

Payload Systems Data and Malfunction Procedures

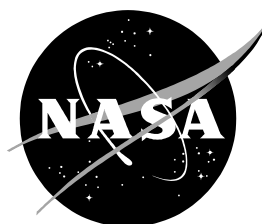
STS-125

**Mission Operations Directorate
Operations Division**

**Final
March 19, 2008**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



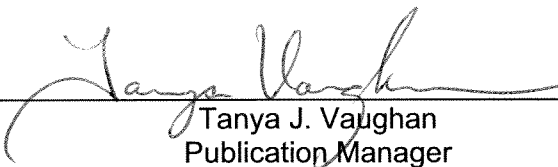
SMS FDF CHANGE NOTIFICATION		SIM PACK		DATE INITIATED 5/9/08	DATE RECEIVED (PMO)
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PL SYS STS-125		Change is for flights (Also give SMS load if load dependent):		SMS UNIQUE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	DEVELOPMENTAL? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
FABRICATED ITEM CHANGE? <input checked="" type="checkbox"/> NONE <input type="checkbox"/> CUE CARDS <input type="checkbox"/> TRANSPARENCIES <input type="checkbox"/> Other _____					
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OTHER AFFECTED FDF BOOKS				*Refer to Crew Procedures Management Plan Are all SIM PACKS submitted? <input type="checkbox"/> YES <input type="checkbox"/> NO	
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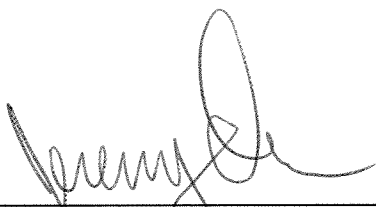
**PAYLOAD SYSTEMS DATA AND MALFUNCTION PROCEDURES
STS-125**

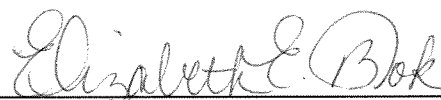
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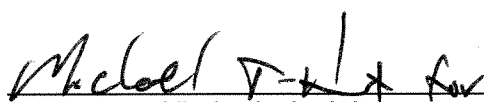
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Publication Manager	DO35/T. Vaughan	281-483-4180
Alternate Publication Manager	DO35/R. Ross	281-244-1104
SSE	DO53/M. Halverson	281-483-1831
HST Systems	DO52/R. Adams	281-483-8191
HST Command/Data	DO55/S. Tripodi	281-483-3521

PAYLOAD SYSTEMS DATA AND MALFUNCTION PROCEDURES
 STS-125

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* – Omit from flight book

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SSE

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SSE

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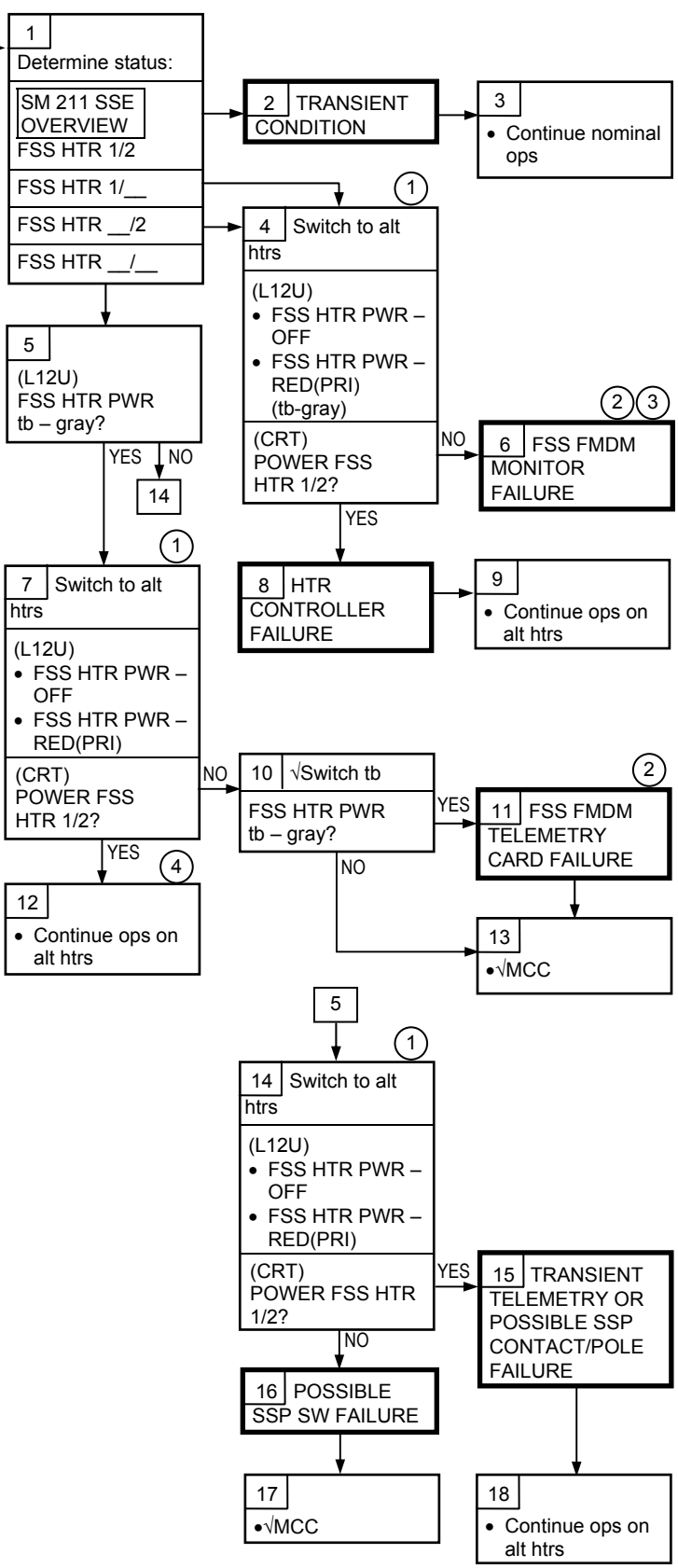
SSE THERMAL OVERVIEW (TBS)

SSE THERMAL

1.1a POWER FSS HTR NOT 1/2 (S211)

POWER FSS HTR NOT 1/2

Nominal Config:
 (R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB)
 (L12U)
 cb FSS/ORUC A
 SIDE PWR – cl
 FSS HTR PWR – PRI(RED) (tb-gray)



- ① If tm shows off but FSS HTR drawing current, then HTR is ON. HTR may be ON but not drawing current based on temp
- ② Ref FSS FMDM DISCRETE INPUT CARDS, DIH CARD 04 CH 01
- ③ Single discrete input failure
- ④ Possible transient tm failure or multiple failures

SSE THERMAL 1.1

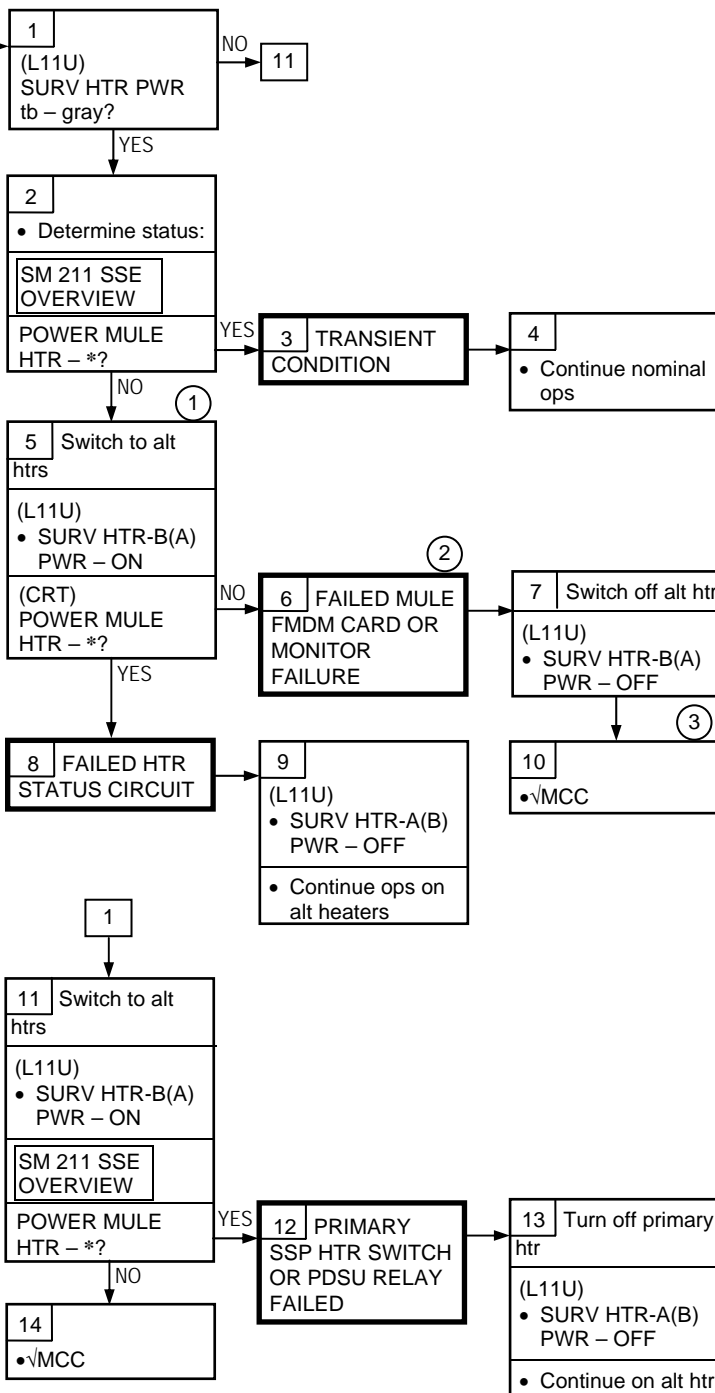
SSE THERMAL

1.1b POWER MULE HTR NOT * (S211)

POWER MULE HTR NOT *

Nominal Config:

(R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB)
 (L11U)
 cb MULE B SIDE
 PWR – cl
 SURV HTR-A(B)
 PWR – ON



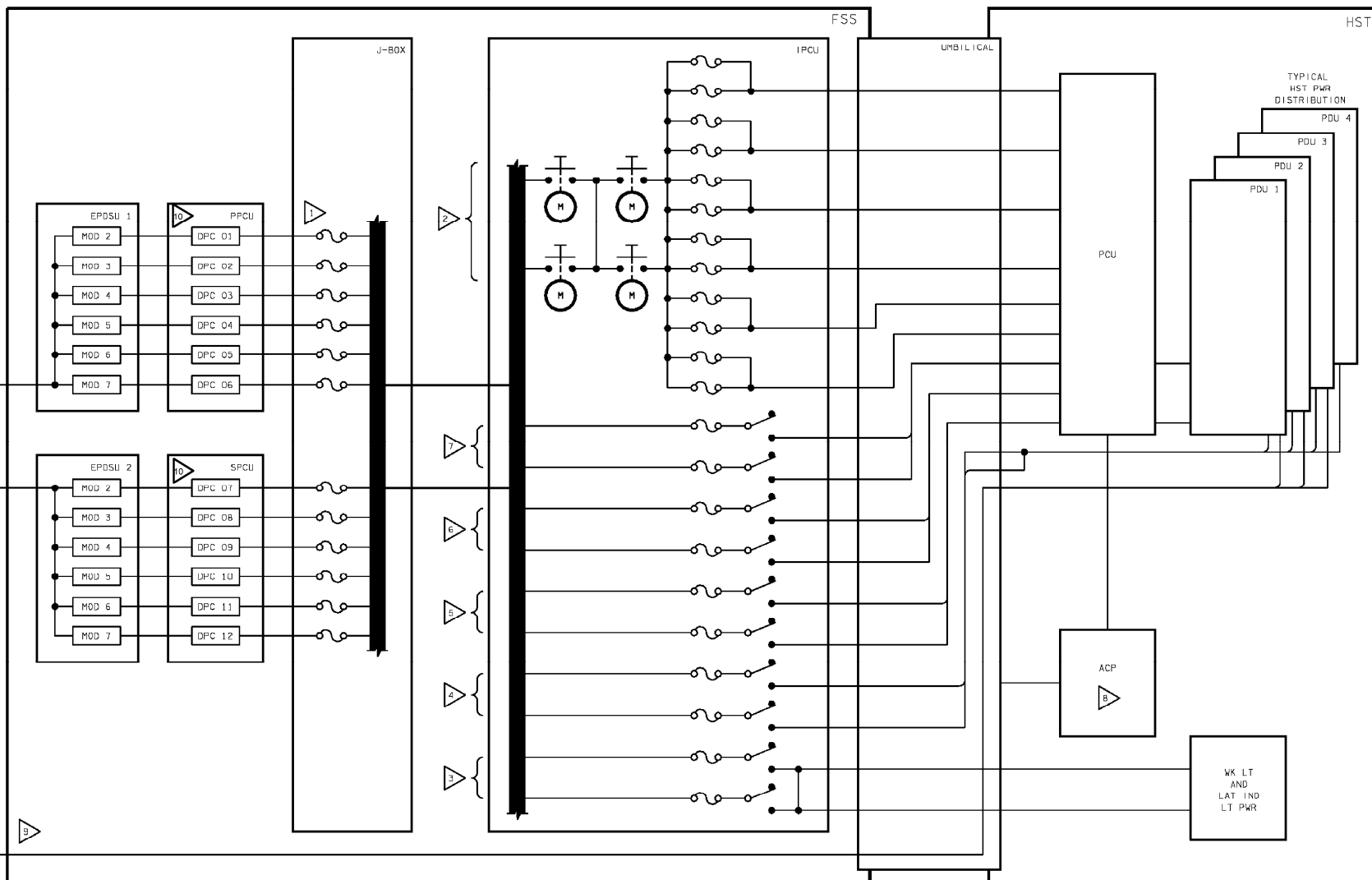
①
 If tlm shows off but MULE HTR drawing current, then HTR is ON. HTR may be ON but not drawing current based on temp

②
 Ref MULE FMDM CHANNELIZATION CHART, CARD 04 CHANNEL 01

③
 Possible SSE SSR-1 FMDM SWAP reqd

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SSE/HST POWER TRANSFER OVERVIEW



- NOTES:
- 1 INDIVIDUAL DPC OUTPUTS REDUNDANTLY FUSED
 - 2 EXT MAIN PWR
 - 3 WK LT PWR
 - 4 RSU HTR PWR/CNTRL
 - 5 EXT ESS PWR A, B
 - 6 INT ESS PWR CNTRL ON, OFF
 - 7 INT MAIN PWR CNTRL ON, OFF
 - 8 ACP ALLOWS REMOTE CONTROL OF IPCU RELAYS FOR MAIN AND ESS PWR BY EVA PERSONNEL
 - 9 HST SHUTTER CLOSE PWR
 - 10 DPC CAN BE INDIVIDUALLY CONTROLLED VIA FMDM COMMAND

48069002_109. ART 2

1-7

PL SYS/125/FIN

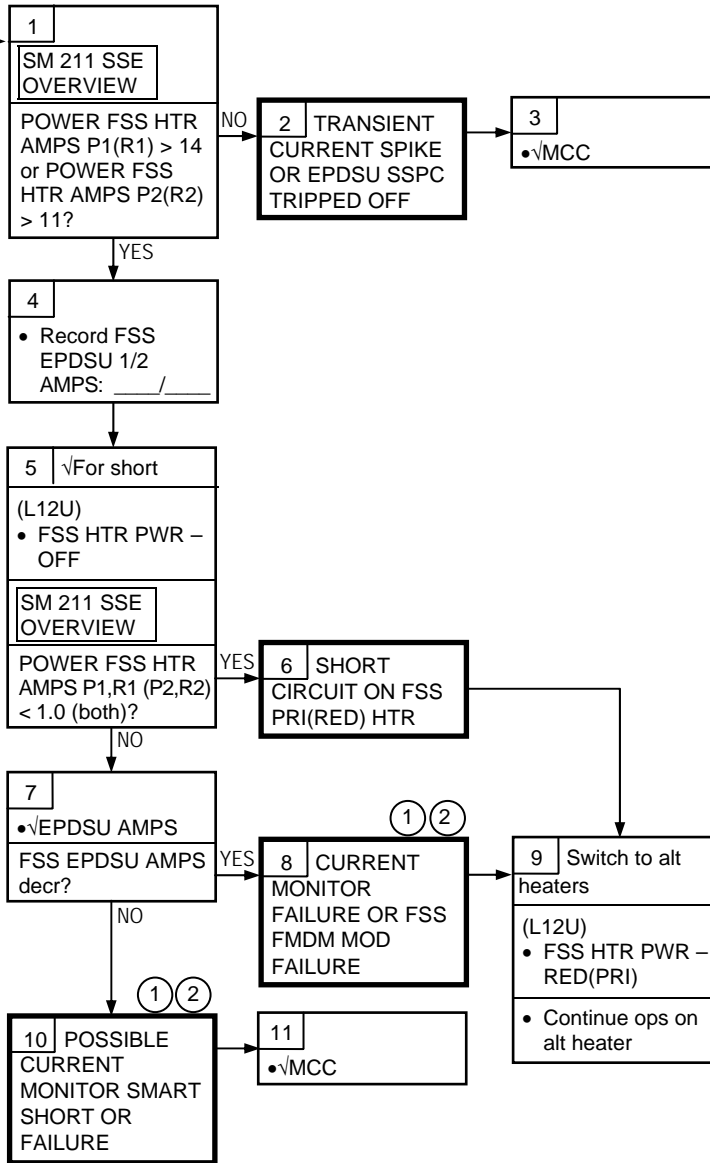
SSE EPS

1.2a POWER FSS HTR AMPS ↑ (S211)

POWER FSS HTR AMPS ↑

If:
 POWER FSS HTR P1(R1) AMPS > 14 or
 POWER FSS HTR P2(R2) AMPS > 11

Nominal Config:
 (R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB)
 (L12U)
 cb FSS/ORUC A
 SIDE PWR – cl
 FSS HTR PWR –
 PRI(RED) (tb-gray)



- ① Single analog input failure
- ② Ref FSS FMDM ANALOG INPUT CARDS
 MOD 1
 CH 8 – Htr P1
 CH 21 – Htr R1
 MOD 0
 CH 13 – Htr R2
 CH 15 – Htr P2

SSE
EPS

1.2

SSE EPS

1.2b 'S212 AMSB DC AMPS'

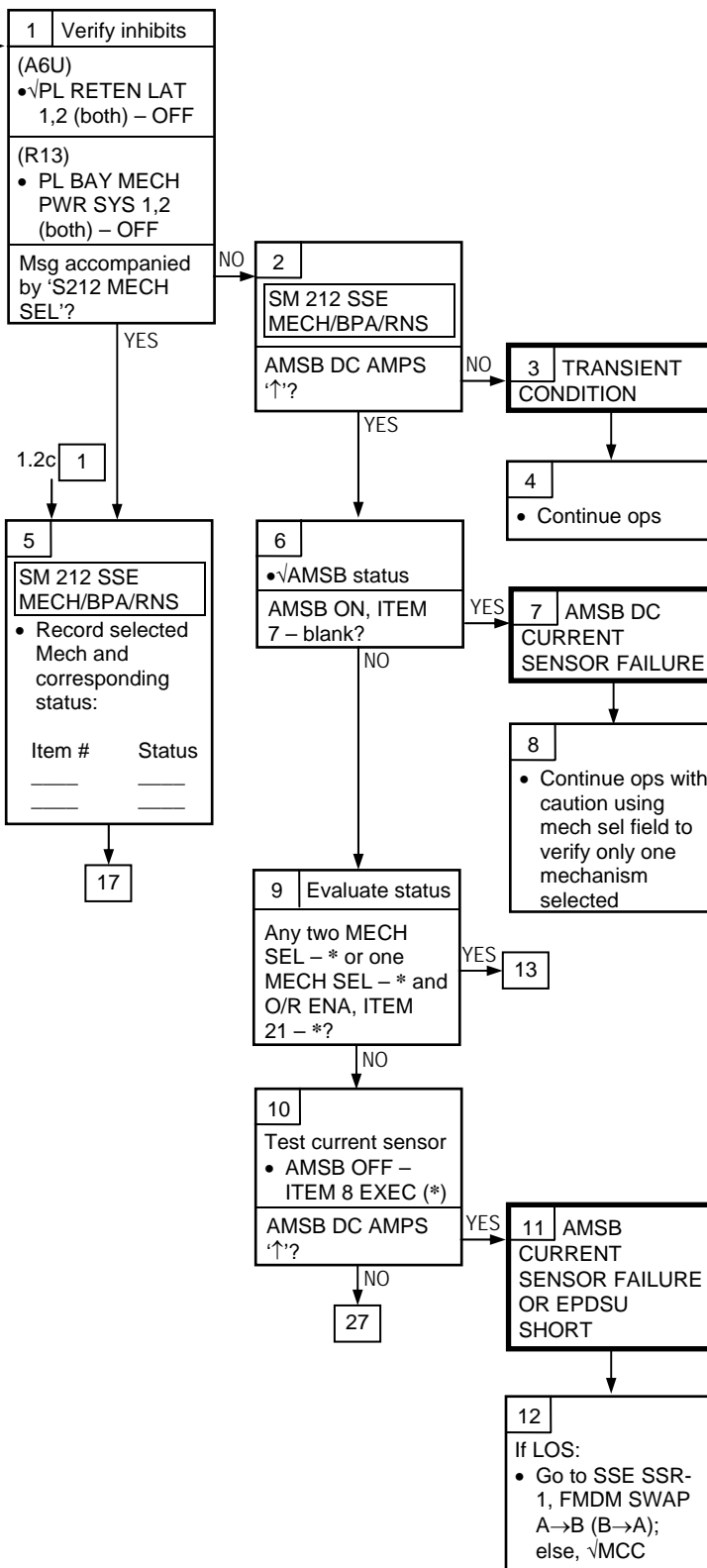
SM ALERT

'S212 AMSB DC AMPS'

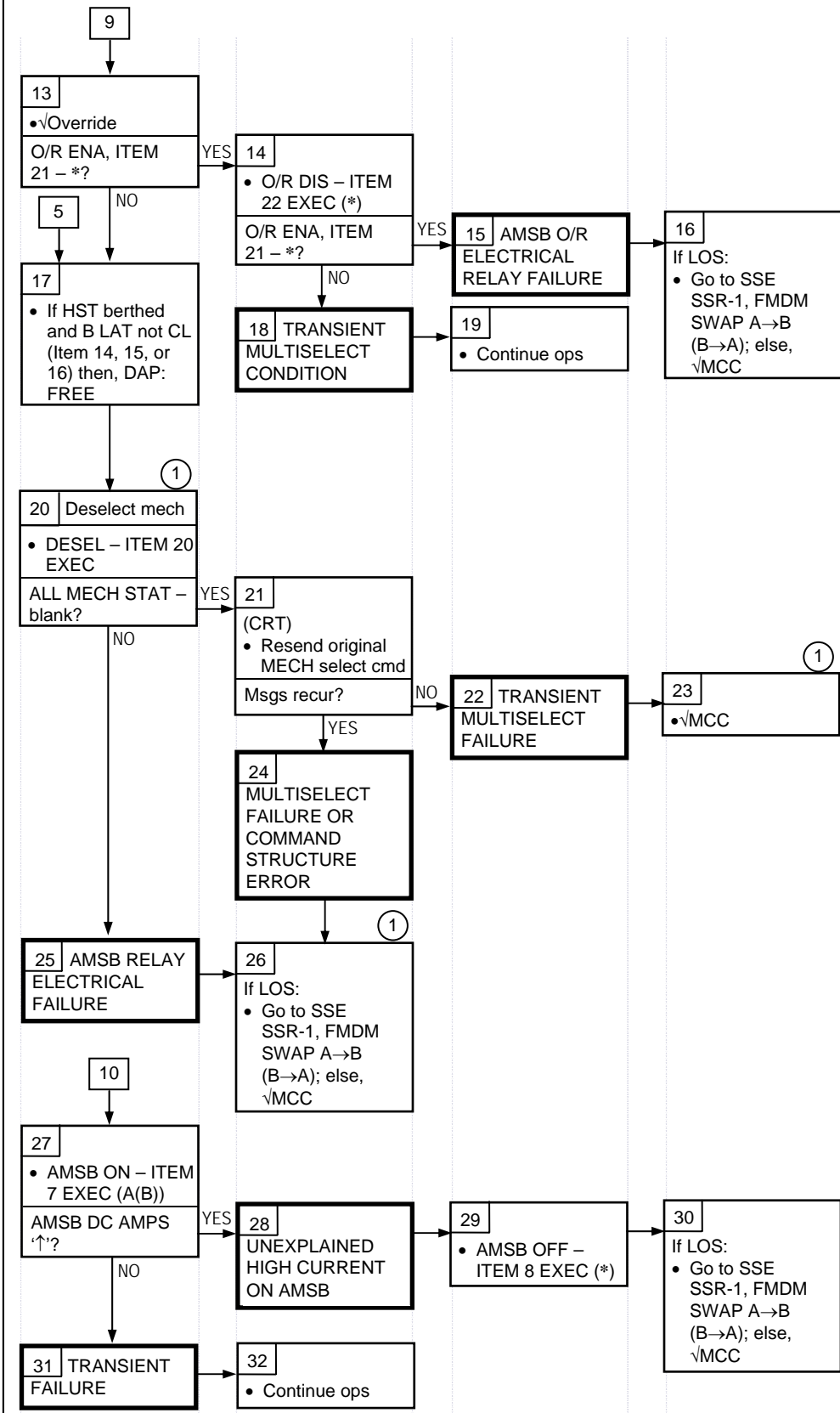
If:
AMSB DC AMPS > 0.13

Nominal Config:

(R1)
PL PRI MNC tb – ON
PL CAB – MNA(MNB)
(L12U)
cb FSS/ORUC A
SIDE PWR – cl
(A6U)
PL RETEN LAT
1(2) – OFF
PL RETEN PL SEL – 1
(R13L)
PL BAY MECH PWR
SYS 1(2) – OFF



SSE EPS 1.2b (Cont)



① Multiple mechanisms may have driven and need to be reconfigured to a nominal state prior to continuing operations

SSE EPS

1.2c 'S212 MECH SEL'

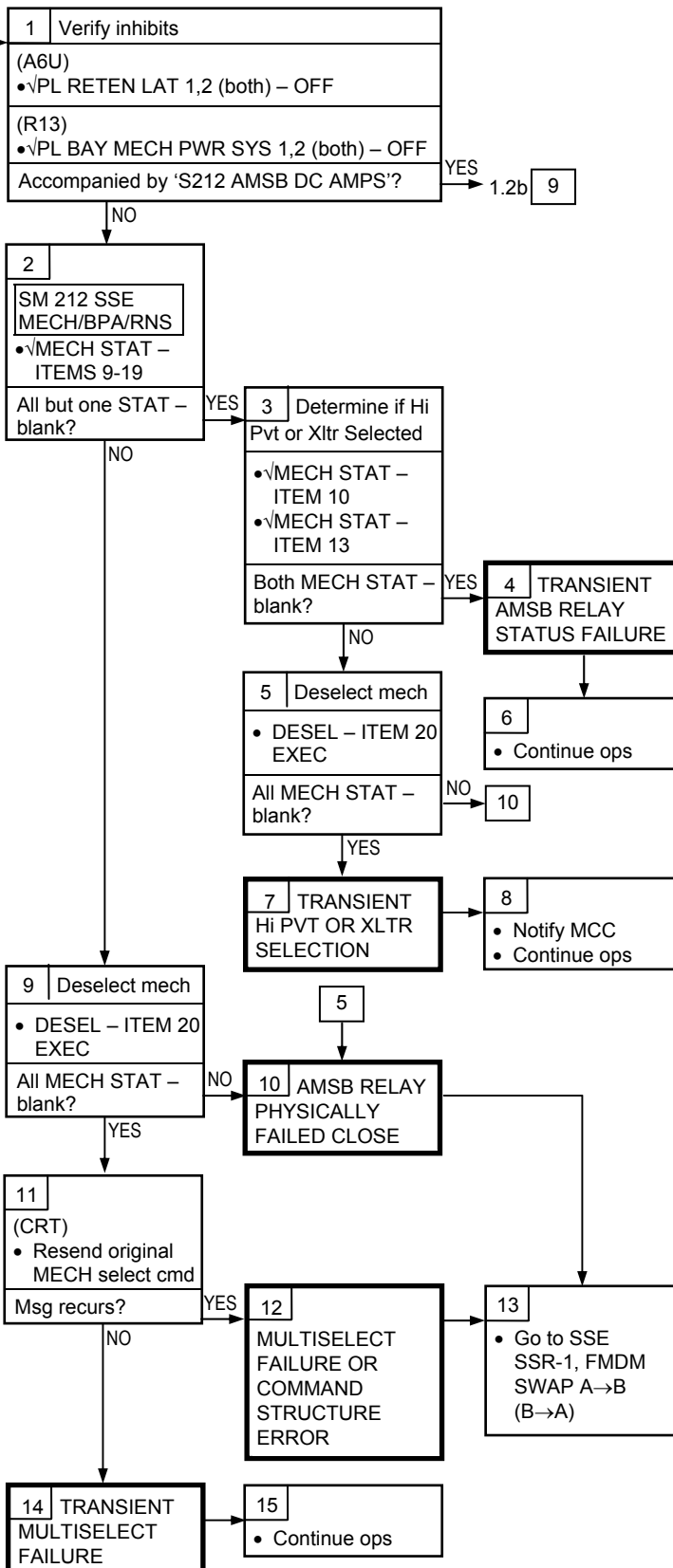
SM
ALERT

'S212 MECH
SEL'

If:
If Translator, Hi
Pivoter or any two
of following
mechanisms
selected: LO
Pivoter, Rotator,
Downlock, B-
LATCHES 1,2,3,
Main Umbilical

Nominal Config:

(R1)
PL PRI MNC
tb – ON
PL CAB – MNA
(MNB)
(L12U)
cb FSS/ORUC A
SIDE PWR – cl
(A6U)
PL RETEN LAT
1(2) – OFF
(R13L)
PL BAY MECH PWR
SYS 1(2) – OFF



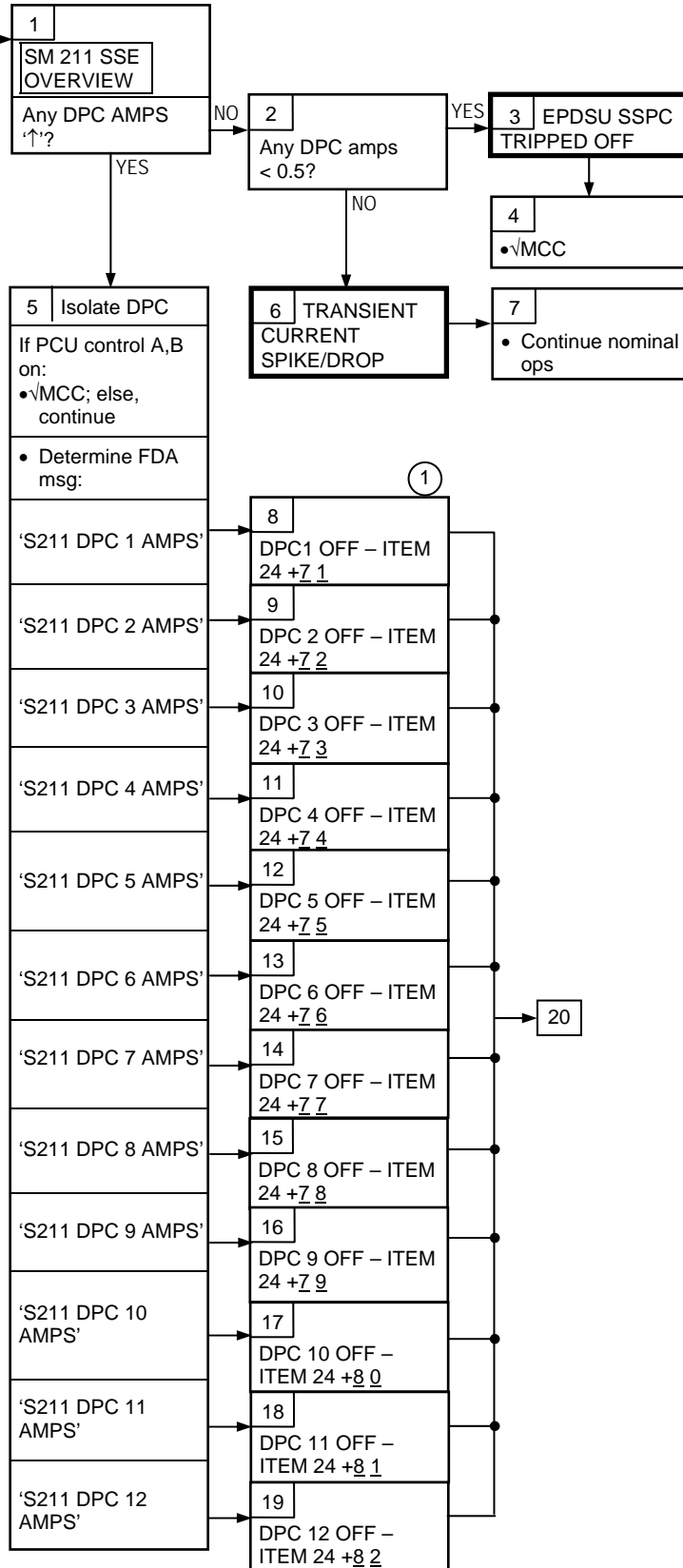
SSE EPS

1.2d 'S211 DPC 1(2,3,4,...12) AMPS'

'S211 DPC AMPS'

If:
any DPC 1-12
AMPS > 19.0

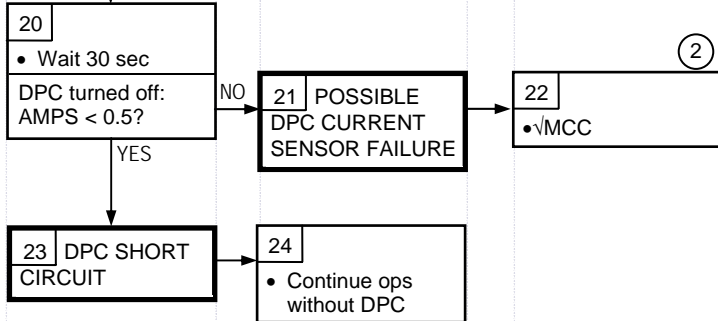
Nominal Config:
(R1)
PL PRI MNC tb – ON
PL CAB – MNA(MNB)
(L12U)
cb FSS/ORUC A
SIDE PWR – cl
SM 211 SSE
OVERVIEW
DPC 1-12 – *



① Full HST load can be met by remaining DPCs

SSE EPS 1.2d (Cont)

8	9	10	11
12	13	14	15
16	17	18	19



②
Ground to evaluate whether to turn DPC back on

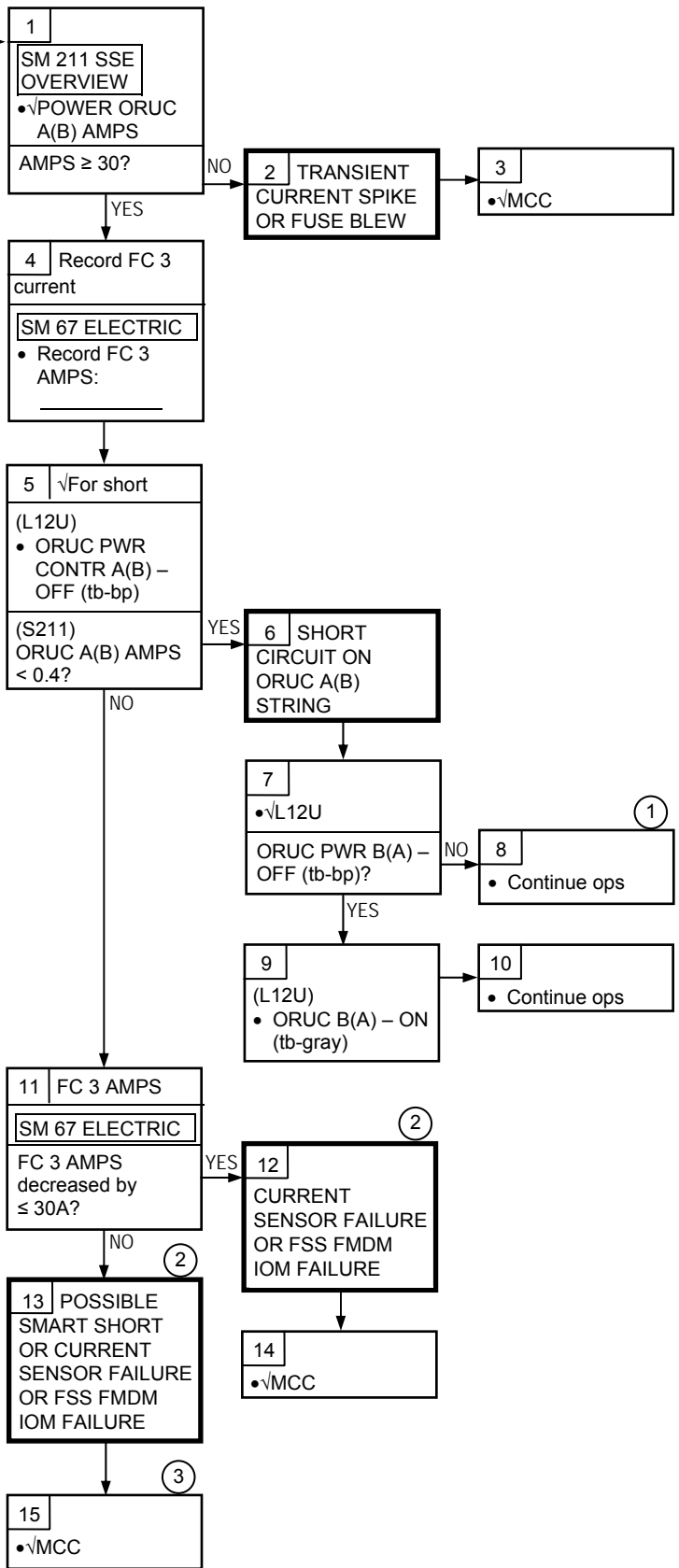
SSE EPS

1.2e 'S211 PWR ORUC A(B) AMPS'

'S211 PWR ORUC A(B) AMPS'

If:
ORUC HTR A(B) AMPS > 30

Nominal Config:
(R1)
PL PRI MNC tb – ON
PL CAB – MNA(MNB) (L12U)
cb FSS/ORUC A SIDE PWR – cl



- ① Loss of ORUC HTR redundancy
- ② Ref FMDM CHANNELIZATION CHART
MOD 0
CH 14 – B AMPS
MOD 1
CH 9 – A AMPS
- ③ Possible SSE SSR-1 FMDM swap reqd

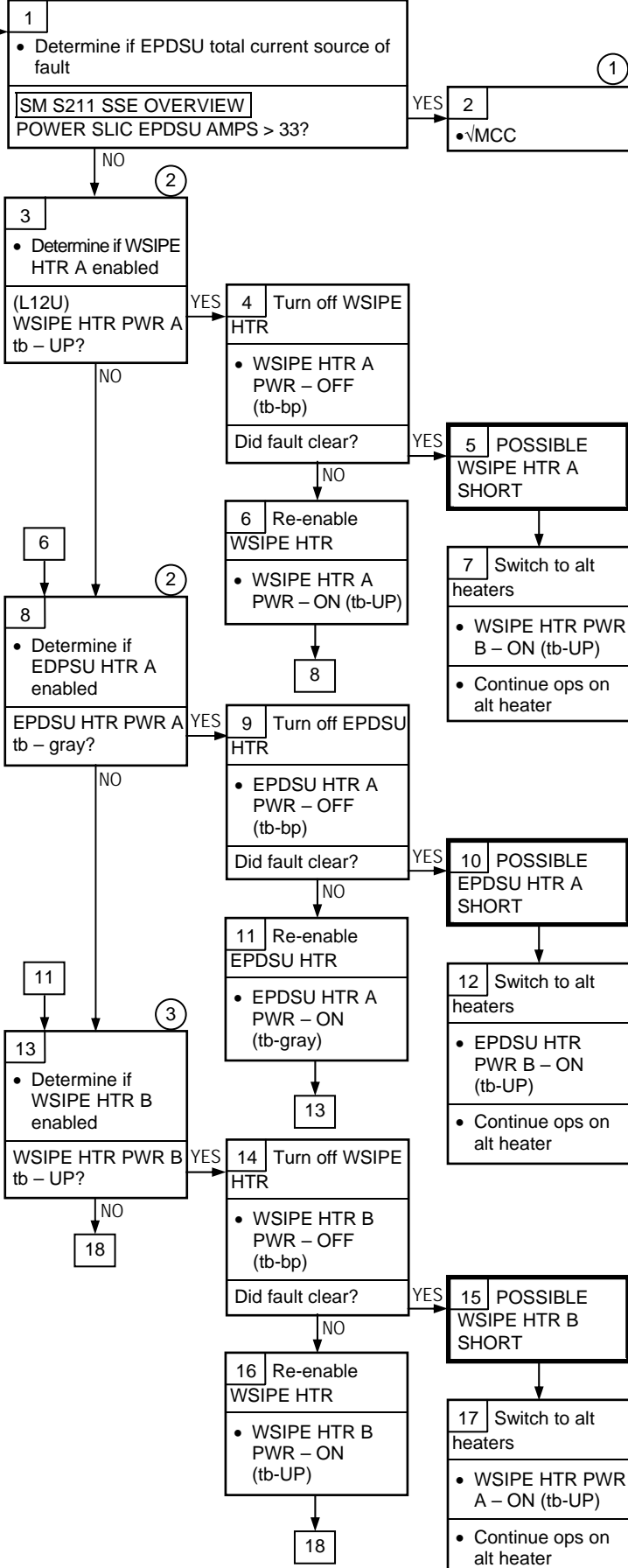
SSE EPS

1.2f POWER SLIC EPDSU AMPS ↑ (S211)

POWER SLIC EPDSU AMPS ↑

If:
 SLIC EPDSU AMPS > 33
 OR
 SLIC EPDSU MODULE 4 AMPS > 12
 OR
 SLIC EPDSU MODULE 5 AMPS > 12
 OR
 SLIC SPDSU MODULE 6 AMPS > 8
 OR
 SLIC EPDSU MODULE 7 AMPS > 8

Nominal Config:
 (R1)
 PL PRI MNC – ON
 PL CAB – MNA(MNB) (L12L)
 cb SLIC A-SIDE PWR ENA – cl
 SLIC B-SIDE PWR ENA – ON
 WSIPE HTR-A PWR – ON (tb-UP)
 SLIC EPDSU HTR PWR-B – ON (tb-gray)
 BPA PORT HTR-A PWR – ON (tb-UP)
 BPA STBD HTR-B PWR – ON (tb-gray)

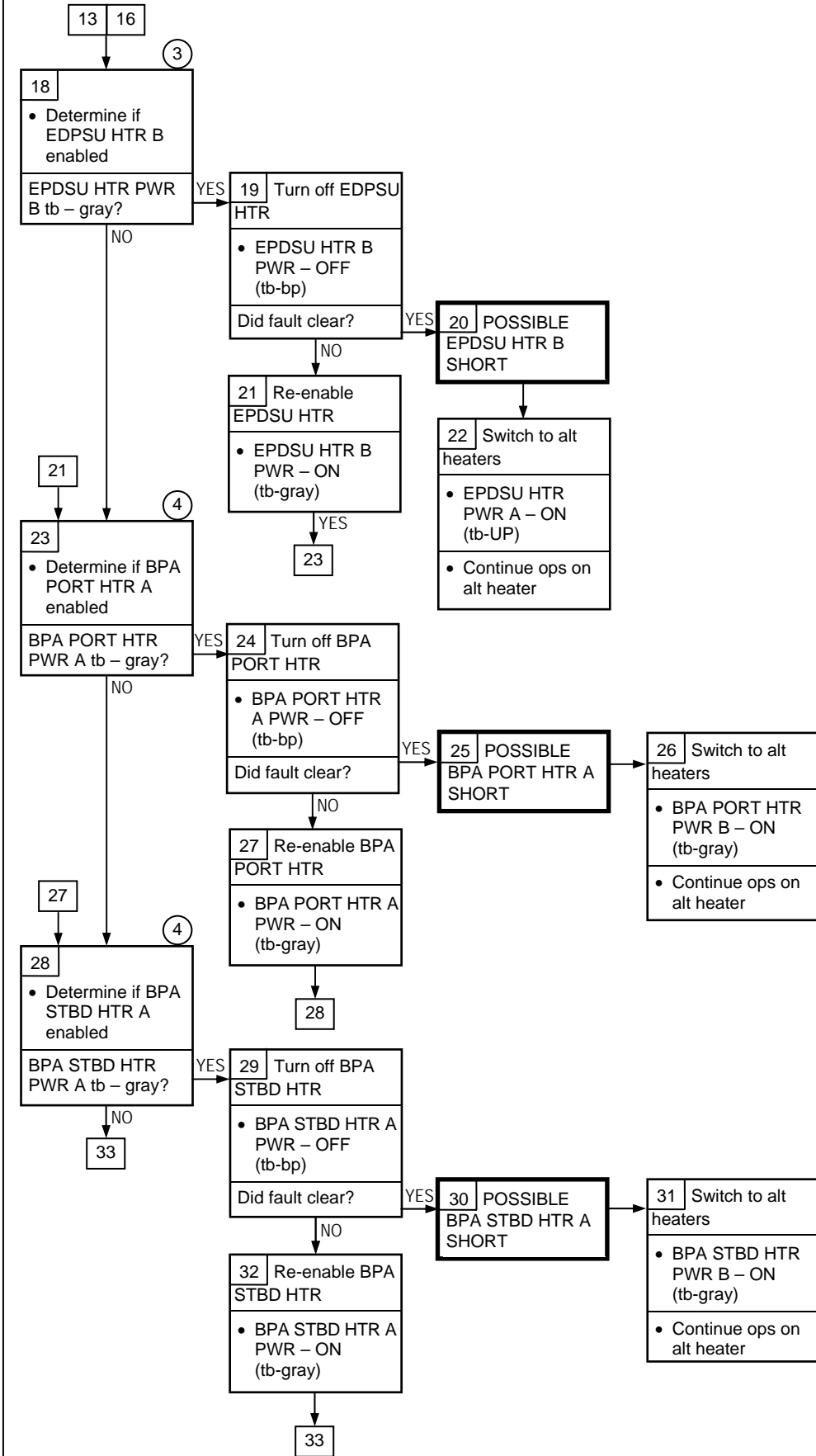


① Possible smart short between EPDSU total current sensor and Module current sensors, or SLIC total current monitor problem. Ground to determine if corresponding current increase seen on Payload Main Bus

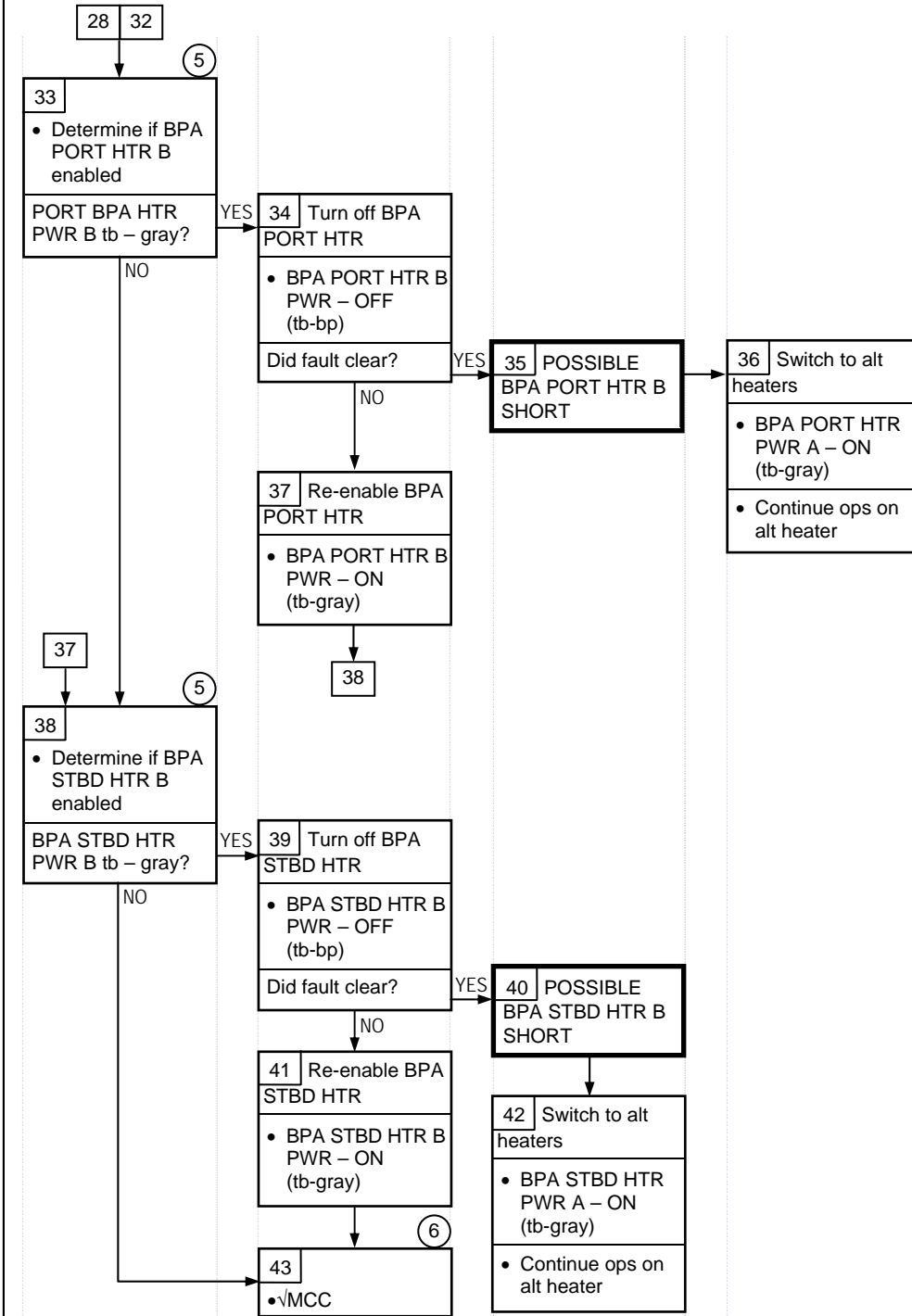
② Module 4: WSIPE HTR A EPDSU HTR A

③ Module 5: WSIPE HTR B EPDSU HTR B

SSE EPS 1.2f (Cont)



SSE EPS 1.2f (Cont)



5
 Module 7:
 BPA PORT HTR B
 BPA STBD HTR B

6
 Possible current monitor problem. MCC to determine if any of the individual SLIC MODULE currents out of limit

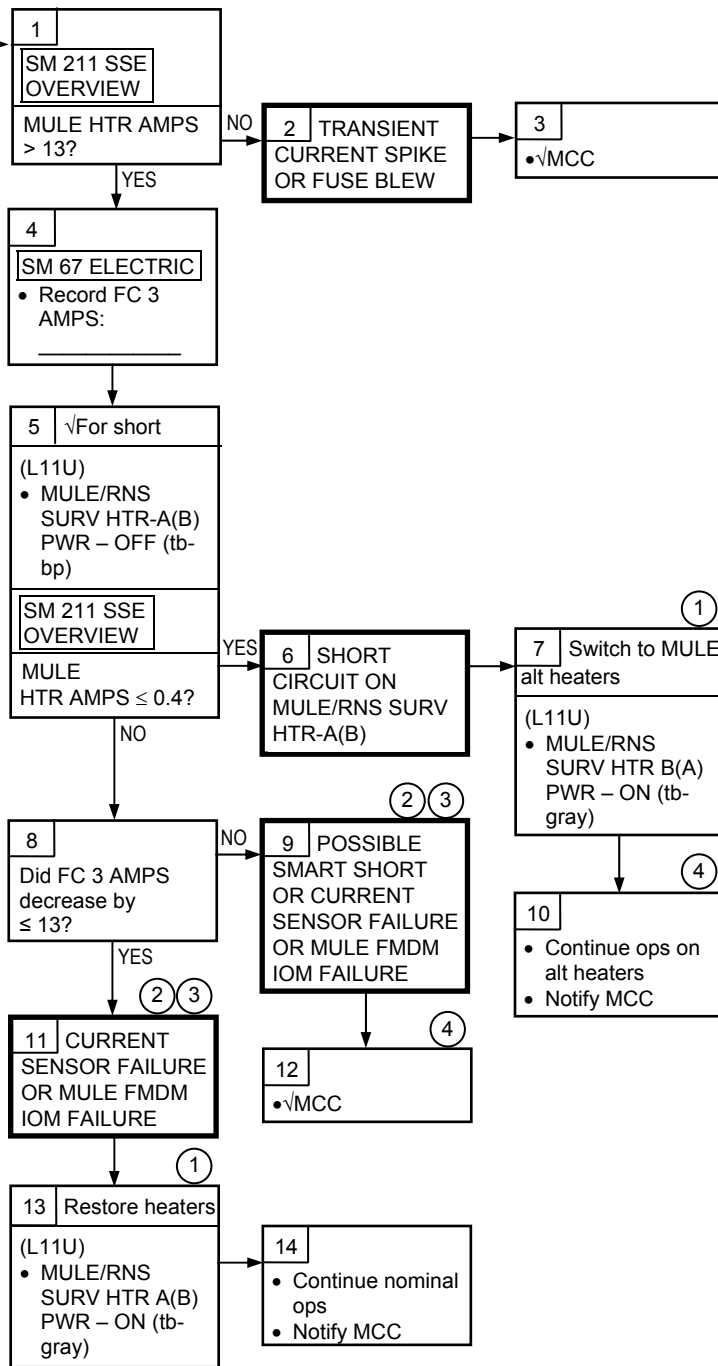
SSE EPS

1.2g POWER MULE HTR AMPS ↑ (S211)

POWER MULE
HTR AMPS ↑

If:
MULE HTR AMPS
> 13

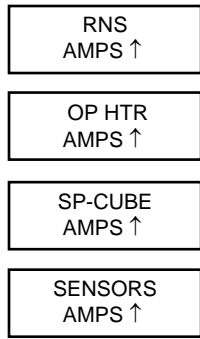
Nominal Config:
(R1)
PL PRI MNC tb – ON
PL CAB – MNA(MNB)
(L11U)
cb MULE SW
PWR – cl
MULE/RNS SURV
HTR-A(B) PWR – ON
MULE/RNS SURV
HTR PWR tb – gray



- ① MULE HTR AMPS Invalid
- ② Single analog input failure
- ③ Ref FMDM CHANNELIZATION CHART MOD 1 CH 26 – MULE/RNS SURV HTR CURRENT
- ④ Possible SSE SSR-1 FMDM SWAP reqd

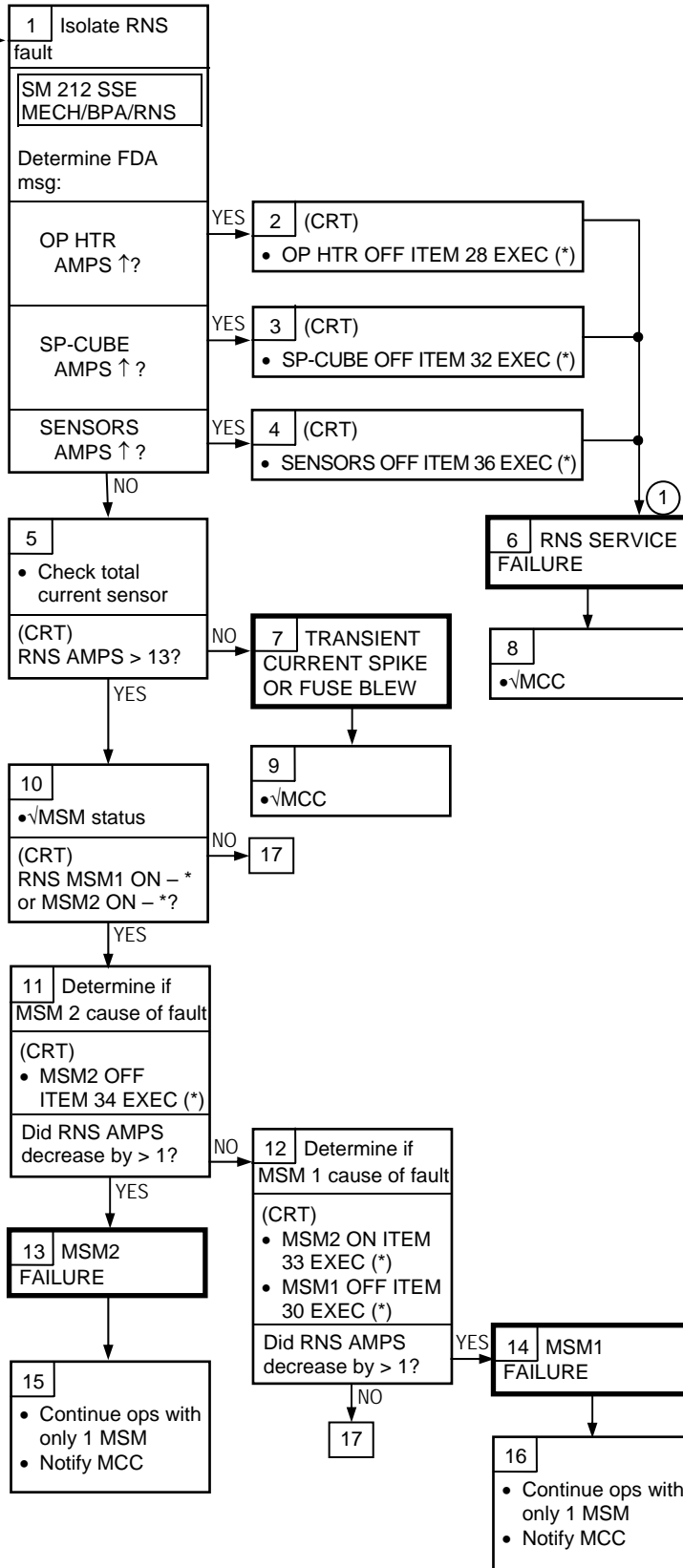
SSE EPS

1.2h RNS AMPS ↑ (S211,S212), RNS OP HTR, SP-CUBE, SENSORS AMPS ↑ (S212)



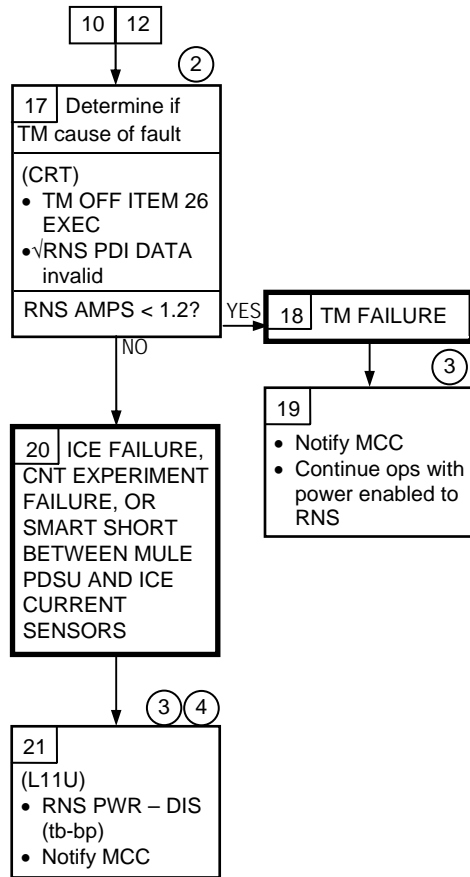
If:
 RNS AMPS > 13
 OR
 OP HTR AMPS > 8.5
 OR
 SP-CUBE AMPS > 2.5
 OR
 SENSORS AMPS > 2.5

Nominal Config:
 (R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB)
 (L11U)
 cb MULE SW
 PWR – cl
 RNS PWR-ENA
 tb – gray



① Limited operation may be possible with disabled RNS components

SSE EPS 1.2h (Cont)



(2) Turning TM power off will disable all RNS components and terminate PDI stream

(3) Power enable to RNS provides thermistor bias for RNS temperatures read by MULE

(4) RNS cannot be powered on for the remainder of the mission without powering into the short

SSE EPS

1.2i POWER MULE COPE AMPS ↑ (S211)

POWER MULE
COPE AMPS ↑

If:
MULE COPE 1A
AMPS > 3.5

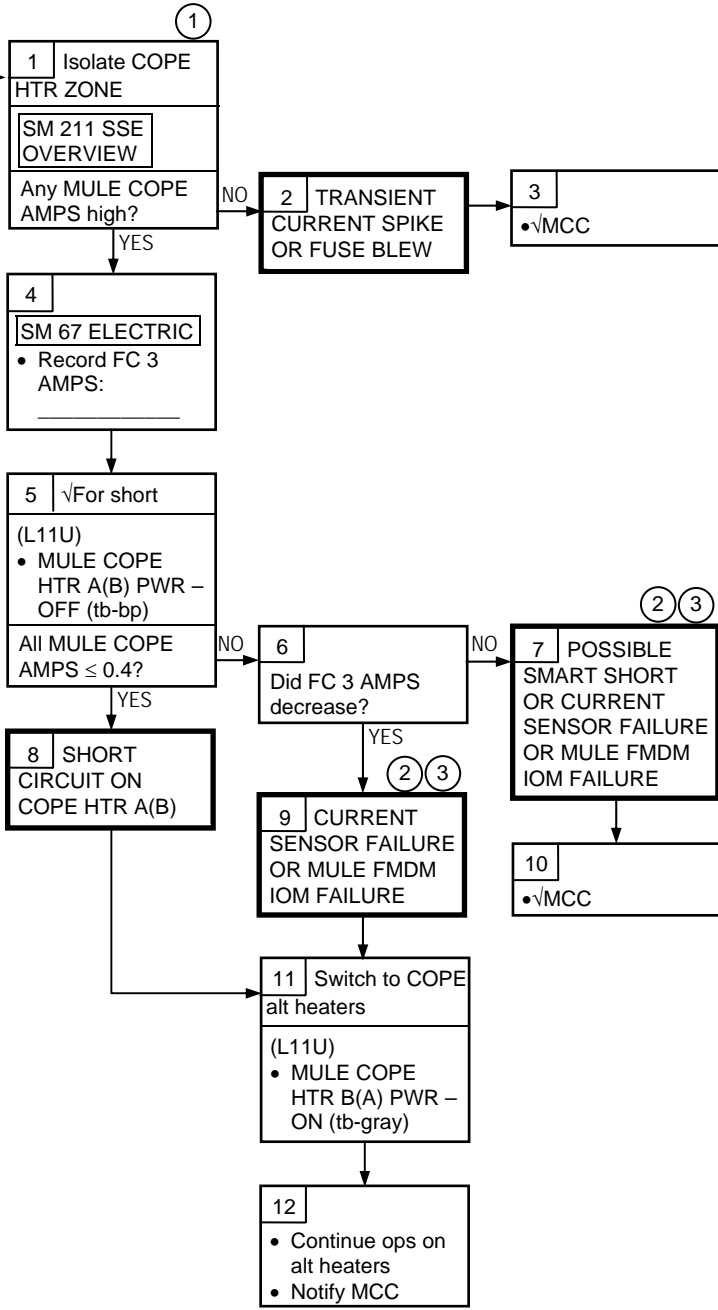
If:
MULE COPE 2A
AMPS > 3.5

If:
MULE COPE 3A
AMPS > 3.5

If:
MULE COPE
1B&2B AMPS > 6

If:
MULE COPE
3B AMPS > 3.5

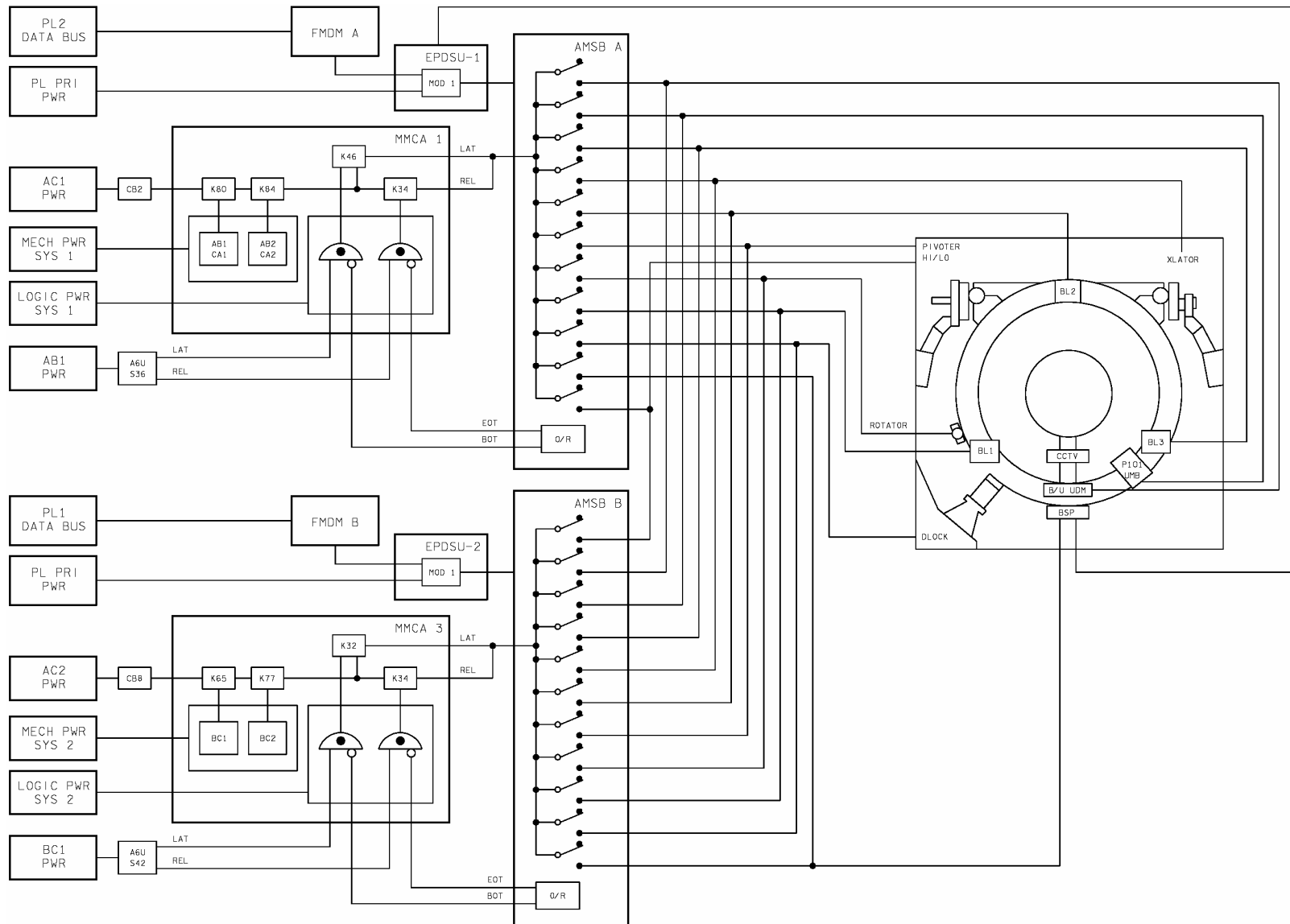
Nominal Config:
(R1)
PL PRI MNC tb – ON
PL CAB – MNA(MNB)
(L11U)
cb MULE SW
PWR – cl
MULE COPE HTR
A(B) PWR – ON
(tb-gray)



- ①
COPE HTR HIGH AMP indications:
1A > 3.5
2A > 3.5
3A > 3.5
1B&2B > 6
3B > 3.5
- ②
Single analog input failure
- ③
Ref FMDM CHANNELIZATION CHART
MOD 1
CH 8 – MULE COPE ZONE 2 A HTR CURRENT
MOD 1
CH 13 – MULE COPE ZONE 1 A HTR CURRENT
MOD 1
CH 14 – MULE COPE ZONE 3 A HTR CURRENT
MOD 1
CH 24 – COPE ZONES 1&2 B HTR CURRENT
MOD 1
CH 25 – COPE ZONE 3 B HTR CURRENT

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SSE MECHANISMS



1-23

PL SYS/125/FIN

48069003_109, ART: 3

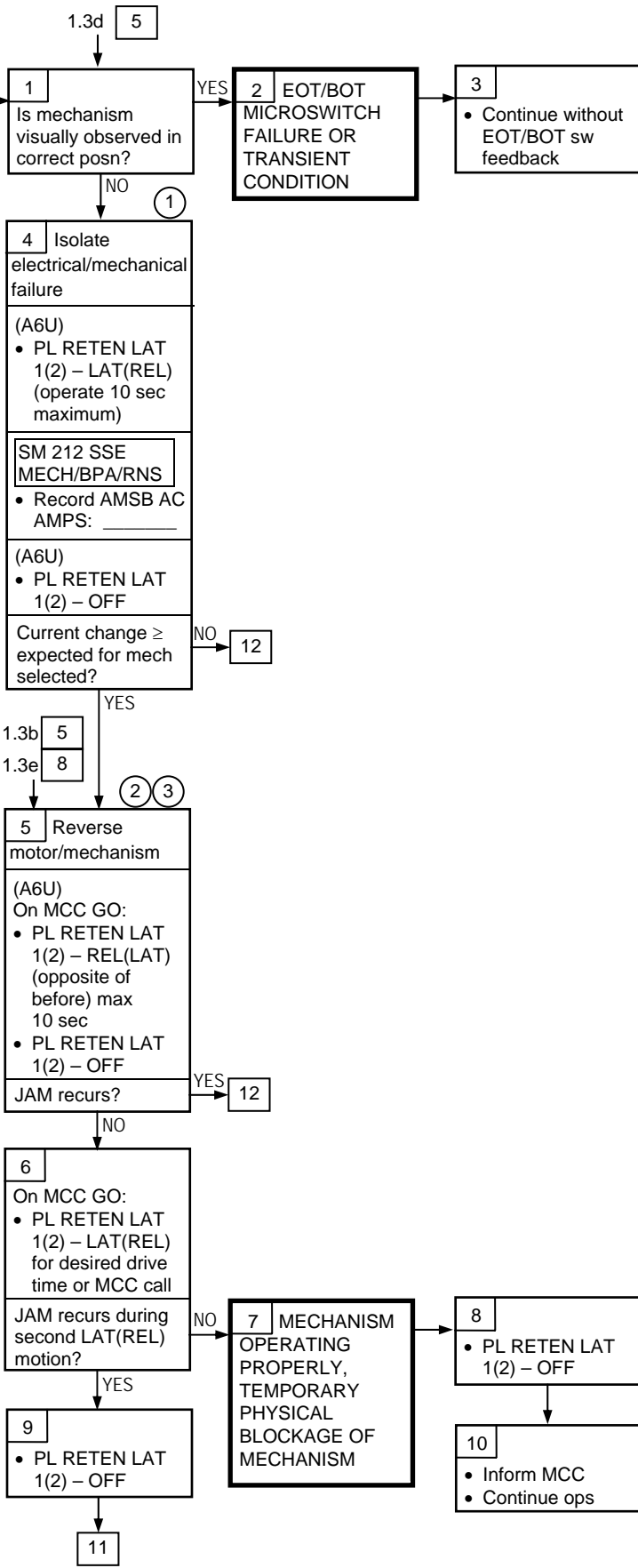
SSE MECH

1.3a PRIMARY MOTOR FAILS TO DRIVE MECHANISM

Mechanism fails to operate

Nominal Config:

(R1)
 PL PRI MNC tb – ON
 PL CAB – MNA (MNB) (A6U)
 PL RETEN LAT 1(2) – OFF
 PL RETEN LOGIC PWR SYS 1(2) – ON
 PL RETEN PL SEL – 1
 PL BAY MECH PWR 1(2) – ON
 (MA73C)
 cb MCA PWR
 AC1(2) 3φ
 MID 1(3) – cl (S212)
 AMSB ON, ITEM 7 – A(B)

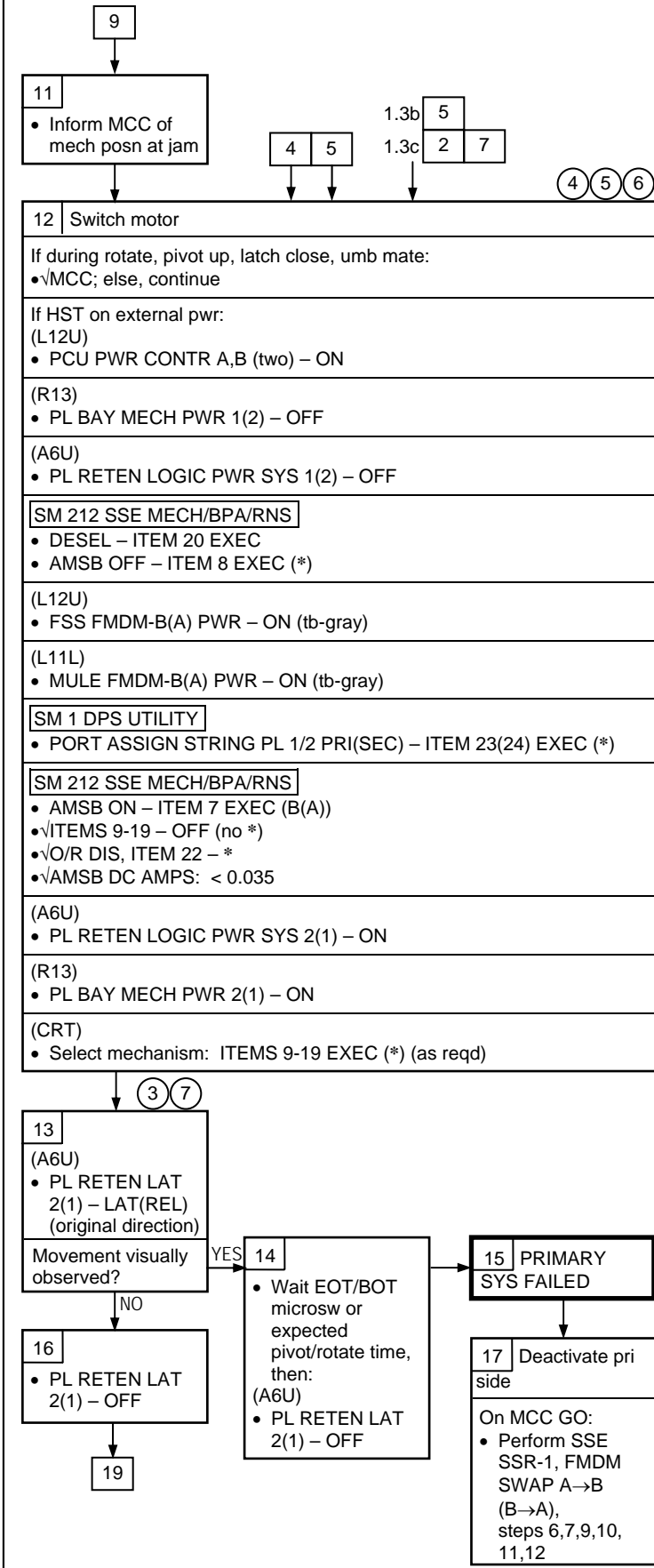


- ① Mechanism total currents:
 DLOCK 1.0-2.5A
 BLAT 1,2,3 1.0-2.5A
 UMB MAT 0.6-1.2A
 UMB B/U 0.6-1.2A
 PIVOT LO 0.3-0.7A
 ROTATOR 0.3-0.7A
 BSP MECH 0.6-1.2A
 For BSP and UMB B/U, current may not be observed due to short duration of mechanism run time
- ② MCC GO reqd to prevent possible mech drive to/failure in undesirable posn and determine if cool down reqd
- ③ MOTION CUE:
 For Pivoter and Rotator use Tach:
 Pivoter > 2.5 deg/min
 Rotator > 10 deg/min
 For BSP:
 EOT/BOT microsw and BSP microsws as expected
 For ALL others:
 Visual cues

SSE MECH

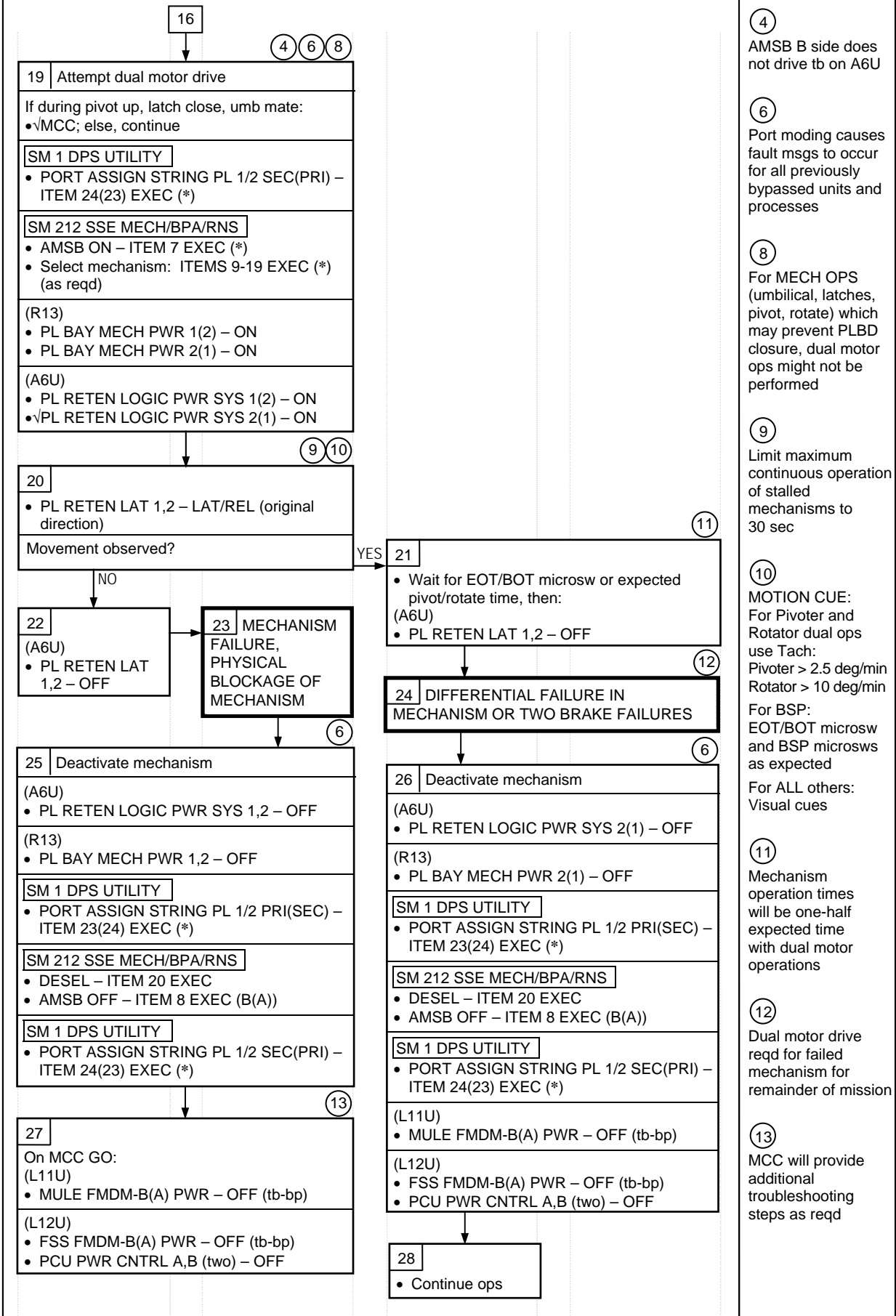
1.3

SSE MECH 1.3a (Cont)



- ③ MOTION CUE:
 For Pivoter and Rotator use Tach:
 Pivoter > 2.5 deg/min
 Rotator > 10 deg/min
 For BSP:
 EOT/BOT microsw and BSP microsws as expected
 For ALL others:
 Visual cues
- ④ AMSB B side does not drive tb on A6U
- ⑤ For MECH OPS (umbilical, latches, pivot, rotate) which may prevent PLBD closure, alt motor ops might not be performed
- ⑥ Port moding causes fault msgs to occur for all previously bypassed units and processes
- ⑦ Maximum operation of Berthing Latches or Down Lock is limited to 30 sec

SSE MECH 1.3a (Cont)



4
AMSB B side does not drive tb on A6U

6
Port moding causes fault msgs to occur for all previously bypassed units and processes

8
For MECH OPS (umbilical, latches, pivot, rotate) which may prevent PLBD closure, dual motor ops might not be performed

9
Limit maximum continuous operation of stalled mechanisms to 30 sec

10
MOTION CUE:
For Pivoter and Rotator dual ops use Tach:
Pivoter > 2.5 deg/min
Rotator > 10 deg/min

For BSP:
EOT/BOT microsw and BSP microsws as expected
For ALL others:
Visual cues

11
Mechanism operation times will be one-half expected time with dual motor operations

12
Dual motor drive reqd for failed mechanism for remainder of mission

13
MCC will provide additional troubleshooting steps as reqd

SSE MECH

1.3b BSP FAILS TO DISENGAGE

BSP DIS Blank

BSP DIS A(B) and BSP STAT Not REL

Nominal Config:
 (R1)
 PL PRI MNC – ON
 PL CAB – MNA(MNB)
 (A6U)
 PL RETEN PL SEL – 1
 PL RETEN LOGIC
 PWR SYS 1(2) – ON
 (R13)
 PL BAY MECH PWR
 1(2) – ON
 (L12U)
 cb FSS/ORUC A
 SIDE PWR – cl
 FSS FMDM A(B)
 PWR – ON (tb-gray)
 (S212)
 AMSB ON, ITEM 7 –
 A(B)

1 Pivot BAPS down to relieve latch interference

SM 212 SSE MECH/BPA/RNS

- PIVOT LO SEL – ITEM 11 EXEC (*)

(A6U)

- PL RETEN LAT 1(2) – REL

(CRT)
 When PIVOT TACH: < 0.25 deg/min

(A6U)

- PL RETEN LAT 1(2) – OFF

2 Reattempt BSP release

(CRT)
 BSP SEL – ITEM 19 EXEC (*)

(A6U)

- PL RETEN LAT (2) – REL
- Wait 4 sec
- PL RETEN LAT 1(2) – OFF
- √BSP DIS, BSP STAT

(CRT)
 BSP DIS *(BSP STAT REL and BSP DIS A(DIS B))?

3 TRANSIENT LATCH INTERFERENCE RELIEVED

4

- Continue with nominal pivot ops

5 √BSP engage status

BSP ENG – blank?

1.3a 12

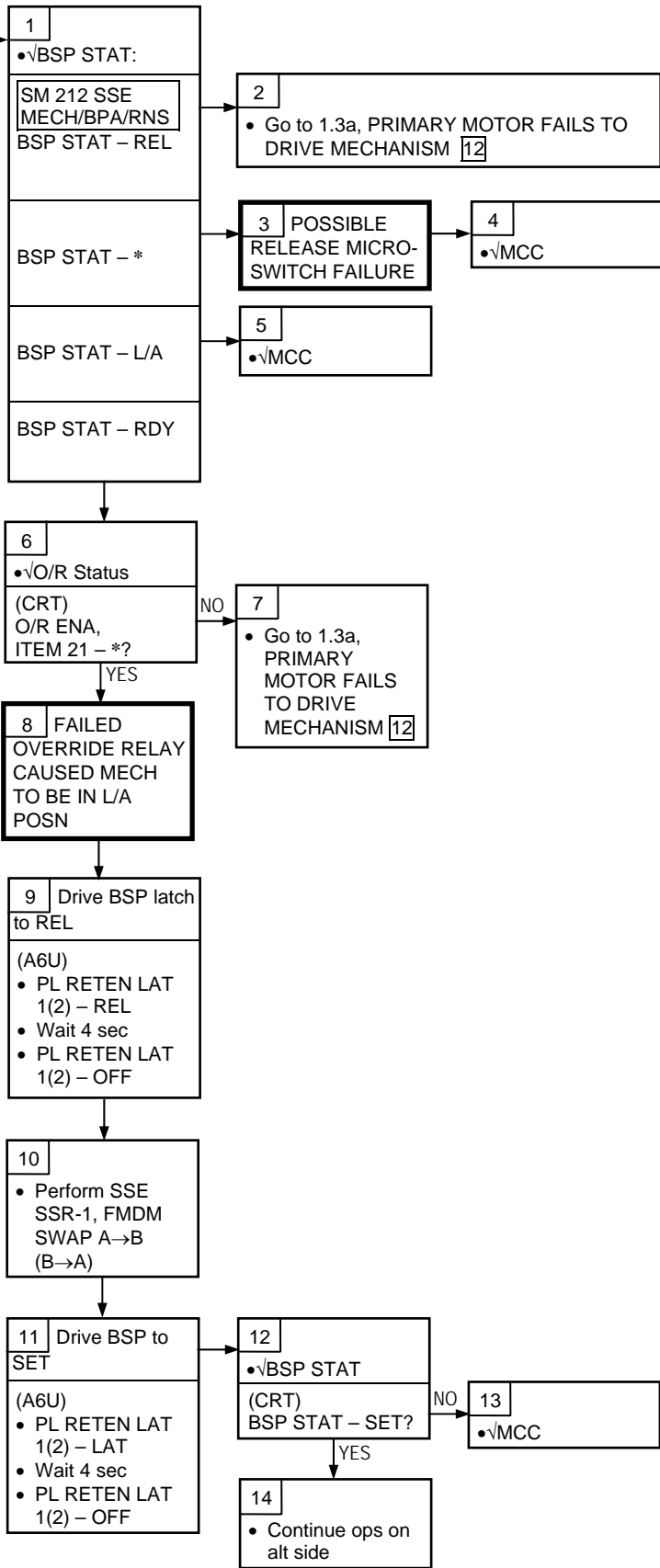
1.3a 5

SSE MECH

1.3c BSP FAILS TO SET

BSP STAT Not 'SET'

Nominal Config:
 (R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB)
 (A6U)
 PL RETEN PL SEL – 1
 PL RETEN LOGIC
 PWR SYS 1(2) – ON
 (R13)
 PL BAY MECH PWR
 1(2) – ON
 (L12U)
 cb FSS/ORUC A
 SIDE PWR – cl
 FSS FMDM A(B)
 PWR – ON (tb-gray)
 (S212)
 AMSB ON, ITEM 7 –
 A(B)

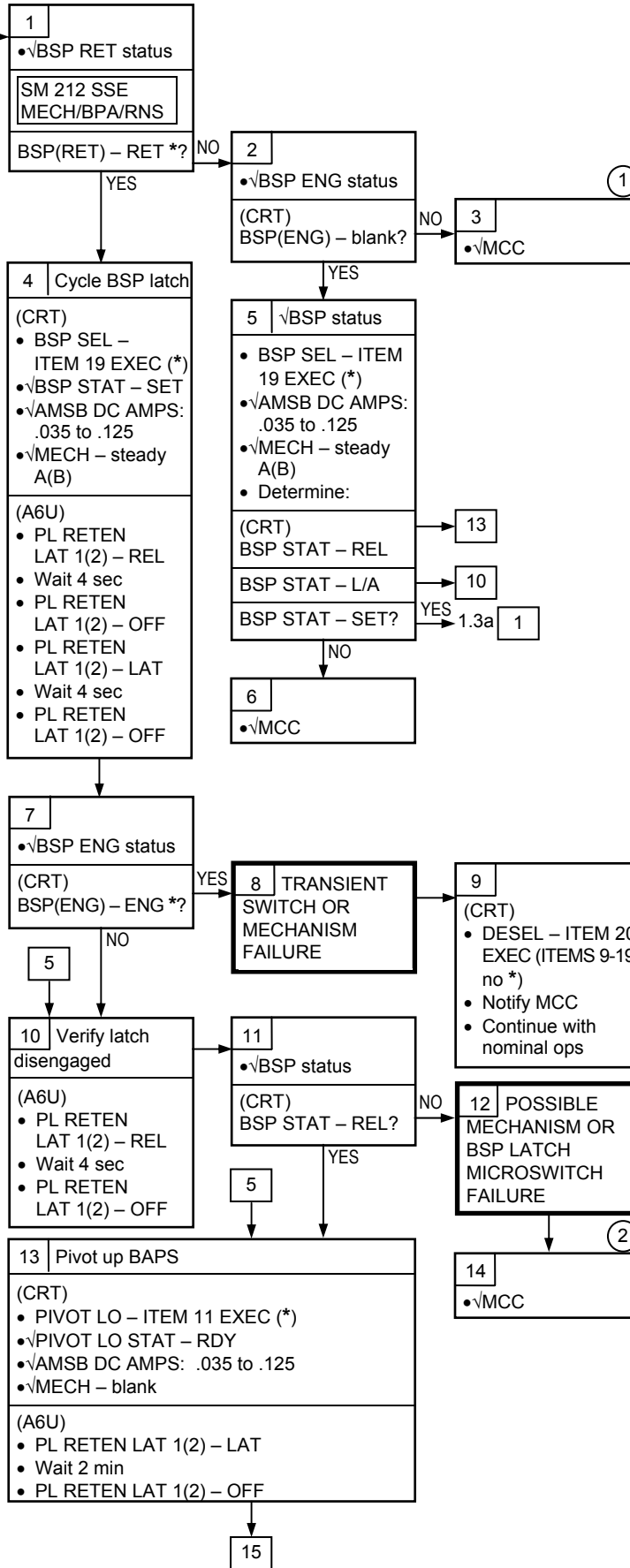


SSE MECH

1.3d BSP FAILS TO ENGAGE

BSP ENG Status
Not *

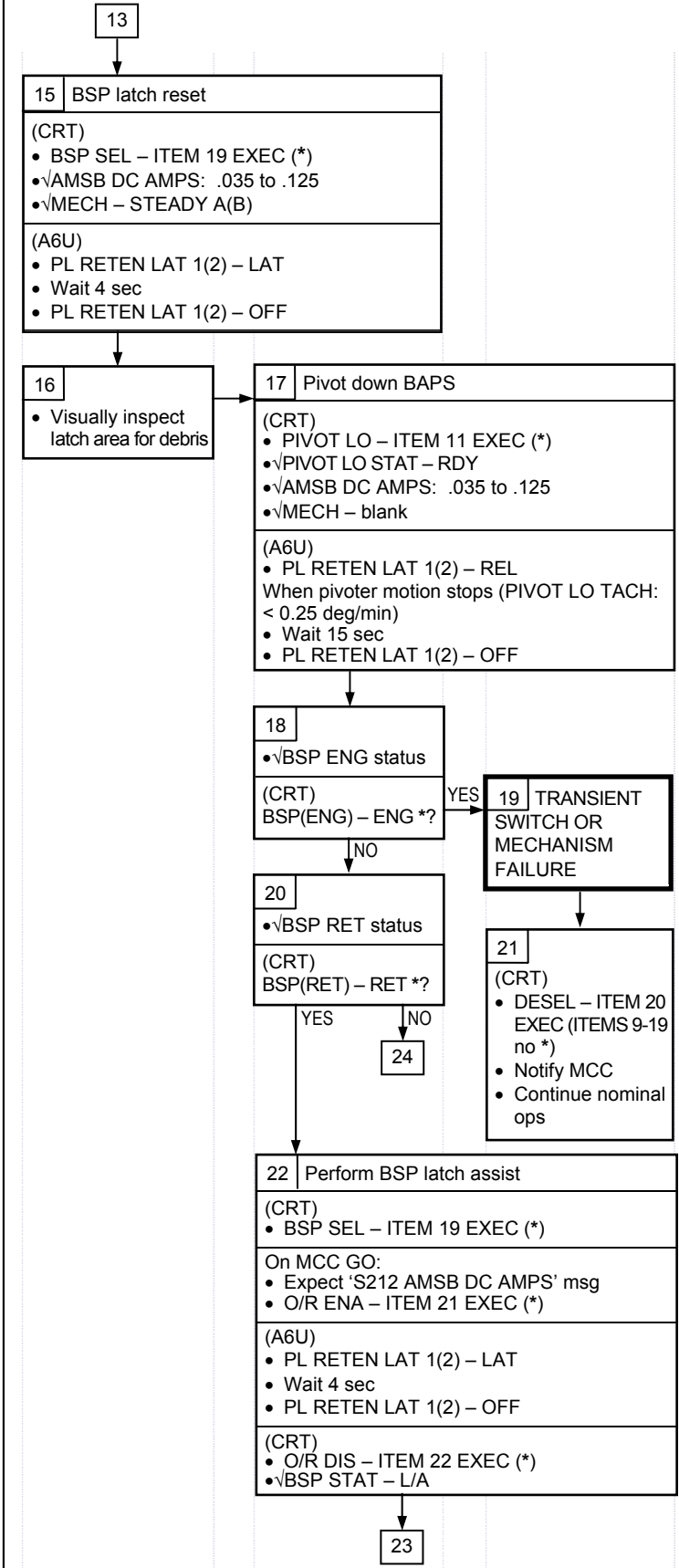
Nominal Config:
(R1)
PL PRI MNC tb – ON
PL CAB – MNA(MNB)
(A6U)
PL RETEN PL SEL – 1
PL RETEN LOGIC
PWR SYS 1(2) – ON
PL BAY MECH
PWR 1(2) – ON
(L12U)
cb FSS/ORUC A
SIDE PWR – cl
FMDM-A(B)
PWR – ON (tb-gray)
(S212)
AMSB ON,
ITEM 7 – A(B)



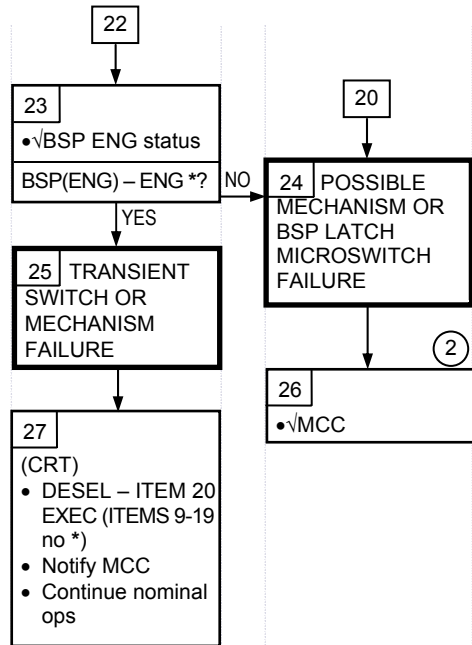
① If BSP (ENG)-A and (RET)-A or BSP (ENG)-B and (RET)-B then possible power supply failure

② BSP latch configuration is indeterminate

SSE MECH 1.3d (Cont)



SSE MECH 1.3d (Cont)



②
BSP latch configuration is indeterminate

SSE MECH

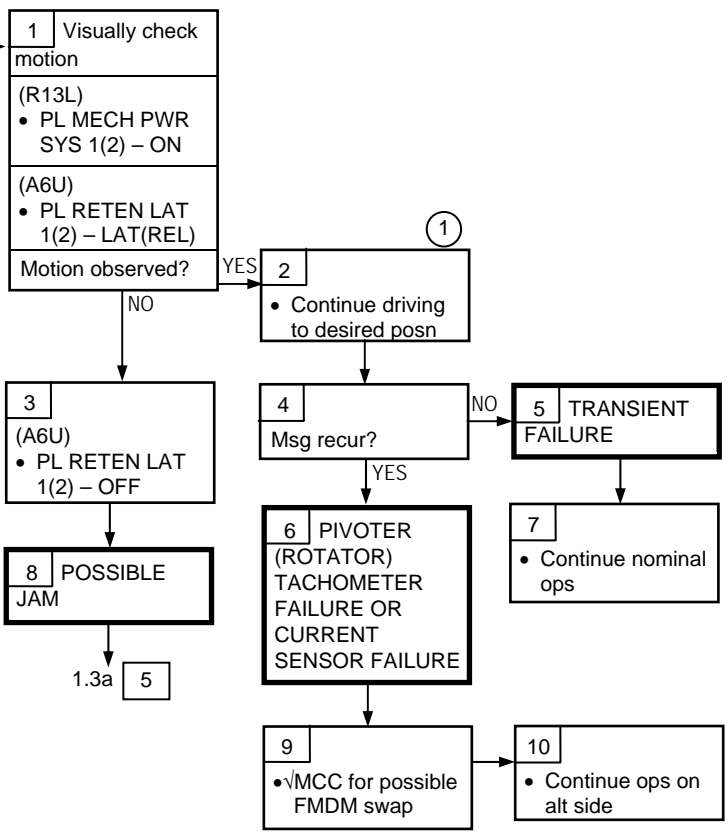
1.3e 'S212 PVT(ROT) STALL'

**SM
ALERT**

'S212 PVT
(ROT) STALL'

If:
PVT(ROT)
Selected and
AMSB AC AMPS
> 0.30 and
(PVT Tach
< 0.2 deg/min or
ROT Tach
< 0.4 deg/min)

Nominal Config:
(R1)
PL PRI MNC tb – ON
PL CAB – MNA (MNB)
(A6U)
PL RETEN LAT
1(2) – OFF
PL RETEN LOGIC
PWR SYS 1(2) – ON
PL RETEN PL SEL – 1
(R13)
PL BAY MECH PWR
1(2) – OFF
(L12U)
cb FSS A SIDE
PWR – cl
FSS FMDM – A(B)
PWR – ON (tb-gray)
(S212)
AMSB ON, ITEM 7 –
A(B)



①
PVT(ROT) STALL condition must exist for 15 sec with no motion before FDA message is annunciated. Ignore FDA if it recurs while mech is still moving. Continue until desired position attained

SSE DPS

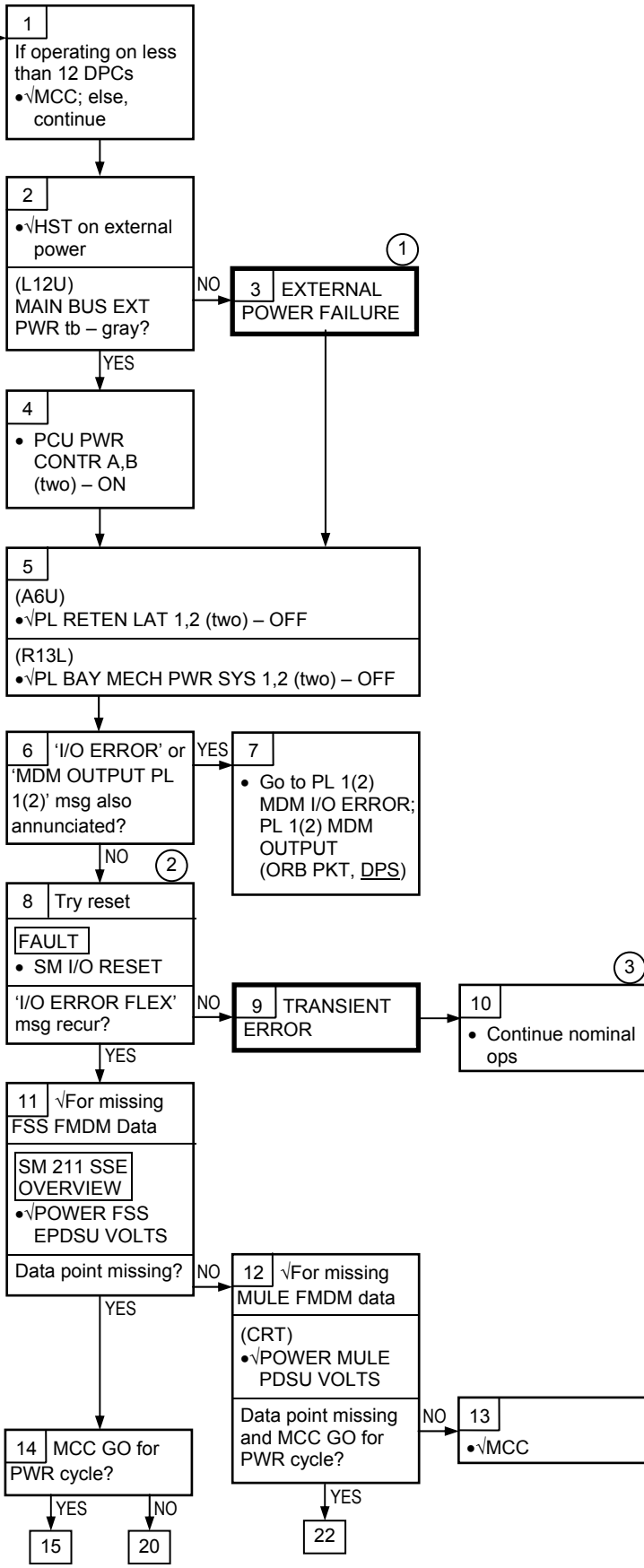
SM
ALERT

'I/O ERROR FLEX'

If:
FMDM failure
IOP failure
IOP XMTR/RCVR failure

Nominal Config:
(L12U)
cb FSS/ORUC A
SIDE PWR – cl
FSS FMDM – A(B)
PWR – ON (tb-gray)
(L11U)
cb MULE SW
PWR – cl
MULE FMDM
PWR A(B) – ON
(tb-gray)

1.4a 'I/O ERROR FLEX'

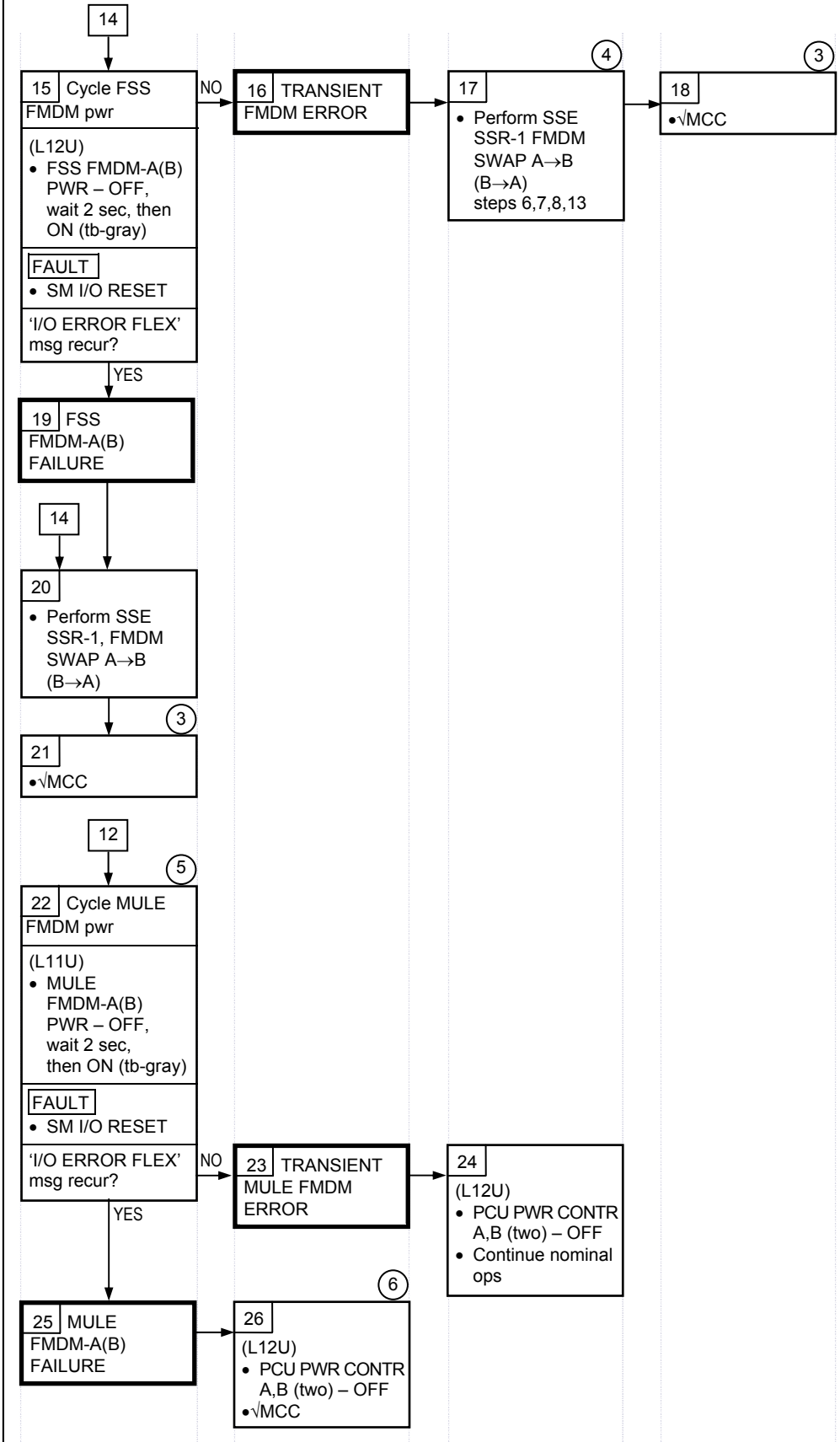


- ① HST external power recovery will be necessary after FMDM recovery
- ② Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes
- ③ MCC will determine if clean-up step to turn off PCUs is necessary

SSE
DPS

1.4

SSE DPS 1.4a (Cont)



- ③ MCC will determine if clean-up step to turn off PCUs is necessary
- ④ This step will reconfigures the FSS and does not swap to the alternate FMDM
- ⑤ Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes. RNS is in survival heaters only mode and will recovered by ground command
- ⑥ MCC will determine if SSE SSR-1, FMDM SWAP A→B (B→A) is performed

SSE DPS
1.4

SSE DPS

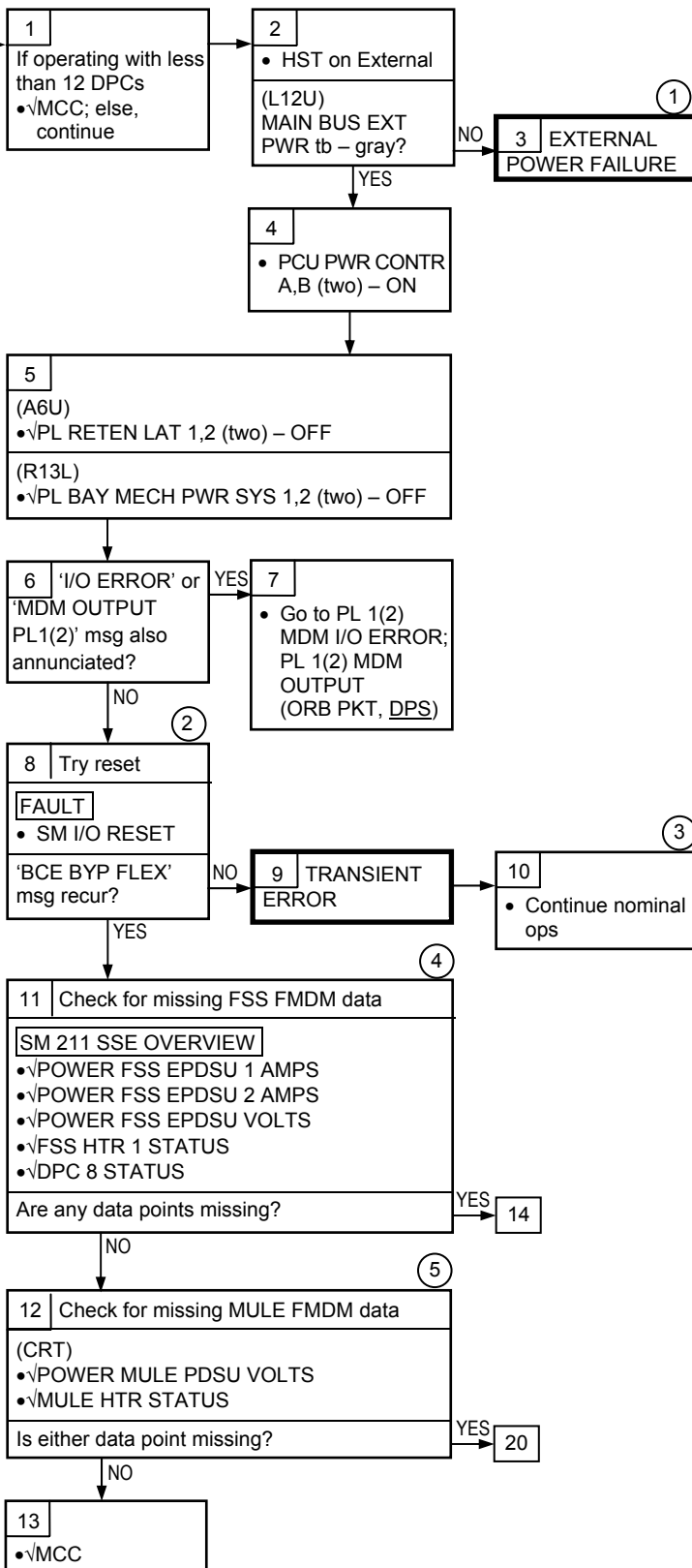
1.4b 'BCE BYP FLEX'

SM ALERT

BCE BYP FLEX

If:
MDM FLEX card failure
MDM/LRU FLEX interface failure
IOP failure
IOP XMTR/RCVR failure

Nominal Config:
(L12U)
cb FSS/ORUC A SIDE PWR – cl
FSS FMDM-A(B) PWR – ON (tb-gray)
(L11U)
cb MULE SW PWR – cl
MULE FMDM PWR A(B) – ON



① HST external power recovery will be necessary after FM DM recovery

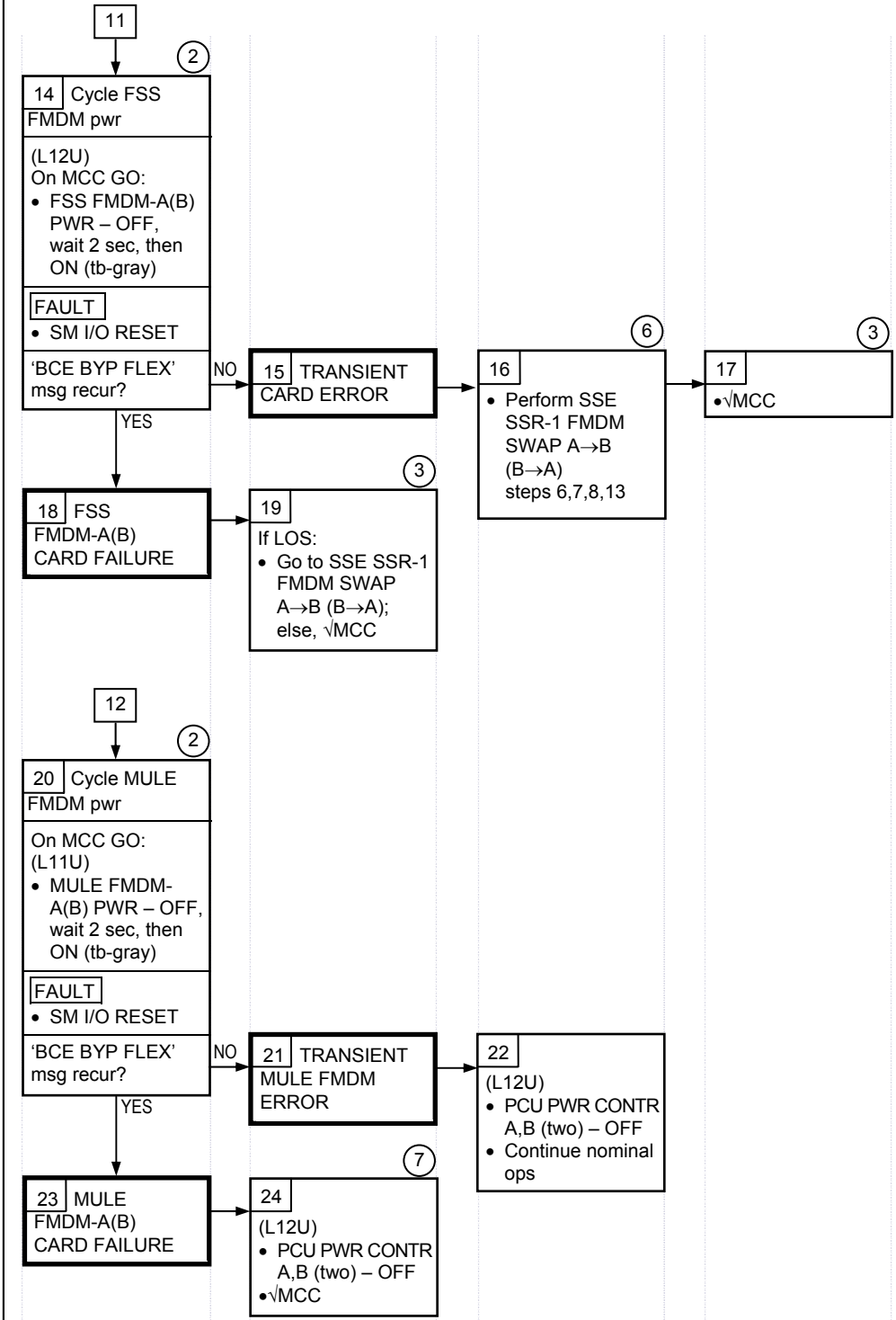
② Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes

③ MCC will determine if clean-up step to turn off PCUs is necessary

④ FSS FMDM Channelization Data:
IOM 0
CH 23 – FSS EPDSU 1 AMPS
IOM 1
CH 23 – FSS EPDSU 2 AMPS
IOM 2
CH 9 – FSS EPDSU 1 VOLTS
IOM 4
CH 9 – FSS HTR 1 STATUS
IOM 7
CH 2 BIT 15 – DPC 8 STATUS

⑤ MULE FMDM Channelization Data:
IOM 1
CH 31 – MULE PDSU VOLTS
IOM 4
CH 1 BIT 12 – MULE HTR STATUS

SSE DPS 1.4b (Cont)



- ② Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes
- ③ MCC will determine if clean-up step to turn off PCUs is necessary
- ⑥ This step reconfigures the FSS and does not swap to alternate FMDM
- ⑦ MCC will determine if SSE SSR-1, FMDM SWAP A→B (B→A) is performed

SSE SSR-1

FMDM SWAP A→B(B→A)

1. If operating on less than 12 DPCs, √MCC; else, continue
- L12U 2. If HST on ext pwr:
 - √cb FSS/ORUC A SIDE PWR – cl
 - PCU POWER CONTR A,B (two) – ON
- A6U 3. Verify mechanism unprwd:
 - √PL RETEN LAT 1,2 (two) – OFF
 - √LOGIC PWR SYS 1,SYS 2 (two) – OFF
 - √PL SEL – 1
- R13L √BAY MECH PWR SYS 1,2 (two) – OFF

SM 212 SSE MECH/BPA/RNS

√AMSB OFF, ITEM 8 – *

- * If AMSB OFF – (not *), *
- * AMSB OFF – ITEM 8 EXEC (*) *

- L12U 4. Pwr on alt FMDMs:
 - FSS FMDM-B(A) PWR – ON (tb-gray)
 - MULE FMDM-B(A) PWR – ON (tb-gray)
- L11U

NOTE

Port moding causes fault msgs to occur for all previously bypassed units and processes

5. Port Mode

SM 1 DPS UTILITY

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

6. Verify SSE status:

SM 211 SSE OVERVIEW

POWER

- √FSS FMDM A/B AMPS (two): .5 to 1.1
- √HTR – 1/2
- √P1/P2 AMPS (two): < 0.4
- √R1/R2 AMPS (two): < .4
- √CCTV HTR AMPS: < .9
- √ORUC – A/B
- √AMPS (two): < 30
- √MULE FMDM A/B AMPS (two): .7 to 1.3
- √HTR – *
- √COPE 1A/2A AMPS (two): < 3.5
- √1B&2B AMPS: < 6
- √3A/3B AMPS (two): < 3.5
- √SLIC EPDSU AMPS: < 16
- √FSS VOLTS (two): 24.0 to 32.0
- √SLIC VOLTS (two): 24.0 to 32.0
- √MULE VOLTS: 24.0 to 32.0

THERMAL

- √FSS EPDSU TEMP (two): -20 to 50 degC
- √FMDM TEMP (two): -3 to 55 degC
- √PCU TEMP (two): -20 to 50 degC
- √IPCU TEMP: -30 to 50 degC
- √AMSB TEMP: -20 to 50 degC
- √ORUC PRJU TEMP (two): -20 to 50 degC
- √MULE PDSU TEMP: -20 to 50 degC
- √FMDM TEMP (two): -3 to 55 degC
- √SLIC EPDSU TEMP (two): -20 to 50 degC

Determine steps necessary to reconfigure new FMDM(s):

7. If HST on external power:
 - Apply redundant control to DPCs
 - PCU ON – ITEM 1 EXEC (*)
 - √PCU – P/S
 - √DPC 1-12 – *
 - √DPC AMPS: < 11.0
 - √VOLTS: 33.8 to 35.3

8. If during FSS CCTV operations:
 CCTV ENA ON – ITEM 3 EXEC (*)
 PWR ON – ITEM 5 EXEC (*)
- L11U 9. MULE HTR SWAP
 MULE/RNS SURV HTR-B(A) PWR – ON
 HTR-A(B) PWR – OFF
 √HTR PWR tb – gray

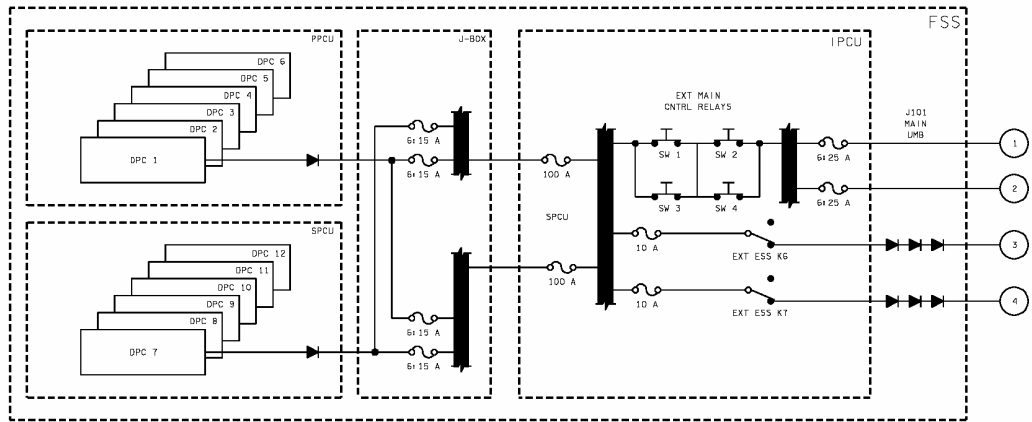
 COPE HTR-B(A) PWR – ON (tb-gray)
 HTR-A(B) PWR – OFF (tb-bp)
10. SM 212 SSE MECH/BPA/RNS
 If RNS FRM CNT – INCR:
 RNS TM ON – ITEM 25 EXEC
- L12U 11. FSS FMDM-A(B) PWR – OFF (tb-bp)
- L11U 12. MULE FMDM-A(B) PWR – OFF (tb-bp)
- A6U 13. If failure occurred during mechanism operations:
 PL RETEN LOGIC PWR SYS 2(SYS 1) – ON
- CRT AMSB ON – ITEM 7 EXEC (B(A))
 √DC AMPS: < .035
 √AC AMPS: < .2
 √MECH – blank
 √SEL (ITEMS 9-19) – (no *)
 √STAT (ITEMS 9-19) – blank
 √O/R DIS – *
- R13L PL BAY MECH PWR SYS 2(1) – ON
14. Return to step where failure occurred

HST

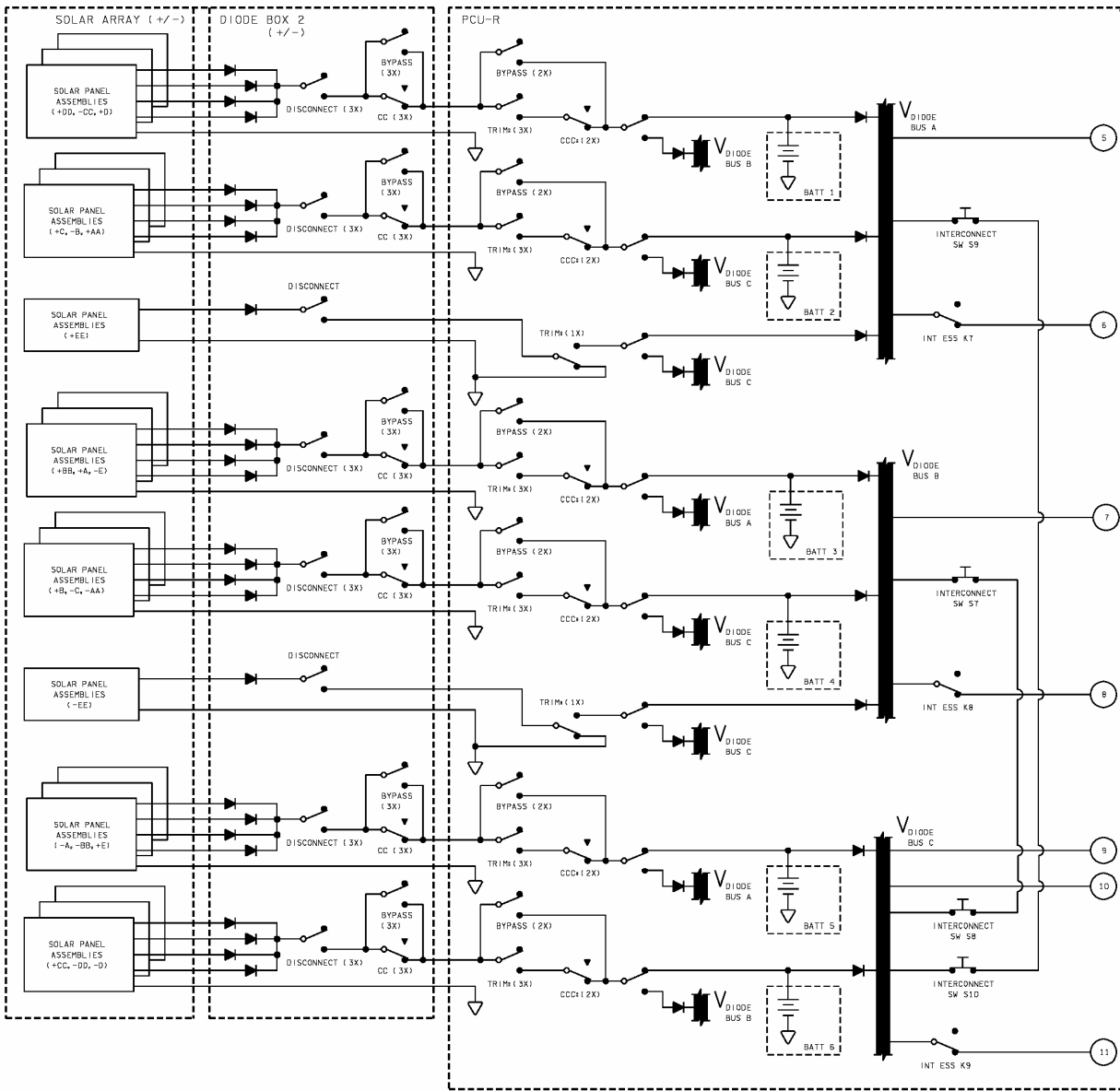
<u>2.1</u>	<u>HST</u>	
	EPS CONFIGURATION FOR SOLAR ARRAY 3	2-2
2.1a	ESS BUS INT PWR tb – bp WHEN SHOULD BE tb – UP (WHEN CMDED)	2-4
2.1b	ESS BUS INT PWR tb – UP WHEN SHOULD BE tb – bp (AUTO SWITCHOVER)	2-6
	HST SSR-1 PWR LOSS RECOVERY	2-7

HST

EPS CONFIGURATION FOR SOLAR ARRAY 3

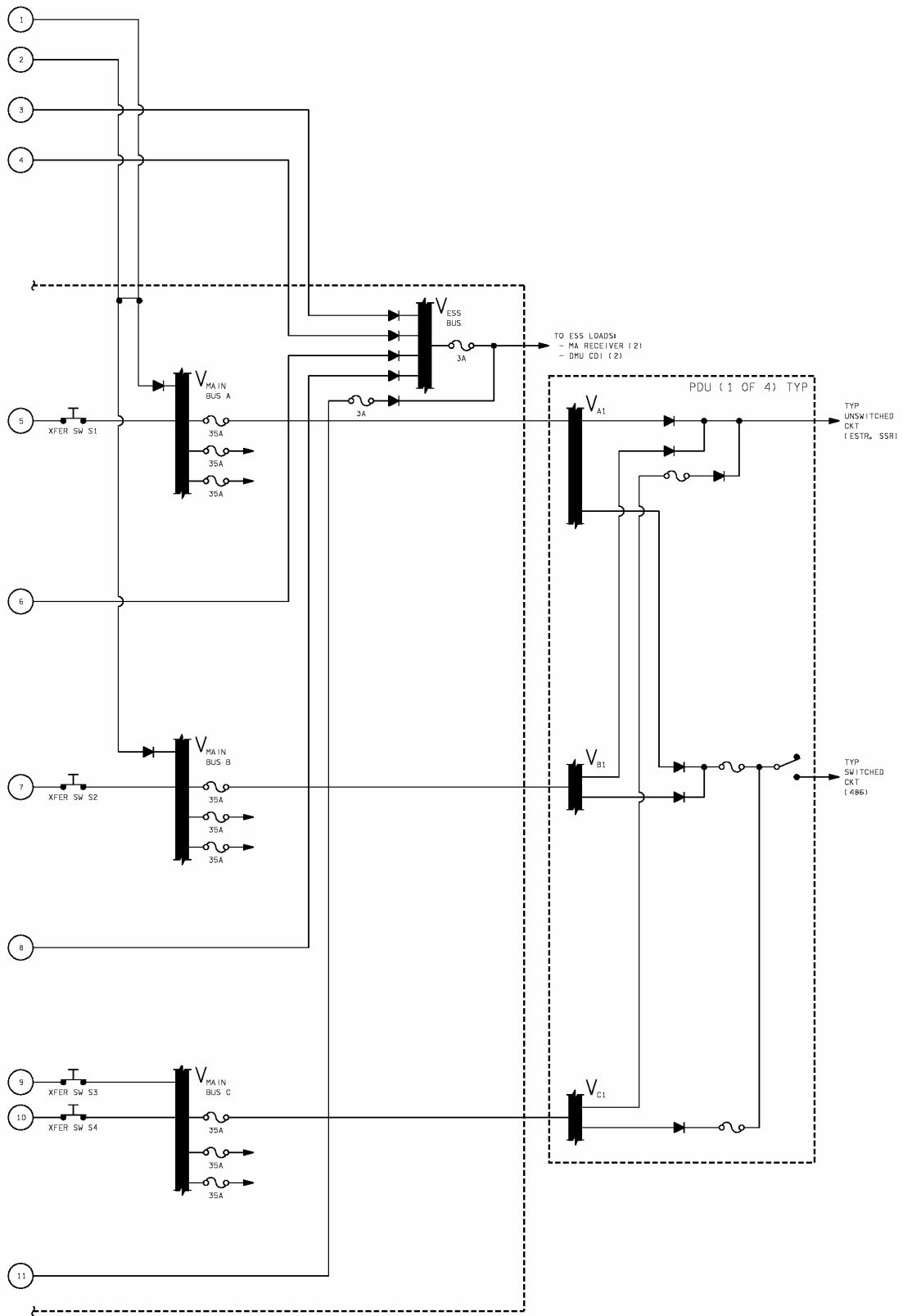


HST



48069012_109_SCH 2

EPS CONFIGURATION FOR SOLAR ARRAY 3 (Cont)



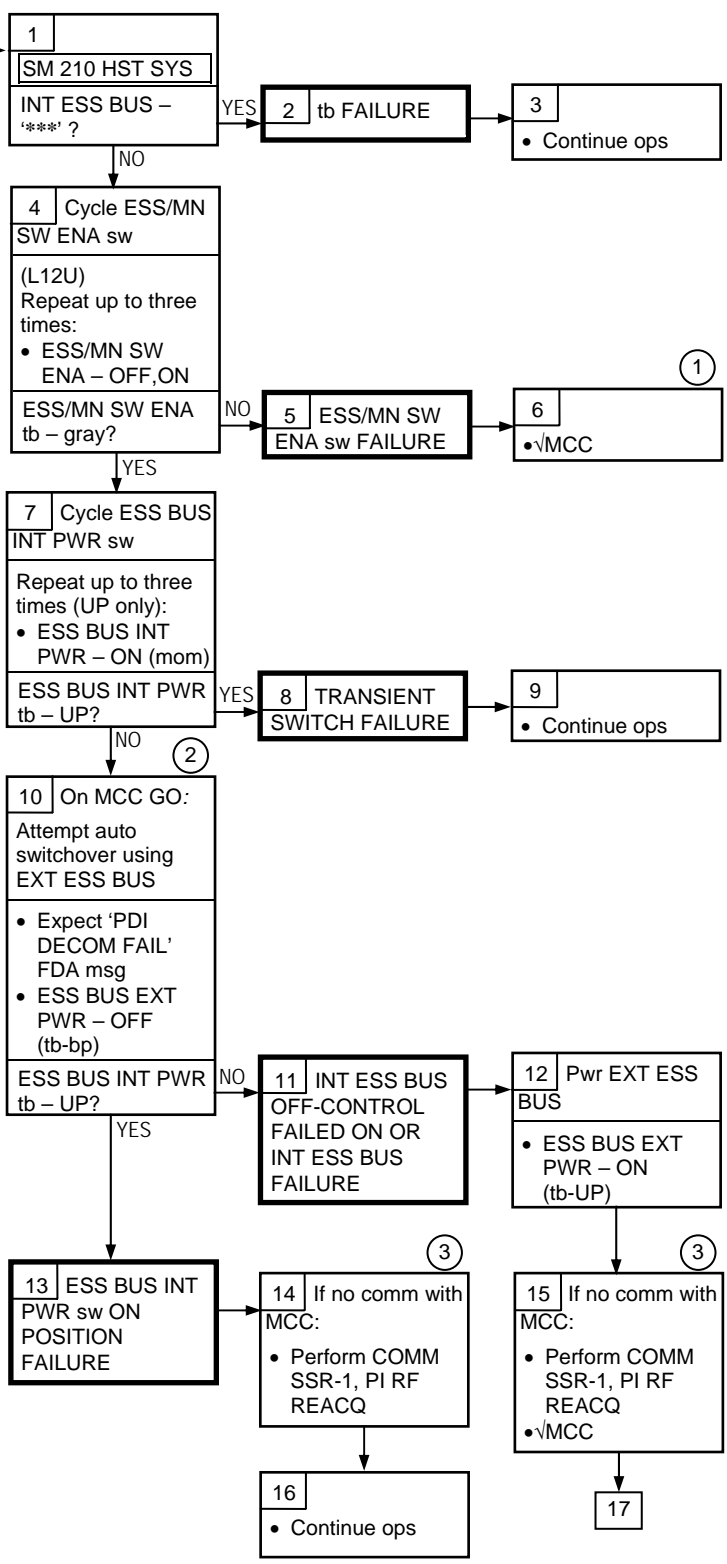
HST

2.1a ESS BUS INT PWR tb – bp WHEN SHOULD BE tb – UP (WHEN CMDED)

ESS BUS INT PWR tb – bp

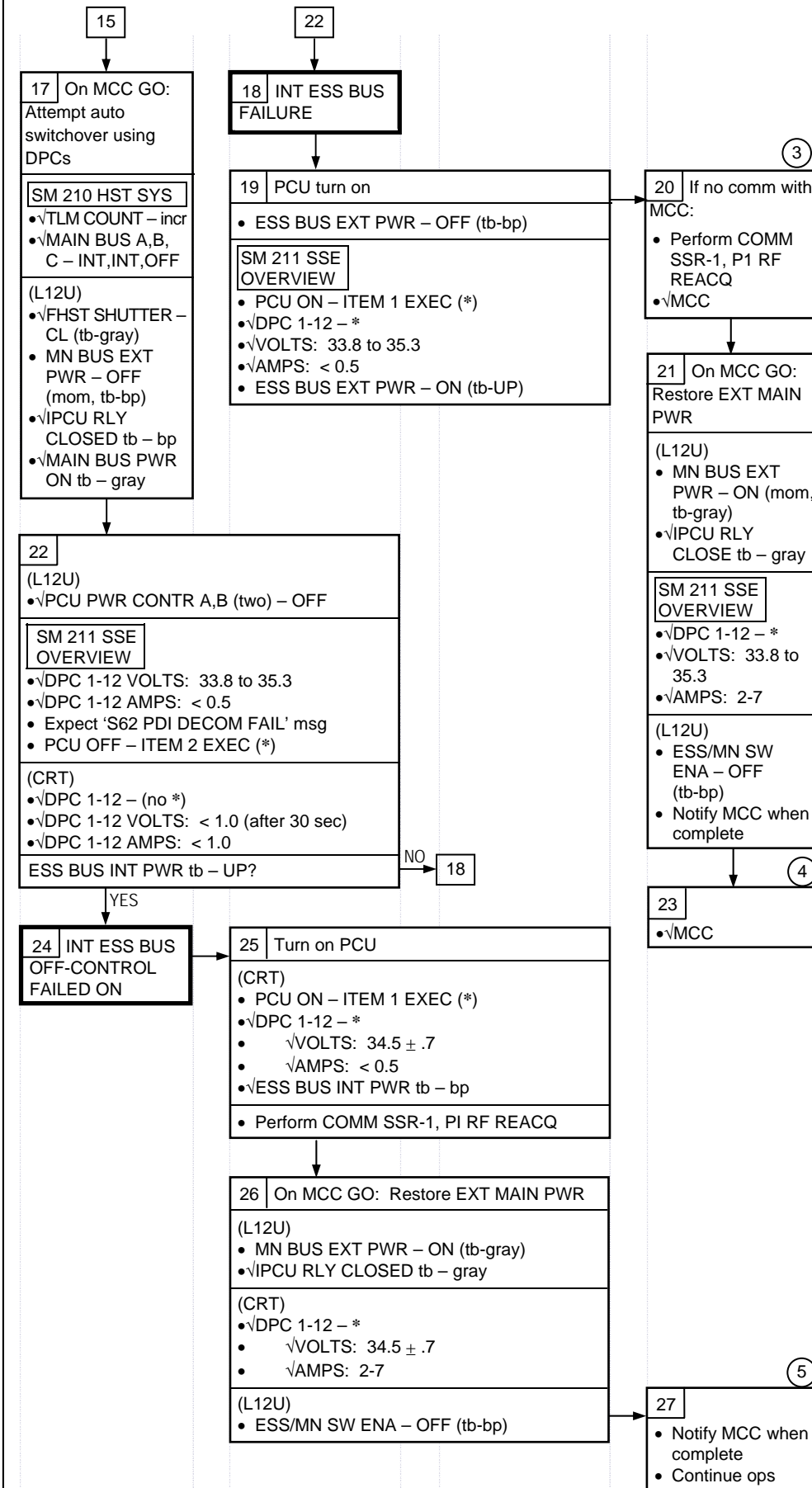
Nominal Config:
 (R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB)
 (L12U)
 cb ST SW PWR – cl

SM 211 SSE OVERVIEW
 PCU – P/S
 DPC 1-12: *
 DPC 1-12 VOLTS:
 33.8 to 35.3



- ① Possible STANDARD SWITCH PANEL (SSP) CABLE CHANGEOUT IFM
- ② Loss or interruption of HST ESS BUS forces MA transponder into pwr on reset (transmitter off)
- ③ Can be performed by ground

HST 2.1a (Cont)



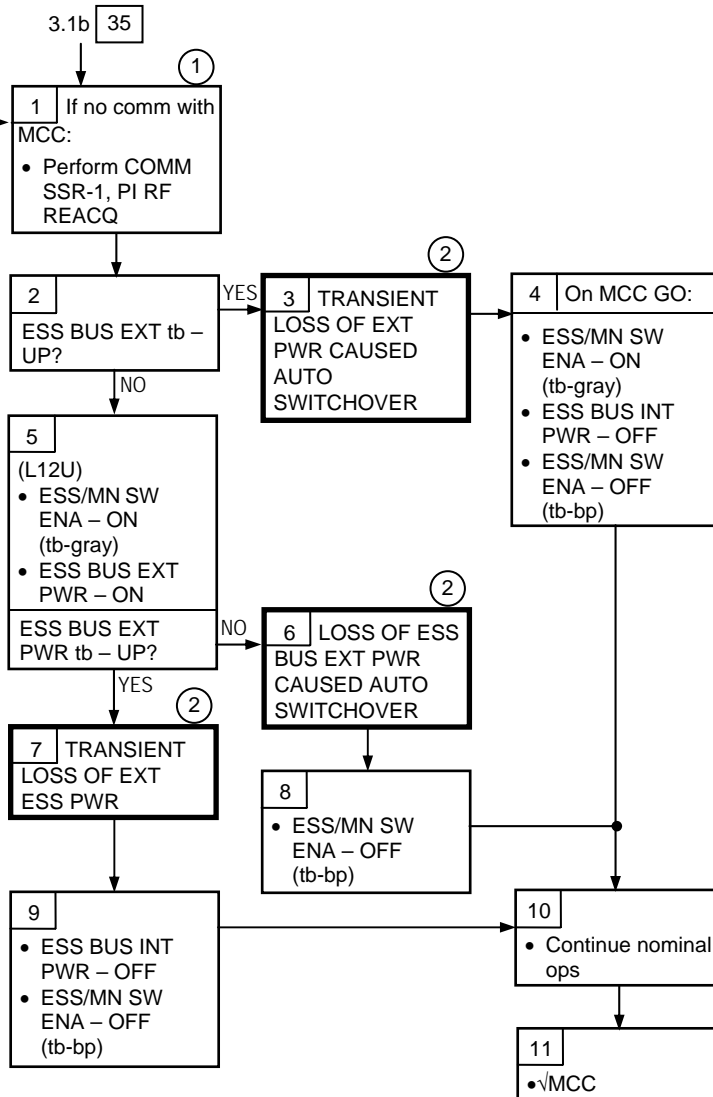
- ③ Can be performed by ground
- ④ Possible EVA reqd for astronaut control panel actions
- ⑤ Perform remainder of mission without Internal ESS Bus available. Auto-Switchover using DPCs reqd to recover INT ESS on deploy day

HST

2.1b ESS BUS INT PWR tb – UP WHEN SHOULD BE tb – bp (AUTO SWITCHOVER)

ESS BUS INT PWR tb – UP

Nominal Config:
 (R1)
 PL PRI MNC tb – ON
 PL CAB – MNA(MNB) (L12U)
 cb ST SW PWR – cl
 SM 211 SSE OVERVIEW
 PCU – P/S
 DPC 1-12 – *
 DPC 1-12 VOLTS: 33.8 to 35.3



- ① Can be performed by ground
- ② Automatic switchover to INT ESS BUS pwr occurs whenever EXT ESS BUS pwr lost or interrupted

HST SSR-1

PWR LOSS RECOVERY

- L12U 1. Disable ext pwr:
ESS/MN SW ENA – ON (tb-gray)
√ESS BUS INT PWR tb – UP

NOTE

Talkbacks not shown for remaining switches
are invalid with DPCs unpowered

ESS BUS EXT PWR – OFF
FHST SHUTTER – OP
RSU SURV HTR PWR – OFF

- ESS/MN SW ENA – OFF (tb-bp)
SSM WK LTS – OFF
√PCU PWR CONTR-A,B (two) – OFF

SM 211 SSE OVERVIEW

SM I/O RESET EXEC
PCU OFF – ITEM 2 EXEC (*)

NOTE

PCU Motor transfer switches remain closed

2. If no comm with MCC, perform COMM SSR-1 PI RF REAQ

NOTE

May be performed by ground

- CRT 3. XFER to EXT:
On MCC GO:
PCU ON – ITEM 1 EXEC
√DPC 1-12 – *
√VOLTS: 33.7 to 35.3
√AMPS: 2 to 7

- L12U √MAIN BUS EXT PWR tb – gray
ESS/MN SW ENA – ON (tb-gray)
ESS BUS EXT PWR – ON (tb-UP)

4. On MCC GO:
ESS BUS INT PWR – OFF (tb-bp)
5. ESS/MN SW ENA – OFF (tb-bp)

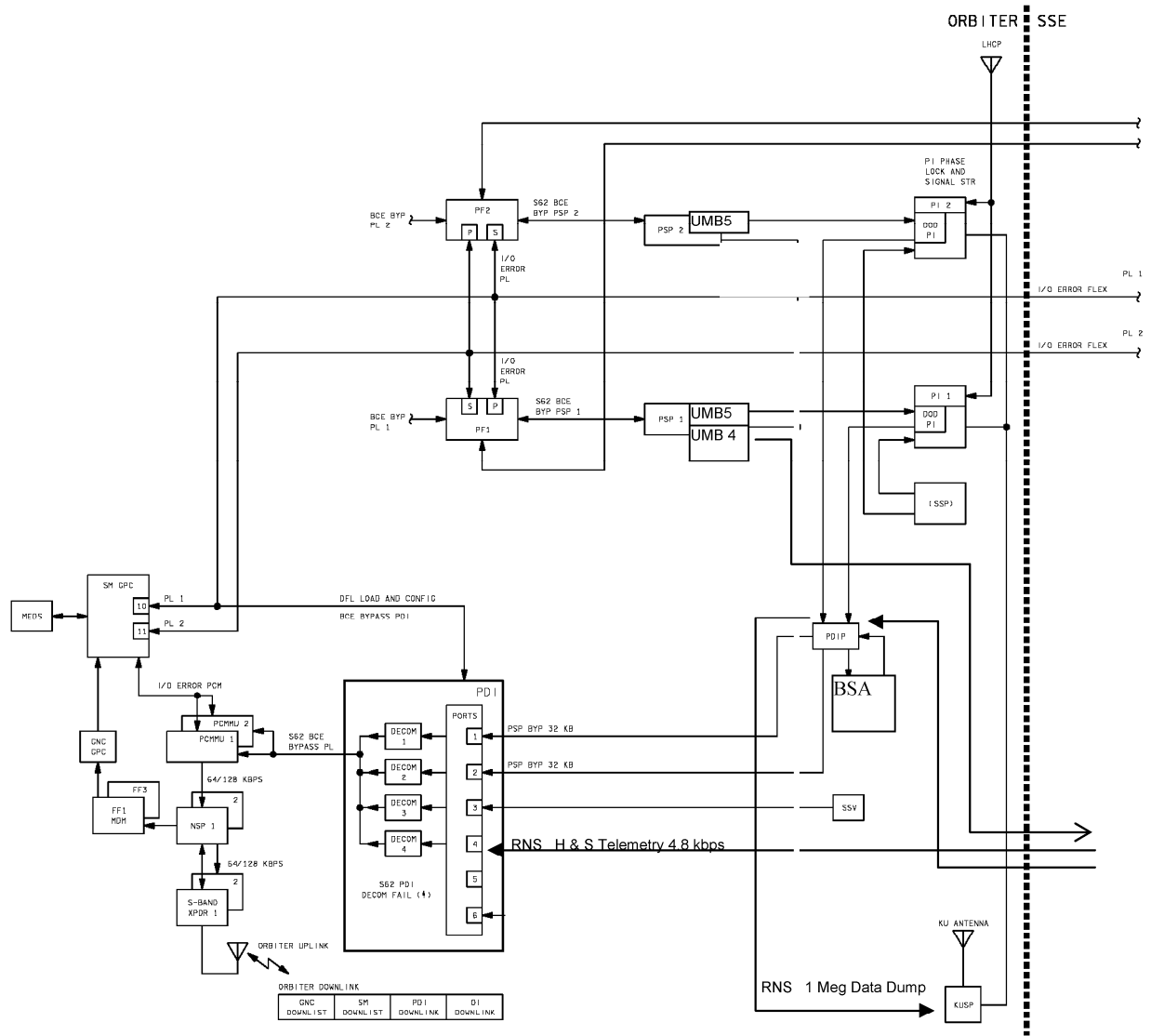
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PL COMM

STS-125 COMM MALFUNCTION POINTS	3-2
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SSR-2 SWAP S-BD PL COMM STRINGS	3-12
SSR-3 BSA PDIP PORT SWAP	3-13
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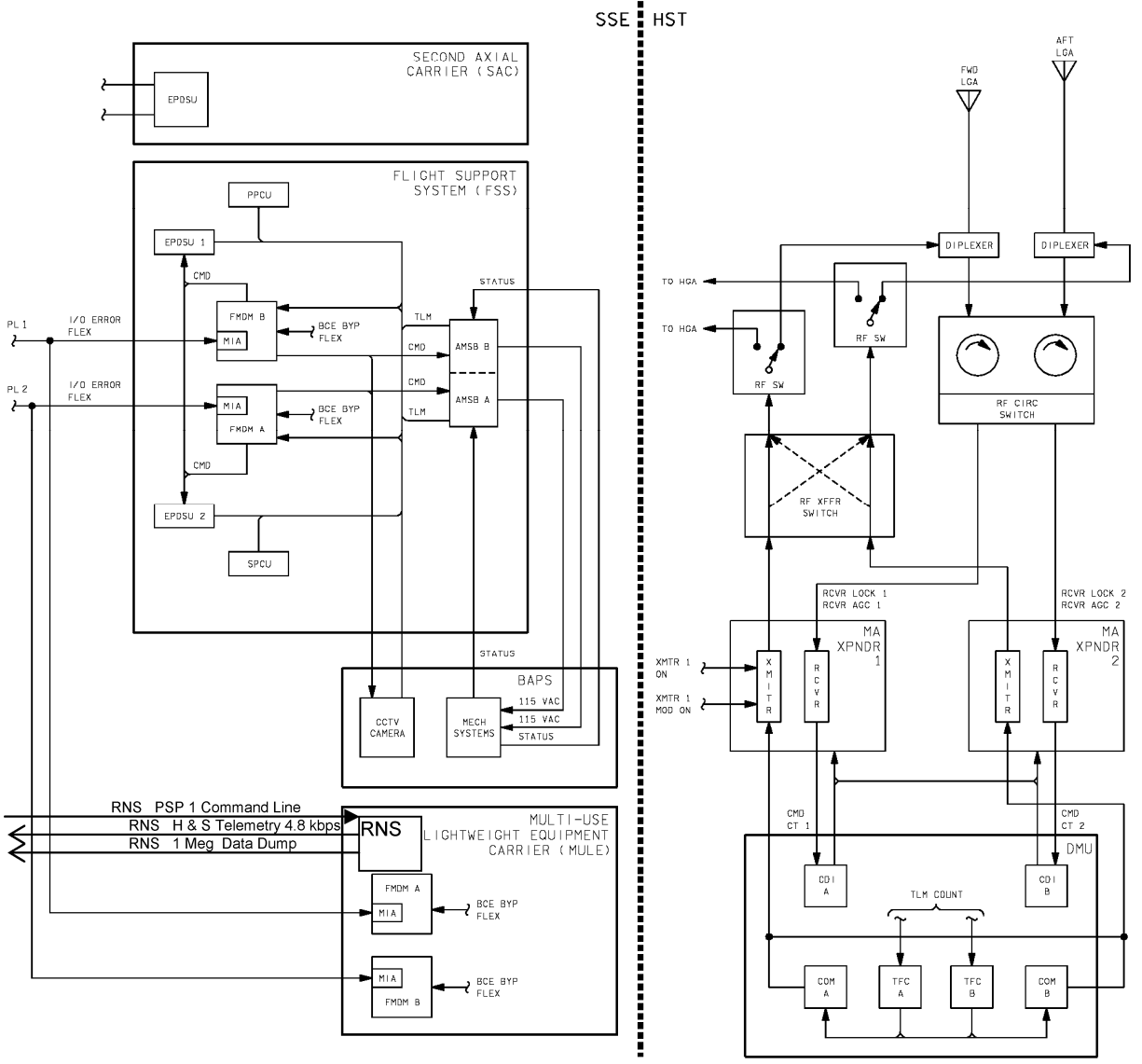
STS-125 COMM MALFUNCTION POINTS

PL COMM



48069009_109_SCH 1

STS-125 COMM MALFUNCTION POINTS (Cont)



48069010_109. SCH 1

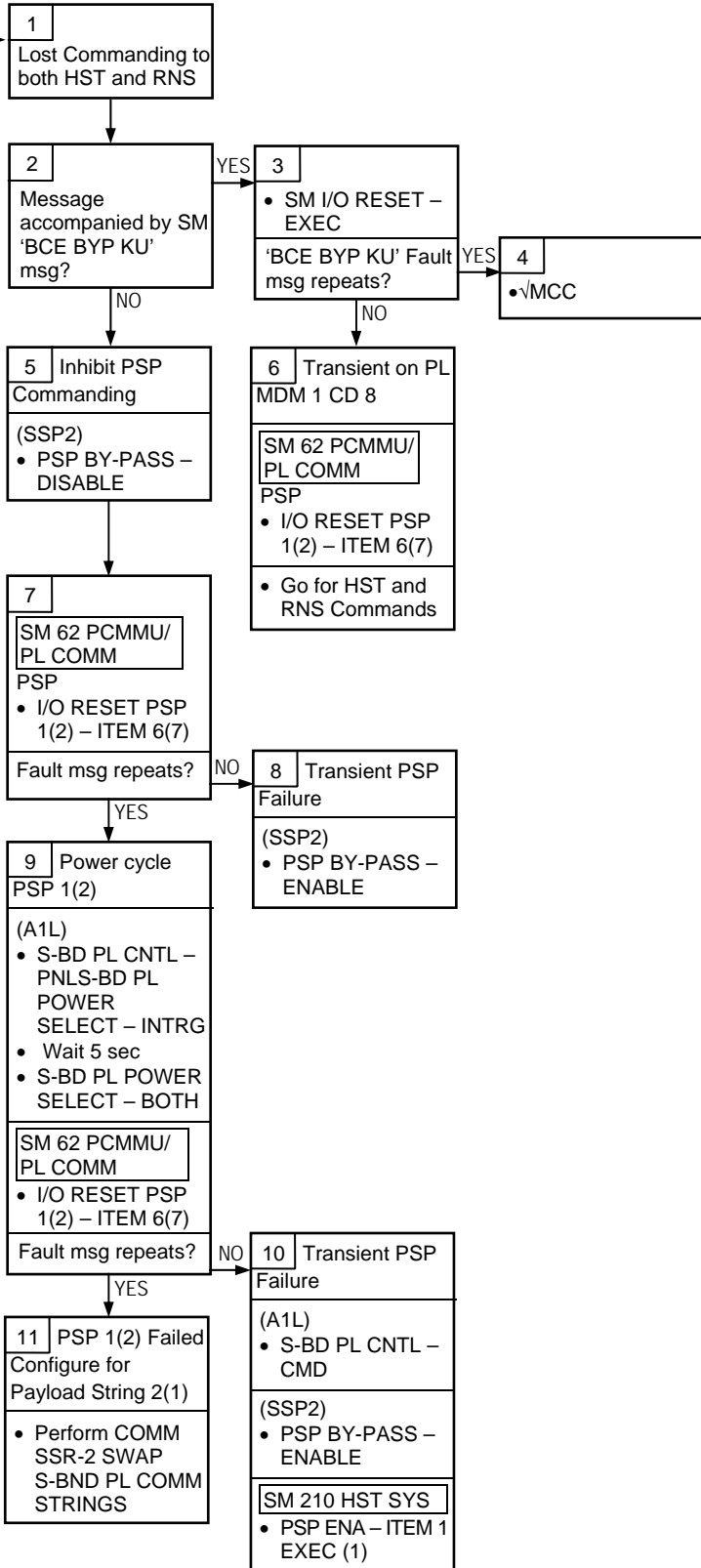
HST COMM

3.1a 'S62 BCE BYP PSP 1(2)'

SM
ALERT

S62 BCE BYP
PSP 1(2)

Nominal Config:
S-BD PL PWR
SYS - 1(2)
S-BD PL PWR
SEL - BOTH
S-BD PL PSP COM
OUTPUT - PL UMB



HST COMM

SM ALERT

S62 PDI DECOM FAIL

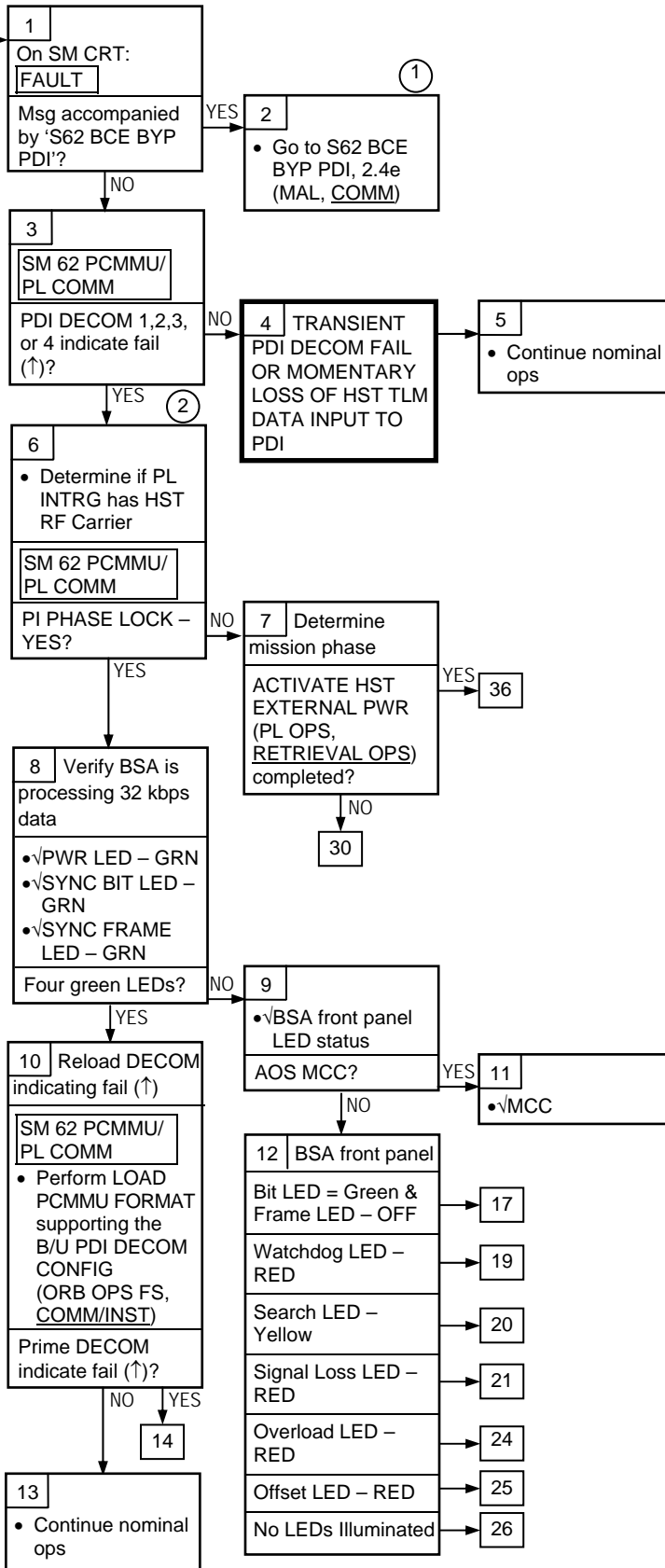
Nominal Config:

- SM 210 HST SYS
- PSP ENA 1 ID 1 (R1)
- PL PRI MNC – ON
- PL CAB – MNA (MNB) (L12L)
- cb SW PWR – cl
- PSP BYP – ENA (L12U)
- cb SPACE TEL SW PWR – cl (A1L)
- If S-BD PL CNTL – CMD, √MCC
- Else, √config:
- If HST RF link:
- S-BD PL ANT POLAR – L CIRC
- S-BD PL XMTR PWR: LO (as reqd) MED (> 40 ft) HI (> 125 ft)
- S-BD PL CH SEL INTRG 1,2 (six) – 701,701
- S-BD PL FREQ SWEEP – OFF
- S-BD PL MOD – ON
- S-BD PL PWR SYS – 1(2)
- S-BD PL PWR SEL – BOTH
- S-BD PL PSP COM OUTPUT – PL UMB

BSA

- PWR – ON
- RATE – AUTO
- POLARITY – NORM(INV)
- WATCHDOG – ENABLE

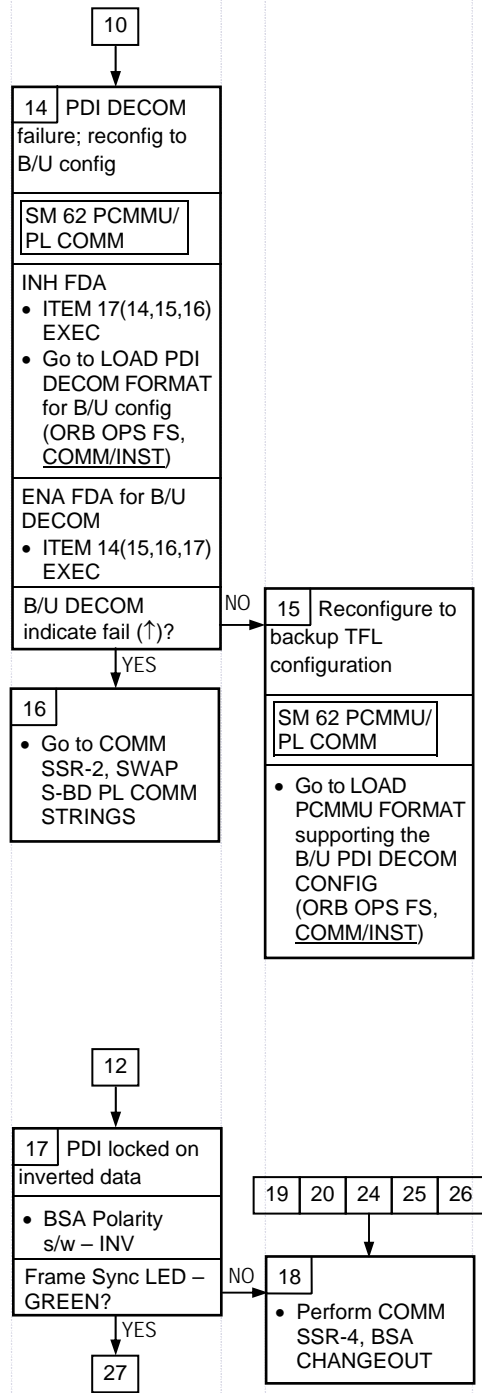
3.1b 'S62 PDI DECOM FAIL'



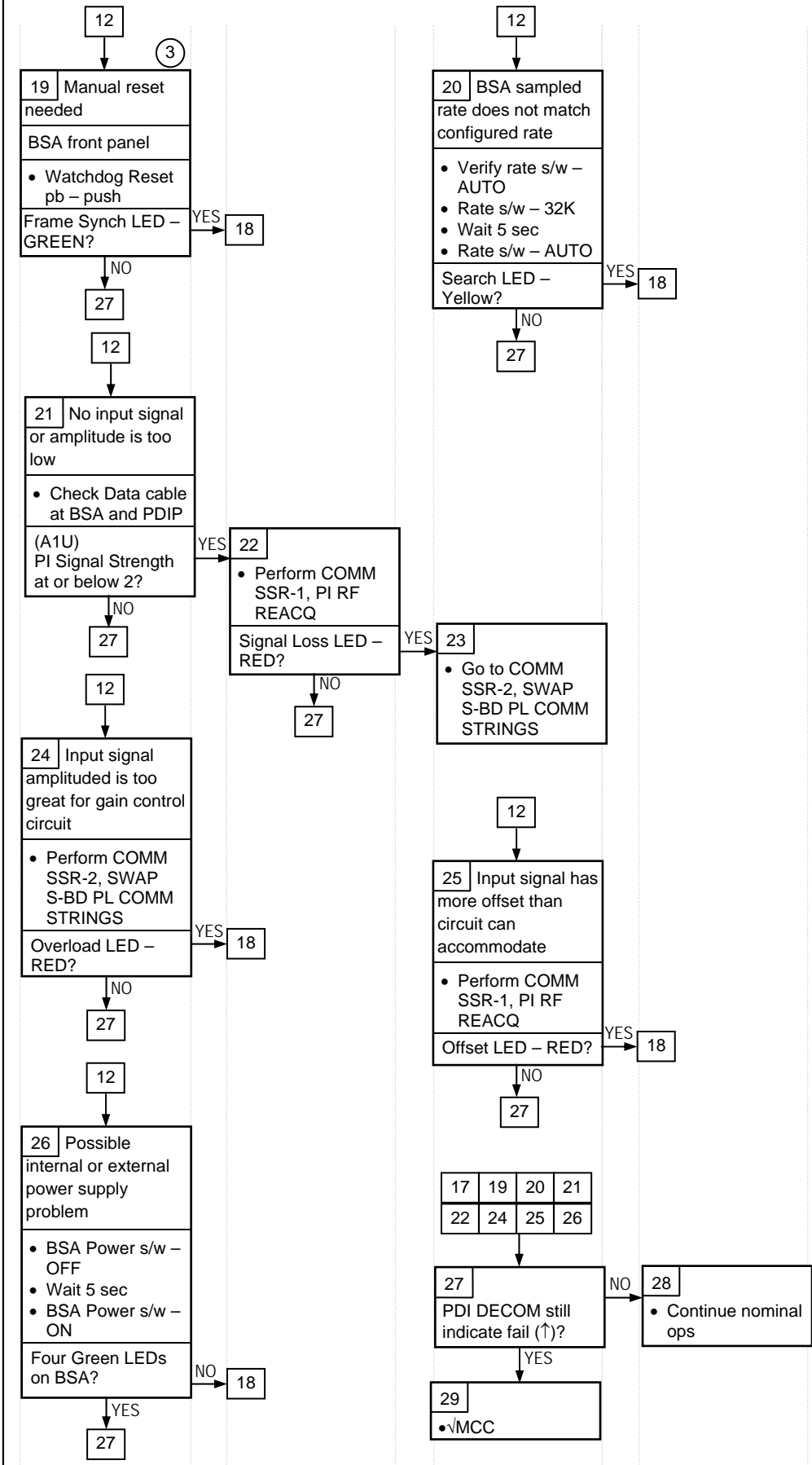
① Possible PDI Replacement IFM

② If KU downlink of HST tlm available, Ground will check with STOCC. If STOCC not receiving tlm via KU, then possible HST tlm system failure or PI receiver failure

HST COMM 3.1b (Cont)

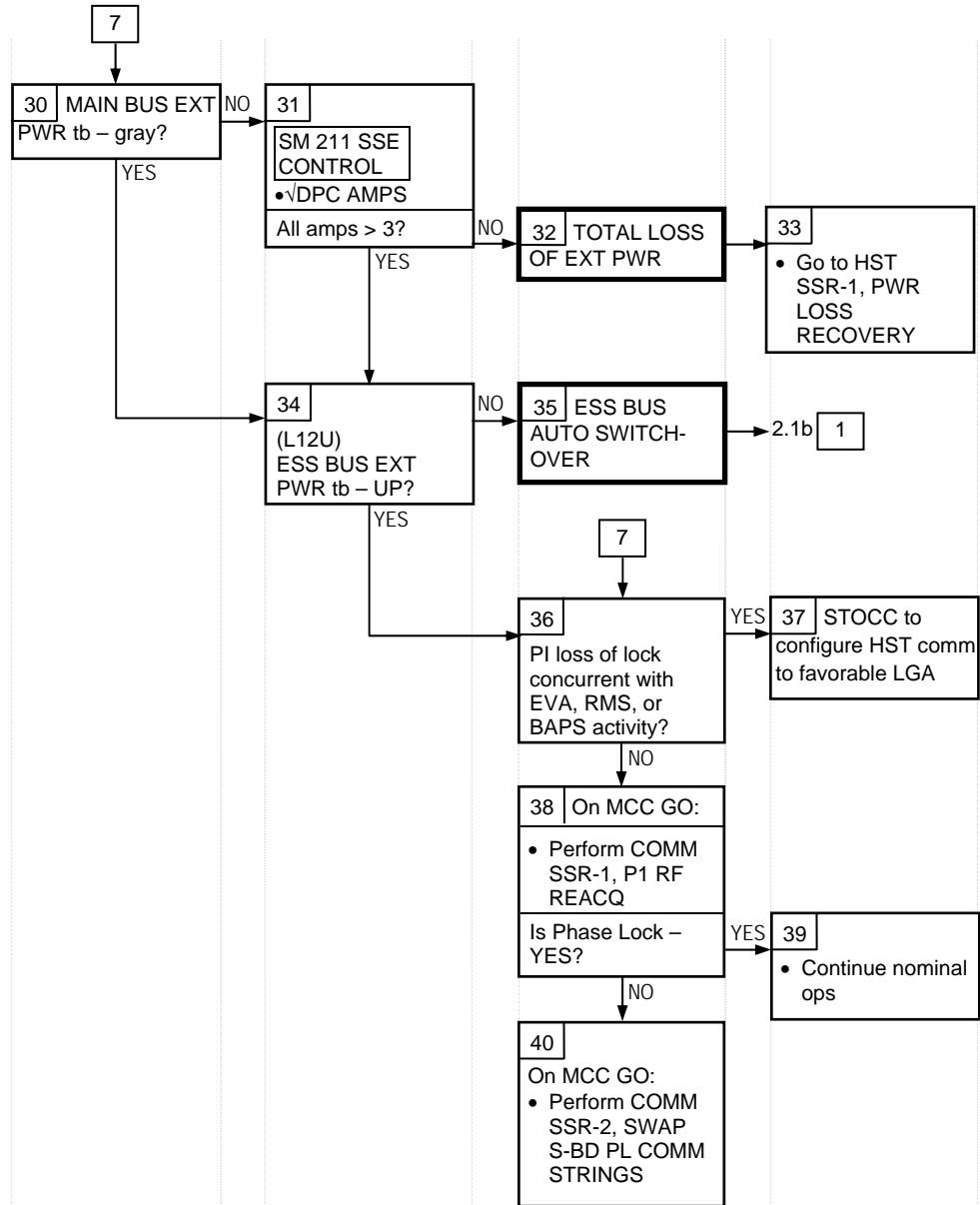


HST COMM 3.1b (Cont)



- ③ BSA Reset and Power Cycle Counters should clear
- ④ Upon powerup, all LEDs lit for 4 sec

HST COMM 3.1b (Cont)

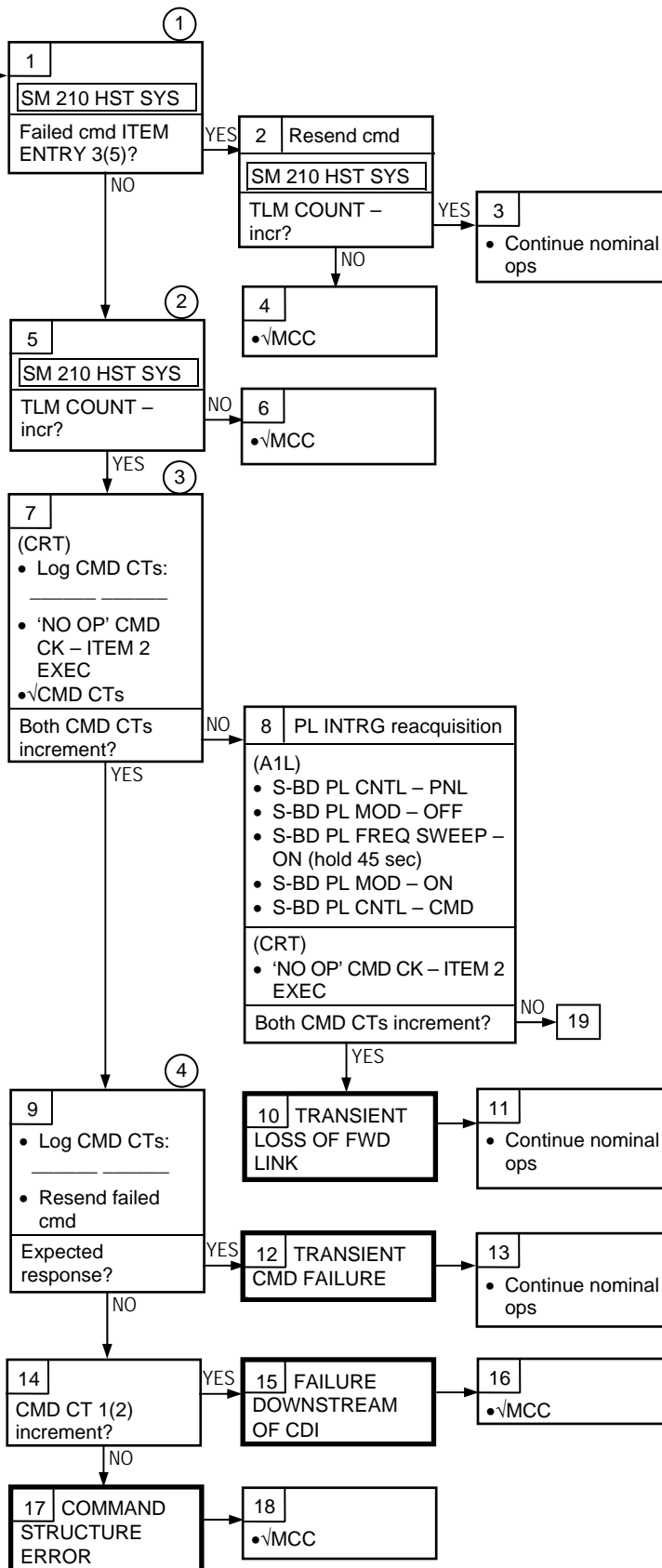


HST COMM

3.1c NO HST RESPONSE TO RF COMMAND

Nominal Config:
 PI link setup (A1L)
 S-BD PL CNTL – CMD
 S-BD PL ANT POLAR – L CIRC
 S-BD PL XMTR PWR: LO (as reqd) MED (> 40 ft) HI (> 125 ft)
 S-BD PL CH SEL INTRG 1,2 tw (six) – 701,701
 S-BD PL PWR SYS 1(2)
 S-BD PL PWR SEL – BOTH
 S-BD PL PSP CMD OUTPUT – PL UMB
 S-BD PL XMTR FREQ SWEEP – OFF
 S-BD PL XMTR MOD – ON
 S-BD PL CNTL – PNL,CMD
 L12L PSP BYPASS – ENABLE

SM 210 HST SYS
 PSP ENA 1 ID – (1)



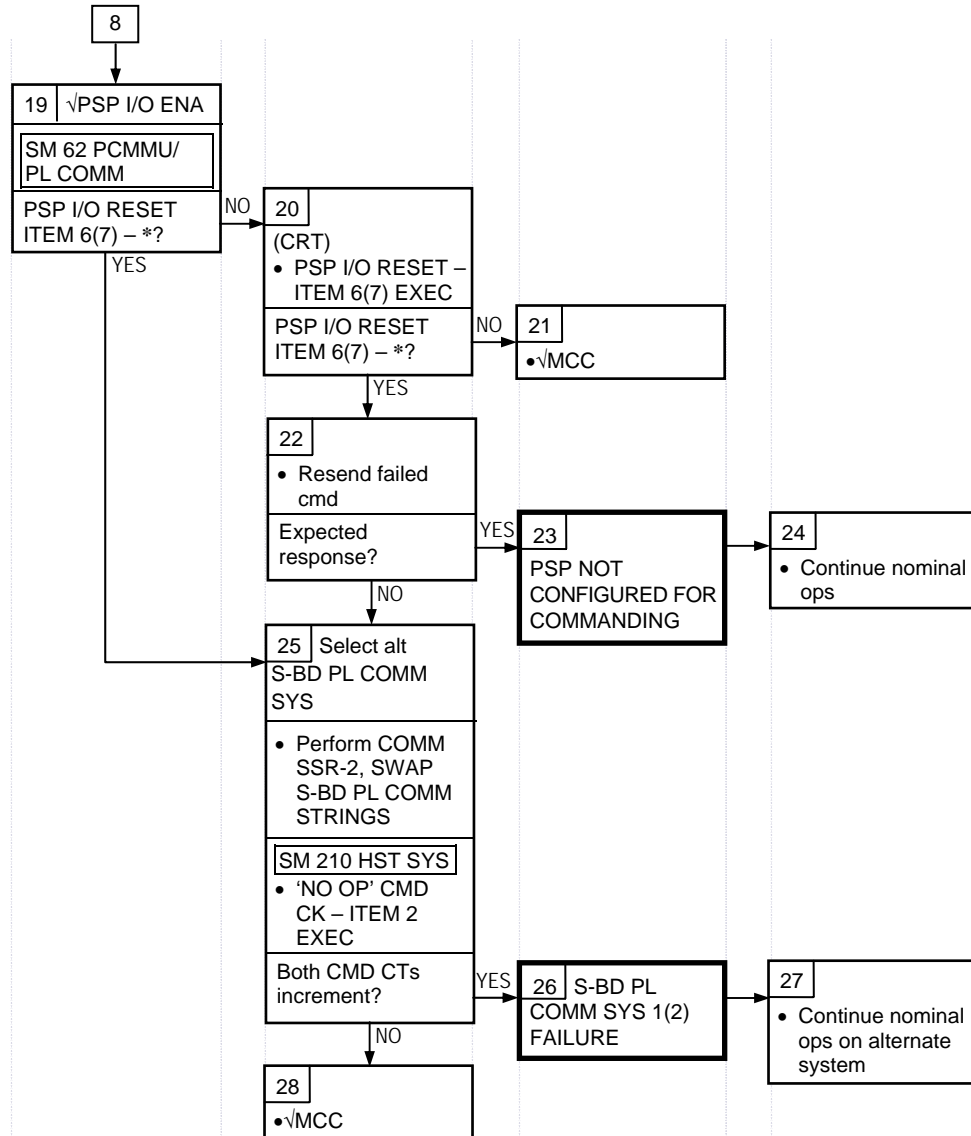
① If failed cmd was XMTR 1 ON, ITEM 3, then XMTR MOD ON, ITEM 5 must be sent before tlm is received

② Must be in 32K T format or 4K A format, or 4K D format to receive valid tlm (DFL 5, 6,7,9, 16, 17 or 19). If not, when AOS, √MCC

③ HST RCVR could have lock but pwr level (AGC) could be too low for cmd processing. For this case, MCC may decide to go to PI MED pwr

④ CMD CT 1 corresponds to CDI A cmds and CMD CT 2 corresponds to CDI B

HST COMM 3.1c (Cont)



①
STOCC can perform
blocks 3-5
if necessary

②
XMTR 1 ON
cmd also turns off
HST modulation

1	RF reacquisition	
(A1L)		
<ul style="list-style-type: none"> •√S-BD PL CNTL – CMD •√S-BD PL ANT POLAR – L CIRC •√S-BD PL XMTR PWR – LO, MED (> 40 ft), HI (> 125 ft) (as reqd) •√S-BD PL CH SEL INTRG 1,2 tw (six) – 701,701 •√S-BD PL MOD – OFF •√S-BD PL PWR SEL – BOTH •√S-BD PL SYS – 1(2) • S-BD PL CNTL – PNL 		
<table border="1" style="width: 100%;"> <tr> <td>SM 210 HST SYS</td> </tr> </table> <ul style="list-style-type: none"> • PSP ENA – ITEM 1 EXEC (1) 		SM 210 HST SYS
SM 210 HST SYS		

2	Forward link reacquisition
(A1L)	
<ul style="list-style-type: none"> • S-BD PL FREQ SWEEP – ON (hold 45 sec) • S-BD PL MOD – ON • S-BD PL CNTL – CMD 	

3	Return link reacquisition		
<table border="1" style="width: 100%;"> <tr> <td>SM 210 HST SYS</td> </tr> </table> <ul style="list-style-type: none"> • XMTR 1 ON CDI-A(B) – ITEM 3 +1(2) EXEC <table border="1" style="width: 100%;"> <tr> <td>SM 62 PCMMU/PL COMM</td> </tr> </table> <ul style="list-style-type: none"> •√PL INTRG PHASE LOCK – YES • Log PL SIG STR: _____ 		SM 210 HST SYS	SM 62 PCMMU/PL COMM
SM 210 HST SYS			
SM 62 PCMMU/PL COMM			

4	HST tlm verification	
<table border="1" style="width: 100%;"> <tr> <td>SM 210 HST SYS</td> </tr> </table> MOD ON CDI-A(B) – ITEM 5 +1(2) EXEC		SM 210 HST SYS
SM 210 HST SYS		

5	HST tlm verification	
<table border="1" style="width: 100%;"> <tr> <td>SM 210 HST SYS</td> </tr> </table> <ul style="list-style-type: none"> •√TLM COUNT – incr • Log MET: _____/_____:_____:_____ 		SM 210 HST SYS
SM 210 HST SYS		

COMM

SSR-2 SWAP S-BD PL COMM STRINGS

1	Swap BSA ports
<ul style="list-style-type: none"> • Perform COMM SSR-3 BSA PDIP PORT SWAP 	



2	RF reacquisition	
<p>(A1L)</p> <ul style="list-style-type: none"> •√S-BD PL CNTL – CMD •√S-BD PL ANT POLAR – L CIRC •√S-BD PL XMTR PWR – LO •√S-BD PL CH SEL INTRG 1,2 tw (six) – 701,701 • S-BD PL MOD – OFF •√S-BD PL PWR SEL – BOTH • S-BD PL PWR SYS – 2(1) • S-BD PL CNTL – PNL • Fault msg 'S62 BCE BYP PSP 1(2) 		
<ul style="list-style-type: none"> • Perform PSP I/O RESET 		
<table border="1"> <tr> <td style="width: 20px; text-align: center;">SM 62 PCMMU/PL COMM</td> </tr> </table>		SM 62 PCMMU/PL COMM
SM 62 PCMMU/PL COMM		
<ul style="list-style-type: none"> • I/O RESET PSP 2(1) – ITEM 7(6) EXEC (*) 		
<table border="1"> <tr> <td style="width: 20px; text-align: center;">SM 210 HST SYS</td> </tr> </table>		SM 210 HST SYS
SM 210 HST SYS		
<ul style="list-style-type: none"> • PSP ENA – ITEM 1 EXEC (1) 		



3	Reload PDI switch matrix for alternate PI	
<table border="1"> <tr> <td style="width: 20px; text-align: center;">SM 62 PCMMU/PL COMM</td> </tr> </table>		SM 62 PCMMU/PL COMM
SM 62 PCMMU/PL COMM		
<p>PDI: (DECOM 1)</p> <ul style="list-style-type: none"> • SEL DECOM – ITEM 9 +1 EXEC • SEL INPUT – ITEM 12 +2(1) EXEC • LOAD – ITEM 13 EXEC <p>PDI: (DECOM 4)</p> <ul style="list-style-type: none"> • SEL DECOM – ITEM 9 +4 EXEC • SEL INPUT – ITEM 12 +2(1) EXEC • LOAD – ITEM 13 EXEC 		



4	Forward link reacquisition
<p>(A1L)</p> <ul style="list-style-type: none"> • S-BD PL FREQ SWEEP – ON (hold 45 sec) • S-BD PL MOD – ON • S-BD PL CNTL – CMD 	



5	Return link reacquisition	
<table border="1"> <tr> <td style="width: 20px; text-align: center;">SM 210 HST SYS</td> </tr> </table>		SM 210 HST SYS
SM 210 HST SYS		
<ul style="list-style-type: none"> • XMTR 1 ON CDI-A(B) – ITEM 3+1(2) EXEC 		
<table border="1"> <tr> <td style="width: 20px; text-align: center;">SM 62 PCMMU/PL COMM</td> </tr> </table>		SM 62 PCMMU/PL COMM
SM 62 PCMMU/PL COMM		
<ul style="list-style-type: none"> • PL INTRG PHASE LOCK – YES • Log PL SIG STR: _____ 		



6	HST tlm verification	
<table border="1"> <tr> <td style="width: 20px; text-align: center;">SM 210 HST SYS</td> </tr> </table>		SM 210 HST SYS
SM 210 HST SYS		
<ul style="list-style-type: none"> • MOD ON CDI-A(B) – ITEM 5 +1(2) EXEC •√TLM COUNT – incr • Log MET: ____/____:____:____ 		

①
STOCC can perform blocks 2,4 if necessary

②
XMTR 1 ON cmd also turns off HST modulation

COMM SSR-3

BSA PDIP PORT SWAP

NOTE

Possible 'S62 PDI DECOM FAIL' msg

- | | | |
|-------|--|--|
| L12L | 1. <u>REMOVE PI DATA FROM BSA</u>
PSP BY-PASS – DISABLE | |
| BSA | 2. <u>BSA PWR OFF</u>
BSA PWR – OFF | |
| PDIP1 | 3. <u>PDIP PORT SWAP</u>
Disconnect BSA data cable from HST PI NO 1(2)
Remove Turn-Around Plug on HST PI NO 2(1)
Install Turn-Around Plug on HST PI NO 1(2)
Connect BSA data cable to HST PI NO 2(1) | |
| BSA | 4. <u>BSA PWR UP AND LED VERIFICATION</u>
BSA PWR – ON
√All LEDs illuminate for 4 sec

After full LED check:
√PWR – GREEN

* If pwr to BSA fails: *
* Check pwr cable connection: *
* BSA PWR – OFF *
* BSA PWR – ON * | |
| L12L | 5. <u>ENABLE PSP BYPASS</u>
PSP BY-PASS – ENABLE | |
| BSA | 6. √BSA Rate – Auto | |
| | 7. <u>STATUS INDICATORS</u>

<u>Signal Status</u>
√Sync BITE – GREEN
√Sync Frame – GREEN

Report status to MCC | |

COMM SSR-4

BSA CHANGEOUT

TO REMOVE FAILED BSA

- BSA
L12L
1. POWER OFF FAILED BSA
BSA PWR – OFF
PSP BY-PASS – DISABLE
 2. DISCONNECT FAILED BSA
DC UTIL PWR MNB – OFF
- BSA
- Disconnect: BSA Power cable
Disconnect: BSA Data cable
3. REMOVE FAILED BSA
Remove failed BSA with caution to avoid damaging velcro
 4. STOW FAILED HST BSA
Stow BSA in locker

TO INSTALL SPARE BSA

5. UNSTOW SPARE BSA
Remove spare BSA from storage locker
 6. VERIFY CONNECTORS DEADFACED FOR BSA INSTALLATION
L12L √PSP BY-PASS – DISABLE
MO13Q √DC UTIL PWR MNB – OFF
BSA √BSA PWR – OFF
 7. POSITION BSA
Place Spare BSA into position and velcro
 8. BSA INSTALLATION
BSA Connect: BSA 14 foot data cable to BSA data port
Connect: BSA power cable to BSA power port
 9. CONFIGURE BSA FRONT PANEL
BSA RATE – Auto
POLARITY – Norm
WATCHDOG – Ena
 10. BSA POWERUP AND LED VERIFICATION
L12L PSP BY-PASS – ENABLE
MO13Q DC UTIL PWR MNB – ON
BSA BSA PWR – ON
√All LEDs illuminate for 4 sec
- After LED check:
- √PWR – Green
 - √RATE – 32k – Green
 - √SYNC – Bit – Green
 - √SYNC – Frame – Green
- * If status indicators do not agree, *
 - * call MCC *
 - * If pwr to BSA fails: *
 - * Check pwr cable connection *
 - * BSA PWR – OFF (wait 5 sec) *
 - * BSA PWR – ON *

Notify MCC, HST BSA CHANGEOUT is complete

PL/DPS RECONFIG

PL/DPS
RECONFIG

PL/DPS RECONFIG

PROCEDURE	SECURE ACTION	RECOVERY ACTION	INFO ONLY
PL1(2) MDM I/O ERROR; PL1(2) MDM OUTPUT (ORB PKT, <u>DPS</u>)	A,B	E	I
PASS SM GPC FAIL (ORB PKT, <u>DPS</u>)	N/A	F	J
GNC RECOVERY VIA G2FD (ORB PKT, <u>DPS</u>)	N/A	F	J
5.1a CS SPLIT (MAL, <u>DPS</u>)	N/A	F	J
5.3c I/O ERROR PL1(2), MDM OUTPUT PL1(2) (MAL, <u>DPS</u>)	- - -	D,E	I
5.3e I/O ERROR FLEX (MAL, <u>DPS</u>)	A,C	G	
5.3f BCE BYP FLEX (MAL, <u>DPS</u>)	A,C	G	
5.3g BCE BYP PL1(2) (MAL, <u>DPS</u>)	A,B	D,E	I
GPC FRP-4 PASS RECOVERY AFTER BFS ENGAGE (ASCENT/ORBIT/ENTRY) (MAL, <u>DPS</u>)	N/A	*F	J
GPC FRP-7 DPS RECONFIG FOR LOSS OF AV BAY COOLING (MAL, <u>DPS</u>)	N/A	*F,H	J
DPS SSR-3 GNC REASSIGNMENT (MAL, <u>DPS</u>)	N/A	N/A	J
DPS SSR-4 SM REASSIGNMENT (MAL, <u>DPS</u>)	N/A	F,H	J
ECLS SSR-10 H2O PUMP OPS VIA GPC (MAL, <u>ECLSS</u>)	N/A	N/A	
*Recovery procedure is not called from GPC FRP-7, specified actions are reqd to return to a nominal config			

ACTION A

If during FSS MECH OPS, terminate motor drive immediately

A6U PL RETEN LAT 1,2 (two) – OFF
R13L PL BAY MECH PWR SYS 1,2 (two) – OFF

NOTE

If port mode reqd, and operating on less than 12 DPC, \sqrt{MCC} ; else, enable PCU hardline to ensure continuous HST ext pwr

If HST on ext pwr:

L12U PCU CONTR A,B (two) – ON

ACTION B

If port moding to alternate ports, do not power off any flex MDMs. All 4 FMDMs can be powered

If port moding back to primary ports, power off alternate FMDMs, primary FMDMs will still be powered

PL/DPS
RECONFIG

ACTION C

If entering from 5.3e, 'I/O ERROR FLEX' (MAL, DPS):

Go to 1.4a, 'I/O ERROR FLEX' (SSE), [9]

If entering from 5.3f, 'BCE BYP FLEX' (MAL, DPS):

Go to 1.4b, 'BCE BYP FLEX' (SSE), [9]

ACTION D

If procedure swapped to alternate FMDM,

Perform SSE SSR-1 FMDM SWAP A→B(B→A) (SSE), steps 6-14

ACTION E

L12U

PCU CONTR A,B (two) – OFF

ACTION F (Can be performed by MCC if AOS)

If SM GPC recovered:

[SM 62 PCMMU/PL COMM]

I/O RESET PSP1(2) – ITEM 6(7) EXEC (*)

[SM 210 HST SYS]

PSP ENA – ITEM 1 EXEC (1) or SM 213 HST BATT, PSP ENA – ITEM 1 EXEC (1)

ACTION G

Verify SSE status:

[SM 211 SSE OVERVIEW]

POWER

- √FSS EPDSU 1/2 AMPS (two): < 3.0
- √FSS FMDM A/B AMPS (two): .5 to 1.1
- √HTR – 1/2
- √P1/P2 AMPS (two): < 0.4
- √R1/R2 AMPS (two): < 0.4
- √CCTV HTR AMPS: < .9
- √ORUC – A/B
- √AMPS (two): < 30
- √MULE FMDM A/B AMPS (two): .7 to 1.3
- √HTR – (no *)
- √HTR AMPS: < 0.4

- √COPE 1A/2A AMPS (two): < 3.5
- √1B&2B: < 6
- √3A/3B (two): < 3.5
- √SLIC EPDSU AMPS: < 16
- √FSS VOLTS (two): 24.0 to 32.0
- √SLIC VOLTS (two): 24.0 to 32.0
- √MULE VOLTS: 24.0 to 32.0

[SM 212 SSE MECH/BPA/RNS]

If RNS FRM CNT – INCR:

RNS TM ON – ITEM 25 EXEC

If during FSS CCTV operations:

CCTV ENA ON – ITEM 3 EXEC (*)

PWR ON – ITEM 5 EXEC (*)

ACTION H (Can be performed by MCC if AOS)

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

Reenable PDI DECOM FDA as reqd

ACTION I

If 'I/O ERROR PL1' msg, note following losses:

Loss of onboard and ground cmd capability via PL comm string 1 (PF1/PSP1/PI1)
to HST

If 'I/O ERROR PL2' msg, note following losses:

Loss of onboard and ground cmd capability via PL comm string 2 (PF2/PSP2/PI2)
to HST

ACTION J

If affected GPC SM:

Note PL commanding (onboard and ground) via SM GPC not possible until
SM machine restored and PF1(2) MDM I/F restored

If affected GPC GNC:

Ground commanding not possible until GNC machine restored

HST DATA INVERSION 5-2

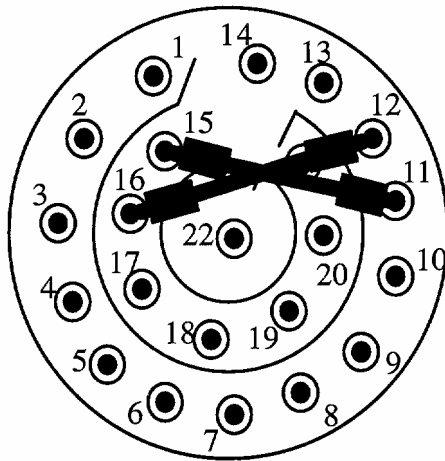
HST DATA INVERSION

OBJECTIVE: To recover onboard payload tlm by reversing polarity of telemetry signal coming from PI #1(PI #2)

LOCATION: PDIP (J101(J103)) on panel L12L

TOOLS REQD: Gray Tape
Pin Kit

- A1L 1. \sqrt{S} -BD PL PWR SEL – BOTH
 $\sqrt{SYS} - 1(2)$
- PDIP 2. Obtain two 5-in (22 ga) Pin/Pin Test Jumper Leads from Pin Kit
3. Demate connector from J101(J103) on PDIP
4. Install 5-in (22 ga) Pin/Pin Test Jumper Leads into following socket positions on J101(J103)



J101(J103)

5. Secure Jumpers with Gray Tape
6. Notify MCC: IFM complete
7. Stow tools

CRITICAL EQUIPMENT LOST

ELECTRICAL BUS LOSS MATRIX 6-3
MDM BUS LOSS IMPACTS 6-7

CRITICAL
EQUIP LOST

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ELECTRICAL BUS LOSS MATRIX

ORBITER ELECTRICAL BUSES →	FC1	FC2			FC3	MNA DA1						MNB DA2						FC3	MNC DA3												
	ESS 1BC	ESS 2CA			ESS 3AB	FPC1		R14	O14	A6 & A14	MPC 1	MPC2	A6 & A14	APC5	FPC2			O15	R14	(R)	(R)	P	O16	R14	APC6	FPC3					
	O13 & R15	O13 & R14	O13 & R16		CNTL AB1	CNTL AB2				AUX PLA	P	(R)	AUX PLB	APC2	AC2 φA	CNTL BC1	CNTL BC2	FLC2						APC3	FLC3	AC3	CNTL CA1	CNTL CA2			
											CABIN PL			AFT PLB											AFT PLC		A15 ACφC				
PAYLOAD BUS CNTL PWR																															
CABIN PL MN A		XC																													
CABIN PL MN B				XC																											
AUX PL A		XC																													
AUX PL B				XC																											
PL PRI MN B				XRC																											
PL PRI MN C					XRC			XRC																							
PL PRI FC3					XRC			XRC																							
AFT PLB				XRC																											
AFT PLC					XRC			XRC																							
ORBITER EQUIPMENT																															
APCU 1											XC			X																	
APCU 2												XC													X						
Keel Cam/Htr/Illum																															
PDIP 1 (SSV)																															
PDIP 2 (ICBC3D PGSC)																															
Video Processing Unit																															
Payload Timing Buffer																															
OPP																															
DTV MUX											X																				
DTV VIP																															
ORBITER COMM																															
PDI																															
PCMMU 1					XRC		R																								
PCMMU 2					XRC		R																								
PSP 1																															
PSP 2																															
PI 1																															
PI 2																															

X = Total loss of operational power
P = Loss of primary power source
R = Loss of redundant power source
(R) = Requires action to use redundant source
XC = Total loss of CNTL power
XRC = Loss of redundant CNTL power

* – CNTL bus name identifies power source (ex: CNTL BC1 is powered by MNB & MNC through RPCs and by MNA through cb and fuse)

ELECTRICAL BUS LOSS MATRIX (Cont)

ORBITER ELECTRICAL BUSES →	FC1	FC2			FC3	MNA DA1								MNB DA2								FC3	MNC DA3											
	ESS 1BC	ESS 2CA			ESS 3AB	FPC1			R14	O14	A6 & A14	MPC 1	MPC2	A6 & A14	APC5	FPC2			O15	R14	(R)	(R)	P	O16	R14	APC6	FPC3							
	O13 & R15	O13 & R14	O13 & R16		CNTL AB1	CNTL AB2	AC1				AUX PLA	P	(R)	AUX PLB		APC2	AC2	CNTL BC1	CNTL BC2	FLC2						APC3	FLC3	AC3	CNTL CA1	CNTL CA2				
												PL1	PL2	PL3		AFT PLB							PRI PL				AFT PLC		A15 ACφC					
PRLAs																																		
MECH PWR SYS 1 (A MTRS)					XRC																											XRC		
AC ENA 1					XRC																											XRC		
AC ENA 2						XRC																												XRC
AC PWR							X																											
PL RET SW 1				XRC																						XRC								
MECH PWR SYS 2 (B MTRS)					XRC					XRC																								
AC ENA 1					XRC					XRC																								
AC ENA 2				XRC																						XRC								
AC PWR																		X																
PL RET SW 2																																		
PL SEL POSN TLM					XRC																													
PAYLOADS																																		
HST POWER																																		X
SSE POWER (does not include ICBC3D)																																		X
ICBC 3D POWER												XC				X																		

X = Total loss of operational power
P = Loss of primary power source
R = Loss of redundant power source
(R) = Requires action to use redundant source
XC = Total loss of CNTL power
XRC = Loss of redundant CNTL power

* – CNTL bus name identifies power source (ex: CNTL BC1 is powered by MNB & MNC through RPCs and by MNA through cb and fuse)

ELECTRICAL BUS LOSS MATRIX (Cont)

ORBITER ELECTRICAL BUSES →	FC1		FC2		FC3	MNA DA1						MNB DA2					FC3		MNC DA3									
	ESS 1BC	O13 & R15	ESS 2CA		ESS 3AB	FPC1		R14	O14	A6 & A14	MPC 1	MPC2	A6 & A14	APC5	FPC2			O15	R14	(R)	(R)	P	O16	R14	APC6	FPC3		
O13 & R15	O13 & R14		O13 & R16	CNTL AB1		CNTL AB2	AUX PLA	P	(R)	AUX PLB	A6 & A14	APC2	AC2 ϕ A	CNTL BC1	CNTL BC2	FLC2	(R)	(R)	P	O16	R14	APC6	FLC3	AC3	CNTL CA1	CNTL CA2		
																									A15 AC ϕ C			
SSP1																												
FSS PCU POWER CONTR-A																												
FSS PCU POWER CONTR-B																												
ORUC POWER CONTR-A																												
ORUC POWER CONTR-B																												
CCTV HTR PWR																												
FSS FMDM-A PWR																												
FSS FMDM-B PWR																												
FSS HTR PWR PRI																												
FSS HTR PWR REDUN																												
ESSENTIAL BUS EXTERNAL POWER																												
ESSENTIAL BUS INTERNAL POWER																												
FHST SHUTTER																												
RSU SURV HTR PWR																												
MN BUS INT PWR																												
ESS/MN SW ENA																												
MAIN BUS EXT PWR																												
SSM WK LIGHTS																												

- X = Total loss of operational power
- P = Loss of primary power source
- R = Loss of redundant power source
- (R) = Requires action to use redundant source
- XC = Total loss of CNTL power
- XRC = Loss of redundant CNTL power

* – CNTL bus name identifies power source (ex: CNTL BC1 is powered by MNB & MNC through RPCs and by MNA (through cb and fuse)

ELECTRICAL BUS LOSS MATRIX (Cont)

ORBITER ELECTRICAL BUSES →	FC1		FC2		FC3	MNA DA1						MNB DA2						FC3	MNC DA3																					
	ESS 1BC		ESS 2CA		ESS 3AB	FPC1		R14	O14	A6 & A14	MPC 1		MPC2		A6 & A14	APC5	FPC2			O15	R14	(R)	(R)	P	O16	R14	APC6	FPC3												
	O13 & R15	O13 & R14	O13 & R16	CNTL AB1	CNTL AB2		AUX PLA	P	(R)	AUX PLB			APC2	AC2 φA	CNTL BC1	CNTL BC2	FLC2						PRI PL				APC3	FLC3	AC3	CNTL CA1	CNTL CA2									
								CABIN PL				AFT PLB															AFT PLC	A15 ACφC												
SSP2																																								
APCU 1 CONV																																								
APCU 1 OUTPUT RLY																																								
APCU 2 CONV																																								
APCU 2 OUTPUT RLY																																								
PSP BY-PASS																																								
ICBC3D PWR																																								
ICBC3D EMER RUN																																								
WSIPE HEATER A PWR																																								
WSIPE HEATER B PWR																																								
BPA PORT HEATER A PWR																																								
BPA PORT HEATER B PWR																																								
SLIC B SIDE PWR ENA																																								
BPA STBD HEATER A PWR																																								
BPA STBD HEATER B PWR																																								
SLIC EPDSU HTR PWR A																																								
SLIC EPDSU HTR PWR B																																								
SSP3																																								
RNS GPS REC																																								
RNS CAM REC																																								
MULE FMDM-A PWR																																								
MULE FMDM-B PWR																																								
SURV HTR B PWR																																								
SURV HTR A PWR																																								
HTR/ILLUM PWR																																								
KEEL CAM ENABLE																																								
RNS PWR																																								
MULE COPE HTR A PWR																																								
MULE COPE HTR B PWR																																								

X = Total loss of operational power
P = Loss of primary power source
R = Loss of redundant power source
(R) = Requires action to use redundant source
XC = Total loss of CNTL power
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* – CNTL bus name identifies power source (ex: CNTL BC1 is powered by MNB & MNC through RPCs and by MNA through cb and fuse)

MDM BUS LOSS IMPACTS

OF1

PL BAY MECH PWR SYS 1 & 2 mon
PL RETEN LOGIC PWR SYS 1 & 2 mon
AC1 PBM MMC 1 BUS ENA 1 & 2 mon
PRLA B SIDE TLM OF:
ORUC LATCHES
FSS KEEL LATCH
SLIC KEEL LATCH

OF2

ALL PL RETEN LATCH CMD mon
REL CMD mon
PRLA A SIDE TLM OF:
ORUC LATCHES
FSS KEEL LATCH
SLIC KEEL LATCH
PRLA B SIDE TLM OF:
FSS MECH PWR 1,2
PL INTRG SIG STR FROM PI 1,2

OF3

FC 2 & 3 AMPS INDICATION

OF4

PL RETEN PL SELECT SW mon
(and thus SPEC 097 update format)

OA1

AC2 PBM MMC 3 BUS ENA 1 & 2 mon

OA3

PRLA A SIDE TLM OF:
FSS MECH PWR 1,2

PF1 MDM

PRI RF CMD PATH VIA PSP1 (HST)
KU BAND ANTENNA CNTL
SLIC TLM (for more detail see SLIC PF 1
MDM CHANNELIZATION CHARTS)

PF2 MDM

REDUN RF CMD PATH VIA PSP2 (HST)
SLIC TLM (for more detail see SLIC PF 2
MDM CHANNELIZATION CHARTS)

FF1

UPLINK THRU NSP1

FF3

UPLINK THRU NSP2

FSS FMDM A(B)

MECHANISM SELECTION VIA S212
FSS CCTV CONTROL VIA S211
PCU CONTROL VIA S211
AMSB CONTROL VIA S212
TLM INDICATIONS VIA S211 & S212
(for more detail see FSS FMDM
CHANNELIZATION CHART)

MULE FMDM A(B)

TLM INDICATIONS VIA S211 (for more
detail see MULE FMDM
CHANNELIZATION CHARTS)

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MDM CHANNELIZATION

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MDM
CHANNEL

FSS FMDM ANALOG INPUT CARDS

I

CH	AID CARD 00		AID CARD 01		AID CARD 02	
	MSID	NOMENCLATURE	MSID	NOMENCLATURE	MSID	NOMENCLATURE
0	P34T1001V	ORUC SOPE AFT A TEMP	P34T1002V	ORUC SOPE STBD A TEMP	P34T1003V	ORUC SOPE FWD A TEMP
1	P34T1004V	BOTTOM A TEMP	P34T1005V	AFT B TEMP	P34T1006V	STBD B TEMP
2	P34T1007V	FWD B TEMP	P34T1023V	FSIPE LATCH (A) TEMP	P34T1010V	ASIPE LID (B) TEMP
3	P34T1011V	ASIPE FWD (B) TEMP	P34T1012V	ASIPE B-LATCH (B) TEMP	P34T1013V	(A) TEMP
4	P34T1014V	ORUC ASIPE FWD (A) TEMP	P34T1015V	ORUC ASIPE PORT (A) TEMP	P34T1024V	ORUC LARGE ORU STBD (B) TEMP
5	P34T1025V	FSIPE LATCH (B) TEMP	P34T1019V	FSIPE LID (B) TEMP	P34T1020V	FSIPE LID (A) TEMP
6	P34T1021V	BOTTOM (B) TEMP	P34T1031V	STBD LOAD ISO SYS A TEMP	P34T1032V	PORT (SI-ENV) STRUCT TEMP
7	P34V1035V	FSS HST EXT ESS BUS VOLTAGE	P34T1036V	LARGE ORU PORT (B) TEMP	P34T1030V	(TF1) STBD FWD STRUCT TEMP
8	P34T2003V	FSS AMSB TEMP	P34C2026V	FSS HTR-1A CURRENT	P34C2022V	FSS FMDM B CURRENT
9	P34T1008V	ORUC SOPE BOTTOM B TEMP	P34C2020V	ORUC HEATER-A CURRENT	P34V2040V	EPDSU-1 BUS VOLTAGE
10	P34V1009V	FSS HST EXT MAIN BUS VOLTAGE	P34T2004V	FSS EPDSU-1 TEMP	P34C2025V	AMSB DIRECT CURRENT
11	P34T1016V	ORUC ASIPE B-LATCH (A) TEMP	P34C2008V	PPCU DPC 1 CURRENT	P34C2010V	PPCU DPC 3 CURRENT
12	P34T1029V	ORUC (TF3) STBD AFT STRUCT TEMP	P34C2009V	FSS PPCU DPC 2 CURRENT	P34C2011V	FSS PPCU DPC 4 CURRENT
13	P34C2114V	FSS HEATER-2B CURRENT	P34C2014V	SPCU DPC 7 CURRENT	P34C2012V	5 CURRENT
14	P34C2021V	ORUC HEATER-B CURRENT	P34C2015V	8 CURRENT	P34C2013V	6 CURRENT
15	P34C2027V	FSS HTR-2A CURRENT	P34C2095V	CCTV HEATER CURRENT	P34V2041V	EPDSU-2 BUS VOLTAGE
16			P34T1033V	ORUC LARGE ORU FWD (A) TEMP	P34T1034V	ORUC LARGE ORU LID (A) TEMP
17	P34T1037V	ORUC PRJU A TEMP	P34T1022V	FSIPE BOTTOM (A) TEMP	P34T2117V	FSS STRUCTURE A TEMP
18	P34T1038V	B TEMP	P34V1027V	FSS HST INT MAIN BUS VOLTAGE	P34T1028V	ORUC (HP21) PORT AFT STRUCT TEMP
19			P34V1026V	ESS BUS VOLTAGE	P34T2118V	FSS STRUCTURE B TEMP
20	P34R2108V	FSS PIVOTER TACHOMETER	P34R2109V	FSS ROTATOR TACHOMETER	P34R2110V	FSS TRANSLATOR TACHOMETER
21	P34C2111V	AMSB TOTAL AC CURRENT	P34C2024V	HEATER-1B CURRENT		
22			P34C2115V	FMDM A CURRENT		
23	P34C2113V	FSS EPDSU-1 TOTAL CURRENT	P34C2116V	EPDSU-2 TOTAL CURRENT		
24	P34T2001V	FSS FMDM A TEMP	P34V2028V	FSS PPCU DPC 1 VOLTAGE	P34V2034V	FSS SPCU DPC 7 VOLTAGE
25	P34T2002V	B TEMP	P34V2029V	2 VOLTAGE	P34V2035V	8 VOLTAGE
26	P34T1017V	ORUC ASIPE STBD (A) TEMP	P34V2030V	3 VOLTAGE	P34V2036V	9 VOLTAGE
27	P34T1018V	AFT (A) TEMP	P34V2031V	4 VOLTAGE	P34V2037V	10 VOLTAGE
28	P34C2016V	FSS SPCU DPC 9 CURRENT	P34V2032V	FSS PPCU DPC 5 VOLTAGE	P34V2038V	FSS SPCU DPC 11 VOLTAGE
29	P34C2017V	10 CURRENT	P34V2033V	6 VOLTAGE	P34V2039V	12 VOLTAGE
30	P34C2018V	11 CURRENT	P34T2005V	TEMP	P34T2006V	TEMP
31	P34C2019V	12 CURRENT	P34T2007V	EPDSU-2 TEMP	P34T2093V	IPCU TEMP

FSS FMDM DISCRETE OUTPUT CARDS

I

BIT	DOH CARD 03 CH 01			DOH CARD 03 CH 02	
	MSID	NOMENCLATURE		MSID	NOMENCLATURE
0	P34K4001U	FSS KEEL LATCH JAW 1 SELECT	AMSB MECHANISM DESELECT** P34K4018J	P34K4041J	FSS CCTV ON CNTL (OFF-4042)
1	P34K4002U	2 SELECT		P34K4050J	PPCU DPC 4 ON CNTL (OFF-4051)
2	P34K4003J	PIVOTER LOW TORQUE SELECT		P34K4052J	5 ON CNTL (OFF-4053)
3	P34K4004J	HI TORQUE SELECT		P34K4054J	6 ON CNTL (OFF-4055)
4	P34K4005J	FSS ROTATOR SELECT		P34K4056J	PPCU DPC 2 ON CNTL (OFF-4057)
5	P34K4006J	TRANSLATOR SELECT		P34K4058J	SPCU DPC 10 ON CNTL (OFF-4059)
6	P34K4007J	DOWNLOCK SELECT		P34K4060J	11 ON CNTL (OFF-4061)
7	P34K4008J	BERTH LATCH 1 SELECT		P34K4062J	12 ON CNTL (OFF-4063)
8	P34K4009J	FSS BERTH LATCH 2 SELECT		P34K4064J	SPCU DPC 8 ON CNTL (OFF-4065)
9	P34K4010J	3 SELECT		P34K4017J	AMSB ON CNTL (OFF-4020)
10	P34K4011J	MAIN UMBILICAL SELECT		P34K4039J	CCTV PWR ENABLE 2 (DSBL-4040)
11	P34K4012J	B/U UMBILICAL SELECT		P34K4039J	1 (DSBL-4040)
12	P34K4013J	FSS BSP SELECT		P34K4024J	PPCU DPC 3 ON CNTL (OFF-4025)
13				P34K4026J	1 ON CNTL (OFF-4027)
14	P34K4015J	AMSB EOT/BOT OVERRIDE ENBL (DSBL-4019)		P34K4028J	SPCU DPC 9 ON CNTL (OFF-4029)
15			P34K4030J	7 ON CNTL (OFF-4031)	

* PCU ON/OFF COMMAND WILL POWER ON ALL 12 DPCS WITH 1 COMMAND (BITS 1-8, 12-15)

** AMSB DESELECT WILL DISABLE ALL AMSB MECHANISMS AND THE OVERRIDE WITH 1 COMMAND

FSS FMDM DISCRETE INPUT CARDS

I

BIT	DIH CARD 04 CH 00		DIH CARD 04 CH 01		DIH CARD 04 CH 02	
	MSID	NOMENCLATURE	MSID	NOMENCLATURE	MSID	NOMENCLATURE
0	P34X2098Y	FSS FHST SHUTTER CLS PWR STAT	P34X2073Y	FSS ALT FMDM POWER STATUS	P34X2102Y	FSS BSP RETRACTED SWITCH-B STAT
1	P34X2099Y	RSU SURVIVAL HTR PWR STAT	P34X2119Y	PPCU DPC 4 ON/OFF STATUS	P34X2103Y	ENGAGED SWITCH-B STATUS
2	P34X2100Y	AFT WORKLIGHT PWR-1 STATUS	P34X2120Y	6 ON/OFF STATUS	P34X2104Y	DISENGAGED SWITCH-B STAT
3	P34X2101Y	PWR-2 STATUS	P34X2076Y	AMSB-A PWR STATUS		
4			P34X2077Y	FSS AMSB-B PWR STATUS	P34X2105Y	FSS BSP RETRACTED SWITCH-A STAT
5			P34X2049Y	PPCU DPC 3 ON/OFF STATUS	P34X2106Y	ENGAGED SWITCH-A STATUS
6			P34X2050Y	5 ON/OFF STATUS	P34X2107Y	DISENGAGED SWITCH-A STAT
7			P34X2047Y	1 ON/OFF STATUS		
8			P34X2048Y	FSS PPCU DPC 2 ON/OFF STATUS	P34X2087Y	FSS AMSB PRI LATCHED STATUS
9			P34X2082Y	HEATER-1 POWER STATUS	P34X2088Y	SEC LATCHED STATUS
10			P34X2043Y	ORUC HTR-A POWER ON/OFF STATUS	P34X2089Y	PRI RELEASED STATUS
11			P34X2096Y	FSS CCTV PWR-1 STATUS	P34X2090Y	SEC RELEASED STATUS
12			P34X2097Y	FSS CCTV PWR-2 STATUS	P34X2091Y	FSS AMSB PRI RTL STATUS
13			P34X2083Y	HEATER-2 POWER STATUS	P34X2092Y	SEC RTL STATUS
14			P34X2044Y	ORUC HTR-B POWER ON/OFF STATUS		
15						

BIT	DIH CARD 07 CH 00		DIH CARD 07 CH 01		DIH CARD 07 CH 02	
	MSID	NOMENCLATURE	MSID	NOMENCLATURE	MSID	NOMENCLATURE
0			P34X2058Y	FSS KEEL LATCH JAW 1 SEL STATUS		
1			P34X2059Y	2 SEL STATUS		
2			P34X2060Y	PIVOTER LO TORQUE SEL STATUS		
3			P34X2061Y	HI TORQUE SEL STATUS		
4			P34X2062Y	FSS ROTATOR SEL STATUS		
5			P34X2063Y	TRANSLATOR SEL STATUS		
6			P34X2064Y	DOWNLOCK SEL STATUS		
7			P34X2065Y	BERTH LATCH 1 SEL STATUS		
8			P34X2066Y	FSS BERTH LATCH 2 SEL STATUS		
9			P34X2067Y	3 SEL STATUS		
10			P34X2068Y	MAIN UMB DRIVE SEL STATUS	P34X2121Y	FSS SPCU DPC 10 ON/OFF STATUS
11			P34X2069Y	B/U UMBILICAL SEL STATUS	P34X2122Y	12 ON/OFF STATUS
12	P34X1043Y	ORUC ASIPE NOT A-LATCH STATUS	P34X2070Y	FSS BAPS SUPPORT POST SEL STATUS	P34X2053Y	FSS SPCU DPC 9 ON/OFF STATUS
13	P34X1042Y	A-SEATED STATUS			P34X2054Y	11 ON/OFF STATUS
14	P34X1045Y	B-READY STATUS	P34X2072Y	FSS AMSB EOT/BOT O/R STATUS	P34X2051Y	7 ON/OFF STATUS
15	P34X1044Y	ORUX FSIPE NOT LATCH STATUS			P34X2052Y	8 ON/OFF STATUS

MULE FMDM ANALOG INPUT CARDS

I

CH	AID CARD 01		CH	AID CARD 01	
	MSID	NOMENCLATURE		MSID	NOMENCLATURE
0	P34T8101V	MULE COPE A TEMP*	16	P34C8125V	MULE RNS OP HEATERS CURRENT
1	P34T8102V	ENVIRONMENT A TEMP*	17	P34C8126V	SENSORS CURRENT
2	P34T8103V	LOPE A TEMP (SPARE)*	18	P34C8127V	SPACECUBE CURRENT
3	P34T8104V	COPE B TEMP**	19	P34V8128V	ICE OUTPUT VOLTAGE
4	P34T8105V	MULE ENVIRONMENT B TEMP**	20	P34T8129V	MULE RNS CAMERA PLATE TEMP
5	P34T8106V	LOPE B TEMP (SPARE)**	21	P34T8130V	AVIONICS PANEL TEMP
6	P34C8123V	RNS POWER ENABLE CURRENT	22	P34T8131V	ICE TEMP
7	P34C8124V	ICE TOTAL CURRENT	23		
8	P34C8107V	MULE COPE ZONE 2 HTR A CURRENT	24	P34C8115V	MULE COPE ZONES 1&2 HTRS B CURRENT
9	P34C8108V	PDSU K24 CURRENT (SPARE)	25	P34C8116V	3 HTR B CURRENT
10	P34C8109V	FMDM A CURRENT	26	P34C8117V	SURVIVAL HTR CURRENT
11	P34C8110V	PDSU K11/K12 CURRENT (SPARE)	27	P34C8118V	PDSU SENSOR 3B CURRENT (SPARE)
12	P34C8111V	MULE PDSU K13/K14 CURRENT (SPARE)	28	P34T8119V	MULE PDSU TEMP
13	P34C8112V	COPE ZONE 1 HTR A CURRENT	29	P34T8120V	FMDM A TEMP
14	P34C8113V	3 HTR A CURRENT	30	P34T8121V	B TEMP
15	P34C8114V	FMDM B CURRENT	31	P34V8122V	PDSU BUS VOLTAGE

* FMDM A provides power for these sensors, data is only valid when FMDM A is powered on

** FMDM B provides power for these sensors, data is only valid when FMDM B is powered on

MULE FMDM DISCRETE INPUT CARDS

I

BIT	DIH CARD 04 CH 01		DIH CARD 04 CH 02	
	MSID	NOMENCLATURE	MSID	NOMENCLATURE
0	P34X8401Y	MULE PDSU K11 ON STATUS (SPARE) K13 ON STATUS (SPARE) ALT FMDM ON STATUS		
1	P34X8402Y			
2	P34X8403Y			
3				
4	P34X8404Y	MULE PDSU K12 ON STATUS (SPARE) K14 ON STATUS (SPARE) COPE ZONES 1&2 HTRS A ON STATUS ZONE 3 HTR ON STATUS		
5	P34X8405Y			
6	P34X8406Y			
7	P34X8407Y			
8				
9	P34X8408Y	MULE PDSU K21/K22 EN STAT (SPARE) COPE ZONES 1&2 HTRS B ON STAT ZONE 3 HTR B ON STAT		
10	P34X8409Y			
11	P34X8410Y			
12	P34X8411Y	MULE SURVIVAL HTRS ON STATUS RNS POWER ENABLE STATUS PDSU K18/K23 ON STAT (SPARE) K24 ON STATUS (SPARE)	P34X8415Y	MULE RNS OP HTRS ON STATUS SENSORS ON STATUS SPACECUBE ON STATUS TM OK STATUS
13	P34X8412Y		P34X8416Y	
14	P34X8413Y		P34X8417Y	
15	P34X8414Y		P34X8418Y	

SLIC PF01 ANALOG INPUT CARDS

I

CH	AID CARD 01		CH	AID CARD 11	
	MSID	NOMENCLATURE		MSID	NOMENCLATURE
0	P34T5513V	SLIC STRUCTURE BOTTOM B TEMP	0		
1	P34T5514V	STBD B TEMP	1		
2	P34T5515V	SPARE EPDSU J7-12 TEMP	2	P34T6458V	SLIC WSIPE LID-1 TEMP
3	P34V5516V	EPDSU A VOLTS	3	P34T6459V	SPARE EPDSU J8-94 TEMP
4	P34T5517V	SLIC BPA PORT-AFT TEMP	4		
5	P34T5518V	PORT-FWD TEMP	5		
6	P34T5519V	SPARE EPDSU J7-112 TEMP	6		
7	P34T5520V	WSIPE BOTTOM TEMP	7		
8	P34T5521V	SLIC EPDSU TEMP 1	8		
9	P34C5522V	MODULE 7 CURRENT	9		
10	P34C5523V	6 CURRENT	10		
11	P34C5524V	5 CURRENT	11		
12	P34C5525V	SLIC EPDSU MODULE 4 CURRENT	12		
13			13		
14			14		
15			15		

SLIC PF01 DISCRETE INPUT CARDS

I

BIT	DIL CARD 13 CH 02	
	MSID	NOMENCLATURE
0	P34X6433Y	SLIC SPARE EPDSU J8-28 STATUS
1	P34X6434Y	WSIPE A NOT LATCHED STATUS
2	P34X6435Y	A LATCHED STATUS
3		

SLIC PF02 ANALOG INPUT CARDS

I

CH	AID CARD 01		SAMPLE RATE
	MSID	NOMENCLATURE	
0	P34T5501V	SLIC STRUCTURE PORT A TEMP	1
1	P34T5502V	BPA STBD-AFT TEMP	1
2	P34T5503V	STBD-FWD TEMP	1
3	P34T5504V	SPARE EPDSU J10-66 TEMP	1
4	P34T5505V	SLIC EPDSU TEMP 2	1
5	P34T5506V	TOTAL CURRENT	1
6	P34T5507V	WSIPE STBD TEMP	1
7	P34T5508V	EPDSU B VOLTS	1
8	P34T5509V	SLIC SPARE EPDSU J10-75 TEMP	1
9	P34T5510V	J10-96 TEMP	1
10	P34T5511V	WSIPE PORT TEMP	1
11	P34T5512V	LID 2 TEMP	1

SLIC PF02 DISCRETE INPUT CARDS

I

BIT	DIH CARD 05 CH 01		DIH CARD 05 CH 02	
	MSID	NOMENCLATURE	MSID	NOMENCLATURE
0			P34X5534Y	SLIC EPDSU M6S3 STATUS (SPARE)
1			P34X5535Y	BPA PORT HTR B PWR STATUS
2			P34X5536Y	STBD HTR B PWR STATUS
3			P34X5537Y	EPDSU M7S3 STATUS (SPARE)
4				
5				
6				
7				
8	P34X5526Y	SLIC WSIPE HTR A PWR STATUS		
9	P34X5527Y	EPDSU M4S2 STAT (SPARE)		
10	P34X5528Y	HTR A PWR STATUS		
11	P34X5529Y	WSIPE HTR B PWR STATUS		
12	P34X5530Y	SLIC EPDSU M5S2 STAT (SPARE)		
13	P34X5531Y	HTR B PWR STATUS		
14	P34X5532Y	SLIC BPA PORT HTR A PWR STATUS		
15	P34X5533Y	STBD HTR A PWR STATUS		

CRT DISPLAYS

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212 SSE MECH/BPA/RNS	8-15
213 HST BATT	8-20

CRT
DISPLAYS

	1	2	3	4	5
	12345678901	2345678901	2345678901	2345678901	2345678901
1	XXXX/210/XXX	HST SYS	XX X	DDD/HH:MM:SS	
2	TLM COUNT XXX	PCS		DDD/HH:MM:SS	
3	COMM	7+ MODE XX XXXX	ORU/ORI	DEACT	
4	PSP ENA 1 ID X	SNPT DIS 8+ XXX	WFPC2	10+ XXX	
5	RCVR 1 2	PSEA XXXX	COSTAR	11+ XXX	
6	LOCK X X		STIS	12+ XXX	
7	AGC ±XXX ±XXX	SOLAR ARRAY	ACS	13+ XXX	
8	NO-OP CMD 2	+WING -WING			
9	CMD CT XXX XXX	SLEW XXXS XXXS			
10	XMTR 1	POS XXX XXX	RSU 1 2 3		
1	3 ON X	SADE OFF 9+XXX	STATXXX	XXX XXX	
2	SEL 4K 4		MAMPXXX	XXX XXX	
3	5 MOD ON X	HGA +V3 -V3		XXX XXX XXX	
4	6 SSA OFF	HNG XXXX XXXX	OFF	15+ 16+ 17+	
5	EPS ABC	LAT XXX XXX			
6	INT ESS BUS XXX		FGS	BUS V	
7	MAIN BUS V		3	18+ 2X XX.X	
8	A XX.X XXX		2	20+ 2X XX.X	
9	B XX.X XXX		OCE	19+ 4X XX.X	
20	C XX.X XXX		EPT	XX.X	
1	AMPS XXX		AME 3	XX.X	
2	UMB SG V INT EXT		AME 2	XX.X	
3	MN BUS XXS XXS				
4	ESS BUS XXS XXS				
5					(XX)
6					

PARAMETER CHARACTERISTICS: SM 210 HST SYS

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
COMM:									
TLM COUNT	P34U3004A	486/DMU	integer	1 to 120					
PSP ENA ID	V92J1103C		integer						
RCVR 1 LOCK	P34X3050E	DMU	event	blank or '*'					
2 LOCK	P34X3051E	DMU	event	blank or '*'					
RCVR 1 AGC	P34Y3064A	DIU 4	dBMs	-51 to -131					
2 AGC	P34Y3065A	DIU 4	dBMs	-50.8 to -130					
CMD CT 1	P34U3001A	DMU	integer	0 to 255					
2	P34U3002A	DMU	integer	0 to 255					
XMTR 1 ON	P93J1000C		echo fb of item entry						
MOD ON	P93J1001C		echo fb of item entry						
EPS:									
INT ESS BUS A	P34X3085E	DIU 2	event	blank or '*'					
B	P34X3086E	DIU 2	event	blank or '*'					
C	P34X3087E	DIU 2	event	blank or '*'					

PARAMETER CHARACTERISTICS: SM 210 HST SYS (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
MAIN BUS V									
A	P34V3061A P34X3046E	486/DIU 2 DIU 2	volts event	-0.56 to 35.39 EXT, INT, ON *					
B	P34V3062A P34X3047E	486/DIU 2 DIU 2	volts event	-0.42 to 35.53 EXT, INT, ON *					
C	P34V3063A P34X3048E/ P34X3049E	486/DIU 2 DIU 2 DIU 2	volts event	-0.42 to 35.53 OFF or ON					
AMPS	P34C3060A	486/DIU 2	amps	-1.80 to 151.2					
UMB SG V									
MN BUS INT	P34V1027V	FMDM	volts	0 to 40	M	H	L		
EXT	P34V1009V	FMDM	volts	0 to 40	M	H	L		
ESS BUS INT	P34V1026V	FMDM	volts	0 to 40	M	H	L		
EXT	P34V1035V	FMDM	volts	0 to 40	M	H	L		
PCS: MODE	P93J1002C		echo fb of item entry						
	P34X3075E/ P34X3076E	486 486	event	NORM, SNPT, DRFT, blank					
SNPT DIS	P34X3005E	486	event	YES or NO					
PSEA	P34X3284E/ P34X3285E	DIU 4 DIU 5	event	RSET or ACTV					
SOLAR ARRAY: SLEW +WING	P34X3178E/ P34X3180E	486/DIU 4 486/DIU 4	event	blank or +OP (flashing)					↓
-WING	P34X3179E/ P34X3181E	486/DIU 4 486/DIU 4	event	blank or -OP (flashing)					↓
POS +WING	P34H3127A	486/DIU 4	degrees	-508 to 504					
-WING	P34H3128A	486/DIU 4	degrees	-508 to 504					

PARAMETER CHARACTERISTICS: SM 210 HST SYS (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
SADE OFF	P34X3129E/ P34X3130E	DIU 2 DIU 2	event	OFF or ON					
HGA HNG +V3	P34X3097E/ P34X3098E/ P34X3067E	DIU 4 DIU 4 DIU 5	event	blank, DPLY, STWD, TRAN					
-V3	P34X3099E/ P34X3100E/ P34X3067E	DIU 4 DIU 4 DIU 5	event	blank, DPLY, STWD, TRAN					
HGA LAT +V3	P34X3093E/ P34X3094E/ P34X3067E	DIU 4 DIU 4 DIU 5	event	blank, TRA, LAT, REL					
-V3	P34X3095E/ P34X3096E/ P34X3067E	DIU 4 DIU 4 DIU 5	event	blank, TRA, LAT, REL					
ORU/ORI DEACT: WFPC2	P34X3141E/ P34X3142E/ P34X3143E/ P34X3144E	DIU 2 DIU 5 DIU 5 DIU 5	event	OFF or ON					
COSTAR	P34X3212E/ P34X3213E/ P34X3214E/ P34X3215E	DIU 2 DIU 5 DIU 5 DIU 2	event	OFF or ON					
STIS	P34X3137E/ P34X3138E/ P34X3139E/ P34X3140E	DIU 2 DIU 5 DIU 5 DIU 2	event	OFF or ON					
ACS	P34X3015E/ P34X3016E/ P34X3017E/ P34X3018E	DIU 2 DIU 5 DIU 5 DIU 2	event	OFF or ON					
RSU:									
1 STAT	P34X3120E/ P34X3121E/ P34X3122E/ P34X3123E	DIU 5 DIU 5 DIU 5 DIU 5	event	OFF or ON					
2 STAT	P34X3029E/ P34X3030E/ P34X3031E/ P34X3032E	DIU 5 DIU 5 DIU 5 DIU 5	event	OFF or ON					
3 STAT	P34X3025E/ P34X3026E/ P34X3027E/ P34X3028E	DIU 5 DIU 5 DIU 5 DIU 5	event	OFF or ON					
1 MAMP	P34C3124A P34C3125A	DIU 5 DIU 5	m amps m amps	-8.4 to 705.6 -8.4 to 705.6					
2 MAMP	P34C3055A P34C3056A	DIU 5 DIU 5	m amps m amps	-8.4 to 705.6 -8.4 to 705.6					
3 MAMP	P34C3057A P34C3058A	DIU 5 DIU 5	m amps m amps	-8.4 to 705.6 -8.4 to 705.6					

PARAMETER CHARACTERISTICS: SM 210 HST SYS (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
FGS:									
3 BUS	P34X3023E	DIU 2	event	blank or '*'					
V	P34V3022A	DIU 1	volts	-0.189 to 15.88					
2 BUS	P34X3023E	DIU 2	event	blank or '*'					
V	P34V3021A	DIU 1	volts	-0.189 to 15.88					
OCE BUS	P34X3024E	DIU 2	event	blank or '*'					
OV	P34V3022A	DIU 1	volts	-0.189 to 15.88					
EPT V	P34V3147A	DIU 1	volts	-0.09 to 7.20					
AME 3 V	P34V3020A	DIU 1	volts	-0.06 to 5.29					
2 V	P34V3019A	DIU 1	volts	-0.06 to 5.29					

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 210 HST SYS

- ITEM 1: PSP can be configured to output commands to HST via PI by executing an item 1. Corresponding PSP config message ID of 1 will be displayed. PSP must be configured to enable idle pattern output to HST after RF acquisition.
- ITEM 2: Integrity of forward link from PI to HST receivers provided to allow crewmembers to verify a stable link to perform RF commanding. TLM COUNT parameter (PDI frame counter provided in HST 32 kbps stream) increments when PDI processing is established to allow verification that data is being updated on display when PDI processing is established. RCVR LOCK indicates '*' when command detector unit within each receiver detects presence of a stable forward link. RCVR AGC provides crewmembers a measure of received signal strength at receiver to be used in conjunction with lock status for troubleshooting link problems. Nominal range for RCVR AGC between -51 and -131 dBm for receiver 1 and -51 and -130 dBm for receiver 2. Item 2 provides NO-OP command to both strings of HST command system, causing command counter (CMD CT) from each HST command data interface (CDI) to increment.
- ITEM 3 +1,
+2: Item 3 has two indexes to select CDI-A or CDI-B versions of command to turn ON multi-access transmitter no. 1 in GSTDN mode without modulation. Crewmembers have previously swept PI forward link to lock HST MA receiver to PI carrier.
- ITEM 4: Item 4 selects 4 kbps fixed format (format D) for transmission. Used only when recovering from DMU power-on reset condition onboard HST.
- ITEM 5 +1,
+2: Once PI phase lock verified, item 5, which also has two indexes to transmit via the proper CDI, is then transmitted to enable modulation and start transmission of telemetry to ground via PI. (Subsequent ground commands MAY be required to select a telemetry format compatible with PDI.)
- ITEM 6: Powers OFF SSA Transmitters 1 and 2 via CDIs A and B.
- EPS: Status of HST onboard electrical power config provided to allow crewmember verification of various standard switch panel functions and insight into health and status of electrical interface to SSE and orbiter.
- INT ESS BUS monitor combines three relay statuses to provide feedback on internal essential bus status. HST essential bus provides power to HST command receivers and command decoders. An '*' is driven for each of the three internal essential buses when one corresponding bus is powered.
- MAIN BUS XFER SW statuses provide insight into internal main bus power status in response to use of main bus internal power ON/OFF switch on SSP. Transfer switches connect HST batteries to main bus when HST is on internal power. 'INT' is driven if transfer switches for MAIN BUS A/B are closed and 'EXT' if open. 'ON*' is driven if the respective main bus transfer switch is closed but one or both of the respective Diode Bus interconnect switches are open. MAIN BUS C cannot be directly powered from the external source; therefore, it will show 'ON' if transfer switch closed and 'OFF' if open.
- Bus voltages for HST MAIN BUS A and B and total MAIN BUS AMPS provide insight into interface to orbiter during attached operations. The total current for the MAIN BUS is displayed with a range of -2 to 151 amperes. The UMB SG V for the MN INT, MN EXT, ESS INT, and ESS EXT buses provides for limited insight into the interface in the absence of HST PDI telemetry. Their ranges are 0 to 40 V dc.

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 210 HST SYS (Cont)

PCS:

ITEM 7 +9 1,
+9 2: Provides ability to command HST to free drift immediately after capture to prevent reaction wheel overspeed and to remove any torques HST might place on orbiter RMS after grapple. When executed, feedback transitions from NORM to DRFT, and SNPT DIS status transitions from NO to YES.

ITEM 7 +9 3,
+9 4: Item 7 has two indexes to select CDI-A or CDI-B versions of a command to initiate Sun pointing via 486. When executed, SNPT DIS feedback transitions from YES to NO immediately indicating 5-min sunpoint timer macro has been activated. MODE status will transition from DRFT to SNPT 5 min later indicating HST sunpoint control law is active. SNPT DIS will transition from NO to YES approximately 52 sec after sunpoint mode is entered (5:52 after command sent), indicating macro execution has stopped.

ITEM 7 +9 5,
+9 6,
+9 7: Items 7 +9 5, 7 +9 6 and 7 +9 7 will bypass HST main computer to initiate hardware sunpoint. These commands will only be sent if an HST jettison or RMS Quick Deploy is required. PDI DECOM FAIL FDA msg will accompany this command.

ITEM 8 +9 8: Item 8 +9 8 will reset both sides of the Pointing Safemode Electronics Assembly (PSEA). This command will be used to disable the HST hardware sunpoint pointing control after retrieval, effectively placing HST in free drift.

ITEM 8 +9 9: During retrieval, a backup stored program command is placed onboard HST by STOCC to maneuver vehicle back to a sun-favorable attitude approximately 180 minutes after initiation of maneuver to capture attitude in event orbiter has not captured it. If this timer command is near its timeout time but it becomes desirable to prevent HST from maneuvering because the orbiter is within a few minutes of capture, a SNPT DISable command (item 8 +9 9) is issued to disable timer command and is verified by transition of SNPT DIS status from NO to YES.

SOLAR ARRAY: The SLEW field indicates a flashing +OP or -OP when the +V2 or -V2 wing motor operate flags are set, respectively. The POS field indicates the angular position for each solar array wing, which is displayed in steps of 4 degrees.

ITEM 9 +9 9: If a solar array slew is in a runaway condition, an Item 9 +9 9 will power off SADE 1 and 2. This command is routed to both CDI-A and CDI-B. When both SADE 1 and 2 are off, the status will indicate 'OFF'. An 'ON' is displayed if either SADE is on.

HGA: Telemetry data provided for monitoring High Gain Antenna (HGA) deploy status. Hinge status (HNG) indicates 'DPLY' for fully deployed, 'TRAN' for in transit, and 'STWD' for fully stowed. HGA latch status (LAT) indicates 'LAT' for latch closed, 'TRA' for in transit, and 'REL' for latch open. Both HNG and LAT fields will be blanked if MCU-A link power supply is OFF since data is invalid in that case.

ORU/ORI DEACT:

ITEM 10 +9 8,
+9 9: An Item 10 +9 8 followed by an item 10 +9 9 will command OFF/Deadface the Wide Field Planetary Camera 2 (WFPC2), providing a status of 'OFF'. These commands will save the WFPC2 primary and redundant power and the WFPC2 remote interface unit (RIU) primary and redundant power. If any of these items remains ON, status will indicate 'ON'.

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 210 HST SYS (Cont)

- ITEM 11 +9 7,
+9 8,
+9 9: An item 11 +9 7 followed by an item 11 +9 8 and an item 11 +9 9 will command OFF/Deadface the Corrective Optics Space Telescope Axial Replacement (COSTAR), providing a status of 'OFF'. These commands will safe the High Speed Photometer (HSP) primary and redundant power and the HSP remote interface unit (RIU) primary and redundant power. If any of these items remains on, the status will indicate 'ON'.
- ITEM 12 +9 7,
+9 8,
+9 9: An Item 12 +9 7 followed by 12 +9 8 and 12 +9 9 will command OFF/Deadface the Space Telescope Imaging Spectrograph (STIS), providing a status of 'OFF'. These commands will safe the High Resolution Spectrograph (HRS) primary and redundant power and the HRS remote interface unit (RIU) primary and redundant power. If any of these items remain on, status will indicate 'ON'. These commands will also disable STIS side 2 heater control zone B.
- ITEM 13 +9 6,
+9 7,
+9 8,
+9 9: An Item 13 +9 6 followed by an item 13 +9 7, 13 +9 8, and 13 +9 9 will command OFF/Deadface the Advanced Camera for Surveys (ACS), providing a status of 'OFF'. These commands will safe the Faint Object Camera (FOC) primary and redundant power. If any of these items remain on, status will indicate 'ON'. These commands will also disable ACS side 1 heater control zone B.
- ITEM 15 +9 9,
16 +9 9,
17 +9 9: Powers OFF rate sensor units (RSUs) 1, 2, 3, respectively. RSU STAT field indicates 'OFF' when corresponding RSU control heater, survival heater, and channel power all deactivated. In addition, there is motor current telemetry corresponding to the B-phase for each Rate Gyro Assembly (RGA) motor, for a total of six. Assuming no failure of the B-phase flex leads, these motor currents provide an additional verification that each RGA has been shut down. If a failure of one of the B-phase flex leads occurs, SPEC 210 does not provide any insight as to whether the respective RGA is running. Motor currents go to zero mAmps when the RSU is commanded OFF.
- ITEM 18 +9 8,
+9 9: An item 18 +9 8 followed by an item 18 +9 9 will power off and deadface the Fine Guidance Sensor (FGS) 3. Disables FGE 3 Control #1, FGE 3 Inrush Control 1, selects the FGE 3 Redundant Power Bus. Powers OFF TCE Heaters: SM Primary, PM Primary, MR Primary, FGS1 Primary, FGS2 Primary, FGS3 Primary, FPS1 Primary, FPS2 Primary, and FPS3 Primary. Disables TCE Control 1 and 2. Powers OFF OTA Primary Bus 2. The DC/DC converter voltage for FGS3 is displayed to the right of item 18 and ranges from -0.2 to 15.9. The status of the Optical Telescope Assembly (OTA) primary bus 2 is displayed to the right of item 18, and is indicated by a '*' for the high state (on) and blank for the low state (off). Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).
- ITEM 20 +9 8,
+9 9: An item 20 +9 8 followed by an item 20 +9 9 will power off and deadface the Fine Guidance Sensor (FGS) 2. The DC/DC converter voltage for FGS2 is displayed to the right of item 20 and ranges from -0.2 to 15.9. The status of the Optical Telescope Assembly (OTA) primary bus 2 is displayed to the right of item 20, and is indicated by a '*' for the high state (on) and blank for the low state (off). Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 210 HST SYS (Cont)

- ITEM 19 +9 8,
+9 9: An item 19 +9 8 followed by an item 19 +9 9 will power off and deadface the Optical Control Electronics (OCE). Disables OCE Control 1, powers OFF OCE Inrush Control 1, disables FGE 3 Control 1, powers OFF FGE 3 Inrush Control 1, selects FGE 3 Redundant Power Bus, powers OFF OTA Primary Bus 4. The DC/DC converter voltage for OCE is displayed to the right of item 19 and ranges from -0.2 to 15.9. The status of the Optical Telescope Assembly (OTA) primary bus 4 is displayed to the right of item 19, and is indicated by a '*' for the high state (on) and blank for the low state (off). Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).
- EPT: The Electrical Power and Thermal Control Electronics telemetry corresponds to PR DC/DC converter voltage. This telemetry is for verification prior to FGS-3 or FGS-2 changeout
- AME 3: The Actuator Mechanism Electronics Secondary Voltage telemetry for FGS-3 is provided for verification prior to FGS-3 changeout
- AME 2: The Actuator Mechanism Electronics Secondary Voltage telemetry for FGS-2 is provided for verification prior to FGS-2 changeout.

	1			2			3			4			5								
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
1	XXXX / 2 1 1 / XXX			SSE OVERVIEW						XX X			DDD / HH : MM : SS								
2	ON OFF												DDD / HH : MM : SS								
3	PCU	X / X	1 X S	2 X	DPC			VOLTS			AMPS										
4	CCTV	ENA	3 X S	4 X	1 / 2	XS / XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS									
5		PWR	5 X 5	6 X	3 / 4	XS / XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS									
6		ZONE	1 & 2	3	5 / 6	XS / XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS									
7	COPE	A	HTR	XS XS	7 / 8	XS / XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS									
8		B	HTR	XS XS	9 / 10	XS / XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS									
9	RNS	ENA	STAT	XS XS	11 / 12	XS / XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS	XX . XS / XX . XS									
10		AMPS	XX . XS		23	ON	XX	24	OFF	XX											
1	POWER			AMPS			THERMAL			TEMP											
2	FSS	EPDSU	1 / 2	XXX . XS / XXX . XS	FSS	EPDSU	± XXXS / ± XXXS														
3		FMDM	A / B	X . XXS / X . XXS		FMDM	± XXXS / ± XXXS														
4		HTR	XS / XS			PCU	± XXXS / ± XXXS														
5		P1 / P2		XX . XS / XX . XS		IPC	± XXXS														
6		R1 / R2		XX . XS / XX . XS		AMSB	± XXXS														
7		CCTV	HTR	X . XXS	ORUC	PRJU	± XXXXS / ± XXXXS														
8	ORUC	XS / XS		XX . XS / XX . XS	MULE	PDSU	± XXXS														
9	MULE	FMDM	A / B	X . XXS / X . XXS		FMDM	± XXXS / ± XXXS														
20		HTR	XS	XX . XS	SLIC	EPDSU	± XXXXS / ± XXXXS														
1		COPE	1A / 2A	XX . XS / XX . XS				VOLTS													
2			1B & 2B	XX . XS		FSS	XX . XS / XX . XS														
3			3A / 3B	XX . XS / XX . XS		SLIC	XX . XS / XX . XS														
4	SLIC	EPDSU		XXX . XS		MULE	XX . XS					(XX)									
5																					
6																					

PARAMETER CHARACTERISTICS: SM 211 SSE OVERVIEW

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
PCU (P)	P34K4024Y/ P34K4026Y/ P34K4050Y/ P34K4052Y/ P34K4054Y/ P34K4056Y		event	blank, P, '*'					
(S)	P34K4028Y/ P34K4030Y/ P34K4058Y/ P34K4060Y/ P34K4062Y/ P34K4064Y		event	blank, S, '*'					
PCU ON	P34K4024Y/ P34K4026Y/ P34K4028Y/ P34K4030Y/ P34K4052Y/ P34K4060Y		event	blank or '*'	M				
OFF	P34K4024Y/ P34K4026Y/ P34K4028Y/ P34K4030Y/ P34K4052Y/ P34K4060Y		event	blank or '*'					

PARAMETER CHARACTERISTICS: SM 211 SSE OVERVIEW (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
CCTV ENA ON	P34X2096Y/ P34X2097Y		event	'*', 1, 2, blank	M				
OFF	P34X2096Y/ P34X2097Y		event	'*', 1, 2, blank					
PWR ON	P34X4041Y		event	blank or '*'	M				
OFF	P34X4041Y		event	'*' or blank					
COPE A HTR ZONE 1&2	P34X8406Y		event	blank or '*'	M				
3	P34X8407Y		event	blank or '*'	M				
COPE B HTR ZONE 1&2	P34X8409Y		event	blank or '*'	M				
3	P34X8410Y		event	blank or '*'	M				
RNS ENA STAT	P34X8412Y		event	blank or '*'	M				
AMPS	P34C8123C		amps	0.0 to 40.0	M	H	L	↑	
DPC 1	P34X2047Y		event	blank or '*'	M				
2	P34X2048Y		event	blank or '*'	M				
DPC 1 VOLTS	P34V2028V		volts	0.0 to 40.0	M	H	L		
2 VOLTS	P34V2029V		volts	0.0 to 40.0	M	H	L		
DPC 1 AMPS	P34C2008V		amps	0.0 to 20.5	M	H	L	↑	
2 AMPS	P34C2009V		amps	0.0 to 20.4	M	H	L	↑	
3	P34X2049Y		event	blank or '*'	M				
4	P34X2119Y		event	blank or '*'	M				
DPC 3 VOLTS	P34V2030V		volts	0.0 to 40.0	M	H	L		
4 VOLTS	P34V2031V		volts	0.0 to 40.0	M	H	L		
DPC 3 AMPS	P34C2010V		amps	0.0 to 20.2	M	H	L	↑	
4 AMPS	P34C2011V		amps	0.0 to 20.3	M	H	L	↑	
DPC 5	P34X2050Y		event	blank or '*'	M				
6	P34X2120Y		event	blank or '*'	M				
DPC 5 VOLTS	P34V2032V		volts	0.0 to 40.0	M	H	L		
6 VOLTS	P34V2033V		volts	0.0 to 40.0	M	H	L		
DPC 5 AMPS	P34C2012V		amps	0.0 to 20.2	M	H	L	↑	
6 AMPS	P34C2013V		amps	0.0 to 20.2	M	H	L	↑	
7	P34X2051Y		event	blank or '*'	M				
8	P34X2052Y		event	blank or '*'	M				
DPC 7 VOLTS	P34V2034V		volts	0.0 to 40.0	M	H	L		
8 VOLTS	P34V2035V		volts	0.0 to 40.0	M	H	L		
DPC 7 AMPS	P34C2014V		amps	0.0 to 20.0	M	H	L	↑	
8 AMPS	P34C2015V		amps	0.0 to 20.3	M	H	L	↑	
9	P34X2053Y		event	blank or '*'	M				
10	P34X2121Y		event	blank or '*'	M				
DPC 9 VOLTS	P34V2036V		volts	0.0 to 40.0	M	H	L		
10 VOLTS	P34V2037V		volts	0.0 to 40.0	M	H	L		
DPC 9 AMPS	P34C2016V		amps	0.0 to 20.3	M	H	L	↑	
10 AMPS	P34C2017V		amps	0.0 to 20.3	M	H	L	↑	
DPC 11	P34X2054Y		event	blank or '*'	M				
12	P34X2122Y		event	blank or '*'	M				
DPC 11 VOLTS	P34V2038V		volts	0.0 to 40.0	M	H	L		
12 VOLTS	P34V2039V		volts	0.0 to 40.0	M	H	L		
DPC 11 AMPS	P34C2018V		amps	0.0 to 20.2	M	H	L	↑	
12 AMPS	P34C2019V		amps	0.0 to 20.2	M	H	L	↑	
DPC ON	P93J0100C	echo fb of item entry							
OFF	P93J0101C	echo fb of item entry							

PARAMETER CHARACTERISTICS: SM 211 SSE OVERVIEW (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
POWER:									
FSS EPDSU 1 AMPS	P34C2113V		amps	0.0 to 180.0	M	H	L		
2 AMPS	P34C2116V		amps	-0.1 to 168.0	M	H	L		
FMDM A AMPS	P34C2115V		amps	0.0 to 5.0	M	H	L		
B AMPS	P34C2022V		amps	0.0 to 5.1	M	H	L		
HTR (1)	P34X2082Y		event	blank or 1	M				
HTR (2)	P34X2083Y		event	blank or 2	M				
FSS HTR P1 AMPS	P34C2026V		amps	0.0 to 20.6	M	H	L	↑	
P2 AMPS	P34C2027V		amps	0.0 to 19.9	M	H	L	↑	
R1 AMPS	P34C2024V		amps	0.0 to 19.9	M	H	L	↑	
R2 AMPS	P34C2114V		amps	0.0 to 20.5	M	H	L	↑	
FSS CCTV HTR AMPS	P34C2095V		amps	0.0 to 5.3	M	H	L		
ORUC HTR A	P34X2043Y		event	blank or A	M				
HTR B	P34X2044Y		event	blank or B	M				
A AMPS	P34C2020V		amps	0.0 to 40.3	M	H	L	↑	
B AMPS	P34C2021V		amps	0.0 to 40.5	M	H	L	↑	
MULE FMDM A AMPS	P34C8109V		amps	0.0 to 5.0	M	H	L		
B AMPS	P34C8114V		amps	0.0 to 5.0	M	H	L		
MULE HTR	P34X8411Y		event	blank or **	M				
AMPS	P34C8117V		amps	0.0 to 20.0	M	H	L	↑	
MULE ESM 1&2 AMPS	P34C8110V		amps	0.0 to 5.0	M	H	L	↑	
3 AMPS	P34C8111V		amps	0.0 to 5.0	M	H	L	↑	
MULE COPE 1A AMPS	P34C8112V		amps	0.0 to 20.0	M	H	L	↑	
2A AMPS	P34C8107V		amps	0.0 to 20.0	M	H	L	↑	
1B&2B AMPS	P34C8115V		amps	0.0 to 20.0	M	H	L	↑	
3A AMPS	P34C8113V		amps	0.0 to 20.0	M	H	L	↑	
3B AMPS	P34C8116V		amps	0.0 to 20.0	M	H	L	↑	
SLIC EPDSU AMPS	P34C5506V		amps	-1.2 to 150.0	M	H	L	↑	
THERMAL:									
FSS EPDSU (1) TEMP	P34T2004V		deg C	-35 to 65	M	H	L		
(2) TEMP	P34T2007V		deg C	-35 to 65	M	H	L		
FMDM (A) TEMP	P34T2001V		deg C	-55 to 120	M	H	L		
(B) TEMP	P34T2002V		deg C	-55 to 120	M	H	L		
PCU (P) TEMP	P34T2005V		deg C	-35 to 65	M	H	L		
(S) TEMP	P34T2006V		deg C	-35 to 65	M	H	L		
IPCU TEMP	P34T2093V		deg C	-35 to 65	M	H	L		
AMSB TEMP	P34T2003V		deg C	-35 to 65	M	H	L		
ORUC PRJU (A) TEMP	P34T1037V		deg C	-35 to 65	M	H	L		
(B) TEMP	P34T1038V		deg C	-35 to 65	M	H	L		
MULE PDSU TEMP	P34T8119V		deg C	-35 to 65	M	H	L		
FMDM (A) TEMP	P34T8120V		deg C	-55 to 120	M	H	L		
(B) TEMP	P34T8121V		deg C	-55 to 120	M	H	L		
SLIC EPDSU TEMP (1)	P34T5521V		deg C	-35 to 65	M	H	L		
(2)	P34T5505V		deg C	-35 to 65	M	H	L		
FSS EPDSU (1) VOLTS	P34V2040V		volts	0.0 to 40.0	M	H	L		
(2) VOLTS	P34V2041V		volts	0.0 to 40.0	M	H	L		
SLIC EPDSU VOLTS (A)	P34V5516V		volts	0.7 to 40.7	M	H	L		
(B)	P34V5508V		volts	0.7 to 40.7	M	H	L		
MULE PDSU VOLTS	P34V8122V		volts	0.0 to 40.0	M	H	L		

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 211 SSE OVERVIEW

ITEM 1,2: Items 1 and 2 will set and reset, respectively, twelve FMDM discrete outputs to command the twelve FSS direct power converters (DPCs) on and off. Due to GPC limitations, the feedback for these commands is only based on command response from the six odd numbered DPCs. The feedback for item 3 ON will indicate a blank when all DPCs are commanded off (based on the BITE test 4 feedback) and an '*' when any of the DPCs are commanded on. The item 4 OFF status will be blank as long as any FMDM DPC ON discrete output is set, and will indicate an '*' when all are reset.

ITEM 3,4,5,6: Items 3 through 6 provide power control over the closed circuit television (CCTV) camera mounted on the FSS berthing and positioning system (BAPS) platform. Two power relays in series feed power to the CCTV camera by execution of item 3, whose status will nominally indicate an '*' when both relays indicate they are closed. If either relay remains open, a '1' or '2' will be displayed for the item 3 ON status to indicate the closed relay, while the item 4 OFF status will show the corresponding open relay number. When commanded off with an item 4, the item 4 OFF status will indicate an '*' upon both relays achieving an open condition. The camera iris is commanded open upon execution of an item 5, whose ON status will show an '*' driven by the setting of the corresponding FMDM discrete output (BITE test 4 feedback). This same FMDM BITE status is used for the item 6 OFF status, which is blank when the camera is commanded on (iris open) and an '*' when the camera is powered off (iris closed).

COPE HTR: COPE heater statuses are provided for each zone and heater string. An '*' indicates that the associated heaters are powered.

MULE RNS: MULE RNS power enable status indicated with a '*'. MULE RNS power enable current telemetry is listed from 0 to 40 amps.

DPC: Provides status and control of twelve DPCs used for powering berthed HST. The DPC status telemetry is provided for each DPC. The voltage for the twelve DPCs is displayed, each with a range of 0 to 40 V dc. Also, the current for the twelve DPCs is displayed, each with a range of 0 to 20 amperes. DPCs are commanded as follows:

ITEM 23,24: Status and control of the twelve DPCs used for powering the berthed HST are provided. The DPCs can be commanded individually by sending indexed commands as follows:

ON ITEM 23+	OFF ITEM 24+	DPC
1	71	1
2	72	2
3	73	3
4	74	4
5	75	5
6	76	6
7	77	7
8	78	8
9	79	9
10	80	10
11	81	11
12	82	12

The corresponding number of the index command sent appears to the right of 23 ON or 24 OFF.

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 211 SSE OVERVIEW (Cont)

POWER: SSE power distribution telemetry is provided from the both the orbiter and FSS. The FSS EPDSU 1 and 2 voltages, ranging from 0 to 40 V dc, provide insight into orbiter-provided voltage at the interface to the FSS. The currents for active boxes on the SSE and heaters are provided. These currently include the two FSS Flex MDMs, the four heater current circuits on the FSS (along with status indications), the FSS CCTV heater circuit, the ORUC heater A and B on/off status and related currents (A is -1 to +40.3 Amps, B is -1 to +40.5 Amps), the MULE Flex MDM currents, the MULE survival heater circuit (along with status indication), the two ESM heater circuit currents, and the five COPE heater circuit currents. The current for the Super Lightweight Interchangeable Carrier (SLIC) enhanced power distribution and switching unit (EPDSU) is provided.

THERMAL: The heaters on the FSS, ORUC, MULE, and SLIC are controlled from the standard switch panels. Power for the FSS, ORUC, and MULE circuits was discussed in the POWER section. Temperatures are provided for the FSS EPDSU 1 and 2, FSS FMDM A and B, FSS, PCU Primary and Secondary, FSS IPCU, FSS AMSB, ORUC PRJU A and B, MULE PDSU, MULE FMDM A and B, and SLIC EPDSU 1 and 2 to verify each is within operating limits prior to its use.


```

1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
1  XXXX / 2 1 2 / XXX  SSE MECH / BPA / RNS  XX X  DDD / HH : MM : SS
2                                     DDD / HH : MM : SS
3      ON  OFF  DC AMPS  AC  AMPS  TEMP
4  AMSB  7XS 8X      X.XXS      X.XXS      ±XXXX
5  MECH X X SEL STAT  TACH                                     BATT PLATE TEMP
6  DLOCK      9XS XXX                                     PORT - FWD ±XXXX
7  PIVOT HI 10XS XXX                                     PORT - AFT ±XXXX
8              LO 11XS XXX  X.XXS DEG / MIN          STBD - FWD ±XXXX
9  ROTATOR 12XS XXX  XX.XS DEG / MIN                STBD - AFT ±XXXX
10 XLATOR 13XS XXX
1  B LAT 1 14XS XXX
2              2 15XS XXX
3              3 16XS XXX
4  UMB MN 17XS XXX
5              B / U 18XS XXX
6  BSP      19XS XXX  XXXXS / XXXXS / XXXXS
7  DESEL    20
8  O / R ENA 21XS
9              DIS 22XS
20
1      ON  OFF FRM CNT      ON  OFF  AMPS
2  TM      25  26    XXX  OP HTR 27XS 28XS XX.XS
3  MSM1    29XS 30XS      SP - CUBE 31XS 32XS XX.XS
4  MSM2    33XS 34XS      SENSORS 35XS 36XS XX.XS
5
6                                     ( XX )

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PARAMETER CHARACTERISTICS: SM 212 SSE MECH/BPA/RNS

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS					
					M	H	L	↑	↓	
AMSB ON	P34X2076Y/ P34X2077Y		event	A, B, blank, or '*'	M					
OFF	P34X2076Y/ P34X2077Y		event	A, B, blank, or '*'						
AMSB DC AMPS	P34C2025V		amps	0.0 to 0.30	M	H	L	↑	↓	
AC AMPS	P34C2111V		amps	0.0 to 5.0	M	H	L	↑		
TEMP	P34T2003V		deg C	-35 to 65	M	H	L			
MECH (A)	V54X8111E/ V54X8113E/ V54S8400E/ V54S8402E		event	A, A flash, blank						
(B)	V54X8122E/ V54X8124E/ V54S8400E/ V54S8402E		event	B, B flash, blank						
DLOCK SEL	P34X2064Y		event	blank or '*'	M					↓
STAT	P34X2064Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, DIS, ENG, '*', blank						
PIVOT HI SEL	P34X2061Y		event	blank or '*'	M					↓
STAT	P34X2061Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, DN, UP, '*', blank						

PARAMETER CHARACTERISTICS: SM 212 SSE MECH/BPA/RNS (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
PIVOT LO SEL STAT	P34X2060Y		event	blank or '*'	M				↓
	P34X2060Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, DN, UP, '*', blank					
	P34R2108V		deg/min	0.0 to 5.3	M	H	L		↓
	P34X2062Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2062Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, CCW, CW, '*', blank					
ROTATOR SEL STAT	P34R2109V		deg/min	0.0 to 18.0	M	H	L		↓
	P34X2063Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2063Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, FWD, AFT, '*', blank					
	P34X2065Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2065Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, OP, CL, '*', blank					
B LAT 1 SEL STAT	P34X2066Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2066Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, OP, CL, '*', blank					
	P34X2067Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2067Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, OP, CL, '*', blank					
	P34X2068Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
UMB MN SEL STAT	P34X2068Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2068Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, REL, MAT, '*', blank					
	P34X2069Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2069Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, REL, MAT, '*', blank					
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
UMB B/U SEL STAT	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, REL, SET, L/A, '*', blank					
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, REL, SET, L/A, '*', blank					
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
BSP SEL STAT	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, REL, SET, L/A, '*', blank					
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	RDY, REL, SET, L/A, '*', blank					
	P34X2070Y/ P34X2087Y/ P34X2088Y/ P34X2089Y/ P34X2090Y		event	blank or '*'	M				↓

PARAMETER CHARACTERISTICS: SM 212 SSE MECH/BPA/RNS (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS				
					M	H	L	↑	↓
BSP (RET)	P34X2102Y/ P34X2105Y		event	RET A, RET B, RET *, blank	M				
(ENG)	P34X2103Y/ P34X2106Y		event	ENG A, ENG B, ENG *, blank	M				
(DIS)	P34X2104Y/ P34X2107Y		event	DIS A, DIS B, DIS *, blank	M				
O/R ENA	P34X2072Y		event	'*' or blank	M				
DIS	P34X2072Y		event	blank or '*'	M				
BATT PLATE TEMP PORT-FWD	P34T5518V		deg C	-60 to 80	M				
PORT-AFT	P34T5517V		deg C	-60 to 80	M				
STBD-FWD	P34T5503V		deg C	-60 to 80	M				
STBD-AFT	P34T5502V		deg C	-60 to 80	M				
RNS TM FRM CNT	P73U9002A		counter	'*' or blank	M				
MSM1 ON	P73X9003E		event	'*' or blank	M				
OFF	P73X9003E		event	blank or '*'	M				
MSM2 ON	P73X9004E		event	'*' or blank	M				
OFF	P73X9004E		event	blank or '*'	M				
OP HTR ON	P34X8415Y		event	'*' or blank	M				
OFF	P34X8415Y		event	blank or '*'	M				
AMPS	P34C8125V		amps	0 to 10	M	H	L	↑	
SP-CUBE ON	P34X8417Y		event	'*' or blank	M				
OFF	P34X8417Y		event	blank or '*'	M				
AMPS	P34C8127V		amps	0 to 4	M	H	L	↑	
SENSORS ON	P34X8416Y		event	'*' or blank	M				
OFF	P34X8416Y		event	blank or '*'	M				
AMPS	P34C8126V		amps	0 to 5	M	H	L	↑	
CMD CNT	P73U9001A		counter		M				
ICE VOLTS	P34C8128V		volts	0.7 to 40.7	M	H	L		
RNS AMPS	P34C81234V		amps	0 to 40	M	H	L	↑	↓
ICE TEMP	P34T8131V		deg C	-35 to 65	M	H	L		

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 212 SSE MECH/BPA/RNS

ITEM 7,8: Item numbers 7 and 8 provide power ON/OFF control over the flight support system (FSS) advanced mechanism selection box (AMSB). When both AMSBs are off, the item 7 ON status will be blank and the item 8 OFF status will show an '*'. When only AMSB A is on, the item 7 ON status will indicate 'A' and the item 8 OFF status will indicate 'B'. When only AMSB B is ON, the item 7 ON status will indicate 'B' and the item 8 OFF status will indicate 'A'. Under a contingency scenario where both sides of the FSS system are being used simultaneously with both AMSBs powered on, the item 7 ON status will show * and the item 8 OFF status will be blank. When commanded on, the DC current to the commanded AMSB will be displayed. When a mechanism is operated, the AC current being drawn by the motor will be displayed. The temperature of the AMSB is also displayed.

MECH: Two parameter fields to the right of the MECH text callout provide payload retention system feedback related to A6U circuits controlling FSS mechanism operations. The left-hand field will show a flashing 'A' whenever the A6U panel switch 1 is taken out of the OFF position. A steady 'A' is driven whenever system 1 latch 1 LATCHED or RELEASED feedbacks indicate high. The right-hand field will show a flashing 'B' whenever A6U panel switch 2 is taken out of OFF position. A steady 'B' is driven whenever system 2 latch 2 LATCHED or RELEASED feedbacks indicate high. During nominal A-side(B-side) operations, B(A) field should be blank.

ITEM 9,10,11, 12,13,14,15,16, 17,18,19,20 Items 9 through 19 are used to select FSS mechanisms. When a mechanism is selected, an '*' is driven next to the corresponding item number and the mechanism status is displayed in an adjacent field under the STAT heading. Item 20 deselects the last mechanism selected.

NOTE: The previously selected mechanism is deselected when a new mechanism is selected. The STAT field for each mechanism will indicate as follows:

Mechanism	REL(BOT)	Mid-travel	LAT(EOT)
Downlock (DLOCK)	DIS	RDY	ENG
PIVOT HI/LO	DN	RDY	UP
ROTATOR	CW	RDY	CCW
Translator (XLATOR)	FWD	RDY	AFT
Berthing latch (BLAT 1/2/3)	OP	RDY	CL
Main umbilical (UMB MN)	REL	RDY	MAT
Backup umbilical (UMB B/U)	REL	RDY	MAT
BAPS support post (BSP)	REL	*	SET

In the event of an error condition where both the beginning and end of travel microswitches of the selected mechanism indicate high, the STAT field will show '*', except for the BSP which will display 'L/A' if the BOT and EOT are indicated for the same microswitch, which is indicative of the Latch Assist mode.

The status of the BSP retracted A and B switches is provided. When only switch A is retracted, 'RETA' is displayed. When only switch B is retracted, 'RETB' is displayed. When both switches A and B are retracted, 'RET*' is displayed. When neither switch A or B is retracted, a blank is displayed. The next two fields below indicate the status of the BSP engaged A and B switches and the BSP disengaged A and B switches. They are handled in the same manner as the above BSP retracted A and B switches, except their feedbacks are: 'ENGA', 'ENGB', 'ENG*', and 'DISA', 'DISB', 'DIS*', respectively.

ITEM 21,22: Items 21 and 22 provide the ability to override (O/R) limit switch cutoff of the selected mechanism in the event of microswitch failures or if the need arises to drive the selected mechanism to the mechanical limit (stall). The O/R ENA/DIS status is a direct feedback from the AMSB override relay. An '*' is driven next to the appropriate item number to indicate enabled or disabled.

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 212 SSE MECH/BPA/RNS (Cont)

- ITEM 25, 26: Item 25 (there are no items 23 and 24 on this SPEC) commands the Relative Navigation System (RNS) Telemetry Module (TM) mounted on the MULE to 'ON'. Item 26 commands the RNS TM to 'OFF'.
- ITEM 27, 28: Item 27 enables the RNS operational heaters, and item 28 disables them. Each item entry displays a '*' when selected.
- ITEM 29, 30: Item 29 powers ON the RNS Mass Storage Module 1 (MSM1), and then Item 30 powers it OFF. Each item entry displays a '*' when selected.
- ITEM 31, 32: Item 31 powers ON the RNS SPACECUBE. Item 32 powers it OFF. Each item entry displays a '*' when selected.
- ITEM 33, 34: Item 33 powers ON the RNS Mass Storage Module 2 (MSM2), and then item 34 powers it OFF. Each item entry displays a '*' when selected.
- ITEM 35, 36: Item 35 powers ON the RNS sensors. Item 36 powers them OFF. Each item entry displays a '*' when selected.
- ITEM 37, 38: Item 37 powers ON the RNS OPS. Item 38 powers it OFF.
- ITEM 39: Item 39 is a 'No-Op' command to RNS.

```

1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
1  XXXX / 2 1 3 / XXX      HST BATT      XX X  DDD / HH : MM : SS
2                                     DDD / HH : MM : SS
3
4  TLM COUNT XXX      BATT      1 2 3 4 5 6  EE
5  COMM      TRIM      XXXXXX  X
6  PSP ENA  1      ID  X      BYPASS  XXXXXX
7  RCVR      1      2
8  LOCK      X      X      BATT      BAY2  BAY3
9  AGC      ±XXX  ±XXX  DEACT      3+    4+
10 NO - OP  CMD  2      SA SECT  XXX  XXX
1  CMD CT  XXX  XXX      DISCHG  XXX  XXX
2                                     PRI HTR  XXX  XXX
3                                     VIK      XXX  XXX
4
5                                     DIODE BUS
6  BATT  PRESS  CURR  VOLTS      VOLTS
7  1      XXXX  XXX . X  XX . XX  A  XX . XX
8  2      XXXX  XXX . X  XX . XX
9  3      XXXX  XXX . X  XX . XX  B  XX . XX
10 4      XXXX  XXX . X  XX . XX
1  5      XXXX  XXX . X  XX . XX  C  XX . XX
2  6      XXXX  XXX . X  XX . XX
3
4
5
6                                     ( X X )

```

PARAMETER CHARACTERISTICS: SM 213 HST BATT

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS					
					M	H	L	↑	↓	
COMM:										
TLM COUNT	P34U3004A	486/DMU	cnt	1 to 120						
PSP ENA ID	V92J1103C		cnt							
RCVR 1 LOCK	P34X3050E	DMU	event	blank or "**"						
2 LOCK	P34X3051E	DMU	event	blank or "**"						
RCVR 1 AGC	P34Y3064A	DIU 4	dBm	-51 to -131						
2 AGC	P34Y3065A	DIU 4	dBm	-50.8 to -130						
CMD CT 1	P34U3001A	DMU	cnt	0 to 255						
2	P34U3002A	DMU	cnt	0 to 255						
BATT PRESS										
1	P34P3194A	DIU5	psi	+15.5 to +1632						
2	P34P3195A	DIU2	psi	-76.8 to +1558						
3	P34P3196A	DIU2	psi	-26.4 to +1614						
4	P34P3197A	DIU2	psi	+39.9 to +1607						
5	P34P3198A	DIU2	psi	+33.5 to +1662						
6	P34P3199A	DIU2	psi	-15.3 to +1675						
BATT CURR										
1	P34C3289A	DIU 2	amps	-25.6 to +25.4						
2	P34C3290A	DIU 2	amps	-25.6 to +25.4						
3	P34C3291A	DIU 2	amps	-25.6 to +25.4						
4	P34C3292A	DIU 2	amps	-25.6 to +25.4						
5	P34C3293A	DIU 2	amps	-25.6 to +25.4						
6	P34C3288A	DIU 2	amps	-25.6 to +25.4						
BATT VOLTS										
1	P34V3254A	DIU2	volts	-0.42 to +35.53						
2	P34V3255A	DIU2	volts	-0.42 to +35.53						
3	P34V3256A	DIU2	volts	-0.42 to +35.53						
4	P34V3257A	DIU2	volts	-0.42 to +35.53						
5	P34V3258A	DIU2	volts	-0.42 to +35.53						
6	P34V3259A	DIU2	volts	-0.42 to +35.53						

PARAMETER CHARACTERISTICS: SM 213 HST BATT (Cont)

CRT NAME	MSID	HST SRC	UNITS	DISPLAY RANGE	STATUS INDICATORS					
					M	H	L	↑	↓	
BATT:										
TRIM										
1	P34X3168E	DIU2	event	blank or "**"						
2	P34X3163E	DIU2	event	blank or "**"						
3	P34X3160E	DIU2	event	blank or "**"						
4	P34X3159E	DIU2	event	blank or "**"						
5	P34X3157E	DIU2	event	blank or "**"						
6	P34X3164E	DIU2	event	blank or "**"						
BYPASS										
1	P34X3218E	DIU4	event	blank or "**"						
2	P34X3219E	DIU4	event	blank or "**"						
3	P34X3220E	DIU4	event	blank or "**"						
4	P34X3221E	DIU4	event	blank or "**"						
5	P34X3222E	DIU4	event	blank or "**"						
6	P34X3223E	DIU4	event	blank or "**"						
EE	P34X3172E	DIU2	event	blank or "**"						
BATT:										
SA SECT BAY2	P34X3217E	DIU4	event	ON or OFF						
	P34X3294E									
	P34X3295E									
BAY 3	P34X3216E	DIU4	event	ON or OFF						
	P34X3296E									
	P34X3297E									
DISCHG BAY 2	P34X3230E	DIU2	event	ON or OFF						
	P34X3231E									
	P34X3232E									
	P34X3233E									
	P34X3234E									
	P34X3235E									
BAY 3	P34X3236E	DIU2,	event	ON or OFF						
	P34X3237E	DIU4								
	P34X3238E									
	P34X3239E									
	P34X3240E									
	P34X3241E									
PRI HTR BAY 2	P34X3200E		event	ON or OFF						
	P34X3201E	DIU5								
	P34X3202E									
BAY 3	P34X3203E		event	ON or OFF						
	P34X3204E	DIU5								
	P34X3205E									
VIK BAY 2	P34X3242E		event	ON or OFF						
	P34X3243E	DIU2								
	P34X3244E									
BAY 3	P34X3245E		event	ON or OFF						
	P34X3246E	DIU2								
	P34X3247E									
DIODE BUS										
A	P34V3260A	DIU2	volts	-0.42 to +35.53						
B	P34V3261A	DIU2	volts	-0.56 to +35.39						
C	P34V3262A	DIU2	volts	-0.56 to +35.39						

ITEM ENTRY CHARACTERISTICS AND SUMMARY: SM 213 HST BATT

- ITEM 1: PSP: Item 1 will load the Payload Signal Processor (PSP) configuration message, which will allow commanding to HST via the Payload Interrogator (PI). The ID field will display the corresponding PSP configuration message ID of 1
- ITEM 2: Integrity of the forward link from the PI to the HST receivers is provided to allow the crew to verify a stable link to perform RF commanding. The RCVR 1/2 LOCK will indicate "*" when the command detector unit within each receiver detects the presence of a stable forward link. The RCVR 1/2 Automatic Gain Control (AGC) provides the crew a measure of received signal strength at the receiver to be used in conjunction with the lock status for troubleshooting link problems. The nominal range for the RCVR AGC is between -51 and -131 dBm for receiver 1 and between -51 and -130 for receiver 2. Item 2 provides a NO-OP command to both strings of the HST command system, causing the Command Counter (CMD CT) for each HST Command Data Interface (CDI) to increment. The command counter range is 0 to 255.
- ITEM 3+96, Items 3+96 and 3+97 are the first step in preparing the Bay 2 batteries for removal.
- +97: Powers off all Charge Current Controllers (CCCs) and connects Solar Array (SA) sections 1-3 to the diode buses. Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).
- ITEM 3+98, Items 3+98 and 3+99 are the second step in preparing the Bay 2 batteries for removal.
- +99: Disables batteries 1-3 pressure excitations/redundant heaters, primary heaters and enables Voltage Improvement Kits (VIKs) (power at the connectors is off when VIK is enabled). Disables command and telemetry (CT) buses 1, 2, 3 and 5. Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).
- ITEM 4+96, Items 4+96 and 4+97 are the first step in preparing the Bay 3 batteries for removal.
- +97: Powers off all Charge Current Controllers (CCCs) and connects Solar Array (SA) sections 4-6 to the diode buses. Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).
- ITEM 4+98: Items 4+98 and 4+99 are the second step in preparing the Bay 3 batteries for removal.
- +99: Disables batteries 4-6 pressure excitations/redundant heaters, primary heaters and enables Voltage Improvement Kits (VIKs) (power at the connectors is off when VIK is enabled). Disables command and telemetry (CT) buses 1, 2, 3 and 5. Separate indexes are provided for each HST command path (i.e., CDI-A and CDI-B).

FDA

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FDA CHARACTERISTICS: SM 210 HST SYS

Msg Text	Alarm Class	Noise Filter	Rate	SM Param ID	Sensed Parameter				Preconditions
					Nomenclature	SET	LO (STATE)	HI	
210 SADE WING	3	3	1	6343178	SADE-1 +WING MOTOR	1	1		
210 SADE WING	3	3	1	6343179	SADE-1 -WING MOTOR	1	1		
210 SADE WING	3	3	1	6343180	SADE-2 +WING MOTOR	1	1		
210 SADE WING	3	3	1	6343181	SADE-2 -WING MOTOR	1	1		

FDA CHARACTERISTICS: SM 211 SSE OVERVIEW

Msg Text	Alarm Class	Noise Filter	Rate	SM Param ID	Sensed Parameter				Preconditions
					Nomenclature	SET	LO (STATE)	HI	
211 DPC 1 AMPS	3	3	1	6342008	FSS PPCU DPC 1 CURRENT	1		19	
211 DPC 2 AMPS	3	3	1	6342009	FSS PPCU DPC 2 CURRENT	1		19	
211 DPC 3 AMPS	3	3	1	6342010	FSS PPCU DPC 3 CURRENT	1		19	
211 DPC 4 AMPS	3	3	1	6342011	FSS PPCU DPC 4 CURRENT	1		19	
211 DPC 5 AMPS	3	3	1	6342012	FSS PPCU DPC 5 CURRENT	1		19	
211 DPC 6 AMPS	3	3	1	6342013	FSS PPCU DPC 6 CURRENT	1		19	
211 DPC 7 AMPS	3	3	1	6342014	FSS SPCU DPC 7 CURRENT	1		19	
211 DPC 8 AMPS	3	3	1	6342015	FSS SPCU DPC 8 CURRENT	1		19	
211 DPC 9 AMPS	3	3	1	6342016	FSS SPCU DPC 9 CURRENT	1		19	
211 DPC 10 AMPS	3	3	1	6342017	FSS SPCU DPC 10 CURRENT	1		19	
211 DPC 11 AMPS	3	3	1	6342018	FSS SPCU DPC 11 CURRENT	1		19	

FDA CHARACTERISTICS: SM 211 SSE OVERVIEW (Cont)

Msg Text	Alarm Class	Noise Filter	Rate	SM Param ID	Sensed Parameter				Preconditions
					Nomenclature	SET	LO (STATE)	HI	
211 DPC 12 AMPS	3	3	1	6342019	FSS SPCU DPC 12 CURRENT	1		19	
211 PWR ORUC A AMPS	3	3	1	6342020	ORUC HEATER-A CURRENT	1		33	
211 PWR ORUC B AMPS	3	3	1	6342021	ORUC HEATER-B CURRENT	1		33	
	0	3	1	6342026	FSS HEATER-1A CURRENT	1		14	
	0	3	1	6342024	FSS HEATER-1B CURRENT	1		14	
	0	3	1	6342027	FSS HEATER-2A CURRENT	1		11	
	0	3	1	6342114	FSS HEATER-2B CURRENT	1		11	
	0	3	1	6345506	SLIC EPDSU TOTAL CURRENT	1		42	
	0	3	1	6348107	MULE COPE ZONE 2 HTR A CURRENT	1		3.5	
	0	3	1	6348112	MULE COPE ZONE 1 HTR A CURRENT	1		3.5	
	0	3	1	6348113	MULE COPE ZONE 3 HTR A CURRENT	1		3.5	
	0	3	1	6348115	MULE COPE ZONES 1&2 HTRS B CUR	1		6	
	0	3	1	6348116	MULE COPE ZONE 3 HTR B CURRENT	1		3.5	
	0	3	1	6348117	MULE SURVIVAL HEATER CURRENT	1		0	
	0	3	1	6348123	MULE RNS POWER ENABLE CURRENT	1		0	

FDA CHARACTERISTICS: SM 212 SSE MECH/BPA/RNS

Msg Text	Alarm Class	Noise Filter	Rate	SM Param ID	Sensed Parameter				Preconditions
					Nomenclature	SET	LO (STATE)	HI	
212 AMSB DC AMPS	3	2	1	6342025	AMSB DIRECT CURRENT	1	-1	0	
212 MECH SEL	3	2	1	6342060	PIVOTER LOW TORQUE SEL STATUS	1	BYPASS		PIV LOW TOR SEL STATUS = DSBL
						2	1		PIVOT HI = ENBL or ROTATOR = ENBL or XLATOR = ENBL or DLOCK = ENBL
						3	1		B LAT 1 = ENBL or B LAT 2 = ENBL or B LAT 3 = ENBL or UMB MN = ENBL
212 MECH SEL	3	2	1	6342061	PIVOTER HI TORQUE SEL STATUS	1	BYPASS		PIVOTER HI TORQUE SEL STATUS = DSBL
						2	1		ROTATOR = ENBL or XLATOR = ENBL or DLOCK = ENBL
						3	1		B LAT 1 = ENBL or B LAT 2 = ENBL or B LAT 3 = ENBL or UMB MN = ENBL
212 MECH SEL	3	2	1	6342062	ROTATER SEL STATUS	1	BYPASS		ROTATOR SEL STATUS = DSBL
						2	1		XLATOR = ENBL or DLOCK = ENBL
						3	1		B LAT 1 = ENBL or B LAT 2 = ENBL or B LAT 3 = ENBL or UMB MN = ENBL
212 MECH SEL	3	2	1	6342063	TRANSLATOR SEL STATUS	1	BYPASS		TRANSLATOR SEL STATUS = DSBL
						2	1		DLOCK = ENBL
						3	1		B LAT 1 = ENBL or B LAT 2 = ENBL or B LAT 3 = ENBL or UMB MN = ENBL
212 MECH SEL	3	2	1	6342064	DOWNLOCK SEL STATUS	1	BYPASS		DOWNLOCK SEL STATUS = DSBL
						2	1		B LAT 1 = ENBL or B LAT 2 = ENBL or B LAT 3 = ENBL or UMB MN = ENBL
212 MECH SEL	3	2	1	6342065	BERTH LATCH 1 SEL STATUS	1	BYPASS		BERTH LAT 1 SEL STATUS = DSBL
						2	1		B LAT 2 = ENBL or B LAT 3 = ENBL or UMB MN = ENBL

FDA CHARACTERISTICS: SM 212 SSE MECH/BPA/RNS (Cont)

Msg Text	Alarm Class	Noise Filter	Rate	SM Param ID	Sensed Parameter				Preconditions
					Nomenclature	SET	LO (STATE)	HI	
212 MECH SEL	3	2	1	6342066	BERTH LATCH 2 SEL STATUS	1	BYPASS		BERTH LAT 2 SEL STATUS = DSBL
212 MECH SEL	3	2	1	6342067	BERTH LATCH 3 SEL STATUS	2	1		B LAT 3 = ENBL or UMB MN = ENBL
						1	BYPASS		BERTH LAT 3 SEL STATUS = DSBL
212 PVT STALL	3	15*	1	6342108	PIVOTER TACHOMETER	1	-1		UMB MN = ENBL
						2	0.2**		PIVOT LO SEL STATUS = DSBL
212 ROT STALL	3	15*	1	6342109	ROTATER TACHOMETER	1	-1		PIVOT LO SEL STATUS = ENBL and AMSB AC CURRENT = OL
						2	0.4**		ROTATOR SEL STATUS = DSBL
	0	3	1	6342111	AMSB TOTAL ALTERNATING CURRENT	1		0.30	ROTATOR SEL STATUS = ENBL and AMSB AC CURRENT = OL

*FDA limit will be updated to listed value via TMBU during Post Insertion

**PVT STALL and ROT STALL FDAs have a time delay of 28 cycles after preconditioning is met

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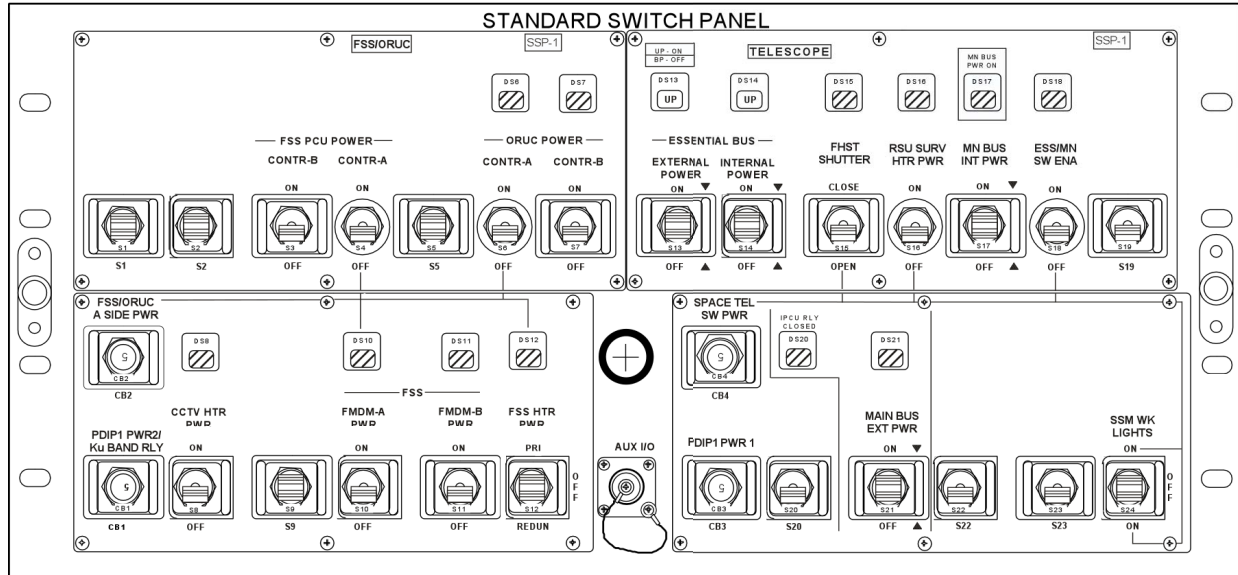
HST MECHANISM MOVEMENT TIMES

MECHANISM	NOMINAL TIME
SDM (deploy/retract)	5 min
SSM LATCHES (latch/unlatch)	136 sec
AD (open/close)	140 sec
HGA (deploy/retract)	461 sec
SA LATCH SLEW	(<5.8 deg) > 11 min

FSS MECHANISM DRIVE TIMES

MECHANISM	NOMINAL TIME (single)
PIVOTER	1428 sec \pm 90 sec/90° (3.78°/min)
ROTATOR	731 sec \pm 19 sec/180° (14.77°/min)
TRANSLATOR	170 sec \pm 5 sec/1.75 in
DOWNLOCK	24 sec \pm 2 sec
BERTH LATCH	15 sec \pm 2 sec
MAIN UMB	8 sec \pm 1 sec/4.5 in stroke (mate/demate)
B/U UMB	4 sec \pm 1 sec (demate only)
BSP	~1 sec

SSP 1



SSP 1 SWITCH PANEL FUNCTIONS (L12U)

ITEM	TYPE DEVICE	FUNCTION	USAGE
FSS PCU POWER CONTR-B Switch (S3 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables the B hardline control signal to EPDSU-1 and EPDSU-2, providing power to the PCUs OFF (DOWN) – Disables the B control signal to EPDSU-1 and EPDSU-2, removing power to the PCUs	Not normally used. PCUs will normally be controlled via FMDM NOTE: The power on/off indication is observed on telemetry
FSS PCU POWER CONTR-A Switch (S4 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables the A hardline control signal to EPDSU-1 and EPDSU-2, providing power to the PCUs OFF (DOWN) – Disables the A control signal to EPDSU-1 and EPDSU-2, removing power to the PCUs	Not normally used. PCUs will normally be controlled via FMDM NOTE: The power on/off indication is observed on telemetry
ORUC POWER CONTR-A Switch (S6 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables the A hardline control signal to SLIC EPDSU-1 providing power to the ORUC PRJU OFF (DOWN) – Disables the A hardline control signal to SLIC EPDSU-1 removing power from the ORUC PRJU	Turned on during SSE activation Turned off during SSE deactivation

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
ORUC POWER CONTR-A Status Indicator (DS6 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Status indicator
ORUC POWER CONTR-B Switch (S7 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables the B hardline control signal to SLIC EPDSU-2 providing power to the ORUC PRJU OFF (DOWN) – Disables the A hardline control signal to SLIC EPDSU-2 removing power from the ORUC PRJU	Turned on during SSE activation Turned off during SSE deactivation
ORUC POWER CONTR-B Status Indicator (DS7 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Status indicator
FSS/ORUC A SIDE PWR Circuit breaker (CB2 - SSP 1)	Circuit breaker	OUT – Open IN – Closed <u>NOTE:</u> FSS B side power is hardwired	Closed during SSE activation 5-amp circuit breaker which routes orbiter power to S4, S6, S8, S10, and S12 (UP)
PDIP PWR2/ Ku BAND RLY Circuit Breaker (CB1 - SSP 1)	Circuit breaker	OUT – Open IN – Closed	
CCTV HTR PWR Switch (S8 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables EPDSU-1 power to the CCTV heater circuits. This allows thermostatic control of the CCTV heaters OFF (DOWN) – Disables EPDSU-1 power to CCTV heater circuits	Turned on during SSE activation (no later than 8 hr after PLBD opening) Turned off during SSE deactivation (no earlier than 1 hr prior to reentry)
CCTV HTR PWR Status Indicator (DS8 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Status indicator
FSS FMDM-A PWR Switch (S10 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables EPDSU-1 power to FMDM-A OFF (DOWN) – Disables EPDSU-1 power to FMDM-A	Turned on during SSE check-out for continuous control and monitoring of FSS Turned off during SSE deactivation

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
FSS FMDM-A PWR Status Indicator (DS10 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Status indicator
FSS FMDM-B PWR Switch (S11 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables EPDSU-2 power to FMDM-B OFF (DOWN) – Disables EPDSU-2 power to FMDM-B	Turned on during SSE activation for initial control and monitoring of FSS. FMDM-B is a redundant unit and will only be used during initial FSS activation and check-out and in the event of a failure on the A-side avionics or used in contingencies in conjunction with the A-side for dual mechanism operations Turned off during completion of SSE checkout
FSS FMDM-B PWR Status Indicator (DS11 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Status indicator
FSS HTR PWR Switch (S12 - SSP 1)	Toggle switch, 3-position DPDT	PRI (UP) – Enables EPDSU-1 and EPDSU-2 power to primary FSS heater circuits. This allows thermostatic control of primary FSS heaters OFF (CENTER) – Disables EPDSU-1 and EPDSU-2 power from FSS primary heater and redundant heater circuits RED (DOWN) – Enables EPDSU-1 and EPDSU-2 power to redundant FSS heater circuits. This allows thermostatic control of redundant FSS heaters	Turned on during SSE activation (no later than 8 hr after PLBD opening). Monitor current sensors A1 and B1 for primary heaters Turned off during SSE deactivation (no earlier than 1 hr prior to reentry) Redundant FSS heaters may be activated in the event of a failure in the primary FSS heaters. Monitors current sensors A2 and B2 for redundant heaters
FSS HTR PWR Status Indicator (DS12 - SSP 1)	Display indicator, 2-position	ON (PRI or RED) – gray OFF – bp	Status indicator

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
<p>ESSENTIAL BUS EXTERNAL POWER Switch (S13 - SSP 1)</p>	<p>Toggle switch, 3-position DPDT momentary (should be held for approximately 2 sec)</p>	<p>ON (momentary UP) – Enables IPCU power latching relays K6 and K7 that provide FSS PCU power to HST external essential bus feeds A and B. Relay K6 powers HST external essential bus A and relay K7 powers bus B Center Position – Normal</p> <p>OFF (momentary DOWN) – Disables IPCU power latching relays K6 and K7. This action disconnects FSS PCU power from HST external essential bus A and B feeds and connects HST battery power (internal) to HST essential buses A,B, and C</p>	<p>Used to provide FSS PCU power to HST external essential buses thru FSS umbilicals. Essential buses power the HST DMU CDIs and MA receivers. S13 is powered from S18</p> <p>Normal switch position when not in use Used to remove FSS PCU power from HST essential buses. Removal of FSS PCU power from HST essential buses, whether intentional or inadvertent, will automatically activate a fail-over circuit in the HST PCU which will connect HST battery power (internal) to HST essential buses</p>
<p>ESSENTIAL BUS EXTERNAL POWER Status Indicator (DS13 - SSP 1)</p>	<p>Display indicator, 3-position</p>	<p>ON – UP OFF – bp DOWN indication not used for HST</p>	<p>UP indicates that at least one external essential bus power service is activated inside the HST PCU. Indicates continuity thru HST umbilicals</p>
<p>ESSENTIAL BUS INTERNAL POWER Switch (S14 - SSP 1)</p>	<p>Toggle switch, 3-position DPDT momentary (should be held for approximately 1 sec)</p>	<p>ON (momentary UP) – Enables IPCU relay K12 to latch HST PCU power relays K7,K8,K9 closed, and turns on HST CDI A and B. This action connects battery power from HST diode buses A,B,C to HST essential buses A,B,C and ensures that both CDIs are on Center Position – Normal</p>	<p>Used to configure HST essential bus to internal battery power following PCU changeout</p> <p>Normal switch position when not in use</p>

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
ESSENTIAL BUS INTERNAL POWER Switch (S14 - SSP 1) (Cont)		OFF (momentary DOWN) – Enables IPCU relay K13 to unlatch HST PCU power relays K7,K8,K9. This action disconnects battery power from the HST essential buses A,B,C	Used to remove internal essential power when external (FSS PCU) power is provided. S14 is powered from S18 <u>NOTE:</u> For powerdown in preparation of PCU changeout, S14 will be held off while External Essential is powered off, to override the fail-over function and prevent unnecessary cycling of K7,K8,K9 relays
ESSENTIAL BUS INTERNAL POWER Status Indicator (DS14 - SSP 1)	Display indicator, 3-position	ON – UP OFF – bp DOWN indicator not used for HST	UP indicates that at least one internal essential bus power is activated inside the HST PCU. Indicates continuity thru HST umbilicals
FHST SHUTTER Switch (S15 - SSP 1)	Toggle switch, 2-position DPST	CLOSE (UP) – Provides SSP power (PL CAB3 thru CB4) to the HST FHST shutters 1,2,3. Also enables nonlatching relay K5 in the IPCU, which provides power from the FSS PCUs to the FHST shutters status indicator (DS15) <u>NOTE:</u> The IPCU is externally jumpered to provide this capability OPEN (DOWN) – Removes SSP power from the FHST shutters and disables relay K5 in the IPCU, removing FSS PCU power from the HST FHST shutter status indicator	Used to keep FHST shutter closed during SM to avoid FHST exposure directly to a bright object. Switch must be used to keep shutter closed whenever HST is on the FSS and the HST main bus is powered off unless the FHST cover has been installed Used following reapplication of main bus power to allow STOCC commanding of FHST shutters. Also used to deadface power to PCU, PDUs 1,2,3, and FHSTs for changeout of these units

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
FHST SHUTTER Status Indicator (DS15 - SSP 1)	Display indicator, 2-position	CLOSE – gray OPEN – bp	Gray indicates that external FHST shutter power is turned on at the IPCU. FHST shutter close is powered directly from SSP CAB PL3, bypassing IPCU and the SSP talkback is driven by IPCU relay. Does not indicate continuity thru HST umbilicals
RSU SURV HTR PWR Switch (S16 - SSP 1)	Toggle switch, 2-position DPST	ON (UP) – Enables IPCU nonlatching relays K16 and K17. This action provides FSS PCU power to RSU heaters 1,2,3 OFF (DOWN) – Disables IPCU relays K16 and K17, removing power from the RSU survival heaters	Used to maintain RSU survival thermal conditioning. (Not normally used for SM4) Used to allow STOCC commanding of RSU survival heaters. Also used to deadface power to PCU, PDUs 1,2,3,4, ECUs, and RSUs for changeout of these units
RSU SURV HTR PWR Status Indicator (DS16 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Gray indicates that external RSU survival heater power service is turned on at the IPCU. Does not indicate continuity thru HST umbilicals. Monitor is powered from the FSS DPCs

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
<p>MN BUS INT PWR Switch (S17 - SSP 1)</p>	<p>Toggle switch, 3-position DPDT momentary (should be held for approximately 2 sec). (Switch cover installed to prevent inadvertent actuation of the OFF command)</p>	<p>ON (momentary UP) – Enables IPCU relay K10 which supplies power from the FSS PCUs to close motorized main buses A and B transfer switches S1 and S2, open main bus C transfer switches S3 and S4, and to close the diode bus interconnect switches S7 thru S10. This action connects battery power from diode buses A, B, and C to main buses A and B, and disconnects bus C Center Position – None OFF (momentary DOWN) – Enables IPCU relay K11 which supplies power from the FSS PCUs to open motorized transfer switches S1 thru S4. This action disconnects battery power from main buses A,B,C</p>	<p>The ON command is used to connect HST main bus to HST batteries if the batteries have been switched off-line. During PCU changeout, reqd switch operations are performed by STOCC via ground command. S17 is powered from S18 Normal switch position when not in use The OFF command is used to disconnect the HST main bus from HST batteries. This action removes one of two inhibits that could cause a catastrophic HST failure under certain conditions when an SA SPA is connected directly to its respective diode bus</p>
<p>MN BUS PWR ON Status Indicator (DS17 - SSP 1)</p>	<p>Display indicator, 2-position</p>	<p>ON – gray OFF – bp</p>	<p>Gray indicates that at least one main bus is powered. Talkback does not indicate whether power is from internal or external source. Indicates continuity thru HST umbilicals bp indicates main buses are not powered from either internal or external source</p>
<p>ESS/MN SW ENA Switch (S18 - SSP 1)</p>	<p>Toggle switch, 2-position DPST</p>	<p>ON (UP) – Provides orbiter power thru CB4 (from PL CAB3 bus) to SSP switches S13,S14,S17,S21 OFF (DOWN) – Removes orbiter power from SSP switches S13,S14,S17,S21</p>	<p>Enables use of SSP control of HST main and essential buses via S13,S14,S17,S21 Disables use of SSP control of HST main and essential buses</p>

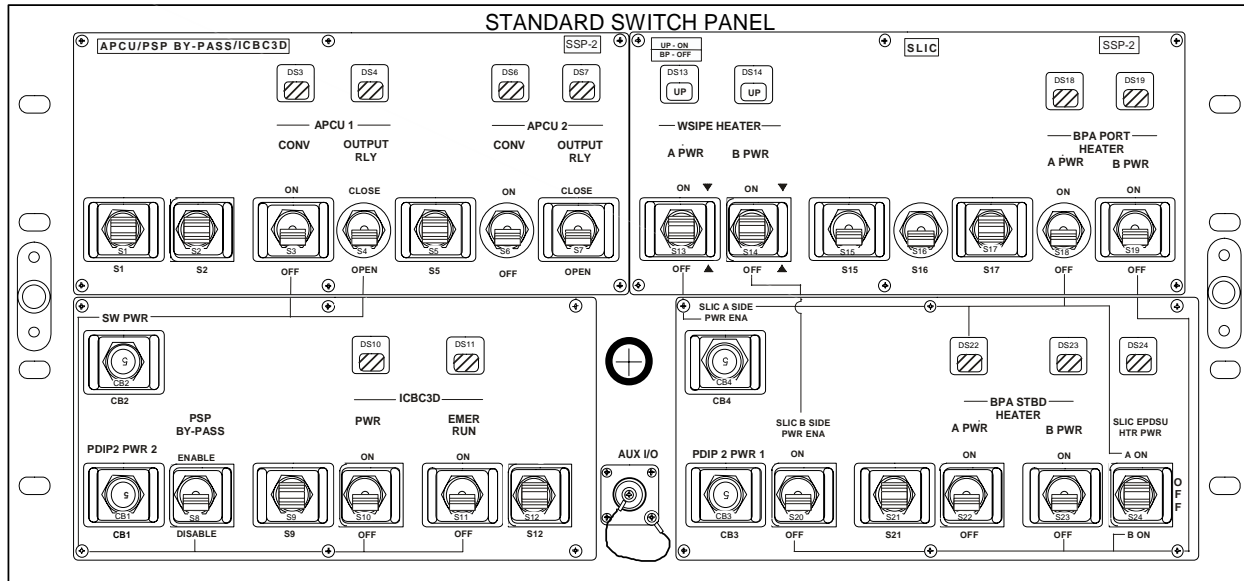
SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
ESS/MN SW ENA Status (DS18 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Monitor power is provided from PL CAB3 bus thru CB4
SPACE TEL SW PWR Circuit Breaker (CB4 - SSP 1)	Circuit breaker	OUT – Open IN – Closed 5-amp circuit breaker which routes PL CAB3 power to S13,S14,S15,S16,S17,S18 (UP) concurrent with SSE activation	Opened following powerdown for PCU changeout and during umbilical deadfacing at HST redeployment Closed during SSE checkout and prior to PCUR powerup
PDIP1 PWR 1 Circuit Breaker (CB3 - SSP 1)	Circuit breaker	OUT – Open IN – Closed	
IPCU RLY CLOSED Status Indicator (DS20 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Display status of IPCU relays. Indicates that IPCU main power switches (S1 and S2) or (S3 and S4) are closed. Monitor is powered from the FSS DPCs
MAIN BUS EXT PWR Switch (S21 - SSP 1)	Toggle switch, 3-position DPDT, momentary	ON (momentary UP) – Closes motorized transfer switches S1 thru S4 in IPCU that provides orbiter power to HST main buses A and B Center Position – None OFF (momentary DOWN) – Opens motorized transfer switches S1 thru S4 in IPCU that provide orbiter power to the HST main buses A and B	Used to provide FSS PCU power to the HST main buses for initial external power activation after berthing and for PCUR powerup. S21 is enabled by S18 Normal switch position when not in use Used to remove orbiter power from HST prior to PCU changeout and redeployment
MAIN BUS EXT PWR Status Indicator (DS21 - SSP 1)	Display indicator, 2-position	ON – gray OFF – bp	Status indicator. Gray indicates that at least one external main bus is powered inside the HST PCU. Indicates continuity thru HST umbilicals

SSP 1 SWITCH PANEL FUNCTIONS (L12U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
SSM WK LIGHTS Switch (S24 - SSP 1)	Toggle switch, 3-position DPDT	<p>ON (UP) – Enables IPCU relay K18 to provide FSS PCU power to all HST site receptacles, plus all SI latch indicator lights</p> <p>OFF (CENTER) – Disables IPCU relays K18 and K19, removing power from all internal/external worklight receptacles and latch indicator lights</p> <p>ON (DOWN) – Enables IPCU relay K19 to provide HST worklight receptacles, plus all SI latch indicator lights</p>	<p>Used to provide power to aft shroud (AS) internal/external worklight receptacles and latch indicator lights. For EVA use only</p> <p>Used to disable power to AS internal/external worklight receptacles and latch indicator lights</p> <p>Used to provide power to AS internal/external worklight receptacles and latch indicator lights. For EVA use only</p>

SSP 2



SSP 2 SWITCH PANEL FUNCTIONS (L12L)

ITEM	TYPE DEVICE	FUNCTION	USAGE
APCU 1 CONV Switch (S3 - SSP 2)	Toggle switch, 2-position DPST	ON (UP) – Look at recent flight Assembly Ops OFF (DOWN) – Look at recent flight Assembly Ops	
APCU 1 CONV Status Indicator (DS3 - SSP 2)		ON – gray OFF – bp	Status indicator
APCU 1 OUTPUT RLY Switch (S4 - SSP 2)	Toggle switch, 2-position DPST	CLOSE (UP) – Look at recent flight Assembly Ops OPEN (DOWN) – Look at recent flight Assembly Ops	
APCU 1 OUTPUT RLY Status Indicator (DS4 - SSP 2)		CLOSE – gray OPEN – bp	Status indicator
APCU 2 CONV Switch (S6 - SSP 2)	Toggle switch, 2-position DPST	ON (UP) – Look at recent flight Assembly Ops OFF (DOWN) – Look at recent flight Assembly Ops	
APCU 2 CONV Status Indicator (DS6 - SSP 2)		ON – gray OFF – bp	Status indicator

SSP 2 SWITCH PANEL FUNCTIONS (L12L) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
APCU 2 OUTPUT RLY Switch (S7 - SSP 2)	Toggle switch, 2-position DPST	CLOSE (UP) – Look at recent flight Assembly Ops OPEN (DOWN) – Look at recent flight Assembly Ops	
APCU 2 OUTPUT RLY Status Indicator (DS7 - SSP 2)		CLOSE – gray OPEN – bp	Status indicator
SW PWR Circuit Breaker (CB2 - SSP 2)	Circuit breaker (5 Amps)	OUT – Open IN – Closed, provides power to PSP BY-PASS selector switch	On orbit, as reqd
PDIP2 PWR 2 Circuit Breaker (CB1 - SSP 2)	Circuit breaker (5 Amps)	OUT – Open IN – Closed	
PSP BY-PASS Switch (S8 - SSP 2)	Toggle switch, 2-position DPST	ENABLE (UP) – Allows PDI data flow (DOD mode). Provides unique orbiter PI/PSP/PDI command/data configuration for HST only DISABLE (DOWN) – Inhibits PDI data flow (PSP Mode)	On orbit, as reqd
ICBC3D PWR Switch (S10 - SSP 2)	Toggle switch, 2-position DPST	ON (UP) - routes power to the ICBC3D assembly OFF (DOWN) – removes power from the ICBC3D assembly	Turned on during ICBC3D activation. Turned off during ICBC3D deactivation.
ICBC3D PWR Status Indicator (DS10 - SSP 2)	Display indicator, 2-position	ON – gray OFF – bp	
ICBC3D EMER RUN Switch (S11 - SSP 2)	Toggle switch, 2-position DPST	ON (UP) – provides Emergency Run power to the ICBC3D camera OFF (DOWN) – removes Emergency Run power from the ICBC3D camera	
ICBC3D EMER RUN Status Indicator (DS11 - SSP 2)	Status indicator, 2-position	ON – gray OFF – bp	

SSP 2 SWITCH PANEL FUNCTIONS (L12L) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
WSIPE HEATER A PWR Switch (S13 - SSP 2)	Toggle switch, 3-position DPDT momentary	ON (momentary UP) – Provides a latching signal to the SLIC EPDSU. This applies power for the thermostatic control of WSIPE A heaters Center Position – Normal OFF (momentary DOWN) – Disables the EPDSU power from the thermostatically controlled WSIPE A heaters	Turned on during SSE activation Normal switch position when not in use Turned off during SSE deactivation
WSIPE HEATER A PWR Status Indicator (DS13 - SSP 2)	Display indicator, 3-position	ON – UP OFF – bp DN indicator not used for HST	Status Indicator
WSIPE HEATER B PWR Switch (S14 - SSP 2)	Toggle switch, 3-position DPDT momentary	ON (momentary UP) – Provides a latching signal to the SLIC EPDSU. This applies power for the thermostatic control of WSIPE B heaters Center Position – Normal OFF (momentary DOWN) – Disables the EPDSU power from the thermostatically controlled WSIPE B heaters	Redundant WSIPE heaters may be activated in the event of a failure in the A side heaters Normal switch position when not in use
WSIPE HEATER B PWR Status Indicator (DS14 - SSP 2)	Display indicator, 3-position	ON – UP OFF – bp DN indicator not used for HST	Status Indicator
BPA PORT HEATER A PWR Switch (S18 - SSP 2)	Toggle switch, 2-position DPDT	ON (UP) – Enables the SLIC EPDSU. This applies power for the thermostatic control of the BPA A heaters OFF (DOWN) – Disables the EPDSU power from the thermostatically controlled BPA A heaters	Turned on during SSE activation Turned off during SSE deactivation
BPA PORT HEATER A PWR Status Indicator (DS18 - SSP 2)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator

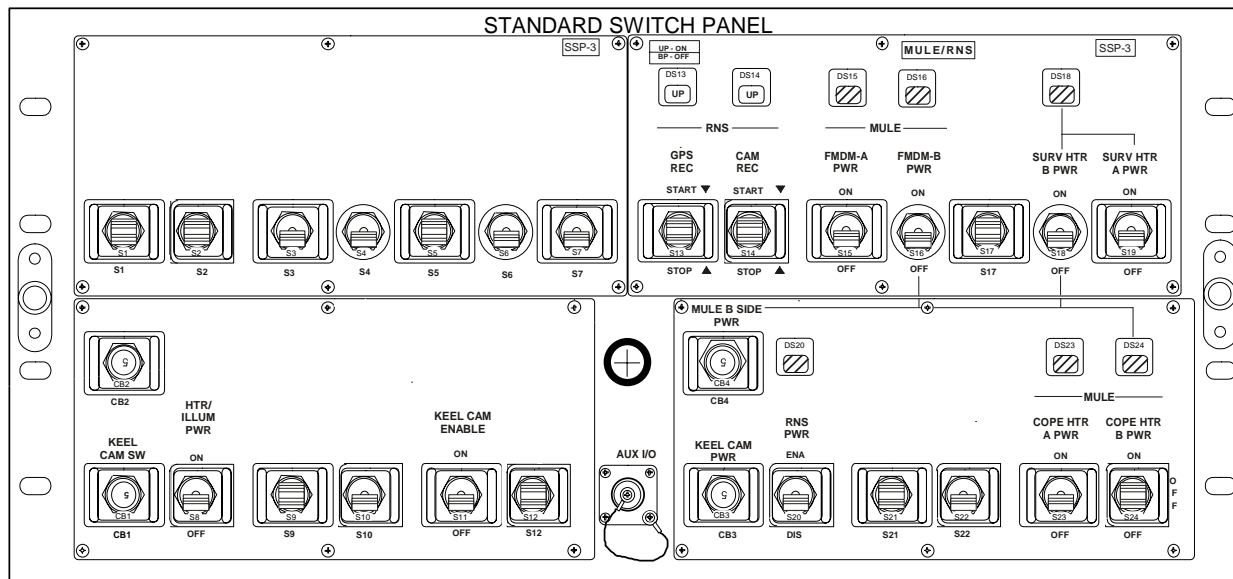
SSP 2 SWITCH PANEL FUNCTIONS (L12L) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
BPA PORT HEATER B PWR Switch (S19 - SSP 2)	Toggle switch, 2-position DPDT	ON (UP) – Enables the SLIC EPDSU. This applies power for the thermostatic control of the BPA B heaters OFF (DOWN) – Disables the EPDSU power from the thermostatically controlled BPA B heaters	Redundant BPA heaters may be activated in the event of a failure in the A side heaters
BPA PORT HEATER B PWR Status Indicator (DS19 - SSP 2)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator
SLIC A SIDE PWR ENA Circuit Breaker (CB4 - SSP 2)	Circuit breaker (5 Amps)	OUT – Open IN – Closed	Closed during SSE activation. 5-amp circuit breaker that routes orbiter power to S13,S18,S22,S24 (UP)
PDIP 2 PWR 1 Circuit Breaker (CB3 - SSP 2)	Circuit breaker (5 Amps)	OUT – Open IN – Closed	
SLIC B SIDE PWR ENA Switch (S20 - SSP 2)	Toggle switch, 2-position DPDT	ON (UP) – Provides fused orbiter power from the EPDSU to SSP switches S14,S19,S23,S24 (DN) for control of SLIC B side circuits OFF (DOWN) – Removes orbiter power from B side circuits	Turned on during SSE activation Turned off during SSE deactivation
BPA STBD HEATER A PWR Switch (S22 - SSP 2)	Toggle switch, 2-position DPDT	ON (UP) – Enables the SLIC EPDSU. This applies power for the thermostatic control of the BPA A heaters OFF (DOWN) – Disables the EPDSU power from the thermostatically controlled BPA A heaters	Redundant BPA heaters may be activated in the event of a failure in the B side heaters
BPA STBD HEATER A PWR Status Indicator (DS22 - SSP 2)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator

SSP 2 SWITCH PANEL FUNCTIONS (L12L) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
BPA STBD HEATER B PWR Switch (S23 - SSP 2)	Toggle switch, 2-position DPDT	<p>ON (UP) – Enables the SLIC EPDSU. This applies power for the thermostatic control of the BPA B heaters</p> <p>OFF (DOWN) – Disables the EPDSU power from the thermostatically controlled BPA B heaters</p>	<p>Turned on during SSE activation</p> <p>Turned off during SSE deactivation</p>
BPA STBD HEATER B PWR Status Indicator (DS23 - SSP 2)	Display indicator, 2-position	<p>ON – gray</p> <p>OFF – bp</p>	Status Indicator
SLIC EPDSU HTR PWR Switch (S24 - SSP 2)	Toggle switch, 3-position DPDT center off	<p>A ON (UP) – Enables the SLIC EPDSU. This applies power for the thermostatic control of the EPDSU A side heaters</p> <p>OFF (CENTER) – Removes power from the thermostatically controlled SLIC EPDSU A and B side heaters</p> <p>B ON (DOWN) – Enables the SLIC EPDSU. This applies power for the thermostatic control of the EPDSU B side heaters</p>	<p>Redundant SLIC EPDSU heaters may be activated in the event of a failure in the B side heaters</p> <p>Turned off during SSE deactivation</p> <p>Turned on during SSE activation</p>
SLIC EPDSU HTR PWR Status Indicator (DS24 - SSP 2)	Display indicator, 2-position	<p>ON A or B side – gray</p> <p>OFF – bp</p>	Status Indicator

SSP 3



SSP 3 SWITCH PANEL FUNCTIONS (L11U)

ITEM	TYPE DEVICE	FUNCTION	USAGE
KEEL CAM SW Circuit Breaker (CB1 - SSP 3)	Circuit breaker (5 Amps)	OUT – Open IN – Closed	5 amp circuit breaker which routes orbiter power to S8 and S11
HTR/ILLUM PWR Switch (S8 - SSP 3)	Toggle switch, 2-position DPST	ON (UP) – Enables power to Keel camera heaters and illuminator OFF (DN) – Disables power to Keel camera heaters and illuminator	
KEEL CAM ENABLE Switch (S11 - SSP 3)	Toggle switch, 2-position DPST	ON (UP) – Enables Keel camera controller OFF (DN) – Disables Keel camera controller	
RNS GPS REC Switch (S13 - SSP 3)	Toggle switch, 3-position DPDT momentary	START (momentary UP) – Enables hardline control to the RNS ICE on the MULE. ICE latches command and starts recording GPS data to the MSM hard drives Center Position – Normal STOP (momentary DOWN) – Enables hardline control to the RNS ICE on the MULE. ICE latches command and stops recording GPS data to the MSM hard drives	Operated by crew during RNS Checkout. Otherwise contingency use only. Normally controlled by the ground just prior to HST rendezvous and HST deploy Normal switch position when not in use Operated by crew during RNS Checkout. Otherwise contingency use only. Normally controlled by the ground just after HST rendezvous and HST deploy

RNS GPS REC Status Indicator (DS13 - SSP 3)	Display indicator, 3-position	START – UP STOP – bp DN indicator not used for HST	Status indicator
RNS CAM REC Switch (S14 - SSP 3)	Toggle switch, 3-position DPDT momentary	START (momentary UP) – Enables hardline control to the RNS ICE on the MULE. ICE latches command and starts recording RNS Cameras data to the MSM hard drives Center Position – Normal STOP (momentary DOWN) – Enables hardline control to the RNS ICE on the MULE. ICE latches command and stops recording RNS Cameras data to the MSM hard drives	Operated by crew during RNS Checkout. Otherwise contingency use only. Normally controlled by the ground just prior to HST rendezvous and HST deploy Normal switch position when not in use Operated by crew during RNS Checkout. Otherwise contingency use only. Normally controlled by the ground just after HST rendezvous and HST deploy

SSP 3 SWITCH PANEL FUNCTIONS (L11U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
RNS CAM REC Status Indicator (DS14 - SSP 3)	Display indicator, 3-position	START – UP STOP – bp DN indicator not used for HST	Status indicator
MULE FMDM-A PWR Switch (S15 - SSP 3)	Toggle switch, 2-position DPDT	ON (UP) – Enables the PDSU power to FMDM-A, A-side thermistor biases, and PDSU current sensors OFF (DOWN) – Disables the PDSU power from FMDM-A, A-side thermistor biases, and PDSU current sensors	Turned on during SSE checkout for monitoring of the MULE Turned off during SSE deactivation
MULE FMDM-A PWR Status Indicator (DS15 - SSP 3)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator
MULE FMDM-B PWR Switch (S16 - SSP 3)	Toggle switch, 2-position DPDT	ON (UP) – Enables the PDSU power to FMDM-B, B-side thermistor biases, and PDSU current sensors OFF (DOWN) – Disables the PDSU power from FMDM-B, B-side thermistor biases, and PDSU current sensors	Turned on during SSE activation for initial monitoring of MULE. FMDM-B is a redundant unit and will only be used during initial MULE activation and checkout, and in the event of a failure on the A-side avionics Turned off during completion of SSE checkout
MULE FMDM-B PWR Status Indicator (DS16 - SSP 3)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator
SURV HTR B PWR Switch (S18 - SSP 3)	Toggle switch, 2-position DPDT	ON (UP) – Enables the PDSU power to the B-side heaters: PDSU, avionics radiator plate and RNS survival heaters OFF (DOWN) – Disables the PDSU power to the B-side heaters: PDSU, avionics radiator plate and RNS survival heaters	Turned on during SSE activation Turned off during SSE checkout
SURV HTR PWR Status Indicator (DS18 - SSP 3)	Display indicator, 2-position	ON A or B side – gray OFF – bp	Status Indicator

SSP 3 SWITCH PANEL FUNCTIONS (L11U) (Cont)

ITEM	TYPE DEVICE	FUNCTION	USAGE
SURV HTR A PWR Switch (S19 - SSP 3)	Toggle switch, 2-position DPDT	ON (UP) – Enables the PDSU power to the A-side heaters: PDSU, avionics radiator plate and RNS survival heaters OFF (DOWN) – Disables the PDSU power to the A-side heaters: PDSU, avionics radiator plate and RNS survival heaters	Turned on during SSE checkout Turned off during SSE deactivation
MULE B SIDE PWR Circuit Breaker (CB4 - SSP 3)	Circuit breaker (5 Amps)	OUT – Open IN – Closed	Closed during SSE activation. 5-amp circuit breaker that routes orbiter power to S16,S18,S24 (UP)
KEEL CAM PWR Circuit Breaker (CB3 - SSP 3)	Circuit breaker (5 Amps)	OUT – Open IN – Closed	5-amp circuit breaker which routes orbiter power to Keel camera
RNS PWR Switch (S20 - SSP 3)	Toggle switch, 2-position DPDT	ENA (UP) – Enables the MULE PDSU power to RNS DIS (DOWN) – Disables the MULE PDSU power to RNS	Turned on during SSE activation Turned off during SSE deactivation
RNS PWR Status Indicator (DS20 - SSP 3)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator
MULE COPE HTR A PWR Switch (S23 - SSP 3)	Toggle switch, 2-position DPDT	ON (UP) – Enables the PDSU power to COPE A-side heaters OFF (DOWN) – Disables the PDSU power to COPE A-side heaters	Turned on during SSE checkout Turned off during SSE deactivation
MULE COPE HTR A PWR Status Indicator (DS23 - SSP 3)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator
MULE COPE HTR B PWR Switch (S24 - SSP 3)	Toggle switch, 3-position DPDT center off	ON (UP) – Enables the PDSU power to COPE B-side heaters OFF (CENTER) – Disables the PDSU power to COPE B-side heaters (DOWN) – not wired	Turned on during SSE activation Turned off during SSE checkout
MULE COPE HTR B PWR Status Indicator (DS24 - SSP 3)	Display indicator, 2-position	ON – gray OFF – bp	Status Indicator



**PAYLOAD SYS
MALFUNCTIONS**

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