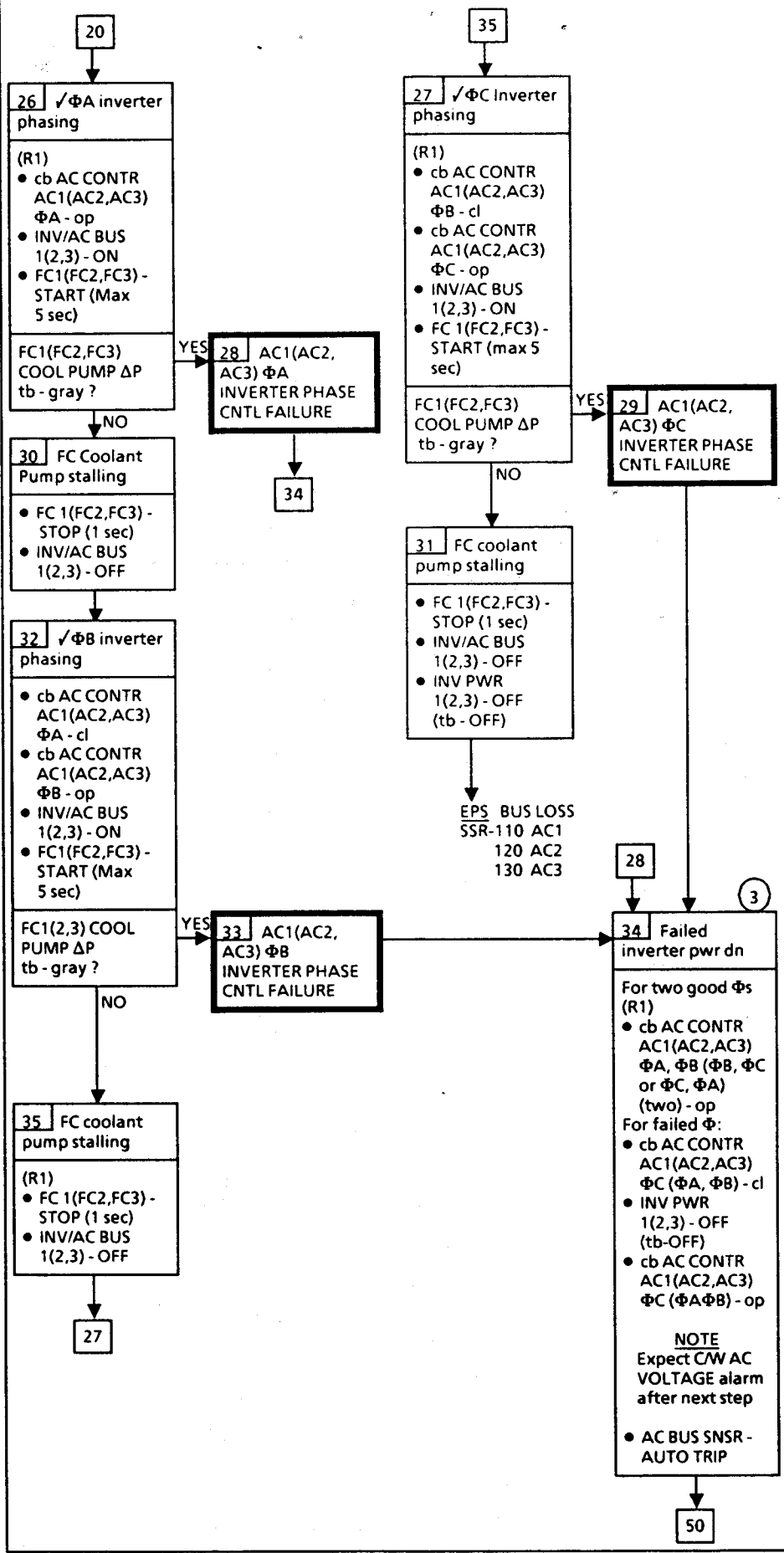
5 Φ A, Φ C reqd to use UTILITY PWR for direct connection to single food warmer

EPS 7.5b (Cont)



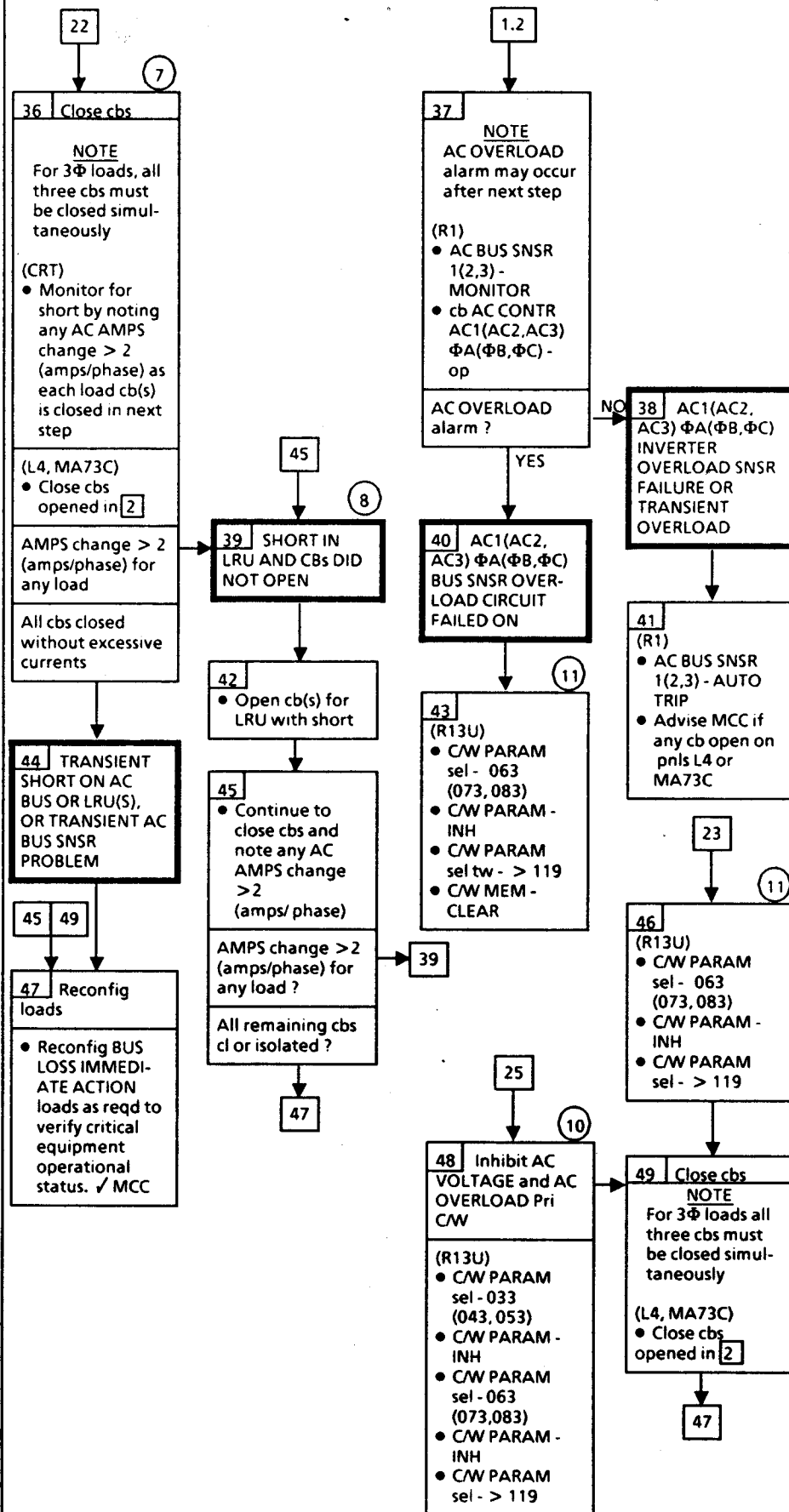
6 FC being used to determine if AC problem is due to 3Φ motor stall. FC pumps may be exposed to stall conditions; therefore, do not hold START sw longer than 5 sec

EPS 7.5b (Cont)



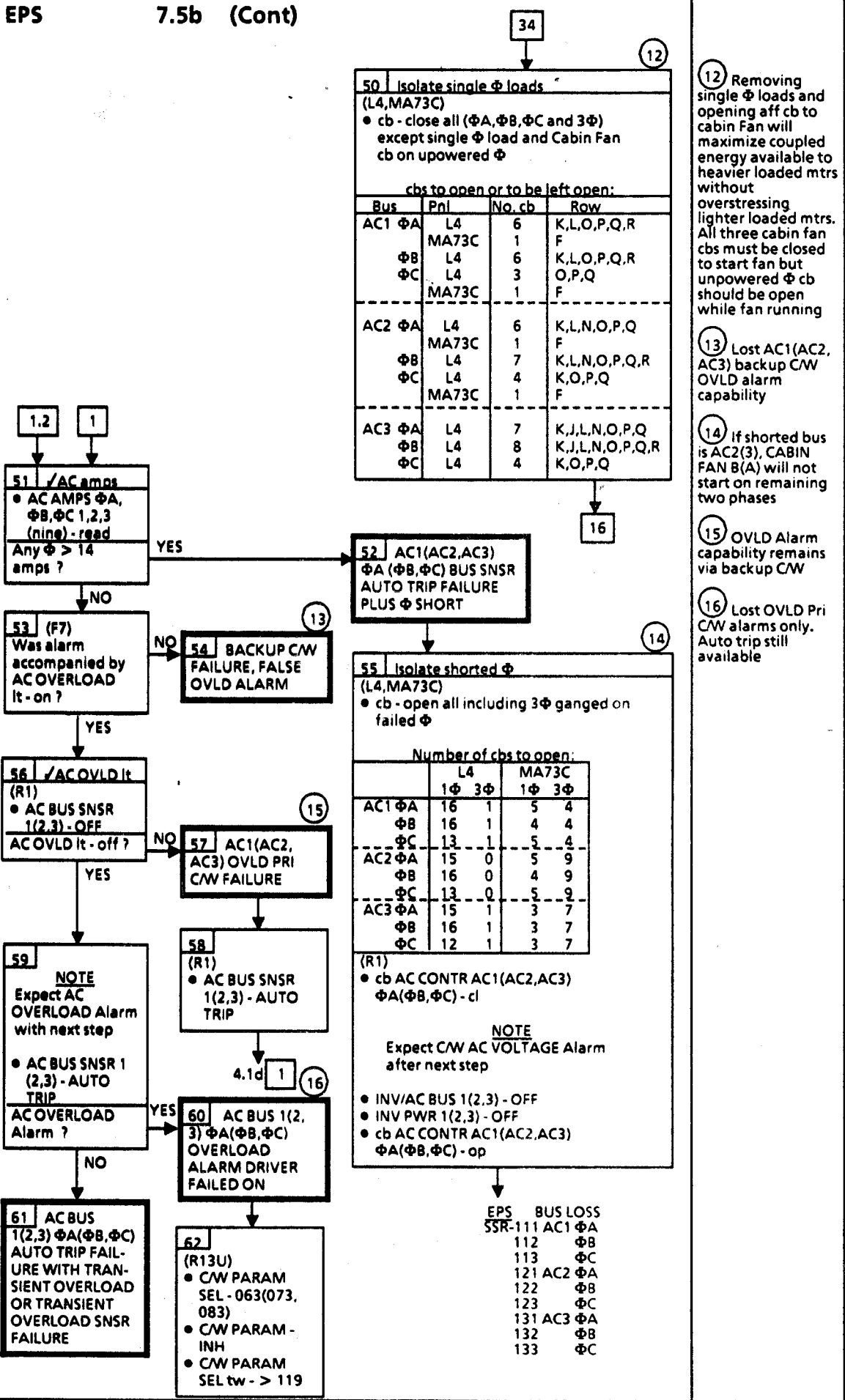
3 Lost AC1(2,3) AC VOLTAGE primary C/W alarm capability. Still have AUTO TRIP and B/U C/W AC VOLTAGE alarm capability.

EPS 7.5b (Cont)



- 7 Same AC Loads have high starting currents which should stabilize within 5 sec
- 8 The cbs will normally open with loads in excess of 3 Amps
- 10 Only B/U C/W AC VOLTAGE Alarm remains. No AUTO TRIP exists for AC 1(AC2,AC3)
- 11 Lost AC1(AC2, AC3) overload and over-voltage auto trip protection along with AC OVERLOAD C/W Alarm

EPS 7.5b (Cont)



- 12 Removing single Φ loads and opening aff cb to cabin Fan will maximize coupled energy available to heavier loaded mtrs without overstressing lighter loaded mtrs. All three cabin fan cbs must be closed to start fan but unpowered Φ cb should be open while fan running
- 13 Lost AC1(AC2, AC3) backup C/W OVLd alarm capability
- 14 If shorted bus is AC2(3), CABIN FAN B(A) will not start on remaining two phases
- 15 OVLd Alarm capability remains via backup C/W
- 16 Lost OVLd Pri C/W alarms only. Auto trip still available

34

12

50 Isolate single Φ loads (L4, MA73C)

- cb - close all (Φ A, Φ B, Φ C and 3 Φ) except single Φ load and Cabin Fan cb on upowered Φ

cbs to open or to be left open:

Bus	Ph	No. cb	Row
AC1 Φ A	L4	6	K,L,O,P,Q,R
	MA73C	1	F
	Φ B	6	K,L,O,P,Q,R
	Φ C	3	O,P,Q

AC2 Φ A	L4	6	K,L,N,O,P,Q
	MA73C	1	F
	Φ B	7	K,L,N,O,P,Q,R
	Φ C	4	K,O,P,Q

AC3 Φ A	L4	7	K,J,L,N,O,P,Q
	Φ B	8	K,J,L,N,O,P,Q,R
	Φ C	4	K,O,P,Q
	MA73C	1	F

16

14

55 Isolate shorted Φ (L4, MA73C)

- cb - open all including 3 Φ ganged on failed Φ

Number of cbs to open:

	L4		MA73C	
	1 Φ	3 Φ	1 Φ	3 Φ
AC1 Φ A	16	1	5	4
Φ B	16	1	4	4
Φ C	13	1	5	4
AC2 Φ A	15	0	5	9
Φ B	16	0	4	9
Φ C	13	0	5	9
AC3 Φ A	15	1	3	7
Φ B	16	1	3	7
Φ C	12	1	3	7

(R1)

- cb AC CONTR AC1(AC2,AC3) Φ A(Φ B, Φ C) - cl

NOTE

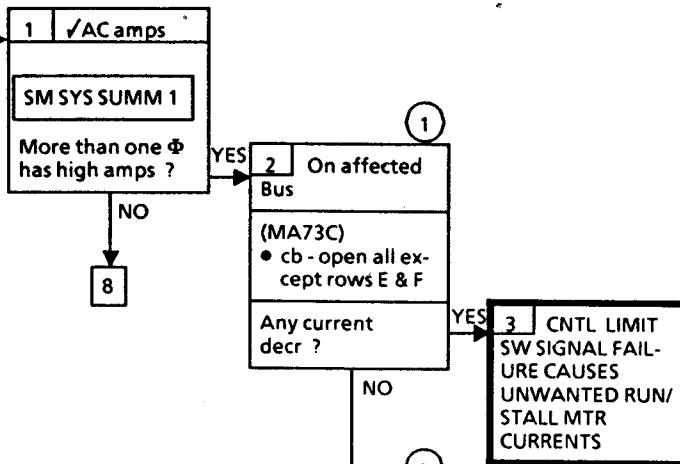
Expect C/W AC VOLTAGE Alarm after next step

- INV/AC BUS 1(2,3) - OFF
- INV PWR 1(2,3) - OFF
- cb AC CONTR AC1(AC2,AC3) Φ A(Φ B, Φ C) - op

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

AC Bus Current High

Caused by:
Soft short,
Equip out-of-
config, or
Mtr control
signal failure

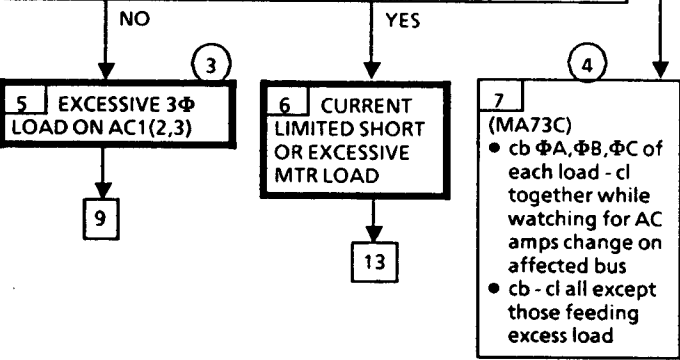


4 (MA73C,L4,R11)
• cb - op and cl ΦA,ΦB,ΦC together on each 3Φ load noting AC amps change on affected bus

Normal cb current listed in parentheses

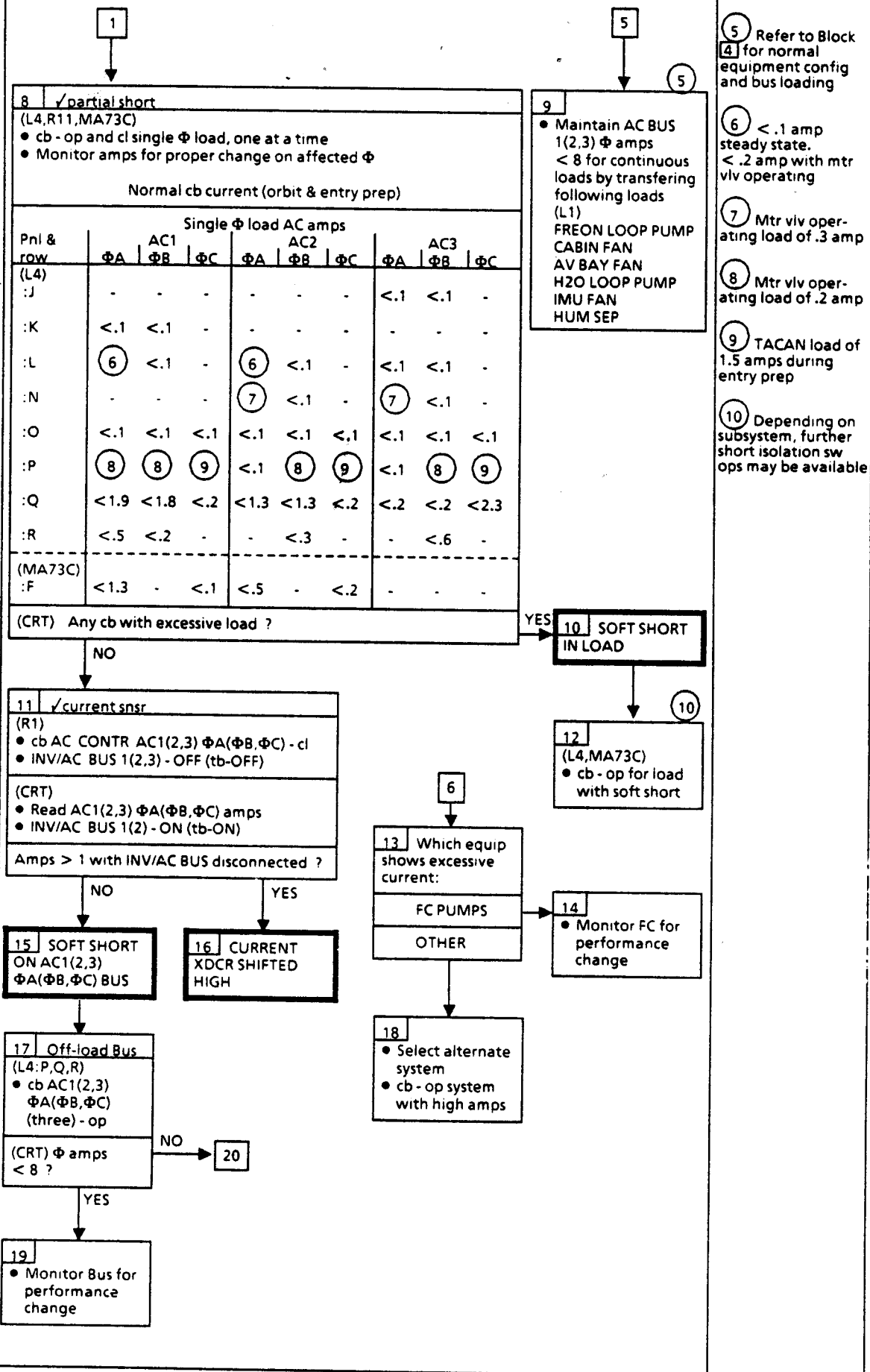
EQUIPMENT	ID (AMPS/Φ)		
	AC1	AC2	AC3
(MA73C) :E WCS FAN SEP PAYLOAD	1 (.9)*	2 (.9)* AC2 (0)*	AC3 (< 1.7)
(L4) UTILITY PWR (3Φ cb)	(0)		(0)
:C FC PUMPS	1 (.8)	2 (.8)	3 (.8)
:D C,RENG	C (< 1.6)*	C (< 1.6)*	R (< 1.6)*
:E R,LENG	R (< 1.6)*	L (< 1.6)*	L (< 1.6)*
:F H2O LOOP PUMP	1A/2 (1.0)*	1B (1.0)*	2 (1.0)
: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 "*" not normally active
- 3 AC Bus Snr fused at 3 amps/Φ. AC voltmeter fused at .5 amps/Φ. Signal conditioners are protected by 3 amp cbs
- 4 Some mtrs have thermal cutoff sw that may remove load unexpectedly. In this event, Block 11 will be inconclusive

EPS 7.5c (Cont)



EPS 7.5c (Cont)

17

11

20 Isolate shorted Φ

(L4, MA73C)

- cb - open all including 3 Φ ganged on failed Φ

Number of cb to open:

	L4		MA73C	
	1 Φ	3 Φ	1 Φ	3 Φ
AC1 Φ A	16	1	5	4
Φ B	16	1	4	4
Φ C	13	1	5	4
AC2 Φ A	15	0	5	9
Φ B	16	0	4	9
Φ C	13	0	5	9
AC3 Φ A	15	1	3	7
Φ B	16	1	3	7
Φ C	12	1	3	7

(R1)

- cb AC CONTR AC1(2,3) Φ A(Φ B, Φ C) - cl

NOTE
Expect C/W AC VOLTAGE alarm after next step

- INV/AC BUS 1(2,3) - OFF (tb-OFF)
- INV PWR 1(2,3) - OFF (tb-OFF)
- cb AC CONTR AC1(2,3) Φ A(Φ B, Φ C) - op



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

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

More Than One
3φ AC Motor
Stopped (No AC
Volts Alarm)

Loss of phase
sequence separa-
tion cntl on any
φ of 3φ bus

1.3

**3φ AC MOTORS STOPPED
(No AC VOLTS Alarm: Φ Shift)**

SM FAULT

NOTE

If no FC Coolant Pump within 9 min, go to aff AC BUS (2 or 3φs) BUS LOSS IMMEDIATE ACTIONS, MAL, EPS SSR-9

NOTE: Loads with '*' normally active

(F7) FAULT It	AC1	AC2	AC3
FUEL CELL PUMP	1*	2*	3*
FREON LOOP	1A	1B*	2A
	2B*		
H2O LOOP	1A	1B	2*
AV BAY/CABIN AIR (Cab Fan)		B	A*
BFS FAULT MSG			
SM2 AV BAY FAN	1A	1B*	2B
	3B*	2A*	3A
SM1 CABIN FAN		B	A*
SM1 CABIN IMU	A	B*	C
SM1 FC PUMP 1(2,3)	1*	2*	3*
SM2 FREON FLOW 1(2)	1A	1B*	2A
	2B*		
SM2 H2O PUMP P 1(2)	1A	1B	2*
SM FAULT MSG			
S66 AV BAY FAN	1A	1B*	2B
	3B*	2A*	3A
S66 CABIN (Hum Sep)	A	B*	
S66 CABIN FAN		B	A*
S66 CABIN IMU	A	B*	C
S68 FC PUMP 1(2,3)	1*	2*	3*
S88 FREON FLOW 1(2)	1A	1B*	2A
	2B*		
S88 H2O PUMP P 1(2)	1A	1B	2*
S88 THERMAL FRN	1A	1B*	2A
	2B*		
S88 THERMAL H2O	1A	1B	2*

1. Determine aff AC BUS:
 - FC1 & FREON PUMP 2B: AC1
 - FC2 & AV BAY 1B & 2A: AC2
 - FC3 & CABIN FAN A: AC3
2. Isolate ΦA:
 - cb AC CONTR - cl
 - INV/AC BUS - OFF (tb-OFF)
 - If FC COOL PUMP ΔP tb - gray: (mtrs restarted) ①
 - 3. Aff INV PWR - OFF (tb-OFF) ②
 - cb AC CONTR - op
 - ✓Aff CAB FAN A(B) - OFF
 - ✓B(A) - ON
 - 4. Go to aff BUS LOSS IMMEDIATE ACTIONS, MAL, EPS SSR-9 >>
 - If FC COOL PUMP ΔP tb - bp:
 - 5. Aff INV/AC BUS - ON (tb-ON)
 - cb AC CONTR - op
 - 6. Repeat steps 2 thru 5 for ΦB, ΦC as reqd, then:
 - If FC COOL PUMP ΔP tb still bp:
 - 7. Go to aff AC BUS (2 or 3φs) BUS LOSS IMMEDIATE ACTIONS, MAL, EPS SSR-9

①

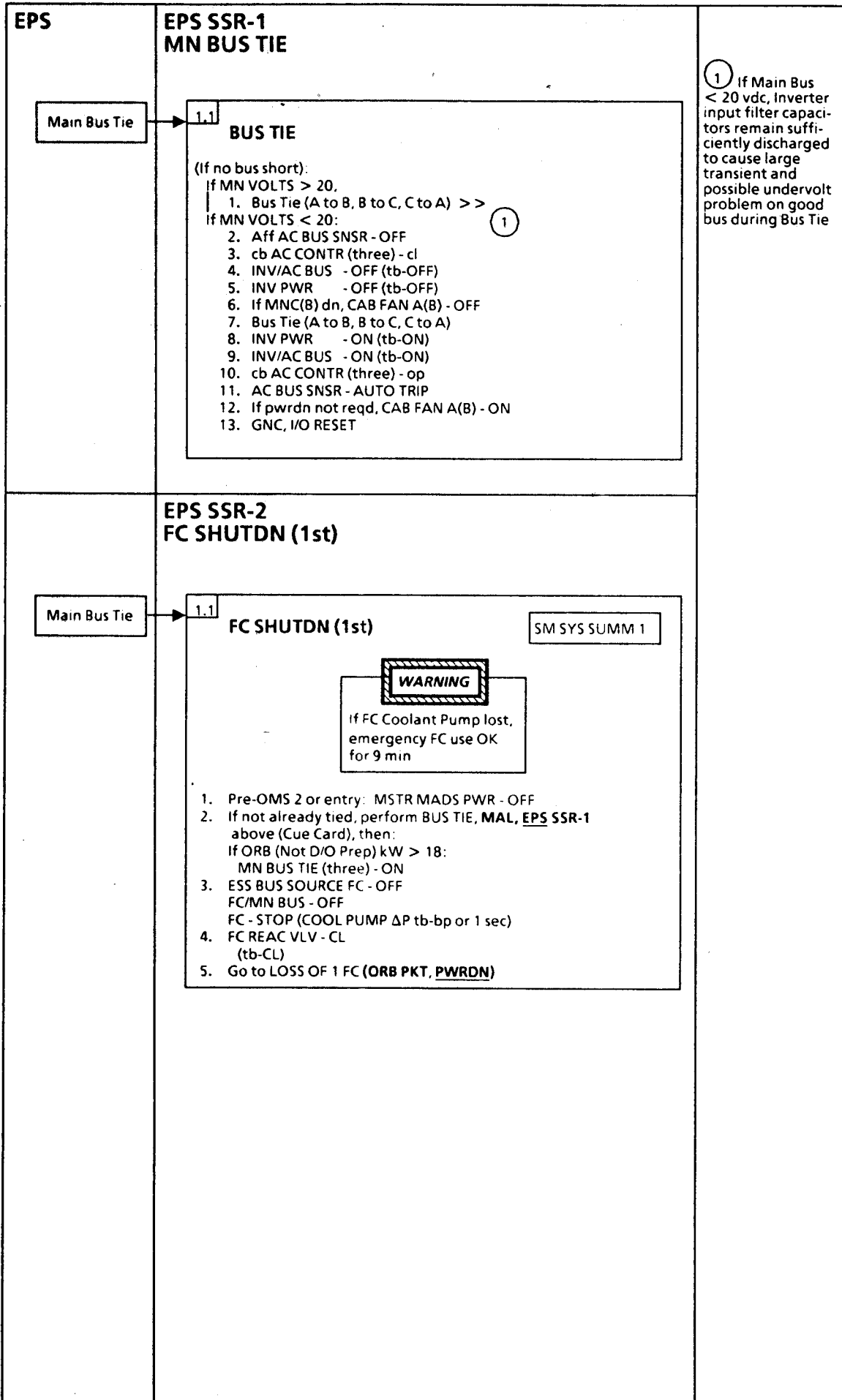
AC1(2,3) INV
PHASE CON-
TROL FAILURE

②

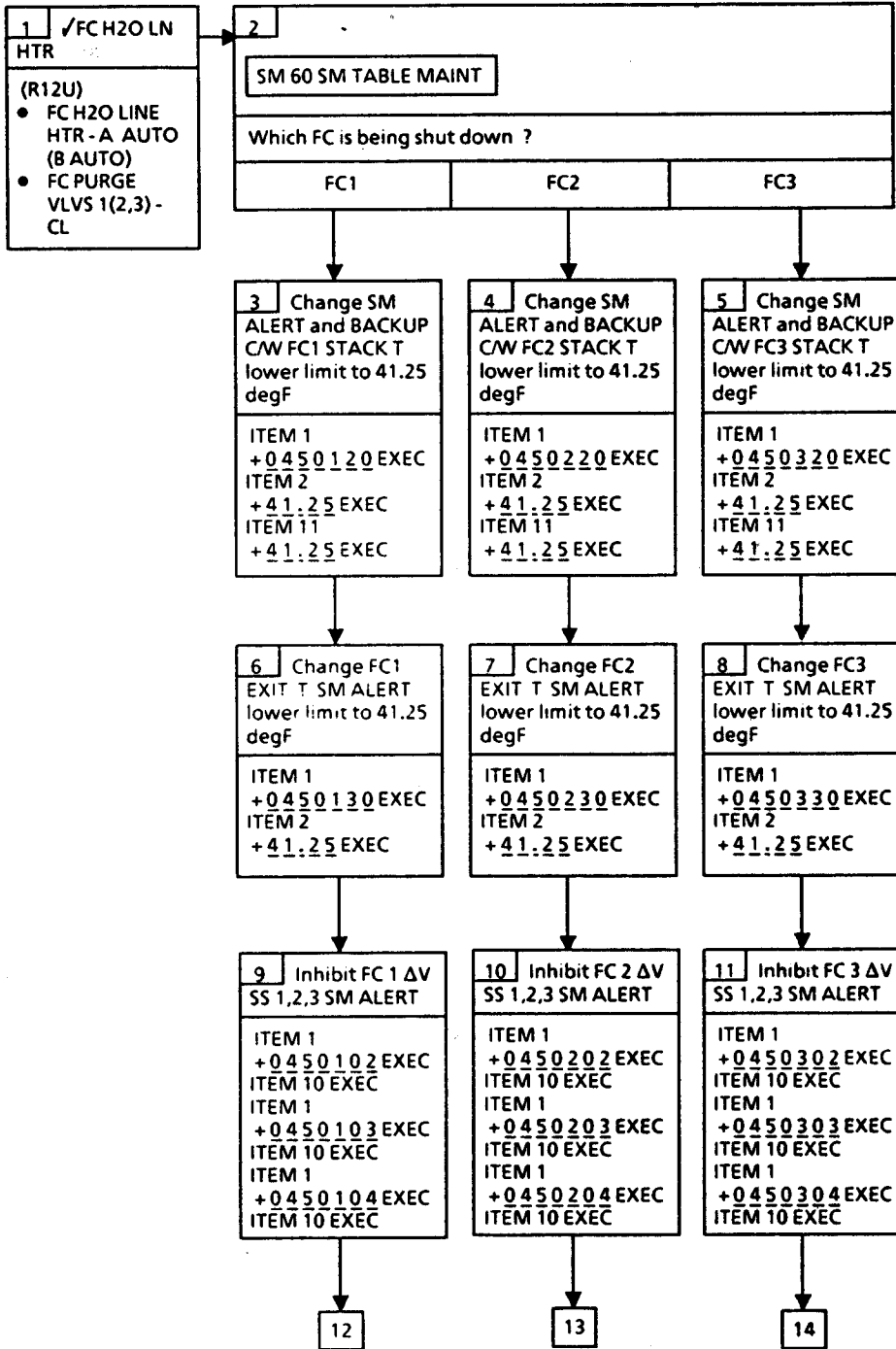
LOST C/W
AC1(2,3) AC
VOLTAGE
PRIMARY
ALARM
CAPABILITY

Still have AUTO
TRIP and B/U C/W
AC VOLTAGE alarm
capability

EPS SSR

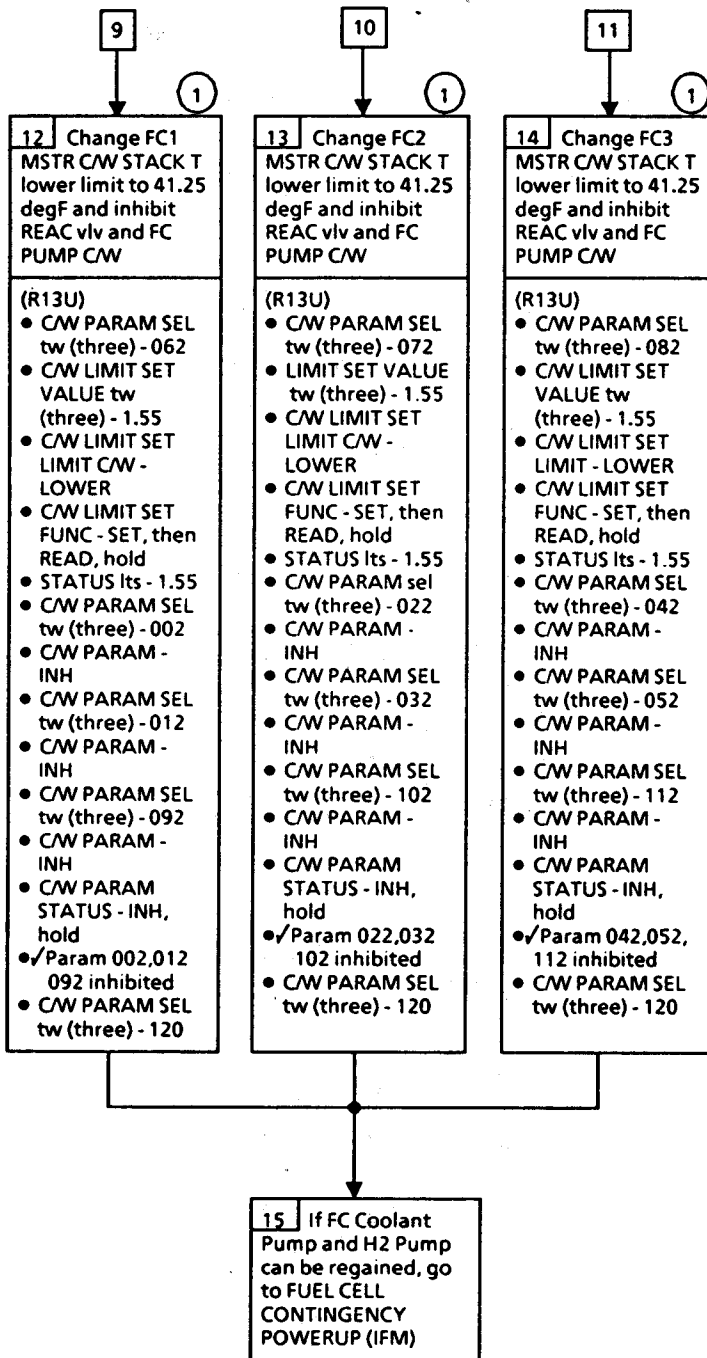


EPS SSR-3 FC SHUTDN C&W LIMIT CHANGE



EPS SSR-3 (Cont)

① MCC must change lower limits in BFS



**EPS SSR-4
2nd FC SHUTDN**

SM SYS SUMM 1

NOTE

If FC Coolant Pump lost, emergency
FC use OK for 6 min

1. MSTR MADS PWR - OFF

If affected FC pwr 1 MN bus, go to step 4:

2. MN BUS TIE (three) - OFF
3. Perform BUS TIE, **MAL, EPS, SSR-1** (Cue Card), to good FC/BUS
4. ESS BUS SOURCE FC - OFF
FC/MN BUS - OFF
FC - STOP (COOL PUMP Δ P tb-bp or 1 sec)
5. FC REAC VLV - CL (tb-CL)
6. Go to LOSS OF 2ND FC ON-ORBIT (**ORB PKT, PWRDN**)

**EPS SSR-5
AC POWERUP**

AC BUS 1(2,3) POWERUP

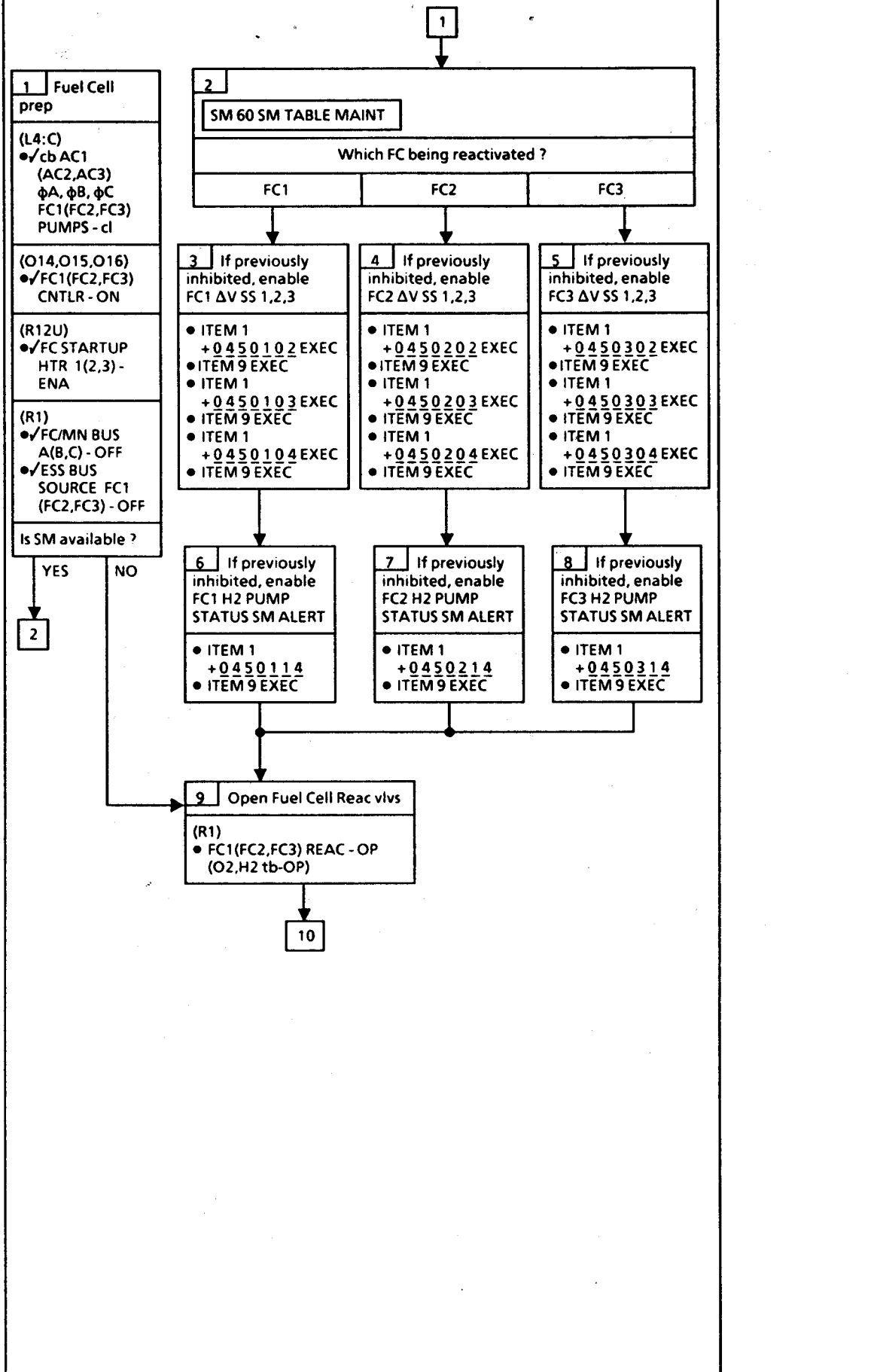
O13:A ✓cb ESS 1BC(2CA,3AB)
:C AC1(2,3) SNSR - cl
:E
R1 cb AC CONTR AC1(2,3) φA,B,C (three) - cl

NOTE

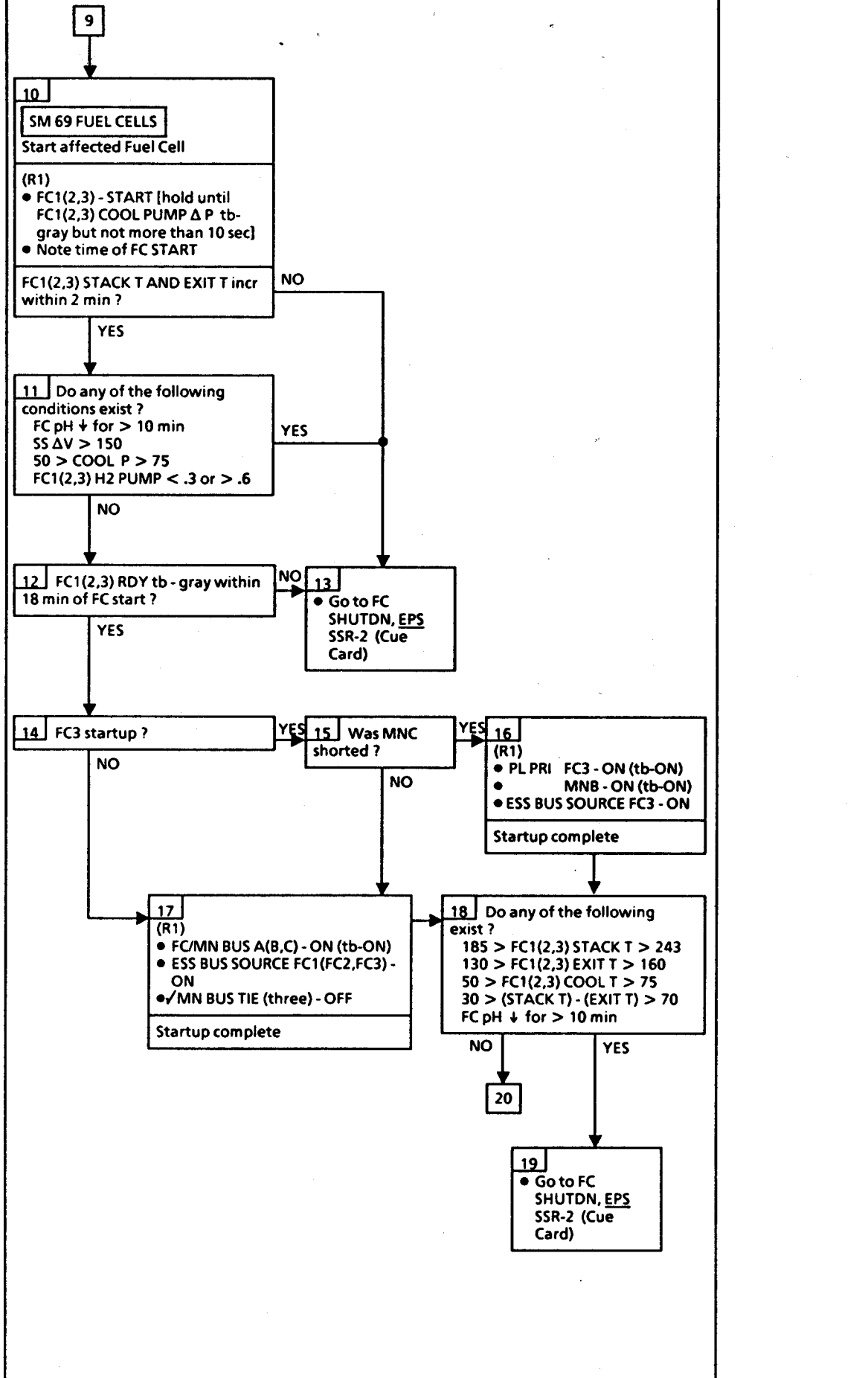
C/W AC VOLTAGE primary alarm will occur
if AC bus not powered within 6.5 to 8.5 sec
after enabling AC Bus Snsr

R1 AC BUS SNSR 1(2,3) - OFF (1 sec), then AUTO TRIP
 INV PWR 1(2,3) - ON (1 sec) (tb-ON)
 INV/AC BUS 1(2,3) - ON (tb-ON)
 cb AC CONTR AC1(2,3) φA,B,C (three) - op
R13U C/W PARAM STATUS - INH (hold)
 ✓PARAM STATUS It 033(043, 053) not lit

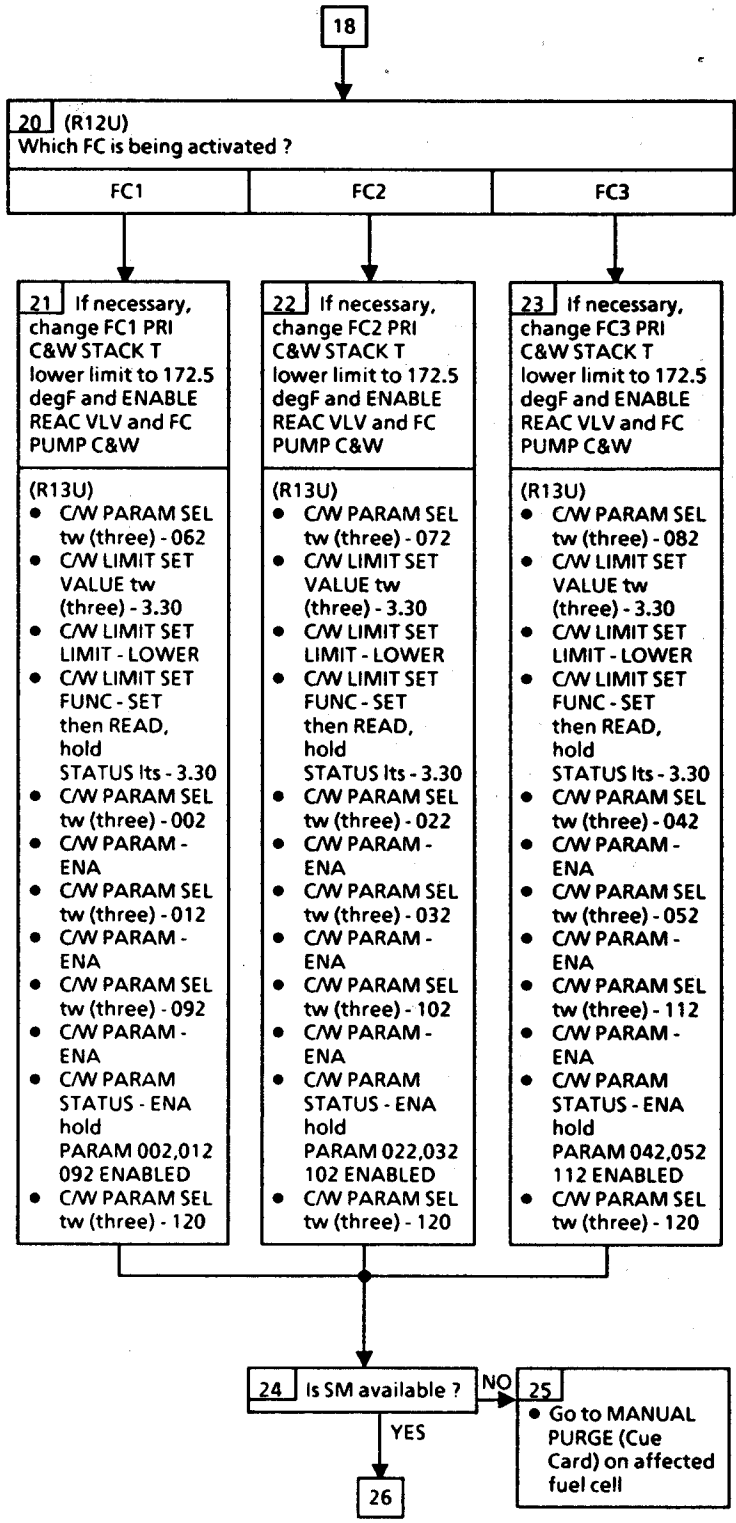
EPS SSR-6 FC POWERUP



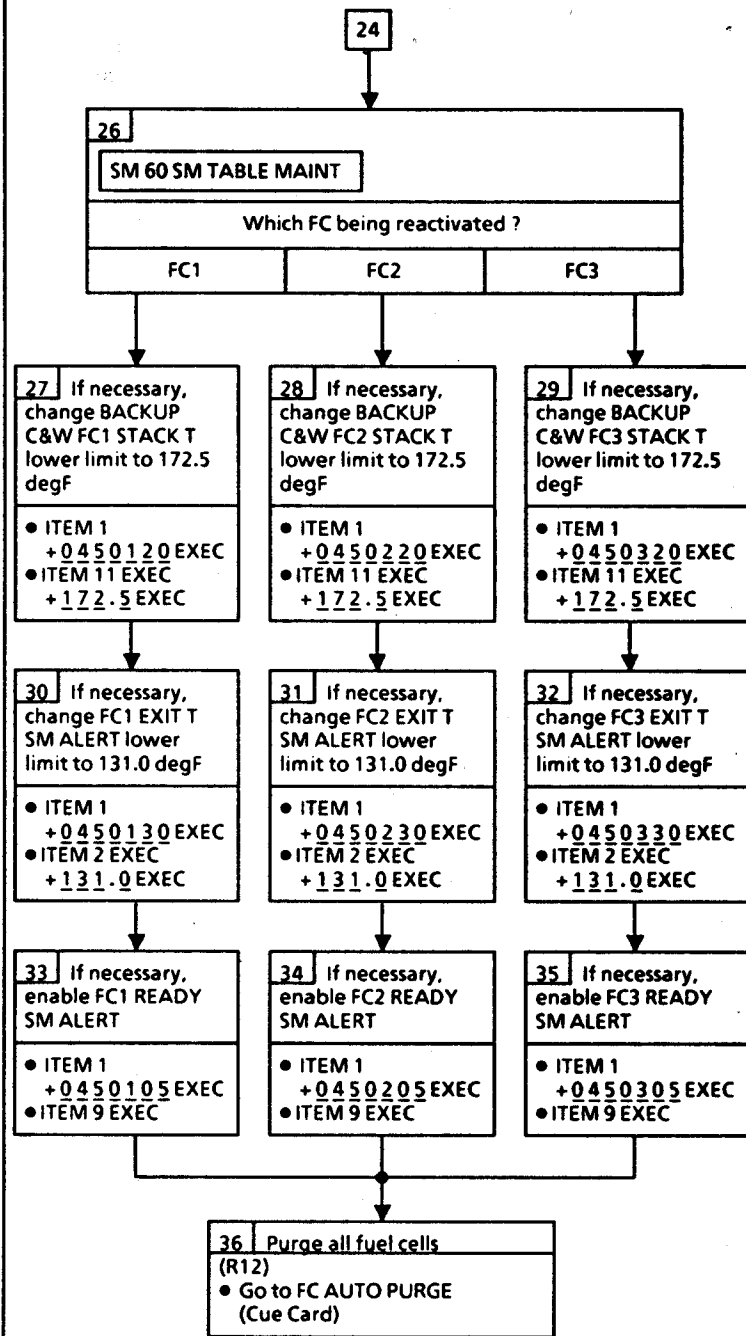
EPS SSR-6 (Cont)



EPS SSR-6 (Cont)



EPS SSR-6 (Cont)



EPS SSR-7 FC SAFING

1.1

SM SYS SUMM 1

If FC already SHUTDN:

1. ✓FC1(2,3) REAC - CL (O2,H2 tbs-CL)
2. FC1(2,3) - START (10 sec or ΔP tb-gray)
3. Go to step 11

If FC not SHUTDN:

4. MSTR MADS PWR - OFF
5. If not already tied, perform MN BUS TIE, MAL, EPS SSR-1 (Cue Card), then:
6. If ORB (not D/O Prep) kW > 18, MN BUS TIE (three) - ON (tbs-ON)
7. ESS BUS SOURCE FC1(2,3) - OFF
8. FC/MN BUS - OFF (tb-OFF)
9. FC1(2,3) REAC - CL (O2,H2 tb-CL)
10. Perform LOSS OF 1 FC (2ND FC) (ORB PKT, PWRDN), then:
11. When FC1(2,3) COOL P decr to < 15:
12. FC1(2,3) - STOP (ΔP tb-bp or 1 sec)

EPS SSR-8 BUS LOADING - LRU SELECT

1	To load MAIN A, select:
	<p>NOTE Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed</p> <p>(L1)</p> <ul style="list-style-type: none"> 1. ● TOP EVAP HTR DUCT - A 2. ● AV BAY 1 FAN A - ON <ul style="list-style-type: none"> ● B - OFF 3. ● 3 FAN B - ON <ul style="list-style-type: none"> ● A - OFF 4. ● FREON PUMP LOOP 1 - A 5. ● 2 - B <p>(L2)</p> <ul style="list-style-type: none"> 6. ● FES FEEDLINE HTRA SUP - 1 7. ● B SUP - 2 <p>(R1)</p> <ul style="list-style-type: none"> 8. ● CRYO O2,H2 TK 1,2,3 HTR A (six) - AUTO (as reqd) ● CRYO O2,H2 TK 1,2,3 HTR B (six) - OFF <p>(A12)</p> <p>APU HTR</p> <ul style="list-style-type: none"> 9. ● GG/FP 1 - A AUTO 10. ● 3 - B AUTO 11. ● LUBE OIL LINE 1 - A AUTO 12. ● 3 - B AUTO 13. ● TK/FU LN/H2O 1A,3B (two) - AUTO <ul style="list-style-type: none"> ● TK/FU LN/H2O 1B,3A (two) - OFF <p>HYD HTR</p> <ul style="list-style-type: none"> 14. ● SPD BK A - AUTO <ul style="list-style-type: none"> ● B - OFF 15. ● BDY FLP A - AUTO <ul style="list-style-type: none"> ● B - OFF 16. ● ELEV A - AUTO <ul style="list-style-type: none"> ● B - OFF <p>HYD</p> <ul style="list-style-type: none"> 17. ● CIRC PUMP 3 - MNA <p>(A14)</p> <p>RCS/OMS HTR</p> <ul style="list-style-type: none"> 18. ● FWD RCS - A AUTO 19. ● L POD A - A AUTO <ul style="list-style-type: none"> ● B - OFF 20. ● R POD B - B AUTO <ul style="list-style-type: none"> ● A - OFF 21. ● OMS CRSFD LINES - A AUTO

2	To load MAIN B, select:
	<p>NOTE Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed</p> <p>(L1)</p> <ul style="list-style-type: none"> 31. ● TOP EVAP HTR DUCT - B 32. ● AV BAY 1 FAN B - ON <ul style="list-style-type: none"> ● A - OFF 33. ● 2 FAN A - ON <ul style="list-style-type: none"> ● B - OFF 34. ● FREON PUMP LOOP 1 - B 35. ● CABIN FAN B - ON <ul style="list-style-type: none"> ● A - OFF <p>(L2)</p> <ul style="list-style-type: none"> 36. ● FES FEEDLINE HTR A SUP - 2 <p>(R1)</p> <ul style="list-style-type: none"> 37. ● CRYO O2,H2 TK 1,2,3 HTR B (six) - AUTO (as reqd) ● CRYO O2,H2 TK 1,2,3 HTR A (six) - OFF 38. If MNC connected to FC1: <ul style="list-style-type: none"> ● Perform PWRDN, 1 FUEL CELL (ORBIT PKT, FLT SUPPL), then: <ul style="list-style-type: none"> ● PL PRI MNB - ON (tb-ON) ● MNC - OFF (tb- OFF) ● FC3 - OFF (tb-OFF) <p>(A12)</p> <p>APU HTR</p> <ul style="list-style-type: none"> 39. ● GG/FP 1 - B AUTO 40. ● 2 - A AUTO 41. ● LUBE OIL LINE 1 - B AUTO 42. ● 2 - A AUTO 43. ● TK/FU LN/H2O 1B,2A (two) - AUTO <ul style="list-style-type: none"> ● TK/FU LN/H2O 1A,2B (two) - OFF <p>HYD HTR</p> <ul style="list-style-type: none"> 44. ● SPD BK B - AUTO <ul style="list-style-type: none"> ● A - OFF 45. ● BDY FLP B - AUTO <ul style="list-style-type: none"> ● A - OFF 46. ● ELEV B - AUTO <ul style="list-style-type: none"> ● A - OFF <p>HYD</p> <ul style="list-style-type: none"> 47. ● CIRC PUMP 1 - MNB <p>(A14)</p> <p>RCS/OMS HTR</p> <ul style="list-style-type: none"> 48. ● FWD RCS - B AUTO 49. ● L POD B - B AUTO <ul style="list-style-type: none"> ● A - OFF 50. ● R POD A - A AUTO <ul style="list-style-type: none"> ● B - OFF 51. ● OMS CRSFD LINES - B AUTO

3	To load MAIN C, select:
	<p>NOTE Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed</p> <p>(L1)</p> <ul style="list-style-type: none"> 61. ● TOP EVAP HTR DUCT - C 62. ● AV BAY 2 FAN B - ON <ul style="list-style-type: none"> ● A - OFF 63. ● 3 FAN A - ON <ul style="list-style-type: none"> ● B - OFF 64. ● FREON PUMP LOOP 2 - A 65. ● CABIN FAN A - ON <ul style="list-style-type: none"> ● B - OFF <p>(L2)</p> <ul style="list-style-type: none"> 66. ● FES FEEDLINE HTR B SUP - 1 <p>(R1)</p> <ul style="list-style-type: none"> 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 <p>(A12)</p> <p>APU HTR</p> <ul style="list-style-type: none"> 68. ● GG/FP 2 - B AUTO 69. ● 3 - A AUTO 70. ● LUBE OIL LINE 2 - B AUTO 71. ● 3 - A AUTO 72. ● TK/FU LN/H2O 2B,3A (two) - AUTO <ul style="list-style-type: none"> ● TK/FU LN/H2O 2A,3B (two) - OFF <p>HYD</p> <ul style="list-style-type: none"> 73. ● CIRC PUMP 2 - MNC <p>(A14)</p> <p>RCS/OMS HTR</p> <ul style="list-style-type: none"> 74. ● L POD B - B AUTO <ul style="list-style-type: none"> ● A - OFF 75. ● R POD B - B AUTO <ul style="list-style-type: none"> ● 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 on-board 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 first Bus Loss SSR, EPS SSR-9, BUS LOSS IMMEDIATE ACTIONS, lists all the reconfig steps that need to be accomplished immediately following recognition of a bus loss. Following completion of the BUS LOSS IMMEDIATE ACTIONS, the remainder of the action contained in the BUS LOSS SSR should be accomplished as soon as practical. The BUS LOSS IMMEDIATE ACTIONS are identical to the BUS LOSS ACTIONS in the ORB PKT except for the order of the bus listings. The buses are listed in the following order: MNA, MNB, MNC, ESS, CNTL, AC. The following buses are not included in the BUS LOSS IMMEDIATE ACTIONS listings as no loss of equipment requires quick reconfig:

MNA MMC1, MMC3, AMC1, O14&A8, R1A1, A6&14, ML86B

MNB MMC1, MMC2, MMC3, MMC4, AMC2, R15, O15&A8, R1A1, A6&14, ML86B

MNC MPC3, APC3, FMC3, MMC2, MMC4, AMC3, O16RJD, R1A1, A6&14, 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 SSRs 10 thru 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, are repeated in the ACTIONS column for completeness. No trouble-shooting steps are listed since it is assumed 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, it 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

On-board 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 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, it is followed by '(2)'. If FSM is available in OPS 3 only or BFS only, it is followed by '(3)' or '(B)'. If FSM is available in OPS 3 and BFS, it is followed by '(3,B)'. Nothing is listed for an FSM if it is 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.

**EPS SSR-9
BUS LOSS IMMEDIATE ACTIONS**

**EPS
SSR-9**

1.1	<p>MNA DA1 (Entire Bus) (Includes AC1)</p> <p style="text-align: center;">NOTE UHF SPLX Hi Pwr Xmit lost</p> <p>O7 AFT L RCS MANF ISOL 5 - CL (tb-CL) R1 Perform FC1 SHUTDN (Cue Card), then PL CAB - MNB L1 IMU FAN B(C) - ON ✓AV BAY 1 FAN B - ON 3 FAN A - ON FREON PUMP LOOP 1 - B 2 - A TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B O6 ANNUN BUS SEL ACA 1 - MNB A12 APU HTR GAS GEN/FUEL PUMP 1 - B AUTO 3 - A AUTO TK/FU LINE/H2O SYS 1B,3A (two) - AUTO Perform LOSS OF VERNIERS (ORB OPS, RCS) Go to MAL, <u>EPS</u>, SSR-10</p>
1.2	<p>MNA FPC1</p> <p>Perform FC1 SHUTDN (Cue Card), then: Perform AC1 (2 or 3φs) IMMEDIATE ACTIONS 1.45 (omit SSR-110) Go to MAL, <u>EPS</u>, SSR-11</p>
1.3	<p>MNA MPC1</p> <p>L1 TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B R1 PL CAB - MNB Go to MAL, <u>EPS</u>, SSR-12</p>
1.4	<p>MNA APC4</p> <p>O7 AFT L RCS MANF ISOL 5 - CL (tb-CL) L1 TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B A12 APU HTR GAS GEN/FUEL PUMP 1 - B AUTO 3 - A AUTO TK/FU LINE/H2O SYS 1B,3A (two) - AUTO Perform LOSS OF VERNIERS (ORB OPS, RCS) Go to MAL, <u>EPS</u>, SSR-14</p>

EPS SSR-9 (Cont)

1.5	<p>MNA FLC1</p> <p style="text-align: center;">GNC 23 RCS ovrd F1 MANF STAT - CL Go to MAL, <u>EPS</u>, SSR-15</p>
1.6	<p>MNA ALC1</p> <p>O7 AFT L RCS MANF ISOL 5 - CL (tb-CL) L1 TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B A12 APU HTR GAS GEN/FUEL PUMP 1 - B AUTO 3 - A AUTO TK/FU LINE/H2O SYS 1B,3A (two) - AUTO Perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS</u>, SSR-16</p>
1.7	<p>MNA FMC1</p> <p>If reqd for att control: GNC 23 RCS ovrd F1 MANF STAT - OP Go to MAL, <u>EPS</u>, SSR-17</p>
1.8	<p>MNA R15 (R11 & 15 on 102)</p> <p style="text-align: center;"><u>NOTE</u> UHF SPLX Hi Pwr Xmit lost Go to MAL, <u>EPS</u>, SSR-21</p>
1.9	<p>MNA O14</p> <p>O6 ANNUN BUS SEL ACA 1 - MNB Go to MAL, <u>EPS</u>, SSR-23</p>
1.10	<p>MNB DA2 (Entire Bus) (Includes AC2)</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">CAUTION</p> <p>Do not sw S-BD PM CNTL to PNL if subsequent Fault Msg 'BCE STRG 3 NSP' or loss of comm</p> </div> <p>O7 AFT R RCS MANF ISOL 5 - CL (tb-CL) R1 Perform FC2 SHUTDN (Cue Card), then L1 CAB FAN A - ON IMU FAN A(C) - ON AV BAY 1 FAN A - ON 2 FAN B - ON FREON PUMP LOOP 1 - A TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A O6 ANNUN BUS SEL ACA 1 - MNA ACA 2/3 - MNC O17:C SIG CONDR FREON A - AC3 (Continued)</p>

EPS SSR-9 (Cont)

1.10	<p>MNB DA2 (Cont)</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 1 - A AUTO 2 - B AUTO TK/FU LINE/H2O SYS 1A,3B (two) - AUTO</p> <p>A1L If payload RF comm reqd: S-BD PL PWR SYS - 2 CNTL - PNL,CMD To reconfigure PSP: ✓MCC Perform LOSS OF VERNIERS (ORB OPS, RCS) Go to MAL, <u>EPS</u>, SSR-30</p>
1.11	<p>MNB FPC2</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"><p style="text-align: center;">CAUTION</p><p style="text-align: center;">Do not sw S-BD PM CNTL to PNL if subsequent Fault Msg 'BCE STRG 3 NSP' or loss of comm</p></div> <p>Perform FC2 SHUTDN (Cue Card), then:</p> <p>A1L If payload RF comm reqd: S-BD PL PWR SYS - 2 CNTL - PNL,CMD Perform AC2 (2 or 3φs) IMMEDIATE ACTION 1.49 (omit SSR-120), then: To reconfigure PSP: ✓MCC Go to MAL, <u>EPS</u>, SSR-31</p>
1.12	<p>MNB MPC2</p> <p>L1 TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A</p> <p>A1U KU PWR - OFF CNTL - PNL Go to MAL, <u>EPS</u>, SSR-32</p>
1.13	<p>MNB APC5</p> <p>O7 AFT R RCS MANF ISOL 5 - CL (tb-CL)</p> <p>L1 TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 1 - A AUTO 2 - B AUTO TK/FU LINE/H2O SYS 1A,2B (two) - AUTO Perform LOSS OF VERNIERS (ORB OPS, RCS) Go to MAL, <u>EPS</u>, SSR-34</p>

EPS SSR-9 (Cont)

1.14	<p>MNB FLC2</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"><p style="text-align: center;">CAUTION</p><p>Do not sw S-BD PM CNTL to PNL if subsequent Fault Msg 'BCE STRG 3 NSP' or loss of comm</p></div> <p style="margin-left: 40px;">GNC 23 RCS ovrd F2 MANF STAT - CL</p> <p>A1L If payload RF comm reqd: S-BD PL PWR SYS - 2 CNTL - PNL,CMD To reconfig PSP: ✓MCC Go to MAL, <u>EPS</u>, <u>SSR-35</u></p>
1.15	<p>MNB ALC2</p> <p>O7 AFT R RCS MANF ISOL 5 - CL (tb-CL) L1 TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A</p> <p>A12 APU HTR GAS GEN/FUEL PUMP1 - A AUTO 2 - B AUTO TK/FU LINE/H2O SYS 1A,2B (two) - AUTO</p> <p>Perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS</u>, <u>SSR-36</u></p>
1.16	<p>MNB FMC2</p> <p>If reqd for att control:</p> <p style="margin-left: 40px;">GNC 23 RCS ovrd F2 MANF STAT - OP</p> <p>Go to MAL, <u>EPS</u>, <u>SSR-37</u></p>
1.17	<p>MNB O15</p> <p>O6 ANNUN BUS SEL ACA 1 - MNA 2/3 - MNC</p> <p>Go to MAL, <u>EPS</u>, <u>SSR-45</u></p>

EPS SSR-9 (Cont)

1.18	<p>MNC DA3 (Entire Bus) (Includes AC3)</p> <p>R1 Perform FC3 SHUTDN (Cue Card), then</p> <p>L1 CAB FAN B - ON IMU FAN B (A) - ON H2O PUMP LOOP 1 - ON ✓AV BAY 2 FAN A - ON ✓3 FAN B - ON FREON PUMP LOOP 2 - B FLASH EVAP CNTLR PRI A - OFF PRI B - ON</p> <p>C3 S-BD PM CNTL - PNL, CMD AUD CTR - 1 GNC 23 RCS ovrd F4 MANF STAT - CL</p> <p>O6 ANNUN BUS SEL ACA 2/3 - MNB O17:C SIG CONDR FREON B - AC2</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 2 - A AUTO 3 - B AUTO TK/FU LINE/H2O SYS 2A,3B (two) - AUTO Perform LOSS OF VERNIERS, (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS SSR-50</u></p>
1.19	<p>MNC FPC3</p> <p>Perform FC3 SHUTDN (Cue Card), then:</p> <p>C3 S-BD PM CNTL - PNL, CMD GNC 23 RCS ovrd F4 MANF STAT - CL Perform AC3 (2 or 3Φs), IMMEDIATE ACTIONS 1.53 (omit SSR-130), then: Perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS SSR-51</u></p>
1.20	<p>MNC APC6</p> <p>L1 FLASH EVAP CNTLR PRI A - OFF PRI B - ON</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 2 - A AUTO 3 - B AUTO TK/FU LINE/H2O SYS 2A,3B (two) - AUTO Go to MAL, <u>EPS SSR-54</u></p>
1.21	<p>MNC FLC3</p> <p>C3 S-BD PM CNTL - PNL, CMD GNC 23 RCS ovrd F4 MANF STAT - CL Perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS SSR-55</u></p>

EPS SSR-9 (Cont)

1.22	MNC ALC3 L1 FLASH EVAP CNTLR PRI A - OFF PRI B - ON A12 APU HTR GAS GEN/FUEL PUMP 2 - A AUTO 3 - B AUTO TK/FU LINE/H2O SYS 2A,3B (two) - AUTO Go to MAL, <u>EPS</u> , SSR-56
1.23	MNC R15 C3 AUD CTR - 1 Go to MAL, <u>EPS</u> , SSR-61
1.24	MNC O16 O6 ANNUN BUS SEL ACA 2/3 - MNB Go to MAL, <u>EPS</u> , SSR-63
1.25	ESS 1BC DA1 (Entire Bus) <u>NOTE</u> Pri C/W Sys & Matrix lost (B/U C/W Tone remains) GPC 1,4 lost if pwr cycled OFF or ON Perform FC1 SHUTDOWN (Cue Card), then If the calling procedure is complete: Go to MAL, <u>EPS</u> , SSR-70
1.26	ESS 1BC MPC1 Perform FC1 SHUTDOWN (Cue Card), then Go to MAL, <u>EPS</u> , SSR-72
1.27	ESS 1BC FD Perform FC1 SHUTDOWN (Cue Card), then GPC 1,4 lost if pwr cycled OFF or ON Go to MAL, <u>EPS</u> , SSR-74

EPS SSR-9 (Cont)

1.28	<p>ESS 1BC O13&R15</p> <p>NOTE Pri C/W Sys and Matrix lost (B/U C/W Tone remains)</p> <p>Go to MAL, <u>EPS</u>, SSR-75</p>
1.29	<p>ESS 2CA DA2 (Entire Bus)</p> <p>NOTE C/W B PWR SPLY lost (Pri C/W remains) Fault Sum Msg must be reset to avoid C/W Tone masking. GPC 2,5 lost if pwr cycled OFF or ON</p> <p>C3 AUD CTR - 2 Perform FC2 SHUTDN (Cue Card), then If the calling procedure is complete: Go to MAL, <u>EPS</u>, SSR-80</p>
1.30	<p>ESS 2CA MPC2</p> <p>Perform FC2 SHUTDN (Cue Card), then Go to MAL, <u>EPS</u>, SSR-82</p>
1.31	<p>ESS 2CA FD</p> <p>Perform FC2 SHUTDN (Cue Card), then GPC 2,5 lost if pwr cycled OFF or ON Go to MAL, <u>EPS</u>, SSR-83</p>
1.32	<p>ESS 2CA O13&R15</p> <p>NOTE C/W B PWR SPLY lost (Pri C/W remains) Fault Sum Msg must be reset to avoid C/W Tone masking</p> <p>C3 AUD CTR - 2 Go to MAL, <u>EPS</u>, SSR-84</p>

EPS SSR-9 (Cont)

1.33	<p>ESS 3AB DA3 (Entire Bus)</p> <p>NOTE BFS engage capability lost Computer Status Matrix lost GPC 3 lost if pwr cycled OFF or ON</p> <p>Perform FC3 SHUTDOWN (Cue Card), then If the calling procedure is complete: Go to MAL, <u>EPS</u>, SSR-90</p>
1.34	<p>ESS 3AB MPC3</p> <p>Perform FC3 SHUTDOWN (Cue Card), then Go to MAL, <u>EPS</u>, SSR-92</p>
1.35	<p>ESS 3AB FD</p> <p>NOTE GPC 3 lost if pwr cycled OFF or ON BFS engage capability lost</p> <p>Perform FC3 SHUTDOWN (Cue Card), then Go to MAL, <u>EPS</u>, SSR-93</p>
1.36	<p>CNTL AB1</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"><p style="text-align: center;">CAUTION</p><p>Do not sw S-BD PM CNTL to PNL if pnl A1 Encryption switches in either T/R, RCV, or ALL. Will result in loss of all S-BD comm</p></div> <p>L1 TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B</p> <p>A12 APU HTR GAS GEN/FUEL PUMP1 - B AUTO 3 - A AUTO TK/FU LINE/H2O SYS 1B,3A (two) - AUTO</p> <p>Go to MAL, <u>EPS</u>, SSR-100</p>
1.37	<p>CNTL AB2</p> <p>L1 TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B</p> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">GNC 23 RCS</div> ovrld F1 MANF STAT - CL <p>A12 APU HTR GAS GEN/FUEL PUMP 1 - B AUTO TK/FU LINE/H2O SYS 1B,3A (two) - AUTO</p> <p>Go to MAL, <u>EPS</u>, SSR-101</p>

EPS SSR-9 (Cont)

1.38	<p>CNTL AB3</p> <p style="text-align: center;"><u>NOTE</u> CDR's BFS Engage cap lost</p> <p>L1 TOP EVAP HTR DUCT - B If HI LOAD EVAP ENA: HI LOAD DUCT HTR - B If reqd for att control: GNC 23 RCS ovrd F1 MANF STAT - OP</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 1 - A AUTO TK/FU LINE/H2O SYS 1B,3A (two) - AUTO</p> <p>A6U If DAP MAN MODE reqd: use aft station If BFS ENGAGE reqd: use PLT's RHC, then</p> <p>O6 GPC MODE 1,2,4 (three) - STBY,HALT BFS I/O RESET If encrypted (comm lost): S-BD PM CNTL - PNL, CMD Go to MAL, <u>EPS, SSR-102</u></p>
1.39	<p>CNTL BC1</p> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Do not sw S-BD PM CNTL to PNL if subseqent Fault Msg 'BCE STRG 3 NSP' or loss of comm</p> <p>O7,08 F,L,R RCS MANF ISOL 5 (three) - CL (tb-CL)</p> <p>L1 TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 1 - A AUTO 2 - B AUTO TK/FU LINE/H2O SYS 1A,2B (two) - AUTO</p> <p>A1L If payload RF comm reqd: S-BD PL PWR SYS - 2 CNTL - PNL,CMD To reconfigure PSP: ✓MCC Perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS, SSR-103</u></p>
1.40	<p>CNTL BC2</p> <p>O7,08 F,L,R RCS MANF ISOL 5 (three) - CL (tb-CL)</p> <p>L1 TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A</p> <p>C3 S-BD PM CNTL - PNL, CMD GNC 23 RCS ovrd F2 MANF STAT - CL</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 2 - B AUTO TK/FU LINE/H2O SYS 1A,2B (two) - AUTO</p> <p>C3 If DAP MAN MODE reqd: use fwd station Perform LOSS OF VERNIERS (ORB OPS, <u>RCS</u>) Go to MAL, <u>EPS, SSR-104</u></p>

EPS SSR-9 (Cont)

1.41	<p>CNTL BC3</p> <p>L1 TOP EVAP HTR DUCT - A If HI LOAD EVAP ENA: HI LOAD DUCT HTR - A If reqd for att control: GNC 23 RCS ovrd F2 MANF STAT - OP</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 2 - A AUTO TK/FU LINE/H2O SYS 1A,2B (two) - AUTO</p> <p>A6 If DAP MAN MODE reqd: use aft station Go to MAL, <u>EPS</u>, SSR-105</p>
1.42	<p>CNTL CA1</p> <p><u>NOTE</u> GPC 3,5 - No BFS Engage cap ✓MCC for possible move of BFS function</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 2 - A AUTO 3 - B AUTO TK/FU LINE/H2O SYS 2A,3B (two) - AUTO Go to MAL, <u>EPS</u>, SSR-106</p>
1.43	<p>CNTL CA2</p> <p>L1 FLASH EVAP CNTLR PRI A - OFF PRI B - ON GNC 23 RCS ovrd F3 MANF STAT - CL</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 3 - B AUTO TK/FU LINE/H2O SYS 2A,3B (two) - AUTO</p> <p>C3 If DAP MAN MODE reqd: use fwd station Go to MAL, <u>EPS</u>, SSR-107</p>
1.44	<p>CNTL CA3</p> <p>GNC 23 RCS ovrd F4 MANF STAT - CL</p> <p>A12 APU HTR GAS GEN/FUEL PUMP 3 - A AUTO TK/FU LINE/H2O SYS 2A,3B (two) - AUTO Go to MAL, <u>EPS</u>, SSR-108</p>

EPS SSR-9 (Cont)

1.45	<p>AC1 (2 or 3Φs)</p> <p>R1 Perform FC1 SHUTDN (Cue Card), then:</p> <p>L1 IMU FAN A - OFF B(C) - ON AV BAY 1 FAN A - OFF √B - ON 3 FAN A - ON B - OFF FREON PUMP LOOP 1 - B 2 - A If the calling procedure is complete: Go to MAL, <u>EPS SSR-110</u></p>
1.46	<p>AC1ΦA</p> <p>L4 cb UTIL PWR F1/MO52J AC1 - op O6 LTG PNL L/CTR - OFF O8 LTG PNL R INST - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-111</u></p>
1.47	<p>AC1ΦB</p> <p>O6 LTG PNL L/OVHD - OFF O8 LTG PNL NUMERIC - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-112</u></p>
1.48	<p>AC1ΦC</p> <p>O7 √TACAN 1 MODE - OFF L4 cb UTIL PWR F1/MO52J AC1 - op If the calling procedure is complete: Go to MAL, <u>EPS SSR-113</u></p>
1.49	<p>AC2 (2 or 3Φs)</p> <p>R1 Perform FC2 SHUTDN (Cue Card), then:</p> <p>L1 CAB FAN A - ON B - OFF IMU FAN A(C) - ON B - OFF AV BAY 1 FAN A - ON B - OFF 2 FAN A - OFF B - ON FREON PUMP LOOP 1 - A O17:C SIG CONDR FREON A - AC3 If the calling procedure is complete: Go to MAL, <u>EPS SSR-120</u></p>

EPS SSR-9 (Cont)

1.50	<p>AC2ΦA</p> <p>O8 LTG PNL R OVHD - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-121</u></p>
1.51	<p>AC2ΦB</p> <p>O17:C SIG CONDR FREON A - AC3 O6 LTG INST OVHD - OFF O8 LTG PNL R - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-122</u></p>
1.52	<p>AC2ΦC</p> <p>O7 ✓TACAN 2 MODE - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-123</u></p>
1.53	<p>AC3 (2 or 3Φs)</p> <p>R1 Perform FC3 SHUTDN (Cue Card), then: L1 CAB FAN A - OFF B - ON IMU FAN B(A) - ON C - OFF H2O PUMP LOOP 1 - ON 2 - GPC ✓AV BAY 2 FAN A - ON B - OFF 3 FAN A - OFF ✓B - ON FREON PUMP LOOP 2 - B O17:C SIG CONDR FREON B - AC2 If the calling procedure is complete: Go to MAL, <u>EPS SSR-130</u></p>
1.54	<p>AC3ΦA</p> <p>If the calling procedure is complete: Go to MAL, <u>EPS SSR-131</u></p>
1.55	<p>AC3ΦB</p> <p>O17:C SIG CONDR FREON B - AC2 O6 LTG INST L/CTR - OFF R10 MS LTG PNL - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-132</u></p>
1.56	<p>AC3ΦC</p> <p>O7 ✓TACAN 3 MODE - OFF A6U OS LTG PNL - OFF If the calling procedure is complete: Go to MAL, <u>EPS SSR-133</u></p>

**EPS MNA
SSR 10-26**

**EPS SSR-10
BUS LOSS: MNA DA1**

(Includes all MNA sub-buses and AC)

EPS MNA
SSR 10-26

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<ul style="list-style-type: none"> Perform FC1 SHUTDN, EPS SSR-2 (FC SHUTDN Cue Card) 	1 FC1 PUMPS, pH Snsr Cell Perf Monitor Purge Vlv O2,H2 Flow Xdcrs	MASTER ALARM Light/ Tone - on SM ALERT Light/Tone - on	① May be repwr'd after AC Pwr Transfer Cable connected
<ul style="list-style-type: none"> Perform LOSS OF 1 FC (ORB PKT, PWRDN) 		(F7) CRT 1 blanks CW CABIN ATM It - on CW FREON LOOP It - on CW AV BAY/CAB AIR It - on	② Pwrs PL Timing buffer and VTR
(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 O2,H2 MANF VLV TK1,2 (four) - OP 	2 MNA pwr to CABPL1,2,3 buses AC1 φA,φB,φC Inverters	CW MN BUS UNDERVOLT It - on CW AC VOLT It - on CW FC PUMP It - on CW RCS JET It - on CW H2O LOOP It - on EVENT TIMER ind - blank MPS PRESS ind (eight) - Red Flag visible	③ Indications do not appear until jet commanded
If only two CRYO TK sets or TK3 and/or 4 depleted (Q < 10%) (R1) <ul style="list-style-type: none"> O2,H2 TK1,2 HTRS A (four) - OFF O2,H2 TK1,2 HTRS B (four) - AUTO 	Cryo O2,H2 Tk1 Htrs A	(COMM LOST) MS,OS audio lost Xmit to gnd via UHF	
If three CRYO TK sets and TK3 not depleted (Q > 10%), complete steps above plus: (R1) <ul style="list-style-type: none"> O2,H2 TK3 HTR A(two) - OFF O2,H2 TK3 HTR B (two) - AUTO 	Cryo O2,H2 Tk3 Htrs A	(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	
If four CRYO TK sets and TK3,4 not depleted (Q > 10%) complete all steps above plus: (A11) <ul style="list-style-type: none"> CRYO TK4 HTR O2,H2 A (two) - OFF CRYO TK4 HTR O2,H2 B (two) - AUTO 		(F9) AC1 φA,φB,φC volts ind < 90 DC VOLTS MNA ind - OSL	
(R2) <ul style="list-style-type: none"> BLR CNTLR/HTR - A - B 	Hyd H2O Blr Cntlr B Cntlr A	(FSMs) S86 APU/HYD HYD S86 APU/HYD W/B SM 0 THRM HYD (B) S66 AV BAY FAN S66 CABIN FAN S66 CABIN IMU (2) S66 CABIN PPO2 S66 CABIN PRESS SM1 EMER dP/dT BU (B) S67 AC VOLTS 1 S69 FC PUMP 1 S69 FUEL CELL S88 FREON FLOW 1 S88 H2O PUMP P 2 I/O ERROR CRT 1 S67 MAIN BUS V S88 THERMAL FRN (2) S88 THERMAL H2O (2) L RCS D,L JET	
	Av Bay 3 Agent discharge capability	If ADTA 1, MLS 1, - STAR TRKR pwr'd: 'BCE STRG 1 ADTA' (3,B) 'BCE STRG 1 MLS' (3) 'BCE STRG 1 STKR'	
If EMU(s) in battery charge mode: (AW18H) <ul style="list-style-type: none"> PWR/BATT CHGR EMU 1(2) BUS SEL - MNB 	EMU 1,2 PWR/BATT Charger MNA pwr	(Continued)	(Continued)

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR</p> <p>4 • GAS GEN/FUEL PUMP 1 - B AUTO</p> <p>4 • GAS GEN/FUEL PUMP 3 - A AUTO</p> <p>• LUBE OIL LINE 1 - B AUTO</p> <p>• LUBE OIL LINE 3 - A AUTO</p> <p>APU HTR TK/FU LINE/H2O</p> <p>4 • SYS 1B - AUTO</p> <p>4 • SYS 1A - OFF</p> <p>4 • 3A - AUTO</p> <p>• 3B - OFF</p> <p>HYD HTR</p> <p>• RUD SPD BK B - AUTO</p> <p>• A - OFF</p> <p>• BDY FLP B - AUTO</p> <p>• A - OFF</p> <p>• ELEV B - AUTO</p> <p>• A - OFF</p> <p>HYD CIRC</p> <p>• PUMP 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>1 Lube Oil Line htrs A</p> <p>3 Lube Oil Line Htrs B</p> <p>1 Tk/Fu Ln Htrs A</p> <p>1 Fu Pump/GG H2O Htrs A</p> <p>1 Inj H2O Htrs A</p> <p>3 Tk/Fu Ln Htrs B</p> <p>3 Fu Pump/GG H2O Htr 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>(L2)</p> <p>5 CAB VENT ISOL tb - bp</p> <p>5 VENT tb - bp</p> <p>6 O2 SYS 1 SPLY tb - CL</p> <p>6 N2 SYS 1 SPLY tb - bp</p> <p>6 N2 SYS 1 REG INLET tb - bp</p> <p>(O1)</p> <p>AIR TEMP AV BAY 2 ind - 45 degF</p> <p>H2O PUMP OUT PRESS LOOP 2 ind - 0 psia</p> <p>O2/N2 FLOW SYS 1 ind - 0 pph</p> <p>CAB PRESS ind - 0 psia</p> <p>PP02 SNSR A ind - 0 psia</p> <p>(O3)</p> <p>RCS/OMS Prplt Qty Gage blanks</p> <p>Mission Timer blanks</p> <p>(F6)</p> <p>HSI,AMI,AVVI,SPI Flags visible</p> <p>(F8)</p> <p>HYD QTY 1 ind - 0%</p> <p>APU H2O QTY 3 ind - 0%</p> <p>(R1)</p> <p>FC1 COOL PUMP ΔP tb - bp</p> <p>(R4)</p> <p>8 HYD LG HYD ISOL VLV 1 tb - OP</p> <p>8 HYD MPS/TVC ISOL VLV SYS 1 tb - CL</p> <p>(O7)</p> <p>10 AFT L,R RCS He PRESS A (two) tb - bp</p> <p>AFT L,R RCS TK ISOL 3/4/5 A tb-bp (if vlv in CL position)</p> <p>(O8)</p> <p>10 FWD RCS He PRESS A tb - bp</p> <p>8 FWD RCS TK ISOL 3/4/5 tb - bp</p> <p>8 FWD RCS MANF ISOL 1 tb - bp</p> <p>(R12L)</p> <p>8 SPLY H2O TKA INLET tb - bp</p> <p>8 SPLY H2O TKB OUTLET tb - bp</p> <p>(R13L)</p> <p>14 RAD CNTL STBD, PORT (two) tb - bp</p> <p>(R13L)</p> <p>8 MMU GN2 SPLY ISOL VLV A tb - bp</p> <p>(A4)</p> <p>EVENT TIME ind - blank</p>	<p>① May be repwr'd after AC Pwr Transfer Cable connected</p> <p>④ 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>⑤ After MET 3:30, tb already bp</p> <p>⑥ Vlv holds position. N2 SYS 2 remains</p> <p>⑦ May be repwr'd after AC Pwr Transfer Cable connected. H2O Loop 2 Byp vlv holds position</p> <p>⑧ Vlv holds position</p> <p>⑨ H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</p> <p>⑩ Vlv holds position. Man OP capability remains</p> <p>⑪ AV Bay 2 Fan ΔP, Air Out Temp snrs lost</p> <p>⑫ Crew and ground have lost PPO2 XDRCR if Cabin Air Sig Cond not recovered</p> <p>⑬ Use streamers (if flown) or monitor by feel during wake period if Cabin Air Sig Cond not recovered</p> <p>⑭ Rad Dpy/Sto and Lat Mtrs 1 lost. Lat Mtrs 1 may be regained via AC Pwr Transfer Cable, but mtrs continue to run until Sys A Lat Cntl sw placed OFF</p>
<p>(L1)</p> <p>• HUMIDITY SEP A - OFF</p> <p>• √B - ON</p> <p>• IMU FAN A - OFF</p> <p>• B(C) - ON</p> <p>• H2O PUMP LOOP 1 - ON, B</p> <p>• H2O PUMP LOOP 2 - OFF</p> <p>• AV BAY 1 FAN A - OFF</p> <p>• √B - ON</p> <p>• AV BAY 2 FAN (two) - ON</p> <p>• AV BAY 3 FAN A - ON</p> <p>• B - OFF</p> <p>• FREON PUMP LOOP 1 - B</p> <p>• 2 - A</p> <p>• RAD CNTLR LOOP (two) - AUTO A</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>Humidity Sep A</p> <p>IMU Fan A</p> <p>7 H2O Loop 2 Byp Cntrl, Sig</p> <p>9 Cond</p> <p>H2O Loop 2 Byp Vlv pwr</p> <p>2 Pump GPC Cntl</p> <p>1 Pump A</p> <p>Av Bay 1 Fan A</p> <p>1 Av Bay 2 Sig Cond, Xdcrs</p> <p>11 (ECLS SC3)</p> <p>Av Bay 3 Fan B</p> <p>Freon Loop 1 Pump A</p> <p>2 Pump B</p> <p>1 Rad Cntrl B</p> <p>2 Rad Cntrl B</p> <p>FES Pri B Cntrl</p> <p>Top Evap L Noz Htr A</p> <p>Top Evap Duct L,R,Fwd,Aft Htrs A</p> <p>Hi Load Duct Outbd,Inbd Noz Htrs A</p> <p>1 Cabin Air Sig Cond (ECLS SC6)</p> <p>FES H2O Fdln A Htrs 1 (all)</p> <p>B Htrs 2 (all)</p>	<p>(L2)</p> <p>FLASH EVAP FDLN</p> <p>• HTR A SPLY - 2</p> <p>• B SPLY - 1</p>	<p>⑬ Use streamers (if flown) or monitor by feel during wake period if Cabin Air Sig Cond not recovered</p> <p>⑭ Rad Dpy/Sto and Lat Mtrs 1 lost. Lat Mtrs 1 may be regained via AC Pwr Transfer Cable, but mtrs continue to run until Sys A Lat Cntl sw placed OFF</p>
<p>12 • Maintain LIOH Canister(s) change out per cue card and CAP</p> <p>During sleep periods:</p> <p>13 (L1)</p> <p>• CAB FAN (two) - ON</p>			
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A8L) ● PORT RMS HTR A - OFF ● HTR B - AUTO	15 Port RMS: Primary pwr 14 MCIU 16 Mid MRL Mtr 1 16 Aft MRL Mtr 2 15 Shldr Brace Rel Htr A D&C Primary Itg	14 (A8U) Port 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	8 Vlv holds position 10 Vlv holds position. Man OP capability remains 14 All brakes ON and safing initiated 15 B/U pwr remains for RMS ops
(F8) ● HSI SEL SOURCE - (other than MLS, 1) ● RDR ALTM - 2 ● Use R AMI, AVVI, HSI	MLS 1 Radar Altm 1 L INST pwr (MPS Meters, SPI, L HSI, AMI, AVVI)	(A8L) Port RMS: DPY/STO tb - bp R-F-L MID tb - bp Reten Latches tb - bp	16 Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
(O6) ● ANNUN BUS SEL ACA 1 - MNB	ACA 1 MNA pwr	If cooling by FES B only: 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'	
(O7) ● AFT L RCS MANF ISOL 5 - CL (tb-CL)	RCS Manf L5 RJD pwr (L5L, L5D)	(ML31C) WASTE H2O TK 1 VLV tb - bp WASTE H2O DUMP ISOL VLV tb - bp WASTE H2O DUMP VLV tb - bp SPLY H2O TKD OUTLET tb - bp	17 Manifold status not automatically declared closed. Fail-offs will occur when commended
● For attitude control, LOSS OF VERNIER (ORB OPS, RCS)	RCS Manf F1 RJD pwr (F1F, F1L, F1U, F1D)	(AW82D) EMU 2 H2O SPLY, WASTE tb (two) - CL	18 Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge
For RCS Loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O7) ● AFT L RCS He PRESS A, B ● R RCS He PRESS A	10 L, R, F RCS He Pr Isol A GPC Cntl and man CL capability 20 Aft L RCS He Pr Isol B man OP capability 20 L, R, F RCS Manf Isol 5 man OP capability	If OMS GmbI Cmd Abs value > 2 deg: C/W OMS TVC It - on 'L OMS GMBL' (3, B)	19 Do not reconfig for reg switch or I'CNT procedures
(O8) ● FWD RCS He PRESS A	8 Fwd RCS Manf Isol 1 Cntl 8 TK Isol 3/4/5 Cntl	If OMS GmbI Cmd Abs value > 2 deg and Sec TVC selected: C/W OMS TVC It - on 'R OMS GMBL' (3, B)	20 Vlv holds position. Man CL and full GPC cntl remains
GNC 23 RCS ● Reprioritize L, R Manf 2 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc	Aft RCS L, R Jet 2 Htrs Fwd RCS Jet 1 Htrs	If Hum Sep A ON: 'S66 CABIN' (2)	21 Current Snsr 2 remains
(O14:C) ● cb MNA CRYO O2 HTR TK1 SNSR 1 - op	21 Cryo O2 Tk 1 Htr Current Snsr 1	If H2O Loop 1 Pump A active: 'S88 H2O PUMP P 1'	22 Only listen capability restored for MS ATU (CCU only)
(C2) ● L CRT SEL - 3 ● GPC/CRT 01 EXEC	DEU/CRT 1	(O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia	23 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
SM1 OPS UTILITY (G2, G8, S2) MMU 2 ASSIGN ● GNC ITEM 2 EXEC ● SM ITEM 4 EXEC ● PL ITEM 6 EXEC	MMU 1	(R2) If APUs active, and using BLR CNTLR/HTR 1B or 3A: C/W APU TEMP It - on after ~ 2 min	
(R12U) ● FC H2O LINE HTR - B AUTO ● FC H2O RELIEF HTR - B AUTO ● MS AUD CNTL - PS	23 FC H2O Line Htrs A FC H2O Relief Htrs A MS ATU, CCU & FD Spkr	If first AA failure and S/W Processing Accel data: RM FAIL ACC (3)	
		STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec	
		L ADP deploy time incr from 15 to 30 sec	
(Continued)	(Continued)	(Continued)	

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L9) ● PS AUD PNL config for use		CCTV Video and TV Annun Its lost if MNA selected for VCU CCTV Mon 1 lost	8 Vlv holds position
(A14) RCS/OMS HTR ● FWD RCS - B AUTO ● L POD (two) - A OFF, B AUTO ● R POD (two) - B OFF, A AUTO ● OMS CRSFD LINES - A OFF, B AUTO	24 Fwd RCS A Htrs 24 L Pod A Htrs (all) 25 R Pod B Htrs (partial) 24 OMS Crsfd Ln A Htrs		21 Current Snsr 2 remains 24 Htr B remains 25 Htr A remains 26 Maintains He Isol redundancy
(ML86B:A) ● cb MNB H2O LINE HTR B - cl	H2O Line Htrs A: Waste Dump Line Htr A Sply Dump Line Htr A Vac Vent Line Htr A		27 Man Cntl remains. Redundant Isol remains
(ML86B:D) cb MNB ● MMU PORT, STBD HTR B (two) - cl	24 MMU Port, Stbd Htr A		28 Lost TM: GNC SYS SUMM 2
(ML86B:F) ● cb MNA CRYO O2 HTR TK3 SNSR 1 - op	21 Cryo O2 Tk3 Htr Current Snsr 1		L OMS N2 P VLV: If ENG - ARM/PRESS, assume vlv OP L OMS ENG VLV 1: Assume Vlv 1 status same as vlv 2
For PLBD ops: ● OP/CL Drs in man mode	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	SM (BFS SM 63) PL BAY DOORS	29 Vlv fails closed
26 Prior to using L(R) OMS: (O8)	27 L,R OMS He Pr Isol A GPC OP Cntl	If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	
28 L(R) OMS He PRESS/VAP ● ISOL A - OP ● B - GPC	27 L,R OMS He Vap Isol 1 GPC OP Cntl L OMS GN2 Press Vlv OP sig	During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left	
GNC XXXXX MNVRYYYYY (3,B) Sel L OMS SEC: ● OMS L GMBL SEL - ITEM 30 EXEC Sel R OMS PRI: ● OMS R GMBL PRI - ITEM 29 EXEC	L OMS Pri TVC R OMS Sec TVC	During Rad Dpy/Sto ops: (R13L) RAD LAT CNTL tbs (two) indicate single mtr ops	
If Waste H2O Dump reqd: ● Perform WASTE H2O SYS BACKUP DUMP (IFM)	8 Waste H2O: Dump Vlv Cntl Dump Noz Htr		
If on PCS1: ● Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3	29 O2/N2 Cntl Sys 1: 29 O2/N2 Sys 1 Flow Xdcrs 29 O2 Sys 1 Sply Vlv Cntl 29 N2 Sply Vlv 1 Cntl 29 N2 Reg Inlet Vlv 1 Cntl 29 O2 Xovr Vlv 1 OP cabability O2/N2 Cntl Vlv 1 man Cntl PPO2 Snsr A		
(Continued)	(Continued)		

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

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS	NOTES
			Cabin Press Snsr Emer dP/dT B/U comp		<p>① May be repwrd after AC Pwr Transfer Cable connected</p> <p>③① Lose Auto Temp Cntrl via Cntrl 2 and H2O Loop 2 Cabin Hx In Temp snsr. Hx Byp vlv holds position. May be repwrd after AC Pwr Transfer Cable connected</p> <p>③② Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively</p> <p>③③ Sys A Sec Cntrl man on capability remains</p>
1	<p>If Cab Temp Cntrl 2 active: (L1)</p> <ul style="list-style-type: none"> • CAB TEMP CNTLR - OFF <p>(MD44F)</p> <ul style="list-style-type: none"> • 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 	30	Cabin Temp Cntrl 2 and Hx Byp Vlv Mtr 2		
1	<p>(R13U)</p> <p>H2O LOOP 2 OUT P</p> <ul style="list-style-type: none"> • CW PARAM SEL tw - 115 • PARAM - INH • CW PARAM SEL tw - >119 				
31	<p>SM 60 TABLE MAINT</p> <ul style="list-style-type: none"> • Inhibit 0612705, 0612700, 0612740, 0612710 <p>If reqd during entry (< 120K ft): (L1)</p> <ul style="list-style-type: none"> • NH3 CNTLR B - PRI/GPC <p>(ML31C)</p> <ul style="list-style-type: none"> • VAC VENT ISOL VLV BUS SEL - MNB <p>(WCS)</p> <ul style="list-style-type: none"> • FAN SEP - 2 • HOSE BLOCK - SEP 2 <ul style="list-style-type: none"> • Perform AC POWER TRANSFER CABLE, <u>EPS SSR-200</u> 				
		32	NH3 Sys A Pri Cntrl		
			Vac Vent Isol Vlv MNA Cntrl		
			WCS Fan/Sep 1 WCS Sep Fan 1 Mtr Relay		

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

	BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
33	(C2) ● CRT 1 PWR - OFF			<p>33 AC1 Bus Isolation accomplished in MNA DA1 ACTIONS column prior to connecting AC Pwr Transfer Cable. For listing of AC1 ISOLATION STEPS, see AC1 SSR BUS ISOLATION column</p> <p>34 Redundant pwr source remains for equipment</p> <p>35 H2O Loop 1 Intchr Flow rate and IMU Fan ΔP Snrs lost</p> <p>36 Cabin Smoke Detector remains</p> <p>37 Cntrlr A remains</p> <p>38 Six vlvs fail to non-isolation position</p>
	(F6) ● INST PWR - OFF			
	(O6) ● STAR TRKR PWR -Z - OFF	-Z Star Trkr Dr OP capability -Z Star Tracker		
	(O8) ● RADAR ALTM 1 - OFF ● MLS 1 - OFF			
34	(O14:B) cb MNA ● OI SIG CONDR OF 1/4 A - op			
34	● OI SIG CONDR OM 1/2 A - op			
34	● OI MDM OF 1/2 A - op			
34	● 3/4 A - op			
	● OI H2O BYP LOOP 1 SNR - op	35 H2O Byp Loop 1 Snr (ECLS SC11)		
	● MNC CONTR - op ● MSN TIMER FWD - op ● EVENT TIMER AFT - op	Fwd Mission Timer Aft Event Timer		
36	(O14:C) cb MNA ● SMOKE DETN L/R FLT DK - op	36 L,R Flt Dk Smoke Detectors		
	● SMOKE DETN BAY 2A/3B - op	Av Bay 2 Smoke Detector A 3A Smoke Detector B		
	● FIRE SUPPR BAY 3 - op			
	● UTIL PWR O19/MO52J - op	MNA Utility pwr		
	● FLOOD L CNSL - op	L Console Floodlt		
	● ANNUN FWD ACA 1 - op			
37	(O14:D) cb MNA ● FREON RAD CNTLR 1 - op			
37	● FREON RAD CNTLR 2 - op			
	● GPS PRE AMPL UC - op ● LC - op			
	● N2 SPLY 1 - op			
	● O2/N2 CNTLR 1 - op			
	● O2 XOVR 1 - op			
	● N2 REG INLET 1 - op			
	● CAB VENT - op	Cabin Vent Vlv		
	● VENT ISOL - op	Vent Isol		
34	(O14:E) cb MNA ● RADAR ALTM 1 - op			
34	● MLS 1 - op	ADTA 1		
	● ADTA 1 - op	AA 1		
	● STAR TRKR -Z - op			
	● ACCEL 1 - op			
	● DDU L - op			
	● AFT - op			
	● INST L/CTR - op			
	● NWS - op	NWS		
	(O14:F) ● MMU 1 - OFF			
		38 ATVC 2 Isol ME		
	(Continued)	(Continued)		

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R4) ● MPS ENG CNTLR HTR CTR - OFF	MPS Ctr Eng Cntrlr Htr		39 Lose capability to xmit to gnd from UHF
(R12U) ● FC PURGE VLV 1 - CL ● STARTUP HTR 1 - ENA	FC1 Startup Htr Inh capability		40 GCIL also pwr'd via MNC cb
OV102 only (R15:A) cb MNA ● AUD MS/OS - op ● MIDDECK CCU - op	OV102 only MS ATU OS SMU OS ATU MIDDECK CCU ATU		41 MNB pwr may be selected via TV pwr sw (pnl A7) or GCIL if req'd
All except OV102 (R15:A) ● cb MNA AUD MS/OS - op	All except OV102 MS ATU OS SMU		
All Vehicle (R15:B) cb MNA ● UHF - op ● GCILC - op ● CNTL BUS BC1/2/3 - op	All Vehicle 39 UHF Splx Pwr Amp 40 GCIL MNA pwr MNA pwr for Cntl BC1,2,3 Buses		
(R15:D) cb MNA ● TV C AFT BAY CAMR/ PAN-TILT - op ● TV C AFT BAY CAMR HTR - op ● TV C AFT BAY PAN - TILT HTR - op ● TV CONTR UNIT - op ● MON 1 - op	Aft Bay Camr/Pan-Tilt Camr Htr Aft Bay Camr Pan-Tilt Htr 41 Video Cntl Unit MNA pwr CCTV Mon 1		
(R15:E) cb MNA ● PS FLOOD - op ● STBD RMS TV CAMR/ PAN-TILT - op ● STBD RMS TV CAMR HTR - op ● STBD RMS TV PAN-TILT HTR - op	PS Floodlt		
(A7U) PL BAY ● FLOOD AFT STBD - OFF ● FWD PORT - OFF ● DOCKING - OFF ● RMS SPOT PORT - OFF	PLB Aft Stbd Floodlt Fwd Port Floodlt Docking Floodlt Port RMS Spot lt		
(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) - OFF	MNA FMC1 Bus pwr AMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr		
(Continued)	(Continued)		

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(ML86B:A)</p> <ul style="list-style-type: none"> • 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 	<p>8 Sply H2O TK A Inlet Vlv Cntl</p> <p>8 Sply H2O TKB Outlet Vlv Cntl</p>		<p>8 Vlv holds position</p>
<p>(ML86B:B)</p> <ul style="list-style-type: none"> • cb MNA WASTE H2O TK1 VLV - OP • cb MNA SUPPLY 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 	<p>8 Waste H2O TK1 Inlet Vlv Cntl</p> <p>8 Sply H2O TKD Outlet Vlv Cntl</p> <p>8 Waste H2O Dump Isol Cntl</p> <p>WCS Press Xdcr</p>		<p>42 Htr B remains</p> <p>43 Buses remain pwr'd</p> <p>44 CAUTION No purge. Wait 10 min between burns</p> <p>45 Redundant coils remain</p> <p>46 ✓MCC for OMS Qty's. Aft QTYs are frozen on</p>
<p>(ML86B:D)</p> <ul style="list-style-type: none"> • cb MNA MMU • PORT/STBD HTRA (two) - op • GN2 SPLY ISOL VLV A - op 	<p>42 MMU Port,Stbd Htr A</p> <p>8 GN2 Sply Isol Vlv A</p>		<p>GNC SYS SUMM 2</p> <p>47 Pwr Sply B remains</p>
<p>(ML86B:F)</p> <ul style="list-style-type: none"> • cb MNA FLOODS • MIDDECK 1/8 - op • WMC/MO13Q - op • AIRLK 1 - op 	<p>Middeck floodlts 1,8</p> <p>WMC Floodlt, MO13Q pnt It 2</p> <p>Airrk Floodlt 1</p>		<p>48 Vlv fails closed. Redundant vlv remains</p> <p>49 Pwr Sply A remains</p>
	<p>CDR HUD</p> <p>43 MNA pwr to AUXPLA Bus</p> <p>43 MNA pwr to CNTL Buses AB1,AB2,AB3,CA1,CA2,CA3</p> <p>MNA pwr to ESS2CA, ESS3AB</p> <p>Port Rad Dpy/Sto Mtr 1</p> <p>Stbd Rad Dpy/Sto Mtr 1</p> <p>Fwd RCS Jet 1 Htrs</p> <p>44 L OMS Purge Vlv 1;2</p> <p>45 L OMS Eng Pr Vlv coil 1 and Cntl Vlv 1,2 Coils 1</p> <p>45 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2</p> <p>46 OMS QTY Gaging</p> <p>47 APU 1 Cntlr Pwr Sply A</p> <p>48 1 Fu Tk Vlv A</p> <p>49 3 Cntlr Pwr Sply B</p> <p>48 3 Fu Tk Vlv B</p> <p>8 LG Hyd Sys 1 Isol Cntl</p> <p>Dump Vlv (Vlv N.C.)</p> <p>Control Vlv</p> <p>50 No WOW Relay K9</p> <p>51 TVC Hyd Sys 1 Isol Cntl</p>		<p>50 Lose Hyd deploy capability for all Ldg Grs. Pyro backup release sys will deploy Ldg Grs</p> <p>51 Brake/Skid Cntl Box A enabled before WOW</p>
	<p>(Continued)</p>		

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	-Y Star Trkr Dr Sys 1 OP/CL capability LH Vents 4,7,5,6,8,9 Mtrs 1 RH Vents 1,2,3,5,6 Mtrs 1 L ADP Deploy Mtr 1 Htr Cntrl 1		8 Vlv holds position
52			44 CAUTION No purge. Wait 10 min between burns
53			
54	Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtr Man Cntl		52 Mtr 2 remains
55	Atm Press Cntl O2 Sys 1 Sply Vlv Cntl		53 Htr Cntrl 2 remains
56	EMU 2 Sply and Waste H2O Vlv Cntl		54 Cntrls A, B Rad Byp Vlv Mtrs Auto Cntrl and Cntrl A Rad Byp Vlv Mtr Man Cntl remains
57	EMU 1,2 Pwr/Batt Chgr MNA pwr		55 Vlv holds position. N2 Sys 2 remains
	PL Reten Sys A Rel/Lat Mtrs		56 Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/ recharge
	MPS: Ctr Eng Cntrl Ch A R Eng Cntrl Ch B Ctr Eng He Intercon Outlet Vlv Ctr Eng He Isol A Pneu He Isol 1 He Sply Blowdn Vlv 1,2 OP capability Prplt Topping Vlv LH2 MPS Meters Prplt F/D Inbd LH2 Vlv Prplt Hi Pt Bid LH2 Vlv		57 MNB pwr select capability remains
44			58 Vlv fails closed. Redundant vlv remains
58			59 Htr B remains
58			60 Redundant mtrs remain
59			61 Sys B remains
44			
8			
44			
60	ET Door Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1		
61	KU-BD Jettison Sys A		
	Tacan 1		

**EPS SSR-11
BUS LOSS: MNA FPC1**

(Includes MNA FLC1, MNA FMC1, AC1)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 <ul style="list-style-type: none"> Perform FC1 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then: 	2 <ul style="list-style-type: none"> FC1 Pumps & pH Snsr 	MASTER ALARM Light/Tone - on CRT 1 blanks	<ol style="list-style-type: none"> TIME CRITICAL FC1 must be shut down within 9 min to avoid a potentially hazardous condition
(R1) <ul style="list-style-type: none"> cb AC CONTR AC1 (three) - cl INV/AC BUS 1 - OFF (tb-OFF) INV PWR 1 - OFF (tb-OFF) cb AC CONTR AC1 (three) - op 	<ul style="list-style-type: none"> AC1 ΦA, ΦB, ΦC inverters 	(F7) <ul style="list-style-type: none"> 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 	<ol style="list-style-type: none"> Will be repwr'd after AC Pwr Transfer Cable connected
(R2) <ul style="list-style-type: none"> BLR CNTLR/HTR 1 - A BLR CNTLR/HTR 3 - B 	3 <ul style="list-style-type: none"> Hyd H2O Blr 1 Cntlr B 3 Cntlr A Hyd Rsvr 1 Qty Snsr 	(F9) <ul style="list-style-type: none"> AC1 ΦA, ΦB, ΦC AC volts < 90 	<ol style="list-style-type: none"> May be repwr'd after AC Pwr Transfer Cable connected
(L1) <ul style="list-style-type: none"> HUM SEP A - OFF √B - ON IMU FAN A - OFF B(C) - ON H2O PUMP LOOP 1 - ON, B H2O PUMP LOOP 2 - OFF AV BAY 1 FAN A - OFF √B - ON AV BAY 2 FAN A,B (two) - ON AV BAY 3 FAN A - ON B - OFF FREON PUMP LOOP 1 - B FREON PUMP LOOP 2 - A 	4 <ul style="list-style-type: none"> Hum Sep A IMU Fan A 	(LIGHTS LOST) <ul style="list-style-type: none"> 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) 	<ol style="list-style-type: none"> May be repwr'd after AC Pwr Transfer Cable connected. H2O Loop 2 Byp Vlv holds position
7 <ul style="list-style-type: none"> Maintain LIOH canister(s) change out per cue card and CAP During sleep periods: 	5 <ul style="list-style-type: none"> H2O Loop 2 Byp Cntlr, Sig Cond'r H2O Loop 2 Byp Vlv pwr 2 Pump GPC Cntl 1 Pump A Av Bay 1 Fan A 	(FSMs) <ul style="list-style-type: none"> S67 AC VOLTS 1 S86 APU/HYD HYD S86 APU/HYD W/B SMO THRM HYD (B) S66 CABIN FAN S69 FC PUMP 1 S88 FREON FLOW 1 S88 H2O PUMP P2 I/O ERROR CRT 1 S88 THERMAL FRN (2) S88 THERMAL H2O (2) RM DLMA MANF 	<ol style="list-style-type: none"> H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrsr lost
8 <ul style="list-style-type: none"> CAB FAN (two) - ON 	3 <ul style="list-style-type: none"> Av Bay 2 Sig Cond'r, Xdcrs (ECLS SC3) Av Bay 3 Fan B 	(R1) <ul style="list-style-type: none"> FC1 COOL PUMP ΔP tb - bp 	<ol style="list-style-type: none"> Av Bay 2 Fan ΔP, Air Out Temp snrsr lost
11 <ul style="list-style-type: none"> For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O8) FWD RCS He PRESS A MANF ISOL 5 	9 <ul style="list-style-type: none"> Cabin Air Sig Cond'r (ECLS SC6) 	(F8) <ul style="list-style-type: none"> HYD QTY 1 ind - 0% APU H2O QTY 3 ind - 0% 	<ol style="list-style-type: none"> Crew and gnd have lost PPO2 Xdcr if Cabin Air Sig Cond'r not recovered
(C2) <ul style="list-style-type: none"> L CRT SEL - 3 GPC/CRT 01 EXEC 	10 <ul style="list-style-type: none"> Fwd RCS He Press Isol A GPC Cntl and man CL capability 	(O1) <ul style="list-style-type: none"> FREON FLOW LOOP 1 ind - 578 pph AIR TEMP AV BAY 2 ind - 45 degF H2O PUMP OUT PRESS LOOP 2 ind - 0 psia 	<ol style="list-style-type: none"> CO2 partial Press and Cabin Fan ΔP snrsr lost
(WCS) <ul style="list-style-type: none"> FAN SEP - 2 HOSE BLOCK - SEP 2 	12 <ul style="list-style-type: none"> Fwd RCS Tk Isol 3/4/5 Cntl RCS Manf F1 RJD Driver (F1F,F1L,F1U,F1D) 	(O3) <ul style="list-style-type: none"> RCS/OMS PRPLT QTY Gage and MSN TIMER ind - blank 	<ol style="list-style-type: none"> Vlv holds position. Man OP capability remains. Isol B remains
(Continued)	DEU/CRT 1	(O8) <ul style="list-style-type: none"> Fwd RCS He PRESS A tb - bp TK ISOL 3/4/5 tb - bp MANF ISOL 1 tb - bp 	<ol style="list-style-type: none"> Do not reconfig for reg switch or I'CENT procedures
	WCS Fan/Sep 1	L ADP deploy time incr from 15 to 30 sec	<ol style="list-style-type: none"> Vlv holds position
		STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec	
(Continued)	(Continued)	(Continued)	

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

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>SM 1 DPS UTILITY (G2,G8,S2) MMU 2 ASSIGN • GNC - ITEM 2 EXEC • SM - ITEM 4 EXEC • PL - ITEM 6 EXEC</p>	MMU 1	(L1) If H2O PUMP LOOP 1 A active: 'S88 H2O PUMP P1' If FREON PUMP LOOP 2 - B ON: 'S88 FREON FLOW'	(13) May be repwrd after AC Pwr Transfer Cable connected
13	<p>If Cab Temp Cntrlr 2 active: (L1) • CAB TEMP CNTLR - OFF</p>	14 Cabin Temp Cntrlr 2, Hx Byp Vlv Mtr 2	(O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia FREON FLOW LOOP 2 ind - 578 pph	(14) Lose Auto Temp Cntrl via Cntrlr 2 and H2O Loop 2 Cabin Hx In Temp snsrns. Hx Byp Vlv holds position. May be repwrd after AC Pwr Transfer Cable connected
	<p>(MD44F) • Remove pin from SEC Actuator and BYP vlv linkage, connect linkage to PRI Actuator</p>		If Hum Sep A ON: 'S66 CABIN' (2)	(15) Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively
	<p>(L1) • CAB TEMP CNTLR - 1</p>		If IMU Fan A ON: 'S66 CABIN IMU'	
13	<p>(R13U) H2O LOOP 2 OUT P • CW PARAM SEL tw - 115 • PARAM - INH • CW PARAM SEL tw - >119</p>		(R2) If APUs active and using BLR CNTLR/HTR 1B or 3A: CW APU TEMP It - on after ~ 2 min	(16) All brakes ON and safing initiated
15	<p>SM 60 TABLE MAINT • Inhibit 0612705, 0612700, 0612740, 0612710</p>		16 (A8U) Port 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	(17) Temp sensing lost
	<p>(A14) • RCS/OMS HTR FWD RCS - B AUTO</p>	Fwd RCS A Htrs		(18) Single mtr time. If unlatched one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
	<p>If EMU(s) in battery charge mode: (AW 18M) • PWR/BATT CHGR EMU 1(2) BUS SEL - MNB</p>	EMU 1,2 Pwr/Batt Chgr MNA Pwr		(19) May be repwrd after AC Pwr Transfer Cable connected
17	<p>(A8L) • PORT RMS HTR A - Auto • HTR B - Auto</p>	16 Port RMS: 18 MCIU 18 Mid MRL Mtr 1 18 Aft MRL Mtr 2 19 Shldr Brace release 19 D&C Primary Itg		
	<p>• Perform AC POWER TRANSFER CABLE, EPS SSR-200</p>			
	(Continued)	(Continued)		

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

20 BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(C2) • CRT 1 PWR - OFF			
(O14:C) • cb MNA FIRE SUPPR BAY 3 - op			<p>20 AC1 Bus Isolation accomplished in MNA FPC1 ACTIONS column prior to connecting AC Pwr Transfer Cable. For listing of AC1 Isolation steps, see AC1 BUS LOSS SSR-110 (BUS ISOLATION column)</p> <p>21 Mtr 2 remains</p> <p>22 Htr Cntrlr 2 remains</p> <p>23 Brake/Skid Cntl Box A enabled before WONG</p> <p>24 Lost Hyd deploy capability for all Ldg Grs. Pyro backup Release Sys will deploy Ldg Grs</p> <p>25 Buses remain pwr'd</p> <p>26 Redundant mtrs remain</p>
(O14:F) • MMU 1 - OFF			
(MA73C:A) • MCA LOGIC MNA FWD 1 - OFF	MNA FMC1 Bus pwr		
Pre-seat ingress: • Discharge handheld fire ext into AV BAY 3	Av Bay 3 agent discharge capability		
	21 22 CDR HUD -Y Star Trkr Dr Sys 1 OP/CL capability L ADP Dpy Mtr 1 Htr Cntrlr 1		
	RH Vent 1,2 Mtr 1		
	23 24 No WOW Relay K9 Lg Dump Vlv (vlv N.C.), LG Cntl Vlv NWS		
	25 MNA pwr to Cntl Buses AB1, AB2,AB3 CA1,CA2,CA3		
	MPS Ctr Eng Cntrlr Ch A MPS R Eng Cntrlr Ch B		
	26 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 Actr 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1		

EPS SSR-12
BUS LOSS: MNA MPC1 (Includes MNA MMC1 & MNA MMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1</p> <ul style="list-style-type: none"> Perform MNA BUS TIE, EPS SSR-2 BUS TIE (Cue Card) Monitor, record ΔAmps between FC1 and tied FC <p>(R1)</p> <ul style="list-style-type: none"> PL CAB - MNB <p>(A8L)</p> <ul style="list-style-type: none"> PORT RMS HTR A - OFF B - AUTO <p>(L1)</p> <ul style="list-style-type: none"> TOP EVAP HTR DUCT - B <p>If Hi Load Evap enabled:</p> <ul style="list-style-type: none"> HI LOAD DUCT HTR - B (C) <p>(L2)</p> <p>FLASH EVAP FDLN HTR</p> <ul style="list-style-type: none"> A SPLY - 2 B SPLY - 1 <p>(R12U)</p> <p>FC H2O</p> <ul style="list-style-type: none"> LINE HTR - B AUTO RELIEF HTR - B AUTO <p>(MA73C:C,D)</p> <ul style="list-style-type: none"> cb MCA PWR AC1 3Φ MID 1,3 (two) - op <p>For PLBD ops:</p> <ul style="list-style-type: none"> OP/CL Drs in man mode 	<p>1</p> <p>FC1 Purge Vlv O2,H2 Flow Xdcrs SS ΔV Snrs</p> <p>3</p> <p>MNA pwr to CABPL1,2,3 buses</p> <p>4</p> <p>Port RMS:</p> <p>5 Primary pwr</p> <p>6 Mid MRL Mtr 1</p> <p>6 Aft MRL Mtr 2</p> <p>Htr A</p> <p>Top Evap Duct Fwd, Aft Htrs A</p> <p>Hi Load Duct Outbd, Inbd Htrs A</p> <p>FES H2O Fdln A Mid 2 Htr 1 B Mid 2 Htr 2</p> <p>FC H2O Line Htrs A Relief Htrs A</p> <p>7</p> <p>Port, Stbd Rad Lat 1-6,7-12 Mtrs 1 Limit sw</p> <p>PLBD:</p> <p>C/L Lat 1-4,5-8,9-12 Mtrs 1</p> <p>Port, Stbd Fwd Blkhd Lat Mtrs 1</p> <p>Port Aft Blkhd Lat Mtr 1</p> <p>Stbd Door Mtr 1</p> <p>Port Door Mtr 2 CL Limit sw</p> <p>8</p> <p>FC1 Startup Htr Inh capability</p> <p>PLB Aft Stbd Floodlt Fwd Port Floodlt Docking Floodlt</p> <p>MADS W/B FDM, WBSC, SGSC, ACIP PCM</p> <p>MNA MMC1 and MNA MMC3 Bus pwr</p> <p>9</p> <p>MNA pwr to ESS2CA and ESS3AB AUXPLA Bus Pwr</p> <p>(Continued)</p>	<p>2</p> <p>(L2)</p> <p>O2 SYS 1 SPLY tb - CL</p> <p>(R13L)</p> <p>RAD CNTL STBD tb - bp PORT tb - bp</p> <p>(A8L)</p> <p>PORT RMS: DPY/STO tb - bp R-F-L MID tb - bp Reten Lat tb - bp</p> <p>PLB Floodlts lost: Fwd Port Aft Stbd Docking</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</p> <p>Buses are tied due to: <u>Loss of FC1 Purge capability</u>. As FC1 loses performance, the Tied FC will pick up load, slowing FC1 degradation. If degradation projection does not allow nominal EOM, FC1 will be shutdn. ✓MCC; and <u>Loss of FC1 SS ΔV Snrs</u>. Change in ΔAmps > 12 amps indicates possible cell crossover problem. ΔAmps shift due to loss of FC1 Purge capability is indicated by change in ΔAmps between pre and post purge readings. MCC will aid in this determination</p> <p>2</p> <p>Vlv holds position. Sys 2 remains</p> <p>3</p> <p>Pwrs PL Timing Buffer and VTR</p> <p>4</p> <p>B/U pwr remains for RMS ops</p> <p>5</p> <p>All brakes ON and safing initiated</p> <p>6</p> <p>Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or jettison capability exists. If latched, one failure away from inability to use RMS</p> <p>7</p> <p>If AC1 cbs not opened, Lat Mtrs 1 of actuators for Port and Stbd Rad Lat 1-6, 7-12 continues to run until Sys A Lat Cntl sw placed to OFF. Other equip pwr'd by AC1 MMC1 and AC1 MMC3 lost because of MNA MMC1 and MNA MMC3 loss</p> <p>8</p> <p>FC1 startup Htr is disconnected</p> <p>9</p> <p>Buses remain pwr'd</p>
<p>BUS ISOLATION</p> <p>(R12U)</p> <ul style="list-style-type: none"> FC PURGE VLV 1 - CL STARTUP HTR 1 - ENA <p>(A7U)</p> <p>PL BAY FLOOD</p> <ul style="list-style-type: none"> AFT STBD - OFF FWD PORT - OFF DOCKING - OFF <p>(A7L)</p> <p>MADS</p> <ul style="list-style-type: none"> STRAIN GAGE - OFF WB/ACIP PCM - OFF <p>(MA73C:A,B)</p> <ul style="list-style-type: none"> MCA LOGIC MNA MID 1,3 (two) - OFF 			

EPS SSR-12 (Cont)

BUS LOSS: MNA MPC1

(Includes MNA MMC1 & MNA MMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>10 Freon Loop 1,2 Cntlr B Rad Byp Vlv Mtrs Man Cntl</p> <p>2 ATM Press Cntl O2 Sys 1 Sply Vlv Cntl</p> <p>Port Rad Dpy/Sto Mtr 1 Stbd Rad Dpy/Sto Mtr 1 LH Vents 4,7,5,6 Mtrs 1 RH Vents 3,5,6 Mtrs 1</p>		<p>② Vlv holds position. Sys 2 remains</p> <p>⑩ Cntlrs A, B Rad Byp Vlv mtrs auto cntl and Cntlr A Rad Byp Vlv mtr remain</p>

**EPS SSR-13
BUS LOSS: MNA APC1**

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1	(O7) • AFT L RCS MANF ISOL 5 - GPC (tb-CL)	RCS Manf L5 RJD pwr (L5L,L5D)	2 MASTER ALARM Light/Tone - on	① Manf status not automatically declared closed. Fail-offs will occur when commanded
	For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)		(F7) CW RCS JET It - on	
	For RCS loss, refer to OMS/RCS Slide Rule (use APC 4 Slide for Aft RCS)	3 Aft L,R RCS He Pr Isol A GPC Cntl and Man CL capability	(FSM) L RCS D(L) JET	② Indications do not appear until jet commanded
4	Reconfig following vlv for leak isolation only: (O7) • AFT L RCS He PRESS A,B • R RCS He PRESS A	5 Aft L RCS He Pr Isol B Man OP capability 5 Aft L,R RCS Manf Isol 5 Man OP capability	If OMS GMBL cmd abs value > 2 deg: CW OMS TVC It 'L OMS GMBL' (3,B)	③ Vlv holds position. Man OP capability remains
	(A12) APU HTR TK/FU LINE/H2O • SYS 1A - OFF • SYS 1B - AUTO • 3A - AUTO • SYS 3B - OFF HYD HTR • RUD SPD BK A - OFF • B - AUTO	APU 1 Fu Pump/GG H2O Htrs A APU 1 Inj H2O Htrs A APU 3 Fu Pump/GG H2O Htrs B APU 3 GG Inj H2O Htrs B Rud/Spd Brake Htr A	If OMS GMBL cmd abs value > 2 deg and Sec TVC selected: CW OMS TVC It 'R OMS GMBL' (3,B)	④ Do not reconfig for reg switch or 'CNT' procedures
	(A14) RCS/OMS HTRS • L POD (two) - A OFF, B AUTO • R POD (two) - B OFF, A AUTO • OMS CRSFD LINES (two) - A OFF, B AUTO	6 L Pod A Htrs (all) 7 R Pod B Htrs (partial) 6 OMS Crsfd Ln A Htrs		⑤ Vlv holds position. Man CL and full GPC cntl remain
8	Prior to using L(R) OMS: (O8)	9 L,R OMS He Pr A GPC Cntl 9 L,R OMS He Vap Isol 1 GPC Cntl		⑥ Htr B remains
10	L(R) OMS He PRESS/VAP • ISOL A - OP • B - GPC			⑦ Htr A remains
	GNC XXXXX MNVY YYYYY (3,B)			⑧ Lost TM: GNC SYS SUMM 2
	Set L OMS SEC TVC: • L OMS GMBL SEC - ITEM 30 EXEC Set R OMS PRI TVC: • R OMS GMBL PRI - ITEM 29 EXEC	L OMS Pri TVC R OMS Sec TVC		L,R OMS ENG BALL VLV 1: Assume Vlv 1 status same as Vlv 2
BUS ISOLATION				⑨ Vlv fails closed. Man cntl remains. Redundant Isols remain
NONE				⑩ Maintains He Isol redundancy

**EPS SSR-14
BUS LOSS: MNA APC4**

(Includes MNA APC1, MNA ALC1, MNA AMC1)

ACTIONS	- EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR GAS GEN/FUEL 2 ● PUMP 1 - B AUTO 2 ● 3 - A AUTO APU HTR ● LUBE OIL LINE 1 - B AUTO ● LUBE OIL LINE 3 - A AUTO APU HTR TK/FU LINE/H2O 2 ● SYS 1B - AUTO 2 ● SYS 1A - OFF 2 ● 3A - AUTO 2 ● 3B - OFF HYD HTR ● RUD SPD BK B - AUTO ● A - OFF ● BDY FLP B - AUTO ● A - OFF ● ELEVON B - AUTO ● A - OFF HYD CIRC PUMP ● PWR 1 - MNB ● 3 - MNC</p>	<p>APU 1 GG/Fu Pump Htrs A 3 GG/Fu Pump Htrs B 1 Lube Oil Line Htr A 3 Lube Oil Line Htr B 1 Tk/Fu Ln Htrs A 1 Fu Pump/GG H2O Htrs A 1 Inj H2O Htrs A 3 Tk/Fu Ln Htrs B 3 Fu Pump/GG H2O Htrs B Rud/Spd Brake Htr A Body Flap Htr A Elevon Actr Htrs A Circ Pump 1 MNA pwr 3 MNA pwr</p>	<p>1 MASTER ALARM Light/Tone - on (F7) C/W RCS JET It - on SM ALERT Light/Tone - on (FSMs) S86 APU/HYD W/B SMO THRM HYD (B) L RCS D(L) JET (R4) 3 HYD LG ISOL VLV 1 tb - OP 3 HYD MPS/TVC ISOL VLV SYS 1 tb - CL (O7) 4 AFT L RCS He PRESS A tb - bp 4 AFT R RCS He PRESS A tb - bp AFT L,R RCS TK ISOL 3/4/5A tb - bp (if vlv in CL position) (R2) If APUs active, and using BLR CNTLR/HTR 1B or 3A: C/W APU TEMP It - on after ~2 min If OMS GMBL cmd abs value > 2 deg: C/W OMS TVC It L OMS GMBL (3,B) If OMS GMBL cmd abs value > 2 deg and TVC selected: C/W OMS TVC It R OMS GMBL (3,B) If cooling by FES B only: C/W FREON LOOP It 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'</p>	<p>① Indications do not appear until jet commanded ② TIME CRITICAL * TIME CRITICAL * If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp ③ Vlv holds position ④ Vlv holds position. Man OP capability remains ⑤ Manf status not automatically declared closed. Fail-offs will occur when jet commanded ⑥ Htr B remains ⑦ Htr A remains ⑧ Do not reconfig for reg switch or I'CNT procedures ⑨ Vlv holds position. Man CL, full GPC Cntl remains</p>
<p>(L1) ● FLASH EVAP CNTLR PRI A(SEC) - ON (if reqd) ● TOP EVAP HTR NOZ L - B AUTO ● TOP EVAP HTR DUCT - B If Hi Load Evap enabled: ● HI LOAD DUCT HTR - B (C)</p>	<p>FES Pri B Cntlr Top Evap L Noz Htr A Top Evap Duct L,R Htrs A Hi Load Duct Noz Htr A</p>		
<p>(L2) FLASH EVAP FDLN ● HTR A SPLY - 2 ● B SPLY - 1</p>	<p>FES H2O Fdln A Htrs 1 (all except MID 2) FES H2O Fdln B Htrs 2 (all except MID 2)</p>		
<p>(R2) ● BLR CNTLR/HTR 1 - A ● BLR CNTLR/HTR 3 - B</p>	<p>Hyd H2O Blr 1 Cntlr B 3 Cntlr A</p>		
<p>(O7) 5 ● AFT L RCS MANF ISOL 5 - GPC (tb-CL) ● For attitude control, perform, LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>RCS Manf L5 RJD pwr (L5L,L5D)</p>		
<p>(A14) RCS/OMS HTR ● L POD (two) - A OFF, B AUTO ● R POD (two) - B OFF, A AUTO ● OMS CRSFD LINES (two) - A OFF, B AUTO</p>	<p>6 L Pod A Htrs (all) 7 R Pod B Htrs (partial) 6 OMS Crsfd Ln A Htrs (all)</p>		
<p>8 For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O7) ● AFT L RCS He PRESS A,B ● R RCS He PRESS A</p>	<p>4 Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability 9 Aft L RCS He Pr Isol B man OP capability 9 Aft L,R RCS Manf Isol 5 man OP capability</p>		
(Continued)	(Continued)		

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>Aft RCS L,R Jet 2 Htrs</p>		<p>3 Vlv holds position</p> <p>10 Vlv fails closed. Man cntl remains. Redundant Isols remain</p>
<p>12 Save L OMS eng for deorbit (if reqd for additional on-orbit burns, ✓MCC)</p>	<p>12 L OMS GN2 Press Vlv OP TM 13 L OMS Eng Pr Vlv Coil 1</p>		<p>11 Maintains He Isol redundancy</p> <p>12 Lost TM:</p>
<p>11 Prior to using L(R) OMS: (O8) L(R) OMS He PRESS/VAP</p> <ul style="list-style-type: none"> ISOLA - OP B - GPC 	<p>10 L,R OMS He Pr Isol A GPC Cntl 10 L,R OMS He Vap Isol 1 GPC Cntl 14 L OMS Eng Cntl Vlv 1,2 Coils 1 14 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2 15 L OMS Purge Vlv 1,2 16 OMS Qty Gage</p>		<p>GNC SYS SUMM 2 L OMS N2 P VLV L,R OMS ENG VLV 1: assume Vlv 1 status same as Vlv 2</p>
<p>GNC XXXXX MNVY 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>13 Unable to confirm redundant coils</p> <p>14 Redundant coils remain</p> <p>15 CAUTION</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>17 NH3 Sys A Pri Cntlr and Auto Swover to Sec Cntlr</p>		<p>No purge. Wait 10 min between burns</p> <p>16 ✓MCC for OMS Qty's. Disregard Qty's on meter and</p>
<p>BUS ISOLATION</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>18 APU 1 Cntlr pwr Sply A 19 APU 1 Fu Tk Vlv A 20 APU 3 Cntlr pwr Sply B 21 APU 3 Fu Tk Vlv B</p> <p>3 LG Hyd Sys 1 Isol Cntl 3 TVC Hyd Sys 1 Isol Cntl</p> <p>22 ATVC 2 Isol ME</p> <p>23 L OMS Purge Vlv 1,2 Qty gauging</p> <p>(Continued)</p>		<p>GNC SYS SUMM 2</p> <p>17 Sys A Sec Cntlr man on capability remains</p> <p>18 Pwr Sply B remains</p> <p>19 Vlv B remains</p> <p>20 Pwr Sply A remains</p> <p>21 Vlv A remains</p> <p>22 Six vlvs fail to non-isolation position</p> <p>23 Vlv fails closed</p>

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>MPS:</p> <p>19 Pneu He Isol 1</p> <p>19 Ctr Eng He Isol A</p> <p>23 Ctr Eng He Intercon Outlet Vlv</p> <p>24 He Sply Blowdn Vlv 1,2 OP capability</p> <p>23 Prplt Topping Vlv LH2</p> <p>3 Prplt F/D Inbd LH2 Vlv</p> <p>23 Prplt Hi Pt Bld LH2 Vlv</p> <p>25 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>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>No ctr MPS He usage during entry (MM304)</p>	<p>③ Vlv holds position</p> <p>⑱ Vlv B remains</p> <p>⑳ Vlv fails closed</p> <p>㉔ Vlv fails closed. Aft compartment, OMS pods, and ET Umbilical cavity will not be purged during entry (MM304)</p> <p>㉕ Redundant mtrs remain</p>

EPS SSR-15
BUS LOSS: MNA FLC1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>2 For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O8)</p> <ul style="list-style-type: none"> ● FWD RCS He PRESS A ● MANF ISOL 5 	<p>1 Fwd RCS He Press Isol GPC CNTL and MAN CL capability</p> <p>3 Fwd RCS Manf Isol 5 man OP capability</p>	<p>MASTER ALARM Light/Tone - on</p> <p>(F7) 4 C/W RCS JET It - on</p> <p>(FSM) 4 F RCS D(F,L,U) JET</p> <p>(O8) 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 I'CNT procedures</p> <p>③ Vlv holds position</p> <p>④ Indications do not appear until jet commanded</p> <p>⑤ Manf status not automatically declared closed. Jet fail-offs may occur</p> <p>⑥ Brake/Skid Cntl Box A enabled before WOW</p> <p>⑦ Htr Cntl 2 remains</p>
<p>5 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: ● Discharge handheld fire ext into AV BAY 3</p>	<p>RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)</p> <p>Av Bay 3 agent discharge capability</p>		
<p>BUS ISOLATION</p> <p>(O14:C ● cb MNA FIRE SUPPR BAY 3 - op</p>	<p>6 No WOW Relay K9</p> <p>7 L ADP Htr Cntl 1</p>		

**EPS SSR-16
BUS LOSS: MNA ALC1**

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
2	(A12) APU HTR ● GAS GEN/FUEL PUMP 1 - B AUTO ● GAS GEN/FUEL PUMP 3 - A AUTO ● LUBE OIL LINE 1 - B AUTO ● LUBE OIL LINE 3 - A AUTO APU HTR TK/FU LINE/H2O ● SYS 1B - AUTO ● 1A - OFF ● 3A - AUTO ● 3B - OFF HYD HTR ● BDY FLP B - AUTO, A - OFF ● ELEV B - AUTO, A - OFF HYD CIRC PUMP ● PWR 1 - MNB ● 3 - MNC	APU 1 GG/Fu Pump Htrs A 3 GG/FU Pump Htrs B 1 Lube Oil Line Htrs A 3 Lube Oil Line Htrs B 1 Tk/Fu Ln Htrs A 3 Tk/Fu Ln Htrs B Body Flap Htr A Elevon Actr Htrs A Circ Pump 1 MNA pwr 3 MNA pwr	1 MASTER ALARM Light/Tone - on (R4) 3 HYD LG HYD ISOL VLV 1 tb - OP 3 HYD MPS/TVC ISOL VLV SYS 1 tb - CL (O7) 4 AFT L RCS He PRESS A tb - bp 4 AFT R RCS He PRESS A tb - bp AFT L,R RCS TK ISOL 3/4/5A tb (two) - bp (if vlv in CL position) If cooling by FES only using PRI B CNTLR: CW FREON LOOP It - on 'S88 EVAP OUT T1' 'S88 EVAP OUT T2'	① Indications do not appear until jet commanded ② TIME CRITICAL If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp ③ Vlv holds position ④ Vlv holds position. Man open capability remains ⑤ In A position, HYD H2O Sys 3 Blr and Tk Htrs still operative, but GN2 SOV opens and cannot be closed. Select B position for entry
	(L1) ● FLASH EVAP CNTLR PRI A(SEC) - ON (if reqd) ● TOP EVAP HTR NOZ L - B AUTO ● TOP EVAP HTR DUCT - B If Hi Load Evap enabled ● HI LOAD DUCT HTR - B (C)	FES Pri B Cntrl Top Evap L Noz Htr A Top Evap Duct L,R Htrs A Hi Load Duct Noz Htr A	If APUs active and using BLR CNTLR/HTR 1B or 3A: CW APU TEMP It - on after ~ 2 min (F7) CW RCS JET It (FSM) L RCS D(L) JET	⑥ Manf status not automatically declared closed. Fail-offs will occur when jet commanded ⑦ Vlv holds position. Man CL and full GPC Cntl remain ⑧ Do not reconfig for reg switch or I'CNT procedures
	(L2) FLASH EVAP FDLN HTR ● A SPLY - 2 ● B SPLY - 1	FES H2O Fdln A Htrs 1 (all except MID 2) FES H2O Fdln B Htrs 2 (all except MID 2)		
	(R2) ● BLR CNTLR/HTR 1 - A ● 3 - B	5 Hyd H2O Blr 1 Cntrl B 3 Cntrl A		
	(O7) ● AFT L RCS MANF ISOL 5 - CL (tb-CL)			
	For attitude control: ● Perform LOSS OF VERNIERS (ORB OPS, RCS)	RCS Manf L5 RJD pwr (RJDs L5L,L5D)		
	(A14) RCS/OMS HTR OMS ● CRSFD LINES (two) - A OFF, B AUTO	OMS Crsfd Ln A Htrs (partial)		
	For RCS loss, refer to OMS/RCS Slide Rule	4 Aft L,R RCS He Pr Isol A GPC Cntl and man CL capability 7 Aft L RCS He Pr Isol B man OP capability 7 Aft L,R RCS Manf Isol 5 man OP capability		
	8 Reconfig following vlv for leak isolation only: (O7) ● AFT L RCS He PRESS A,B ● R RCS He PRESS A			
	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 (Continued)	Aft RCS L,R Jet 2 Htrs (Continued)		

EPS SSR-16 (Cont)
BUS LOSS: MNA ALC1

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS	NOTES
14	Save L OMS eng for deorbit (if reqd for additional on-orbit burns, ✓MCC)	14	L OMS GN2 Press Vlv OP Sig	No ctr MPS He usage during entry (MM304)	<p>③ Vlv holds position</p> <p>⑨ Maintains He Isol redundancy</p> <p>⑩ Vlv fails closed. Man cntl remains. Isol B remains</p> <p>⑪ Unable to confirm redundant coils</p> <p>⑫ Sys A Sec Cntlr man on capability remains</p> <p>⑬ Redundant coils remain</p> <p>⑭ ✓MCC for OMS Qtys. Disregard Qtys on meter and</p> <p>GNC SYS SUMM 2</p> <p>⑮ Lost TM:</p> <p>GNC SYS SUMM 2</p> <p>L OMS N2 P.VLV</p> <p>⑯</p> <p>CAUTION</p> <p>No purge. Wait 10 min between burns</p> <p>⑰ Vlv fails closed</p> <p>⑱ Vlv fails closed. Redundant vlv remains</p> <p>⑲ Vlv fails closed. Aft compartment, OMS pods, and ET umbilical cavity will not be purged during entry (MM304)</p>
	Prior to using OMS: (O8)	11	L OMS Eng Pr Vlv Coil 1		
9	L(R) OMS He PRESS/VAP • ISOL A - OP • B - GPC	10	L,R OMS He Pr Isol A GPC Cntl		
	If reqd during entry (< 120K ft): (L1)	12	NH3 Sys A Pri Cntlr & Auto sw over to Sec Cntlr		
	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)				
BUS ISOLATION					
		13	L OMS Cntl Vlv 1,2 Coils 1		
		13	R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2		
		14	OMS Qty gauging		
		16	L OMS GN2 Purge Vlv 1,2		
		17	APU 1 Fu Tk Vlv A		
		17	3 Fu Tk Vlv B		
		3	LG Hyd Sys 1 Isol Cntl NWS		
		3	TVC Hyd Sys 1 Isol Cntl		
			MPS:		
		18	Pneu He Isol 1		
		18	Ctr Eng He Isol A		
		17	Ctr Eng He Intercon Outlet Vlv		
		19	He Sply Blowdn Vlv 1,2 OP capability		
		17	Prplt Topping Vlv Inbd LH2		
		3	Prplt F/D Inbd LH2 Vlv		
		17	Prplt Hi Pt Bld LH2 Vlv		

**EPS SSR-17
BUS LOSS: MNA FMC1**

ACTIONS
(L1) ● H2O PUMP LOOP 1 - B
For RCS loss, refer to OMS/ RCS Slide Rule
GNC 23 RCS Override F1 Manf status to OP: ● RCS FWD ITEM 1 EXEC ● MANF VLVS 1 OVRD ITEM 40 EXEC

BUS ISOLATION
(L1) ● H2O PUMP LOOP 1 - OFF
(MA73C:A) ● MCA LOGIC MNA FWD 1 - OFF

EQUIP/FUNCTION LOST
H2O Loop 1 Pump A
1 Fwd RCS Tk Isol 3/4/5 Cntl
1 Fwd RCS Manf Isol 1 Cntl
MNA FMC 1 Bus pwr
3 RH Vent 1,2 Mtr 1 L ADP Deploy Mtr 1 Disc 1
4 Htr Cntrl 1 -Y Star Trkr Dr Sys 1 OP/CL capability

CREW INDICATIONS	NOTES
MASTER ALARM Light/ Tone - on	① Vlv holds position
(F7) SM ALERT Light/Tone - on	② If this action taken, H2O Pump Loop 2 must be pwr'd
(FSM) RM DLMA MANF	③ Mtr 2 remains
(O8) FWD RCS TK ISOL 3/4/5 tb - bp MANF ISOL 1 tb - bp	④ Htr Cntrl 2 remains
L ADP deploy time incr from 15 to 30 sec	
STAR TRKR DR POS -Y OP time incr from 8 to 16 sec	
If H2O PUMP LOOP 1,A active: C/W H2O LOOP It - on 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2)	
(O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia	

**EPS SSR-18
BUS LOSS: MNA MMC1**

ACTIONS
(MA73C:C) ● cb MCA PWR AC1 3φ MID 1 - op
For PLBD ops: ● OP/CL Drs in man mode

BUS ISOLATION
(MA73C:A) ● MCA LOGIC MNA MID 1 - OFF

EQUIP/FUNCTION LOST
1 Port Rad Lat 1-6,7-12 Mtrs 1 Limit sw Port Rad Dpy/Sto Mtr 1
PLBD: C/L Lat 9-12 Mtr 1 Port,Stbd Fwd Bikh Lat Mtrs 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw
MNA MMC1 Bus pwr RH Vents 3,5,6 Mtrs 1
2 Port RMS Mid MRL Mtr 1

CREW INDICATIONS	NOTES
(R13L) RAD CNTL PORT tb - bp	① If AC1 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. Other equip pwr'd by AC1 MMC1 lost because of MNA MMC1 loss
(A8L) PORT RMS: R-F-L MID tb - bp RETEN LAT tb - bp	② Single mtr time
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	

**EPS SSR-19
BUS LOSS: MNA MMC3**

ACTIONS
(MA73C:D) ● cb MCA LOGIC MCA PWR AC1 3Φ MID 3 - op
For PLBD ops: ● OP/CL Drs in man mode

BUS ISOLATION
(MA73C:B) ● MCA LOGIC MNA MID 3 - OFF

EQUIP/FUNCTION LOST
1 Stbd Rad Lats 1-6,7-12 Mtrs 1 Limit sw Stbd Rad Dpy/Sto Mtr 1
PLBD: C/L Lat 1-4,5-8 Mtr 1 Port Aft Bkhd Lats Mtr 1

MNA MMC3 Bus pwr LH Vents 4,7,5,6 Mtr 1
2 Port RMS Aft MRL Mtr 2

CREW INDICATIONS
1 (R13L) RAD CNTL PORT tb - bp
SM (BFS SM 63) PL BAY DOORS
If in <u>AUTO</u> OP/CL for PLBDs, sequence termi- nates immediately and msg '(S63) PBD CONFIG'
During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left

NOTES
① If AC1 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. Other equip pwr'd by AC1 MMC3 lost because of MNA MMC3 loss
② Single mtr time

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	LH Vent 8,9 Mtr 1	NONE	① Redundant mtrs remain
BUS ISOLATION			
(MA73C:B) ● MCA LOGIC MNA AFT 1 - OFF	MNA AMC1 Bus pwr		
	1 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		
	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		

**EPS SSR-21
BUS LOSS: MNA R15**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (R12L) ● MS AUD CNTL - PS	2 MS ATU, CCU, FD Spkr	PS Floodit lost MS, OS CCTV Video lost if MNA selected for VCU CCTV Mon 1 lost	① Only listen capability regained for MS ATU (CCU only)
(L9) ● PS AUD PNL config for use			② Causes loss of redundant path for ACCU config control bits, loss of xmit capability via CCU, loss of FD spkr
BUS ISOLATION			③ Lost capability for xmitting to gnd via UHF
<u>OV102 only</u> (R15:A) cb MNA ● AUD MS/OS - op ● AUD MIDDECK CCU - op	<u>OV102 only</u> MS ATU OS SMU OS ATU Middeck CCU ATU		④ GCILC also pwr'd via MNC cb
<u>All except OV102</u> (R15:A) ● cb MNA AUD MS/OS - op	<u>All except OV102</u> MS ATU OS SMU		⑤ Buses remain powered
<u>All Vehicle</u> (R15:B) cb MNA ● UHF - op ● GCILC - op ● CNTL BUS BC 1/2/3 - op	3 UHF Spix Pwr Amp 4 GCILC MNA pwr 5 MNA pwr for Cntl BC1,2,3 Buses		⑥ MNB pwr may be selected via TV pwr sw (pnl A7) or GCILC, if reqd
(R15:D) cb MNA TV ● AFT BAY CAMR/PAN-TILT - op ● AFT BAY CAMR HTR - op ● AFT BAY PAN-TILT HTR - op ● CONTR UNIT - op ● MON 1 - op	Aft Bay Camr/Pan-Tilt Aft Bay Camr Htr Aft Bay Camr Pan-Tilt Htr 6 Video Cntl Unit MNA pwr CCTV Mon 1		
(Continued)	(Continued)		

EPS SSR-21 (Cont)
BUS LOSS: MNA R15

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R15:E) cb MNA ● PS FLOOD - op cb MNA D STBD RMS ● TV CAMR/PAN-TILT - op ● CAMR HTR - op ● PAN-TILT HTR - op	PS Floodt		

EPS SSR-22
BUS LOSS: MNA O14&A8

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(ABL) ● PORT RMS HTR A - OFF ● B - AUTO	1 Port RMS: 2 Primary pwr MCIU Htr A	2 Port 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	<ol style="list-style-type: none"> ① B/U drive capability remains ② All brakes ON and safing initiated ③ If driver sw OFF when bus failed, F1 Manf Drivers lost
BUS ISOLATION NONE	3 ON control for RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)		<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>CAUTION</p> <p>Do not turn off RJDF-1B F1 Manf Driver during pre-sleep activities</p> </div>

**EPS SSR-23
BUS LOSS: MNA O14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 On MCC call, Place FC3 in standby: • Perform BUS TIE, <u>EPS</u> SSR-1 (R1) • ESS BUS SOURCE FC3 - OFF • FC/MN BUS C - OFF (tb-OFF) • Perform LOSS OF 1 FC (ORB PKT, <u>PWRDN</u>)</p>		<p>MASTER ALARM Light/ Tone - on</p>	<p>① FC3 only one failure away (loss of ESS3AB) from loss of FC cooling, and inability to disconnect from Main Bus and close reactant vlvs. FC3 may only be used to support 2 FC ops</p>
<p>(L1) • RAD CNTLR LOOP 1,2 (two) - AUTO A</p>	<p>Freon Loop 1,2 Rad Cntrlr B</p>	<p>(F7) C/W CAB ATM It - on SM ALERT Light/Tone - on Red Flag visible on MPS PRESS meters</p>	<p>② H2O Loop 1 Intchgr flowrate and IMU fan ΔP snsrs lost</p>
<p>(F8) • HSI SEL SOURCE (two) - other than MLS 1 • RADAR ALTM - 2</p>	<p>MLS 1 Radar Altm 1</p>	<p>(LIGHTS LOST) L Console Floodlt</p>	<p>③ Current Snsr 2 remains</p>
<p>(O6) • ANNUN BUS SEL ACA 1 - MNB</p>	<p>ACA 1 MNA pwr</p>	<p>(F6) HSI,AMI,AVVI,SPI flags visible</p>	<p>④ After MET 3:30, tb already bp</p>
<p>(O14:C) • cb MNA CRYO O2 HTR TK1 SNSR 1 - op</p>	<p>3 Cryo O2 Tk 1 Htr Current Snsr 1</p>	<p>(FSMs) 2 S66 CABIN IMU (2) S66 CABIN PPO2 S66 CABIN PRES 2 S88 THERMAL H2O (2) SMO TIRE PRESS</p>	<p>⑤ Vlv holds position</p>
<p>If on PCS 1: • Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3</p>	<p>5 O2/N2 Cntl Sys 1: O2/N2 Sys 1 Flow Xdcrs N2 Sply Vlv 1 Cntl N2 Reg Inlet Vlv 1 Cntl O2 Xovr Vlv 1 OP capability O2/N2 Cntl Vlv 1 man Cntl PPO2 Snsr A Cabin Press Snsr Emer dP/dT B/U comp</p>	<p>If ADTA 1, MLS 1, -Z STAR TRKR pwr d: 'BCE STRG 1 ADTA' (3,B) 'BCE STRG 1 MLS' (3) 'BCE STRG 1 STKR'</p>	<p>⑥ Vlv fails closed</p>
<p>1 Following loss of 2nd FC: (R1) • FC/MN BUS C - ON (tb-ON) • ESS BUS SOURCE FC3 - ON • MN BUS TIE C - OFF (tb-OFF) (Do not BUS TIE MNC to any other bus)</p>		<p>(L2) 4 CAB VENT ISOL tb - bp 4 VENT tb - bp 5 N2 SYS 1 SPLY tb - bp 5 REG INLET tb - bp</p>	<p>(O1) O2/N2 FLOW SYS 1 ind - 0 pph CAB PRESS ind - 0 psia PPO2 SNSR A ind - 0 psia</p>
<p>• Pre-seat ingress for entry: discharge hand- held fire ext into AV BAY 3</p>	<p>Av Bay 3 agent discharge capability</p>	<p>(O1) O2/N2 FLOW SYS 1 ind - 0 pph CAB PRESS ind - 0 psia PPO2 SNSR A ind - 0 psia</p>	<p>(O3) MSN TIME ind - blank</p>
<p>BUS ISOLATION</p>		<p>(O3) MSN TIME ind - blank</p>	<p>(A4) EVENT TIME ind - blank</p>
<p>(F6) • INST PWR - OFF</p>	<p>L Inst pwr (MPS Meters,SPI, L HSI, AMI, AVVI)</p>	<p>(A4) EVENT TIME ind - blank</p>	<p>If first AA failure and S/W processing accel data: 'RM FAIL ACC' (3)</p>
<p>(O6) • STAR TRKR PWR -Z - OFF</p>	<p>-Z Star Tracker Dr OP capability -Z Star Tracker</p>	<p>If first AA failure and S/W processing accel data: 'RM FAIL ACC' (3)</p>	
<p>(O8) • RADAR ALTM 1 - OFF • MLS 1 - OFF</p>			
<p>(Continued)</p>	<p>(Continued)</p>		

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EPS SSR-23 (Cont)
BUS LOSS: MNA 014

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(O14:B) cb MNA OI SIG CONDR 7 ● OF 1/4 A - op 7 ● OM 1/2 A - op cb MNA OI MDM OF 7 ● 1/2 A - op 7 ● 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</p>	<p>2 H2O Byp Loop 1 Snsr (ECLS SC11) 8 Tire Press Sig Cond A1,A2 Fwd Mission Timer Aft Event Timer</p>		<p>② H2O Loop 1 Intchgr flowrate and IMU fan ΔP snrsrs lost ⑦ Redundant pwr source remains for equip ⑧ Redundant measurement remains. FDA Alarm - BFS only; OPS 3,6</p>
<p>(O14:C) cb MNA 9 ● 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</p>	<p>9 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</p>		<p>⑨ Cabin Smoke Detector remains ⑩ Cntrlr A remains</p>
<p>(O14:D) cb MNA 10 ● FREON RAD CNTLR 1,2 (two) - op ● GPS PRE AMPL UC - op ● LC - 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</p>	<p>Cabin Vent Vlv Vent Isol</p>		
<p>(O14:E) cb MNA ● RADAR ALTM 1 - op ● MLS 1 - op ● ADTA 1 - op ● STAR TRKR -Z - op ● ACCEL 1 - op 7 ● DDU LEFT, AFT (two) - op ● INST L/CTR - op ● NWS - op</p>	<p>ADTA 1 AA 1 7 L DDU MNA pwr 7 Aft DDU MNA pwr NWS</p>		

**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			
NONE			

**EPS SSR-25
BUS LOSS: MNA A6&A14**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<div style="border: 1px solid black; padding: 2px; width: fit-content;">GNC 23 RCS</div> <ul style="list-style-type: none"> Reprioritize FRCS Manf Jets to first priority: DES INH all other jets; highest priority first, then next highest, etc 	Fwd RCS Jet 1 Htrs	(A6U) PL RETEN RDY tb - bp RETEN/LAT tb - bp	
BUS ISOLATION			
NONE	PL Reten Sys A Rel/Lat Mtrs		

**EPS SSR-26
BUS LOSS: MNA ML86B**

ACTIONS
(ML86B:A) ● cb MNB H2O LINE HTR B - cl
(ML86B:D) cb MNB MMU ● PORT,STBD HTR B (two) - cl
(ML86B:F) ● cb MNA CRYO O2 HTR TK3 SNSR 1 - op
If Waste H2O Dump reqd: ● Perform WASTE WATER SYS BACKUP DUMP (IFM)
(ML31C) ● VAC VENT ISOL VLV BUS SEL - MNB
(WCS) ● FAN SEP - 2 ● HOSE BLOCK - SEP 2

BUS ISOLATION
(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
(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

EQUIP/FUNCTION LOST
1 H2O Line Htrs A: Waste Dump Line Htr A Sply Dump Line Htr A Vac Vent Ln Htr A
1 MMU Port,Stbd Htr A
3 Cryo O2 Tk 3 Htr Current Snsr 1
2 Waste H2O: Dump Vlv Cntl Noz Htr
VAC VENT ISOL MNA Cntl
WCS SEP FAN 1 Mtr Relay
2 Sply H2O Tka Inlet Vlv Cntl 2 Sply H2O TkB,D Outlet Vlv Cntl
Waste H2O Dump Isol Cntl Waste H2O TK1 Inlet Vlv Cntl
Galley Oven

CREW INDICATIONS	NOTES
(R12L) 2 SPLY H2O TKA INLET tb - bp 2 SPLY H2O TKB OUTLET tb - bp	① Htr B remains ② Vlv holds position
(R13L) 2 MMU GN2 SPLY ISOL VLV A tb - bp	③ Current Snsr 2 remains
(ML31C) 2 WASTE H2O TK 1 VLV tb - bp 2 WASTE H2O DUMP ISOL VLV tb - bp 2 WASTE H2O DUMP VLV tb - bp 2 SPLY H2O TKD OUTLET tb - bp	④ Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge
(AW82D) 4 EMU 2 H2O SPLY, WASTE (two) tb - CL	
(LIGHTS LOST) Middeck floodlts 1,8 WMC Floodlt MO13Q pnl lt 2 Airlk Floodlt 1 TA Flood 2 (SL only)	

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<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 5 KU-BD Jettison Sys A</p>		<p>① Htr B remains ② Vlv holds position ④ Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/ recharge</p>
<p>(ML86B:E) cb MNA EMU 2 H2O ● SPLY - op ● WASTE - op cb MNA FLOOD ● TNL ADAPT 2 - op</p>			<p>⑤ Sys B remains</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 pnt It 2 Airlk Floodlt 1</p>		
	<p>4 EMU 2 Sply H2O Vlv Cntl Waste H2O vlv Cntl WCS Press Xdcr</p>		

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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, EPS SSR-2 (FC SHUTDN Cue Card) 	1 MNB pwr to ESS1BC, ESS3AB FC2 Pumps and pH Snr Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor	MASTER ALARM Light/ Tone - on SM ALERT Light/Tone - on	① May be repwr'd after AC Pwr Transfer Cable connected
<ul style="list-style-type: none"> Perform LOSS OF 1 FC (ORB PKT, PWRDN) 		(F7) CRT 2 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	② Indications do not appear until jet commanded
(R1) <ul style="list-style-type: none"> PL CAB - MNA cb AC CONTR AC2 (three) - cl INV/AC BUS 2 - OFF (tb-OFF) INV PWR 2 - OFF (tb-OFF) cb AC CONTR AC2 (three) - op O2,H2 MANF VLV TK1,2 (four) - OP 	MNB pwr to CABPL 1,2,3 buses AC2 φA,φB,φC Inverters	(COMM LOST) All S-BD A/G voice lost if Sys 1 selected Middeck SMU audio lost	③ If MNB lost during sleep period, operate: O2,H2 TK1 HTRS (four) - AUTO O2, H2 TK2,3,4 HTRS (twelve) - OFF until morning
3 If only two CRYO TK sets or TK3 and/or 4 depleted (Q < 10%): (R1) <ul style="list-style-type: none"> O2,H2 TK1,2 HTRS A (four) - man ops (refer to ECLS SSR-1) O2,H2 TK1,2 HTRS B (four) - OFF 	Cryo O2(H2) Tk2,3,4 hrs A if in Auto	(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 Mid Port Floodlt Fwd Stbd Floodlt	⑤ Vlv holds position ⑥ When gear deployed, tb does not indicate DN
3 If three CRYO TK sets and TK3 not depleted (Q > 10%), perform following simo with all of the above: (R1) <ul style="list-style-type: none"> O2,H2 TK3 HTRS A (two) - man ops (refer to ECLS SSR-1) O2,H2 TK3 HTRS B (two) - OFF 	Cryo O2,H2 Tk2,3,4 Htrs B	(F9) AC2 φA,φB,φC AC volts ind - <90 DC VOLTS MNB ind - OSL	
3 If four CRYO TK sets and TK3,4 not depleted (Q > 10%), perform following simo with all of the above: (A11) <ul style="list-style-type: none"> CRYO TK4 HTR O2,H2 A (two) - man ops (refer to ECLS SSR-1) CRYO TK4 HTR O2,H2 B (two) - OFF 		(FSM) S67 AC VOLTS 2 S86 APU/HYD W/B SMO THRM HYD (B) S66 AV BAY FAN S66 CABIN PPO2 S69 FC PUMP 2 S69 FUEL CELL R RCS D,L JET S67 MAIN BUS V I/O ERROR CRT 2 S88 THERMAL H2O (2)	
(R2) <ul style="list-style-type: none"> BLR CNTLR/HTR 1 - B 2 - A 	Hyd H2O Blr 1 Cntrl A 2 Cntrl B	If ADTA 2, MLS 2, -Y STAR TRKR pwr'd: 'BCE STRG 2 ADTA' (3,B) 'BCE STRG 2 MLS' (3) 'BCE STRG 3 STKR'	
	Av Bay 1 Agent discharge capability	(L2) CAB RELIEF A tb - bp O2 SYS 2 SPLY tb - CL N2 SYS 2 SPLY tb - bp 2 REG INLET tb - bp	
		(F6/F8) LDG GEAR L, NOSE (two) tb - bp	
		(F7) FWD EVENT TIME ind - blank	
(Continued)	(Continued)	(Continued)	

EPS MNB
SSR 30-48

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

EPS MNB
SSR 30-48

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR</p> <p>7 ● GAS GEN/FUEL PUMP 1 - A AUTO</p> <p>7 ● 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>7 APU HTR TK/FU LINE/H2O</p> <p>7 ● SYS 1A - AUTO</p> <p>7 ● 1B - OFF</p> <p>● 2B - AUTO</p> <p>● 2A - OFF</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>● AFT FUS B - AUTO</p> <p>● A - OFF</p> <p>HYD CIRC</p> <p>● PUMP 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>2 Lube Oil Line Htrs A</p> <p>1 Tk/Fu Line Htr B</p> <p>1 Fu Pump/GG H2O Htrs B</p> <p>1 GG Inj H2O Htrs B</p> <p>2 Tk/Fu Line Htr A</p> <p>2 Fu Pump/GG H2O Htrs A</p> <p>Rudder/Speed Brake Htr B</p> <p>Body Flap Htr B</p> <p>Elev Act Htr B</p> <p>Aft Fuselage Htrs A</p> <p>Circ Pump 1 MNB pwr</p> <p>2 MNB pwr</p>	<p>(F8)</p> <p>HSI,AMI,AVVI Flags visible</p> <p>APU/HYD Meters lost</p> <p>(R1)</p> <p>FC2 COOL PUMP ΔP tb - bp</p> <p>(R4)</p> <p>HYD MPS/TVC ISOL VLV SYS 2 tb - CL</p> <p>5 HYD LG HYD ISOL VLV 2 tb - OP</p> <p>If Sys 1 pwrd: 'S62 BCE BYP PSP 1' Loss of PL TLM and CMD</p> <p>If PDI FDA enabled: 'S62 PDI DECOM FAIL'</p> <p>(O7)</p> <p>5 AFT R RCS He PRESS B tb - bp</p> <p>AFT L,R RCS TK ISOL 3/4/5B tb - bp (if vlv in CL position)</p> <p>(O8)</p> <p>5 FWD RCS</p> <p>5 He Press B tb - bp</p> <p>MANF ISOL 2 tb - bp</p> <p>(R12L)</p> <p>5 SPLY H2O</p> <p>5 DUMP ISOL VLV tb - bp</p> <p>5 TKB INLET tb - bp</p> <p>5 TKC OUTLET tb - bp</p> <p>5 B SPLY ISOL VLV tb - bp</p> <p>(R13L)</p> <p>5 MMU GN2 SPLY ISOL VLV B tb - bp</p> <p>(ML31C)</p> <p>5 WASTE H2O TK1 DRAIN VLV tb - bp</p> <p>5 SPLY H2O TKD INLET tb - bp</p> <p>(O1)</p> <p>AIR TEMP AV BAY 3 ind - 45 degF</p> <p>FREON FLOW LOOP 2 ind - 443 pph</p> <p>CAB dP/dT ind - .45</p> <p>O2/N2 FLOW SYS 2 ind - 0 pph</p> <p>PPO2 SNSR B,C ind - 0</p> <p>(A4)</p> <p>MSN and EVENT TIME ind - blank</p>	<p>5 Vlv holds position</p> <p>7</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>(A1L)</p> <p>S-BD PM</p> <p>● ANT SW ELEC - 2</p> <p>● XPNDR - 2</p> <p>● PWR AMPL OPER - 2</p> <p>● PWR AMPL STBY - 2</p> <p>● PRE AMP - 2</p> <p>NSP</p> <p>● PWR - 2</p>	<p>S-Bd PM Sys 1:</p> <p>Xpndr 1</p> <p>PreAmp 1</p> <p>NSP 1</p> <p>COM SEC 1</p>	<p>5</p> <p>5</p>	
<p>(A1L)</p> <p>If PSP and INTRG reqd for PL ops:</p> <p>● S-BD PL PWR SYS - 2</p> <p>● CNTL - PNL</p> <p>● Reconfig PSP</p> <p>● Perform PL INTRG REACQ</p>	<p>S-BD PL Intrg 1</p> <p>PSP 1</p> <p>SW PL Ant capability to 2RH, 2LH</p>	<p>5</p>	
<p>(A1R)</p> <p>● S-BD FM PWR - 2</p> <p>● S-BD FM CNTL - PNL, then CMD</p>	<p>Pwr Amp 1</p> <p>PM and FM Ant SW 1</p> <p>NSP 1/COM SEC 1</p> <p>S-BD FM Sig Proc 1</p> <p>Xmtr 1</p>	<p>5</p>	
<p>(C3)</p> <p>● S-BD PM CNTL - PNL, then CMD</p>			
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1)</p> <ul style="list-style-type: none"> ● 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 ● RAD CNTLR LOOP 1,2 (two) - AUTO B ● 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) 	<p>Hum Sep B</p> <p>IMU Fan B</p> <p>1 H2O Loop 1 Pump B Cabin Fan B</p> <p>AV Bay 1 Fan B</p> <p>AV Bay 2 Fan A</p> <p>1 AV Bay 3 Sig Condr, Xdcrs 9 (ECLS SC4) Freon Loop 1 Pump B</p> <p>Freon Loop 1, 2 Rad Cntlr A</p> <p>FES Sec Cntlr</p> <p>Top Evap L Noz Htr B</p> <p>Top Evap L R Noz Htr A</p> <p>Top Evap Duct R Fwd, Aft Htrs B</p> <p>Hi Load Duct Inbd,Outbd Noz Htrs B</p>	<p>If Site AOS and using S-BD PM Xpndr 1 or Auto Elect 1: 'ANTENNA' (2)</p> <p>If NSP 1 selected: 'BCE STRG 1 NSP'</p> <p>If Hum Sep B ON: 'S66 CABIN' (2)</p> <p>If Cabin Fan B ON: C/W AV BAY/CAB AIR It - on 'S66 CABIN FAN'</p> <p>If IMU Fan B ON: 'S66 CABIN IMU'</p> <p>If Freon Loop 1 Pump B ON: 'S88 FREON FLOW 1' 'S88 THERMAL FRN' (2)</p> <p>If H2O Loop 1 Pump B ON: C/W H2O LOOP It 'S88 H2O PUMP P 1'</p>	<p>① May be repwr'd after AC Pwr Transfer Cable connected</p> <p>⑧ Antenna miscompare causes FSM</p> <p>⑨ Av Bay 3 Fan ΔP, Air out Temp snrs lost</p> <p>⑩ Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</p> <p>⑪ One failure away from loss of jettison capability</p> <p>⑫ Manf status not automatically declared closed. Fail-offs will occur when commanded</p>
<p>(L2)</p> <ul style="list-style-type: none"> ● FLASH EVAP FDLN HTR A SPLY - 1 	<p>FES H2O Fdln A Htrs 2 (all)</p>	<p>(O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia</p>	
<p>(L4:P)</p> <ul style="list-style-type: none"> ● cb AC3 φA LG SNSR 1 - cl 	<p>Prox Snsr Electronics Box 2</p>	<p>During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops</p>	
<p>(A8L)</p> <ul style="list-style-type: none"> ● PORT RMS HTR B - OFF ● A - AUTO 	<p>Port RMS: B/U Pwr MPM Mtr 2 Fwd MRL Mtr 1 Mid MRL Mtr 2 D&C B/U edge Itg Htr B</p> <p>10</p> <p>1 D&C B/U edge Itg Htr B</p> <p>11 Jettison Sys A Deadface Relays</p>	<p>(A8L) PORT RMS: DPY/STO tb - bp RFL Fwd tb - bp Reten Hatches tb - bp</p>	
<p>(F6)</p> <ul style="list-style-type: none"> ● HSI SEL SOURCE - (other than MLS 2) 	<p>MLS 2</p>	<p>If Freon sig condr A(B) on pnl O17:C in AC2 position: 'S88 FREON FLOW 2(1)' 'S88 THERMAL FRN'</p>	
<p>(F8)</p> <ul style="list-style-type: none"> ● RDR ALTM - 1 	<p>RA 2</p>	<p>(O1) FREON FLOW LOOP 2(1) ind - 443 pph</p>	
<p>(O6)</p> <p>ANNUN BUS</p> <ul style="list-style-type: none"> ● SEL ACA 1 - MNA ● 2/3 - MNC 	<p>ACA 1 MNB pwr</p> <p>ACA 2/3 MNB pwr</p>	<p>CCTV video TV Annun Its lost if MNB selected for VCU CCTV Mon 2 lost (VTR input lost)</p>	
<p>(O7)</p> <ul style="list-style-type: none"> ● AFT R RCS MANF ISOL 5 - CL (tb-CL) ● For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS) 	<p>RCS Manf R5 RJD pwr (RSR,R5D)</p>	<p>(R2) If APUs active and using BLR CNTLR/HTR 1A or 2B: C/W APU TEMP It - on after ~ 2 min</p>	
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

	ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	For RCS loss, refer to OMS/RCS Slide Rule	RCS manf F2 RJD pwr (F2F,F2R,F2U,F2D)	If OMS GmbI cmd abs value > 2 deg and Sec TVC selected: OMS TVC C/W It 'L OMS GMBL' (3,B)	5 Vlv holds position
13	Only reconfig following vlv for leak isolation: (O7) ● AFT L RCS He PRESS A ● RCS He PRESS A, B	14 F,L,R RCS He Pr Isol A man OP capability 15 F,R RCS He Pr Isol B GPC Cntl, man CL capability 5 Fwd RCS Manf Isol 2 Cntl	If first AA failure and S/W Processing Accel data: 'RM FAIL ACC' (3)	13 Do not reconfig for reg switch or I'CNT procedures
	(O8) ● FWD RCS He PRESS A,B		If first RGA failure and rates sensed: 'RM FAIL RGA' (3)	14 Man CL and GPC cntl remain. Vlv holds position
	(O15:C) ● cb MNB CRYO O2 HTR TK2 SNSR 2 - op	16 Cryo O2 Tk2 Htr Current Snsr 2	Star Trkr Dr -Z OP/CL time and -Y CL time incr from 8 to 16 sec	15 Man OP capability remains. Vlv holds position
	(O17:C) ● SIG CONDR FREON A - AC3 ● SIG CONDR FREON B - AC3	17 Freon Sig Condr A AC2 pwr (ECLS SC 1A) 18 Freon Sig Condr B AC2 pwr (ECLS SC 1B)	L,R ADP deploy times incr from 15 to 30 sec	16 Current Snsr 1 remains
	(C2) ● R CRT SEL - 3 ● GPC/CRT O2 EXEC	DEU/CRT 2	APU H2O QTY 1 - 0% HYD QTY 2 = 0%	17 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsr lost
	DPS UTILITY (G2,G8,S2) MMU 1 ASSIGN ● GNC - ITEM 1 EXEC ● SM - ITEM 3 EXEC ● PL - ITEM 5 EXEC	MMU 2		18 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsr lost
	(CDR's SEAT) ● SEAT PWR - AC3	CDR Seat Adj via AC2 pwr		19 Htr A remains
	(PLT's SEAT) ● SEAT PWR - AC3	PLT Seat Adj via AC2 pwr		20 Htr B remains
	(A6U) ● ANNUN BUS SEL - MNC	ACA 4/5 MNB pwr		21 Current Snsr 2 remains
	(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	19 Fwd RCS Htrs B L Pod B Htrs (partial) 20 R Pod A Htrs (all) 19 OMS Crsfed Ln Htrs B		
	(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:D) cb MNA MMU ● PORT HTR A - cl ● STBD HTR A - cl	19 MMU Port, Stbd Htr B		
16 21	(ML86B:F) cb MNB CRYO O2 ● HTR TK3 SNSR 2 - op ● TK4 SNSR 1 - op	16 Cryo O2: Tk3 Htr Current Snsr 2 21 Tk4 Htr Current Snsr 1		
	(Continued)	(Continued)		

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS	NOTES
	<ul style="list-style-type: none"> If on PCS 2: Perform RECONFIG TO ALT PCS SYS, <u>ECLS</u> SSR-3 	5 5 5 22	O2/N2 Cntl Sys 2: O2 Sply Vlv Cntl N2 Sply Vlv 2 Cntl N2 Reg Inlet Vlv 2 Cntl O2/N2 Cntl Vlv 2 Man Cntl O2 Xovr Vlv 2 OP capability O2/N2 Sys 2 Flow Xdcrs PPO2 Snrsrs B,C		5 Vlv holds position 22 Vlv fails closed 23 Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
	For PLBD ops: <ul style="list-style-type: none"> OP/CL Drs in man mode 		dP/dt Snrs 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	SM (BFS SM 63) PL BAY DOORS If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	24 Maintains He Isol redundancy 25 Man cntl remains. Vap Isol closes. Pr Isol normally closed
24 25 27	Prior to using L(R) OMS: (O8) L OMS He PRESS/VAP ISOL <ul style="list-style-type: none"> A - GPC B - OP R OMS He PRESS/VAP ISOL <ul style="list-style-type: none"> A(B) - GPC B(A) - CL 	23 23 26	L OMS He Pr Isol B and Vap Isol 2 GPC Cntl R OMS He Pr Isol A, B man Cntl and Vap Isol 1,2 man A,B Cntl	During <u>MAN</u> PLBD OP/CL single mtr run time noted on actuators listed at left	26 GPC cntl remains. Vlv fails closed 27 Lost TM: GNC SYS SUMM 2 L OMS ENG VLV 2: If ENG - ARM/PRESS, assume vlv OP
	If Supply H2O Dump reqd and DUMP ISOL VLVs failed closed: <ul style="list-style-type: none"> Perform SUPPLY WATER DUMP USING FES, <u>ECLS</u> SSR-9 	5	Supply H2O Dump Isol Cntl		28 Lose Auto Temp Cntl via Cntl 1 and Cabin Temp, Cabin Hx Air Out Temp, and H2O Loop 1 Cabin Hx In Temp snrsrs. Hx Byp Vlv holds position. May be repwr'd after AC Pwr Transfer Cable connected
	If Cab Temp Cntlr 1 active: (L1) <ul style="list-style-type: none"> CAB TEMP CNTLR - OFF 	28	Cabin Temp Cntlr 1, Hx Byp Vlv Mtr 1		
	(MD44F) <ul style="list-style-type: none"> Remove pin from PRI Actuator BYP vlv linkage, connect linkage to SEC Actuator 				
	(L1) <ul style="list-style-type: none"> CAB TEMP CNTLR - 2 				
	If EMU(s) in battery charge mode: (AW18H) <ul style="list-style-type: none"> PWR/BATT CHGR EMU 1(2) BUS SEL - MNA 		EMU 1,2 Pwr/Batt Chgr MNB pwr		
	GNC 23 RCS <ul style="list-style-type: none"> Reprioritize L,R Manf 1,3 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc 		Aft RCS L,R Jet 1 Htrs Fwd RCS Jet 3 Htrs		
	If CCTV reqd: (A7U) <ul style="list-style-type: none"> TV PWR CONTR UNIT - MNA 		Video Cntl Unit MNB pwr		
	For SSME Hyd Reprss: (R4) <ul style="list-style-type: none"> HYD MPS/TVC ISOL VLV SYS 1,3 (two) - OP, wait 10 sec, then CL 	5	MPS/TVC Hyd Sys 2 Isol Cntl		
	(Continued)		(Continued)		

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

ACTION		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	GNC XXXXX MNVY YYYYY Sel L OMS PRI GMBL • ITEM 28 EXEC	L OMS Sec TVC		(29) Sys B Pri Cntrl, auto switchover to Sec Cntrl remain
	(ML31C) • VAC VENT ISOL VLV BUS SEC - MNA	Vac Vent Isol MNB Cntl		(30) AC2 Bus Isolation accomplished in MNB DA2 Actions column prior to connecting AC Power Transfer Cable. For listing of AC2 Isolation steps, see AC2 BUS LOSS SSR-120 Bus Isolation column
	(WCS) • FAN SEP - 1 • HOSE BLOCK - SEP 1	WCS Sep/Fan 2 WCS Sep Fan 2 Mtr Relay		(31) If this action taken, activate H2O Pump Loop 2
	If reqd during entry (< 120 K ft): (L1) • NH3 CNTLR A(B) - PRI/GPC	29 NH3 Sys B Sec Cntrl Man capability		(32) Redundant pwr source remains for equipment
	• Perform AC POWER TRANSFER CABLE, EPS SSR-200			(33) H2O Loop 2 ICH Flow Rate snsr lost
30	BUS ISOLATION			(34) Other detn in Av Bay remains
31	(L1) • H2O PUMP LOOP 1 - OFF			
	(C2) • CRT 2 PWR - OFF			
	(C3) • MSTR MADS PWR - OFF	All MADS equipment		
	(F8) • INST PWR - OFF	R Inst Pwr (APU/HYD Meters, R HSI,AMI,AVVI)		
	(O6) • STAR TRKR PWR -Y - OFF	-Y Star Tracker		
	(O8) • RADAR ALTM 2 - OFF • MLS 2 - OFF			
	(O15:A) • RGA 2 - OFF	RGA 2		
32	(O15:B) cb MNB OI SIG CONDR			
32	• OF 1/4 B - op			
32	• Of 2/3 A - op			
32	• cb MNB OM 1/2 B - op			
32	• cb MNB OI MDM OF 1/2 B - op	33 H2O Byp Loop 2 Snsr (ECLS SC12)		
	• cb MNB OI H2O BYP LOOP 2 SNSR - op	Aft Mission Timer Fwd Event Timer		
	• cb MNA CONTR - op			
	• MSN TIMER AFT - op			
	• EVENT TIMER FWD - op			
34	(O15:C) cb MNB			
	• SMOKE DETN BAY 1B/3A - op	Av Bay 1 Smoke Det B, Av Bay 3 Smoke Det A		
	• FIRE SUPPR BAY 1 - op	MNB Utility pwr		
	• UTIL PWR F1/MO13Q - op	R Console Floodt L Seat/Ctr Console Floodt		
	• FLOOD R CNSL - op			
	• L CTR - op			
	• ANNUN FWD ACA 1 - op			
	• ANNUN FWD ACA 2/3 - op			
	• ANNUN AFT ACA 4/5 - op			
	(Continued)	(Continued)		

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
35 (O15:D) cb MNB ● FREON RAD CNTLR 1 - op 35 ● FREON RAD CNTLR 2 - op ● PPO2 C CAB dP/dT - op ● N2 SPLY 2 - op ● O2/N2 CNTLR - op ● O2 XOVR 2 - op ● N2 REG INLET 2 - op ● CAB RELIEF A - op	Cabin Relief Vlv A Cntl		5 Vlv holds position 35 Cntrl B remains 36 Redundant pwr source remains for equipment 37 Six vlvs fail to non-isolation position
36 (O15:E) cb MNB ● RADAR ALTM 2 - op ● MLS 2 - op ● ADTA 2 - op ● STAR TRKR -Y - op ● ACCEL 2 - op 36 ● DDU L - op ● R - op ● INST R - op	5 ADTA 2 AA2		
(O15:F) ● MMU 2 - OFF			
	37 ASA 4 Isol		
	37 ATVC 3 Isol ME 37 4 Isol ME		
(R1) ● PL AFT MNB - OFF	MNB pwr to AUX PLB Bus Aft PL MNB pwr		
(R12U) ● FC PURGE VLV 2 - CL ● STARTUP HTR 2 - ENA	FC2 Startup Htr Inhibit capability		
(R15:A) ● cb MNB AUD MIDDECK SPKR - op	OV102 only Middeck SM ATU All except OV102 Middeck ATU		
(R15:B) ● cb MNB CNTL BUS CA 1/2/3 - op	MNB pwr for CNTL CA 1,2,3 Buses		
(R15:C) cb MNB KU ● ELEC - op ● ANT HTR - op ● CABLE HTR - op	KU-BD sys (I/F cont Limit, RDR) Sig Proc & Dpy Assy Deployed Assy Htrs		
(R15:D) cb MNB ● TV FWD BAY CAMR/PAN-TILT - op ● TV FWD BAY CAMR HTR - op ● TV FWD BAY PAN-TILT HTR - op ● TV CONTR UNIT - op ● TV MON 2 - op	Fwd Bay Camr/Pan-Tilt Fwd Bay Camr Htr Fwd Bay Camr Pan-Tilt Htr CCTV Mon 2		
(Continued)	(Continued)		

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R15:E) cb MNB ● OS FLOOD - op ● RMS PORT RMS TV CAMR/PAN-TILT - op ● RMS PORT RMS TV CAMR HTR - op ● RMS PORT RMS TV PAN-TILT HTR - op	OS Floodlt Port RMS Camr/Pan-Tilt Camr Htr Port RMS Camr Pan-Tilt Htr		(5) Vlv holds position (19) Htr A remains (38) No redundancy
(A7U) PL BAY FLOOD ● FWD BHD - OFF ● MID PORT - OFF ● FWD STBD - OFF	PLB Fwd Blkhd Floodlt Mid Port Floodlt Fwd Stbd Floodlt		(39) Mtr 2 Sto capability remains (40) Redundant coils remain
(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		(41) ✓MCC for Oms Qtys
(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	38 Waste H2O Vac Vent Noz Htr 5 Waste Tk1 Drain Vlv Cntl 5 Sply H2O TKD Inlet Vlv Cntl Galley H2O Htrs		
(ML86B:D) cb MNB MMU ● PORT, STBD HTR B - op ● GN2 SPLY ISOL VLV B - op	19 MMU Port Stbd Htr B 5 GN2 Sply Isol Vlv B		
(ML86B:F) cb MNB FLOODS ● MIDDECK 2/6 - op ● BUNK 2/4 - op ● PHS - op ● AIRLK 3 - op	Middeck Floods 2,6 Bunk Floodlts 2/4 PHS Floodlt Airkl Flood 3		
(Continued)	MNB pwr to CNTLAB 1,2,3 and CNTLBC 1,2,3 39 Port, Stbd Rad Mtrs 2 Dpy capability Fwd RCS Jet 2 Htrs 40 L OMS ENG Press Vlv Coil 2, Cntl Vlv 1,2 Coil 2 41 OMS Qty Gauging for all L OMS single engine burns (Continued)		

EPS SSR-30 (Cont)
BUS LOSS: MNB DA2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	5 LG Hyd Sys 2 Isol Cntl 42 APU 1 Cntrl Pwr Sply B 43 1 Fuel Tk Vlv B 44 2 Cntrl Pwr Sply A 2 Fuel Tk Vlv A		(5) Vlv holds position (42) Pwr supply A remains
	45 Freon Loop 2 Cntrl A Rad Byp Vlv Mtr Man Cntl		(43) Vlv fails closed. Redundant vlv remains
	46 L,R ADP Dpy Mtrs 2 47 Htr Cntrl 2 RH Vents 1,2,4,6,7,8,9 Mtrs 2 LH Vents 1,2,3,4,5,7,8,9 Mtrs 2		(44) Pwr supply B remains
	Tacan 2		(45) Cntrls A, B Rad Byp Vlv Mtrs Auto Cntl and Cntrl B Rad Byp Vlv Mtr Man Cntl remain
	48 NLG B/U Rel and Ext Sys 2 LMG, RMG B/U Rel Sys 2 No WOW Relay K11		(46) Mtr 1 remains
	-Y Star Trkr Dr OP and Sys 2 CL capability -Z Star Trkr Dr Sys 1 OP/CL capability		(47) Htr Cntrl 1 remains
	46 PL Reten Sys B Rel/Lat Mtrs KU ANT Sto/Dpy Mtr 2		(48) Brake/Skid Cntl Box B enabled before WOW
	MPS: L Eng Cntrl Ch A Ctr Eng Cntrl Ch B L Eng He Intercon Outlet Vlv 43 L Eng He Isol A 43 Pneu He Isol 2 5 Prplt F/D Inbd LO2 Vlv 5 Prplt F/D Outbd LH2 Vlv 49 Manf Repress LH2 Vlv 1,2		(49) Vlv fails closed
	50 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		(50) Redundant mtrs remain
	51 KU-BD I/F & Cont Unit RDR Sig Proc & deployed Assy		(51) Loss of KU-BD pwr causes loss of ability to lock Gimbals. GIMBALS CAN BE LOCKED IFM may be reqd w/ EVA to position antenna Gimbals. If antenna cannot be secured, antenna jettison reqd

EPS SSR-31
BUS LOSS: MNB FPC2 (Includes MNB FLC2, MNB FMC2, AC2)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1</p> <ul style="list-style-type: none"> Perform FC2 SHUTDN, <u>EPS SSR-2 FC SHUTDN</u> (Cue Card), then: <p>(R1)</p> <ul style="list-style-type: none"> cb AC CONTR AC2 (three) - cl INV/AC BUS 2 - OFF (tb-OFF) INV PWR 2 - OFF (tb-OFF) cb AC CONTR AC2 (three) - op <ul style="list-style-type: none"> Perform LOSS OF 1 FC (ORB PKT, PWRDN) <p>(R2)</p> <ul style="list-style-type: none"> BLR CNTLR/HTR 1 - B 2 - A <p>(L1)</p> <ul style="list-style-type: none"> HUMIDITY 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 AV BAY 2 FAN A - OFF B - ON AV BAY 3 FAN A,B (two) - ON FREON PUMP LOOP 1 - A <p>(L4:P)</p> <ul style="list-style-type: none"> cb AC3 ϕA LG SNSR 1 - cl <p>For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O8)</p> <ul style="list-style-type: none"> FWD RCS He PRESS A,B <p>(O17:C)</p> <ul style="list-style-type: none"> SIG CONDR FREON A - AC3 SIG CONDR FREON B - AC3 <p>(WCS)</p> <ul style="list-style-type: none"> FAN SEP - 1 HOSE BLOCK - SEP 1 <p>(A1L)</p> <ul style="list-style-type: none"> S-BD PM ANT SW ELEC - 2 S-BD PM XPNDR - 2 S-BD PM PWR AMPL OPER - 2 S-BD PM PWR AMPL STBY - 2 S-BD PM PRE AMPL - 2 NSP PWR - 2 <p>(Continued)</p>	<p>2</p> <p>FC2 Pumps and pH Snsr</p> <p>AC2 ϕA, ϕB, ϕC Inverters</p> <p>2</p> <p>Hyd H2O Blr 1 Cntrl A</p> <p>2 Cntrl B</p> <p>2</p> <p>RSVR 2 Qty Snsr</p> <p>Humidity Sep B</p> <p>Cabin Fan B</p> <p>IMU Fan B</p> <p>2</p> <p>H2O Loop 1 Pump B</p> <p>Av Bay 1 Fan B</p> <p>Av Bay 2 Fan A</p> <p>2</p> <p>Av Bay 3 Sig Condr, Xdcrs (ECLS SC4)</p> <p>3</p> <p>Freon Loop 1 Pump B</p> <p>Prox Snsr Electronics Box 2</p> <p>5</p> <p>Fwd RCS He Press Isol A man OP capability</p> <p>6</p> <p>Fwd RCS He Press Isol B man CL and full GPC Cntl</p> <p>8</p> <p>Fwd RCS Manf Isol 2 Cntl RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)</p> <p>9</p> <p>Freon Sig Condr A AC2 pwr (ECLS SC1A)</p> <p>10</p> <p>Freon Sig Condr B AC2 pwr (ECLS SC 1B)</p> <p>WCS Fan/Sep 2</p> <p>S-Bd PM Sys 1: Xpndr 1 Pre-Amp 1 Pwr Amp 1 PM, FM Ant Sw 1</p> <p>NSP 1/COMSEC 1</p> <p>(Continued)</p>	<p>MASTER ALARM Light/Tone - on CRT 2 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 SM ALERT Light/Tone - on</p> <p>(F9) AC2 ϕA, ϕB, ϕC AC volts < 90</p> <p>(COMM LOST) All S-BD A/G voice lost if Sys 1 selected</p> <p>(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)</p> <p>(FSMs) S67 AC VOLTS 2 S86 APU/HYD W/B S86 SM 0 THRM HYD (B) S66 AV BAY FAN S69 FC PUMP 2 S88 THERMAL FRN (2) RM DLMA MANF S88 I/O ERROR CRT 2 S66 CABIN (2) S66 CABIN FAN S66 CABIN IMU</p> <p>(F6/F8) LDG GEAR L, NOSE tb - bp</p> <p>(F8) APU H2O QTY 1 ind - 0% HYD QTY 2 ind - 0%</p> <p>(R1) FC2 COOL PUMP ΔP tb - bp</p> <p>(O8) FWD RCS He PRESS B tb - bp</p> <p>8</p> <p>FWD RCS MANF ISOL 2 tb - bp</p> <p>(O1) AIR TEMP AV BAY 3 ind - 45 degF AIR TEMP CAB HX OUT ind - 45 degF FREON FLOW LOOP 2 ind - 578 pph</p> <p>(A4) MSN and EVENT TIME ind - blank</p> <p>L,R ADP deploy times incr from 15 to 30 sec</p> <p>11</p> <p>If site AOS and using S-BD Xpndr or Ant Elec 1: 'ANTENNA' (2)</p> <p>(Continued)</p>	<p>1</p> <p>TIME CRITICAL</p> <p>FC2 must be shut-down within 9 min to avoid potentially hazardous condition</p> <p>2</p> <p>May be repwr'd after AC Pwr Transfer Cable connected</p> <p>3</p> <p>AV Bay 3 Fan ΔP Air Out Temp Snrs lost</p> <p>4</p> <p>When gear deployed, tb will not indicate DN</p> <p>5</p> <p>Man CL and full GPC cntl remains. Vlv holds position</p> <p>6</p> <p>Man OP capability remains. Vlv holds position</p> <p>7</p> <p>Do not reconfig for reg switch or I'CNT procedures</p> <p>8</p> <p>Vlv holds position</p> <p>9</p> <p>Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty Snrs lost</p> <p>10</p> <p>Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty Snrs lost</p> <p>11</p> <p>FSM caused by antenna miscompare</p>

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A1L) If simo loss of MNA & MNB: ● NSP ENCRYPTION MODE - SEL ● NSP ENCRYPTION SEL - BYP</p> <hr/> <p>If PSP and INTRG reqd for PL ops: ● S-BD PL PWR SYS - 2 ● S-BD PL PWR - PNL, then CMD ● Reconfig PSP ● Perform PL INTRG REACQ</p>	<p>S-BD PL Intrg 1 PSP 1 Sw PL Ant capability to 2RH, 2LH</p>	<p>-Y,-Z Star Trkr Drs OP/CL time incr from 8 to 16 sec</p> <p>If Sys 1 pwrd: 'S62 BCE BYP PSP1' Loss of PL TLM and CMD</p> <p>If PDI FDA Enabled: 'S62 PDI DECOM FAIL'</p> <p>If NSP 1 selected: 'BCE STRG 1 NSP'</p> <p>If Freon Loop 1 Pump B ON: 'S88 FREON FLOW 1' 'S88 THERMAL FRN' (2)</p>	<p>12 Lost Auto Temp Cntl via Cntl 1 and Cabin Temp, Cabin Hx Air Out Temp and H₂O Loop Cabin Hx In Temp snrs Hx Byp Vlv holds position</p>
<p>(A1R) ● S-BD FM PWR - 2 ● S-BD FM CNTL - PNL, then CMD</p>	<p>S-BD FM Sig Proc 1, Xmtr 1</p>	<p>If Freon Sig Condr A(B) (O17:C) in AC2 position: 'S88 FREON FLOW 2(1)' 'S88 THERMAL FRN'</p>	
<p>(C3) ● S-BD PM CNTL - PNL, then CMD</p>		<p>(O1) FREON FLOW LOOP 2(1) ind - 578 pph</p>	
<p>(C2) ● R CRT SEL - 3 ● GPC/CRT O2 EXEC</p>	<p>DEU/CRT 2</p>	<p>If H₂O Loop 1 Pump B ON: C/W H₂O LOOP It 'S88 H₂O PUMP P 1' 'S88 THERMAL H₂O' (2)</p>	
<p>(CDR's SEAT) ● CDR SEAT PWR BUS SEL - AC3 (dn)</p>	<p>CDR Seat Adj via AC2 pwr</p>	<p>(O1) H₂O PUMP OUT PRESS LOOP 1 ind - 20-25 psia</p>	
<p>(PLT's SEAT) ● PLT SEAT PWR BUS SEL - AC3 (dn)</p>	<p>PLT Seat Adj via AC2 pwr</p>	<p>If APUs active and using H₂O Blr Cntl 28(3A): C/W APU TEMP It after ~ 2 min</p>	
<p>(A14) ● RCS/OMS HTR FWD RCS - A AUTO</p>	<p>Fwd RCS Htrs B</p>	<p>During Rad Dpy/Sto ops: (R13L) RAD LAT CNTL tbs (two) indicate single mtr ops</p>	
<p>DPS UTILITY (G2,G8,S2)</p> <p>MMU ASSIGN ● GNC - ITEM 1 EXEC ● SM - ITEM 3 EXEC ● PL - ITEM 5 EXEC</p>	<p>MMU 2</p>		
<p>If Cab Temp Cntl 1 active: (L1) ● CAB TEMP CNTLR - OFF</p>	<p>12 Cabin Temp Cntl 1 and Hx Byp vlv Mtr 1</p>		
<p>(MD44F) ● Remove pin from PRI Actuator and BYP vlv linkage ● Connect linkage to SEC Actuator</p>			
<p>(L1) ● CAB TEMP CNTLR - 2</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>Pre-seat ingress for Entry: ● Discharge handheld fire ext into AV BAY 1</p>	<p>Av Bay 1 agent discharge capability</p>		
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<ul style="list-style-type: none"> Perform AC POWER TRANSFER CABLE, EPS SSR-200 			<p>2 May be repwr'd after AC Pwr Transfer Cable connected</p>
<p>13 BUS ISOLATION</p>			
<p>(L1)</p> <ul style="list-style-type: none"> H2O PUMP LOOP1 - OFF 2 - ON 			
<p>(C2)</p> <ul style="list-style-type: none"> CRT 2 PWR - OFF 			
<p>(O15:F)</p> <ul style="list-style-type: none"> MMU 2 - OFF 			
<p>(A7L)</p> <ul style="list-style-type: none"> MADS RCDR PWR - OFF 	<p>MADS Rcdr All MADS and ACIP data</p>		
<p>(MA73C:A)</p> <ul style="list-style-type: none"> MCA LOGIC MNB FWD 2 - OFF 	<p>MNB FMC2 Bus pwr</p>		
<p>(O15:C)</p> <ul style="list-style-type: none"> cb MNB FIRE SUPPR BAY 1 - op 	<p>14 MNB Pwr to CNTL Buses AB1, AB2, AB3, BC1, BC2, BC3</p>		
	<p>15 NLG B/U Rel and Ext Sys 2 LMG, RMG B/U Rel Sys 2 No WOW Relay K11</p>		
	<p>-Y Star Trkr Dr Sys 2 OP/CL capability -Z Star Trkr Dr Sys 1 OP/CL capability</p>		
	<p>L,R ADP Dpy Mtrs 2 Htr Cntrl 2 RH Vents 1,2 Mtrs 2 LH Vents 1,2 Mtrs 2</p>		
	<p>MPS L Eng Cntrl Ch A Ctr Eng Cntrl Ch B</p>		
	<p>16 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</p>		
	<p>2 Tacan 2</p>		
	<p>17 Port RMS: 2 MPM Mtr 2 2 Fwd MRL Mtr 1 2 Mid MRL Mtr 2 2 D&C B/U edge ltg</p>		
			<p>13 AC2 Bus isolation accomplished in MNB FPC2 Actions Column prior to connecting AC Pwr Transfer Cable. For listing of AC2 Isolation steps, refer to AC2 BUS LOSS SSR-120 (BUS ISOLATION column)</p> <p>14 Buses remain pwr'd</p> <p>15 Brakes/Skid Cntl Box B enabled before WOW</p> <p>16 Redundant mtrs remain</p> <p>17 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</p>

EPS SSR-32
BUS LOSS: MNB MPC2 (Includes MNB MMC1, MNB MMC2, MNB MMC3, MNB MMC4)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1</p> <ul style="list-style-type: none"> Perform MNA BUS TIE, EPS SSR-2 BUS TIE (Cue Card) Monitor, record Δ amps between FC2 and tied FC <p>(R1) <ul style="list-style-type: none"> PL CAB - MNA </p> <p>(A8L) <ul style="list-style-type: none"> PORT RMS HTR B - OFF PORT RMS HTR A - AUTO </p> <p>(L1) <ul style="list-style-type: none"> TOP EVAP HTR DUCT - A If Hi Load Evap enabled HI LOAD DUCT HTR - A(C) </p> <p>(L2) <ul style="list-style-type: none"> FLASH EVAP FDLN HTR A SPLY - 1 </p> <p>(A12) <ul style="list-style-type: none"> HYD HTR AFT FUS B - AUTO HYD HTR AFT FUS A - OFF </p> <p>(MA73C:C,D) <ul style="list-style-type: none"> cb MCA PWR AC2 3ϕ MID 2 - op cb MCA PWR AC2 3ϕ MID 4 - op </p> <p>For PLBD ops: <ul style="list-style-type: none"> OP/CL Drs in man mode </p> <p>(R15:C) <ul style="list-style-type: none"> cb MNB KU ELEC - op ANT HTR - op CABLE HTR - op cb MNC KU SIG PROC - op </p>	<p>1 FC2 Purge Vlv O2,H2 Flow Xdcrs SS ΔV Snrs</p> <p>3 MNB pwr to CABPL1,2,3 Buses</p> <p>4 Port RMS: B/U pwr MPM Mtr 2 Fwd MRL Mtr 1 Mid MRL Mtr 2 Htr B</p> <p>Top Evap Duct Fwd, Aft Htrs B Hi Load Duct Inbd, Outbd Htrs B</p> <p>FES H2O Fdln A Mid 2 Htr 2</p> <p>Aft Fuselage Hyd Htrs A</p> <p>6 Stbd Rad Lat 1-6 Mtr 2 Limit sw Port Rad Lat 1-6 Mtr 2 Limit sw</p> <p>PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Lat Mtr 2 Port Door Mtr 2 Port,Stbd Fwd Blkhd Lat Mtr 2 Stbd Door Mtr 2 Port,Stbd Door Mtr 1 CL Limit sw</p> <p>FC2 Startup Htr Inhibit capability</p> <p>PLB Fwd Blkhd Floodlt Mid Port Floodlt Fwd Stbd Floodlt</p> <p>MADS PCCMU</p> <p>MNB MMC1,2,3,4 Bus pwr</p> <p>(Continued)</p>	<p>2 (L2) O2 SYS 2 SPLY tb - CL</p> <p>(LIGHTS LOST) PLB Fwd Blkhd Floodlt Mid Port Floodlt Fwd Stbd Floodlt</p> <p>(A8L) PORT RMS: DPY/STO tb - bp R-F-L FWD tb - bp RETEN LAT tb - bp</p> <p>(R13L) During Rad Dpy ops: RAD CNTL tbs (two) indicate single mtr ops</p> <p>5 If in RDR/Comm Track, will break track (A1U) SIG STRENGTH - 0 SM 210 ANTENNA SIG STR - 0 Erratic antenna motion</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>1 Buses are tied due to: <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 and <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</p> <p>2 Vlv holds position</p> <p>3 Pwrs PL Timing Buffer and VTR</p> <p>4 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</p> <p>5 Deployed assy can still be stowed</p> <p>6 If AC2 cbs not opened, Lat Mtrs 2 of actuators for Port and Stbd Rad Lat 1-6 continues to run until Sys B Lat Cntl sw placed to OFF. Other equip pwr'd by AC2 MMC2 and AC2 MMC4 lost because of MNB MMC2 and MNB MMC4 loss</p>
<p>BUS ISOLATION</p> <p>(R12U) <ul style="list-style-type: none"> FC PURGE VLV 2 - CL STARTUP HTR 2 - ENA </p> <p>(A7U) PL BAY FLOOD <ul style="list-style-type: none"> FWD BHD - OFF MID PORT - OFF FWD STBD - OFF </p> <p>(A7L) <ul style="list-style-type: none"> MADS PCM - OFF </p> <p>(MA73C:A,B) <ul style="list-style-type: none"> MCA LOGIC MNB MID (four) - OFF </p>			

EPS SSR-32 (Cont)
 BUS LOSS: MNB MPC2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>7 Freon Loop2 Cntrl A Rad Byp Vlv Mtr Man Cntl</p> <p>2 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl</p> <p>8 Port,Stbd Rad Mtrs 2 Dpy capability LH Vent 3,4,5,7 Mtrs 2 RH Vent 4,6,7 Mtrs 2</p> <p>9 MNB pwr to ESS1BC, ESS3AB AUX PLB BUS Pwr</p> <p>10 KU ANT Sto/Dpy Mtr 2 Sto and Dpy Limit sw</p> <p>11 Ku-Bd Sys Deployed Assy including Htr Ckts (Rdr & Comm)</p> <p>12 Redundant Ku-Bd Xmit Enable</p> <p>13 Redundant Ku-Bd Boom Stow Enable II Excitation Signal</p>		<p>② Vlv holds position</p> <p>⑦ Cntrls, A,B Rad Byp Vlv Mtrs Auto Cntl and Cntrl B Rad Byp Vlv Mtr Man Cntl remain</p> <p>⑧ Mtr 2 stow capability remains</p> <p>⑨ Buses remain pwr'd</p> <p>⑩ With an inoperative limit sw, mtr will continue to run until DPY/STO sw placed to GND position</p> <p>⑪ Loss of KU-BD pwr causes loss of ability to lock Gimbals. GIMBALS CAN BE LOCKED IFM may be reqd w/ EVA to position antenna Gimbals. If antenna cannot be secured, antenna jettison reqd</p> <p>⑫ MNC MMC2 pwr for KU-BD Xmit Enable signal remains</p> <p>⑬ MNB MMC4 pwr remains to supply pwr to Boom stow. Enable II signal for stow mtrs</p>

EPS SSR-33 BUS LOSS: MNB APC2

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
4	For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O7) ● AFT R RCS He PRESS A,B ● L RCS He PRESS A	1	Aft L,R RCS He Pr Isol A man OP capability	2	MASTER ALARM Light/Tone - on	①	Man CL and full GPC cntl remains. Vlv holds position
5	(O7) ● AFT R RCS MANF ISOL 5 - CL (tb-CL)	3	Aft R RCS He Pr Isol B GPC Cntl and man CL capability		If OMS GMBL cmd abs value > 2 deg and Sec TVC selected: C/W OMS TVC It - on 'L OMS GMBL' (3,B)	②	Indications do not appear until jet commanded
	● For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)		RCS Manf R5 RJD pwr (R5R,R5D)		(F7) C/W RCS JET It - on	③	Man OP capability remains. Vlv holds position
	(A12) APU HTR TK/FU LINE/H2O ● SYS 1A - AUTO ● 2B - AUTO		APU 1 Fu Pump/GG H2O Htrs B APU 1 GG Inj H2O Htrs B APU 2 Fu Pump/GG H2O Htrs A Rudder/Speed Brake Htr B		(FSM) R RCS D, L JET	④	Do not reconfig for reg switch or I'CNT procedures
	HYD HTR RUD SPD ● BK A - AUTO ● B - OFF	6	APU 2 Fu TK Vlv A CL capability via APU 2 Auto Shutdn Signal			⑤	Manf status not automatically declared closed. Fail-offs will occur when commanded
7	Prior to using L(R) OMS: (O8)	8	Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl			⑥	In event of APU 2 auto shutdn, vlv remains OP until pwr removed by APU FUEL TK VLV sw throw.
9	L OMS He PRESS/VAP ISOL ● A - GPC ● B - OP	11	Left OMS Bi Prop 2 Pos Ind Snsr			⑦	Maintains He Isol redundancy
10	R OMS He PRESS/VAP ISOL ● A(B) - GPC ● B(A) - CL		Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man A,B Cntl			⑧	Man cntl remains. Vap Isol closes. Pr Isol normally closed
	(A14) RCS/OMS HTR ● R POD (two) - A OFF, B AUTO ● L POD (two) - A AUTO, B OFF ● OMS CRSFD LINES - A AUTO, B OFF	12	Right Pod A Htrs			⑨	Lost TM: GNC SYS SUMM 2
	GNC XXXXX MNVY YYYYY	13	Left Pod B Htrs (partial)				L OMS ENG VLV 2: assume VLV 2 status same as VLV 1
	Sel L OMS PRI TVC: ● GMBL L PRI - ITEM 28 EXEC	13	OMS Crsfd Ln B Htrs			⑩	Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
			L OMS Sec TVC			⑪	GPC cntl remains. Vlv fail closed
						⑫	B Htrs remain
						⑬	A Htrs remain
						⑭	Six vlvs fail to non-isolation position
BUS ISOLATION							
	(R1) ● PL AFT MNB - OFF	14	Aft PL MNB pwr				
			ASA 4 Isol ATVC 4 Isol ME				

**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 • SYS 1B - OFF</p> <p>2 • 2B - AUTO</p> <p>2 • 2A - OFF</p> <p>HYD HTR</p> <p>• BDY FLP A - AUTO</p> <p>• B - OFF</p> <p>• ELEV A - AUTO</p> <p>• B - OFF</p> <p>• RUD SPD BK 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 1 Fu Pump/GG H2O Htrs B</p> <p>APU GG Inj H2O Htrs B</p> <p>2 Tk/Fu Line Htr A</p> <p>APU 2 Fu Pump/GG H2O Htrs 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>3 HYD LG ISOL VLV 2 tb - OP</p> <p>4 (O7) AFT R RCS He PRESS B tb - bp</p> <p>AFT L,R RCS TK ISOL 3/4/5 B tb - bp (if vlv in CL position)</p> <p>(FSMs) S86 APU/HYD W/B SM 0 THRM HYD (B)</p> <p>If APUs active and using BLR CNTLR/HTR 1A or 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) R RCS D,L JET</p>	<p>① Indications do not appear until jet commanded</p> <p>② 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 Man OP capability remains. Vlv holds position</p> <p>⑤ Manf status not automatically declared closed. Fail-offs will occur when commanded</p> <p>⑥ Man CL and GPC cntl remains Vlv holds position</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 If Hi Load Evap enabled</p> <p>• HI LOAD DUCT HTR - A(C)</p>	<p>FES Sec Cntlr</p> <p>Top Evap L Noz Htr B</p> <p>Top Evap R Noz Htr A</p> <p>Top Evap Duct L,R Htrs B</p> <p>Hi Load Duct Noz Htr B</p>		
<p>(L2)</p> <p>• FLASH EVAP FDLN HTR A SPLY - 1</p>	<p>FES H2O Fdln A Htrs 2 (all except Mid 2)</p>		
<p>(R2)</p> <p>• BLR CNTLR/HTR 1 - B</p> <p>• 2 - A</p>	<p>Hyd H2O Blr 1 Cntlr A</p> <p>2 Cntlr B</p>		
<p>(O7)</p> <p>5 • AFT R RCS MANF ISOL 5 - CL (tb-CL),</p> <p>• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>RCS Manf R5 RJD pwr (R5R,R5D)</p>		
<p>For RCS loss, refer to OMS/RCS Slide Rule</p>	<p>6 Aft L RCS He Pr Isol A man OP capability</p> <p>6 Aft R RCS He Pr Isol A man OP capability</p> <p>4 Aft R RCS He Pr Isol B GPC Cntl and man CI 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>Aft RCS L,R Jets 1 Htrs</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 AUTO, B OFF	7	R Pod A Htrs (all)		③ Vlv holds position
		8	L Pod B Htrs (partial)		⑦ B Htrs remain
		8	OMS Crsfd Ln Htrs B		⑧ A Htrs remain
9	Prior to using L(R) OMS: (O8) L OMS He PRESS/VAP ISOL	10	Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl		⑨ Maintains He Isol redundancy
11	• A - GPC • B - OP	12	Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man OP		⑩ Man cntl remains. Vap Isol closes. Primary Isol normally closed
13	R OMS He PRESS/VAP ISOL • A(B) - GPC • B(A) - CL				⑪ Lost TM:
	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 SYS SUMM 2 L OMS ENG VLV 2: Assume VLV 2 status same as Vlv 1
	GNC XXXXX MNVR YYYYY Sel L OMS PRI TVC: • GMBL L PRI - ITEM 28 EXEC		L OMS Sec TVC		⑫ GPC cntl remains. Vlv fails closed
	If reqd during entry (<120K ft): (L1) • NH3 CNTLR A(B) - PRC/GPC	14	NH3 Sys B Sec Cntlr man ON capability		⑬ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
BUS ISOLATION					⑭ Sys B Pri Cntlr, auto switchover to Sec Cntlr remain
	(R1) • PL AFT MNB - OFF		Aft PL MNB pwr		⑮ Six vlvs fail to nonisolation position
	(R4) • MPS ENG CNTL HTR L - OFF		L Eng Cntlr Htr		⑯ Redundant coils remain
	(O15:A) • RGA 2 - OFF		RGA 2		⑰ ✓ MCC for OMS Qtys
	(MA73C:B) • MCA LOGIC MNB AFT 2 - OFF	15	ASA 4 Isol ATVC 3 Main Eng Isol 4 Main Eng Isol		⑱ Pwr Sply A remains
		16	L OMS Eng Press Vlv Coil 2, Cntl Vlv 1,2 Coil 2		⑲ Vlv A remains
		17	OMS Qty Gaging for all L OMS Single engine burns		⑳ Pwr Sply B remains
		3	LG Hyd Sys 2 Isol Cntl		㉑ Vlv B remains
		18	APU 1 Cntlr Pwr Sply B Fu Tk Vlv B		
		19	2 Cntlr Pwr Sply A Fu Tk Vlv A		
		20			
		21			

(Continued)

EPS SSR-34 (Cont)
BUS LOSS: MNB APC5

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>MPS:</p> <p>22 L Eng He Intercon Outlet Vlv</p> <p>23 L Eng He Isol A Pneu He Isol 2</p> <p>24 Prplt F/D Inbd LO2 Vlv</p> <p>25 Prplt F/D Outbd LH2 Vlv</p> <p>26 Manf Repress LH2 Vlv 1,2</p> <p>27 ET Door Mtrs: C/L Lat Actr 1 Mtr 2 GPC Cntl L Dr Uplock Lat Mtr 2 GPC Lat capability R Dr Uplock Lat Mtr 2 GPC Lat capability R Dr Closure Mtr 2 GPC CL capability</p> <p>-----</p> <p>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>22 Vlv fails closed</p> <p>23 Vlv fails closed. Redundant vlv remains</p> <p>24 Vlv holds position. LO2 Manf will not be inerted during entry (MM304)</p> <p>25 Vlv holds position. LH2 Manf will not be inerted during entry (MM304)</p> <p>26 Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</p> <p>27 Redundant mtrs remain</p>

**EPS SSR-35
BUS LOSS: MNB FLC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>3 For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O8)</p> <ul style="list-style-type: none"> • FWD RCS He PRESS A,B 	<p>1 Fwd RCS He Press Isol A man OP capability</p> <p>4 Fwd RCS He Press Isol B man CL and GPC Cntl</p>	<p>2 MASTER ALARM Light/Tone - on</p>	<p>① Man CL and full GPC cntl remains. Vlv holds position</p>
<p>(A1L) S-BD PM</p> <ul style="list-style-type: none"> • ANT SW ELEC - 2 • XPNDR - 2 • PWR AMPL OPER - 2 • PWR AMPL STBY - 2 • PRE AMP - 2 • NSP PWR - 2 	<p>S-Bd PM Sys 1: Xpnder 1 Pre Amp 1 Pwr Amp 1 FM, PM Auto sw 1</p> <p>NSP 1</p>	<p>2 (F7) C/W RCS JET It - on</p>	<p>② Indications do not appear until jet commanded</p>
<p>If PSP and INTRG reqd for PL ops:</p> <ul style="list-style-type: none"> • S-BD PL PWR SYS - 2 • S-BD PL CNTL - PNL, then CMD • Reconfig PSP • Perform PL Intrg Reacq 	<p>S-BD PL Intrg 1 PSP 1 Sw PL Ant capability to 2RH, 2LH</p>	<p>(COMM LOST) All S-BD A/G voice lost if Sys 1 selected</p>	<p>③ Do not reconfig for reg switch or I'CNT procedures</p>
<p>(C3)</p> <ul style="list-style-type: none"> • S-BD PM CNTL - PNL, then CMD 		<p>(FSM) 'F RCS D(F,R,U) JET'</p>	<p>④ Man OP capability remains. Vlv holds position</p>
<p>(A1R)</p> <ul style="list-style-type: none"> • S-BD FM PWR - 2 • S-BD FM CNTL - PNL, then CMD 	<p>S-BD FM Sig Proc 1, Xmtr 1</p>	<p>If site AOS and using S-BD PM Xpndr 1 or ANT ELEC 1: 'ANTENNA' (2)</p>	<p>⑤ FSM caused by antenna RM</p>
<p>(A14)</p> <ul style="list-style-type: none"> • RCS/OMS HTR FWD RCS JET (five) - A AUTO 	<p>FWD RCS HTRS B</p>	<p>If sys 1 pwrd: 'S62 BCE BYP PSP1' Loss of PL TLM and CMD</p>	<p>⑥ When gear deployed, tb will not indicate DN</p>
<p>7 GNC 23 RCS Override F2 Manf status to CL:</p> <ul style="list-style-type: none"> • RCS FWD - ITEM 1 EXEC • MANF VLVS 2 OVRD - ITEM 41 EXEC 	<p>RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)</p>	<p>If PDI FDA enabled: 'S62 PDI DECOM FAIL'</p>	<p>⑦ Manf status not automatically declared closed. Jet fail-offs may occur</p>
<p>Pre-seat ingress:</p> <ul style="list-style-type: none"> • Discharge handheld fire ext into AV BAY 1 	<p>Av Bay 1 agent discharge capability</p>	<p>If NSP 1 selected, 'BCE STRG 1 NSP'</p>	<p>⑧ Htr Cntrl 1 remains</p>
<p>BUS ISOLATION</p>		<p>(F6/F8) LDG GEAR L,NOSE tb - bp</p>	<p>⑨ Brake/Skid Cntl Box B enabled before WONG</p>
<p>(O15:C)</p> <ul style="list-style-type: none"> • cb MNB FIRE SUPPR BAY 1 - op 	<p>8 L,R ADP Htr Cntrl 2</p> <p>9 No WOW Relay K11</p>	<p>(O8) FWD RCS He PRESS B tb - bp</p>	

**EPS SSR-36
BUS LOSS: MNB ALC2**

ACTIONS	
	(A12) APU HTR ● GAS GEN/FUEL PUMP 1 - A AUTO ● GAS GEN/FUEL PUMP 2 - B AUTO ● LUBE OIL LINE 1 - A AUTO ● LUBE OIL LINE 2 - B AUTO APU HTR TK/FU LINE/H2O ● SYS 1A - AUTO ● 1B - OFF ● 2B - AUTO ● 2A - OFF
2	HYD HTR ● BODY FLP A - AUTO ● B - OFF ● ELEV A - AUTO ● B - OFF HYD CIRC PUMP ● PWR 1 - MNA ● 2 - MNC
	(L1) ● FLASH EVAP CNTLR PRI A(B) - ON (if reqd) TOP EVAP HTR ● NOZ L - A AUTO ● R - B AUTO ● DUCT - A If Hi Load Evap enabled: ● HI LOAD DUCT HTR - A(C)
	(L2) ● FLASH EVAP FDLN HTR A SPLY - 1
	(R2) ● BLR CNTLR/HTR 1 - B ● 2 - A
6	For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O7) ● AFT R RCS He PRESS A,B ● L RCS He PRESS A
8	(O7) ● AFT R RCS MANF ISOL 5 - CL (tb-CL)
	For attitude control: ● Perform LOSS OF VERNIERS (ORB OPS, RCS)
	GNC 23 RCS ● Reprioritize L,R Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc
	(A14) ● RCS/OMS HTR CRSFD LINES - A AUTO, B OFF
	(Continued)

EQUIP/FUNCTION LOST	
	APU 1 GG/Fu Pump Htrs B
	2 GG/Fu Pump Htrs A
	1 Lube Oil Line Htrs B
	2 Lube Oil Line Htrs A
	APU 1 Tk/Fu Line Htr B
	2 Tk/Fu Line Htr A
	Body Flap Htr B
	Elev Act Htr B
	Circ Pump 1 MNB pwr 2 MNB pwr
	FES Sec Cntrl
	Top Evap L Noz Htr B R Noz Htr A Duct L,R Htrs B
	HI Load Duct Noz Htr B
	FES H2O FdIn A Htrs 2 (all except Mid 2)
5	Hyd H2O Blr 1 Cntrl A 2 Cntrl B
4	Aft L,R RCS He Pr Isol A man OP capability
7	Aft R RCS He Pr Isol B GPC Cntl and man CL capability
	RCS Manf R5 RJD pwr (R5R,R5D)
	Aft L,R RCS Jet 1 Htrs
	OMS Crsfed Ln B Htrs (partial)
	(Continued)

CREW INDICATIONS		NOTES
1	MASTER ALARM Light/Tone - on	① Indications do not appear until jet commanded
(R4)		
3	HYD LG ISOL VLV 2 tb - OP	
3	HYD MPS/TVC ISOL VLV SYS 2 tb - CL	② <div style="border: 1px dashed black; padding: 2px; 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
(O7)		
4	AFT R RCS He PRESS B tb - bp AFT L,R RCS TK ISOL 3/4/5 B tb - bp (if vlv in CL position)	
	If APUs active and using BLR CNTLR/HTR 1A or 2B: C/W APU TEMP It - on after ~2 min	③ Vlv holds position
(F7)	C/W RCS JET It - on	④ Man CL and full GPC Cntl remains. Vlv holds position
(FSM)	R RCS D,L JET	
		⑤ In A position, Sys 3 HYD H2O Blr and Tk Htrs still operative, but GN2 SOV opens and cannot be closed. B position must be selected for entry
		⑥ Do not reconfig for reg switch or I'CNT procedures
		⑦ Man OP capability remains. Vlv holds position
		⑧ Manf status not automatically declared closed. Fail-offs will occur when commanded

EPS SSR-36 (Cont)
BUS LOSS: MNB ALC2

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS	NOTES
9	Prior to using L OMS: (O8) L OMS He PRESS/VAP ISOL • A - GPC • B - OP	10	L OMS He Pr Isol B GPC Cntl		③ Vlv holds position
	For SSME Hyd Reprss: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) - OP wait 10 sec, then CL	3	MPS/TVC Hyd Sys 2 Isol Cntl		⑨ To maintain He Isol redundancy
	If reqd during entry (<120k ft): (L1) • NH3 CNTLR A(B) - PRI/GPC	17	NH3 Sys B Sec Cntlr man ON capability		⑩ Man cntl remains
BUS ISOLATION					⑪ ✓MCC for OMS Qtys
		10	L OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2		⑫ Vlv fails closed. Redundant vlv remains
		11	OMS Qty gauging for all L OMS single engine burns		⑬ Vlv fails closed
		12	APU 1 Fu Tk Vlv B		⑭ Vlv holds position. LO2 Manf will not be inerted during entry (MM304)
		12	2 Fu Tk Vlv A		⑮ Vlv holds position. LH2 Manf will not be inerted during entry (MM304)
		3	TVC Hyd Sys 2 Isol Cntl		⑯ Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)
		3	LG Hyd Sys 2 Isol Cntl		⑰ Sys B Pri Cntlr, auto switchover to Sec Cntlr remain
	MPS:	13	L Eng He Intrcon Outlet Vlv		
		12	L Eng He Isol A		
		12	Pneu He Isol 2		
		14	Prplt F/D Inbd LO2 Vlv		
		15	Outbd LH2 Vlv		
		16	Manf Reprss LH2 Vlv 1,2		

**EPS SSR-37
BUS LOSS: MNB FMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) ● H2O PUMP LOOP 1 - A <div style="border: 1px solid black; padding: 2px; width: fit-content;">GNC 23 RCS</div> Override F2 Manf status to OP ● RCS FWD ITEM 1 EXEC ● MANF VLVS 2 OVRD ITEM 41 EXEC	H2O Loop 1 Pump B 1 Fwd RCS Manf Isol 2 Cntl	MASTER ALARM Light/Tone - on (F7) SM ALERT Light/Tone - on (FSM) RM DLMA MANF (O8) FWD RCS MANF ISOL 2 tb - bp	① Vlv holds position ② Redundant mtr remains ③ Htr Cntlr 1 remains
BUS ISOLATION (MA73C:A) ● MCA LOGIC MNB FWD 2 - OFF	2 MNB FMC2 Bus pwr L,R Vents 1,2 Mtrs 2 ADP Deploy Mtrs 2 ~ Deploy Disc 2 3 Htr Cntlr 2 2 -Y Star Trkr Dr Sys 2 OP/CL capability 2 -Z Star Trkr Dr Sys 1 OP/CL capability	If H2O PUMP LOOP 1, B ON: C/W H2O LOOP It - on 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2) (O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia L,R ADP deploy time incr from 15 to 30 sec STAR TRKR DRS POS -Y,-Z OP/CL time incr from 8 to 16 sec	

**EPS SSR-38
BUS LOSS: MNB MMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
BUS ISOLATION (MA73C:A) ● MCA LOGIC MNB MID 1 - OFF	MNB MMC1 Bus pwr LH Vent 5 Mtr 2		

**EPS SSR-39
BUS LOSS: MNB MMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 (MA73C:C) ● cb MCA PWR AC2 3φ MID 2 - op For PLBD ops: ● OP/CL Drs in man mode MANUAL PLBD CLOSING (DEORBIT PREP)	1 Stbd Rad Lat 1-6 Mtr 2 Limit sw 2 Stbd Rad Mtr 2 Dpy capability PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Lat Mtr 2 Port Door Mtr 2 Stbd Door Mtr 1 CL Limit sw	<div style="border: 1px solid black; padding: 2px; width: fit-content;">SM (BFS SM 63) PL BAY DOORS</div> 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	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. Other equip pwr'd by AC2 MMC2 lost because MNB MMC2 lost ② Mtr 2 stow capability remains ③ Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
BUS ISOLATION (MA73C:A) ● MCA LOGIC MNB MID 2 - OFF	3 MNB MMC2 Bus pwr Port RMS: MPM Mtr 2 Fwd MRL Mtr 1 LH Vent 3 Mtr 2	(A8L) PORT RMS: RETEN LAT tb - bp R-F-L FWD tb - bp (R13L) During RAD Dpy ops: RAD CNTL STBD tb indicates single mtr ops	

**EPS SSR-40
BUS LOSS: MNB MMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
BUS ISOLATION			
(MA73C:B) ● MCA LOGIC MNB MID 3 - OFF	MNB MMC3 Bus pwr RH Vent 4,7 Mtr 2		

**EPS SSR-41
BUS LOSS: MNB MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(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	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. Other equip pwr'd by AC2 MMC4 lost because MNB MMC4 lost
For PLBD ops: ● OP/CL Drs in man mode MANUAL PLBD CLOSING (DEORBIT PREP)	PLBD: Port, Stbd Fwd Bkhd Lat Mtrs 2 Stbd Door Mtr 2 Port Door Mtr 1 CL Limit sw	During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left	② Mtr 2 stow capability remains
BUS ISOLATION		(R13L) During Rad Dpy ops, RAD CNTL PORT tb indicates single mtr ops	③ With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed in GND position
(MA73C:B) ● MCA LOGIC MNB MID 4 - OFF	MNB MMC4 Bus pwr		④ Redundant pwr (MNC) enables KU-Band xmit
	LH Vents 4,7 Mtr 2 RH Vent 6 Mtr 2		⑤ MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs
	6 Port RMS: Mid MRL Mtr 2		⑥ Single mtr time
	3 KU ANT Sto/Dpy Mtr 2 Sto and Dpy Limit sw		
	4 Redundant KU-Band Xmit Enable		
	5 Redundant Boom Stow Enable II Excitation Signal		

**EPS SSR-42
BUS LOSS: MNB AMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	MNB AMC2 Bus pwr LH,RH Vents 8,9 Mtrs 2	NONE	① Redundant mtrs remain
BUS ISOLATION			
(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		
	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		

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**EPS SSR-43
BUS LOSS: MNB R15**

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	<p>① MNA and MNC pwr sources remain</p> <p>② Loss of KU-BD pwr causes loss of ability to lock Gimbals. GIMBALS CAN BE LOCKED IFM may be reqd w/ EVA to position antenna Gimbals. If antenna cannot be secured, antenna jettison reqd</p>
(R15:C) • cb MNC KU SIG PROC - op		OS FloodIt lost	
		(FSM) 'BCE BYP KU' (2)	
		(A2) Meters: X-PNTR will display 'OFF' flag Digital - display will blank	
BUS ISOLATION			
(R15:A) • cb MNB AUD MIDDECK SPKR - op	<u>OV102 only</u> Middeck SMU ATU All except OV102 Middeck ATU		
(R15:B) • cb MNB CNTL BUS CA1/2/3 - op	1 MNB Pwr for CNTL CA1,2,3 Buses		
(R15:C) cb MNB KU • ELEC - op • ANT HTR - op • CABLE HTR - op	2 KU-Bd Sys I/F Cont Unit, RDR Sig Proc, Deployed Assy & Deployed Assy Htrs (Rdr & Comm)		
(R15:D) cb MNB TV A FWD BAY • CAMR/PAN - TILT - op • CAMR/HTR - op • PAN-TILT HTR - op cb MNB TV • CONTR UNIT - op • MON 2 - op	Fwd Bay Camr Pan-Tilt Fwd Bay Camr Htr Fwd Bay Camr Pan-Tilt Htr CCTV Mon 2		
(R15:E) • cb MNB OS FLOOD - op cb MNB PORT RMS TV • CAMR/PAN-TILT - op • CAMR HTR - op • PAN-TILT HTR - op	OS FloodIt Port RMS: Camr/Pan-Tilt Camr Htr Camr Pan-Tilt Htr		

**EPS SSR-44
BUS LOSS: MNB O15&A8**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(A8L) • PORT RMS HTR B - OFF • PORT RMS HTR A - AUTO	Port RMS: B/U pwr Htr B	NONE	<p>① If Driver sw OFF when bus failed, F2 Manf Drivers lost</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CAUTION</p> <p>Do not turn off RJDF-1A F2 Manf during pre-sleep activities</p> </div>
BUS ISOLATION			
(C3) • MSTR MADS PWR - OFF	All MADS equipment		
	1 RJDF 1A Drivers ON Cntl (Jets F2F,F2R,F2U,F2D)		

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**EPS SSR-45
BUS LOSS: MNB 015**

ACTIONS	
1	<p>On MCC call, Place FC1 in standby:</p> <ul style="list-style-type: none"> • Perform BUS TIE, <u>EPS SSR-1</u> <p>(R1)</p> <ul style="list-style-type: none"> • ESS BUS SOURCE FC1 - OFF • FC/MN BUS A - OFF (tb-OFF) • Perform LOSS OF 1 FC (ORB PKT, PWRDN)
	<p>(L1)</p> <ul style="list-style-type: none"> • RAD CNTLR LOOP 1,2 - AUTO B
	<p>(F6)</p> <ul style="list-style-type: none"> • HSI SEL SOURCE (two) - (other than MLS 2)
	<p>(F7)</p> <ul style="list-style-type: none"> • RADAR ALTM - 1
	<p>(O6)</p> <p>ANNUN BUS SEL</p> <ul style="list-style-type: none"> • ACA 1 - MNA • 2/3 - MNC
	<p>(O15:C)</p> <ul style="list-style-type: none"> • cb MNB CRYO O2 HTR TK2 SNSR 2 - oo
	<p>(A6U)</p> <ul style="list-style-type: none"> • ANNUN BUS SEL - MNC
	<p>If on PCS 2:</p> <ul style="list-style-type: none"> • Perform RECONFIG TO ALT PCS SYS, <u>ECLS SSR-3</u>
1	<p>Following loss of 2nd FC: (R1)</p> <ul style="list-style-type: none"> • FC/MN BUS A - ON (tb-ON) • ESS BUS SOURCE FC1 - ON • MN BUS TIE A - OFF (tb-OFF) (Do not BUS TIE MN A to any other bus) <p>• Prior to seat ingress for Entry: discharge handheld ext into AV BAY 1</p>

BUS ISOLATION	
(F8)	<ul style="list-style-type: none"> • INST PWR - OFF
(O6)	<ul style="list-style-type: none"> • STAR TRKR PWR -Y - OFF
(Continued)	

EQUIP/FUNCTION LOST	
	Freon Loop 1,2 Rad Cntrl A
	MLS 2
	RA 2
	ACA 1 MNB pwr 2/3 MNB pwr
2	Cryo O2 TK 2 Htr Current Snsr 2
	ACA 4/5 MNB pwr
3	<p>O2/N2 Cntl Sys 2:</p> <ul style="list-style-type: none"> N2 Sply Vlv 2 Cntl N2 Reg Inlet Vlv 2 Cntl O2/N2 Cntl Vlv 2 man Cntl O2 Xover Vlv 2 OP capability O2/N2 Sys 2 Flow Xdcrs PPO2 Snsr B,C
3	
4	
5	
	dP/dT Snsr
	Av Bay 1 Agent discharge capability
	R Inst pwr (APU/HYD Meters, R HSI,AMI,AVVI)
	-Y Star Trkr Dr OP capability -Y Star Trkr
(Continued)	

CREW INDICATIONS		NOTES
<p>MASTER ALARM Light/Tone - on</p>		<p>① FC1 only one failure away (loss of ESS1BC) from loss of FC cooling, and inability to disconnect from Main Bus and close reactant vlvs. FC1 may only be used to support 2 FC ops</p> <p>② Current Snsr 1 remains</p> <p>③ Vlv holds position</p> <p>④ Vlv normally closed</p> <p>⑤ Vlv fails closed</p>
<p>(F7) C/W CAB ATM Lt SM ALERT Light/Tone Fwd EVENT TIME ind blank</p>		
<p>(LIGHTS LOST) L Seat/Ctr Cnsl Floodlt R Ovhd Cnsl Floodlt</p>		
<p>(F8) Rt HSI,AMI,AVVI Flags visible APU/HYD Meters lost</p>		
<p>(A4) MSN TIME ind blank</p>		
<p>(O1) CABIN dP/dT ind - .45 O2/N2 FLOW SNSR 1 ind - 0 pph PPO2 SNSR B,C ind - 0 psia</p>		
<p>(FSMs) S66 CABIN PPO2 S88 THERMAL H2O (2) SM0 TIRE PRESS</p>		
<p>If ADTA 2, MLS 2, -Y Star Trkr pwrd: BCE STRG 2 ADTA (3,B) BCE STRG 2 MLS (3) BCE STRG 3 STKR (2,3)</p>		
<p>(L2) CABIN RELIEF A tb - bp N2 SYS 2 SPLY tb - bp REG INLET tb - bp</p>		
<p>If first AA failure and SAW processing accel data: 'RM FAIL ACC' (3)</p>		
<p>(O6) If ANNUN BUS SEL ACA 2/3 - MNB, then L/R Event lts lost</p>		

EPS SSR-45 (Cont)
BUS LOSS: MNB O15

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O8) ● RADAR ALTM 2 - OFF ● MLS 2 - OFF			3 Vlv holds position
(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 H2O BYP LOOP 2 SNSR - op ● OI TIRE PRESS - op ● MNA CONTR - op ● MSN TIMER AFT - op ● EVENT TIMER FWD - op	7 H2O Byp Loop 2 Snsr (ECLS SC12) 6 Tire Press Sig Condr A3,A4 Aft Mission Timer Fwd Event Timer		6 Redundant measurement remains. FDA Alarm BFS only; OPS 3,6 7 H2O Loop 2 ICH Flow Rate snsr lost 8 Redundant pwr source remains
(O15:C) cb MNB ● 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	Av Bay 1 Smoke Det B Av Bay 3 Smoke Det A MNB Utility pwr R Ovhd Console Floodlt L Seat/Ctr Cnsl Floodlts		9 Cntrl B remains
(O15:D) cb MNB ● FREON RAD CNTLR 1,2 (two) - op ● PPO2 C CAB dP/dT - op ● N2 SPLY 2 - op ● O2/N2 CNTLR 2 - op ● O2 XOVR 2 - op ● N2 REG INLET 2 - op ● CAB RELIEF A - op	PPO2 Snsr C 3 Cabin Relief Vlv A Cntrl		
(O15:E) cb MNB ● RADAR ALTM 2 - op ● MLS 2 - op ● ADTA 2 - op ● STAR TRKR -Y - op ● ACCEL 2 - op ● DDU L - op ● R - op ● INST R - op	ADTA 2 8 AA2 8 Left DDU MNB pwr 8 Right DDU MNB pwr		

EPS SSR-46
BUS LOSS: MNB R1A1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 MNB pwr to CNTLAB1,2,3 CNTLBC1,2,3 ESS1BC ESS3AB	NONE	1 Buses remain pwr'd
BUS ISOLATION			
NONE			

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**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 	<p>Fwd RCS Jet 2,3 Htrs</p>		
<p>BUS ISOLATION</p>	<p>PL Reten Sys B Rel/Lat Mtrs All MADS equipment</p>		
<p>(C3) • MSTR MADS PWR - OFF</p>			

**EPS SSR-48
BUS LOSS: MNB ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(ML86B:A) • cb MNA H2O LINE HTR A - cl</p>	<p>H2O Line Htr B: Waste Dump Line Sply Dump Line Vac Vent Line</p>	<p>(R12L) SPLY H2O DUMP ISOL VLV tb - bp TKB INLET tb - bp TKC OUTLET tb - bp B SPLY ISOL VLV tb - bp</p>	<p>① Vlv holds position ② Htr A remains</p>
<p>(ML86B:D) cb MNA MMU • PORT, STBD HTR A (two) - cl</p>	<p>2 MMU Port, Stbd Htr B</p>	<p>(R13L) MMU GN2 SPLY ISOL VLV B tb - bp</p>	<p>③ Current Snsr 1 remains</p>
<p>(ML86B:F) cb MNB 3 • CRYO O2 HTR TK3 SNSR 2 - op 4 • CRYO O2 HTR TK4 SNSR 1 - op</p>	<p>3 Cryo O2 Tk 3 Htr Current Snsr 2 4 Cryo O2 Tk 4 Htr Current Snsr 1</p>	<p>(ML31C) WASTE H2O TK1 DRAIN VLV tb - bp SPLY H2O TKD INLET tb - bp</p>	<p>④ Current Snsr 2 remains</p>
<p>(ML31C) • VAC VENT ISOL VLV BUS SEL - MNA</p>	<p>Vac Vent Isol Vlv MNB Cntl</p>	<p>(LIGHTS LOST) Middeck Floodlts 2,6 Bunk Floodlts 2/4 PHS Floodlt Airk Floodlt 3 TA Flood It 3 (SL only)</p>	
<p>(WCS) • FAN SEP - 1 • HOSE BLOCK - SEP 1</p>	<p>WCS Sep Fan 2 Mtr Relay</p>		
<p>(CDR's SEAT) • CDR SEAT PWR BUS SEL - AC3 (dn)</p>	<p>CDR Seat Adj via AC2 pwr</p>		
<p>(PLT's SEAT) • PLT SEAT PWR BUS SEL - AC3 (dn)</p>	<p>PLT Seat Adj via AC2 pwr</p>		
<p>If Supply H2O Dump reqd and dump ISOL VLV is failed closed: • Perform SUPPLY WATER DUMP USING FES, ECLS SSR-9</p>	<p>1 Sply H2O Dump Isol Vlv Cntl</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-48 (Cont)
BUS LOSS: MNB ML86B

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(ML86B:A) cb MNB ● SPLY H2O TKB INLET - op ● TKC OUTLET - op ● DUMP ISOL - op ● SPLY H2O B SPLY ISOL VLV - op ● H2O LINE HTR B - op</p>	<p>Sply H2O: 1 Tk B Inlet Vlv Cntl 1 Tk C Outlet Vlv Cntl 1 B Sply Isol Vlv Cntl</p>		<p>① Vlv holds position ② Htr A remains ⑤ No redundancy</p>
<p>(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</p>	<p>5 Waste H2O Vac Vent Noz Htr 1 Waste Tk 1 Drain Vlv Cntl 1 Sply H2O Tk D Inlet Vlv Cntl Galley Hot H2O Htr</p>		<p>⑥ One failure away from loss of jettison capability</p>
<p>(ML86B:D) cb MNB MMU ● PORT HTR B - op ● STBD HTR B - op ● GN2 SPLY ISOL VLV B - op cb PYRO JETT SYS A ● PORT RMS - op</p>	<p>2 MMU Port Htr B 2 Stbd Htr B 1 GN2 Sply Isol Vlv B 6 PORT RMS: Jett Sys A Deadface Relays</p>		
<p>(ML86B:E) cb MNB SEAT ● LEFT - op ● RIGHT - op cb MNB FLOOD ● TUNNEL ADAPTER 3 - op</p>	<p>TA 3 Floodlt</p>		
<p>(ML86B:F) cb MNB FLOODS ● MIDDECK 2/6 - op ● BUNK 2/4 - op ● PHS - op ● AIRLK 3 - op</p>	<p>Middeck Floodlts 2,6 Bunk Floodlts 2/4 PHS Floodlt AirLk Floodlt 3</p>		

**EPS SSR-50
BUS LOSS: MNC DA3**

(Includes all MNC sub-buses & AC3)

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	Perform FC3 SHUTDN, <u>EPS</u> SSR-2	2	FC3 Pumps and pH Snrs		SM ALERT 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	(FC SHUTDN Cue Card)	1	Purge Vlv O2,H2 Flow Xdcrs Cell Perf Monitor		MASTER ALARM Light/Tone - on		
	Perform LOSS OF 1 FC (ORB PKT, PWRDN)		FC3 Startup Htr Inhibit capability		(F7) C/W MN BUS UNDERVOLT It - on		② May be repwr'd after AC Pwr Transfer Cable connected
	(R1) ● cb AC CONTR AC3 (three) - cl ● INV/AC BUS 3 - OFF ● INV PWR 3 - OFF ● cb AC CONTR AC3 (three) - op ● O2,H2 MANF VLV TK1,2 (four) - OP	3	MNC pwr to ESS1BC ESS2CA CNTLBC1,2,3 CNTL CA1,2,3		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 CRT 3,4 blank		
					(COMM LOST) Comm via PS ATU & A/L All S-BD A/G voice lost if Sys 2 selected		③ Buses remain pwr'd
6	If only two CRYO TK sets or TKs 3 and/or 4 depleted (Q < 10%): (R1) ● O2,H2 TK1 HTRS A (two) - man ops (refer to ECLS SSR-1) ● O2,H2 TK1 HTRS B (two) - OFF ● O2,H2 TK2 HTRS A (two) - OFF ● O2,H2 TK2 HTRS B (two) - man ops (refer to ECLS SSR-1)		AC3 φA,φB,φC Inverters	5	(LIGHTS LOST) Inst lts L/Ctr (pnls C2,F6,F7) MS pnl lts (pnls R10,R12) OS pnl lts (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		④ Indications do not appear until jet commanded ⑤ If Aud Ctr 2 selected, all intercomm, A/G, and recorded voice lost until AUD CTR 1 selected
	If three CRYO TK sets and TK3 not depleted (Q > 10%), perform the following instead of the preceding: (R1) ● O2,H2 TK1 HTRS A,B (four) - OFF ● O2,H2 TK2 HTRS A (two) - OFF ● O2,H2 TK2 HTRS B (two) - AUTO ● O2,H2 TK3 HTRS A,B (four) - AUTO		Cryo O2,H2 Tk1 Htrs A if in Auto Cryo O2,H2 Tk1 Htrs B Cryo O2,H2 Tk2 Htrs A		(F9) AC3 φA,φB,φC AC volts ind - < 90 DC VOLTS MNC ind - OSL		⑥ If MNC lost during sleep period, operate O2,H2 TK2 HTR B (two) - AUTO until morning; all other htrs OFF
	If four CRYO TK sets and TKs 3,4 not depleted (Q > 10%), perform the 3TK reconfig plus: (R1) ● O2,H2 TK3 HTRS A (two) - OFF (A11) ● CRYO TK4 HTR O2,H2 A (two) - OFF ● CRYO TK4 HTR O2,H2 B (two) - AUTO				(FSMs) S67 AC VOLTS 3 S86 APU/HYD WB S66 AV BAY FAN S66 CABIN FAN (2) S66 CABIN IMU S68 FC PUMP 3 S88 FREON FLOW 1 S88 FREON FLOW 2 S69 FUEL CELL S88 H2O PUMP P1 S67 MAIN BUS V C RCS PWR FAIL S88 THERMAL FRN (2) S88 THERMAL H2O SM 0 THRM/HYD (8) BCE STRG 3 ADTA (3,B) BCE STRG 4 ADTA (3,B) BCE STRG 3 MLS (3) I/O ERROR CRT 3 I/O ERROR CRT 4 RM DLMA MANF		⑦ If O2 Qty < 55%, place A Htrs to OFF ⑧ Vlv holds position
8					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'		
	(C2) ● L CRT SEL - 1 ● R CRT CEL - 2 ● GPC/CRT 03 EXEC ● 04 EXEC		Cryo O2,H2 Tk4 Htrs A		(L2) O2 EMER tb - bp CAB RELIEF B tb - bp		
			DEU/CRT 3,4	9			
	(Continued)		(Continued)		(Continued)		

EPS MNC
SSR 50-66

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

**EPS MNC
SSR 50-66**

ACTIONS
(A1L) <ul style="list-style-type: none"> S-BD PM ANT SW ELEC - 1 S-BD PM XPNDR - 1 S-BD PM PWR AMPL OPER - 1 S-BD PM PWR AMPL STBY - 1 S-BD PM PRE AMPL - 1 NSP PWR - 1
If PSP and INTRG reqd for PL ops: <ul style="list-style-type: none"> S-BD PL CNTL - PNL PWR SYS - 1 Reconfig PSP Perform PL INTRG REACQ
(A1R) <ul style="list-style-type: none"> S-BD FM PWR - 1 S-BD FM CNTL - PNL, then CMD
(C3) <ul style="list-style-type: none"> S-BD PM CNTL - PNL, then CMD AUD CTR - 1
(R2) <ul style="list-style-type: none"> BLR CNTLR/HTR 2 - B 3 - A
(L1) <ul style="list-style-type: none"> IMU FAN B(A) - ON C - OFF H2O PUMP LOOP 2 - GPC Perform SSR-10 (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS H2O PUMP LOOP 1 - OFF 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 FLASH EVAP CNTLR PRI A - OFF FLASH EVAP CNTLR PRI B(SEC) - ON (if reqd) TOP EVAP HTR NOZ R - A AUTO
<ul style="list-style-type: none"> TOP EVAP HTR DUCT - A(B) If Hi Load Evap enabled: <ul style="list-style-type: none"> Hi LOAD DUCT HTR - A(B)
(L2) <ul style="list-style-type: none"> FLASH EVAP FDLN HTR B SPLY - 2
(L4:P) <ul style="list-style-type: none"> cb AC2 φA LG SNSR 2 - cl
(Continued)

EQUIP/FUNCTION LOST
S-BD PM Sys 2: <ul style="list-style-type: none"> Xpndr 2 Pre Amp 2 Pwr Amp 2 PM, FM Ant sw 2 NSP 2 COM SEC 2
S-BD PL Intrg 2 <ul style="list-style-type: none"> PSP 2 Sw PL Ant capability to IRH, ILH
S-BD Fm Sig Proc 2, Xmtr 2
Audio Ctr 2
Hyd H2O Blr 2 Cntlr A <ul style="list-style-type: none"> 3 Cntlr B
IMU Fan C
2 H2O Loop 2 Pump man ON capability
12 H2O Loop 1 Byp Cntlr, Sig
13 Cond'r
H2O Loop 1 Byp Vlv pwr Cabin Fan A
2 Av Bay 1 Sig Cond'r, Xdcrs (ECLS SC2)
14 Av Bay 2 Fan B
Av Bay 3 Fan A
Freon Loop 2 Pump A <ul style="list-style-type: none"> Flash Evap Cntlr Pri A
Topping Evap R Noz Htr B
Topping Evap Duct Fwd, Aft Htrs C <ul style="list-style-type: none"> Hi Load Duct Inbd, Outbd, Noz Htrs C
FES H2O FdIn B Htrs 1 (all)
Prox Snsr Electronics Box 1
Av Bay 2 Agent discharge capability
(Continued)

CREW INDICATIONS	NOTES
(R1) FC3 COOL PUMP ΔP tb - bp	② May be re-pwr'd after AC Pwr Transfer Cable connected
(F6,F8) NOSE LDG GEAR tb - bp	⑨ Vlv holds position
10 R LDG GEAR tb - bp	⑩ Indicates DN when NLG down
(F8) HYD QTY 3 ind - 0% APU H2O QTY 2 ind - 0%	⑪ Will not indicate DN when RMG down
If SYS 2 pwr'd: 'S62 BCE BYP PSP2' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'	⑫ Vlv holds position. May be re-pwr'd after AC Pwr Transfer Cable connected
(O1) H2O PUMP OUT PRESS LOOP 1 ind - 0 psia H2O PUMP OUT PRESS LOOP 2 ind - 20-25 psia	⑬ H2O Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snrs lost
(O3) RCS/OMS PRPLT QTY display is blank	⑭ Av Bay 1 Fan ΔP, Air Out Temp snrs lost
R ADP deploy time incr from 15-30 sec	⑮ If SPLY H2O DUMP VLV ENA/NOZ HTR - OFF, tb upward and already bp
(O7) 9 AFT L RCS He PRESS B tb - bp	⑯ Lat Mtrs 2 of both actuators for Port, Stbd Rad will continue to run until Sys B Lat Cntl sw placed OFF
9 AFT L RCS MANF ISOL 5 tb - bp	
9 AFT R RCS MANF ISOL 5 tb - bp	
(O8) 9 FWD RCS TK ISOL 1/2 tb - bp	
9 FWD RCS MANF ISOL 4 tb - bp	
9 FWD RCS MANF ISOL 5 tb - bp	
(R4) 9 HYD LG HYD ISOL VLV 3 tb - OP	
9 HYD MPS/TVC ISOL VLV SYS 3 tb - CL	
(R12L) 9 SPLY H2O TKA OUTLET tb - bp	
15 SPLY H2O DUMP VLV tb - bp	
9 SPLY H2O XOVR VLV tb - bp	
9 SPLY H2O GALLEY SPLY VLV tb - bp	
9 SPLY H2O TKC INLET tb - bp	
(R13L) 16 RAD CNTL STBD, PORT (two) tb - bp	
(Continued)	

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

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	17 Port RMS: MPM Mtr 1 14 Fwd MRL Mtr 2 14 Aft MRL Mtr 1 18 Jettison Sys B	(A8L) PORT RMS: DPY/STO tb - bp RETEN LAT tb - bp R-F-L AFT tb - bp	2 May be re- pwr'd after AC Pwr Transfer Cable connected
• For attitude control, perform, LOSS OF VERNIERS(ORB OPS RCS)	RCS Manf F5 RJD pwr (F5L,F5R)	(AW82D) 9 EMU 1 H2O SPLY,WASTE tb - CL	9 Vlv holds position
	RCS Manf F4 RJD pwr (F4R,F4D)	STAR TRKR DR POS -Z OP/CL time incr from 8-16 sec	14 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 ability to use RMS
(F6,F8) • HSI SEL SOURCE - other than MLS or TACAN 3	2 MLS 3 Tacan 3	If Cabin Fan A selected: C/W AV BAY/CAB AIR It - on 'S66 CABIN FAN'	
(O6) • ANNUN BUS SEL ACA 2/3 - MNB	ACA 2/3 MNC pwr	If site AOS and using 5-BD PM Xpndr 2 or ANT ELEC 2: 'ANTENNA' (2)	17 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
For RCS loss, refer to OMS/RCS Slide Rule For leak isolation only, reconfig following vlv: (O7) • AFT L RCS He PRESS B • R RCS He PRESS B	9 Aft L RCS He Press Isol B GPC Cntl, man CL capability 20 F,R RCS He Press Isol B man OP capability 9 F,L,R RCS Manf Isol 5 GPC Cntl, man CL capability	If H2O Loop 2 Pump active: 'S88 H2O PUMP P2'	18 One failure away from loss of jettison capability
(O8) • FWD RCS He PRESS B		If OMS Gmbl cmd abs value > 2 deg: C/W OMS TVC It - on 'R OMS GMBL' (3,B)	19 FSM caused by Antenna miscompare
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	Aft RCS L,R Jet 3,4,5 Htrs Fwd RCS Jet 4,5 Htrs	If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It - on after ~ 2 min	20 Man CL and GPC cntl remains
	9 Fwd RCS Manf Isol 3,4 Cntl 22 Tk Isol 1/2 Cntl	If first RGA failure and Rates sensed: 'RM FAIL RGA'	21 Do not reconfig for reg switch or I'CNT procedures
23 Prior to using L(R) OMS: (O8)		If ANNUN BUS SEL ACA 2/3 - MNC, L/R Event Seq Its lost	22 Vlv holds position. May be repwr'd after AC Pwr Transfer Cable connected
24 R OMS He PRESS/VAP ISOL • A - GPC • B - OP	25 R OMS He Vap Isol 2 GPC Cntl 25 R OMS He Pr Isol B GPC Cntl	(L2) 9 O2 EMER tb - bp 9 CAB RELIEF B tb - bp	23 Lost TM:
26 L OMS He PRESS/VAP ISOL • A(B) - GPC • B(A) - CL	23 L OMS He Pr/Vap Isol A,B 5 man Cntl		GNC SYS SUMM 2
GNC XXXXX MNV R VYYYY (3,B) Sel R OMS SEC TVC: • OMS GMBL SEC R ITEM 31 EXEC	R OMS Pri TVC		R OMS ENG VLV 2: Assume VLV 2 status same as Vlv 1 R OMS N2 P VLV: if ENG - ARM/ PRESS, assume vlv OP
			24 Maintains He Isol redundancy
			25 Vlv norm closed. Manual cntl remains
			26 Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
(Continued)	(Continued)	(Continued)	

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

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(O16:C) <ul style="list-style-type: none"> cb MNC CRYO O2 HTR TK1 SNSR 2 - op cb MNC CRYO O2 HTR TK2 SNSR 1 - op 	27 Cryo O2 Tk1 Htr Current Snsr 2 28 Cryo O2 Tk2 Htr Current Snsr 1		27 Current Snsr 1 remains 28 Current Snsr 2 remains
	(O17:C) <ul style="list-style-type: none"> SIG CONDR FREON A - AC2 SIG CONDR FREON B - AC2 	29 Freon S/C A AC3 pwr (ECLS SC 1A) 30 Freon S/C B AC3 pwr (ECLS SC 1B)		29 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty Snsrs lost
	(CDR SEAT PNL) <ul style="list-style-type: none"> CDR SEAT PWR BUS SEL - AC2 (up) 	CDR Seat adj via AC3 pwr		30 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty Snsrs lost
	(PLT SEAT PNL) <ul style="list-style-type: none"> PLT SEAT PWR BUS SEL - AC2 (up) 	PLT Seat adj via AC3 pwr		
	(A6U) <ul style="list-style-type: none"> ANNUN BUS SEL - MNB 	ACA 4/5 MNC pwr		31 TIME * CRITICAL *
31	(A12) APU HTR <ul style="list-style-type: none"> GAS GEN/FUEL PUMP 2 - A AUTO GAS GEN/FUEL PUMP 3 - B AUTO LUBE OIL LINE 2 - A AUTO LUBE OIL LINE 3 - B AUTO APU HTR TK/FU LINE/H2O SYS 2A - AUTO 2B - OFF 3A - OFF 3B - AUTO HYD HTR AFT FUS A - AUTO B - OFF HYD CIRC PUMP PWR 2 - MNB 3 - MNA 	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 APU 2 Fu Pump/GG H2O Htrs B APU 2 Tk/Fu Ln Htr B 3 Tk/Fu Ln Htr A APU 3 Fu Pump/GG H2O Htrs A APU 3 GG Inj H2O Htrs 3A, 23A Aft Fuselage Hyd Htrs B MNC Circ Pump 2 pwr 3 pwr		If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
	(A14) RCS/OMS HTR <ul style="list-style-type: none"> L,R POD (four) - A AUTO B OFF 	L,R Pod Htrs B (partial)		32 Inhibits H2O Loop 1 Pump ΔP, Pump Out Temp, Accum Qty, respectively
	(ML86B:F) <ul style="list-style-type: none"> cb MNC CRYO O2 HTR TK4 SNSR 2 - op 	27 Cryo O2 Tk4 Htr Current Snsr 2		
	(AW18D) <ul style="list-style-type: none"> AIRLK AUD CNTL - MIDDECK 	AL ATU,EMU CCU 1,2 PS ATU and CCU		
32	SM 60 SM TABLE MAINT <ul style="list-style-type: none"> Inhibit 0612605, 0612600, 0612640, 0612610 			
	(Continued)	(Continued)	(Continued)	

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

ACTIONS
(R12U) <ul style="list-style-type: none"> ● FC H2O LINE HTR - A AUTO ● FC H2O RELIEF HTR - A AUTO
For PLBD ops: <ul style="list-style-type: none"> ● OP/CL Drs in man mode
If supply H2O dump reqd: For TKA and/or B <ul style="list-style-type: none"> ● Perform SUPPLY H2O SYS BACKUP DUMP TK A,B (IFM) for TK C and/or D ● Perform SUPPLY WATER DUMP USING FES, ECLS SSR-9
For SSME Hyd Repress: (R4) <ul style="list-style-type: none"> ● HYD MPS/TVC ISOL VLV SYS 1,2 (two) - OP, wait 10 sec, then CL
If reqd during entry (< 120K ft): (L1) <ul style="list-style-type: none"> ● NH3 CNTLR A - PRI/GPC If reqd for Post Rollout: <ul style="list-style-type: none"> ● NH3 CNTLR B - SEC/ON
<ul style="list-style-type: none"> ● Perform AC POWER TRANSFER CABLE, EPS SSR-200
(Continued)

EQUIP/FUNCTION LOST
FC H2O Line Htrs B
FC H2O Relief Htrs B
PLBD: C/L Lat 13-16 Mtr1 1-4,5-8,9-12 Mtrs 2 Stbd Aft Bikhed Mtr 1 Port Aft Bikhed Mtr 2 Port Door Mtr 1 Stbd Door Mtr 2 CL Limit sw
9 Sply H2O Dump Vlv Cntl Noz Htr 9 Xovr Vlv Cntl
9 MPS/TVC Hyd Sys 3 Isol Cntl
33 NH3 Sys A Sec Cntl man ON capability 34 NH3 Sys B Pri Cntl
(Continued)

CREW INDICATIONS	NOTES
<div style="border: 1px solid black; padding: 2px; display: inline-block;">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'	9 Vlv holds position 33 Sys A Pri Cntl, auto switchover to Sec Cntl remain 34 Sys B Sec Cntl man On capability remains
During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left	
(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL tb (two) indicate single mtr ops	

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

35	BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(C2) ● CRT 3 PWR - OFF			<p>9 Vlv holds position</p> <p>35 AC3 bus isolation accomplished in MNC DA3 ACTIONS column prior to connecting AC Power Transfer Cable. For listing of AC3 Isolation steps, see AC3 BUS LOSS SSR (BUS ISOLATION column)</p> <p>36 If Emer O2 Mission Kit not flown, cb is open prelaunch</p> <p>37 Six vlvs fail to non-isolation position</p>
	(R1) ● PAYLOAD AFT MNC - OFF	Aft Payload C pwr		
	(R4) ● MPS ENG CNTLR HTR R - OFF	R ME Cntrl Htr		
	(O8) ● MLS 3 - OFF ● R SEAT/CTR CNSL FLOOD - OFF	R Seat/Ctr Cnsl Floodlts		
	(O16:A) ● RGA 3 - OFF	RGA 3		
	(O16:B) cb MNC ● 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 ● SMOKE DETN CAB - op ● SMOKE DETN BAY 1A/2B - op ● FIRE SUPPR BAY 2 - op ● UTIL PWR A11/A15/MD30F - op ● FLOOD R CTR - op ● ANNUN FWD ACA 2/3 - op ● ANNUN AFT ACA 4/5 - op	Cabin Smoke Detector Av Bay 1 Smoke Detector A 2 Smoke Detector B MNC Utility pwr (interim Teleprinter MNC pwr)		
	(O16:D) cb MNC ● GPS PRE AMPL UC - op ● LC - op ● H2O ALT PRESS - op ● O2 EMER - op ● CAB RELIEF B - op	9 Emer O2 Sply Vlv Cntl 9 Cabin Relief Vlv B Cntl 9 H2O Alternate Press Vlv Cntl		
	(O16:E) cb MNC ● ADTA 3, 4 (two) - op ● MLS 3 - op ● DDU R,AFT (two) - op ● RCS/OMS PRPLT QTY GAUGE - op	ADTA 3, 4 MLS 3 RCS/OMS Prplt Qty Gauge		
		37 ATVC 1 Isol ME		
	(A7U) PL BAY ● FLOOD AFT PORT - OFF ● MID STBD - OFF	PLB Aft Port Floodlt Mid Stbd Floodlt		
	(Continued)	(Continued)		

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(R12U)</p> <ul style="list-style-type: none"> ● FC PURGE VLV 3 - CL ● FC START UP HTR 3 - ENA ● CRT 4 PWR - OFF 			
<p>(R15:A)</p> <p>cb MNC</p> <ul style="list-style-type: none"> ● AUD CTR 2 - op ● AUD PS/AIRLK - op 			<p>38 KU Comm and RDR function lost. Loss of KU-BD pwr causes loss of ability to lock Gimbals. GIMBALS CAN BE LOCKED IFM may be reqd w/ EVA to position antenna Gimbals. If antenna cannot be secured, antenna jettison reqd</p>
<p>(R15:B)</p> <p>cb MNC</p> <ul style="list-style-type: none"> ● UHF - op ● GCILC - op ● CNTL BUS AB1/2/3 - op 	<p>UHF redundant pwr GCIL redundant pwr MDM cmds to CCTV Sys MNC pwr for CNTLAB1,2,3 Buses</p>		
<p>(R15:C)</p> <ul style="list-style-type: none"> ● cb MNC KU SIG PROC - op 	<p>38 KU Comm Sig Proc & Electronics Assembly No. 1</p>		<p>40 Htr Cntl 2 remains</p>
<p>(R15:D)</p> <p>cb MNC B TV</p> <ul style="list-style-type: none"> ● B KEEL/EVA CAMR/PAN-TILT - op ● B KEEL/EVA CAMR HTR - op ● B KEEL/EVA PAN-TILT HTR - op ● cb MNC TV CAB - op 	<p>Keel/EVA Camr Pan/Tilt Htr Pan/Tilt Htr Flt, Middeck TV Camrs and VFMs</p>		<p>41 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. Brakes enabled before WOW</p>
<p>(R15:E)</p> <ul style="list-style-type: none"> ● cb MNC MS FLOOD - op 	<p>MS Floodlt</p>		
<p>(ML86B:F)</p> <p>cb MNC FLOODS</p> <ul style="list-style-type: none"> ● MIDDECK 5/7 - op ● MIDDECK 3/4/MO13Q - op ● BUNK 1/3 - op ● AIRLK 4 - op 	<p>Middeck Floodlts 3,4,5,7 MO13Q Pnl Lt 1 Bunk Floodlts 1/3 Airlock Lt 4</p>		
<p>(MA73C:A,B)</p> <ul style="list-style-type: none"> ● MCA LOGIC MNC FWD 3 - OFF ● MCA LOGIC MNC MID 2 - OFF ● MCA LOGIC MNC MID 4 - OFF ● MCA LOGIC MNC AFT 3 - OFF 	<p>MNC FMC3 Bus pwr MMC2 Bus pwr MMC4 Bus pwr AMC3 Bus pwr</p>		
<p>(Continued)</p>	<p>39 R HUD -Z Star Trkr Dr Sys 2 OP/CL capability</p>		
	<p>PL MNC Cur Sig Condr</p>		
	<p>39 Port,Stbd Rad Dpy/Sto Mtr 2 39 R ADP Dpy Mtr 1 40 Htr Cntl 1 LH Vents 1,2,3 Mtrs 1 6 Mtrs 2 RH Vents 4,7,8,9 Mtrs 1 3,5 Mtrs 2</p>		
	<p>41 NLG Extend Sys 1 NLG,LMG,RMG Bkup Rel Sys 1</p> <p>(Continued)</p>		

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

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(ML86B:A) ● cb MNC SUPPLY H2O TKA OUTLET - op ● cb MNC SUPPLY H2O TKC INLET - op ● cb MNC DUMP VLV/NOZ HTR - op ● cb MNC SUPPLY H2O XOVR VLV - op ● cb SUPPLY H2O GALLEY SUPPLY - op	9 Sply H2O Tk A Out Vlv Cntl C In Vlv Cntl 9 9 Galley H2O Sply Vlv Cntl		(2) May be repwrd after AC Pwr Transfer Cable connected (9) Vlv holds position (17) Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
	42 R OMS ENG Pr Vlv Coil 1 and Cntl Vlv 1,2 Coils 1 43 R OMS Purge Vlv 1,2 44 OMS QTY Gauging for all R OMS Single Engine burns R OMS Press Vlv Op Sig APU 2 Cntlr Sply B pwr 3 Cntlr Sply A pwr 45 2 Fu Tk Vlv B 43 3 Fuel Tk Vlv A 9 LG Hyd Sys 3 Isol Cntl		(42) Redundant coils remain (43) Vlv fails closed <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">No purge. Wait 10 min between burns</p> </div>
	9 EMU 1 Waste H2O Vlv Cntl Sply H2O Vlv Cntl 9 46 Freon Loop 1 Cntl A Rad Byp Vlv Mtr man Cntl Freon Loops 1,2 Cold Plate Flow Xdcrs		(44) ✓MCC for OMS Tot Qtys. Aft Qtys are found on <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 2px auto;"> <p style="text-align: center;">GNC SYS SUMM 2</p> </div>
	MPS: L Eng Cntl Ch B R Eng Cntl Ch A 43 R Eng He Intercon Outlet Vlv 43 L Eng He Xovr Vlv 45 R Eng He Isol A 43 Manf Reprss LO2 Vlv 1,2 9 Prplt F/D Outbd LO2 Vlv		(45) Vlv fails closed. Redundant vlv remains (46) Cntlr A,B Rad Byp Mtrs Auto Cntl and Cntl B Rad Byp Vlv Mtr remain
	47 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		(47) Redundant mtrs remain (48) Sys A remains
	48 KU-BD Jettison Sys B		
	2 Port RMS: 17 MPM Mtr 1 49 Fwd MRL Mtr 2 49 Aft MRL Mtr 1		(49) Single mtr time. If unlatched, one failure away for loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS

**EPS SSR-51
BUS LOSS: MNC FPC3**

(Includes MNC FLC3, MNC FMC3, AC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1</p> <ul style="list-style-type: none"> Perform FC3 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then: 	<p>2</p> <p>FC3 Pumps and pH Snsr</p>	<p>MASTER ALARM Light/Tone - on CRT 3,4 blank</p>	<p>①</p> <p style="border: 1px dashed black; padding: 2px; display: inline-block;">TIME CRITICAL</p> <p>FC3 must be shut down within 9 min to avoid potentially hazardous condition</p>
<p>(R1)</p> <ul style="list-style-type: none"> cb AC CONTR AC3 (three) - cl INV/AC BUS 3 - OFF (tb - OFF) INV PWR 3 - OFF (tb - OFF) cb AC CONTR AC3 (three) - op 	<p>AC3 ΦA, ΦB, ΦC Inverters</p>	<p>(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</p>	<p>② Will be repwr'd after AC Pwr Transfer Cable connected</p>
<p>(R2)</p> <ul style="list-style-type: none"> BLR CNTLR/HTR 2 - B 3 - A 	<p>3</p> <p>Hyd H2O Blr 2 Cntrl A</p> <p>3</p> <p>3 Cntrl B</p> <p>3</p> <p>Rsvr 3 Qty Snsr</p>	<p>(F9) AC3 ΦA, ΦB, ΦC AC volts < 90</p>	<p>③ May be repwr'd after AC Pwr Transfer Cable connected</p>
<p>(C2)</p> <ul style="list-style-type: none"> L CRT SEL - 1 R CRT SEL - 2 GPC/CRT 03 EXEC 04 EXEC 	<p>DEU/CRT 3,4</p>	<p>(COMM LOST) All S-BD A/G voice lost if Sys 2 selected</p>	<p>④ Vlv holds position. May be repwr'd after AC Pwr Transfer Cable connected</p>
<p>(A1L)</p> <ul style="list-style-type: none"> S-BD PM ANT SW ELEC - 1 XPNDR - 1 PWR AMPL OPER - 1 PWR AMPL STBY - 1 PRE AMPL - 1 NSP PWR - 1 	<p>S-BD PM Sys 2: Xpndr 2 Pre Amp 2 Pwr Amp 2 PM, FM Ant Sw 2</p>	<p>(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)</p>	<p>⑤ H2O Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</p>
<p>If PSP and INTRG reqd for PL ops:</p> <ul style="list-style-type: none"> S-BD PL PWR SYS - 1 CNTL - PNL Reconfig PSP Perform PL INTRG REACQ 	<p>NSP 2/COMM SEC 2</p>	<p>(FSMs) S66 AV BAY FAN S66 CABIN S66 CABIN IMU S67 AC VOLTS 3 S69 FC PUMP 3 S86 APU/HYD W/B S88 FREON FLOW 1 S88 H2O PUMP P2 BCE BYP KU (2) S88 FREON FLOW 2 S88 THERMAL FRN (2) S88 THERMAL H2O (2) S88 H2O PUMP P1 I/O ERROR CRT 3 I/O ERROR CRT 4 RM DLMA MANF</p>	<p>⑥ AV Bay 1 Fan ΔP, Air Out Temp snrs lost</p>
<p>(A1R)</p> <ul style="list-style-type: none"> S-BD FM PWR - 1 CNTL - PNL - CMD 	<p>S-BD PL Intrg 2 PSP 2</p>	<p>If CABIN FAN A selected: C/W AV BAY/CAB AIR It - on 'S66 CABIN FAN'</p>	<p>⑦ Will indicate DN when NLG down</p>
<p>(C3)</p> <ul style="list-style-type: none"> S-BD PM CNTL - PNL - CMD 	<p>S-BD FM Sig Proc 2, Xmtr 2</p>	<p>If SYS 2 pwr'd: 'S62 BCE BYP PSP 2' Loss of PL TLM and CMD If PDI FDA enabled: 'S62 PDI DECOM FAIL'</p>	<p>⑧ Will not indicate DN when RMG down</p>
<p>(L1)</p> <ul style="list-style-type: none"> IMU FAN B(A) - ON C - OFF H2O PUMP LOOP 2 - GPC Perform (H2O Loop 2 only), H2O PUMP OPS via GPC ECLS SSR-10 H2O PUMP LOOP 1 - OFF CAB FAN A - OFF √B - ON AV BAY 1 FAN (two) - ON √AV BAY 2 FAN A - ON B - OFF 3 FAN A - OFF √B - ON FREON PUMP LOOP 2 - B 	<p>3</p> <p>IMU Fan C</p> <p>4</p> <p>H2O Loop 2 Pump man ON capability</p> <p>5</p> <p>H2O Loop 1 Byp Cntrl, Sig Condr</p> <p>H2O Loop 1 Byp vlv pwr Cabin Fan A</p> <p>3</p> <p>Av Bay 1 Sig condr, Xdcrs (ECLS SC2)</p> <p>6</p> <p>Av Bay 2 Fab B</p> <p>Av Bay 3 Fan A</p> <p>Freon Loop 2 Pump A</p>	<p>If NSP 2 selected: BCE STRG 3 NSP If site AOS and using S-BD PM Xpndr 2 or Ant Electric Z: 'ANTENNA' (2)</p>	
<p>(R1)</p> <p>FC3 COOL PUMP ΔP tb - bp</p>		<p>(F6, F8) LDG GEAR NOSE L tb - bp LDG GEAR R, L tb - bp HYD QTY 3 ind - 0% APU H2O QTY 2 ind - 0%</p>	
<p>(Continued)</p>	<p>(Continued)</p>	<p>(Continued)</p>	

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

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
(L4:P) • cb AC2 ΦA LG SNSR 2 - cl		Prox Snsr Electronics Box 1		(O8) FWD RCS TK ISOL 1/2 tb - bp MANF ISOL 4 tb - bp MANF ISOL 5 tb - bp		9 Vlv holds position	
For RCS loss, refer to OMS/RCS Slide Rule For leak isolation only, reconfig following vlv: (O8) • FWD RCS He PRESS B		10 Fwd RCS Manf Isol 5 GPC Cntl and Man CL capability		9		10 Vlv holds position. Man OP capability remains. Vlv cannot be closed	
(O17) • SIG CONDR FREON A - AC2 • SIG CONDR FREON B - AC2		11 Fwd RCS Manf Isol 3,4 Cntl		9			
• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)		12 Fwd RCS He Press Isol B man OP capability		10	(O1) H2O PUMP OUT PRESS LOOP 1 ind - 0 psia H2O PUMP OUT PRESS LOOP 2 ind - 20-25 psia	11 Vlv holds position	
SM 60 SM TABLE MAINT		11 Fwd RCS Tk Isol 1/2 Cntl			AIR TEMP AV BAY ind - 45 degF FREON FLOW 1 ind - 578 pph	12 Vlv holds position. Do not reconfig for reg switch or I'CONNECT procedures	
15 • INHIBIT 0612605, 0612600, 0612640, 0612610		13 Freon Sig Condr A AC3 pwr (ECLS SC 1A)			R ADP deploy time incr from 15 to 30 sec	13 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty snrsr lost	
(CDR SEAT PNL) • CDR SEAT PWR BUS SEL-AC2 (up)		14 Freon Sig Condr B AC3 pwr (ECLS SC 1B)			If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It - on after ~ 2 min	14 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty snrsr lost	
(PLT SEAT PNL) • PLT SEAT PWR BUS SEL-AC2 (up)		RCS Manf F5 RJD pwr (F5L, F5R)			STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec	15 Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively	
17 (R15:C) • cb MNC KU SIG PROC - op		RCS Manf F4 RJD pwr (F4R, F4D)				16 IFM to provide ALT pwr to the I/F Cont. Unit may recover stow capability; if not, GIMBALS CAN BE LOCKED IFM may be reqd w/ EVA to position antenna Gimbals. If antenna cannot be secured, antenna jettison reqd	
Pre-seat ingress for Entry: • Discharge handheld fire ext into AV BAY 2		CDR Seat Adj via AC3 pwr				17 Performing DIRECT STOW, MECH, SSR-5, may be reqd. ✓MCC	
• Perform AC POWER TRANSFER CABLE, EPS SSR-200		PLT Seat Adj via AC3 pwr				18 IFM to provide ALT pwr to the I/F Cont. Unit may recover stow capability	
		16 KU-Bd Sys Rdr & Comm				19 May be repwr'd after AC Pwr Transfer Cable connected	
		18 Ku-Bd Sys I/F Cont Unit (Rdr & Comm)				20 Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS	
		Av Bay 2 agent discharge capability				21 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison	
		19 Port RMS: MPM Mtr 1					
		20 Fwd MRL Mtr 2					
		21 Aft MRL Mtr 1					
(Continued)		(Continued)		NOTES			

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

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BUS ISOLATION
(C2) • CRT3 PWR - OFF
(O16:C) • cb MNC FIRE SUPPR BAY 2 - op
(R12L) • CRT4 PWR - OFF
(MA73C:A) • MCA LOGIC MNC FWD 3 - OFF
(R15:C) • cb MNB KU ELEC - op

EQUIP/FUNCTION LOST
MNC FMC 3 Bus pwr
AC3 FMC3 Bus Pwr LH Vents 1,2,3 Mtr 1 6 Mtr 2 RH Vents 4,7 Mtr 1 Ku-Ant Dpy/Sto Mtr 1 -Z Star Trkr Dr Sys 2 OP/CL capability R ADP Dpy Mtr 1
23 PLT HUD
24 R ADP Htr Cntrl 1
25 NLG Ext Sys 1
25 NLG, LMG, RMG Bkup Rel Sys 1
MNC Pwr to CNTL Buses BC1, BC2, BC3, CA1, CA2, CA3
MPS R Eng Cntrl Ch A L Eng Cntrl Ch B
26 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1
TAGS total loss

CREW INDICATIONS	NOTES
	<p>22 AC3 Bus Isolation accomplished in MNC FPC 3 ACTIONS column prior to connecting AC Pwr Transfer Cable. For listing of AC3 isolation steps, refer to AC3 BUS LOSS SSR-130 (BUS ISOLATION column)</p> <p>23 Mtr 2 remains</p> <p>24 Htr Cntrl 2 remains</p> <p>25 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. Brakes Enabled before WOW</p> <p>26 Redundant mtrs remain</p>

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EPS SSR-52
BUS LOSS: MNC MPC3 (Includes MNC MMC2 & MNC MMC4)

ACTIONS	
1	<ul style="list-style-type: none"> Perform MNC BUS TIE, EPS SSR-2 BUS TIE (Cue Card)
1	<ul style="list-style-type: none"> Monitor, record Δ amps 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
(R12U)	
	<ul style="list-style-type: none"> FC H2O LINE HTR - A AUTO FC H2O RELIEF HTR - A AUTO
(MA73C: C,D)	
2	<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)	
	If HI LOAD EVAP enabled: <ul style="list-style-type: none"> HI LOAD DUCT HTR - A(B) TOP EVAP HTR DUCT - A(B)

BUS ISOLATION	
(A7U)	
	PL BAY FLOOD <ul style="list-style-type: none"> AFT PORT - OFF MID STBD - OFF RMS STBD SPOT - OFF
7	
(O16:A)	
	<ul style="list-style-type: none"> RGA 3 - OFF
(R12U)	
	<ul style="list-style-type: none"> FC PURGE VLV 3 - CL 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 Δ V Snrs
	FES H2O Fdln B Mid 2 Htr 1
	Aft Fuselage Hyd Htrs B
	FC H2O Line Htrs B Relief Htrs B Noz Htr
2	Stbd Rad Lat 7-12 Mtr 2 Limit sw
2	Port Rad Lat 7-12 Mtr 2 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
	Hi Load Duct Inbd, Outbd Htr C
	Topping Evap Duct Fwd, Aft Htr C
	PLB Aft Port Floodlt Mid Stbd Floodlt
	RGA 3
	FC3 Startup Htr INH capability
	MNC MMC2, MNC MMC4 Bus pwr
3	MNC pwr to ESS1BC,2CA
4	Freon Loop 1 Cntrl A Rad Byp Vlv Mtr man Cntl
	Port RMS: MPM Mtr 1 Fwd MRL Mtr 2 Aft MRL Mtr 1
5	
6	
6	
	(Continued)

CREW INDICATIONS		NOTES
(R13L)	RAD CNTL PORT,STBD (two) tb - bp	① Buses are tied due to: Loss of FC3 Purge capability. As FC3 loses performance the tied FC will pick up load, slowing FC3 degradation. If degradation projection does not allow for nominal EOM, Fuel Cell will be shut down. \checkmark MCC. and Loss of FC3 SS Δ V Snrs. Change in Δ Amps > 12 amps indicates possible cell crossover problem. Δ Amps shift due to loss of FC3 Purge capability is indicated by change in Δ Amps between pre- and post-purge readings. MCC will aid in this determination ② If AC3 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. Other equip pwr'd by AC3 MMC2 and AC3 MMC4 lost because of MNC MMC2 and MNC MMC4 loss ③ Buses remain pwr'd ④ Cntrlrs A,B Rad Byp Mtrs Auto Cntl and Cntrlr B Rad Byp Vlv Mtr Man Cntl remain ⑤ Single mtr time. One failure away from EVA to stow MPM or from RMS jettison ⑥ Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS ⑦ This switch may be used to pwr other equipment
(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 R-F-L AFT tb - bp Reten Latches tb - bp	

EPS SSR-52 (Cont)
BUS LOSS: MNC MPC3

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	RH Vent 3 Mtr 2 4,7 Mtr 1 5 Mtr 2 LH Vent 3 Mtr 1 6 Mtr 2 6 KU ANT Dpy/Sto Mtr 1 Limit sw 7 Redundant KU BAND Xmit Enable 8 Redundant Boom Stow Enable II Excitation Signal		6 With an inop limit sw, mtr will continue to run until primary sw returned to GND 7 Redundant sig (MNB) enables KU Band Xmit 8 MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs

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**EPS SSR-53
BUS LOSS: MNC APC3**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS	NOTES
3	For RCS loss, refer to OMS/RCS Slide Rule (use APC6 Slide for Aft RCS)	1	Aft L RCS He Press Isol B GPC Cntl, man CL capability	If OMS GMBL cmd abs value > 2 deg: C/W OMS TVC It - on 'R OMS GMBL' (3,B)	① Vlv holds position ② Man CL and GPC cntl remains ③ Do not reconfig for reg switch or I'CNT procedures ④ Maintains He Isol redundancy ⑤ Vlv normally closed. Man cntl remains ⑥ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk ⑦ Vlv normally closed. GPC cntl remains ⑧ Vlv fails closed. Redundant vlv remains
	For leak isolation only, reconfig following vlv: (O7)	2	Aft R RCS He Press Isol B man OP capability		
	<ul style="list-style-type: none"> AFT L RCS He PRESS B R RCS He PRESS B 	1	Aft L,R RCS Manf Isol 5 GPC Cntl, man CL capability		
	(A12) APU HTR TK/FU LN/H2O		APU 2 Fu Pump/GG H2O Htrs B APU 3 Fu Pump/GG H2O Htrs A APU 3 GG Inj H2O Htrs 3A,23A		
	<ul style="list-style-type: none"> SYS 2A - AUTO SYS 3B - AUTO 		L,R Pod Htrs B (partial)		
(A14)					
<ul style="list-style-type: none"> RCS/OMS HTR L,R POD - B OFF, A AUTO 					
Prior to using L,R OMS: (O8)					
4	R OMS He PRESS/VAP ISOL	5	R OMS He Vap Isol 2 GPC Cntl		
	<ul style="list-style-type: none"> A - GPC B - OP 	5	R OMS He Pr Isol B GPC Cntl		
6	L OMS He PRESS/VAP ISOL	7	L OMS He Pr/Vap Isol A,B man Cntl		
	<ul style="list-style-type: none"> A(B) - GPC B(A) - CL 				
	GNC XXXXX MNVY YYYYY (3,B)				
	Sel R OMS SEC TVC:		R OMS Pri TVC		
	<ul style="list-style-type: none"> GMBL SEC R - ITEM 31 EXEC 				
BUS ISOLATION					
	(R1)				
	<ul style="list-style-type: none"> PL AFT MNC - OFF 		Aft Payload C pwr		
		8	R OMS BPV 2 OP sig APU 2 Fu Tk Vlv B		

**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 LG ISOL VLV 3 tb - OP 1 HYD MPS/TVC ISOL VLV SYS 3 tb - CL</p> <p>(O7)</p> <p>1 AFT L RCS He PRESS B tb - bp 1 AFT L,R RCS MANF ISOL 5 (two) tb - bp</p>	<p>① Vlv holds position</p> <p>② Do not reconfig for reg switch or I'CENT procedures</p> <p>③ Man CL and GPC cntl remains</p> <p>④ TIME CRITICAL</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>(FSMs)</p> <p>S86 APU/HYD W/B S88 THRMAL FRN (2) SMO THRM HYD (B) RCS PWR FAIL</p>	<p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p>
<p>2 For RCS loss, refer to OMS/RCS Slide Rule For leak isolation only, reconfig following vlv: (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 2 Aft R RCS He Press Isol B man OP capability 1 Aft L,R RCS Manf Isol 5 GPC Cntl and man CL capability</p>	<p>If cooling by FES only: '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>3 Aft RCS L,R Jets 3,4 Htrs</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>Hyd H2O Blr 2 Cntrl A Blr 3 Cntrl B</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>4 APU HTR TK/FU LINE H2O</p> <ul style="list-style-type: none"> SYS 3B - AUTO <p>4</p> <ul style="list-style-type: none"> SYS 2A - AUTO <p>4 APU HTR GAS GEN/FUEL</p> <ul style="list-style-type: none"> PUMP 3 - B AUTO 2 - A AUTO <p>4 APU HTR</p> <ul style="list-style-type: none"> LUBE OIL LINE 3 - B AUTO LUBE OIL LINE 2 - A AUTO <p>HYD CIRC</p> <ul style="list-style-type: none"> PUMP PWR 3 - MNA 2 - MNB 	<p>APU 3 TK/FU Ln Htr A 3 FU Pump/GG H2O Htrs A 3 GG Inj H2O Htrs 3A,23A 2 TK/FU Ln Htr B 2 FU Pump/GG H2O Htrs B</p> <p>3 GG/FU Pump Htr A 2 GG/FU Pump Htr B</p> <p>3 Lube Oil Ln Htr A 2 Lube Oil Ln Htr B</p> <p>Circ Pmp 3 MNC pwr 2 MNC pwr</p>	<p>No R MPS He usage during entry (MM304)</p>	
<p>(A14)</p> <p>RCS/OMS HTR</p> <ul style="list-style-type: none"> L/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
5 Save ROMS Eng for deorbit (If reqd for additional on-orbit burns, ✓MCC)	5 ROMS GN2 Press Vlv OP Sig 6 ROMS Eng Pr Vlv Coil 1		① Vlv holds position
Prior to using L(R) OMS: (O8) 7 ROMS He PRESS/VAP ISOL • A - GPC • B - OP 9 LOMS He PRESS/VAP ISOL • A(B) - GPC • B(A) - CL	8 ROMS He Vap Isol 2 GPC Cntl 8 He Pr Isol B GPC Cntl 10 LOMS He Pr/Vap Isol A,B man Cntl 5 ROMS GN2 Press Vlv OP TM		⑤ Lost TM: GNC SYS SUMM 2 ROMS N2 P VLV ROMS ENG Vlv 2: assume Vlv 2 status same as Vlv 1
<div style="border: 1px solid black; padding: 2px;">GNC XXXXX MNVY YYYYY</div> (3,B) Sel ROMS SEC TVC: • GMBL SEC R - ITEM 31 EXEC	ROMS Pri TVC		⑥ Unable to confirm redundant coils ⑦ 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		⑧ 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	11 NH3 Sys A Sec Cntlr Man ON capability 12 NH3 Sys B Pri Cntlr and Auto swover to Sec Cntlr		⑨ Prevents simultaneous opening of parallel reg paths and possibly rupturing bust disk ⑩ 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 P/L H2O LOOP(s)			⑪ Sys A Pri Cntlr, auto switch-over to Sec Cntlr remain ⑫ Sys B Sec Cntlr man On capability remains
BUS ISOLATION			
(R1) • PL AFT MNC - OFF	Aft Payload C pwr PL MNC Cur Sig Condr		⑬ Six vlvs fail in non-isolation position ⑭ Vlv fails closed. Redundant vlv remains
(MA73C:B) • MCA LOGIC MNC AFT 3 - OFF	13 ATVC 1 Isol ME MNC AMC3 Bus pwr RH Vents 8,9 Mtr 1		⑮ Redundant coils remain ⑯ ✓MCC for OMS Qtys
	Freon Loop 1, 2 Cold Plate Flow Xdcrs 14 APU 2 Cntlr Pwr Sply B Fu Tk Vlv B 14 APU 3 Cntlr Pwr Sply A Fu Tk Vlv A 1 LG Hyd Sys 3 Isol Cntl 15 ROMS Cntl Vlv 1,2 Coils 1 16 OMS Qty Gauging for all ROMS single engine burns 17 ROMS Purge Vlv 1,2 Aft RCS L,R Jet 5 Htr (Continued)		⑰ <div style="border: 1px solid black; padding: 5px; display: inline-block;">CAUTION</div> No Purge. Wait 10 min between burns

EPS SSR-54 (Cont)
BUS LOSS: MNC APC6

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	<p>18 MPS: R Eng He Intercon Outlet Vlv R Eng He Isol A 18 L Eng He Xovr Vlv 19 Manf Repress LO2 Vlv 1,2 20 Prpit F/D Outbd LO2 Vlv</p>		<p>18 Vlv fails closed 19 Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)</p>
	<p>21 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>20 Vlv holds position. LO2 Manf will not be inerted during entry (MM304)</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>21 Redundant mtrs remain</p>

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**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>	<p>S-Band PM Sys 2: FM, PM Ant Sw 2 Xpndr 2 Pwr Ampl 2 Pre Amp 2 NSP 2</p>	<p>(COMM LOST) All S-BD A/G voice lost if Sys 2 selected</p>	<p>① Indications do not appear until jets commanded</p>
<p>If PSP and Intrg reqd for PL ops: ● S-BD PL CNTL - PNL ● PWR SYS - 1 ● Reconfig PSP ● Perform PL INTRG REACQ</p>	<p>S-BD PL Intrg 2 PSP 2 Sw PL Ant capability to 1 RH, 1 LH</p>	<p>1 (F7) C/W RCS JET It - on</p>	<p>② Does not indicate DN when RMG down</p>
<p>(A1R) ● S-BD FM PWR - 1 ● S-BD FM CNTL - PNL ● - CMD</p>	<p>S-BD FM Sys Proc 2 Xmtr 2</p>	<p>2 (F6,F8) LDG GEAR R tb - bp 9 LDG GEAR NOSE tb - bp</p>	<p>③ Vlv holds position</p>
<p>(C3) ● S-BD PM CNTL - PNL ● - CMD</p>		<p>3 (O8) FWD RCS MANF ISOL 5 tb - bp</p>	<p>④ FSM caused by Antenna miscompare</p>
<p>● For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</p>	<p>RCS Manf F5 RJD pwr (F5L,F5R)</p>	<p>1 (FSMs) F RCS D(R) JET</p>	<p>⑤ Manf status not automatically declared closed. Jet fail-offs may occur when commanded</p>
<p>GNC 23 RCS 5 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>4 If NSP 2 selected: 'BCE STRG 3 NSP' If site AOS and using S-BD PM Xpndr 2 or ANT If Elec 2: 'ANTENNA' (2)</p>	<p>⑥ Do not reconfig for reg switch or I'CNT procedures</p>
<p>6 For RCS loss, refer to OMS/RCS Slide Rule Reconfig following vlv for leak isolation only: (O8) ● FWD RCS He PRESS B</p>	<p>3 Fwd RCS He Press Isol B man OP capability 7 Fwd RCS Manf Isol 5 GPC Cntl, man CL capability</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>⑦ Vlv holds position. Man OP capability remains. Vlv cannot be closed</p>
<p>Pre-seat ingress for Entry, discharge handheld fire ext into AV BAY 2</p>	<p>8 Av Bay 2 agent discharge capability</p>		<p>⑧ Htr Cntrl 2 remains</p>
<p>BUS ISOLATION</p>			<p>⑨ Indicates DN when Nose Gear down</p>
<p>(O16:C) ● cb MNC FIRE SUPPR BAY 2 - op</p>			
	<p>R ADP Htr Cntrl 1 NWS fail indication (pnl F2)</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 Cntrl Pri A</p> <p>Topping Evap R Noz Htr B Hi Load Duct Noz Htr C</p>	<p>(R4)</p> <p>1 HYD LG HYD ISOL VLV 3 tb - OP</p> <p>1 HYD MPS/TVC ISOL VLV SYS 3 tb - CL</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>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>If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP It - on after ~2 min</p>	<p>① Vlv holds position</p> <p>② Do not reconfig reg switch or I'CNT procedures</p> <p>③ In A position, Sys 3 HYD H2O Blr and Tk Htrs are still operative, but GN2 SOV opens and cannot be closed. B position must be selected for entry</p> <p>④</p> <div style="border: 1px dashed black; padding: 5px; text-align: center;"> <p>TIME * 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>⑤ Maintains He Isol redundancy</p> <p>⑥ Vlv normally closed. Man cntl remains</p> <p>⑦ Lost TM:</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;"> <p>GNC SYS SUMM 2</p> </div> <p>R OMS N2 P VLV</p> <p>⑧ Unable to confirm redundant coils</p>
<p>(L2)</p> <ul style="list-style-type: none"> FLASH EVAP FDLN HTR B SPLY - 2 	<p>FES H2O FdIn B Htrs 1 (all except Mid 2)</p>		
<p>2 For RCS loss, refer to OMS/ RCS Slide Rule</p> <p>2 Only reconfig following vlv for leak isolation:</p> <p>(O7)</p> <ul style="list-style-type: none"> AFT R RCS He PRESS B L RCS He PRESS B 	<p>1 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>1 Aft L,R RCS Manf Isol 5 GPC Cntl, man CL capability</p>		
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> <p>GNC 23 RCS</p> </div> <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>Aft RCS L,R Jet 3,4 Htrs</p>		
<p>(R2)</p> <ul style="list-style-type: none"> BLR CNTLR/HTR 2 - B 3 - A 	<p>3 Hyd H2O Blr 2 Cntrl A 3 Cntrl B</p>		
<p>(A12)</p> <p>4 APU HTR TK/FU LINE/H2O</p> <ul style="list-style-type: none"> SYS 3B - AUTO 2A - AUTO <p>4 APU HTR GAS GEN/FUEL</p> <ul style="list-style-type: none"> PUMP 3 - B AUTO 2 - A AUTO <p>4 APU HTR LUBE OIL</p> <ul style="list-style-type: none"> LINE 3 - B AUTO 2 - A AUTO <p>HYD CIRC</p> <ul style="list-style-type: none"> PUMP PWR 3 - MNA 2 - MNB 	<p>APU 3 Tk/Fu Ln Htr A 2 Tk/Fu Ln Htr B</p> <p>APU 3 GG/FU Pump Htr A 2 GG/FU Pump Htr B</p> <p>APU 3 Lube Oil Ln Htr A 2 Lube Oil Ln Htr A</p> <p>Circ Pump 3 MNC pwr 2 MNC pwr</p>		
<p>7 Save R OMS eng for deorbit (If reqd for additional on-orbit burns, ✓MCC)</p>	<p>7 R OMS GN2 Press Vlv OP Sig</p> <p>8 Eng Pr Vlv Coil 1</p>		
<p>Prior to using L(R) OMS:</p> <p>(O8)</p> <p>5 R OMS He PRESS/VAP ISOL</p> <ul style="list-style-type: none"> A - GPC B - OP 	<p>6 R OMS He Pr Isol B GPC Cntl</p>		
<p>For SSME Hyd Repress:</p> <p>(R4)</p> <ul style="list-style-type: none"> HYD MPS/TVC ISOL VLV SYS 1,2 (two) - OP, wait 10 sec, then CL 	<p>1 MPS/TVC Hyd Sys 3 Isol Cntl</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-56 (Cont)
BUS LOSS: MNCALC3

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 	<p>16 NH3 Sys A Sec Cntrl man ON capability</p> <p>17 NH3 Sys B Pri Cntrl and Auto swover to Sec Cntrl</p>	<p>No R MPS He usage during entry (MM304)</p>	<p>① Vlv holds position</p> <p>⑨ Redundant coils remain.</p> <p>⑩</p>
<p>If NH3 CNTLR A(B) - SEC/ON reqd, then:</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>CAUTION</p> <p>No Purge. Wait 10 min between burns</p>
<p>BUS ISOLATION</p>			
<p>NONE</p>	<p>9 R OMS Eng Cntl Vlv 1,2 Coils 1</p> <p>12 OMS Qty Gauging for all R OMS Single Engine burns</p> <p>10 R OMS Purge Vlv 1,2 Aft RCS L,R Jet 5 Htr</p> <p>1 LG Hyd Sys 3 Isol</p> <p>11 APU 2 Fu Tk Vlv B</p> <p>11 3 Fu Tk Vlv A</p> <p>MPS:</p> <p>15 R Eng He Intercon Outlet Vlv</p> <p>11 R Eng He Isol A</p> <p>15 L Eng He Xovr Vlv</p> <p>13 Manf Repress LO2 Vlv 1,2</p> <p>14 Prplt F/D Outbd LO2 Vlv</p>		<p>⑪ Vlv fails closed. Redundant vlv remains</p> <p>⑫ ✓MCC for OMS Qtyts</p> <p>⑬ Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)</p> <p>⑭ Vlv holds position. LO2 Manf will not be inerted during entry (MM304)</p> <p>⑮ Vlv fails closed</p> <p>⑯ Sys A Pri Cntrl, auto switchover to Sec Cntrl remain</p> <p>⑰ Sys B Sec Cntrl man On capability remains</p>

**EPS SSR-57
BUS LOSS: MNC FMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<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 	<p>1 Fwd RCS Tk Isol 1/2 Cntl</p> <p>1 Manf Isol 3,4 Cntl</p>	<p>(FSM) RM DLMA FAIL</p> <p>(O8) FWD RCS TK ISOL 1/2 tb - bp</p> <p>FWD RCS MANF ISOL 4 tb - bp</p> <p>R ADP deploy time incr from 15 to 30 sec</p> <p>STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec</p>	<p>① Vlv holds position</p> <p>② Mtr 2 remains</p> <p>③ Htr Cntlr 2 remains</p>
<p>BUS ISOLATION</p>	<p>2 -Z Star Trkr Dr Sys 2 OP/CL capability</p> <p>R ADP Deploy Mtr 1 Disc 1</p>		
<p>(MA73C:A)</p> <ul style="list-style-type: none"> • MCA LOGIC MNC FWD 3 - OFF 	<p>3 MNC FMC3 Bus pwr</p> <p>R ADP Htr Cntlr 1</p> <p>LH Vent 1,2 Mtr 1</p>		

**EPS SSR-58
BUS LOSS: MNC MMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 (MA73C:C)</p> <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) 	<p>1 Stbd Rad Lat 7-12 Mtr 2 Limit sw</p> <p>Stbd Rad Dpy/Sto Mtr 2 PLBD:</p> <p>C/L Lat 1-4 Mtr 2</p> <p>5-8 Mtr 2</p> <p>Port Aft Bikh Lat Mtr 2</p>	<p>1 (R13L) 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>(ABL) PORT RMS: DPY/STO tb - bp</p> <p>R-F-L AFT tb - bp</p> <p>RETEN LAT tb - bp</p>	<p>① If AC3 cb not opened, Lat Mtr 2 of Stbd Lat 7-12 Actuator continues to run until Sys 8 Lat Cntl sw placed to OFF. Other equip pwr'd by AC3 MMC2 lost because of MNC MMC2 loss</p> <p>② With an inoperative limit switch, mtr will continue to run until stow sw returned to gnd</p> <p>③ Redundant sig (MNB) enables Ku-Band Xmit</p> <p>④ MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II Signal for Stow mtrs</p>
<p>BUS ISOLATION</p> <p>(MA73C:A)</p> <ul style="list-style-type: none"> • MCA LOGIC MNC MID 2 - OFF 	<p>MNC MMC2 Bus pwr</p> <p>RH Vents 4,7 Mtr 1</p> <p>LH Vents 3 Mtr 1</p> <p>6 Mtr 2</p> <p>2 KU ANT Dpy/Sto Mtr 1 limit sw</p> <p>3 Redundant Ku-Band Xmit Enable</p> <p>4 Redundant Boom Stow Enable II Excitation Signal</p> <p>Port RMS Aft MRL Mtr 1</p>		

**EPS SSR-59
BUS LOSS: MNC MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 (MA73C:D)</p> <ul style="list-style-type: none"> cb MCA PWR AC3 3Φ MID 4 - op <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>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 PORT tb - bp</p> <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> <p>SM (BFS SM 63) PL BAY DOORS</p> </div> <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 AC3 cb not opened, Lat Mtr 2 of Port Lat 7-12 Actuator continues to run until Sys B Lat Control sw placed to OFF. Other equip pwr'd by AC3 MMC4 lost because of MNC MMC4 loss</p> <p>② One failure away from EVA to stow MPM or from RMS jettison</p> <p>③ Single mtr time</p>
<p>BUS ISOLATION</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>RH Vent 5 Mtr 2 3 Mtr 2</p>		
	<p>2 Port RMS: 3 MPM Mtr 1 3 Fwd MRL Mtr 2</p>		

**EPS SSR-60
BUS LOSS: MNC AMC3**

ACTIONS
NONE

BUS ISOLATION
(MA73C:B) ● MCA LOGIC MNC AFT 3 - OFF

EQUIP/FUNCTION LOST
RH Vents 8,9 Mtr 1
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

CREW INDICATIONS	NOTES
NONE	① Redundant mtrs remain

**EPS SSR-61
BUS LOSS: MNC R15**

ACTIONS
1 (C3) ● AUD CTR - 1
(AW18D) ● AIRLK AUD CNTL - MIDDECK

BUS ISOLATION
(R15:A) cb MNC ● AUD AUD CTR 2 - op ● PS/AIRLK - op
(R15:B) cb MNC ● UHF - op ● GCILC - op ● CNTL BUS AB1/2/3 - op
(R15:C) ● cb MNC KU SIG PROC - op
(R15:D) cb MNC TV ● CAB - op cb MNC TV KEEL/EVA ● CAMR/PAN-TILT - op ● CAMR HTR - op ● KEEL/EVA PAN-TILT HTR - op
(R15:E) ● cb MNC MS FLOOD - op

EQUIP/FUNCTION LOST
1 Audio Center 2
A/L ATU, EMU CCU 1,2 PS ATU, CCU
UHF redundant pwr GCIL redundant pwr MDM cmds to CCTV Sys MNC pwr for CNTL AB1, AB2, AB3
2 KU Comm Sig Proc
Flt, Middeck TV Camrs, VFM's Keel/EVA Camr/Pan-Tilt Keel/EVA Camr Htr Keel/EVA Pan-Tilt Htr
MS Floodlt
3 Tags Cmd pwr ON/OFF Cntl

CREW INDICATIONS	NOTES
1 MS Floodlt lost Comm via PS ATU lost 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 ② KU comm function lost. RDR function OK ③ TAGS reqd comm sig proc
2 If operating KU-Band comm, no U/L voice	
TAGS pwr lt off	

**EPS SSR-62
BUS LOSS: MNC 016RJD**

ACTIONS	1	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		ON Cntl of RCS F4 Manf Drivers (F4D,F4R)		<p>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</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>CAUTION</p> <p>Do not turn off RJDF-2B F4 MANF drivers during pre-sleep activities</p> </div>
BUS ISOLATION				
NONE				

**EPS SSR-63
BUS LOSS: MNC 016**

ACTIONS	1	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>On MCC call, Place FC2 in standby:</p> <ul style="list-style-type: none"> • Perform BUS TIE, <u>EPS</u> SSR-1 (R1) • ESS BUS SOURCE FC2 - OFF • FC/MN BUS B - OFF (tb-OFF) 			<p>R Seat/Ctr Cnsl Floodlts lost</p> <p>(FSMs)</p> <p>BCE STRG 3 ADTA (3,B) 4 ADTA (3,B) 3 MLS (3)</p> <p>(O3) RCS/OMS Prplt Qty Gauge blanks</p> <p>(L2) O2 EMER tb - bp CAB RELIEF B tb - bp</p> <p>Time stops updating</p>	<p>① FC2 only one failure away (loss of ESS2CA) from loss of FC cooling, and inability to disconnect from Main Bus and close reactant vlvs. FC2 may only be used to support 2 FC ops</p> <p>② If ANNUN BUS SEL ACA 2/3 MNC, L/R Event lts lost</p> <p>③ If EMER O2 Mission Kit not flown, cb is opened prelaunch</p> <p>④ Current Snsr 1 remains</p> <p>⑤ Current Snsr 2 remains</p>
<p>(O6)</p> <ul style="list-style-type: none"> • ANNUN BUS SEL ACA 2/3 - MNB <p>(F6,F8)</p> <ul style="list-style-type: none"> • HSI SEL SOURCE (two) - other than MLS 3 <p>(O16:C)</p> <p>cb MNC CRYO C2 HTR</p> <ul style="list-style-type: none"> • TK1 SNSR 2 - op • TK2 SNSR 1 - op <p>(A6U)</p> <ul style="list-style-type: none"> • ANNUN BUS SEL - MNB 	2	ACA 2/3 MNC pwr		
<p>Following loss of 2nd FC: (R1)</p> <ul style="list-style-type: none"> • FC/MN BUS B - ON (tb-ON) • ESS BUS SOURCE FC2 - ON • MN BUS TIE B - OFF (tb-OFF) (Do not BUS TIE MN B to any other bus) <p>Pre-seat ingress for Entry,</p> <ul style="list-style-type: none"> • Discharge handheld fire ext into AV BAY 2 		MLS 3		
		4 5	Cryo O2 Tk1 Htr Current Snsr 2 Cryo O2 Tk2 Htr Current Snsr 1	
			ACA 4/5 MNC pwr	
			Av Bay 2 Agent discharge capability	
(Continued)		(Continued)		

EPS SSR-63 (Cont)
BUS LOSS: MNC 016

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O8) ● MLS 3 - OFF ● R SEAT/CTR CNSL FLOOD - OFF	R Seat/Ctr Cnsl Floodlts		5 If EMER O2 Mission Kit not flown, cb is opened prelaunch
(O16:B) cb MNC ● 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 Aft Mission Timer		6 L,R L + DK smoke detectors remain 7 Vlv remains closed
(O16:C) cb MNC ● 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	6 Cabin Smoke Detector Av Bay 1 Smoke Detector A 2 Smoke Detector B MNC Utility pwr (Interim Teleprinter MNC pwr)		8 Vlv holds position 9 Redundant pwr remains 10 ✓ MCC for total OMS Qty. Aft Qty's are found on
(O16:D) cb MNC ● GPS PRE AMPL UC, LC (two) - op ● H2O ALT PRESS - op ● O2 EMER - op ● CAB RELIEF B - op	7 H2O Alternate Press Vlv 8 Emer O2 Sply Vlv 8 Cabin Relief Vlv B		<div style="border: 1px solid black; padding: 2px;">GNC SYS SUMM 2</div>
(O16:E) cb MNC ● ADTA 3,4 (two) - op ● MLS 3 - op ● DDU R, AFT (two) - op ● RCS/OMS PRPLT QTY GAUGE - op	ADTA 3,4 9 R,Aft DDU MNC pwr 10 RCS/OMS Prplt Qty Gauge		

**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			
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			
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) EMU 1 H2O SPLY tb - CL WASTE tb - CL	① Vlv holds position
(CDR SEAT PNL) ● CDR SEAT PWR BUS SEL - AC2 (up)	PLT Seat Adj via AC3 pwr	(R12L) SPLY H2O TKA OUTLET tb - bp	② If SPLY H2O DUMP VLV ENA/ NOZ HTR - OFF, tb unpwr and already bp
(ML86B:F) ● cb MNC CRYO O2 HTR TK4 SNSR 2 - op	3 Cryo O2 Tk4 Current Snsr 2	DUMP VLV tb - bp XOVR VLV tb - bp GALLEY SPLY VLV tb - bp TKC INLET tb - bp	③ Current Snsr 1 remains
If SUPPLY H2O Dump reqd: For TKA and/or B ● Perform SUPPLY H2O SYS BACKUP DUMP TKA,B (IFM) for TKC and/or D ● Perform SUPPLY WATER DUMP USING FES, ECLS SSR-9	1 Sply H2O Dump Vlv Cntl 1 Noz Htr 1 Xovr Vlv Cntl	(LIGHTS LOST) Middeck Floodlts 3,4,5,7 Bunk Floodlts 1/3 Airlock Floodlt 4 MO13Q Pnl It 1 TA Floodlt 4	④ Sys A remains ⑤ Normally not installed ⑥ One failure away from loss of jettison capability
BUS ISOLATION			
(ML86B:A) cb SPLY H2O ● GALLEY SPLY - op ● XOVR VLV - op ● TK C INLET - op ● TKA OUTLET - op ● DUMP VLV/NOZ HTR - op	1 Galley H2O Sply Vlv Cntl 1 Sply H2O Tk C In Vlv Cntl Tk A Out Vlv Cntl Dump Noz Htr		
5 (ML86B:D) cb PYRO JETT SYS B ● KU ANT - op ● PORT RMS - op ● STBD RMS - op	4 KU-BD Jettison Sys B 6 Port RMS Jettison 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	1 EMU 1 Waste H2O Vlv Cntl 1 Sply H2O Vlv Cntl		
(ML86B:F) cb MNC FLOODS ● MIDDECK 5/7 - op ● 3/4/MO13Q - op ● BUNK 1/3 - op ● AIRLK 4 - op	Middeck Floodlts 3,4,5,7 MO13Q Pnl It 1 Bunk Floodlts 1/3 Airlk Floodlt 4		

EPS ESS
SSR 70-95

**EPS SSR-70
BUS LOSS: ESS1BC DA1** (Includes all ESS1BC sub-buses)

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	<ul style="list-style-type: none"> Perform FC1 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then: 	1	FC1 Controller and Pumps	2	MASTER ALARM Light/Tone - on	①	<div style="border: 1px dashed black; padding: 5px; display: inline-block;"> TIME CRITICAL </div> FC1 must be shutdn within 9 min to avoid potentially hazardous condition ② No intercom, A/G, or recorded voice from CDR ATU. When L AUD CNTL switched to RIGHT, only listen capability restored ③ FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost ④ Vlv holds position but tb and sw lost ⑤ Pwrs PL Timing Buffer and VTR 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 ⑦ Switch works but tb lost ⑧ Flood Its available via EMER LTG (C3,ML18F) ⑨ AC1 remains pwr'd. The tb lost. INV/AC BUS 1 sw inop. INV PWR 1 sw also inop ⑩ FC1 Coolant Pump ΔP tb lost ⑪ Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwoff GPCs 1 or 4 since they must be transitioned thru HALT to force RUN state ⑫ Caused by loss of purge vlv sw position TM
3	(R1)	4	FC1 Reac Vlv Cntl		L Audio lost		
4	<ul style="list-style-type: none"> PL CAB - MNB 	5	MNA pwr to CABPL 1,2,3 buses		L Glrshld FloodIt lost		
	(O5)			6	(F7) No C/W Its Two of four bulbs in MA Its not It SM ALERT Light/Tone		
2	<ul style="list-style-type: none"> L AUD CNTL - R 	2	L Audio pwr		(R1) FC/MN BUS A tb - OFF MN BUS TIE A tb - OFF INV/AC BUS 1 tb - OFF O2 MANF VLV TK1 tb - CL H2 MANF VLV TK1 tb - CL FC1 REAC (two) tb - CL FC1 RDY tb - bp FC1 COOL PUMP ΔP tb - bp		
	(O6)		MTU Pwr Sply A/Osc 1	7	(FSMs) S67 CNTL/ESS V S68 CRYO H2 (2) S68 CRYO H2 PRES (2) S68 CRYO O2 PRES S69 FC PUMP 1 S69 FC REAC 1 S69 FUEL CELL		
	If add'l Itg reqd: (C3)	8	L Glareshield FloodIts via pnl O6 sw	7	(F9) ESS 13C DC VOLTS - OSL		
	<ul style="list-style-type: none"> EMER LTG - ON/OFF 			9	SM 67 ELECTRIC		
	(R1)	4	Cryo O2,H2 Tk1 Manf Vlv Cntl	4	ESS 1BC VOLTS < 20		
	<ul style="list-style-type: none"> O2,H2 MAN VLV TK2 (two) - OP 				(O2) CRYO O2,H2 TK2,4 QTY METER (four) - 0%		
	If only two CRYO TK sets or TKs 3 and/or 4 depleted:		Cryo Tk1 O2,H2 Htrs Auto ops if O2,H2 Tk2 Htrs A(B) in Auto Cryo Tk2 O2,H2 Htrs Auto ops	10	Airlock FloodIt 2 lost Tnl Adapt Flood It 1 lost		
	(R1)				NOTES (Cont)		
	<ul style="list-style-type: none"> O2,H2 TK1,2 HTRS A,B (eight) - man ops (refer to ECLS SSR-1) 				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		
	If three or more CRYO TK sets and TK3 not depleted:				⑭ IFM procedure recovers C/W A system by providing pwr source, which bypasses failed ESS1BC DA1 bus		
	(R1)						
	<ul style="list-style-type: none"> O2,H2 TK1,3 HTRS A,B (eight) - AUTO O2,H2 TK2 HTRS A,B (four) - OFF 						
	(O2)						
	<ul style="list-style-type: none"> If CRYO O2 TK QTY < 55%, deactivate B HTRS 						
	If four or more CRYO TK sets and TK4 not depleted:		Cryo Tk3 O2,H2 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in AUTO Cryo Tk4 O2,H2 Htrs Auto ops				
	(A11)						
	<ul style="list-style-type: none"> CRYO TK4 HTR O2,H2 A,B (four) - OFF (if OV-102, refer to ECLS, 6.3 CRYO TABLE A for switch nomen) 						
11	If GPC 1 or 4 dump reqd, attempt S/W dump in RUN	11	GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6) GPC Output sw Terminate capability for GPCs 1,4				
13	To release crewmember from constant monitoring requirement:						
14	<ul style="list-style-type: none"> Perform C&W EU CONTINGENCY POWER (IFM) 						
	When reqd:	12	FC1 Auto purge capability				
	<ul style="list-style-type: none"> For FC1, perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS) 						

EPS SSR-70 (Cont)
BUS LOSS: ESS1BC DA1

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>6 (O13:A) cb ESS 1BC • C/W A - op • AC1 SNSR - op • MTU A - op</p>	<p>6 8 Pri C/W Sys, Annun pnl F7 AC1 Bus Snsr</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>8 Flood lts available via EMER LTG (C3,ML18F)</p>
<p>(R15:F) cb ESS 1BC • FLOOD L GLRSHLD - op • AUD L - op</p>			<p>15 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>(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>16 FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost</p>
	<p>15 AC1 Inverters: Input DC pwr Cntl INV/AC Bus Cntl 16 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 PLA Bus pwr LG Arm/Dn Reset capability Tacan 1 Auto Self-Test</p>		

**EPS SSR-71
BUS LOSS: ESS1BC FP&LC1**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
NONE		1	AC1 Inverters Input DC pwr Cntl	1	(R1) INV PWR 1 tb - OFF	① Inverters remain pwr, but tb and sw lost	
BUS ISOLATION							
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	<ul style="list-style-type: none"> Perform FC1 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card) 	1	FC1 Controller and Pumps	MASTER ALARM		① TIME CRITICAL FC1 must be shutdn within 9 min to avoid potentially hazardous condition ② Vlv holds position, but tb and sw lost ③ FC1 Coolant Pump ΔP tb lost	
2		2	Reac Vlv Cntl	Light/Tone - on			
BUS ISOLATION				2 (F7) C/W FC REAC It C/W FC PUMP It SM ALERT Light/Tone			
NONE		2	Cryo O2,H2 Tk1 Manf Vlv Cntl	2 (R1) O2 MANF VLV TK1 tb - CL H2 MANF VLV TK1 tb - CL FC1 REAC (two) tb - CL FC1 RDY tb - bp FC1 COOL PUMP ΔP tb - bp			
				2 (FSMs) S68 CRYO H2 (2) S68 CRYO O2 (2) S69 FC PUMP 1 S69 FC REAC 1 S69 FUEL CELL			

**EPS SSR-73
BUS LOSS: ESS1BC ML86B**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>If four or more CRYO TK sets: (A11)</p> <ul style="list-style-type: none"> CRYO TK4 HTR O2,H2 A,B (four) - OFF (if OV-102, refer to ECLS, 6.3, CRYO TABLE A for switch nomen) 	<p>Cryo Tk3 O2,H2 Htrs Auto ops if O2,H2 TK4 Htrs A(B) in Auto</p> <p>Cryo TK4 O2,H2 Htrs Auto ops</p>	<p>MASTER ALARM Light/Tone - on</p> <p>(F7) C/W O2 PRESS It C/W H2 PRESS It</p> <p>(FSMs) S68 CRYO H2 PRES S68 CRYO O2 PRES</p> <p>(O2) CRYO O2,H2 QTY TK4 meters (two) = 0%</p> <p>Airlk Floodlt 2 lost Tnl Adapt Floodlt 1 lost</p>	
<p>BUS ISOLATION</p> <p>(ML86B:G) cb ESS 1BC</p> <ul style="list-style-type: none"> FLOOD AIRLK 2 - op FLOOD TNL ADAPT 1 - op CRYO CNTLR O2,H2 TK4 (two) - op CRYO QTY O2,H2 TK4 (two) - op 	<p>Airlk Floodlt 2 Tnl Adapt Floodlt Cryo O2,H2 Tk4 Htrs Auto ops Cryo O2,H2 TK4 Qty Xdcrs</p>		

**EPS SSR-74
BUS LOSS: ESS1BC FD**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>1 • Perform FC1 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then:</p> <p>(R1) • PL CAB - MNB</p> <p>4 If GPC 1 or 4 dump reqd, attempt S/W dump in RUN</p> <p>When reqd: • For FC1, perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS)</p>	<p>1 FC1 Controller and Pumps</p> <p>2 MNA pwr to CABPL1,2,3 Buses</p> <p>4 GPC Mode sw Halt Contacts for GPCs 1,4 (Pnl O6)</p> <p>4 GPC Output sw Terminate capability for GPCs 1,4 (pnl O6)</p> <p>5 FC1 Auto purge capability</p> <p>6 AUXPLA Bus AC1 Inverters: Input DC Pwr Cntl Inv/AC Bus Cntl Cryo O2 Tk2,4 Htr Snsr Test/Reset sw</p> <p>Tacan 1 Auto Self Test</p>	<p>MASTER ALARM Light/Tone - on</p> <p>(F7) C/W FC PUMP It</p> <p>(R1) FC1 RDY tb - bp FC1 COOL PUMP ΔP tb - bp</p> <p>(FSMs) S69 FC PUMP 1 S69 FUEL CELL</p> <p>(F9) ESS1BC DC VOLTS - OSL</p> <p>SM 67 ELECTRIC ESS1BC Volts 25-32V</p>	<p>① TIME CRITICAL FC1 must be shutdn within 9 min to avoid potentially hazardous condition</p> <p>② Pwrs PL Timing Buffer and VTR</p> <p>③ FC1 Coolant Pump ΔP tb lost</p> <p>④ 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</p> <p>⑤ Caused by loss of purge vlv sw position TM</p> <p>⑥ AC1 inverters and buses remain pwr. INV PWR 1 and INV/AC BUS 1 switches and INV PWR 1 tb lost</p>
<p>BUS ISOLATION</p> <p>NONE</p>			

**EPS SSR-75
BUS LOSS: ESS1BC O13&R15**

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 MANF VLV TK1,2 (four) - OP		2 (F7) No C/W lts Two of four bulbs in MA lts not ON SM ALERT Light/Tone - on	② Retain BACK-UP 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 only two CRYO TK sets or TKs 3 and/or 4 depleted: (R1) • O2,H2 TK1,2 HTRS A,B (eight) - man ops (refer to ECLS SSR-1)	Cryo Tk 1 O2,H2 Htrs Auto ops if O2,H2 Tk2 Htrs A(B) in Auto Cryo Tk2 O2,H2 Htrs Auto ops	(FSMs) S68 CRYO H2 PRES S68 CRYO O2 PRES	
If three or more CRYO TK sets and TK3 not depleted: (R1) • O2,H2 TK1,3 HTRS A,B (eight) - AUTO • O2,H2 TK2 HTRS A,B (four) - OFF (O2) If CRYO O2 TK QTY < 55%, deactivate B Htrs		3 (R1) INV/AC BUS 1 tb - OFF	③ AC1 bus remains pwr'd. INV/AC BUS 1 sw works, but tb lost
If four or more CRYO TK sets and TK 4 not depleted: (A11) • CRYO TK4 HTR O2,H2 A,B (four) - AUTO (if OV-102, refer to ECLS, 6.3 CRYO TABLE A for switch nomen) (O2) • If CRYO O2 TK QTY < 55%, deactivate B Htrs		(O2) CRYO O2,H2 QTY TK2 METER (two) ind - 0%	
If add'l lgt reqd: (C3) • EMER LTG - ON/OFF	4 L Glareshield Floodlts via pnl O6 sw		④ Floodlts available via EMER LTG (C3, ML18F)
5 To release crewmember from constant monitoring requirement:			⑤ Until IFM cables installed: a) Loss of ESS2CA DA2 would not generate aural alarm so that Fuel Cell 2 could be safed within 9 min. FSM should be closely monitored. b) Loss of C/W B system would not be annunciated and subsequent orbiter problems would not trigger aural alarm
6 • Perform C&W EU CONTINGENCY POWER (IFM)			
(Continued)	(Continued)		⑥ IFM procedure recovers C/W A system by providing pwr source, which bypasses failed ESS 1BC O13&R15 bus

EPS SSR-75 (Cont)
BUS LOSS: ESS1BC O13&R15

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(O13:A) cb ESS1BC • C/W A - op • AC1 SNSR - op • MTU A - op	2 Pri C/W Sys, Annun Pnl F7 7 AC1 Bus Snsr		② Retain BACK-UP 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
(O13:B) cb ESS1BC • CRYO CNTLR O2,H2 TK2 (two) - op • CRYO QTY O2,H2 TK2 (two) - op	Cryo O2,H2 TK2 Htrs Auto ops Cryo O2,H2 Tk2 Qty Xdcrs		⑦ Disables AC1 Auto Trip. AC1 Voltage and OVLD C/W lost
(R15:F) cb ESS1BC • FLOOD L GLRSHLD - op • AUD L - op			⑧ Switches and tbs still operate
	LG ARM/DN Reset capability		
	8 ESS pwr to FC/MN BUS A and MN BUS TIE A Pwr Contactor Cntl		

EPS SSR-80
BUS LOSS: ESS2CA DA2 (Includes all ESS2CA sub-buses)

	ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 2 4	<ul style="list-style-type: none"> Perform FC2 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then: 	1 4	3 3	<p>① TIME CRITICAL</p> <p>FC2 must be shutdn within 9 min to avoid potentially hazardous condition</p> <p>② FC/MN BUS B and MN BUS TIE B SWS work, but tbs are lost</p> <p>③ 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</p> <p>④ Vlv holds position, but tb and sw lost</p> <p>⑤ Pwrs PL Timing Buffer and VTR</p> <p>⑥ Retain C/W Sys A Alarm tones (Pri & Bu) Ref C/W MAL 4.1a18 for capabilities lost. Only two of four bulbs lit in MA lt. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable</p> <p>⑦ Floodlts available via EMER LTG (C3, ML18F)</p> <p>⑧ Caused by loss of FC Purge Htr - GPC sw position TM</p> <p>⑨ 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 pwr-off, but pwr-up in STBY</p>
	(R1) <ul style="list-style-type: none"> PL CAB - MNA 	5	6	
3	(C3) <ul style="list-style-type: none"> AUD CTR - 2 	3	(F7) C/W O2 PRESS lt - on C/W H2 PRESS lt - on C/W FC REAC lt - on C/W FC PUMP lt - on C/W PRI C/W lt - on C/W BACKUP C/W ALARM lt - on Two of four bulbs in MA lts - inoperative SM ALERT lt/Tone - on	
3	(O9) <ul style="list-style-type: none"> R AUD CNTL - L 	3	4	
	(O6) <ul style="list-style-type: none"> MTU - OSC 1 		6	
	If add'l Itg reqd: (C3) <ul style="list-style-type: none"> EMER LTG - ON/OFF 	7	(FSMs) S67 CNTL/ESS V S68 CRYO H2 (2) S68 CRYO H2 PRES (2) S68 CRYO O2 S68 CRYO O2 PRES S69 FC PUMP 2 S69 FC REAC 2 S69 FUEL CELL	
	(R1) <ul style="list-style-type: none"> O2,H2 MANF VLV TK1 (two) - OP 	4		
	If only two CRYO TK sets or TKs 3 and/or 4 depleted: (R1) <ul style="list-style-type: none"> O2,H2 TK1,2 HTRS A,B (eight) - man ops (refer to ECLS SSR-1) 			
	If three or more CRYO TK sets and TK3 not depleted: (R1) <ul style="list-style-type: none"> O2,H2 TK2,3 HTRS A,B (eight) - AUTO O2,H2 TK1 HTRS A,B (four) - OFF (O2) <ul style="list-style-type: none"> If CYRO O2 TK QTY < 55%, deact B Htrs 			
	If four or more CRYO TK sets and TK4 not depleted: (A11) <ul style="list-style-type: none"> CRYO TK4 HTR O2,H2 A,B (four) - AUTO (if OV-102, refer to ECLS 6.3, CRYO TABLE A for switch nomen) (O2) <ul style="list-style-type: none"> If CRYO O2 TK QTY < 55%, deact B Htrs 			
	When reqd: <ul style="list-style-type: none"> Perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS) 	8		
9	If GPC 2 or 5 dump reqd, attempt S/W dump in RUN	9		
		9		
	(Continued)	(Continued)	(Continued)	

EPS SSR-80 (Cont)
BUS LOSS: ESS2CA DA2

ACTIONS		EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
10	To release crewmember from constant monitoring requirement:		(R1) 2 FC/MN BUS B tb - OFF 2 MN BUS TIE B tb - OFF 2 PL PRI MNB tb - OFF	(2) FC/MN BUS B and MN BUS TIE B sws work, but tbs lost (4) Vlv holds position, but tb and sw lost (6) Retain C/W Sys A Alarm tones (Pri & Bu) Ref C/W MAL 4.1a(8) for capabilities lost. Only lower 2 of 4 bulbs lit in MN lt. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable (10) 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 (11) IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS 2CA DA2 bus (12) AC2 Inverters and buses remain pwr'd, but switches and tbs lost (13) FC2 Coolant Pump ΔP tb lost (14) Disables AC2 AUTO Trip. AC2 Voltage & OVLD C/W lost (15) FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pni R1 not affected
11	<ul style="list-style-type: none"> Perform C&W EU CONTINGENCY POWER (IFM) 		12 INV/AC BUS 2 tb - OFF 4 O2 MANF VLV TK2 tb - CL 4 H2 MANF VLV TK2 tb - CL 4 FC2 REAC (two) tb - CL 4 FC2 RDY tb - bp 13 FC2 COOL PUMP ΔP tb - bp	
BUS ISOLATION			(F9) ESS2CA DC VOLTS - OSL	
6	(O13:C) cb ESS 2CA <ul style="list-style-type: none"> C/W B - op AC2 SNSR - op MTU B - op 	6 14 C/W Sys B Alarm Tones AC2 Bus Snsr	SM 67 ELECTRIC ESS2CA Volts < 20	
14	(O13:D) cb ESS2CA <ul style="list-style-type: none"> 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	(O2) CRYO O2,H2 QTY TK1 meters (two) ind - 0%	
	(R15:F) cb ESS2CA <ul style="list-style-type: none"> FLOOD R GLRSHLD - op AUD R - op CTR 1 - op 	Cryo O2 Tk1 Htr Snsr Test /Reset sw		
		12 AUX PLB Bus 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		
		15 MNB/PRIPL and MNC/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal Tacan 2 Auto Self-Test		

**EPS SSR-81
BUS LOSS: ESS2CA FP&LC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 AC2 Inverters Input DC Pwr Cntl	1 (R1) INV PWR 2 tb - OFF	1 Loss of tb and sw. Inverters remain pwr'd
BUS ISOLATION			
NONE			

**EPS SSR-82
BUS LOSS: ESS2CA MPC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 • Perform FC2 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card)	1 FC2 Controller and Pumps 2 Reac Vlv Cntl	MASTER ALARM Light/Tone - on	1 TIME CRITICAL FC2 must be shutdn within 9 min to avoid potentially hazardous condition
BUS ISOLATION		(F7) C/W FC REAC It C/W FC PUMP It SM ALERT Light/Tone	2 Vlv holds position, but tb and sw lost
NONE	2 Cryo O2,H2 Tk2 Manf Vlv Cntl 3 MNB/PRIPL and MNC/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal	(R1) 2 O2 MANF VLV TK2 tb - CL 2 H2 MANF VLV TK2 tb - CL 2 FC2 REAC (two) tb - CL RDY tb - bp 4 COOL PUMP ΔP tb - bp	3 FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, pnl R1 not affected
		(FSMs) 2 S68 CRYO H2 (2) 2 S68 CRYO O2 (2) 2 S69 FC PUMP 2 2 S69 FC REAC 2 2 S69 FUEL CELL	4 FC2 Coolant Pump ΔP tb lost

**EPS SSR-83
BUS LOSS: ESS2CA FD**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	<ul style="list-style-type: none"> Perform FC2 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then: 	1	FC2 Controller and Pumps		MASTER ALARM Light/Tone - on	①	<div style="border: 1px dashed black; padding: 2px; display: inline-block;"> * TIME CRITICAL * </div> FC2 must be shutdn within 9 min to avoid potentially hazardous condition ② Pwrs PL Timing Buffer and VTR ③ FC 2 Coolant Pump ΔP tb lost ④ Caused by loss of FC Purge Htr - GPC sw position TM pwr 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 pwrdup in STBY ⑥ AC2 inverters and buses remain pwrd. INV PWR 2 and INV/AC BUS 2 switches lost and INV PWR 2 tb lost
	(R1) • PL CAB - MNA	2	MNB pwr to CABPL1,2,3 Buses		(F7) C/W FC PUMP It		
	When reqd: • Perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS)	4	All FC Auto Purge capability	3	(R1) FC2 RDY tb - bp FC2 COOL PUMP ΔP tb - bp		
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)		(FSMs) S69 FC PUMP 2 S69 FUEL CELL		
		5	GPC Output sw Terminate capability for GPCs 2,5 (pnl O6)		(F9) ESS2CA DC VOLTS - OSL		
					SM 67 ELECTRIC ESS2CA Volts 25-32V		
		6	AUXPLB Bus AC2 Inverters: Input DC Pwr Cntl Inv/AC Bus Cntl				
			Tacan 2 Auto Self-Test				
BUS ISOLATION							
	NONE						

**EPS SSR-84
BUS LOSS: ESS2CA 013&R15**

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 Flood lit available via EMER LTG (C3, ML18F)</p> <p>④ Retain C/W Sys A alarm tones (Pri & BU) Ref C/W Mal 4.1a [8] for C/W capabilities lost. Only two of four bulbs lit in MA lit. PRIMARY C/W, BACKUP C/W ALARM lts are not resettable</p> <p>⑤ AC2 bus remains pwr'd. INV/AC BUS 2 sw works, but tb lost</p> <p>⑥ 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>⑦ IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS2CA 013&R15 bus</p>
2 (O9) • R AUD CNTL - L	2 R Audio pwr	2 R Audio lost 3 R Glareshield Floodlt lost	
(O6) • MTU - OSC 1	MTU Pwr Sply B/OSC 2	MASTER ALARM Light/Tone - on	
(R1) • O2,H2 MANF VLV TK1,2 (four) - OP		(F7) C/W O2 PRESS lt - on C/W H2 PRESS lt - on C/W PRI C/W lt - on C/W BACKUP C/W ALARM lt - on Two of four bulbs in MA lts - inoperative	
If only two CRYO TK sets or TKs 3 and/or 4 depleted: (R1) • O2,H2 TK1,2 HTRS A,B (eight) - man ops (refer to ECLS, SSR-1)	Cryo Tk2 O2,H2 Htrs Auto ops if O2,H2 Tk1 Htrs A(B) in Auto Cryo TK1 O2,H2 Htrs Auto ops	4 (FSMs) S68 CRYO H2 PRES S68 CRYO O2 PRES	
If three or more CRYO TK sets and TK 3 not depleted: (R1) • O2,H2 TK2,3 HTRS A,B (eight) - AUTO • O2,H2 TK1 HTRS A,B (four) - OFF (O2) • If CRYO O2 TK QTY < 55%, deact B Htrs		(R1) 5 INV/AC BUS 2 tb - OFF	
If four or more CRYO TK sets and TK4 not depleted: (A11) • CRYO TK4 HTR O2,H2 A,B (four) - AUTO (if OV-102, refer to ECLS 6.3 CRYO TABLE A for switch nomen) (O2) • If CRYO O2 TK QTY < 55%, deact B Htrs		(O2) CRYO O2,H2 QTY TK1 METER (two) - 0%	
If add'l ltg reqd: (C3) • EMER LTG - ON/OFF	3 R Glareshield Floodlts via pnl O8 sw		
6 To release crewmember from constant monitoring requirement: 7 • Perform C&W EU CONTINGENCY POWER (IFM)			
(Continued)	(Continued)		

EPS SSR-84 (Cont)
BUS LOSS: ESS2CA DA 2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
4 8 (O13:C) cb ESS 2CA • C/W B - op • AC2 SNSR - op • MTU B - op -----	4 8 C/W Sys B Alarm Tones AC2 Bus Snsr -----		4 Retain C/W Sys A alarm tones (Pri & BU) Ref C/W Mal 4.1a [B] for C/W capabilities lost. Only two of four bulbs lit in MA lt. PRIMARY C/W, BACKUP C/W ALARM lts are not resettable
(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 Xdrs		
(R15:F) cb ESS 2CA • FLOOD R GLRSHLD - op • AUD R - op • CTR 1 - op			8 Disables AC2 Auto Trip. AC2 Voltage and OVLD C/W lost 9 Switches and tbs still operate
	9 ESS pwr to FC/MN BUS B and MN BUS TIE B Pwr Contactor Cntl		

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**EPS SSR-90
BUS LOSS: ESS3AB DA3**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1 2 3	<ul style="list-style-type: none"> Perform FC3 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card) 	1 3	FC3 Controller and Pumps Reac Vlv Cntl	MASTER ALARM Light/Tone - on	①	<p>TIME CRITICAL</p> <p>FC3 must be shutdn 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</p> <p>④ Switch works, but tb lost</p> <p>⑤ AC3 inverters and buses remain pwr. INV PWR 3 and INV/AC BUS 3 switches and tbs lost</p> <p>⑥ FC3 Coolant Pump ΔP tb lost</p> <p>⑦ Caused by loss of FC GPC Purge Seq Start sw pwr</p> <p>⑧ 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>⑨ Disables AC3 Auto Trip. AC3 Voltage and OVLD C/W lost</p> <p>⑩ Ltg pwr remains via individual lt sws</p> <p>⑪ Pressing Engage button will cause all PASS GNC GPCs to go to software halt</p> <p>⑫ MNB/PRIPL and MNC/PRIPL pwr-off capability of SL not affected. FC3/PRIPL sw, Pnl R1 not affected</p>	
	(R1) <ul style="list-style-type: none"> O2,H2 MANF VLV TK1,2 (four) - OP 			(F7) C/W O2 PRESS lt - on C/W H2 PRESS lt - on C/W FC REAC lt - on C/W FC PUMP lt - on SM ALERT lt/Tone - on	3		
	If three or more CRYO TK sets: (R1) <ul style="list-style-type: none"> O2,H2 TK3 HTRS A,B (four) - OFF O2,H2 TK1,2 HTRS A,B (eight) - AUTO (O2) <ul style="list-style-type: none"> If CRYO O2 TK QTY < 55%, deact B Htrs 		Cryo Tk3 O2,H2 Htrs Auto ops Cryo O2,H2 Tk4 Htr Auto ops if O2,H2 Tk3 Htrs A(B) in Auto	(R1) FC/MN BUS C tb - OFF MN BUS TIE C tb - OFF INV/AC BUS 3 tb - OFF PL PRI FC3 tb - OFF PL PRI MNC tb - OFF FC3 REAC (two) tb - CL FC3 RDY tb - bp FC3 COOL PUMP ΔP tb - bp	4 4 5 4 4 3 6		
	When reqd: <ul style="list-style-type: none"> Perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS) 	7	All FC Auto Purge capability	(A12) FC3 STRUCT RTN tb - OFF	4		
8	<ul style="list-style-type: none"> If GPC 3 dump reqd, attempt S/W dump in RUN 	8 8	GPC Mode sw Halt Contacts for GPC 3 (pnl O6) GPC Output sw Terminate capability for GPC 3 (pnl O6)	(FSMs) S67 CNTL/ESS V S68 CRYO H2 PRES S68 CRYO O2 PRES S69 FC PUMP 3 S69 FC REAC 3 S69 FUEL CELL	3		
BUS ISOLATION				(F9) ESS 3AB DC VOLTS ind - OSL <div style="border: 1px solid black; padding: 2px; display: inline-block;">SM 67 ELECTRIC</div> ESS 3AB Volts < 20			
9	(O13:E) cb ESS 3AB <ul style="list-style-type: none"> AC3 SNSR - op GPC STAT - op 	9	AC3 Bus Snsr Computer Status Matrix (pnl O1) and CCIU	(O1) GPC status lts lost			
10	(C3) <ul style="list-style-type: none"> EMER LTG - OFF/ON 	10	Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glrshld Floodlts, OS Floodlt)	(O2) CRYO O2,H2 QTY TK3 ind (two) - 0%			
10	(ML18F) <ul style="list-style-type: none"> EMER LTG - ON/OFF 						
	(ML86B:G) cb ESS 3AB <ul style="list-style-type: none"> 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				
		11	Lost BFS select and BFS engage capability to all GPCs				
		12	FC3/PRIPL pwr-off capability via Spacelab Pwr-Kill signal				
			Tacan 3 Auto Self Test				
		2	ESS pwr to FC/MN BUS C and MN BUS TIE C Pwr Contactur Cntl				

**EPS SSR-91
BUS LOSS: ESS3AB FP&LC3**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS	NOTES
NONE		1	AC3 Inverters Input DC Pwr Cntl	(R1) INV PWR 3 tb - OFF	① Inverters remain pwr'd, but tb and sw lost ② Ltg pwr remains via individual lt switches
		2	Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glareshield FloodLts, OS Floodlt)		
BUS ISOLATION					
(C3) ● EMER LTG - OFF/ON		2			
(ML18F) ● EMER LTG - ON/OFF		2			

**EPS SSR-92
BUS LOSS: ESS3AB MPC3**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	<ul style="list-style-type: none"> Perform FC3 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card) 	1	FC3 Controller and Pumps		MASTER ALARM	<p>① TIME CRITICAL</p> <p>FC3 must be shutdn within 9 min to avoid potentially hazardous condition</p> <p>② Vlv holds position, but tb and sw lost</p> <p>③ FC 3 Coolant Pump ΔP tb lost</p> <p>④ MNB/PRIPL and MNC/PRIPL pwr-off capability of SL not affected. FC3/PRIPL sw Pnl R1 not affected</p>	
2		2	FC3 Reac Vlv Cntl		Lighting/Tone - on		
					(F7)		
					2 CW FC REAC It - on CW FC PUMP It - on		
					(R1)		
		4	FC3/PRIPL pwr-off capability via Spacelab Pwr-Kill signal		2 FC3 REAC (two) tb - CL FC3 RDY tb - bp		
					3 FC3 COOL PUMP ΔP tb - bp		
					(FSMs)		
					2 S69 FC PUMP 3 S69 FC REAC 3 S69 FUEL CELL		
BUS ISOLATION							
NONE							

**EPS SSR-93
BUS LOSS: ESS3AB FD**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
1	<ul style="list-style-type: none"> Perform FC3 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card) 	1	FC3 Controller and Pumps		MASTER ALARM Light/Tone - on	①	<div style="border: 1px dashed black; padding: 5px; display: inline-block;"> * TIME CRITICAL * </div> FC3 must be shutdn within 9 min to avoid potentially hazardous condition ② Caused by loss of FC GPC Purge Seq Start sw pwr ③ Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwr-off GPC 3 since it must be transitioned thru HALT to force RUN state ④ Ltg pwr remains via individual lt sws ⑤ Pressing the engage button will cause all PASS GNC GPCs to go to software halt ⑥ AC3 Inverters and Buses remain pwr. INV PWR 3 and INV/AC BUS 3 switches lost and INV PWR 3 tb lost ⑦ FC3 Coolant Pump ΔP tbs lost
	When reqd: <ul style="list-style-type: none"> Perform FUEL CELL PURGE - MANUAL (ORB OPS, EPS) 	6	All FC Auto Purge capability	7	(F7) CW FC PUMP It		
3	<ul style="list-style-type: none"> If GPC 3 dump reqd, attempt S/W dump in RUN 	3	GPC Mode sw Halt Contact for GPC 3 (pnl O6)		(R1) FC3 RDY tb - bp FC3 COOL PUMP ΔP tb - bp		
		3	GPC Output sw Terminate capability for GPC 3 (pnl O6)		(FSMs) S69 FC PUMP 3 S69 FUEL CELL		
					(F9) ESS3AB DC VOLTS - OSL		
		4	Emer Ltg capability (Middeck Floodlts 6,7,8, L,R Glrshld Floodlts OS Floodlt)		SM 67 ELECTRIC		
					ESS3AB Volts 25-32V		
		5	Lost BFS select and BFS engage capability to all GPCs				
		6	AC3 Inverters: Input DC Pwr Cntl INV/AC Bus Cntl				
			Cryo O2 Tk3 Htr Snsr Test/Reset sw				
			Tacan 3 Auto Self-Test				
BUS ISOLATION (C3) 4 • EMER LTG - OFF/ON (ML18F) 4 • EMER LTG - ON/OFF							

**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	2	(R1) INV/AC BUS 3 tb - OFF	① Switches and tbs still operate ② AC1 Bus remains pwr'd. 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			
2	(O13:E) cb ESS 3AB ● 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 MANF VLV TK1,2 (four) - OP If three or more CRYO TK sets: (R1) ● O2,H2 TK3 HTRS A,B (four) - OFF ● O2,H2 TK1,2 HTRS A,B (eight) - AUTO (O2) ● If CRYO O2 TK QTY < 55%, deact B Htrs		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 CRYO H2 PRES S68 CRYO O2 PRES (O2) CRYO O2,H2 QTY TK3 METER (two) ind - 0%			
BUS ISOLATION		Cryo O2,H2 Tk3 Qty Xdcrs					
(ML86B:G) cb ESS 3AB ● CRYO CNTLR O2,H2 TK3 (two) - op ● CRYO QTY O2,H2 TK3 (two) - op							

EPS CNTL
SSR 100-108

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

EPS CNTL
SSR 100-108

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR</p> <p>1 • GAS GEN/FUEL PUMP 1 - B AUTO</p> <p>1 • GAS GEN/FUEL PUMP 3 - A AUTO</p> <p>• LUBE OIL LINE 1 - B AUTO</p> <p>APU HTR TK/FU LINE/H2O/</p> <p>• SYS 1B - AUTO</p> <p>• 1A - OFF</p> <p>• 3A - AUTO</p> <p>• 3B - OFF</p> <p>HYD HTR</p> <p>• ELEV B - AUTO</p> <p>• A - OFF</p> <p>• AFT FUS B - AUTO</p> <p>• A - OFF</p> <p>HYD CIRC PUMP</p> <p>• PWR 1 - MNB</p> <p>• 3 - MNC</p>	<p>(A12) 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>1 Tk/Fu Ln Htrs A</p> <p>1 Fu Pump/GG H2O Htr 11A</p> <p>1,2 GG Inj H2O Htrs 4A,5A</p> <p>3 Tk/Fu Ln Htrs B</p> <p>Elevon Actr Htrs A</p> <p>Aft Fuselage Htrs A</p> <p>Circ Pump 1 MNA pwr 3 MNA pwr</p>	<p>CRT 1 blanks SM ALERT Light/Tone - on</p> <p>(FSMs) S86 APU/HYD APU SM0 THRM HYD (B) S67 CNTL/ESS V S69 FUEL CELL I/O ERROR CRT 1</p> <p>SM 67 ELECTRIC</p> <p>CNTL AB1 Volts < 20</p> <p>(F8) APU 1 FUEL QT Y % inaccurate (displays H2O qty)</p> <p>During Rad Dpy/Sto: (R13L) RAD CNTL tbs (four) indicate single mtr ops</p> <p>L ADP deploy time incr from 15 to 30 sec</p> <p>STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec</p> <p>(F7) If APUs active and using BLR CNTLR/HTR 1B: CW APU TEMP It - on after ~ 2 min</p> <p>CCTV Video TV Annum Its lost if MNA selected for VCU</p> <p>SM 76 COMM/RCDR (2)</p> <p>A,B GMBL and PA TEMP Read High ↑</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>① 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 Msg occurs only if A AUTO (pnl R12U) selected for FC H2O Relief Htr</p> <p>③ Pri B Man ON Sel capability remains. Pri A and Sec Cntlrs remain</p> <p>④ Vlv holds position. Vlv B remains</p> <p>⑤ Do not reconfig for reg switch or I'CENT procedures</p> <p>⑥ Vlv holds position</p> <p>⑦ Vlv normally closed</p> <p>⑧ Pwr to MCA Drivers lost through ENABLE sw</p>
<p>(L1) If using B CNTLR: • FLASH EVAP CNTLR PRI B - ON</p> <p>• TOP EVAP HTR DUCT - B</p> <p>If Hi Load Evap enabled: • HI LOAD DUCT HTR - B (C)</p>	<p>3 (L1A2) Flash Evap Cntlr Pri B GPC Sel capability Top Evap Duct Fwd,Aft L,R Htrs A Hi Load Duct Outbd,Inbd Noz Htrs A</p>		
<p>(L2) • FLASH EVAP FDLN HTR B SPLY - 2</p>	<p>(L2A1) FES H2O Fdln B Htrs 1</p>		
<p>(R2) • BLR CNTLR/HTR 1 - A</p>	<p>(R2) Hyd H2O Blr 1 Cntlr B</p>		
<p>For RCS loss, refer to OMS/ RCS Slide Rule</p> <p>For leak isolation only, reconfig following vlv:</p> <p>(O7)</p> <p>• AFT L RCS He PRESS A</p> <p>• L,R RCS XFEED 3/4/5</p>	<p>4 (O7) Aft L RCS He Pr Isol A man CL capability</p> <p>4 Aft L RCS Tk Isol 3/4/5 A man Cntl</p> <p>6 Aft L RCS Manf Isol 2 man Cntl</p> <p>6 Aft L,R RCS Xfeed Vlv 3/4/5 man CL capability</p>		
<p>(O8) • L OMS XFEED A</p> <p>• R OMS XFEED A</p> <p>• FWD RCS He PRESS A</p>	<p>7 (O8) R OMS He Press Isol A man Cntl and He Vap Isol 1,2 man Cntl</p> <p>4 L,R OMS Tk Isol A man CL capability</p> <p>4 L,R OMS Xfeed Vlv A man CL capability</p> <p>4 Fwd RCS He Press Isol A man CL capability</p> <p>6 Fwd RCS Tk Isol 3/4/5 man Cntl</p> <p>6 Fwd Rcs Manf Isol 1 man Cntl</p>		
	<p>8 (R13A2) PLBD: CL Lat 9-12 Mtr 1 Port,Stbd Fwd Bikhhd Mtrs 1 Stbd Door Mtr 1</p>		

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**EPS SSR-100 (Cont)
BUS LOSS: CNTLAB1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(C2) • L CRT SEL - 3 • GPC/CRT 01 EXEC	(C2A2) DEU/CRT 4		7 Vlv normally closed
SM 1 DPS UTILITY (G2,G8,S2) MMU 2 ASSIGN • GNC - ITEM 2 EXEC • SM - ITEM 4 EXEC • PL - ITEM 6 EXEC	(O14) MMU 1		9 Noz Htr A not wired; Noz Htr B still operates in A AUTO position. Other A relief htrs lost
(R12U) • FC H2O RELIEF HTR - B AUTO • FC H2O LINE HTR - B AUTO	9 (R12A1) FC H2O Relief: Vlv Htrs A Vent Line Htrs A Barrel Htrs A Noz Htrs A FC H2O Line Htrs A		10 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)
When reqd: • For FC1, perform FUEL CELL PURGE - AUTO (ORB OPS, EPS)	7 (R12A1) FC1 Purge Vlv man Cntl		11 B htrs remain
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	10 (F6A7) L Trim RHC INH capability 10 L Trim Pnl ON capability (L2A1) 10 L Bdy Flp UP/DN capability		12 Sys A Pri Cntlr, Auto switchover to Sec Cntlr remains
(A14) RCS/OMS HTR • FWD RCS - B AUTO • L POD (two) - A OFF, B AUTO	11 (A14) Fwd RCS A Htrs 11 L Pod A Htrs (all)		
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	(A14) Aft RCS L, R Jet 2 Htrs		
If encryption mandatory (A1L) • NSP PWR - 2	(A1A2) COMSEC 1 key		
(C3) • S-BD PM CNTL - PNL • - CMD			
If encryption optional (A1L) • NSP ENCRYPTION MODE - SEL • NSP ENCRYPTION SEL - BYP			
If reqd during entry (<120K ft): (L1) • NH3 CNTLR A(B) - PRI/ GPC	12 (L1A2) NH3 Sys A Sec Cntlr man ON capability		
(Continued)	(Continued)		

**EPS SSR-100 (Cont)
BUS LOSS: CNTLAB1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(C2) • CRT1 PWR - OFF			⑥ Vlv holds position
(O14:F) • MMU 1 - OFF			⑬ APU 1 Fuel/H2O Qty meter (pnl F8) displays H2O qty when in FUEL position
(F3) • TRIM RHC PNL - ENA • PNL - OFF			⑭ Loss of manual capability to inert LH2 Manf
(F8) • APU Sel (two) - H2O, 1(2,3)	13 (F8) APU 1 Fuel Qty display		⑮ MNB pwr may be selected via TV pwr sw (pnl A7) or GCIL if reqd
(R4) • MPS FILL/DRAIN LH2 INBD - GND	14 (R4) Prplt F/D Inbd LH2 Vlv and Hi Pt Bld Inbd LH2 Vlv Man OP capability		⑯ This switch may be used to pwr other equipment
(R15:D) • cb MNA TV CONTR UNIT - op	15 (A7A1) Video Cntl Unit MNA pwr		⑰ Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
16 (A7U) PL BAY • FLOOD AFT STBD - OFF • FWD PORT - OFF • BHD - OFF RMS • SPOT STBD - OFF	(A7A1) PLB Floodlts: Aft Stbd Fwd Port Bikhd		⑱ Vlv holds position. Sys 2 remains
	6 (R1A2) Man ON Cntl of Cryo O2,H2 Tk 1 Htrs B, Tk 3 Htrs A Cryo O2,H2 Tk 1 Manf Vlv Cntl		⑲ Cntlrs A,B Rad Byp Vlv Mtrs Auto Cntl and Cntlr A Rad Byp Vlv Mtr Man Cntl remain
	17 (A6A1) Port RMS: Fwd MRL Mtr 1 17 Mid MRL Mtr 1 17 Aft MRL Mtr 2		
	6 (R1A2) FC1 Reac Vlv Cntl 17 FC1 STOP capability via START/STOP sw (pnl R1)		
	18 (L2A1) Atm Press Cntl O2 Sys 1 Sply Vlv Cntl (L1A2)		
	19 (L1A2) Freon Loop 1,2 Cntlr B Rad Byp Vlv Mtrs Man Cntl		
(Continued)	(Continued)		

EPS SSR-100 (Cont)
BUS LOSS: CNTLAB1

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	20 (C3A1) L OMS Eng Pr Vlv Coil 1, Cntl Vlv 1,2 Coils 1		6 Vlv holds position
	21 (O14) RJDF 1B F1 Manf Logic sw pwr (F1F,F1L,F1U,F1D)		20 Redundant coils remain
	(F6A1) L ADI Att Ref Set capability		21
	22 (R13A2) Rad Cntl Sys: Port Lat 7-12 Mtr 1 Dpy/Sto Mtr 1 Stbd Lat 1-6 Mtr 1 Dpy/Sto Mtr 2		WARNING Driver pwr to F1 jets lost if RJDF 1B Driver sw OFF (O14:F)
	23 (R2) APU 1 Fu Tk Vlv B		22 Redundant mtrs remain
	24 APU 1 Cntlr Pwr Sply A (all except OV102)		23 Vlv closes. Redundant vlv remains
	25 APU 2 Cntlr Pwr Sply A (OV102 only)		24 Redundant pwr sply remains
	26 APU 3 Fu Tk Vlv B (OV102 only)		25 Vlv holds position. GPC OP capability remains during entry
	27 APU 3 Cntlr Pwr Sply B (OV102 only)		26 MNB pwr select capability remains
	6 (R4) TVC Hyd Sys 1 Isol man Cntl		27 Mtr 2 remains
	25 LG Hyd Sys 1 Isol man Cntl (F6A6,F8A5) NLG Backup Rel and Extension Sys 2 LMG, RMG Backup Rel Sys 2		28 Htr Cntlr 2 remains
	26 (FPC1/AW18H) EMU 1,2 Pwr/Batt chgr MNA pwr		29 NWS fail light still driven by GPC Mode feedback miscompare logic. Fail light will not work in Direct
	(O6) -Y Star Trkr Dr Sys 1 OP/CL capability (C3A5)		30 L OMS auto shutdown if Pc <80% and '↑' on MNVR EXEC display
	27 L ADP Dpy Mtr 1		
	28 Htr Cntlr 1		
	29 (L2A1) NWS fail indication (pnl F2) (for actuator pressure sw) (A6A1) PL Reten Sys A Rel/Lat Mtrs		
	22 (R2) ET Door Mtrs: C/L Lat Actr 1 Mtr 1 man STO capability C/L Lat Act 2 Mtr 1 man STO capability L Dr Closure Mtr 1 man Cntl L Dr Uplock Lat Mtr 2 man Cntl R Dr Uplock Lat Mtr 2 man Cntl		
	(A14) 6 KU-Band Temp Meas PA, Rcvr, A&B Gimbal, Rate Snsr, Ant Feed		
	30 (C3A1) L OMS Arm 1, Arm/Press 1 sw Contacts		

**EPS SSR-101
BUS LOSS: CNTLAB2**

ACTIONS
<p>(A12) APU HTR</p> <p>1</p> <ul style="list-style-type: none"> ● GAS GEN/FUEL PUMP 1 - B AUTO ● APU HTR TK/FU LINE/H2O/ ● SYS 1B - AUTO ● 1A - OFF ● 3A - AUTO ● 3B - OFF <p>HYD</p> <ul style="list-style-type: none"> ● HTR RUD SPD BK B - AUTO, A - OFF ● CIRC PUMP PWR 1 - MNB
<p>(L1)</p> <ul style="list-style-type: none"> ● 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 <p>If Hi Load Evap enabled</p> <ul style="list-style-type: none"> ● HI LOAD DUCT HTR - B(C)
<p>(L2)</p> <ul style="list-style-type: none"> ● FLASH EVAP FDLN HTR A SPLY - 2
<p>Place CDR disp sws (eight) to green dot position:</p> <p>(F6)</p> <ul style="list-style-type: none"> ● AIR DATA - NAV ● ADI ATT - LVLH ● ERR - MED ● RATE - MED ● HSI SEL MODE - ENTRY ● SOURCE (two) - NAV, 3
<p>(F7)</p> <ul style="list-style-type: none"> ● RADAR ALTM - 2
<p>For RCS loss, refer to OMS/RCS Slide Rule</p> <p>6</p> <p>Reconfig following vlv for leak isolation only:</p> <p>(O7)</p> <ul style="list-style-type: none"> ● AFT R RCS He PRESS A ● L, R RCS XFEED 3/4/5 <p>(O8)</p> <ul style="list-style-type: none"> ● L OMS XFEED A ● R OMS XFEED A
<p>(Continued)</p>

EQUIP/FUNCTION LOST
<p>(A12)</p> <p>APU 1 GG/Fu Pump Htrs A</p> <p>APU 1 TK/Fu Ln Htrs A</p> <p>APU Fu Pump/GG H2O Tank Htrs 6A,7A</p> <p>APU GG Inj H2O Tank Htrs 1A,2A</p> <p>APU 3 Tk/Fu Ln Htrs B</p> <p>Rud/Spd Brk Htr A</p> <p>Circ Pump 1 MNA pwr</p>
<p>(L1A2)</p> <p>H2O Loop 1 Pump A man ON capability</p> <p>Flash Evap Cntlr Pri B man ON Sel capability</p> <p>Top Evap L Noz Htr B</p> <p>Top Evap Duct Fwd,Aft L,R Htrs A</p> <p>Hi Load Duct Outbd,Inbd Htrs A</p>
<p>(L2A1)</p> <p>FES H2O FdIn A Htrs 1 (all)</p>
<p>(F6A1)</p> <p>Air Data Source Sel capability</p> <p>L ADI Att, Err, Rate Sel capability</p> <p>(F6A5)</p> <p>L HSI Mode, Source Sel capability</p>
<p>(F6A7)</p> <p>L Radar Altm Sel capability</p>
<p>(O7)</p> <p>5 Aft L RCS He Pr Isol A man Cntl and GPC CL capability</p> <p>5 Aft R RCS He Pr Isol A man CL capability</p> <p>5 Aft R RCS Tk Isol 3/4/5A man Cntl</p> <p>7 Aft R RCS Manf Isol 2 man Cntl</p>
<p>(O7)</p> <p>7 Aft L,R RCS Xfeed Vlv 3/4/5 man CL capability</p>
<p>(R13A2)</p> <p>8 PLBD:</p> <p>C/L Lat 1-4, 5-8 Mtrs 1</p> <p>Port Aft Blkhd Mtr 1</p>
<p>(Continued)</p>

CREW INDICATIONS	NOTES
<p>(F7)</p> <p>2 C/W RCS JET It - on</p> <p>SM ALERT Light/Tone - on</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>(FSMs)</p> <p>S86 APU/HYD W/B</p> <p>SM0 THRM HYD (B)</p> <p>S67 CNTL/ESS V</p> <p>S67 DISPLAY SW L</p> <p>F RCS D(F,L,U) JET</p>	<p>2</p> <p>Indications do not appear until jet commanded</p>
<p>SM 67 ELECTRIC</p> <p>CNTL AB2 Volts < 20</p>	<p>3</p> <p>Pri B GPC Sel capability remains. Pri A and Sec Cntls remain</p>
<p>During Rad Dpy/Sto ops: (R13L)</p> <p>RAD CNTL tbs (four) indicate single mtr ops</p>	<p>4</p> <p>In OPS 2, FES GPC cmd is not present, but one may be sent if reqd</p>
<p>If H2O PUMP LOOP 1,A active:</p> <p>C/W H2O LOOP It - on 'S88 H2O PUMP P1'</p> <p>'S88 THERMAL H2O' (2)</p> <p>(O1)</p> <p>H2O PUMP OUT PRESS meter ind - 20-25 psia</p>	<p>5</p> <p>Vlv holds position. Isol B remains</p>
<p>L ADP deploy time incr from 15 to 30 sec</p>	<p>6</p> <p>Do not reconfig for reg switch or I'CENT procedures</p>
<p>STAR TRKR DR POS -Y CL time incr from 8 to 16 sec</p>	<p>7</p> <p>Vlv holds position</p>
<p>If APUs active and using H2O BLR CNTLR/HTR 1B:</p> <p>C/W APU TEMP It - on after ~ 2 min</p>	<p>8</p> <p>Pwr to MCA Drivers lost through ENABLE sw</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>	

**EPS SSR-101 (Cont)
BUS LOSS: CNTLAB2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(R1) ● O2,H2 MANF VLV TK2 (two) - OP	7 (R1A2) Cryo O2,H2 Tk1 Manf Vlv Cntl		7 Vlv holds position
If O2,H2 MANF VLV TK1 tb - OP (R1) ● O2,H2 TK1,2 HTRS A (four) - AUTO ● O2,H2 TK1,2 HTRS B (four) - OFF	(R1A2) Cryo O2,H2 Tk1 Htrs B		9 Manf status not automatically declared closed. Jet fail-offs may occur
If three or more CRYO TK sets and TK3 not depleted: (R1) ● O2,H2 TK3 HTRS A (two) - OFF ● O2,H2 TK3 HTRS B (two) - AUTO	(R1A2) Cryo O2,H2 Tk3 Htrs A		10 When SM unavailable, use NSP block to inhibit UL Cnds. Requires GNC I/O reset after UPLK - ENA for ADS
If four or more CRYO TK sets and TK4 not depleted: (A11) ● CRYO TK4 HTR O2,H2 B (two) - AUTO ● CRYO TK4 HTR O2,H2 A (two) - OFF (if OV-102, refer to ECLS, 6.3 CRYO TABLE A, for switch nomen)			11 Vlv normally closed 12 B Htrs remain
(R2) ● BLR CNTLR/HTR 1 - A	(R2) Hyd H2O Blr 1 Cntlr B		13 Redundant coils remain
9 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)		14 RM sw downmodes to 2-level for -X position
SM1 DPS UTILITY (G2,G8,S2) MMU 1 ASSIGN ● GNC - ITEM 1 EXEC ● SM - ITEM 3 EXEC ● PL - ITEM 5 EXEC	(O15) MMU 2		
If no SM GPC and LOS: (C3) ● UPLK - NSP BLK	10 (C3A5) Uplink switch GPC block of UL Cnds capability		
When reqd: ● Perform FC1 purges in AUTO mode (ORB OPS)	11 (R12A1) FC1 Purge Vlv man Cntl		
(A14) RCS/OMS HTR ● FWD RCS - B AUTO ● L POD (two) - A OFF, B AUTO	12 (A6A1) Fwd RCS A Htrs 13 L Pod A Htrs (partial) L OMS Eng Pr Vlv Coil 2, Cntl Vlv 1,2 Coils 2		
If SENSE - - Z: (A6U) ● SENSE - - X ● Wait at least one sec, then reposition as desired	14 (A6A1) 3-level sw RM for - X Sense		
(Continued)	(Continued)		

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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	15 (L1A2) NH3 Sys B Sec Cntrl man ON capability		7 Vlv holds position 15 Sys B Pri Cntrl, Auto switchover to Sec Cntrl remain
BUS ISOLATION			16 Loss of manual capability to inert LH2 Manf during entry (MM304)
(R2) • MPS He I'CONNECT CTR - GPC			17 Six vlvs fail to non-isolation position 18 FC1 can be stopped via FC1 CNTLR sw (O14:A)
(R4) • MPS FILL/DRAIN LH2 INBD - GND	16 (R4) Prplt F/D LH2 Inbd Vlv Man Cntl, LH2 Hi Pt Bld Inbd Vlv man OP capability		19 Vlv holds position. Sys 2 remains
(O15:F) • MMU 2 - OFF			20 Redundant mtrs remain 21 Mtr 2 remains 22 Htr Cntrl 2 remains
	17 (O17) ATVC 2 Isol ME		23
	7 (R1A2) FC1 Reac Vlv Cntl		20 Driver pwr to L5 jets lost if L5/F5/R5 Driver sw OFF (O16:F)
	18 FC1 STOP capability via START/STOP sw (Pnl R1)		
	19 (L2A1) Atm Press Cntl O2 Sys 1 SPly Vlv Cntl		
	(F6) L HUD (F6A1) L ADI Att Ref Set capability		
	7 (R4) TVC Hyd Sys 1 Isol man Cntl		
	20 (O6) -Y Star Trkr Dr sys 1 CL capability		
	21 (C3A5) L ADP Deploy Mtr 1		
	22 Htr Cntrl 1		
	20 (R13A2) Rad Cntl Sys: Port Lat 1-6 mrt 1 Dpy/Sto mtr 1 Stbd Lat 7-12 Mtr 1 Dpy/Sto Mtr 2		
	23 (O15) RJDA L Vernier Logic pwr (L5L)		
	20 (R2) 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		
	(Continued)		

**EPS SSR-101 (Cont)
BUS LOSS: CNTLAB2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(C3A1) 24 L OMS ARM 2, ARM/PRESS 2 sw Contacts		(5) Vlv holds position. Isol B remains
	(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 Ovrđ of GPC CL and cap		(24) L OMS auto shutdown if Pc <80% and '↓' on MNVR EXEC display (25) Vlv closes. Redundant vlv remains
	(R2) 25 APU 2 Fu TK Vlv B		

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**EPS SSR-102
BUS LOSS: CNTLAB3**

(Includes MNA FMC1, MNA MMC1, MNA MMC3, MNA AMC1)

ACTIONS	
1	(A12) APU HTR ● GAS GEN/FUEL PUMP 1 - A AUTO ● LUBE OIL LINE 1 - A AUTO APU HTR TK/FU LINE H2O ● SYS 1B - AUTO ● 1A - OFF ● 3A - AUTO ● 3B - OFF
	HYD ● HTR BDY FLP B - AUTO ● A - OFF ● CIRC PUMP PWR 1 - MNA
	(R2) ● BLR CNTLR/HTR 1,3 (two) - B
	(A14) RCS/OMS HTR ● OMS CRSFD LINES - A OFF, B AUTO
	(L1) ● H2O PUMP LOOP 1 - B ● TOP EVAP HTR DUCT - B If Hi Load Evap enabled: ● HI LOAD DUCT HTR - B(C)
	For RCS loss, refer to OMS/ RCS Slide Rule
4	(MA73C:C,D) ● cb MCA PWR AC1 3φ MID 1, 3 (two) - op
	For PLBD ops: ● OP/CL Drs in man mode
	GNC 23 RCS Override F1 Manf status to OP: ● RCS FWD - ITEM 1 EXEC ● MANF VLVS 1 OVRD - ITEM 40 EXEC
	● PLT RHC pb - push, if BFS engage reqd
	If encryption in use: (A1L) ● NSP PWR - 1
661	(C3) ● S-BD PM CNTL - PNL ● -CMD
	(Continued)

EQUIP/FUNCTION LOST	
	(A12) APU 1 GG/Fu Pump Htrs B 1 Lube Oil Line Htrs B 1 Tk/Fu Ln Htrs A 1 Fu Pump/GG H2O Htrs 12A,16A,18A,19A 3 Tk/Fu Ln Htrs B 3 Fu Pump/GG H2O Htr 13B 3 GG Inj H2O Htrs,3B, 23B
	Body Flap Htr A
	Circ Pump 1 MNB pwr
	(R2) Hyd H2O BLR 1,3 Cntlr A
	(A14) OMS Crsfed Ln Htrs A
	(L1A2) H2O Loop 1 Pump A Top Evap Duct Fwd,Aft Htrs A
	Hi Load Duct Outbd, Inbd Noz Htrs A
5	(O7) Aft R RCS He Press Isol A man Cntl, GPC CL capability
3	Fwd RCS Tk Isol 3/4/5 Cntl
4	(MA73C) Port, Stbd Rad Lat 1-6,7-12 Mtrs 1 Limit sw
	(MA73C) PLBD: C/L Lat 1-4,5-8,9-12 Mtrs 1 Port, Stbd Fwd Blkhd Mtrs 1 Port Aft Blkhd Mtr 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw
3	(MA73C) Fwd RCS Manf Isol 1 Cntl
	(F6) CDR BFS no eng capability GPC 1,2,4 no eng capability
	(A1A2) COMSEC 2 Key
	(Continued)

CREW INDICATIONS		NOTES
	SM ALERT Light/Tone - on 'S67 CNTL/ESS V' 'S88 THERMAL FRN' (2)	① TIME CRITICAL If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
	(FSM) RM DLMA MANF	
2	(L1) FLOW PROP VLV LOOP 1 tb - bp	② Freon Loop 1 Flow Prop Vlv operation not affected
3	(O8) FWD RCS TK ISOL 3/4/5 tb - bp	③ Vlv holds position
3	MANF ISOL 1 tb - bp	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
4	(R13L) RAD CNTL STBD tb - bp PORT tb - bp	⑤ Vlv holds position. GPC OP capability remains. Isol B remains
	SM 67 ELECTRIC CNTL AB3 Volts < 20	
	LADP deploy time incr from 15 to 30 sec	
	If APUs active and using H2O BLR CNTLR/HTR 1A or 3A: C/W APU TEMP It - on after ~ 2 min	
	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	
	(Continued)	

**EPS SSR-102 (Cont)
BUS LOSS: CNTLAB3**

ACTIONS
If encryption optional: (A1L) ● NSP ENCRYPTION MODE - SEL ● NSP ENCRYPTION SEL - BYP

BUS ISOLATION

EQUIP/FUNCTION LOST
(MA73C) Stbd Rad Dpy/Sto Mtr 1 Port Rad Dpy/Sto Mtr 1 -Y Star Trkr Dr Sys 1 OP/CL capability
6 (R4) LG Dump Vlv (Vlv N.C.), LG Control Vlv NWS
(MA73C) LH Vents 4,5,6,7,8,9 Mtrs 1 RH Vents 1,2,3,5,6 Mtrs 1
7 (MA73C) L ADP Deploy Mtr 1 Disc 1
8 Htr Cntrl 1
(R2) All except OV102 9 APU 3 Cntrl pwr Sply B
10 Fu Tk Vlv B
(C3A6) 11 Fwd Pnl Trans X,Y Norm, Pulse, and Fwd Pnl Roll, Pitch, Yaw Disc Rate, Accel, Pulse, Select capability
11 Fwd Pnl Trans Z High, Norm, Pulse Sel capability
11 Fwd Pnl Trans Low Z Sel capability
11 Fwd Pnl Man LVLH Sel capability
(R4) MPS Inbd LH2 Prplt Topping Vlv man Cntl
(R2) 12 MPS Pneu He Isol 1 man Cntl
(MA73C) 13 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
(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
(MA73C) 14 Port RMS: Mid MRL Mtr 1 Aft MRL Mtr 2

CREW INDICATIONS	NOTES
STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec	⑥ Lose Hyd deploy capability for all Ldg Grs. Pyro backup re- lease sys will deploy Ldg Grs
(L1) If H2O PUMP LOOP1, A ON: CW H2O LOOP It - on 'S88 H2O PUMP P1' 'S88 THERMAL H2O' (2) (O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia	⑦ Mtr 2 remains ⑧ Htr Cntrl 2 remains
(A8L) PORT RMS: DPY/STO tb - bp R-F-L MID tb - bp RETEN LAT tb - bp	⑨ Redundant pwr sply remains ⑩ Vlv closes. Redundant vlv remains
	⑪ Use pb on Aft pnl A6 ⑫ Vlv normally closed. GPC cntl remains ⑬ Redundant mtrs remain ⑭ Single mtr time. If unlatched, one failure away from loss of 2 out of 3 mtrs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS

**EPS SSR-103
BUS LOSS: CNTLBC1**

ACTIONS
<p>(A12)</p> <p>APU HTR</p> <ul style="list-style-type: none"> • GAS GEN/FUEL PUMP 1 - A AUTO • GAS GEN/FUEL PUMP 2 - B AUTO • LUBE OIL LINE 2 - B AUTO <p>APU HTR TK/FU LINE/H2O/</p> <ul style="list-style-type: none"> • SYS 1A - AUTO • 1B - OFF • 2B - AUTO • 2A - OFF <p>HYD</p> <ul style="list-style-type: none"> • HTR BDY FLP A - AUTO • B - OFF • CIRC PUMP PWR 1 - MNA • CIRC PUMP PWR 2 - MNC
<p>(A1L)</p> <p>S-BD PM</p> <ul style="list-style-type: none"> • ANT SW ELEC - 2 • XPNDR - 2 • PWR AMPL OPER - 2 • STBY - 2 • PRE AMP - 2 • NSP PWR - 2 <p>If PSP and INTRG reqd for PL ops:</p> <ul style="list-style-type: none"> • S-BD PL PWR SYS - 2 • CNTL - PNL • - CMD • Reconfig PSP • Perform PL INTRG REACQ
<p>(A1R)</p> <ul style="list-style-type: none"> • S-BD FM PWR - 2 • CNTL - PNL • - CMD
<p>(C3)</p> <ul style="list-style-type: none"> • S-BD PM CNTL - PNL • - CMD
<p>(L1)</p> <ul style="list-style-type: none"> • TOP EVAP HTR NOZ L - B AUTO • TOP EVAP HTR DUCT - A <p>If Hi Load Evap enabled:</p> <ul style="list-style-type: none"> • HI LOAD DUCT HTR - A (C)
<p>(R2)</p> <ul style="list-style-type: none"> • BLR CNTLR/HTR 2 - A
<p>(Continued)</p>

EQUIP/FUNCTION LOST
<p>(A12)</p> <p>APU 1 GG/Fu Pump Htrs B</p> <p>2 GG/Fu Pump Htrs A</p> <p>2 Lube Oil Line Htrs A</p> <p>1 Tk/Fu Ln Htr B Fu Pump/GG H2O Tank Htrs 6B,7B 1,2 GG Inj H2O Htrs 4B,5B 2 Tk/Fu Line Htr A 2 Fu Pump/GG H2O Htr 15A</p> <p>Body Flap Htr B</p> <p>MNB Circ Pump 1 pwr</p> <p>MNB Circ Pump 2 pwr</p>
<p>(A1A2)</p> <p>S-BD PM Sys 1</p> <p>Xpndr 1</p> <p>Pre-Amp 1</p> <p>Pwr Amp 1</p> <p>PM Ant Sw 1</p> <p>FM Ant Sw 1</p> <p>NSP 1/COMSEC 1</p> <p>S-BD PL INTRG 1</p> <p>PSP 1</p>
<p>(A1A3)</p> <p>S-BD FM Sig Proc 1</p> <p>Xmtr 1</p>
<p>(L1A2)</p> <p>Top Evap L Noz Htr A</p> <p>Top Evap Duct Fwd,Aft Htrs B</p> <p>Hi Load Duct Outbd,Inbd Noz Htrs B</p>
<p>(R2)</p> <p>Hyd H2O Blr 2 Cntr B</p>
<p>(R13A2)</p> <p>PLBD:</p> <p>C/L Lat 13-16 Mtr 2</p> <p>Stbd Aft Bikhd Mtr 2</p> <p>Port Drive Mtr 2</p>
<p>(Continued)</p>

CREW INDICATIONS	NOTES
<p>MASTER ALARM Light/Tone - on</p>	<p>① TIME CRITICAL</p> <p>If not done within 20 min, may freeze N2H4 and lose APU.</p> <p>However, SM ALERT occurs above freezing temp</p>
<p>(F7)</p> <p>SM ALERT Light/Tone - on</p> <p>SM 67 ELECTIRC</p> <p>CNTL BC1 Volts < 20</p>	
<p>(FSMs)</p> <p>S67 CNTL/ESS V</p> <p>S69 FUEL CELL</p> <p>S86 APU/HYD W/B</p> <p>SM 0 THRM HYD</p> <p>F,L,R RCS L,R,D JET (B)</p>	<p>② Msg occurs only if B AUTO (pnl R12U) selected for FC H2O Relief Htr</p>
<p>(COMM LOST)</p> <p>All S-BD A/G voice lost if Sys 1 selected</p>	<p>③ Indications do not appear until jet commanded</p>
<p>(L1)</p> <p>RAD BYP VLV 2 tb - bp</p>	<p>④ Vlv still functional</p>
<p>If Site AOS and using S-BD PM Xpndr 1 or Ant Elec 1: 'ANTENNA'</p>	<p>⑤ FSM caused by antenna miscompare</p>
<p>If NSP 1 selected: 'BCE STRG 1 NSP'</p>	<p>⑥ Pwr to MCA Drivers lost through ENABLE sw</p>
<p>During Rad Dpy/Sto: (R13L) RAD CNTL STBD tb indicates single mtr ops RAD LAT CNTL 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 -Y CL time incr from 8 to 16 sec</p>	
<p>STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec</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>If first RGA failure and rates sensed: 'RM FAIL RGA' (3)</p>	
<p>(R2)</p> <p>If APUs active and using BLR CNTLR/HTR 2B: C/W APU TEMP It - on after ~ 2 min</p>	
<p>CCTV Video & Annun Its lost if MNB selected for VCU</p>	
<p>PLB FloodIts lost: Fwd Stbd Mid Port</p>	
<p>(Continued)</p>	

EPS SSR-103 (Cont)
BUS LOSS: CNTLBC1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>For RCS loss, see OMS/RCS Slide Rule</p> <p>Only reconfig following vlv for leak isolation: (O7) • AFT R RCS He PRESS B</p>	<p>(O8) 7 F,R,RCS He Press Isol B man CL capability (O7) 9 Aft L RCS Tk Isol 3/4/5B man Cntl 9 Aft L RCS Manf Isol 1 man Cntl</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>⑦ Vlv holds position. Man OP and full GPC cntl remains</p>
<p>(O8) • L OMS XFEED B • R OMS XFEED B • FWD RCS He PRESS B</p>	<p>(O8) 7 L OMS Tk Isol B man CL capability 7 L, R OMS Xfeed Vlv B man capability 9 Fwd RCS Manf Isol 2 man Cntl</p>		<p>⑧ Do not reconfig for reg switch or I'CENT procedures</p> <p>⑨ Vlv holds position. GPC cntl remains</p>
<p>(O7) • AFT L,R RCS MANF ISOL 5 (two) - CL (tb-CL)</p>	<p>(O16) RCS Manf F5,L5,R5 RJD pwr (F5L,F5R,L5L,L5D,R5R,R5D)</p>		<p>⑩ Manf status not automatically declared closed. Fail-offs will occur when commanded</p>
<p>(O8) • FWD RCS MANF ISOL 5 - CL (tb-CL)</p>			<p>⑪ NOZ Htr A not wired</p>
<p>For attitude control, perform RCS, LOSS OF VERNIERS (ORB OPS)</p>			<p>⑫ Vlv normally closed. GPC cntl remains. Man override of GPC OP CMD is lost</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 priority, etc</p>	<p>(A14) Aft RCS L,R Jet 1 Mtrs</p>		
<p>(A14) RCS/OMS HTR • FWD RCS - A AUTO • L POD (two) - A AUTO, B OFF • R POD (two) - A OFF, B AUTO</p>	<p>(A14) Fwd RCS Htrs B L Pod Htrs B (all) R Pod Htrs A (all)</p>		
<p>(R12U) • FC H2O LINE HTR - A AUTO • FC H2O RELIEF HTR - A AUTO</p>	<p>(R12A1) FC H2O Line Htrs B FC H2O Relief Htrs B Vent Line Htrs B Barrel Htrs B Rif Noz Htrs B</p>		
<p>When reqd: • For FC2, perform FUEL CELL PURGE - AUTO (ORB OPS, EPS)</p>	<p>(R12A1) 12 FC2 Purge Vlv man Cntl</p>		
<p>Prior to using L(R) OMS: (O8) L, R OMS He PRESS/VAP • ISOL A (two) - OP, then • - GPC • ISOL B (two) - GPC</p>	<p>(O8) 12 L,R OMS He Press Isol B man Cntl and VAP ISOL 1,2 Man B Cntl</p>		
<p>If CCTV reqd: (A7U) • TV PWR CONTR UNIT - MNA</p>	<p>(A7A1) Video Cntl Unit MNB pwr</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

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		
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) 13 L Trim RHC - INH capability 13 L Trim Pnl - ON capability (L2A1) 13 L Bdy Flp Cntl		13 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)
For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,3 (two) - OP • Wait 10 sec, then CL	(R4) 14 MPS/TVC Hyd Sys 2 Isol man Cntl		14 Vlv holds position 15 Vlv holds position. GPC cntl remains. Loss of manual capability to inert MPS Manfs
BUS ISOLATION			16 FC2 can be stopped via FC2 CNTLR sw on pnl O15:A
(F3) • TRIM RHC - ENA • PNL - OFF			17 Cntlrs A, B Rad Byp Vlv Mtrs Auto Cntl and Cntlr B Rad Byp Vlv Mtr Man Cntl remain
(R4) MPS • FILL/DRAIN LO2 INBD - GND • FILL/DRAIN LH2 OUTBD - GND	(R4) 15 Prplt F/D Inbd LO2 Vlv man OP capability 15 Prplt F/D Outbd LH2 Vlv man Cntl		18 Vlv holds position. Sys 1 remains
(O15:A) • RGA 2 - OFF	(O15) RGA 2		
(R15:D) cb MNB • TV CONTR UNIT - op			
(A7U) PL BAY FLOOD • MID PORT - OFF • FWD STBD - OFF	(A7A1) PLB Mid Port Floodlt Fwd Stbd Floodlt		
	(R1A2) 14 Cryo O2,H2 Tk 2,4 Htrs A man ON Cntl 14 Cryo O2,H2 Tk2 Manf Vlv Cntl		
	(R1A2) 14 FC2 Reac Vlv Cntl 16 FC2 Stop capability via START/STOP sw (pnl R1)		
	(L1A2) 17 Freon Loop 1 Cntlr A Rad Byp Vlv Mtr man Cntl		
	(L2A1) 18 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl		
	(F8) R HUD Rt ADI Aft Ref Set capability (C3A5) L,R ADP Dpy Mtrs 2 Probe Htr Cntlr 2		
	(Continued)		

**EPS SSR-103 (Cont)
BUS LOSS: CNTLBC1**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(A6A1) Port RMS: 19 MPM Mtr 2 20 Fwd MPM Mtr 1 20 Mid MPM Mtr 2		9 Vlv holds position. GPC cntl remains
	(O6) -Y Star Trkr Dr Sys 2 CL capability -Z Star Trkr Dr Sys 1 OP/CL capability		19 One failure away from EVA to stow MPM or from RMS jettison 20 Single mtr time
	(O15) 21 RJDF 1A F2 Manf Logic pwr (F2F,F2R,F2U,F2D)		21
	(R2A2) 22 APU 1 Cntlr Pwr Sply B 22 APU 3 Cntlr Pwr Sply A (OV102 only) 23 APU 2 Fu Tk Vlv A (OV102 only)		<div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;">WARNING</div> Driver pwr to F2 jets lost if RJDF 1A Driver sw OFF (pnl O15:F)
	(R4) NLG Ext 2 Fire 1, Fire 2 NLG,LMG,RMG Bkup Rel 2 Fire 1 9 LG Hyd Sys 2 Isol Man Cntl		22 Redundant pwr sply remains 23 Mtr 1 remains
	(R13A2) Rad Cntl sys: Stbd Rad Lat 1-6 Mtr 2 Dpy/Sto Mtr 1 Port Rad Lat 1-6 Mtr 2		24 Redundant stow initiates (CA-1) sig to Ku-Band remains
	(R13A2) 23 PL Reten Sys B Rad/Lat Mtrs KU Ant Sto/Dpy Mtr 2 Direct Stow Mtr 2 24 Redundant Stow Initiate Signal to Ku-Band		

**EPS SSR-104
BUS LOSS: CNTLBC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A1L) S-BD PM ● ANT SW ELEC - 1 ● XPNDR - 1 ● PWR AMP OPER - 1 ● STBY - 1 ● PRE AMP - 1 ● NSP PWR - 1 If PSP and INTRG reqd for PL ops: ● S-BD PL PWR SYS - 1 ● CNTL - PNL ● - CMD ● Reconfig PSP ● Perform PL INTRG REACQ</p>	<p>(A1A2) S-Bd PM Sys 2: Xpndr 2 Pre Amp 2, Pwr Amp 2 PM and FM Ant sw 2 NSP 2/COM SEC 2 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>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 If S-BD FM Sys 2 selected at time of bus failure, all ops recorder dumps and TV/TR downlinks lost until Sys 1 selected</p> <p>④ Indication appears only during site AOS for antenna miscompares</p> <p>⑤ TIME CRITICAL If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>⑥ Sec Cntrl Man ON Sel capability remains. Pri A,B Cntrls remain</p> <p>⑦ Pwr to MCA Drivers lost through ENABLE sw</p>
<p>(A1R) ● S-BD FM PWR - 1 ● CNTL - PNL ● - CMD</p>	<p>(A1A3) S-BD FM Sig Proc 2 Xmtr 2</p>	<p>(F7) RCS JET C/W It - on SM ALERT Light/Tone - on</p>	
<p>(C3) ● S-BD PM CNTL - PNL ● - CMD</p>		<p>(FSMs) S86 APU/HYD W/B SMO THRM HYD (B) BCE STRG 3 NSP (if using NSP 2) S67 CNTL/ESS V DISPLAY SW R F,L,R RCS(F,R,L,U,D) JET I/O ERROR CRT2</p>	
<p>(A12) APU HTR ● GAS GEN/FUEL PUMP 2 - B AUTO APU HTR TK/FU LINE/H2O/ ● SYS 1A - AUTO ● 1B - OFF ● 2B - AUTO ● 2A - OFF</p>	<p>(A12) APU 2 GG/Fu Pump Htrs A 1 Tk/Fu Line Htrs B APU 1 Fu Pump/GG H2O Htr 11B APU GG Inj H2O Tank Htrs 1B,2B APU 2 Tk/Fu Line Htrs A APU Fu Pump/GG H2O Tank Htrs 8A,9A</p>	<p>SM 67 ELECTRIC CNTL BC2 Volts < 20</p>	
<p>HYD ● HTR ELEV A - AUTO B - OFF ● CIRC PUMP PWR 2 - MNC</p>	<p>Elevon Actr Htrs B (R2) Circ Pump 2 MNB pwr</p>	<p>(F8) APU FUEL QTY 2 ind - % inaccurate (displays H2O QTY)</p>	
<p>(L1) ● H2O PUMP LOOP 1 - A If using Sec Cntrl: ● FLASH EVAP CNTLR SEC - ON ● TOP EVAP HTR DUCT - A If Hi Load Evap enabled: ● HI LOAD DUCT HTR - A(C)</p>	<p>(L1A2) H2O Loop 1 Pump B man ON capability</p>	<p>If site AOS and using S-BD PM Xpndr 2 or Ant Elec 2: 'ANTENNA' (2)</p>	
<p>(L2) ● FLASH EVAP FDLN HTR A SPLY - 1</p>	<p>(LZA1) FES H2O FdIn A Htrs 2 (all)</p>	<p>(L1) if H2O PUMP LOOP 1,B active: C/W H2O LOOP It 'S88 H2O PUMP P1' 'S88 THERMAL H2O' (2)</p>	
	<p>6 FES Sec Cntrl GPC Sel capability Top Evap Duct Fwd,Aft Htrs B</p>	<p>(O1) H2O PUMP OUT PRESS LOOP 1 - 20-25 psia</p>	
	<p>7 (R13A2) PLBD: Port,Stbd Fwd Bkhd Mtrs 2 Stbd Door Mtr 2</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>(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>SM (BFS SM 63) PL BAY DOORS</p>	
		<p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	

(Continued)

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EPS SSR-104 (Cont)
BUS LOSS: CNTLBC2

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
9 For RCS loss, refer to OMS/ RCS Slide Rule Reconfig following vlv for leak isolation only: (O8) • L OMS XFEED B • R OMS XFEED B	8 (O8) F,R RCS He Pr Isol B man Cntl, GPC CL capability (O7) 10 Aft R RCS Tk Isol 3/4/5B man Cntl 11 Aft R RCS Manf Isol 1 man Cntl		8 Vlv holds position. GPC OP capability remains. Isol A remains
(R1) • O2,H2 MANF VLV TK1 (two) - OP	11 (R1A2) Cryo O2,H2 Tk2 Manf Vlv Cntl		9 Do not reconfig for reg switch or I'CNT procedures 10 Vlv holds posi- tion. Vlv A remains
If O2,H2 Manf Vlv Tk2 tb - OP (R1) • O2,H2 TK1,2 HTRS A (four) - OFF • O2,H2 TK1,2 HTRS B (four) - AUTO	(R1A2) Cryo O2,H2 TK2 HTRS A		11 Vlv holds position
If four or more Cryo Tk sets and Tk3,4 not depleted: (R1) • O2,H2 TK3 HTR A (two) - OFF • O2,H2 TK3 HTR B (two) - AUTO (A11) • CRYO TK4 HTR O2,H2 A (two) - OFF • CRYO TK4 HTR O2,H2 B (two) - AUTO (if OV-102, refer to ECLS, 6.3 CRYO TABLE A for switch nomen)	(R1A2) Cryo O2,H2 TK4 Htrs A		
(R2) • BLR CNTLR/HTR 2 - A	(R2) Hyd H2O Blr 2 Cntlr B		
(C2) • R CRT SEL -3 • GPC/CRT O2 EXEC	(C2A2) DEU/CRT 2		
(Continued)	(Continued)		

EPS SSR-104 (Cont)
BUS LOSS: CNTLBC2

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>GNC 23 RCS</p> <p>12 Override F2 Manf status to CL: <ul style="list-style-type: none"> ITEM 1,41 EXEC </p>	<p>(O15) RCS Manf F2 RJD pwr (F2F,F2R,F2U,F2D)</p>		<p>12 Manf status not automatically declared closed. Jet fail-offs may occur</p>
<p>(O7) <ul style="list-style-type: none"> AFT L,R RCS MANF ISOL 5 (two) - CL </p>	<p>(O16) RCS Manf F5/R5/L5 RJD pwr (F5L,F5R,L5L,L5D,R5R,R5D)</p>		<p>13 When SM not available, use NSP block to inhibit UL cmds. Requires GNC I/O RESET after UPLK - ENA for AOS</p>
<p>(O8) <ul style="list-style-type: none"> FWD RCS MANF ISOL 5 - CL (tb-CL) <ul style="list-style-type: none"> For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS) </p>			<p>14 Vlv normally closed</p>
<p>13 No SM GPC and LOS: (C3) <ul style="list-style-type: none"> UPLK - NSP BLK </p>	<p>13 (C3A5) Uplink switch GPC Block of UL Cmd capability</p>		<p>15 RM sw down-modes to 2-level for -X position</p>
<p>Place PLT disp sws (eight) to green dot position: (F8) <ul style="list-style-type: none"> AIR DATA - NAV ADI ATT - LVLH ERR - MED RATE - MED HSI SEL MODE - ENTRY HSI SEL SOURCE (two) - NAV 3 RADAR ALTM - 1 </p>	<p>(F8) Air Data Source Sel capability R ADI Att, Err, Rate Sel capability R HSI Mode, Source Sel capability R Radar ALTM Sel capability</p>		
<p>When reqd: <ul style="list-style-type: none"> For FC2, perform FUEL CELL PURGE - AUTO (ORB OPS, EPS) </p>	<p>14 (R12A1) FC2 Purge Vlv man Cntl</p>		
<p>(A6U) If SENSE - -Z: <ul style="list-style-type: none"> SENSE - -X Wait 1 sec, reposition as desired </p>	<p>15 (A6A1) 3-Level sw RM for -X Sense</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-104 (Cont)
BUS LOSS: CNTLBC2

ACTION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>During OPS 8:</p> <div style="border: 1px solid black; padding: 2px; width: fit-content;">GNC 43 CONTROLLER</div> <p>Desel R Pnl Trim R2: • DES PNL TRIM R2 ITEM 39 EXEC</p> <p>Desel R Bdy Flp up/dn R2: • DES BDY FLP UP/DN R2 ITEM 22 EXEC</p>	<p>(F8)</p> <p>16 R Trim RHC INH capability 16 R Trim Pnl ON capability (C3A1) 16 R Bdy Flp UP/DN capability</p>		<p>11 Vlv holds position</p> <p>16 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)</p>
<p>For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,2 - OP, wait 10 sec, then CL</p>	<p>(R4) 11 MPS/TVC Hyd Sys 2 Isol man Cntl</p>		<p>17 Sys B Sec Cntlr man ON capability remains</p>
<p>If reqd during entry (< 120K ft): (L1) • NH3 CNTLR A - PRI/GPC If reqd for Post Rollout: (L1) • NH3 CNTLR B - SEC/ON</p>	<p>(L1A2) 17 NH3 SYS B Pri Cntlr and Auto swover to Sec Cntlr</p>		<p>18 A Htrs remain 19 B Htrs remain</p>
<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 • Activate P/L H2O loop(s) (if applicable)</p>			<p>20 APU 2 Qty meter (pnl F8) displays H2O qty when in FUEL position</p>
<p>(A14) RCS/OMS HTR • FWD RCS - A AUTO • L POD (two) - A AUTO, B OFF • R POD (two) - A OFF, B AUTO</p>	<p>(A14) 18 Fwd RCS B Htrs 18 L Pod B Htrs (partial) 19 R Pod A Htrs (partial)</p>		<p>21 Vlv fails closed</p> <p>22 Vlv holds position. GPC cntl remains. Loss of manual capability to inert LO2 Manf</p>
BUS ISOLATION			
<p>(C2) • CRT2 PWR - OFF</p>			
<p>(F3) • R TRIM RHC/PNL - ENA • PNL - OFF</p>			
<p>20 (F8) • APU sel (two) - H2O, 1(2,3)</p>	<p>(F8A8) 20 APU 2 Fuel Qty display</p>		
<p>(R2) • MPS He I'CONNECT L - GPC</p>	<p>(R2) 21 L ME He Intercon Outlet Vlv man Cntl</p>		
<p>(R4) • MPS FILL/DRAIN LO2 INBD - GND</p>	<p>(R4) 22 MPS Prplt F/D Inbd LO2 Vlv man OP capability</p>		
	<p>(O16) 23 ASA 4 Isol Driver pwr</p>		
	<p>(L2A1) 11 Atm Press Cntl O2 Sys 2 Sply Vlv Cntl</p>		<p>23 Six vlvs fail to non-isolation position</p>
(Continued)	(Continued)		

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**EPS SSR-104 (Cont)
BUS LOSS: CNTLBC2**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(R1A2) 11 FC2 Reac Vlv Cntl 24 FC2 STOP capability via START/STOP sw (pnl R1)		(10) Vlv holds position. Vlv A remains
	(A6A1) 25 R ADI Att Ref set capability Aft Pnl Trans X,Y Norm and Pulse Sel capability 25 Aft Pnl Trans Z High, Norm, and Pulse Sel capability 25 Aft Pnl Trans Low Z Sel capability 25 Aft Pnl Rot Roll, Pitch, Yaw Disc Rate, Accel and Pulse Sel capability 25 Aft Pnl man LVLH Sel capability		(11) Vlv holds position (24) Able to stop FC2 via FC2 CNTLR sw (pnl O15:A) (25) Use Fwd pnl C3 pbs (26) Redundant mtrs remain
	(R13A2) 26 Rad Cntl Sys: Port and Stbd Lat 1-6 Mtr 2 Stbd Dpy/Sto Mtr 1		(27) Htr Cntrlrs 1 remain (28) Sys 1 remains
	(C3A5) 26 L,R ADP Dpy Mtrs 2 27 Htr Cntrlrs 2		(29) Mtr 1 remains
	(O6) 26 -Y Star Trkr Dr Sys 2 OP/CL capability 26 -Z Star Trkr Dr Sys 1 CL capability		(30) Redundant pwr sply remains (31) One failure away from EVA to stow MPM or from RMS jettison
	(F6A5, F8A5) 28 NLG Bkup Release, Extension Sys 2 28 LMG, RMG Bkup Release Sys 2		(32) Single mtr time
	(R13A2) PL Reten Sys B Rel/Lat Mtrs		
	(R13A2) 29 KU ANT Sto/Dpy Mtr 2 Direct Sto Mtr 2		
	(R2) 30 All except OV102 APU 2 Cntrlr pwr Sply A		
	(R13A2) 31 Port RMS: MPM Mtr 2 32 Fwd MPM Mtr 1 32 Mid MPM Mtr 2		
	(O8) 10 L OMS Tk Isol B man CL cap 10 L,R OMS Xfeed Vlv B man CL capability		
	(O17) Aft PL MNB current transducer		

EPS SSR-105
BUS LOSS: CNTLBC3 (Includes MNB FMC2, MNB MMC1, MNB MMC2, MNB MMC3, MNB MMC4, MNB AMC2)

ACTIONS	EQUIP/FUNCTION LOST	- CREW INDICATIONS	NOTES
<p>(A12)</p> <p>APU HTR</p> <p>1 ● GAS GEN/FUEL PUMP 2 - A AUTO</p> <p>● 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 ● 2B - AUTO</p> <p>1 ● 2A - OFF</p> <p>HYD HTR</p> <p>● RUD SPD BK A - AUTO</p> <p>● B - OFF</p> <p>HYD</p> <p>● CIRC PUMP PWR 2 - MNB</p>	<p>(A12)</p> <p>APU 2 GG/Fu Pump Htr B</p> <p>2 Lube Oil Line Htrs B</p> <p>1 Tk/Fu Line Htr B</p> <p>APU 1 Fu Pump/GG H2O Htrs 12B,16B,18B,19B</p> <p>APU 2 Tk/Fu Line Htr A</p> <p>APU 2 Fu Pump/GG H2O Htr 14A</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 BC 3 Volts < 20</p> <p>(FSM)</p> <p>RM DLMA MANF</p> <p>(O8)</p> <p>FWD RCS MANF ISOL 2 tb - bp</p> <p>If H2O PUMP LOOP 1,B - ON:</p> <p>CW H2O LOOP It - on 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2)</p> <p>(O1)</p> <p>H2O PUMP OUT PRESS LOOP 1 meter ind - 20-25 psia</p> <p>If APUs active and using H2O BLR CNTLR/HTR 1A or 2A: CW APU TEMP It on - after ~ 2 min</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>(A8L)</p> <p>Port RMS: DPY/STO tb - bp R-F-L FWD tb - bp RETEN LAT tb - bp</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>① TIME CRITICAL</p> <p>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</p> <p>② Vlv holds position</p> <p>③ In OPS 2, FES GPC cmd is not present, but one may be sent if reqd</p> <p>④ Sec Cntrl On sel capability remains. Pri A,B Cntrls remain</p> <p>⑤ If AC2 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 1-6 continue to run until Sys B Lat Cntl sw placed to OFF. Other equip pwr'd by AC2 MMC2 and AC2 MMC4 lost because of MNB MMC2 and MNB MMC4 loss</p> <p>⑥ Sys A Sec Cntrl man On Capability remains</p>
<p>(A14)</p> <p>● RCS/OMS HTR OMS CRSFD LINES - A AUTO, B OFF</p>	<p>(A14)</p> <p>OMS Crsfd Ln Htrs B</p>		
<p>(L1)</p> <p>● H2O PUMP LOOP 1 - A</p> <p>● FLASH EVAP CNTLR SEC - GPC (if using Sec Cntrl)</p> <p>● TOP EVAP HTR NOZ R - B AUTO</p> <p>● TOP EVAP HTR DUCT - A(C)</p> <p>If HI LOAD EVAP enabled:</p> <p>● HI LOAD DUCT HTR - A(C)</p>	<p>(L1A2)</p> <p>H2O Loop 1 Pump B</p> <p>4 FES Sec Cntrl man ON Sel capability</p> <p>Top Evap R Noz Htr A</p> <p>Top Evap Duct Fwd,Aft L,R Htrs B</p> <p>Hi Load Duct Outbd,Inbd Htrs B</p>		
<p>(R2)</p> <p>● BLR CNTLR/HTR 1,2 (two) - B</p>	<p>(R2)</p> <p>Hyd H2O Blr 1,2 Cntrl A</p>		
<p>GNC 23 RCS</p> <p>Override F2 Manf status to OP:</p> <p>● RCS FWD - ITEM 1 EXEC</p> <p>● MANF VLVS 2 OVRD - ITEM 41 EXEC</p>	<p>(MA73C)</p> <p>2 Fwd RCS Manf Isol 2 Cntl</p>		
<p>(MA73C:C,D)</p> <p>5 ● cb MCA PWR AC2 3Φ MID 2,4 (two) - op</p>	<p>(MA73C)</p> <p>5 Stbd,Port Rad Lat 1-6 Mtr 2 Limit sw</p>		
<p>For PLBD Ops:</p> <p>● OP/CL Drs in man mode</p>	<p>(MA73C)</p> <p>PLBD:</p> <p>C/L Lat 13-16 Mtr 2</p> <p>Stbd Aft Blkhd Mtr 2</p> <p>Port Drive Mtr 2</p> <p>Port,Stbd Fwd Blkhd Mtr 2</p> <p>Stbd Door Mtr 2</p> <p>Port,Stbd Door Mtr 1 CL Limit sw</p>		
<p>If reqd during entry (< 120K ft):</p> <p>(L1)</p> <p>● NH3 CNTLR B - PRI/GPC</p>	<p>(L1A2)</p> <p>6 NH3 Sys A Pri Cntrl and Auto Swover to Sec Cntrl</p>		

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 P/L H2O LOOP(s)</p>			<p>7 WARNING Driver pwr to F4/F5 Jets lost only if both RJDF 2B and L5/F5/R5 Driver sws (pnl O16:F) OFF simultaneously</p>
<p>BUS ISOLATION (L1) • SMOKE DETN CKT TEST - OFF</p>	<p>(L1A1) Smoke Detn Test capability (all dets)</p>		<p>8 Six vlvs fail to non-isolation position</p>
	<p>7 (O16) RJDF 2B F4/F5 Manf Logic pwr (F4R,F4D,F5L,F5R)</p>		<p>9 Use pb on AFT pnl A6</p>
	<p>8 (O17) TVC 3 Isol ME 4 Isol ME</p>		<p>10 Vlv normally closed. GPC cntl remains</p>
	<p>(R1A2) Man ON Cntl of Cryo O2,H2 Tk 2,4 Htrs B</p>		<p>11 Stow capability remains</p>
	<p>(MA73C) L Vents 1,2,3,4,5,7,8,9 Mtrs 2 R Vents 1,2,4,6,7,8,9 Mtrs 2</p>		<p>12 Redundant mtrs remain</p>
	<p>9 (C3A6) Fwd Pnl Trans X,Y Norm, Pulse, Fwd Pnl Rot Roll, Pitch, Yaw Disc Rate, Accel Pulse Sel capability</p>		
	<p>9 Fwd Pnl Trans Low Z Sel capability</p>		
	<p>9 Fwd Pnl Trans Z High, Norm, Pulse Sel capability</p>		
	<p>9 Fwd Pnl man LVLH Sel capability</p>		
	<p>10 (R2) Pneu He Isol 2 man Cntl (F6A5, F8A5) NLG, LMG, RMG Bkup Rel Sys 1, NLG Pyro Extension Sys 1</p>		
	<p>11 (MA73C) Port, Stbd Rad Mtrs 2 Dpy capability -Y Star Trkr Dr Sys 2 OP/CL capability -Z Star Trkr Dr Sys 1 OP/CL capability L,R ADP Htr Cntlr 2 Deploy Mtrs 2 Deploy Disc 2</p>		
	<p>12 (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</p>		
	<p>(Continued)</p>		

EPS SSR-105 (Cont)
BUS LOSS: CNTLBC3

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(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		⑬ One failure away from EVA to stow MPM or from RMS jettison
13 14 14	(MA73C) Port RMS: MPM Mtr 2 Fwd MRL Mtr 1 Mid MRL Mtr 2		⑭ Single mtr time
15 16 17	(MA73C) KU ANT Sto/Dpy Mtr 2 Sto and Dpy Limit sw Redundant Ku-Bd Xmit Enable Signal Redundant Ku-Bd Boom Stow Enable II Excitation Signal		⑮ With an inoperative limit sw, mtr will continue to run until DPY/STO sw is placed to GND position ⑯ MNC MMC2 pwr for KU-BD Xmit Enable signal remains
			⑰ MNB MMC4 pwr remains to supply pwr to Boom stow. Enable II signal for stow mtrs

**EPS SSR-106
BUS LOSS: CNTLCA1**

ACTIONS	
1	(A12) APU HTR ● GAS GEN/FUEL PUMP 2 - A AUTO ● GAS GEN/FUEL PUMP 3 - B AUTO ● LUBE OIL LINE 3 - B AUTO APU HTR TK/FU LINE/H2O/ ● SYS 2A - AUTO ● 2B - OFF ● 3B - AUTO ● 3A - OFF HYD HTR ● AFT FUS A - AUTO ● B - OFF HYD CIRC PUMP PWR ● 2 - MNB ● 3 - MNA
	(L1) ● H2O PUMP LOOP 2 - ON 1 - GPC ● FLASH EVAP CNTLR PRI A - ON (if using A Cntrl) ● TOP EVAP HTR NOZ R - A AUTO ● TOP EVAP HTR DUCT - A If HI LOAD EVAP enabled: ● HI LOAD DUCT HTR - A(B)
	(L2) ● FLASH EVAP FDLN HTR B SPLY - 1
	(C2) ● L CRT SEL - 1 ● R CRT SEL - 2 ● GPC/CRT 03 EXEC
	(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
	(A14) ● RCS/OMS HTR R POD (two) - A AUTO, B OFF
4	For RCS loss, refer to OMS/RCS Slide Rule Only reconfig following vlv for leak isolation: (O7) ● AFT L RCS He PRESS B TK 1/2 ● XFEED 1/2 ● R RCS TK 1/2 ● XFEED 1/2
	(O8) ● R OMS TK ISOL B ● FWD RCS MANF ISOL 5
	(Continued)

EQUIP/FUNCTION LOST	
	(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 Fu Pump/GG H2O Tank Htrs 8B,9B APU 3 Tk/Fu Ln Htr A APU 3 Fu Pump/GG H2O Htrs 10A,17A,20A,21A,22A Aft Fuselage Htrs B Circ Pump 2 MNC pwr 3 MNC pwr
2	(L1A2) H2O Loop 2 Pump GPC Cntl FES Cntrlr Pri A GPC Sel capability Topping Evap R Noz Htr B Topping Evap Duct L,R Fwd, Aft Htr B,C Hi Load Duct Inbd, Outbd Htrs C
	(L2A1) FES H2O Fdln B Htrs 2 (all)
	(C2A2) DEU/CRT 3
	(R2) Hyd H2O Blr 3 Cntrlr B
	(F6A5) GPC 3,5 engage capability PLT BFS engage capability
	(A14) R Pod Htrs B (all)
	(O7) Aft L RCS He Press Isol B man CL capability Aft L,R RCS Tk Isol 1/2 man CL capability Aft L RCS Manf Isol 3 man Cntl Aft L RCS Manf Isol 5 man CL capability Aft R RCS Manf Isol 3,4 man Cntl Aft L,R RCS Xfeed Vlv 1/2 man CL capability
	(O8) R OMS Tk Isol B man CL capability Fwd RCS Tk Isol 1/2 man Cntl Fwd RCS Manf Isol 3 man Cntl Fwd RCS Manf Isol 5 man CL capability
	(Continued)

CREW INDICATIONS		NOTES
(F7) SM ALERT Light/Tone - on CRT 3 blanks		① TIME CRITICAL If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
(FSMs) S67 CNTL/ESS 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		② PRI A man On Sel capability remains. Pri B and Sec Cntrlr remain
R ADP deploy time Incr from 15 to 30 sec.		③ The wrong FDA limit set is selected by SM preconditioning software due to loss of H2O Loop 2 pump On switch scan
PLB Floodlts lost: Mid Stbd Aft Port Docking		④ Do not reconfig for reg switch or I'CNT procedures
(F7) If APUs active and using BLR CNTLR/HTR 3B: CW APU TEMP It - on after ~ 2 min		
SM (BFS SM 63) PL BAY DOORS		
During PLBD OP/CL, single mtr run time noted on actuators listed at left		
SM 88 APU/ENVIRON THERM		
H2O LOOP 2 PUMP ΔP ↑		
	3	

EPS SSR-106 (Cont)
BUS LOSS: CNTLCA1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>GNC 23 RCS</p> <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 	<p>(A14) Aft RCS L,R Jet 3 Htrs</p>		<p>5 Vlv normally closed</p>
<p>When reqd:</p> <ul style="list-style-type: none"> For FC3, perform FUEL CELL PURGE - AUTO (ORB OPS, EPS) 	<p>5 (R12A1) FC3 Purge Vlv man Cntl</p>		<p>6 Sys B Pri Cntlr, auto switchover to Sec Cntlr remain</p>
<p>Prior to using L OMS: (O8)</p> <p>L OMS He PRESS/VAP ISOL</p> <ul style="list-style-type: none"> A (two) - GPC B (two) - OP, then GPC 	<p>(O8) L OMS He Press Isol A man Cntl, He Vap Isol 1,2 man A Cntl</p>		<p>7 Loss of manual capability to inert LO2 Manf</p>
<p>For SSME Hyd Repress: (R4)</p> <ul style="list-style-type: none"> HYD MPS/TVC ISOL VLV SYS 1,2 - OP, wait 10 sec, then CL 	<p>(R4) MPS/TVC Hyd Sys 3 Isol man Cntl</p>		<p>8 Six vlvs fail to non-isolation position</p>
<p>If reqd during entry (< 120 k ft): (L1)</p> <ul style="list-style-type: none"> NH3 CNTLR A(B) - PRI/GPC 	<p>6 (L1A2) NH3 Sys B Sec Cntlr man On capability</p>		<p>9 Redundant mtr remains</p>
<p>BUS ISOLATION</p>			
<p>(C2)</p> <ul style="list-style-type: none"> CRT3 PWR - OFF 			
<p>(R2)</p> <ul style="list-style-type: none"> MPS He I'CONNECT R - GPC 	<p>(R2) R Eng He Intercon Outlet Vlv man Cntl</p>		
<p>(R4) MPS</p> <ul style="list-style-type: none"> FILL/DRAIN LO2 OUTBD - GND 	<p>7 (R4) Prpl't F/D Outbd LO2 Vlv man Cntl</p>		
<p>(O16:A)</p> <ul style="list-style-type: none"> RGA 3 - OFF 	<p>(O16) RGA 3</p>		
<p>(A7U) PL BAY</p> <ul style="list-style-type: none"> FLOOD AFT PORT - OFF MID STBD - OFF DOCKING - OFF 	<p>8 (O17) ATVC 1 Isol ME</p>		
<p>RMS</p> <ul style="list-style-type: none"> SPOT PORT - OFF 	<p>(A7A1) PLB Floodlts Aft Port Mid Stbd Docking</p> <p>RMS Spot Port</p>		
<p></p>	<p>9 (C3A5) R ADP Dpy Mtr 1 Htr Cntlr 1</p>		
<p></p>	<p>11 (R1A2) FC3 Reac Vlv Cntl</p> <p>12 FC3 STOP capability via START/STOP sw</p>		<p>10 Htr Cntlr 2 remains</p>
<p></p>	<p>(R1A2) Cryo O2,H2 TK1 Htrs A and Tk 3 Htrs B man ON Cntl</p>		<p>11 Vlv holds position</p>
<p></p>	<p>13 (R13A2) PLBD: C/L Lat 1-4, 5-8 Mtrs 2 Port Aft Blkhd Mtr 2</p>		<p>12 FC3 can be stopped via FC3 CNTLR sw (O16:A)</p>
<p></p>	<p>(Continued)</p>		<p>13 Pwr to MCA Drivers lost through ENABLE sw</p>

EPS SSR-106 (Cont)
BUS LOSS: CNTLCA1

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	(A8A2) Port RMS: 14 Fwd MRL Mtr 2 14 Mid MRL Mtr 2 14 Aft MRL Mtr 1		9 Redundant mtr remains
	(L1A2) 15 Freon Loop 2 Cntrl A Rad Byp Vlv Mtr man Cntl		14 Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
	(A6A1) Aft ADI Att ref set capability		
	(O16) 16 RJDF 2A F3 Manf Logic pwr (F3L,F3D,F3U,F3F) 9 R OMS Eng Pr Vlv coil 1 and Cntl Vlv 1,2 Coils 1 (O8) R OMS Eng Purge		15 Cntrls A, B Rad Byp Vlv Mtrs Auto Cntl and Cntrl B Rad Byp Vlv Mtr Man Cntl remain
	(R4) 17 LG Hyd Sys 3 Isol man Cntl (F6A5, F8A5) LG Dump Vlv (Vlv N.C.), LG Cntl Vlv NWS (O6) 9 -Z Star Trkr Dr Sys 2 OP/CL capability		16 <div style="border: 1px solid black; padding: 2px; display: inline-block;">WARNING</div> Driver pwr to F3 Jets lost if RJDF 2A Driver sw OFF (O16:F)
	(R13A2) Rad Cntl Sys: Stbd Rad Lat 7-12 Mtr 2 Port Rad Dpy/Sto Mtr 2		17 Lost Hyd deploy capability for all Ldg Grs. Pyro.Backup Release Sys will deploy Ldg Grs
	(R2) 9 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		18 Mtr 2 remains
	(R13A2) 18 KU ANT Sto/Dpy Mtr 1 Direct Sto Mtr 1		19 Redundant stow initiate sig (CNTL BC1) to Ku-Band remains
	(R13A2) 19 Redundant Sto Initiate Signal to Ku-Band		20 MCC ON Cntl available. Off Cntl OK via Master Pwr sw
	(O17) 20 FCL 1 Coldplate Flow Rate Sig Condr FCL 2 Coldplate Flow Rate Sig Condr Crew ON Cntl of TAGS		21 Redundant pwr sply remains
	(R2) 21 OV102 only APU 1 Cntrl Pwr Sply A 2 Cntrl Pwr Sply B 22 2 Fu Tk Vlv B 22 3 Fu Tk Vlv A		22 Vlv fails closed. Redundant vlv remains
	(R2) 22 All except OV102 APU 1 Fu Tk Vlv A		
	(O17) Aft PL MNC current transducer		

**EPS SSR-107
BUS LOSS: CNTLCA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12)</p> <ul style="list-style-type: none"> ● APU HTR GAS GEN/FUEL PUMP 3 - B AUTO ● APU HTR TK/FU LINE/H2O/ ● SYS 2A - AUTO ● 2B - OFF ● 3A - OFF ● 3B - AUTO ● HYD CIRC PUMP PWR 3 - MNA 	<p>(A12)</p> <ul style="list-style-type: none"> ● APU 3 GG/Fu Pmp Htrs A ● 2 Tk/Fu Ln Htrs B ● 2 Fu Pump/GG H2O Htr 14B ● 3 Tk/Fu Ln Htrs A ● 3 GG Inj H2O Htrs 3A,23A <p>(R2)</p> <ul style="list-style-type: none"> ● Circ Pump 3 MNC pwr 	<p>MASTER ALARM Light/Tone - on</p> <p>(F7)</p> <ul style="list-style-type: none"> ● SM ALERT Light/Tone - on ● C/W FREON LOOP It - on ● C/W RCS JET It - on ● CRT 4 blanks <p>(FSMs)</p> <ul style="list-style-type: none"> ● S67 CNTL/ESS ● S67 DISPLAY SW A (2) ● S88 EVAP OUT T 1,2 ● F RCS D(L,R) JET ● I/O ERROR CRT4 ● S88 THERMAL FRN <p>SM 67 ELECTRIC</p> <p>CNTL CA2 < 20 V</p> <p>During Rad Dpy/Sto ops: (R13L)</p> <ul style="list-style-type: none"> ● RAD CNTL PORT tbs (two) indicate single motor ops <p>RADP deploy time incr from 15 to 30 sec</p> <p>STAR TRKR DR POS -Z CL time incr from 8 to 16 sec</p> <p>If APUs active and using BLR CNTLR/HTR 3B: C/W APU TEMP It - on after ~2 min</p> <p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	<p>① 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 If FES Cntrl Pri A in ON position and cooling by FES only</p> <p>③ Indications do not appear until jets commanded</p> <p>④ If GPC commands CRT</p> <p>⑤ Pri A GPC Sel capability remains. Pri B and Sec Cntrls remain</p>
<p>(R1)</p> <ul style="list-style-type: none"> ● O2,H2 MANF VLV TK1,2 (four) - OP 			
<p>(R1)</p> <ul style="list-style-type: none"> ● O2,H2 TK1,2 HTRS A (four) - OFF ● O2,H2 TK1,2 HTRS B (four) - AUTO 	<p>(R1A2)</p> <ul style="list-style-type: none"> ● Cryo O2,H2 Tk 1 Htrs A 		
<p>If three or more CRYO TK sets and TK3 not depleted:</p> <p>(R1)</p> <ul style="list-style-type: none"> ● O2,H2 TK3 HTRS A (two) - AUTO ● O2,H2 TK3 HTRS B (two) - OFF 	<p>(R1A2)</p> <ul style="list-style-type: none"> ● Cryo O2,H2 Tk 3 Htrs B 		
<p>If four or more CRYO TK sets and TK4 not depleted:</p> <p>(A11)</p> <ul style="list-style-type: none"> ● CRYO TK4 HTR O2,H2 A (two) - AUTO ● CRYO TK4 HTR O2,H2 B (two) - OFF (if OV-102, refer to ECLS 6.3 CRYO TABLE A for switch nomen) 			
<p>(R2)</p> <ul style="list-style-type: none"> ● BLR CNTLR/HTR 3 - A 	<p>(R2)</p> <ul style="list-style-type: none"> ● Hyd H2O Blr 3 Cntrl B 		
<p>(L1)</p> <ul style="list-style-type: none"> ● FLASH EVAP CNTLR PRI A - OFF ● FLASH EVAP CNTLR PRI B - ON (if reqd) ● TOP EVAP HTR DUCT - A(B) <p>If HI LOAD EVAP enabled:</p> <ul style="list-style-type: none"> ● HI LOAD DUCT HTR - A(B) 	<p>(L1A2)</p> <ul style="list-style-type: none"> ● FES Cntrl Pri A man ON Sel capability <p>Topping Evap Duct Fwd, Aft Htrs C</p> <p>Hi Load Duct Inbd, Outbd, Noz Htrs C</p>		
<p>(C2)</p> <ul style="list-style-type: none"> ● GPC/CRT 04 EXEC 	<p>(R12A2)</p> <ul style="list-style-type: none"> ● DEU/CRT 4 		
(Continued)	(Continued)		

**EPS SSR-107 (Cont)
BUS LOSS: CNTLCA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>6 For RCS loss, refer to OMS/ RCS Slide Rule Only reconfig following vlv for leak isolation: (O7)</p> <ul style="list-style-type: none"> • AFT L,R RCS TK 1/2 • XFEED 1/2 • R RCS MANF 5 	<p>(O7) AFT L RCS: Manf Isol 4 man Cntl Tk Isol 1/2 man CL capability Manf Isol 5 man Cntl and GPC CL capability He Press Isol B man Cntl, GPC CL capability Xfeed vlv 1/2 man CL capability AFT R RCS: Manf Isol 5 man CL capability 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 Ovr of GPC CL capability Manf Isol 4 man Cntl Manf Isol 5 man Cntl and GPC CL capability</p>		<p>6 Do not reconfig for reg switch or I'CNT procedures</p> <p>7 Vlv normally closed</p> <p>8 Manf status not automatically declared closed. Jet fail-offs may occur</p> <p>9 RM sw down-modes to 2-level for -X position</p>
<p>When reqd: • Perform FC3 purges in AUTO mode (ORB OPS)</p>	<p>7 (R12A1) FC3 Purge Vlv man Cntl</p>		
<p>(L4:E) • cb AC2 ΦA,ΦB,ΦC L ENG- op • cb AC3 ΦA,ΦB,ΦC L ENG- op</p>			
<p>(A6U) • ADI ATT - LVLH • ERR - MED • RATE - MED</p>	<p>(A6A1) Aft ADI capability: Att Sel Error Scale Sel Rate Scale Sel Att ref set</p>		
<p>(A14) RCS/OMS HTR • R POD (two) A - AUTO, B - OFF</p>	<p>(A14) R Pod B Htrs (partial)</p>		
<p>GNC 23 RCS 8 Override F3 Manf status to CL: • RCS FWD - ITEM 1 EXEC • OVRD MANF VLVS STAT 3 - ITEM 42 EXEC</p>	<p>(O16) RCS Manf F3 RJD pwr (F3L,F3D,F3U,F3F)</p>		
<p>(A6U) If SENSE -- -Z: • SENSE -- -X • Wait at least 1 sec, then reposition as desired</p>	<p>9 (A6A1) 3-level sw RM for -X Sense</p>		
<p>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</p>	<p>(A14) Aft RCS L,R Jet 4 Htr</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

**EPS SSR-107 (Cont)
BUS LOSS: CNTLCA2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>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</p> <p>For SSME Hyd Repress: (R4) • HYD MPS/TVC ISOL VLV SYS 1,2 - OP, wait 10 sec, then CL</p> <p>If reqd during entry (< 120 k ft): (L1) • NH3 CNTLR A(B) - PRI/GPC</p>	<p>(F8A7) 10 R Trim RHC - INH capability 10 PNL - ON capability</p> <p>(C3A1) 10 R Bdy Flp - UP/DN capability</p> <p>(R4) MPS/TVC Hyd Sys 3 Isol man Cntl</p> <p>(L1A2) 11 NH3 Sys A Sec Cntrlr man ON capability</p>		<p>10 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)</p> <p>11 SYS A Pri Cntrlr, auto switchover to Sec Cntrlr remain</p> <p>12 Redundant mtrs remain</p> <p>13 Vlv holds position</p> <p>14 FC3 can be stopped via FC3 CNTLR sw (pnl O16:A)</p> <p>15 Htr Cntrlr 2 remains</p> <p>16 Use pbs at pnl C3</p> <p>17 Redundant coils remain</p> <p>18 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison</p>
<p>BUS ISOLATION</p>			
<p>(F3) • TRIM RHC - ENA • PNL - OFF</p>	<p>(O6) 12 -Z Star Trkr Dr Sys 2 CL capability</p>		
<p>(R12L) • CRT4 PWR - OFF</p>	<p>(C3A1) Left ME man shutdn cmd B</p>		
	<p>(R1A2) 13 FC3 Reac Vlv Cntl</p>		
	<p>14 FC3 STOP capability via START/STOP sw</p>		
	<p>(C3A5) 12 R ADP Dpy Mtr 1</p>		
	<p>15 Htr Cntrlr 1</p>		
	<p>(A6A1) 16 Aft Panel Trans X,Y, Norm, Pulse, Rot Roll, Pitch, Yaw Disc Rate, Accel and Pulse Sel capability</p>		
	<p>16 Aft Pnl Trans Z High, Norm Pulse Sel capability</p>		
	<p>16 Aft Pnl Trans Low Z Sel capability</p>		
	<p>16 Aft Pnl man LVLH Sel capability</p>		
	<p>(O16) 17 R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coil 2</p>		
	<p>(O8) R OMS Eng Purge</p>		
	<p>(F6A5,F8A5) NLG Ext Sys 1 NLG,LMG,RMG Bkup Rel Sys 1</p>		
	<p>(R13A2) Rad Cntl Sys: Port RAD Lat 7-12 Mtr 2 Dpy/Sto Mtr 2</p>		
	<p>18 Port RMS MPM Mtr 1</p>		
	<p>(Continued)</p>		

EPS SSR-107 (Cont)
BUS LOSS: CNTLCA2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	12 (R2) 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		12 Redundant mtrs remain 19 Mtr 2 remains 20 Redundant pwr sply remains 21 Vlv closed. Redundant vlv remains 22 Pwr to MCA Drivers lost through ENABLE sw
	19 (R13A2) KU Ant Sto/Dpy Mtr 1 Direct Sto Mtr 1		
	20 (R2) <u>All except OV102</u> APU 2 Cntl Pwr Sply B 21 Fu Tk Vlv A		
	22 (R13A2) PLBD: C/L Lat 9-12 Mtr 2 13-16 Mtr 1 Stbd Aft Bikhd Mtr 1 Port Door Mtr 1		

**EPS SSR-108
BUS LOSS: CNTLCA3**

(Includes MNC FMC3, MNC MMC2, MNC MMC4, MNC AMC3)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(A12) APU HTR 2 • GAS GEN/FUEL PUMP 3 - A AUTO • LUBE OIL LINE 3 - A AUTO APU HTR TK/FU LINE/H2O/ 2 • SYS 2A - AUTO 2 • 2B - OFF 2 • SYS 3B - AUTO 2 • 3A - OFF HYD CIRC • PUMP PWR 3 - MNC</p>	<p>(A12) APU 3 GG/Fu Pump Htrs B APU 3 Lube Oil Ln Htr B APU 2 Tk/Fu Ln Htr B APU 2 Fu Pump/GG H2O Htr 15B APU 3 Tk/Fu Ln Htr A APU 3 Fu Pump/GG H2O Htr 13A Hyd Circ Pump 3 MNA pwr</p>	<p>1 MASTER ALARM Light/Tone - on (F7) 1 C/W RCS JET It - on SM ALERT Light/Tone - on (FSM) 1 S67 CNTL/ESS V F RCS D(L,R) JET RCS PWR FAIL SM 67 ELECTRIC CNTL CA3 Volts < 20 (O8) 3 FWD RCS TK ISOL 1/2 tb - bp 3 FWD RCS MANF ISOL 3,4 tb - bp (L1) 4 RAD BYP VLV 1 tb - bp 4 FLOW PROP VLV LOOP 2 tb - bp (F8) APU 3 FUEL QTY % inaccurate (displays H2O qty) 5 (R13L) RAD CNTL (two) 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 If APUs active, using BLR CNTLR/HTR 2A or 3A: C/W APU TEMP It - on after ~ 2 min</p>	<p>① Indications do not appear until jet commanded ② TIME CRITICAL* If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp ③ Vlv holds position ④ Vlv ops not affected 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 ⑥ Manf status not automatically declared closed. Jet fail-offs may occur</p>
<p>(R1) • O2,H2 MANF VLV TK1,2 (four) - OP</p>			
<p>(R1) • O2,H2 TK1,2 HTRS A (four) - AUTO • O2,H2 TK1,2 HTRS B (four) - OFF</p>	<p>(R1A2) Cryo O2,H2 Tk2 Htrs B</p>		
<p>If four or more CRYO TK sets and TK 3,4 not depleted: (R1) • O2,H2 TK3 HTR A (two) - AUTO • O2,H2 TK3 HTR B (two) - OFF (A11) • CRYO TK4 HTR O2,H2 A (two) - AUTO • CRYO TK4 HTR O2,H2 B (two) - OFF (if OV-102, refer to ECLS 6.3 CRYO TABLE A for switch nomen)</p>	<p>(R1A2) Cryo O2,H2 Tk4 Htrs B</p>		
<p>(R2) • BLR CNTLR/HTR 2 - B 3 - B</p>	<p>(R2) Hyd H2O Blr 2 Cntrl A 3 Cntrl A</p>		
<p>For RCS loss, refer to OMS/RCS Slide Rule</p>	<p>3 (O7) Aft R RCS Manf Isol 5 man Cntl and GPC CL capability (MA73C) 3 Fwd RCS Tk Isol 1/2 Cntl Manf Isol 4 Cntl Manf Isol 3 Cntl</p>		
<p>GNC 23 RCS</p>	<p>(O16) RCS Manf F4 RJD pwr (F4R,F4D)</p>		
<p>6 Override F4 Manf status to CL: • ITEM 1,43 EXEC</p>			
<p>(MA73C:C,D) 5 • cb MCA PWR AC3 MID 2,4 (two) - op</p>	<p>5 (MA73C) Stbd, Port Rad Lat 7-12 Mtr 2 Limit sw</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-108 (Cont)
BUS LOSS: CNTLCA3

ACTIONS
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: <ul style="list-style-type: none"> HI LOAD DUCT HTR - A(B)

BUS ISOLATION
(F8) <ul style="list-style-type: none"> APU FUEL/H2O QTY - H2O

EQUIP/FUNCTION LOST
(MA73C) Port, Stbd Rad Dpy/Sto Mtrs 2 PLBD: C/L Lat 1-4, 5-8, 9-12 Mtrs 2 13-16 Mtr 1 Port Aft Bikhdr Mtr 2 Stbd Aft Bikhdr Mtr 1 Port Door Mtr 1 Stbd Door Mtr 2 CL Limit sw
(L1A2) Topping Evap Duct Fwd Aft Htrs C Hi Load Duct Outbd Inbd Noz Htrs C
(F8A8) APU 3 Fuel Qty display
(A14) Aft RCS L,R Jet 5 Htrs
(F6A5, F8A5) LG Dump Vlv (Vlv N.C), Cntl Vlv NWS
(MA73C) -Z Star Trkr Dr Sys 2 OP/CL capability R ADP Deploy Mtr 1 Deploy Dsc 1 Htr Cntlr 1
(MA73C) LH Vents 1, 2, 3 Mtrs 1 Vent 6 Mtr 2 RH Vents 4, 7, 8, 9 Mtrs 1 Vent 3 Mtr 2 Vent 5 Mtr 2
(MA73C) ET Door Mtrs: C/L Lat Actr 2 Mtr 2 GPC Cntl L Dr Closure Mtr 2 GPC CL capability R Dr Closure Mtr 1 GPC CL capability R Dr Uplock Lat Mtr 1 GPC Lat capability
(MA73C) AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1
(MA73C) Port RMS: MPM Mtr 1 Fwd MRL Mtr 2 Aft MRL Mtr 1
(Continued)

CREW INDICATIONS	NOTES
SM (BFS SM 63) PL BAY DOORS If in <u>AUTO</u> OP/CL for PLBDs, sequence terminates immediately and msg '(S63) PBD CONFIG'	7 APU 3 Qty meter (pnl F8) displays H2O qty when in FUEL position
During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left	8 Lost Hyd deploy capability for all Ldg Grs. Pyro Backup Release Sys will deploy Ldg Grs
(A8L) PORT RMS: DPY/STO tb - bp R-F-L AFT tb - bp RETEN LAT tb - bp	9 Mtr 2 remains
	10 Htr Cntlr 2 remains
	11 Redundant mtrs remain
	12 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison

**EPS SSR-108 (Cont)
BUS LOSS: CNTLCA3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	13 (MA73C) KU ANT Sto/Dpy Mtr 1 Limit sw and Stow capability		13 With an inop limit sw, mtr will continue to run until primary sw returned to GND
	14 (MA73C) Redundant KU-BD Xmit Enable Signal		14 MNC MMC2 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
	16 (R2) All except OV102 APU 3 Cntrl pwr Sply A 17 3 FU Tk Vlv A		16 Redundant pwr sply remains
			17 Vlv closed. Redundant vlv remains

**EPS SSR-109
CONTROL BUS - PANEL WIRING MATRIX**

CNTL BUS PANEL	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
F2 (OV102)	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		
F4 (OV102)						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	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
A7A2 (OV102)									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

* NOT ON OV102

NOTE

This table shows the control bus and the "daisy-chained" panels that make up that particular control bus

**EPS AC
SSR 110-148**

**EPS SSR-110
BUS LOSS: AC1** (Includes all AC1 sub-buses)

EPS AC
SSR 110-148

ACTIONS	
1	<ul style="list-style-type: none"> Perform FC1 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then:
	(R2) <ul style="list-style-type: none"> BLR CNTLR/HTR 1 - A 3 - B
	(L1) <ul style="list-style-type: none"> HUMIDITY SEP A - OFF √B - ON IMU FAN A - OFF B(C) - ON H2O PUMP LOOP 1 (two) - ON, B H2O PUMP LOOP 2 - OFF
	(L1) <ul style="list-style-type: none"> 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
5	<ul style="list-style-type: none"> Maintain LIOH canister(s) change out per cue card and CAP During sleep periods: <ul style="list-style-type: none"> (L1)
6	<ul style="list-style-type: none"> CAB FAN (two) - ON
	(R13U) <ul style="list-style-type: none"> C/W PARAM SEL tw (three) - 033,115,074, 092, 062 C/W PARAM - INH MEM - CLEAR C/W PARAM SEL tw (three) - > 119
8	
9	<div style="border: 1px solid black; padding: 2px;">SM 60 SM TABLE MAINT</div> <ul style="list-style-type: none"> Inhibits 0612705, 0612700, 0612740, 0612710
	(WCS) <ul style="list-style-type: none"> FAN SEP - 2 HOSE BLOCK - SEP 2
	If CAB TEMP CNTLR 2 active: <ul style="list-style-type: none"> (L1) CAB TEMP CNTLR - OFF
	(MD44F) <ul style="list-style-type: none"> Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR
	(L1) <ul style="list-style-type: none"> CAB TEMP CNTLR - 1
	(Continued)

EQUIP/FUNCTION LOST	
	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 Cond
3	H2O Loop 2 Byp Vlv pwr 2 Pump GPC Cntl 1 Pump A
	Av Bay 1 Fan A
4	Av Bay 2 Sig Cond, Xdcrs (ECLS SC3) Av Bay 3 Fan B
	Freon Loop 1 Pump A 2 Pump B
7	Cabin Air S/C (ECLS SC6)
	WCS Fan/Sep 1
10	Cabin Temp Cntrl 2, Hx Byp Vlv Mtr 2
	(Continued)

CREW INDICATIONS		NOTES
MASTER ALARM Light/Tone - on		<div style="border: 1px dashed black; padding: 5px; display: inline-block;"> ① TIME CRITICAL </div> <p>FC1 must be shut-down within 9 min to avoid potentially hazardous condition</p> <p>② H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</p> <p>③ H2O Loop 2 Byp vlv holds position</p> <p>④ Av Bay 2 Fan ΔP, Air Out Temp snrs lost</p> <p>⑤ Crew and gnd have lost POCO2 Xdcr</p> <p>⑥ Use streamers (if flown) or monitor by feel during wake period</p> <p>⑦ CO2 partial Press and Cabin Fan ΔP snrs lost</p> <p>⑧ Inhibits Primary C/W for AC1 Voltage, CAB Fan ΔP, H2O Loop 2 Pump P, FC1 stack Temp, FC1 Cool Pump ΔP</p> <p>⑨ Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively</p> <p>⑩ Lose Auto Temp Cntl via Cntl 2 and H2O Loop 2 Cabin Hx In Temp Snsr. Hx Byp Vlv holds position</p>
(F7) EVENT TIME ind blank C/W FC PUMP It - on C/W AC VOLT It - on C/W FREON LOOP It - on C/W AV BAY/CAB AIR It - on C/W H2O LOOP It - on SM ALERT Light/Tone - on		
(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 APU/HYD HYD S86 APU/HYD W/B SMO THRM HYD (B) S66 AV BAY FAN S66 CABIN FAN S69 FC PUMP 1 S88 FREON FLOW 1 S88 H2O PUMP P2 S88 THERMAL FRN (2) S88 THERMAL H2O (2)		
(R1) FC1 COOL PUMP ΔP tb - bp		
(F8) 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 PUMP LOOP 1 and A active: 'S88 H2O PUMP P 1'		
(O1) H2O PUMP OUT PRESS LOOP 1 ind - 20-25 psia		
If HUM SEP A ON: 'S66 CABIN' (2)		
(Continued)		

EPS SSR-110 (Cont)
BUS LOSS: AC1

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For OMS/RCS Vlv loss, refer to OMS/RCS Slide Rule (use FPC1 Slide for Aft RCS and FMC1 Slide for Fwd RCS)	11 Fwd RCS Tk Isol 3/4/5 Cntl 11 Manf Isol 1 Cntl 11 Aft Pod Gp 1 Vlv Mtrs: L,R OMS Tk Isol A L OMS Xfeed Vlv A L,R Aft RCS Xfeed Vlv 3/4/5 Tk Isol 3/4/5A Manf Isol 2	If IMU FAN A ON: 'S66 CABIN IMU'	11 Vlv holds position
BUS ISOLATION		If APUs active and using H2O BLR CNTLR/HTR 1B or 3A, then C/W APU TEMP It - on after ~ 2 min	12 Redundant mtr remains
(MA73C:C) cb MCA PWR • AC1 3 Φ FWD 1 - op • MID 1 - op	12 AC1 FMC1 Bus pwr RH Vent 1,2 Mtr 1 -Y Star Trkr Dr Sys 1 OP/CL capability 12 L ADP Dpy Mtr 1 AC1 MMC1 Bus pwr RH Vents 3,5,6 Mtrs 1 PL Reten Sys A Rel/Lat Mtrs Port Rad Lat 1-6, 7-12 Mtrs 1 Port Rad Dpy/Sto Mtr 1 PLBD: C/L Lat 9-12 Mtr 1 Port, Stbd Fwd Blkhd Mtrs 1 Stbd Door Mtr 1	STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec	13 Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
(MA73C:D) cb MCA PWR • AC1 3 Φ MID 3 - op • AFT 1 - op	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	L ADP deploy time incr from 15 to 30 sec	
(MA73C:E) • cb AC1 WCS FAN SEP 1 (three) - op		If Freon Loop 2 pump B on: 'S88 FREON FLOW 2' (O1) FREON FLOW LOOP 2 ind - 578 pph	
(MA73C:F) cb AC1 • RMS PRI ΦA - op • OPS INST HYD ACTR ΦC - op	13 Port RMS: Mid MRL Mtr 1 Aft MRL Mtr 2 D&C Primary Itg Shldr Brace release Ops Hyd Actr Instr	<div style="border: 1px solid black; padding: 2px;"> SM (BFS SM 63) PL BAY DOORS </div> During PLBD OP/CL, single mtr run time noted on actuators listed at left	
(MA73C:H,I) • cb AC1 FWD RCS VLV (three) - op • cb AC1 AFT POD VLV GP 1 (three) - op		During Rad Dpy/Sto ops, (R13L) RAD CNTL tbs (four) indicate single mtr ops	
(L4:A-E) • cb UTIL PWR F1/MO52J AC1 - op cb AC1 • FC1 PUMPS (three) - op • CTR ENG (three) - op • R ENG (three) - op	AC1 Util pwr (F1/MO52J) Ctr ME Cntrl A R ME Cntrl B		
(L4:F-J) cb AC1 • 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 (Continued)	(Continued)		

EPS SSR-110 (Cont)
BUS LOSS: AC1

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:K) cb AC1 ● ΦA H2O CNTLR 2 - op ● ΦB CAB AIR S/C - op			⑫ Redundant mtr remains
(L4:L) cb AC1 ● ΦA CAB T CNTLR 2 - op ● ΦB AV BAY 2 S/C - op			⑭ Bypass vlvs hold position and Cntrl A Rad Byp Vlv Mtrs remain
(L4:M,N) cb AC1 ΦA, ΦB, ΦC ● FREON LOOP 1 PUMP A (three) - op ● FREON LOOP 2 PUMP B (three) - op			⑮ ✓MCC for total OMS Qtys. Aft Qtys are found on <div style="border: 1px solid black; padding: 2px; display: inline-block;">GNC SYS SUMM 2</div>
(L4:O) cb AC1 ● ΦA BLR HYD BYP 1B - op ● ΦB HYD QTY 1 - op ● ΦC BLR HYD BYP 3A - op	Hyd Rsvr 1 Qty Snsr		
(L4:P) cb AC1 ● ΦA RAD CNTLR 1B - op ● ΦB RAD CNTLR 2B - op ● ΦC TACAN 1 - op	14 Freon Loop 1 Cntrl B Rad Byp Vlv Mtr 2 Cntrl B Rad Byp Vlv Mtr Tacan 1		
(L4:Q) cb AC1 ● ΦA LTG PNL L/CTR - op ● ΦB LTG PNL L OVHD - op ● ΦC LTG INST OS - op	Pnl Its L/Ctr Pnl Its L/OH (pnls 05,06,07, 013,014,015) Orbit Sta Instr Its		
(L4:R) cb AC1 ● ΦA LG INST R - op ● ΦB NUMERIC FWD - op	15 Inst Its R Numeric Its (pnls 03,F7) (RCS/OMS Prplt Qty, Gauge, Mission and Event Timers)		
	LH Vents 4,7,5,6 Mtrs 1 Stbd Rad 1 Lat 1-6,7-12 Mtrs 1 Stbd Rad Dpy/Sto Mtr 1		
	12 ET Door Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1		

**EPS SSR-111
BUS LOSS: AC1 Φ A**

ACTIONS	
(L1) H2O	<ul style="list-style-type: none"> • PUMP LOOP 1 (two) - ON, B • PUMP LOOP 2 - OFF FREON • PUMP LOOP 1 - B • 2 - A
(R2)	<ul style="list-style-type: none"> • BLR CNTLR/HTR 1 - A
3	<div style="border: 1px solid black; padding: 2px;">SM 60 SM TABLE MAINT</div> <ul style="list-style-type: none"> • Inhibit 0612705, 0612700, 0612740, 0612710
	If CAB TEMP CNTLR 2 active: (L1)
	<ul style="list-style-type: none"> • CAB TEMP CNTLR - OFF
	(MD44F)
	<ul style="list-style-type: none"> • Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR
	(L1)
	<ul style="list-style-type: none"> • CAB TEMP CNTLR - 1
	(R13U)
5	<ul style="list-style-type: none"> • CW PARAM SEL tw (three) - 033,115 • CW PARAM - INH • CW MEM - CLEAR • CW PARAM SEL tw (three) - > 119
	(WCS)
	<ul style="list-style-type: none"> • FAN SEP - 2 • HOSE BLOCK - SEP 1
	(MO52J)
	<ul style="list-style-type: none"> • Unpwr Food Warmer if connected to AC1 UTIL PWR Outlet
6	If bus shorted:
	<ul style="list-style-type: none"> • Open all AC1 ΦA cbs that pwr 3Φ loads on pnl L4 (10 cbs), MA73C (4cbs) • Open all AC1 3Φ ganged cbs on pnl L4:B (1 cb), MA73C:C,D (4cbs)
7	If bus not shorted:
	<ul style="list-style-type: none"> • Perform the following BUS ISOLATION steps
7	BUS ISOLATION
	(L4:K)
	<ul style="list-style-type: none"> • cb AC1 ΦA H2O CNTLR 2 - op
	(L4:L)
	<ul style="list-style-type: none"> • cb AC1 ΦA CAB T CNTLR 2 - op
	(Continued)

EQUIP/FUNCTION LOST	
1	H2O Loop 2 Byp Cntrl, Sig Condr, Byp Vlv pwr 1 Φ of H2O Loop 2 Pump GPC Cntrl pwr 1 Φ of H2O Loop 1 Pump A 1 Φ of Freon Loop 1 Pump A 2 Pump B
	Hyd H2O Blr 1 Cntrl B
4	Cabin Temp Cntrl 2, Hx Byp Vlv Mtr 2
	1 Φ of WCS Fan/Sep 1
	1 Φ of AC1 Utility pwr
	(Continued)

CREW INDICATIONS	NOTES
MASTER ALARM Light/Tone - on	① H2O Loop 2 Byp Vlv holds position and H2O Loop 2 Pump Out Press, Pump Δ P Accum Qty, Pump Out Temp snrs lost
(F7) CW AC VOLT It - on CW H2O LOOP It - on SM ALERT Light/Tone - on	
(F9) AC1 Φ A AC volts < 90	② If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger CW
(LIGHTS LOST) Instr lts R (pnl C2, F8,F9) Pnl lts L/Ctr (pnl L1,L2,L4, C2,C3,F2,F6,F7)	③ Inhibits H2O Loop 2 Pump Δ P, Pump Out Press, Pump Out Temp, and Accum Qty, respectively
(FSMs) S67 AC VOLTS 1 S88 H2O PUMP P 2 S88 THERMAL H2O (2)	
(O1) H2O PUMP OUT PRESS LOOP 2 ind - 0 psia	④ Lose Auto Temp Cntl via Cntrl 2 and H2O Loop 2 Cabin Hx In Temp snsr. Hx byp Vlv holds position
If H2O PUMP LOOP 1, A active: 'S88 H2O PUMP P 1' (O1) H2O PUMP OUT PRESS LOOP 1 ind - 40-45 psia	⑤ Inhibits Primary CW for AC1 voltage and H2O Loop 2 Pump P
If IMU FAN A ON: 'S66 CABIN IMU' (2)	⑥ 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: SSRs 114, 115, 116, 117
If HUM SEP A ON: 'S66 CABIN' (2)	
If APUs active, and using BLR CNTLR/HTR 1B: CW APU TEMP It - on after ~ 2 min	⑦ For unshorted bus, perform single Φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases

**EPS SSR-111 (Cont)
BUS LOSS: AC1 ΦA**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:O) ● cb AC1 ΦA BLR HYD BYP 1B - op			8 Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains
(L4:P) ● cb AC1 ΦA RAD CNTLR 1B - op	8 Freon Loop 1 Cntrl B Rad Byp Vlv Mtr		
(L4:Q) ● cb AC1 ΦA LTG PNL L/CTR - op	Pnl Its L/Ctr (pnls L1,L2,L4,C2, C3,F2,F6,F7)		
(L4:R) ● cb AC1 ΦA INST R - op	Instr Its R (pnls C2,F8,F9)		
(MA73C:F) ● cb AC1 RMS PRI ΦA - op	Port RMS Shldr Brace Release D&C Primary Itg 1Φ of Mid MRL Mtr 1 1Φ of Aft MRL Mtr 2		
	Ctr ME Cntrl Ch A R ME Cntrl Ch B		
	FC1 pH Snsr		

**EPS SSR-112
BUS LOSS: AC1 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) ● H2O PUMP LOOP 2 - ON ● H2O PUMP LOOP 1 (two) - GPC, B ● AV BAY 2 FAN (two) - ON ● FREON PUMP LOOP 1 - B 2 - A	1Φ of H2O Loop 2 Pump GPC Cntrl pwr 1Φ of H2O Loop 1 Pump A	MASTER ALARM Light/Tone - on	1 If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W
3 ● Maintain LIOH canister(s) changeout per cue card and CAP During sleep periods: (L1)	2 Av Bay 2 Sig Condr, Xdcrs (ECLS SC3) 1Φ Freon Loop 1 Pump A 2 Pump B	(F7) C/W AC VOLT It - on C/W AV BAY/CAB AIR It - on SM ALERT Light/Tone - on	2 Av Bay 2 Fan ΔP, Air Out Temp snsrs lost
4 ● CAB FAN (two) - ON		(F7) EVENT TIME ind blank	3 Crew and grd have lost POCO2 xdr
(R13U) ● C/W PARAM SEL tw (three) - 033,074 ● C/W PARAM - INH ● C/W MEM - CLEAR ● C/W PARAM SEL tw (three) - > 119	4 Cab Air Sig Cond 5 (ECLS SC6)	(F9) AC1 ΦB volts < 90	4 Use streamers (if flown) or moni- tor by feel during wake period
(WCS) ● FAN SEP - 2 ● HOSE BLOCK - SEP 2		(LIGHTS LOST) Pnl Its L/OH (pnls O5, O6, O7,O13,O14,O15) Numeric Its (pnls O3,F7)	5 CO2 partial Press and Cabin Fan ΔP snsrs lost
7 If bus shorted: ● Open all AC1 ΦB cbs that pwr 3Φ loads on pnls L4 (10 cbs), MA73C:C,D (4 cbs) ● Open all AC1 3Φ ganged cbs on pnls L4:B (1 cb), MA73C:C,D (4 cbs)	1Φ of WCS Fan/Sep 1	(FSMs) S67 AC VOLTS 1 S86 APU/HYD HYD S66 AV BAY FAN S66 CABIN FAN	6 Inhibits Primary C/W for AC1 voltage and Cabin Fan ΔP
(Continued)	(Continued)	(F8) HYD QTY 1 - 0%	7 Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the follow- ing SSRs for func- tions lost and crew indications caused by unpowering sub- buses: SSRs 114, 115, 116, 117
		(O1) AIR TEMP AV BAY 2 - 45 degF	
		(O3) RCS/OMS PRPLT QTY Gage and MSN TIME ind blank	
		(Continued)	

EPS SSR-112 (Cont)
BUS LOSS: AC1 ΦB

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
	Port RMS: 1Φ of Mid MRL Mtr 1 1Φ of Aft MRL Mtr 2	If H2O PUMP LOOP 1,A active: H2O LOOP C/W It 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2) (O1) H2O PUMP OUT PRESS LOOP 1 - 40-45 psia	1 If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W
8 If bus not shorted: • Perform the following BUS ISOLATION steps			8 For unshorted bus, perform single Φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases
(L4:K) • cb AC1 ΦB CAB AIR S/C - op			
(L4:L) • cb AC1 ΦB AV BAY 2 S/C - op			
(L4:O) • cb AC1 ΦB HYD QTY 1 - op	Hyd Rsvr 1 Qty Snsr		9 Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains
(L4:P) • cb AC1 ΦB RAD CNTLR 2B - op	9 Freon Loop 2 Cntrl B Rad Byp Vlv Mtr		10 ✓MCC for total OMS Qtys. Aft Qtys are found on
(L4:Q) • cb AC1 ΦB LTG PNL LOVHD - op	Pnl Its L/OH (pnls O5,O6,O7, O13,O14,O15)		GNC SYS SUMM 2
(L4:R) • cb AC1 ΦB NUMERIC FWD - op	10 Numeric Its (pnls O3,F7) (OMS Prplt Qty, Gage, Mission and Event timers)		
	Ctr ME Cntrl Ch A R ME Cntrl Ch B		

**EPS SSR-113
BUS LOSS: AC1 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(R2) ● BLR CNTLR/HTR 3 - B</p>	<p>Hyd H2O Blr 3 Cntrl A</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>(L1) ● H2O PUMP LOOP 2 - ON</p> <p>● H2O PUMP LOOP 1 (two) - GPC, B ● FREON PUMP LOOP 1 - B 2 - A</p>	<p>1Φ of H2O Loop 2 Pump GPC Cntrl pwr 1Φ of H2O Loop 1 Pump A</p> <p>1Φ of Freon Loop 1 Pump A 2 Pump B</p>	<p>(F7) C/W AC VOLT It - on SM ALERT Light/Tone - on</p>	<p>② 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: SSRs 114, 115, 116, 117</p>
<p>(R13U) ● C/W PARAM SEL tw (three) - 033 (AC1 voltage) ● C/W PARAM - INH MEM - CLEAR ● C/W PARAM SEL tw (three) > 119</p>		<p>(F9) AC1 ΦC AC volts < 90</p>	
<p>(WCS) ● FAN SEP - 2 ● HOSE BLOCK - SEP 2</p>	<p>1Φ of WCS Fan/Sep 1</p>	<p>(LIGHTS LOST) Orbit Sta Instr Its (pnls A1,A2)</p>	
<p>(MO52J) ● Unpwr Food Warmer if connected to AC1 UTIL PWR outlet</p>	<p>1Φ of AC1 Utility pwr</p>	<p>(FSMs) S67 AC VOLTS 1 S86 APU/HYD W/B SM 0 THRM HYD (B)</p>	
<p>2 If bus shorted: ● Open all AC1 ΦC cbs that pwr 3Φ loads on pnls L4 (10 cbs), MA73C (4 cbs) ● Open all AC1 3Φ ganged cbs on pnls L4:B (1 cb), MA73C:C,D (4 cbs)</p>		<p>(F8) APU H2O QTY 3 - 0%</p>	
<p>If bus not shorted: ● Perform the following BUS ISOLATION steps</p>		<p>If H2O PUMP LOOP 1, A active: C/W H2O LOOP It - on 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2) (O1) H2O PUMP OUT PRESS LOOP 1 - 40-45 psia</p>	<p>③ For unshorted bus, perform single isolation steps to prevent powering single phase loads with coupled energy from remaining two phases</p>
		<p>If APUs active and using H2O BLR CNTLR/HTR 3A: C/W APU TEMP It - on after ~ 2 min</p>	
<p>3 BUS ISOLATION</p>			
<p>(L4:O) ● cb AC1 ΦC BLR HYD BYP 3A - op</p>			
<p>(L4:P) ● cb AC1 ΦC TACAN 1 - op</p>	<p>Tacan 1</p>		
<p>(L4:Q) ● cb AC1 ΦC LTG INST OS - op</p>	<p>Orbit Sta Instr Its (Pnls A1,A2)</p>		
<p>(MA73C:F) ● cb AC1 OPS INST HYD ACTR ΦC - op</p>	<p>Ops Hyd Actr Instr</p>		
<p></p>	<p>Ctr ME Cntrl Ch A R ME Cntrl Ch B</p>		
<p></p>	<p>Port RMS: 1Φ of Mid MRL Mtr 1 1Φ of Aft MRL Mtr 2</p>		

**EPS SSR-114
BUS LOSS: AC1 FMC1**

ACTIONS	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			
(MA73C:C) • cb MCA LOGIC MCA PWR AC1 3Φ FWD 1 - op	AC1 FMC1 Bus pwr RH Vent 1,2 Mtr 1 L ADP Dpy Mtr 1 -Y Star Trkr Dr Sys 1 OP/CL capability		

**EPS SSR-115
BUS LOSS: AC1 MMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		SM (BFS SM 63) PL BAY DOORS	① Single mtr time
		During PLBD OP/CL, single mtr run time noted on actuators listed at left	
BUS ISOLATION		During Rad Dpy/Sto ops: (R13L) RAD CNTL PORT tb (two) indicates single mtr ops	
(MA73C:C) • cb MCA LOGIC MCA PWR AC1 3Φ MID 1 - op	PLBD: C/L Lat 9-12 Mtr 1 Port,Stbd Fwd Bikh 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 Renten Sys A Rel/Lat Mtrs		
	Port RMS Mid MRL Mtr 1		

**EPS SSR-116
BUS LOSS: AC1 MMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		SM (BFS SM 63) PL BAY DOORS	① Single mtr time
		During PLBD OP/CL, single mtr run time noted on actuators listed at left	
BUS ISOLATION		During Rad Dpy/Sto ops: (R13L) RAD CNTL STBD tb (two) indicates single mtr ops	
(MA73C:D) • cb MCA LOGIC MCA PWR AC1 3Φ MID 3 - op	PLBD C/L Lat 1-4, 5-8 Mtrs 1 Port Aft Bikh Mtr 1 LH Vents 4,5,6,7 Mtrs 1 AC1 MMC3 Bus pwr Stbd Rad Lat 1-6, 7-12 Mtrs 1 Dpy/Sto Mtr 1		
	Port RMS Aft MRL Mtr 2		

**EPS SSR-117
BUS LOSS: AC1 AMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	① Redundant mtrs remain
BUS ISOLATION			
(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, EPS SSR-2 (Cue Card)	FC2 Pumps and pH Snsr	MASTER ALARM Light/Tone - on	① TIME CRITICAL FC2 must be shutdn within 9 min to avoid potentially hazardous condition
(R2) ● BLR CNTLR/HTR 1 - B ● 2 - A	Hyd H2O Blr 1 Cntrl A 2 Cntrl B	(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	
(L1) ● HUMIDITY 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 ● FREON PUMP LOOP 1 - 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, Xdcrs (ECLS SC4) Freon Loop 1 Pump B	(F9) AC2 ΦA, ΦB, ΦC AC volts < 90	② Av Bay 3 Fan ΔP, Air Out Temp Snsrs lost
(L4:P) ● cb AC3 ΦA LG SNSR 1 - cl	3 Prox Snsr Elec Box 2	(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)	③ Brakes enabled before WONG
(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)	(FSMs) S67 AC VOLTS 2 S86 APU/HYD HYD S86 APU/HYD W/B (B) SMO THRM HYD S66 AV BAY FAN S69 FC PUMP 2 S88 FREON FLOW 2 S88 THERMAL FRN (2) S66 CABIN (2) S66 CABIN FAN S66 CABIN IMU	④ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty Snsrs lost
(CDR SEAT PNL) ● CDR SEAT PWR BUS SEL - AC3 (dn)	CDR Seat Adj via AC2 pwr	(F6,F8) LDG GEAR L, NOSE tb - bp	⑤ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty Snsrs lost
(PLT SEAT PNL) ● PLT SEAT PWR BUS SEL - AC3 (dn)	PLT Seat Adj via AC2 pwr	(F8) APU H2O QTY 1 ind - 0% HYD QTY 2 ind - 0%	⑥ When gear deployed, tb will not indicate DN
		(R1) FC2 COOL PUMP ΔP tb - bp	
(Continued)	(Continued)	(Continued)	

EPS SSR-120 (Cont)
BUS LOSS: AC2

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ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(R13U)</p> <ul style="list-style-type: none"> ● C/W PARAM SEL tw (three) - 043,072,102 ● C/W PARAM - INH MEM - CLEAR ● C/W PARAM SEL tw (three) - > 119 		<p>(O1)</p> <p>AIR TEMP AV BAY 3 - 45 degF</p> <p>FREON FLOW LOOP 2 - 578 pph</p> <p>AIR TEMP CAB HX OUT - 45 degF</p>	<p>⑦ Inhibits Primary C/W for AC2 Voltage, FC2 Stack Temp, and Pump ΔP</p>
<p>(WCS)</p> <ul style="list-style-type: none"> ● FAN SEP - 1 ● HOSE BLOCK - SEP 1 	WCS Fan/Sep 2	<p>(A4)</p> <p>Mission and Event Timers blank</p>	<p>⑧ Lose Auto Temp Cntl via Cntl 1 and Cabin Temp, Cabin Hx Air Out Temp and H2O Loop 1 Cabin Hx In Temp snrs. Hx Byp Vlv holds position</p>
<p>If CAB TEMP CNTLR 1 active: (L1)</p> <ul style="list-style-type: none"> ● CAB TEMP CNTLR - OFF 	8 Cabin Temp Cntl 1 and Hx Byp Vlv Mtr 1	<p>If Freon Loop 1 Pump B ON: 'S88 FREON FLOW 1'</p>	
<p>(MD44F)</p> <ul style="list-style-type: none"> ● Remove pin from PRI ACTUATOR and BYP Vlv linkage, connect linkage to SEC ACTUATOR 		<p>If APU active and using H2O Blr Cntl 1A or 2B: C/W APU TEMP It - on after ~ 2 min</p>	<p>⑨ Vlv holds position</p>
<p>(L1)</p> <ul style="list-style-type: none"> ● CAB TEMP CNTLR - 2 		<p>If H2O Loop 1 Pump B active: H2O LOOP C/W It 'S88 H2O PUMP P1' 'S88 THERMAL H2O' (O1) H2O PUMP OUT PRESS LOOP 1 - 20-25 psia</p>	<p>⑩ Redundant mtr remains</p>
<p>For vlv loss, refer to OMS/ RCS Slide Rule (use FPC2 Slide for Aft RCS and FMC2 for Fwd RCS)</p>	9 Fwd RCS Manf Isol 2 Cntl 9 Aft Pod Gp 2 Vlv Mtrs: L,R OMS Xfeed Vlv B Aft RCS Tk Isol 3/4/5B Manf Isol 1 L RCS Xfeed Vlv 3/4/5	<p>L,R ADP deploy times incr from 15 to 30 sec</p>	<p>⑪ Mtr 1 remains</p>
<p>BUS ISOLATION</p> <p>(MA73C:C) cb MCA PWR</p> <ul style="list-style-type: none"> ● AC2 3Φ FWD 2 - op ● AC2 3Φ MID 1 - op ● AC2 3Φ MID 2 - op 	10 AC2 FMC2 Bus pwr 10 L,R Vents 1,2 Mtrs 2 10 ADP Deploy Mtrs 2 -Y Star Trkr Dr Sys 2 OP/CL capability -Z Star Trkr Dr Sys 1 OP/CL capability	<p>SM (BFS SM 63) PL BAY DOORS</p> <p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	
<p>(MA73C:D) cb MCA PWR</p> <ul style="list-style-type: none"> ● AC2 3Φ AFT 2 - op ● AC2 3Φ MID 3 - op ● AC2 3Φ MID 4 - op 	11 KU ANT Sto/Dpy Mtr 2 AC2 AMC2 Bus pwr LH,RH Vents 8,9 Mtr 2 AC2 MMC3 Bus pwr RH Vent 4,7 Mtr 2 PL Reten Sys B Rel/Lat Mtrs AC2 MMC4 Bus pwr PLBD Port,Stbd Fwd Bikh Mtrs 2 PLBD Stbd Door Mtr 2 Port Rad Lat 1-6 Mtr 2 LH Vent 4,7 Mtr 2 RH Vent 6 Mtr 2	<p>(R13L)</p> <p>During Rad Dpy/Sto ops: RAD LAT CNTL tbs (two) indicate single mtr ops</p>	
<p>(MA73C:E)</p> <ul style="list-style-type: none"> ● cb AC2 WCS FAN SEP 2 (three) - op ● cb AC2 PAYLOAD 3Φ - op 	AC2 pwr to MS,PS Patch pnl		
(Continued)	(Continued)		

EPS SSR-120 (Cont)
BUS LOSS: AC2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(MA73C:F) cb AC2 • RMS B/U ΦA - op • OPS INST HYD ACTR ΦC - op	12 13 13 Port RMS: MPM Mtr 2 Fwd MRL Mtr 1 Mid MRL Mtr 2 D&C B/U edge Itg Ops Hyd Actr Inst		(12) Single mtr time (13) One failure away from EVA to stow MPM or from RMS jettison
(MA73C:H,I) cb AC2 • FWD RCS VLV (three) - op • AFT POD VLV GP 2 (three) - op			(14) Flow prop vlv holds position (15) Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains
(L4:C-E) cb AC2 • FC2 PUMPS (three) - op • CTR ENG (three) - op • L ENG (three) - op	Ctr ME Cntrl Ch B L ME Cntrl Ch A		
(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			
(L4:N) cb AC2 • ΦA FREON FLOW PROP 1 - op • ΦB FREON SIG CONDR - op	14 Freon Loop 1 Flow Prop Vlv		
(L4:O) cb AC2 • ΦA BLR HYD BYP 1A - op • ΦB HYD QTY 2 - op • ΦC BLR HYD BYP 2B - op	Hyd Rsvr 2 Qty Snsr		
(L4:P) cb AC2 • ΦA LG SNSR 2 - op • ΦB RAD CNTLR 1A - op • ΦC TACAN 2 - op	15 Freon Loop 1 Cntrl A Rad Byp Vlv Mtr Tacan 2		
(L4:Q) cb AC2 • ΦA LTG PNL R OVHD - op • ΦB LTG PNL R - op • ΦC LTG NUMERIC OS - op (Continued)	R Ovhd Pnl Its R Pnl Lts OS Numeric Its (Continued)		

EPS SSR-120 (Cont)
BUS LOSS: AC2

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:R) ● cb AC2 ΦB LTG INST OVHD - op	Ovhd Inst Its		⑩ Redundant mtr remains
	10 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		

**EPS SSR-121
BUS LOSS: AC2 ΦA**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) ● H2O PUMP LOOP 1 (two) - GPC,A ● H2O PUMP LOOP 2 - ON ● FREON PUMP LOOP 1 - A	1 1Φ of H2O Loop 1 Pump B 1Φ of Freon Loop 1 Pump B	MASTER ALARM Light/Tone - on (F7) C/W AC VOLT It - on SM ALERT 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
(L4:P) ● cb AC3 ΦA LG SNSR 1 - cl	2 Prox Snsr Elec Box 2	(F9) AC2 ΦA AC volts < 90	② Brakes enabled before WONG
(R2) ● BLR CNTLR/HTR 1 - B	Hyd H2O Blr 1 Cntrl A	(LIGHTS LOST) R Ovhd pnl lts (pnls O1,O2, O3,O8,O9,O16,O17)	③ Lose Auto Temp Cntl via Cntrl 1 and Cabin Temp, Cabin Hx A Out Temp and H2O Loop 1 Cabin Hx In Temp snrs Hx Byp Vlv hold position
(WCS) ● FAN SEP - 1 ● HOSE BLOCK - SEP 1	1Φ of WCS Fan/Sep 2	(F6/F8) LDG GEAR L, NOSE tb-bp	④ When gear deployed, tb will not indicate DN ⑤ 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 unprwng sub-buses: SSRs 124, 125, 126, 127, 128, 129
If Cab Temp Cntrl 1 active: (L1) ● CAB TEMP CNTLR - OFF	3 Cabin Temp Cntrl 1, Hx Byp Vlv Mtr 1	(F8) APU H2O QTY 3 ind - 0%	
(MD44F) ● Remove pin from PRI Actuator and BYP vlv linkage, connect linkage to SEC Actuator		(FSMs) S67 AC VOLTS 2 S86 APU/HYD W/B SM0 THRM HYD (B) S66 CABIN IMU S66 CABIN	⑥ For unshorted bus, perform single Φ isolation steps to prevent prwng single phase loads with coupled energy from remaining two phases
(L1) ● CAB TEMP CNTLR - 2		(O1) AIR TEMP CAB HX OUT ind - 45 degF	
(R13U) ● C/W PARAM SEL tw (three) - 043 (AC2 voltage) ● C/W PARAM - INH ● MEM - CLEAR ● C/W PARAM SEL tw (three) - >119		If H2O PUMP LOOP 1,B active: C/W H2O LOOP It - on 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2)	⑦ All three cabin fan cbs must be closed to start cabin fan. Unprwd Φ cb should be opened while cabin fan runs
5 If bus shorted: ● Open all AC2 ΦA cbs that pwr 3Φ loads on pnl L4 (10 cbs), pnl MA73C (4 cbs) ● Open all AC2 3Φ ganged cbs on pnl MA73C (9 cbs)		(O1) H2O PUMP OUT PRESS LOOP 1 ind - 40-45 psia	
6 If bus not shorted: (L4:K) ● cb AC2 ΦA CAB FAN B - op ● Perform the following BUS ISOLATION steps		If IMU FAN B ON: 'S66 CABIN IMU'	⑧ Flow prop vlv holds position
6 BUS ISOLATION		If HUM SEP B ON: 'S66 CABIN ' (2)	
(L4:L) ● cb AC2 ΦA CAB T CNTLR 1 - op		If APUs active and using BLR CNTLR/HTR 1A: C/W APU TEMP It - on after ~ 2 min	
(L4:N) ● cb AC2 ΦA FREON FLOW PROP 1 - op	8 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			
(Continued)	(Continued)		

EPS SSR-121 (Cont)
BUS LOSS: AC2 ΦA

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(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	Port RMS: D&C B/U edge ltg 1Φ of MPM mtr 2 1Φ of FWD MRL mtr 1 1Φ of MID MRL mtr 2		
	NLG, LMG B/U Rel 2 Fire 2 L ME Cntrl Ch A Ctr ME Cntrl Ch B		
	FC2 pH Snsr		

**EPS SSR-122
BUS LOSS: AC2 ΦB**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) • H2O PUMP LOOP 1 (two) - GPC,A • H2O PUMP LOOP 2 - ON • AV BAY 3 FAN (two) - ON • FREON PUMP LOOP 1 - A	1 1Φ of H2O Loop 1 Pump B 2 AV Bay 3 Sig Condr, Xdcrs (ECLS SC4) 1Φ of Freon Loop 1 Pump B	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
(O17:C) • SIG CONDR FREON A - AC3 • SIG CONDR FREON B - AC3	3 Freon Sig Condr A AC2 pwr (ECLS SC1A) 4 Freon Sig Condr B AC2 pwr (ECLS SC1B)	(F7) C/W AC VOLT It C/W FREON LOOP It SM ALERT Light/Tone	② Av Bay 3 Fan ΔP, Air Out Temp 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		(F9) AC2 ΦB AC volts < 90	③ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty snrs lost
(WCS) • FAN SEP - 1 • HOSE BLOCK - SEP 1	1Φ of WCS Fan/Sep 2	(LIGHTS LOST) Ovhd Instr (pnls O1,O2,O3) R pnl (pnls F4,F8,F9,R1,R2,R4)	④ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty snrs lost
5 If bus shorted: • Open all AC2 ΦB cbs that pwr 3Φ loads on pnl L4 (10 cbs), pnl MA73C (4 cbs) • Open all AC2 3Φ ganged cbs on pnl MA73C (9 cbs)		(FSMs) S67 AC VOLTS 2 S86 APU/HYD HYD S66 AV BAY FAN S88 FREON FLOW 2 S88 THERMAL FRN (2)	⑤ 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: SSRs 124, 125, 126, 127, 128, 129
6 If bus not shorted: (L4:K)		(A4) Mission and Event Timers blank	
7 • cb AC2 ΦB CAB FAN B - op • Perform the following BUS ISOLATION steps		(F8) HYD QTY 2 - 0%	
6 BUS ISOLATION		(O1) AIR TEMP AV BAY 3 - 45 degF FREON FLOW LOOP 2 - 578 pph	
(L4:L) • cb AC2 ΦB AV BAY 3 S/C - OP		2 If H2O Loop 1 Pump B active: C/W H2O LOOP It 'S88 H2O PUMP P1' 'S88 THERMAL H2O' (2)	⑥ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases
(L4:N) • cb AC2 ΦB FREON SIG CONDR - op		2 (O1) H2O PUMP OUT PRESS LOOP 1 - 40-45 psia	
(L4:O) • cb AC2 ΦB HYD QTY 2 - op	Hyd Rdvr 2 Qty Snsr		⑦ All three cabin fan cbs must be closed to start cabin fan. Unpwr Φ cb should be opened while cabin fan runs
(L4:P) • cb AC2 ΦB RAD CNTLR 1A - op	8 Freon Loop 1 Cntlr A Rad Byp Vlv Mtr		⑧ Bypass vlv holds position and Cntlr B Rad Byp vlv Mtr remains
(L4:Q) • cb AC2 ΦB LTG PNL R - op	R pnl Itg (pnls F4,F8,F9,R1,R2,R4)		
(L4:R) • cb AC2 ΦB INST OVHD - op	Ovhd Instr Itg (pnls O1,O2,O3)		
	L ME Cntlr Ch A Ctr ME Cntlr Ch B		
	Port RMS: 1Φ of MPM mtr 2 1Φ of FWD MRL mtr 1 1Φ of MID MRL mtr 2		

**EPS SSR-123
BUS LOSS: AC2 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(L1) <ul style="list-style-type: none"> • H2O PUMP LOOP 1 (two) - GPC,A • H2O PUMP LOOP 2 - ON • FREON PUMP LOOP 1 - A </p>	<p>1 1Φ of H2O Loop 1 Pump B Freon Loop 1 Pump B</p>	<p>MASTER ALARM Light/Tone - on</p>	<p>① If H2O Loop 1 Pump B active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</p>
<p>(R2) <ul style="list-style-type: none"> • BLR CNTLR PWR/HTR 2 - A </p>	<p>HYD H2O Blr 2 Cntrl B</p>	<p>(F7) C/W AC VOLT It SM-ALERT Light/Tone</p>	<p>② 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: SSRs 124, 125, 126, 127, 128, 129</p>
<p>(R13U) <ul style="list-style-type: none"> • C/W PARAM SEL tw (three) - 043 (AC2 voltage) • C/W PARAM - INH • C/W MEM - CLEAR • C/W PARAM SEL tw (three) - > 119 </p>		<p>(LIGHTS LOST) Orbit Sta Numeric (pnls A2,A4)</p>	<p>③ For unshorted bus, perform single isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases</p>
<p>(WCS) <ul style="list-style-type: none"> • FAN SEP - 1 • HOSE BLOCK - SEP 1 </p>	<p>1Φ of WCS Fan/Sep 2</p>	<p>(FSM) S67 AC VOLTS 2</p>	<p>④ All three cabin fan cbs must be closed for cabin fan start. Unpwrd Φ cb should be opened while cabin fan runs</p>
<p>2 If bus shorted: <ul style="list-style-type: none"> • Open all AC2 ΦC cbs that pwr 3Φ loads on pnl L4 (10 cbs), pnl MA73C (4 cbs) • Open all AC2 3Φ ganged cbs on pnl MA73C (9 cbs) </p>		<p>1 If H2O Loop 1 Pump B active: C/W H2O LOOP It 'S88 H2O PUMP P 1' 'S88 THERMAL H2O' (2)</p>	
<p>3 If bus not shorted: (L4:K) 4 • cb AC2 ΦC CABIN FAN B - op • Perform the following BUS ISOLATION steps</p>		<p>(O1) H2O PUMP OUT PRESS LOOP 1 = 40-45 psia</p>	
<p>3 BUS ISOLATION</p>		<p>If APUs active and using H2O BLR CNTLR 2B: C/W APU TEMP It after ~ 2 min</p>	
<p>(L4:O) <ul style="list-style-type: none"> • cb AC2 ΦC BLR HYD BYP 2B - op </p>			
<p>(L4:P) <ul style="list-style-type: none"> • cb AC2 ΦC TACAN 2 - op </p>	<p>Tacan 2</p>		
<p>(L4:Q) <ul style="list-style-type: none"> • cb AC2 ΦC LTG NUMERIC OS - op </p>	<p>Orbit Sta Numeric Ltg (pnls A2,A4)</p>		
<p>(MA73C:F) <ul style="list-style-type: none"> • cb AC2 OPS INST HYD ACTR ΦC - op </p>	<p>Ops Hyd Act Inst</p>		
	<p>L ME Cntrl Ch A Ctr MR Cntrl Ch B</p>		
	<p>Port RMS: 1Φ of MPM mtr 2 1Φ of FWD MRL mtr 1 1Φ of MID MRL mtr 2</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
BUS ISOLATION (MA73C:C) ● cb MCA LOGIC MCA PWR AC2 3Φ FWD 2 - op	1 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	-Y,-Z Star Trkr OP/CL time incr from 8 to 16 sec	

**EPS SSR-125
BUS LOSS: AC2 MMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
BUS ISOLATION (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	1 Port RMS MPM Mtr 2 2 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 One failure away from EVA to stow MPM or from RMS jettison ② Single mtr time
BUS ISOLATION (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		
		(R13) During Rad Dpy/Sto ops, RAD LAT CNTL STBD tb indicates single mtr ops	

**EPS SSR-127
BUS LOSS: AC2 MMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	
BUS ISOLATION (MA73C:D) ● cb MCA LOGIC MCA PWR AC2 3Φ MID 3 - op	AC2 MMC3 Bus pwr RH Vent 4.7 Mtr 2 PL Reten Sys B Rel/Lat Mtrs		

**EPS SSR-128
BUS LOSS: AC2 MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	<p>AC2 MMC4 Bus pwr PLBD Port, Stbd Fwd Bkhd Mtrs 2 PLBD Stbd Door Mtr 2</p> <p>Port Rad Lat 1-6 Mtr 2 LH Vent 4,7 and RH Vent 6 Mtrs 2</p> <p>Port RMS Mid MRL Mtr 2</p> <p>1 KU ANT Sto/Dpy Mtr 2</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>(R13L) During Rad Dpy/Sto ops: RAD LAT CNTL PORT tb indicates single mtr ops</p>	<p>① Mtr 1 remains</p>
<p>BUS ISOLATION</p>			
<p>(MA73C:D) • cb MCA LOGIC MCA PWR AC2 3Φ MID 4 - op</p>			

**EPS SSR-129
BUS LOSS: AC2 AMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	<p>AC2 AMC2 Bus pwr LH, RH Vents 8,9 Mtr 2</p> <p>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</p>	NONE	<p>① Redundant mtr's remain</p>
<p>BUS ISOLATION</p>			
<p>(MA73C:D) • cb MCA LOGIC MCA PWR AC2 3Φ AFT 2 - op</p>			

**EPS SSR-130
BUS LOSS: AC3** (Includes all AC3 sub-buses)

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
1 ● Perform FC3 SHUTDN, EPS SSR-2 FC SHUTDN (Cue Card), then:	FC3 Pumps and pH Snsr	MASTER ALARM Light/Tone - on	① TIME CRITICAL FC3 must be shutdn within 9 min to avoid potentially hazardous condition
(R2) ● BLR CNTLR/HTR 2 - B ● 3 - A	Hyd H2O Blr 2 Cntrl A 3 Cntrl B	(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	② Vlv holds position
(L1) ● IMU FAN B(A) - ON ● C - OFF ● H2O PUMP LOOP 2 - GPC ● Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS SSR-10 ● H2O PUMP LOOP 1 - OFF ● CAB FAN A - OFF ● B - ON ● AV BAY 1 FAN (two) - ON ● AV BAY 2 FAN A - ON ● B - OFF ● 3 FAN A - OFF ● B - ON ● FREON PUMP LOOP 2 - B	IMU Fan C H2O Loop 2 Pump man ON capability H2O Loop 1 Byp Cntrl, Sig Condr 2 H2O Loop 1 Byp Vlv pwr 3 Cabin Fan A Av Bay 1 Sig Condr, Xdcrs (ECLS SC2)	(F9) AC ΦA, ΦB, ΦC AC volts < 90	③ Av Bay 1 Fan ΔP, Air Out Temp snrsr lost
(L4:P) ● cb AC2 ΦA LG SNSR 2 - cl	Av Bay 2 Fan B Av Bay 3 Fan A Freon Loop 2 Pump A	(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)	④ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty snrsr lost
(O17:C) ● SIG CONDR FREON A - AC2 ● SIG CONDR FREON B - AC2	Prox Snsr Elec box 1	(FSMs) S67 AC VOLTS 3 S66 AV BAY FAN S86 APU/HYD HYD S86 APU/HYD WB S66 CABIN (2) S66 CABIN IMU S69 FC PUMP 3 S88 FREON FLOW 1 S88 FREON FLOW 2 S88 H2O PUMP P1 S88 H2O PUMP P2 S88 THERMAL FRN (2) S88 THERMAL H2O (2) SM0 THRM HYD (B)	⑤ Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty snrsr lost
(CDR SEAT PNL) ● CDR SEAT PWR BUS SEL - AC2 (up)	Freon Sig Condr A AC3 pwr (ECLS SC1A) 5 Freon Sig Condr B AC3 pwr (ECLS SC1B)	(R1) FC3 COOL PUMP ΔP tb - bp	⑥ Indicates DN when NLG down
(PLT SEAT PNL) ● SEAT PWR BUS BUS SEL - AC2 (up)	CDR Seat Adj via AC3 pwr PLT Seat Adj via AC3 pwr	(F6, F8) LDG GEAR NOSE, R tb - bp	⑦ Will not indicate DN when RMG down
SM 60 TABLE MAINT		(R1) FC3 COOL PUMP ΔP tb - bp	⑧ Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively
8 ● Inhibit 0612605, 0612600, 0612640, 0612610		(F8) HYD QTY 3 ind - 0% APU H2O QTY ind - 0%	⑨ Inhibits Primary C/W for FC3 Stack Temp and Pump ΔP, AC3 Voltage, H2O Loop 1, 2 Pump P
(R13U) ● C/W PARAM SEL tw (three) - 082, 112, 053, 105, 115 ● C/W PARAM - INH ● C/W MEM - CLEAR ● C/W PARAM SEL tw (three) - > 119		(O1) H2O PUMP OUT PRESS LOOP 1 meter ind - 0 psia H2O PUMP OUT PRESS LOOP 2 ind - 20-25 psia	
9 For vlv loss, refer to OMS/ RCS Slide Rule (use FPC3 Slide for Aft RCS, and FMC3 for Fwd RCS)	NLG, RMG B/U Rel 1 Fire 2 2 Fwd RCS Tk Isol 1/2 Cntl 2 Fwd RCS Manf Isol 3, 4 Cntl 2 Aft Pod Gp 3 Vlv Mtrs: L, R OMS Tk Isol B R OMS Xfeed Vlv A L, R Aft RCS Tk Isol 1/2 Manf Isol 3, 4 Xfeed Vlv 1/2	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	
(Continued)	(Continued)	(Continued)	

**EPS SSR-130 (Cont)
BUS LOSS: AC3**

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
<p>(MA73C:C) cb MCA LOGIC MCA PWR • AC3 3Φ FWD 3 - op</p> <p>• AC3 3Φ MID 2 - op</p>	<p>11 KU ANT Sto/Dpy Mtr 1 AC3 FMC3 Bus pwr R ADP Dpy Mtr 1 12 -Z Star Trkr Dr Sys 2 OP/CL 12 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 Bikhdr Mtr 2 Stbd Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2 LH Vent 6 Mtr 2 3 Mtr 1 RH Vents 4,7 Mtr 1</p>	<p>R ADP deploy time incr from 15 to 30 sec</p> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;"> <p>SM (BFS SM 63) PL BAY DOORS</p> </div> <p>During PLBD OP/CL, single mtr run time noted on actuators listed at left</p>	<p>11 Mtr 2 remains</p> <p>12 Redundant mtrs remain</p> <p>13 Hum Sep A,B Speed Norm Snrs lost</p> <p>14 IMU Fan A,B,C Speed Norm Snrs lost</p>
<p>(MA73C:D) cb MCA LOGIC MCA PWR • AC3 3Φ AFT 3 - op • AC3 3Φ 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 Bikhdr 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>(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>R ME Cntrl Ch A L ME Cntrl Ch B</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</p> <p>• ΦB SIG/CONDR IMU FAN - op</p>	<p>13 Hum Sep Sig Condr (ECLS SC5)</p> <p>14 IMU Fan Sig Condr (ECLS SC7)</p>		
<p>(Continued)</p>	<p>(Continued)</p>		

EPS SSR-130 (Cont)
BUS LOSS: AC3

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:K,L) cb AC3 • CABIN FAN A (three) - op • ΦA H2O CNTLR 1 - op • ΦB AV BAY 1 S/C - op			2 Valve holds position 12 Redundant mtrs remain
(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		15 Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains 16 Single mtr time. One failure away from EVA to stow MPM or from RMS jettison
(L4:O) cb AC3 • ΦA BLR HYD BYP 1A - op • ΦB HYD QTY 3 - op • ΦC BLR HYD BYP 3B - op	Hyd Rsvr 3 Qty Snsr		17 Single mtr time. If unlatched, one failure away from loss of 2 out of 3 MRLs. EVA or RMS jettison capability exists. If latched, one failure away from inability to use RMS
(L4:P) cb AC3 • ΦA LG SNSR 1 - op • ΦB RAD CNTLR 2A - op • ΦC TACAN 3 - op	15 Freon Loop 2 Cntrl A Rad Byp Vlv Mtr Tacan 3		
(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)		
(L4:R) • cb AC3 ΦB INST L/CTR - op	L/Ctr Inst Its (pnls C2,F6, F7)		
	12 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 1 Uplock Lat Mtr 1		
	16 Port RMS: MPM mtr 1 17 FWD MRL mtr 2 17 AFT MRL mtr 1		

**EPS SSR-131
BUS LOSS: AC3 Φ A**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) ● H2O PUMP LOOP 2 - GPC ● Perform (H2O Loop only), H2O PUMP OPS via GPC, <u>ECLS</u> SSR-10 ● H2O PUMP LOOP 1 - OFF ● FREON PUMP LOOP 2 - B	1 1 Φ of H2O Loop 2 Pump man ON 2 H2O Loop 1 Byp Cntrl, Sig Condr	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
(L4:P) ● cb AC3 Φ A LG SNSR 2 - cl	3 H2O Loop 1 Byp Vlv pwr 1 Φ of Freon Loop 2 Pump A	(F7) C/W AC VOLT It - on C/W H2O LOOP It - on	② H2O Loop 1 Pump Out Press, Pump Δ P, Accum Qty, Pump Out Temp snsrs lost
SM 60 SM TABLE MAINT	Prox Snsr Electronics Box 1	(F9) AC3 Φ A AC volts < 90	
6 ● Inhibit 0612605, 0612600, 0612640, 0612610		(F6/F8) LDG GEAR NOSE, R tb - bp	
(R2) ● BLR CNTLR/HTR 2 - B	Hyd H2O Blr 2 Cntrl A	(O1) H2O PUMP OUT PRESS LOOP 1 meter ind - 0 psia	③ H2O Loop 1 Byp Vlv holds position
(R13U) ● C/W PARAM SEL tw (three) - 105, 115, 053 ● C/W PARAM - INH ● C/W MEM - CLEAR ● C/W PARAM SEL tw (three) - > 119		(FSMs) S67 AC VOLTS 3 S86 APU/HYD W/B S66 CABIN (2) S88 H2O PUMP P1 S88 THERMAL H2O (2) SM0 THRM HYD (B)	④ Indicates DN when NLG down ⑤ Will not indicate DN when RMG down
(MO13Q) ● Unpwr Food Warmer if connected to AC3 UTIL PWR outlet	1 Φ of AC3 Utility pwr	(F8) APU H2O QTY 2 ind - 0%	⑥ Inhibits H2O Loop 1 Pump Δ P, Pump Out Press, Pump Out Temp, Accum Qty, respectively
8 If bus shorted: ● Open all AC3 Φ A cbs that pwr 3 Φ loads on pnls L4 (9 cbs), MA73C (3 cbs) ● Open all AC3 3 Φ ganged cbs on pnls L4:B (1 cb), MA73C (7 cbs)		If H2O PUMP LOOP 2 active: 'S88 H2O PUMP P 2' (O1) H2O PUMP OUT PRESS LOOP 2 ind - 40-45 psia	⑦ Inhibits Primary C/W for H2O Loop 1, 2 Pump P and AC3 voltage
9 If bus not shorted: (L4:K) ● cb AC3 Φ A CAB FAN A - op		If APUs active and using BLR CNTLR/HTR 2A: C/W APU TEMP It - on after ~ 2 min	⑧ 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: SSRs 134, 135, 136, 137
10 ● Perform the following BUS ISOLATION steps		If IMU-FAN CON: 'S66 CABIN IMU' (2)	⑨ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases ⑩ All three cabin fan cbs must be closed for cabin fan start. Unpwr Φ cb should be opened while cabin fan runs
(Continued)	(Continued)		

EPS SSR-131 (Cont)
BUS LOSS: AC3 Φ A

9

BUS ISOLATION	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L4:J) • cb AC3 Φ A SIG CONDR HUM SEP - op	11 Hum Sep Sig Condr (ECLS SC 5)		9 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 Φ A H2O CNTLR 1 - op			
(L4:N) • cb AC3 Φ A FREON FLOW PROP 2 - op	13 Freon Loop 2 Flow Prop Vlv		
(L4:O) • cb AC3 Φ A BLR HYD BYP 2A - op			11 Hum Sep A,B Speed Norm snrs lost
(L4:P) • cb AC3 Φ A LG SNSR 1 - op			12 Vlv holds position
(L4:Q) • cb AC3 Φ A LTG COAS - op	Sta 1,2 COAS pwr		
	NLG,RMG Backup Rel 1 Fire 2 L ME Cntlr Ch B R ME Cntlr Ch A FC 3 pH Snr		
	Port RMS: 1 Φ of MPM mtr 1 1 Φ of FWD MRL mtr 2 1 Φ of AFT MRL mtr 1		

**EPS SSR-132
BUS LOSS: AC3 ΦB**

ACTIONS	
	(L1) ● H2O PUMP LOOP 1 (two) - ON,B ● H2O PUMP LOOP 2 - GPC ● AV BAY 1 FAN (two) - ON ● FREON PUMP LOOP 2 - B
	(O17:C) ● SIG COND R FREON A - AC2 ● SIG COND R FREON B - AC2
5	(R13U) ● C/W PARAM SEL tw (three) - 053, 115 ● C/W PARAM - INH
6	● Change PRI C/W PARAM 105 low limit to 1.50 ● C/W MEM - CLEAR ● C/W PARAM SEL tw (three) - > 119
7	If bus shorted: ● Open all AC3 ΦB cbs that pwr 3Φ loads on pnls L4 (9 cbs), MA73C (3 cbs) ● Open all AC3 3Φ ganged cbs on pnls L4:B (1 cb), MA73C (7 cbs)
8	If bus not shorted: (L4:K)
9	● cb AC3 ΦB CAB FAN A - op ● Perform the following BUS ISOLATION steps
8	BUS ISOLATION
	(L4:J) ● cb AC3 ΦB SIG COND R IMU FAN - op
	(L4:L) ● cb AC3 ΦB AV BAY 1 S/C - op
	(L4:N) ● cb AC3 ΦB FREON SIG COND R - op
	(L4:O) ● cb AC3 ΦB HYD QTY 3 - op
	(L4:P) ● cb AC3 ΦB RAD CONTRL 2A - op
	(L4:Q) ● cb AC3 ΦB LTG PNL MS - op
	(L4:R) ● cb AC3 ΦB INST L/C TR - op

-EQUIP/FUNCTION LOST	
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
3	Freon Sig Condr A AC3 pwr (ECLS SC1A)
4	Freon Sig Condr B AC3 pwr (ECLS SC1B)
10	IMU Fan Sig Condr (ECLS SC7)
	Hyd Rsvr 3 Qty Snsr
11	Freon Loop 2 Cntrl A Rad Byp Vlv Mtr
	MS pnl Its (pnl R10,R12)
	L/Ctr Inst Its (pnl C2,F6,F7) L ME Cntrl Ch B R ME Cntrl Ch A
	Port RMS: 1Φ of MPM Mtr 1 1Φ of FWD MRL Mtr 2 1Φ of AFT MRL Mtr 1

CREW INDICATIONS	NOTES
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
(F7) C/W AC VOLT It C/W FREON LOOP It SM ALERT It C/W H2O PUMP It	② Av Bay 1 Fan ΔP, Air Out Temp Snrsr lost
(F9) AC3 ΦB AC volts < 90	③ Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty Snrsr lost
(FSMs) S67 AC VOLTS 3 S86 APU/HYD HYD S66 AV BAY FAN S66 CABIN IMU S88 FREON FLOW 1 S88 THERMAL FRN (2) S88 H2O PUMP P 2 S88 THERMAL H2O	④ Freon Loop 2 P/L Hx Flow Rate Freon Loop 1 ICH Flow Rate and Accum Qty Snrsr lost
(F8) HYD QTY 3 - 0%	⑤ Inhibits Primary C/W for AC3 Voltage and H2O Loop 2 Pump P
(LIGHTS LOST) L/Ctr Instr Its (pnls C2,F6,F7) MS pnl Its (pnls R10,R12)	⑥ Sets H2O Loop 1 Pump P low limit to 45 psia
(O1) H2O PUMP OUT PRESS LOOP 2 - 40-45 psia FREON FLOW 1 - 578 pph AV Bay 1 Air Out - 45 deg F	⑦ 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: SSRs 134, 135, 136, 137
	⑧ For unshorted bus, perform single Φ isolation steps to prevent pwrng single phase loads with coupled energy from remaining two phases
	⑨ All three cabin fan cbs must be closed for cabin fan to start. Unpwr Φ cb should be opened while cabin fan runs
	⑩ IMU Fan A,B,C Spe Norm Snrsr lost
	⑪ Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains

**EPS SSR-133
BUS LOSS: AC3 ΦC**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
(L1) ● H2O PUMP LOOP 1 (two) - ON,B ● H2O PUMP LOOP 2 - GPC ● FREON PUMP LOOP 2 - B	1 1Φ of H2O Loop 2 Pump man ON capability 1Φ of Freon Loop 2 Pump A	MASTER ALARM Light/Tone - on	① H2O Loop 2 Pump Out Press must drop below 45 psia to trigger C/W
(R2) ● BLR CNTLR/HTR 3 - A	Hyd H2O Blr 3 Cntrlr B	(F7) C/W AC VOLT It - on C/W FREON LOOP It - on SM ALERT It - on C/W H2O PUMP It - on	② Inhibits Primary C/W for AC3 Voltage and H2O Loop 2 Pump P
2 3 (R13U) ● C/W PARAM SEL tw (three) - 053, 115 ● C/W PARAM - INH ● Change PRI C/W PARAM 105 low limit to 1.50 ● C/W MEM - CLEAR ● C/W PARAM SEL tw (three) - > 119		(F9) AC3 ΦC AC volts < 90	③ Sets H2O Loop 1 Pump P low limit to 45 psia
(MO13Q) ● Unpwr Food Warmer if connected to AC3 UTIL PWR outlet	1Φ of AC3 Utility pwr	(LIGHTS LOST) OS pnl lts (pnls A1,A2,A6,A7,A8,A13,L9)	④ 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: SSRs 134, 135, 136, 137
4 If bus shorted: ● Open all AC3 ΦC cbs that pwr 3Φ loads on pnls L4 (9 cbs), MA73C (3 cbs) ● Open all AC3 3Φ ganged cbs on pnls L4:B (1 cb), MA73C (7 cbs)		1 (FSMs) S88 H2O PUMP P 2 S88 THERMAL H2O (2)	⑤ For unshorted bus, perform single Φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases
5 6 If bus not shorted: (L4:K) ● cb AC3 ΦC CAB FAN A - op ● Perform the following BUS ISOLATION steps		1 (O1) H2O PUMP OUT PRESS LOOP 2 ind - 40-45 psia If APUs active and using BLR CNTLR/HTR 3B: C/W APU TEMP It - on after ~ 2 min	⑥ All three cabin fan cbs must be closed for cabin fan to start. Unpwr Φ cb should be opened while cabin fan runs
5 BUS ISOLATION (L4:O) ● cb AC3 ΦC BLR HYD BYP 3B - op ----- (L4:P) ● cb AC3 ΦC TACAN 3 - op ----- (L4:Q) ● cb AC3 ΦC LTG PNL OS - op	Tacan 3 OS pnl lts (pnls A1,A2,A6,A7,A8,A13,L9) L ME Cntrlr Ch B R ME Cntrlr Ch A Port RMS: 1Φ of MDM mtr 1 1Φ of FWD MRL mtr 2 1Φ of AFT MRL mtr 1		

**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
		R ADP deploy time incr from 15 to 30 sec	
BUS ISOLATION (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ FWD 3 - op	AC3 FMC3 Bus pwr LH Vent 1,2 Mtr 1 R ADP Dpy Mtr 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			① Single mtr time
			② Mtr 2 remains
BUS ISOLATION (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 RH Vent 4,7 Mtr 1	<div style="border: 1px solid black; padding: 2px; width: fit-content;"> SM (BFS SM 63) PL BAY DOORS </div> During PLBD OP/CL, single mtr run time noted on actuators listed at left	
	1 Port RMS Aft MRL Mtr 1	(R13L) During Rad Dpy/Sto ops, RAD CNTL STBD tb (two) indicates single mtr ops	
	2 KU ANT Dpy/Sto Mtr 1		

**EPS SSR-136
BUS LOSS: AC3 MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	1 Port RMS: MPM Mtr 1 2 Fwd MRL Mtr 2	<div style="border: 1px solid black; padding: 2px;">SM (BFS SM 63) PL BAY DOORS</div> During PLBD OP/CL, single mtr run time noted on actuators listed at left (R13L) During Rad Dpy/Sto ops, RAD CNTL PORT tb (two) indicates single mtr ops	① One failure away from EVA to stow MPM or from RMS jettison ② Single mtr time
BUS ISOLATION	AC3 MMC4 Bus pwr PLBD C/L Lat 9-12 Mtr 2 13-16 Mtr 1 Stbd Aft Bikhhd Mtr 1 Port Door Mtr 1 RH Vents 3,5 Mtrs 2 Port Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2		
(MA73C:D) • cb MCA LOGIC MCA PWR AC3 3Φ MID 4 - op			

**EPS SSR-137
BUS LOSS: AC3 AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	① Redundant mtrs remain
BUS ISOLATION	AC3 AMC2 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		
(MA73C:D) • cb MCA LOGIC MCA PWR AC3 3Φ AFT 3 - op			

**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
		R ADP deploy time incr from 15 to 30 sec	
BUS ISOLATION (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ FWD 3 - op	AC3 FMC3 Bus pwr LH Vent 1,2 Mtr 1 R ADP Dpy Mtr 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			① Single mtr time
			② Mtr 2 remains
BUS ISOLATION (MA73C:C) • cb MCA LOGIC MCA PWR AC3 3Φ MID 2 - op	AC3 MMC2 Bus pwr PLBD Lat 1-4 Mtr 2 5-8 Mtr 2 L Aft Bkhd Mtr 2 Stbd Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2 LH Vent 6 Mtr 2 3 Mtr 1 RH Vent 4,7 Mtr 1	<div style="border: 1px solid black; padding: 2px; width: fit-content;">SM PL BAY DOORS</div> During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left <hr style="border-top: 1px dashed black;"/> <u>AUTO</u> PLBD OP/CL time ~ 300 sec vs ~ 200 sec (R13L) During Rad Dpy/Sto ops, RAD CNTL STBD tb (two) indicates single mtr ops	
	1 Port RMS Aft MRL Mtr 1		
	2 KU ANT Dpy/Sto Mtr 1		

**EPS SSR-136
BUS LOSS: AC3 MMC4**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE	Port RMS: MPM Mtr 1 Fwd MRL Mtr 2		① One failure away from EVA to stow MPM or from RMS jettison
BUS ISOLATION (MA73C:D) • cb MCA LOGIC MCA PWR AC3 3Φ MID 4 - op	AC3 MMC4 Bus pwr PLBD Lat 9-12 Mtr 2 Lat 13-16 Mtr 1 R Aft Blkhd Mtr 1 L Drive Mtr 1 RH Vents 3,5 Mtrs 2 Port Rad Lat 7-12 Mtr 2 Dpy/Sto Mtr 2	SM PL BAY DOORS During <u>MAN</u> PLBD OP/CL, single mtr run time noted on actuators listed at left ----- AUTO PLBD OP/CL time ~ 300 sec vs ~ 200 sec (R13L) During Rad Dpy/Sto ops, RAD CNTL PORT tb (two) indicates single mtr ops	② Single mtr time

**EPS SSR-137
BUS LOSS: AC3 AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
NONE		NONE	① Redundant mtrs remain
BUS ISOLATION (MA73C:D) • cb MCA LOGIC MCA PWR AC3 3Φ AFT 3 - op	AC3 AMC2 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		

**EPS SSR-140
BUS LOSS: AC1 RCS/FMC1**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (Use FMC1 Slide for Fwd RCS)	1 Fwd RCS Manf Isol 1 Cntl 1 Tk Isol 3/4/5 Cntl	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			
(MA73C:H) ● cb AC1 FWD RCS VLV (three) - op			

**EPS SSR-141
BUS LOSS: AC2 RCS/FMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (Use FMC2 Slide for Fwd RCS)	1 FWD RCS Manf Isol 2 Cntl	1 The following tb indications does not change position in response to cmds: (08) FWD RCS MANF ISOL 2	① Vlv remains in tb indicated position
BUS ISOLATION			
(MA73C:H) ● cb AC2 FWD RCS VLV (three) - op			

**EPS SSR-142
BUS LOSS: AC3 RCS/FMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FMC3 Slide for Fwd RCS)	1 Fwd RCS Manf Isol 3,4 Cntl 1 Tk Isol 1/2 Cntl	1 The following tb indications do not change position in response to cmds: (08) FWD RCS TK ISOL 1/2 MANF ISOL 3 MANF ISOL 4	① Vlv remains in tb indicated position
BUS ISOLATION			
(MA73C:H) ● cb AC3 FWD RCS VLV (three) - op			

**EPS SSR-143
BUS LOSS: AC1 POD/AMC1**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FPC1 Slide for Aft RCS)		1	L,R OMS Tk Isol A Cntl	1	The following tb indications do not change position in response to cmds: (O8) L,R OMS TK ISOL A L OMS XFEED A ----- (O7) AFT L,R RCS TK ISOL 3/4/5A MANF ISOL 2 XFEED 3/4/5	① Vlv remains in tb indicated position	
		1	L OMS Xfeed A Cntl				
		1	AFT L,R RCS Tk Isol 3/4/5A Cntl				
		1	Manf Isol 2 Cntl				
		1	Xfeed 3/4/5 Cntl				
BUS ISOLATION							
(MA73C:I) ● cb AC1 AFT POD VLV GP 1 (three) - op							

**EPS SSR-144
BUS LOSS: AC2 POD/AMC2**

ACTIONS		EQUIP/FUNCTION LOST		CREW INDICATIONS		NOTES	
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FPC2 Slide for Aft RCS)		1	L,R OMS Xfeed B Cntl	1	The following tb indications do not change position in response to cmds: (O8): L,R OMS XFEED B ----- (O7) AFT L,R RCS TK ISOL 3/4/5B MANF ISOL 1	① Vlv remains in tb indicated position	
		1	AFT L,R RCS Tk Isol 3/4/5B Cntl				
		1	Manf Isol 1 Cntl				
BUS ISOLATION							
(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	
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FPC3 Slide for Aft RCS)		1	L,R OMS Tk Isol B Cntl	1	The following tb indications do not change position in response to cmds: (O8) L,R OMS TK ISOL B R OMS XFEED A ----- (O7) AFT L,R RCS TK ISOL 1/2 XFEED 1/2 MANF ISOL 3,4	① Vlv remains in tb indicated position	
		1	R OMS Xfeed A Cntl				
		1	Aft L,R RCS Tk Isol 1/2 Cntl				
		1	Xfeed 1/2 Cntl				
		1	Manf Isol 3,4 Cntl				
BUS ISOLATION							
(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
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FPC1 Slide for Aft RCS)	1 L,R OMS Tk Isol A Cntl 1 L OMS Xfeed A Cntl 1 Aft L,R RCS Tk Isol 3/4/5A Cntl 1 Xfeed 3/4/5 Cntl 1 Manf Isol 2 Cntl	1 (O8) L,R OMS TK ISOLA tb - bp L OMS XFEED A tb - bp	1 (1) Vlv remains in last commanded position
BUS ISOLATION (MA73C:1) • cb AFT POD VLV LOGIC GP 1/3, 1/2 (two) - OFF	2 OMS Qty Gauging Degraded	(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 (2) ✓MCC for impacts to OMS Gauging

**EPS SSR-147
BUS LOSS: MNB/C POD/AMC2**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FPC2 Slide for Aft RCS)	1 L,R OMS Xfeed B Cntl 1 Aft L,R RCS Tk Isol 3/4/5B Cntl 1 Manf Isol 1 Cntl	1 (O8) L,R OMS XFEED B tb - bp	1 (1) Vlv remains in last commanded position
BUS ISOLATION (MA73C:1) • cb AFT POD VLV LOGIC GP 1/2, 2/3 (two) - OFF	2 OMS Qty Gauging Degraded	(O7) AFT L,R RCS TK ISOL 3/4/5 B tb - bp MANF ISOL 1 tb - bp	2 (2) ✓MCC for impacts to OMS Gauging

**EPS SSR-148
BUS LOSS: MNC/A POD/AMC3**

ACTIONS	EQUIP/FUNCTION LOST	CREW INDICATIONS	NOTES
For OMS/RCS vlv loss, refer to OMS/RCS Slide Rule (use FPC3 Slide for Aft RCS)	1 L,R OMS Tk Isol B Cntl 1 R OMS Xfeed A Cntl 1 Aft L,R RCS Tk Isol 1/2 Cntl 1 Xfeed 1/2 Cntl 1 Manf Isol 3,4 Cntl	(O8) L,R OMS TK ISOL B tb - bp R OMS XFEED A tb - bp	1 (1) Vlv remains in last commanded position
BUS ISOLATION (MA73C:1) • cb AFT POD VLV LOGIC GP 1/3,2/3 (two) - OFF	2 OMS Qty Gauging Degraded	(O7) AFT L,R RCS TK ISOL 1/2 tb - bp MANF ISOL 3,4 tb - bp XFEED 1/2 tb - bp	2 (2) ✓MCC for impacts to OMS Gauging

**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, then ON (tb-ON)
	If MNC/PRIPL connection failed, attempt FC3/PRIPL connection:
R1	4. PL PRI MNC - OFF (tb-OFF)
	5. PL PRI 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. PL PRI MNB - ON (tb-ON)

EPS
SSR 150-200

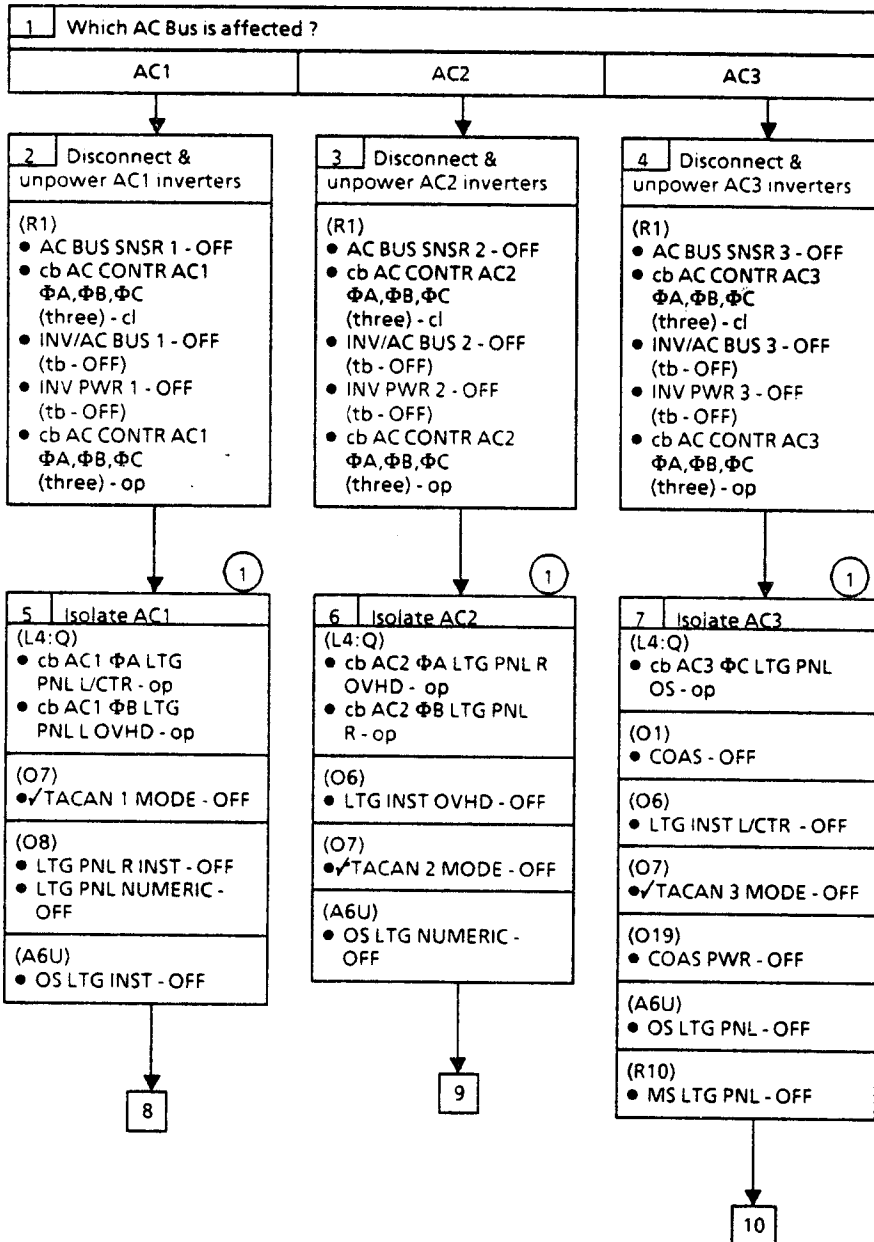
EPS SSR-200 AC POWER TRANSFER CABLE

NOTE

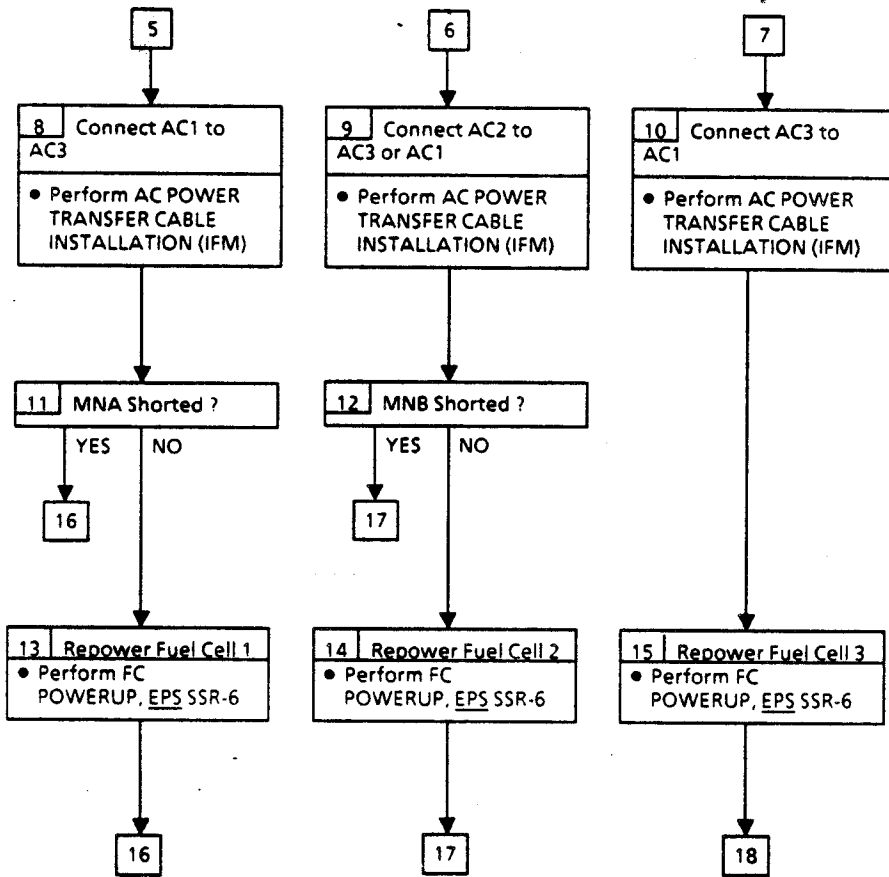
Failed AC bus will be isolated before connecting AC Power Transfer Cable. After completing IFM, return to this procedure for additional steps to be performed.

✓ associated AC, MN FPC, or MN BUS LOSS SSR complete before entering this procedure

① Other AC bus isolation steps performed in associated BUS LOSS SSR. AC bus isolation accomplished by switching to alternate AC equipment or powering off equipment. Only lighting circuit breakers opened to prevent powering lights inadvertently



EPS SSR-200 (Cont)



EPS SSR-200 (Cont)

11 13

AC1 LOAD REFERENCE TABLE

16 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	3	.81	.81	.81	.81
(L4:K) AC1 ΦA H2O CNTLR 2 (S/C)		.06			
ΦB CAB AIR S/C		.04		.04	
(L4:L) ΦB AV BAY 2 S/C		.02		.02	
ΦB HYD QTY 1		.02		.02	
(MA73C:F) ΦC OPS HYD ACTR INST	4	.06			.06
	5	SUBTOTAL AMPS/PHASE	.87	.89	.87
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)	6	.14			
(L4:P) ΦA RAD CNTLR 1B (FREON LOOP 1 CNTLR B RAD BYP VLV MTR)	6 13	.17			
(L4:P) ΦB RAD CNTLR 2B (FREON LOOP 2 CNTLR B RAD BYP VLV MTR)	6 13	.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	6	.14			
L ADP DPY MTR 1	6	.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			
STBD DOOR MTR 1		1.64			
PORT RMS MID RETN LAT MTR 1		.25			
(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 4/7 MTR 1		OP -.64 CL -.46			
(Cont)					

2 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 enabled for intermittent operation. CONTINGENCY EQUIPMENT will be available for contingency use only

3 If MNA lost, FC pumps will not be restarted

4 Includes RUD/SPDBRK and ELVN SW VLV Xdcrs

5 AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at approximately 4.5 amps/phase for 1 sec for dual motor operation, peaks for 6 sec for single motor operation. The cb should not trip if steady-state loads less than 3 amps/phase for dual motor ops or less than 1 amp/phase for single motor operation on all associated vent doors

6 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

13 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) (Cont) 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) ⑥	.42			
(MA73C:I) AFT POD VLV GP 1 ⑥ AFT RCS ISOL L MANF 2 FU VLV	.42			
L MANF 2 OX VLV	.42			
R MANF 2 FU VLV	.42			
R MANF 2 OX VLV	.42			
L TK 3/4/5A RU 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			
LOMS 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			
CONTINGENCY EQUIPMENT	AC CURRENT (amps/phase)	AC1 CURRENT AFTER CABLE INSTALLED		
After cable installation, the following AC1 continuous equipment will be powered off but available for CONTINGENCY use only. Minimize loading to prevent exceeding 3 amps/phase		ΦA	ΦB	ΦC
(L4:J) HUM SEP A	.28			
Cont.				

⑥ Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

EPS SSR-200 (Cont)

AC1 LOAD REFERENCE TABLE Cont)

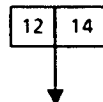
CONTINGENCY EQUIPMENT (Cont)	AC CURRENT (amps/phase)	AC1 CURRENT AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(L4:I) IMU FAN A	.17			
(L4:F) H2O LOOP PUMP 1A	1.01			
(L4:F) H2O LOOP PUMP 2 (7)	1.03			
(L4:G) AV BAY 1 FAN A	.69			
(L4:H) AV BAY 3 FAN B	.73			
(L4:M) FREON LOOP 1 PUMP A	1.68			
(L4:N) FREON LOOP 2 PUMP B	1.68			
(L4:L) AC1 ΦA CABIN TEMP CNTLR 2 (EL)	.04		///	///
(L4:L) AC1 ΦA CABIN TEMP CNTLR 2	.15		///	///
(R2) AC1 ΦA BLR HYD BYP VLV 1B (6)	.21		///	///
ΦC BLR HYD BYP VLV 3A (6)	.21	///	///	
ΦA BLR HYD BYP SENSOR 1B	.07		///	///
ΦC BLR HYD BYP SENSOR 3A	.07	///	///	
(O6) AC1 ΦA LTG PNL L/CTR (8)	2.85		///	///
ΦB LTG PNL L/OVHD (8)	1.94	///	///	
(O8) ΦA LTG R INST	.46		///	///
ΦB LTG NUMERIC	.16	///	///	
(A6U) ΦC OS LTG INST	.13	///	///	
(O7) AC1 ΦC TACAN 1	1.66	///	///	
(MA73C:E) WCS FAN SEP 1	.50			
(F1) AC1 UTILITY POWER				
VACUUM CLEANER	1.44			
FOOD WARMER	2.00		///	
	TOTAL AMPS/PHASE			

(6) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

(7) H2O LOOP 2 PUMP GPC position pwr'd by AC1

(8) cb opened to prevent powering lights inadvertently

EPS SSR-200 (Cont)



AC2 LOAD REFERENCE TABLE

17 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	9	.81	.81	.81	.81
(L4:L) AC2 ΦB AV BAY 3 S/C		.02		.02	
(L4:O) ΦB HYD QTY 2		.02		.02	
(L4:P) ΦA LG PROX SNSR 2		.07	.07		
(MA73C:F) ΦC OPS INST HYD ACTR	10	.13			.13
	11	SUBTOTAL AMPS/PHASE	.88	.85	.94
INTERMITTENT EQUIPMENT		AC CURRENT (amps/phase)	AC2 CURRENT		
After cable installation, the following equipment will be available for INTERMITTENT operation:			ΦA	ΦB	ΦC
(L4:P) AC2 ΦB RAD CNTLR 1A (FREON LOOP 1 CNTLR A RAD BYP VLV MTR)	6 14	.17			
(L4:N) ΦA FREON FLOW PROP 1 (VLV)	6	.30			
(MA73C:C) AC2 3 Φ 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	6	.14			
-Y STR TRKR DR SYS 2 MTR CNTL	6	.14			
-Z STR TRKR DR SYS 1 MTR CNTL	6	.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			
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			
CL LAT 1 MTR 2		.41			
(Cont)					

2 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 operation. CONTINGENCY EQUIPMENT will be available for contingency use only

6 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

9 If MNB lost, FC2 pumps will not be restarted

10 Includes ELIVN PS2 and ME TVC SW VLV Xdcrs

11 AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at approximately 5.1 amps/phase for 1 sec for dual motor operation, peaks for 6 sec for single motor operation. The cb should not trip if steady-state loads less than 3 amps/phase for dual motor ops or less than 1 amp/phase for single motor operation on all associated vent doors

14 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 AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(MA73C:C) (Cont) AC2 Φ AFT 2 ET DOORS R DRIVE MTR 2	1.06			
R LAT MTR 2	1.28			
AC2 3Φ MID 3 RH VENTS 4/7 MTR 2	OP - .28 CL - OP - .69 CL - .29			
PL RET LAT MTR 2	.41			
AC2 3Φ MID 4 LH VENTS 4/7 MTR 2	OP - .60 CL - .43			
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 (6)	.99			
AC2 ΦA PORT RMS SHLD BRACE ACTR	.25			
(MA73C:G) OMS KIT VLV				
(MA73C:H) FWD RCS VLV (3 ea) (6)	.42			
(MA73C:I) AFT POD VLV GP 2 (6) AFT RCS ISOL L MANF 1 FU VLV	.42			
L MANF 1 OX VLV	.42			
R MANF 1 FU VLV	.42			
R MANF 1 FU 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)				

6 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

CONTINGENCY EQUIPMENT	After cable installation, the following AC2 continuous equipment will be powered off but available for CONTINGENCY use only. Minimize loading to prevent exceeding 3 amps/phase.	AC CURRENT (amps/phase)	AC2 CURRENT AFTER CABLE INSTALLED		
			ΦA	ΦB	ΦC
(L4:F) H2O LOOP PUMP 1B		1.02			
(L4:G) AV BAY 1 FAN B		.69			
(L4:H) AV BAY 2 FAN A		.70			
(L4:I) IMU FAN B		.18			
(L4:J) HUM SEP B		.28			
(L4:K) CABIN FAN B		1.67			
(L4:M) FREON LOOP 1 PUMP B		1.68			
(L4:L) AC2 ΦA CABIN TEMP CNTLR 1 (EL)		.04			
(L4:L) AC2 ΦA CABIN TEMP CNTLR 1		.15			
(R2) AC2 ΦA BLR HYD BYPASS VLV 1A (6)		.22			
AC2 ΦC BLR HYD BYPASS VLV 2B (6)		.21			
AC2 ΦA BLR HYD CNTL SENSOR 1A		.07			
AC2 ΦC BLR HYD CNTL SENSOR 2B		.06			
(O6) AC2 ΦB LTG INST OVHD		.26			
(A6U) AC2 ΦB OS LTG NUMERIC		.20			
(O7) AC2 ΦC TACAN 2		1.66			
(O8) AC2 ΦA LTG PNL R OVHD (8)		1.34			
AC2 ΦB LTG PNL R (8)		1.56			
(L4:N) AC2 ΦB FREON SIG CONDR		.05			
(MA73C:E) WCS FAN SEP 2		.50			
		TOTAL AMPS/PHASE			

(6) Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

(8) cb opened to prevent powering lights inadvertently

EPS SSR-200 (Cont)

15

AC3 LOAD REFERENCE TABLE

2

18	CONTINUOUS EQUIPMENT	AC CURRENT (amps/phase)	AC3 CURRENT AFTER CABLE INSTALLED		
			ΦA	ΦB	ΦC
After cable installation, the following AC3 equipment will be powered CONTINUOUSLY:					
	(R1) FUEL CELL 3 PUMPS	.81	.81	.81	.81
	(L4:J) AC3 ΦA HUM SEP S/C	.02	.02		
	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	
	(L4:P) AC3 ΦA LG PROX SNSR 1	.07			
	(12) SUBTOTAL AMPS/PHASE		.96	.87	.81
INTERMITTENT EQUIPMENT					
After cable installation, the following AC3 equipment will be available for INTERMITTENT operation:		AC CURRENT (amps/phase)	AC3 CURRENT		
	(L4:L) AC3 ΦA H2O CNTLR 1 (BYP VLV) (6)	.14			
	(L4:N) AC3 ΦA FREON FLOW PROP 2 (VLV) (6)	.30			
	(L4:P) AC3 ΦB RAD CNTLR 2A (FREON LOOP 2 CNTLR A RAD BYP VLV MTR) (6)	.17			
	(MA73C:C) AC3 Φ3 FWD 3 FWD RCS ISOL TK 1/2 FU VLV (6)	.42			
	TK 1/2 OX VLV (6)	.42			
	MANF 3 FU VLV (6)	.42			
	OX VLV (6)	.42			
	4 FU VLV (6)	.42			
	OX VLV (6)	.42			
	LH VENTS 1/2 MTR 1	OP - .29 CL - .21			
	R ADP MTR 1, 18	.14			
	-Z STAR TRKR SYS 2 MTR CNTRL (6)	.14			
	AC3 Φ3 MID 2				
	LH VENT 3 MTR 1	OP - .59 CL - .29			
	LH VENT 6 MTR 2	OP - .59 CL - .29			
	RH VENT 4/7 MTR 1	OP - .73 CL - .27			
	PLBD PORT AFT BLKHD LAT MTR 2	.87			
	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			
(Cont)					

2 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 enabled for intermittent operation. CONTINGENCY EQUIPMENT will be available for contingency use only

6 Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

12 AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at approximately 4.2 amps/phase for 1 sec for dual motor operation, peaks for 6 sec for single motor operation. The cb should not trip if steady-state loads less than 3 amps/phase for dual motor ops or less than 1.3 amp/phase for single motor operation 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) AC3 Φ3 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	.37			
RIGHT SEAT (6)	.99			
(MA73C:H) FWD RCS VLV (3 ea) (6)	.42			
(MA73C:I) AFT POD VLV GP 3 (6) 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			
R MANF 3 FU VLV	.42			
R MANF 3 OX VLV	.42			
L MANF 4 FU VLV	.42			
L MANF 4 OX VLV	.42			
(Cont)				

6 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)

INTERMITTANT EQUIPMENT (Cont)	AC CURRENT (amps/phase)	AC3 CURRENT AFTER CABLE INSTALLED		
		ΦA	ΦB	ΦC
(MA73C:I) AFT POD VLV GP 3 (Cont) ⑥				
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 ⑱	1.03			
(L4:G) AV BAY 3 FAN A	.75			
(L4:H) AV BAY 2 FAN B	.75			
(L4:I) IMU FAN C	.18			
(L4:K) CABIN FAN A	1.66			
(L4:M) FREON LOOP 2 PUMP A	1.68			
(R1) AC3 ΦA BLR HYD BYP VLV 2A ⑥	.21			
AC3 ΦC BLR HYD BYP VLV 3B ⑥	.21			
AC3 ΦA BLR HYD BYP SENSOR 2A	.07			
AC3 ΦC BLR HYD BYP SENSOR 3B	.07			
(O6) AC3 ΦB LTG INST L/CTR	.53			
(O7) AC3 ΦC TACAN 3	1.66			
(L4:N) AC3 ΦB FREON SIG CONDR	.05			
(O19/O1) AC3 ΦA LIGHTING COAS	.11			
(R10) AC3 ΦB MS LTG PNL	.28			
AC3 ΦC LIGHTING PANEL OS ⑧	2.66			
(A15) AC3 UTILITY POWER				
VACUUM CLEANER	1.44			
FOOD WARMER	2.00			
	TOTAL AMPS/PHASE			

⑥ Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase.

⑧ cb opened to prevent powering lights inadvertently.

⑱ H2O LOOP 2 PUMP MAN ON pwr'd by AC3

GNC

<u>8.1</u>	<u>IMU</u>	
8.1a	RM DLMA IMU.....	8-4
8.1b	'RM FAIL IMU'.....	8-5
8.1c	'IMU BITE/T 1(2,3)'.....	8-5
<u>8.2</u>	<u>CNTRLR</u>	
8.2a	'RHC L(R,A)'.....	8-6
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<u>8.3</u>	<u>STAR TRKR</u>	
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GNC FRP

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GNC SSR

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

AERO DRIVE	NAV EDIT	ROLL REF
α BIAS SW	NAV EDIT ALT (TAC)	SELL AUTO
BDY FLP CYCL (FAIL, HOLD)	OTT ST IN	SENSE SW
BDY FLP SW L(R)	PNL TRIM L(R)	SPD BRK
DISPLAY SW A(L,R)	PROBES	
FCS CH 1(2,3,4)	RM DLMA ADTA	
FCS SAT POS(MOM)	(MLS,TAC,PRL,WOW)	
G51 RL MODE SW	RM FAIL XFER	
HIGH G	(ACC,ADTA,MLS, RGA, TAC)	
L(R) OMS GMBL(VLV)		

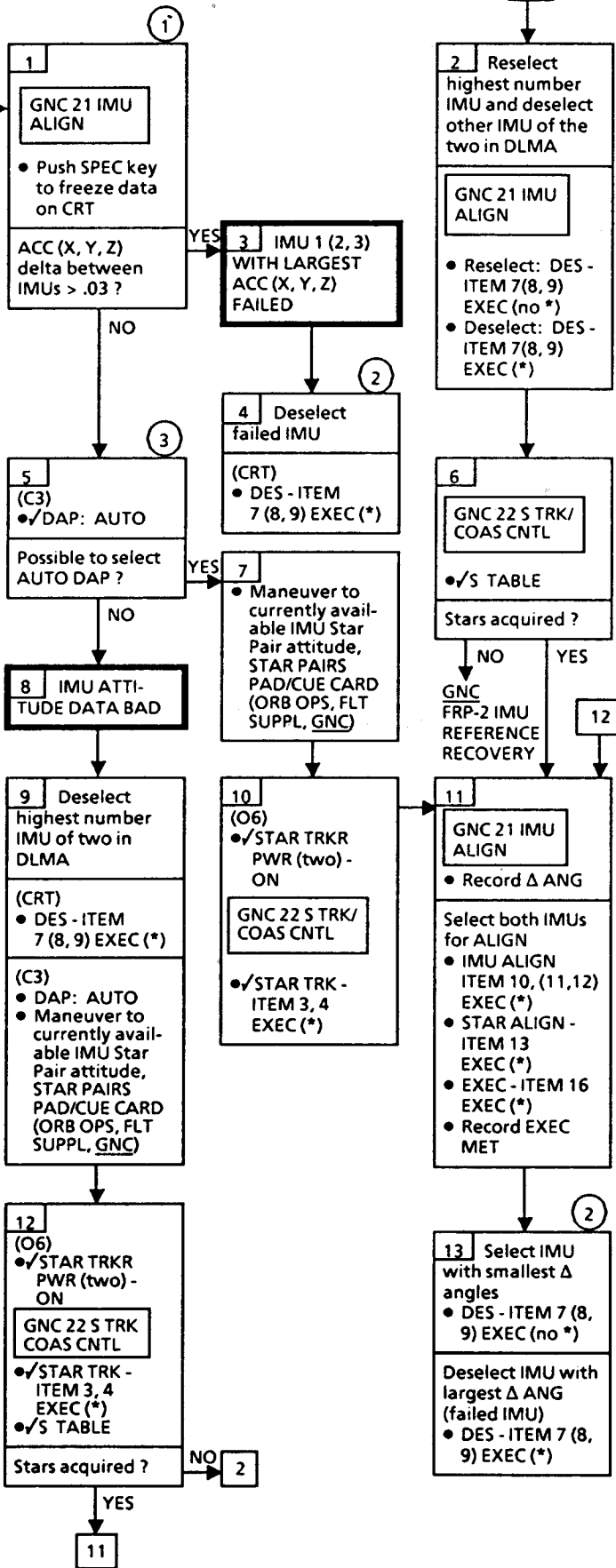
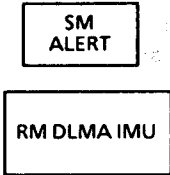
GNC
8

IMU

8.1

GNC

8.1a RM DLMA IMU

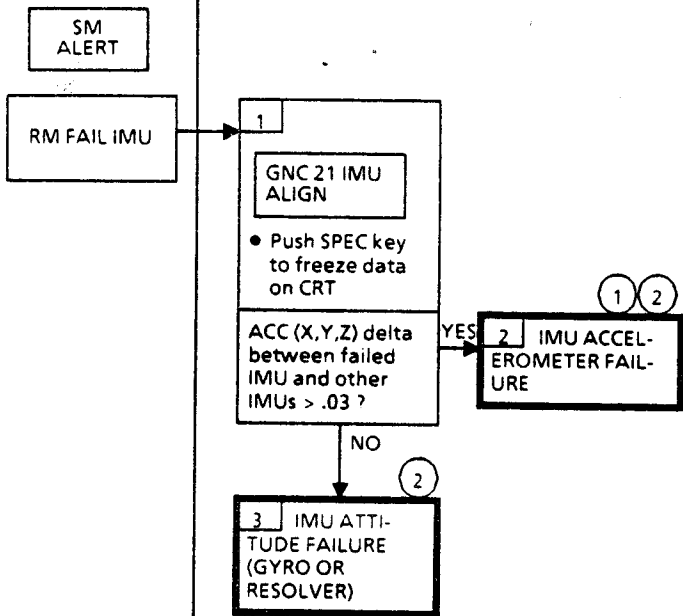


- ① ACC(X,Y,Z) value of .03 equivalent to 938 ug (RM threshold 951 ug)
- ② ✓MCC for recovery of failed IMU
- ③ Attitude threshold incr WRT time from last alignment. If attitude error exceeds 1 deg (IMU ATT DG = 0) Orbital Dap downmodes to MAN/PULSE

731

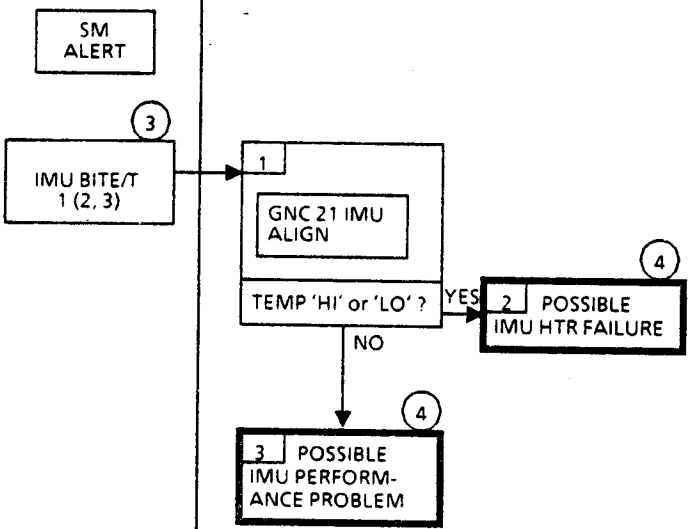
GNC

8.1b RM FAIL IMU



- ① IMU still good attitude source if needed
- ② ✓MCC for possible recovery of IMU. BFS does not recognize PASS RM failures. If IMU still failed on entering OPS 3, deselect IMU in BFS (SPEC 51)
- ③ If BITE fail occurs only on remaining IMU in OPS 2 or 8, RM declares IMU failed and DAP will down-mode to MAN/PULSE
- ④ ✓MCC for validation or possible BITE masking

8.1c IMU BITE/T 1 (2,3)



- ③
- ④

CNTLR

8.2

GNC

8.2a RHC L(R,A)

First Fail

SM ALERT

RHC L(R,A) ①

If: L(R,A) RHC fails tracking test limits

RM TRACKING TEST LIMITS:
29% Roll
22% Pitch
20% Yaw

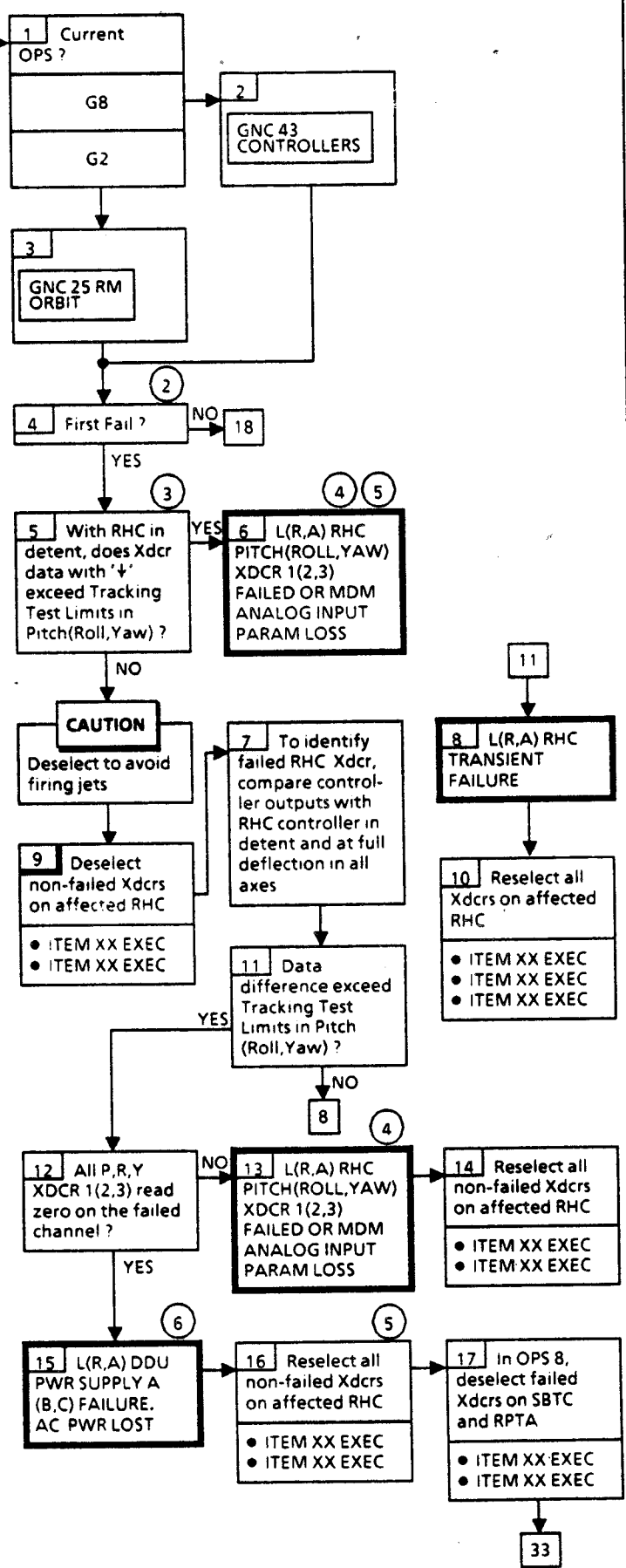
Second Fail

LEFT RHC (F7)
or
RIGHT/AFT RHC (F7) ①

RHC L(R,A)

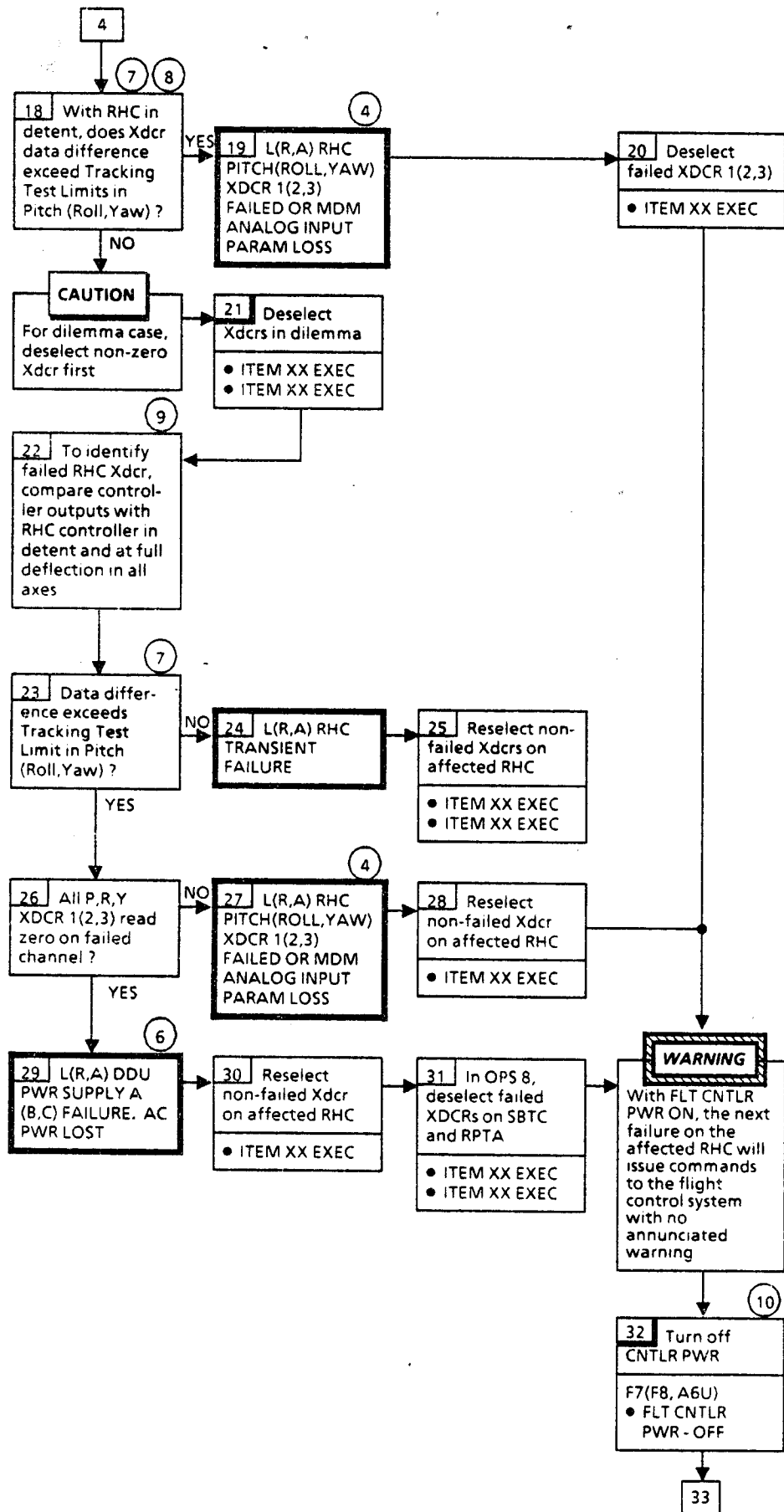
If: L(R,A) RHC fails tracking test limits for two channels available

Nominal Config:
(O14:E)
cb MNA DDU (two) - cl
(O15:E)
cb MNB DDU (two) - cl
(O16:E)
cb MNC DDU (two) - cl



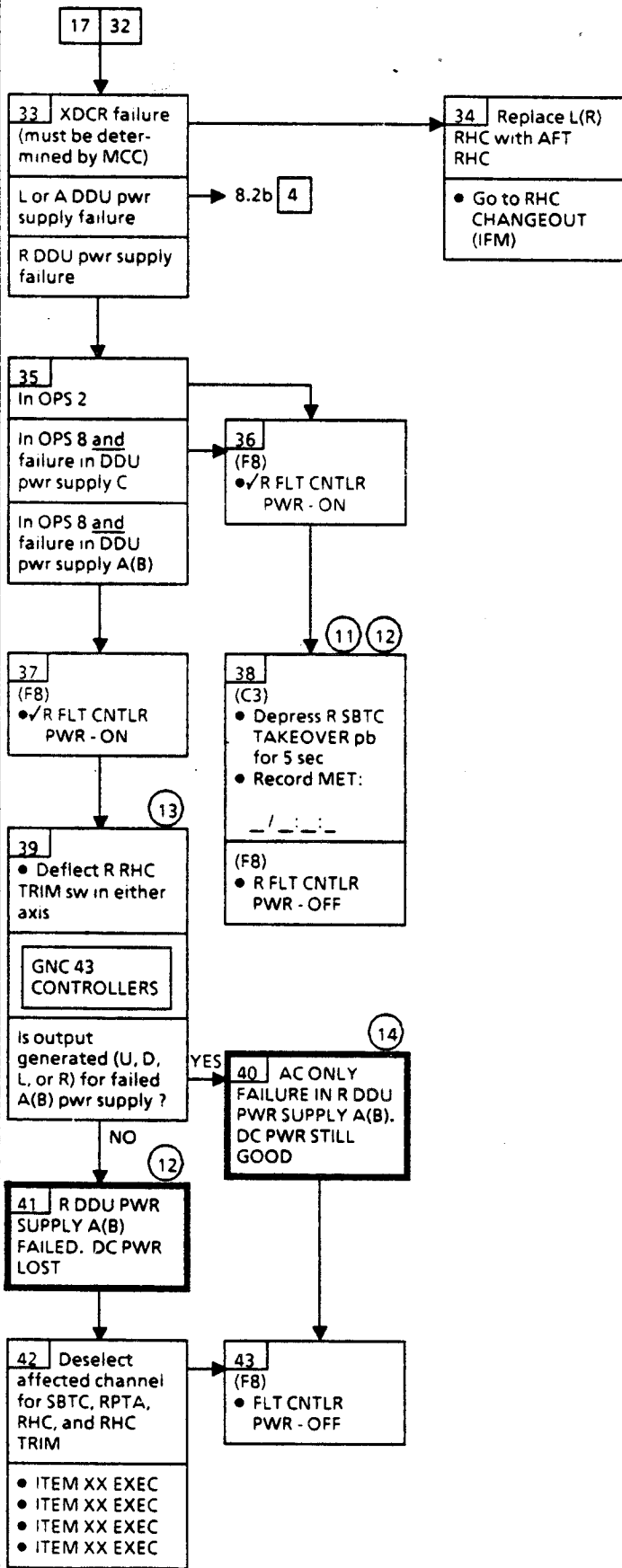
- ① Not available in BFS
- ② First Fail indications are shown in the left column of this page
- ③ RM Tracking Test Limits are shown in the left column of this page. Bad channel must disagree with good channel(s) by RM limit to declare dilemma (failure)
- ④ MDM port moding (OPS 2.3.8 only) may regain parameters. ✓MCC before moding
- ⑤ Next failure in any axis of same RHC will cause a dilemma and zero output of RHC
- ⑥ If DDU's AC pwr fails, corresponding channel on SBTC and RPTA lost at this flight station

GNC 8.2a (Cont)



- ④ MDM port moding (OPS 2,3,8 only) may regain parameters. ✓MCC before moding
- ⑥ If DDU's AC pwr fails, corresponding channel on SBTC and RPTA lost at this flight station
- ⑦ RM Tracking Test Limits are shown in the left column of previous page
- ⑧ Software will not honor outputs from RHC when dilemma in an axis is detected
- ⑨ Full scale deflection is >92% for P,R and >88% for Y
- ⑩ With FLT CNTLR PWR turned OFF, RHC, SBTC, RPTA, THC, RHC TRIM functions lost at this flight station

GNC 8.2a (Cont)



11 TAKEOVER pb depressed so that MCC can determine whether pwr supply A(B,C) is outputting DC voltage

12 If R DDU's DC pwr fails, corresponding channels on SBTC, RPTA, THC, RHC, and RHC TRIM are lost at this flight station. BFS engage capability also lost on R RHC

13 This action will allow crew to determine whether pwr supply A(B) is outputting DC voltage

14 AC pwr affects only those controllers that use transducers (RHC, SBTC, RPTA). DC pwr affects cntlrs that use AC pwr plus THC, RHC TRIM, and BFS ENGAGE

GNC

8.2b SBTC/THC L(R,A)

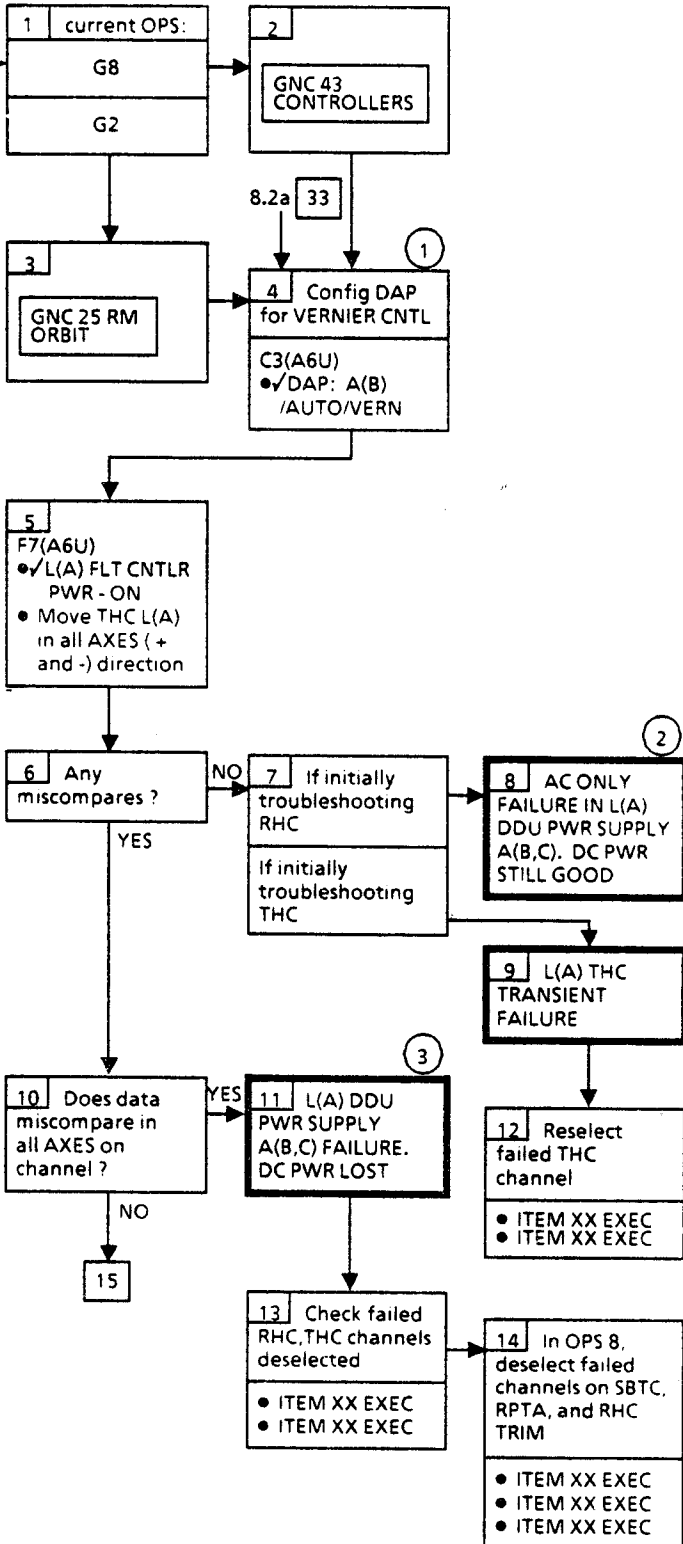
SM
ALERT

SBTC/THC L(R,A)

If:
L(A) THC X(Y,Z)
1(2,3) contact
failure
L(A) THC X(Y,Z)
1(2,3) contact
disagree

Nominal Config:

- (O14:E)
- cb MNA DDU
- (two) - cl
- (O15:E)
- cb MNB DDU
- L - cl
- R - op
- (O16:E)
- cb MNC DDU
- R - op
- AFT - cl

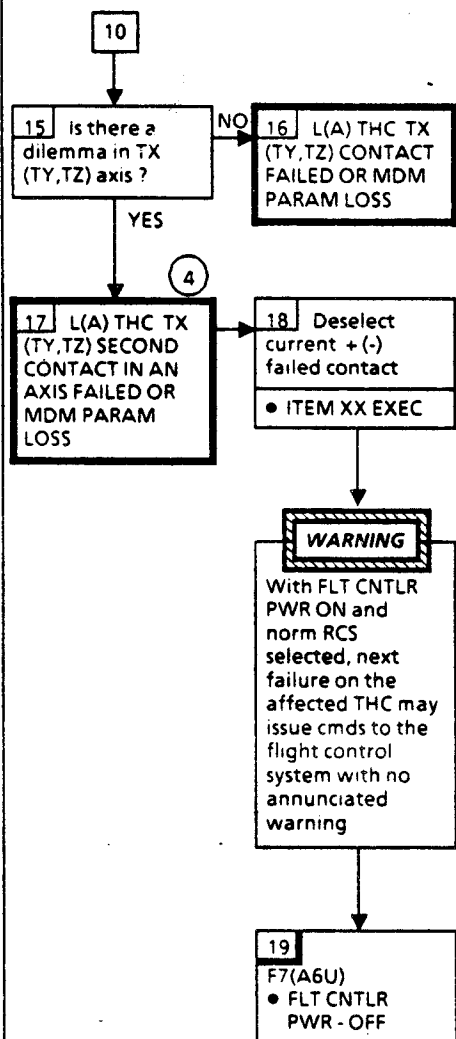


① Prevents firing jets

② AC pwr affects only those controllers that use transducers (RHC, SBTC, RPTA). DC pwr affects cntlrs that use AC pwr plus THC, RHC TRIM, and BFS ENGAGE

③ If DDU's DC pwr fails, corresponding channel on SBTC, RPTA, THC, RHC, and RHC TRIM lost at this flight station. If L DDU, then BFS engage capability is lost on L RHC

GNC 8.2b (Cont)



4 Subsequent failures will not be annunciated from this axis

GNC

8.3a STAR TRKR BITE

① BITE expected during self-test

① Star Tracker BITE

If:

GNC 22 S TRK/COAS CNTL

STAR TRKR BITE pwr supply out-of-tolerance, input data word failure, or loss of pressurization (P < 14.7 psia)

1 Obtain memory addresses of affected STAR TRKR HDW words from (REF DATA, FLT SUPPL, MAL ADD, GNC)

	TRKR	Address
-Z	HDW WD 1	(1)
	HDW WD 2	(2)
-Y	HDW WD 1	(3)
	HDW WD 2	(4)

2 GPC memory readout of failed STAR TRKR HDW words 1 and 2

GNC 0 GPC MEMORY

- DATA - ITEM 20 (*)
- HEX - ITEM 27 (*)
- ADD ID ITEM 28 + ----- EXEC (HDW WD 1)
- ADD ID ITEM 30 + ----- EXEC (HDW WD 2)

HDW WD 2 right-most digit 1 ?

3 PRESSURIZATION FAILURE. STAR TRKR OPS, ACCURACY NOT AFFECTED

4 HDW WD 1 left-most digit '8' or '9' ?

5 CMD WORD FAILURE. CONTINUOUS OR INTERMITTENT FAILURE OF TRKR TO ACQUIRE STARS. ACCURACY OF COMPLETED MEASUREMENTS NOT DEGRADED. TRKR MAY BE USED BUT NOT DEPENDABLE

6 GNC 22 S TRK/COAS CNTL

One TRKR failed previously ?

7 Collect star data using currently available IMU Star Pair, STAR PAIRS PAD/CUE CARD (ORB OPS, FLT SUPPL, GNC)

8 Collect data with COAS using COAS Star Pair. Maneuver to COAS Star Pair attitude for appropriate COAS location, STAR PAIRS PAD/CUE CARD (ORB OPS, FLT SUPPL, GNC). Record torquing angles

COAS and TRKR torque angles agree within 0.2 deg ?

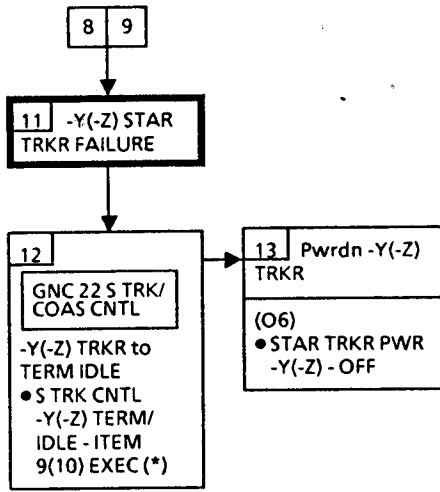
9 Collect data with one star in each TRKR

Data from suspect TRKR accepted into table ?

11

11

10 Adequate STAR TRKR performance for non-critical alignments

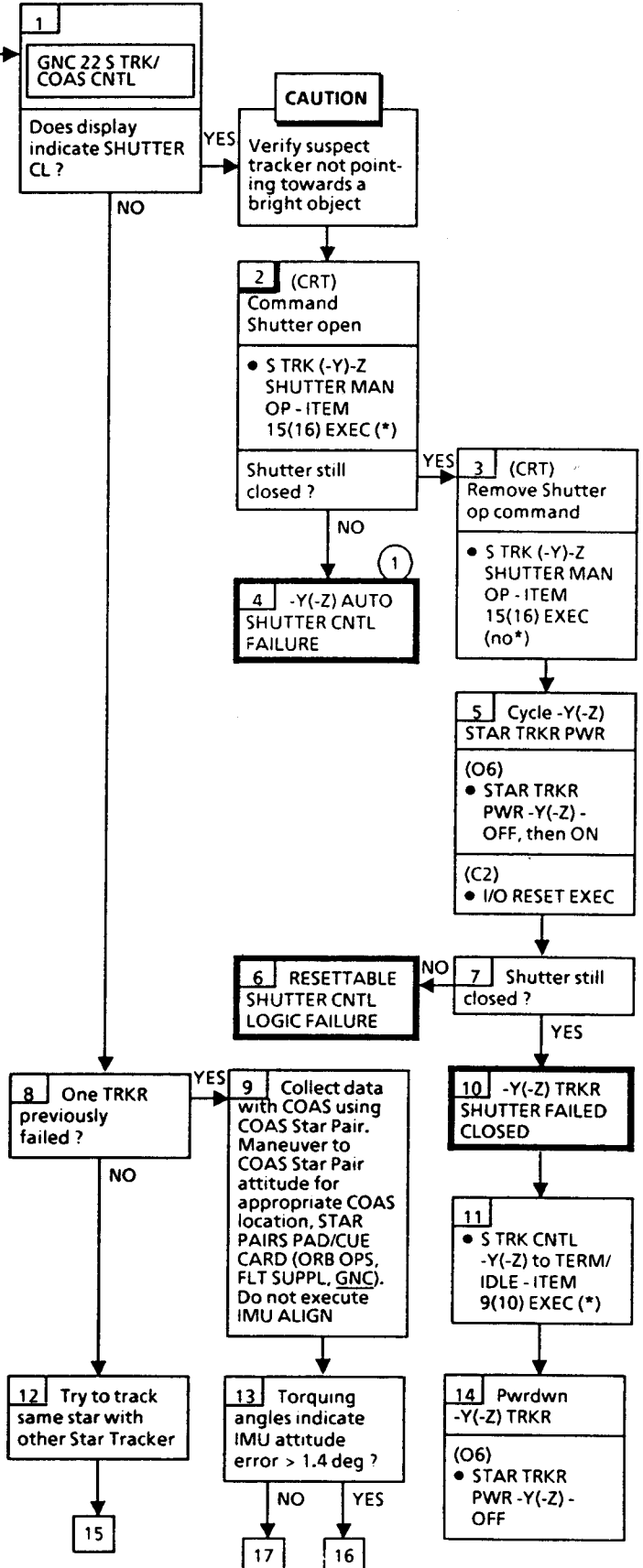


① Shutter commanded open; no bright object protection

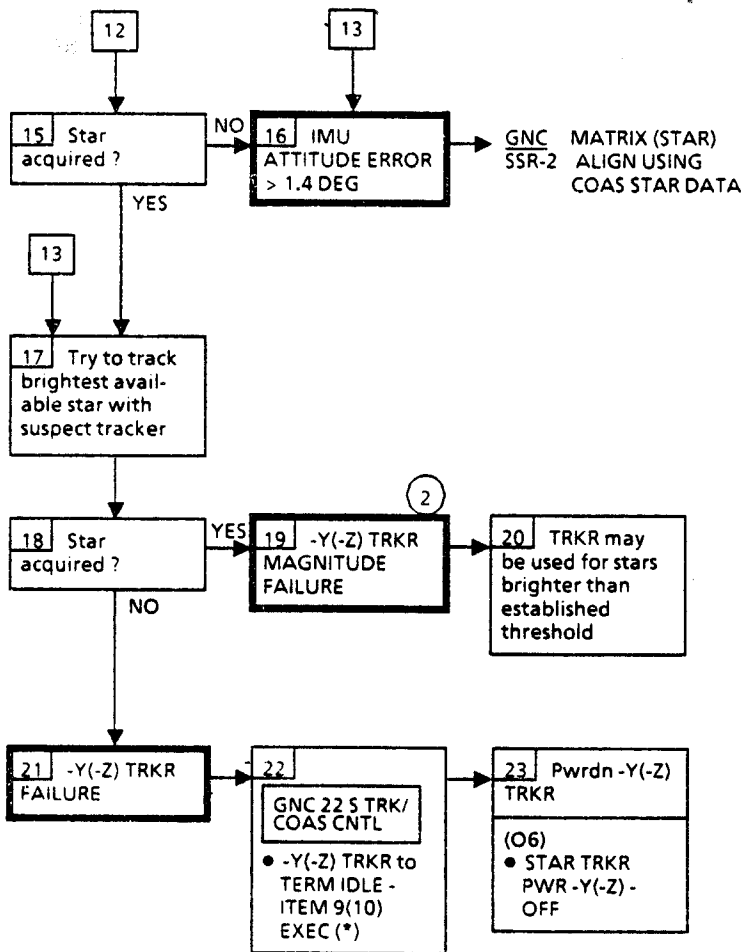
-Y(-Z) Tracker Fails To Acquire Star

If:
 IMU attitude error > 1.4 deg
 Shutter failed closed
 Auto shutter control system failed closed
 Tracker sensitivity decr

Nominal Config:
 (O6)
 STAR TRKR
 DR CNTL SYS 1(2) - OFF
 DR POS -Y(-Z) tb - OP
 PWR -Y(-Z) - ON
 (O14:E)
 cb MNA STAR TRKR -Z - cl
 (O15:E)
 cb MNB STAR TRKR -Y - cl



GNC 8.3b (Cont)



2 Select star from middle of catalog, then one from the middle of brighter or dimmer half, depending on whether or not first star acquired. Continue as time and consumables permit to establish threshold

GNC

8.4a COAS FAIL

No Reticle

If:
Burned-out bulb
Pwr sply dimmer
ckt failure
Unpowered
receptacles

Nominal Config:
(O1)
COAS - ON
or
(O19)
COAS PWR - ON
(L4:Q)
cb AC3 φA LTG
COAS - cl

1 Move COAS
electrical connec-
tion to other
location

2 Reticle
restored ?

YES 3 PWR LOST
AT FIRST COAS
RECEPTACLE

NO 4 Change bulb

5 Reticle
restored ?

NO 6 COAS PWR
SPLY OR DIMMER
CNTL CKT
FAILURE

YES 7 BURNED-OUT
BULB

① COAS reticle
may be restored
with flashlight

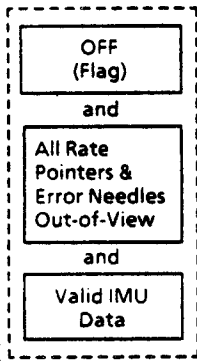
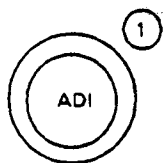
COAS

8.4

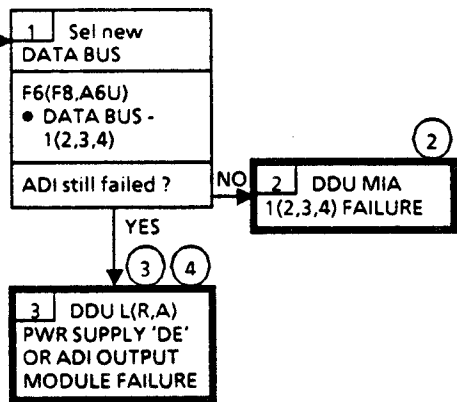
742

GNC

8.5a OFF FLAG, ALL RATE POINTERS & ERROR NEEDLES OUT-OF-VIEW, VALID IMU DATA

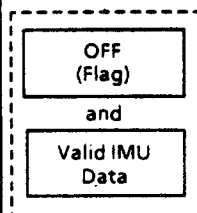


If: DDU failure
ADI failure

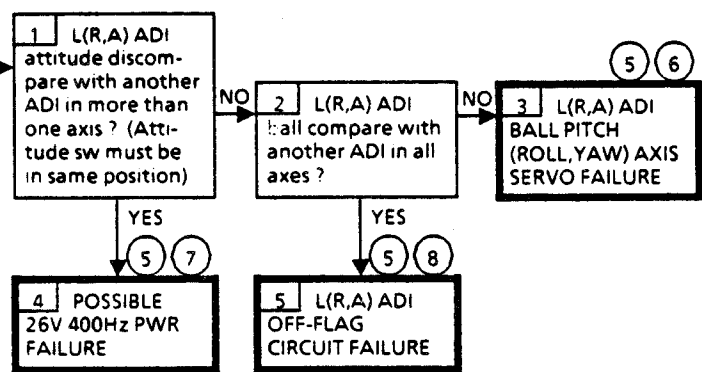


- ① Available in BFS
- ② Failure affects L(R) ADI, AMI, AVVI, and HSI
- ③ L(R,A) ADI not usable. Fwd ADI may be replaced with Aft ADI, time permitting. ✓MCC
- ④ Pwr sply D failure not detected by DDU good discrete on TLM
- ⑤ Fwd ADI may be replaced with Aft ADI, time permitting. ✓MCC
- ⑥ L(R,A) ADI not usable for attitude in affected axis
- ⑦ L(R,A) ADI not usable for attitude in any axis
- ⑧ L(R,A) ADI may be usable for attitude in all axes

8.5b OFF FLAG, VALID IMU DATA



If: Sustained pitch (yaw,roll) attitude servo error > 6 deg
26V 400Hz pwr failure
Flag circuit failure

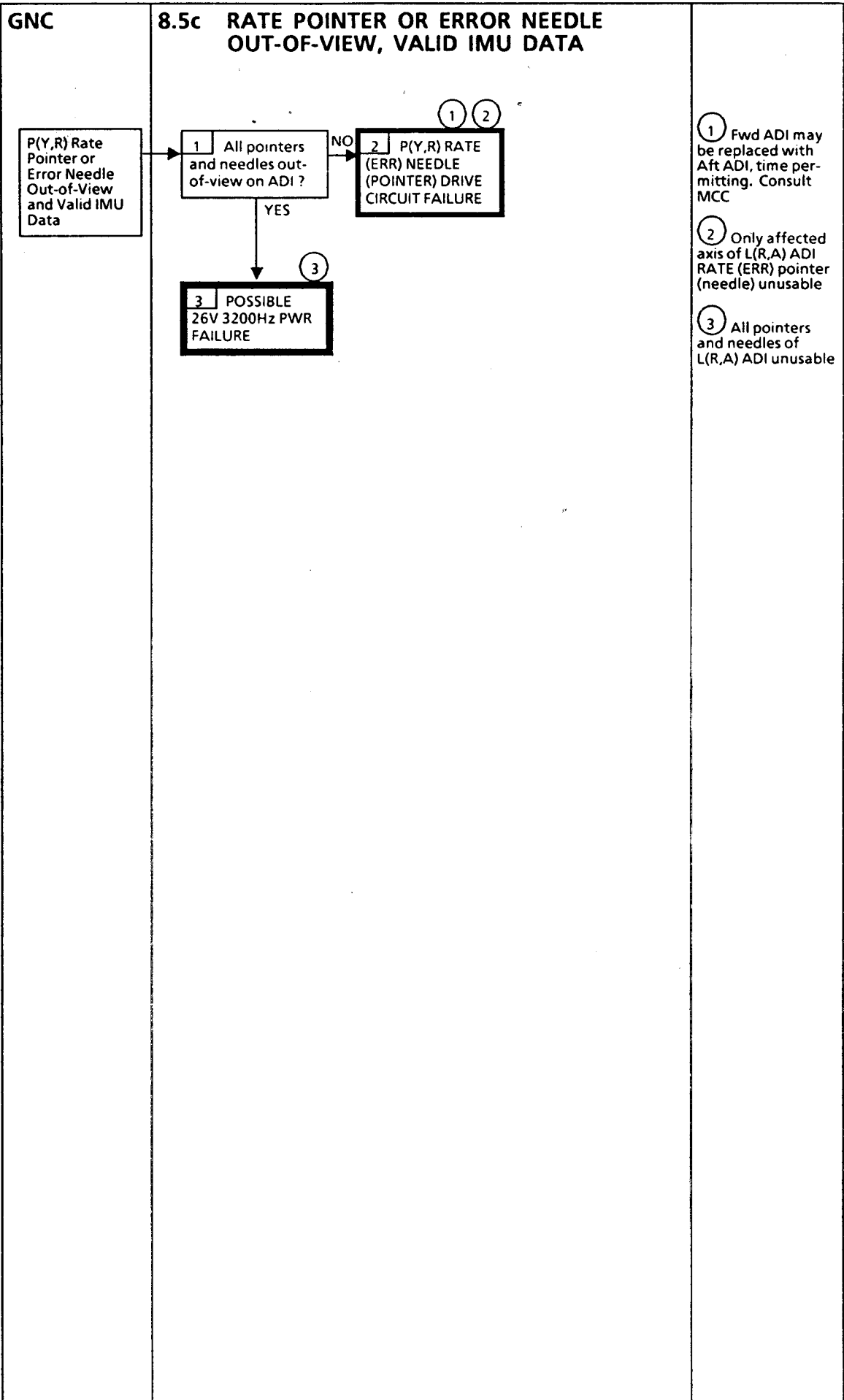


Nominal Config:
(O14:E)
cb MNA DDU L (AFT) - cl
(O15:E)
cb MNB DDU L (R) - cl
(O16:E)
cb MNC DDU R (AFT) - cl

ADI

8.5

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GNC FRP

GNC FRP-1 IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D

GNC FRP

NOTE

Preferable to accomplish this procedure in GNC OPS 2;
however, it is also valid for MM301

- 06 1. Ensure pwr ON to both STAR TRKR and doors open
✓STAR TRKR PWR (two) - ON
✓DR CNTL SYS (two) - OP
2. Mass Memory Read of IMU calibration data (gyro and accel biases,
scale factors, etc.) computed in preflight cal

GNC 21 IMU ALIGN

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

NOTE

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

3. Reselect one IMU for attitude reference

GNC 21 IMU ALIGN

- ✓IMU 1,2, or 3: DES - ITEM 7,8, or 9 (no *)
Deselect remaining two IMUs
✓IMU DES - ITEM 7(8,9) (*)

4. Perform Matrix Align of IMUs 1,2,3 in MATRIX (STAR) ALIGN USING
COAS STAR DATA..... GNC SSR-2

5. Reselect all deselected IMUs

GNC 21 IMU ALIGN

IMU DES - ITEM 7(8,9) EXEC (no *)

NOTE

Do not proceed until uplink of REFSMMATs verified with MCC

6. Reestablish skew between IMUs with IMU TO IMU ALIGN
Perform IMU ALIGNMENT IMU/IMU - IMUs 1,2,3 using best IMU
as reference (ORB OPS, GNC)

NOTE

IPL causes loss of previous COAS CAL.
✓MCC for performing CAL

7. Go to IMU ALIGN - S TRK (ORB OPS, GNC)

GNC FRP-2 IMU REFERENCE RECOVERY

NOTE

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

- O6 1. Apply pwr to both STAR TRKRs
✓STAR TRKR PWR -Y,-Z - ON
- O14A, 2. Ensure pwr applied to all IMUs
O15A, IMU 1,2,3 - ON
O16A If not, ACTIVATE IMU(s).....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 (≤ 4 min), then GNC I/O RESET EXEC

4. 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 (*)

5. Perform MATRIX ALIGN IMUs 1,2,3 USING COAS STAR DATA.....SSR-2

6. Reselect all deselected IMUs

GNC 21 IMU ALIGN

✓IMUs: DES - ITEM 7(8,9) EXEC (no *)

7. Reestablish skew between IMUs with IMU TO IMU ALIGN
Perform IMU/IMU ALIGNMENT - IMUs 1,2,3 using best IMU as
reference, GNC (ORB OPS)

8. 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 (*)

- O14A, O15A, O16A
2. Ensure pwr applied to all IMUs
If not, ACTIVATE IMU(s) 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 (≤ 4 min), then GNC I/O RESET EXEC

4. 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 the align - IMU to IMU ALIGNMENT (ORB OPS, GNC)

NOTE

Both nonreference IMUs should be aligned to preclude possibility of IMU RM FAIL (RM threshold reset following any align)

5. Reselect IMUs previously deselected
If GNC OPS 3:

GNC 50 HORIZ SIT

NAV DELTA zero update

GNC 21 IMU ALIGN

DES - ITEM 7(8,9) EXEC (no *)

GNC SSR-1 ACTIVATE IMU(s)

O6 ✓MDM FF 1(2,3) - ON
 O14,O15, IMU 1(2,3) - ON
 O16:A
 L1 ✓IMUFAN 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 (*)
 ✓IMU 1(2,3): OPER - ITEM 4(5,6) EXEC (*)

NOTE

If ITEMS 4,5, or 6 executed, wait for asterisks to appear (≤ 4 min), then GNC I/O RESET EXEC

GNC SSR

GNC SSR-2 MATRIX (STAR) ALIGN USING COAS 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 PULSE mode. If OPS 301, AFT station and GNC SPEC 20 (DAP CONFIG) not available. Therefore, use + X COAS location (Barrel Index - FW) and PULSE mode

O19(O1) COAS PWR - ON
 COAS ✓Barrel Index - OW(FW)
 A6U If using -Z COAS, ✓SENSE - -Z
 A6U(F7) ✓FLT CNTLR PWR - ON

if OPS 2:

GNC 20 DAP CONFIG

Config DAP to B5 (VERN)
 B1 (NORM)

or

NOTE

A6U(C3) Option 1: DAP ROT: DISC/DISC/DISC(VERN)
 Option 2: DAP ROT: PULSE/PULSE/PULSE(P RCS or VERN)

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

If + X(-Z) ADI to be used as reference for single axis rotation, position ADI ATT sw on pnl F6(A6U) 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

A6U(C3) POS -Z(+ X) - ITEM 27(26) EXEC
SIGHT mode - ITEM 22 EXEC (*)
DAP: as reqd for precise manual mnvr
Mnvr to center star in COAS:

CAUTION

Use ATT REF pb serviced by operable MDM:
F6-FF1, F8-FF2, A6U-FF3

A6U(F6) 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

A6U(C3) DAP: as reqd for large manual mnvr
Mnvr to second COAS star att

NOTE

Second star should be > 35 deg and < 145 deg from the first

CRT COAS REQD ID - ITEM 21 + ___ EXEC
A6U(C3) DAP: as reqd for precise manual mnvr
Mnvr to center star in COAS:
A6U(F6) 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 - (*)
A6U (F7) FLT CNTLR PWR - OFF

GNC 21 IMU ALIGN

✓IMU 1(2,3) STAT - (blank)
ALIGN IMU 1(2,3) - ITEM 10(11,12) EXEC (*)
If Matrix Align
ALIGN MATRIX - ITEM 15 EXEC (*)
A6U(C3) ✓DAP: MAN
DAP ROT: PULSE/PULSE/PULSE
CRT or EXEC - ITEM 16 EXEC (*), Rcd MET ___:___:___
✓EXEC - ITEM 16 - (no*)
DAP as reqd
If Star Align
STAR ALIGN - ITEM 13 EXEC (*)
✓ANG 1,2,3 ΔX, ΔY, ΔZ - < = .80
Rcd ANG 1 2 3
ΔX () ___ () ___ () ___
ΔY () ___ () ___ () ___
ΔZ () ___ () ___ () ___

GNC SSR-2 (Cont)

CAUTION

If ANG $\Delta X, \Delta Y, \Delta Z > .80$ for 2 or more IMUs:
DO NOT TORQUE PLATFORMS EXCEPT UNDER
MCC INSTRUCTIONS

CRT EXEC - ITEM 16 EXEC (*); Rcd MET _____
✓ EXEC - ITEM 16 - (no *)

O19 COAS PWR - OFF
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)

GNC SSR-3 MATRIX ALIGN USING STR TRKR STAR DATA

NOTE

Procedure assumes 5 TRKs on at least 15 min and vehicle
at 5 TRK star attitude. DAP as reqd for star trk ops

GNC 22 S TRK/COAS CNTL

✓ S TRK -Y, -Z REQD ID, ITEM 11,12 - 0
STATUS - (no BITE)
SHUTTER - OP
✓ S TABLE CLR - ITEM 20 EXEC (*)
STAR TRK -Y, -Z - ITEM 3,4 EXEC (*)
✓ S TABLE TRK ID 1,2 - (reqd ID)
ANG ERR - < .09, Rcd _____
SEL - ITEM 17,18 (*)

GNC 21 IMU ALIGN

✓ IMU 1(2,3) STAT - (blank)
MATRIX - ITEM 15 EXEC (*)
ALIGN IMU 1(2,3) - ITEM 10(11,12) EXEC (*)
EXEC - ITEM 16 EXEC (*) Rcd MET _____
✓ EXEC - ITEM 16 (no *)

GNC SSR-4 GPC READ/WRITE FOR MASKING IMU BITE

NOTE

Procedure used whenever MCC determines that IMU BITE should be masked to preclude erroneous failure of IMU at the two level (any OPS) or one level (OPS 2 only).
Procedure verified for use in PASS GPCs for GNC OPS 201 and 301 only. READ/WRITE carried across OPS transitions. Prior to first masking of IMU BITE word, actual word will read 'FFFC.' If second BITE is being masked on same IMU, actual mask word will no longer read 'FFFC.' MCC will determine FINAL ACTUAL.
Refer to (REF DATA, FLT SUPPL, MAL ADD; GNC) for memory address to mask BITE. If MCC has not identified BITE to be masked, refer to IMU HARDWARE (SOFTWARE) BITE, (REF DATA, FLT SUPPL, MEM READ)

1 GNC 0 GPC MEMORY

Perform MEMORY READ/WRITE for applicable BITE bits as determined by MCC
✓HEX - ITEM 27 (*)
BIT RST - ITEM 23 EXEC (*)
ADD ID: ITEM 28 + _____ EXEC
✓ACTUAL = INITIAL ACTUAL values in DATA TABLE
DESIRED - ITEM 29 + _____ EXEC
WRITE - ITEM 25 EXEC
✓ACTUAL = FINAL ACTUAL values in DATA TABLE

GNC SSR-4 (Cont)

DATA TABLE PASS OPS 1,2,3,6,8

PARAM NAME CGMB_IMU_BITE_MASK	ADDRESS	DESIRED	INITIAL ACTUAL	FINAL ACTUAL
IMU 1				
1. IMU GOOD		8000	FFFC	7FFC
2. TRANS 2 FAIL		4000	FFFC	8FFC
3. 1 FAIL		2000	FFFC	DFFC
4. FAIL RED RTE		1000	FFFC	EFFC
5. IR NULL		0800	FFFC	F7FC
6. RES LIM		0400	FFFC	FBFC
7. VEL LIM		0200	FFFC	FDFC
8. ECHO 2	(1)	0100	FFFC	FEFC
9. ECHO 1		0080	FFFC	FF7C
10. ACCEL SF		0040	FFFC	FFBC
11. PLAT TEMP RDY		0020	FFFC	FFDC
12. SAFE		0010	FFFC	FFEC
13. CAPRI TEMP RDY		0008	FFFC	FFF4
14. TEMP SAFE		0004	FFFC	FFF8
15. SPARE		N/A	N/A	N/A
16. SPARE		N/A	N/A	N/A
IMU 2				
1. IMU GOOD		8000	FFFC	7FFC
2. TRANS 2 FAIL		4000	FFFC	8FFC
3. 1 FAIL		2000	FFFC	DFFC
4. FAIL RED RTE		1000	FFFC	EFFC
5. IR NULL		0800	FFFC	F7FC
6. RES LIM		0400	FFFC	FBFC
7. VEL LIM		0200	FFFC	FDFC
8. ECHO 2	(2)	0100	FFFC	FEFC
9. ECHO 1		0080	FFFC	FF7C
10. ACCEL SF		0040	FFFC	FFBC
11. PLAT TEMP RDY		0020	FFFC	FFDC
12. SAFE		0010	FFFC	FFEC
13. CAPRI TEMP RDY		0008	FFFC	FFF4
14. TEMP SAFE		0004	FFFC	FFF8
15. SPARE		N/A	N/A	N/A
16. SPARE		N/A	N/A	N/A
IMU 3				
1. IMU GOOD		8000	FFFC	7FFC
2. TRANS 2 FAIL		4000	FFFC	8FFC
3. 1 FAIL		2000	FFFC	DFFC
4. FAIL RED RTE		1000	FFFC	EFFC
5. IR NULL		0800	FFFC	F7FC
6. RES LIM		0400	FFFC	FBFC
7. VEL LIM		0200	FFFC	FDFC
8. ECHO 2	(3)	0100	FFFC	FEFC
9. ECHO 1		0080	FFFC	FF7C
10. ACCEL SF		0040	FFFC	FFBC
11. PLAT TEMP RDY		0020	FFFC	FFDC
12. SAFE		0010	FFFC	FFEC
13. CAPRI TEMP RDY		0008	FFFC	FFF4
14. TEMP SAFE		0004	FFFC	FFF8
15. SPARE		N/A	N/A	N/A
16. SPARE		N/A	N/A	N/A

GNC SSR-5 GPC READ/WRITE FOR IMU CALIBRATION TERMS

NOTE

Procedure changes IMU Accelerometer Bias and Gyro Bias in PASS and BFS if uplink capability for these terms lost. Accelerometer Scale Factor can be changed only via READ/WRITE.

Procedure verified for use in GNC OPS 201 and 301 in PASS, OPS 301 in BFS. OPS transition (i.e., OPS 2 to 8, OPS 3 to 2, etc.) reqd before WRITE will take effect in PASS, with the exception of Gyro Bias entered in OPS 3. No OPS transition reqd in BFS. For memory addresses, refer to (REF DATA, FLT SUPPL, MAL ADD; GNC).

Mass Memory Read (GNC 21 IMU ALIGN, ITEM 19) or IPL of all GNC computers will initialize these terms back to their prelaunch values

CRT1

✓Desired display

GNC 0 GPC MEMORY

or

BFS, GNC 0 BFS MEMORY

Perform memory READ/WRITE for applicable params and data as determined by MCC in PASS and BFS

NOTE

Each param in table has two HEX words for address and data

PASS

✓DATA - ITEM 20*

✓HEX - ITEM 27*

ADD ID - ITEM 28 + _ _ _ _ _ EXEC

- ITEM 30 + _ _ _ _ _ EXEC

✓ACTUAL = INITIAL ACTUAL values provided by MCC

DESIRED - ITEM 29 + _ _ _ _ _ EXEC

- ITEM 31 + _ _ _ _ _ EXEC

WRITE - ITEM 25 EXEC

✓ACTUAL = DESIRED

BFS

✓DATA - ITEM 1*

✓HEX - ITEM 8*

ADD ID - ITEM 9 + _ _ _ _ _ EXEC

- ITEM 11 + _ _ _ _ _ EXEC

✓ACTUAL = INITIAL ACTUAL values provided by MCC

DESIRED - ITEM 10 + _ _ _ _ _ EXEC

- ITEM 12 + _ _ _ _ _ EXEC

WRITE - ITEM 6 EXEC

✓ACTUAL = DESIRED

DATA TABLE 1 - PASS OPS 2,3

NOTE

Each param has two HEX words for address and data associated with each address. For memory addresses, refer to (REF DATA, FLT SUPPL, MAL ADD; GNC)

PARAM (HAL NAME - IMU/AXIS)	ADDRESS	DESIRED	INITIAL ACTUAL
A. Gyro bias (restraint) CGMS_GYREST		TBS by MCC	TBS by MCC
IMU 1/X-AXIS	(1)		
	(2)		
IMU 1/Y-AXIS	(3)		
	(4)		
IMU 1/Z-AXIS	(5)		
	(6)		
IMU 2/X-AXIS	(7)		
	(8)		
IMU 2/Y-AXIS	(9)		
	(10)		
IMU 2/Z-AXIS	(11)		
	(12)		
IMU 3/X-AXIS	(13)		
	(14)		
IMU 3/Y-AXIS	(15)		
	(16)		
IMU 3/Z-AXIS	(17)		
	(18)		
B. Accelerometer Bias CGMS_ACC_BILO		TBS by MCC	TBS by MCC
IMU 1/X-AXIS	(19)		
	(20)		
IMU 1/Y-AXIS	(21)		
	(22)		
IMU 1/Z-AXIS	(23)		
	(24)		
IMU 2/X-AXIS	(25)		
	(26)		
IMU 2/Y-AXIS	(27)		
	(28)		
IMU 2/Z-AXIS	(29)		
	(30)		
IMU 3/X-AXIS	(31)		
	(32)		
IMU 3/Y-AXIS	(33)		
	(34)		
IMU 3/Z-AXIS	(35)		
	(36)		
C. Accelerometer Scale Factor CGMS_ACC_SFLO		TBS by MCC	TBS by MCC
IMU 1/X-AXIS	(37)		
	(38)		
IMU 1/Y-AXIS	(39)		
	(40)		
IMU 1/Z-AXIS	(41)		
	(42)		
IMU 2/X-AXIS	(43)		
	(44)		
IMU 2/Y-AXIS	(45)		
	(46)		
IMU 2/Z-AXIS	(47)		
	(48)		
IMU 3/X-AXIS	(49)		
	(50)		
IMU 3/Y-AXIS	(51)		
	(52)		
IMU 3/Z-AXIS	(53)		
	(54)		

DATA TABLE 2 - BFS OPS 3

NOTE

Each param has two HEX words for address and data associated with each address. BFS must be in STANDBY, RUN, or engaged before executing procedure. For memory addresses, refer to (REF DATA, FLT SUPPL, MAL ADD; GNC)

PARAM (HAL NAME - IMU/AXIS)	ADDRESS	DESIRED	INITIAL ACTUAL
A. Gyro Bias (restraint)		TBS by MCC	TBS by MCC
DFX - IMU 1/X-AXIS	(55)		
DFX - IMU 2/X-AXIS	(56)		
DFX - IMU 3/X-AXIS	(57)		
DFX - IMU 3/X-AXIS	(58)		
DFX - IMU 3/X-AXIS	(59)		
DFY - IMU 1/Y-AXIS	(60)		
DFY - IMU 2/Y-AXIS	(61)		
DFY - IMU 2/Y-AXIS	(62)		
DFY - IMU 2/Y-AXIS	(63)		
DFY - IMU 3/Y-AXIS	(64)		
DFY - IMU 3/Y-AXIS	(65)		
DFY - IMU 3/Y-AXIS	(66)		
DFZ - IMU 1/Z-AXIS	(67)		
DFZ - IMU 2/Z-AXIS	(68)		
DFZ - IMU 2/Z-AXIS	(69)		
DFZ - IMU 2/Z-AXIS	(70)		
DFZ - IMU 3/Z-AXIS	(71)		
DFZ - IMU 3/Z-AXIS	(72)		
B. Accelerometer Bias		TBS by MCC	TBS by MCC
KOX - IMU 1/X-AXIS	(73)		
KOX - IMU 2/X-AXIS	(74)		
KOX - IMU 2/X-AXIS	(75)		
KOX - IMU 3/X-AXIS	(76)		
KOX - IMU 3/X-AXIS	(77)		
KOX - IMU 3/X-AXIS	(78)		
KOY - IMU 1/Y-AXIS	(79)		
KOY - IMU 2/Y-AXIS	(80)		
KOY - IMU 2/Y-AXIS	(81)		
KOY - IMU 2/Y-AXIS	(82)		
KOY - IMU 3/Y-AXIS	(83)		
KOY - IMU 3/Y-AXIS	(84)		
KOZ - IMU 1/Z-AXIS	(85)		
KOZ - IMU 2/Z-AXIS	(86)		
KOZ - IMU 2/Z-AXIS	(87)		
KOZ - IMU 2/Z-AXIS	(88)		
KOZ - IMU 3/Z-AXIS	(89)		
KOZ - IMU 3/Z-AXIS	(90)		
C. Accelerometer Scale Factor		TBS by MCC	TBS by MCC
KIX - IMU 1/X-AXIS	(91)		
KIX - IMU 2/X-AXIS	(92)		
KIX - IMU 2/X-AXIS	(93)		
KIX - IMU 3/X-AXIS	(94)		
KIX - IMU 3/X-AXIS	(95)		
KIX - IMU 3/X-AXIS	(96)		
KIY - IMU 1/Y-AXIS	(97)		
KIY - IMU 2/Y-AXIS	(98)		
KIY - IMU 2/Y-AXIS	(99)		
KIY - IMU 2/Y-AXIS	(100)		
KIY - IMU 3/Y-AXIS	(101)		
KIY - IMU 3/Y-AXIS	(102)		
KIZ - IMU 1/Z-AXIS	(103)		
KIZ - IMU 2/Z-AXIS	(104)		
KIZ - IMU 2/Z-AXIS	(105)		
KIZ - IMU 2/Z-AXIS	(106)		
KIZ - IMU 3/Z-AXIS	(107)		
KIZ - IMU 3/Z-AXIS	(108)		

**GNC SSR-6
BFS GPC READ/WRITE TO SUBSTITUTE FOURTH RGA,
AA, OR POSITION FEEDBACK**

NOTE

BFS performs MVs on elements 1,2,3. Element 4 not utilized by RM. Substitution of element 4 into slots 1,2, or 3 enables survival of BFS following second failure. Multi-param elements should be replaced in their entirety. Procedure may be performed anytime BFS active (i.e., MM301). For memory addresses, refer to (REF DATA, FLT SUPPL, MAL ADD; GNC)

GNC0 BFS MEMORY

- ✓HEX - ITEM 8 (*)
- CODE - ITEM 2 EXEC (*)
- ADD ID - ITEM 9 + _____ EXEC
- ✓ACTUAL = INITIAL ACTUAL in DATA TABLE
- DESIRED - ITEM 10 + _____ EXEC
- WRITE - ITEM 6 EXEC
- ✓ACTUAL = DESIRED

OPS3		DATA TABLE			
	FAILED PARAM	ADDRESS	DESIRED	INITIAL ACTUAL	
A.	ELVN Posn FDBK 1 LIB	(1)	6723	63AB	
	LOB	(2)	6724	63AC	
	RIB	(3)	6725	63AD	
	ROB	(4)	6726	63AE	
B.	ELVN Posn FDBK 2 LIB	(5)	6723	64D3	
	LOB	(6)	6724	64D4	
	RIB	(7)	6725	64D5	
	ROB	(8)	6726	64D6	
C.	ELVN Posn FDBK 3 LIB	(9)	6723	65FB	
	LOB	(10)	6724	65FC	
	RIB	(11)	6725	65FD	
	ROB	(12)	6726	65FE	
D.	RUDDER Posn FDBK 1	(13)	6728	63B0	
	2	(14)	6728	64D8	
	3	(15)	6728	6600	
E.	S/B Posn FDBK 1	(16)	6727	63AF	
	2	(17)	6727	64D7	
	3	(18)	6727	65FF	
F.	B/F Posn FDBK 1	(19)	6729	63B1	
	2	(20)	6729	64D9	
	3	(21)	6729	6601	
G.	RGA 1 R	(22)	672E	63B6	
	P	(23)	672F	63B7	
	Y	(24)	6730	63B8	
H.	RGA 2 R	(25)	672E	64DE	
	P	(26)	672F	64DF	
	Y	(27)	6730	64E0	
I.	RGA 3 R	(28)	672E	6606	
	P	(29)	672F	6607	
	Y	(30)	6730	6608	
J.	AA 1 NORM	(31)	66EC	6374	
	LAT	(32)	66EB	6373	
K.	AA 2 NORM	(33)	66EC	649C	
	LAT	(34)	66EB	649B	
L.	AA 3 NORM	(35)	66EC	65C4	
	LAT	(36)	66EB	65C3	

**GNC SSR-7
GRAVITY GRADIENT FREE DRIFT, OPS 3**

1. OVERRIDE FWD RCS MANIFOLDS

GNC 23 RCS

RCS FWD - ITEM 1 EXEC (*)
MANF VLVS STAT OVRD
1 CL - ITEM 40 EXEC
2 CL - ITEM 41 EXEC
3 CL - ITEM 42 EXEC
4 CL - ITEM 43 EXEC

2. CONFIG FOR FREE DRIFT

L1

FLASH EVAP CNTLR PRI (two) - OFF
✓SEC - OFF
✓HI LOAD DUCT HTR - OFF

NOTE

For memory addresses, refer to MAL ADD, GNC (REF DATA)

GNC 0 GPC MEMORY

✓DATA - ITEM 20*
ENG UNITS - ITEM 26 + 2 0 0 EXEC
ADD ID - ITEM 28 + (1) EXEC
(Roll Rate %/sec)
- ITEM 30 + (2) EXEC
(Pitch Rate %/sec)
- ITEM 32 + (3) EXEC
(YAW RATE %/sec)

3. - MNVR TO ATT AND ESTABLISH FREE DRIFT

F6
F7
C3

ADI ATT - LVLH
FLT CNTLR PWR - ON
DAP: A(B)/MAN/VERN
DAP ROT: PULSE/PULSE/PULSE
Mnvr to LVLH ATT (step 5)
When in Att, establish rates as given in step 5 to within following
limits:
Roll rate $\pm .02$
Pitch and Yaw rates $\pm .008$

NOTE

Display update of rates sluggish. Wait several sec between pulses

F7

When rates established:
FLT CNTLR PWR - OFF

GNC SSR-7 (Cont)

4. VEHICLE RECOVER AND FES RESTART

GNC 23 RCS

RCS FWD - ITEM 1 EXEC (*)

MANF VLV STAT OVRD

1 OP - ITEM 42 EXEC

2 OP - ITEM 43 EXEC

3 OP - ITEM 44 EXEC

4 OP - ITEM 45 EXEC

C3
O14,O15,
O16:F
C3

✓DAP: MAN
✓Primary RJD DRIVER (eight) - ON

DAP: AUTO

BFS, SM SYS SUMM 2

L1
CRT
L1
CRT
L1

if EVAP OUT T > 41 and ≤ 47
RAD CNTLR OUT TEMP - HI
When EVAP OUT T = 50 ± 2
FLASH EVAP CNTLR PRI A(B) - ON
RAD CNTLR OUT TEMP - NORM
if EVAP OUT T ≤ 41 or > 47
FLASH EVAP CNTLR PRI A(B) - ON

5. GRAVITY GRADIENT LVLH ATTITUDES AND RATES

	PLBD	ATT ID	LVLH ATT			BODY RATES		
			R	P	Y	R	P	Y
+	NORTH	A	249	268	358	+.00	+.02	-.06
X	SOUTH	B	111	268	2	-.00	+.02	+.06
L	IN-PLANE	C	4	271	0	+.00	-.07	+.00
V								
-	NORTH	D	291	92	358	+.00	-.02	-.06
X	SOUTH	E	69	92	2	-.00	-.02	+.06
L	IN-PLANE	F	184	89	0	+.00	+.07	-.00
V								

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 the CG. Actual burn will not be executed. When procedure completed, the L(R) OMS will be protected from loss due to PRI(SEC) GMBL pwr or data path failures

GNC, OPS 202(301,302) PRO

GNC XXXXX MNVR YYYYY

If L OMS to be positioned:
L OMS PRI(SEC) SEL - ITEM 28(30) EXEC

or

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

or

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-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 the CG. Actual burn will not be executed. When procedure completed, the L(R) OMS will be protected from loss due to PRI(SEC) GMBL pwr or data path failures

GNC, OPS 202(301,302) PRO

GNC XXXXX MNVR YYYYY

If L OMS to be positioned:
L OMS PRI(SEC) SEL - ITEM 28(30) EXEC

or

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

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

or

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

MECH

	RADIATOR POWER CONFIGURATION.....	9-2
	PLBD CLOSING TABLE.....	9-3
<u>9.1</u>	<u>PLB DOORS</u>	
9.1a	OP/CL NOT BLANK AFTER SEQ INITIATION.....	9-4
9.1b	PL BAY DOOR tb NOT bp DURING PLBD SEQ.....	9-4
9.1c	'PBD SW' INDICATES STOP.....	9-5
9.1d	'?' DISPLAYED IN OP/CL COLUMN.....	9-6
9.1e	PBD SEQ FAIL.....	9-7
9.1f	BOTH LATCH CL OR BOTH DOOR CL MICROSWITCHES = 1 AFTER OP COMMAND.....	9-9
9.1g	BOTH LATCH OP OR BOTH DOOR OP MICROSWITCHES = 1 AFTER CL COMMAND.....	9-10
9.1h	LATCH GANG DOES NOT OP IN SINGLE MOTOR TIME.....	9-11
9.1i	CL IN SINGLE MOTOR TIME.....	9-12
9.1j	DOOR DOES NOT OP TO AT LEAST ONE MICROSWITCH OPEN-INDICATOR.....	9-13
9.1k	DOOR DOES NOT CL.....	9-14
9.1l	PLBD OUT OF CONFIG.....	9-15
<u>9.2</u>	<u>RADIATOR</u>	
9.2a	STBD RAD LAT tb NOT bp.....	9-16
9.2b	tb NOT bp.....	9-18
9.2c	LAT tb NOT LAT OR REL IN 50 SEC.....	9-19
9.2d	tb NOT DPY OR STO IN 40 SEC.....	9-21
9.2e	PORT RAD LAT tb NOT bp.....	9-23
9.2f	tb NOT bp.....	9-25
9.2g	LAT tb NOT LAT OR REL IN 50 SEC.....	9-26
9.2h	tb NOT DPY OR STO IN 40 SEC.....	9-28
<u>9.3</u>	<u>ET UMB DOORS</u>	
9.3a	CTRLINE LAT tb NOT STO.....	9-30
9.3b	DRIVE tb NOT CL.....	9-31
9.3c	UNLOCK LAT tb NOT LAT.....	9-32
<u>9.4</u>	<u>PL RETEN</u>	
9.4a	PL RETEN RDY 1(2,3,4,5) tb NOT bp.....	9-34
9.4b	NOT gray.....	9-35
9.4c	LAT 1(2,3,4,5) tb NOT REL(LAT) AFTER 30 SEC.....	9-36
<u>9.5</u>	<u>KU ANT</u>	
9.5a	KU ANT tb NOT DPY IN 46 SEC.....	9-38
9.5b	NOT STO IN 46 SEC.....	9-39
<u>MECH SSR</u>		
SSR-1	PORT/STBD RAD OPS.....	9-42
SSR-2	CL PORT PLBD.....	9-43
SSR-3	SIMULTANEOUS PLBD CL.....	9-44
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SSR-5	CONTINGENCY KU-BD ANT DIRECT STOW (CIL).....	9-49
SSR-6	PLBD CL MICRO-SWITCH FAILURE WORKAROUND.....	9-50
SSR-7	KU-BAND ANTENNA DPY/STO MICRO/SW FAILURE.....	9-51

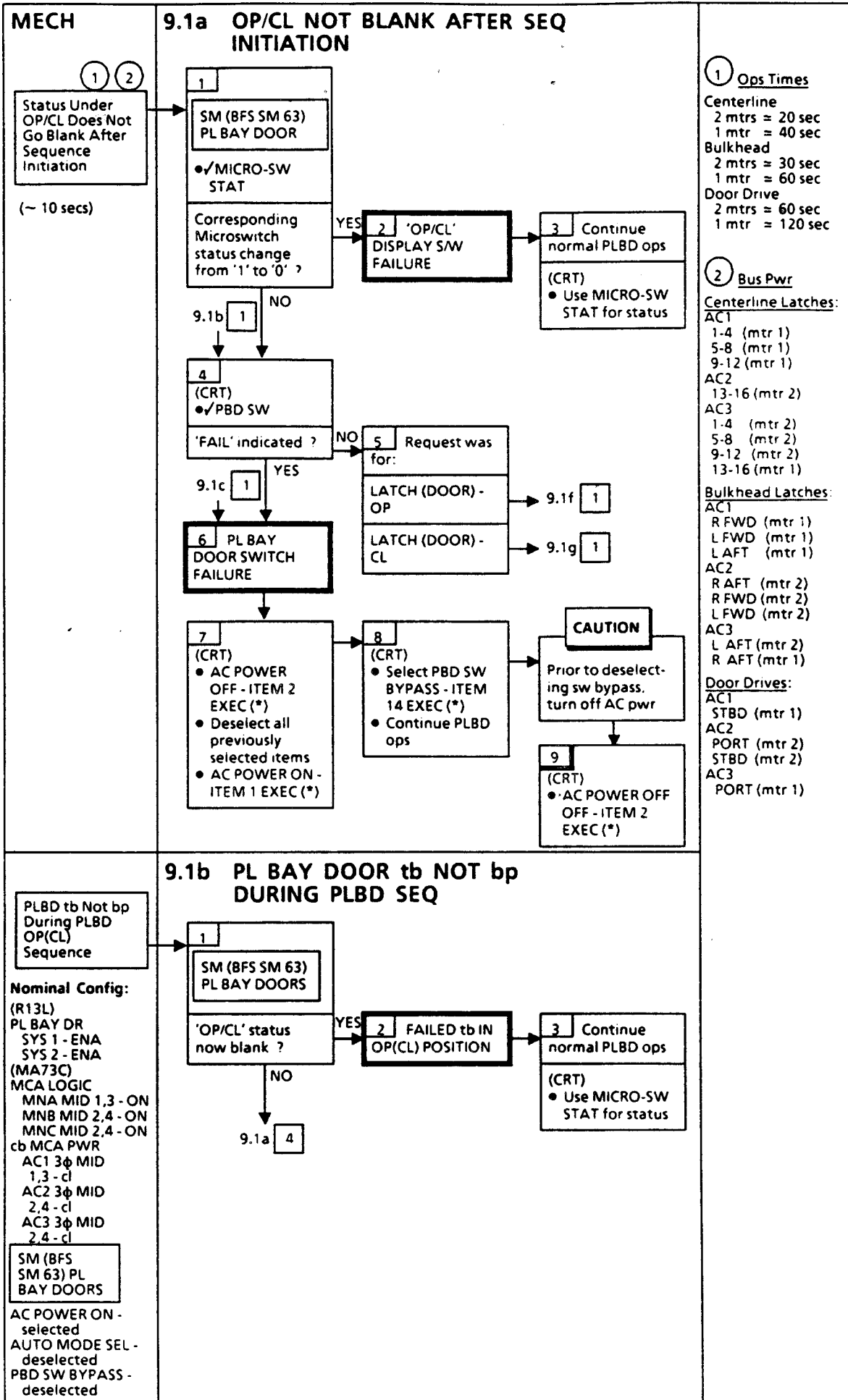
MECH

RADIATOR POWER CONFIGURATION

ACTUATOR	HTR	M-MCA	AC PWR		MCA LOGIC	LAT CNTL		RAD CNTL				
			BUS	MECH PWR 1		MECH PWR 2	DC BUS	CNTL BUS	SYS A	SYS B	SYS A	SYS B
STBD 1-6	1	3	1		AB1,CA1 AND AB2,CA2	A (MPC1)	AB3	AB1				
	2	2	2	BC1 AND BC2		B (MPC2)	BC3		BC1			
STBD 7-12	1	3	1		AB1,CA1 AND AB2,CA2	A (MPC1)	AB3	AB2				
	2	2	3	AB1,CA1 AND AB2,CA2		C (MPC3)	CA3		CA1			
STBD DRIVE	1	3	1		AB1,CA1 AND AB2,CA2	A (MPC1)	AB3					BC1 AND BC2
	2	2	3	AB1,CA1 AND AB2,CA2		C (MPC3)	CA3			AB1 AND AB2		
PORT 1-6	1	1	1	AB1,CA1 AND AB2,CA2		A (MPC1)	AB3	AB2				
	2	4	2		BC1 AND BC2	B (MPC2)	BC3		BC2			
PORT 7-12	1	1	1	AB1,CA1 AND AB2,CA2		A (MPC1)	AB3	AB1				
	2	4	3		AB1,CA1 AND AB2,CA2	C (MPC3)	CA3		CA2			
PORT DRIVE	1	1	1	AB1,CA1 AND AB2,CA2		A (MPC1)	AB3			AB1 AND AB2		
	2	4	3		AB1,CA1 AND AB2,CA2	C (MPC3)	CA3					CA1 AND CA2

9 MECH

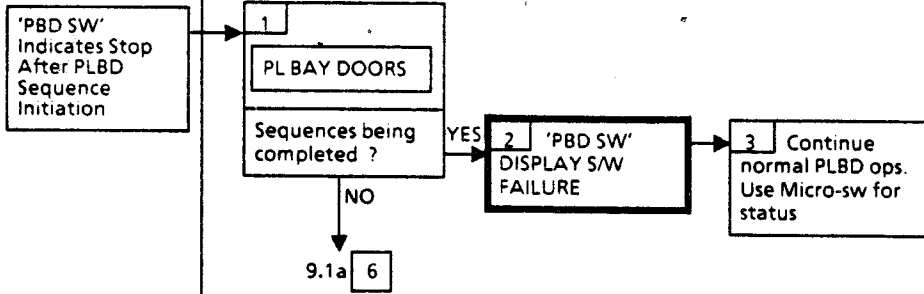
FUNCTION	PLBD CLOSING								PLBD DISPLAY PL MDM								
	Ref: MA73C C&D for MCA (cb)																
	MTR 1				MTR 2				C	C	O	O	C	R	R	R	O
	AC/MCA	CNTL	MDM	SYS	AC/MCA	CNTL	MDM	SYS	A	B	A	B	A	B	C		
LATCH																	
5-8	1/MID3	AB3/AB2	PL1	2	3/MID2	CA3/CA1	PL2	1	1	2	1	2					
9-12	1/MID1	AB3/AB1	PL1	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					
A AFT	3/MID4	CA3/CA2	PL2	2	2/MID2	BC3/BC1	PL1	1	2	1	2	1					
S DQOR	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



- 1** Ops Times
- Centerline
 2 mtrs = 20 sec
 1 mtr = 40 sec
- Bulkhead
 2 mtrs = 30 sec
 1 mtr = 60 sec
- Door Drive
 2 mtrs = 60 sec
 1 mtr = 120 sec
- 2** Bus Pwr
- Centerline Latches:
- AC1
 1-4 (mtr 1)
 5-8 (mtr 1)
 9-12 (mtr 1)
- AC2
 13-16 (mtr 2)
- AC3
 1-4 (mtr 2)
 5-8 (mtr 2)
 9-12 (mtr 2)
 13-16 (mtr 1)
- Bulkhead Latches:
- AC1
 R FWD (mtr 1)
 L FWD (mtr 1)
 L AFT (mtr 1)
- AC2
 R AFT (mtr 2)
 R FWD (mtr 2)
 L FWD (mtr 2)
- AC3
 L AFT (mtr 2)
 R AFT (mtr 1)
- Door Drives:
- AC1
 STBD (mtr 1)
- AC2
 PORT (mtr 2)
 STBD (mtr 2)
- AC3
 PORT (mtr 1)

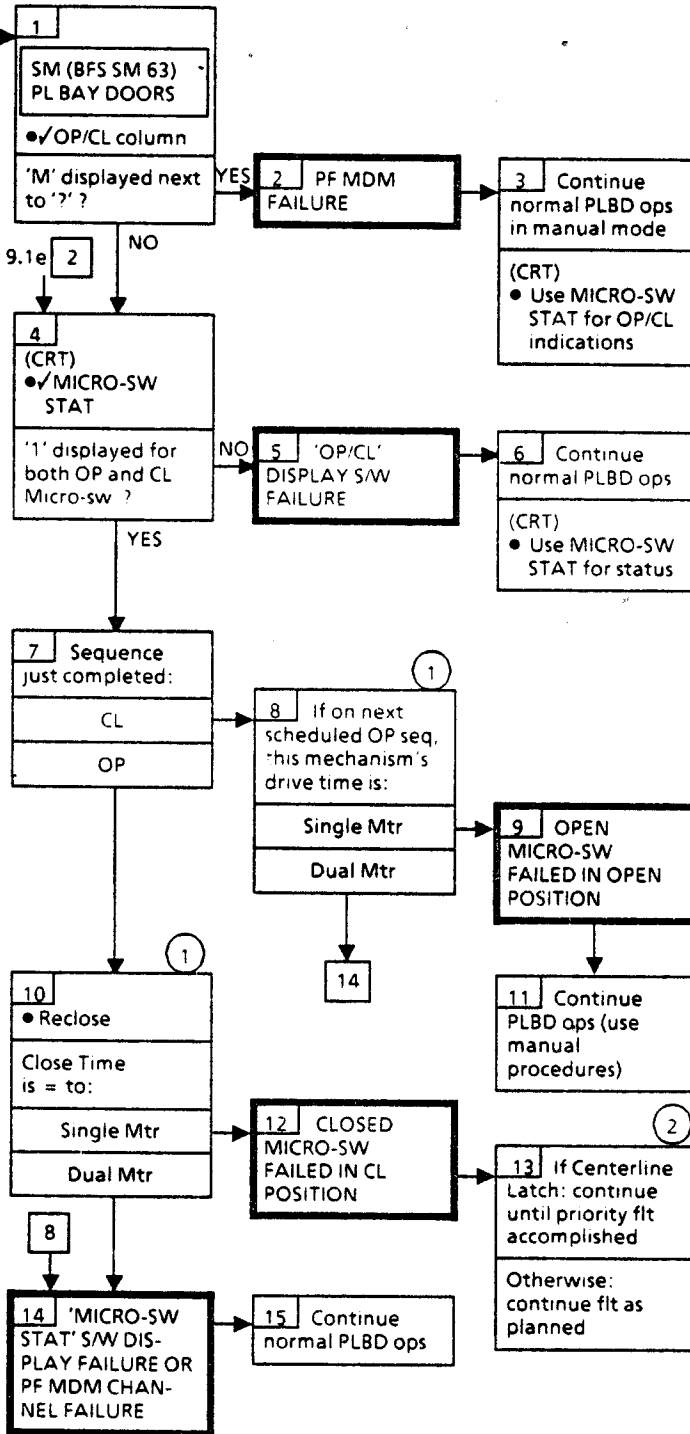
MECH

9.1c 'PBD SW' INDICATES STOP



9.1d '?' DISPLAYED IN OP/CL COLUMN

'?' Displayed in OP/CL Column at End of PLBD Sequence

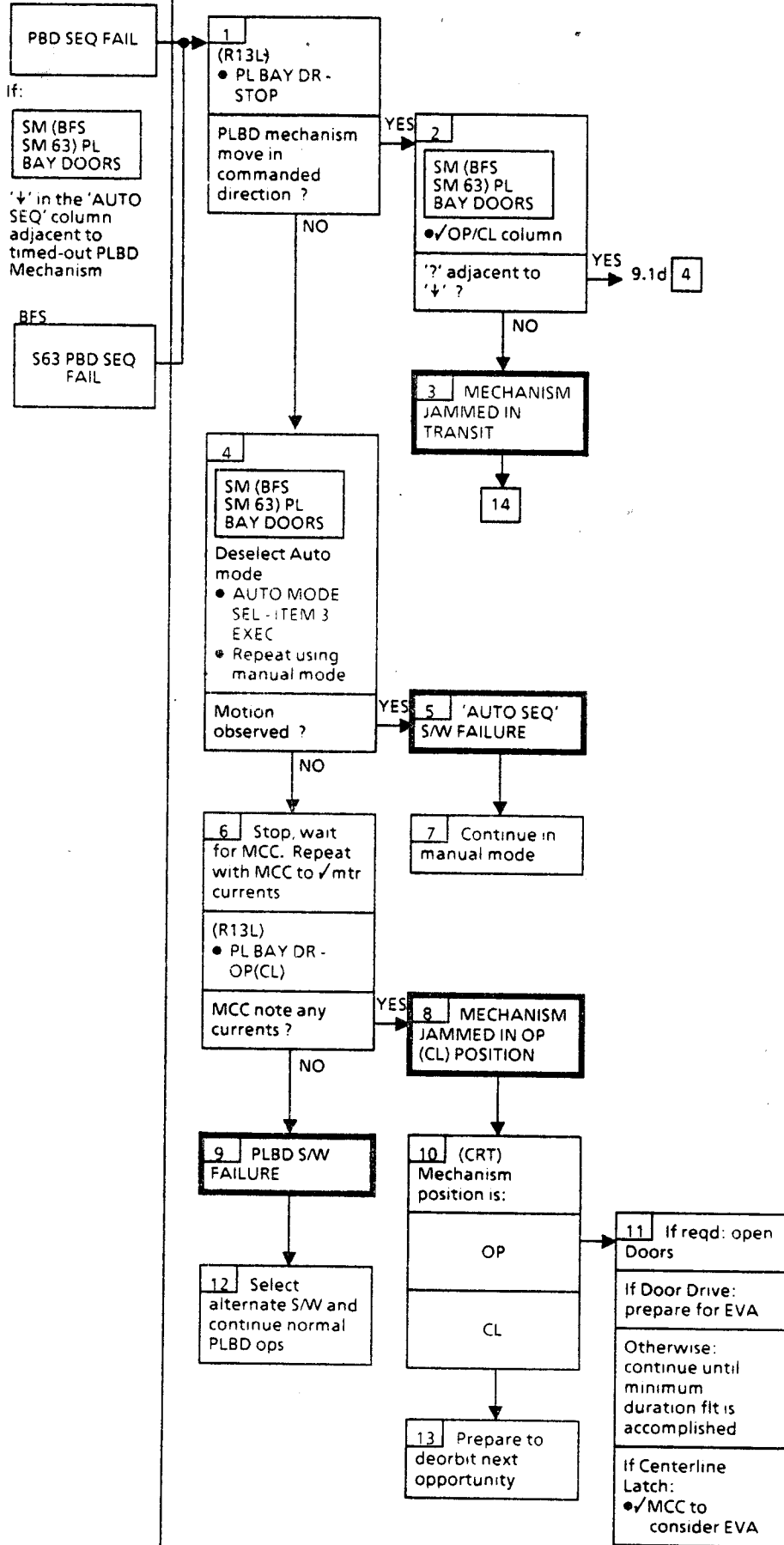


- ① Ops Times
Centerline
2 mtrs = 20 sec
1 mtr = 40 sec
Bulkhead
2 mtrs = 30 sec
1 mtr = 60 sec
Door Drive
2 mtrs = 60 sec
1 mtr = 120 sec

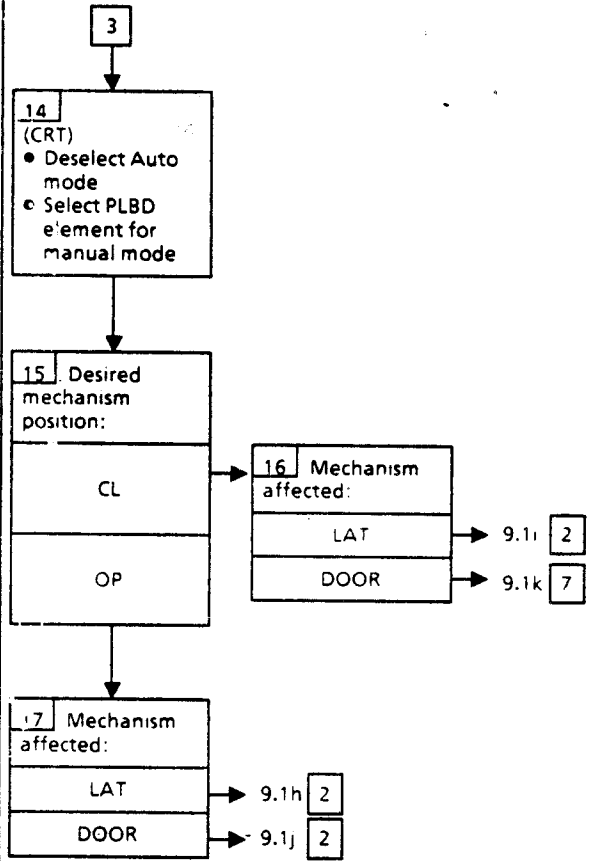
- ② Dual Mtr CL ops available for door drive with use of MECH SSR-6

MECH

9.1e PBD SEQ FAIL

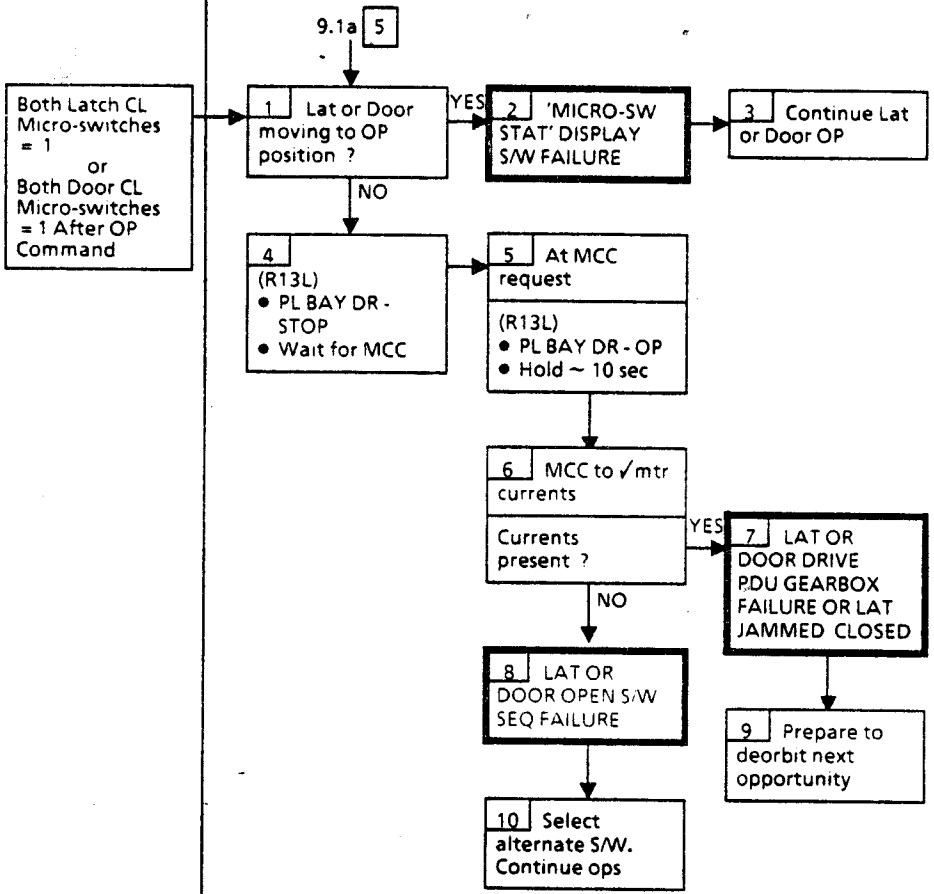


MECH 9.1e (Cont)

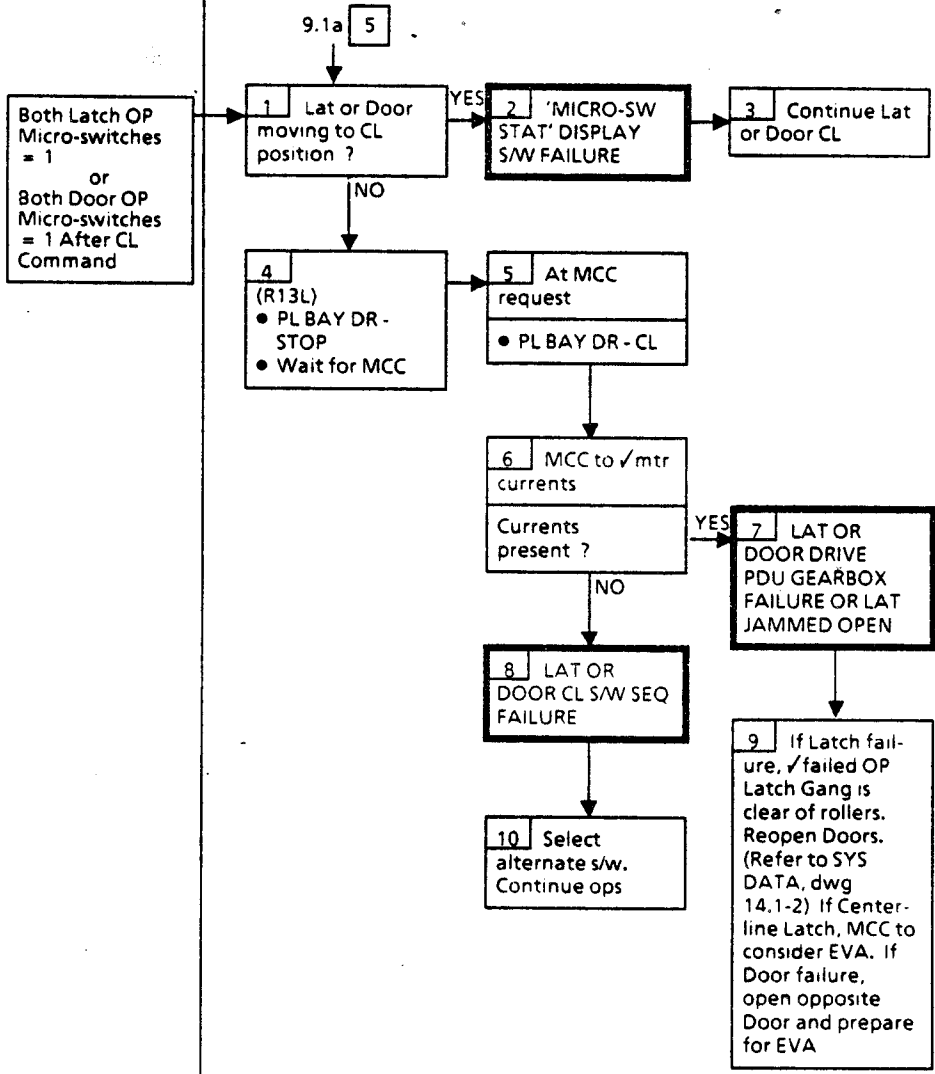


MECH

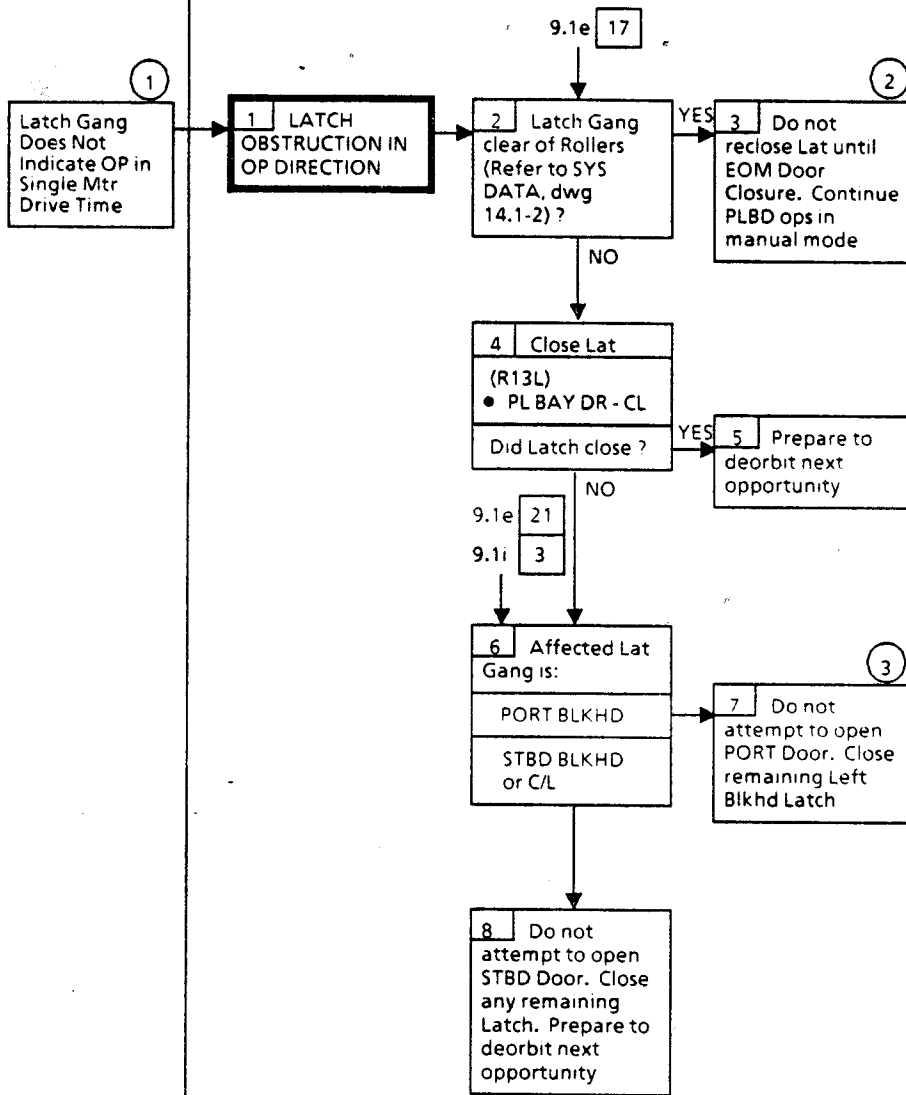
9.1f BOTH LATCH CL OR BOTH DOOR CL MICROSWITCHES = 1 AFTER OP COMMAND



9.1g BOTH LATCH OP OR BOTH DOOR OP MICROSWITCHES = 1 AFTER CL COMMAND



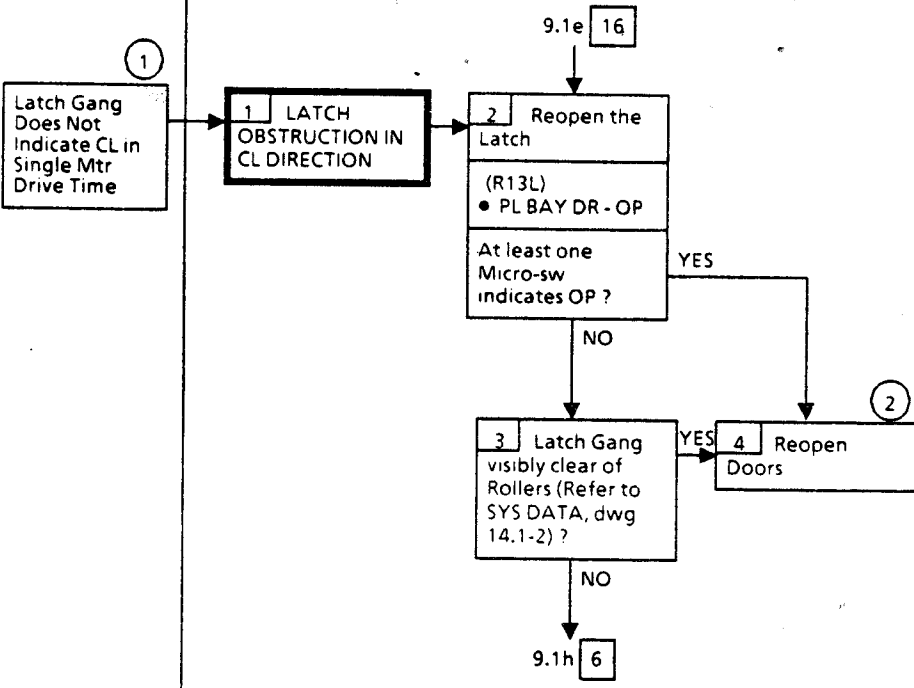
9.1h LATCH GANG DOES NOT OP IN SINGLE MOTOR TIME



- ① Ops Times
 Centerline
 2 mtrs = 20 sec
 1 mtr = 40sec
 Bulkhead
 2 mtrs = 30 sec
 1 mtr = 60 sec
 Door Drive
 2 mtrs = 60 sec
 1 mtr = 120 sec
- ② Fit will continue until priority flight accomplished. If Centerline Latch, MCC to consider EVA
- ③ ✓MCC for pwrn Invoce priority flight if accomplishable

MECH

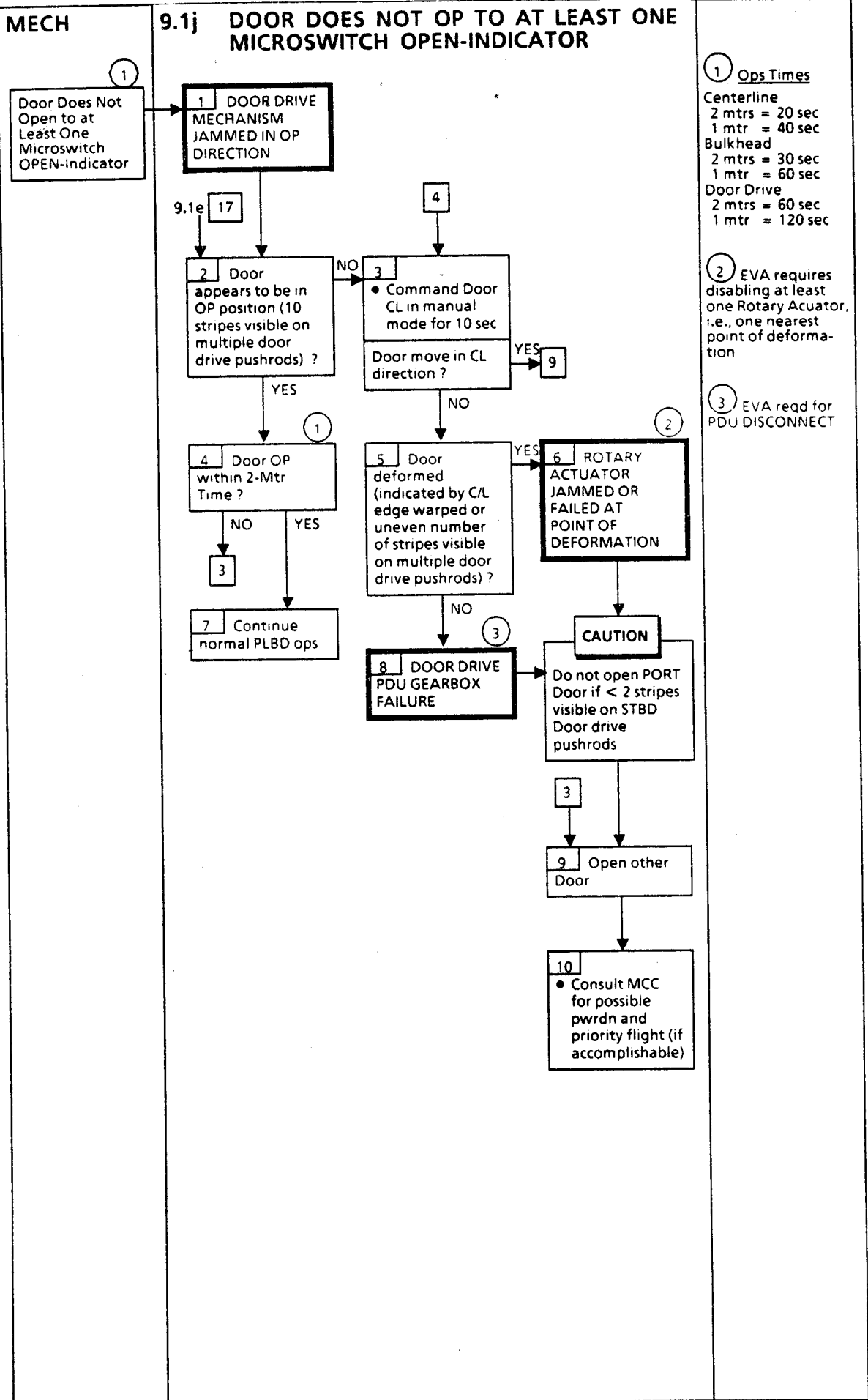
9.1i LATCH GANG DOES NOT CL IN SINGLE MOTOR TIME



1 Ops Times

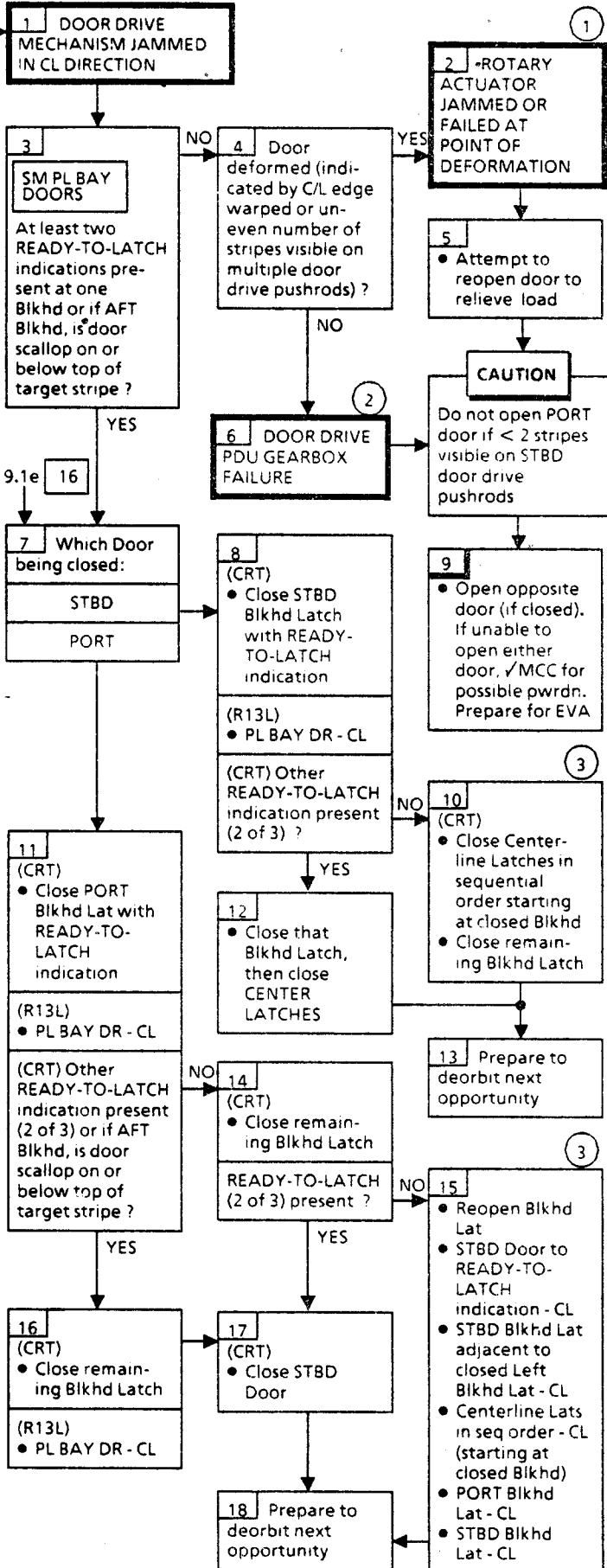
Centerline
 2 mtrs = 20 sec
 1 mtr = 40 sec
 Bulkhead
 2 mtrs = 30 sec
 1 mtr = 60 sec
 Door Drive
 2 mtrs = 60 sec
 1 mtr = 120 sec

2 Fit will continue until priority flight accomplished. If Centerline Latch, MCC to consider EVA



9.1k DOOR DOES NOT CL

Door Does Not Close To the READY-TO-LATCH (2 of 3) From Both Bikhds



- ① EVA requires disabling at least one Rotary Actuator, i.e., one nearest point of deformation
- ② EVA reqd for PDU DISCONNECT
- ③ Sequential C/L Latch order:
AFT BLKHD
A 13-16
B 9-12
C 5-8
D 1-4
FWD BLKHD
A 1-4
B 5-8
C 9-12
D 13-16

MECH

9.11 PLBD OUT OF CONFIG

PASS

S63 PBD CONFIG

FDA msg and auto mode door ops terminate

BFS

S63 PBD CONFIG

1 AUTO SEQ SW TERMINATED BY OUT-OF-CONFIG STATE

2 (R13L)
• PLBAY DR - STOP

3 Deselect auto mode
(CRT)
• AUTO MODE SEL - ITEM 3 EXEC (blank)

4 Reselect AC pwr
• AC PWR ON - ITEM 1 EXEC (*)

5
• Using manual mode, command out-of-config mechanism to correct config
• Continue normal ops

CAUTION

If manual mode used, ✓ micro-sw stat for proper config prior to issuing any door mechanism command

① AC pwr terminated and must be reselected

RADIATOR

9.2

RADIATOR

9.2

MECH

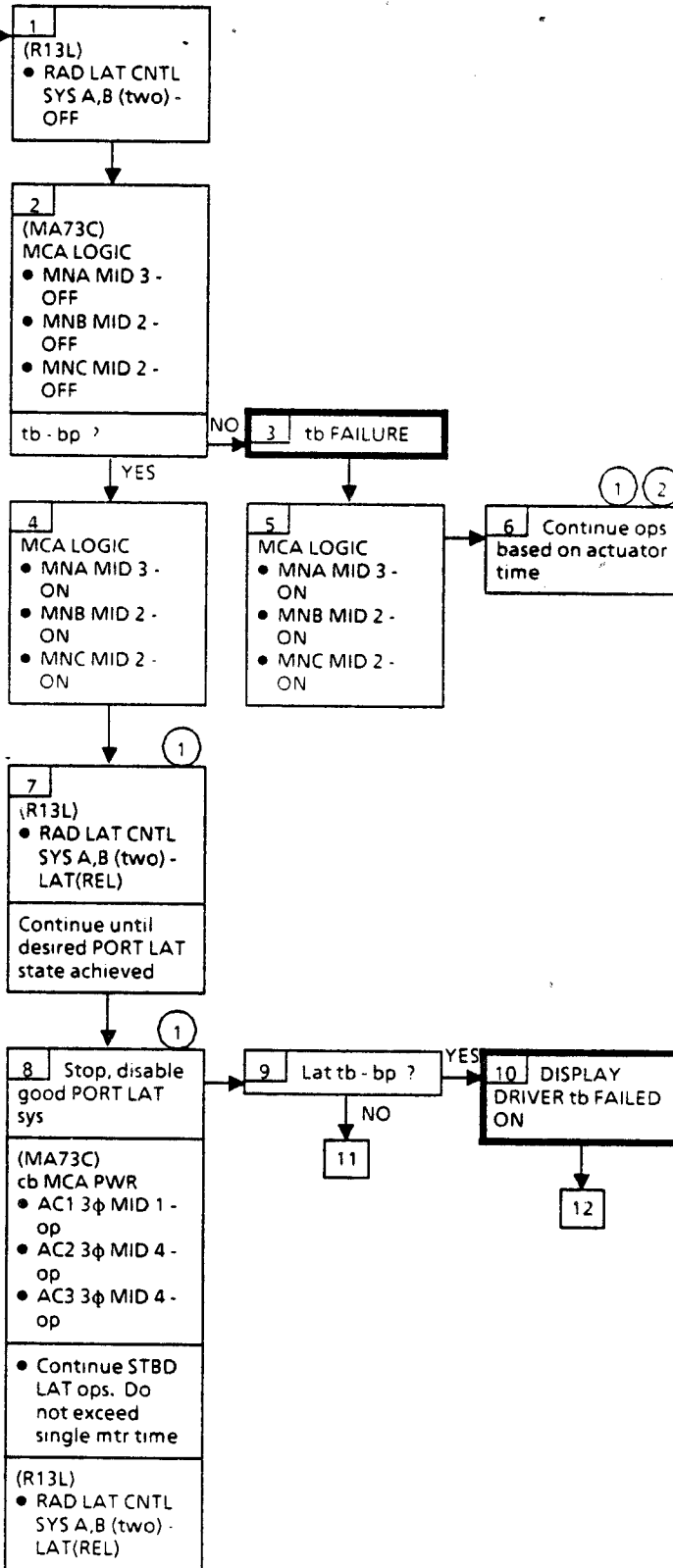
9.2a STBD RAD LAT tb NOT bp

RAD STBD LAT
tb Not bp After
Switch Action
= 10 sec

AC Config

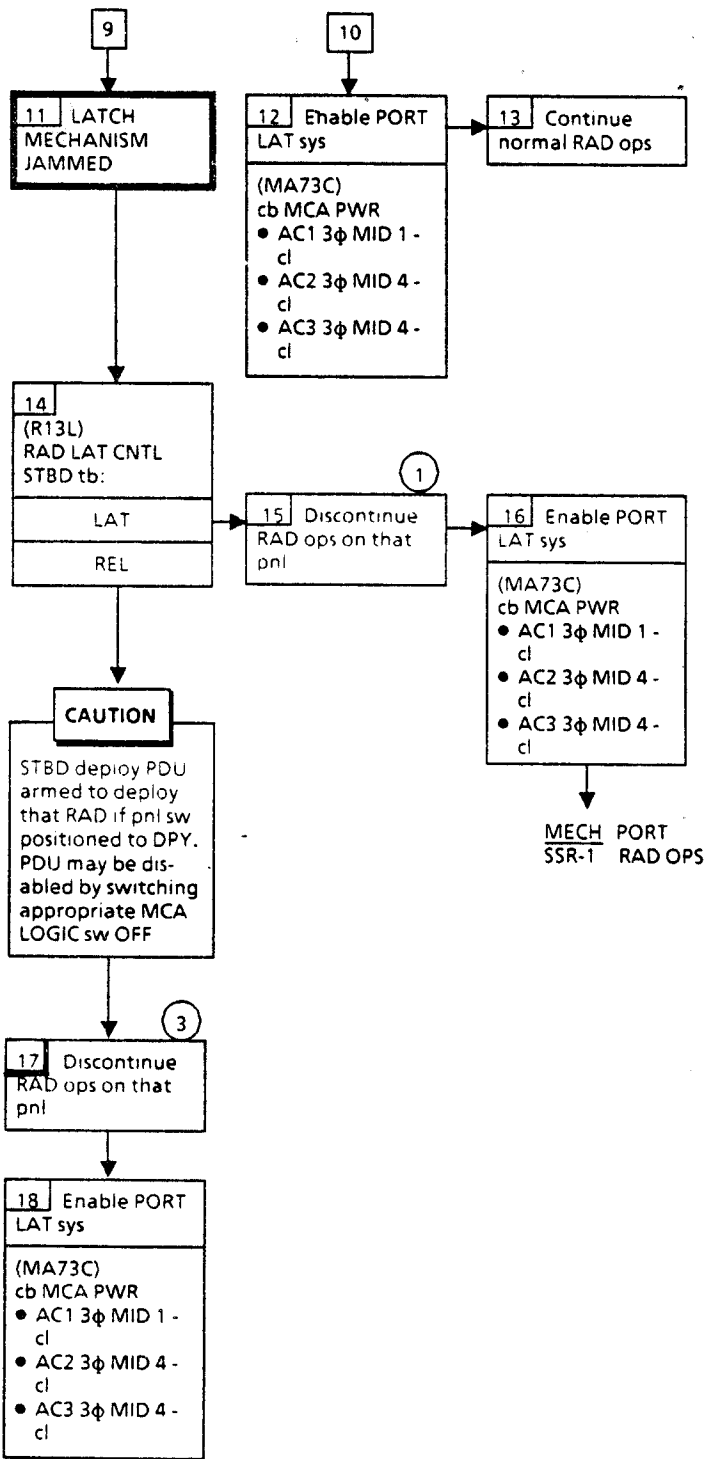
	MTR	MCA	BUS
STBD Lat	1	3	1
1-6 Lat	2	2	2
7-12 Lat	1	3	1
DPY	1	3	1
	2	2	3
PORT Lat	1	1	1
1-6 Lat	2	4	2
7-12 Lat	1	1	1
DPY	1	1	1
	2	4	3

Nominal Config:
(MA73C)
MNA LOGIC
MNA MID 1,3 (two) - ON
MNB MID 2,4 (two) - ON
MNC MID 2,4 (two) - ON
cb MCA PWR
AC1 3φ MID 1,3 (two) - cl
AC2 3φ MID 2,4 (two) - cl
AC3 3φ MID 2,4 (two) - cl
(R13L)
PL BAY MECH PWR
SYS 1,2 (two) - ON



- ① PDU Actuator Times
Normal Lat - 25 sec
Rad - 40 sec
Single Mtr Lat - 50 sec
Rad - 80 sec
- ② MCC verification needed for stuck tb and Micro-sw status

MECH 9.2a (Cont)



① PDU Actuator Times

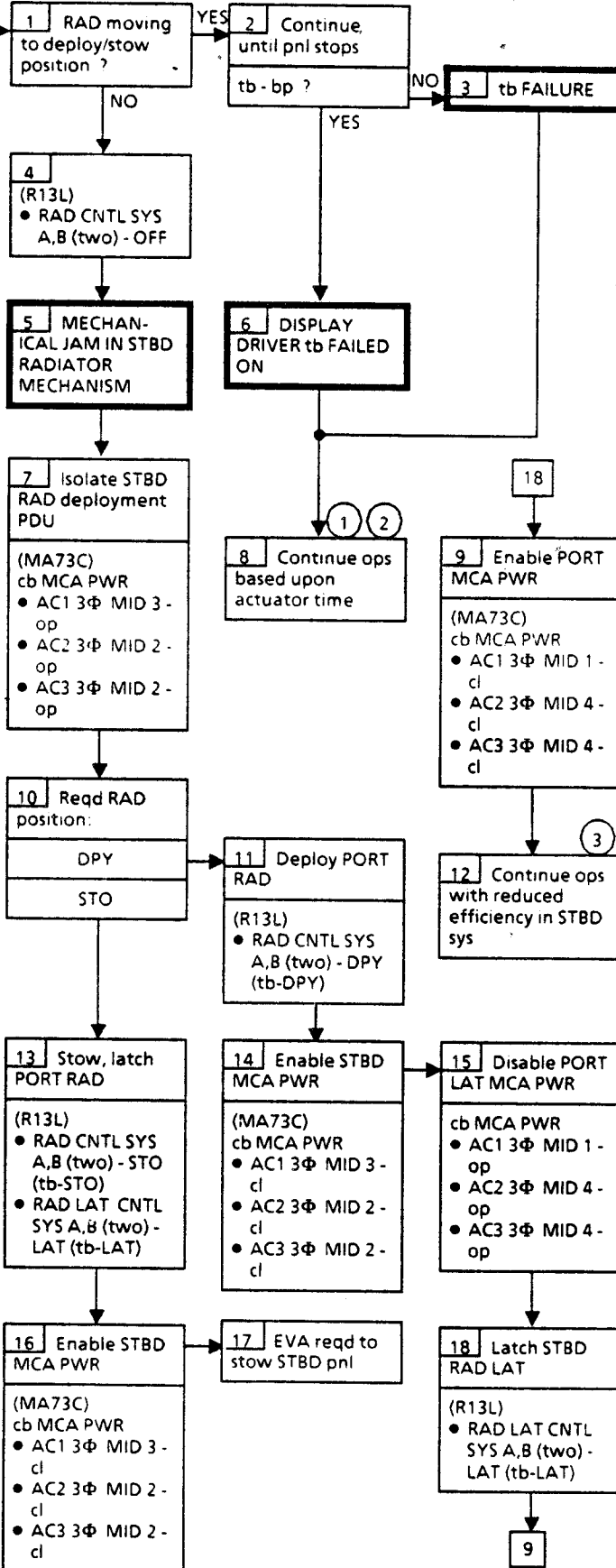
Normal
Lat - 25 sec
Rad - 40 sec
Single Mtr
Lat - 50 sec
Rad - 80 sec

③ Consult MCC to determine pwrn requirements, if any

9.2b STBD RAD tb NOT bp

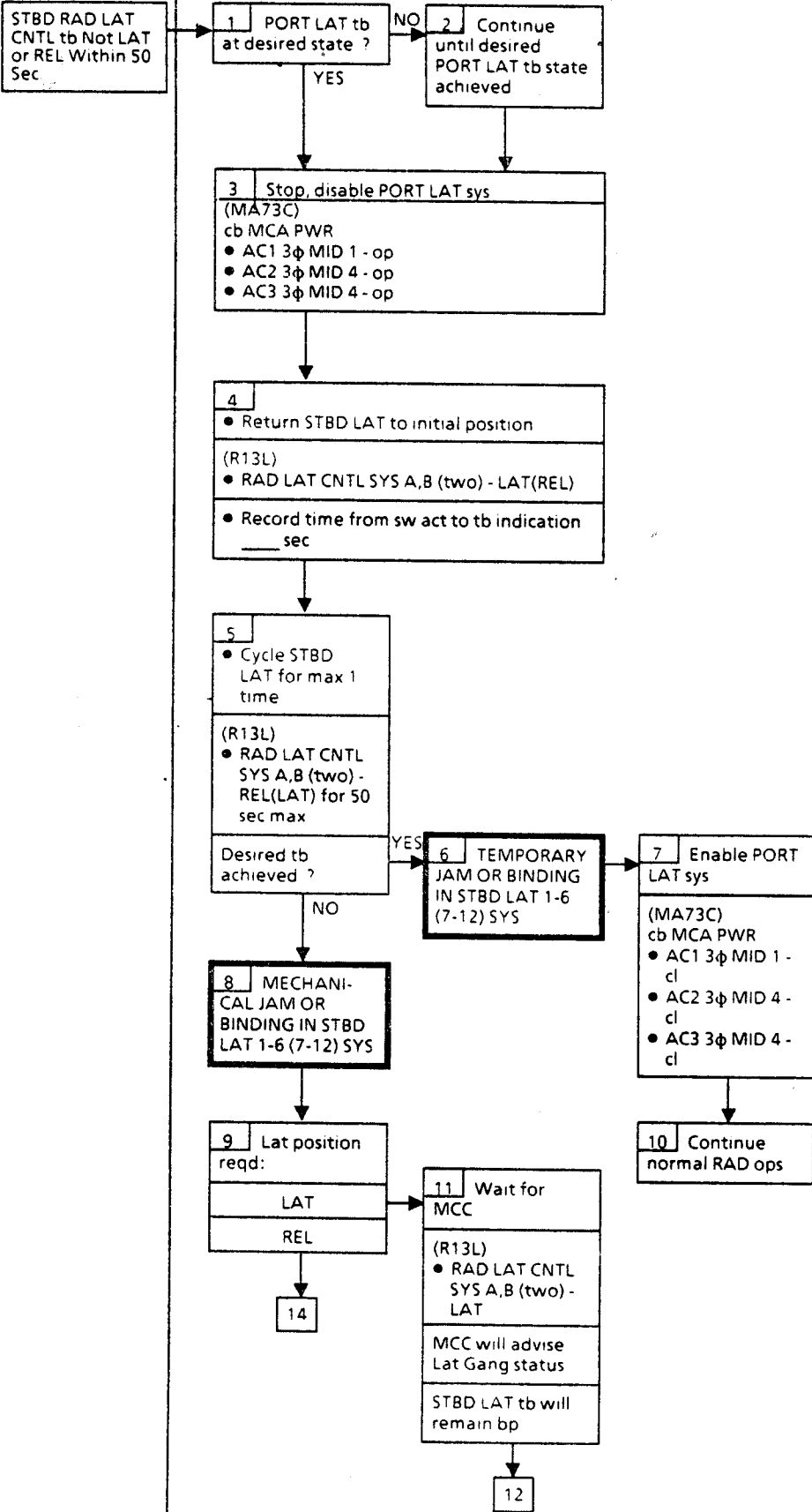
RAD STBD RAD
tb Not bp After
sw Action

= 10 secs

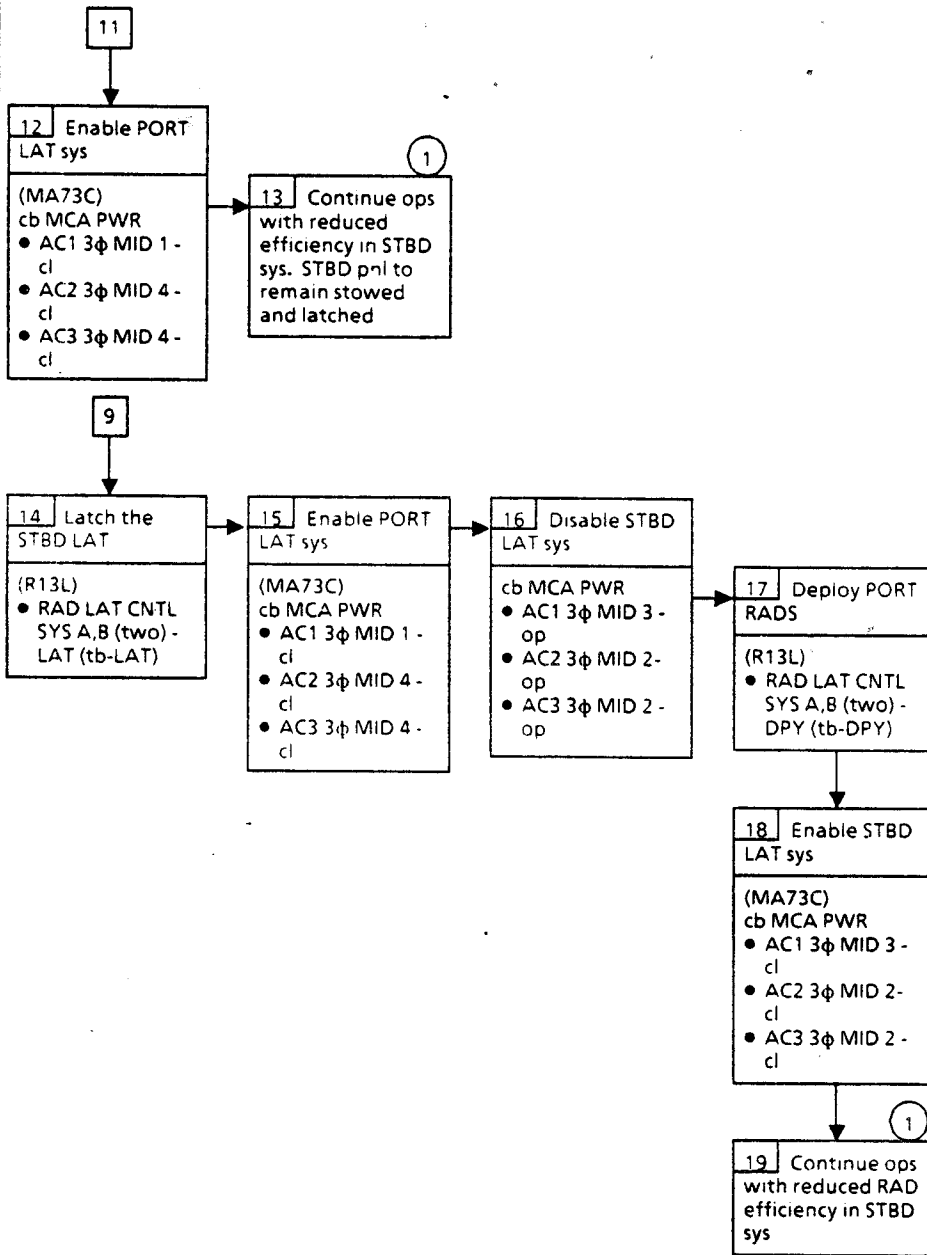


- ① PDU Actuator Times
Normal
Lat - 25 sec
Rad - 40 sec
Single Mtr
Lat - 50 sec
Rad - 80 sec
- ② MCC verification needed for stuck tb and Micro-sw status
- ③ Consult MCC to determine pwrn requirements, if any

9.2c STBD RAD LAT tb NOT LAT OR REL IN 50 SEC



MECH 9.2c (Cont)



① Consult MCC to determine pwrdrn requirements, if any

MECH

9.2d STBD RAD tb NOT DPY OR STO IN 40 SEC

RAD STBD CNTL tb Not DPY or STO Within 40 Sec

1 RAD appears to move to the correct position ?

2 Continue until RAD pnl stops
RAD stowed ?

3 ✓RAD position

PL BAY DOORS

- AC PWR ON - ITEM 1 EXEC (*)
- Select R DR

(R13L)

- PL BAY DR - CL (30 sec, = 90°)
- PL BAY DR - STOP

(CRT)

- Deselect R DR
- AC PWR - ITEM 2 EXEC (*)

4 (R13L)
• RAD CNTL SYS A,B (two) - OFF

5 STBD RAD JAMMED

8

6 Disable PORT RAD sys
(MA73C)
cb MCA PWR
• AC1 3φ MID 1 - op
• AC2 3φ MID 4 - op
• AC3 3φ MID 4 - op

7 If deployed, compare STBD RAD to PORT RAD. If stowed, compare STBD RAD with STBD fixed RAD pnls. Does RAD appear to be in correct position ?

8 ACTUATOR MTR FAILED AND MECHANISM JAMMED

10 • Return STBD RAD to initial position
• Record time from sw act to tb indication ___ sec

9 (R13L) STBD tb indicate STO(DPY) ?

11 FAILED-CL STO(DPY) MICRO-SW OR ACTUATOR MTR FAILURE

12 FAILED-OP MICRO-SW OR STO MICRO-SW NOT CL CAUSED BY RAD OVER-RIGGING

13 RAD position is now ?
STO
DPY

15 Cycle STBD RAD max 1 time
(R13L)
• RAD CNTL SYS A,B (two) - STO (tb-STO)
RAD stow ?

16 Latch the STBD RAD
(R13L)
• RAD LAT CNTL SYS A,B (two) - LAT (tb-LAT)

14 Continue RAD ops based on time and observed motion

20

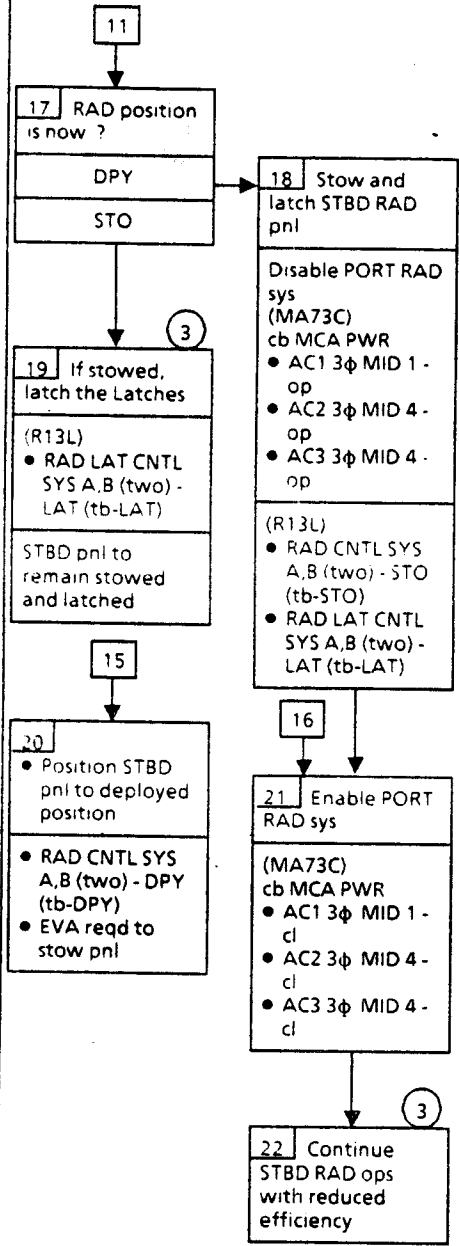
21

1 R DR may remain at 90 deg position. PLBD ops will begin following latching of RADs

2 PDU Actuator Times

Normal
Lat - 25 sec
Rad - 40 sec
Single Mtr
Lat - 50 sec
Rad - 80 sec

MECH 9.2d (Cont)



3 Consult MCC to determine pwrn requirements, if any

MECH

9.2e PORT RAD LAT tb NOT bp

**RAD PORT LAT
tb Not bp After
Switch Action**

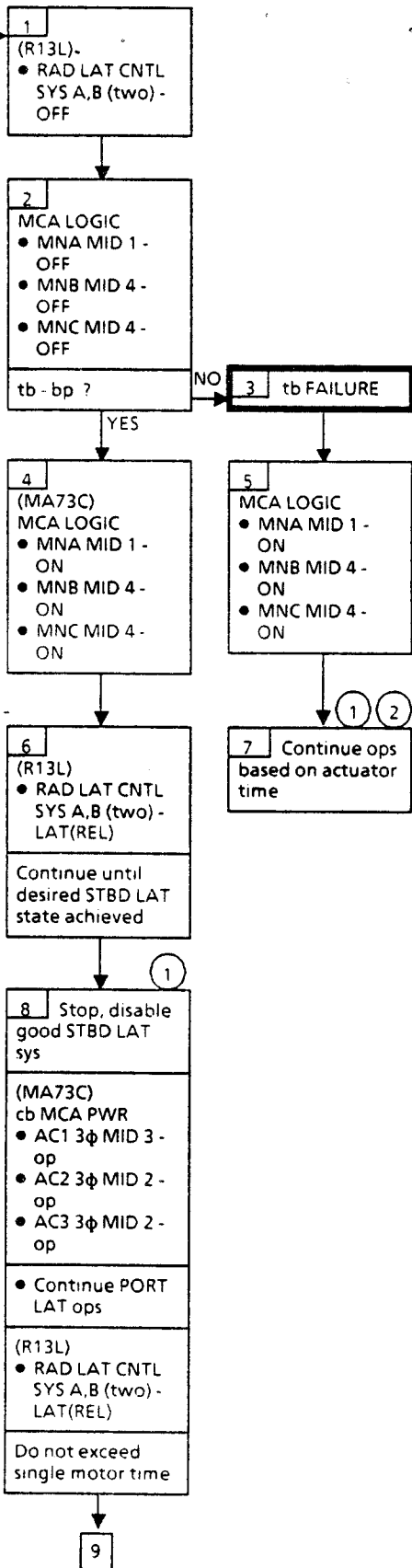
= 10 sec

AC Config

	MTR	MCA	BUS
STBD			
Lat	1	3	1
1-6	2	2	2
Lat	1	3	1
7-12	2	2	3
DPY	1	3	1
	2	2	3
PORT			
Lat	1	1	1
1-6	2	4	2
Lat	1	1	1
7-12	2	4	3
DPY	1	1	1
	2	4	3

Nominal Config:

(MA73C)
MCA LOGIC
MNA MID 1,3 - ON
MNB MID 2,4 - ON
MNC MID 2,4 - ON
cb MCA PWR
AC1 3φ MID
1,3 - cl
AC2 3φ MID
2,3 - cl
AC3 3φ MID
2,4 - cl
(R13L)
PL BAYMECH PWR
SYS 1,2 (two) - ON

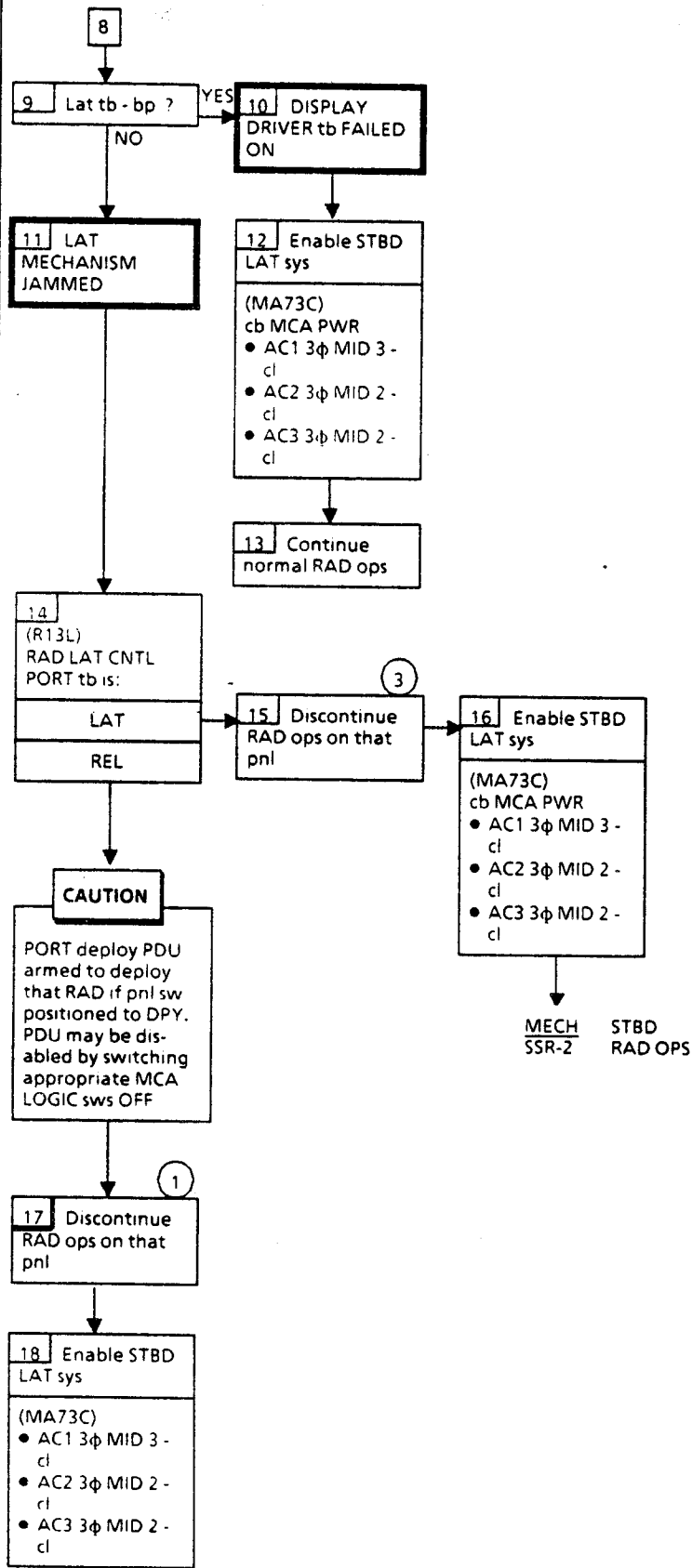


① PDU Actuator Times

Normal
Lat - 25 sec
Rad - 40 sec
Single Mtr
Lat - 50 sec
Rad - 80 sec

② MCC verification will be needed for stuck tb and Micro-sw status

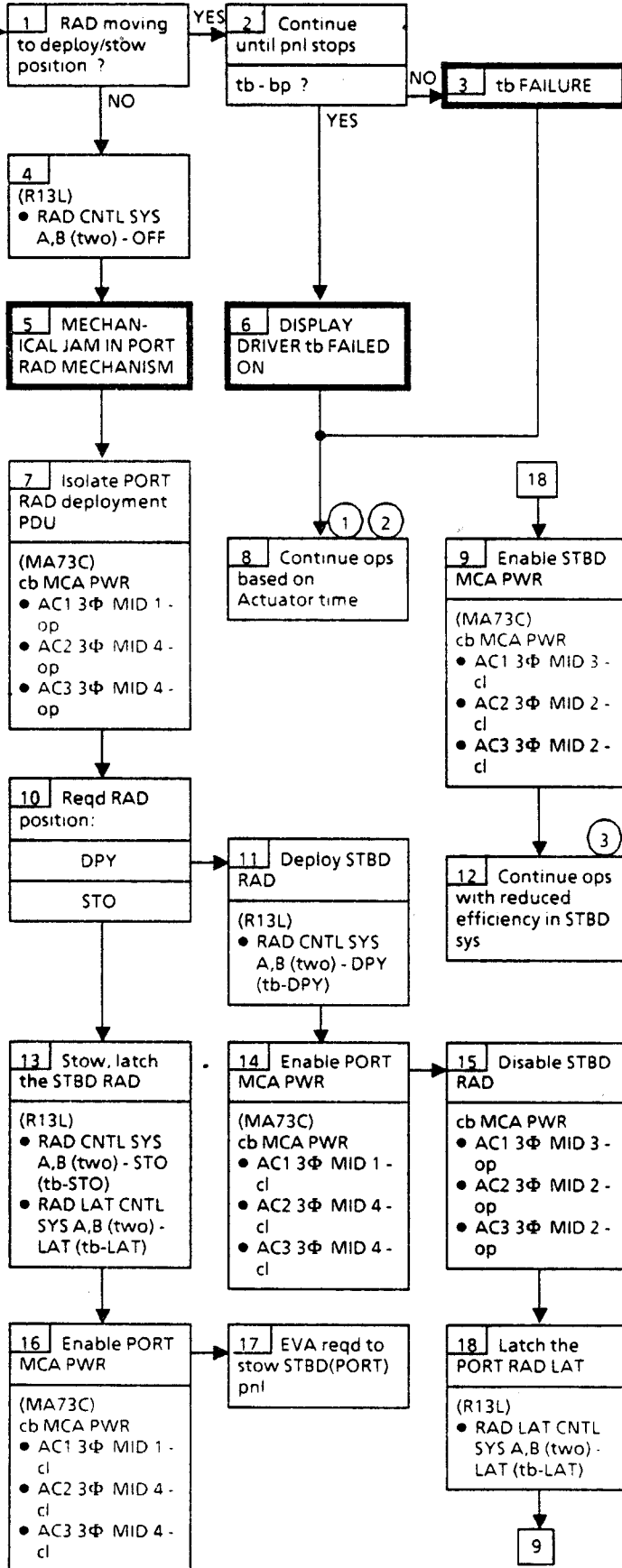
MECH 9.2e (Cont)



- ① PDU Actuator Times
Normal
Lat - 25 sec
Rad - 40 sec
Single Mtr
Lat - 50 sec
Rad - 80 sec
- ③ Consult MCC to determine pwrn requirements, if any

9.2f PORT RAD tb NOT bp

RAD PORT RAD tb Not bp After sw Action = 10 secs



1 PDU Actuator Times

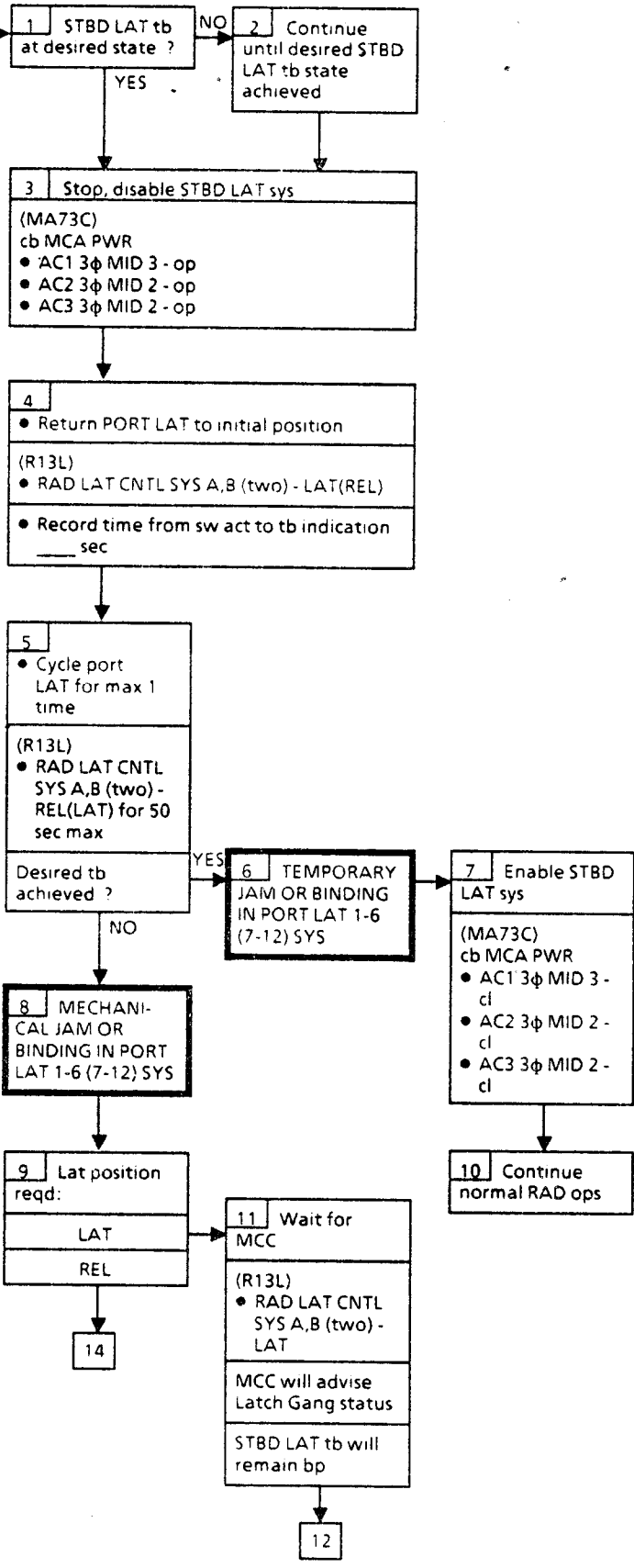
Normal Lat - 25 sec Rad - 40 sec Single Mtr Lat - 50 sec Rad - 80 sec

2 MCC verification needed for stuck tb and Micro-sw status

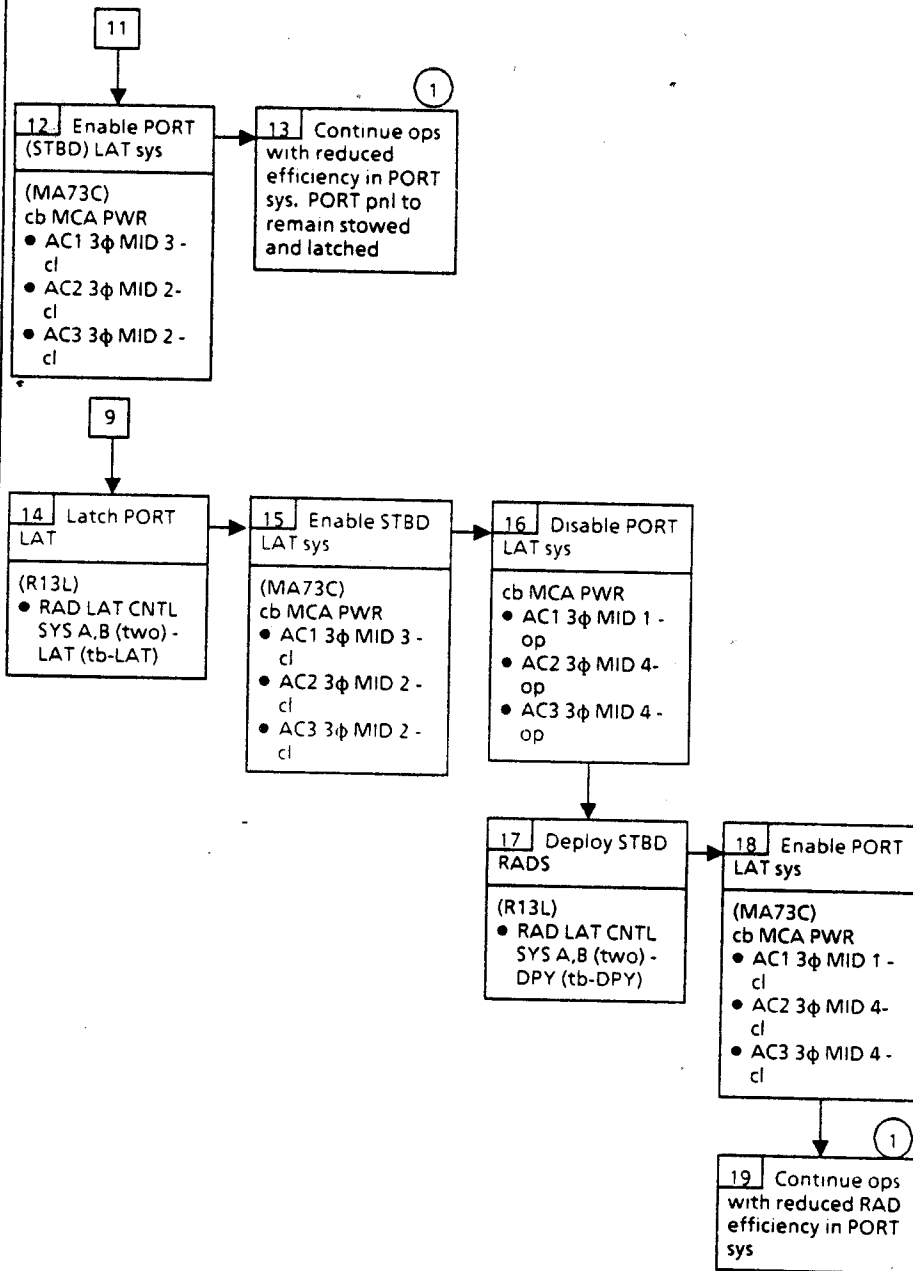
3 Consult MCC to determine pwr'dn requirements, if any

9.2g PORT RAD LAT tb NOT LAT OR REL IN 50 SEC

PORT RAD LAT CNTL tb Not LAT or REL Within 50 Sec



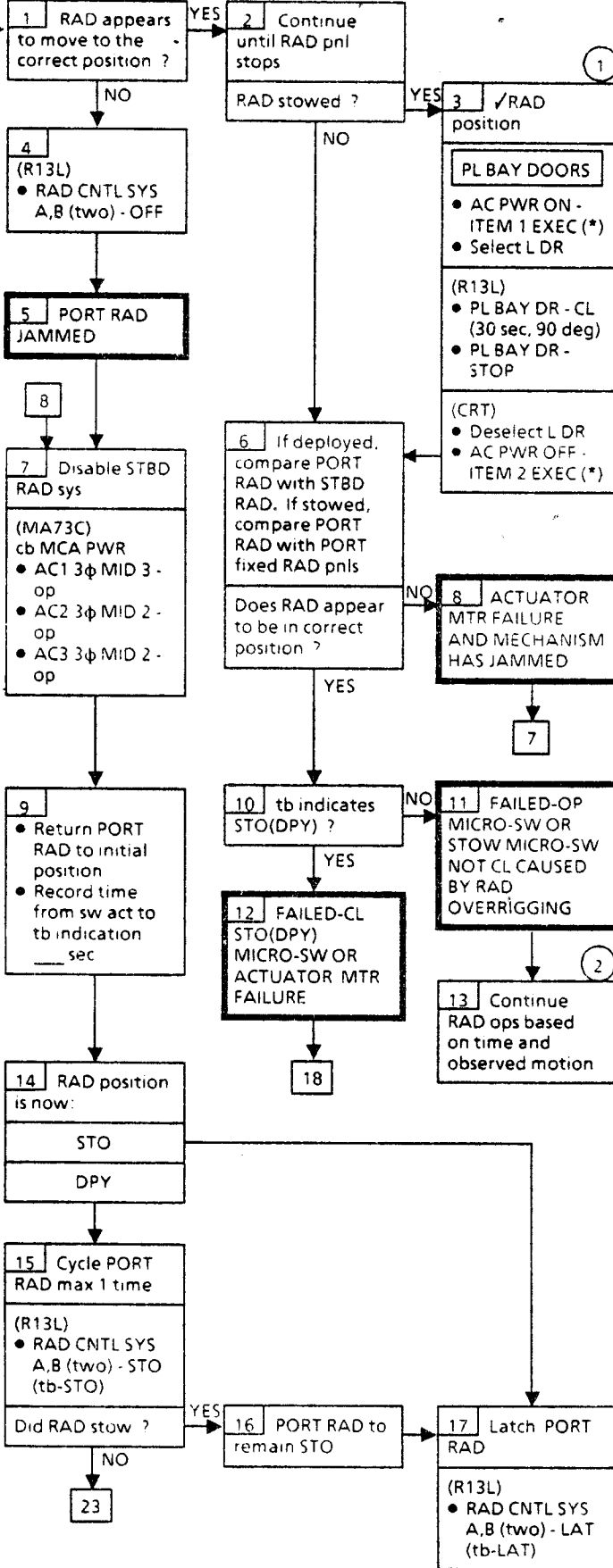
MECH 9.2g (Cont)



① Consult MCC to determine pwrn requirements, if any

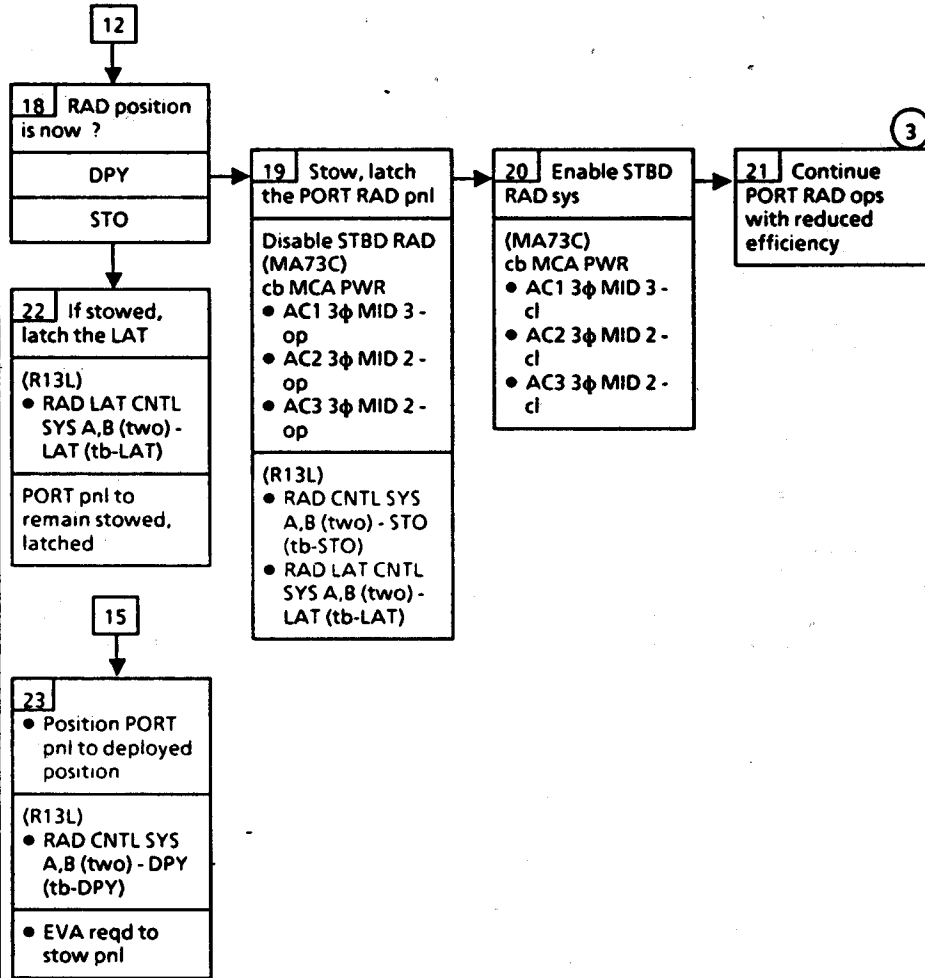
9.2h PORT RAD tb NOT DPY OR STO IN 40 SEC

RAD CNTL PORT
tb Not DPY or
STO Within 40
Sec



- ① L DR may remain at 90 deg position. PLBD ops will begin following latching of RADs
- ② PDU Actuator Times
 - Normal Lat - 25 sec Rad - 40 sec
 - Single Mtr Lat - 50 sec Rad - 80 sec

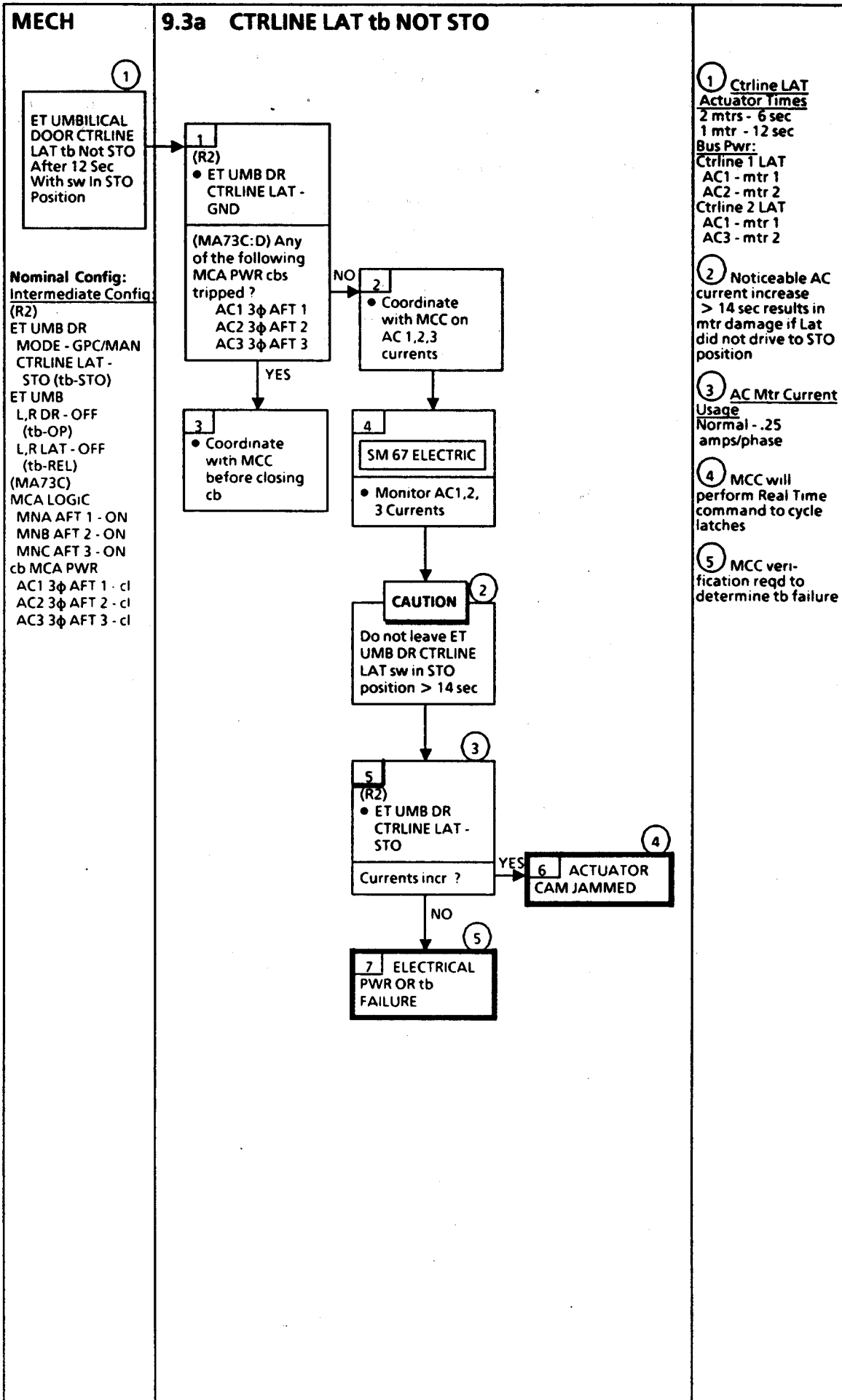
MECH 9.2h (Cont)



3 Consult MCC to determine pwrdrn requirements, if any

**ET UMB
DOORS
9.3**

ET UMB DOORS
9.3

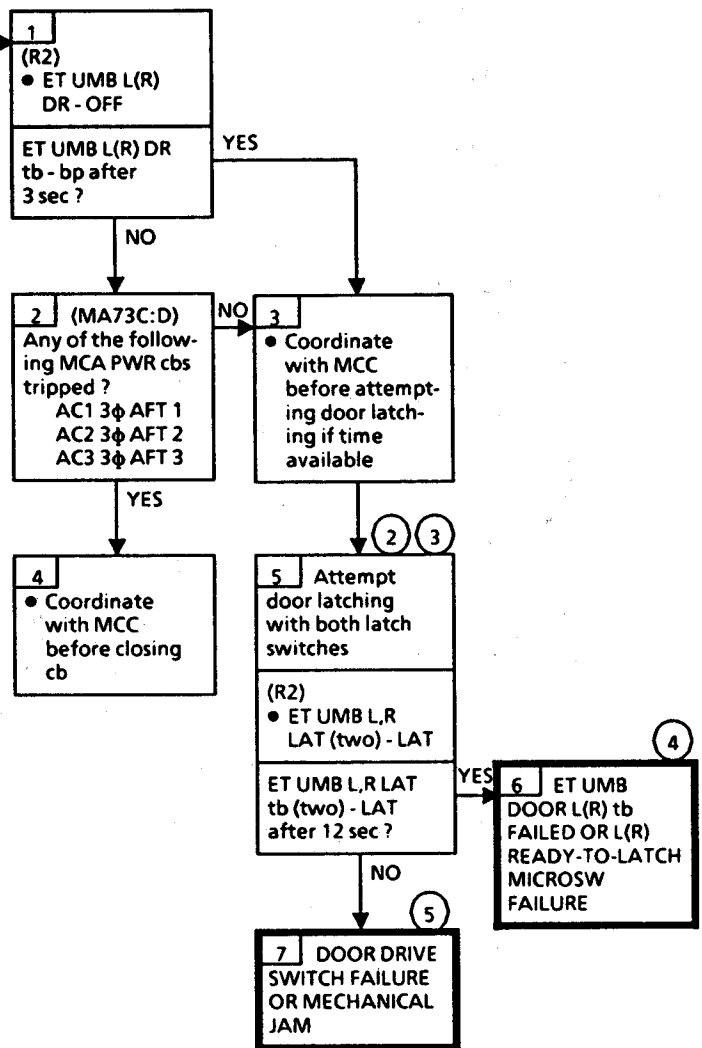


MECH

9.3b DRIVE tb NOT CL

1
ET UMB L(R)
DR (Drive) tb
Not CL After 48
Sec With sw In
CL Position

Nominal Config:
Intermediate Config:
(R2)
ET UMB DR
MODE - GPC/MAN
CTRLINE LAT -
STO (tb-STO)
ET UMB
L,R DR - CL
(tb-CL)
L,R LAT - OFF
(tb-REL)
(MA73C)
MCA LOGIC
MNA AFT 1 - ON
MNB AFT 2 - ON
MNC AFT 3 - ON
cb MCA PWR
AC1 3φ AFT 1 - cl
AC2 3φ AFT 2 - cl
AC3 3φ AFT 3 - cl



1 **Door Drive Actuator Times**
2 mtrs - 24 sec
1 mtr - 48 sec
Bus Pwr
Right Door Drive
AC3 - mtr 1
AC2 - mtr 2
Left Door Drive
AC1 - mtr 1
AC3 - mtr 2

2 **Door Latch Actuator Times**
2 mtrs - 6 sec
1 mtr - 12 sec

3 Opposite door uplock latch switch L(R) will override failed R-T-L Microsw

4 Verification of door close and latch will be determined by ground TM

5 Wait for MCC to further troubleshoot L(R) Door drive

MECH

9.3c UPLOCK LAT tb NOT LAT

①
ET UMB L(R)
(Uplock) LAT
tb Not LAT
After 12 Sec
With sw in LAT
Position

Nominal Config:
Intermediate Config:
(R2)
ET UMB DR
MODE - GPC/MAN
CTRLINE LAT -
STO (tb-STO)
ET UMB
L,R DR - CL
(tb-CL)
L,R LAT - LAT
(tb-LAT)
(MA73C)
MCA LOGIC
MNA AFT 1 - ON
MNB AFT 2 - ON
MNC AFT 3 - ON
cb MCA PWR
AC1 3φ AFT 1 - cl
AC2 3φ AFT 2 - cl
AC3 3φ AFT 3 - cl

①
(R2)
• ET UMB L(R)
LAT - OFF
ET UMB L(R) LAT
tb - bp after 3
sec ?

② (MA73C:D)
Any of the follow-
ing MCA PWR cbs
tripped ?
AC1 3φ AFT 1
AC2 3φ AFT 2
AC3 3φ AFT 3

⑤
• Coordinate
with MCC
before closing
cb

②
③ Reattempt
Door Uplock
Latching using
both latch
switches
(R2)
• ET UMB L,R
LAT (two) - LAT
ET UMB L,R LAT
tb (two) - LAT
after 12 sec ?

③
④ TEMPORARY
ET UMB DOOR
UPLOCK LAT tb
FAILURE

③
⑥ DOOR LAT
sw FAILURE OR
MECHANICAL
JAM OR tb
FAILURE

① **Door Uplock
Actuator Times**
2 mtrs - 6 sec
1 mtr - 12 sec
Bus Pwr
Right Uplock LAT
AC3 - mtr 1
AC2 - mtr 2
Left Uplock LAT
AC1 - mtr 1
AC3 - mtr 2

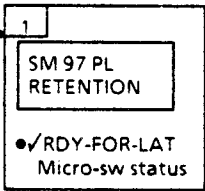
② Opposite door
uplock latch switch
L(R) will override
failed R-T-L Micro-sw

③ Verification of
uplock LAT position
can be determined
by ground TM. Wait
for MCC to further
troubleshoot L/R
Uplock LAT

MECH

9.4a PL RETEN RDY 1(2,3,4,5) tb NOT bp

PL RETEN RDY
1(2,3,4,5) tb
Not bp When PL
Deployed



Nominal Config:
(MA73C)
MCA LOGIC
MNA MID 1,3
(two) - ON
MNB MID 1,3
(two) - ON
(MA73C: C,D)
cb MCA PWR
AC1 3φ MID
1,3(two) - cl
cb MCA PWR
AC2 3φ MID
1,3(two) - cl
(R13L)
PL BAY MECH PWR
SYS 1,2 (two) - ON
(A6U)
PL RETEN LOGIC
PWR SYS 1, SYS
2 (two) - ON
PL RETEN PL SEL -
1(2,3)
(PDRS OPS C/L)
PL RETEN LAT
1(2,3,4,5) -
REL(LAT) (PDRS
OPS)

2	PL SEL X RDY-FOR-LAT LAT/REL	LAT X AB/AB XX/XX
P(S,K)	00	00/11
P(S,K)	10	00/11
P(S,K)	11	00/11

3 tb FAILURE

4 MICRO-SW A FAILURE

6 TRUNNION EJECT ARM FAILURE

5 Continue ops using CRT

7 Continue ops using available cues. During stow, latch all other latches before attempting a failed latch

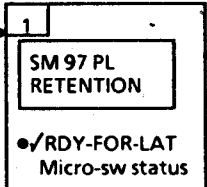
- 1 P = PORT
S = STBD
K = KEEL
Depicts SM SPEC 097
PL RET M/S LOGIC
- 2 Micro-sw A drives PL RETN Sys tb
- 3 Trunnion Eject Arm same as R-F-L Lever Arm

PL RETEN
9.4

MECH

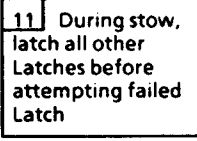
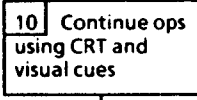
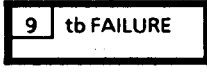
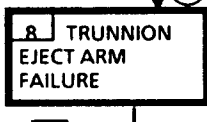
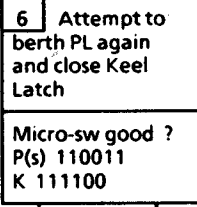
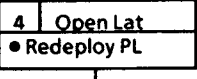
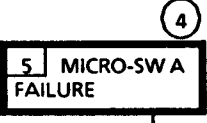
9.4b PL RETEN RDY 1(2,3,4,5) tb NOT GRAY

PL RETEN RDY
tb Not Gray
when PL
Berthed



Nominal Config:
Refer to 9.4a

2	PL SEL X RDY-FOR-LAT LAT/REL	LAT X AB/AB XX XX/XX
P(S)	00 00/11 00	
K	00 11/00	
P(S)	01 00/11 01	
K	01 11/00	
P(S)	11 00/11 11	
K	11 11/00	



1 P = PORT
S = STBD
K = KEEL
Depicted is SM SPEC
097 PL RET M/S
LOGIC

2 Keel R-F-L
indication appears
just prior to Lat
indication.
Procedure to be
used when Keel Lat
confirmed latched

3 Trunnion Eject
Arm same as R-F-L
lever

4 Micro-sw A
drives PL RETEN Sys
tb

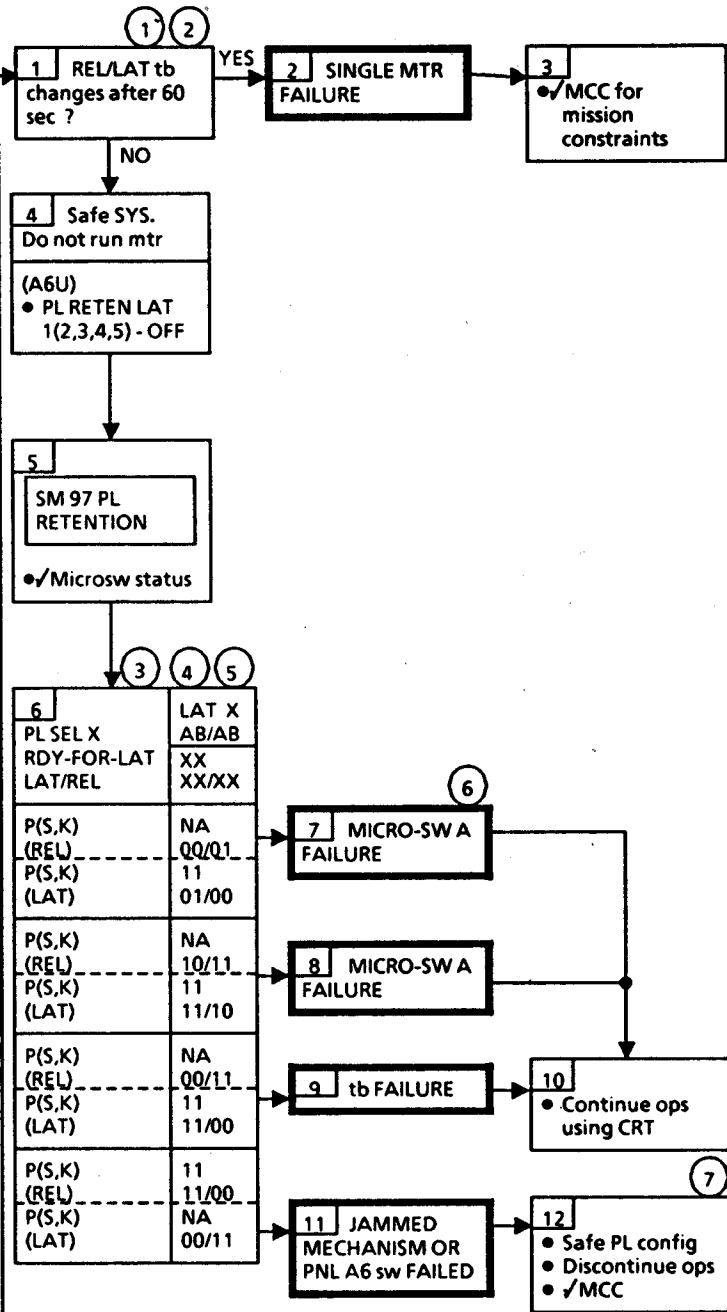
5 Continue
normal ops

MECH

9.4c PL RETEN LAT 1(2,3,4,5) tb NOT REL(LAT) AFTER 30 SEC

PL RETEN LAT 1(2,3,4,5) tb Not REL(LAT) After 30 Sec

Nominal Config:
Refer to 9.4a



1 REL(LAT) Ops Drive Time
Single mtr - 60 sec
Dual mtr - 30 sec

2 Applies to either LAT or REL sequence

3 P = PORT
S = STBD
K = KEEL
Depicts SM SPEC 097
PL RET M/S LOGIC

4 REL(LAT) indicates which sequences are being performed

5 KEEL R-F-L indication appears just prior to LAT indication

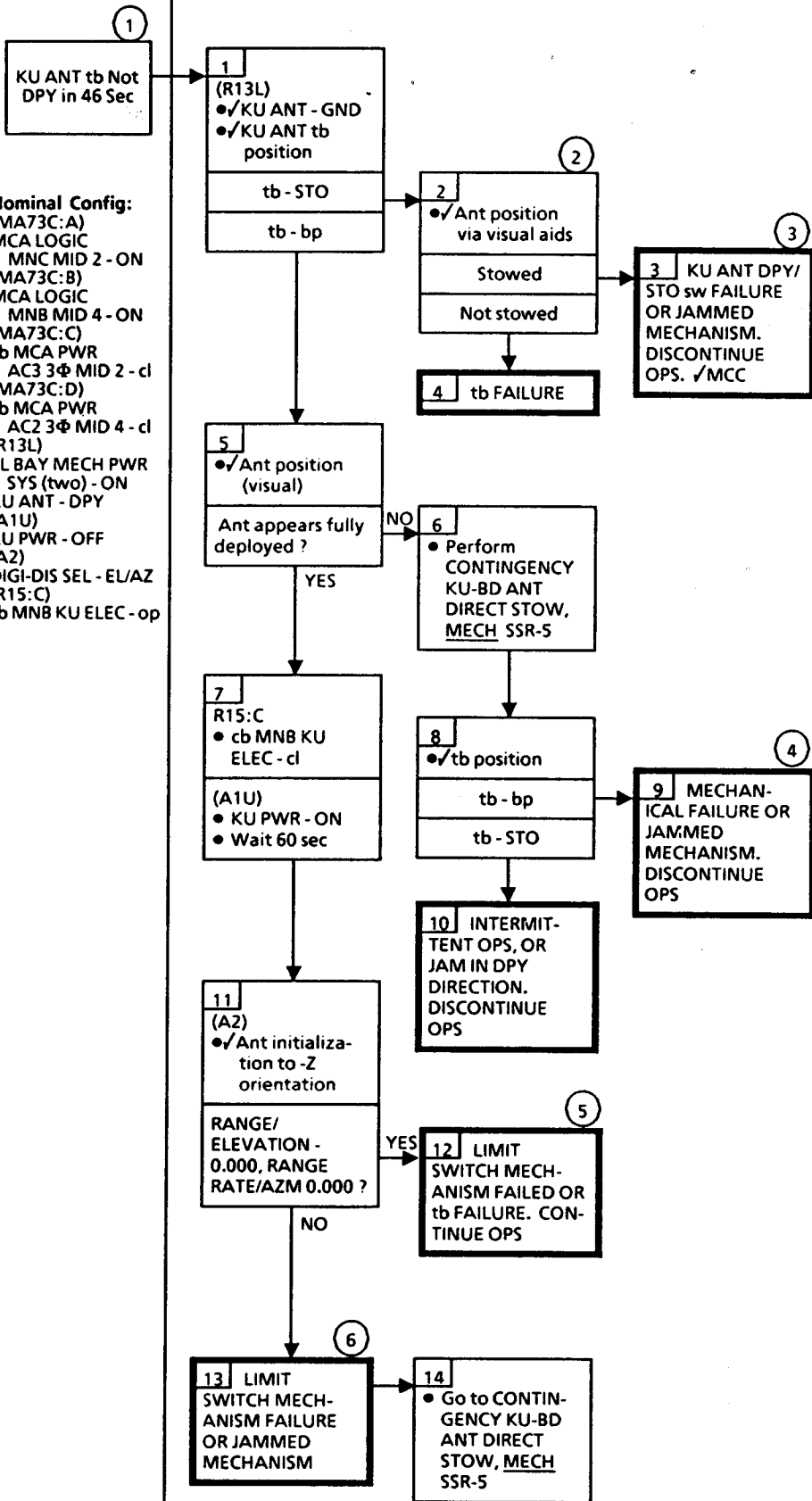
6 Micro-sw A drives PL RETEN Sys tb. This tb not reliable; expect single mtr times for LAT(REL) sequence

7 PL RETEN EVA procedure may be used as a work-around when LWLL (Lightweight Longeron Latches) or MWLL (Middle Weight Longeron Latches) are flown

MECH

9.5a KU ANT tb NOT DPY IN 46 SEC

Nominal Config:
 (MA73C:A)
 MCA LOGIC
 MNC MID 2 - ON
 (MA73C:B)
 MCA LOGIC
 MNB MID 4 - ON
 (MA73C:C)
 cb MCA PWR
 AC3 3Φ MID 2 - cl
 (MA73C:D)
 cb MCA PWR
 AC2 3Φ MID 4 - cl
 (R13L)
 PL BAY MECH PWR
 SYS (two) - ON
 KU ANT - DPY
 (A1U)
 KU PWR - OFF
 (A2)
 DIGI-DIS SEL - EL/AZ
 (R15:C)
 cb MNB KU ELEC - op



- ① Drive Time
Single mtr - 46 sec
Dual mtr - 23 sec
- ② KU-BD CCTV overlay located in commander's CAP
- 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, the failure results in loss of Ku-Bd comm and radar ops. KU-BAND ANTENNA TRANSMIT/SCAN ENABLE SIGNAL CONTINGENCY (IFM) may be reqd

KU ANT

9.5

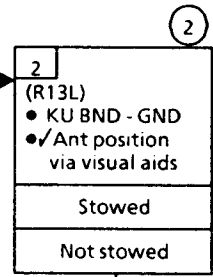
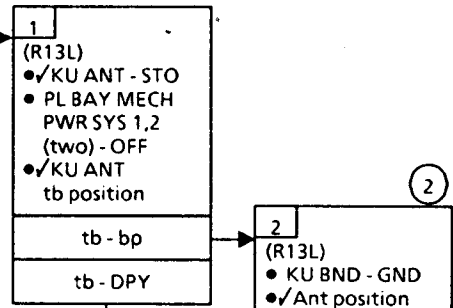
796

MECH

9.5b KU ANT tb NOT STO IN 46 SEC

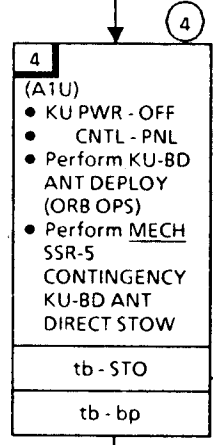
1
 KU ANT tb Not STO in 46 Sec

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 PWR - ON
 (R15:C)
 cb MNB KU
 ELEC-cl



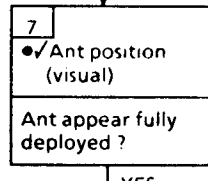
3 tb FAILURE
 OR LIMIT SWITCH
 MECHANISM
 FAILED.
 DISCONTINUE
 OPS

CAUTION
 Prior to deploying
 Ku Band, turn off
 Ku Pwr



5 INTERMIT-
 TENT OPS.
 DISCONTINUE
 OPS

6 MECHAN-
 ICAL FAILURE OR
 JAMMED
 MECHANISM.
 DISCONTINUE
 OPS

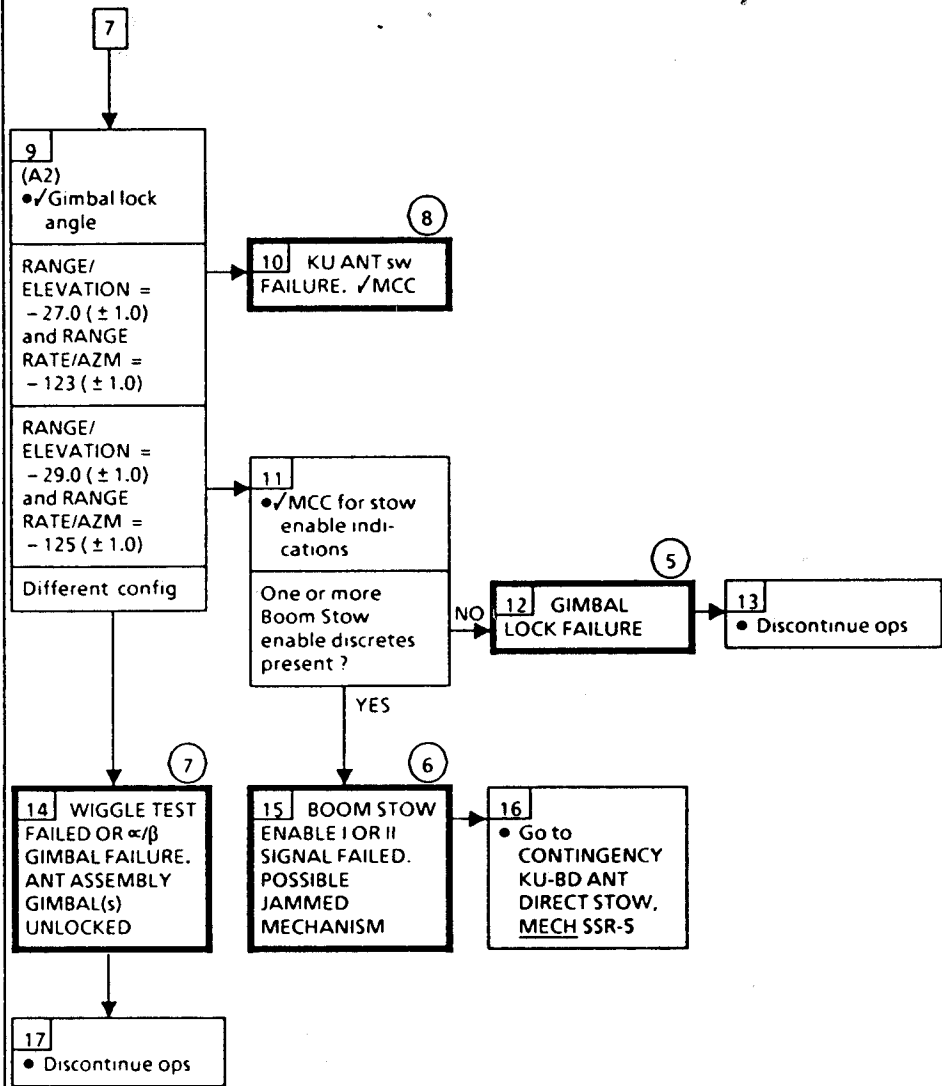


8 tb FAILURE

9

- 1** Drive Time
 Single mtr - 46 sec
 Dual mtr - 23 sec
- 2** KU-BD CCTV
 overlay located in
 Commander's CAP
- 3** If limit sw
 mechanism failed
 in deploy position,
 MECH SSR-7 reqd
 for subsequent
 deploy ops
- 4** Ku Pwr must
 be turned off prior
 to performing
 deploy procedure
 to prevent
 retracting gimbal
 lock pins
- 5** Possible Ant
 jettison reqd

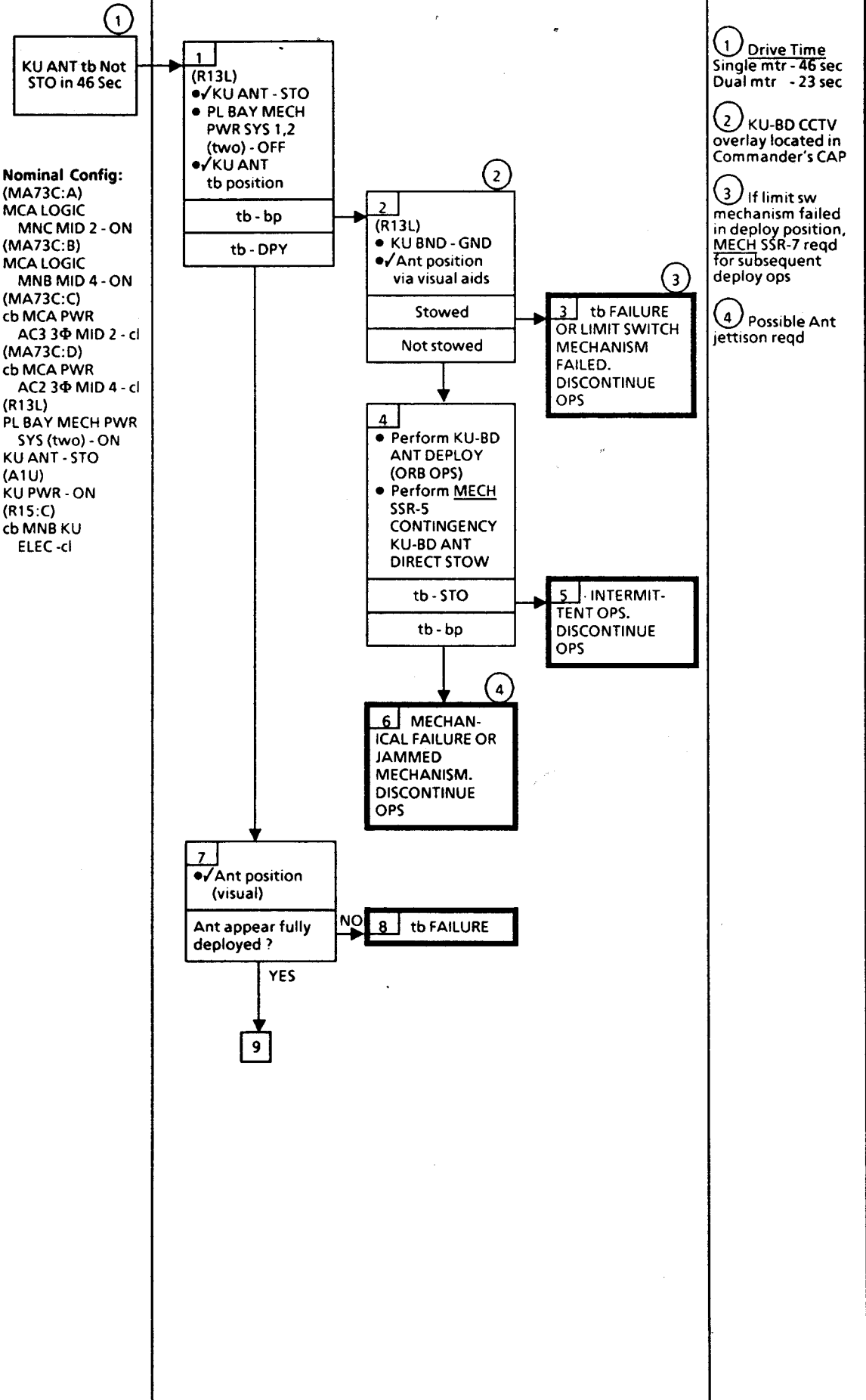
MECH 9.5b (Cont)



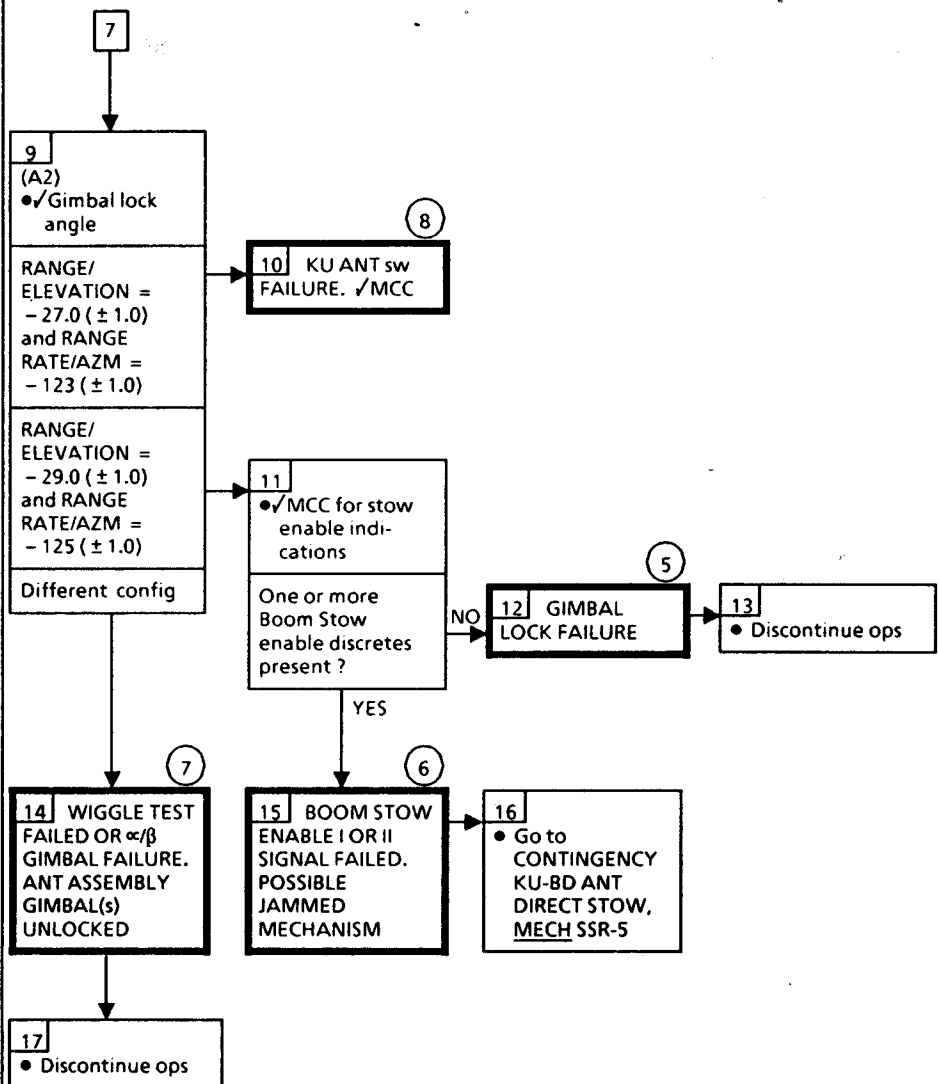
- ⑤ KU-BAND ANTENNA CONTINGENCY STOW-GIMBAL LOCK (IFM) may be reqd
- ⑥ Ant jettison may be reqd if mechanism is jammed
- ⑦ EVA and/or KU-BAND ANTENNA CONTINGENCY STOW-GIMBAL LOCK (IFM) may be reqd
- ⑧ KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW FAILED DEPLOY/STOW SWITCH (IFM) may be reqd

MECH

9.5b KU ANT tb NOT STO IN 46 SEC



MECH 9.5b (Cont)



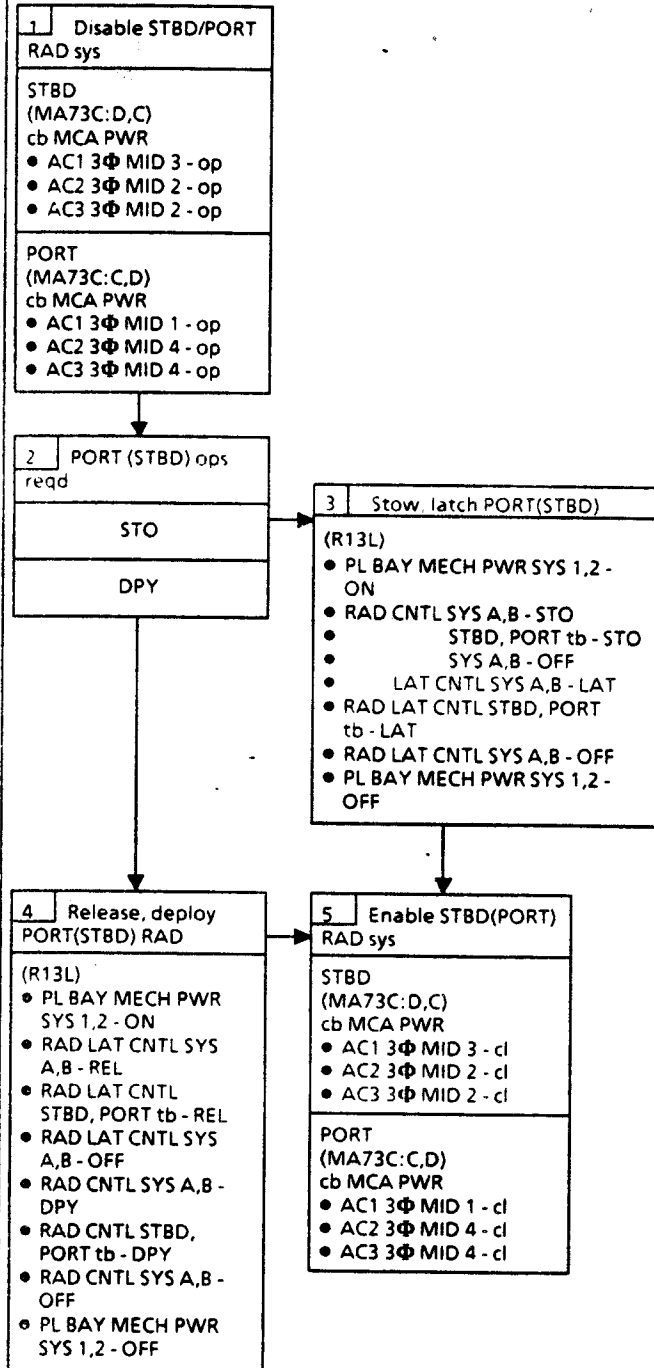
⑤ KU-BAND ANTENNA CONTINGENCY STOW-GIMBAL LOCK (IFM) may be reqd

⑥ Ant jettison may be reqd if mechanism is jammed

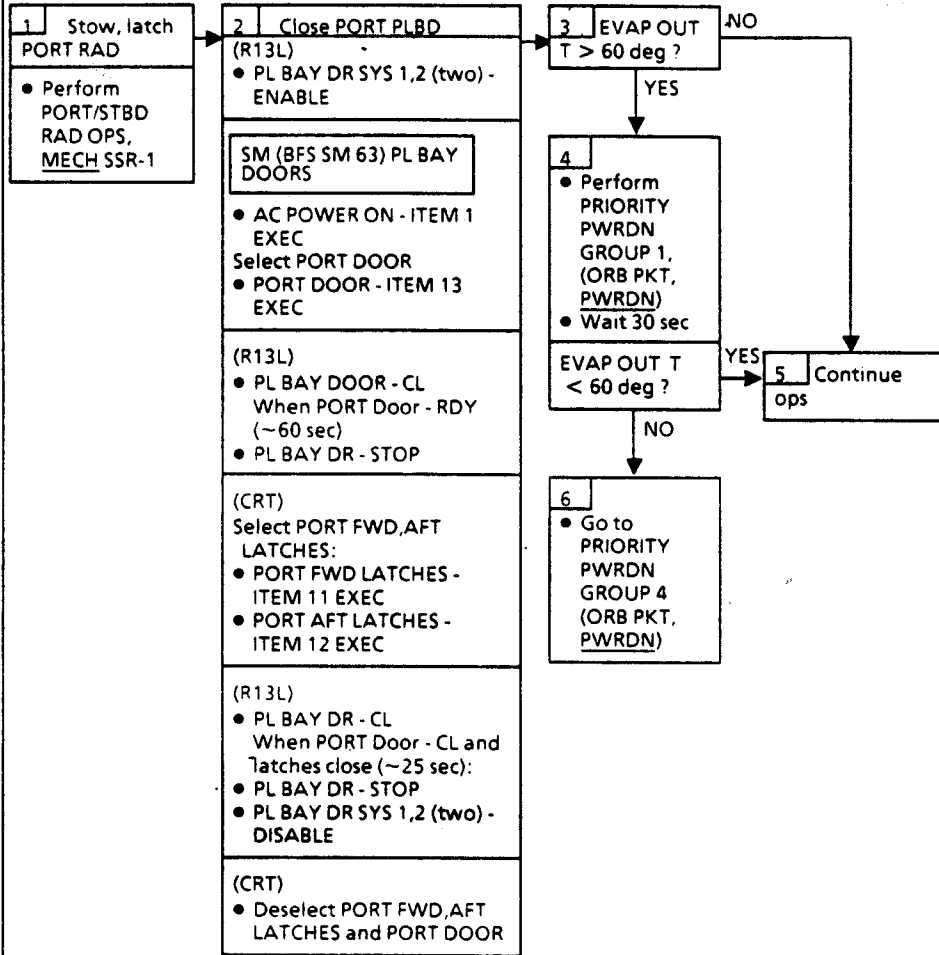
⑦ EVA and/or KU-BAND ANTENNA CONTINGENCY STOW-GIMBAL LOCK (IFM) may be reqd

⑧ KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW FAILED DEPLOY/STOW SWITCH (IFM) may be reqd

**MECH SSR-1
PORT/STBD RAD OPS**



MECH SSR-2 CL PORT PLBD



MECH SSR-3 SIMULTANEOUS PLBD CL

CAUTION

Excessive Overlap Noted with PORT DR Closed and Latched. Entry Req'd at Next Opportunity

If SM (BFS) GPC fails during this operation: (O6)

- MDM PL1, PL2 (two) - OFF
- GPC MODE 4(5) - STBY, HALT
- MDM PL1, PL2 (two) - ON
- Perform TBS, then:
- Use new SM (BFS) to close PLBDs

When closing any PLBD LAT set:

If no CL after 40 sec ctrline (60 sec bkhd), and Lat visually closed with at least one microswitch closed indication occurring at dual mtr close time, continue PLBD operations (use manual procedures); otherwise, wait for MCC

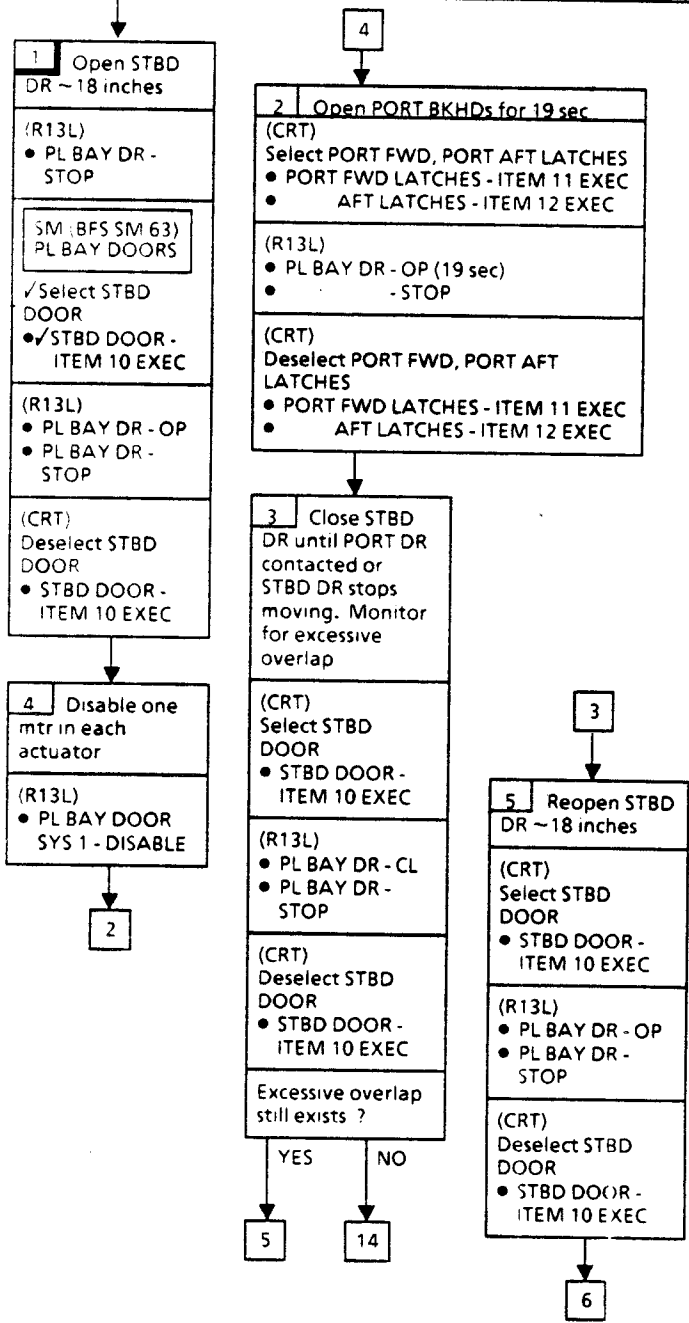
If no latch or door motion within ~10 sec after cmd (no motion determined visually):

- PL BAY DR - STOP, wait for MCC

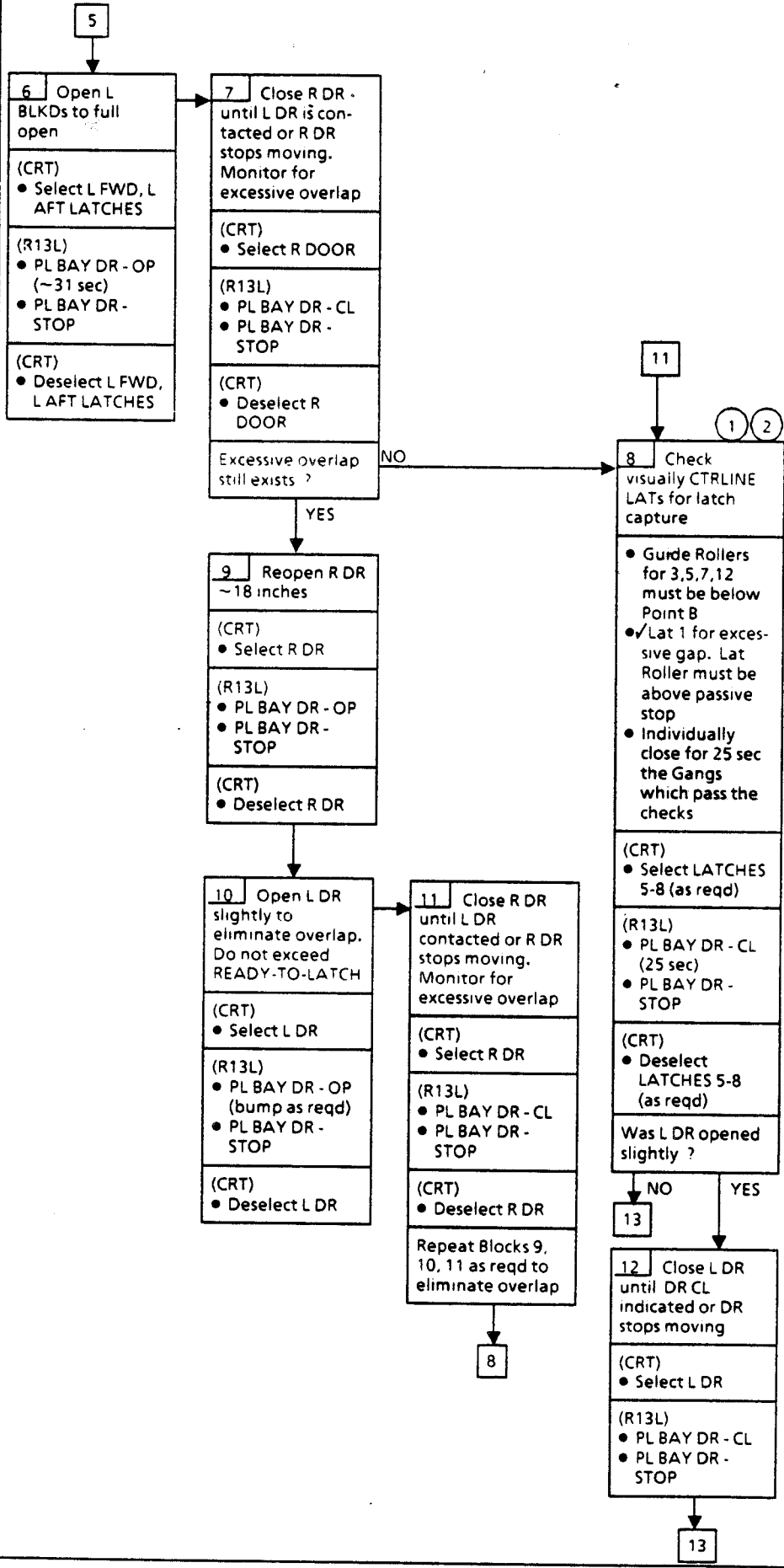
When closing PLBD:

If door motion stops and no RDY status:

- PL BAY DR - STOP, wait for MCC



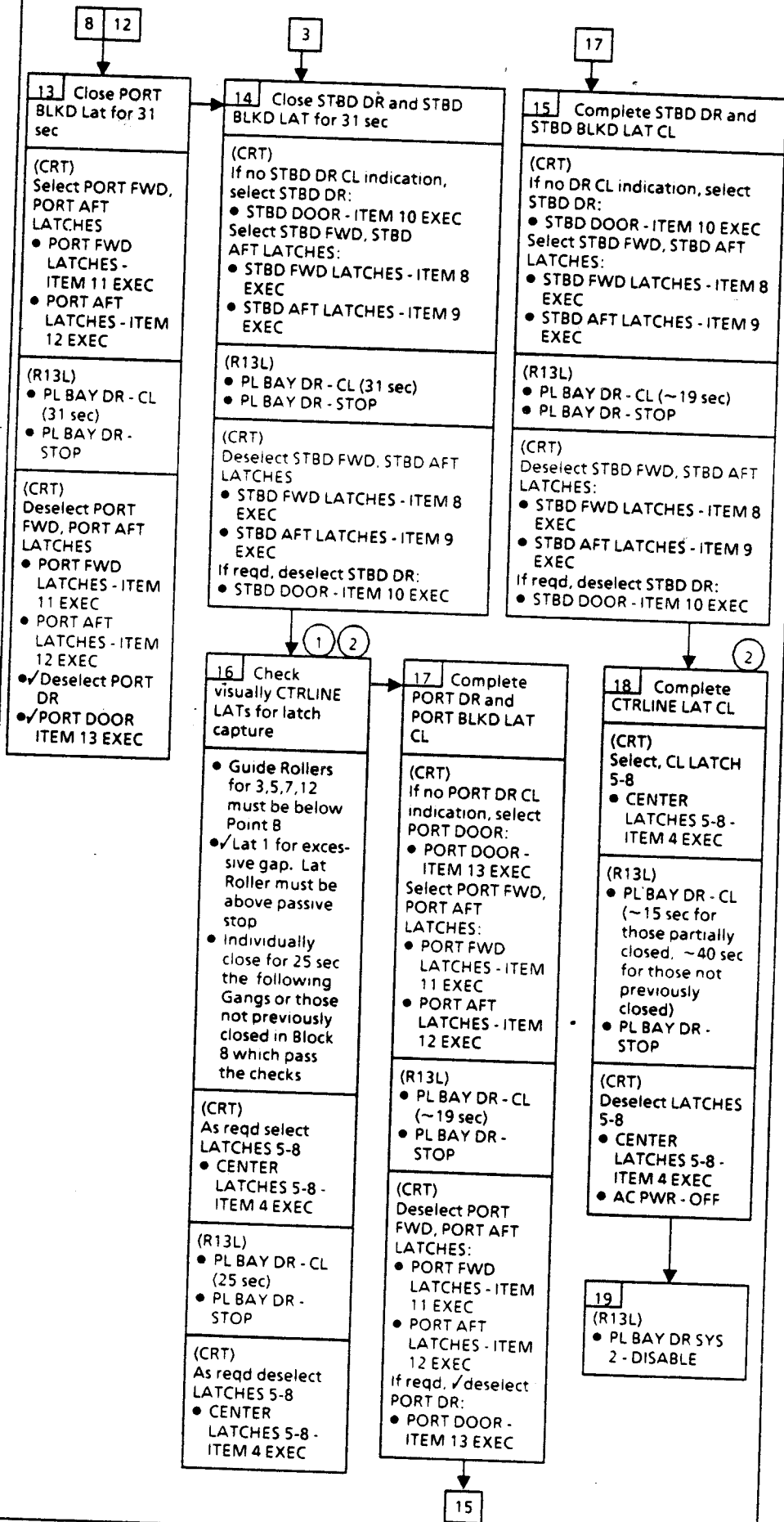
MECH SSR-3 (Cont)



① Refer to Figure 9-1 to visually check Lat 1 and extended guide roller trajectory for latches 3, 5, 7, 12

② As reqd, repeat for Lat 9-12 1-4 13-16 individually

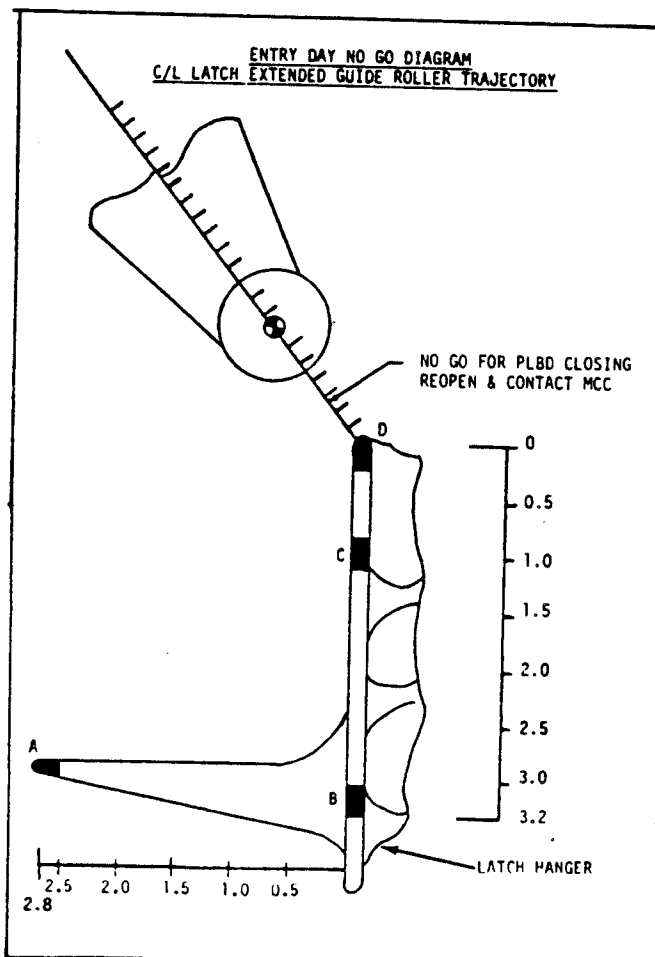
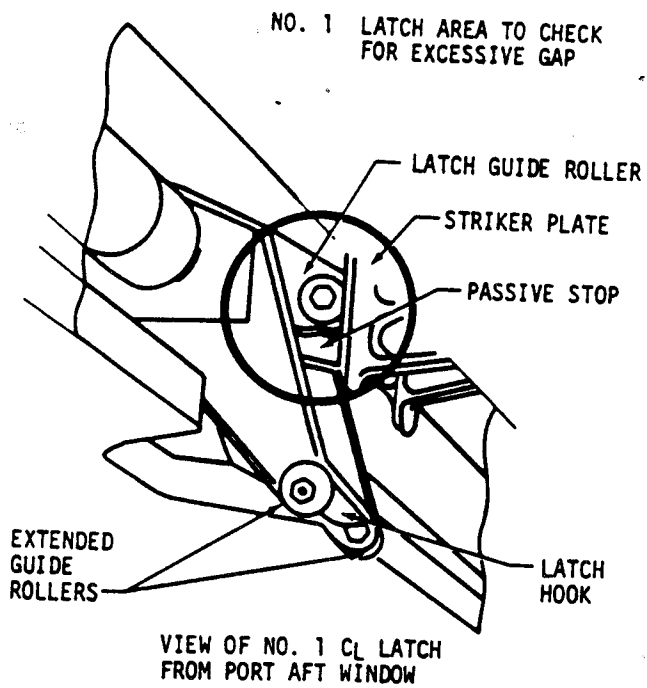
MECH SSR-3 (Cont)



① Refer to Figure 9-1 to visually check Lat 1 and extended guide roller trajectory for latches 3, 5, 7, 12

② As reqd, repeat for Lat 9-12 1-4 13-16 individually

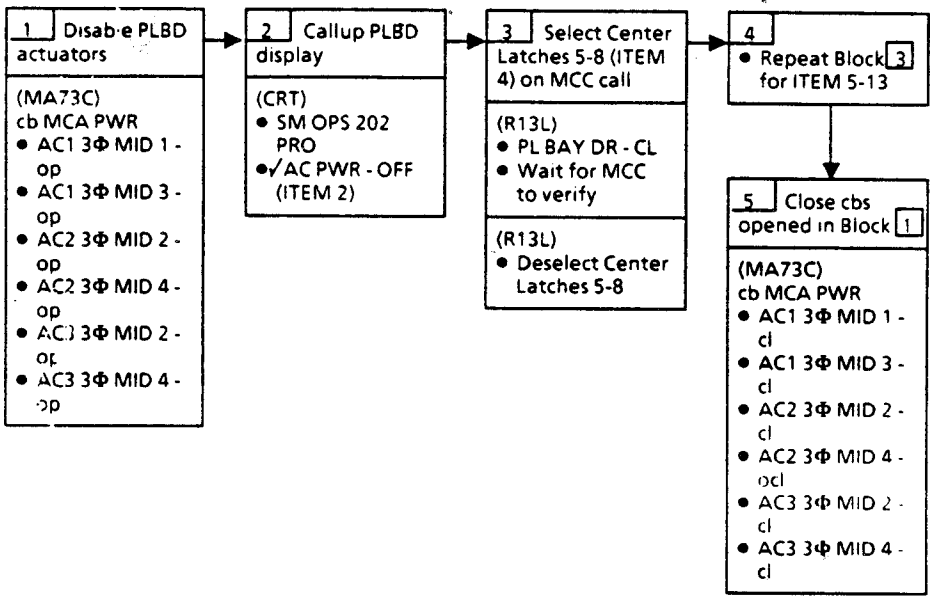
MECH SSR-3 (Cont)



806

FIGURE 9-1

MECH SSR-4 PLBD CHECKOUT AFTER MDM CHANGEOUT



MECH SSR-5 CONTINGENCY KU-BD ANT DIRECT STOW

CAUTION

Gimbal lock capability reqd
for 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 PWR - OFF
KU CNTL - PNL
R13L KU 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

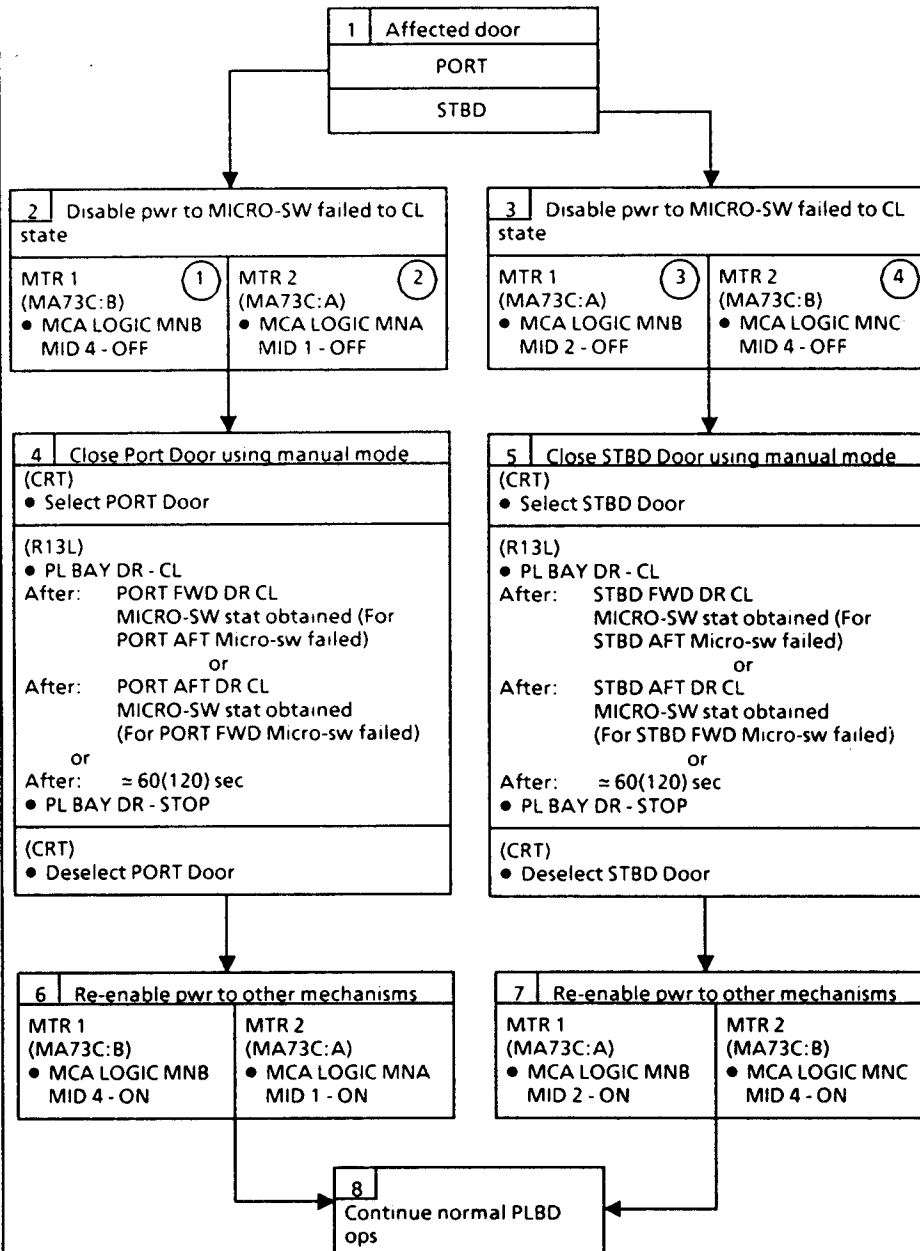
✓ KU-BD is within STO envelope

NOTE

KU-BD CCTV overlay is located in
the Commander's CAP

MECH SSR-6 PLBD CL MICRO-SWITCH FAILURE WORKAROUND

This procedure establishes motor door close capability for failure of a door close microswitch failed to the CL state (Mtr 1 or Mtr 2 inhibited from running).



① This step also disables pwr to:
 ● PORT FWD
 ● BKHD MTR 2
 ● STBD DR MTR 2
 ● STBD FWD
 ● BKHD MTR 2

② This step also disables pwr to:
 ● PORT FWD
 ● BKHD MTR 1
 ● STBD DR MTR 1
 ● STBD FWD
 ● BKHD MTR 1
 ● C/L 9-12 MTR 1

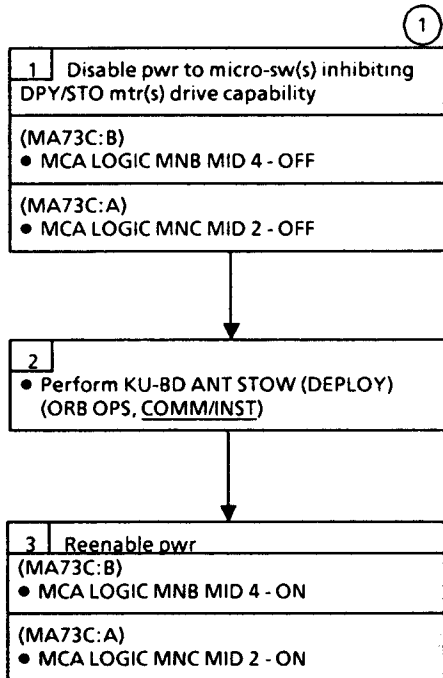
③ This step also disables pwr to:
 ● PORT DR MTR 2
 ● STBD AFT
 ● BKHD MTR 2
 ● C/L 13-16 MTR 2

④ This step also disables pwr to:
 ● PORT DR MTR 1
 ● STBD AFT
 ● BKHD MTR 1
 ● C/L 9-12 MTR 2
 ● C/L 13-16 MTR 1

MECH SSR-7 KU-BAND ANTENNA DPY/STO MICRO/SW FAILURE

This procedure regains capability to deploy or stow antenna if the (DPY/STO) micro-switch package failed, which prevents deploy/stow mtr ops

① Logic pwr does not inhibit mtr drive capability if pwrd off

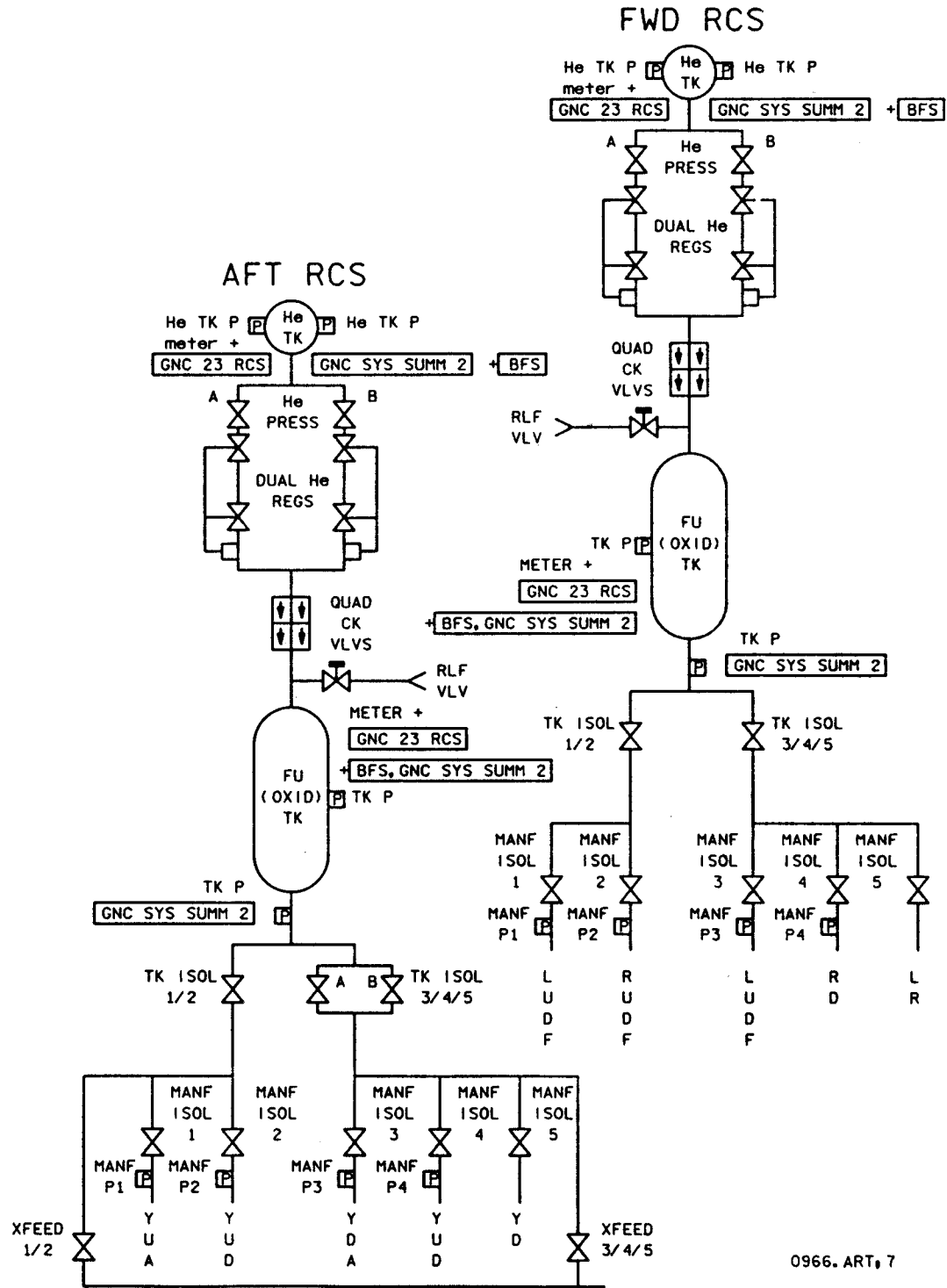


RCS

RCS SCHEMATIC.....	10-3
<u>10.1</u> <u>RCS JET/DLMA/PWR</u>	
1.1	RCS JET FAIL (ON)..... 10-4
1.2	FAIL (LEAK)..... 10-4
1.3	FAIL (OFF)..... 10-4
1.4	LEAK ISOL..... 10-4
1.5	TK P LOW (FU OR OX)..... 10-6
1.6	HIGH (FU OR OX)..... 10-6
1.7	I'CONNECT: L OMS TO RCS (CIL)..... 10-6
1.8	R OMS TO RCS (CIL)..... 10-6
1.9	RCS SECURE (FWD,AFT)..... 10-7
1.10	XFEED: R RCS TO L RCS..... 10-7
1.11	L RCS TO R RCS..... 10-7
1.12	XFEED RETURN: RCS..... 10-7
1.13	I'CONNECT TK SWITCH: FROM L TO R OMS FEED..... 10-8
1.14	FROM R TO L OMS FEED..... 10-8
1.15	I'CONNECT RETURN (OPS 2,3)..... 10-8
1.16	RCS RM LOSS..... 10-9
1.17	RM DLMA MANF..... 10-9
10.1a	L(R,F) RCS (L,U,D,R,A,F) JET, F(L,R) RCS TK P, F(L,R) RCS LEAK..... 10-10
10.1b	ALL JETS DES ON ANY ONE MANF..... 10-16
10.1c	'RM DLMA MANF'..... 10-17
10.1d	RCS PWR FAIL..... 10-18
10.1e	JET SELF-TEST FAIL..... 10-19
<u>10.2</u> <u>RCS He P ABNORMAL</u>	
10.2a	'F(L,R) RCS He P'..... 10-20
10.2b	RCS He P METER ABNORMAL..... 10-21
10.2c	He P ABNORMAL ON CRT..... 10-22
<u>10.3</u> <u>RCS VLV MISCOMP</u>	
10.3a	RCS VLV tb - bp..... 10-24
10.3b	tb & SW POSITION DISAGREE..... 10-27
<u>10.4</u> <u>RCS PRPLT THERM/SYS</u>	
10.4a	'S89 PRPLT THRM RCS'..... 10-28
10.4b	'RCS SYSTEM F(L,R)'..... 10-29
<u>RCS SSR</u>	
SSR-1	RCS MIXED XFEED MEM READ/WRITE..... 10-32
SSR-2	HOT FIRE RCS..... 10-34
SSR-3	AFT RCS MANF/LEG PRESS, READ/WRITE..... 10-37
SSR-4	STAGED, MANF REPRESS..... 10-39
SSR-5	LEAKING He RCS PRPLT/He BURN..... 10-40
SSR-6	RCS DRIVER TEST..... 10-45

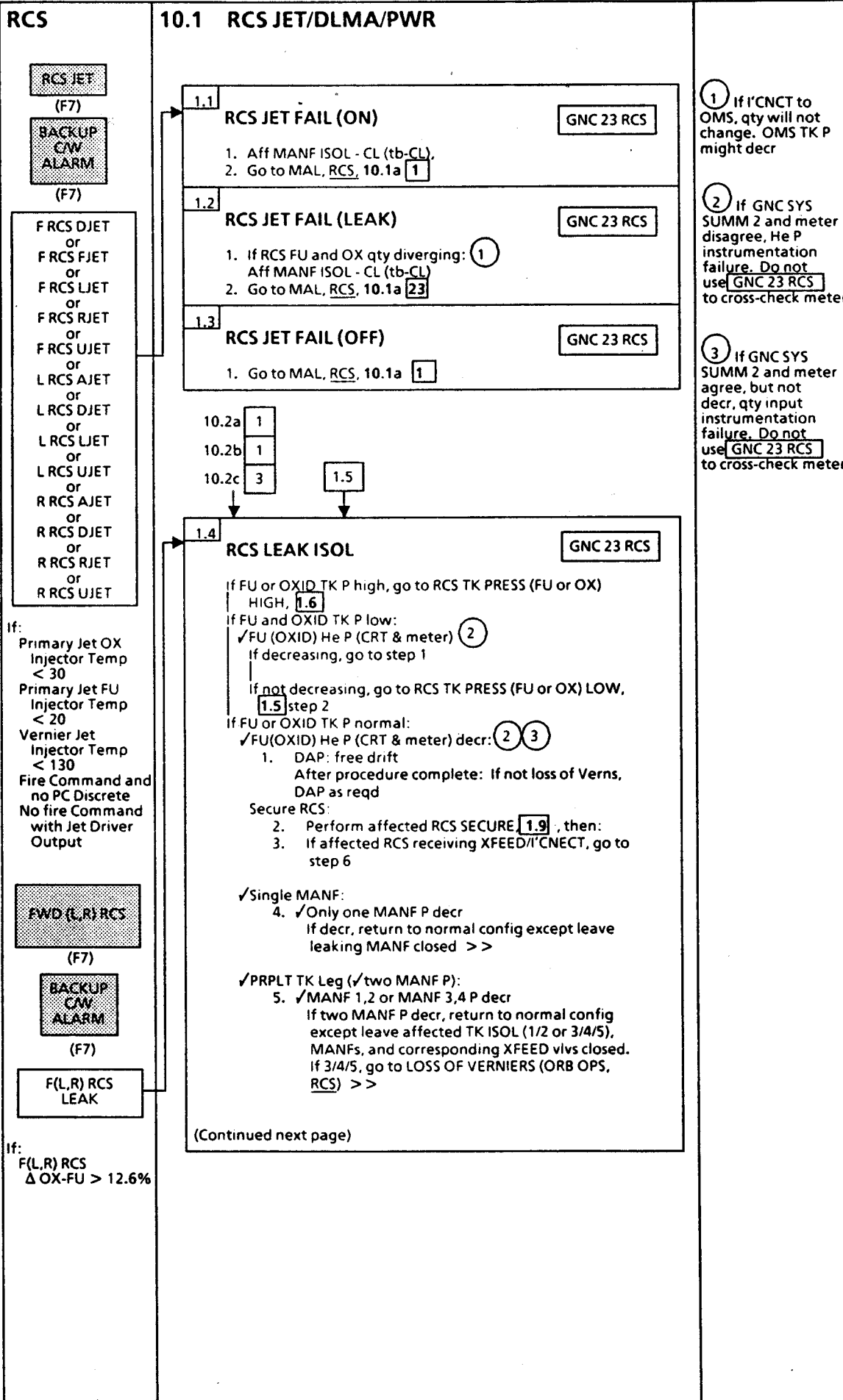
The following Fault Msgs have no corresponding MAL procedures in this book:

- ET SEP AUTO (INH,MAN)
- F(L,R) RCS PVT
- G23 OMS/RCS QTY
- RCS VLV
- SW TO MEP



0966. ART, 7

RCS JET/
DLMA/PWR
10.1



FWD(L,R) RCS
(F7)

BACKUP
C/W
ALARM
(F7)

F(L,R) RCS
LEAK

If:
F(L,R) RCS
Δ FU-OX
> 12.6%

Nominal Config:

(A14)
RCS/OMS HTR
FWD RCS JET
(five) - AUTO
AFT RCS JET
(five) - AUTO
(O7,O8)
FWD (AFT L, AFT R)
RCS He PRESS
A(B) - GPC
(tb-OP)
B(A) - CL
(tb-CL)
FWD (AFT L, AFT R)
RCS MANF
ISOL (fifteen) -
OP (tb-OP)
(O7)
AFT L, AFT R RCS TK
ISOL (six) - OP
(tb-OP)
(O8)
FWD RCS TK ISOL
(two) - OP
(tb-OP)

If Xfeed or
I'cnect:

Feeding RCS:
(O7)
AFT L(AFT R) RCS
He PRESS A(B) -
GPC (tb-OP)
He PRESS B(A) -
CL (tb-CL)
TK ISOL (three) -
OP (tb-OP)
XFEED (two) - OP
(tb-OP)

Receiving RCS:
(O7)
AFT L(AFT R) RCS
TK ISOL (three or
six) - CL (tb-CL)
XFEED (two or
four) - OP
(tb-OP)

Feeding OMS:
(O8)
L(R) OMS
He PRESS/VAP
ISOL(two) - CL
TK ISOL (two) -
OP (tb-OP)
XFEED A - CL
(tb-CL)
XFEED B - OP
(tb-OP)

(Cont in notes
column)

1.4 (Cont) -

✓He TK:

6. ✓He P decr

If decr, call MCC for use of LEAKING RCS PRPLT/He BURN, (MAL, RCS, SSR-5).

If no comm or no burn performed:

If Aft RCS, perform XFEED from leaking RCS
1.10 or 1.11. When He TK P 456, go to
I'CNECT from OMS 1.7 or 1.8 >>

If Fwd RCS, return to normal config. When He
TK P < 456, FWD RCS He PRESS (two) - CL
(tb-CL). When PRPLT TK P < 190, perform
RCS SECURE (FWD) 1.9, then go to LOSS OF
VERNIERS (ORB OPS, RCS) >>

If burn performed:

If Aft RCS >>

If FWD RCS:

When PRPLT TK P < 190, perform RCS
SECURE (FWD), 1.9, then go to LOSS OF
VERNIERS (ORB OPS, RCS) >>

✓PRPLT TK:

7. ✓PRPLT TK P decr

If decr, perform LEAKING RCS PRPLT/He BURN
(MAL, RCS, SSR-5) >>

✓He Leg:

8. Open He PRESS A and B (✓He P decr)

If decr:

If AFT RCS, close He PRESS A and B, I'CNECT
from OMS, 1.7 or 1.8 then open all MANFs.
Prior to deorbit TIG, return to straight RCS
feed. Leave He PRESS A and B - CL. Cycle
to maintain TK P 200-245. Repress to 245
at C/W Limit (200 psia). When He TK P
< 456, I'CNECT from OMS 1.7 or 1.8.
At EI perform XFEED from good RCS,
1.10 or 1.11 >>

If FWD RCS, return to normal config except
close He PRESS A,B; cycle to maintain
PRPLT TK P 200-245. Repress to 245 at C/W
limit (200 psia). When He P < 456,
GNC 23 RCS - override FWD MANFs STAT
closed, perform LOSS OF VERNIERS (ORB
OPS, RCS) override open prior to
deorbit, then when PRPLT TK P < 190,
go to RCS SECURE, 1.9 >>

If XFEED, ✓XFEED lines (✓L(R) RCS MANF 1,2 P):

9. L(R) RCS XFEED 1/2 - OP

✓L(R) MANF 1,2 P decr

If decr:

L(R) RCS XFEED 1/2 - CL (tb-CL)
TK ISOL 1/2 - OP (tb-OP)
MANF ISOL 1 - OP (tb-OP) ④

Wait 2 sec, then open remaining
nine MANF ISOLS.

Complete return to straight feed.

Do not XFEED/I'CNECT >>

MANF 5:

10. If leak not found above, reconfig system as reqd,
Leave MANF ISOL 5 (two) - GPC (tb-CL). Perform
LOSS OF VERNIERS (ORB OPS, RCS), then go to MAL,
RCS, 10.1a 77

4
WARNING

Repressing more
than one mani-
fold at a time
when the mani-
folds are at low
pressure may
damage RCS
propellant tank

Nominal Config:

(Cont)
JET DRIVERS:
(O14:F)
RJDA 1A L2/R2
LOGIC - ON
DRIVER - ON
RJDA 2A L4/R4
LOGIC - ON
DRIVER - ON
RJDF 1B F1
LOGIC - ON
DRIVER - ON
(O15:F)
RJDA 1B
L1/L5/R1 LOGIC -
ON
L1/R1 DRIVER - ON
RJDF 1A F2
LOGIC - ON
DRIVER - ON
(O16:F)
RJDA 2B
L3/R3/R5 LOGIC -
ON
L3/R3 DRIVER - ON
RJDF 2A F3
LOGIC - ON
DRIVER - ON
RJDF 2B
F4/F5 LOGIC - ON
F4 DRIVER - ON
RJDF L5/F5/R5
DRIVER - ON

F(L,R) RCS
(F7)

BACKUP
C/W
ALARM
(F7)

F(L,R) RCS
TK P

If:

GNC 23 RCS

TK P
> 312 psia
< 200 psia

1.5 **RCS TK P LOW (FU or OX)** GNC SYS SUMM 2

✓FU(OXID) He P (CRT & meter)

If decr:

1. Go to RCS LEAK ISOL, step 1, **1.4** >>

If not decr:

2. Affected RCS He PRESS A(B) - CL (tb-CL)
8(A) - OP (tb-OP), then
GPC (tb-OP)
3. Go to MAL, RCS, 10.1a **66**

1.6 **RCS TK P HIGH (FU or OX)** GNC 23 RCS

1. Aff RCS He PRESS (two) - CL (tb-CL)
2. Go to MAL, RCS, 10.1a **57**

10.1a **75**

1.4 steps 6,7,8

1.7 **I'CONNECT: L OMS to RCS** GNC 23 RCS

1. DAP: free drift
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 check with MCC
4. ✓L OMS He PRESS/VAP ISOL (two) - CL
TK ISOL (two) - OP (tb-OP)
✓R OMS XFEED (two) - CL (tb-CL)
L OMS XFEED A - CL (tb-CL)
B - OP (tb-OP)
5. OMS PRESS ENA, L OMS - ITEM 5 EXEC
6. DAP: as reqd

NOTE
Gauging not avail in ops 3

10.1a **75**

1.4 steps 6,7,8

1.8 **I'CONNECT: R OMS to RCS** GNC 23 RCS

1. DAP: free drift
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 check with MCC and >>
4. ✓R OMS He PRESS/VAP ISOL (two) - CL
TK ISOL (two) - OP (tb-OP)
✓L OMS XFEED (two) - CL (tb-CL)
R OMS XFEED A - CL (tb-CL)
B - OP (tb-OP)
5. OMS PRESS ENA, R OMS - ITEM 6 EXEC
6. DAP: as reqd

NOTE
Gauging not avail in ops 3

RCS 10.1 (Cont)

1.4 steps 6,7,8

1.9 RCS SECURE (FWD,AFT)

If normal config:

1. RCS MANF ISOL (five) - CL (tb-CL)
- or
- XFEED (two) - CL (tb-CL)
 - TK ISOL (all) - CL (tb-CL)
 - He PRESS (two) - CL (tb-CL) >>

If feeding XFEED:

2. L,R RCS MANF ISOL (ten) - CL (tb-CL)
- Receiving XFEED (two) - CL (tb-CL)
 - Feeding XFEED (two) - CL (tb-CL)
 - TK ISOL (three) - CL (tb-CL)
 - He PRESS (two) - CL (tb-CL) >>

If receiving XFEED or OMS/RCS I'CONNECT:

3. ✓RCS TK ISOL (three) - CL (tb-CL)
- He PRESS (two) - CL (tb-CL)

1.4 steps 6,7,8

1.10 XFEED: R RCS to L RCS

1. DAP: free drift
2. ✓L,R OMS XFEED (four) - CL (tb-CL)
3. L,R RCS TK ISOL (six) - CL (tb-CL)
4. XFEED (four) - OP (tb-OP)
5. If RCS MANF P (OX and FU) > 130 continue; otherwise, check with MCC and >>
6. R RCS
 - ✓He PRESS A(B) - GPC (tb-OP)
 - ✓B(A) - CL (tb-CL)
 - TK ISOL (three) - OP (tb-OP)
7. MSTR RCS XFEED - FEED FROM R
8. DAP: as reqd

1.4 steps 6,7,8

1.11 XFEED: L RCS to R RCS

1. DAP: free drift
2. ✓L,R OMS XFEED (four) - CL (tb-CL)
3. L,R RCS TK ISOL (six) - CL (tb-CL)
4. XFEED (four) - OP (tb-OP)
5. If RCS MANF P (OX and FU) > 130 continue; otherwise, check with MCC and >>
6. L RCS
 - ✓He PRESS A(B) - GPC (tb-OP)
 - ✓B(A) - CL (tb-CL)
 - TK ISOL (three) - OP (tb-OP)
7. MSTR RCS XFEED - FEED FROM L
8. DAP: as reqd

1.12 XFEED RETURN: RCS

1. DAP: free drift
2. MSTR RCS XFEED - OFF
3. AFT L,R RCS XFEED (four) - CL (tb-CL)
4. TK ISOL (six) - OP (tb-OP)
5. ✓He PRESS A(B) (two) - GPC (tb-OP)
6. ✓B(A) (two) - CL (tb-CL)
7. DAP: as reqd

1.13

**I'CONNECT SWITCH:
From L to R OMS FEED**

GNC 23 RCS

1. DAP: free drift
2. L OMS XFEED B - CL (tb-CL)
R OMS XFEED B - OP (tb-OP)
3. OMS PRESS ENA, OFF - ITEM 7 EXEC
R OMS - ITEM 6 EXEC
4. DAP: as reqd

1.14

**I'CONNECT SWITCH:
From R to L OMS FEED**

GNC 23 RCS

1. DAP: free drift
2. R OMS XFEED B - CL (tb-CL)
L OMS XFEED B - OP (tb-OP)
3. OMS PRESS ENA, OFF - ITEM 7 EXEC
L OMS - ITEM 6 EXEC
4. DAP: as reqd

1.15

I'CONNECT RETURN (OPS 2,3)

GNC 23 RCS

1. DAP: free drift
2. OMS PRESS ENA, OFF - ITEM 7 EXEC
3. ✓ OMS TK ISOL (four) - OP (tb-OP)
XFEED (four) - CL (tb-CL)
4. L,R RCS XFEED (four) - CL (tb-CL)
TK ISOL (six) - OP (tb-OP)
5. DAP: as reqd

RCS 10.1 (Cont)

1.4 steps 6,7,8

1.9
RCS SECURE (FWD,AFT)

If normal config:

1. RCS MANF ISOL (five) - CL (tb-CL)
- or
 - XFEED (two) - CL (tb-CL)
 - TK ISOL (all) - CL (tb-CL)
 - He PRESS (two) - CL (tb-CL) >>

If feeding XFEED:

2. L,R RCS MANF ISOL (ten) - CL (tb-CL)
- Receiving XFEED (two) - CL (tb-CL)
- or
 - Feeding XFEED (two) - CL (tb-CL)
 - TK ISOL (three) - CL (tb-CL)
 - He PRESS (two) - CL (tb-CL) >>

If receiving XFEED or OMS/RCS I'CONNECT:

3. ✓RCS TK ISOL (three) - CL (tb-CL)
- He PRESS (two) - CL (tb-CL)

1.4 steps 6,7,8

1.10
XFEED: R RCS to L RCS

1. DAP: free drift
2. ✓L,R OMS XFEED (four) - CL (tb-CL)
3. AFT L RCS TK ISOL (three) - CL (tb-CL)
- XFEED (two) - OP (tb-OP)
4. AFT R RCS
 - ✓He PRESS A(B) - GPC (tb-OP)
 - ✓B(A) - CL (tb-CL)
 - ✓TK ISOL (three) - OP (tb-OP)
 - XFEED (two) - OP (tb-OP)
5. MSTR RCS XFEED - FEED FROM R
6. DAP: as reqd

1.4 steps 6,7,8

1.11
XFEED: L RCS to R RCS

1. DAP: free drift
2. ✓L,R OMS XFEED (four) - CL (tb-CL)
3. AFT R RCS TK ISOL (three) - CL (tb-CL)
- XFEED (two) - OP (tb-OP)
4. AFT L RCS
 - ✓He PRESS A(B) - GPC (tb-OP)
 - ✓B(A) - CL (tb-CL)
 - ✓TK ISOL (three) - OP (tb-OP)
 - XFEED (two) - OP (tb-OP)
5. MSTR RCS XFEED - FEED FROM L
6. DAP: as reqd

1.12
XFEED RETURN: RCS

1. DAP: free drift
2. MSTR RCS XFEED - OFF
3. AFT L,R RCS XFEED (four) - CL (tb-CL)
- TK ISOL (six) - OP (tb-OP)
- ✓He PRESS A(B) (two) - GPC (tb-OP)
- ✓B(A) (two) - CL (tb-CL)
4. DAP: as reqd

1.13

**I'CONNECT SWITCH:
From L to R OMS FEED**

GNC 23 RCS

1. DAP: free drift
2. L OMS XFEED B - CL (tb-CL)
R OMS XFEED B - OP (tb-OP)
3. OMS PRESS ENA, OFF - ITEM 7 EXEC
R OMS - ITEM 6 EXEC
4. DAP: as reqd

1.14

**I'CONNECT SWITCH:
From R to L OMS FEED**

GNC 23 RCS

1. DAP: free drift
2. R OMS XFEED B - CL (tb-CL)
L OMS XFEED B - OP (tb-OP)
3. OMS PRESS ENA, OFF - ITEM 7 EXEC
L OMS - ITEM 6 EXEC
4. DAP: as reqd

1.15

I'CONNECT RETURN (OPS 2,3)

GNC 23 RCS

1. DAP: free drift
2. OMS PRESS ENA, OFF - ITEM 7 EXEC
3. ✓ OMS TK ISOL (four) - OP (tb-OP)
XFEED (four) - CL (tb-CL)
4. L,R RCS XFEED (four) - CL (tb-CL)
TK ISOL (six) - OP (tb-OP)
5. DAP: as reqd

10.1a 5

1.16

GNC 23 RCS

RCS RM LOSS

If vernier jets:

If loss of FAIL-OFF detection:

1. Resel >>

If BCE BYP (B or D), MDM fail, or loss of

or LK detection:

If only LSL and/or R5R affected:

2. Desel affected jet >>

If any Down Firing Vernier affected:

3. Affected MANF 5 - CL (tb-CL)

4. Go to LOSS OF VERNIERS (ORB OPS, RCS) >>

If primary jets:

If loss of FAIL OFF or LK detection:

5. If att control still avail, desel affected jet(s)

or 6. DES INH twice (reprioritize, reset RM)

7. At seat ingress, go to AFT(FWD) RCS RM

LOSS (ENT PKT, RCS) >>

If loss of FAIL ON detection:

8. If att control still avail, override STAT closed

or for all MANFs on affected RJD and affected

RJD - OFF

9. DES INH twice (reprioritize, reset RM)

10. At seat ingress, go to AFT(FWD) RCS RM LOSS

(ENT PKT, RCS) >>

If BCE BYP (B or D), or MDM fail:

11. If att control still avail, leave STAT closed for all

MANFs on affected RJD and affected RJD - OFF

12. DES INH twice (reprioritize, reset RM)

13. At seat ingress, go to AFT(FWD) RCS RM LOSS

(ENT PKT, RCS)

1.17

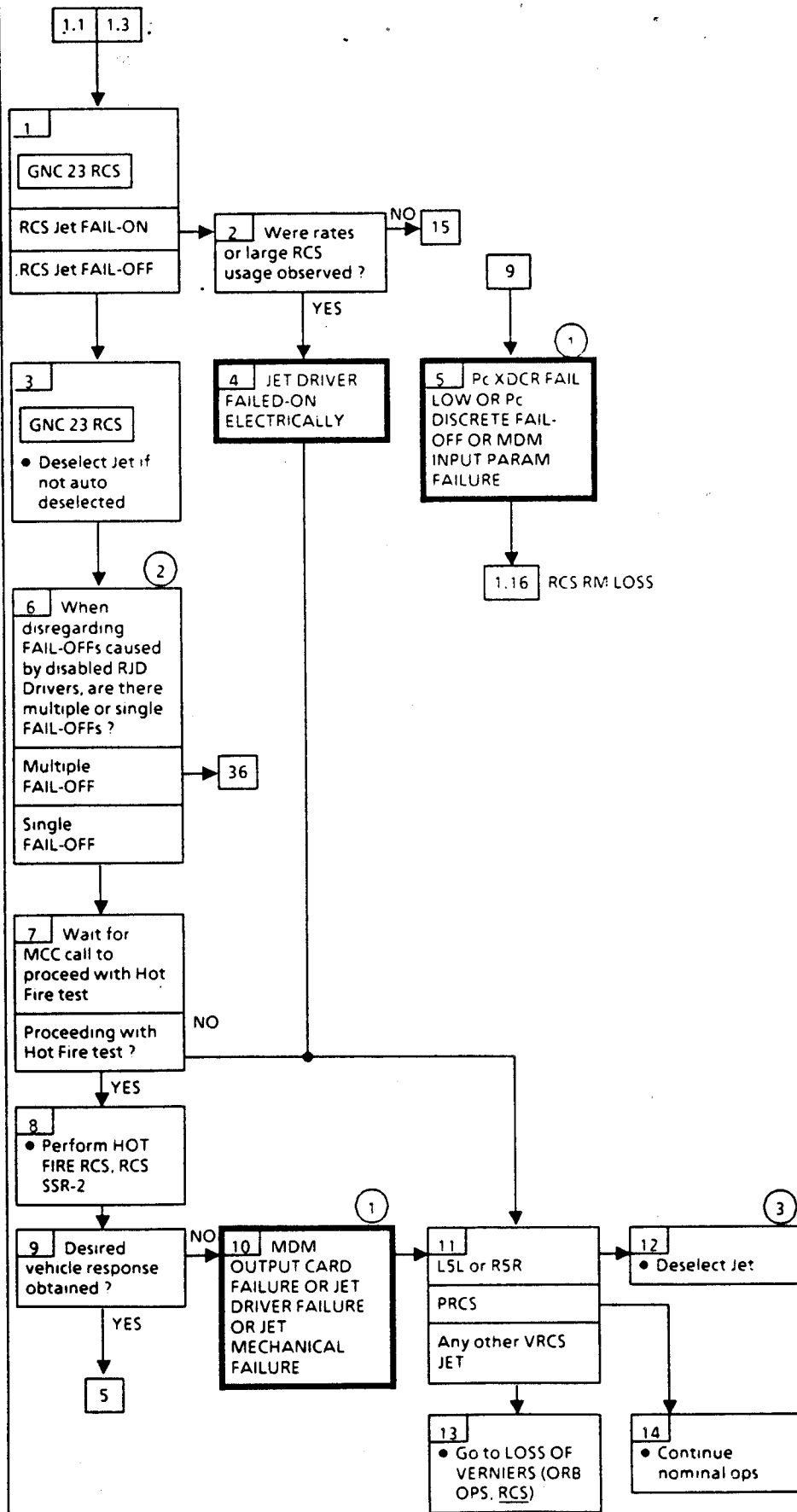
RM DLMA MANF

1. Aff MANF - GPC

Go to MAL RCS, 10.1c 1

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

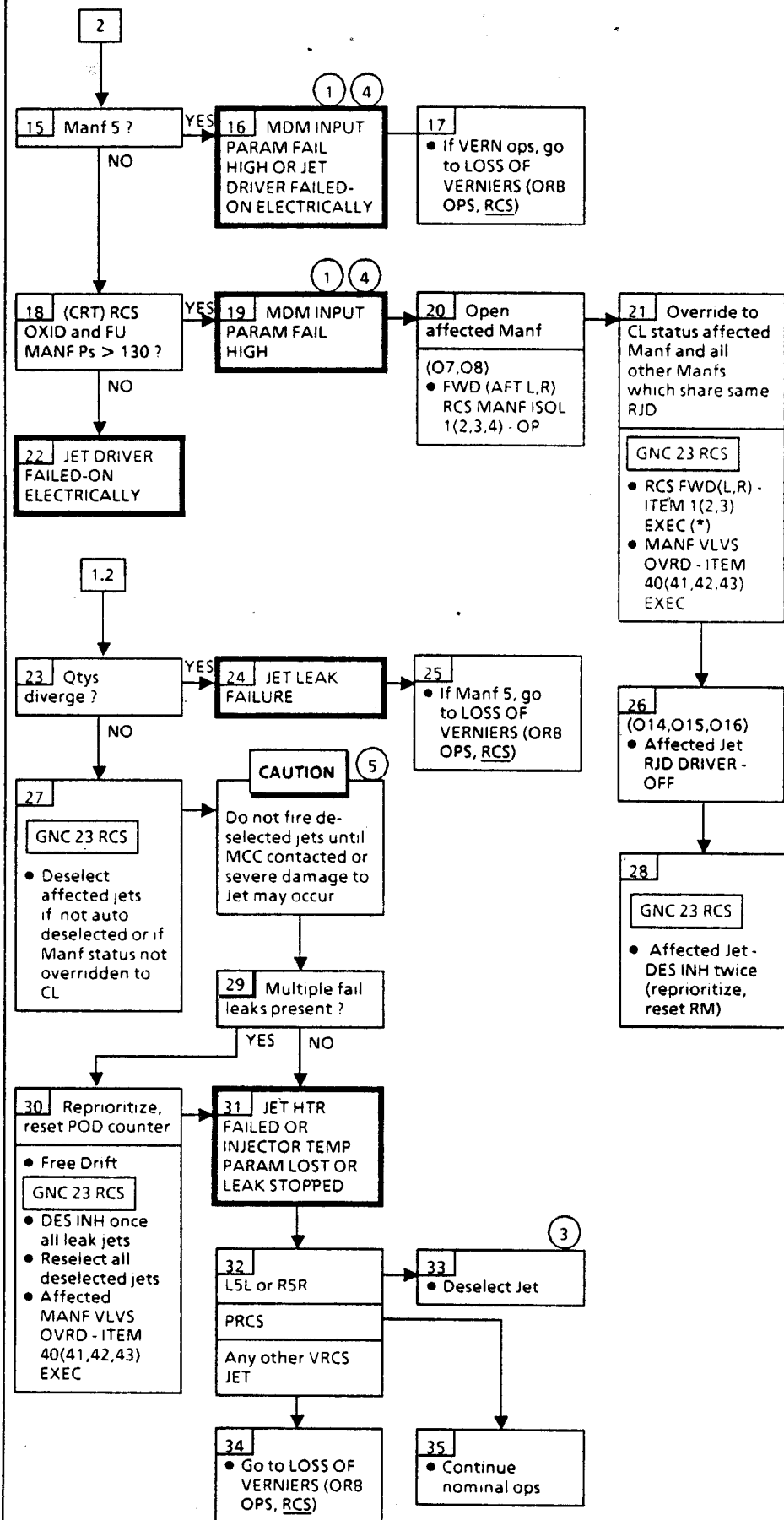


① ✓MCC for other params possibly lost in same MDM card

② To determine if multiple fail-off jets occurred, ✓ both Aft pods

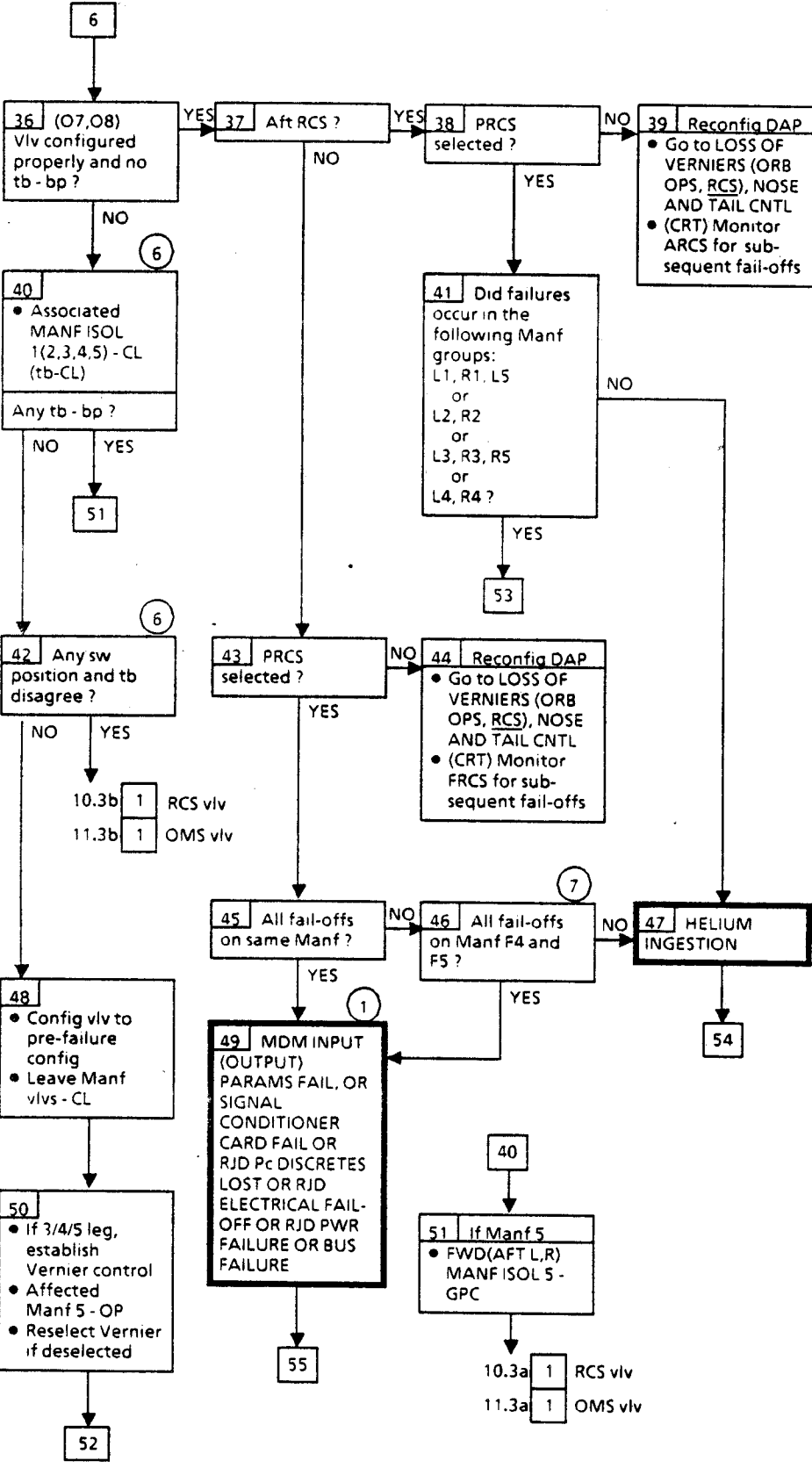
③ If L5L or R5R failed, Vernier control still available

RCS 10.1a (Cont)



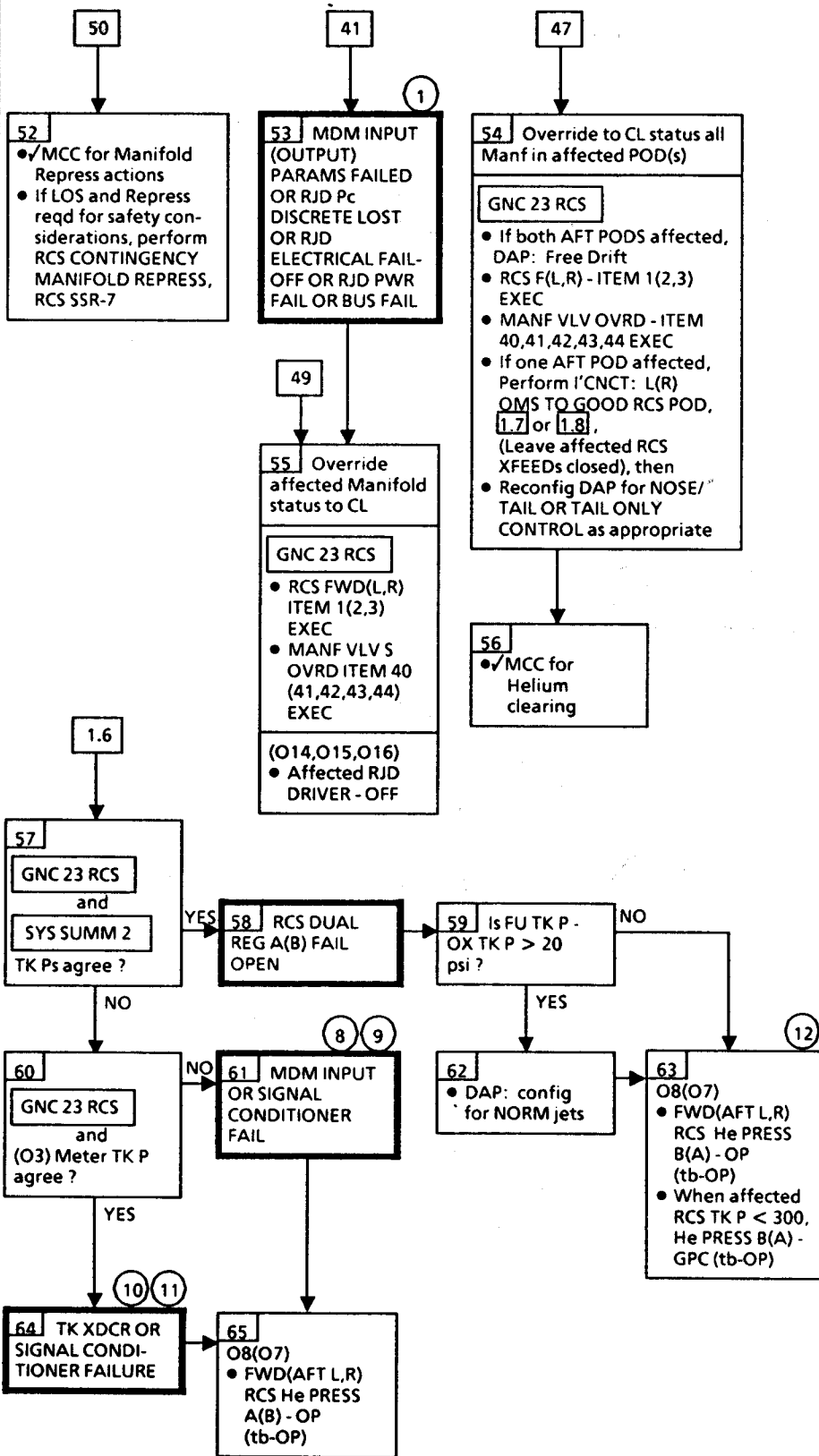
- ① ✓MCC for other params possibly lost in same MDM card
- ③ If L5L or R5R failed, Vernier control still available
- ④ Fail-on protection lost for affected jet
- ⑤ MCC call based on jet injector temps

RCS 10.1a (Cont)



- ① ✓MCC for other params possibly lost in same MDM card
- ⑥ Evacuated Manfs need to be repressed. ✓MCC for config and repress procedure
- ⑦ Both F4,F5 commanded by FF3 and return telemetry by OF2

RCS 10.1a (Cont)



1 ✓MCC for other params possibly lost in same MDM card

8 H/W C&W remains

9 Use SYS SUMM 2

or (O3) Meter TK P only

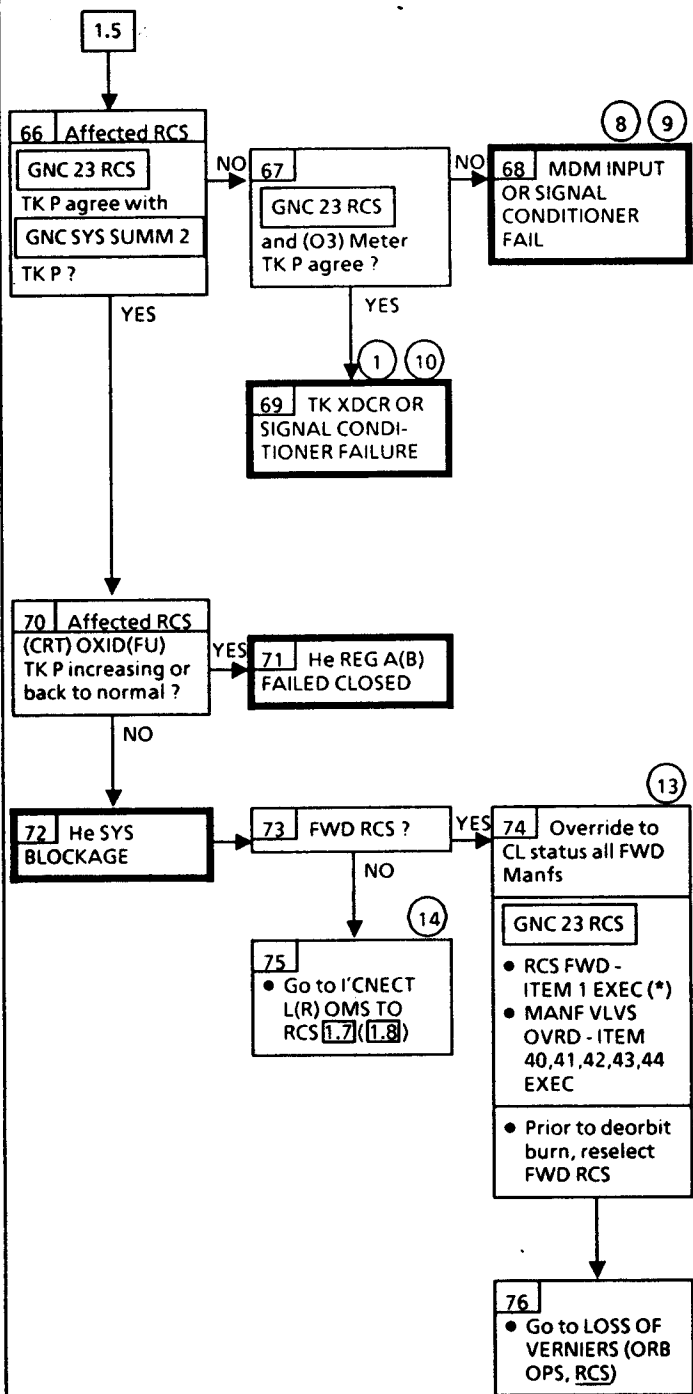
10 RCS PVT for affected OX(FU) may be in error. Use affected pod FU(OX) for qty

11 Use SYS SUMM 2

TK P only

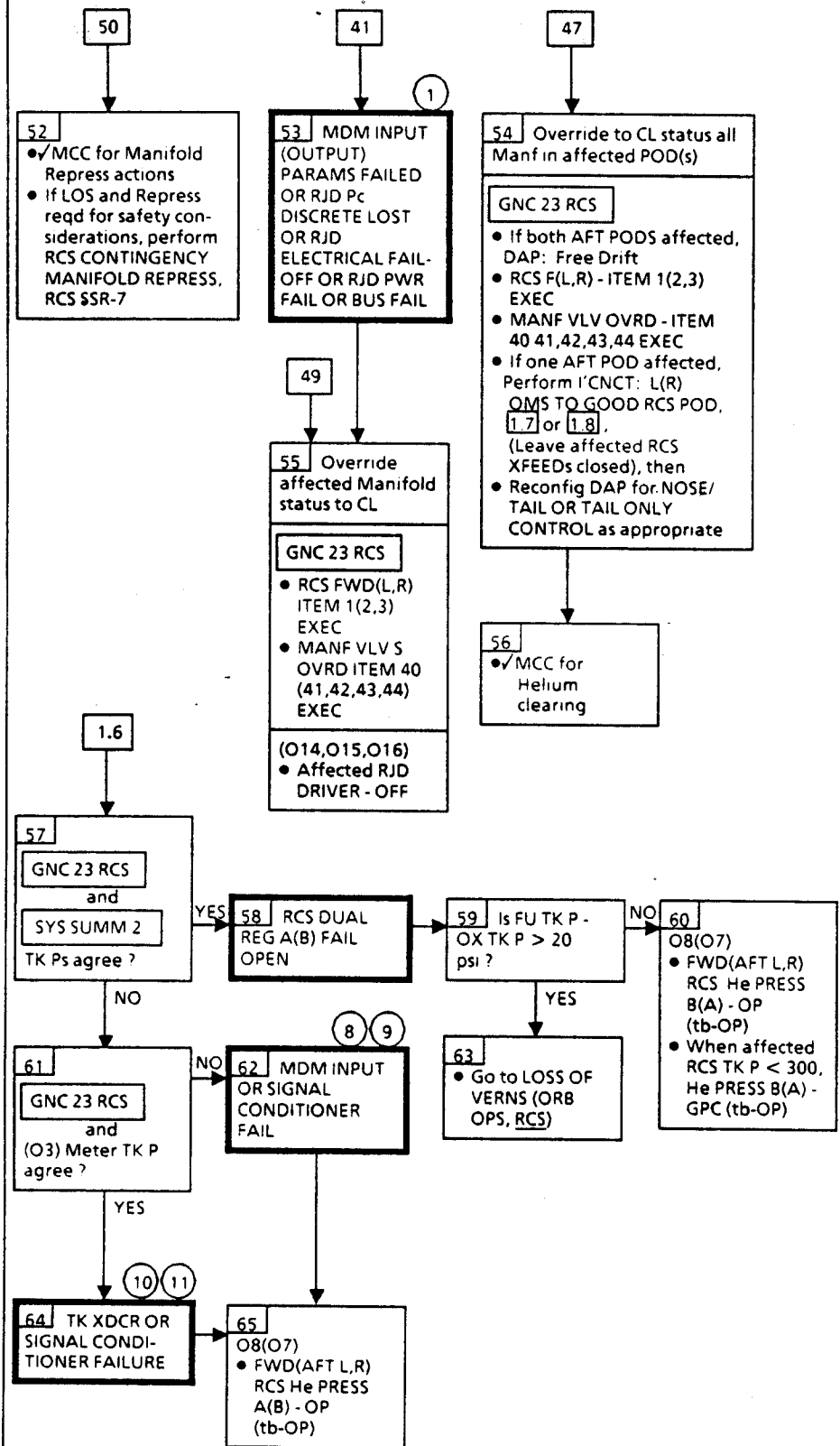
12 When FU TK P - OX TK P ≤ 20 psi, use vern jets if desired

RCS 10.1a (Cont)



- ① ✓MCC for other params possibly lost in same MDM card
- ⑧ H/W C&W OK
- ⑨ Use
SYS SUMM 2
or (O3) meter TK P only
- ⑩ RCS PVT for affected OX(FU) may be in error. Use affected pod FU(OX) for qty
- ⑬ Prior to deorbit burn, reselect FWD RCS. Secure FWD RCS when TK P < 190
- ⑭ Xfeed from good RCS prior to deorbit. Propellant with He blockage available until TK P < 190 psi if reqd

RCS 10.1a (Cont)



1 ✓MCC for other params possibly lost in same MDM card

8 H/W C&W remains

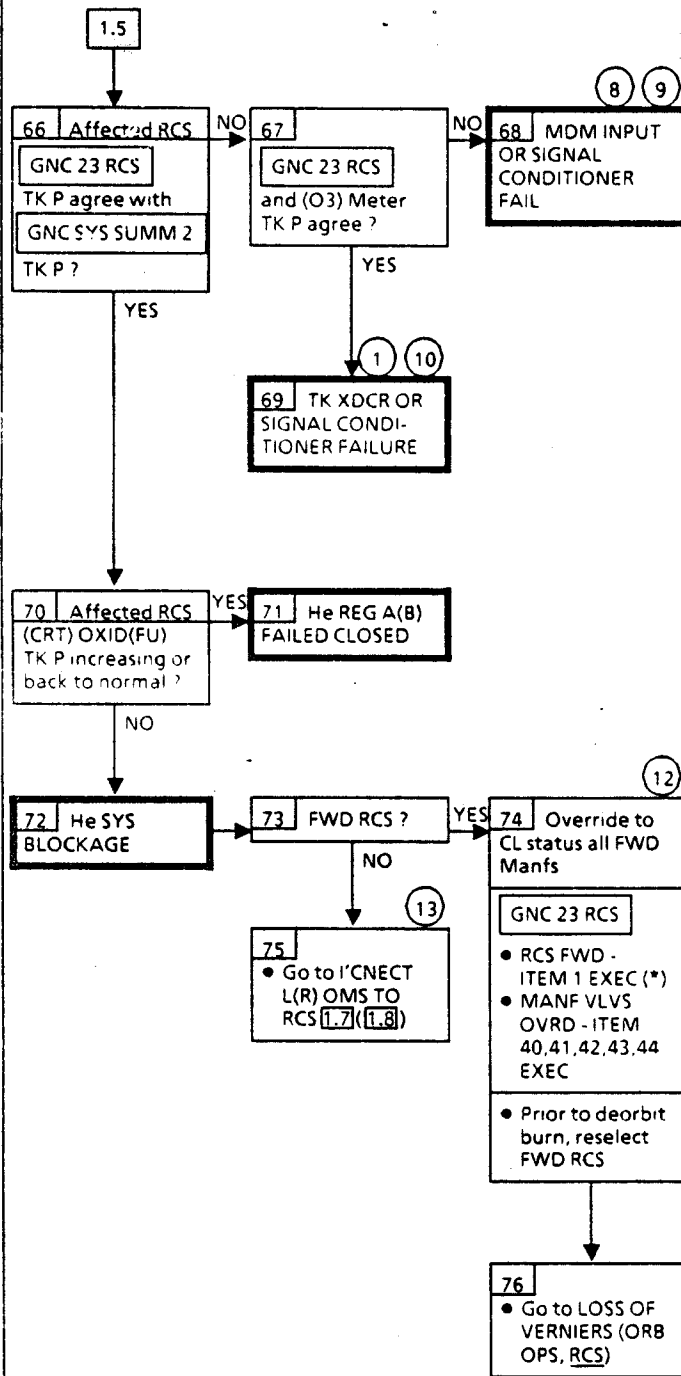
9 Use
SYS SUMM 2

or
(O3) Meter TK P only

10 RCS PVT for affected OX(FU) may be in error. Use affected pod FU(OX) for qty

11 Use
SYS SUMM 2
TK P only

RCS 10.1a (Cont)



① ✓MCC for other
params possibly lost
in same MDM card

⑧ H/W C&W OK

⑨ Use

SYS SUMM 2

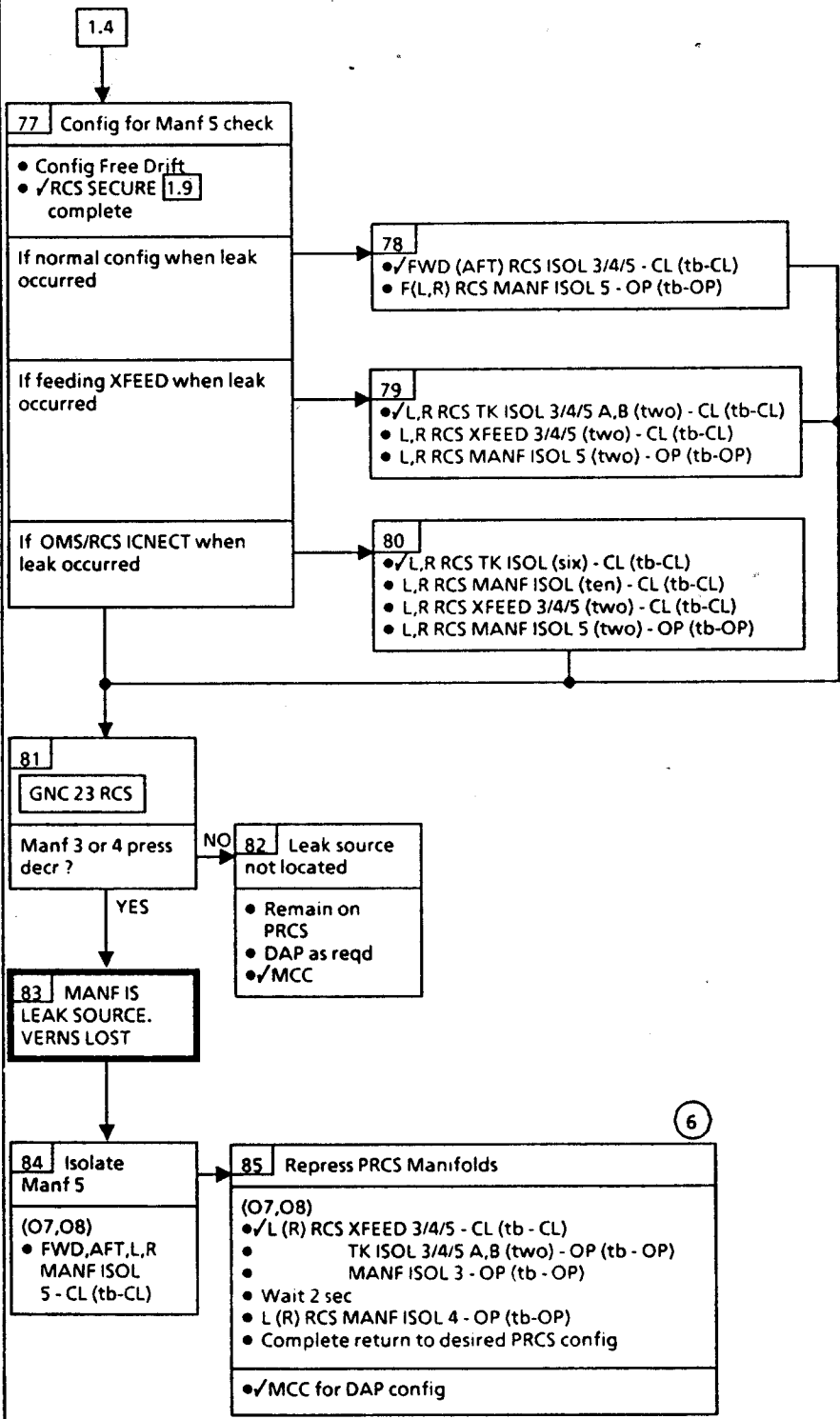
or (O3) meter TK P
only

⑩ RCS PVT for
affected OX(FU)
may be in error. Use
affected pod FU(OX)
for qty

⑫ Prior to deorbit
burn, reselect FWD
RCS. Secure FWD
RCS when TK P
< 190

⑬ Xfeed from
good RCS prior to
deorbit. Propellant
with He blockage
available until TK P
< 190 psi if reqd

RCS 10.1a (Cont)



6

WARNING

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

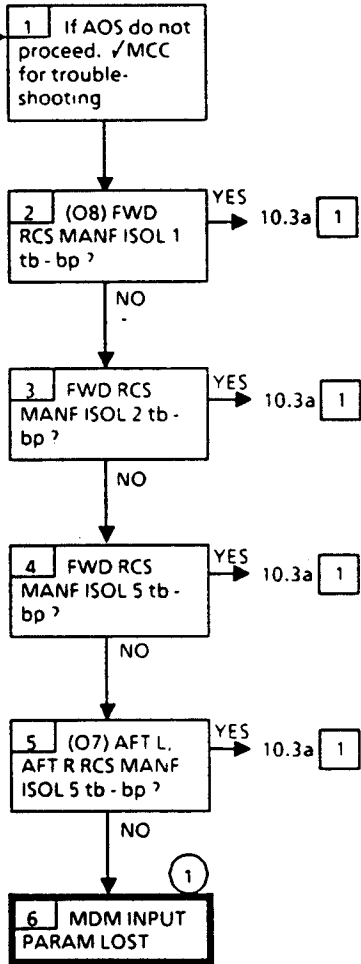
RCS

10.1b ALL JETS DES ON ANY ONE MANF

All Jets DES on Any One Manf

Crew observes all jets on any one manf are deselected without 'RM DLMA MANF' or 'RCS PWR FAIL' alert

Nominal Config: (O7,O8) All Manf vlvs - OP



① ✓MCC for other params possibly lost in same MDM card

RCS

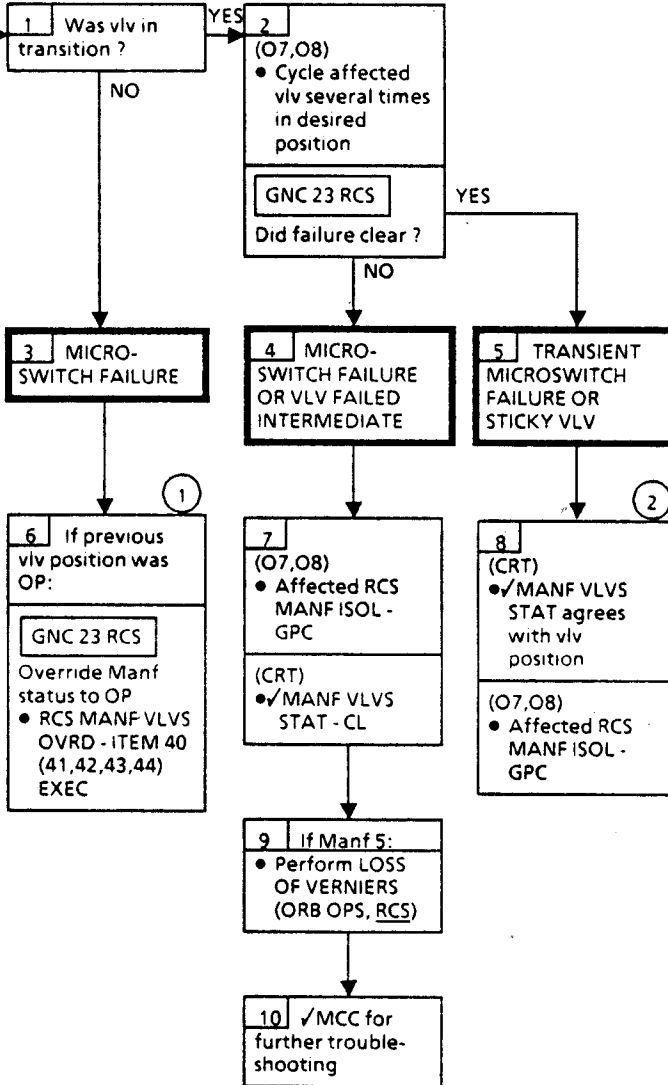
10.1c RM DLMA MANF

SM
ALERT

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 microswitch fails again

RCS

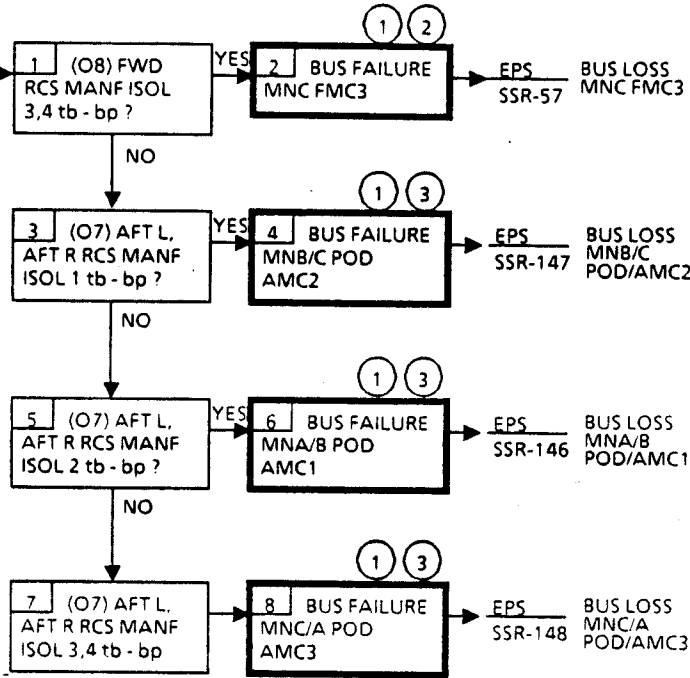
10.1d RCS PWR FAIL

SM
ALERT

RCS PWR FAIL

If loss of vlv logic
pwr to:
(O8)
FWD RCS
MANF ISOL 3,4
or
(O7)
AFT L, AFT R
RCS MANF
ISOL 1
or
ISOL 2
or
ISOL 3,4

Nominal Config:
(MA73C:A)
MCA LOGIC
MNC FWD 3 - ON
(MA73C:I)
AFT POD VLV
LOGIC GP 1/3 - ON
1/2 - ON
2/3 - ON



① If subsequent leak on affected manf:

GNC 23 RCS

ITEM 1(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 loss of CNTL CA3

③ Failure possibly caused by dual CNTL or dual APC bus failures or CNTL and APC bus failure

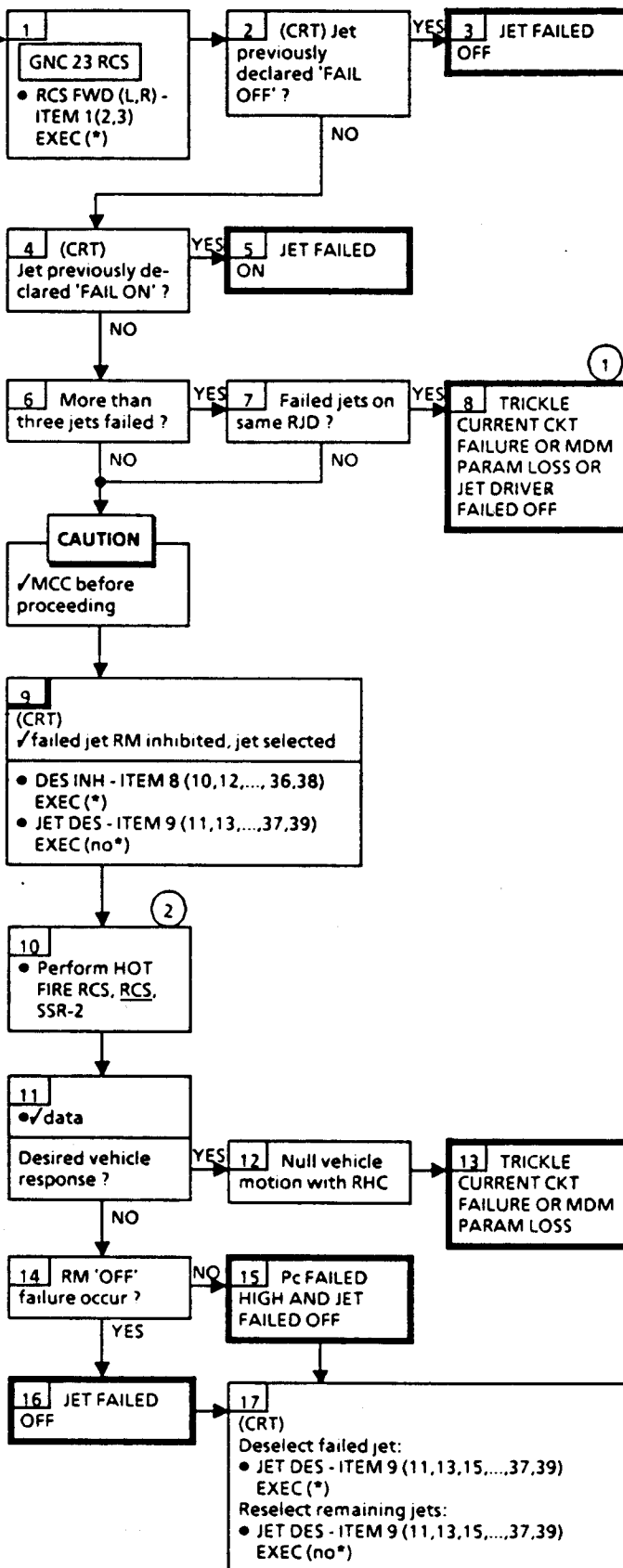
RCS

10.1e RCS JET SELF-TEST FAIL

SSR-6
RCS JET
Self-test
Fail

If:
Jet Driver failed
ON or OFF
Trickle current
circuit failure

Nominal Config:
(O14:F)
RJDA 1A L2/R2
LOGIC - ON
RJDA 2A L4/R4
LOGIC - ON
RJDF 1B F1
LOGIC - ON
(O15:F)
RJDA 1B L1/L5/R1
LOGIC - ON
RJDF 1A F2
LOGIC - ON
(O16:F)
RJDA 2B L3/R3/R5
LOGIC - ON
RJDF 2A F3
LOGIC - ON
(O14,O15,O16)
RJDs (nine) - OFF



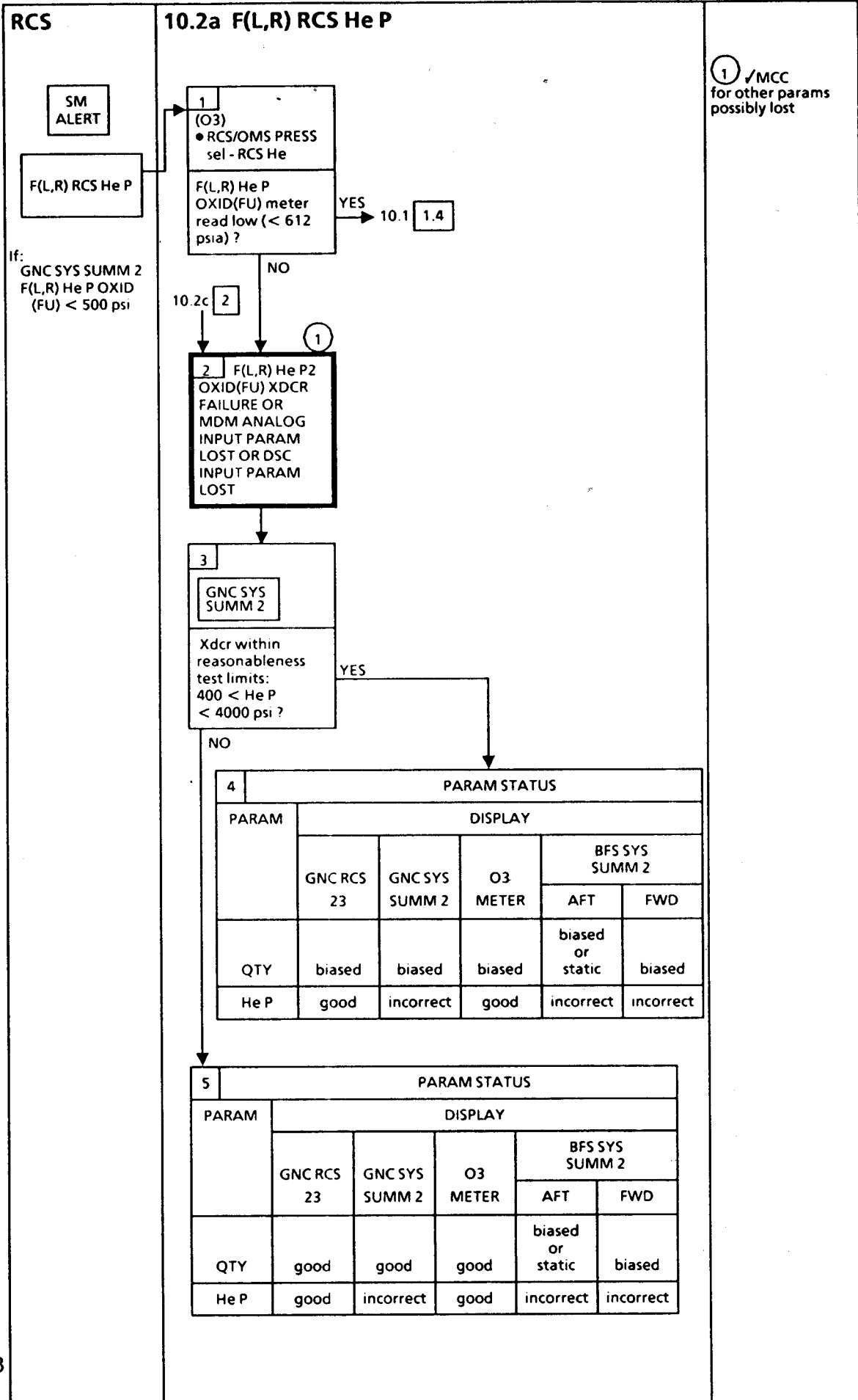
① Jet unusable if RJD failure. ✓MCC for further troubleshooting

② Turn all drivers ON for HOT FIRE RCS

RCS He P
ABNORMAL

10.2

RCS He P
ABNORMAL
10.2



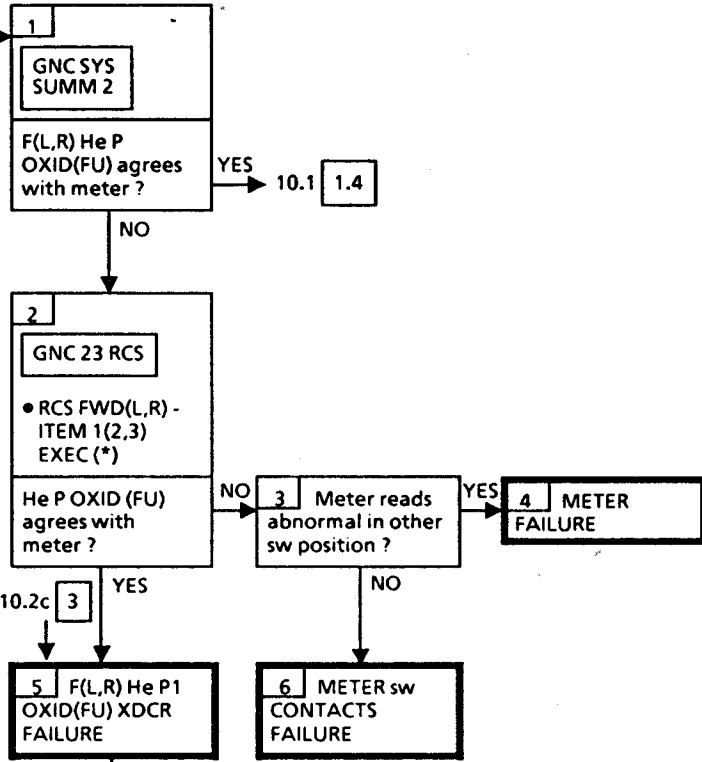
833

RCS

10.2b RCS He P METER ABNORMAL

FWD(L,R) RCS
He P
OXID(FUEL)
PRESS
Abnormal
(O3)

If:
He P OXID(FU)
≠ Mission Profile
or decreasing



10.2c 3
5 F(L,R) He P1
OXID(FU) XDCR
FAILURE

6 METER sw
CONTACTS
FAILURE

7
GNC 23 RCS
Xdcr within
reasonableness
test limits:
400 < He P
< 4000 psi ?

8 PARAM STATUS

PARAM	DISPLAY				
	GNC RCS 23	GNC SYS SUMM 2	O3 METER	BFS SYS SUMM 2	
				AFT	FWD
QTY	biased	biased	biased	good	biased
He P	incorrect	good	incorrect	good	good

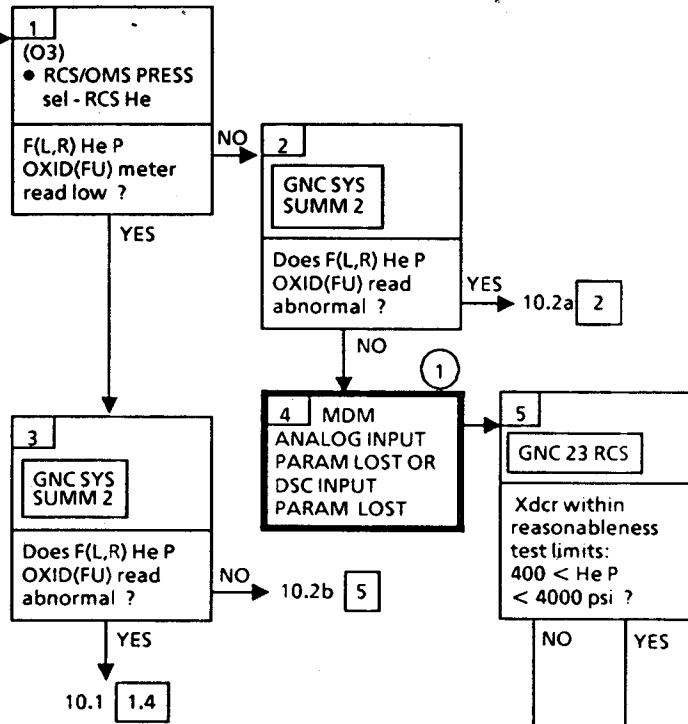
9 PARAM STATUS

PARAM	DISPLAY				
	GNC RCS 23	GNC SYS SUMM 2	O3 METER	BFS SYS SUMM 2	
				AFT	FWD
QTY	good	good	good	good	biased
He P	incorrect	good	incorrect	good	good

① ✓MCC for other params possible lost

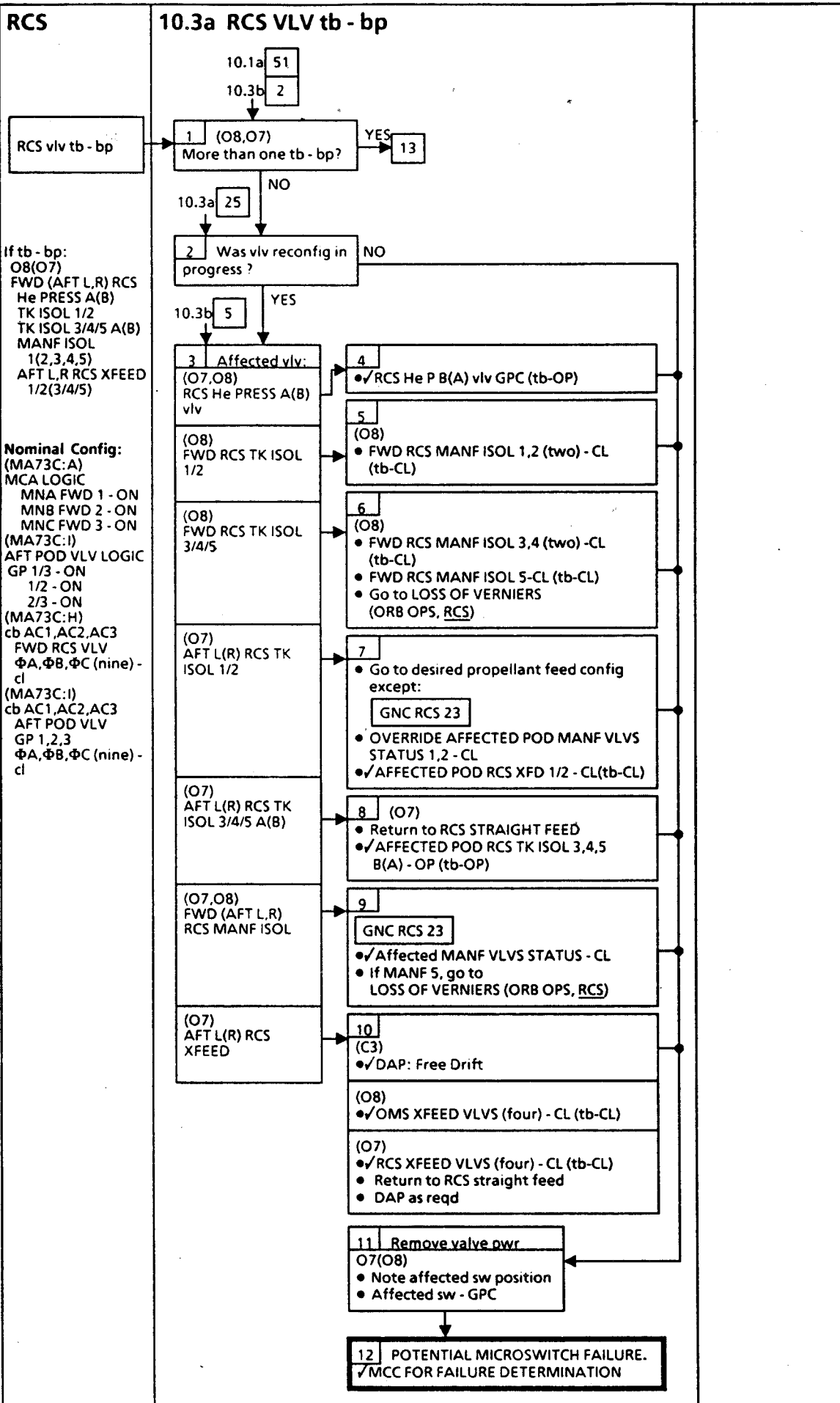
He P OXID(FU) Abnormal
(GNC SYS SUMM 2 or SPEC 23)

He P OXID(FU) ≠ Mission Profile

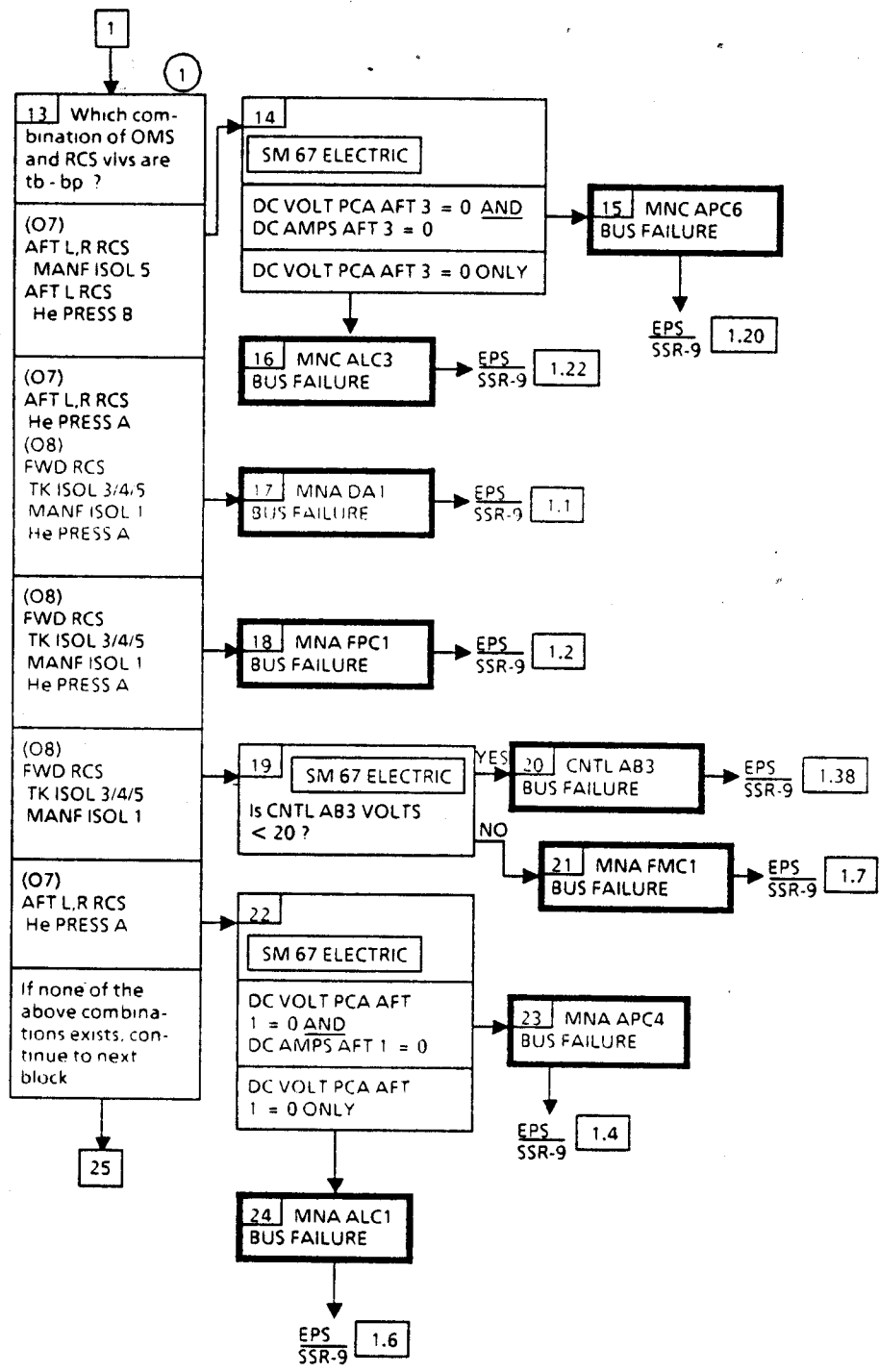


6 PARAM STATUS					
PARAM	DISPLAY				
	GNC RCS 23	GNC SYS SUMM 2	O3 METER	BFS SYS SUMM 2	
				AFT	FWD
QTY	good	good	biased	good	biased
He P	incorrect	good	incorrect	good	good

7 PARAM STATUS					
PARAM	DISPLAY				
	GNC RCS 23	GNC SYS SUMM 2	O3 METER	BFS SYS SUMM 2	
				AFT	FWD
QTY	biased	biased	biased	good	good
He P	incorrect	good	incorrect	good	good

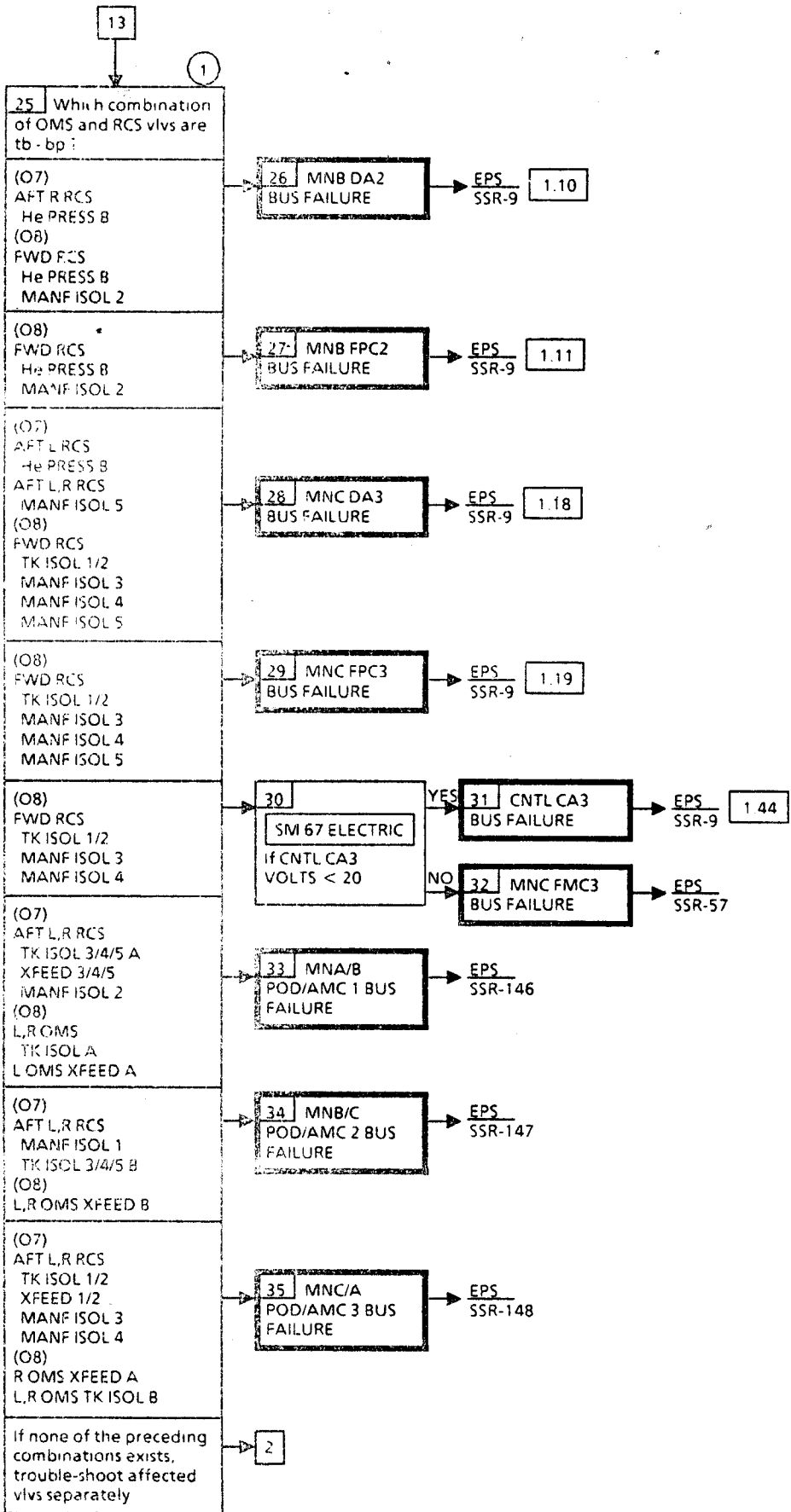


RCS 10.3a (Cont)



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

RCS 10.3a (Cont)



① Refer to BUS LOSS I.D. 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

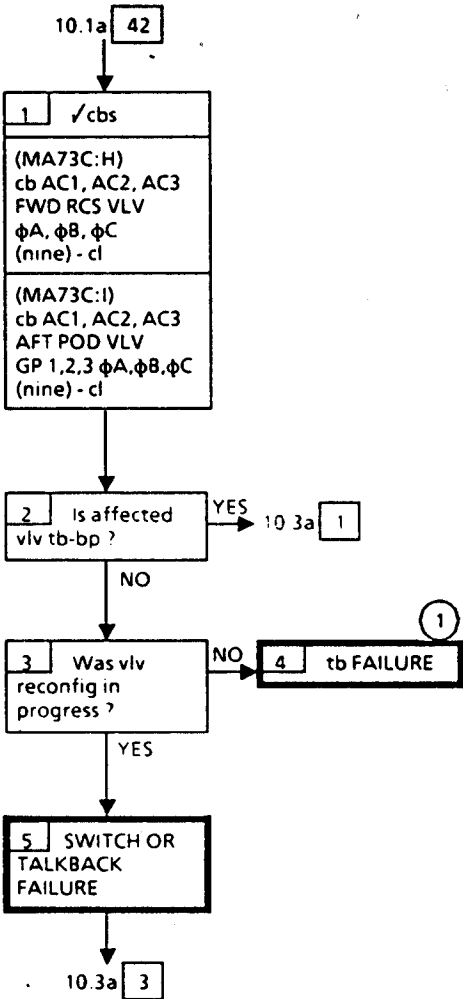
838

RCS

10.3b RCS VLV tb & SW POSITION DISAGREE

RCS Vlv tb & sw Position Disagree

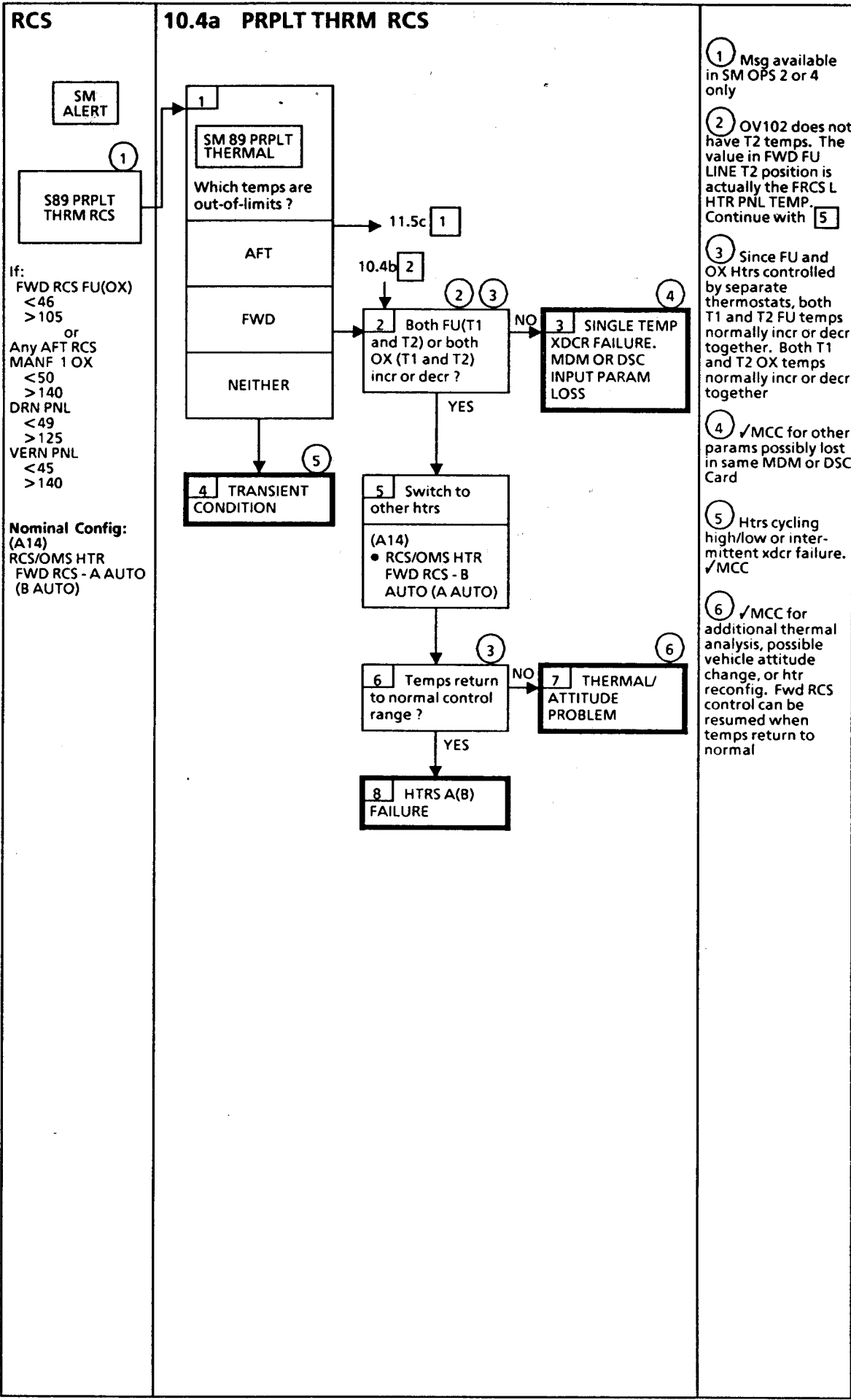
Nominal Config:
 (MA73C:H)
 cb AC1, AC2, AC3
 FWD RCS VLV
 φA, φB, φC
 (nine) - cl
 (MA73C:I)
 cb AC1, AC2, AC3
 AFT POD VLV
 GP 1, 2, 3 φA, φB, φC
 (nine) - cl



(1) Ignore tb, vlv in commanded position

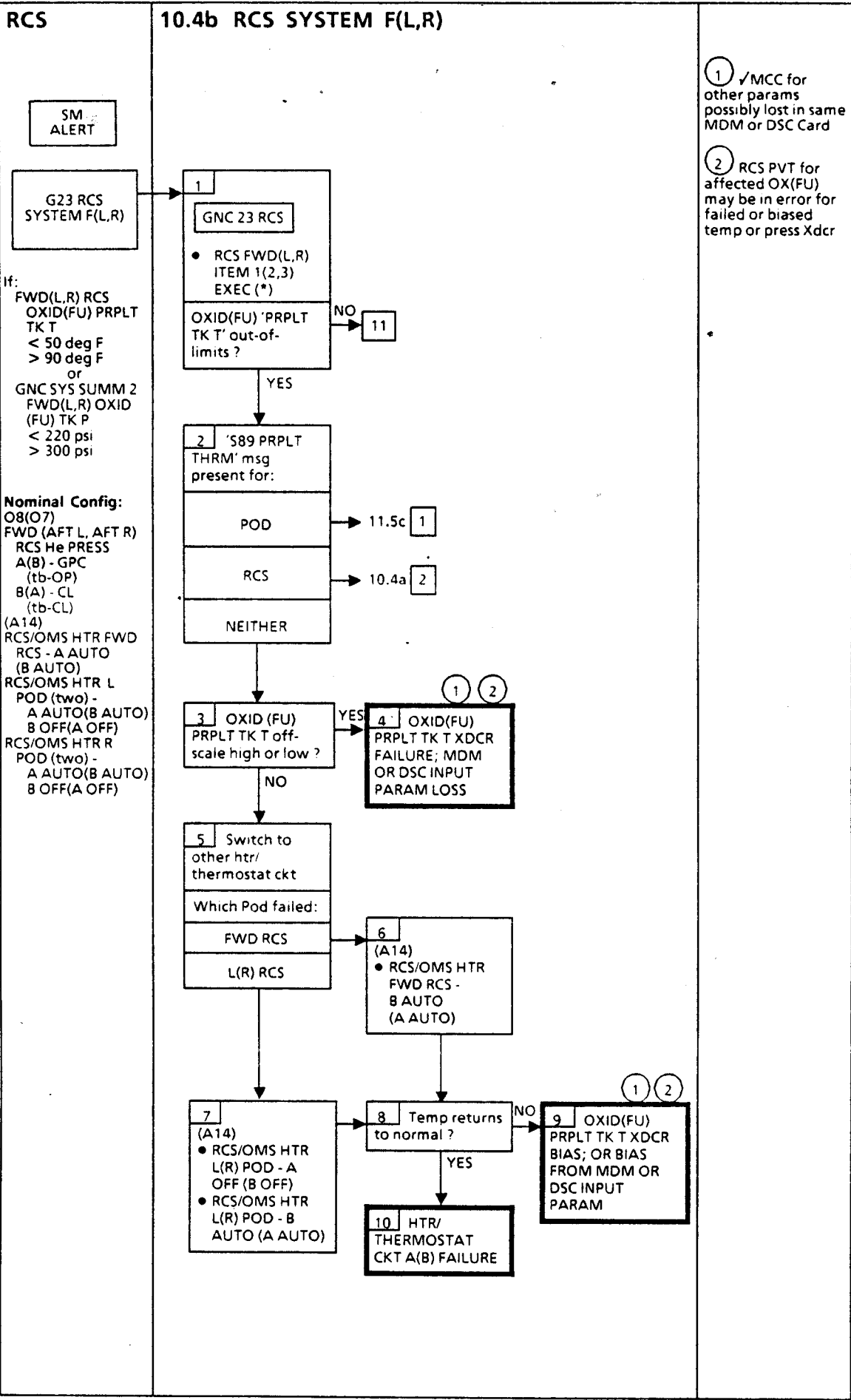
RCS PRPLT THERM/SYS

10.4

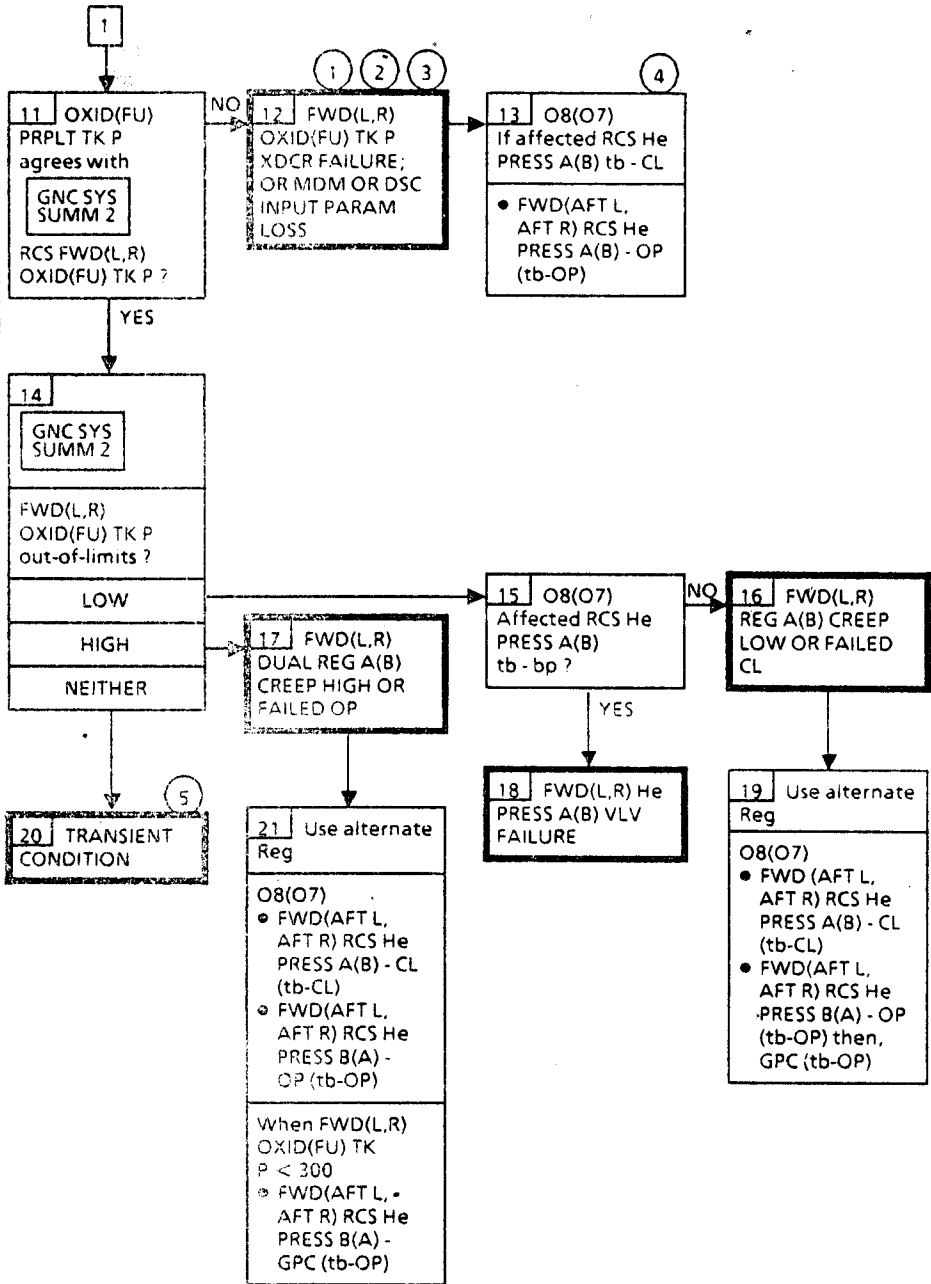


RCS PRPLT
 THERM/SYS

10.4



RCS 10.4b (Cont)



- ① ✓MCC for 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 Use OXID(FU) PRPLT TK P on GNC 23 RCS display or RCS/OMS PRESS meter (pnl O3)
- ④ Overpress protection lost
- ⑤ Transient xdcr bias or pressure surge

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 wave off, which would require a return from Mixed RCS Crossfeed to OMS-RCS Interconnect. Address locations are SW release dependent and will be supplied by the MCC. This procedure requires realtime ground verification (24 hours) prior to use.

1. Check config:
 - O7 ✓AFT L,R RCS TK ISOL (six) - CL (tb-CL)
 - ✓XFEED (four) - OP (tb-OP)
 - O8 ✓L,R OMS XFEED A (two) - CL (tb-CL)
 - ✓L(R) OMS XFEED B - OP (tb-OP)
 - ✓R(L) OMS XFEED B - CL (tb-CL)
- O7 2. MSTR RCS XFEED - FEED FROM L (limits max possible simo jet firings to 4)

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 SSRs

RCS SSR-1 (Cont)

- C3 5. During AOS, perform ARCS reconfig
DAP to free drift:
DAP: MAN
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

- O7 AFT L,R RCS XFEED (four) - OP (tb-OP)
- C3 6. Resume attitude control:
DAP: as reqd

RCS MIXED XFEED TERMINATE (PERFORM IN OPS 3)

1. Return to previous OMS interconnect config
If interconnecting from L OMS:
2. Go to MAL, RCS, 10.1 **1.7**
- If interconnecting from R OMS:
3. Go to MAL, RCS, 10.1 **1.8**
- O7 2. MSTR RCS XFEED - OFF (clears GPC commands)
3. 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 driver - ON
- Perform Hot Fire during AOS

CONFIG DAP FREE DRIFT FOR HOT FIRE

- 1. If OPS 2:
 - GNC 20 DAP CONFIG**
 - If NORM:
 - ITEM 4 + 0.3 EXEC
 - ITEM 1 + 0.1 EXEC
 - If VERN:
 - ITEM 5 + 0.03 EXEC
 - DAP: A/MAN/NORM(VERN)
 - DAP ROT: PULSE/PULSE/PULSE
 - or
 - DAP TRANS: PULSE/PULSE/PULSE
- C3
- 2. If OPS 8:
 - DAP: A/MAN/NORM(VERN)
 - DAP ROT: ACCEL/ACCEL/ACCEL
 - or
 - DAP TRANS: NORM/NORM/NORM
- C3
- 3. If OPS 3:
 - DAP: A(B)/MAN/NORM
 - DAP ROT: ACCEL/ACCEL/ACCEL
 - or
 - DAP TRANS: NORM/NORM/NORM
- C3

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

RCS SSR-2 (Cont)

If OPS 3 or 8:

Command maneuver per table with RHC(THC) for approximately
one sec and release

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)
Deselect jet if not reqd (✓MCC)

NOTE

If > 1 jet/pod/dir lost fail-off RM,
after OPS 301 transition, reselect jets

If no response

Deselect jet

NOTE

During entry, reselect jet if reqd to
maintain 1 pitch or 2 yaw Aft RCS jets

If vernier jet

If jet fired (✓MCC)

Continue vernier control (Failure indication was false.
Have lost fail-off protection)

If jet did not fire (✓MCC)

If LSL or RSR

Deselect jet

Continue vernier control

If F5L, F5R, LSD, or RSD

Deselect jet

Perform LOSS OF VERN (ORB OPS, RCS)

CLEAN UP AFTER HOT FIRE

6. GNC 23 RCS
Reselect jets deselected in step 2
- C3 7. Config DAP: as reqd
- F7 (F8) 8. FLT CNTLR PWR L(R) - OFF
- O14, O15, O16 9. Config cb L,R DDU (four) - as reqd

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 the affected RCS propellant lines, both oxidizer and fuel, (manifold or leg) pressure is less than or equal to the propellant vapor pressure plus instrumentation error (OX P < 49 psia, FU P < 35 psia).

Starting condition for this procedure is straight RCS feed with the appropriate MANF or TK ISOL vlv upstream of the evacuated section closed.

Manually repressing an 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 the 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 a GMEM R/W. This procedure uses GMEM R/W to repress an evacuated line, from same pod OMS propellant tanks, by setting the appropriate GPC open command bit for the RCS XFEED OX vlv, then manually opening appropriate FU vlv. Once the line repress has been completed, nominal RCS propellant feed is resumed.

Reqd GPC address locations for Table 1 and 2 are software release dependent and will be supplied by MCC

- C3 1. DAP: free drift
2. Config RCS for repress:
- O7 ✓Affected RCS TK ISOL 1/2(3/4/5 A,B) - CL (tb-CL)
 ✓XFEED 1/2 (3 4/5) - CL (tb-CL)
 MANF ISOL 1,2(3,4,5) - OP (tb-OP)
3. Config SAME side OMS vlv:
- O8 ✓L(R) OMS TK ISOL A,B - OP (tb-OP)
 ✓XFEED A - CL (tb-CL)
 XFEED B - OP (tb-OP)
4. Zero (0) appropriate RCS XFEED VLV reset command:

GNC 0 GPC MEMORY

✓HEX 27*

BIT RST - ITEM 23 EXEC

Obtain and enter ADD IDs and DESIRED values from Table 1

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

- O7 6. During AOS, perform OX line repress from OMS
 L(R) RCS XFEED 1/2 (3/4/5) - GPC (tb-bp)
 Wait ten sec

GNC 23 RCS

✓OX MANF P > 130 psia

RCS SSR-3 (Cont)

```

CRT
O8
O7
* If MANF P < 130 psia
* L(R) OMS XFEED VLV A,B - CL (tb-CL) *
* RCS XFEED VLV 1/2 (3/4/5) - CL (tb-CL) *
* Set affected 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 ten sec

```

```

CRT ✓FU MANF P > 130 psia
* If MANF P < 130 psia
* L(R) OMS XFEED A,B - CL (tb-CL) *
* RCS XFEED 1/2(3/4/5) - CL (tb-CL) *
* Set affected 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)

```

```

9. Reselect jets as reqd

```

```

C3 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

Use only when $130 > \text{MANF P(s)} > \text{vapor pressure}$ (49 OX, 35 FU). All manifolds on same tank leg may be affected.

GNC 23 RCS

- C3 1. DAP: free drift
- O7(O8) 2. Affected RCS XFEED(s) - CL (tb-CL)
TK ISOL(s) - CL (tb-CL)
MANF ISOL(s) - OP (tb-OP)
3. If affected MANF P(s) < 130 (OX and FU)
Affected RCS MANF ISOL(s) - CL (tb-CL)
TK ISOL(s) - OP (tb-OP)
Repeat step 2
4. If affected MANF P(s) > 130 (OX or FU)
Affected RCS MANF ISOL(s) - CL (tb-CL)
TK ISOL(s) - OP (tb-OP)
MANF ISOL(s) - OP (tb-OP) one at a time
- C3 5. DAP: as reqd

RCS SSR-5 LEAKING He RCS PRPLT/He BURN

TERMINATE CONDITIONS

Terminate RCS burn/dump
when any one of the
following conditions exists:

If He leak:
Affected He P < 456 psia, or
CUR HP = 95 nmi, or
Burn time expired

RCS PRPLT TO BE DUMPED (%) = CURR NON-LEAKING (OX or FU) %

22	30	40	50	60	70	80	90
0:11	0:46	1:21	1:57	2:32	3:08	3:43	
0:00	0:28	1:04	1:39	2:15	2:50	3:25	4:01

TIME FROM DUMP INITIALIZATION (M:S)

If Prplt leak:
First RCS jet FAIL OFF or
CUR HP = 95 nmi

If FWD RCS LEAK, perform either -X TRANSLATION (uses OPS 2, part A)
or FRCS DUMP (uses OPS 3, part B)
(if no MCC, perform -X TRANSLATION)

A. If FRCS -X TRANSLATION

1. RCS BURN PREP
 - 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)

2. MNVR TO BURN ATTITUDE

- ✓MCC for preferred maneuver
- If no COMM, perform out-of-plane burn

If out-of-plane burn:

F6(F8) Maneuver to closest out-of-plane attitude
ADI ATT - LVLH
CRT GNC 20 DAP CONFIG - ✓DAP: B1
GNC UNIV PTG
C3 DAP: B/AUTO/NORM
TGT ID - 2
BODY VECT - 5
P - 107.6
Y - 0
OM - 90 (270 for nose south)
START TRK - ITEM 19 EXEC (CUR *)
✓ADI ATT:
R - 270 (090 for nose south)
P - 090
Y - 288 (072 for nose south)
Go to step 3

If MCC preferred maneuver:

C3 GNC 20 DAP CONFIG - ✓DAP: B1
GNC UNIV PTG
C3 DAP: B/AUTO/NORM
✓ADI ATT - INTRL
Obtain BURN ATT from ORBITAL MNVR PAD
CRT Load MNVR OPTION
R ITEM 5 +
P ITEM 6 +
Y ITEM 7 + EXEC
START MNVR - ITEM 18 EXEC
When in Att,
ADI ATT - REF
ATT REF pb - push

RCS SSR-5 (Cont)

- C2 CNCL - ITEM 21 EXEC
GNC, OPS 202 PRO
- GNC ORBIT MNVR EXEC
- Load TGT DATA per ORBITAL MNVR PAD
- LOAD - ITEM 22 EXEC
TIMER - ITEM 23 EXEC
✓ BURN DATA per ORBITAL MNVR PAD
Perform burn in current Att, ignore computed Att and needles
3. PERFORM FWD RCS BURN
- F7 ✓ FLT CNTLR PWR - ON
C3 ✓ DAP - B/AUTO/NORM
DAP TRANS: NORM/NORM/NORM
If performing out-of-plane, initiate burn when attitude is achieved
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 2)
4. POST BURN RECONFIG
If MCC preferred maneuver, GNC, OPS 201 PRO
- GNC 20 DAP CONFIG
- JET OPT P,Y - ITEM 12,13 + 3 EXEC (tail only)
26,27 + 3 EXEC
- F7 FLT CNTLR PWR - OFF
O8 If He leak: FWD He PRESS B(A) - CL (tb-CL)
If Prplt leak: Perform RCS SECURE (FWD,AFT) (ORB PKT, RCS), then
O16 RJD L5/F5/R5 DRIVER - OFF
C3 DAP: as reqd >>
- B. IF FRCS DUMP
1. RCS DUMP PREP
- O8 FWD He PRESS A(B) - OP (tb-OP)
B(A) - CL (tb-CL)
✓ TK ISOL (two) - OP (tb-OP)
✓ MANF ISOL 1, 2, 3, 4 (four) - OP (tb-OP)
Perform G2/G8 TO G3 TRANS, DPS SSR-18, then:
- C2 GNC, OPS 302 PRO
GNC, OPS 303 PRO
2. PERFORM FWD RCS DUMP
- GNC DEORB MNVR COAST
- FWD RCS ARM - ITEM 36 EXEC
DUMP - ITEM 37 EXEC
When terminate conditions met:
FWD RCS OFF - ITEM 38 EXEC
After dump complete:
C2 GNC, OPS 301 PRO
3. POST DUMP RECONFIG
Perform G3 to G2/G8 TRANS, DPS SSR-19 then:
Reconfig NBAT to pre-dump config
- GNC 20 DAP CONFIG
- JET OPT P,Y - ITEM 12,13 + 3 EXEC (tail only)
- ITEM 26, 27 + 3 EXEC
- O8 If He leak: FWD He PRESS B(A) - CL (tb-CL)
If Prplt leak: Perform RCS SECURE (FWD,AFT) (ORB PKT, RCS), then
O16 RJD L5/F5/R5 DRIVER - OFF
C3 DAP: as reqd >>

RCS SSR-5 (Cont)

If AFT RCS LEAK, perform + X TRANSLATION

- C3
O8
O7
1. XFEED from leaking RCS 1/2 leg to good RCS 1/2 leg
 DAP: free drift
 ✓ L,R OMS XFEED (four) - CL (tb-CL)
 ✓ AFT L, R RCS TK ISOL 3/4/5 (four) - CL (tb-CL)
 good RCS TK ISOL 1/2 - CL (tb-CL)
 leaking RCS TK ISOL 1/2 - OP (tb-OP)
 leaking RCS He PRESS A(B) - OP (tb-OP)
 B(A) - CL (tb-CL)
 L, R RCS MANF ISOL 1 (two) - OP (tb-OP)
 MANF ISOL 2, 3, 4 (six) - CL (tb-CL)
 MANF ISOL 5 (two) - CL (tb-CL), then GPC
 XFEED 1/2 (two) - OP (tb-OP)
 XFEED 3/4/5 (two) - CL (tb-CL)

If prior config was interconnect, then:

GNC 23 RCS

OMS PRESS ENA OFF - ITEM 7 EXEC (*)

2. MNVR TO BURN ATTITUDE
 ✓ MCC for preferred maneuver
 If no COMM, perform out-of-plane burn

If out-of-plane burn:

Maneuver to closest out-of-plane attitude

GNC 20 DAP CONFIG - ✓DAP: B1

DAP: B/AUTO/NORM

GNC, OPS 202 PRO

GNC ORBIT MNVR EXEC

RCS SEL - ITEM 4 EXEC

TV ROLL - ITEM 5 + 1 8 0 EXEC

TIG - ITEM 10 + (Current MET + 10 min) EXEC

ΔVX - ITEM 19 + 0 . 0 EXEC

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

ΔVZ - ITEM 21 + 0 . 0 EXEC

LOAD - ITEM 22 EXEC

TIMER - ITEM 23 EXEC

MNVR - ITEM 27 EXEC (*)

Go to step 3

If MCC preferred maneuver:

GNC 20 DAP CONFIG - ✓DAP: B1

GNC UNIV PTG

DAP: B/AUTO/NORM

CNCL - ITEM 21 EXEC

GNC, OPS 202 PRO

GNC ORBIT MNVR EXEC

Load TGT DATA per ORBITAL MNVR PAD

LOAD - ITEM 22 EXEC

TIMER - ITEM 23 EXEC

✓ BURN DATA per ORBITAL MNVR PAD

MNVR - ITEM 27 EXEC (*)

C3
C2

C3
CRT
C2

RCS SSR-5 (Cont)

3. PERFORM AFT RCS BURN
- F7 ✓FLT CNTLR PWR - ON
 F6 ✓Burn Att when mnvr complete:
 ADI ATT - REF
 ATT REF pb - push
- C3 ✓DAP - B/AUTO/NORM
 DAP TRANS: NORM/NORM/NORM
 If performing out-of-plane, initiate burn when attitude is achieved
- 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 2)
- C3 DAP: free drift
 O7 Leaking RCS He PRESS A(B) - CL (tb-CL)
- C2 GNC, OPS 201 PRO
 If He leak: go to step 10
4. SETUP TO CLEAR He
- O7 Leaking RCS TK ISOL 1/2 - CL (tb-CL)
 O8 ✓L OMS TK ISOL (two) - OP (tb-OP)
 XFEED B(A) - OP (tb-OP)
- GNC 23 RCS
- L OMS PRESS ENA - ITEM 5 EXEC
 Reselect failed-off jets
- Set L,R pod fail limit to 0:
 RCS L - ITEM 2 EXEC
 FAIL LIM - ITEM 4 + 0 EXEC
 RCS R - ITEM 3 EXEC
 FAIL LIM - ITEM 4 + 0 EXEC
5. SETUP DAP
- GNC 20 DAP CONFIG
- Select Nose only Pitch and Yaw control:
 DAP A: JET OPT - ITEM 12,13 + 2 EXEC
- Select Tail only Pitch and Yaw control:
 DAP B: JET OPT - ITEM 26,27 + 3 EXEC
6. CLEAR He FROM LEFT RCS + X
- C3 DAP: A/MAN
 ROT: DISC/DISC/DISC
 TRANS: NORM/NORM/NORM
 If Hp ≤ 98, maneuver out-of-plane
- F5 THC + X
 After 7 sec,
 THC - release
7. CLEAR He FROM XFEED LINE and RIGHT RCS + X
- CRT style="border: 1px solid black; padding: 2px; display: inline-block;">GNC 23 RCS
- Deselect L1A:
 RCS L - ITEM 2 EXEC
 JET DES - ITEM 33 EXEC
- F5 THC + X
 After 31 sec (OV-102) or
 16 sec (OV-103 and subs),
 THC - release

RCS SSR-5 (Cont)

- C3 8. CLEAR He FROM RCS MANF 1 PITCH and YAW
DAP: B/MAN/NORM
ROT: ACCEL/ACCEL/ACCEL
TRANS: NORM/NORM/NORM
- RHC + yaw for 2 sec, then
RHC -yaw for 2 sec
- RHC + pitch for 2 sec
DAP: A/MAN/NORM
ROT: DISC/DISC/DISC
TRANS: PULSE/PULSE/PULSE
- F7 9. 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 drift
AFT L, R RCS XFEED 3/4/5 (two) -OP (tb-OP)
MANF ISOL 2, 3, 4 (six) -OP (tb-OP)
MANF ISOL 5 (two) -OP (tb-OP), then GPC
DAP: A, B as reqd >>
- F7 10. SYSTEMS CLEANUP FOR He LEAKS
C3 FLT CNTLR PWR - OFF
O7 DAP: free drift
- 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)
MANF ISOL 5 (two) -OP (tb-OP), then GPC
✓L OMS TK ISOL (two) -OP (tb-OP)
XFEED B(A) -OP (tb-OP)
- GNC 23 RCS**
- Initiate interconnect usage counter:
L OMS PRESS ENA - ITEM 5 EXEC
- C3 DAP TRANS: as reqd
DAP: A,B as reqd

RCS SSR-6 RCS DRIVER TEST

NOTE

Procedure is used to check RCS Driver command path to the jets. If a short or open circuit exists from GPC to the Driver, jet will appear failed. From Driver to RCS jet, test will only spot open circuits. Test must be done in OPS 8. Reference Table is provided to assist in determining commonality if multiple failures occur

- C3 1. If reqd, perform G2 to G8 TRANSITION (ORB OPS)
2. DAP to free drift:
DAP: A(B)/MAN
DAP TRANS: PULSE
3. DRIVER config:

O14:F RJDA 1A L2/R2 DRIVER - OFF
2A L4/R4 DRIVER - OFF
1B F1 DRIVER - OFF
✓RDJA 1A L2/R2 LOGIC - ON
✓2A L4/R4 LOGIC - ON
✓1B F1 LOGIC - ON

O15:F RJDA 1B L1/R1 DRIVER - OFF
1A F2 DRIVER - OFF
✓RDJA 1B L1/L5/R1 LOGIC - ON
✓1A F2 LOGIC - ON

O16:F RJDA 2B L3/R3 DRIVERS - OFF
2A F3 DRIVER - OFF
2B F4 DRIVER - OFF
✓RJDA 2B L3/R3 DRIVERS - OFF
✓2A F3 LOGIC - ON
✓2B F4/F5 LOGIC - ON
RJD MANF L5/R5/F5 DRIVER - OFF

CAUTION

Use of RHC or THC when DRIVERS - OFF will result in RCS JET FAIL-OFF by RCS RM

4. DRIVER Test:
(All RCS jets will be tested. Test must be run three times: once for each DRIVER group - RJDF, RJDA-A, RJDA-B)

GNC 41 RGA/ADTA/RCS

- a. RJDF - ITEM 12 EXEC (*)
- b. TEST EXEC - ITEM 15 EXEC (*)
✓TEST - RUN
* If TEST - FAIL *
* Record failed jet *
* CONTINUE - ITEM 16 EXEC (*) *
- c. When TEST - CPLT appears,
STOP - ITEM 17 EXEC (Removes *'s)
- d. Repeat steps a through c. Replace step a with
RJDA-A - ITEM 13 EXEC (*)
Repeat again replacing step a with
RJDA-B - ITEM 14 EXEC (*)

5. RCS RM Clean Up:

GNC 23 RCS

- a. JET RESET - ITEM 45 EXEC (Resets fail counters on all available jets)
- b. Jets failing Driver test - DES INH twice (Reprioritize, reset RM) then deselect

6. DRIVER reconfig:
O14:F RJDA 1A L2/R2 DRIVER - ON
2A L4/R4 DRIVER - ON
1B F1 DRIVER - ON
O15:F RJDA 1B L1/R1 DRIVER - ON
1A F2 DRIVER - ON
O16:F RJDA 2B L3/R3 DRIVERS - ON
2A F3 DRIVER - ON
2B F4 DRIVER - ON
RJD MANF L5/R5/F5 DRIVER - ON

7. DAP: as reqd
8. If reqd, perform G8 to G2 TRANSITION (ORB OPS, DPS)
9. If failed jets found, go to RCS 10.1e

REFERENCE TABLE

TEST CASE	DRIVER MDM	SUSPECT JET(s)	TEST CASE	DRIVER MDM	SUSPECT JET(s)	TEST CASE	DRIVER MDM	SUSPECT JET(s)		
RJDF	RJDF-1B (O14) FF1	F1F	RJDA-A	RJDA-1A (O14) FA3	L2L	RJDA-B	RJDA-2B (O16) FA2	L3A		
		F1L			L2U			L3L		
		F1U			L2D			L3D		
	RJDF-1A (O15) FF2	F1D		RJDA-1B (O15) FA1	R2R		RJDA-2A (O14) FA4	R3A	R3R	
		F2F			R2U			R3D		
		F2R			R2D			R5R		
	RJDF-2B (O16) FF3	F2U			L1A			L1L	R5D	
		F2D			L1U			L4L		
		F4R			R1A			L4U		
	RJDF-2A (O16) FF4	F4D			R1R			L4D		
		F5L			R1U			R4R		
		F5R			L5D			R4U		
		F3F						L5L		R4D
		F3L								
		F3U								
		F3D								

OMS

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

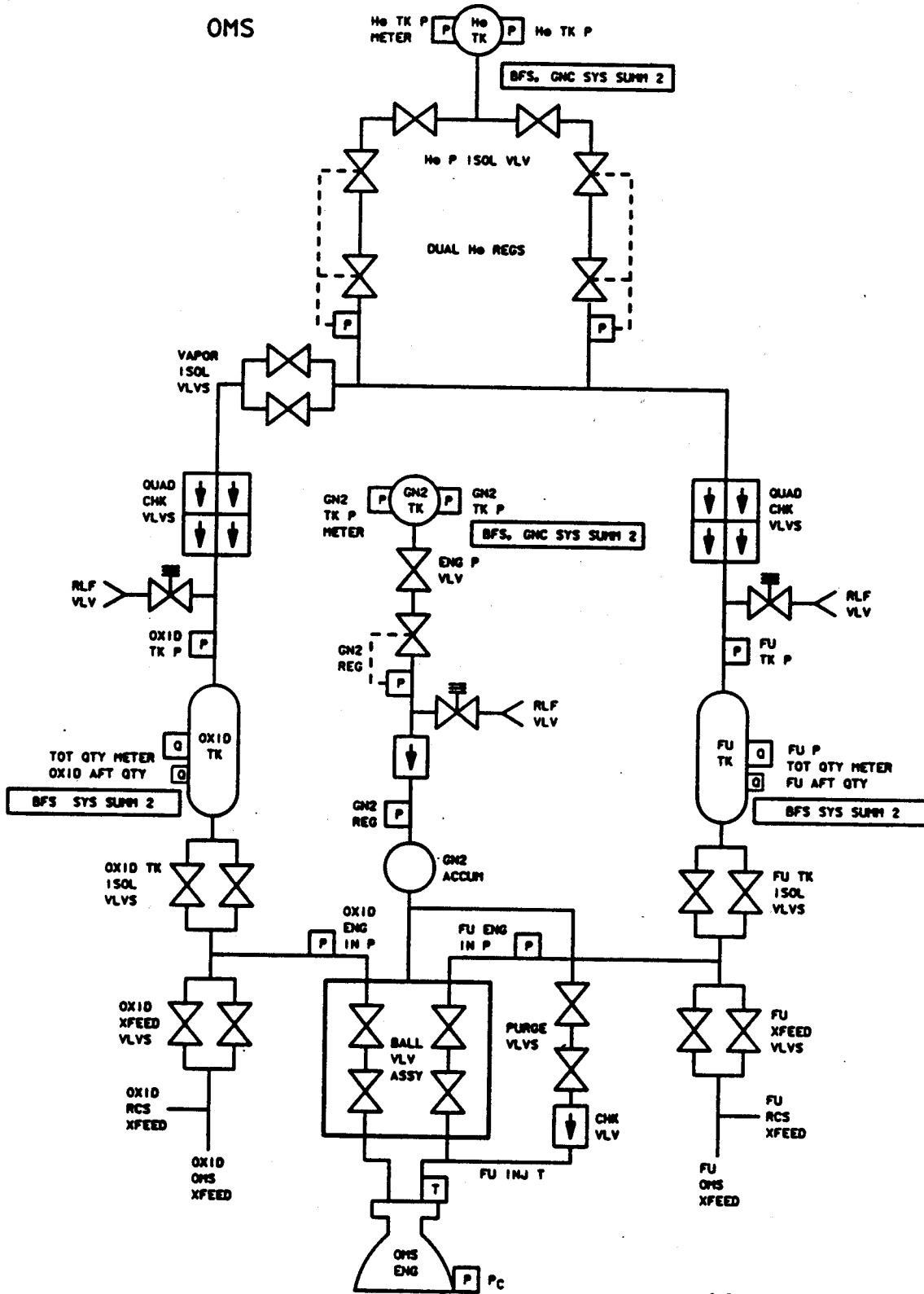
- S89 L(R) OMS TEMP
- G23 OMS/RCS QTY
- L(R) OMS GMBL
- L(R) OMS VLV
- L(R) OMS QTY
- L(R) OMS PC

NOTE A
REFER TO BFS FSM INDEX FOR MSG

11.5 OMS PRPLT THERMAL
11.5b 'SMO THERM.PRPLT' - THERM PRPLT..... 11-23

OMS

11



OMS
1014, ART. 4
2/8/83

L(R) OMS
11.1

<p>OMS</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">LEFT(RIGHT) OMS</div> <p>If: OMS TK P FU (OXID) < 232 or > 288 psia (H/W)</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">LEFT(RIGHT) OMS</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">BACKUP CAW ALARM</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">L(R) OMS TK P</div> <p>If: OMS TK P FU (OXID) < 234 or > 288 psia (S/W)</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">SM ALERT</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">L(R) OMS TK P</div> <p>CRT msg if psia: N2 REG P > 434 N2 REG P < 299 N2 TK P < 1200 He TK P < 1500</p> <p>Nominal Config: OMS/RCS Interconnect (O8) He PRESS/VAP ISOL A - CL B - CL</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">GNC 23 RCS</div> <p>OMS PRESS ENA L OMS 5 * or R OMS 6 * <u>Feeding OMS:</u> (O8) XFEEED B - OP (tb-OP) OMS TK ISOL VLV (four) - OP (tb-OP) (C3) OMS ENG (two) - OFF</p> <p>If No Interconnect: Same as above except: OMS XFEEED (four) - CL (tb-CL)</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">GNC 23 RCS</div> <p>Item 7*</p>	<p>11.1 L(R) OMS</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: right;">GNC SYS SUMM 2</p> <p>1.1 OMS N2 TK PRESS LOW OR DECR</p> <p>✓TK PRESS < 1200 or depr (meter & CRT): If meter and CRT disagree, 1. Inst prob, go to MAL, <u>OMS, 11.1a</u> 1 >> or If meter and CRT agree: 2. ✓Affected OMS ENG - OFF 3. Go to MAL, <u>OMS, 11.1a</u> 6</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: right;">GNC SYS SUMM 2</p> <p>1.2 OMS N2 REG PRESS LOW</p> <p>1. ✓OMS ENG (two) - OFF 2. Go to MAL, <u>OMS, 11.1a</u> 12</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: right;">GNC SYS SUMM 2</p> <p>1.3 OMS N2 REG PRESS HIGH</p> <p>1. ✓OMS ENG (two) - OFF 2. Go to MAL, <u>OMS, 11.1a</u> 24</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: right;">GNC SYS SUMM 2</p> <p>1.4 OMS TK P (FU and OX) HIGH</p> <p>1. ✓Affected OMS He PRESS/VAP ISOL (two) - CL 2. L(R) OMS DUAL He REG FAILED OPEN 1</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: right;">GNC SYS SUMM 2</p> <p>1.5 OMS TK P FU(OX) LOW</p> <p>✓if corresp ENG IN P disagrees: 1. Inst prob, go to MAL, <u>OMS, 11.1a</u> 32 >></p> <p>If affected OMS feeding OMS/RCS I'CONNECT: If both OXID and FU TK P LOW: 2. Affected OMS He PRESS/VAP ISOL A - OP, Wait 10 sec, then OMS HE PRESS/VAP ISOL A - CL 3. If TK P incr >> or If TK P not incr, affected OMS He PRESS/VAP ISOL B - OP. Wait 10 sec, then OMS He PRESS/VAP ISOL B - CL 4. If TK P incr, go to step 5 or If TK P still not incr, perform I'CONNECT RETURN, <u>MAL,</u> <u>RCS 10.1</u> 1.15, then 5. Go to MAL, <u>OMS, 11.1a</u> 25 >> If OXID or FU (not both) TK P LOW: 6. Secure RCS and OMS: DAP: free drift L,R RCS MANF ISOL (ten) - CL (tb-CL) MANF ISOL 5 (two) - CL (tb-CL) XFEEED (four) - CL (tb-CL) Affected OMS XFEEED (two) - CL (tb-CL) TK ISOL (two) - CL (tb-CL) He PRESS/VAP ISOL (two) - CL</p> <p style="text-align: center;">(Cont next page)</p> </div>	<p>1 Begin next burn or OMS/RCS interconnect in blowdown</p>
--	--	---

1.5 (Cont)

GNC SYS SUMM 2

OMS TK P FU(OX) LOW

- ✓ Single MANF (✓ MANF P):
- or 7. If leak found, return to desired config except leave failed MANF closed >>
- ✓ TK Leg (✓ two MANF P):
- 8. If leak found, return to desired config except leave failed TK ISOL (1/2 or 3/4/5), MANFs, and corresponding XFEED vlvs closed. If MANF 3/4/5 Leg leak, go to LOSS OF VERNIERS (ORB OPS, RCS) >>
- ✓ OMS TK and OMS INLET LINE (✓ OMS TK P and OMS IN P)
- 9. If leak found:
 - ✓ L,R RCS He PRESS A(B) (two) - GPC (tb-OP)
 - B(A) (two) - CL (tb-CL)
 - TK ISOL (six) - OP (tb-OP)
 - MANF ISOL (ten) - OP (tb-OP)

GNC 23 RCS

OMS PRESS ENA - OFF ITEM 7 EXEC
DAP: as reqd

If OMS PRPLT TK P decr, go to LEAKING OMS
PRPLT/He BURN, 1.11 >>
If OMS IN P decr >> 3

✓ XFEED LINES

- 10. L(R) RCS XFEED 1/2 (one) - OP (tb-OP)
- ✓ L(R) MANF 1/2 P decr
- 11. If decr, return to RCS straight feed:
 - L(R) RCS XFEED 1/2 (one) - CL (tb-CL)
 - L,R RCS TK ISOLs (six) - OP (tb-OP)

GNC 23 RCS

OMS PRESS ENA - OFF ITEM 7 EXEC 2

or
L(R) RCS MANF ISOL 1 (one) - OP (tb-OP)
Wait 2 sec, then open remaining nine MANF ISOLs
Do not XFEED/I'CONNECT >>

If leak not found:

- 12. L(R) RCS XFEED 1/2 (one) - CL (tb-CL)
- ✓ L(R) RCS He PRESS A(B) (two) - GPC (tb-OP)
- B(A) (two) - CL (tb-CL)
- TK ISOL (six) - OP (tb-OP)
- MANF ISOL 1,2,3,4 (eight) - OP (tb-OP)

GNC 23 RCS

OMS PRESS ENA - OFF ITEM 7 EXEC

DAP: as reqd (NORMS ONLY)

- 13. Go to MAL, OMS, 11.1a 39 >>
- If affected OMS not feeding OMS/RCS I'CONNECT:
- 14. Perform OMS SECURE, 1.7 (Cue Card), then:
- 15. If OMS PRPLT TK P decr, go to LEAKING OMS PRPLT/He BURN 1.11 >>
- 16. If either L(R) OMS in P decr >> 3
- 17. If leak not found, go to MAL, OMS, 11.1a 50

(Cont next page)

2

WARNING

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

3

✓ MCC for leak rate and further eng use. Do not perform any noncritical OMS burns. Do not XFEED OMS. Do not interconnect from affected tank. If used for deorbit burn, (CRT) FU(OXID) ENG IN P must be > 216 (151) for start and PC must be maintained > 80%

OMS 11.1 (Cont)

1.6

OMS He TK P LOW

GNC SYS SUMM 2

- ✓He TK P < 1500 or decr abnormal (meter & CRT)
If meter and CRT disagree, Inst prob, go to MAL, OMS, 11.1a **66**
>>
1. ✓OMS He PRESS/VAP ISOL (two) - CL
 2. If He TK P still decr:
 3. Affected OMS He PRESS/VAP ISOL (two) - OP
 4. If not at max blowdown (QTY > 39%), go to LEAKING OMS PRPLT/He BURN, **1.11** >>
 5. If l'cnect: Perform l'CNECT RETURN MAL, RCS, **10.1 1.15** >>
 6. If OMS TK P FU/OX decr, go to OMS TK P FU/OX LOW, or **1.5** >>
 7. If neither decr, go to MAL, OMS, 11.1a **68**

1.7

OMS SECURE

1. OMS ENG (two) - OFF
2. If OMS XFEED config:
Receiving OMS XFEED (two) - CL (tb-CL)
3. Affected OMS XFEED (two) - CL (tb-CL)
TK ISOL (two) - CL (tb-CL)
He PRESS/VAP ISOL (two) - CL

1.8

XFEED: R OMS to L OMS

GNC 23 RCS

- NOTE: This procedure is only to be used preburn.
1. DAP: free drift
 2. ✓L,R OMS XFEED (four) - CL (tb-CL)
 3. L,R RCS TK ISOL (six) - CL (tb-CL)
XFEED (four) - OP (tb-OP)
 4. If RCS MANF P (OX and FU) > 130 continue;
otherwise, check with MCC and >>
 5. ✓R OMS TK ISOL (two) - OP (tb-OP)
L OMS TK ISOL (two) - CL (tb-CL)
L,R OMS XFEED B (two) - OP (tb-OP)
 6. L,R RCS XFEED (four) - CL (tb-CL)
TK ISOL (six) - OP (tb-OP)
 7. DAP: as reqd

1.9

XFEED: L OMS to R OMS

GNC 23 RCS

- NOTE: This procedure is only to be used preburn.
1. DAP: free drift
 2. ✓L,R OMS XFEED (four) - CL (tb-CL)
 3. L,R RCS TK ISOL (six) - CL (tb-CL)
XFEED (four) - OP (tb-OP)
 4. If RCS MANF P (OX and FU) > 130 continue;
otherwise, check with MCC and >>
 5. ✓L OMS TK ISOL (two) - OP (tb-OP)
R OMS TK ISOL (two) - CL (tb-CL)
L,R OMS XFEED B (two) - OP (tb-OP)
 6. L,R RCS XFEED (four) - CL (tb-CL)
TK ISOL (six) - OP (tb-OP)
 7. DAP: as reqd

1.10

XFEED RETURN: OMS

1. L,R OMS XFEED (four) - CL (tb-CL)
TK ISOL (four) - OP (tb-OP)

(Cont next page)

④ Sys could be used if affected FU (OXID) ENG IN P > 216 (151) psia for start. Do not xfeed or interconnect. When reqd, perform OMS Burn after Payload/RMS berthed and stowed

1.11

LEAKING OMS PRPLT/He BURN

4

1. ✓ Vent doors open for OX or He leak
2. Install LEAKING OMS PRPLT/He BURN, Cue Card and ON-ORBIT OMS BURN MONITOR, Cue Card (C2 WEDGE)
3. GNC OPS 202(302) PRO
4. GNC XXXXX MNVR EXEC - sel leaking OMS and determine out of plane or retrograde burn based on TIG (MCC or msg)
5. GMBL CK selected system
6. Enter retrograde (- ΔV_x) or out of plane (ΔV_y) burn data on LEAKING OMS PRPLT/He BURN Cue Card from ΔV_x vs ORB ALT Chart, 11-8 or LEAKING OMS He ΔV TABLE, 1.12
If out of plane PRPLT LK burn, enter $\Delta V_y \pm 500$
7. Load burn data
LOAD - ITEM 22 EXEC ✓ TGT HP
TIMER - ITEM 23 EXEC
8. If OPS 2:
Pri RJDs (eight) - ON
DAP: A(B) /AUTO/NORM
DAP TRANS: NORM/NORM/NORM
If OPS 3: GNC 23 RCS
- desel L1A or L3A } (N/A He leak)
- desel R1A or R3A }
9. Mnvr to burn att. When mnvr complete update TIG if approp.
At TIG-4, perform OMS burn prep:
10. Leaking OMS TK ISOL (two) - OP (tb-OP)
✓ XFEED (four) - CL (tb-CL)
He PRESS/VAP ISOL A - OP
wait 2 sec ... B - OP
11. Perform burn using LEAKING OMS PRPLT/He BURN Cue Card, then postburn:
12. If OPS 3: GNC 23 RCS
- resel AFT jets (N/A He Leak)
13. FLT CNTLR PWR (two) - OFF
14. Affected OMS He PRESS/VAP ISOL (two) - CL
TK ISOL (two) - CL (tb-CL)
15. GNC OPS 201(301) PRO

1.12

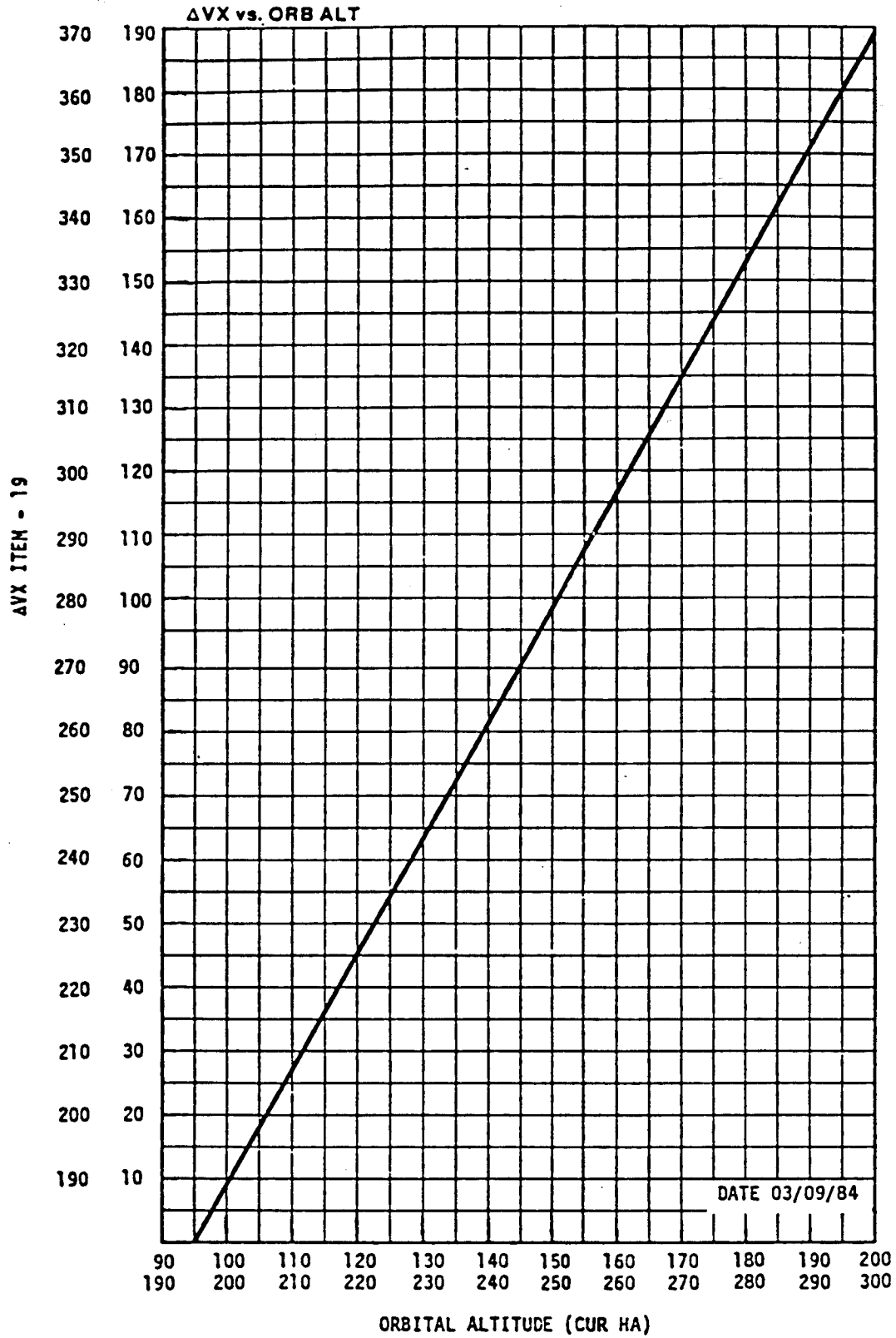
LEAKING OMS He ΔV TABLE

1. Pick ΔV_X from Table to achieve max blowdown

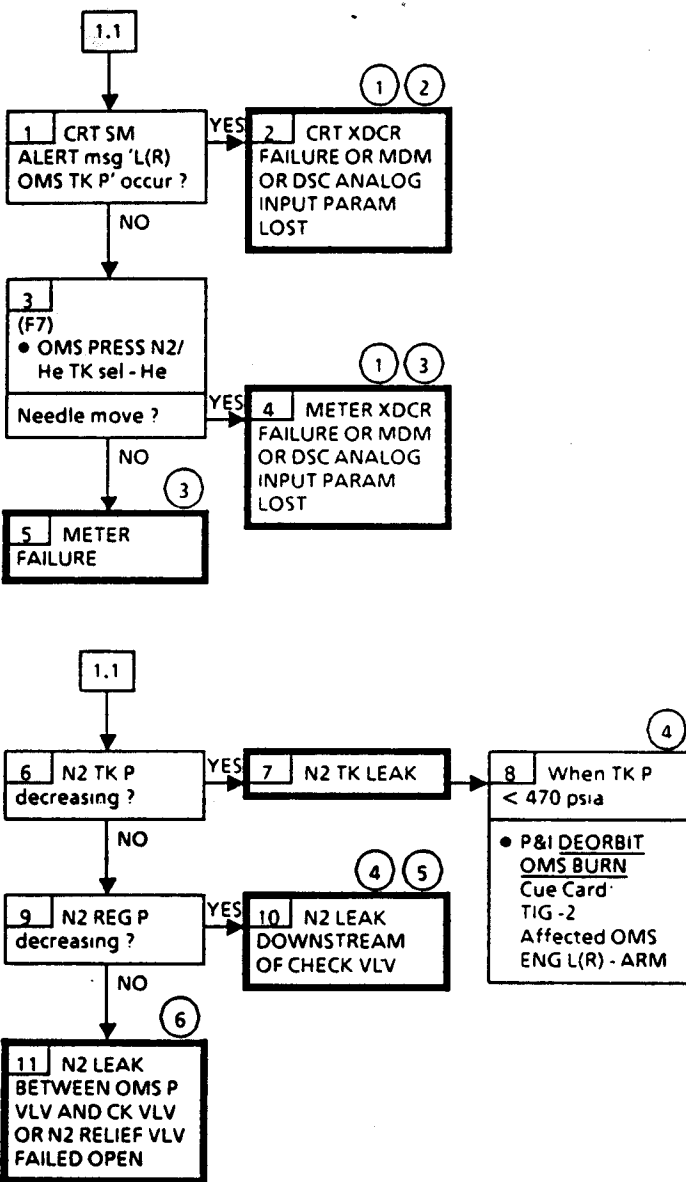
Affected OMS % (QTY)	ΔV_X	Affected OMS % (QTY)	ΔV_X
95	352	65	164
90	320	60	133
85	289	55	102
80	257	50	71
75	226	45	40
70	195	40	10

2. ✓ ΔV_X vs ORB ALT chart
If ΔV_X from table < ΔV_X from chart:
3. Use ΔV_X from table (Hp will be above 95 nm >>
If ΔV_X from table > ΔV_X from chart:
4. Use ΔV_X from chart to take Hp to 95 nm
5. Use remaining ΔV as ΔV_Y target for OUT-OF-PLANE OMS PRPLT/He BURN, 1.12

Matrix Table follows on next page



OMS 11.1a L(R) OMS TK P



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

② N2/He press available on (F7) OMS PRESS N2/He TK meter

③ N2/He press available on SYS SUMM 2 CRT display

④ Do not use engine for additional on-orbit burns

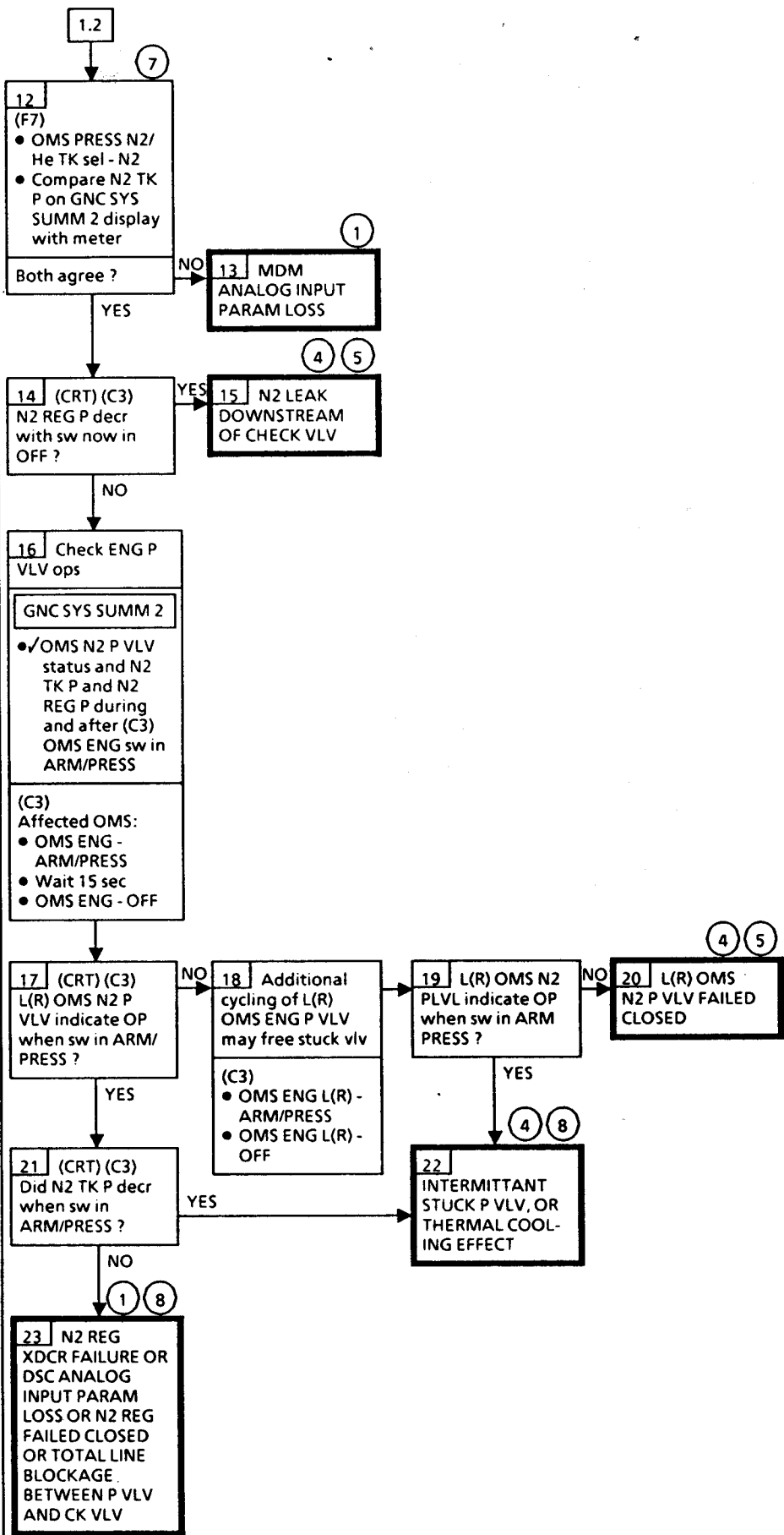
⑤ Refer to OMS N2 REG P LOW in ENT PKT to determine if engine is usable for deorbit

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

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

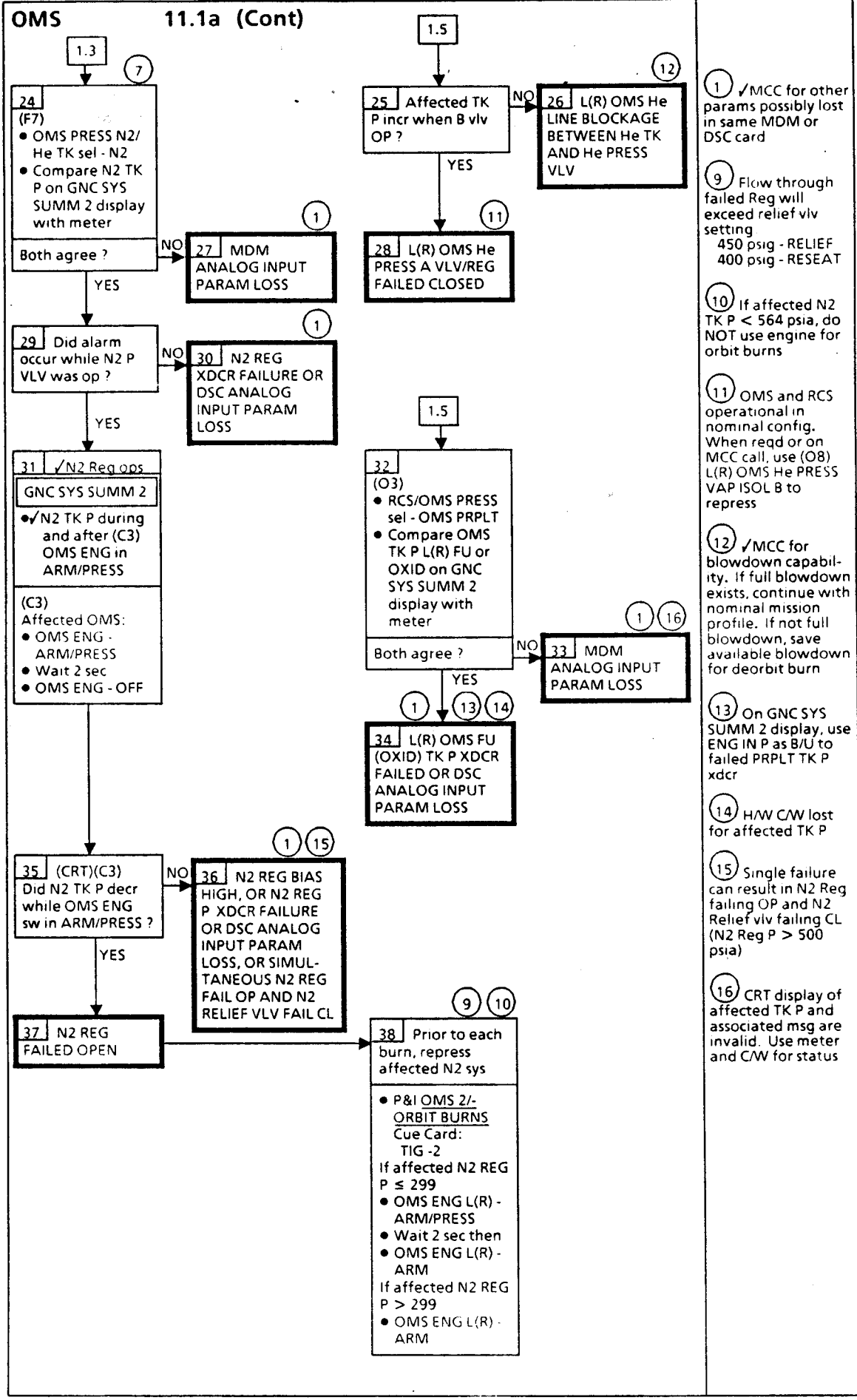
N2 TK P < 564 psia
Save for Deorbit Burn. Capability exists to allow one additional actuation of bipropellant vlvs from N2 REG. Ignore 'L(R) OMS TK P' msg caused by low N2 REG P (P < 299 psia)

OMS 11.1a (Cont)



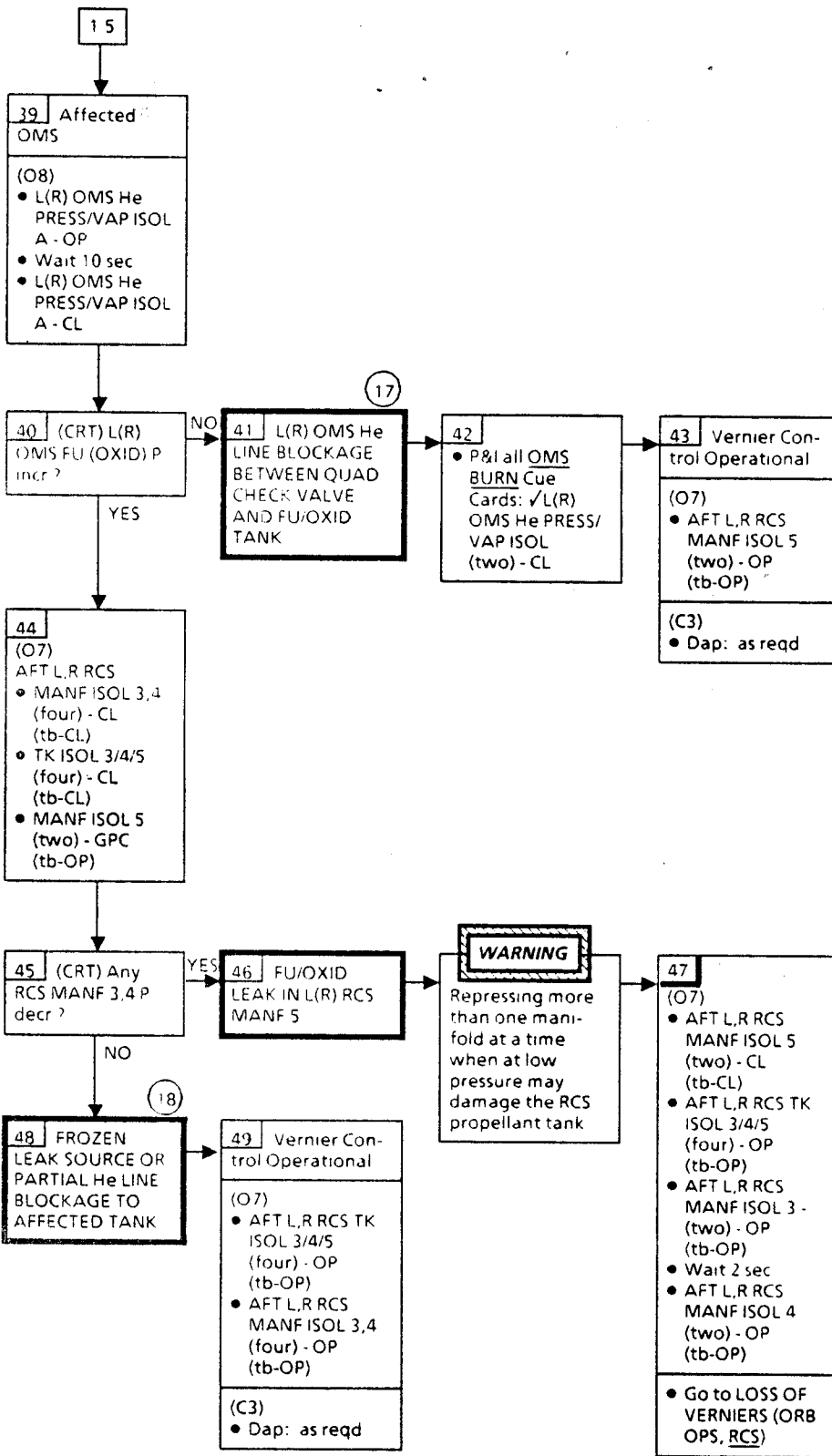
- ① ✓MCC for other params possibly lost in same MDM or DSC card
- ④ Do not use engine for additional on-orbit burns
- ⑤ Refer to OMS N2 REG P LOW in ENT PKT to determine if engine is usable for deorbit
- ⑦ N2 REG xdcr and N2 TK P xdcr on CRT have a common MDM card. This check detects MDM card failure
- ⑧ ✓MCC for further engine use

OMS 11.1a (Cont)



- ① ✓MCC for other params possibly lost in same MDM or DSC card
- ⑨ Flow through failed Reg will exceed relief vlv setting
450 psig - RELIEF
400 psig - RESEAT
- ⑩ If affected N2 TK P < 564 psia, do NOT use engine for orbit burns
- ⑪ OMS and RCS operational in nominal config. When reqd or on MCC call, use (O8) L(R) OMS He PRESS VAP ISOL B to repress
- ⑫ ✓MCC for blowdown capability. If full blowdown exists, continue with nominal mission profile. If not full blowdown, save available blowdown for deorbit burn
- ⑬ On GNC SYS SUMM 2 display, use ENG IN P as B/U to failed PRPLT TK P xdcr
- ⑭ H/W C/W lost for affected TK P
- ⑮ Single failure can result in N2 Reg failing OP and N2 Relief vlv failing CL (N2 Reg P > 500 psia)
- ⑯ CRT display of affected TK P and associated msg are invalid. Use meter and C/W for status

OMS 11.1a (Cont)



17 Perform subsequent burris 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 burris

OMS 1.5 11.1a (Cont)

50 Affected OMS

(O8)

- L(R) OMS He PRESS/VAP ISOL A(B) - OP
- Wait 10 sec
- L(R) OMS He PRESS/VAP ISOL A(B) - CL

51 (CRT) L(R) OMS FU (OXID) TK P incr ?

52 OMS config for Xfeed ops at time of failure ?

53 (O7)

- AFT L RCS MANF ISOL 1.2 (two) - CL (tb-CL)
- AFT L RCS TK ISOL 1/2 - CL (tb-CL)
- AFT L RCS XFEED 1/2 - OP (tb-OP)

54 FROZEN LEAK SOURCE OR PARTIAL He LINE BLOCKAGE TO AFFECTED TANK

55 Affected OMS

(O8)

- L(R) OMS He PRESS/VAP ISOL B(A) - OP
- Wait 10 sec
- L(R) OMS He PRESS/VAP ISOL B(A) - CL

(CRT) L(R) OMS FU (OXID) P incr ?

56 L(R) OMS He PRESS A(B) VLV REG FAILED CL

57 (CRT) Both L(R) OMS FU and OXID TK P agree in affected pod ?

58 L(R) OMS He LINE BLOCKAGE BETWEEN He TK AND He PRESS VLV (A and B)

59 (CRT) Did L RCS MANF 1,2 P decr ?

60 FU/OXID LEAK IN OMS XFEED LINES

61 L(R) OMS He LINE BLOCKAGE TO AFFECTED TANK

62 FROZEN LEAK SOURCE OR PARTIAL He LINE BLOCKAGE TO AFFECTED TANK

WARNING

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

63

- P&I all OMS BURN Cue Cards: ✓L(R) OMS He PRESS/VAP ISOL (two) - CL

64 Reconfig OMS

(O8)

- L,R OMS TK ISOL (four) - OP (tb-OP)

65 (O7)

- AFT L RCS XFEED 1 2 - CL (tb-CL)
- AFT L RCS TK ISOL 1/2 - OP (tb-OP)
- AFT L RCS MANF ISOL 1 - OP (tb-OP)
- Wait 2 sec
- AFT L RCS MANF ISOL 2 - OP (tb-OP)

(O8)

- L,R OMS TK ISOL (four) - OP (tb-OP)

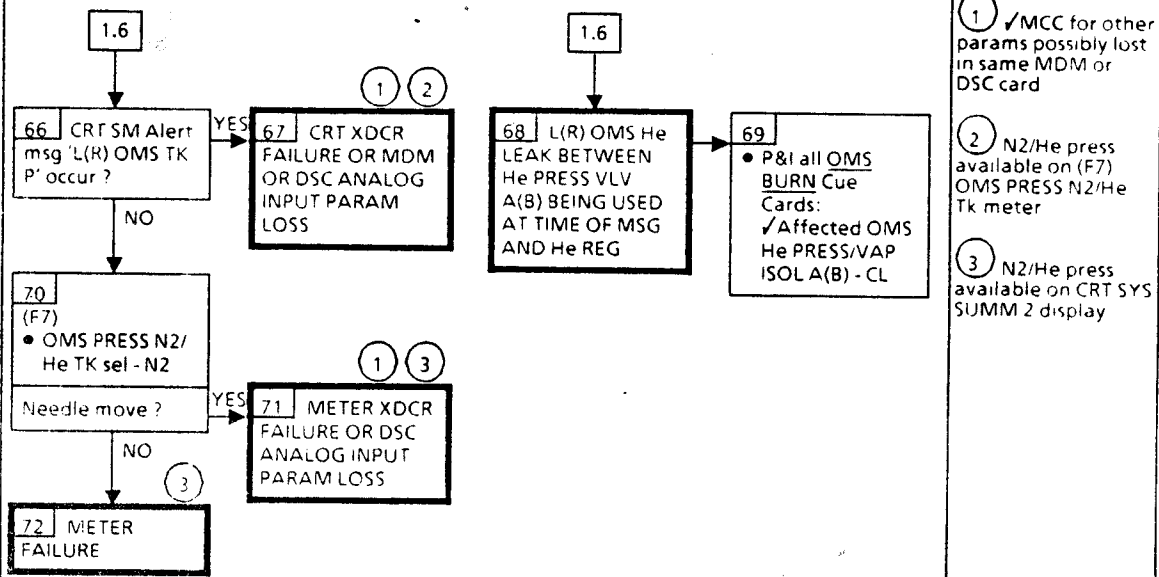
11 OMS and RCS operational in nominal config. When reqd or on MCC call, use (O8) L(R) OMS He PRESS VAP B to repress

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

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

19 OMS and RCS operational in nominal config. Do not xfeed or interconnect



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

② N2/He press
available on (F7)
OMS PRESS N2/He
Tk meter

③ N2/He press
available on CRT SYS
SUMM 2 display

OMS P
ABNORMAL

11.2

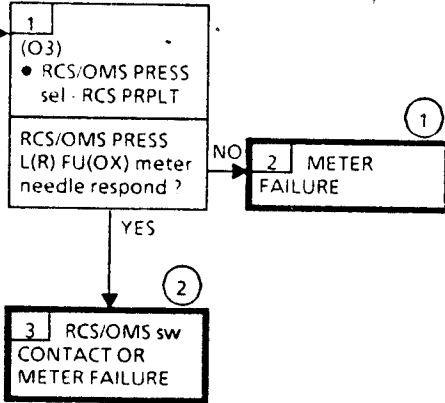
OMS

11.2a RCS/OMS FU/OX
METER < 234 OR > 284

RCS/OMS PRESS
OMS PRPLT L(R)
FU(OX) Meter

< 234 psia or
> 284 psia

No msg or C&W



1 Use GNC
SYS SUMM 2 for
affected OMS and
RCS status

2 Use GNC
SYS SUMM 2 for
affected OMS status

3 He sys data
available on GNC
SYS SUMM 2 CRT
display

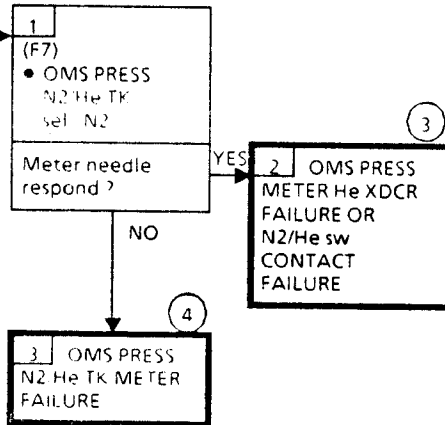
4 N2 and He sys
data available on
GNC SYS SUMM 2
CRT display

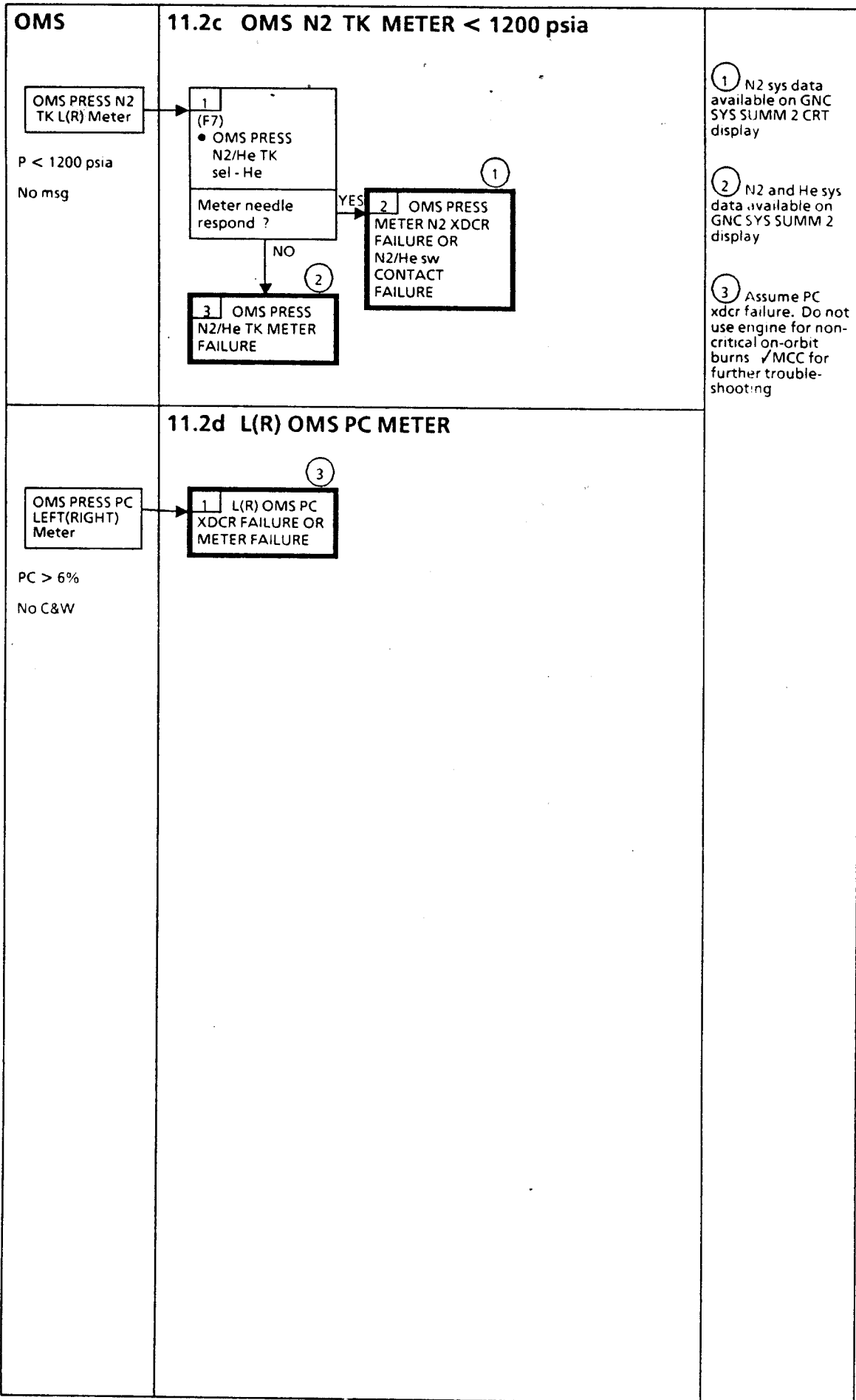
11.2b OMS He TK METER < 1500 psia

OMS He TK
L(R) Meter

P < 1500 psia

No msg





OMS SW/IV MISCOMP

11.3

OMS

11.3a OMS VLV tb - bp

① For subsequent reconfig, ignore tb - bp. After vlv commanded, wait 3 sec, then position appropriate sw to GPC

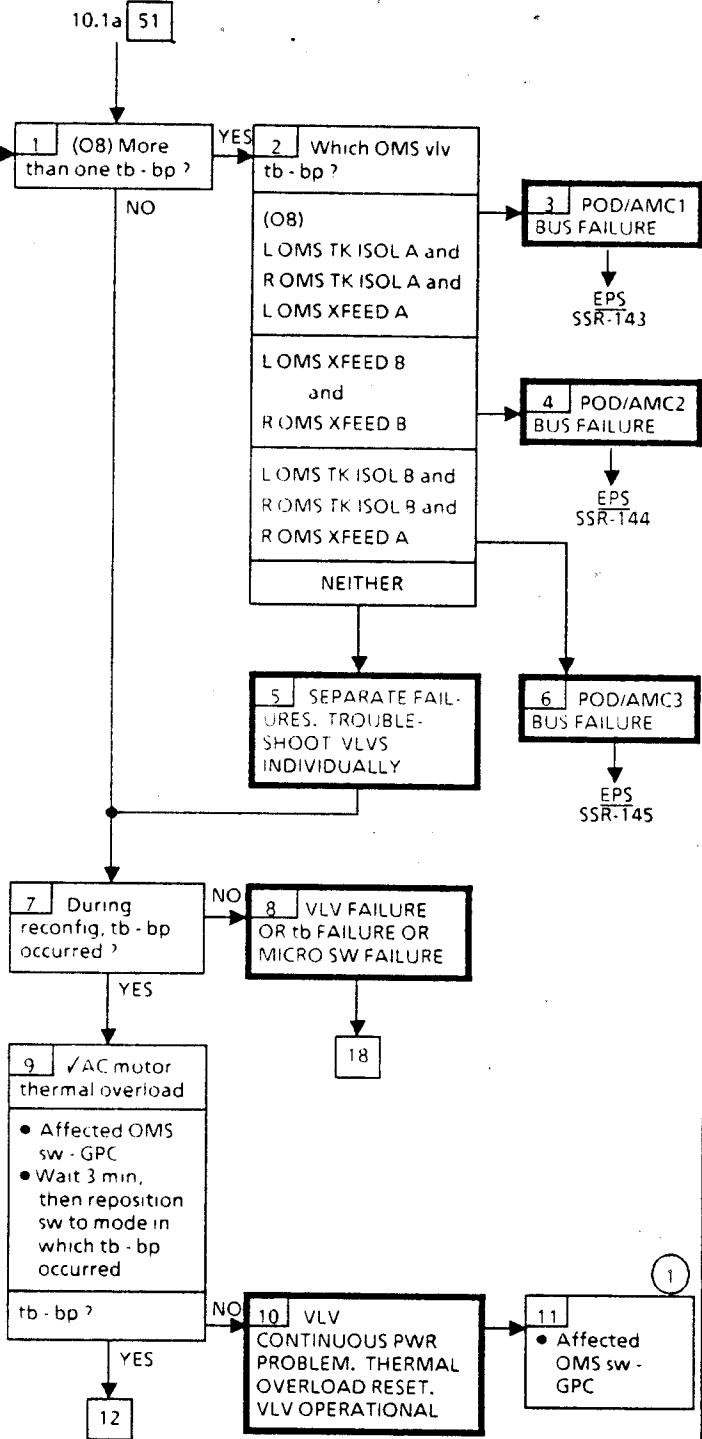
OMS Vlv tb - bp

If mismatch exists in:
 L,R OMS TK ISOL VLV A(B)
 L,R OMS XFEED VLV A(B)

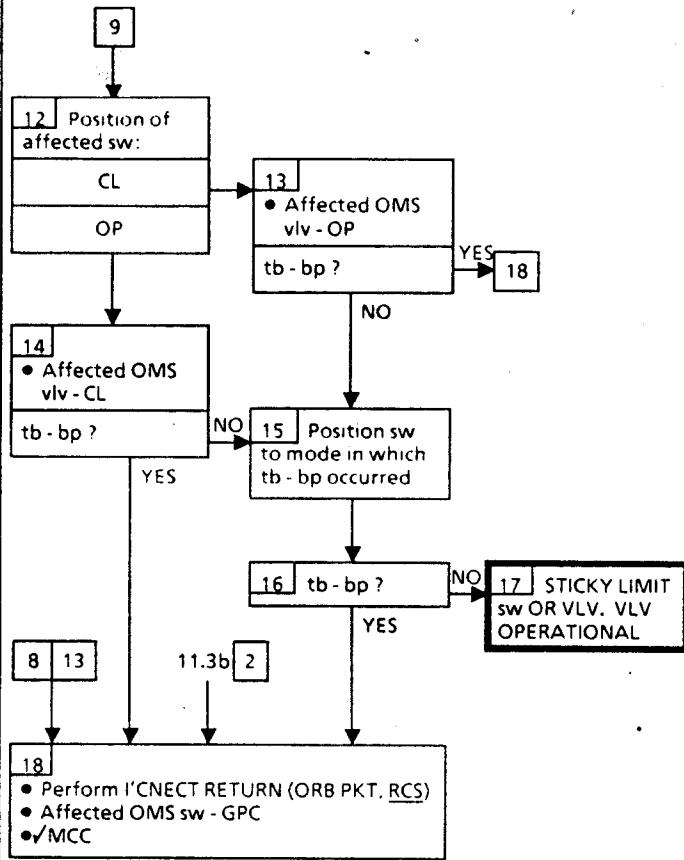
Nominal Config:
 (MA73C 1)
 cb AC1 AFT POD VLV GP 1
 φA(φB, φC) - cl
 cb AC2 AFT POD VLV GP 2
 φA(φB, φC) - cl
 cb AC3 AFT POD VLV GP 3
 φA(φB, φC) - cl
 AFT POD VLV LOGIC GP
 1/3 - ON
 1/2 - ON
 2/3 - ON

OMS SW/VLV MISCOMP

11.3



OMS 11.3a (Cont)



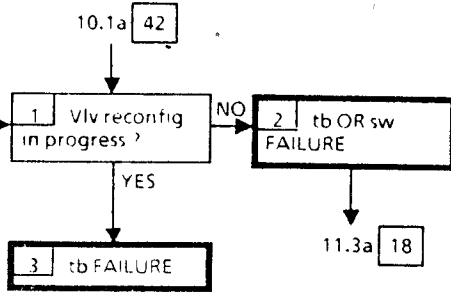
OMS

11.3b OMS VLV tb & sw POSITION DISAGREE

OMS Vlv
tb and sw
Disagree

Occurs when:
OMS vlv tb - OP
but sw closed
OMS vlv tb - CL
but sw open

Nominal Config:
(MA73C:1)
cb AC1 AFT POD
VLV GP 1
ΦA(ΦB, ΦC) - cl
cb AC2 AFT POD
VLV GP 2
ΦA(ΦB, ΦC) - cl
cb AC3 AFT POD
VLV GP 3
ΦA(ΦB, ΦC) - cl
AFT POD VLV
LOGIC GP
1/3 - ON
1/2 - ON
2/3 ON



OMS

11.5a PRPLT THERM OMS

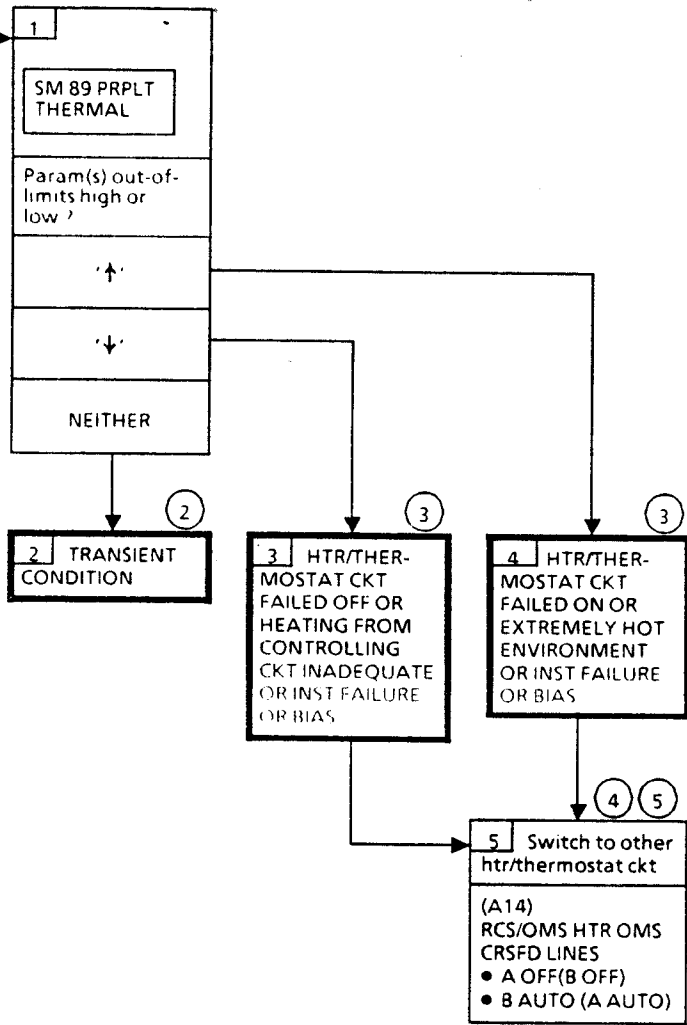
SM ALERT

1

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)



- 1 Msg available with SM in RUN mode only
- 2 Htrs cycling high/low or intermittent xdcr 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 cross-feed 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 THERMAL LIMIT TABLE

PARAMETER	FSA LIMIT			FDA LIMIT	
	L	R	C	LOW	HIGH
OMS CRSFD					
XFD	OX XXXS	XXXS	XXXS	50	90 (6)
GMBL	LN XXXS	XXXS		50	90 (6)
DRN	OX XXXS	XXXS		50	100 (7)
		FU OX			
BLD AFT	FUS	XXXS	XXXS	50	110
PL	BAY	XXXS	XXXS	45	100

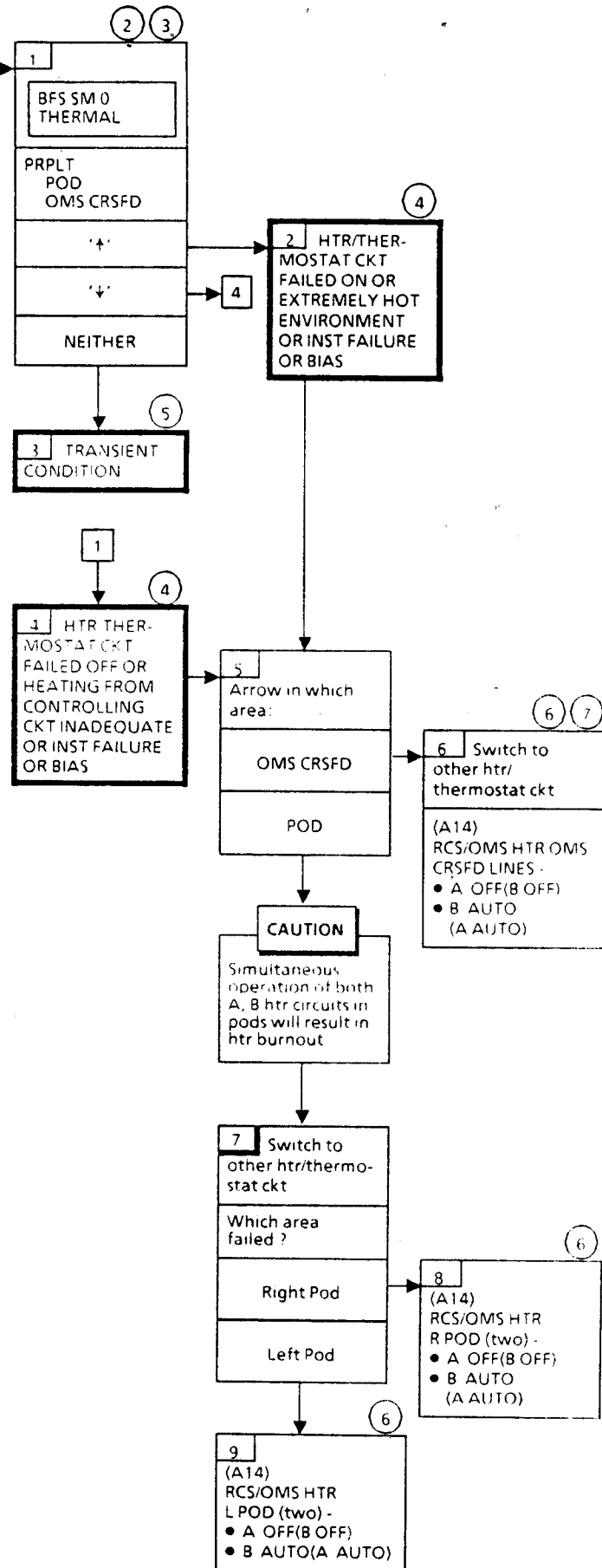
OMS

11.5b THERM PRPLT

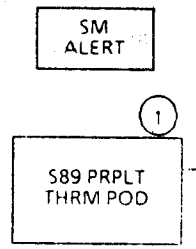
1 SMO THRM PRPLT

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)

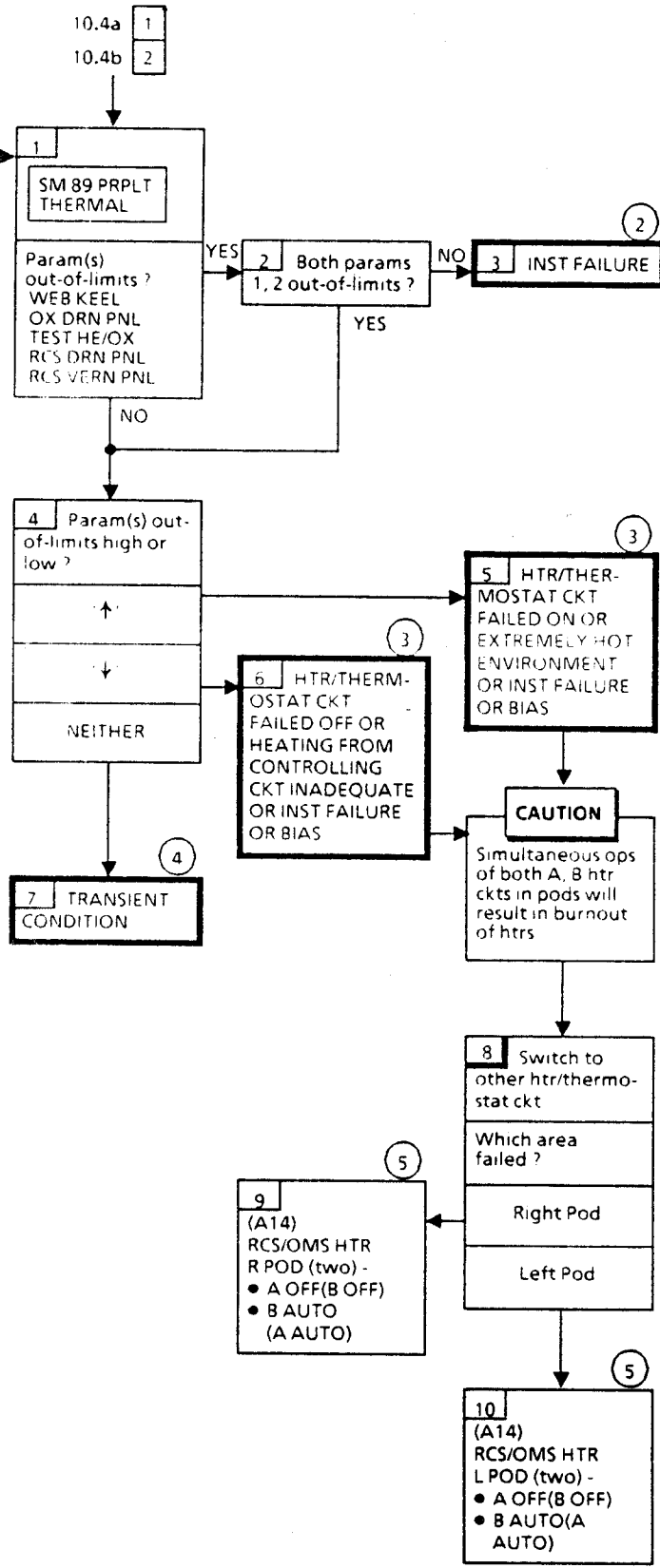


- 1 BFS msg available in MM 104, 105, 106, 301, 302, 303, and when BFS in OPS 0
- 2 If SM 89 PRPLT THERMAL is available, it may be used to provide insight into the problem, with MCC consultation
- 3 THERMAL display available only from BFS. No values displayed, only ↑, ↓, M, H, or L
- 4 Cause of insufficient onboard data and complexity of interfacing htr/thermostat groups, crew cannot identify specific failure or determine instrument faults
- 5 Htr 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 cross-feed lines (no SM and no BFS) exists, both A, B Htr sets will be turned to AUTO



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

11.5c (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	I/F	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-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. 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, AFT 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
L OMS OX TK	4
L OMS OX INLET	4
L OMS FU TK	6
L OMS FU INLET	6
R OMS OX TK	3
R OMS OX INLET	3
R OMS FU TK	5
R OMS FU INLET	5

Dual Failures	Use Table
L OMS FU TK AND R OMS OX TK	1
L OMS OX TK AND R OMS FU TK	2
L OMS FU TK AND R OMS OX INLET	3
L OMS OX INLET AND R OMS FU TK	4
L OMS OX TK AND R OMS FU INLET	5
L OMS FU INLET AND R OMS OX TK	6
L OMS OX INLET AND R OMS FU INLET	7
L OMS FU INLET AND R OMS OX INLET	8

- CRT 4. Set up GPC vlv
GNC O GPC MEMORY

- ✓HEX 27*
BIT RST - ITEM 23 EXEC (*)
Obtain and enter ADD IDs from (REF DATA, FLT SUPPL, MAL ADD; OMS)
Obtain and enter DESIRED values from Tables 1 thru 8

ADD ID	DESIRED	
28 (1)	29	} From Tables 1-8
30 (2)	31	
32 (3)	33	
34 (4)	35	

Table A	Table B
----	----
----	----
----	----
----	----

- ✓Data values in ACTUAL column agree with Table A (MCC supplied)
WRITE - ITEM 25 EXEC
✓Data values in ACTUAL column agree with Table B (MCC supplied)

5. BIT SET - ITEM 22 EXEC (*)
Obtain and enter ADD IDs from (REF DATA, FLT SUPPL, MAL ADD; OMS)
Obtain and enter DESIRED values from Tables 1 thru 8

ADD ID	DESIRED	
28 (5)	29	} From Tables 1-8
30 (6)	31	
32 (7)	33	
34 (8)	35	

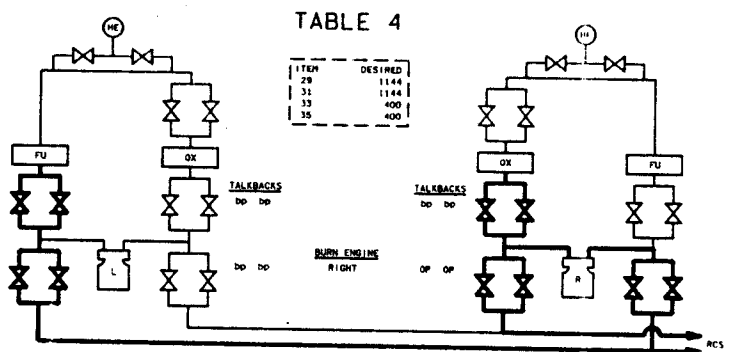
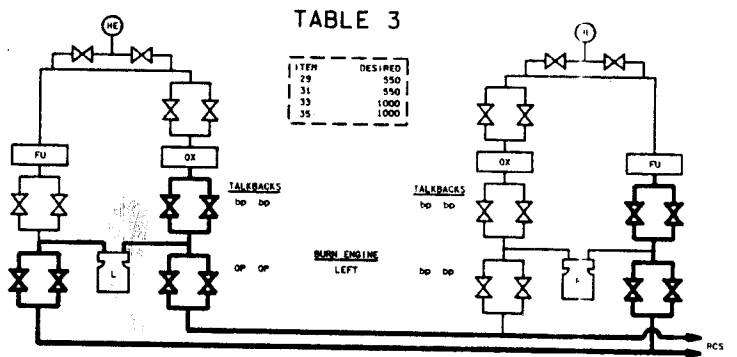
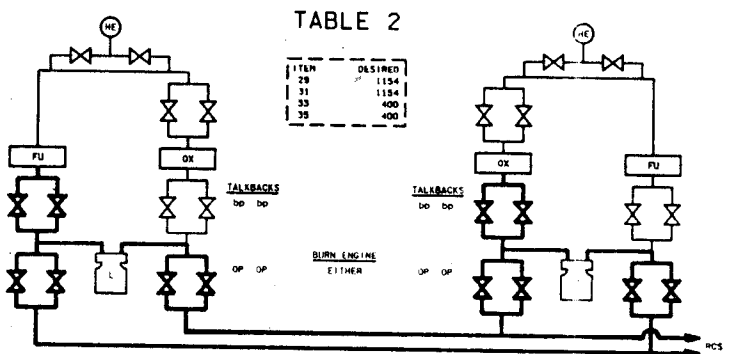
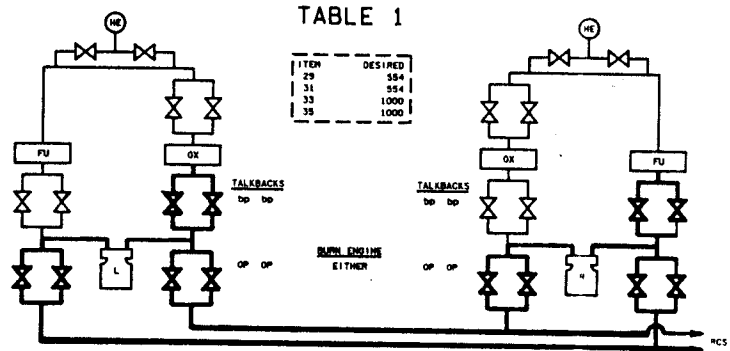
Table C
0000
0000
0000
0000

- ✓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)



4557, ART. 4

OMS SSR-1 (Cont)

TABLE 5

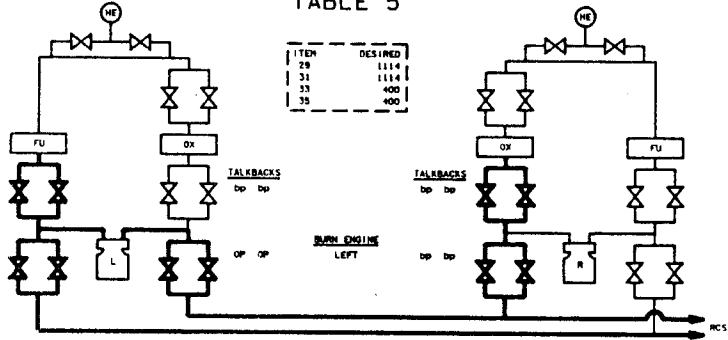


TABLE 6

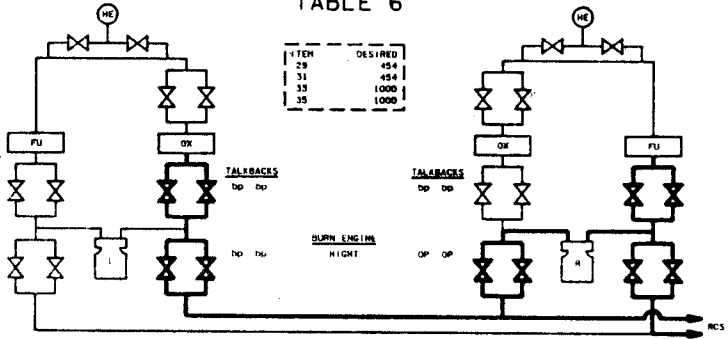


TABLE 7

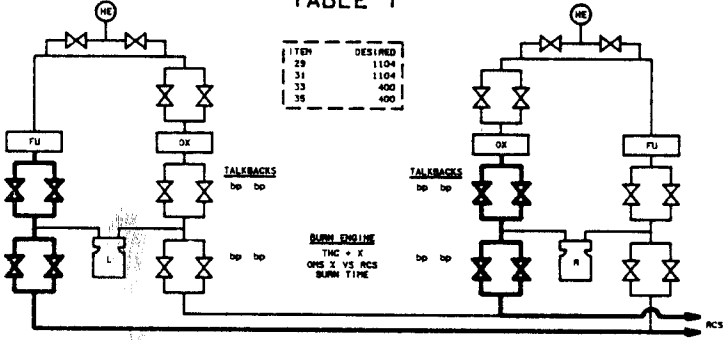
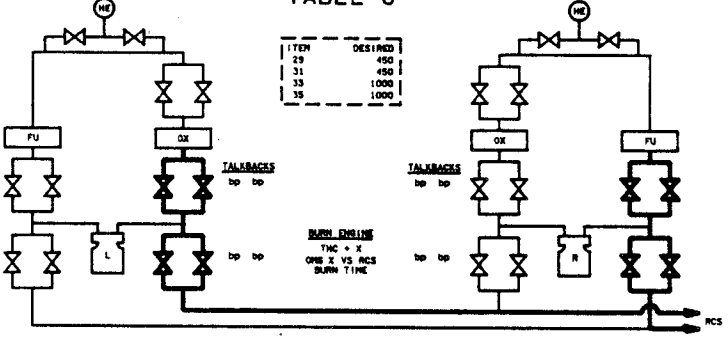


TABLE 8



48" L. ART. 2

MPS

12.1	MPS	
1.1	MPS C/W.....	12-4
12.1a	MPS.....	12-5

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

- ME SHDN SW C(L,R)
- MPS CMD C(L,R)
- MPS DATA C(L,R)
- MPS ELEC C(L,R)
- MPS HYD C(L,R)
- MPS He P C(L,R)
- MPS LH2/O2 MANF
- MPS LH2/O2 ULL

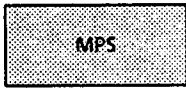
MPS

12

MPS

12.1

MPS



Light on if:
LH2 MANF P
> 60.0 psi
or
LO2 MANF P
> 249.0 psi

Nominal Config:
(R2)
MPS PNEU He ISOL -
GPC
(R4)
MPS FILL/DRAIN
LO2,LH2 OUTBD
(two) - GND

12.1 MPS

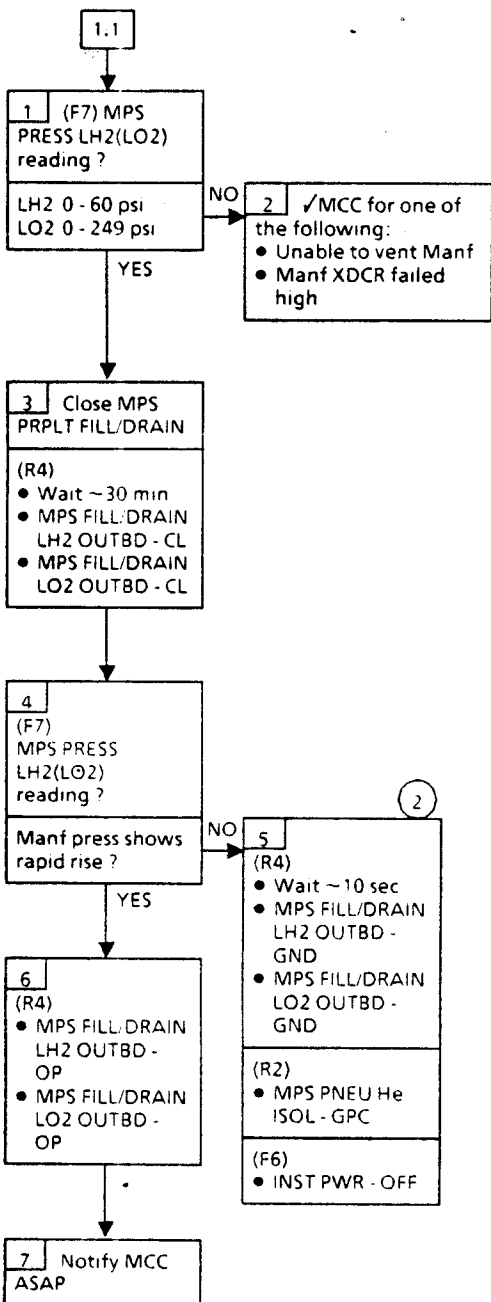
1.1

MPS C/W

1. MPS PNEU He ISOL - OP
2. PRPLT FILL/DRAIN LH2 OUTBD - OP
LO2 OUTBD - OP
3. CDR INST PWR - FLT/MPS
4. Go to MAL, MPS, 12.1a **1**

885

MPS 12.1a MPS



① F/D No Op for LH2 - MNB (ALC2) or CNHC1
LO2 - MNC (ALC3) or CNTCA1

② Normal config

PDRS

<u>13.1</u>	<u>RMS C/W</u>	
13.1a	C/W LT(S) ON, BUT RMS MSTR ALARM LT/TONE OFF.....	13-4
13.1b	MULTIPLE C/W LTS AND PDRS MSGS.....	13-5
13.1c	C/W MCIU LT - S96 PDRS MCIU ICF (MCPC, MADC).....	13-6
13.1d	C/W ABE LT - S96 PDRS ABE COMM (JPC1,JPC2,SY,SP, EP,WP,WY,WR).....	13-7
13.1e	C/W CONTR ERR LT - S96 PDRS CNTL SY (SP,EP,WP,WY,WR).....	13-10
13.1f	C/W GPC DATA LT.....	13-13
13.1g	CHECK CRT LT.....	13-14
13.1h	LT - S96 PDRS CKCRT SY (SP,EP,WP, WY,WR).....	13-15
13.1i	- S96 PDRS CKCKT D.....	13-18
13.1j	- S96 PDRS CKCKT EE.....	13-19
13.1k	- S96 PDRS CKCKT.....	13-22
13.1l	- PDRS CKCRT HC.....	13-23
13.1m	- PDRS SLIP SY (SP,EP,WP,WY,WR, ALL).....	13-24
13.1n	- S94 PDRS WR R.....	13-25
13.1o	RELEASE LT - PDRS REL.....	13-26
13.1p	DERIGIDIZE LT - PDRS DERIG.....	13-27
13.1q	PORT TEMP LT - PDRS TEMP PORT.....	13-29
13.1r	MSTR ALARM ON, BUT ALL C/W LTS OFF.....	13-31
<u>13.2</u>	<u>RMS D&C</u>	
13.2a	BRAKES - ON, BUT BRAKES tb - OFF.....	13-32
13.2b	- OFF, BUT BRAKES tb - ON.....	13-33
13.2c	SAFING - AUTO, BUT SAFING tb - bp.....	13-34
13.2d	RESERVED.....	not used
13.2e	SM 94 I/O OFF, AND ALL RMS C/W LTS OFF.....	13-35
13.2f	SELECTED MODE ANNUN - OFF.....	13-36
13.2g	SHLDR BRACE REL tb - bp AFTER CMD.....	13-39
<u>13.3</u>	<u>END EFFECTOR</u>	
13.3a	EE FAILS TO CAPTURE/RIGIDIZE IN AUTO.....	13-40
13.3b	RELEASE/DERIGIDIZE IN AUTO.....	13-44
13.3c	CAPTURE IN EE MODE - MAN (EE C/O ONLY)..	13-51
13.3d	EE FAILS TO RIGIDIZE IN EE MODE - MAN (EE CHECKOUT ONLY).....	13-52
13.3e	EE FAILS TO RELEASE IN EE MODE - MAN.....	13-54
13.3f	DERIGIDIZE/EXTEND IN MANUAL.....	13-56
13.3g	tb ABNORMAL WHILE NO EE COMMANDS (EE MODE - AUTO OR MAN).....	13-59
13.3h	tb ABNORMAL WHILE EE MODE OFF.....	13-62
<u>13.4</u>	<u>RMS OPS</u>	
13.4a	ARM RESPONSE ABNORMAL IN MANUAL MODES.....	13-64
13.4b	AUTO MODES.....	13-66
13.4c	JOINT RESPONSE ABNORMAL IN SINGLE MODE.....	13-68
13.4d	DIRECT MODE.....	13-71

PDRS

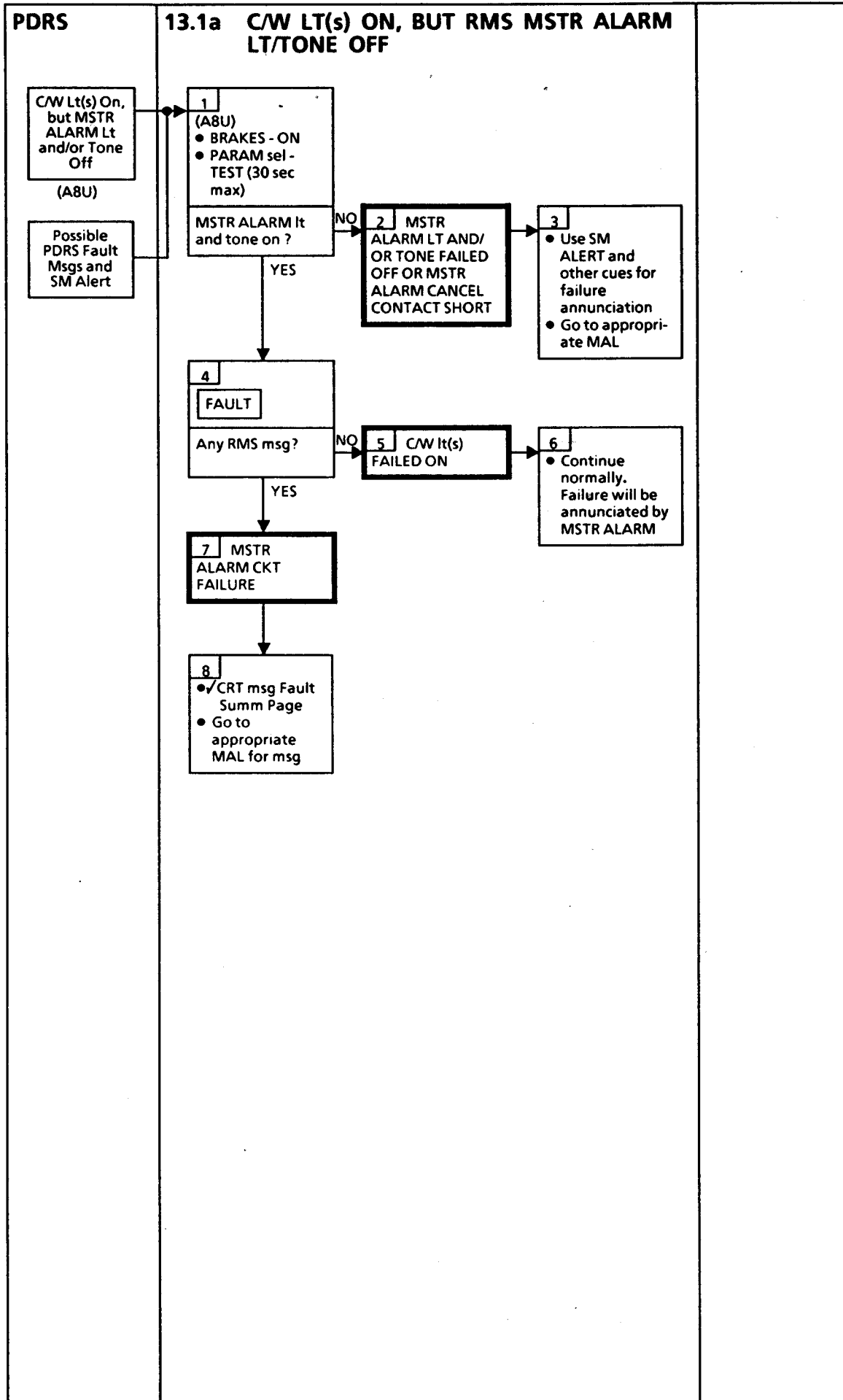
13

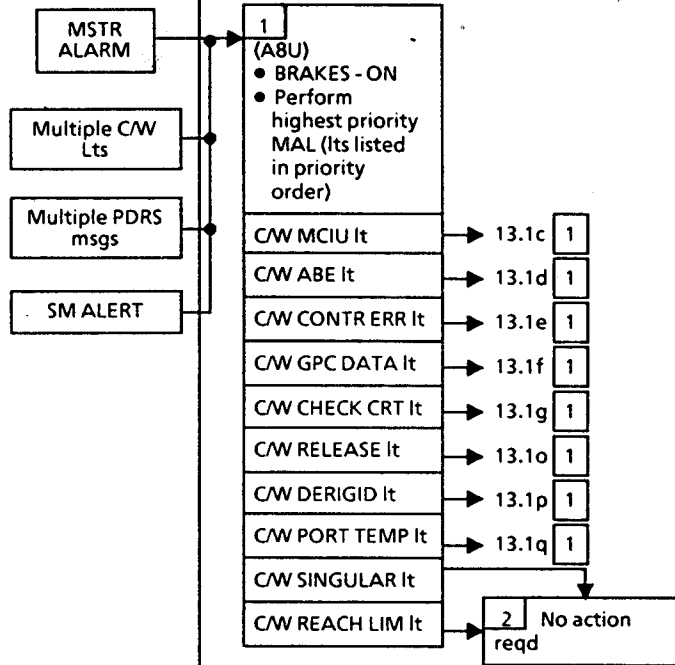
<u>13.5</u>	<u>MPM/MRL</u>		
13.5a	MPM DPY - tb NOT DPY, IND NOT NOMINAL, OR SINGLE	MTR DRIVE TIME.....	13-74
13.5b	MPM STO - tb NOT STO, IND NOT NOMINAL, OR SINGLE	MTR DRIVE TIME.....	13-76
13.5c	MRL REL - tb NOT REL, IND NOT NOMINAL, OR SINGLE	MTR DRIVE TIME.....	13-78
13.5d	MRL LAT - tb NOT LAT, IND NOT NOMINAL, OR SINGLE	MTR DRIVE TIME.....	13-80
13.5e	PORT RMS R-F-L tb - bp WHEN CRADLED.....		13-82
13.5f	- gray WHEN UNCRADLED.....		13-82

<u>PDRS</u>	<u>SSR</u>		
PDRS	SSR-1	MPM MTR INHIBIT DISABLE.....	13-84
	SSR-2	RMS JOINT FAILED PAD.....	13-85
	SSR-3	BACKDRIVE TECHNIQUE - JOINT FREE.....	13-86
	SSR-4	RMS IFM D&C KIT.....	13-94

PDRS

13



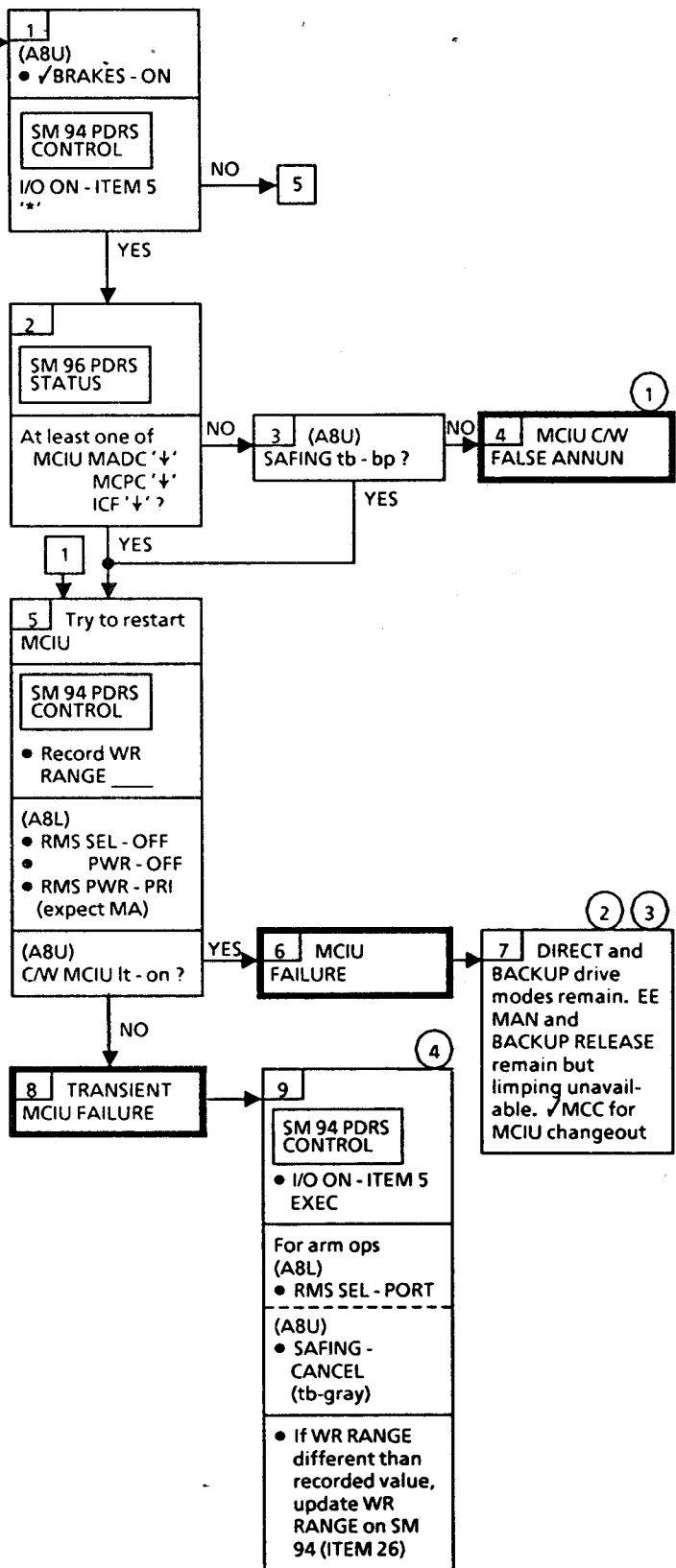


PDRS

13.1c C/W MCIU LT- S96 PDRS MCIU ICF (MCPC,MADC)

- SM ALERT
- RMS MSTR ALARM
- MCIU (ABU)
- MCIU MADC '↓', MCIU MCPC '↓', MCIU ICF '↓'
- S96 PDRS MCIU ICF (MADC, MCPC)

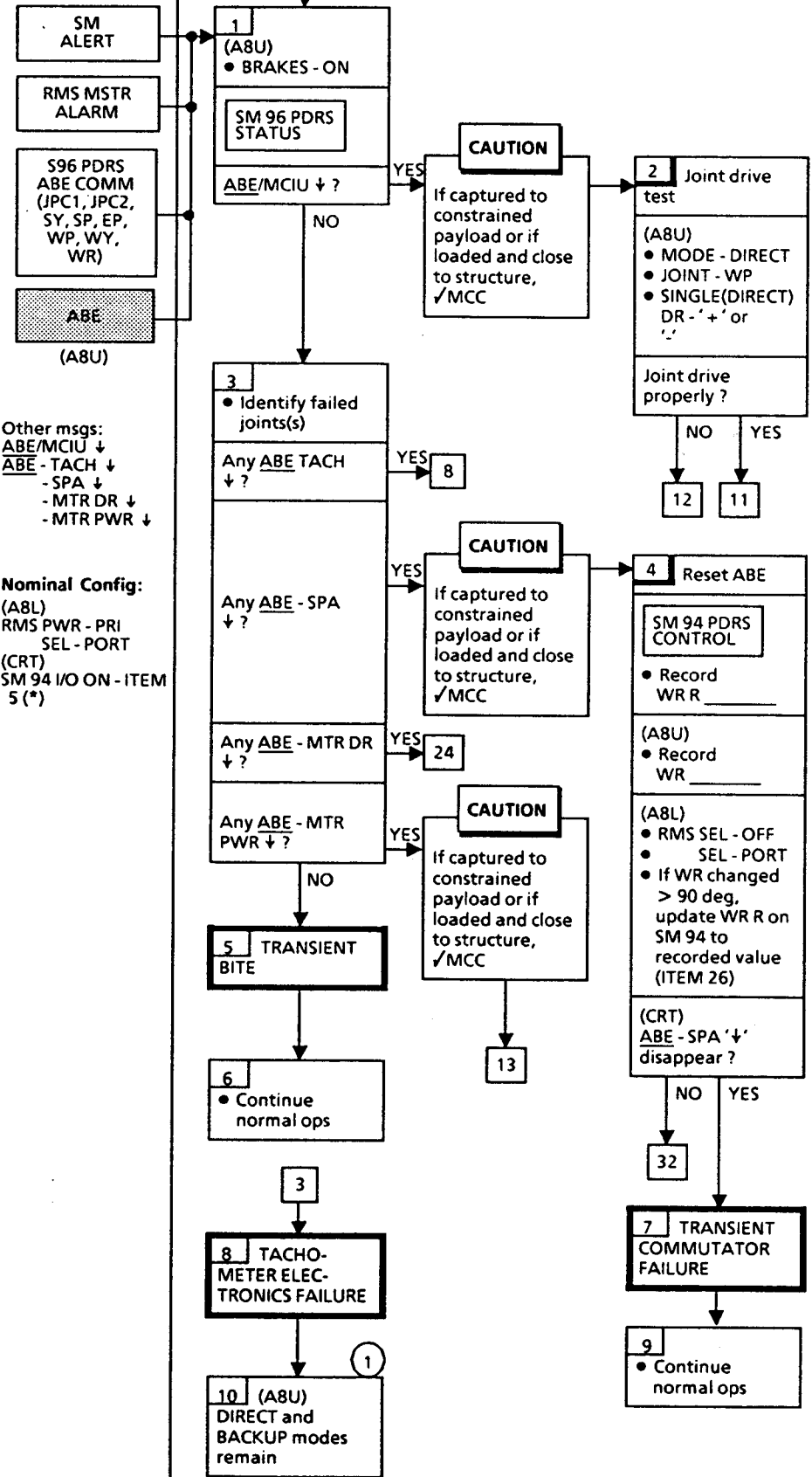
Nominal Config: (ABL) RMS PWR - PRI



- ① Subsequent MCIU failure will not activate MSTR ALARM. SM ALERT cue still available
- ② Full capability may be restored with RMS MCIU CHANGEOUT (IFM)
- ③ Display data may be unreliable. Additional fault msgs and C&W lights possible
- ④ Additional transients possible

13.1d C/W ABE LT - S96 PDRS ABE COMM (JPC1, JPC2, SY, SP, EP, WP, WY, WR)

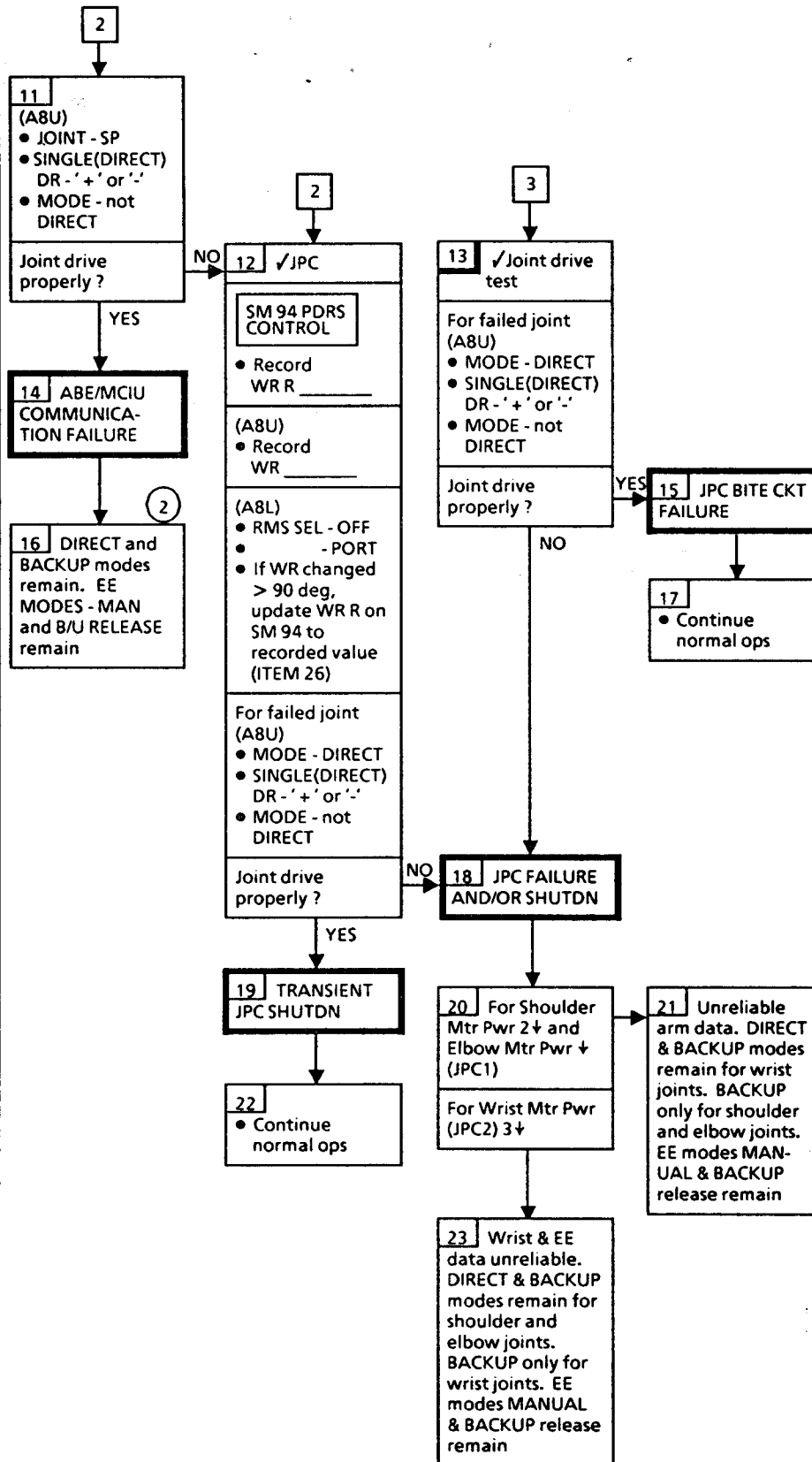
① Rate display is unreliable, but joint angle data are good



Other msgs:
 ABE/MCIU ↓
 ABE - TACH ↓
 - SPA ↓
 - MTR DR ↓
 - MTR PWR ↓

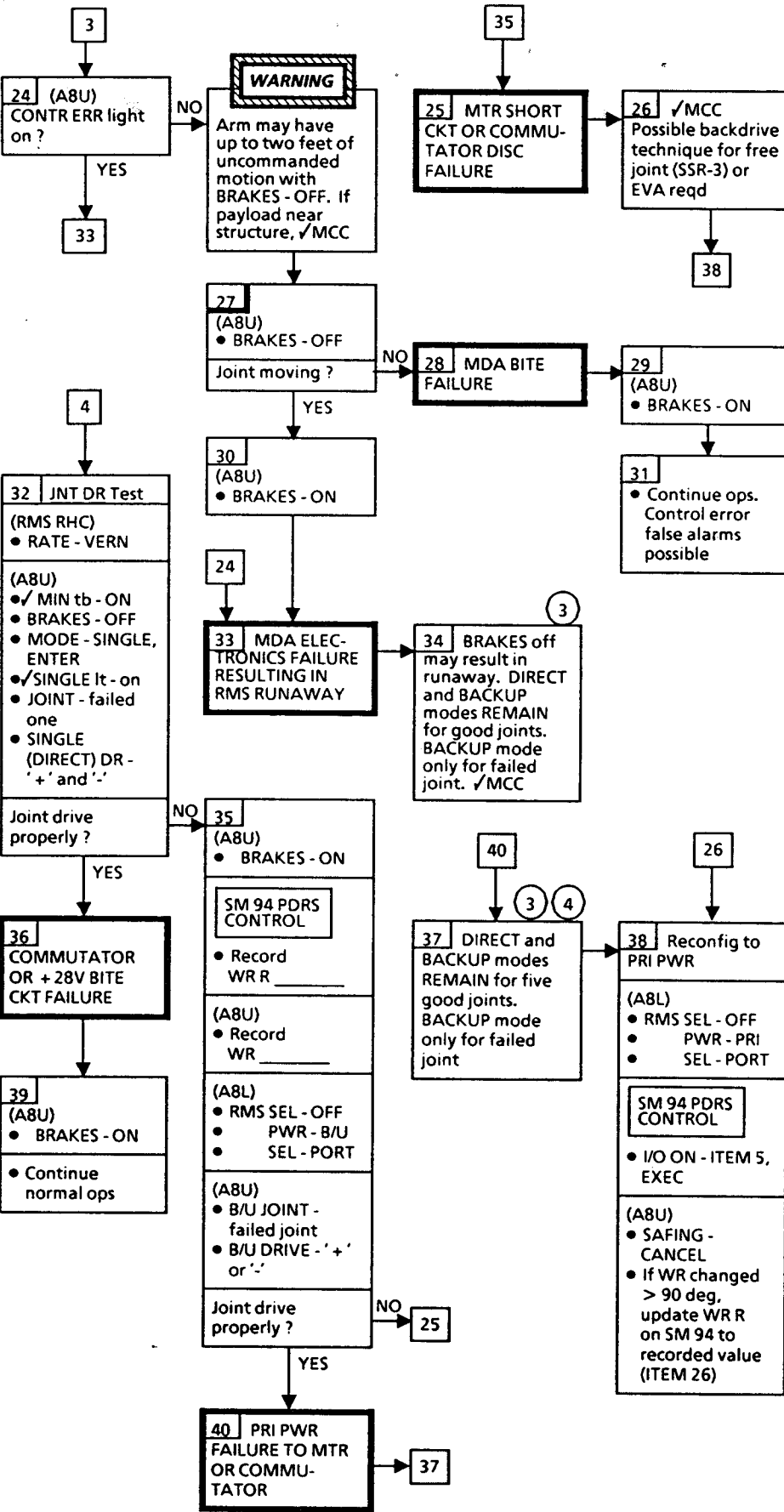
Nominal Config:
 (ABL) RMS PWR - PRI
 SEL - PORT
 (CRT) SM 94 I/O ON - ITEM 5 (*)

PDRS 13.1d (Cont)



② Arm and End Effector data are unreliable

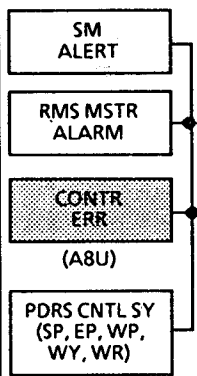
③ Full EE capability in DIRECT; however, limping not available



③ Full EE capability in DIRECT; however, limping not available

④ SINGLE mode capability remains for 5 good joints, but bad joint will fail free

13.1e C/W CONTR ERR LT -
S96 PDRS CNTL SY (SP, EP, WP, WY, WR)

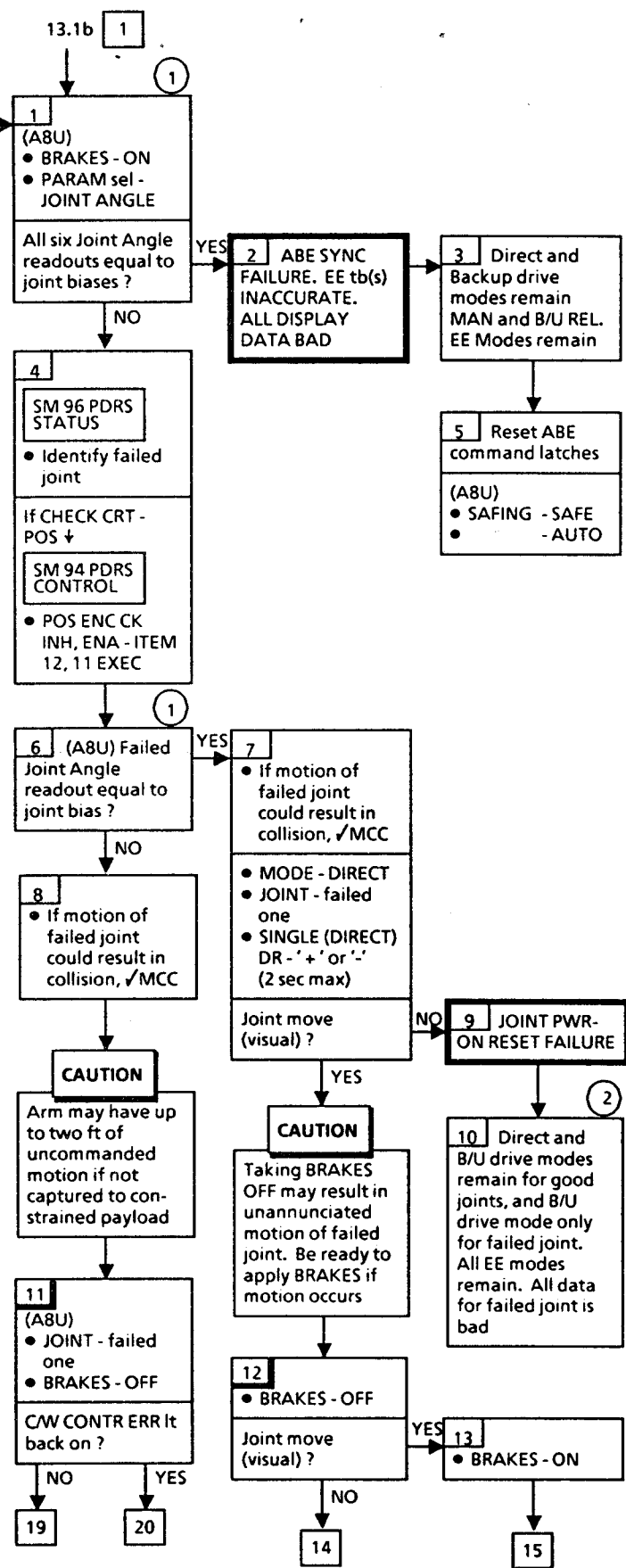


If:

SM 96 PDRS STATUS

CONTROL ERR SY (SP, EP, WP, WY, WR) '↓' (Joint Consistency Check failed)

Nominal Config: (ABL) RMS PWR - PRI SEL - PORT

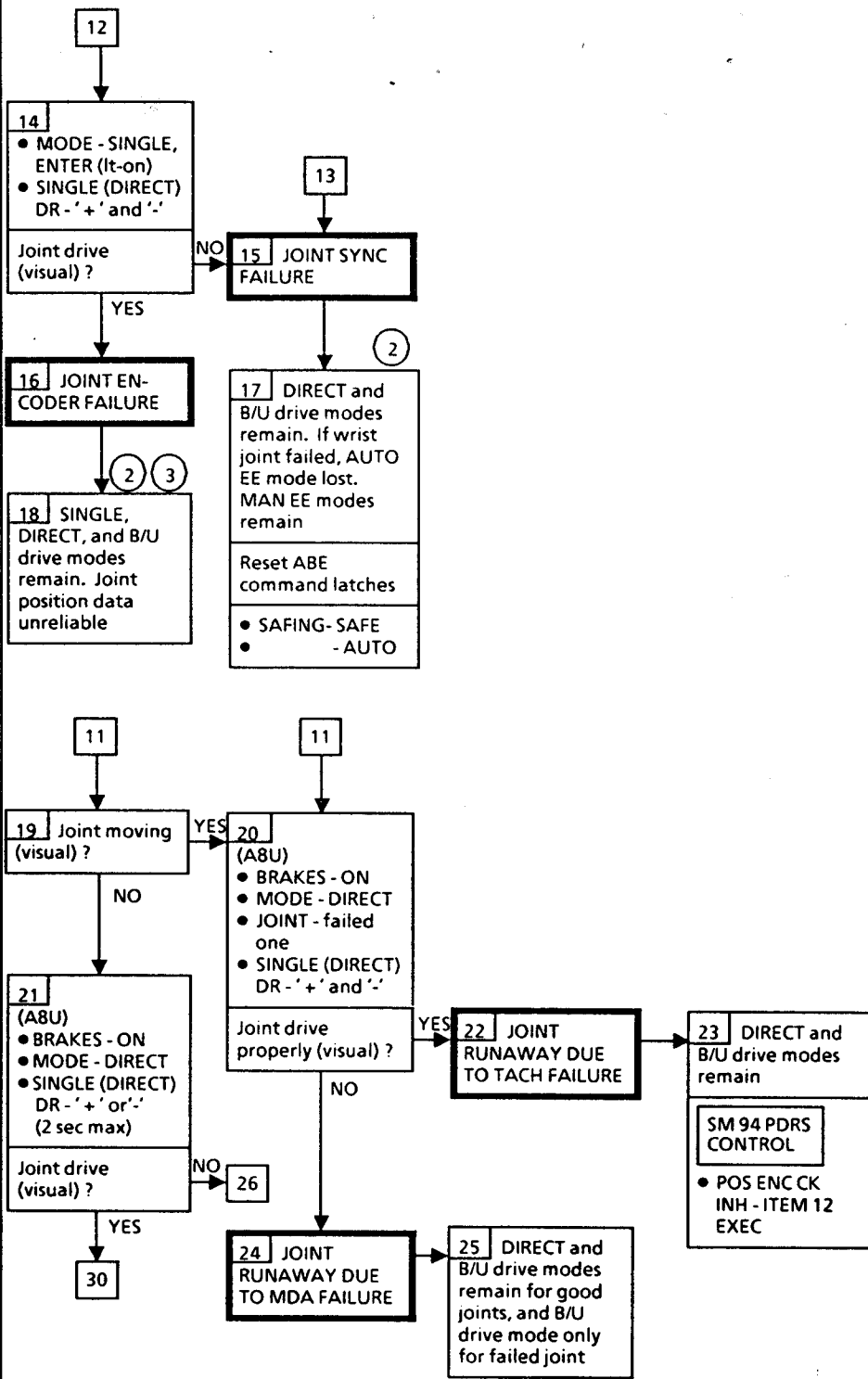


1 Joint biases

DDT&E (#201)	
SY	-2.4
SP	+1.8
EP	+1.9
WP	-2.1
WY	+1.3
WR	+3.4
FOP1 (#301)	
SY	-0.9
SP	+2.4
EP	-0.0
WP	-1.0
WY	-1.9
WR	-0.0
FOP3 (#303)	
SY	-2.4
SP	+4.0
EP	+3.6
WP	+0.9
WY	+0.1
WR	-2.5

2 REACH LIMITS & SOFT STOPS annunciation not available for failed joint

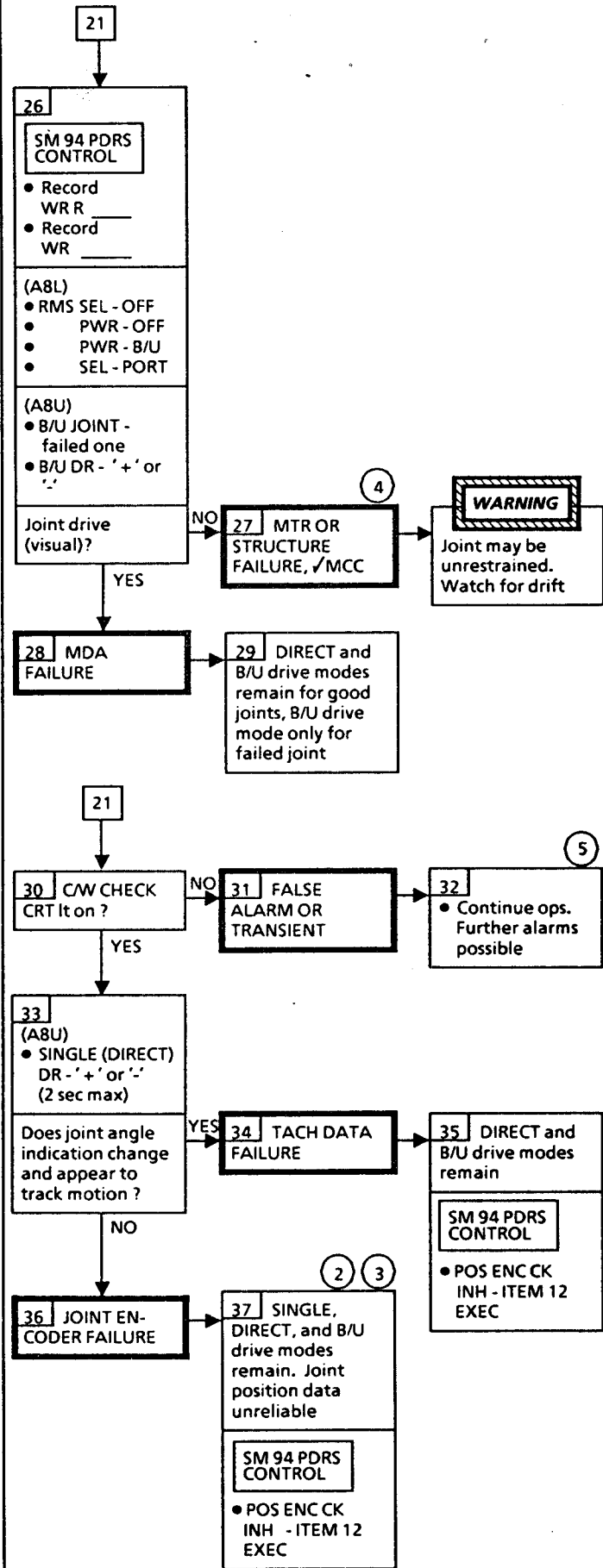
PDRS 13.1e (Cont)



② REACH LIMITS & SOFT STOPS annunciation not available for failed joint

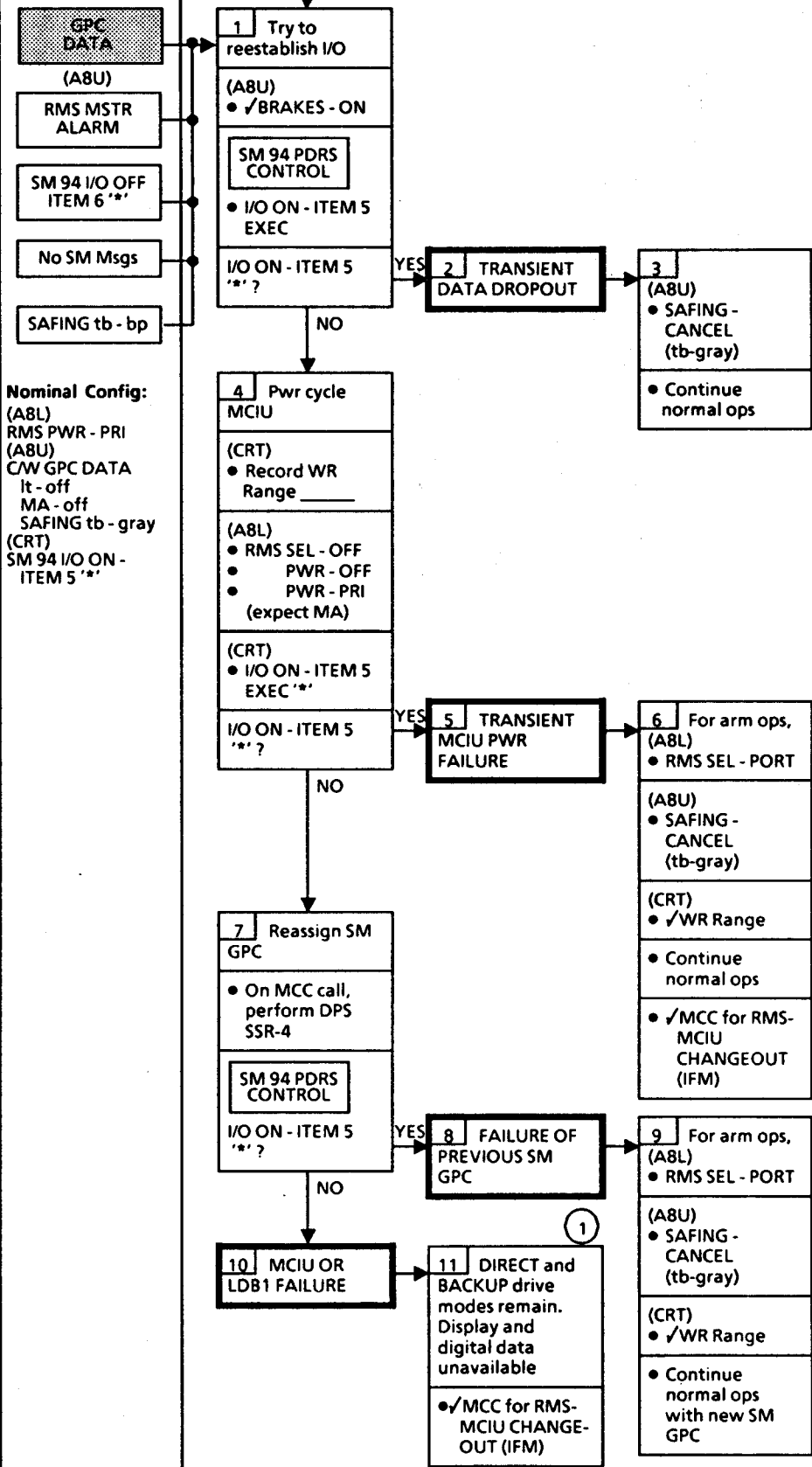
③ Position hold function will not work for failed joint

PDRS 13.1e (Cont)



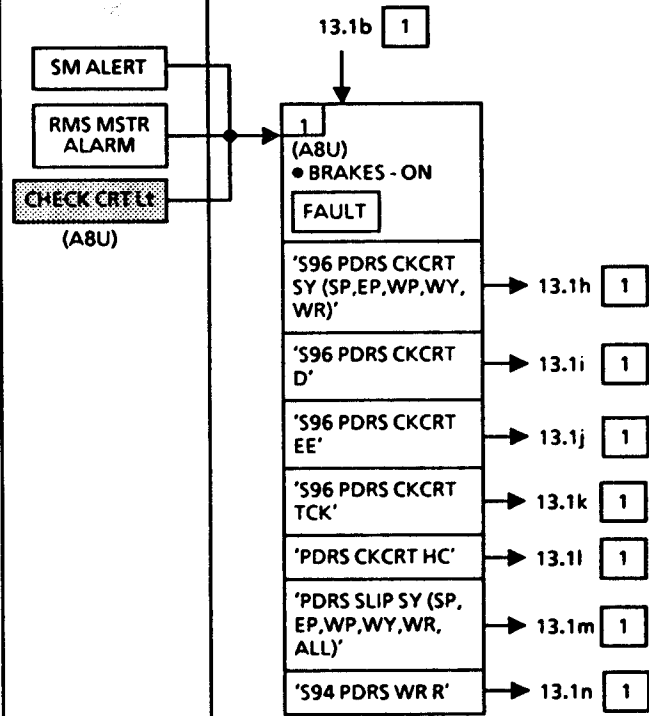
- ② REACH LIMITS & SOFT STOPS annunciation not available for failed joint
- ③ Position hold function will not work for failed joint
- ④ Whiplash technique of EVA may be reqd to stow arm. ✓MCC
- ⑤ MCC can determine if fwd/backdrive flag failure is cause of false alarm

① Full capability may be restored following IFM



PDRS

13.1g C/W CHECK CRT LT

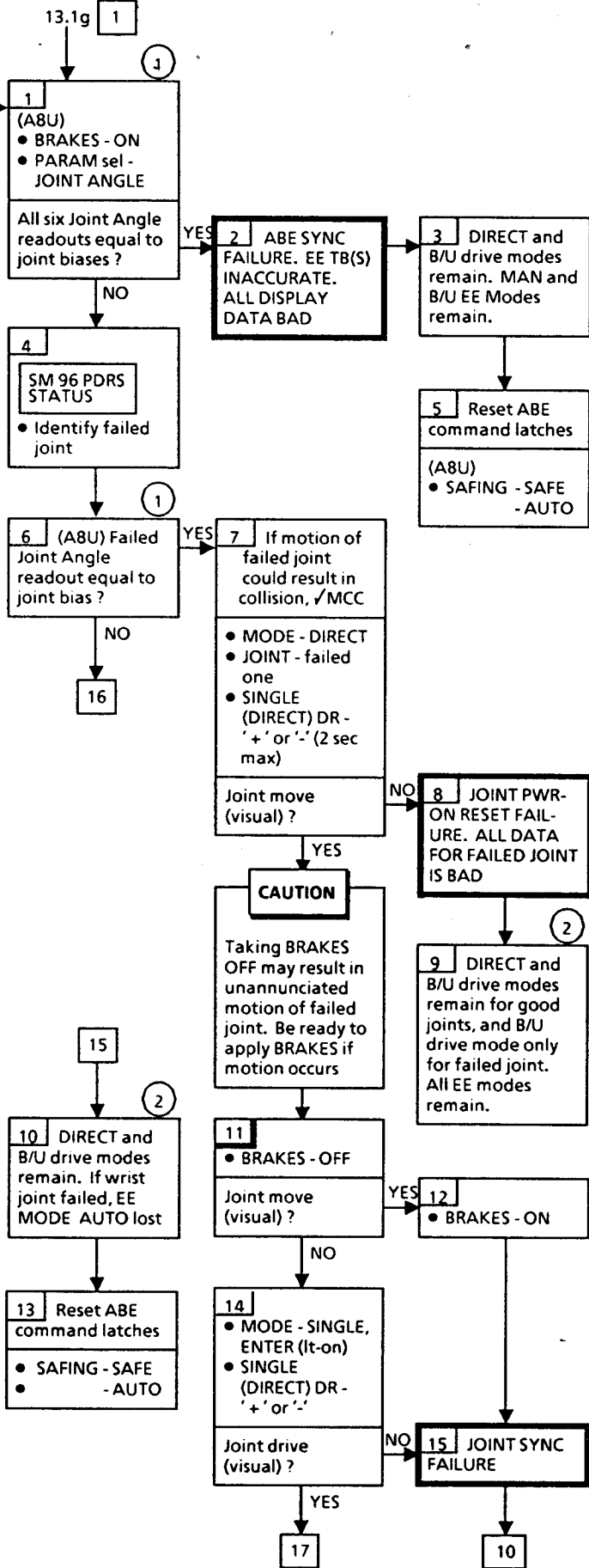


13.1h C/W CHECK CRT LT -
S96 PDRS CKCRT SY (SP, EP, WP, WY, WR)

- SM ALERT
- RMS MSTR ALARM
- CHECK CRT (A8U)
- S96 PDRS CKCRT SY (SP, EP, WP, WY, WR)

If CK CKT-POS SY (SP, EP, WP, WY, WR) ↓

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

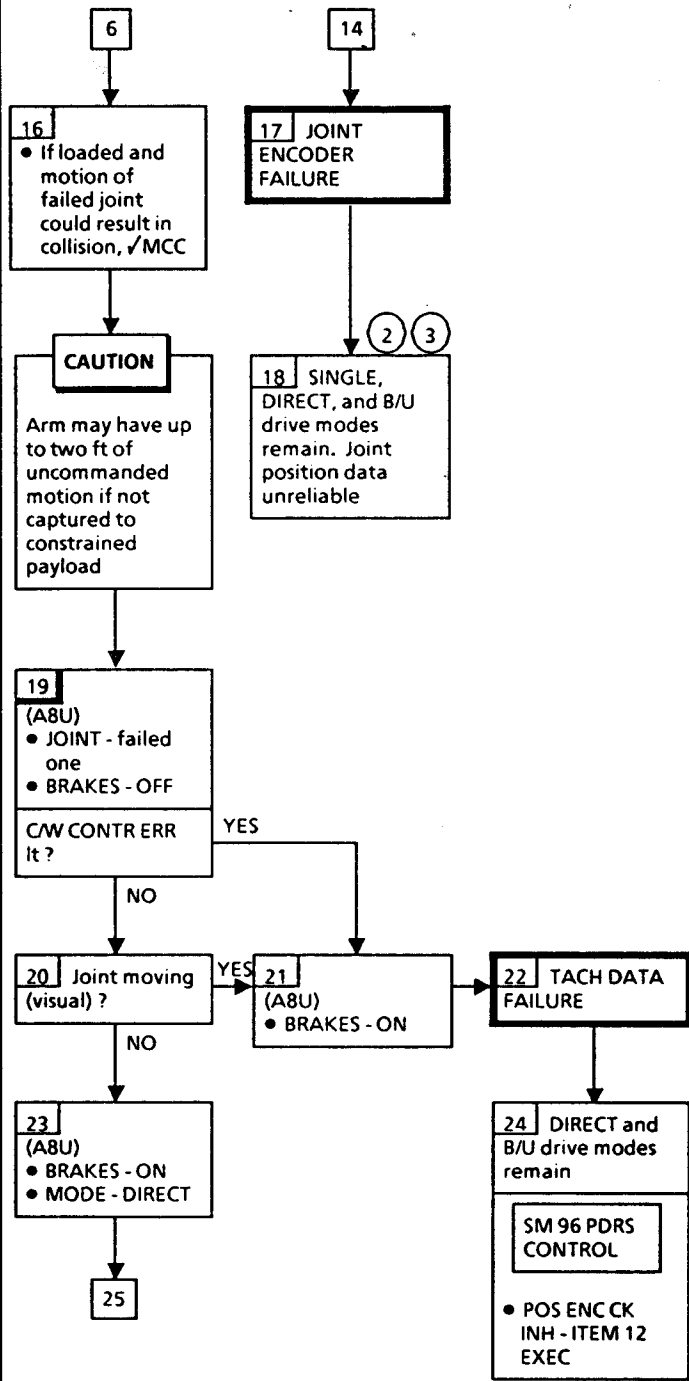


1 Joint biases

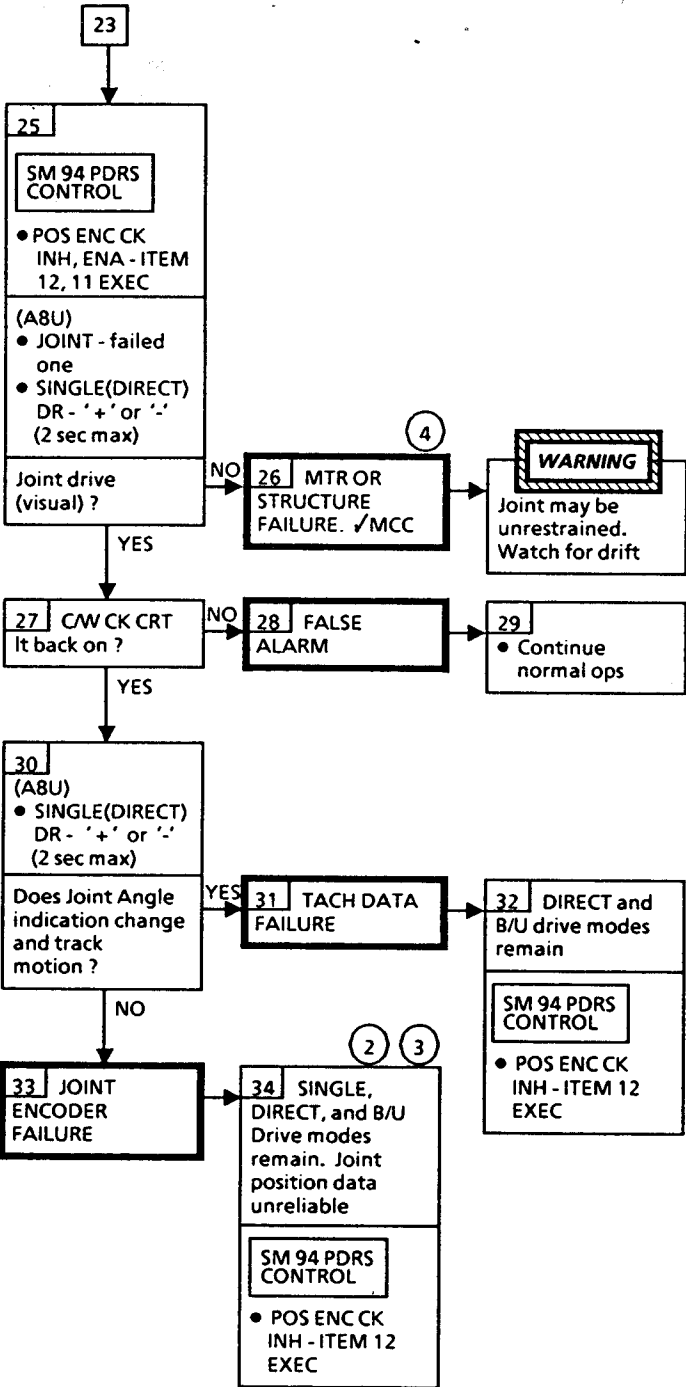
DDT&E (201)	
SY	-2.4
SP	+1.8
EP	+1.9
WP	-2.1
WY	+1.3
WR	+3.4
FOP1 (301)	
SY	-0.9
SP	+2.4
EP	-0.0
WP	-1.0
WY	-1.9
WR	-0.0
FOP3 (303)	
SY	-2.4
SP	+4.0
EP	+3.6
WP	+0.9
WY	+0.1
WR	-2.5

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

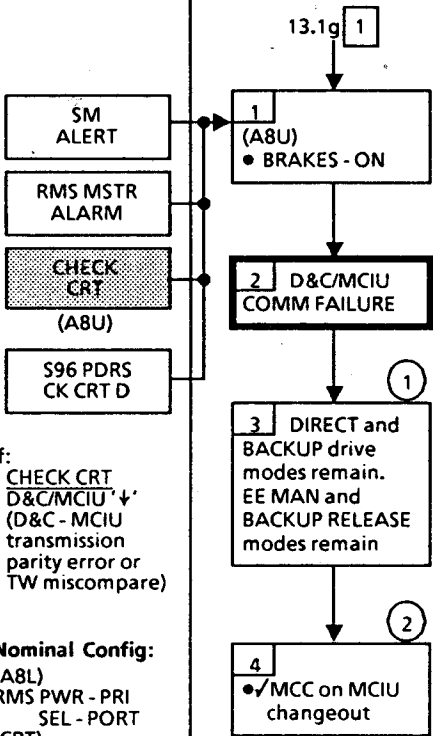
PDRS 13.1h (Cont)



- ② REACH LIMITs and SOFT STOPs annunciation not available for failed joint
- ③ Position hold function will not work for failed joint

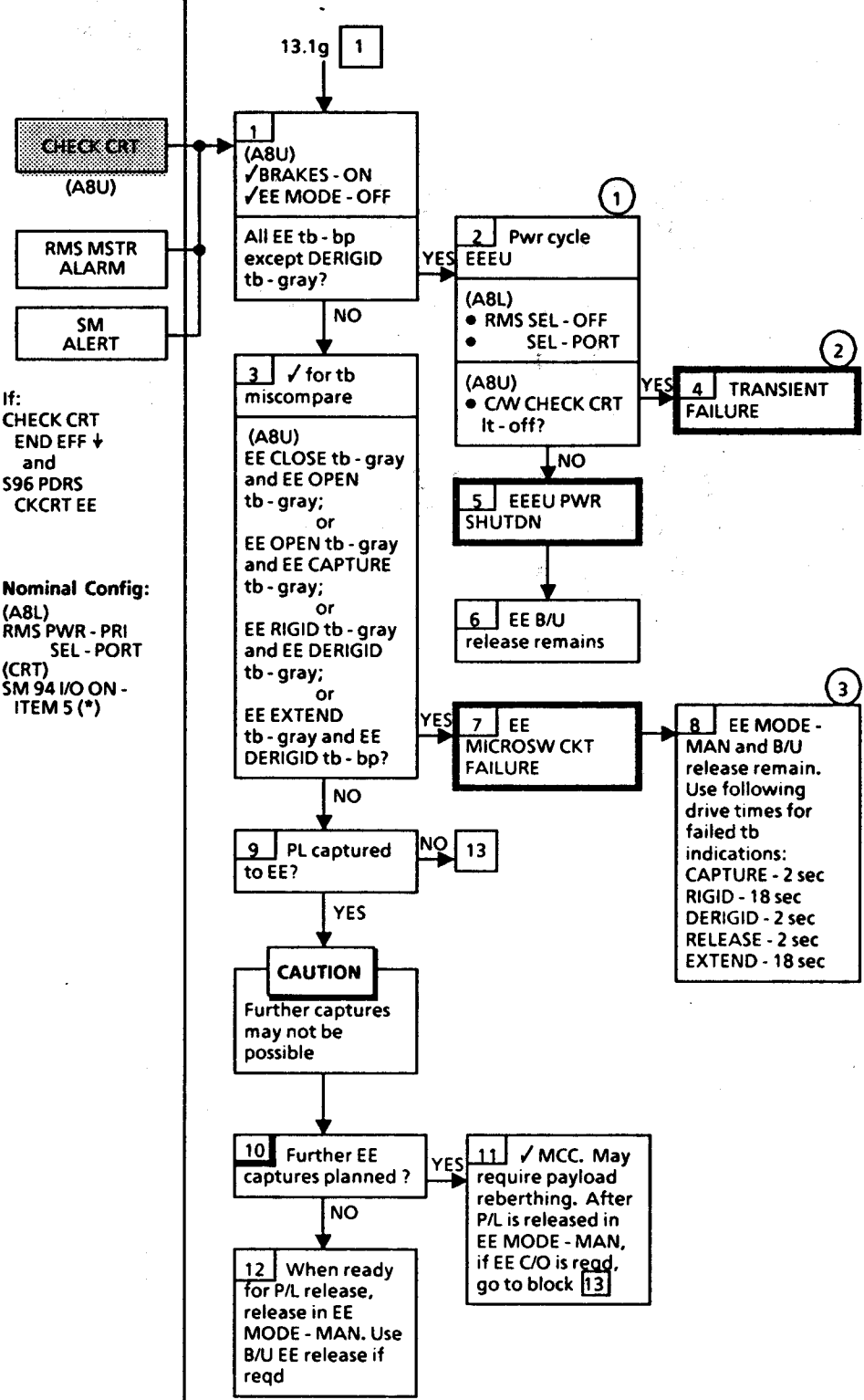


- ② REACH LIMITS and SOFT STOPS annunciation not available for failed joint
- ③ Position hold function will not work for failed joint
- ④ Whiplash technique or EVA may be reqd to stow arm



- ① Data may be unreliable on D&C pni
- ② Full capability may be restored with RMS MCIU CHANGEOUT (IFM). If problem is in D&C pni, MCIU change-out will not restore capability

13.1j C/W CHECK CRT LT - S96 PDRS CK CRT EE



If:
CHECK CRT
END EFF ↓
and
S96 PDRS
CKCRT EE

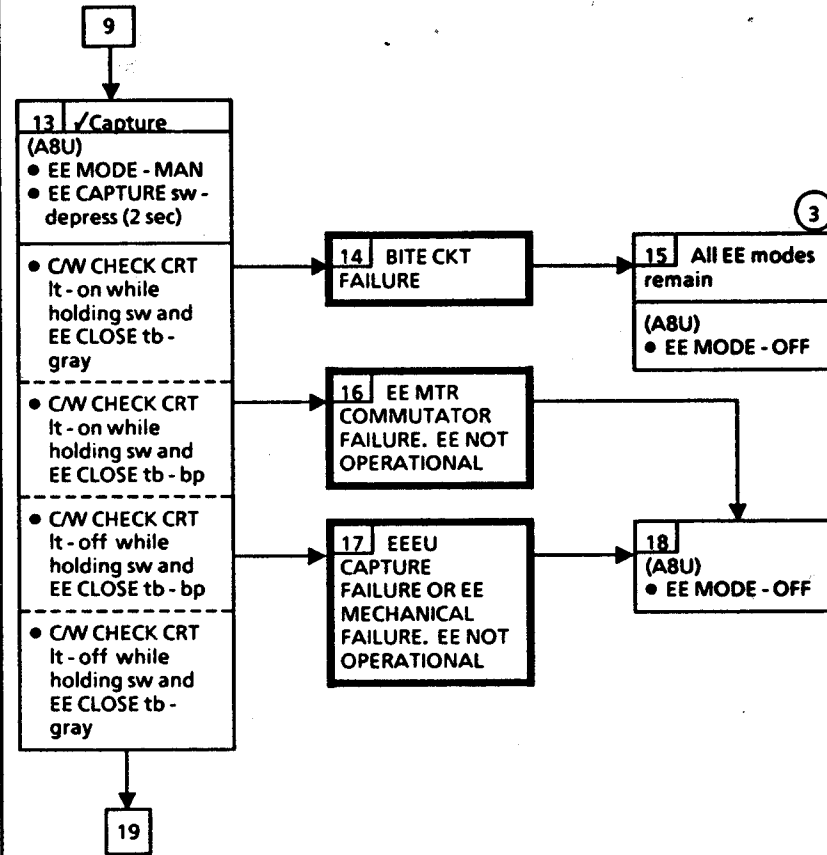
Nominal Config:
(ABL)
RMS PWR - PRI
SEL - PORT
(CRT)
SM 94 I/O ON -
ITEM 5 (*)

① ✓WR roll range value. Deselecting and reselecting RMS may cause WR roll range value to be incorrect

② Additional alarms possible

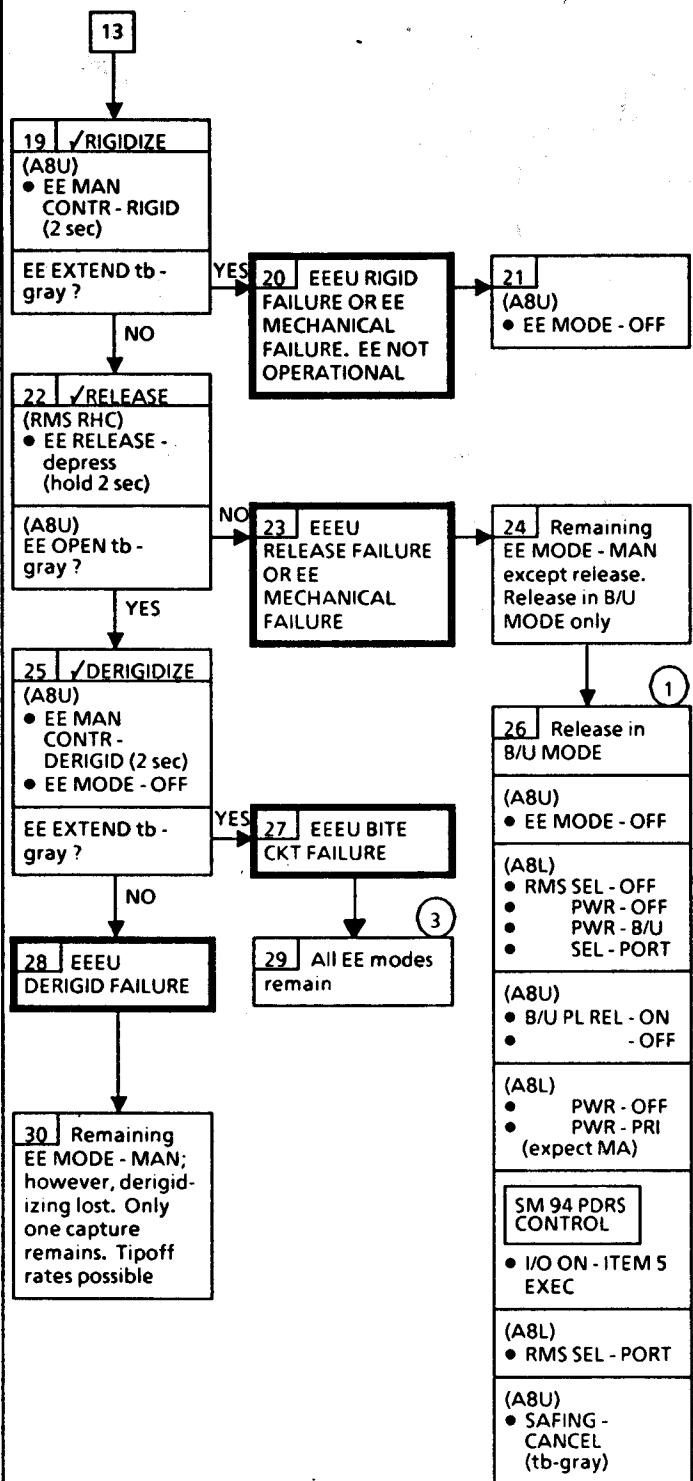
③ Anticipate C/W CHECK CKCRT It to remain on. EEEU BITE and EE flag mismatch checks will be masked. Other CHECK CRT failures will be announced with MA and SM msg

PDRS 13.1j (Cont)



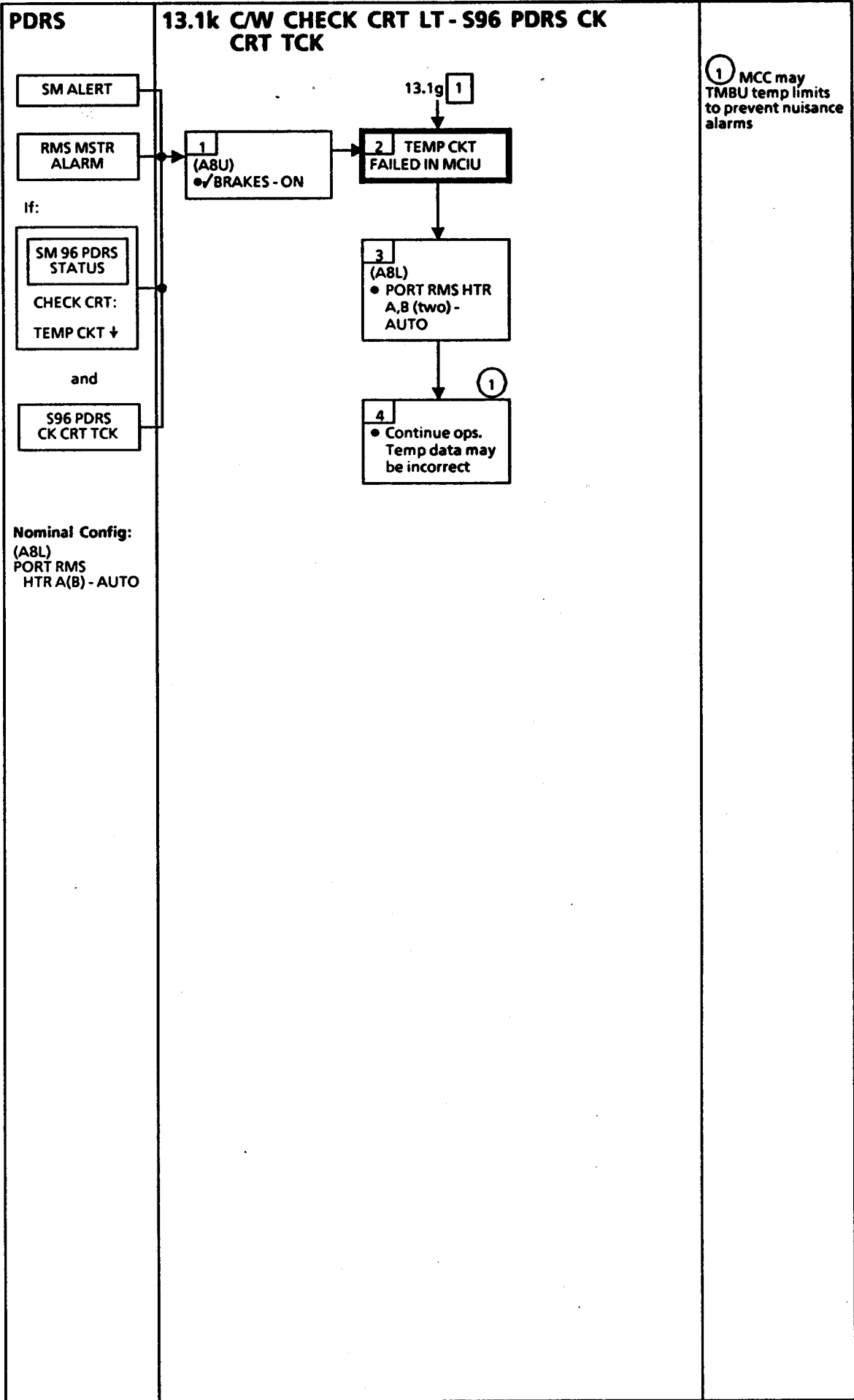
③ Anticipate CW CHECK CRT It to remain on. EEEU BITE and EE flag mismatch checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg

PDRS 13.1j (Cont)

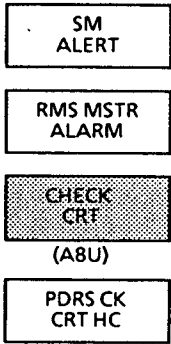


① ✓WR roll range value. Deselecting or reselecting RMS may cause WR roll range value to be incorrect

③ Anticipate C/W CHECK CKCRT It to remain on. EEEU BITE and EE flag mismatch checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg

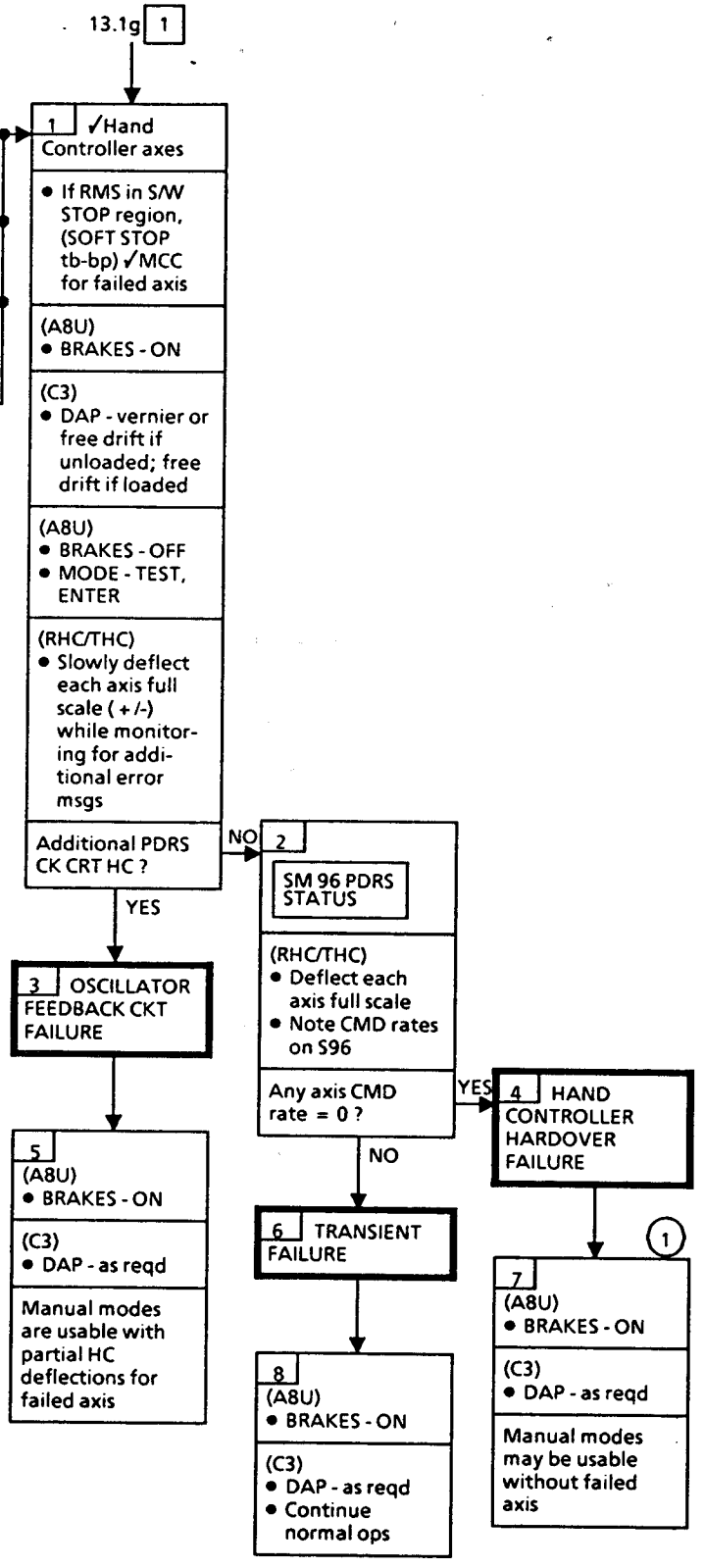


① PL ID or mode substitution possible to work around failed axis



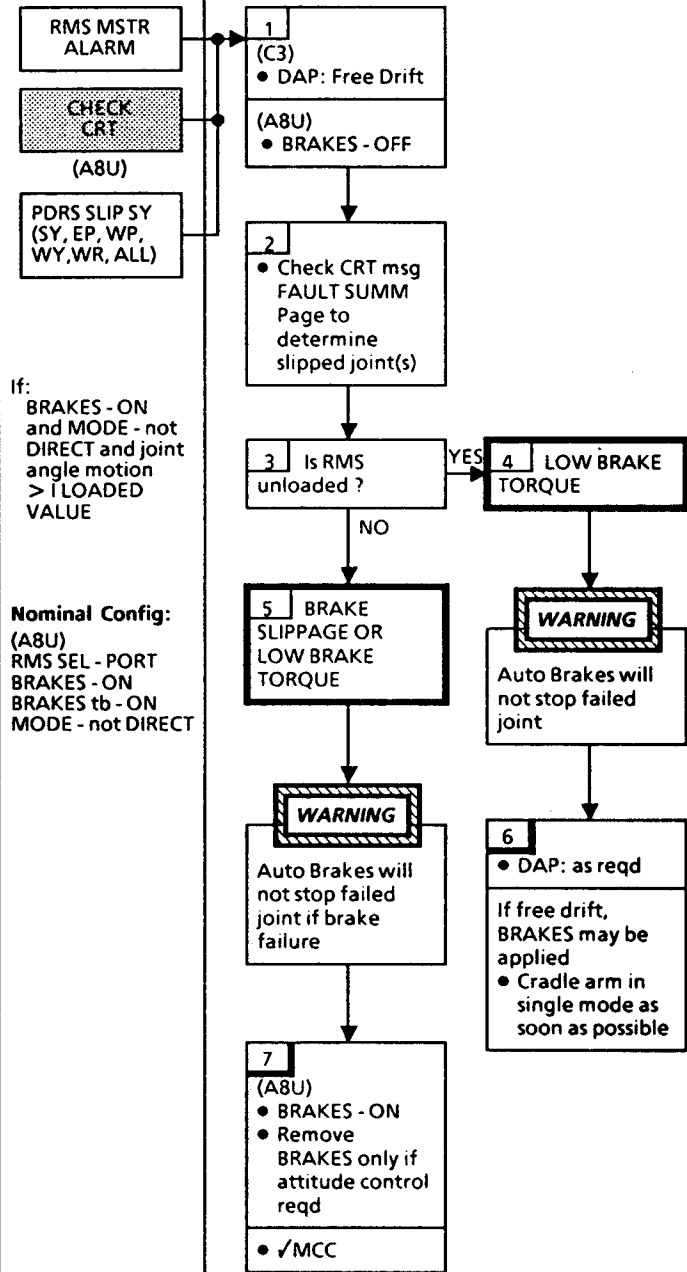
If: HC hardover

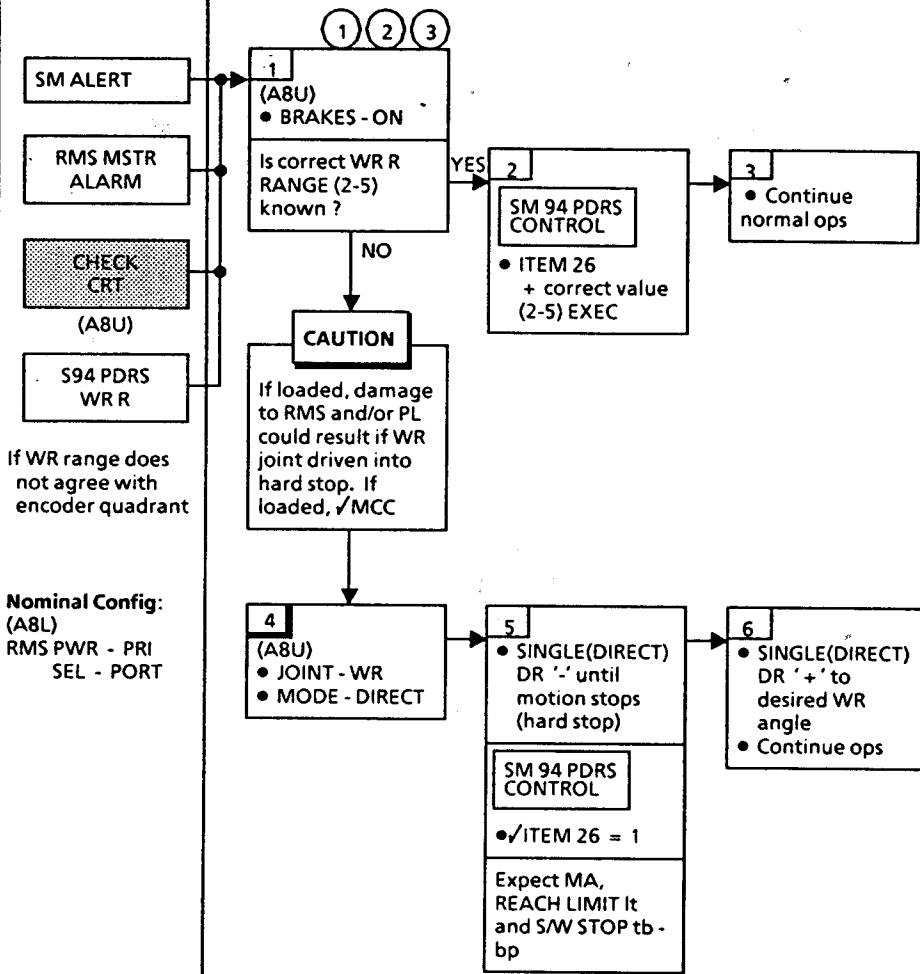
Nominal Config:
(A8L)
RMS PWR - PRI
SEL - PORT



PDRS

13.1m C/W CHECK CRT LT - PDRS SLIP SY(SP,EP,WP,WY,WR,ALL)





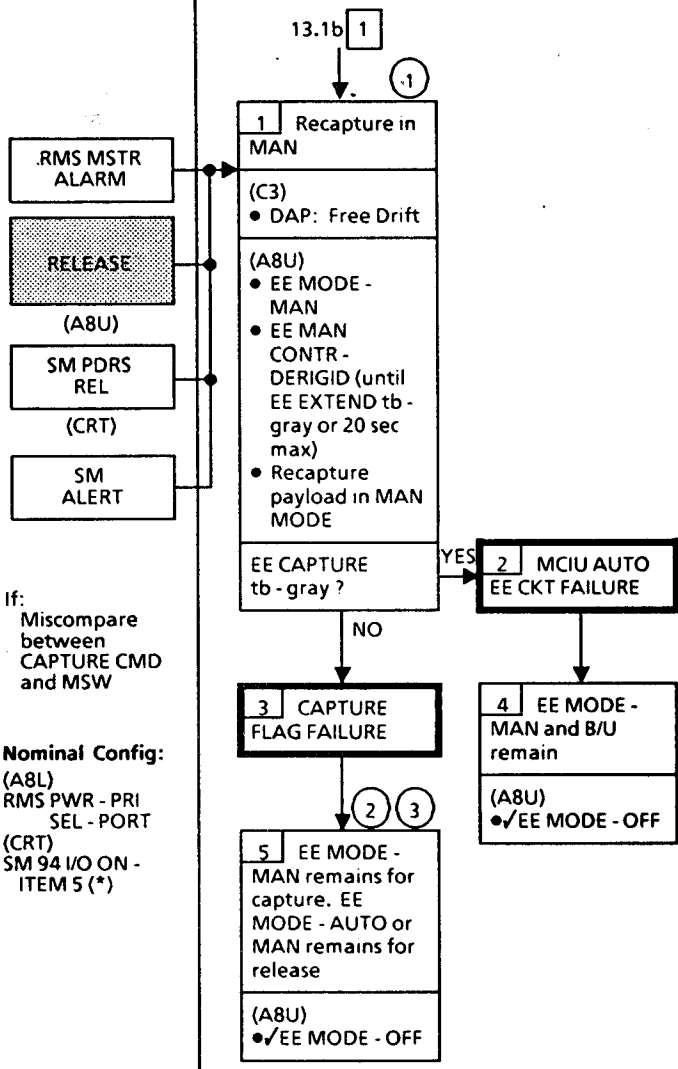
If WR range does not agree with encoder quadrant

Nominal Config: (ABL)
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

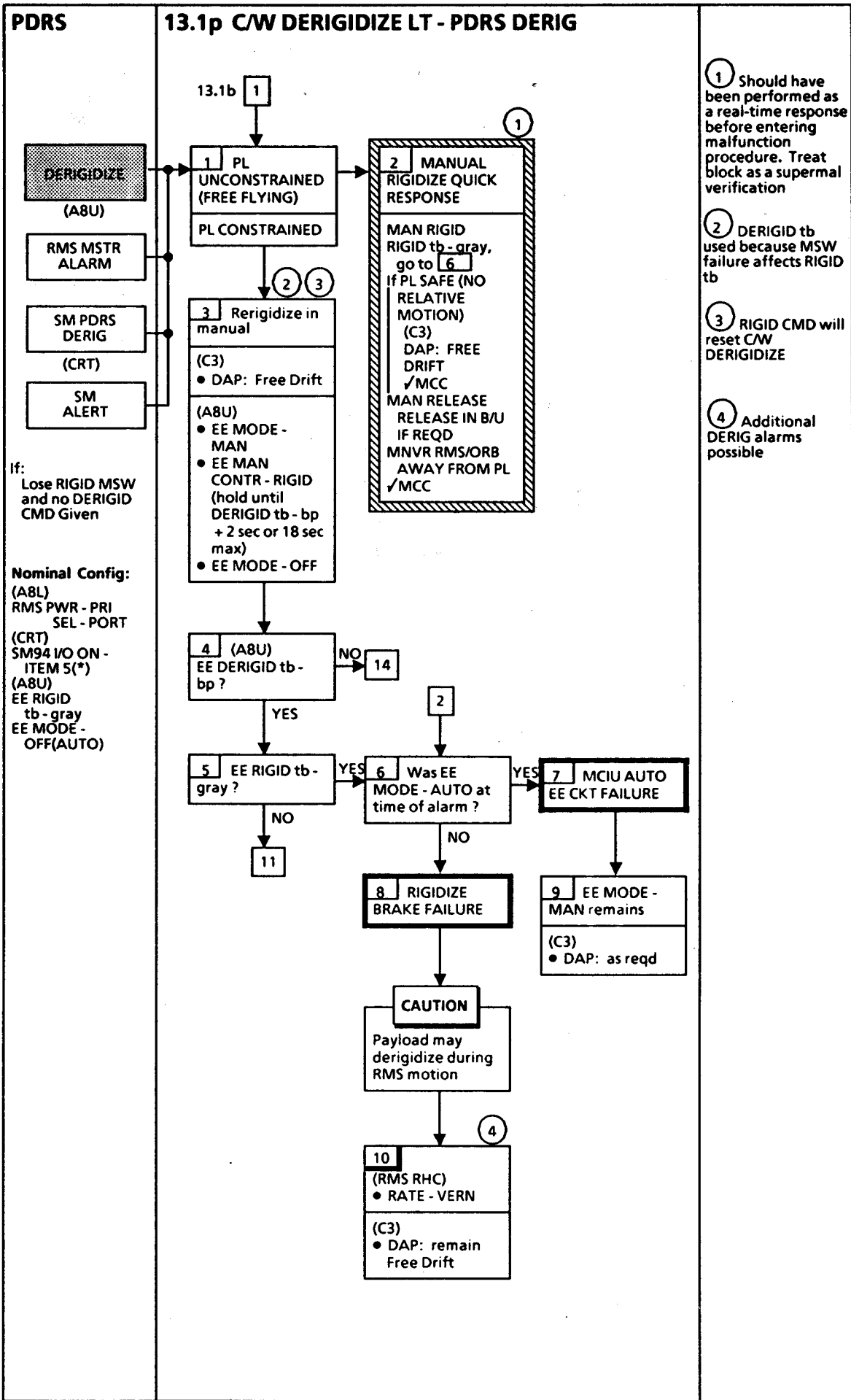
WR	WRR
-360 to -450	1
-180 to -360	2
0 to -180	3
0 to 180	4
180 to 360	5
360 to 450	6



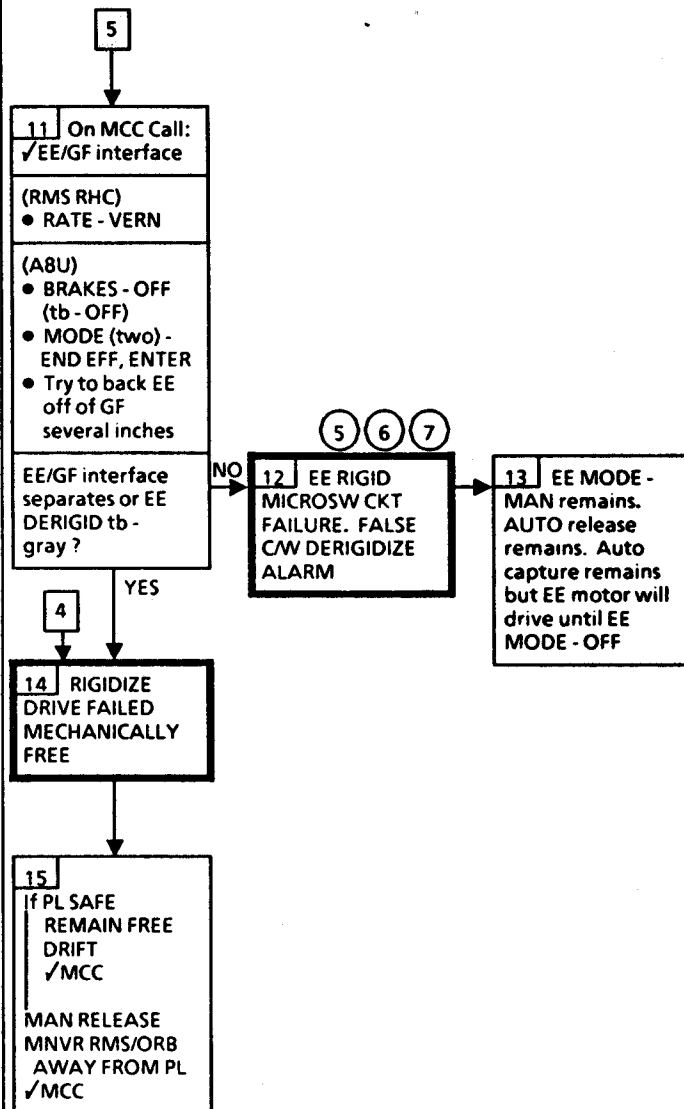
① This block should have been performed at time of msg

② Subsequent uncommanded release will be unannunciated

③ RMS loaded rates may have to be set by GMEM WRITE



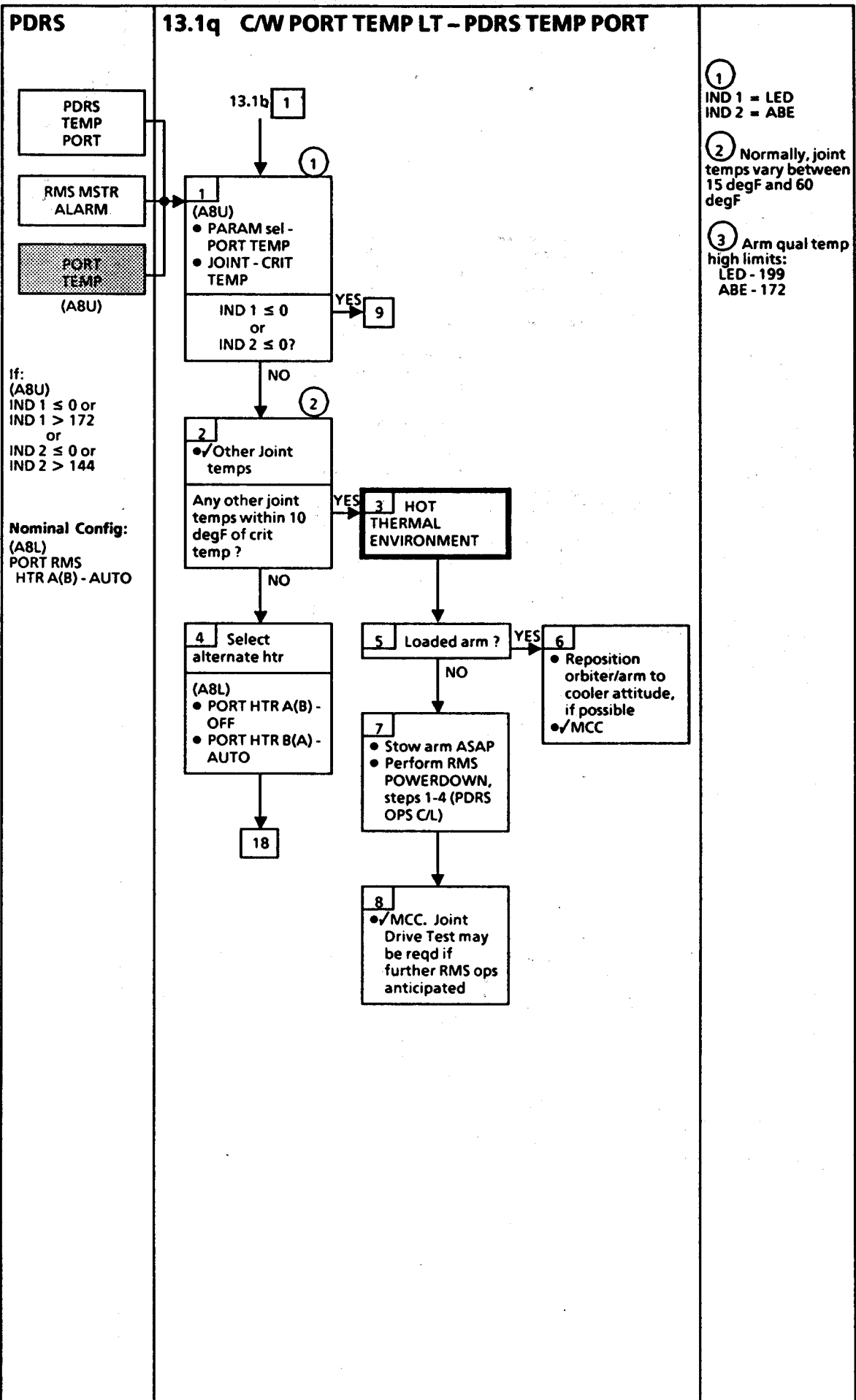
PDRS 13.1p (Cont)



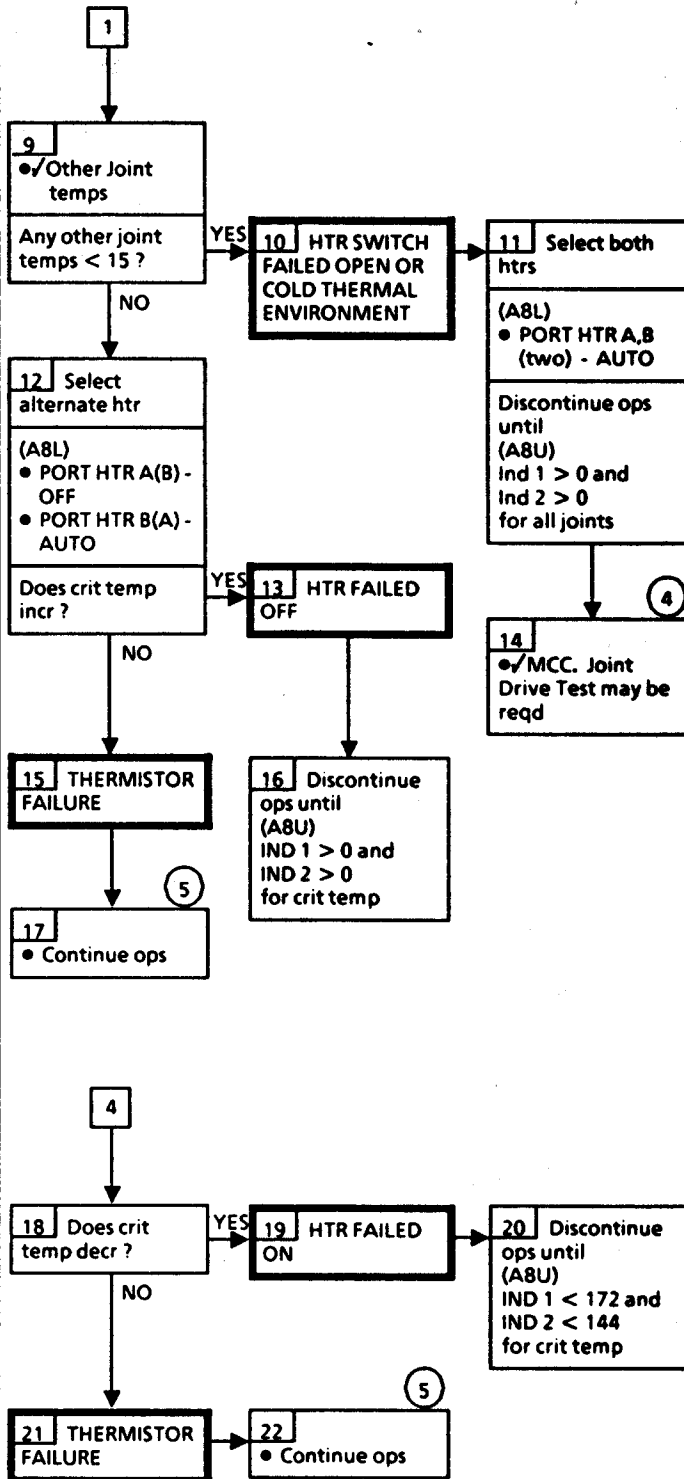
5 EE RIGID tb will remain bp

6 Further uncommanded derigidizations will not be annunciated

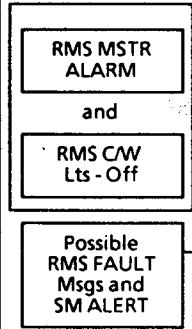
7 RMS loaded rates may have to be set by GMEM WRITE after next payload capture



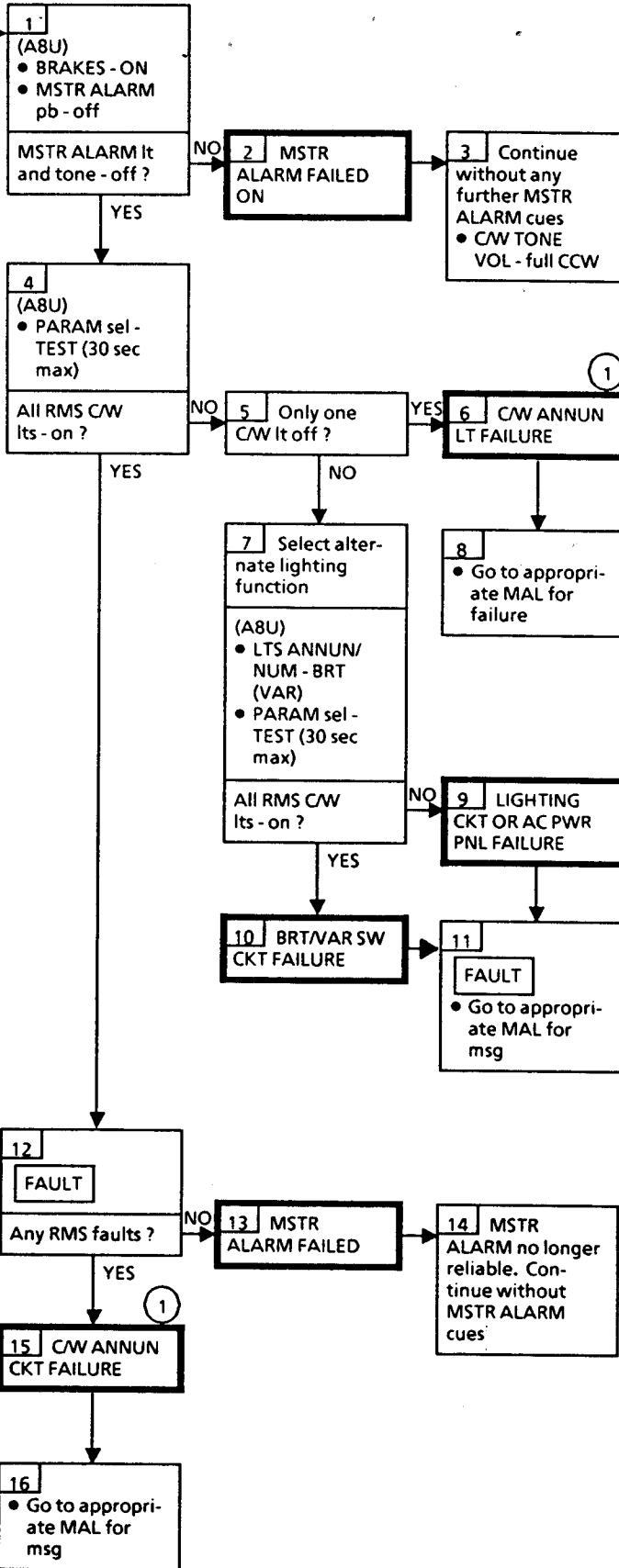
PDRS 13.1q (Cont)



- ④ Arm qual temp low limits:
LED - -10
ABE - -10
- ⑤ MCC may TMBU temp limits to prevent nuisance alarms



Nominal Config:
(MA73C:F)
cb AC1 RMS
PRIMARY A - cl



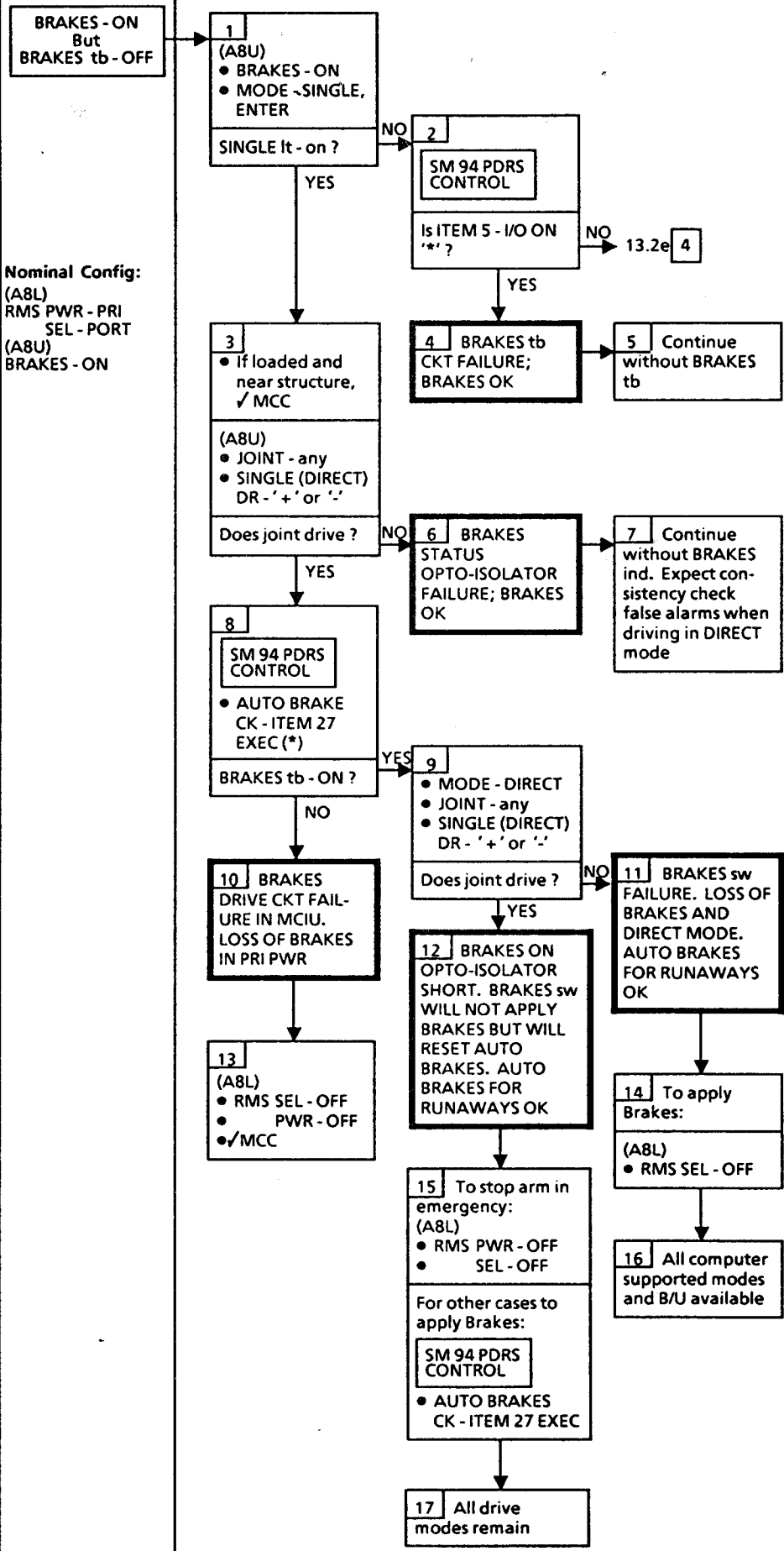
① C/W Lt associated with fault msg will not illuminate

RMS D&C

13.2

PDRS

13.2a BRAKES - ON, BUT BRAKES tb - OFF



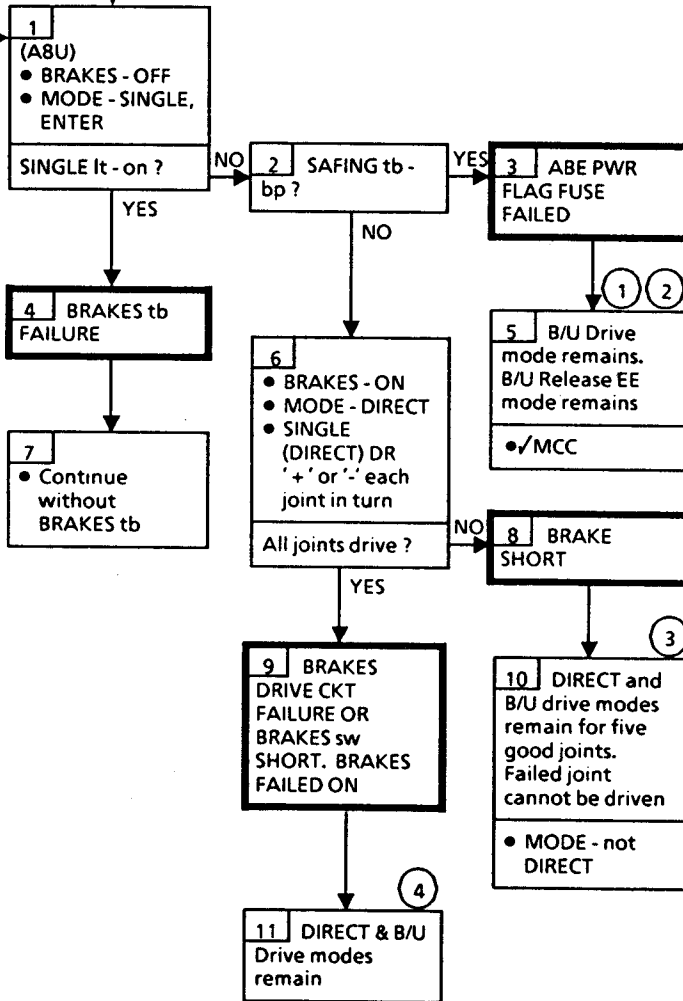
Nominal Config:
(A8L)
RMS PWR - PRI
SEL - PORT
(A8U)
BRAKES - ON

RMS D&C
13.2

BRAKES - OFF
But
BRAKES tb - ON

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

13.4a 5
13.4b 5
13.4c 5

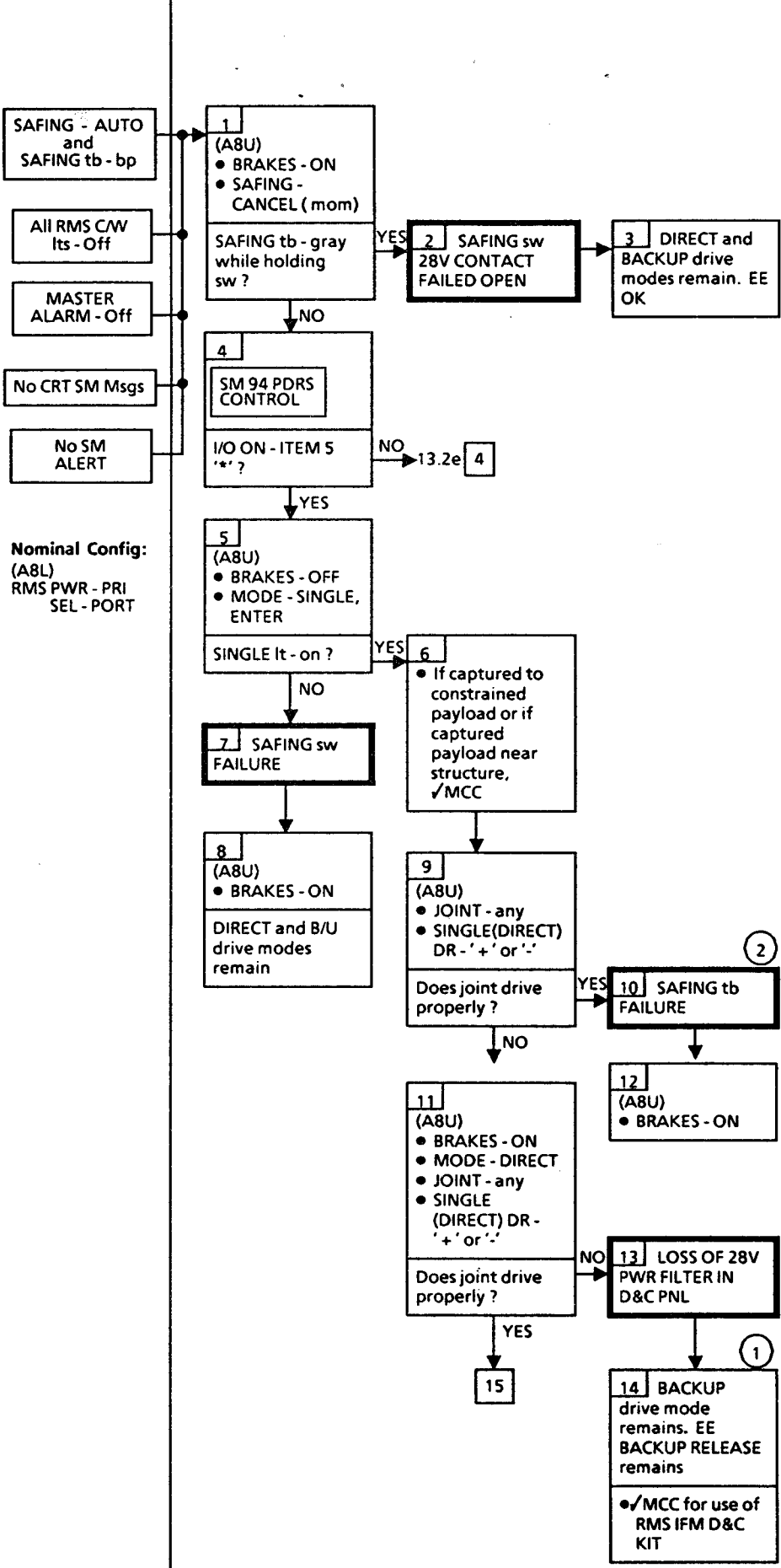


1 RMS D&C IFM Kit available to regain DIRECT mode and EE - MAN modes. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION (IFM) and removal of RMS D&C IFM KIT, and RMS IFM D&C KIT, SSR-4

2 All ABE data lost, except temperatures

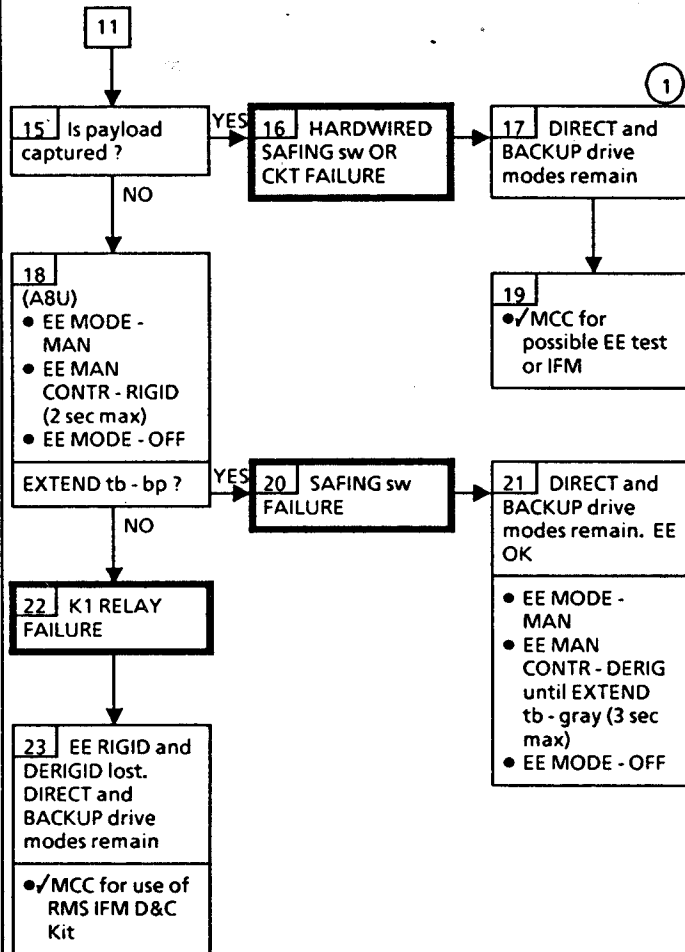
3 Driving failed joint in B/U will blow +28V BDA fuse for all joints. EVA may be reqd to cradle arm

4 RMS limping will not exist during EE ops. Use EE MAN release for single joint ops

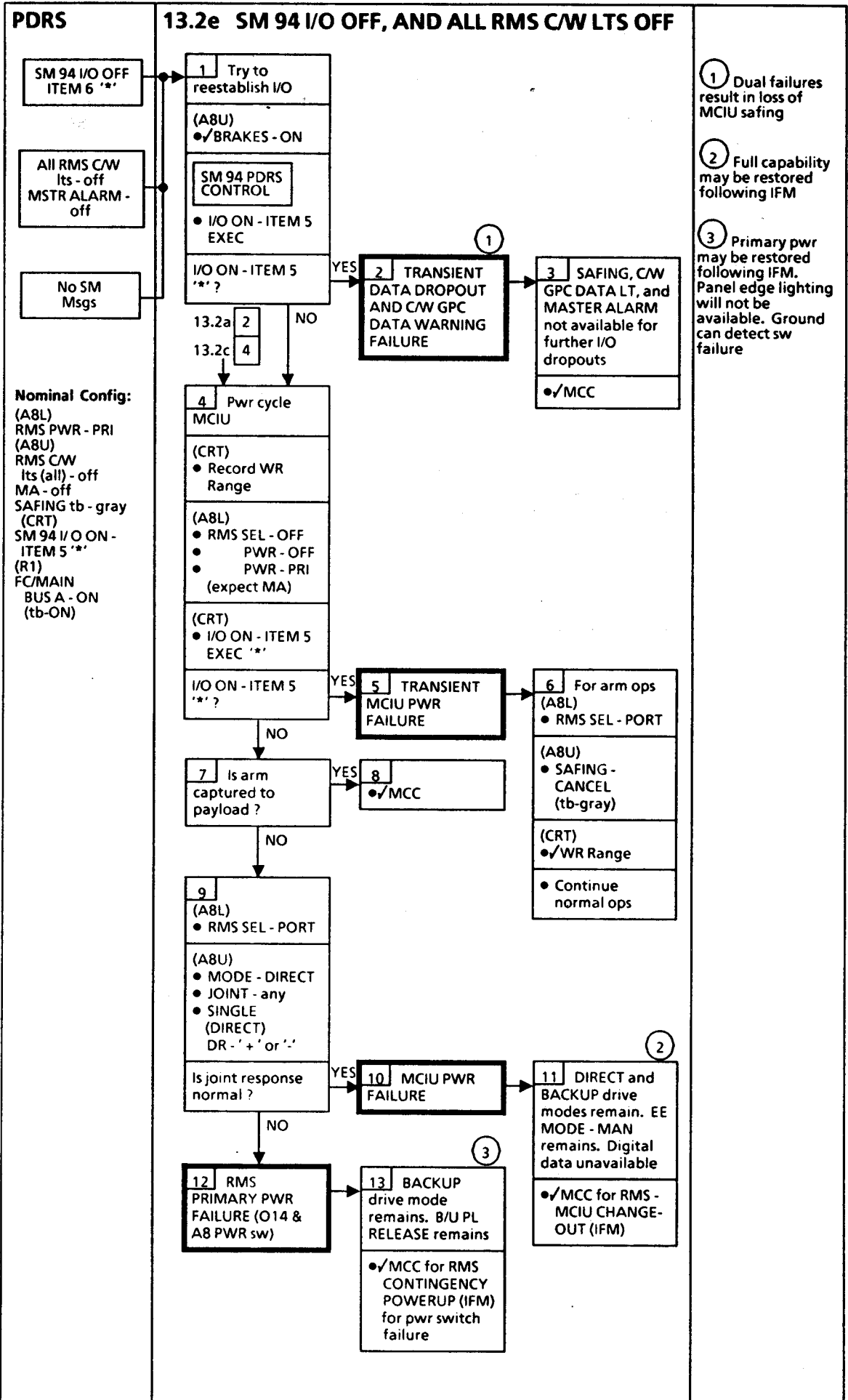


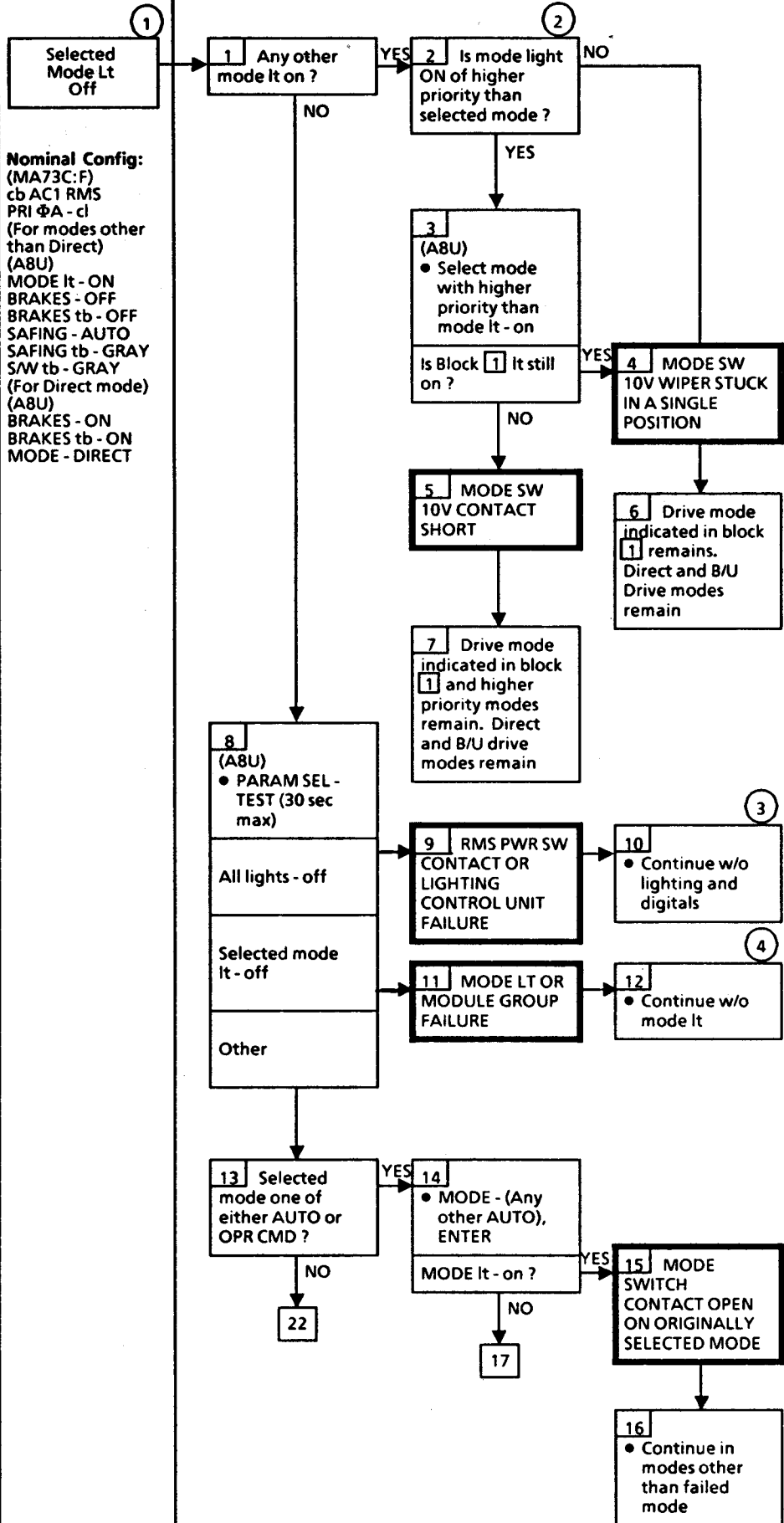
- ① DIRECT and EE MODE - MAN drive modes may be restored with CONTINGENCY OPERATION/ INSTALLATION(IFM) and REMOVAL OF RMS IFM D&C KIT
- ② SAFING circuit still operational

PDRS 13.2c (Cont)



① DIRECT and EE MODE - MAN drive modes may be restored with CONTINGENCY OPERATION/ INSTALLATION(IFM) and REMOVAL OF RMS IFM D&C KIT



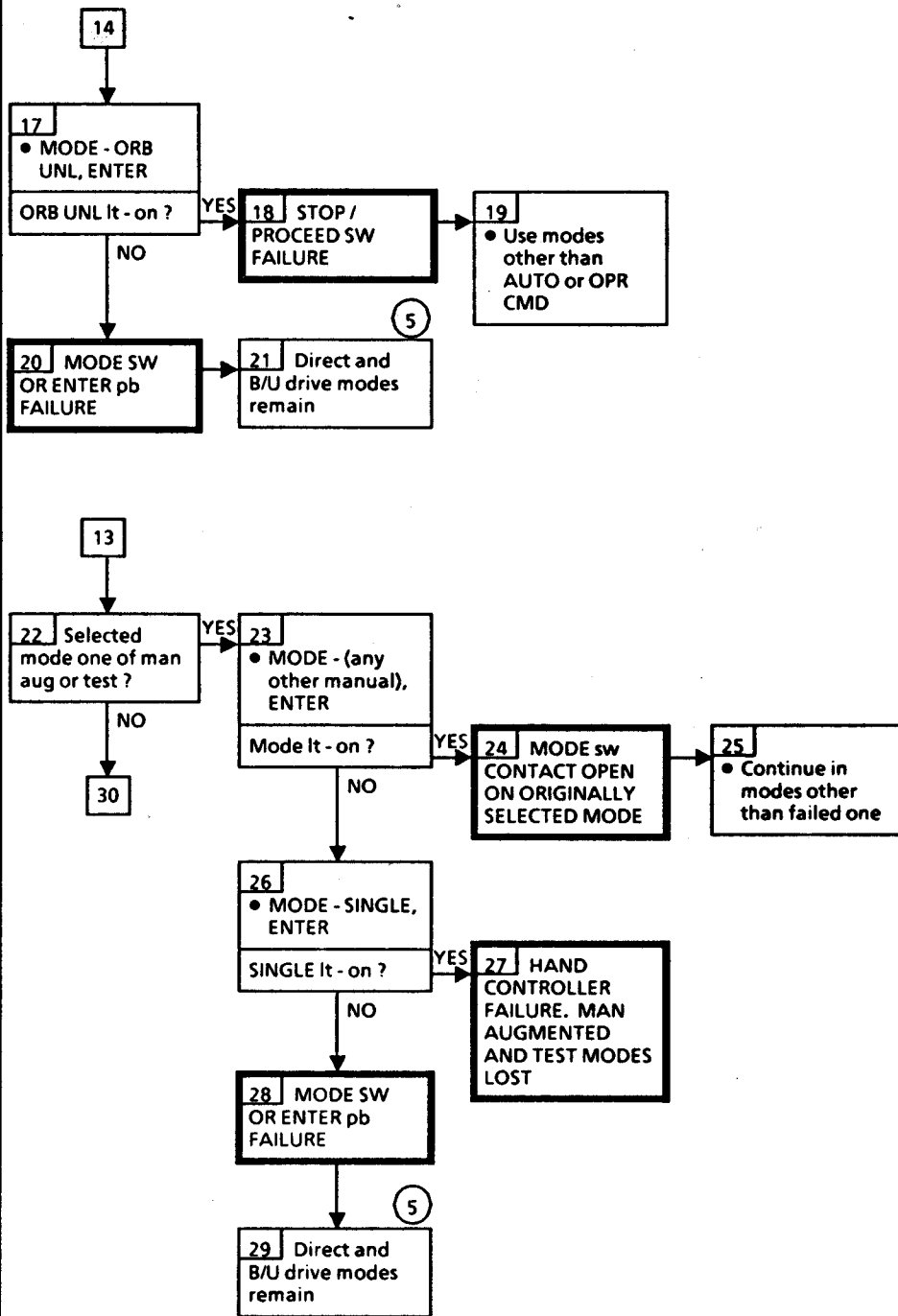


Nominal Config:
 (MA73C:F)
 cb AC1 RMS
 PRI ΦA - cl
 (For modes other than Direct)
 (ABU)
 MODE lt - ON
 BRAKES - OFF
 BRAKES tb - OFF
 SAFING - AUTO
 SAFING tb - GRAY
 S/W tb - GRAY
 (For Direct mode)
 (ABU)
 BRAKES - ON
 BRAKES tb - ON
 MODE - DIRECT

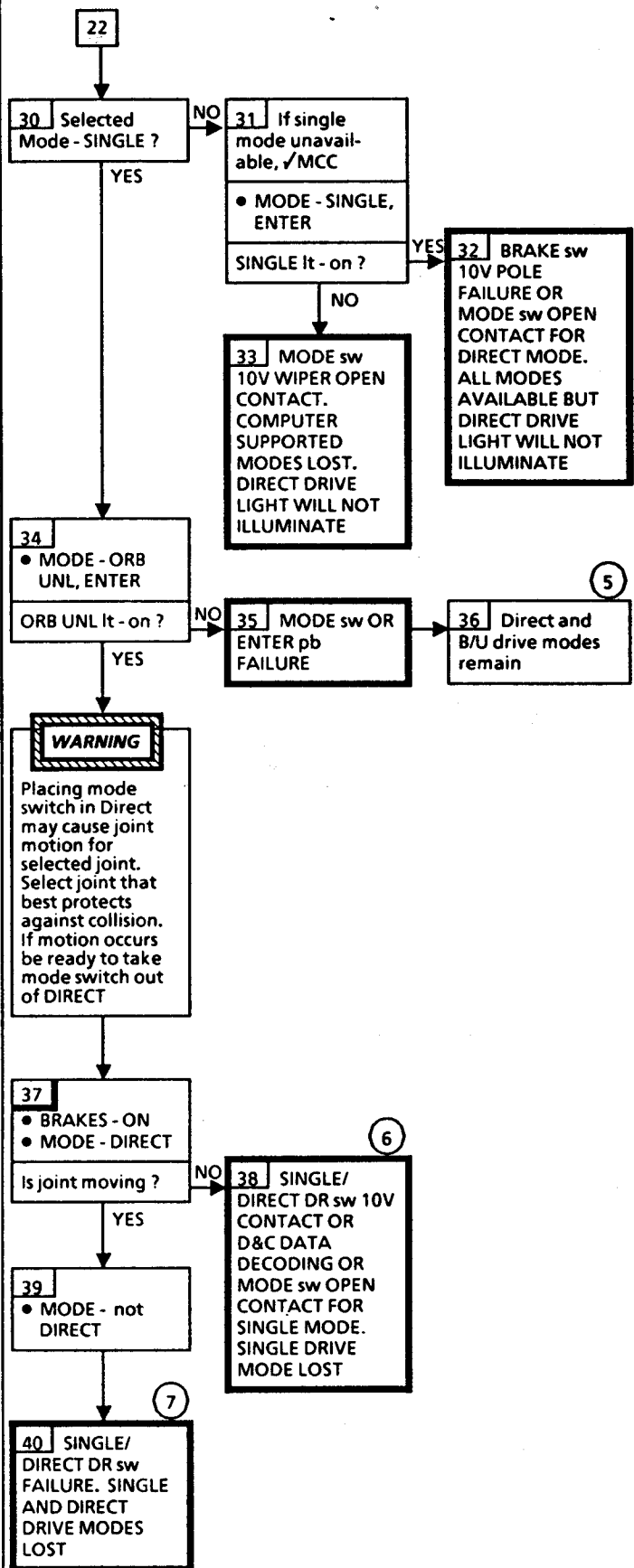
- ① If mode switch will not turn, only selected mode and backup available
- ② Mode sw priority:
 1 MAN ORB UNL
 2 SINGLE
 3 MAN EE
 4 MAN ORB LD
 5 MAN PL
 6 OPR CMD
 7 AUTO 1
 8 AUTO 2
 9 AUTO 3
 10 AUTO 4
 11 TEST
- ③ Read Joint Angles or mode indication using GMEM READ, (REF DATA, FS)
- ④ Read mode indication using GMEM READ (REF DATA, FS)

PDRS 13.2f (Cont)

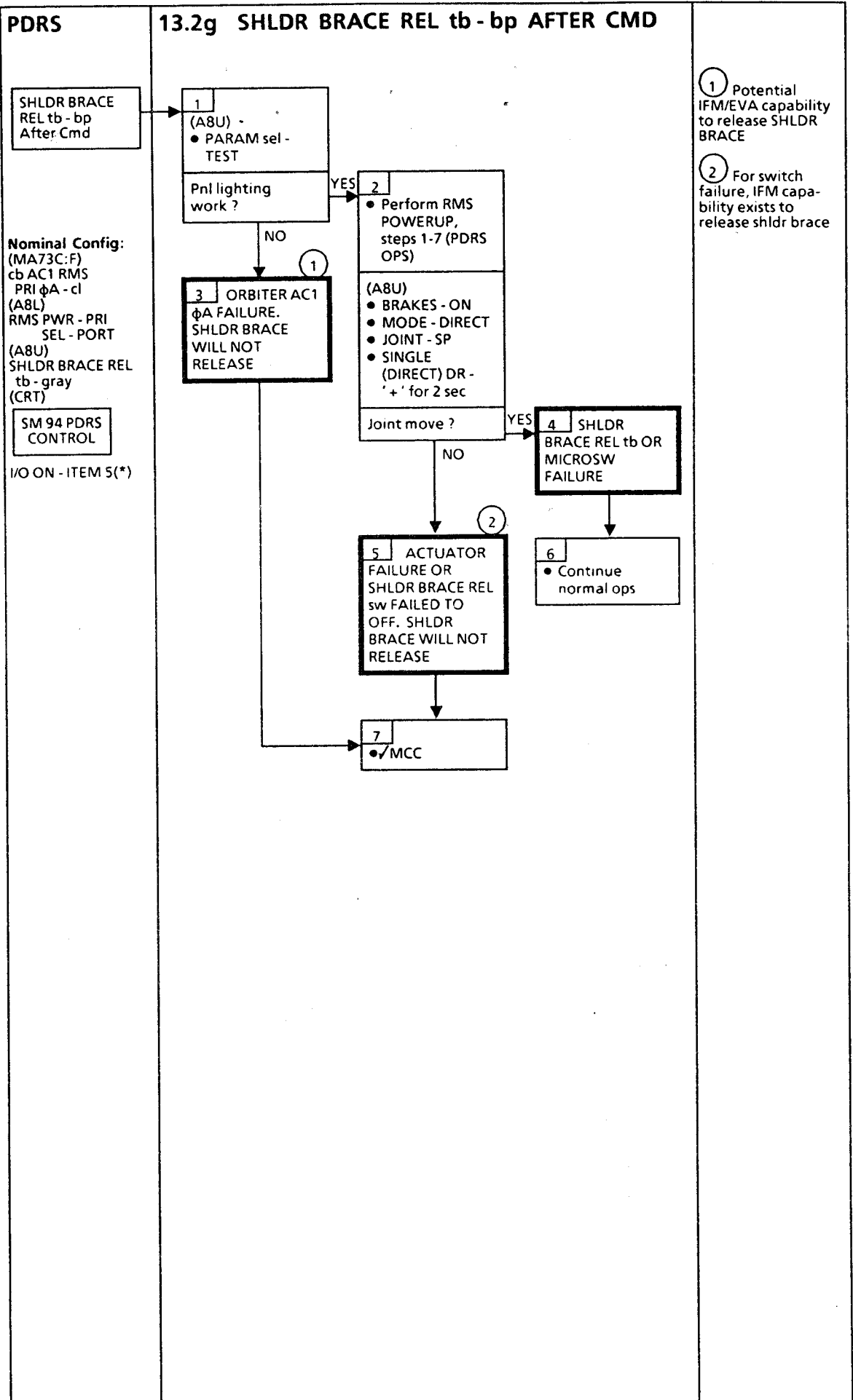
⑤ Lt may not work in Direct



PDRS 13.2f (Cont)



- ⑤ It may not work in Direct
- ⑥ Some display data may be corrupt. Other failures may be manifested
- ⑦ Direct mode can be regained with RMS D&C IFM KIT

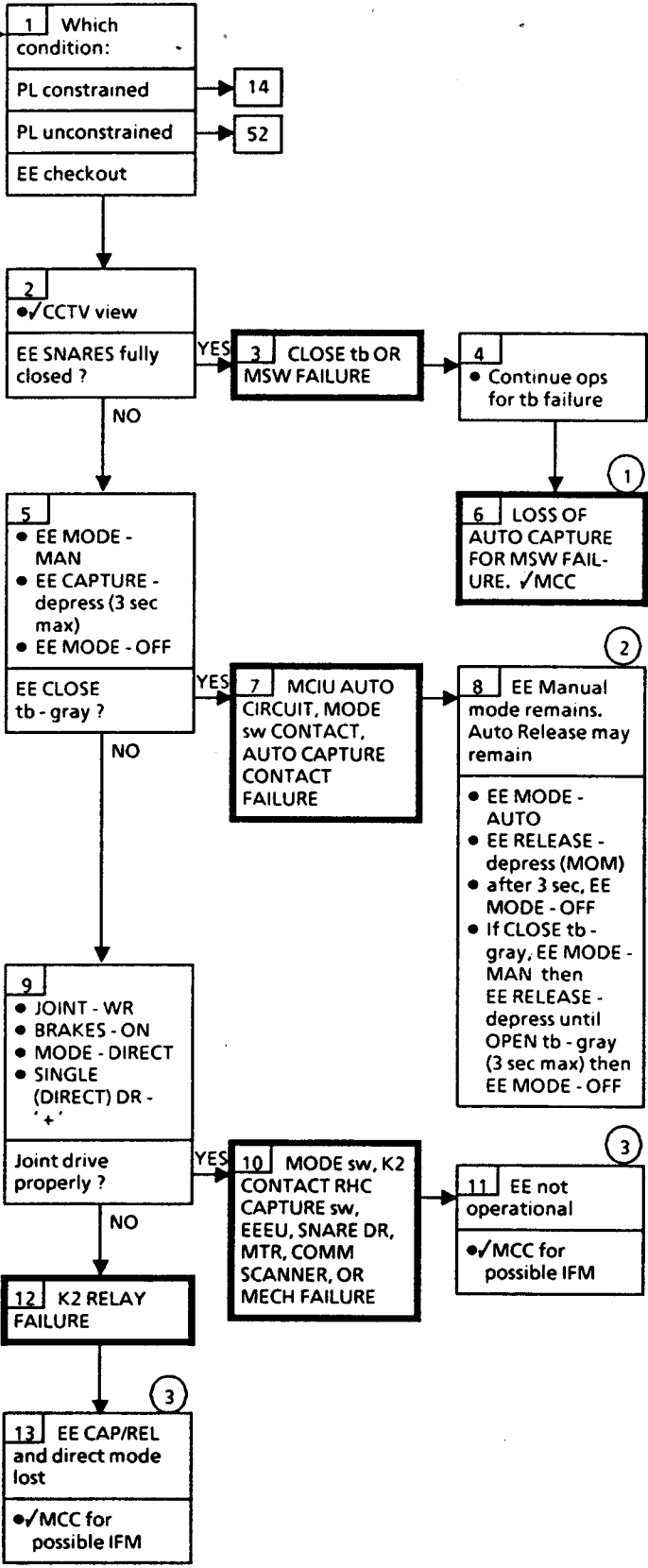


END
EFFECTOR

13.3

If EE Failed to Capture and/ or Rigidize in AUTO

Nominal Config: EE MODE - AUTO SAFING - AUTO

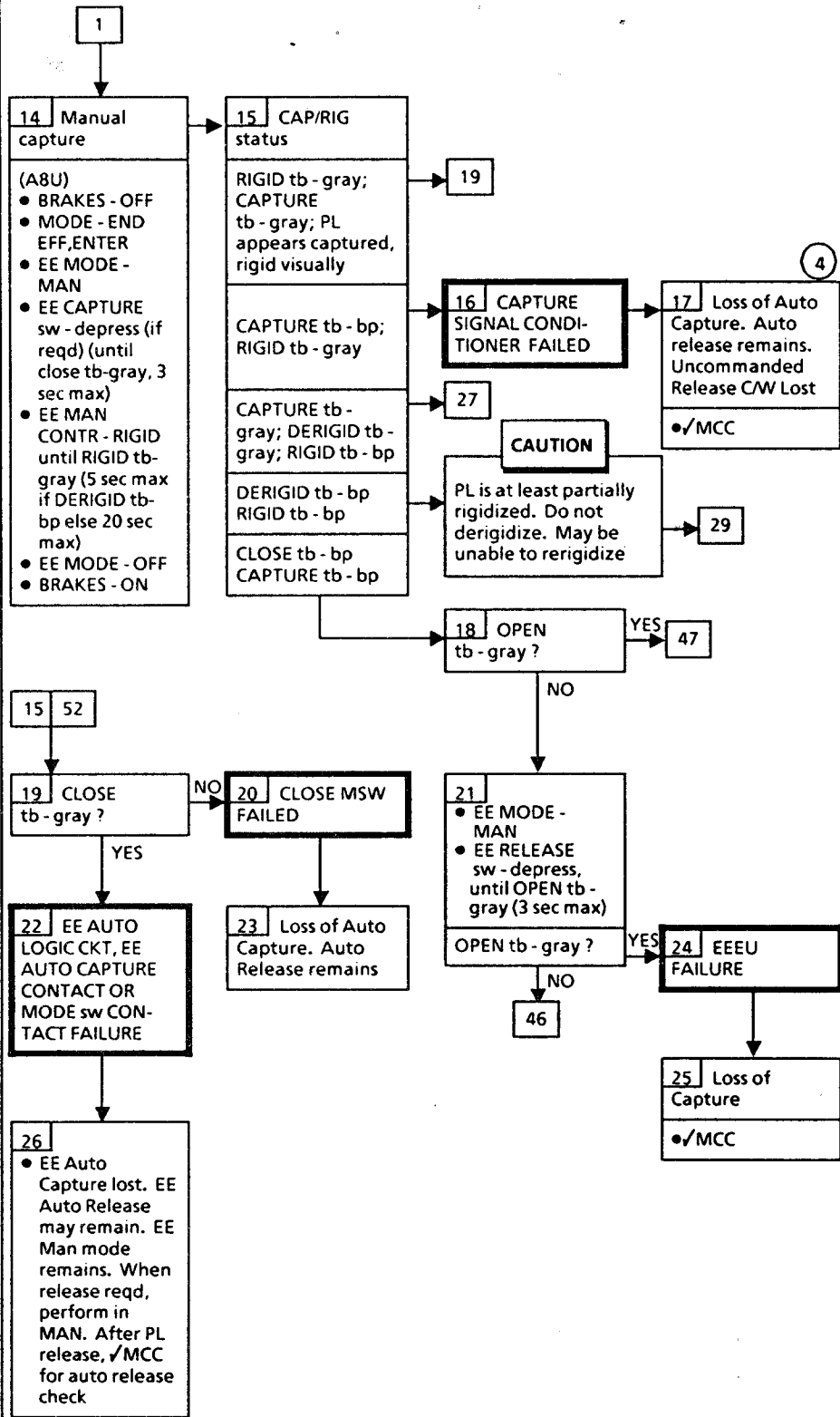


- ① MCC can see microsw status
- ② Limping will not occur in EE Manual for Auto Capture contact failure
- ③ RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/ release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

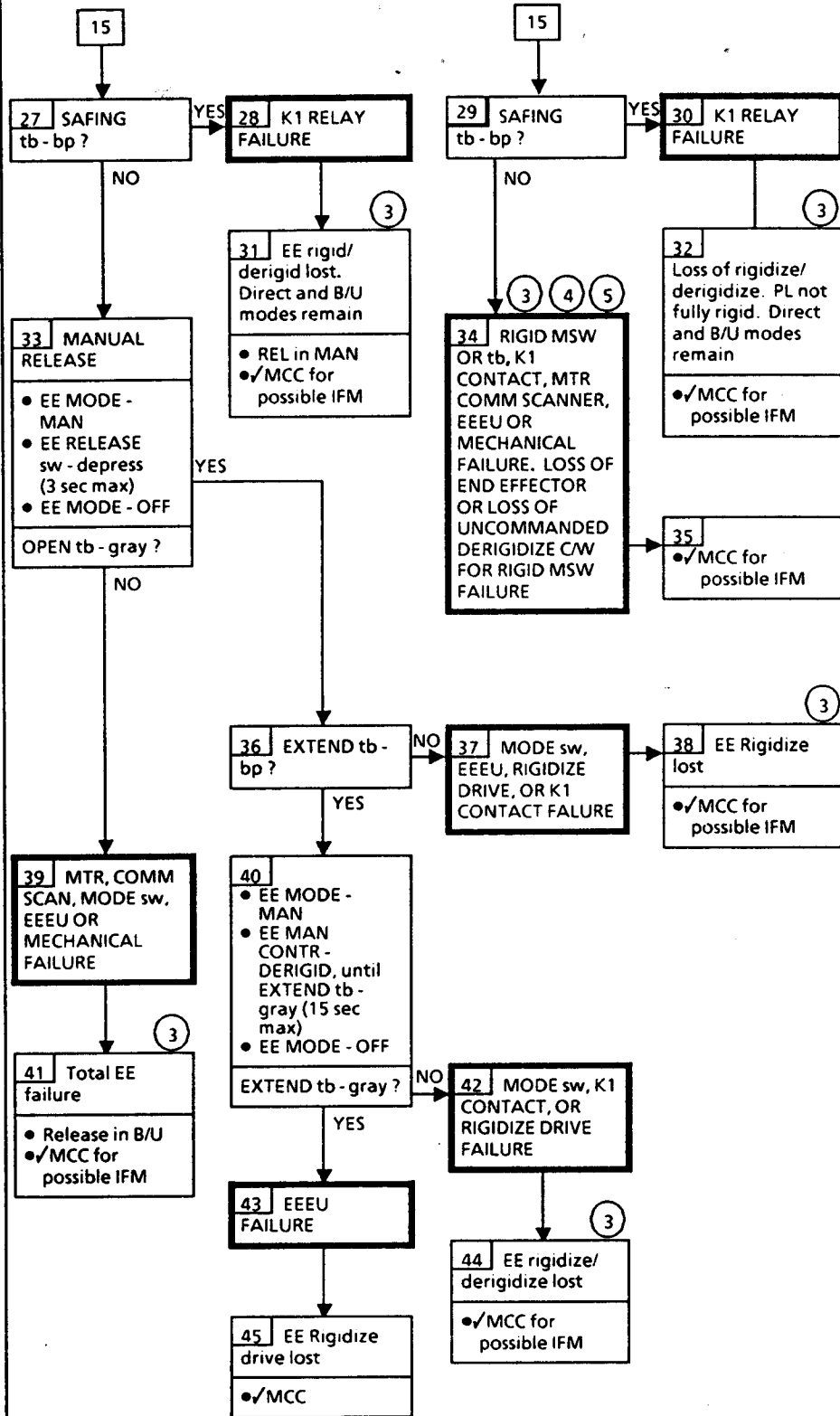
END EFFECTOR 13.3

PDRS 13.3a (Cont)

④ Arm will move at unloaded rates. GMEM available to enable loaded rates

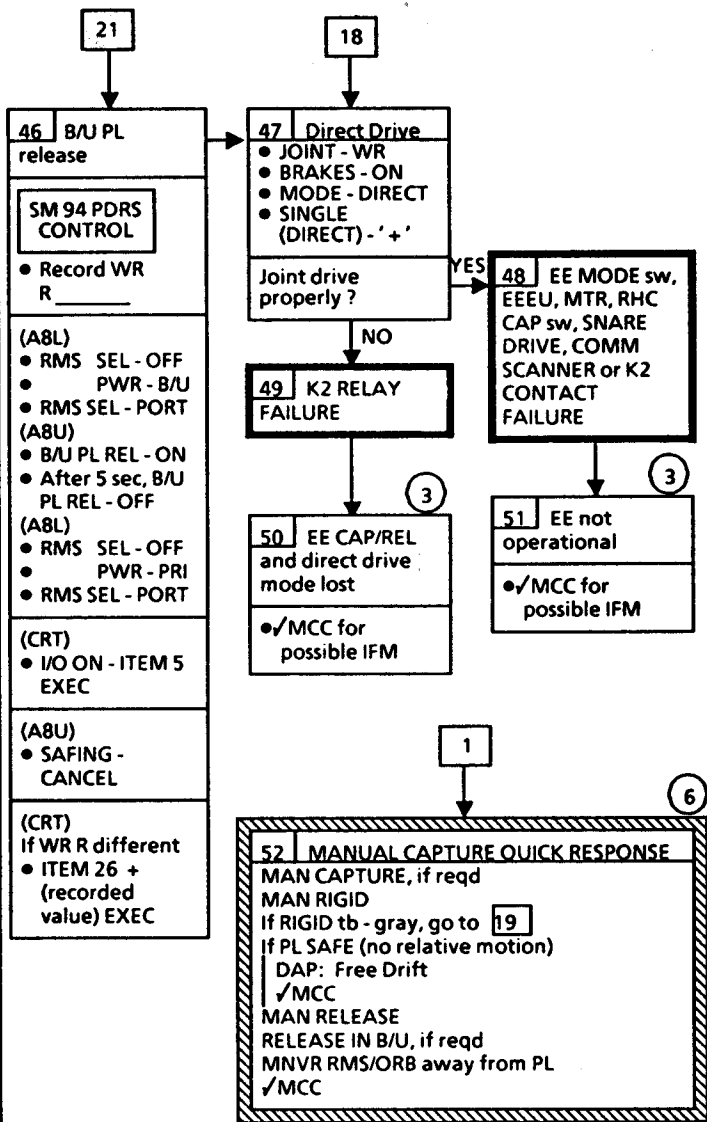


PDRS 13.3a (Cont)



- ③ RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT
- ④ Arm will move at unloaded rates. GMEM available to enable loaded rates
- ⑤ Status for failed tb can be displayed on SMO using GMEM READ (REF DATA, FS)

PDRS 13.3a (Cont)



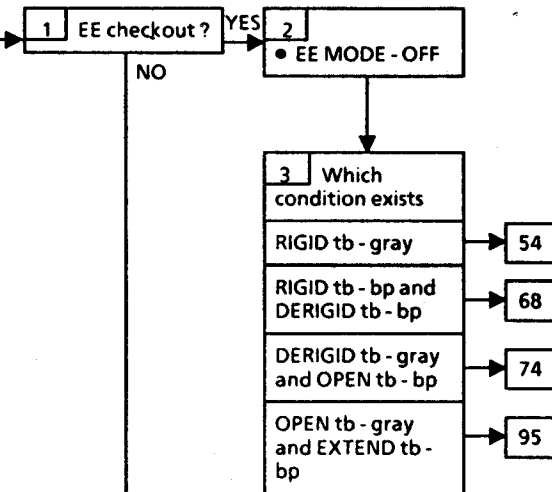
3 RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

6 Should have been performed before entering MAL procedure. Treat block as supermal verification

13.3b EE FAILS TO RELEASE/DERIGIDIZE IN AUTO

EE Fails To Derigidize or Release in AUTO

Nominal Config:
(ABU)
EE MODE - AUTO
SAFING - AUTO

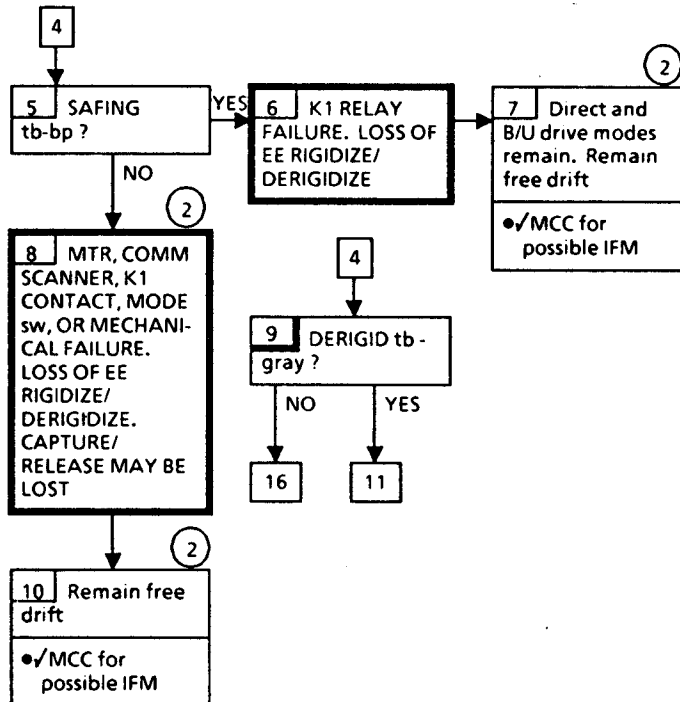


4 MANUAL RELEASE QUICK RESPONSE

If no recapture planned
REL in MAN

CAUTION
Do not derigidize

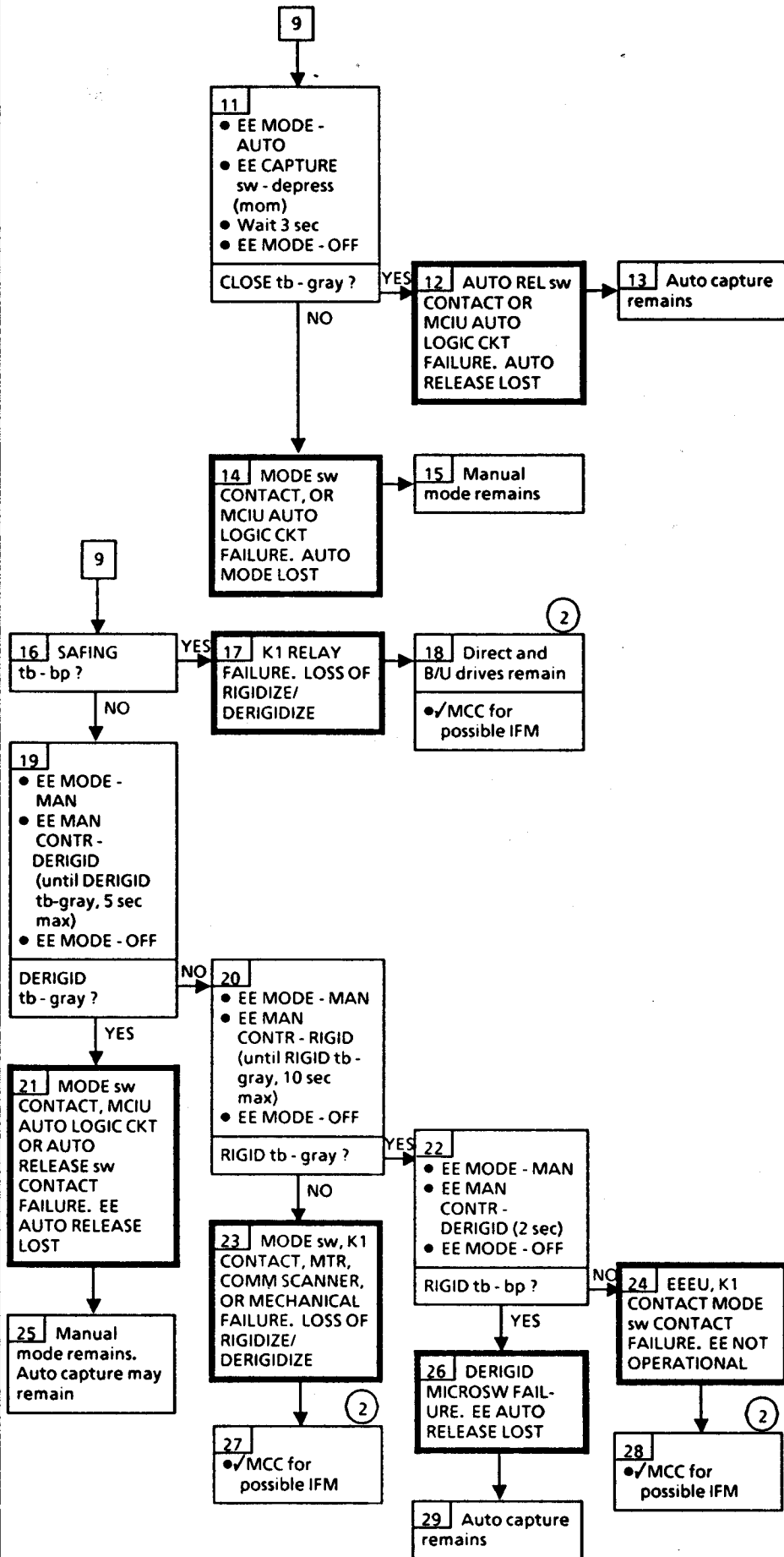
If OPEN tb - gray, mnvr RMS away from PL, go to **9**
If GO for B/U release B/U release, go to **30**
MAN RIGIDIZE
If RIGID tb - gray, go to **42**
If PL not safe (Rel motion) B/U release, go to **30**
DAP: Free Drift
EE MODE - OFF, go to **5**



① Should have been performed as a real-time response prior to entering MAL procedure. Treat block as supermal verification

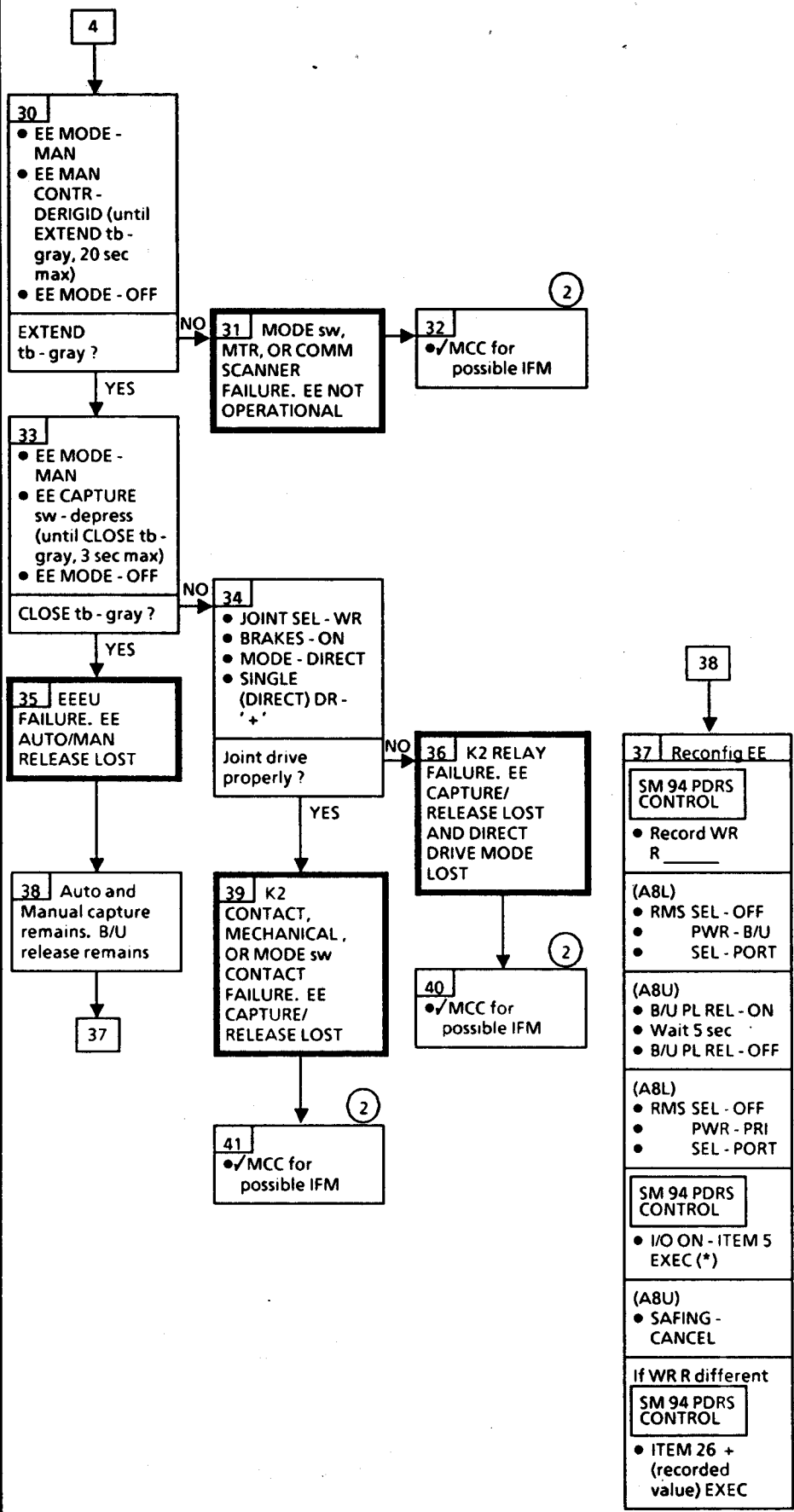
② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS 13.3b (Cont)



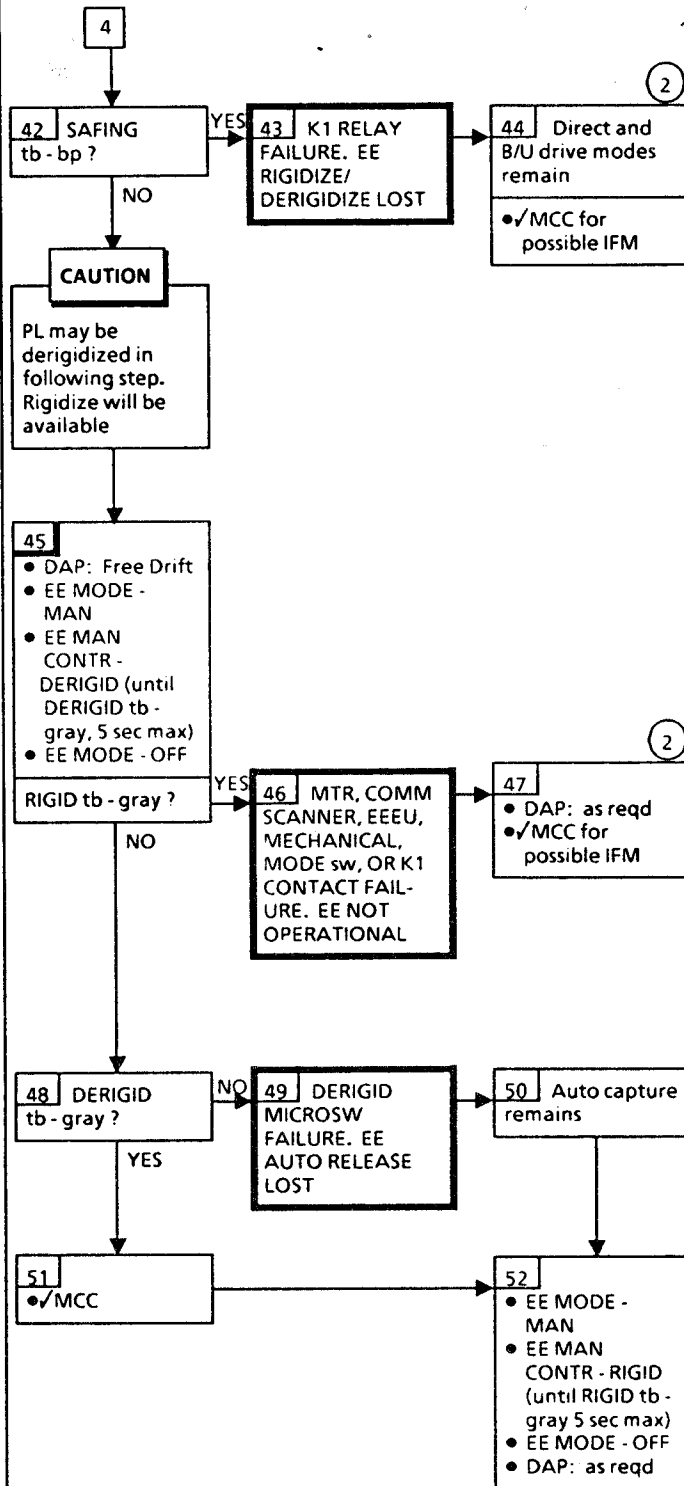
② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/ release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION and REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS 13.3b (Cont)



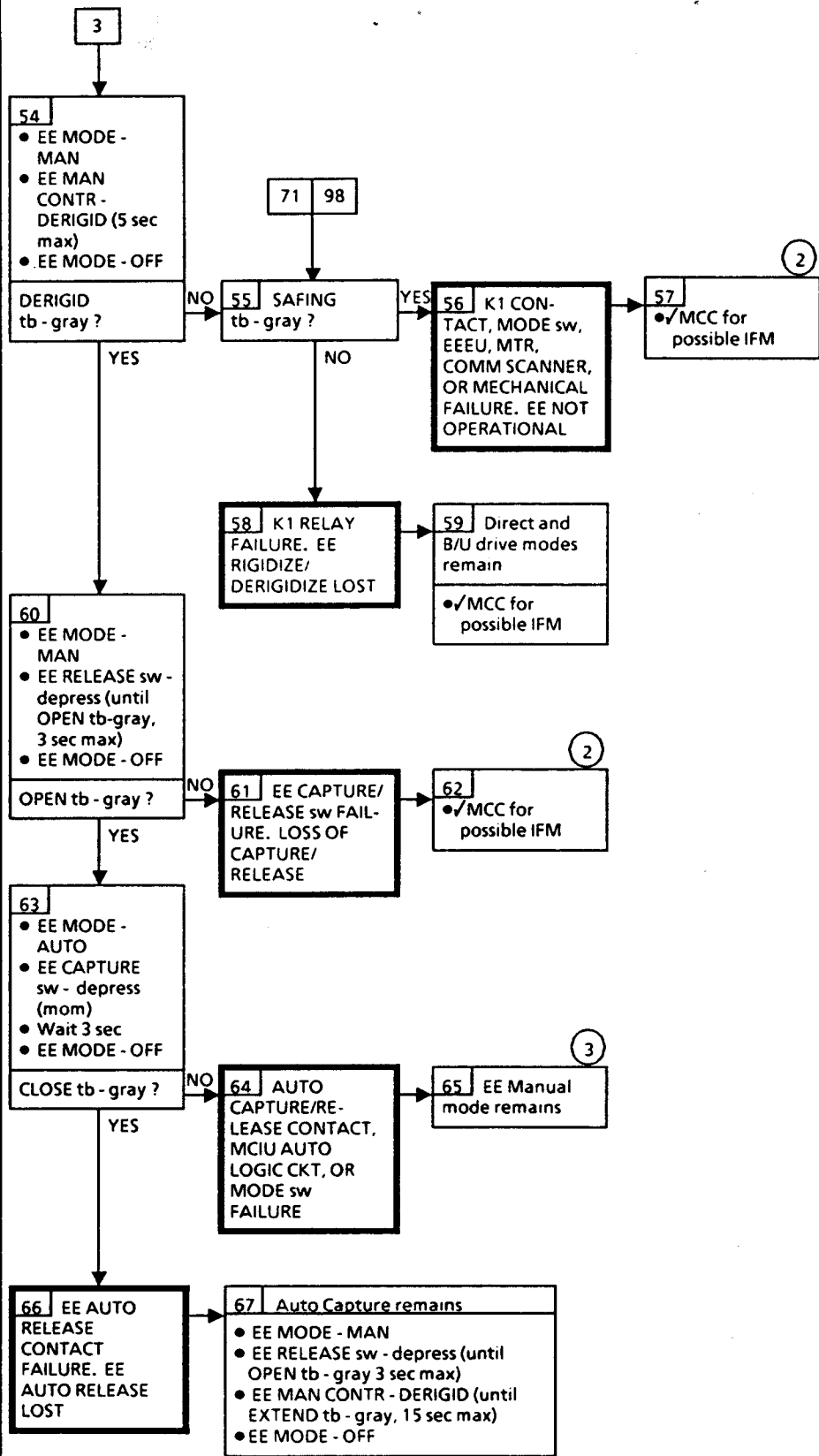
② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS 13.3b (Cont)



② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

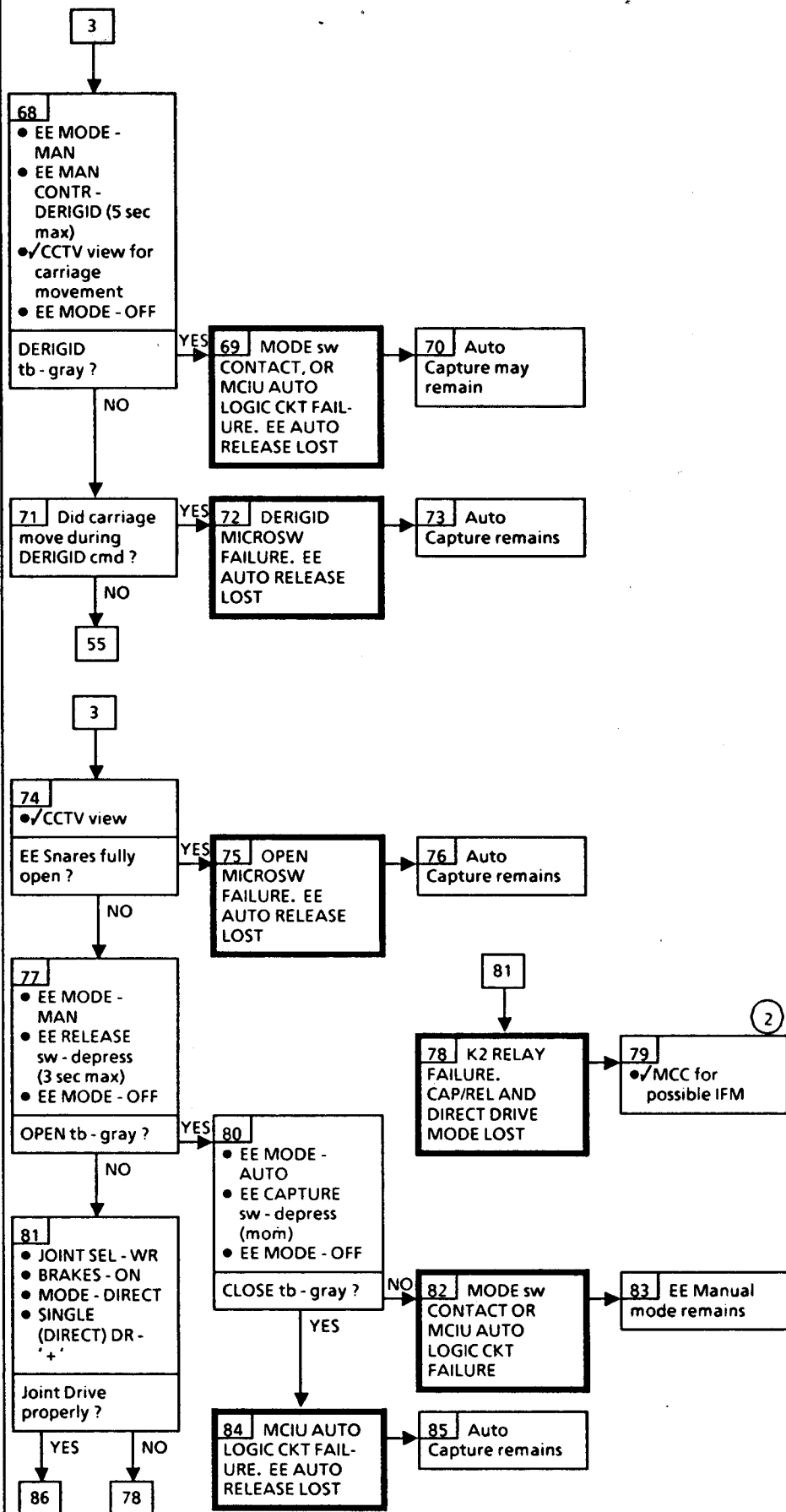
PDRS 13.3b (Cont)



② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

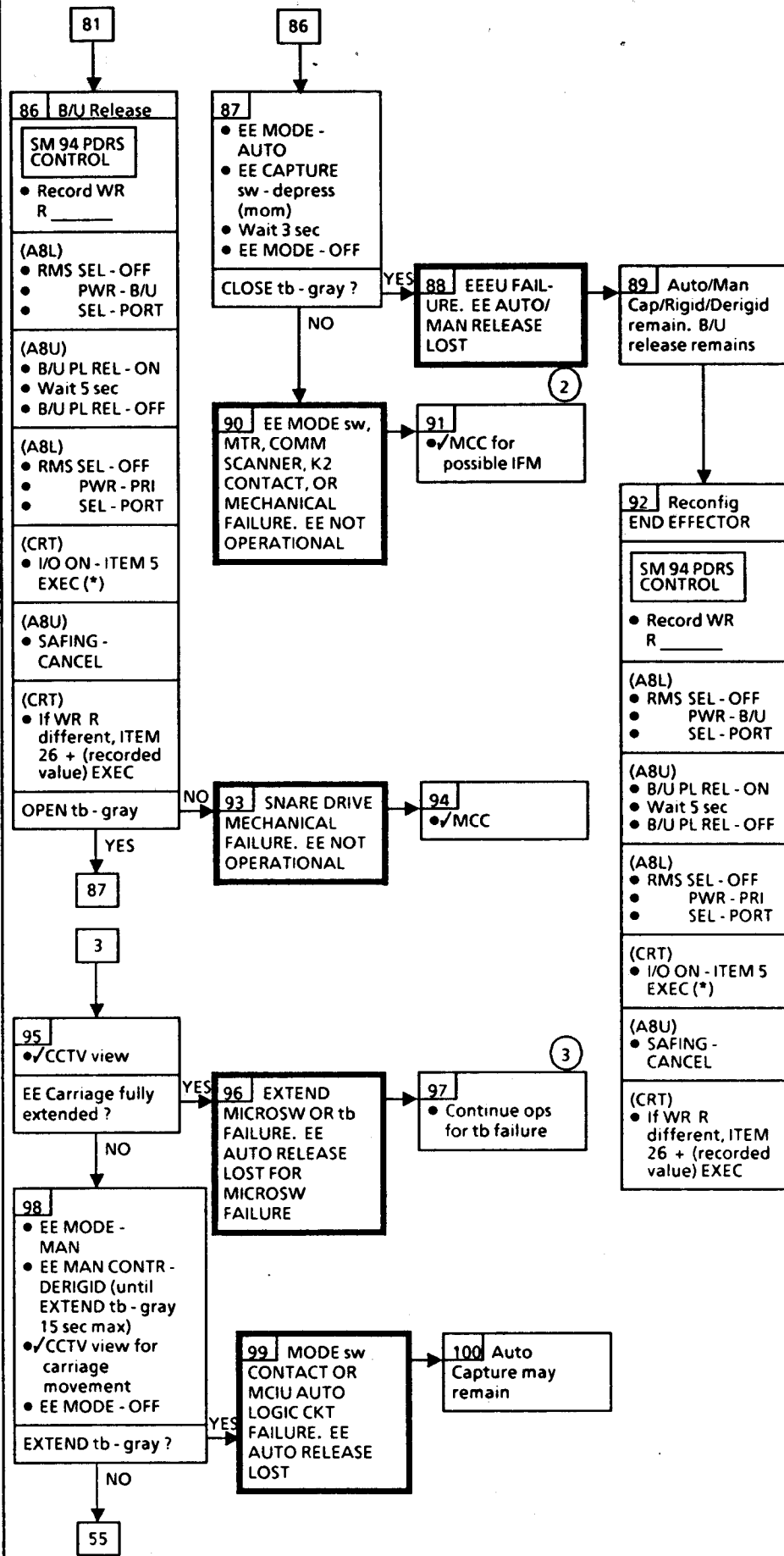
③ Limping will not occur in EE Manual for Auto Capture Contact Failure

PDRS 13.3b (Cont)



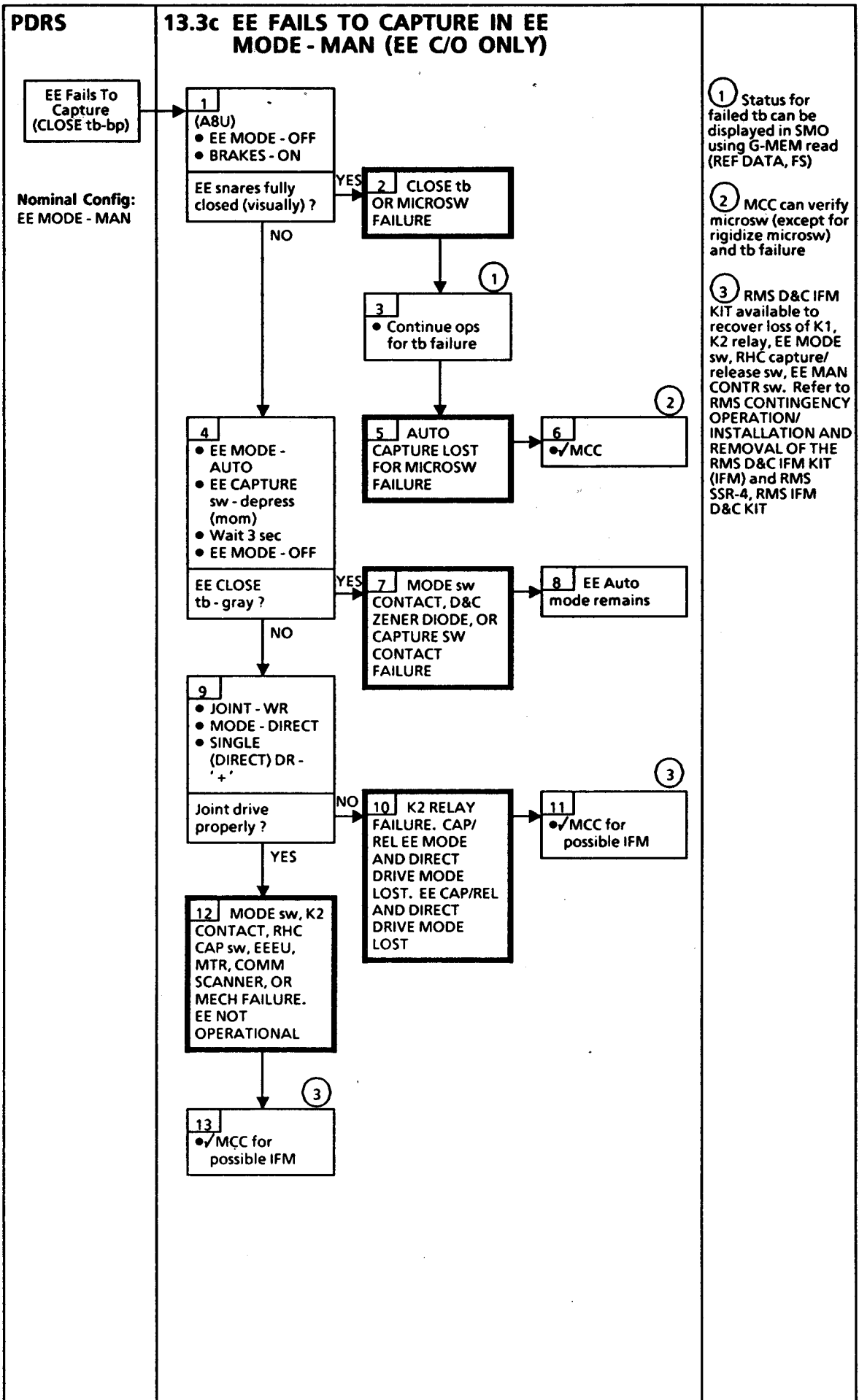
② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS 13.3b (Cont)



② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

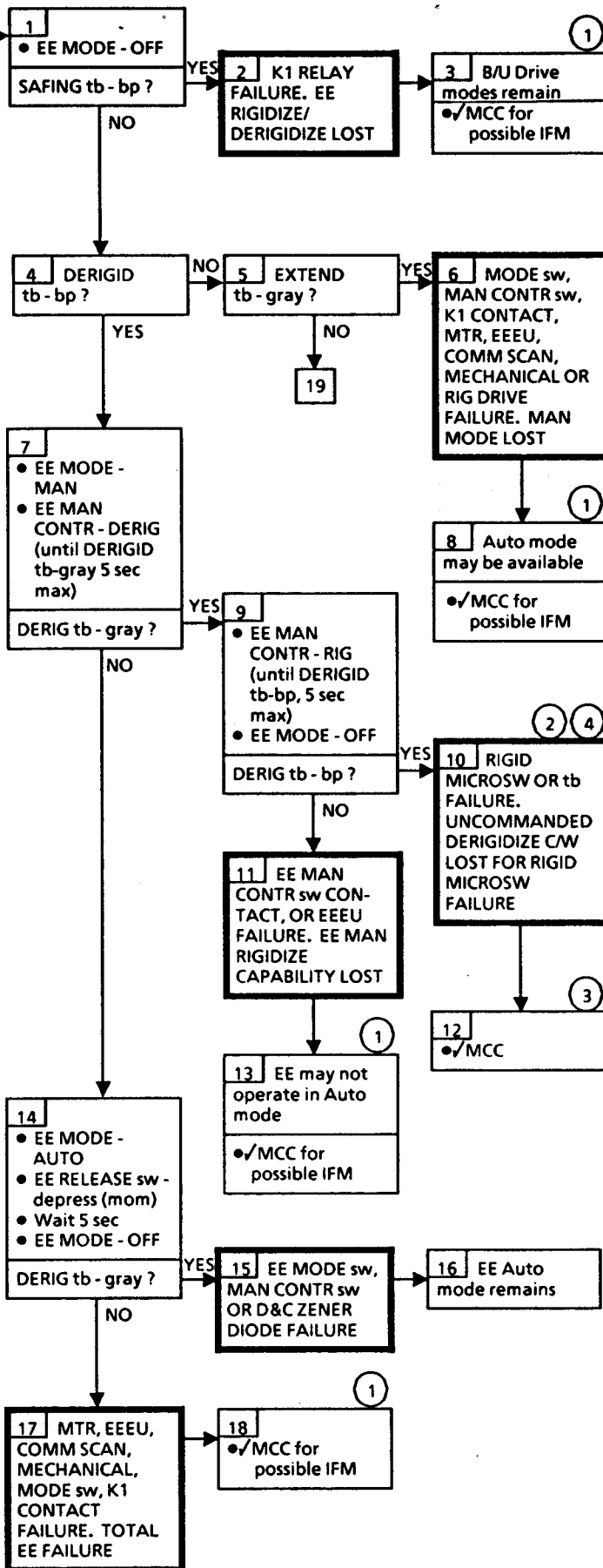
③ MCC can see microsw status



13.3d EE FAILS TO RIGIDIZE IN EE MODE - MAN (EE CHECKOUT ONLY)

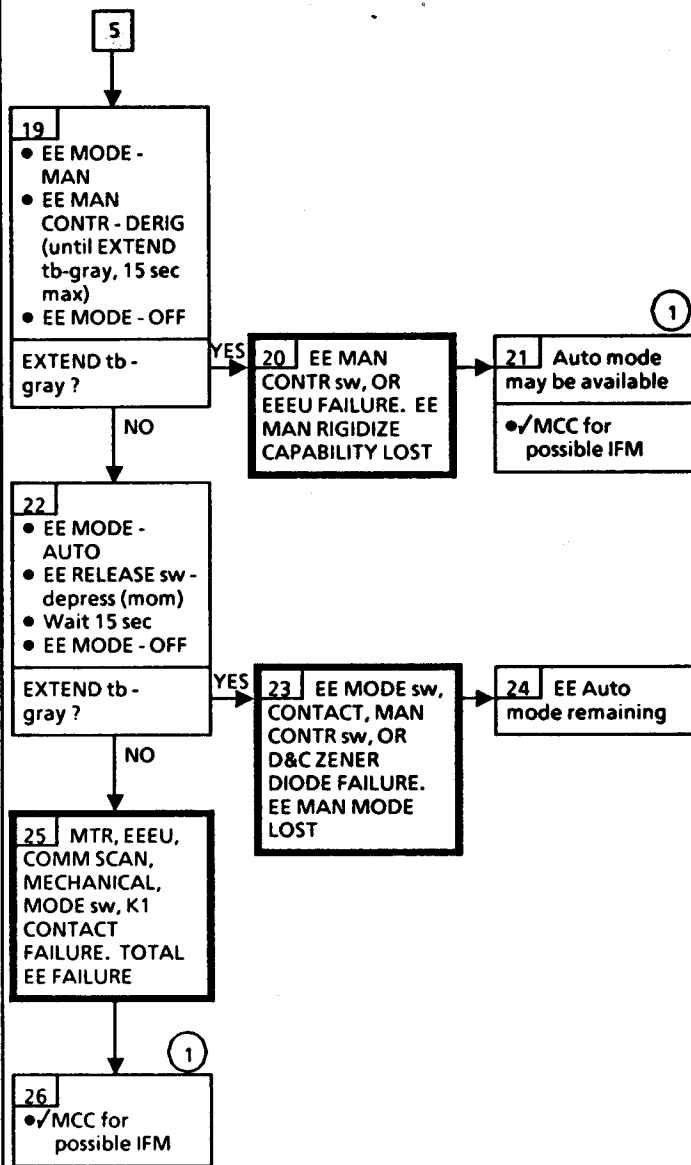
Nominal Config:
EE MODE - MAN

EE Failed to Rigidize in Manual (Rig tb-bp)



- ① RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT
- ② Should have been performed before entering MAL procedure
- ③ MCC can verify microsw (except for rigidize microsw) and tb failure
- ④ Arm will move at unloaded rates. G-MEM available to enable loaded rates

PDRS 13.3d (Cont)



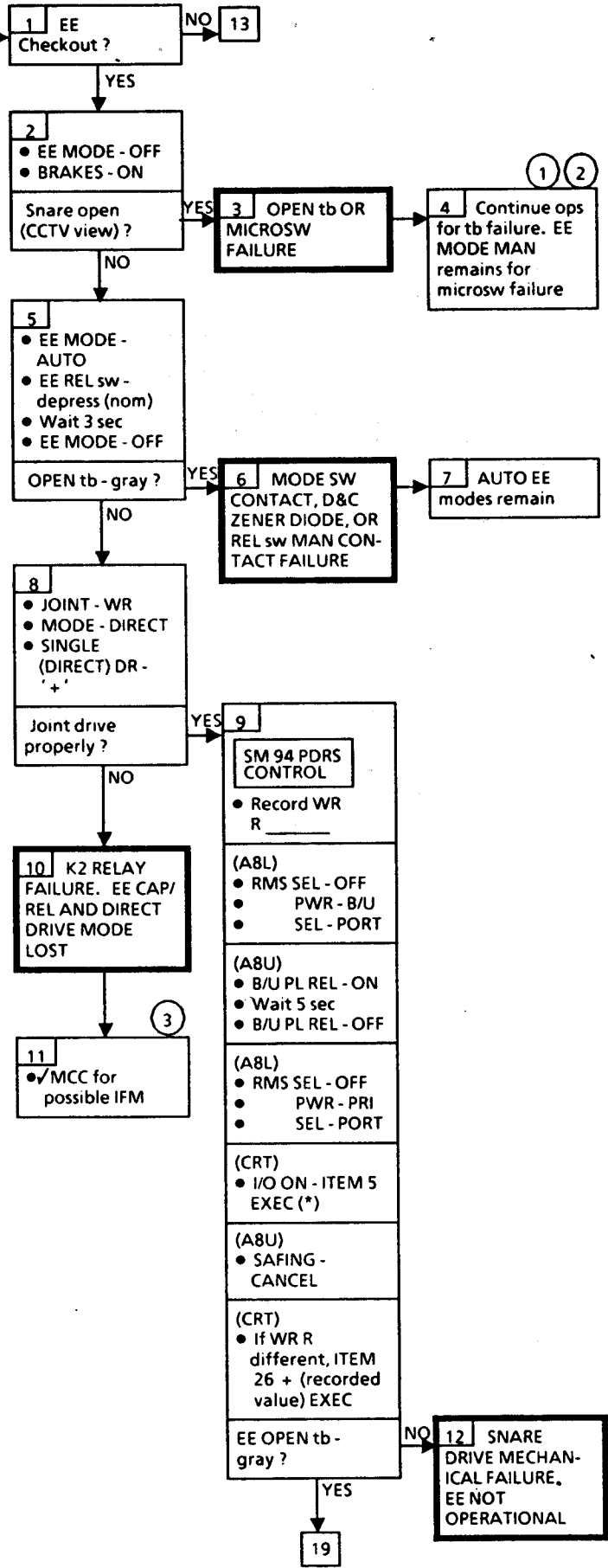
1 RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS

13.3e EE FAILS TO RELEASE IN EE MODE - MAN

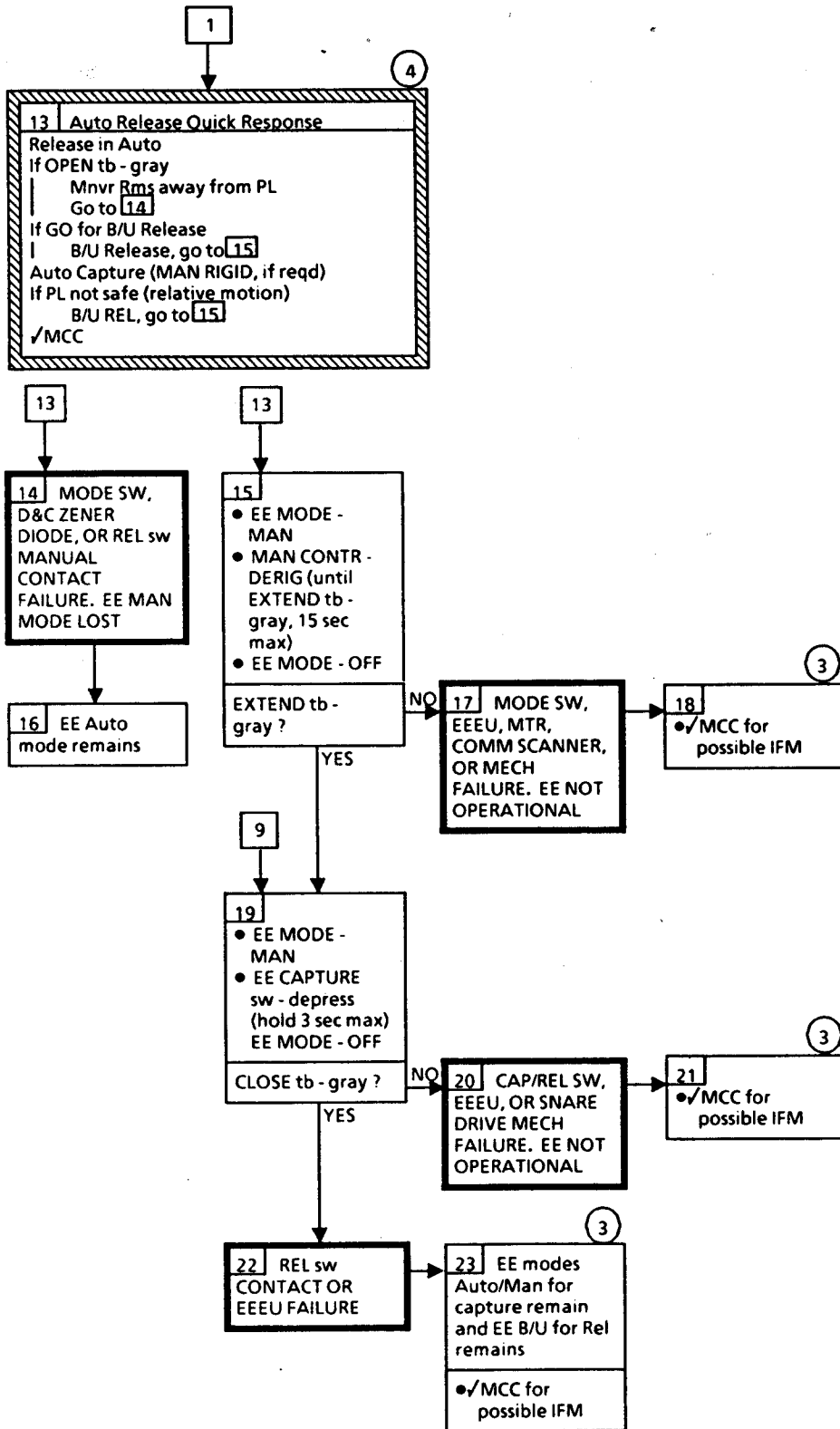
EE OPEN
tb - bp

Nominal Config:
EE MODE - MAN



- ① MCC can see microsw status
- ② Status for failed tb can be displayed on SMO using GMEM READ (REF DATA, FS)
- ③ RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS 13.3e (Cont)



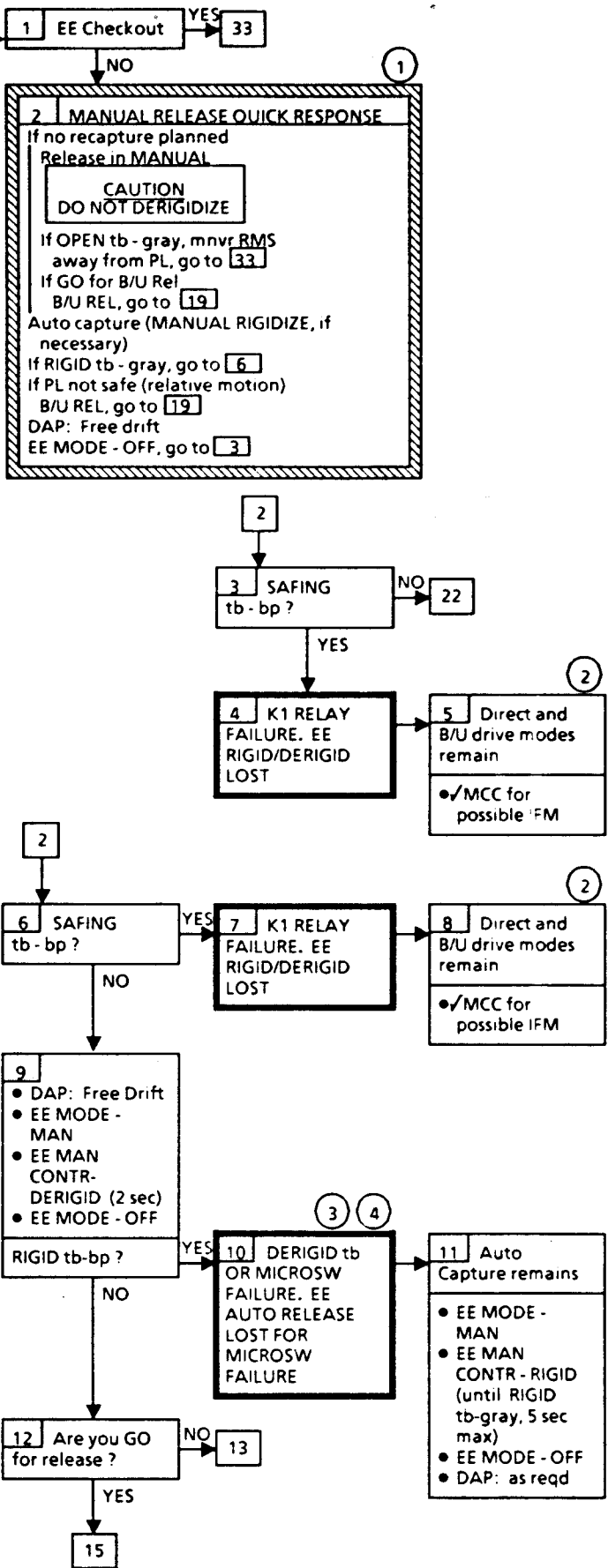
③ RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

④ Should have been performed as real-time response prior to entering MAL procedure. Treat block as "supernal" verification

13.3f EE FAILS TO DERIGIDIZE/EXTEND IN MANUAL

EE Fails to Derigidize in Manual, DERIGID tb - bp, or EXTEND - bp

Nominal Config:
 EE MODE - MAN
 SAFING - AUTO
 DAP: VRCS or free drift



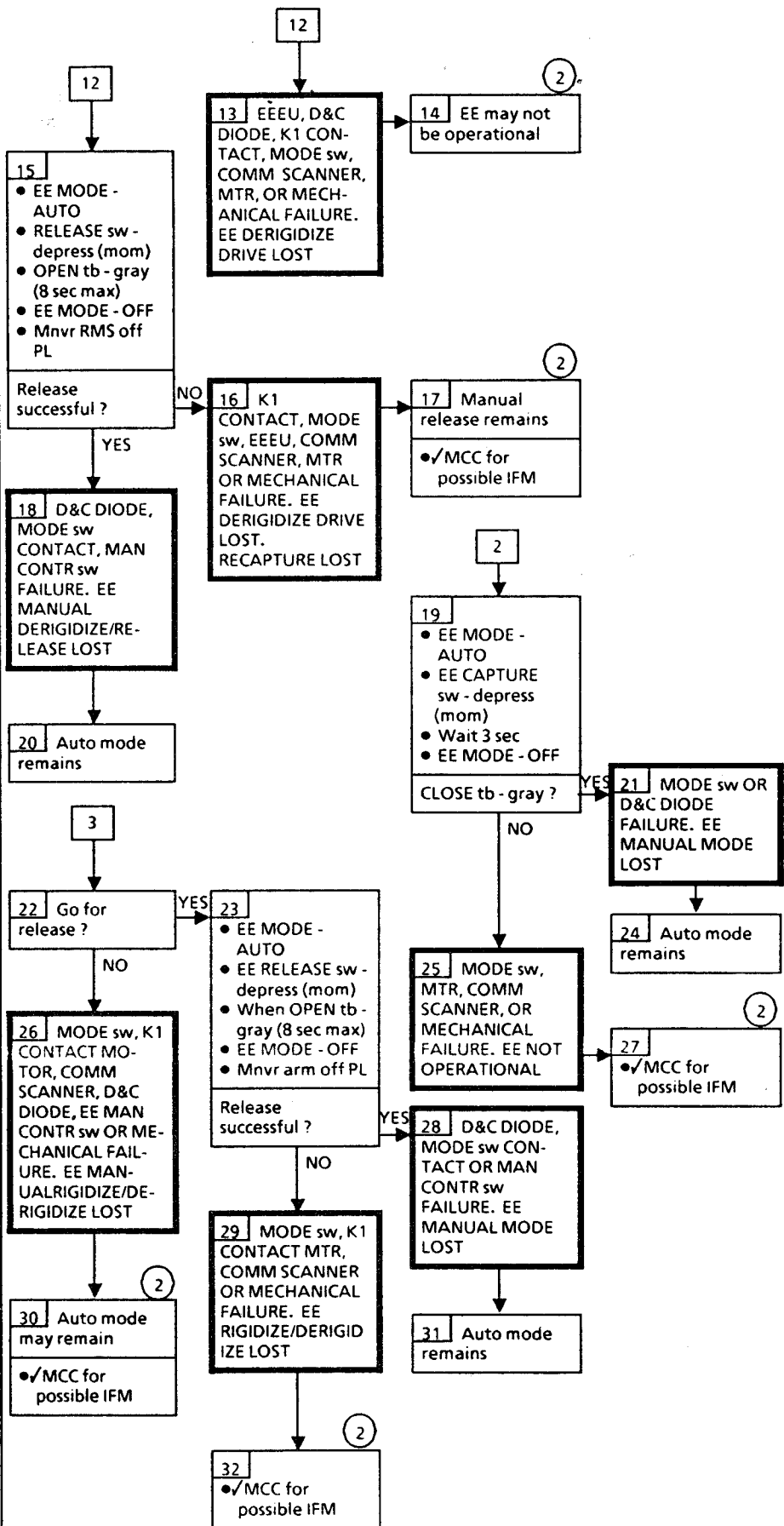
① Should have been performed as real-time response prior to entering MAL procedure. Treat block as "supermal" verification

② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

③ MCC can see microsw status

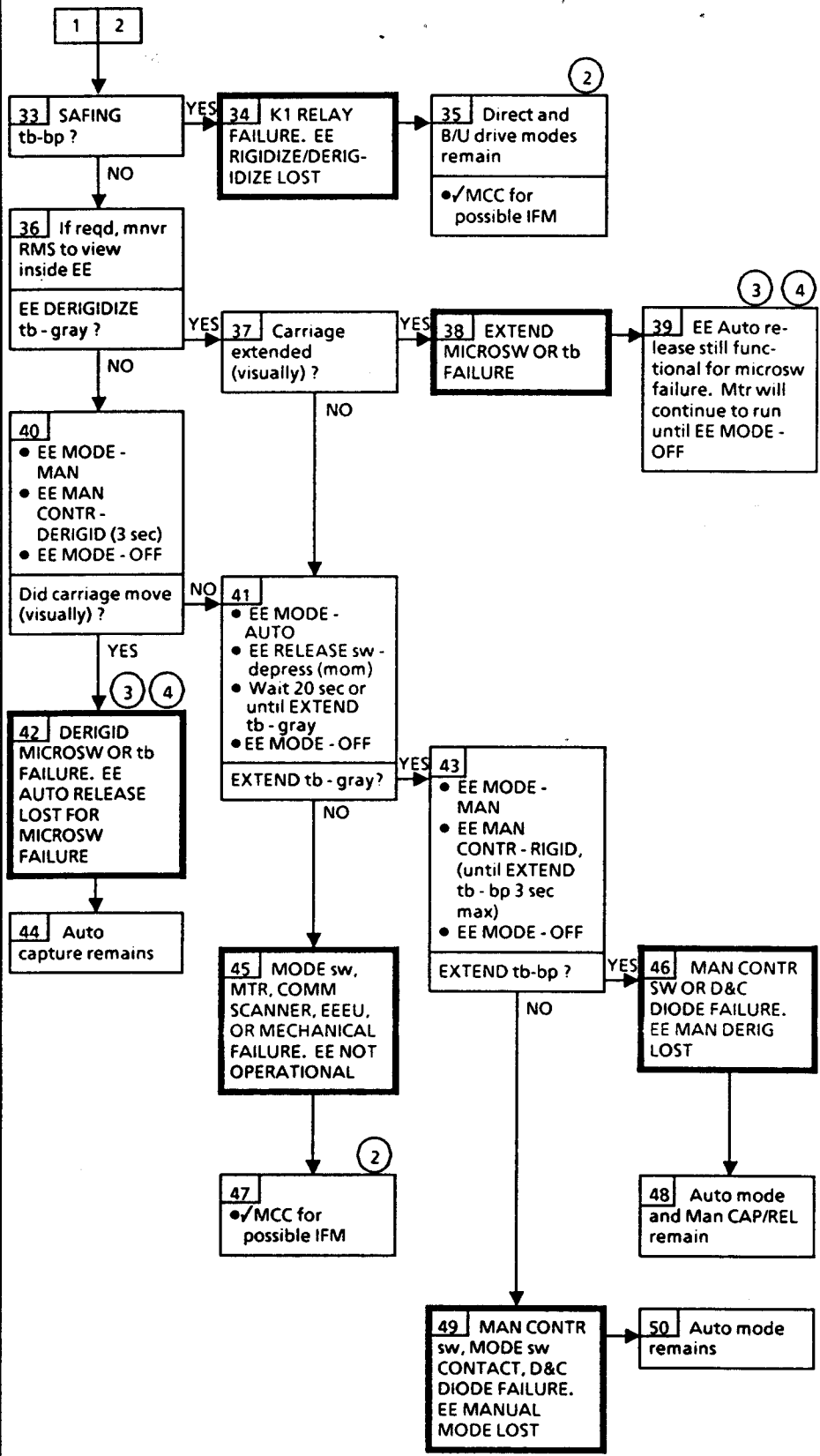
④ Status for failed tb can be displayed on SMO using G-MEM read (REF DATA, FS)

PDRS 13.3f (Cont)



② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

PDRS 13.3f (Cont)



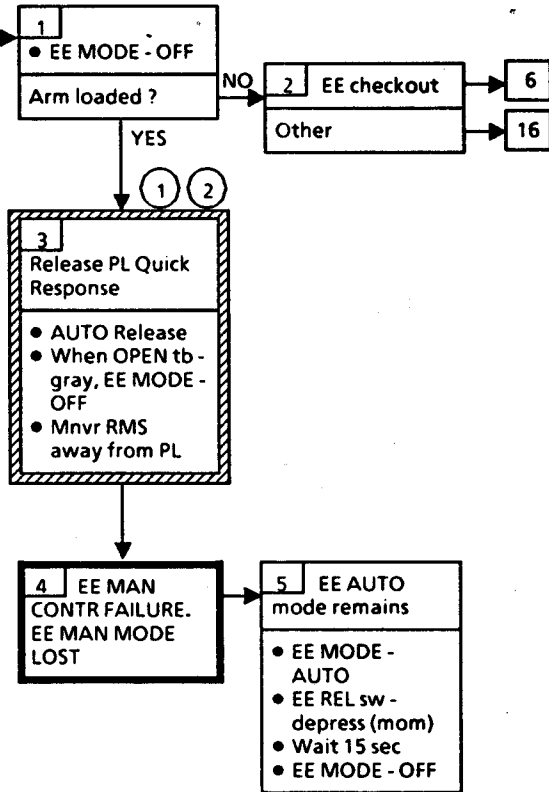
- ② RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT
- ③ MCC can see microsw status
- ④ Status for failed tb can be displayed on SMO using G-MEM read (REF DATA, FS)

PDRS

13.3g EE tb ABNORMAL WHILE NO EE COMMANDS (EE MODE - AUTO OR MAN)

EE tb
Abnormal
While No EE
Commands

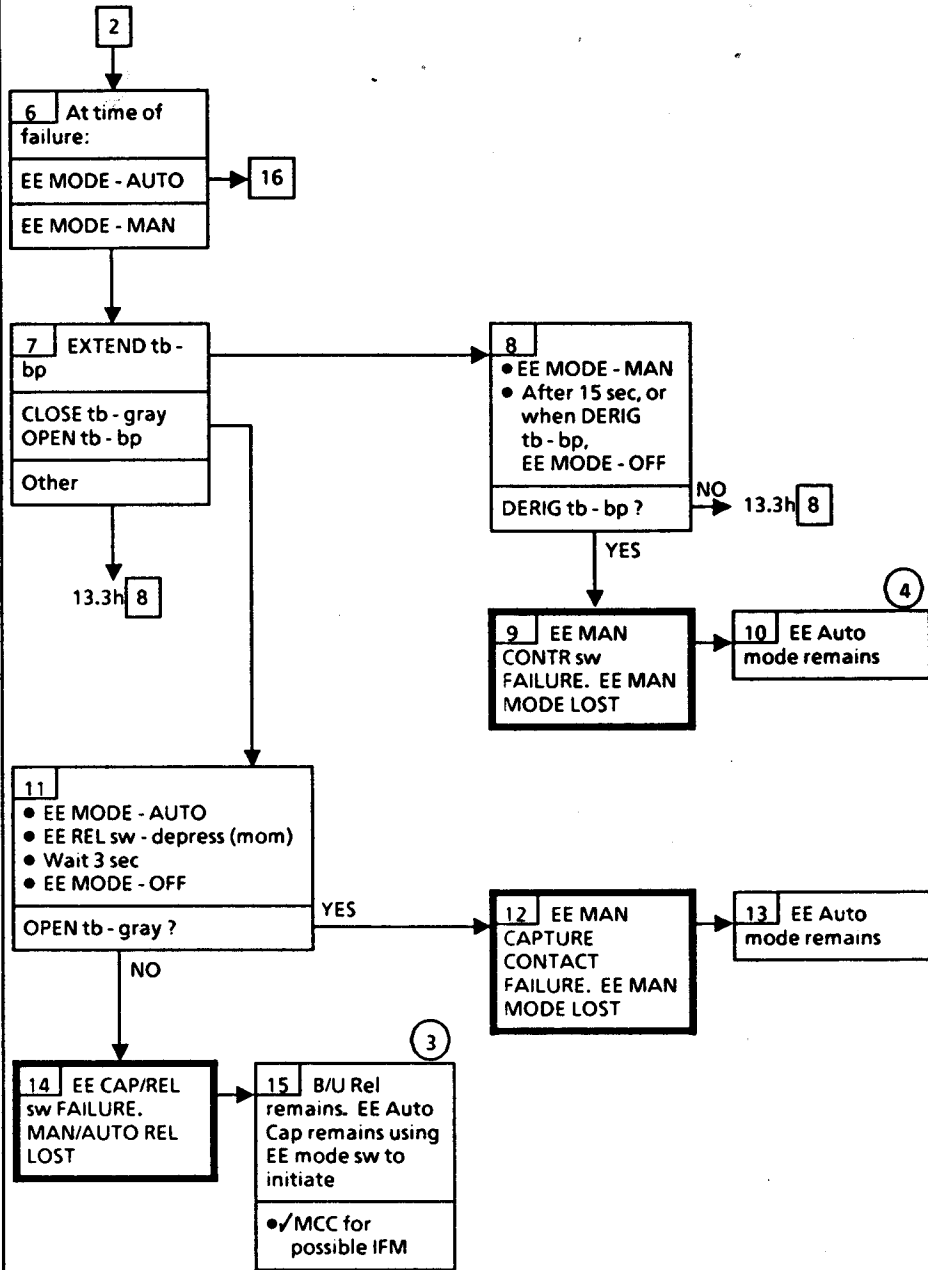
Nominal Config:
EE MODE - AUTO
(MAN)



① Should have been performed as real-time response prior to entering MAL procedure. Treat block as "supermal" verification

② Assumes PL about to be released

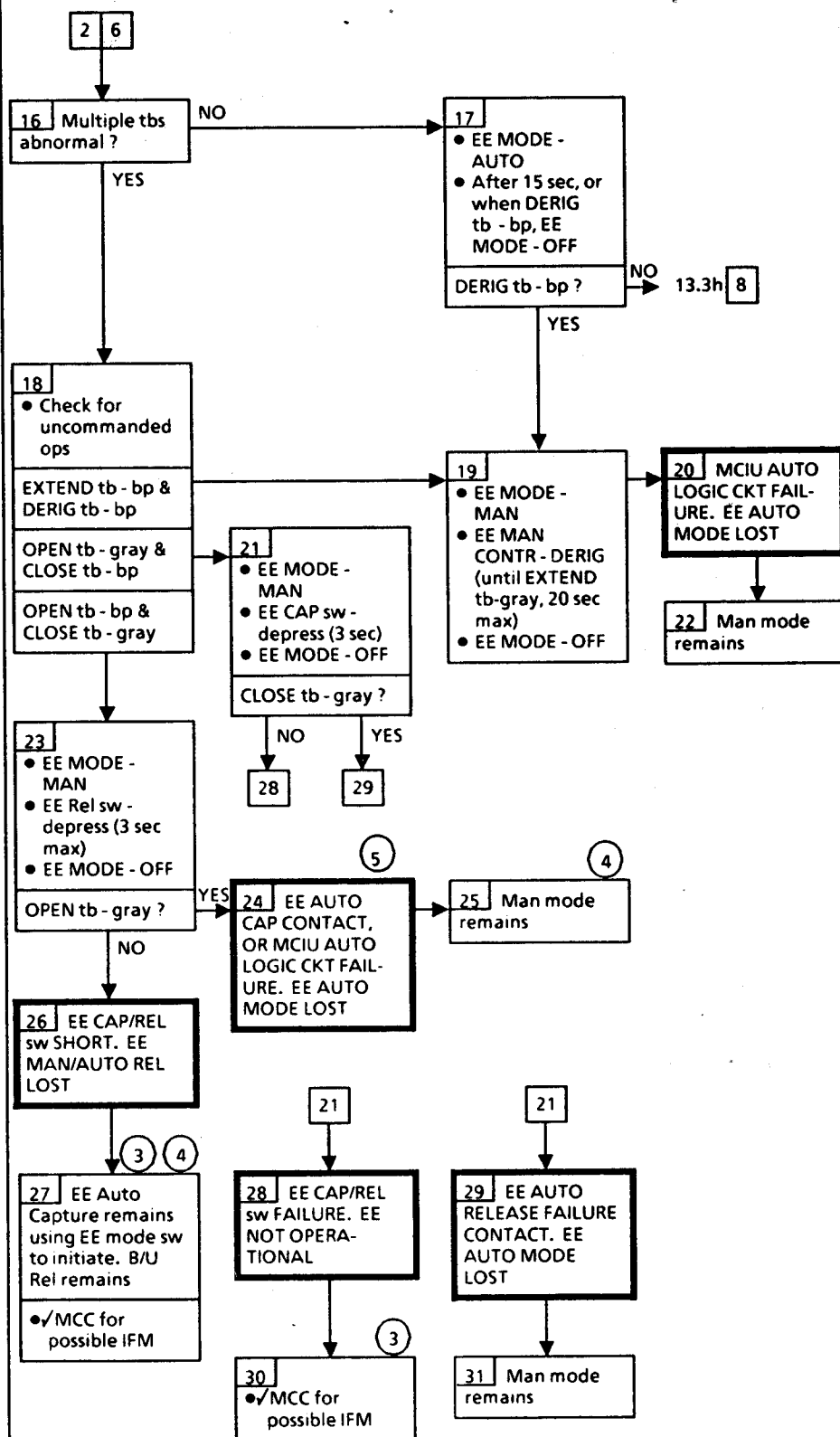
PDRS 13.3g (Cont)



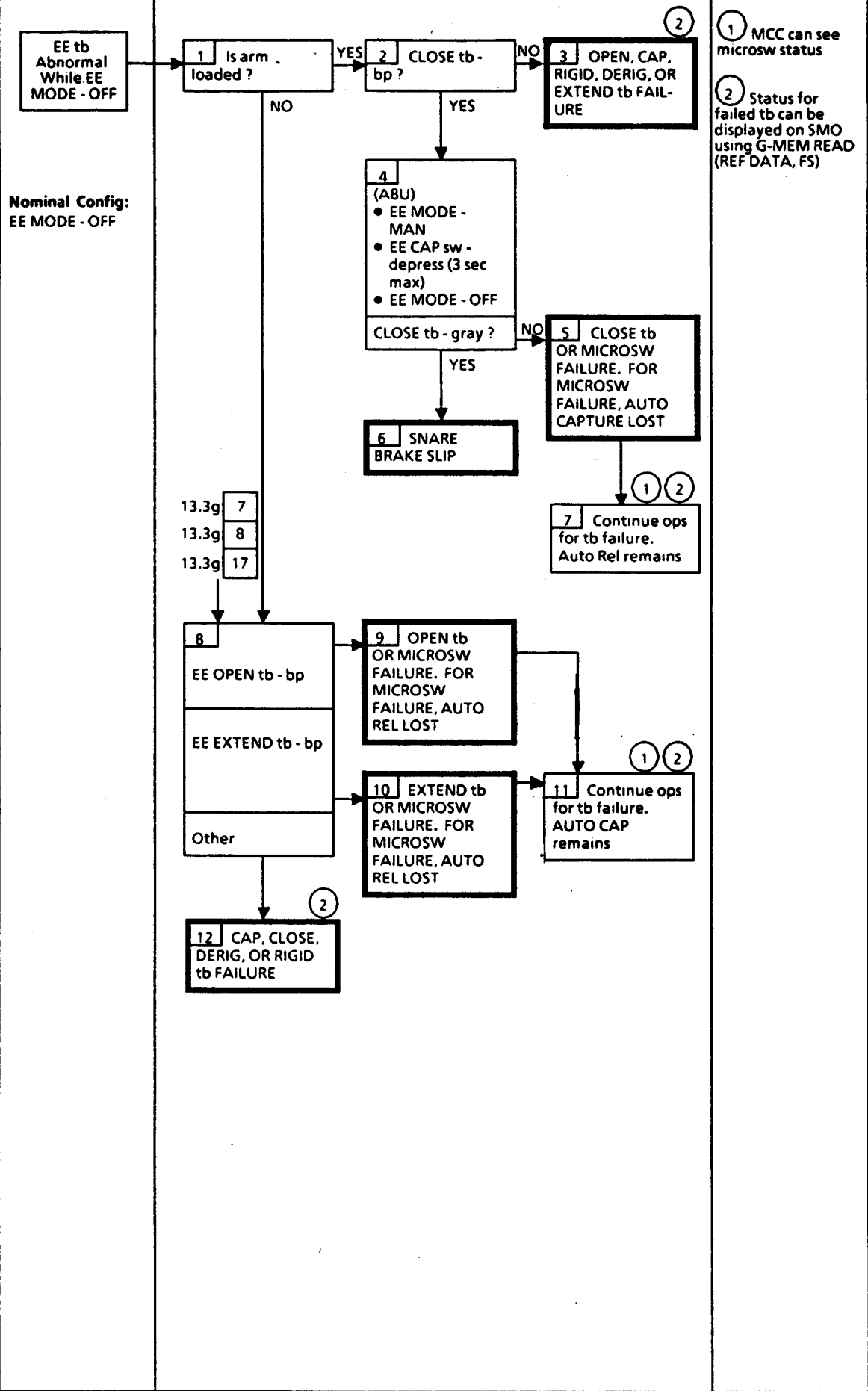
③ RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT

④ RMS limping will occur whenever EE MODE sw is not in OFF position

PDRS 13.3g (Cont)



- ③ RMS D&C IFM KIT available to recover loss of K1, K2 relay, EE MODE sw, RHC capture/release sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS D&C IFM KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT
- ④ RMS limping will occur whenever EE mode sw is not in OFF position
- ⑤ Limping will not occur in EE manual for Auto Capture contact failure



13.4a ARM RESPONSE ABNORMAL IN MANUAL MODES

Arm Response Not Normal for Commands in Manual Mode

Nominal Config:
(A8L)
RMS PWR - PRI
SEL - PORT
(A8U)
SAFING - AUTO
SAFING tb - gray
S/W STOP - gray
EE MODE - OFF

1 (A8U)
• BRAKES - ON
All digitals, but temp data lost and EE tbs (six) - bp?

YES

2 LOSS OF ARM SELECT FLAG IN MCIU

1

3 DIRECT and B/U drive modes remain. EE MAN modes and B/U release remain. RMS in TEMP MONITOR mode. Only temp data displayed
Reset ABE command latches
• SAFING - SAFE
• - AUTO
• /MCC

2

WARNING
Taking Brakes OFF may result in uncommanded motion of arm. Be ready to apply Brakes if motion occurs

4 (A8U)
• BRAKES - OFF
Is any joint moving (visual)?

YES

13.4c 29

5 BRAKES tb - ON?

YES

13.2b 1

6 (A8U)
• RATE - VERN
• MODE - selected one, ENTER
MODE It - on?

NO

7 HAND CONTROLLER BIAS

8 (A8U)
• BRAKES - ON
MANUAL and TEST drive modes unavailable

9 • Cycle RATE - COARSE, then VERN
Does RATE MIN tb respond properly?

NO

10 VERNIER/ COARSE SELECTION FAILURE

11 For failure to select vernier rates, use smaller HC deflections to achieve lower rates when near structure
• BRAKES - ON

3

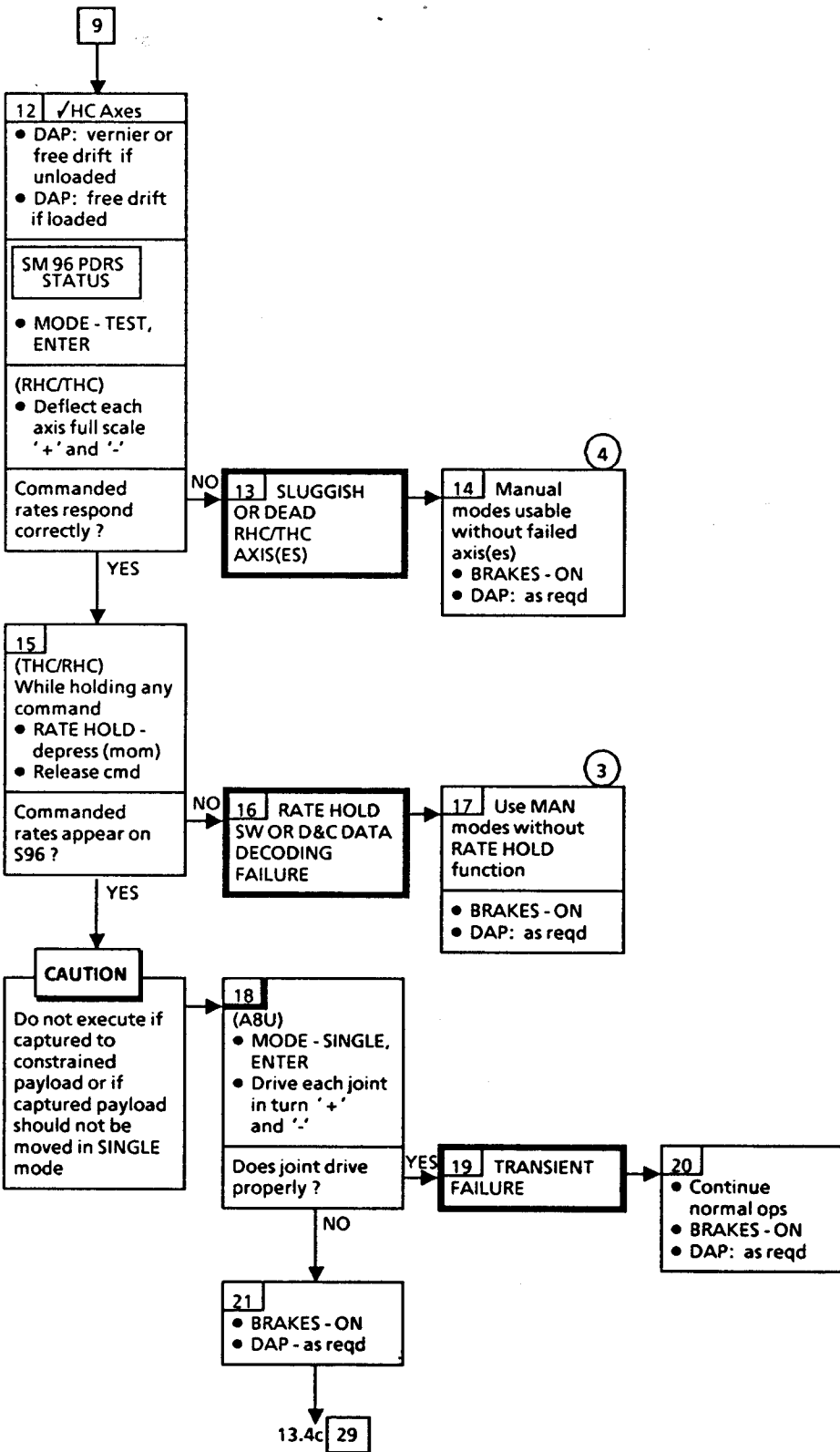
12

1 Last command rates latched in ABE. Can result in RMS runaway with BRAKES - OFF

2 IFM to swap MCIU to regain computer supported modes may be available. Refer to RMS - MCIU CHANGEOUT (IFM)

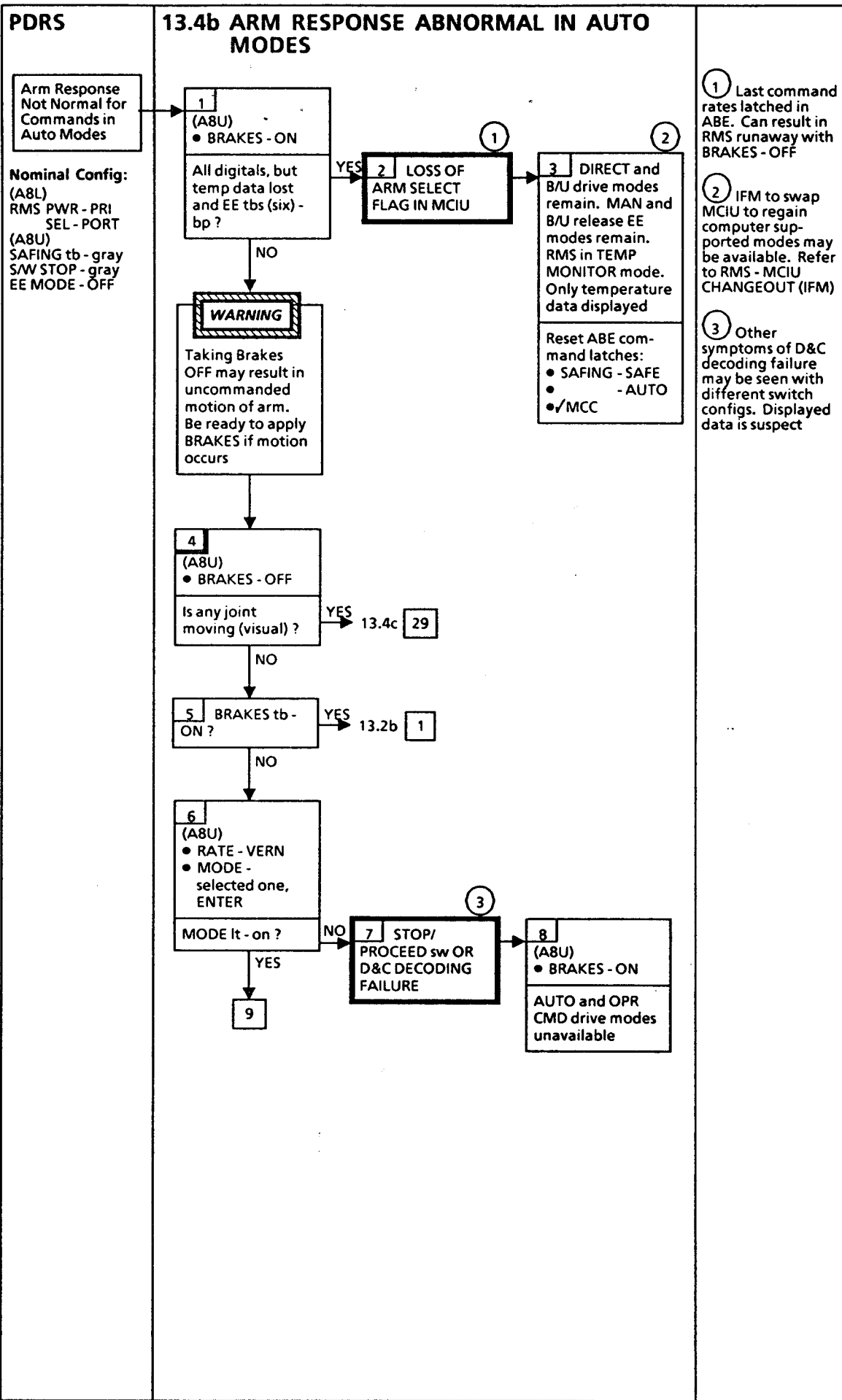
3 Other symptoms of D&C decoding failure may be seen with different switch configs. Displayed data is suspect

RMS OPS
13.4

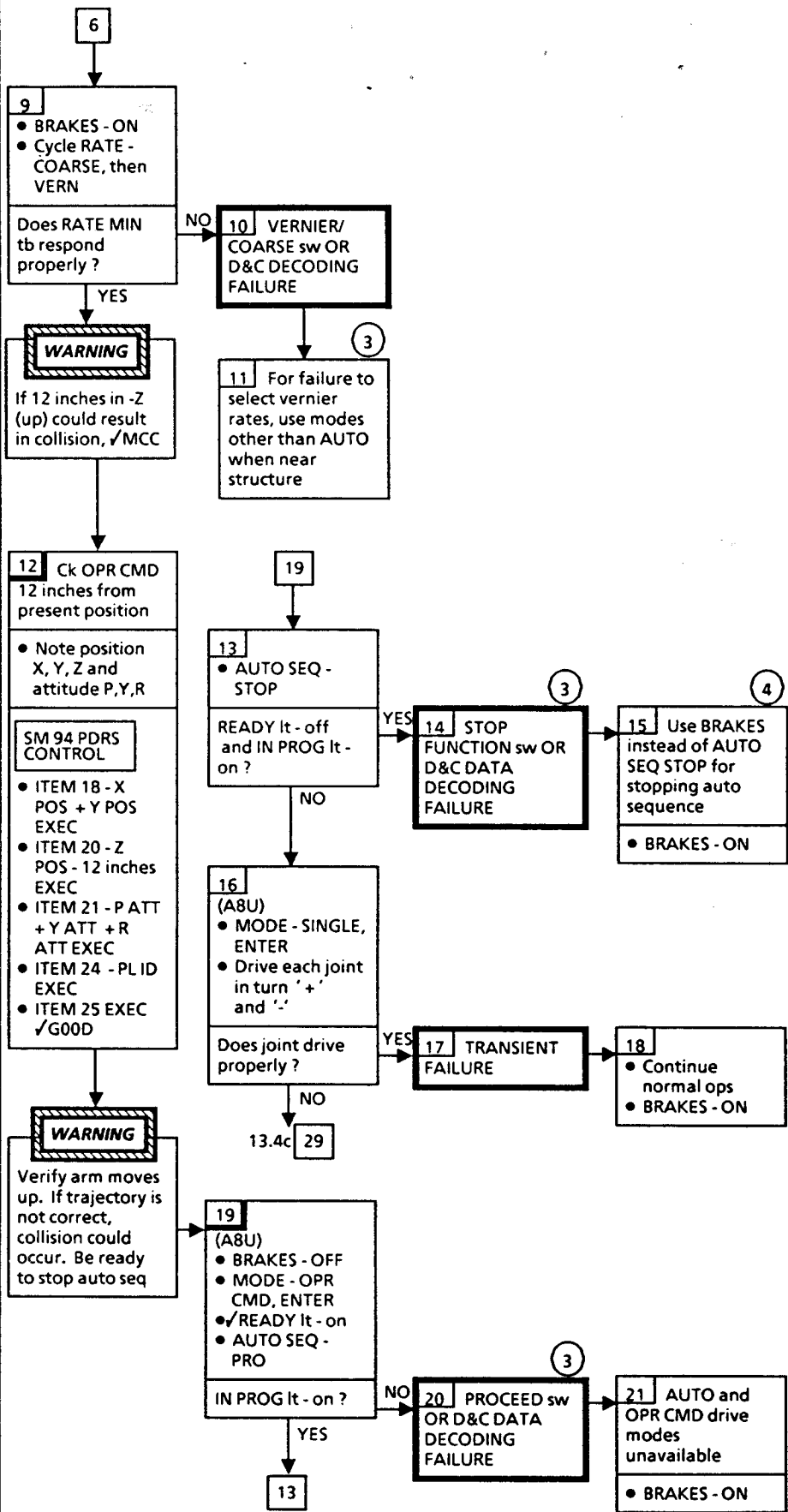


③ Other symptoms of D&C decoding failure may be seen with different switch configs. Displayed data is suspect

④ PL ID or mode substitution possible to work around failed axis



PDRS 13.4b (Cont)



3 Other symptoms of D&C decoding failure may be seen with different switch configs. Displayed data is suspect

4 When BRAKES are used for stopping auto sequence, to continue pre-programmed auto seq., arm must be driven to sequence point and START PT must be updated

13.4c JOINT RESPONSE ABNORMAL IN SINGLE MODE

Joint Response Not Normal for Commands in SINGLE MODE

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

1 (A8U)
 • BRAKES - ON
 All digitals, but Temp data lost and EE tbs (six) - bp ?

2 LOSS OF ARM SELECT FLAG IN MCIU

3 DIRECT and B/U drive modes remain. MAN and B/U release EE modes remain. RMS in TEMP MONITOR mode. Only temp data displayed.

WARNING
 Taking Brakes OFF may result in uncommanded motion of arm. Be ready to apply BRAKES if motion occurs

Reset ABE command latches
 • SAFING - SAFE
 • - AUTO
 • /MCC

4 (A8U)
 • BRAKES - OFF
 Is any joint moving (visual) ?

29

5 BRAKES tb - ON ?

13.2b 1

6
 • RATE - VERN
 • JOINT sel - WR
 • MODE - SINGLE, ENTER
 SINGLE It - ON ?

WARNING
 Placing mode switch in DIRECT may cause joint motion for selected joint. If motion occurs be ready to take mode switch out of DIRECT

11

7 (A8U)
 • BRAKES - ON
 • MODE - DIRECT
 Is joint moving ?

8 SINGLE/DIRECT sw 10V CONTACT OR D&C DATA DECODING FAILURE

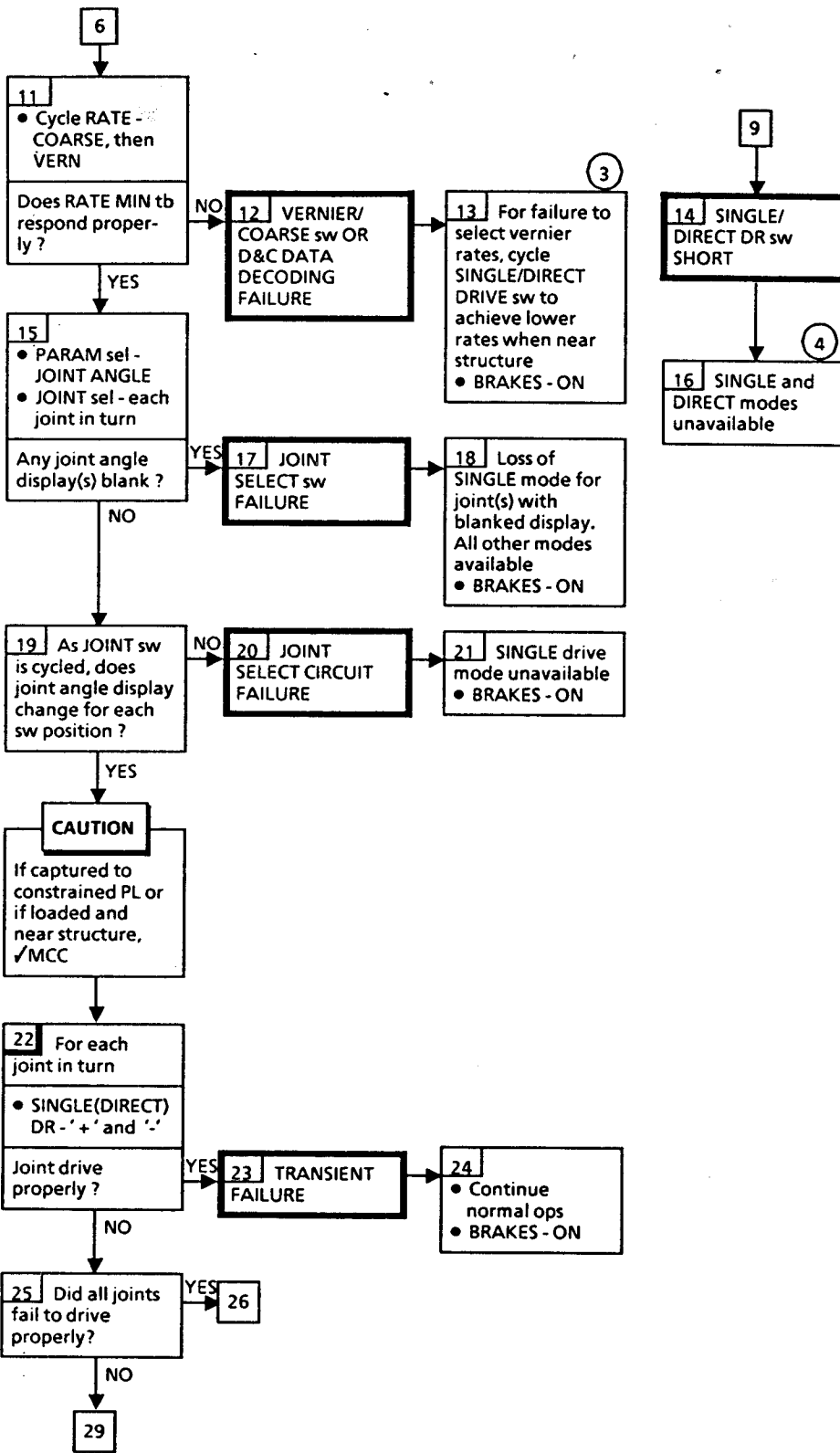
9
 • MODE - not DIRECT

10 SINGLE drive mode unavailable
 • MODE - not DIRECT

14

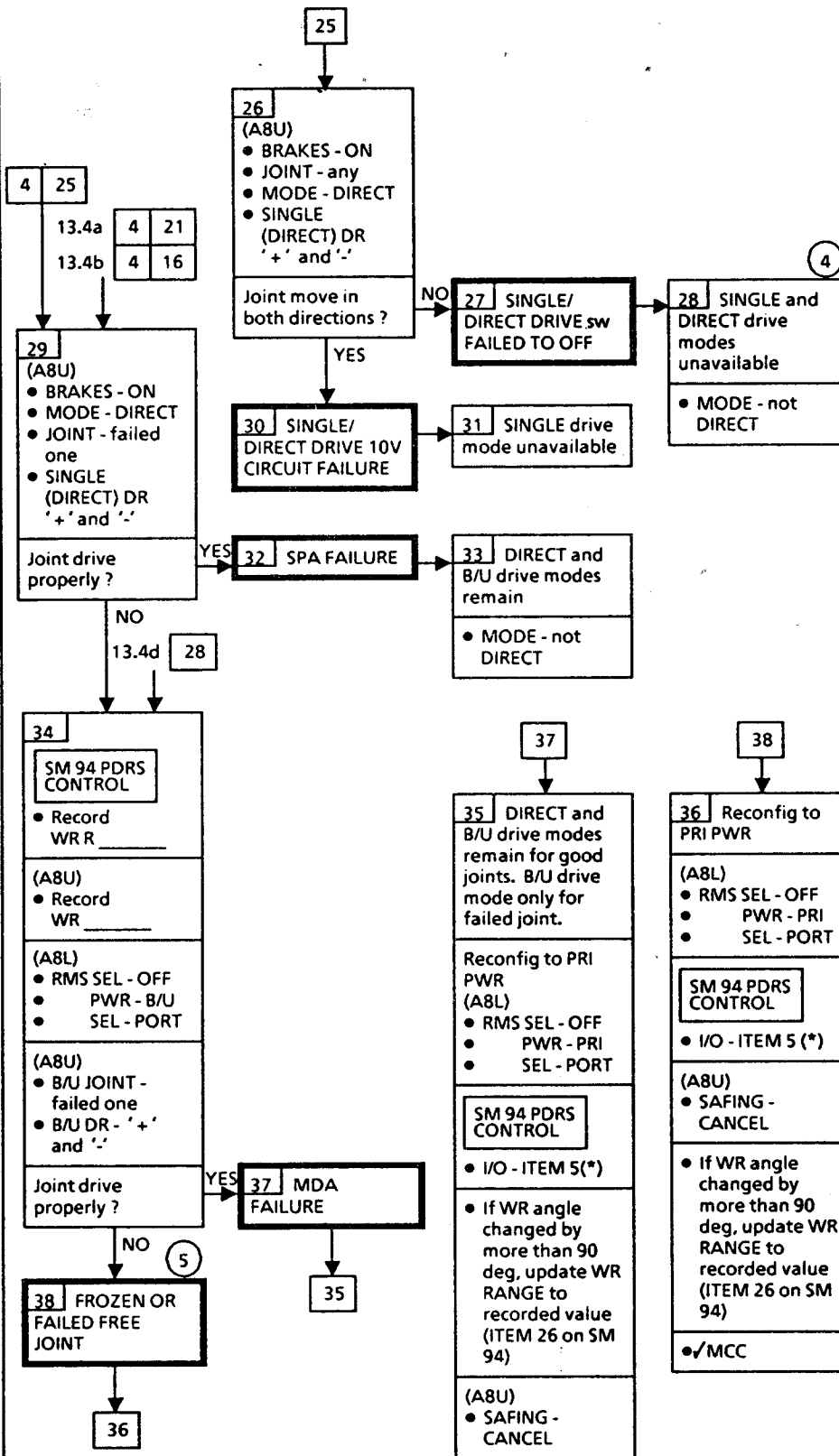
- ① Lost command rates latched in ABE. Can result in RMS runaway with BRAKES off
- ② IFM to swap MCIU to regain computer supported modes may be available. Ref RMS - MCIU Changeout (IFM)
- ③ Other symptoms of D&C decoding failure may be seen with different switch configs. Displayed data is suspect

PDRS 13.4c (Cont)



3 Other symptoms of D&C decoding failure may be seen with different switch configs. Displayed data is suspect

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



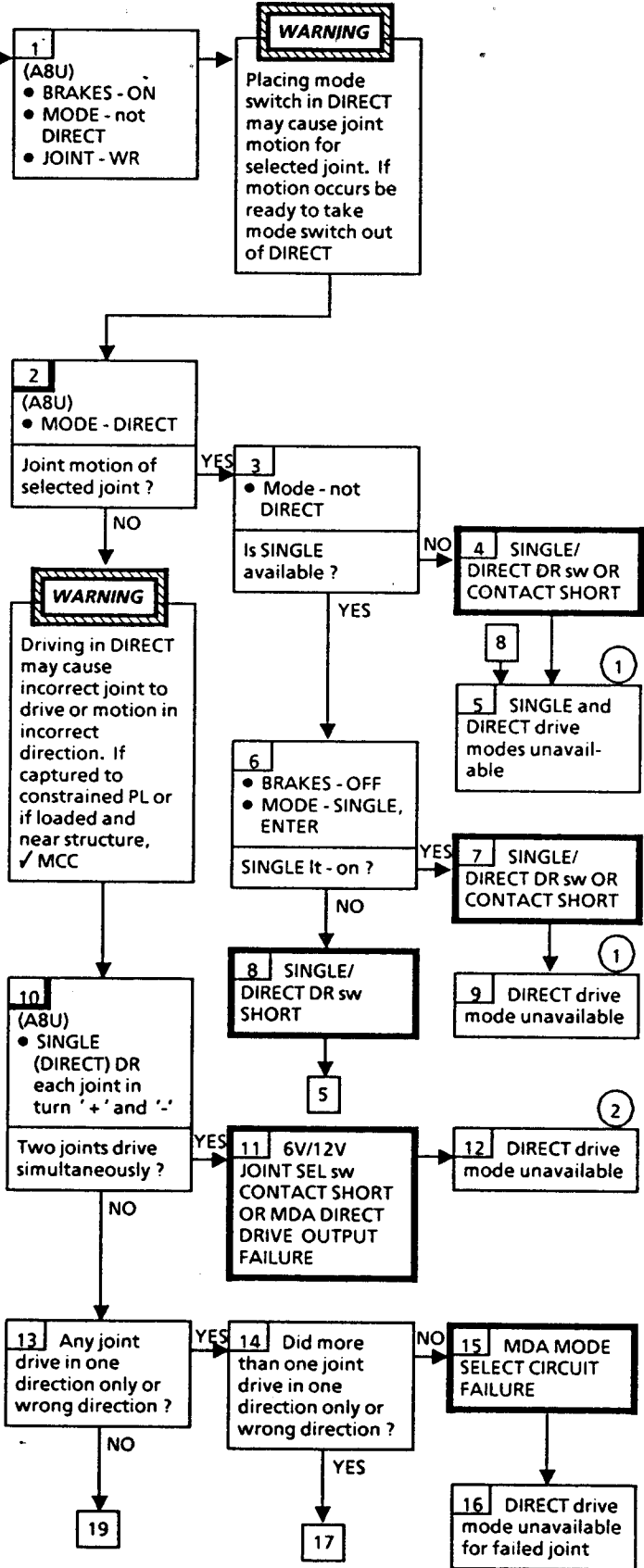
④ DIRECT mode can be regained with RMS D&C IFM kit. Ref to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM) and RMS SSR-4 RMS IFM D&C KIT

⑤ BACKDRIVE TECHNIQUE - JOINT FREE PDRS SSR-3 or EVA reqd to cradle arm for failed free joint

13.4d JOINT RESPONSE ABNORMAL IN DIRECT MODE

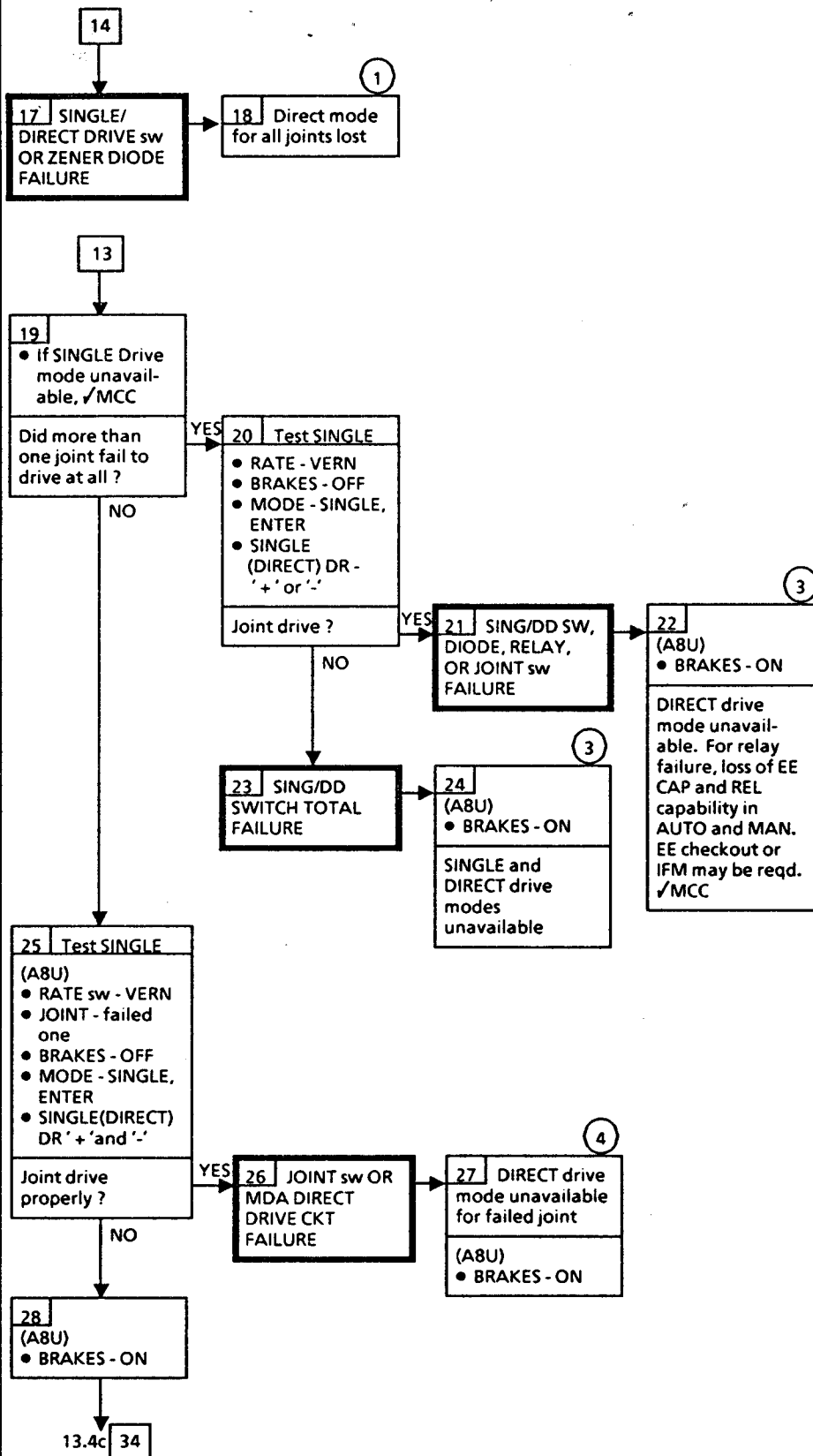
Joint Response Not Normal for Commands in DIRECT MODE

Nominal Config:
 (A8L)
 RMS PWR - PRI
 SEL - PORT
 (A8U)
 BRAKES - ON
 BRAKES tb - ON



- ① DIRECT mode can be regained with RMS D&C IFM KIT. Refer to RMS CONTINGENCY OPERATION/ INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM) and RMS SSR-4, RMS IFM D&C KIT
- ② If JOINT SEL sw short, D&C IFM KIT will regain DIRECT mode capability

PDRS 13.4d (Cont)



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

③ DIRECT mode can be regained with RMS D&C IFM kit

④ For joint sw failure, D&C IFM kit will regain DIRECT for failed joint

③

③

④

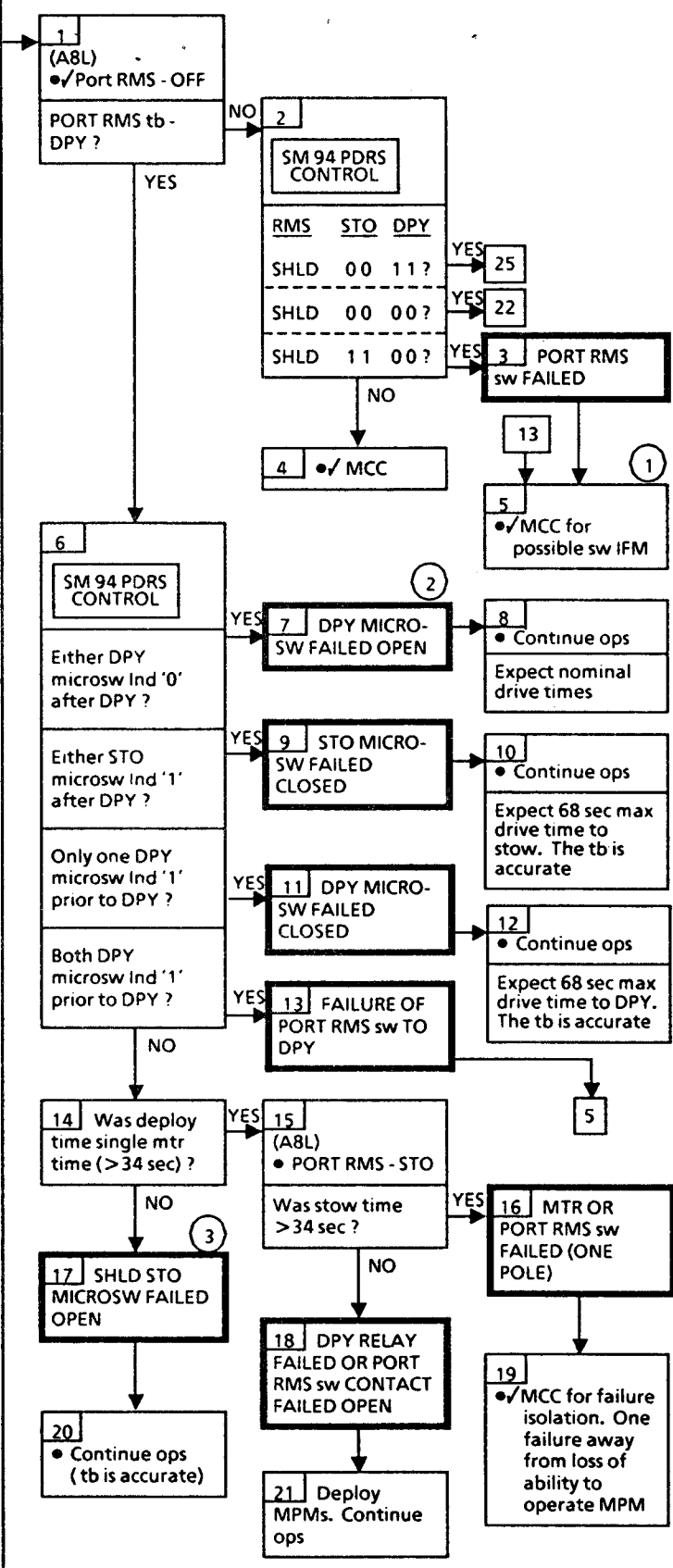
PDRS

13.5a 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 1,2 - ON
MNC MID 2 - ON
(MA73C:B)
MCA LOGIC
MNA MID 3 - ON
MNB MID 3,4 - ON
MNC MID 4 - ON
(MA73C:C)
cb MCA PWR
AC1 3Φ MID 1 - cl
AC2 3Φ MID 1,2 - cl
AC3 3Φ MID 2 - cl
(MA73C:D)
cb MCA PWR
AC1 3Φ MID 3 - cl
AC2 3Φ MID 3,4 - cl
AC3 3Φ MID 4 - cl
(R13L)
PL BAY MECH BAY
SYS 1,2 - ON

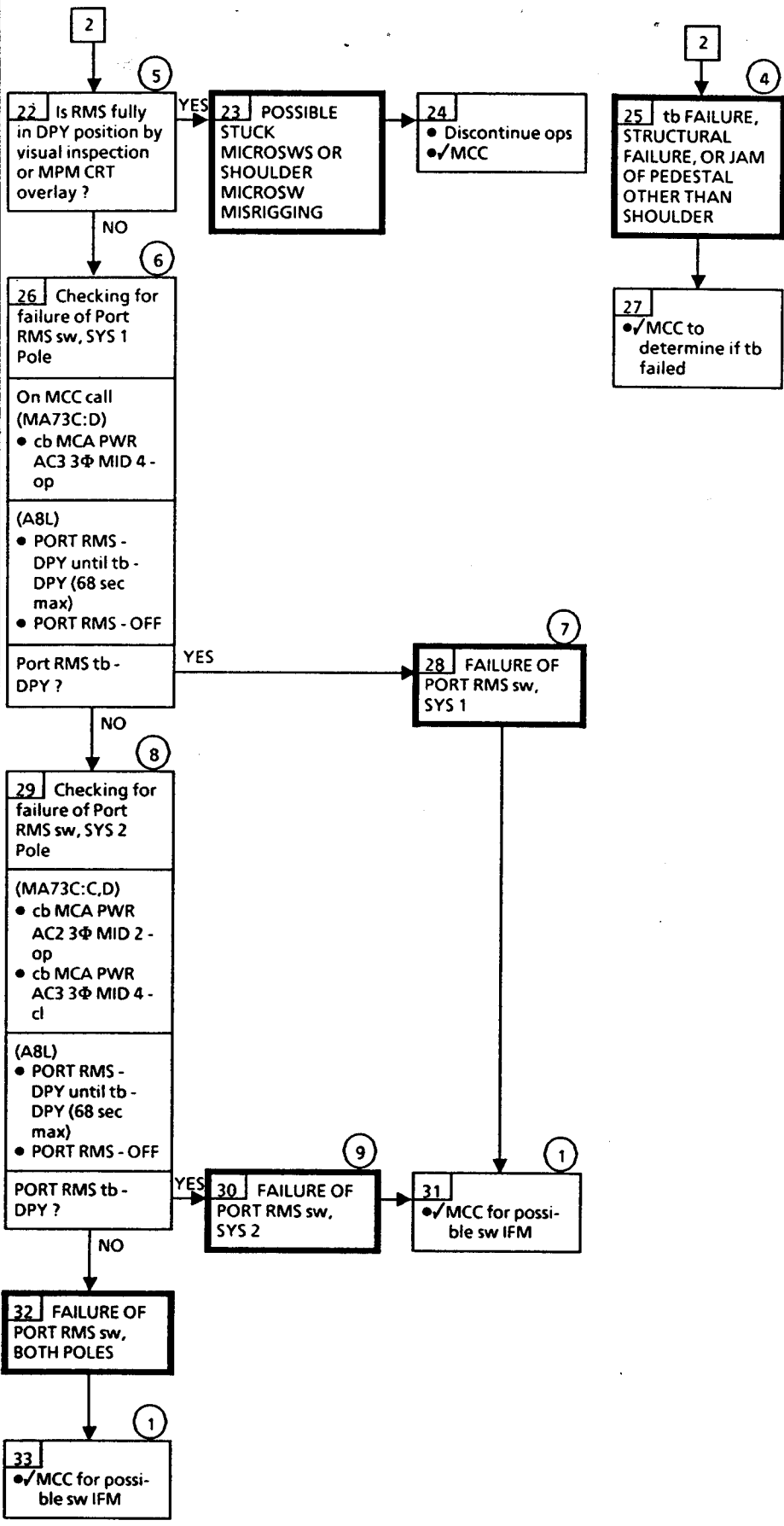


- ① Refer to RMS - MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
- ② One mtr will continue to run while deploying until PORT RMS STO/DPY sw is turned OFF
- ③ One mtr will continue to run while stowing until PORT RMS STO/DPY sw is turned OFF

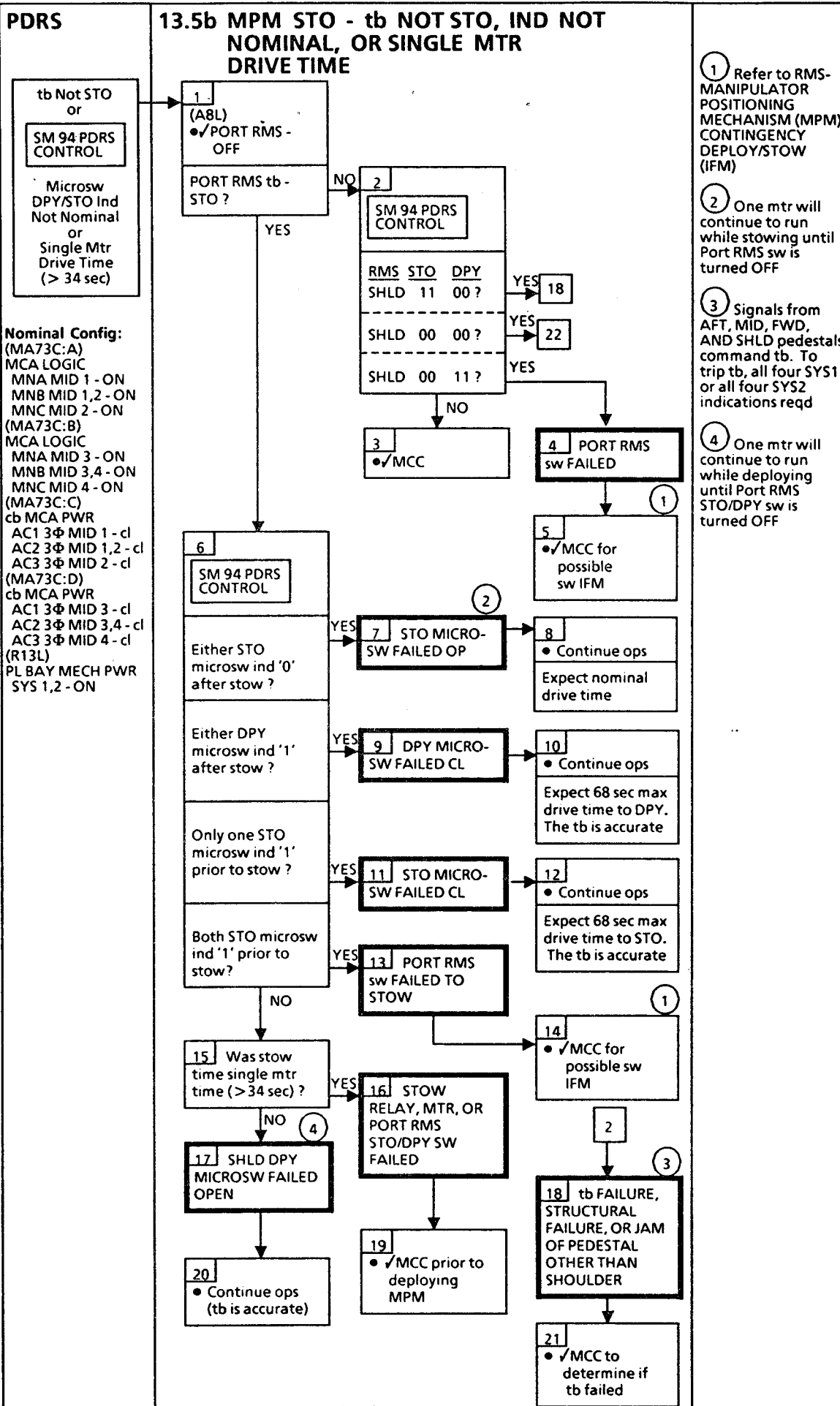
MPM/MRL

13.5

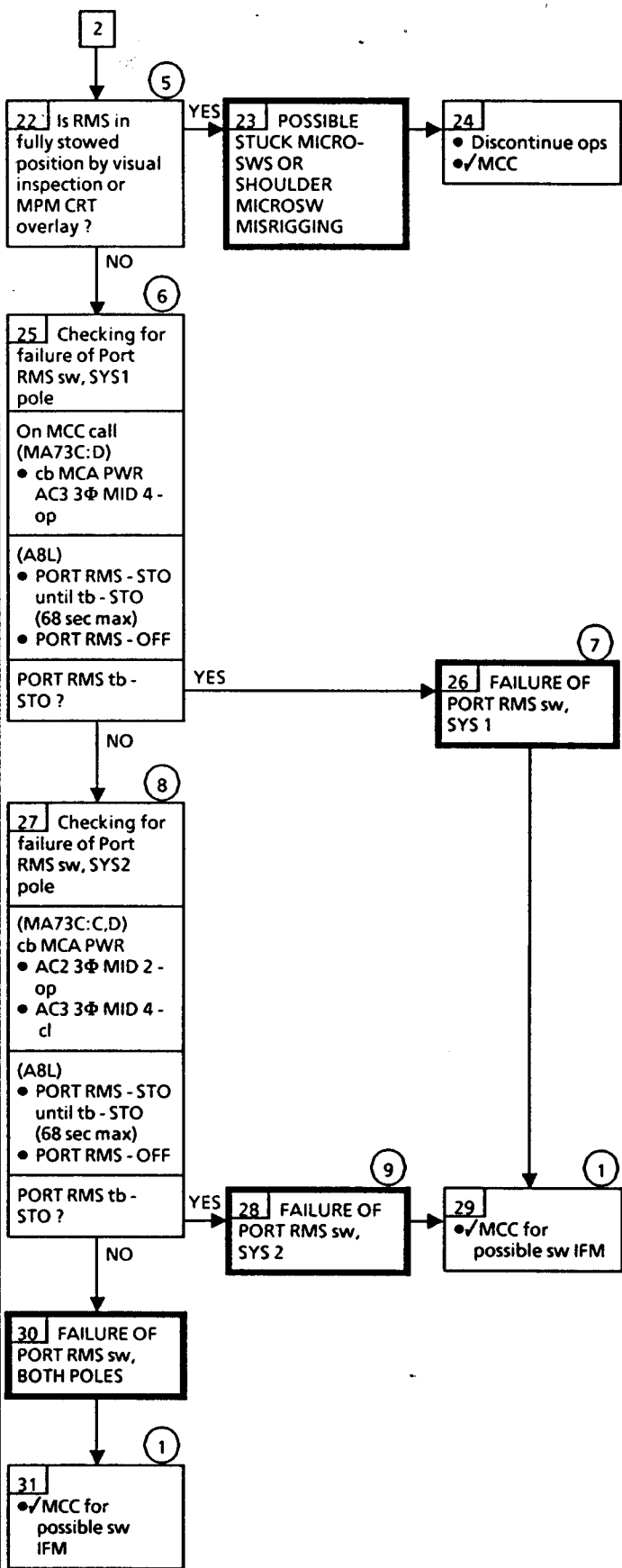
PDRS 13.5a (Cont)



- ① Refer to RMS - MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
- ④ Receiving signals from Aft, Mid, Fwd, and Shld pedestals command tb. To trip tb, all four SYS 1 OR SYS 2 indications are reqd
- ⑤ RMS should not be used unless shoulder linkage is overcenter locked
- ⑥ See EPS SSR-136, MNC MMC4, for equipment lost when cb MCA PWR AC3 3Φ MID 4 - op
- ⑦ Closing cb MCA PWR AC3 3Φ MID 4 while PLD BAY MECH PWR SYS 2 is on may cause MPM to stow
- ⑧ See EPS SSR-126, MNB MNC2, for equipment lost when cb MCA PWR AC2 3Φ MID2 - op
- ⑨ Closing cb MCA PWR AC2 3Φ MID2 while PLD BAY MECH PWR SYS 1 is on may cause MPM to stow



PDRS 13.5b (Cont)



- ① Refer to RMS-MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)
- ⑤ RMS should not be used unless shoulder linkage is overcenter-locked
- ⑥ See EPS SSR-136, MNC MMC4, for equipment lost when cb MCA PWR AC3 3Φ MID4 - op
- ⑦ Closing cb MCA PWR AC3 3Φ MID4 while PLDBAY MECH PWR SYS2 is on may cause MPM to DPY
- ⑧ See EPS SSR-126, MNB MMC2, for equipment lost when cb MCA PWR AC2 3Φ MID2 - op
- ⑨ Closing cb MCA PWR AC2 3Φ MID 2 while PLDBAY MECH PWR SYS 1 is on may cause MPM to DPY

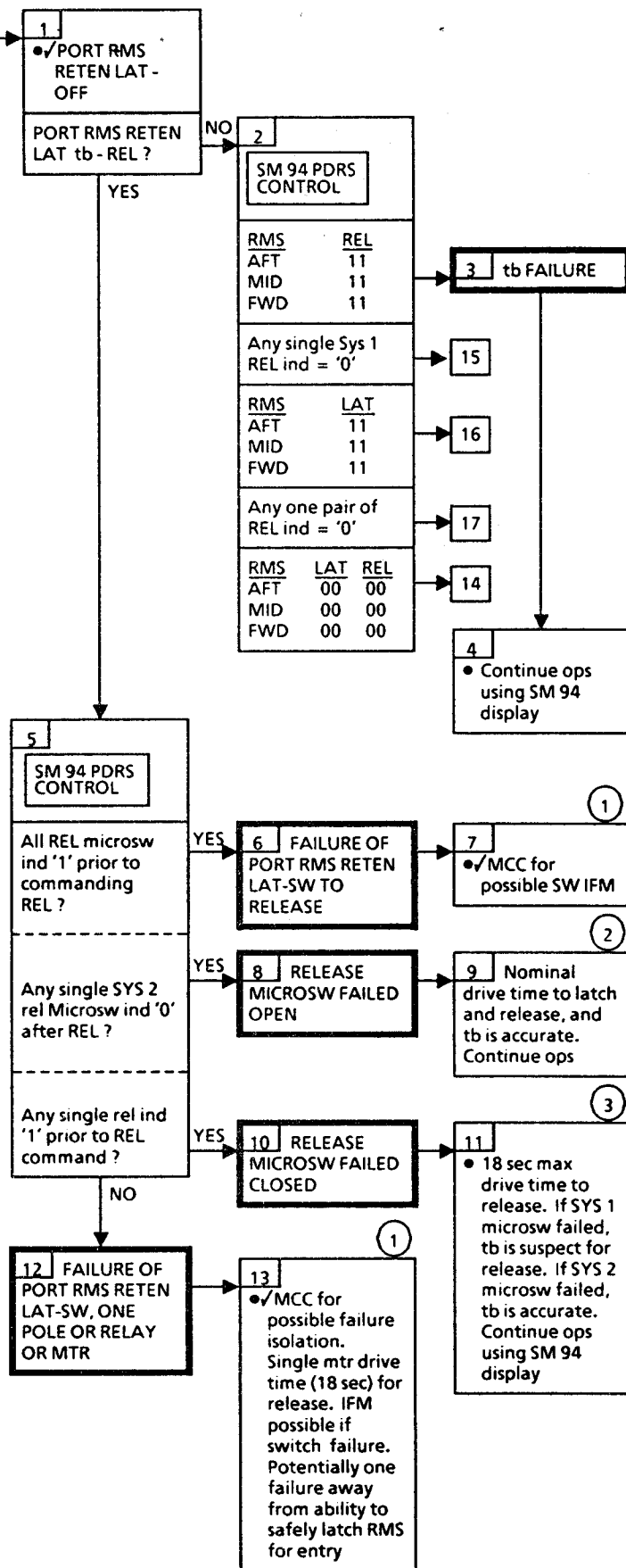
PDRS

13.5c MRL REL - tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

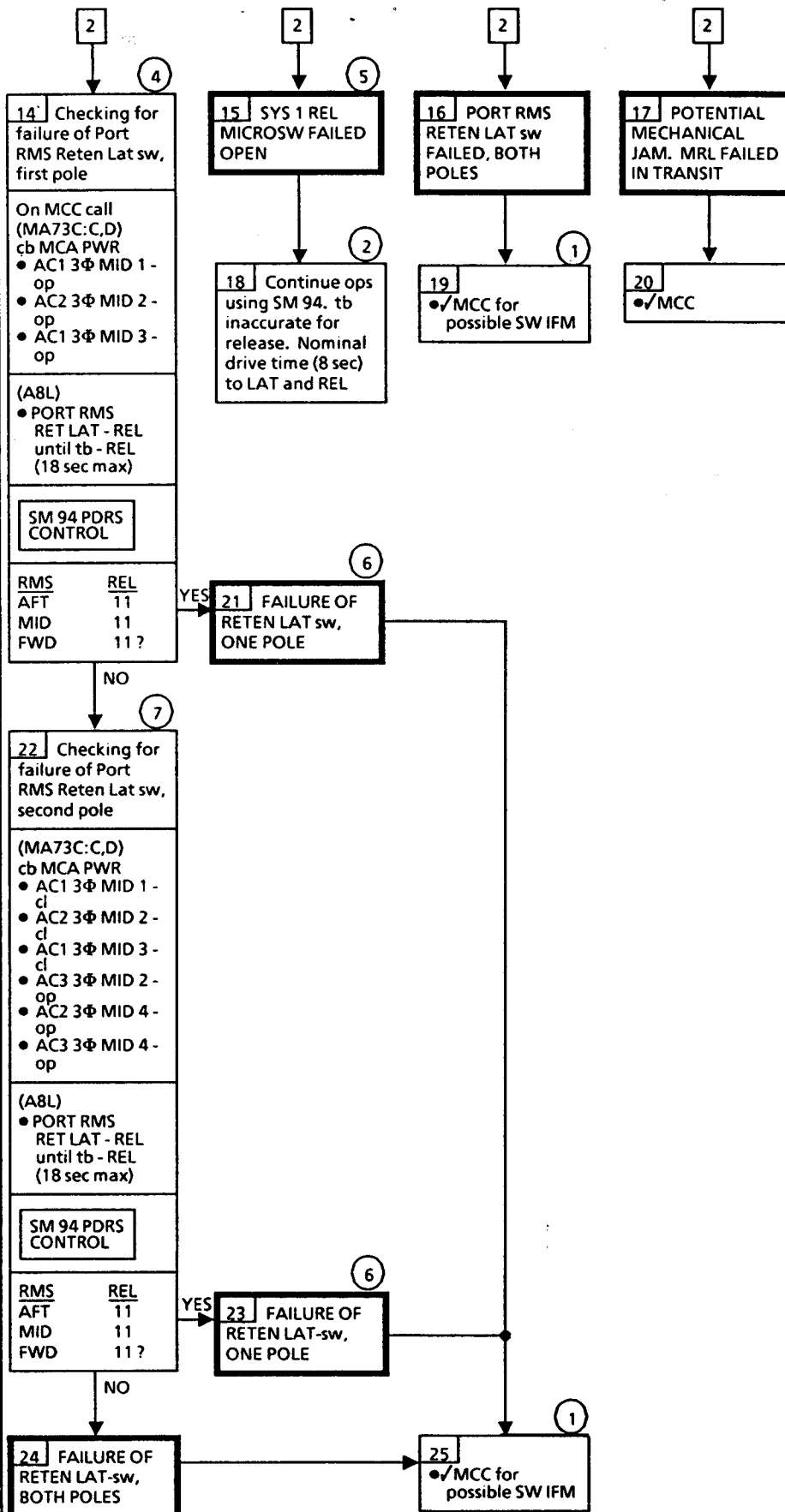
tb not REL
or
SM 94 PDRS CONTROL

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 1,2 - ON
MNC MID 2 - ON
(MA73C:B)
MCA LOGIC
MNA MID 3 - ON
MNB MID 3,4 - ON
MNC MID 4 - ON
(MA73C:C)
cb MCA PWR
AC1 3Φ MID 1 - cl
AC2 3Φ MID 1,2 - cl
AC3 3Φ MID 2 - cl
(MA73C:D)
cb MCA PWR
AC1 3Φ MID 3 - cl
AC2 3Φ MID 3,4 - cl
AC3 3Φ MID 4 - cl
(R13L)
PL BAY MECH PWR
SYS 1,2 - ON



- ① Refer to RMS-MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)
- ② One mtr will continue to drive when commanding release until PORT RMS RETEN LAT - OFF
- ③ Failed-on microsw disables one mtr. The tb is inaccurate from 8-18 sec (latches halfway open at 8 sec)



- ① Refer to RMS-MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)
- ② One mtr will continue to drive when commanding release until PORT RMS RETEN LAT - OFF
- ④ See EPS SSR 126 MMC2, 115 MMC1, 116 MMCs for equipment lost when cb MCA PWR AC1 3Φ MID1, MCA PWR AC2 3Φ MID 2, MCA PWR AC1 3Φ MID 3 - op
- ⑤ The tb is activated by receiving all three microsw indications from SYS1 only
- ⑥ Closing previously opened cb with payload bay mech pwr on may cause MRLs to operate without command
- ⑦ See EPS SSR - 135 MMC2, 128 MMC4, 136 MMC4 for equipment lost when cb MCA PWR AC3 3Φ MID 2, MCA PWR AC2 3Φ MID4, MCA PWR AC3 3Φ MID 4 - op

963

13.5d 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 1,2 - ON
MNC MID 2 - ON
(MA73C:B)
MCA LOGIC
MNA MID 3 - ON
MNB MID 3,4 - ON
MNC MID 4 - ON
(MA73C:C)
cb MCA PWR
AC1 3Φ MID 1 - cl
AC2 3Φ MID 1,2 - cl
AC3 3Φ MID 2 - cl
(MA73C:D)
cb MCA PWR
AC1 3Φ MID 3 - cl
AC2 3Φ MID 3,4 - cl
AC3 3Φ MID 4 - cl
(R13L)
PL BAY MECH PWR
SYS 1,2 - ON

1 (ABL)
•✓/PORT RMS RETEN LAT - OFF
PORT RMS RETEN tb - LAT ?

NO

2

SM 94 PDRS CONTROL

RMS	LAT
AFT	11
MID	11
FWD	11

Any single Sys 1 LAT ind = '0'

RMS	REL
AFT	11
MID	11
FWD	11

Any one pair of LAT ind = '0'

RMS	LAT	REL
AFT	00	00
MID	00	00
FWD	00	00

3 tb FAILURE

15

16

17

14

4
• Continue ops using SM 94 display

5
SM 94 PDRS CONTROL

All LAT microsw ind '1' prior to commanding LAT ?

Any single SYS 2 LAT microsw ind '0' after LAT ?

Any single LAT ind '1' prior to LAT command ?

6 FAILURE OF PORT RMS RETEN LAT SW TO LATCH

7
•✓/MCC for possible sw IFM

8 LATCH MICROSW FAILED OPEN

9 Nominal drive time to latch and release. The tb is accurate. Continue ops

10 LATCH MICROSW FAILED CLOSED

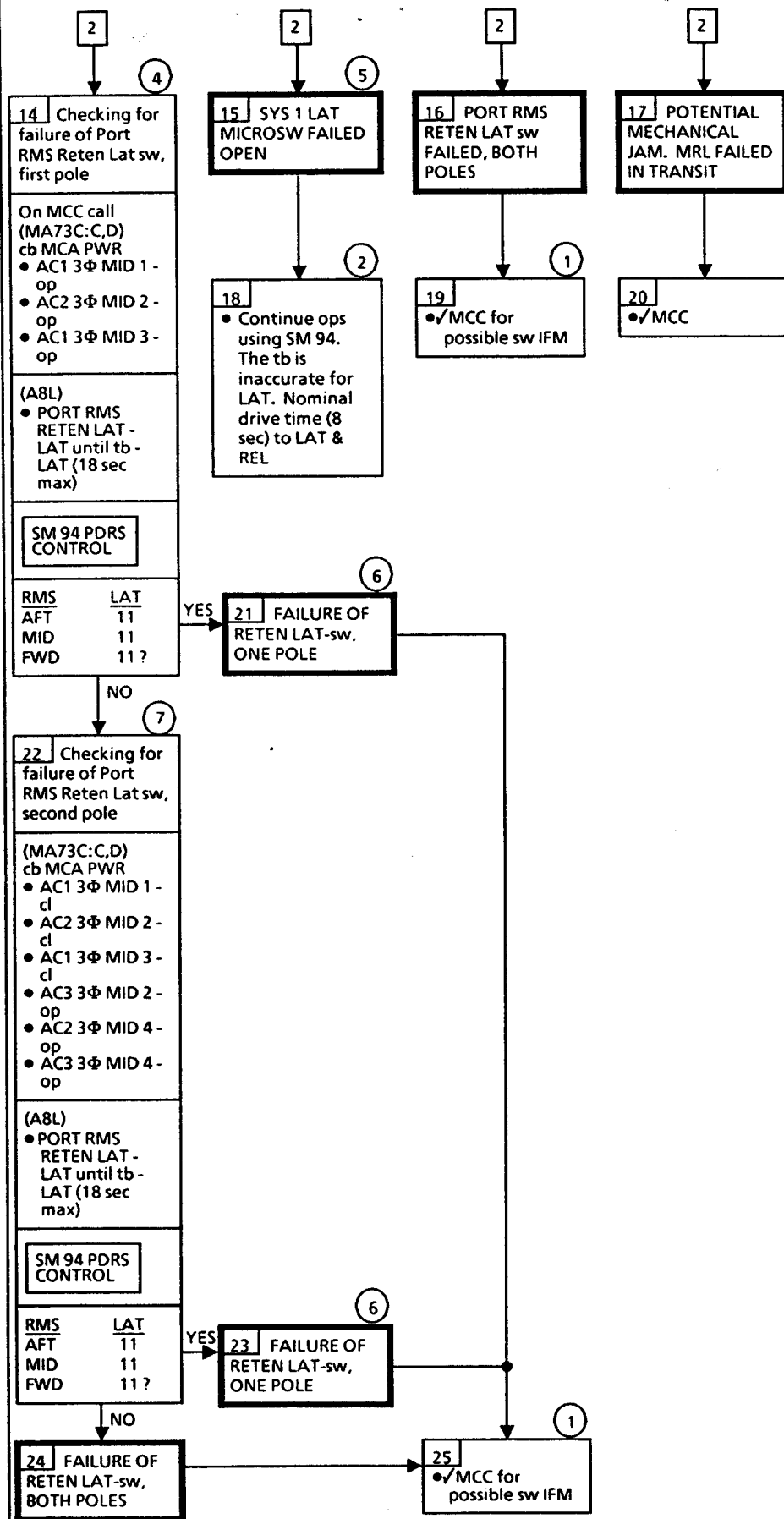
11 FAILURE OF PORT RMS RETEN LAT-SW, ONE POLE OR RELAY OR MTR

12 18 sec max drive time to LATCH. The tb is suspect for release if SYS 1 microswitch failed. The tb is accurate if SYS 2 microswitch failed. Continue Ops using SM 94 display

13
•✓/MCC for possible failure isolation

Single mtr drive time (18 sec) for LATCH. IFM possible if switch failure. Potentially one failure away from ability to safely latch RMS for entry

- 1 Refer to RMS-MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE LATCH) (IFM)
- 2 One mtr will continue to drive when commanding LATCH until Port RMS RETEN LAT switch is off
- 3 Failed-on microsw disables one mtr. The tb is inaccurate from 8-18 sec (latches halfway closed at 8 sec)



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

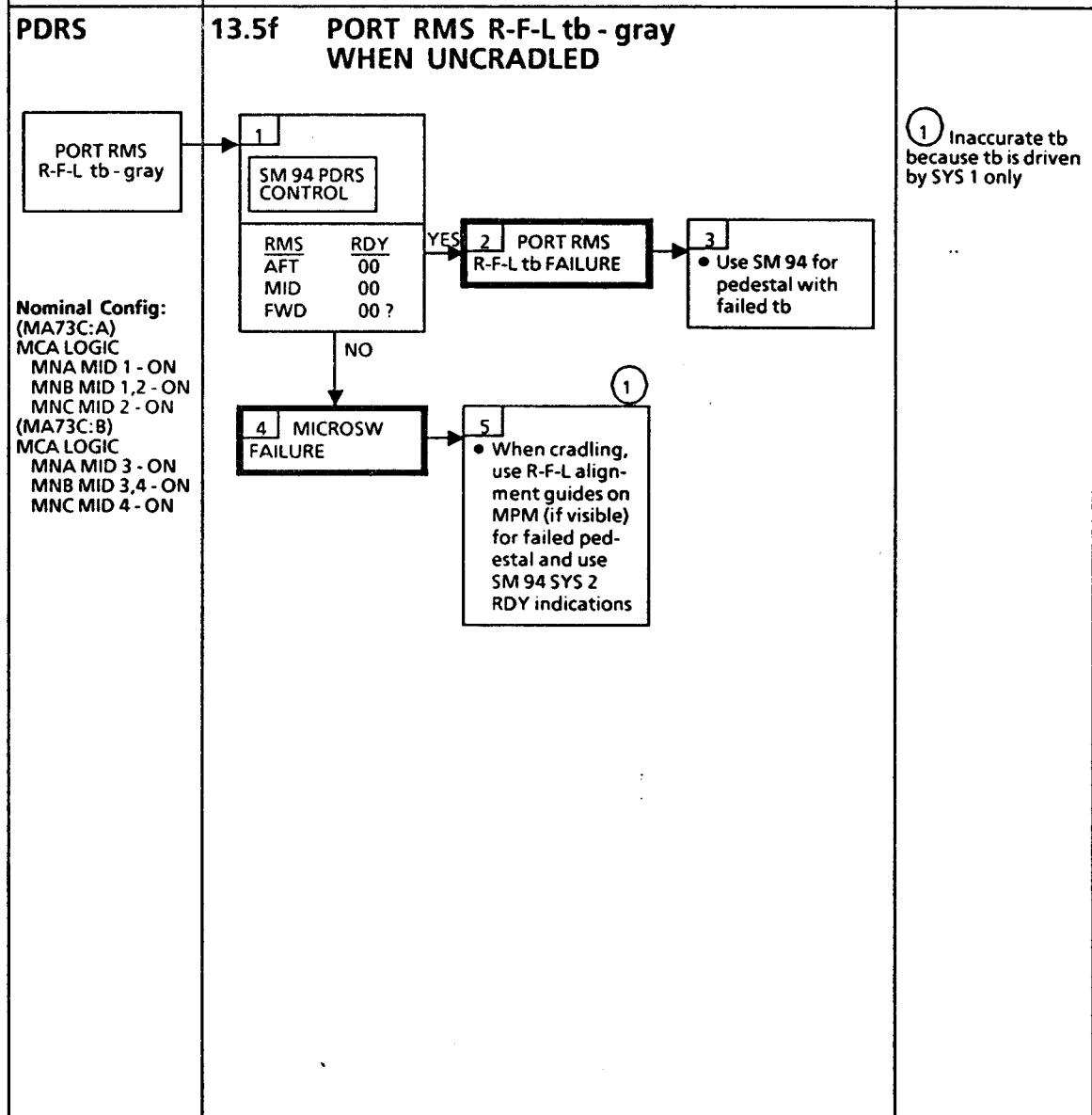
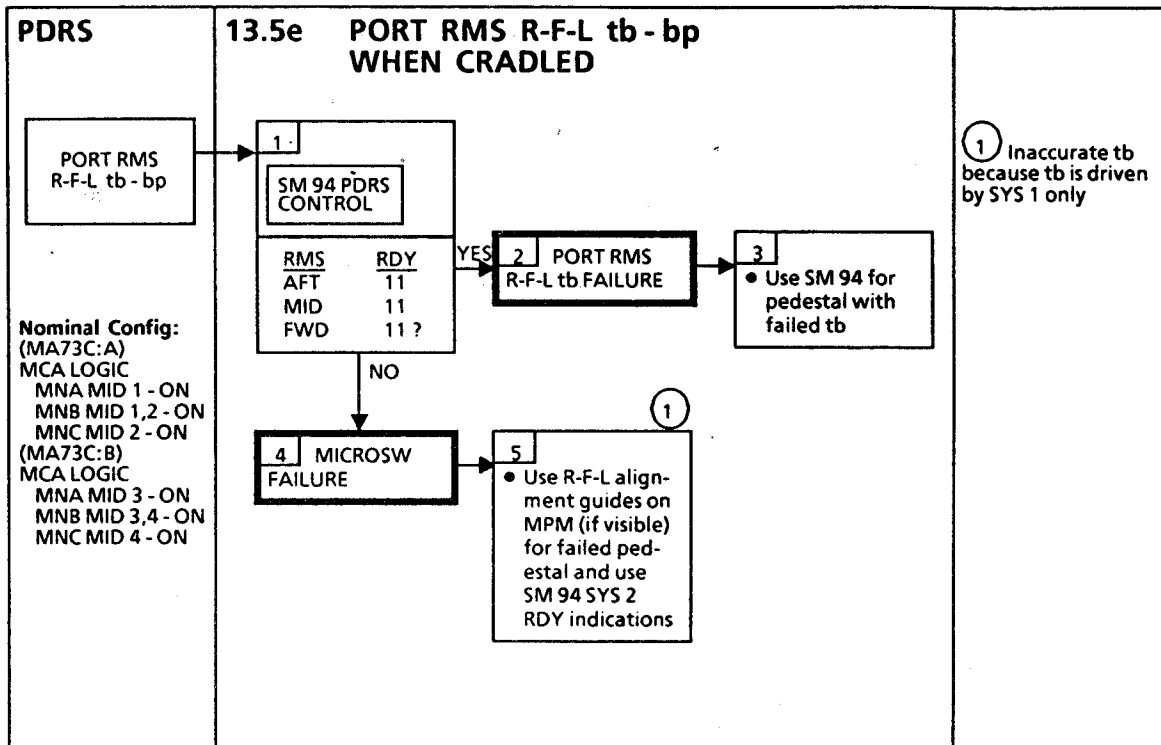
2 One mtr will continue to drive when commanding LATCH until Port RMS RETEN LAT switch is off

4 See EPS SSR-126 MMC2, 115 MMC1, 116 MMC3 for equipment lost when cb MCA PWR AC1 3Φ MID 1, MCA PWR AC2 3Φ MID 2, MCA PWR AC1 3Φ MID 3 - op

5 The tb is activated by receiving all three microsw indications from SYS1 only

6 Closing previously opened cbs with payload bay mech pwr on may cause MRLs to operate without command

7 See EPS SSR-135 MMC2, 128 MMC4, 136 MMC4 for equipment lost when cb MCA PWR AC3 3Φ MID 2, MCA PWR AC2 3Φ MID 4, MCA PWR AC 3 3Φ MID 4 - op



PDRS SSR-1 MPM MTR INHIBIT DISABLE

PDRS SSR

SM 94 PDRS CONTROL

If RMS STO/DPLY - 1 X 1 X :

MA73C:A 1. Inhibit Microswitch
MCA LOGIC MNC MID 2 - OFF

CRT ✓RMS STO/DPLY - 0 X 0 X

2. Stow (Deploy) MPM

CAUTION

If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result

A8L PORT RMS - STO (DPY) as reqd (68 sec max)
- OFF

CRT ✓MPM is stowed (deployed) using CRT indication (tb inaccurate):
Stowed: RMS STO/DPLY - 0 1 0 X
(Deployed: RMS STO/DPLY - 0 X 0 1)

MCC can verify status of FWD, MID, AFT pedestals

MA73C:A 3. Enable Bus
MCA LOGIC MNC MID 2 - ON >>

If RMS STO/DPLY - X 1 X 1:

MA73C:B 4. Inhibit Microswitch
MCA LOGIC MNB MID 4 - OFF

CRT ✓RMS STO/DPLY - X 0 X 0

5. Stow (Deploy) MPM

CAUTION

If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result

A8L PORT RMS - STO (DPY) as reqd (68 sec max)
- OFF

CRT ✓MPM is stowed (deployed) using CRT indication (tb accurate):
Stowed: RMS STO/DPLY - 1 0 X 0
(Deployed: RMS STO/DPLY - X 0 1 0)

MCC can verify status of FWD, MID, AFT pedestals

MA73C:B 6. Enable Bus
MCA LOGIC MNB MID 4 - ON

**PDRS SSR-2
RMS JOINT FAILED PAD**

A8U BRAKES - ON (tb-on)

If joint failed free,
 DAP: VRCS or free drift

BRAKES - as reqd
MODE - _____ (MCC)

Maneuver to:

	SY	SP	EP	WP	WY	WR
1						
2						
3						
4						
5						

BRAKES - ON (tb-on)
MODE - not DIRECT (Its-off)

PDRS SSR-3 BACKDRIVE TECHNIQUE - JOINT FREE

SP - FAILED

WARNING

PORT RADIATOR must be stowed

NOTE
Can expect CONT ERR
and Master Alarm

1. SETUP

If RADIATORS deployed
Perform RAD STOW (ORB OPS, ECLS)

✓BRAKES - ON (tb-ON)
PARAM sel - JOINT ANGLE

A6U

✓DAP: VRCS or free drift

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 BRAKES INH - ITEM 10, EXEC (*)

2. BACKDRIVE OPERATION

NOTE
Hold SINGLE DR command for 4 sec,
apply BRAKES - ON then release
SINGLE DR command

RATE - COARSE (RATE MIN tb-OFF)

JOINT sel - EP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR - '+', after 4 sec and while holding sw
BRAKES - ON (tb - ON)

If SP < 7.5 deg, Go to step 3

If EP ≥ -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

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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 (lt-on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
current value	FREE	+ 1	+ 10	0	0
0					
		-1			

MODE - not DIRECT (lt-off)

4. START RMS CRADLE

NOTE
Hold SINGLE DR command for 1/2 sec,
apply BRAKES - ON then release
SINGLE DR command

JOINT sel - EP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR - '+', after 1/2 sec and while holding sw
BRAKES - ON (tb-ON)

If PORT RMS R-F-L FWD tb - gray,
Go to step 5

If EP ≥ + 1 deg, reconfig EP
MODE - DIRECT (lt-on)
DIRECT DR EP to: 0
MODE - not DIRECT (lt-off)

Repeat step 4

5. COMPLETE RMS CRADLE

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	FREE	0	0	0	0

MODE - not DIRECT (lt-off)

✓PORT RMS R-F-L tb (three) - gray

Perform steps 2-4, RMS PWRDN (PDRS OPS) >>

PDRS SSR-3 (Cont)

EP - FAILED

NOTE
Can expect CONT ERR
and Master Alarm

1. SETUP

✓BRAKES - ON (tb-ON)
PARAM sel - JOINT ANGLE

A6U

✓DAP: VRCS or free drift

If EP \geq -1 deg, Go to step 3

Calculate "IC": If EP > -65, IC = -(2 x EP)
Otherwise, IC = +130

MODE - DIRECT (It-on)
DIRECT DR to:

SY	SP	EP	WP	WY	WR
current value	IC	FREE	+5	0	0
0					

MODE - not DIRECT (It-OFF)

SM 94 PDRS CONTROL

AUTO BRAKES INH - ITEM 10, EXEC (*)

2. BACKDRIVE OPERATION

NOTE
Hold SINGLE DR command for 4 sec,
apply BRAKES - ON then release
SINGLE DR command

RATE - COARSE (RATE MIN tb-OFF)

JOINT sel - SP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR - '-', after 4 sec and while holding sw
BRAKES - ON (tb - ON)

If EP \geq -1 deg, Go to step 3

If SP < -(EP), reconfig SP
MODE - DIRECT (It-on)
DIRECT DR SP to: -(2 X EP) or max +130
MODE - not DIRECT (It-off)

Repeat step 2

PDRS SSR-3 (Cont)

3. RECONFIG FOR CRADLE

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR to:

SY	SP	EP	WP	WY	WR
current value	+ 15	FREE	+ 10	0	0
0					

MODE - not DIRECT (lt-off)

4. START RMS CRADLE

NOTE

Hold SINGLE DR command for 1/2 sec,
apply BRAKES - ON then release
SINGLE DR command

JOINT sel - SP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

If EP > +0.1,
SINGLE DR - '+', after 1/2 sec and while holding sw
BRAKES - ON (tb-ON)

If EP < -0.1,
SINGLE DR - '-', after 1/2 sec and while holding sw
BRAKES - ON (tb-ON)

Repeat step 4 until $-0.1 < EP < +0.1$

5. COMPLETE RMS CRADLE

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)

DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	0	FREE	0	0	0

MODE - not DIRECT (lt-off)

✓PORT RMS R-F-L tb (three) - gray

Perform steps 2-4, RMS PWRDN (PDRS OPS)

PDRS SSR-3 (Cont)

WP - FAILED

1. SETUP

A6U
✓BRAKES - ON (tb-ON)
✓DAP: VRCS or free drift
MODE - DIRECT (lt-on)
DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	+90	-90	FREE	0	+19.5

MODE - not DIRECT (lt-off)
PARAM sel - JOINT ANGLE

CRT

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, the THC input will be at 1/3 to 1/2 deflection.
After 1-2 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 1-2 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 1-2 sec,
THC - '-Z' (UP) full deflection

When WP joint angle is constant,
BRAKES - ON (tb-ON)
Release THC

If $-0.1 \leq WP \leq +0.1$, go to step 2c

If $SP > 120$ deg or < 60 deg, reconfig per step 3

If $WP > +0.1$ deg, repeat step 2b

If $WP < -0.1$ deg, go to step 2a

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PDRS SSR-3 (Cont)

2c. If $-0.1 \leq WP \leq +0.1$ deg

✓BRAKES - ON (tb-ON)
 MODE - DIRECT (lt-on)
 DIRECT DR to cradle:

SY	SP	EP	WP	WY	WR
0	Current Value	+ 1 MA	FREE	0	+ 19.5
	0 (MA)	0			

MODE - not DIRECT (lt-off)

✓PORT RMS R-F-L tb (three) - gray

Perform steps 2-4, RMS PWRDN (PDRS OPS) >>

3. RECONFIG OF JOINTS

✓BRAKES - ON (tb-ON)
 MODE - DIRECT (lt-on)
 DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	+ 90	-90	FREE	0	+ 19.5

MODE - not DIRECT (lt-off)

If $WP < -0.1$ deg, go to step 2a

If $WP > +0.1$ deg, go to step 2b

PDRS SSR-3 (Cont)

WY - FAILED

1. SETUP

A6U

- ✓BRAKES - ON (tb-ON)
- ✓DAP: VRCS or free drift
- 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)
- PARAM sel - JOINT ANGLE

CRT

SM 94 PDRS CONTROL

AUTO BRAKES INH - ITEM 10, EXEC (*)

2. BACKDRIVE OPERATION (To config $-0.1 \leq WY \leq +0.1$ deg)

NOTE

For steps 2a and 2b, the THC input will be at 1/3 to 1/2 deflection. After 2-3 sec, quickly command full scale deflection in opposite direction. When WY joint angle displayed is constant, apply BRAKES - ON and release THC

2a. If $WY < -0.1$ deg

- RATE sw - COARSE (RATE MIN tb-OFF)
- If WP > -2.0 deg,
RATE sw - VERN (RATE MIN tb-ON)

- ✓JOINT sel - WY
- BRAKES - OFF (tb-OFF)
- MODE - END EFF, ENTER

THC - ' + Y ' (PORT) 1/3 to 1/2 deflection

After 3-4 sec,
THC - ' - Y ' (STBD) 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 > 120 deg or < 60 deg, go to step 3

If WP < -0.1 deg, repeat step 2a

If WP > +0.1, go to step 2b

2b. If $WY > +0.1$ deg

- ✓RATE sw - COARSE (RATE MIN tb-OFF)
- If WY < +2.0 deg,
RATE sw - VERN (RATE MIN tb-ON)

- ✓JOINT - WY
- BRAKES - OFF (tb-OFF)
- MODE - END EFF, ENTER

THC - ' - Y ' (STBD) 1/3 to 1/2 deflection

After 2-3 sec,
THC - ' + Y ' (PORT) full deflection

When WY joint angle is constant,
BRAKES - ON (tb-ON)
Release THC

If $-0.1 \leq WY \leq +0.1$ deg, go to step 2c

If SP > 120 deg or < 60 deg, go to step 3

If WP > +0.1 deg, repeat step 2b

If WP < -0.1 deg, go to step 2a

PDRS SSR-3 (Cont)

2c. If $-0.1 \leq WY \leq 0.1$ deg

✓BRAKES - ON (tb-ON)
MODE - DIRECT (It-on)
DIRECT DR to cradle:

SY	SP	EP	WP	WY	WR
0	Current Value	+ 1 MA	+ 5	FREE	0
	<u>0</u>	<u>0</u>	<u>0</u>		

MODE - not DIRECT (It-off)

✓PORT RMS R-F-L tb (three) - gray

Perform steps 2-4, RMS PWRDN (PDRS OPS) >>

3. RECONFIG OF JOINTS

✓BRAKES - ON (tb-ON)
MODE - DIRECT (It-on)
DIRECT DR to:

SY	SP	EP	WP	WY	WR
0	+90	-90	0	FREE	+ 19.5

MODE - not DIRECT (It-off)

If $WP < -0.1$ deg, go to step 2a

If $WP > +0.1$ deg, go to step 2b

**PDRS SSR-4
RMS IFM D&C KIT**

1. Install RMS IFM D&C KIT; RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM, PROCEDURES M THRU R)

NOTE

All pnl A8U, A8L tbs are functional with D&C Kit installed

- A8L 2. RMS SEL - PORT
- O19 3. If SHOULDER BRACE RELEASE reqd:
a. ✓DC UTIL PWR MNA - OFF
b. COAS PWR - ON
c. RMS IFM D&C KIT:
SHOULDER BRACE - RELEASE (Hold for 2 sec following tb-gray on Pnl A8U)
d. COAS PWR - OFF
Go to step 5

4. If DIRECT DRIVE, END EFFECTOR, or safing INHIBIT functions reqd:

CAUTION

If RMS IFM D&C Kit INHIBIT switch is in INHIBIT, auto safing is disabled. Auto brakes still available. If joint runaway occurs while using DIRECT DRIVE, turn DC UTIL PWR MNA (pnl 019) to OFF

- A8U a. RMS IFM D&C Kit:
✓INHIBIT sw - OFF
b. DC UTIL PWR MNA - ON
c. If DIRECT DRIVE functions reqd:
BRAKES - ON (tb-ON)

NOTE

Operation of Joint Select Switch, Direct Drive, and End Effector switches similar to corresponding pnl A8U switches. Limping of arm not available for End Effector functions

- O19 d. Perform DIRECT DRIVE, END EFFECTOR, or safing INHIBIT functions as reqd
e. DC UTIL PWR MNA - OFF

5. Remove RMS IFM D&C KIT; RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM, PROCEDURES M THRU R)

977 END