List of Implemented CR(s):

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Uplinked Messages (or Approved Flight Notes) replaced by this PCN, remove from Book:

None

Incorporates the following:

1. Replace cover

2. Replace iii thru x; after x, add xi and xii

3. After 16, add 16a thru 16v
   Replace 17 thru 44
   After 134, add 134a thru 134p
   After 168, add 168a thru 168af
   After 174, add 174a thru 174n
   Replace 249 thru 262
   After 320, add 320a thru 320ax

APPROVED BY:

[Signature]
John J. Venditti
Book Manager

[Signature]
Carolyn S. Pascucci
Manager, Station Procedures Management

SODF Coordinator

ACCEPTED BY:

[Signature]
Michael T. Hurt
SODF Manager

File this PCN immediately behind the front cover as a permanent record
International Space Station
Assembly Operations

ISS-10A

Mission Operations Directorate
Operations Division

17 OCT 07

These procedures are available electronically on the SODF Homepage at http://mod.jsc.nasa.gov/do3
# LIST OF EFFECTIVE PAGES

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<td></td>
</tr>
<tr>
<td>168j</td>
<td>15 OCT 07</td>
<td>182</td>
<td></td>
<td></td>
</tr>
<tr>
<td>168k</td>
<td>15 OCT 07</td>
<td>183</td>
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<td>168l</td>
<td>15 OCT 07</td>
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<tr>
<td>168m</td>
<td>15 OCT 07</td>
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<tr>
<td>168n</td>
<td>15 OCT 07</td>
<td>186</td>
<td></td>
<td></td>
</tr>
<tr>
<td>168o</td>
<td>15 OCT 07</td>
<td>187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>168p</td>
<td>15 OCT 07</td>
<td>188</td>
<td></td>
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</tr>
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DISPLAYS

Cargo MCDS Display Descriptions

STANDARD SWITCH PANELS

Standard Switch Panel 1
Standard Switch Panel 2
OBJECTIVE:
To perform powerup and functional activation of Node 2 equipment tied to the MTL (ETCS Loop A) and EPS Channel 1/4.

INITIAL CONDITIONS:
RT I/O for Node 2 power strings hardware is inhibited
DDCU Parallel SPC connectors installed
MBSU 1 RBI 11 is Open
MBSU 1 RBI 10 is Open
MBSU 4 RBI 2 is Open
MBSU 4 RBI 10 is Open

NODE 2 DDCU N2S1B ACTIVATION

1. SUPPRESSING PMCU RT CAUTIONS AND WARNINGS
The following Caution and Warning messages in Table 1 should be suppressed during Node 2 activation to prevent nuisance tones.

<table>
<thead>
<tr>
<th>Event Code</th>
<th>Class</th>
<th>Message Text</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>5740</td>
<td>C</td>
<td>DDCU N2D1B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5743</td>
<td>C</td>
<td>DDCU N24B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5731</td>
<td>C</td>
<td>DDCU N24A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5728</td>
<td>C</td>
<td>DDCU N2S1B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5722</td>
<td>C</td>
<td>DDCU N22A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5725</td>
<td>C</td>
<td>DDCU N2P3A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5734</td>
<td>C</td>
<td>DDCU N22B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5737</td>
<td>C</td>
<td>DDCU N2O3A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
</tbody>
</table>
2. **INHIBITING PMCU RT FDIR, IF NECESSARY**

   CDH: Primary PMCU MDM: LB EPS N2 14: RT Status
   
   LB EPS N2 14 RT Status

   \[\text{'RT [X]'}\] where \(X\) = \[13\, 15\, 16\, 24\, 25\, 26\, 27\]

   \text{cmd Inhibit FDIR Execute}

   Verify RT FDIR Status – Inh

   Repeat

3. **CLOSING MBSU 1 RBI 10**

   S0: EPS: MBSU 1: RBI 10

   MBSU 1 RBI 10

   'Cmded Position'

   \text{cmd Close – Arm}

   \text{cmd Close – (Verify – Cl)}

   Verify Voltage > 145 V

4. **ENABLING RT I/O COMM FOR DDCU N2S1B**

   To build the Primary PMCU Enable RT arm command template
   \(<\text{LADD96IM1136K}\>\), perform \{1.203 BUILD COMMAND FROM TEMPLATE\}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM.ORU.x: 30 – DDCU N2STB-1B
   sel PM.CMDHdr: 1 – Arm
   sel PM.ORU.Exist: 1 – Exists

   Name command instance: Prim_PMCA_Ena_RT_DDCU_N2S1B_Arm

   To build the Primary PMCU Enable RT execute command template
   \(<\text{LADD96IM1136K}\>\), perform \{1.203 BUILD COMMAND FROM TEMPLATE\}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM.ORU.x: 30 – DDCU N2STB-1B
   sel PM.CmdHdr: 2 – Fire
   sel PM.ORU.Exist: 1 – Exists

   Name command instance:
   Prim_PMCA_Ena_RT_DDCU_N2S1B_Execute

   \text{cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S1B_Arm – (LADD96IM1136K)>}
**5. VERIFYING INTEGRATION COUNTER DDCU N2S1B**

Node 2: EPS: DDCU N2S1B

**VERIFY INTEGRATION COUNTER**
- Verify Integration Counter – incrementing
- Verify Input Voltage: 146 to 165 V
- Verify Converter Temp: -37.3 to 43.8 °C
- Verify Power Supply Temp: -37.3 to 49.5 °C
- Verify Baseplate Temp: -37.3 to 40.3 °C

**6. ENABLING RT FDIR FOR DDCU N2S1B**

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**cmd 27 DDCU N2S1B Enable FDIR Execute (Verify – Ena)**

**7. SETTING PARALLEL STATUS FOR DDCU N2S1B**

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2S1B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

- **input the following values in the command template:**
  - sel DDCUIP_x: 30 – DDCU N2STB-1B
  - sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
  - sel PM_DDCUI_Parallel: 1 – Parallel

  **Name command instance: DDCU_N2S1B_Set_Status_Parallel_Arm**

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2S1B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

- **input the following values in the command template:**
  - sel DDCUIP_x: 30 – DDCU N2STB-1B
  - sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
  - sel PM_DDCUI_Parallel: 1 – Parallel

  **Name command instance: DDCU_N2S1B_Set_Status_Parallel_Set**
NODE 2 ACTIVATION AND CHECKOUT PART 1

8. CLEARING DDCU N2S1B POWER ON RESET FLAG

Node 2: EPS: DDCU N2S1B: Firmware

**DDCU N2S1B Firmware**

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

**sel** Trip Status

**DDCU N2S1B Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

**NODE 2 DDCU N2S4A ACTIVATION**

9. CLOSING MBSU 4 RBI 2

S0: EPS: MBSU 4: RBI 2

**MBSU 4 RBI 2**

'Cmded Position'

**cmd** Close – Arm

**cmd** Close (Verify – Cl)

Verify Voltage > 145 V

10. ENABLING RT I/O COMM FOR DDCU N2S4A

To build Primary PMCU Enable RT arm command template

<\LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- **sel** PM_ORU_x: 31 – DDCU N2STB-4A
- **sel** PM_CMD_Hdr: 1 – Arm
- **sel** PM_ORU_Exist: 1 – Exists
Name command instance: Prim_PMCA_Ena_RT_DDCU_N2S4A_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel PM_ORU_x: 31 – DDCU N2STB-4A
- sel PM_CMD_Hdr: 2 – Fire
- sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2S4A_Execute

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S4A_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S4A_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 9-LB EPS N2 14

Verify 26 DDCU N2S4A Exist – Y

11. **VERIFYING INTEGRATION COUNTER DDCU N2S4A**

   **Node 2: EPS: DDCU N2S4A**

   **DDCU N2S4A**

   Verify Integration Counter – incrementing
   Verify Input Voltage: 146 to 165 V
   Verify Converter Temp: -37.3 to 43.8 C
   Verify Power Supply Temp: -37.3 to 49.5 C
   Verify Baseplate Temp: -37.3 to 40.3 C

12. **ENABLING RT FDIR FOR DDCU N2S4A**

   **CDH: Primary PMCU MDM: LB EPS N2 14: RT Status**

   **LB EPS N2 14 RT Status**

   **cmd** 26 DDCU N2S4A RT FDIR Status – Enable **Execute** (Verify – Ena)

13. **SETTING PARALLEL STATUS FOR DDCU N2S4A**

   To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2S4A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:

   - sel DDCUIP_x: 31 – DDCU N2STB-4A
   - sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
NODE 2 ACTIVATION AND CHECKOUT PART 1

sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2S4A_Set_Status_Parallel_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2S4A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
- sel DDCUIP_x: 31 – DDCU N2STB-4A
- sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
- sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2S4A_Set_Status_Parallel_Set

**cmd** <Cmd Inv: DDCU_N2S4A_Set_Status_Parallel_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU_N2S4A_Set_Status_Parallel_Set – (LAPC96IM0138K)>

14. CLEARING DDCU N2S4A POWER ON RESET FLAG

Node 2: EPS: DDCU N2S4A: Firmware

[DDCU N2S4A Firmware]

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

[DDCU N2S4A Trip Status]

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

**NODE 2 DDCU N2S1B ACTIVATION**
CAUTION
Node 2 DDCUs will be activated without coolant flowing through the IATCS MT loop. Cooling must be established before DDCU Baseplate temperature exceeds 40.3 deg C (TBD hours).

NOTE
The DDCUs may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR_28971) DDCU OLVCS Advisory

15. **POWERING ON NODE 2 DDCU N2S1B**
   Node 2: EPS: DDCU N2S1B: Converter
   ![DDCU N2S1B Converter](image)
   cmd Converter On – Arm
   cmd Converter On – On
   Verify Converter Status – On
   Verify Output Voltage: 120.2 to 128.8 V
   Verify Output Current: 0 ± 3.75 A

16. **POWERING ON NODE 2 DDCU N2S4A**
   Node 2: EPS: DDCU N2S4A
   ![DDCU N2S4A](image)
   sel DDCU N2S4A Converter
   ![DDCU N2S4A Converter](image)
   cmd Converter On – Arm
   cmd Converter On – On
   Verify Converter Status – On
   Verify Output Voltage: 120.2 to 128.8 V
   Verify Output Current: 0 ± 3.75 A
   'Power Sharing, %'
   Verify DDCU N2S1B: 50
   Verify DDCU N2S4A: 50
17. **ENABLING RT I/O COMM FOR RPCM N21B4A-A**
   CDH: Primary INT MDM: LB SEPS N2 14: RT Status
   
   ```
   LB SEPS N2 14 RT Status
   ```
   
   **cmd** 13 RPCM N21B4A A RT Status – Enable **Execute** (Verify – Ena)

18. **ENABLING RT I/O COMM FOR RPCM N21B4A-B**
   To build Primary PMCU Enable RT arm command template
   `<LADD96IM1136K>`, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   
   sel PM_ORU_x: 71 – RPCM N2STB-1B4A-B
   sel PM_CMD_Hdr: 1 – Arm
   sel PM_ORU_Exist: 1 – Exists
   
   Name command instance:
   Prim_PMCA_Ena_RT_RPCM_N21B4A_B_Arm

   To build Primary PMCU Enable RT execute command template
   `<LADD96IM1136K>`, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   
   sel PM_ORU_x: 71 – RPCM N2STB-1B4A-B
   sel PM_CMD_Hdr: 2 – Fire
   sel PM_ORU_Exist: 1 – Exists
   
   Name command instance:
   Prim_PMCA_Ena_RT_RPCM_N21B4A_B_Execute

   **cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N21B4A_B_Arm – (LADD96IM1136K)>

   **cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N21B4A_B_Execute – (LADD96IM1136K)>

   MSK: ODIN: Overview Displays: PWR_RTs: 9-LB EPS N2 14

19. **ENABLING RT I/O COMM FOR RPCM N21B4A-C**
   To build Primary PMCU Enable RT arm command template
   `<LADD96IM1136K>`, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   
   sel PM_ORU_x: 74 – RPCM N2STB-1B4A-C
   sel PM_CMD_Hdr: 1 – Arm

   Verify 16 RPCM N21B4A B Exist – Y

15 OCT 07
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_RPCM_N21B4A_C_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 74 – RPCM N2STB-1B4A-C
sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_RPCM_N21B4A_C_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N21B4A_C_Arm – (LADD96IM1136K)>
cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N21B4A_C_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 9-LB EPS N2 14

Verify 15 RPCM N21B4A C Exist – Y Execute (Verify – Ena)

20. VERIFYING INTEGRATION COUNTER RPCM N21B4A-A, B, C

Node 2: EPS

sel RPCM N21B4A [X] where [X] = [A][B][C]

   RPCM N21B4A [X]

   Verify Integration Counter – incrementing

   Repeat

21. ENABLING RT FDIR FOR RPCM N21B4A-A

   CDH: Primary INT MDM: LB SEPS N2 14: RT Status

   LB SEPS N2 14 RT Status

   cmd 13 RPCM_N21B4A_A Enable FDIR Execute (Verify – Ena)

22. ENABLING RT FDIR FOR RPCM N21B4A-B

   CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

   LB EPS N2 14 RT Status


**.cmd 16 RPCM_N21B4A_B Enable FDIR Execute (Verify – Ena)**

23. **ENABLING RT FDIR FOR RPCM N21B4A-C**

   CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

   **LB EPS N2 14 RT Status**

**cmd 15 RPCM_N21B4A_C Enable FDIR Execute (Verify – Ena)**

24. **PERFORMING RPCM POWER ON RESET**

   For RPCMs N21B4A A, B, and C

   Perform [5.420 RPCM POWER ON RESET], all (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

   **ACTIVATING N2-1 MDM**

25. **POWERING ON N2-1 MDM**

   Node 2: EPS: RPCM N21B4A A: RPC 01

   **RPCM N21B4A A RPC 01**

   **cmd** RPC Position – Close (Verify – Cl)

   Wait 5 minutes before performing the next step.

26. **ENABLING I/O TO THE N2-1 MDM**

   CDH: Primary INT MDM: LB SYS N2 1: RT Status

   **RT Status**

   **cmd** 24 MDM N2-1 RT STATUS – Enable Execute (Verify – Ena)

27. **VERIFYING MDM N2-1 STATUS**

   CDH: N2-1 MDM

   **N2-1 MDM**

   Verify Frame Count – incrementing
   Verify Processing State – Operational

   √Sync Status – In Sync

28. **ENABLING RT FDIR TO THE N2-1 MDM**

   CDH: Primary INT MDM: LB SYS N2 1: RT Status

   **RT Status**

   **cmd** 24 MDM N2-1 RT FDIR Status – Enable Execute (Verify – Ena)

   **ACTIVATING DDCU N2D4B**
29. **CLOSING MBSU 4 RBI 10**
   S0: EPS: MBSU 4: RBI 10
   
   MBSU 4 RBI 10
   'Cmded Position'

   **cmd** Close – Arm
   **cmd** Close (Verify – Cl)

   Verify Voltage > 145 V

30. **ENABLING RT I/O COMM FOR DDCU N2D4B**

   To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM_ORU_x: 35 - DDCU N2NAD-4B
   sel PM_CMD_Hdr: 1 - Arm
   sel PM_ORU_Exist: 1 - Exists

   Name command instance: Prim_PMCA_Ena_RT_DDCU_N2D4B_Arm

   To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM_ORU_x: 35 - DDCU N2NAD-4B
   sel PM_CMD_Hdr: 2 - Fire
   sel PM_ORU_Exist: 1 - Exists

   Name command instance:
   Prim_PMCA_Ena_RT_DDCU_N2D4B_Execute

   **cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D4B_Arm – (LADD96IM1136K)>

   **cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D4B_Execute – (LADD96IM1136K)>

   MSK: ODIN: Overview Displays: PWR_RTs: 9-LB EPS N2 14

   Verify 25 DDCU N2D4B Exist – Y

31. **VERIFYING INTEGRATION COUNTER FOR DDCU N2D4B**

   Node 2: EPS: DDCU N2D4B
   
   DDCU N2D4B
Verify integration counter – incrementing
Verify Input Voltage: 146 to 165 V
Verify Converter Temp: -37.3 to 43.8 C
Verify Power Supply Temp: -37.3 to 49.5 C
Verify Baseplate Temp: -37.3 to 40.3 C

32. **SETTING PARALLEL STATUS FOR DDCU N2D4B**

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2D4B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
- sel DDCUIP_x: 35 – DDCU N2NAD-4B
- sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
- sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2D4B_Set_Status_Parallel_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2D4B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
- sel DDCUIP_x: 35 – DDCU N2NAD-4B
- sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
- sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2D4B_Set_Status_Parallel_Set

```
cmd <Cmd Inv: DDCU_N2D4B_Set_Status_Parallel_Arm – (LAPC96IM0138K)>
cmd <Cmd Inv: DDCU_N2D4B_Set_Status_Parallel_Set – (LAPC96IM0138K)>
```

33. **ENABLING RT FDIR FOR DDCU N2D4B**

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

```
cmd 25 DDCU N2D4B RT FDIR Status – Enable Execute (Verify – Ena)
```

34. **CLEARING DDCU N2D4B POWER ON RESET FLAG**

Node 2: EPS: DDCU N2D4B: Firmware

```
DDCU N2D4B Firmware
'Clear Commands'
```
cmd Common Clear

Verify Power On Reset – blank

sel Trip Status

**DDCU N2D4B Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

**NODE 2 DDCU N2D1B ACTIVATION**

35. **CLOSING MBSU 1 RBI 11**

S0: EPS: MBSU 1: RBI 11

MBSU 1 RBI 11

'Cmded Position'

**cmd** Close – Arm

**cmd** Close (Verify – Cl)

Verify Voltage > 145 V

36. **ENABLING RT I/O COMM FOR DDCU N2D1B**

To build Primary PMCU Enable RT arm command template

<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM_ORU_x: 34 – DDCU N2NAD-1B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2D1B_Arm

To build Primary PMCU Enable RT execute command template

<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM_ORU_x: 34 – DDCU N2NAD-1B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists
Name command instance:
Prim_PMCA_Ena_RT_DDCU_N2D1B_Execute

```cmd
<Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D1B_Arm – (LADD96IM1136K)>
```

```cmd
<Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D1B_Execute – (LADD96IM1136K)>
```

MSK: ODIN: Overview Displays: PWR_RTs: 9-LB EPS N2 14

Verify 24 DDCU N2D1B Exist – Y

37. **VERIFYING INTEGRATION COUNTER FOR DDCU N2D1B**

Node 2: EPS: DDCU N2D1B

```
[DDCU N2D1B]
```

Verify integration counter – incrementing
Verify Input Voltage: 146 to 165 V
Verify Converter Temp: -37.3 to 43.8 C
Verify Power Supply Temp: -37.3 to 49.5 C
Verify Baseplate Temp: -37.3 to 40.3 C

38. **ENABLING RT FDIR FOR DDCU N2D1B**

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

```
[LB EPS N2 14 RT Status]
```

```cmd
24 DDCU N2D1B – Enable FDIR Execute (Verify – Ena)
```

39. **SETTING PARALLEL STATUS FOR DDCU N2D1B**

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2D1B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel DDCUIP_x: 34 – DDCU N2NAD-1B
- sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
- sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2D1B_Set_Status_Parallel_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2D1B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel DDCUIP_x: 34 – DDCU N2NAD-1B
NODE 2 ACTIVATION AND CHECKOUT PART 1
(assy ops/10a/fin) Page 15 of 21 pages

sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2D1B_Set_Status_Parallel_Set

`cmd <Cmd Inv: DDCU_N2D1B_Set_Status_Parallel_Arm – (LAPC96I0138K)>`

`cmd <Cmd Inv: DDCU_N2D1B_Set_Status_Parallel_Set – (LAPC96I0138K)>`

40. **CLEARING DDCU N2D1B POWER ON RESET FLAG**

Node 2: EPS: DDCU N2D1B: Firmware

**DDCU N2D1B Firmware**

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

**DDCU N2D1B Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

**NODE 2 DDCU N2D4B ACTIVATION**

41. **POWERING ON NODE 2 DDCU N2D4B**

Node 2: EPS: DDCU N2D4B: Converter

**DDCU N2D4B Converter**

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A
NODE 2 DDCU N2D1B ACTIVATION

42. **POWERING ON NODE 2 DDCU N2D1B**

   Node 2: EPS: DCU N2D1B: Converter

   ![DDCU N2D1B Converter](image)

   **cmd** Converter On – Arm
   **cmd** Converter On – On

   Verify Converter Status – On
   Verify Output Voltage: 120.2 to 128.8 V
   Verify Output Current: 0 ± 3.75 A

   ‘Power Sharing, %’

   Verify DDCU N2D1B: 50
   Verify DDCU N2D4B: 50

43. **ENABLING RT I/O COMM FOR RPCM N21B4B-A**

   To build Primary PMCU Enable RT arm command template
   `<LADD96IM1136K>`, perform `{1.203 BUILD COMMAND FROM TEMPLATE}`, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM_ORU_x: 69 – RPCM N2NAD-1B4B-A
   sel PM_CMD_Hdr: 1 – Arm
   sel PM_ORU_Exist: 1 – Exists

   Name command instance:
   Prim_PMCA_Ena_RT_RPCM_N21B4B_A_Arm

   To build Primary PMCU Enable RT execute command template
   `<LADD96IM1136K>`, perform `{1.203 BUILD COMMAND FROM TEMPLATE}`, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM_ORU_x: 69 – RPCM N2NAD-1B4B-A
   sel PM_CMD_Hdr: 2 – Fire
   sel PM_ORU_Exist: 1 – Exists

   Name command instance:
   Prim_PMCA_Ena_RT_RPCM_N21B4B_A_Execute

   **cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N21B4B_A_Arm – (LADD96IM1136K)>
cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N21B4B_A_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RT's: 9-LB EPS N2 14

Verify 13 RPCM_N21B4B_A Exist – Y

44. **ENABLING I/O FOR RPCM N21B4B-B**
   CDH: Primary INT MDM: LB SEPS N2 14: RT Status
   LB SEPS N2 14 RT Status

   cmd 9 RPCM N21B4B_B RT Status Enable **Execute** (Verify – Ena)

45. **VERIFYING INTEGRATION COUNTER RPCM N21B4B-A, B**
   Node 2: EPS
   Node 2: EPS

   sel RPCM N21B4B [X] where [X] = \[A\|B\]
   
   RPCM N21B4B [X]
   
   Verify Integration Counter – incrementing
   Repeat

46. **PERFORMING RPCM POWER ON RESET**
   For RPCMs N21B4B A and B
   Perform [5.420 RPCM POWER ON RESET], all (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

47. **ENABLING RT FDIR FOR RPCM N21B4B-A**
   CDH: PRIMARY PMCU MDM: LB EPS N2 14: RT Status
   LB EPS N2 14 RT Status

   cmd 13 RPCM_N21B4B_A RT FDIR Status – Enable **Execute** (Verify – Ena)

48. **ENABLING RT FDIR FOR RPCM N2D1B4B-B**
   CDH: Primary INT MDM: LB SEPS N2 14: RT Status
   LB SEPS N2 14 RT Status

   cmd 9 RPCM N21B4B_B RT FDIR Enable **Execute** (Verify – Ena)

**NODE-2 IATCS MT LOOP ACTIVATION**
49. **VERIFYING ACCUM LEVEL**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulator launch level is 85%</td>
</tr>
</tbody>
</table>

Node 2: TCS

Node 2: TCS

'PPA MTL'

Verify Avg Accum Qty > 70 %

50. **APPLYING POWER TO MTL IATCS COMPONENTS**

50.1 **MTL Shutoff Valve (SOV) RPC**

Node 2: TCS: MTL SFCA: RPCM N21B4B B RPC 01

RPCM N21B4B B RPC 01

*cmd* RPC Position – Close (Verify – Cl)

51. **MTL SFCA FLOW CONTROL VALVE (FCV) RPC**

Node 2: TCS: MTL SFCA: RPCM N21B4B B RPC 16

RPCM N21B4B B RPC 16

*cmd* RPC Position – Close (Verify – Cl)

52. **MTL TWMV RPC**

Node 2: TCS: MTL TWMV: RPCM N21B4A A RPC 02

RPCM N21B4A A RPC 02

*cmd* RPC Position – Close (Verify – Cl)

53. **MTL NIA ACCUMULATOR VENT VALVE (AVV) RPC**

Node 2: TCS: MTL PPA: Node2 MTL NIA Commands: RPCM N21B4B B RPC 02

RPCM N21B4B B RPC 02

*cmd* RPC Position – Close (Verify – Cl)

54. **MTL NIA ISOLATION VALVE (NIV) RPC**

Node 2: TCS: MTL PPA: Node2 MTL NIA Commands: RPCM N21B4B B RPC 15

*cmd* RPC Position – Close (Verify – Cl)

55. **MTL PPA RPC**

Node 2: TCS: MTL PPA: RPCM N21B4A A RPC 17

RPCM N21B4A A RPC 17
ENABLING COMMUNICATIONS BETWEEN PRIMARY INT AND MTL PPA

56. **ENABLING I/O TO THE MTL PPA**
   CDH: Primary INT MDM; LB SYS N2 1: RT Status
   LB SYS N2 1 RT Status

**cmd** 9 PPA N2-1 RT Status Enable **Execute** (Verify – Ena)

57. **LATCHING MT ACCUM VALUE**
   Node 2: TCS: MTL Software
   **Node2 MTL Software Commands**
   'MTL IATCS'
   'Leak Recovery'

**cmd** Set Normal Leak Limits – Set

58. **CHECKING MTL FDIR STATUS**
   Node 2: TCS: MTL Software
   **Node2 MTL Software Commands**
   'MTL IATCS'

√Leak Recovery Auto Shutdown – Ena
√Failure Recovery Fail Rcvy – Ena
√SFCA Overpress Protection Status – Ena

59. **CHECKING MTL SFCA SOFTWARE STATUS**

   **NOTE**
   In order to ensure that the MTL SFCA Mod Valve is fully opened prior to starting the pump, the MTL SFCA software must be verified to be shutdown prior to sending the MTL ITCS Activation command per SPN 25927/4495.

**PCS**
   Node 2: TCS: MTL SFCA
   **Node2 MTL SFCA Commands**
   'Commands'
   'MTL SFCA'

√SFCA Software – Shutdown
60. **IATCS MTL AUTOMATED ACTIVATION**

   **NOTE**

   MT loop activation is expected to occur within 75 seconds after the "startup N2 MT LOOP IATCS command has been issued. The software will automatically retry the startup process (if the first attempt fails) which can last another 75 seconds.

   **Node 2: TCS: MTL Software**

   **Node2 MTL Software Commands**

   'MTL IATCS'

   Verify the following:

   IATCS Status – Idle
   IATCS Activation – Not In Prog

   **cmd** Startup – Startup

   Verify IATCS Activation – In Prog

   Wait up to 3 minutes, then

   Verify IATCS Status – Oper

   **Node 2: TCS: MTL PPA**

   **Node2 MTL PPA Commands**

   'Commands'

   'MTL PPA'

   Verify the following:

   √ Pump Software – Started
   √ Pump Speed – 13910 ± 1250 rpm

61. **ENABLING FDIR FOR THE MTL PPA**

   **CDH: Primary INT MDM: LB SYS N2 1: RT Status**

   **LB SYS N2 1 RT Status**

   **cmd** 9 PPA N2-1 Enable FDIR **Execute** (Verify – Ena)

62. **SETTING LEAK LIMIT FOR THE MTL PPA**

   **Node 2: TCS**

   **Node 2: TCS**

   'PPA'

   Record MTL Avg Accum Qty: ________________ %
Node2 MTL Software Commands
'MTL IATCS'

**cmd** Set Normal Leak Limits – Set
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OBJECTIVE:
To perform powerup and functional activation of Node 2 equipment tied to the LTL (ETCS Loop B) and EPS Channel 2/3.

INITIAL CONDITIONS:
Node 2 Interim Activation complete.
DDCU SPC parallel connectors installed
MBSU 3 RBI 3 is Open
MBSU 2 RBI 3 is Open
MBSU 2 RBI 10 is Open
MBSU 3 RBI 2 is Open

ACTIVATING 2A3A POWER SUPPLY OUTPUT

1. SUPPRESSING PMCU RT CAUTIONS AND WARNINGS
The following Caution and Warning messages in Table 1 should be suppressed during Node 2 activation to prevent nuisance tones.

<table>
<thead>
<tr>
<th>Event Code</th>
<th>Class</th>
<th>Message Text</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>5740</td>
<td>C</td>
<td>DDCU N2D1B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5743</td>
<td>C</td>
<td>DDCU N24B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5731</td>
<td>C</td>
<td>DDCU N24A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5728</td>
<td>C</td>
<td>DDCU N2S1B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5722</td>
<td>C</td>
<td>DDCU N22A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5725</td>
<td>C</td>
<td>DDCU N2P3A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5734</td>
<td>C</td>
<td>DDCU N22B Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
<tr>
<td>5737</td>
<td>C</td>
<td>DDCU N2O3A Loss of Comm – Node 2</td>
<td>SUPP</td>
</tr>
</tbody>
</table>
2. **INHIBITING PMCU RT FDIR, if necessary**
   CDH: Primary PMCU MDM: LB EPS N2 23: RT Status
   LB EPS N2 23 RT Status

   'RT [X]' where [X] = 11 13 16 24 25 26 27

   **cmd** Inhibit FDIR  Execute
   Verify RT FDIR Status – Inh
   Repeat

3. **CLOSING MBSU 2 RBI 3**
   S0: EPS: MBSU 2: RBI 3
   MBSU 2 RBI 3
   'Cmded Position'

   **cmd** Close – Arm
   **cmd** Close (Verify – Cl)

   Verify voltage > 145 V

4. **ENABLING RT I/O COMM FOR DDCU N2P2A**
   To build Primary PMCU Enable RT arm command template
   <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM_ORU_x: 26 - DDCU N2PRT-2A
   sel PM_CMD_Hdr: 1 - Arm
   sel PM_ORU_Exist: 1 - Exists

   Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P2A_Arm

   To build Primary PMCU Enable RT execute command template
   <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel PM_ORU_x: 26 - DDCU N2PRT-2A
   sel PM_CMD_Hdr: 2 - Fire
   sel PM_ORU_Exist: 1 - Exists

   Name command instance:
   Prim_PMCA_Ena_RT_DDCU_N2P2A_Execute

   **cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P2A_Arm – (LADD96IM1136K)>
5. **VERIFYING INTEGRATION COUNTER DDCU N2P2A**

   Node 2: EPS: DDCU N2P2A

   Verify Integration Counter – incrementing
   Verify Input Voltage: 146 to 165 V
   Verify Converter Temp: -37.3 to 43.8 C
   Verify Power Supply Temp: -37.3 to 49.5 C
   Verify Baseplate Temp: -37.3 to 40.3 C

6. **ENABLING RT FDIR FOR DDCU N2P2A**

   CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

   

   **cmd** 24 DDCU N2P2A RT FDIR Enable Execute (Verify – Ena)

7. **SETTING PARALLEL STATUS FOR DDCU N2P2A**

   To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2P2A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel DDCUIP_x: 30 – DDCU N2PRT-2A
   sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
   sel PM_DDCUI_Parallel: 1 – Parallel

   Name command instance: DDCU_N2P2A_Set_Status_Parallel_Arm

   To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2P2A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel DDCUIP_x: 30 – DDCU N2PRT-2A
   sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
   sel PM_DDCUI_Parallel: 1 – Parallel

   Name command instance: DDCU_N2P2A_Set_Status_Parallel_Set
cmd <Cmd Inv: DDCU_N2P2A_Set_Status_Parallel_Arm – (LAPC96IM0138K)>

cmd <Cmd Inv: DDCU_N2P2A_Set_Status_Parallel_Set – (LAPC96IM0138K)>

8. CLEARING DDCU N2P2A POWER ON RESET FLAG

Node 2: EPS: DDCU N2P2A: Firmware

DDCU N2P2A Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

sel Trip Status

DDCU N2P2A Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

cmd Inhibit – Arm

cmd Inhibit – Inhibit

Verify Trip Function – Inh

9. CLOSING MBSU 3 RBI 3

S0: EPS: MBSU 3: RBI 3

MBSU 3 RBI 3

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify voltage > 145 V

10. ENABLING RT I/O COMM FOR DDCU N2P3A

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM_ORU_x: 27 – DDCU N2PRT-3A
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P3A_Arm
To build Primary PMCU Enable RT execute command template
<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM
TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 27 – DDCU N2PRT-3A
sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_DDCU_N2P3A_Execute

**cmd**<Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P3A_Arm –
(LADD96IM1136K)>

**cmd**<Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P3A_Execute –
(LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 10-LB EPS N2 23

Verify 25 DDCU N2P3A Exist – Y

11. **VERIFYING INTEGRATION COUNTER DDCU N2P3A**

   Node 2: EPS: DDCU N2P3A

   Verify Integration Counter – incrementing
   Verify Input Voltage: 146 to 165 V
   Verify Converter Temp: -37.3 to 43.8 C
   Verify Power Supply Temp: -37.3 to 49.5 C
   Verify Baseplate Temp: -37.3 to 40.3 C

12. **ENABLING RT FDIR FOR DDCU N2P3A**

   CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

   **cmd** 25 DDCU N2P3A Enable FDIR Execute (Verify – Ena)

13. **SETTING PARALLEL STATUS FOR DDCU N2P3A**

   To build the Primary PMCU DDCU Set Status Parallel Arm Command for
   DDCU N2P3A from template <LAPC96IM0138K>, perform {1.203 BUILD
   COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

   input the following values in the command template:
   sel DDCU_IP_x: 30 – DDCU N2PRT-3A
   sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
   sel PM_DDCU_Parallel: 1 – Parallel
Name command instance: DDCU_N2P3A_Set_Status_Parallel_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2P3A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel DDCU_x: 30 – DDCU N2PRT-3A
sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2P3A_Set_Status_Parallel_Set

\texttt{cmd <Cmd Inv: DDCU_N2P3A_Set_Status_Parallel_Arm – (LAPC96IM0138K)>}

\texttt{cmd <Cmd Inv: DDCU_N2P3A_Set_Status_Parallel_Set – (LAPC96IM0138K)>}

14. **CLEARING DDCU N2P3A POWER ON RESET FLAG**

Node 2: EPS: DDCU N2P3A: Firmware

<table>
<thead>
<tr>
<th>DDCU N2P3A Firmware</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Clear Commands'</td>
</tr>
</tbody>
</table>

\texttt{cmd Common Clear}

Verify Power On Reset – blank

sel Trip Status

<table>
<thead>
<tr>
<th>DDCU N2P3A Trip Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Parallel DDCU'</td>
</tr>
<tr>
<td>'Input Undervoltage Trip'</td>
</tr>
</tbody>
</table>

\texttt{cmd Inhibit – Arm}

\texttt{cmd Inhibit – Inhibit}

Verify Trip Function – Inh

**CAUTION**

Node 2 DDCUs will be activated initially without coolant flowing through the IATCS LT LOOP. Cooling must be established before DDCU baseplate temperature exceeds 40.3 deg C (TBD hours).

**ACTIVATING NODE 2 DDCU N2P2A**
The DDCUs may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR_28971)

15. **POWERING ON NODE 2 DDCU N2P2A**

Node 2: EPS: DDCU N2P2A

```
DDCU N2P2A
```

sel DDCU N2P2A Converter

```
DDCU N2P2A Converter
```

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On
Verify Output Voltage: 120.2 to 128.8 V
Verify Output Current: 0 ± 3.75 A

**ACTIVATING NODE 2 DDCU N2P3A**

16. **POWERING ON NODE 2 DDCU N2P3A**

Node 2: EPS: DDCU N2P3A

```
DDCU N2P3A
```

sel DDCU N2P3A Converter

```
DDCU N2P3A Converter
```

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On
Verify Output Voltage: 120.2 to 128.8 V
Verify Output Current: 0 ± 3.75 A

‘Power Sharing, %’

Verify DDCU N2P2A: 50
Verify DDCU N2P3A: 50

17. **ENABLING RT I/O COMM FOR RPCM N22A3A-A**

To build Primary PMCU Enable RT arm command template

<``LADD96IM1136K``>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 70 - RPCM N2PRT-2A3A-A  
sel PM_CMD_Hdr: 1 - Arm  
sel PM_ORU_Exist: 1 - Exists

Name command instance: 
Prim_PMCA_Ena_RT_RPCM_N22A3A_A_Arm

To build Primary PMCU Enable RT execute command template
<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM
TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 70 - RPCM N2PRT-2A3A-A  
sel PM_CMD_Hdr: 2 - Fire  
sel PM_ORU_Exist: 1 - Exists

Name command instance: 
Prim_PMCA_Ena_RT_RPCM_N22A3A_A_Execute

18. **ENABLING RT I/O COMM FOR RPCM N22A3A-C**

To build Primary PMCU Enable RT arm command template
<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM
TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 75 - RPCM N2PRT-2A3A-C  
sel PM_CMD_Hdr: 1 - Arm  
sel PM_ORU_Exist: 1 - Exists

Name command instance: 
Prim_PMCA_Ena_RT_RPCM_N22A3A_C_Arm

To build Primary PMCU Enable RT execute command template
<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM
TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 75 - RPCM N2PRT-2A3A-C  
sel PM_CMD_Hdr: 2 - Fire  
sel PM_ORU_Exist: 1 - Exists
Name command instance:
Prim_PMCA_Ena_RT_RPCM_N2P2A3A_C_Execute

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2P2A3A_C_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2P2A3A_C_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 10-LB EPS N2 23

Verify 11 RPCM N22A3A_C Exist – Y

19. **ENABLING RT I/O COMM FOR RPCM N22A3A-B**

   CDH: Primary INT MDM: LB SEPS N2 23: RT Status
   
   **cmd** 09 RPCM N22A3A_B RT Status – Enable **Execute** (Verify – Ena)

20. **VERIFYING RPCM INTEGRATION COUNTERS**

   Node 2: EPS
   
   sel RPCM N22A3A [X] where [X] = [A][B][C]
   
   **RPCM N22A3A X**
   
   Repeat

21. **PERFORMING RPCM POWER ON RESET**

   For RPCMs N22A3A A, B, and C
   
   Perform {5.420 RPCM POWER ON RESET} (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

22. **ENABLING RT FDIR FOR RPCM N22A3A-A, B, C**

   CDH: Primary PMCU MDM: LB EPS N2 23: RT Status
   
   **cmd** 11 RPCM N22A3A_C RT FDIR Status – Enable **Execute** (Verify – Ena)
   
   **cmd** 13 RPCM N22A3A_A RT FDIR Status – Enable **Execute** (Verify – Ena)

   CDH: Primary INT MDM: LB SEPS N2 23: RT Status
23. **POWERING ON N2-2 MDM**
   Node 2: EPS: RPCM N22A3A B: RPC 01
   RPCM N22A3A B RPC 01
   cmd RPC Position Close (Verify – Cl)
   Wait 5 minutes before performing the next step.

24. **ENABLING I/O TO THE N2-2 MDM**
   CDH: Primary INT MDM: LB SYS N2 2: RT Status
   RT Status
   cmd 24 MDM N2-2 RT Status – Enable Execute (Verify – Ena)

25. **VERIFYING N2-2 MDM STATUS**
   CDH: N2-2 MDM
   N22 MDM
   Verify Frame Count – incrementing
   Verify Processing State – Operational
   \(\checkmark\) Sync Status – In Sync

26. **POWERING N2-2 MDM SDO CARD**
   Node 2: EPS: RPCM N22A3A B: RPC 02
   RPCM N22A3A B RPC 02
   cmd RPC Position Close (Verify – Cl)

27. **POWERING N2-2 MDM SDO CARD**
   Node 2: EPS: RPCM N22A3A B: RPC 04
   RPCM N22A3A B RPC 04
   cmd RPC Position Close (Verify – Cl)

28. **ENABLING RT FDIR FOR THE N2-2 MDM**
   CDH: Primary INT MDM: LB SYS N2 2: RT Status
   LB SYS N2 2 RT FDIR Status
   cmd 24 MDM N2-2 RT FDIR Status – Enable Execute (Verify – Ena)
NOTE
The next 4 commands will inhibit the close command for power application to CCAA solenoid valves. This is done to preclude inadvertent commanding to the circuits.

29. EXECUTING CLOSE CMD INHIBIT TO CCAA H2O VALVES

29.1 Bypass Valve RPC Close Cmd Inh
Node 2: EPS: RPCM N22A3B C: RPC 8
RPCM N22A3B C RPC 08

**cmd** Close Cmd – Inhibit (Verify – Inh)

29.2 Bypass Valve RPC Close Cmd Inh
Node 2: EPS: RPCM N22A3B C: RPC 9
RPCM N22A3B C RPC 09

**cmd** Close Cmd – Inhibit (Verify – Inh)

29.3 Normal Valve RPC Close Cmd Inh
Node 2: EPS: RPCM N22A3B C: RPC 10
RPCM N22A3B C RPC 10

**cmd** Close Cmd – Inhibit (Verify – Inh)

29.4 Normal Valve RPC Close Cmd Inh
Node 2: EPS: RPCM N22A3B C: RPC 11
RPCM N22A3B C: RPC 11

**cmd** Close Cmd – Inhibit (Verify – Inh)

POWERING ON DDCU N2O3A

30. CLOSING MBSU 3 RBI 2
S0: EPS: MBSU 3: RBI 2
MBSU 3 RBI 2

'Cmded Position'

**cmd** Close – Arm
**cmd** Close (Verify – Cl)

Verify voltage > 145 V

31. ENABLING RT I/O COMM FOR DDCU N2O3A
To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
sel PM_ORU_x: 33 – DDCU N2ZEN-3A
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O3A_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:
	name command instance: Prim_PMCA_Ena_RT_DDCU_N2O3A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O3A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O3A_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 10-LB EPS N2 23

Verify 27 DDCU N2O3A Exist – Y

32. VERIFYING INTEGRATION COUNTER DDCU N2O3A

Node 2: EPS: DDCU N2O3A

DDCU N2O3A

Verify Integration Counter – incrementing
Verify Input Voltage: 146 to 165 V
Verify Converter Temp: -37.3 to 43.8 °C
Verify Power Supply Temp: -37.3 to 49.5 °C
Verify Baseplate Temp: -37.3 to 40.3 °C

33. ENABLING RT FDIR FOR DDCU N2O3A

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

LB EPS N2 23 RT Status

**cmd** 27 DDCU N2O3A RT FDIR Status – Enable **Execute** (Verify – Ena)

34. SETTING PARALLEL STATUS FOR DDCU N2O3A

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2O3A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:
input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2ZEN-3A
sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2O3A_Set_Status_Parallel_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2O3A from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2ZEN-3A
sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2O3A_Set_Status_Parallel_Set

\[\text{cmd} \text{<Cmd Inv: DDCU_N2O3A_Set_Status_Parallel_Arm} - \text{(LAPC96IM0138K)}>\]

\[\text{cmd} \text{<Cmd Inv: DDCU_N2O3A_Set_Status_Parallel_Set} - \text{(LAPC96IM0138K)>}\]

35. **CLEARING DDCU N2O3A POWER ON RESET FLAG**

Node 2: EPS: DDCU N2O3A: Firmware

[DDCU N2O3A Firmware]

'Clear Commands'

\[\text{cmd} \text{Common Clear}\]

Verify Power On Reset – blank

sel Trip Status

[DDCU N2O3A Trip Status]

'Parallel DDCU'

'Input Undervoltage Trip'

\[\text{cmd} \text{Inhibit – Arm}\]

\[\text{cmd} \text{Inhibit – Inhibit}\]

Verify Trip Function – Inh

**POWERING ON DDCU N2O2B**
36. **CLOSING MBSU 2 RBI 10**  
S0: EPS: MBSU 2: RBI 10  
MBSU 2 RBI 10  
'Cmded Position'

**cmd** Close – Arm  
**cmd** Close (Verify – Cl)

Verify voltage > 145 V

37. **ENABLING RT I/O COMM FOR DDCU N2O2B**

To build Primary PMCU Enable RT arm command template  
<LADD96IM1136K>, perform **{1.203 BUILD COMMAND FROM TEMPLATE}**, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel PM_ORU_x: 32 – DDCU N2ZEN-2B  
- sel PM_CMD_Hdr: 1 – Arm  
- sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O2B_Arm

To build Primary PMCU Enable RT execute command template  
<LADD96IM1136K>, perform **{1.203 BUILD COMMAND FROM TEMPLATE}**, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel PM_ORU_x: 32 – DDCU N2ZEN-2B  
- sel PM_CMD_Hdr: 2 – Fire  
- sel PM_ORU_Exist: 1 – Exists

Name command instance:  
Prim_PMCA_Ena_RT_DDCU_N2O2B_Execute

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O2B_Arm – (LADD96IM1136K)>  
**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O2B_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 10-LB EPS N2 23

Verify 26 DDCU N2O2B Exist – Y

38. **VERIFYING INTEGRATION COUNTER DDCU N2O2B**

Node 2: EPS: DDCU N2O2B  
**DDCU N2O2B**

Verify Integration Counter – incrementing
Verify Input Voltage: 146 to 165 V
Verify Converter Temp: -37.3 to 43.8 C
Verify Power Supply Temp: -37.3 to 49.5 C
Verify Baseplate Temp: -37.3 to 40.3 C

39. **ENABLING RT FDIR FOR DDCU N2O2B**
   CDH: Primary PMCU MDM: LB EPS N2 23: RT Status
   
   **cmd** 26 DDCU N2O2B RT FDIR Status – Enable **Execute** (Verify – Ena)

40. **SETTING PARALLEL STATUS FOR DDCU N2O2B**
   To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2O2B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:
   
   input the following values in the command template:
   - sel DDCUIP_x: 30 – DDCU N2ZEN-2B
   - sel DDCU_Setpt_Cmd_Hdr: 1 – Arm
   - sel PM_DDCUI_Parallel: 1 – Parallel
   
   Name command instance: DDCU_N2O2B_Set_Status_Parallel_Arm

   To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2O2B from template <LAPC96IM0138K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:
   
   input the following values in the command template:
   - sel DDCUIP_x: 30 – DDCU N2ZEN-2B
   - sel DDCU_Setpt_Cmd_Hdr: 2 – Fire
   - sel PM_DDCUI_Parallel: 1 – Parallel
   
   Name command instance: DDCU_N2O2B_Set_Status_Parallel_Set

   **cmd** <Cmd Inv: DDCU_N2O2B_Set_Status_Parallel_Arm – (LAPC96IM0138K)>

   **cmd** <Cmd Inv: DDCU_N2O2B_Set_Status_Parallel_Set – (LAPC96IM0138K)>

41. **CLEARING DDCU N2O2B POWER ON RESET FLAG**
   Node 2: EPS: DDCU N2O2B: Firmware
   DDCU N2O2B Firmware
   'Clear Commands'

   **cmd** Common Clear
Verify Power On Reset – blank

sel Trip Status

**DDCU N2O2B Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

**ACTIVATING NODE 2 DDCU N2O3A**

**NOTE**

The DDCUs may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR_28971)

42. **POWERING ON NODE 2 DDCU N2O3A**

Node 2: EPS: DDCU N2O3A

**DDCU N2O3A**

sel DDCU N2O3A Converter

**DDCU N2O3A Converter**

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

**ACTIVATING NODE 2 DDCU N2O2B**

43. **POWERING ON NODE 2 DDCU N2O2B**

Node 2: EPS: DDCU N2O2B

**DDCU N2O2B**

sel Converter

**DDCU N2O2B Converter**

**cmd** Converter On – Arm
**cmd Converter On – On**

Verify Converter Status – On
Verify Output Voltage: 120.2 to 128.8 V
Verify Output Current: 0 ± 3.75 A

'Power Sharing, %'

Verify DDCU N2O2B: 50
Verify DDCU N2O3A: 50

44. **ENABLING RT I/O COMM FOR RPCM N22B3A-A**

   CDH: Primary INT MDM: LB SEPS N2 23: RT Status

   [LB SEPS N2 23 RT Status]

   **cmd** 13 RPCM N22B3A_A RT Status – Enable  **Execute** (Verify – Ena)

45. **ENABLING RT I/O COMM FOR RPCM N22B3A-B**

To build Primary PMCU Enable RT arm command template

\(<\text{LADD96IM1136K}\), perform  \{1.203 BUILD COMMAND FROM TEMPLATE\}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel PM_ORU_x: 72 – RPCM N2ZEN-2B3A-B
- sel PM_CMD_Hdr: 1 – Arm
- sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Arm

To build Primary PMCU Enable RT execute command template

\(<\text{LADD96IM1136K}\), perform \{1.203 BUILD COMMAND FROM TEMPLATE\}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

- sel PM_ORU_x: 72 – RPCM N2ZEN-2B3A-B
- sel PM_CMD_Hdr: 2 – Fire
- sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Execute

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR_RTs: 10-LB EPS N2 23
Verify 16 RPCM N22B3A_B Exist – Y

46. VERIFYING RPCM INTEGRATION COUNTERS
   Node 2: EPS
   Node 2: EPS
   RPCM N22B3A [X]
   Repeat
   Verify Integration Counter – incrementing

47. PERFORMING RPCM POWER ON RESET
   For RPCMs N22B3A A and B
   Perform {5.420 RPCM POWER ON RESET} (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

48. ENABLING RT FDIR FOR RPCM N22B3A-B
   CDH: Primary PMCU MDM
   Primary PMCU MDM
   sel LB EPS N2 23
   LB EPS N2 23
   sel RT Status
   LB EPS N2 23 RT Status
   cmd 16 RPCM N22B3A_B RT FDIR Status – Enable Execute (Verify – Ena)

49. ENABLING RT FDIR FOR RPCM N22B3A-A
   CDH: Primary INT MDM
   Primary INT MDM
   sel LB SEPS N2 23
   LB SEPS N2 23
   sel RT Status
   LB SEPS N2 23 RT Status
(cmd 13 RPCM N22B3A_A RT FDIR Status – Enable Execute (Verify – Ena)

PERFORMING AUTOMATED ACTIVATION OF NODE-2 IATCS LT LOOP

50. PROCEEDING WITH NODE 2 IATCS LT LOOP ACTIVATION

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTL Accumulator launch level is 85%</td>
</tr>
</tbody>
</table>

Node 2: TCS

Node 2: TCS

'PPA LTL'

Verify Avg Accum Qty > 70 %

51. APPLYING POWER TO LTL IATCS COMPONENTS

51.1 LTL Shutoff Valve

Node 2: TCS: LTL SFCA: RPCM N22B3A A RPC 01

RPCM N22B3A A RPC 01

(cmd RPC Position – Close (Verify – Cl)

51.2 LTL SFCA Mod Valve

Node 2: TCS: LTL SFCA: RPCM N22B3A A RPC 16

RPCM N22B3A A RPC 16

(cmd RPC Position – Close (Verify – Cl)

51.3 LTL TWMV

Node 2: TCS: LTL TWMV: RPCM N22A3A B RPC 16

RPCM N22A3A B RPC 16

(cmd RPC Position – Close (Verify – Cl)

51.4 LTL Regen TWMV

Node 2: TCS: LTL Regen TWMV: RPCM N22A3A B RPC 03

RPCM N22A3A B RPC 03

(cmd RPC Position – Close (Verify – Cl)

51.5 LTL NIA Vent Valve

Node 2: TCS: LTL PPA: Node2 LTL NIA Commands: RPCM N22B3A A RPC 02

RPCM N22B3A A RPC 02

15 OCT 07  35  _M_18255.xml
cmd RPC Position – Close (Verify – Cl)

51.6 **LTL NIA Isol Valve**
Node 2: TCS: LTL PPA: Node2 LTL NIA Commands: RPCM N22B3A A RPC 15
RPCM N22B3A A RPC 15

**cmd** RPC Position – Close (Verify – Cl)

51.7 **LTL PPA**
Node 2: TCS: LTL PPA: RPCM N22A3A B RPC 17
RPCM N22A3A B RPC 17

**cmd** RPC Position – Close (Verify – Cl)

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTL PPA COMM W/INTSYS must be enabled prior to LT loop activation</td>
</tr>
</tbody>
</table>

52. **VERIFYING CCAA H2O VALVE POSITION**
Node 2: TCS: IATCS Details: Node2 CCAA H2O Valve Commands
Node2 CCAA H2O Valve Commands
'Node2 CCAA H2O Valves'

Verify Normal Valve Open Posn – √

53. **ENABLING RT I/O COMM BETWEEN INT & LTL PPA**
CDH: Primary INT MDM: LB SYS N2 2: RT Status
LB SYS N2 2 RT Status

**cmd** 9 PPA N2-2 RT Status – Enable **Execute** (Verify – Ena)

54. **LATCHING LT ACCUM**
Node 2: TCS: LTL Software
Node2 LTL Software Commands
'LTL IATCS'
'Leak Recovery'

**cmd** Set Normal Leak Limits – Set

55. **SETTING LTL TWMV SETPOINT**
Node 2: TCS: LTL TWMV
Node2 LTL TWMV Commands
'Commands'
'LTL TWMV'
input Temp Setpt – 17.3 deg C

**cmd** Temp Setpt – Set **Execute**

Verify Temp Setpt – 17.2 deg C

56. **VERIFYING LTL FDIR STATUS**

Node 2: TCS: LTL Software

<table>
<thead>
<tr>
<th>Node2 LTL Software Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'LTL IATCS'</td>
</tr>
</tbody>
</table>

√ Leak Recovery Auto Shutdown – Ena
√ Failure Recovery Fail Rcvy – Ena
√ SFCA Overpress Protection Status – Ena

57. **VERIFYING LTL SFCA SOFTWARE STATUS**

NOTE

In order to ensure that the LTL SFCA Mod valve is fully opened prior to starting the pump, the LTL SFCA software must be verified to be shutdown prior to sending the LTL ITCS activation command per SPN 25927/4495.

PCS

Node 2: TCS: LTL SFCA

<table>
<thead>
<tr>
<th>Node2 LTL SFCA Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Commands'</td>
</tr>
<tr>
<td>'LTL SFCA'</td>
</tr>
</tbody>
</table>

√ SFCA Software – Shutdown

58. **COMMANDING LTL STARTUP**

NOTE

Node2 LTL loop activation is expected to occur within 75 seconds after the startup N2 LTL loop ITCS command has been issued. The software will automatically retry the startup process (if first attempt fails) which can last another 75 seconds.

Node 2: TCS: LTL Software

<table>
<thead>
<tr>
<th>Node2 LTL Software Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'LTL IATCS'</td>
</tr>
</tbody>
</table>

Verify IATCS Status – Idle
Verify IATCS Activation – Not In Prog

**cmd** Startup – Startup

Verify IATCS Activation – In Prog
Wait up to 3 minutes, then

Verify IATCS Status – Oper

Node 2: TCS: LTL PPA

Verify Pump Software – Started
Verify Pump Speed: 13325 ± 1250 rpm

59. **ENABLING RT FDIR FOR LTL PPA**

CDH: Primary INT MDM: LB SYS N2 2: RT Status

Verify 9 PPA N2-2 RT Comm Failed Status – blank

60. **SETTING LEAK LIMIT FOR THE LTL PPA**

Record LTL Avg Accum Qty: ________________%

sel LTL Software

61. **ACTIVATING NODE 2 SMOKE DETECTOR 1**

If Node 1 Activation and Checkout Part 1 not complete,
Go to step 67.
**cmd** RPC Position – Close (Verify – Cl)

Node 2: ECLSS: SD1

Node 2 Smoke Detector 1

Verify Obscuration, % Contamination < 25
Verify Scatter, % Obscuration per Meter < 1

'Monitoring'

**cmd** Enable

√Status – Enabled

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean
√Failure – blank

62. **ACTIVATING NODE 2 SMOKE DETECTOR 2**

Node 2: ECLSS: SD2

Node 2 Smoke Detector 2

sel RPCM N22A3B C RPC 01

RPCM N22A3B C RPC 01

**cmd** RPC Position – Close (Verify – Cl)

Node 2: ECLSS: SD2

Node 2 Smoke Detector 2

Verify Obscuration, % Contamination < 25
Verify Scatter, % Obscuration per Meter < 1

'Monitoring'

**cmd** Enable

√Status – Enabled
Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean
√Failure – blank

63. **CONFIGURING CCAA H2O VALVE**

**NOTE**

1. The CCAA dryout valves should be configured in normal (flowthrough) position for CCAA activation.
2. The normal valve must be opened prior to closing the bypass valve to prevent LTL loop deadhead.

63.1 **Verifying CCAA H2O Normal Valve Open**

Node 2: TCS: IATCS Details: Node2 CCAA H2O Valve Commands

<table>
<thead>
<tr>
<th>Node2 CCAA H2O Valve Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Node2 CCAA H2O Valves'</td>
</tr>
<tr>
<td>'Normal Valve'</td>
</tr>
</tbody>
</table>

Verify Open Posn – √ and Close Posn – blank

Node 2: TCS: IATCS Details: Node2 CCAA H2O Valve Commands

<table>
<thead>
<tr>
<th>Node2 CCAA H2O Valve Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Node2 CCAA H2O Valves'</td>
</tr>
<tr>
<td>'Bypass Valve'</td>
</tr>
</tbody>
</table>

Verify Open Posn – blank and Close Posn – √

64. **POWERING UP CCAA**

Node 2: ECLSS: Node 2 CCAA: CCAA Commands

<table>
<thead>
<tr>
<th>Node 2 CCAA Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>sel RPCM N22A3B C RPC [X]</td>
</tr>
</tbody>
</table>

where [X] = 13, 14, 15, 17

<table>
<thead>
<tr>
<th>RPCM N22A3B C RPC [X]</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd RPC Position – Close (Verify – Cl)</td>
</tr>
</tbody>
</table>

Repeat
65. **INITIALIZING CCAA**

Node 2 CCA Commands

**cmd** Initialize [√State – Reset, Test, Off (< 2 minutes)]

65.1 **Inhibiting CCAA Liquid Sensor BITs**

sel Node 2 CCAA

Node 2 CCAA

sel Water Separator

Node 2 CCAA WS

'Liquid Sensor BIT'

'Inhibit'

**cmd** Arm (√Status – Armed)

**cmd** Inhibit (√Command Status – Sep Liquid BIT Confirm Complete)

sel Node 2 CCAA

Node 2 CCAA

'Heat Exchanger Liquid Sensor'

sel HX LS

Node 2 CCAA HX LS

'BIT'

'Inhibit'

**cmd** Arm (√Status – Armed)

**cmd** Inhibit (√Command Status – HX Liquid BIT Confirm Complete)

65.2 **Overriding CCAA Fan Speed**

If commanding from **MCC-H**

Verify Analog Override Parameter values with  \{5.501 CCAA ANALOG PARAMETER TABLE\} (SODF: ECLSS: REFERENCE: THC).

**NOTE**

Changing a hazardous type override value from its current operational value will cause the override type to change from non hazardous to hazardous and will require the operator to send a hazardous ovrd confirm command.
sel CCAA Commands

Node 2 CCAA Commands

'Overrides'

input Fan Normal Speed – 4,920 rpm
input Fan Lock Rotor – 4,420 rpm
input Fan Overspeed – 5,420 rpm

**cmd** Set

'Incorporate Overrides'

**cmd** Incorporate (√Override Type – Hazardous)
**cmd** Hazardous Ovrd Confirm (√Command Status – Confirm Analog Complete)

65.3 Configuring CCAA TCCV to Full Bypass

'Temperature'

input Temperature – 3,2 deg C

**cmd** Set (√Command Status – Temp Setpoint Complete)

sel Node 2 CCAA

Node 2 CCAA

If TCCV Position < 82 deg

sel TCCV

Node 2 CCAA TCCV

'Sweep'

**cmd** Arm (√Status – Armed)
**cmd** Sweep

Wait for TCCV Position ≥ 82 deg, then

**cmd** Normal (√Command Status – TCCV Auto Normal Complete)

65.4 Activating CCAA

sel CCAA Commands

Node 2 CCAA Commands

**cmd** Operate [√State – Startup, On (< 2 minutes)]
sel Node 2 CCAA

Node 2 CCAA

'Fan'

√Speed: 4920 ± 100 rpm
√Fan dp: < 6 mmHg

65.5 Changing CCAA Temp Setpoint
sel CCAA Commands

Node 2 CCAA Commands

'Temperature'

input Temperature – 25 deg C (or other temp per crew preference)

cmd Set (√Command Status – Temp Setpoint Complete)

66. SETTING LTL TWMV SETPOINT

Node 2: TCS: LTL TWMV

Node 2 LTL TWMV Commands

'Commands'

'LTL TWMV'

cmd CLC – Inh Execute (√ – Inh)

input Temp Setpt – 10.1 deg C

cmd Temp Setpt – Set Execute

Verify Temp Setpt – 10.0 deg C

cmd CLC – Ena Execute (√ – Ena)

67. LOADING NEW DEFAULT ORU EXISTENCE PPL TO PMCU MDM

If necessary:

Perform 1.231 CCS BUILD DATA LOAD COMMAND, all (SODF: GND AVIONICS: C&DH: NOMINAL) using the following, then:

Destination Device – PMCU Primary
Storage Type – EEPROM and DRAM
File to Load – pmca_ppl_0003_4_a_03116

Perform 1.236 CCS DATA LOAD MANAGEMENT, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:
Perform **4.413 PMCU MDM TRANSITION B: TRANSITIONING BACKUP MDM 1(2) FROM OFF TO WAIT WHILE MDM 2(1) IS OPERATIONAL**, all (SODF: C&DH: CORRECTIVE), then:

**MCC-H**

Perform **1.231 CCS BUILD DATA LOAD COMMAND**, all (SODF: GND AVIONICS: C&DH: NOMINAL), using the following:

Destination Device – PMCU Backup  
Storage Type – EEPROM  
File to Load – pmca_ppl_0003_4_a_03116

Perform **1.236 CCS DATA LOAD MANAGEMENT**, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

Go to **4.414 PMCU MDM TRANSITION C: TRANSITIONING BACKUP MDM 1(2) FROM WAIT TO DIAGNOSTIC/OFF WHILE MDM 2(1) IS OPERATIONAL**, steps 1 to 3,6 (SODF: C&DH: CORRECTIVE: MDM STATE TRANSITIONS TIER II).
VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

OBJECTIVE:
Reconfigure the PMA2 to LAB1 vestibule in preparation for PMA2 demate and relocate to Node 2 fwd. This procedure will remove ground straps, disconnect Oxygen and Nitrogen Vestibule lines, and reinstall Hatch Thermal Cover Blanket and CBM CPAs.

LOCATION:
Installed: PMA2, LAB1 Vestibule
Stowed: √IMS

DURATION:
4 hours 30 minutes

CREW:
Two

PARTS:
- Hatch Thermal Cover P/N 683-80441-2
- PMA CBCS Target P/N 1F92502-503 S/N 2F262-0329-09
- CBM Controller Panel Assy (two) P/N 2355260-1-1
- CBM Controller Panel Assy (one) P/N 2355260-2-1
- CBM Controller Panel Assy (one) P/N 2355260-3-1
- EVA Hatch Window Cover Kit (P/N 683-13141-1)
  - Hatch Window Cover Assembly (w/ Hook Velcro Tabs)
  - Loop Velcro tabs (seven)

MATERIALS:
- Clean Room Gloves P/N SEG33116979-301
- Dry Wipes
- Zip Tie
- Towel
- Braycote
- 0.375" Gamah Seal (four) P/N S14704C
- 0.375" Retaining Ring (four) P/N R14104C

TOOLS:
- Vacuum Cleaner Assembly
- Mini Maglite
- DCS 760 Camera
- Brass Picks
- Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit
  - Fluid Fitting Torque Device (S/N 001)
  - 0.875" Drive Gear
  - 0.625" Reaction Gear
  - 0.375" Retaining Ring Installation/Removal Tool
  - 0.375" Gamah Seal Removal Tool

ISS IVA Toolbox:
Drawer 1:
- 5/8" Combination Wrench
- 5/8" Crowfoot, 3/8" Drive
- 7/8" Crowfoot, 3/8" Drive
Drawer 2:
- Ratchet, 3/8" Drive
- 1/4" to 3/8" Adapter
- (40-200 in-lbs) Trq Wrench, 3/8" Drive
- (10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 5:
- 8-1/4" Long, 2" Cut Scissors

REFERENCE PROCEDURE(S):
1.100 CBM CONTROLLER PANEL ASSEMBLY INSTALLATION – GENERIC
1.103 ACBM TO PCBM GROUND STRAP REMOVAL
1.404 CBCS PMA TARGET ASSEMBLY INSTALLATION/REMOVAL
1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION

WARNING
Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

1. OXYGEN SAFING STEPS
To prevent fire hazard during this procedure, minimize the time connectors and caps/plugs are open or cover them with Teflon Bags or Disposable Gloves.

If Disposable Gloves become contaminated or damaged, replace immediately with clean Disposable Gloves.

If contaminants are found
- Notify MCC-H
- Photo document. (DCS 760 Camera)
- Remove using the Brass Picks and retain for return to ground.

If contaminants cannot be completely removed
- temporarily cap connectors and hold for detailed MCC-H analysis.

CAUTION
Care must be taken while working in the vicinity of Hatch Seal to avoid rubbing, scratching, or placing any type of direct pressure upon Seal. Damaging Hatch Seal could prevent Hatch from maintaining pressure when closed.

Check MCC-H to verify O2/N2 lines are safed and at ambient pressures.

2. ACCESS
2.1 Remove Axial Port Closeout from LAB1 to PMA2 vestibule, 1/4 Turn Fasteners (sixteen).
- Roll Closeout Panel from loose end toward attached end.
- Temporarily stow.
2.2 Stowage, equipment removed, from PMA2

Clean PMA2 visibly clean (Vacuum Cleaner Assembly).

**NOTE**
The Deck ACBM to PCBM Ground Strap interferes with the removal of the Nitrogen Recharge Hose. The following step will remove the ACBM to PCBM Ground Straps (two).

Figure 1.- Oxygen and Nitrogen Recharge hoses connected to LAB1 Fwd.

3. **REMOVING ACBM TO PCBM GROUND STRAPS**
Perform {1.103 ACBM TO PCBM GROUND STRAP REMOVAL}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

Refer to Figure 1.
Figure 2.- LAB Fwd External Bulkhead (orientation from within PMA2 Looking Aft).

Figure 3.- Oxygen and Nitrogen Recharge Hoses in PMA2 to LAB1 Vestibule.
NOTE
Gamah fitting and FFTD reference information can be found in the following procedures:

{A.2.1 FLUID FITTING TORQUE DEVICE (FFTD) ASSEMBLY AND USAGE}
{A.2.3 MATING GAMAH FITTING USING THE FFTD}
{A.2.13 GAMAH SEAL R&R}
(SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)

<table>
<thead>
<tr>
<th>Item to be Demated</th>
<th>Interface</th>
<th>FFTD Input Torque (in-lbs)</th>
<th>FFTD Output Torque (in-lbs)</th>
<th>FFTD Head Size (in)</th>
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</thead>
<tbody>
<tr>
<td>Oxygen Recharge</td>
<td>Stowage Bracket</td>
<td>N/A</td>
<td>185</td>
<td>N/A</td>
</tr>
<tr>
<td>Nitrogen Recharge</td>
<td>Stowage Bracket</td>
<td>N/A</td>
<td>185</td>
<td>N/A</td>
</tr>
<tr>
<td>Cap</td>
<td>A18</td>
<td>38</td>
<td>185</td>
<td>0.875</td>
</tr>
<tr>
<td>Cap</td>
<td>A19</td>
<td>38</td>
<td>185</td>
<td>0.875</td>
</tr>
</tbody>
</table>

**WARNING**
Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

**CAUTION**
When not using the FFTD to tighten a gamah fitting, failure to maintain counter torque could result in rotation of the feedthrough and damage to feedthrough seal.

4. RESTOWING RECHARGE HOSES ONTO PMA2 STOWAGE BRACKETS

4.1 During disconnection of Oxygen and Nitrogen Hose:
   - Inspect both sides of each gamah fitting for damage and debris before mating.
   - Report damage and debris to **MCC-H**.
   - Inspect male threads for absence of Braycote before mating.
   - If required, apply one drop of Braycote to male threads.
   - Spread Braycote around threads using gloved hand.
   - Refer to Figures 1, 2, 3 and Table 1.

PMA2 4.2 Loosen Gamah Cap on PMA2 OXYGEN RECHARGE Stowage Bracket (Ratchet, 3/8" Drive; 7/8" Crowfoot, 3/8" Drive; 5/8" Crowfoot, 3/8" Drive; 5/8" Combination Wrench)

LAB1 4.3 Loosen Oxygen Recharge Hose on LAB1 Fwd Bulkhead A18 (FFTD; 0.875" Drive Gear; 0.625" Reaction Gear; Ratchet, 3/8" Drive).

4.4 Don Clean Room Gloves.
Gamah Cap ←|→ PMA2 OXYGEN RECHARGE Stowage Bracket

4.5 Remove and replace Gamah Seal on cap (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool). Temporarily stow Gamah Cap for use on LAB Bulkhead A18.

4.6 Oxygen Recharge Hose ←|→ LAB1 A18
Gamah Cap →|← LAB1 A18 hand tighten

4.7 Remove and replace Gamah seal on Oxygen Recharge Hose (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool).

PMA2 4.8 OXYGEN RECHARGE Hose →|← PMA2 OXYGEN RECHARGE Stowage Bracket hand tight

4.9 Tighten, torque OXYGEN RECHARGE hose to PMA2 Oxygen Recharge Stowage Bracket to 185 in-lbs [Ratchet, 3/8" Drive; (40-200 in-lbs) Trq Wrench; 7/8" Crowfoot, 3/8" Drive; 5/8" Crowfoot, 3/8" Drive]

LAB1 4.10 Tighten, torque gamah cap to 38 in-lbs [input torque] [FFTD; 0.875" Drive Gear; 0.625 Reaction Gear; 1/4" to 3/8" Adapter; (10-50 in-lbs) Trq Wrench, 1/4" Drive].

4.11 Doff Clean Room Gloves.

4.12 Repeat for Nitrogen Recharge Hose on LAB1 Fwd Bulkhead (A19).
Figure 4.- PMA2 Aft Bulkhead showing final configuration of Oxygen and Nitrogen Recharge lines - View Looking Fwd in to PMA2 from LAB1.

5. **RESTRAINING OXYGEN AND NITROGEN HOSES TO PMA2 BULKHEAD**
   Refer to Figure 4.

5.1 Latch NITROGEN RECHARGE hose to Thumb Latch 1.

5.2 Latch OXYGEN RECHARGE hose to Thumb Latch 2.

5.3 Restrain OXYGEN RECHARGE hose to structure (Zip Tie).

**NOTE**

During the original installation of the Oxygen and Nitrogen Recharge Hoses, a CBM Load Cell Connector interfered with the mating of the gamah connections A18, A19. This connector was demated. It must now be remated for proper operation of the LAB1 Fwd CBM.
6. **REMATING CBM BOLT ACTUATOR CONNECTOR**
   Refer to Figure 2.

   6.1 Remove Kapton Tape from CBM Bolt Actuator to Load Cell Sensor J1 FNFR connector and cable 683-13497-2.

   6.2 CBM Bolt Actuator to Load Cell Sensor J1 FNFR $\rightarrow$ 683-13497-2

7. **INSTALLING CBM CONTROLLER PANEL ASSEMBLIES**
   7.1 Perform {1.100 CBM CONTROLLER PANEL ASSEMBLY INSTALLATION – GENERIC}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

   7.2 √All Stowage, tools, equipment removed from PMA2 and vestibule

8. **INSTALLING CBCS TARGET**
   8.1 Perform {1.404 PMA TARGET ASSEMBLY INSTALL/REMOVE}, Target install steps only (SODF: S&M: NOMINAL: VESTIBULE), then:

   8.2 √CBCS Target mirror cover removed and all stowage, tools, equipment removed from PMA2 and vestibule

   8.3 Photo document final PMA2-to-LAB1 vestibule configuration (DCS 760 Camera).

   **NOTE**
   Hatch thermal cover CBCS Flap must be left open to allow the CBCS Camera to view target on oncoming element (NOD2).

9. **INSTALLING LAB FWD HATCH THERMAL COVER**
   9.1 Perform {1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION}, Installation steps only (SODF: S&M: NOMINAL: HATCH), then:

   9.2 √Thermal Cover CBCS flap open

   9.3 Photo document final installation of Hatch Thermal Cover (DCS 760 Camera).

10. **POST MAINTENANCE**
    10.1 Check for FOD within 3’ radius of worksite.

    10.2 Notify **MCC-H** of task completion.

    10.3 Stow equipment, tools, materials.
        Update IMS as required.
OBJECTIVE:
Remove Hatch Thermal Cover, CBCS Target and CBM CPAs, then connect Oxygen and Nitrogen Vestibule lines from PMA2 to NOD2. ACBM to PCBM Ground Straps and the Axial Port Closeout will also be installed.

LOCATION:
Installed: PMA 2, NOD2 Vestibule

DURATION:
4 hours

CREW
Two

PARTS:
Axial Port Closeout P/N 683-60461-10
CBM Ground Straps (two) P/N 683-13477-7

MATERIALS:
Clean Room Gloves P/N SEG33116979-301
Dry Wipes
0.375" Metal Seal (four) P/N S14704C
0.375" Retaining Ring (four) P/N R14104C
Braycote
Towel

TOOLS:
DCS 760 Camera
Mini Maglite (Use as needed)
Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit
   Fluid Fitting Torque Device (S/N 001)
   Brass Picks
   0.875" Drive Gear
   0.625" Reaction Gear
   0.375" Retaining Ring Installation/Removal Tool
   0.375" Gamah Seal Removal Tool

ISS IVA Toolbox:
Drawer 1:
   5/8" Combination Wrench
   7/8" Crowfoot, 3/8" Drive
Drawer 2:
   Ratchet, 3/8" Drive
   1/4" to 3/8" Adaptor
(40-200 in-lbs) Trq Wrench, 3/8" Drive
(10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 5:
Scissors

REFERENCE PROCEDURES
1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL – GENERIC
1.404 PMA TARGET ASSEMBLY INSTALLATION/REMOVAL
1.102 ACBM TO PCBM GROUND STRAP INSTALLATION
1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION

WARNING
Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

1. OXYGEN SAFETY STEPS
To prevent fire hazard during this procedure:

Minimize the time connectors and caps/plugs are open or cover using Teflon Bags or Disposable Gloves.

If Clean Room Gloves become contaminated or damaged, replace immediately with new Clean Room Gloves.

If contaminants are found

Notify MCC-H.
Photo document (DCS 760 Camera).
Remove using the Brass Picks and retain for return to ground.

If contaminants cannot be completely removed

Temporarily cap connectors and hold for detailed MCC-H analysis.

CAUTION
Care must be taken while working in the vicinity of Hatch Seal to avoid rubbing, scratching, or placing any type of direct pressure upon Seal. Damaging Hatch Seal could prevent Hatch from maintaining pressure when closed.

2. ACCESS
2.1 Open NOD2 forward Hatch per Decal.
2.2 Perform **{1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION}**, Removal steps only (SODF: S&M: NOMINAL: VESTIBULE), then:

2.3 Perform **{1.404 PMA TARGET ASSEMBLY INSTALLATION/REMOVAL}**, Removal steps only (SODF: S&M: NOMINAL: VESTIBULE), then:

2.4 Perform **{1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL – GENERIC}**, Removal steps only for all four CPA's (SODF: S&M: NOMINAL: VESTIBULE), then:

---

Figure 1. PMA2 Aft Bulkhead showing path of Oxygen and Nitrogen Recharge lines. View Looking Fwd in to PMA2 from NOD2.
Figure 2. NOD2 Fwd External Bulkhead (orientation from within PMA2 looking Aft).

**NOTE**

Gamah fitting and FFTD reference information can be found in:
- {A.2.1 FLUID FITTING TORQUE DEVICE (FFTD) ASSEMBLY AND USAGE}
- {A.2.3 MATING GAMAH FITTING USING THE FFTD}
### Table 1. Nitrogen and Oxygen Recharge line reconfiguration

<table>
<thead>
<tr>
<th>Recharge Line Name/Function</th>
<th>NOD2 Fwd Bulkhead Interface</th>
<th>Output Torque</th>
<th>Input Torque</th>
<th>FFTD Head Size (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen Recharge</td>
<td>NITROGEN RECHARGE</td>
<td>185</td>
<td>38</td>
<td>0.875</td>
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<tr>
<td>Oxygen Recharge</td>
<td>OXYGEN RECHARGE</td>
<td>185</td>
<td>38</td>
<td>0.875</td>
</tr>
</tbody>
</table>

**WARNING**

Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

### 3. RECONFIGURING OXYGEN AND NITROGEN LINES

**PMA2**

3.1 Release NITROGEN RECHARGE line from PMA2 bulkhead as needed to reach NOD2 bulkhead (thumb latches). Close thumb latches. Refer to Figure 1.

3.2 During connection of oxygen and nitrogen lines:
- Inspect both sides of each gamah fitting for damage, debris before mating.
- Report damage, debris to **MCC-H**.
- Inspect male threads for absence of Braycote before mating. If required, apply one drop of Braycote to male threads.
- Spread around threads using gloved hand. Refer to Figures 1, 2 and Table 1.

**NOD2**

3.3 Loosen NOD2 NITROGEN RECHRG, OXYGEN RECHRG feedthrough caps (two) (FFTD; Ratchet, 3/8" Drive). Refer to Figure 2.

**PMA2**

3.4 Loosen OXYGEN RECHARGE, NITROGEN RECHARGE lines from PMA2 stowage brackets (Ratchet, 3/8" Drive; 7/8" Crowfoot, 3/8" Drive; 5/8" Combination Wrench). Refer to Figure 1.

3.5 Don Disposable Clean Room Gloves.
VESTIBULE CONFIG FOR INGRESS – NOD2 TO PMA2

NITROGEN RECHARGE line ←|→ PMA2 NITROGEN RECHARGE Stowage bracket

3.6 Remove and replace Gamah seal on NITROGEN RECHARGE line (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool).

NOD2

3.7 Gamah cap ←|→ NOD2 NITROGEN RECHRG feedthrough NITROGEN RECHARGE line →|← NOD2 NITROGEN RECHRG feedthrough per Table1

3.8 Remove and replace Gamah seal on NITROGEN RECHARGE Gamah cap (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool).

PMA2

3.9 NITROGEN RECHARGE Gamah cap →|← PMA2 NITROGEN RECHARGE Stowage bracket, hand tighten Doff Latex Gloves.

3.10 Repeat steps 3.1 to 3.9 for NOD2 OXYGEN RECHRG connection.

3.11 Torque PMA NITROGEN RECHARGE and OXYGEN RECHARGE caps to 185 in-lbs (Ratchet, 3/8" Drive; (40-200 in-lbs) Trq Wrench, 3/8" Drive; 7/8” Crowfoot, 3/8" Drive, 5/8” Combination Wrench).

NOD2

3.12 Torque NOD2 NITROGEN, OXYGEN RECHRG Gamah connections to 38 in-lbs (input torque) (FFTD; 1/4” to 3/8” Adaptor; (10-50 in-lbs) Trq Wrench, 1/4” Drive).

4. INSTALLING ACBM TO PCBM GROUND STRAPS

4.1 Perform {1.102 ACBM TO PCBM GROUND STRAP INSTALLATION}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

4.2 Photo document oxygen/nitrogen line routing and PCBM Ground Strap installation (DCS 760 Camera).

5. INSTALLING OF AXIAL PORT CLOSEOUT

5.1 Remove Axial Port Closeout from stowage.
Figure 3. Installation of Axial Port Closeout.

NOTE
The flexible bands in the sleeves of the Closeout are placed along the curved portion of the hatch opening.

Figure 4. D-rings for Closeout.
CAUTION

Ensure rings for 1/4 turn fasteners are flush to prevent damage to D-rings if the hatch is closed. Refer to Figure 5.

5.2 Unroll Closeout while installing over CBM Vestibule. Engage 1/4 Turn Fasteners into mounting brackets, flattening D-rings against the Closeout. Refer to Figures 3, 4.

![Diagram of Overlapping Ends of Closeout for Final Attachment]

Figure 5. Overlapping Ends of Closeout for Final Attachment.

5.3 Overlap ends of Closeout, if necessary, detaching 1/4 Turn Fasteners at end of Closeout. Reattach 1/4 Turn Fasteners at end of Closeout by inserting through tabs on other end of Closeout. Press Velcro at Closeout ends together. Refer to Figure 5.

6. POST MAINTENANCE

6.1 Notify MCC-H of task completion.

6.2 √IMS for stowage location of materials

Stow tools, materials.
VESTIBULE CONFIG FOR DEMATE NOD1 TO NOD2

(ASSY OPS/10A/FIN) Page 1 of 16 pages

Parameters 1. YY_ZZ_Choice

<table>
<thead>
<tr>
<th>MDM</th>
<th>SPD Card [YY]</th>
<th>Bus [ZZ]</th>
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<tr>
<td>Primary INT MDM</td>
<td>SPD 3</td>
<td>LB SEPS N2 14</td>
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<tr>
<td>Primary INT MDM</td>
<td>SPD 1</td>
<td>LB SEPS N2 23</td>
</tr>
<tr>
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<td>SPD 5</td>
<td>LB SYS N2 1</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 0</td>
<td>LB SYS N2 2</td>
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</table>

OBJECTIVE:
This procedure will deoutfit the vestibule between the NOD1 and NOD2 modules in preparation for relocating NOD2 to LAB1 forward.

LOCATION:
NOD1-NOD2 Vestibule

DURATION:
2 Hours

CREW*
Two

PARTS:
Jumper Protective Plugs (12)
Bulkhead Connector Protective Caps (10)
IMV Caps (2) P/N 683-15016-1
IMV Caps (1) P/N 683-15016-6
Face O-Ring (3) (P/N 2-255S0604)
Bore O-Ring (3) (P/N 2-248S0604)

MATERIALS:
Towel
Braycote

TOOLS REQUIRED:
Mini Maglite
Portable Fan (Crew Preference)
ISS IVA Toolbox:
Drawer 2:
  - Ratchet, 1/4" Drive
  - 7/16" Deep Socket, 1/4" Drive
  - 1/2" Deep Socket, 1/4" Drive
  - (10-50 in-lbs) Trq Wrench, 1/4" Drive
  - 1/4" to 3/8" Adapter
Drawer 3:
#2 Long Torq Driver, 3/8" Drive

REFERENCED PROCEDURE(S):
1.104 CBM CENTER DISK COVER INSTALLATION

---

**CAUTION**

Care must be taken while working in the vicinity of hatch seal to avoid rubbing, scratching, or placing any type of direct pressure upon seal. Damaging hatch seal could prevent Hatch from maintaining pressure when closed.

---

**Figure 1. NOD2 Aft Bulkhead, External View Looking Port when NOD2 is mated to NOD1 Port.**

1. **REMOVING SECONDARY POWER JUMPERS**

1.1 **Verifying ISS Power to NOD2 is safed:**

PCS

US Lab: EPS: LAB1P3

Lab Rack LAB1P3

sel DDCU LA1A

<table>
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<th>DDCU LA1A</th>
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15 OCT 07  168b
sel F

RPCM LA1A4A F

Verify Integ Counter – incrementing

sel RPC 2

RPCM LA1A4A F RPC 02

Verify RPC Position – Op
Verify Close Cmd – Inh

US Lab: EPS: LAB1O6
Lab Rack LAB1O6

sel DDCU LA3B

DDCU LA3B
‘RPCM LA2A3B’

sel D

RPCM LA2A3B D

Verify Integ Counter – incrementing

sel RPC 4

RPCM LA2A3B D RPC 04

Verify RPC Position – Op
Verify Close Cmd – Inh

Table 1. Secondary 1A4A Pwr Jumper (W3001)

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>NOD1</th>
<th>NOD2</th>
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<td>Secondary 1A4A Pwr</td>
<td>1F89713</td>
<td>W3001</td>
<td>J33</td>
<td>J133</td>
</tr>
</tbody>
</table>

1.2 Secondary 1A4A Pwr Jumper W3001 P33 ←|→ NOD1 J33
Secondary 1A4A Pwr Jumper W3001 P133 ←|→ NOD2 J133
Refer to Figure 1, Table 1.

1.3 Protective caps →|← NOD1 J33, NOD2 J133 feedthroughs
Protective plugs →|← Secondary 1A4A Pwr Jumper W3001
Stow jumper in Vestibule Outfitting Kit (VOK) CTB.
Refer to Figure 1, Table 1.

**Table 2. Secondary 2A3B Power Jumper (W3006)**

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>NOD1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary 2A3B Pwr</td>
<td>1F89715</td>
<td>W3002</td>
<td>J45</td>
<td>J145</td>
</tr>
</tbody>
</table>

1.4 Secondary 2A3B Pwr Jumper W3002 P45 ←|→ NOD1 J45
Secondary 2A3B Pwr Jumper W3002 P145 ←|→ NOD2 J145
Refer to Figure 1, Table 2.

1.5 Protective caps →|← NOD1J45, NOD2 J145 feedthroughs
Protective plugs →|← Secondary 2A3B Pwr Jumper W3002
Stow Jumper in Vestibule Outfitting Kit (VOK) CTB.
Refer to Figure 1, Table 2.

2. **REMOVING 1553 DATA JUMPERS**

<table>
<thead>
<tr>
<th>MDM</th>
<th>SPD Card [YY]</th>
<th>Bus [ZZ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary INT MDM</td>
<td>SPD 3</td>
<td>LB SEPS N2 14</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 1</td>
<td>LB SEPS N2 23</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 5</td>
<td>LB SYS N2 1</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 0</td>
<td>LB SYS N2 2</td>
</tr>
</tbody>
</table>

2.1 ISS ⇓ MCC-H go for INT MDM Bus Safing.

2.2 For all busses in Table 3, where [YY] is the SPD card, [ZZ] is the Bus:
NOTE
The 1553 Jumpers are separated into four segments to allow the placement of connectors next to each hatchway the jumper passes through.

Figure 2. Temporary 1553 Data Jumper Configuration LAB1 to NOD2.
2.3 Removing Ch B Data Jumper:

2.3.1 Install protective caps on all demated connections during removal of segmented 1553 Ch B Data Jumper.

2.3.2 1553 Ch B Data Jumper W2012 P1 ←|→ LABOS6 J10

2.3.3 Terminator Cap ←|→ LABOS6 Stowage Receptacle

2.3.4 LABOS6 J10 Terminator Cap →|← LABOS6 J10

2.3.5 1553 Ch B Data Jumper W2018 P5 ←|→ NOD2 J143

2.3.6 Coil cable small enough to fit in CTB. Stow Jumpers in Vestibule Outfitting Kit (VOK) CTB. Refer to Figures 1, 2, 3 and Table 4.
NOTE
1. The following steps will reconfigure the 1553 busses to allow removal of the 1553A Data jumper by switching to bus channel B.
2. Table 3 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

2.4 For all busses in Table 3:

<table>
<thead>
<tr>
<th>CDH: Primary INT MDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Int MDM</td>
</tr>
<tr>
<td>'SPD Card [YY]'</td>
</tr>
<tr>
<td>sel Bus [ZZ]</td>
</tr>
<tr>
<td>Bus [ZZ]</td>
</tr>
<tr>
<td>sel Bus Status</td>
</tr>
<tr>
<td>[ZZ] Bus Status</td>
</tr>
<tr>
<td>√Channel Selected – B</td>
</tr>
<tr>
<td>√Auto Channel Switch Status – Inh</td>
</tr>
</tbody>
</table>
Repeat

**Table 5. 1553A Data Jumper**

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>LAB1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1553 Ch A Data Jumper</td>
<td>683-22011</td>
<td>W2011</td>
<td>LABOS6</td>
<td>J131</td>
</tr>
<tr>
<td></td>
<td>683-22013</td>
<td>W2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>683-22015</td>
<td>W2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>683-22017</td>
<td>W2017</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.5 Removing 1553 Ch A Data Jumper:

2.5.1 Install protective caps on all demated connections during removal of segmented 1553 Ch A Data Jumper.

2.5.2 1553 Ch A Data Jumper (W2011 P1) ←|→ LABOS6 J9

2.5.3 Terminator Cap ←|→ LABOS6 Stowage Receptacle

2.5.4 LABOS6 J10 Terminator Plug →|← LABOS6 J9

2.5.5 1553 Ch A Data Jumper (W2017 P5) ←|→ NOD2 (J131)
2.5.6  Coil cable small enough to fit in CTB.  
Stow Jumpers in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figures 1, 2, 3 and Table 5.

2.6  For all busses in Table 3:

<table>
<thead>
<tr>
<th>CDH: Primary INT MDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Int MDM</td>
</tr>
<tr>
<td>'SPD [YY]'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>sel Bus [ZZ]</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Bus [ZZ]</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>sel Bus Status</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>[ZZ] Bus Status</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>√Channel Selected – A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>√Auto Channel Switch Status – Inh</th>
</tr>
</thead>
</table>

Repeat

2.7  ISS ↓ MCC-H complete with INT MDM bus reconfigurations,  
1553 Jumper removal.

3.  **REMOVING INSTRUMENTATION JUMPERS**

<table>
<thead>
<tr>
<th>Table 6. Instrumentation Jumpers</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>NOD1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumentation (W3006)</td>
<td>1F89723</td>
<td>W3006</td>
<td>J40</td>
<td>J140</td>
</tr>
<tr>
<td>Instrumentation (W3005)</td>
<td>1F89721</td>
<td>W3005</td>
<td>J28</td>
<td>J128</td>
</tr>
</tbody>
</table>

3.1  Instrumentation Jumper W3006 P40 ←|→ NOD1 J40  
Instrumentation Jumper W3006 P140 ←|→ NOD2 J140  
Refer to Figure 1, Table 6.

3.2  Protective caps ←|→ NOD1 J40, NOD2 J140 feedthroughs  
Protective caps ←|→ Instrumentation Jumper W3006  
Stow Jumper in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figure 1, Table 6.

3.3  Instrumentation Jumper W3005 P28 ←|→ NOD1 J28  
Instrumentation Jumper W3005 P128 ←|→ NOD2 J128  

3.4  Protective caps ←|→ NOD1 J28, NOD2 J128 feedthroughs
Protective caps → Instrumentation Jumper W3005
Stow Jumper in Vestibule Outfitting Kit (VOK) CTB.
Refer to Figure 1, Table 6.

4. **VERIFYING NOD1 TO NOD2 VESTIBULE READY FOR CLOSEOUT**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>If any of the installed CBM harness were demated during the installation of vestibule jumpers, they need to be remated now to ensure proper operation of the CBM</td>
</tr>
</tbody>
</table>

4.1 If any CBM cabling was demated during CONFIG FOR INGRESS – NOD1 TO NOD2:

4.1.1 Remate CBM Connectors as required.

4.1.2 ISS MCC-H CBM connectors demated during CONFIG FOR INGRESS – NOD1 TO NOD2 have been remated

4.2 Inspect CPAs for damage.

Notify MCC-H of any damage observed.

**Table 7. Vestibule Outfitting Kit (VOK) Closeout Checklist**

<table>
<thead>
<tr>
<th>✓</th>
<th>Item Name</th>
<th>Identification Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Secondary 1A4A Pwr Jumper</td>
<td>W3001</td>
</tr>
<tr>
<td></td>
<td>Secondary 2A3B Pwr Jumper</td>
<td>W3002</td>
</tr>
<tr>
<td></td>
<td>1553 Ch A Data Jumper</td>
<td>W2011, W2013, W2015, W2017</td>
</tr>
<tr>
<td></td>
<td>Instrumentation (W3005)</td>
<td>W3005</td>
</tr>
<tr>
<td></td>
<td>Instrumentation (W3006)</td>
<td>W3006</td>
</tr>
<tr>
<td></td>
<td>12&quot; x 12&quot; Ziplock Bags</td>
<td>528-50000-5</td>
</tr>
<tr>
<td></td>
<td>Towel</td>
<td></td>
</tr>
</tbody>
</table>
Table 8. Vestibule Feedthrough Closeout Checklist

<table>
<thead>
<tr>
<th>✓</th>
<th>Item Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NOD2 Feedthrough J133 Capped (NOD2 POWER)</td>
</tr>
<tr>
<td></td>
<td>NOD1 Feedthrough J33 Capped (NOD1 POWER)</td>
</tr>
<tr>
<td></td>
<td>NOD2 Feedthrough J140 Capped (NOD2 Instrumentation)</td>
</tr>
<tr>
<td></td>
<td>NOD1 Feedthrough J40 Capped (NOD1 Instrumentation)</td>
</tr>
<tr>
<td></td>
<td>NOD2 Feedthrough J143 Capped (1553B Data)</td>
</tr>
<tr>
<td></td>
<td>LAB1OS6 J10 Capped (1553B Data)</td>
</tr>
<tr>
<td></td>
<td>NOD2 Feedthrough J131 Capped (1553A Data)</td>
</tr>
<tr>
<td></td>
<td>LAB1OS6 J9 Capped (1553A Data)</td>
</tr>
<tr>
<td></td>
<td>NOD2 Feedthrough J145 Capped (Power)</td>
</tr>
<tr>
<td></td>
<td>NOD1 Feedthrough J45 Capped (Power)</td>
</tr>
<tr>
<td></td>
<td>NOD2 Feedthrough J128 Capped (Instrumentation)</td>
</tr>
<tr>
<td></td>
<td>NOD1 Feedthrough J28 Capped (Instrumentation)</td>
</tr>
</tbody>
</table>

4.3 Verify NOD1 to NOD2 Vestibule ready for Closeout per checklist. Refer to Tables 7, 8.

5. **REMOVING IMV JUMPER**

**CAUTION**

1. Care must be taken while removing the IMV Jumper between the IMV flanges. Damaging the sealing surfaces of the IMV flanges could prevent the IMV Cap, once reinstalled, from maintaining pressure.

2. V-Band clamps may have a 7/16" or 1/2" nut. Use appropriate tool as needed. 7/16" V-Band clamps should be tightened to 35 in-lbs. 1/2" V-Band clamps should be tightened to 135 in-lbs. Over tightening or under tightening V-band may damage V-Band or prevent duct from adequately sealing.

5.1 ✓ Node 1 Port Fwd IMV Valve – CLOSED
5.2   Loosen V-Band clamps from Node 1 (A11), Node 2 (A4) IMV flanges (Ratchet, 1/4” Drive; 7/16” Deep Socket or 1/2” Deep Socket). Temporarily stow V-Band clamps.

5.3   Remove IMV Jumper from vestibule interfaces.

5.4   Remove IMV Jumper O-Rings (two), one from each end of jumper. Stow O-Rings (two) in Ziplock Bag, stow in VOK CTB. Stow IMV Jumper in VOK CTB.

6.   REPLACING IMV CAP O-RINGS AND INSTALLING IMV CAPS

6.1   Retrieve Node 1 IMV Cap.

6.2   Clean Node 1 IMV flange/grooves on IMV Cap.

6.3   Sparingly apply lubricant to new bore, face IMV Cap O-Rings (Braycote - 1 or 2 drops maximum on finger).

6.4   Install new bore, face O-Rings (two) on Node 1 IMV Cap.

6.5   Place IMV Cap on (A11) Node 1 IMV feedthrough.

6.6   Secure IMV Cap to (A11) IMV flange with V-Band clamp. Torque to 35 in-lbs (Ratchet, 1/4” Drive; 7/16” Deep Socket or 1/2” Deep Socket; (10-50 in-lbs) Trq Wrench).

6.7   Repeat steps 6.1 to 6.6 for both Node 2 IMV ports in vestibule (IMV Caps (2) P/N 683-15016-1).
7. REINSTALLING HATCH PIP PIN

Figure 4. Reinstallation of NOD2 Hatch Launch Restraint PIP Pin.

NOD2 Hatch

7.1 If present, reinstall NOD2 Hatch launch restraint PIP Pin. Refer to Figure 4.
8. INSTALLING NOD2 THERMAL BLANKETS

Figure 5. NOD2 Thermal MLI Blanket.

- MLI 1
- MLI 2
- MLI 3
- "Coffee Filter"
- PTCS Strap Assembly (2)
- PTCS Strap Mounting Bracket (2 for each strap)
- Button Fastener (attaches large MLI sections to PTCS Straps)
- Velcro (attaches main MLI sections to NOD2 bulkhead)
Figure 6. Bulkhead Interfaces for the NOD2 Thermal Blanket and PTCS Strap Assemblies.
8.1 Attach upper PTCS Strap to mounting bracket, tighten Fasteners (one per PTCS Strap) (Ratchet, 3/8" Drive; #6 Long Trq Driver).
Refer to Figures 5 to 8.

8.2 Attach NADIR end of PTCS Strap Assemblies (two places) to mounting bracket.
Stretch spring, slip hook into slot of mounting bracket.
Refer to Figure 7.

8.3 Mate MLI ground connectors by hand (six).
Refer to Figures 5 to 8.

8.4 Press edges of blanket (entire perimeter) around Bulkhead (Velcro) to cover ground connectors. Refer to Figures 5 to 8.

9. Verify NOD2 CBM latch Capture Fittings and NOD1 Capture Latch travel paths are clear of obstructions.

If NOD1 Port CBM Prep for Demate complete
Verifying CBM Capture Latches (four) are latched onto NOD2 Capture Fitting.

10. INSTALLING CBM CENTER DISK COVER

10.1 Perform [1.104 CBM CENTER DISK COVER INSTALLATION], all (SODF: S&M: NOMINAL: VESTIBULE), then:

10.2 Center Disk Cover Flap Closed.

10.3 Close NOD1 Port hatch per decal.

11. POST MAINTENANCE

11.1 Notify MCC-H of task completion.

11.2 IMS for stowage location of materials, tools.
OBJECTIVE:
This procedure will outfit the vestibule between the NOD1 and NOD2 modules to provide power to and data from the NOD2 module.

LOCATION:
NOD1-NOD2 Vestibule

DURATION:
1 hours 30 minutes

CREW:
Two

PARTS:

<table>
<thead>
<tr>
<th>Vestibule Jumper</th>
<th>P/N</th>
<th>Harness #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary 1A4A Pwr Jumper</td>
<td>1F89713-1</td>
<td>W3001</td>
</tr>
<tr>
<td>Secondary 2A3B Pwr Jumper</td>
<td>1F89715-1</td>
<td>W3002</td>
</tr>
<tr>
<td>1553 Ch B Data Jumper</td>
<td>683-22012-1</td>
<td>W2012</td>
</tr>
<tr>
<td></td>
<td>683-22014-1</td>
<td>W2014</td>
</tr>
<tr>
<td></td>
<td>683-22016-1</td>
<td>W2016</td>
</tr>
<tr>
<td></td>
<td>683-22018-1</td>
<td>W2018</td>
</tr>
<tr>
<td>1553 Ch A Data Jumper</td>
<td>683-22011-1</td>
<td>W2011</td>
</tr>
<tr>
<td></td>
<td>683-22013-1</td>
<td>W2013</td>
</tr>
<tr>
<td></td>
<td>683-22015-1</td>
<td>W2015</td>
</tr>
<tr>
<td></td>
<td>683-22017-1</td>
<td>W2017</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>1F89721-1</td>
<td>W3005</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>1F89723-1</td>
<td>W3006</td>
</tr>
<tr>
<td>IMV Return Jumper Duct</td>
<td>683-13870-17</td>
<td>N/A</td>
</tr>
</tbody>
</table>

MATERIALS:
12" x 12" Ziplock Bag (1)  P/N 528-50000-5
Towel
IMV Jumper O-Ring (2)  P/N 2-161S0604-70
Braycote

TOOLS:
Mini Maglite
Portable Fan (Crew Preference)
ISS IVA Toolbox:
Drawer 2:
  7/16" Deep Socket, 1/4" Drive
  1/2" Deep Socket, 1/4" Drive
  Ratchet, 1/4" Drive
  Ratchet, 3/8" Drive
  (10-50 in-lbs) Trq Wrench, 1/4" Drive
Drawer 3:
  #6 Long Torq Driver, 3/8" Drive

REFERENCED PROCEDURE(S):
1.105 CBM CENTER DISK COVER REMOVAL
1. OPENING HATCH
   1.1 Open NOD1 Port Hatch per Decal.

   **CAUTION**
   Care must be taken while working in the vicinity of hatch seal to avoid rubbing, scratching, or placing any type of direct pressure upon seal. Damaging hatch seal could prevent Hatch from maintaining pressure when closed.

   1.2 Inspect vestibule for condensation.
   If required, wipe any condensate from vestibule (Towel). Notify MCC-H of condensation.

   1.3 If any CBM cables are demated due to interferences during this procedure, report connector labeling and location to MCC-H for tracking and remating prior to NOD2 relocate to LAB1 fwd.

2. REMOVAL OF CBM CENTER DISK COVER
   2.1 Perform (1.105 CBM CENTER DISK COVER REMOVAL), all (SODF: S&M: NOMINAL: VESTIBULE), then:

3. REMOVAL OF NODE 2 THERMAL BLANKET
   **NOTE**
   Figures 1 to 5 are used for NOD2 Thermal Blanket removal.

   Figure 1.- MPLM Thermal Blanket Installed on MPLM Bulkhead and Hatch. (NOD2 Thermal Blanket similar, but does not have a CBCS flap or IMV MLI Caps.)
Figure 2.- NOD2 Aft Thermal MLI Blanket.

- MLI 1
- MLI 2
- MLI 3
- "Coffee Filter"
- PTCS Strap Assembly (two)
- PTCS Strap Mounting Bracket (two for each strap)
- Button Fastener (attaches large MLI sections to PTCS Straps)
- Velcro (attaches main MLI sections to NOD2 bulkhead)
Figure 3.- Bulkhead Interfaces for the NOD2 Thermal Blanket and PTCS Strap Assemblies.
CAUTION

NODE 2 Thermal Blanket is rolled instead of folded to prevent damage to the multilayer insulation of the blanket.

NOTE

Do not follow MLI removal instructions printed on MLI cover. Perform below steps for easier and quicker method of removal.

3.1 Gently pull back edges of MLI to expose ground connectors (six) on NOD2 bulkhead. Refer to Figures 1 to 5.

3.2 Demate 1/4-turn grounding connectors, by hand, two per MLI section.

3.3 Remove upper PTCS Strap fasteners (one per PTCS Strap) (Ratchet, 3/8" Drive; #6 Long Trq Driver, 3/8" Drive). Temporarily stow fasteners by installing in mounting brackets (hand tight).
3.4 Unhook lower end of PTCS Strap from bulkhead bracket (two places) to release blanket.

3.5 Pull on remaining Velcro, remove MLI blanket from vestibule, roll up. Temporarily stow.

Figure 6.- NOD2 Aft Bulkhead, External View Looking Port when NOD2 is Mated to NOD1 Port. (Bolded text appears on a label on the bulkhead next to corresponding feed-through.)

**CAUTION**

FOD can be generated whenever any connector with a broken EMI ring is mated or demated. Inspect all connectors for broken EMI rings. If a broken EMI ring is found, report cable part number to **MCC-H**. Remove EMI ring if it interferes with mating of the cable.

**NOTE**

Jumper labels do not include the function of the jumper, only the part number, wire harness identifier and end connection data.
4. **INSTALLATION OF SECONDARY POWER JUMPERS**

4.1 **Verifying ISS Power to Node 2 is safed**

PCS Δ MCC-H for which parallel DDCUs to power down.

**US Lab: EPS: LAB1P3: DDCU LA1A (LA4A)**

```
DDCU LA1A (LA4A)
```

**sel Converter**

```
DDCU LA1A (LA4A) Converter
```

**cmd** Converter - Off

Verify Output Current: 0 ± 3.75 A
Verify Power Sharing, % DDCU LA1A (LA4A) < 10

**US Lab: EPS: LAB1P3**

```
LAB Rack LAB1P3
```

**sel DDCU LA1A**

```
DDCU LA1A
RPCM LA1A4A
```

**sel F**

```
RPCM LA1A4AF
```

Verify Integ Counter – incrementing

**sel RPC 02**

```
RPCM LA1A4A F RPC 02
```

Verify RPC Position – Op
Verify Close Cmd – Inh


```
DDCU LA2A (LA3B)
```

**sel Converter**

```
DDCU LA2A (LA3B) Converter
```

**cmd** Converter - Off

Verify Output Current: 0 ± 3.75 A
Verify Power Sharing, % DDCU LA1A (LA4A) < 10

US Lab: EPS: LAB1O6
LAB Rack LAB1O6
sel DDCU LA3B

DDCU LA3B
RPCM LA2A3B

Sel D

RPCM LA2A3B D

Verify Integ Counter – incrementing

Sel RPC 04

RPCM LA2A3B D RPC 04

Verify RPC Position – Op
Verify Close Cmd – Inh

Table 2. Secondary 1A4A Pwr Jumper (W3001)

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>NOD1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary 1A4A Power</td>
<td>1F89713-1</td>
<td>W3001</td>
<td>J33</td>
<td>J133</td>
</tr>
</tbody>
</table>

4.2 Protective caps ←→ NOD1 J33, NOD2 J133 feedthroughs
Protective caps ←→ Secondary 1A4A Pwr Jumper W3001.
Temporarily stow caps in 12"x12" Ziplock bag, stow in Vestibule Outfitting Kit (VOK) CTB.
Refer to Figure 6, Table 2.

4.3 Secondary 1A4A Pwr Jumper W3001 P33 →← NOD1 J33
Secondary 1A4A Pwr Jumper W3001 P133 →← NOD2 J133

Table 3. Secondary 2A3B Power Jumper (W3006)

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>NOD1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary 2A3B Power</td>
<td>1F89715-1</td>
<td>W3002</td>
<td>J45</td>
<td>J145</td>
</tr>
</tbody>
</table>

4.4 Protective caps ←→ NOD1 J45, NOD2 J145 feedthroughs
Temporarily stow caps in 12"x12" Ziplock bag, stow in Vestibule Outfitting Kit (VOK) CTB.
Refer to Figure 6, Table 3.
NOTE
Ground fit-checks indicated a possible interference with a CBM powered bolt connector P2 when NOD2 J45 is connected.

4.5 Secondary 2A3B Pwr Jumper W3002 P45 →|← NOD1 J45
Secondary 2A3B Pwr Jumper W3002 P145 →|← NOD2 J145

Notify MCC-H if the CBM powered bolt connector P2 is demated to allow mating of W3002 P45 to NOD1 J45.

5. INSTALLATION OF 1553 DATA JUMPERS

NOTE
1. The following steps reconfigure the C&DH busses to install 1553 Jumpers by verifying all busses are on bus channel A and inhibiting Auto Channel Switching.

2. Table 1 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

5.1 Notify MCC-H go for INT MDM Bus Safing.

Table 4. 1553 Busses being safed for 1553B Jumper Installation

<table>
<thead>
<tr>
<th>MDM</th>
<th>SPD Card [YY]</th>
<th>Bus [ZZ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary INT MDM</td>
<td>SPD 3</td>
<td>LB SEPS N2-14</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 1</td>
<td>LB SEPS N2-23</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 5</td>
<td>LB SYS N2-1</td>
</tr>
<tr>
<td>Primary INT MDM</td>
<td>SPD 0</td>
<td>LB SYS N2-2</td>
</tr>
</tbody>
</table>

5.2 For all busses in Table 4, where [YY] is the SPD Card and [ZZ] is the Bus:

```
CDH: Primary INT MDM
   Primary Int MDM
   SPD Card [YY]

   sel Bus [ZZ]

   Bus [ZZ]

   sel Bus Status

   [ZZ] Bus Status

   ✓ Channel Selected – A
   ✓ Auto Channel Switch Status – Inh

   Repeat
```
NOTE

1. The 1553 Data Jumpers are separated into four segments to allow the placement of connectors next to each hatchway the jumper passes through.

2. The 1553 Data Jumper segments were mated on the ground to save crew time on-orbit.

Figure 7.- Temporary 1553 Data Jumper Configuration LAB1 to NOD2.

Figure 8.- LAB1OS6 1553 Bus Connections.
Table 5. 1553B Data Jumper

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>LAB1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1553 Ch B Data Jumper</td>
<td>683-22012</td>
<td>W2012</td>
<td>LAB1OS6 J10</td>
<td>J143</td>
</tr>
<tr>
<td></td>
<td>683-22014</td>
<td>W2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>683-22016</td>
<td>W2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>683-22018</td>
<td>W2018</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3 Installation of 1553 Data Jumpers

5.3.1 Remove protective caps as needed during installation of segmented 1553 Ch B Data Jumper.

5.3.2 Terminator Plug ←|→ LAB1OS6 J10
Terminator Plug →|← Stowage Receptacle

5.3.3 1553 Ch B Data Jumper W2012 P1 →|← LABOS6 J10

5.3.4 1553 Ch B Data Jumper W2018 P5 →|← NOD2 J143

5.3.5 Restrain cables and tethered caps as required to keep out of translation path.
Refer to Figures 6, 7, 8, Table 5.

**NOTE**

1. The following steps will reconfigure the 1553 busses to allow installation of the 1553A Data jumper by switching to bus channel B.

2. Table 4 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

5.4. For all busses in Table 4, where [YY] is the SPD Card and [ZZ] is the Bus:

CDH: Primary INT MDM

[Primary Int MDM]

'SPD Card [YY']

sel Bus [ZZ]

[Bus [ZZ]]

sel Bus Status

[ZZ] Bus Status

√ Channel Selected – B
√ Auto Channel Switch Status – Inh

Repeat
Table 6. 1553A Data Jumper

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>LAB1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1553 Ch A Data Jumper</td>
<td>683-22011</td>
<td>W2011</td>
<td>LAB1OS6 J9</td>
<td>J131</td>
</tr>
<tr>
<td></td>
<td>683-22013</td>
<td>W2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>683-22015</td>
<td>W2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>683-22017</td>
<td>W2017</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.5. Installation of 1553 Ch A Data Jumper

5.5.1 Remove protective caps as needed during installation of segmented 1553 Ch A Data Jumper.

5.5.2 Terminator Plug $\leftarrow\rightarrow$ LAB1OS6 J9

LAB1OS6 J9 Terminator Plug $\rightarrow\leftarrow$ Stowage Receptacle

5.5.3 1553 Ch A Data Jumper W2011 P1 $\rightarrow\leftarrow$ LABOS6 J9

5.5.4 1553 Ch A Data Jumper W2017 P5 $\rightarrow\leftarrow$ NOD2 J131

5.5.5 Restrain cable as required to keep out of translation path. Stow caps as needed in 12"x12 " Ziplock Bag. Refer to Figures 6, 7, 8, Table 6.

NOTE
The following steps will reconfigure the 1553 data busses to a normal configuration.

5.6. For all busses in Table 4, where [YY] is the SPD Card and [ZZ] is the Bus:

CDH: Primary INT MDM

[Primary INT MDM]

'SPD Card [YY]'

sel Bus [ZZ]

[Bus [ZZ]]

sel Bus Status

[ZZ] Bus Status

$\sqrt{\text{Channel Selected – A}}$

$\sqrt{\text{Auto Channel Switch Status – Ena}}$

Repeat

5.7. Notify **MCC-H** of completion with INT MDM bus reconfigurations, 1553 Jumper installation.
6. INSTALLATION OF INSTRUMENTATION JUMPERS

Table 7. Instrumentation Jumpers

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Harness #</th>
<th>NOD1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumentation (W3006)</td>
<td>1F89723-1</td>
<td>W3006</td>
<td>J40</td>
<td>J140</td>
</tr>
<tr>
<td>Instrumentation (W3005)</td>
<td>1F89721-1</td>
<td>W3005</td>
<td>J28</td>
<td>J128</td>
</tr>
</tbody>
</table>

6.1 Protective caps ←|→ NOD1 J40 and NOD2 J140 feedthroughs.
Protective caps ←|→ Instrumentation Jumper W3006.
Temporarily stow caps in 12"x12" Ziplock bag.
Stow in Vestibule Outfitting Kit (VOK) CTB.
Refer to Figure 6, Table 7.

6.2 Instrumentation Jumper W3006 P40 →|← NOD1 J40
Instrumentation Jumper W3006 P140 →|← NOD2 J140

6.3 Protective caps ←|→ NOD1 J28 and NOD2 J128 feedthroughs.
Protective caps ←|→ Instrumentation Jumper W3005.
Temporarily stow caps in 12"x12" Ziplock bag.
Stow in Vestibule Outfitting Kit (VOK) CTB
Refer to Figure 6, Table 7

6.4 Instrumentation Jumper W3005 P28 →|← NOD1 J28
Instrumentation Jumper W3005 P128 →|← NOD2 J128

7. INSTALLATION OF VENTILATION JUMPER

**CAUTION**

1. Care must be taken while installing the IMV Duct between the IMV Flanges. Damaging the sealing surfaces of the IMV Flanges could prevent the IMV Jumper, once reinstalled, from maintaining pressure.

2. V-Band clamps may have a 7/16" or 1/2" nut. Use appropriate tool as needed. 7/16" V-Band clamps should be tightened to 35 in-lbs. 1/2" V-Band clamps should be tightened to 135 in-lbs. Over tightening or under tightening V-band may damage V-Band or prevent duct from adequately sealing.

Table 8. IMV Duct Jumper Connection Data

<table>
<thead>
<tr>
<th>Function</th>
<th>P/N</th>
<th>Node 1</th>
<th>NOD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMV Return Jumper Duct</td>
<td>683-13870-17</td>
<td>A11</td>
<td>A4: IMV Sply to LAB</td>
</tr>
</tbody>
</table>

7.1 Loosen, remove V-Band Clamp on NOD1 port fwd (A11) IMV Flange
(Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
Remove IMV Cap from NOD1 (A11) IMV Flange.
Place IMV Cap in 12" x 12" Ziplock Bag.
Stow in VOK CTB.
Refer to Figure 9 and Table 8.

7.2 Loosen, remove V-Band Clamp on NOD2 aft stbd IMV Flange Saver (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
Remove IMV Flange Saver from NOD2 A4 IMV Flange.
Place IMV Flange Saver in 12" x 12" Ziplock Bag.
Stow in VOK CTB.

Figure 9.- Recommended Steps for IMV Duct Installation.
Figure 10.- IMV Jumper Installed.

7.3 Verify O-Ring is installed on both ends of IMV Jumper. If required, apply small amount of Braycote in two to three places around O-Ring grooves to prevent O-Rings from floating out.

7.4 Install IMV Supply Jumper using handling aid to compress bellows, sliding bellows end of jumper in first. Orient flat side of jumper toward the CBM rings. Refer to Figures 9, 10.

7.5 Secure jumper to NOD2 IMV Flange with V-Band Clamp. Torque to 35 in-lbs (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive).

7.6 Secure jumper to NOD1 IMV Flange with V-Band Clamp. Torque to 35 in-lbs (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive).
8. **HATCH LAUNCH RESTRAINT REMOVAL**

![Figure 11.- Removal of NOD2 Hatch Launch Restraint PIP Pin.](image)

**PIP Pin Stowage Location**

**PIP Pin Installed Location**

8.1 Verify Hatch Launch Restraint PIP Pin near NOD2 Aft Hatch window has been removed.
If required, stow PIP Pin in stowage hole on rib in upper area of Hatch.
Refer to Figure 11.

9. **POST MAINTENANCE**

9.1 Stow 12"x12" Ziplock Bag of caps in VOK.

9.2 Check for FOD around work area 3' radius.

9.3 Notify **MCC-H** of task completion.

9.4 Stow materials, tools.
Update IMS as required.
OBJECTIVE:
Replace Node 2 Aft Port and Aft Starboard Negative Pressure Relief Valves (NPRV) with Intermodule Ventilation (IMV) Valve Assemblies and connect Remote Manual Override (RMO) Assemblies. This procedure will be executed when Node 2 is mated to Node 1 Port. There will be power and data to these valves but the final pressure check will not be executed until Node 2 is relocated to LAB Fwd. The valves to be installed will be obtained as part of this procedure from their stowed location, NOD2S3.

LOCATION:
Installed: NOD2P6, NOD2S6
Stowed: NOD2S3 Starboard Midbay Volume

DURATION:
1 hour 15 minutes (each valve)

CREW:
One

PARTS:
None

MATERIALS:
Dry Wipes
Rubber Gloves

TOOLS:
Drawer 2:
    Ratchet, 1/4" Drive
    4" Ext
    6" Ext
    5/32" Hex Head, 1/4" Drive
    5/32" Stubby Hex Head, 1/4" Drive
    7/16" Deep Socket, 1/4" Drive
    1/2" Deep Socket, 1/4" Drive
    1/4" Deep Socket, 1/4" Drive
    (10-50 in-lbs) Trq Wrench, 1/4" Drive
    Driver Handle, 1/4" Drive
Drawer 3:
    Common Tip Screw Driver
Drawer 4:

12 OCT 07
Angled Cutters
Drawer 5:
Static Wrist Tether

REFERENCED PROCEDURE(S):
2.506 IMV Valve Reconfiguration

1. SAFING

WARNING

Failure to remove power can result in electrical shock hazard.

<table>
<thead>
<tr>
<th>IMV Valve Location</th>
<th>RPCM</th>
<th>RPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft Port</td>
<td>N22A3B C</td>
<td>04</td>
</tr>
<tr>
<td>Aft Stbd</td>
<td>N22A3B C</td>
<td>07</td>
</tr>
</tbody>
</table>

1.1 VERIFYING [B] IMV RPC OPEN

Refer to Table 1 for the following steps:

PCS
Node 2: ECLSS: [B] Valve
Node 2 [B] Vlv

sel RPCM [X] RPC [Z]

√RPC Position – Op
√Close Cmd – Inh

2. ACCESS

Table 2. Node 2 Closeout

<table>
<thead>
<tr>
<th>IMV ORU REFDES</th>
<th>Closeout Panel</th>
<th>Fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aft Port</strong></td>
<td>NOD2P6-51</td>
<td>10 Captive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 Non-captive</td>
</tr>
<tr>
<td></td>
<td>NOD2P6-02</td>
<td>4 Captive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Non-captive</td>
</tr>
<tr>
<td></td>
<td>NOD2P6-03</td>
<td>10 captive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 Non-captive</td>
</tr>
<tr>
<td><strong>Aft Starboard</strong></td>
<td>NOD2S6-51</td>
<td>10 Captive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 Non-captive</td>
</tr>
<tr>
<td></td>
<td>NOD2S6-02</td>
<td>4 Captive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Non-captive</td>
</tr>
<tr>
<td><strong>IMV Valve Stowage Volume</strong></td>
<td>NOD2S3-01</td>
<td>6 Captive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 Non-captive</td>
</tr>
</tbody>
</table>
2.1 Remove Closeout Panels as required for each valve and IMV Valve Stowage Volume location (Ratchet, 1/4" Drive; 4" Ext, 5/32" Hex Head, 1/4" Drive).
Temporarily stow.
Refer to Table 2.

IMV Valve Power/Data (J1 and J2 stowed)

3. INSPECTION AND REMOVAL OF PORT AFT NPRV(s)

Figure 1. Node 2 Aft Starboard and Aft Port NPRVs Installed.

Figure 2. Deployed NPRV.
Figure 3. Fully Seated NPRV.

3.1 Verify NPRV fully seated. Refer to Figures 1, 2, 3.

3.2 If NPRV deployed, press external cover toward bulkhead until cover snaps into place against base assembly.

3.3 Loosen, remove V-Band Clamp and stow at bulkhead. Remove NPRV (Ratchet, 1/4” Drive; 4” Ext; 7/16” Deep Socket, 1/4” Drive). Temporarily stow NPRV.

4. OBTAINING IMV VALVE FROM STOWED LOCATION

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>None of the stowed IMV Valves in NOD2S3 have caps on the connectors. Use caution to prevent contact with connector pins without static wrist tether.</td>
</tr>
</tbody>
</table>
4.1 Don Static Wrist Tether.

**Table 3. IMV Valve Identification**

<table>
<thead>
<tr>
<th>IMV Valve Stowage Label</th>
<th>P/N</th>
<th>S/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMV VLV PORT AFT CONE</td>
<td>P/N 2353024-4-1</td>
<td>D0025</td>
</tr>
<tr>
<td>IMV VLV STBD AFT CONE</td>
<td>P/N 2353024-2-1</td>
<td>D0006</td>
</tr>
</tbody>
</table>

4.2 Retrieve IMV Valve identified by label and replace V-Band Clamp on mock flange in stowage volume (Ratchet, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive). Refer to Table 3, Figure 4.
Figure 5. Typical View IMV Teflon Seals.

4.3 √ Teflon Seal (two) on mating surface of IMV Valve flange clean, free of debris
   Clean if required by wiping around circumference of seal (Dry Wipes).
   Refer to Figure 5.

4.4 √ No debris in or around valve installation location at bulkhead

Figure 6. Typical IMV Valve With Alignment Marks.
Figure 7. IMV Valve Partially Installed.
5. INSTALLATION

Figure 8. Aft Stbd IMV Valve with RMO Installed with Proper Bend Radius.
5.1 Visually verify IMV Valve is in Closed position. Refer to Figure 9.

### CAUTION

RMO will not operate without optimum bend radius of flex cable. Installation of IMV Valve using alignment mark insures optimum bend radius of RMO flex cable.

5.2 Using reference mark, align IMV Valve to bulkhead. Install V-Band Clamp loosely to hold Valve in place (Ratchet, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive). Refer to Figures 5, 6, 7, 8, 9.
5.3 Release RMO flex shaft from launch location (Angled Cutters). Remove Tethered Cap from end of RMO flex cable (Ratchet, 1/4" Drive; 4" Ext; 5/32" Hex Head, 1/4" Drive). Refer to Figure 10.

5.4 Verify RMO is at the Closed position hardstop. Refer to Figure 11.

5.5 Position RMO flex cable, verify acceptable bend radius, install Fasteners (two) (Driver Handle, 1/4" Drive; 4" Ext; 5/32" Hex Head, 1/4" Drive). Refer to Figures 6, 7, 8.
Table 4. Node 2 Aft IMV Valve J1 and J2 Connectors

<table>
<thead>
<tr>
<th>IMV Label</th>
<th>Power/Data Cable Connectors</th>
<th>ORU Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2-Aft_Port_IMV_VLV</td>
<td>P1AFT_IMVR HMU253</td>
<td>J1</td>
</tr>
<tr>
<td></td>
<td>P2AFT_IMVR HMU612</td>
<td>J2</td>
</tr>
<tr>
<td>N2-Aft_Stbd_IMV_VLV</td>
<td>P1AFT_IMVVS HMU253</td>
<td>J1</td>
</tr>
<tr>
<td></td>
<td>P2AFT_IMVVS HMU612</td>
<td>J2</td>
</tr>
</tbody>
</table>

5.6 Don Static Wrist Tether.
Mate IMV Valve power and data cables stowed near installed location, to connectors J1 and J2. Refer to Table 4.

5.7 Doff Static Wrist Tether.

6. CHECKOUT

6.1 Notify MCC-H: replacement Valve installed and ready for checkout.

6.2 Close Command Enable For [B] IMV RPC
Refer to Table 1 for below step.

PCS

Node 2: ECLSS: [B] Valve
Node 2 [B] Vlv

sel RPCM [X] RPC [Z]

RPCM [X] RPC [Z]
"Close Cmd"

cmd Ena

√ Close Cmd – Ena

6.3 For Node 2 Aft Port (Stbd) IMV Valve
Perform [2.506 IMV VALVE RECONFIGURATION], steps 1 and 2 (SODF: ECLSS: NOMINAL: THC), then:

Verify RMO Handle commanded to OPEN position hard stop.
Refer to Figure 11.
Notify MCC-H results.
6.4 Photo document RMO showing pointer position (DCS 760 Camera).

6.5 **On MCC-H GO**, verify RMO Handle commanded to CLOSED position hard stop. Refer to Figure 11. Notify **MCC-H** results.

6.6 Photo document RMO showing pointer position (DCS 760 Camera).

6.7 **On MCC-H GO**, deploy RMO Handle, rotate CCW until pointer contacts RMO OPEN position hardstop. Allow handle to return to neutral position. Refer to Figure 11.

6.8 Note position of pointer at neutral position. Determine whether pointer contact OPEN position hardstop. Notify **MCC-H** of results.

6.9 Photo document RMO showing pointer position (DCS 760 Camera).

6.10 **On MCC-H GO**, rotate RMO Handle CW until pointer contacts RMO CLOSED position hardstop. Allow handle to return to neutral position. Refer to Figure 11.

6.11 Note position of pointer at neutral position. Determine whether pointer contact CLOSED position hardstop. Notify **MCC-H** of results.

6.12 Photo document RMO showing pointer position (DCS 760 Camera).

7. **TORQUING IMV VALVE**

7.1 Tighten, torque RMO flex cable bolts (two) (on side of actuator) to 39 in-lbs [Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; 4" Ext; (10-50 in-lbs) Trq Wrench, 1/4" Drive].

7.2 Tighten IMV Valve V-Band Clamp nut, torque to 40 in-lbs [(10-50 in-lbs) Trq Wrench, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive].

8. **DUCT CONNECTION**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some IMV hose clamps may require Flat Tip Driver instead of 1/4&quot; Deep Socket, 1/4&quot; Drive. This is dependent on space between head of fastener and interface tolerances to band clamp.</td>
</tr>
</tbody>
</table>
8.1 Remove cover from rubber sleeve attached to IMV duct, temporarily stow.

8.2 Loosen hose clamp stowed on IMV Valve to allow rubber sleeve to slide onto end of IMV Valve (Driver Handle 1/4" Drive, 1/4" Deep Socket, 1/4" Drive).

8.3 Slide rubber sleeve onto end of IMV Valve. Allow approximately 1 inch overlap between sleeve and duct.

8.4 Slide hose clamp sleeve/valve interface so that it is at least 1/8" from end of sleeve. Orient clamp so that Fastener will be easily accessible from hatchway. Tighten V-Band Clamp Fasteners (two), torque to 17 in-lbs [Driver Handle 1/4" Drive, 1/4" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].

8.5 Notify MCC-H Aft Port valve installed.

8.6 Repeat steps 1 to 8.5 for Aft Stbd valve before Node 2 egress for relocation to LAB Fwd.

9. **CLOSEOUT**

9.1 Install Closeout Panels. Refer to Table 2.

10. **POST MAINTENANCE**

10.1 Notify MCC-H of task completion.

10.2 Stow NPRV(s) per Stowage Note

10.3 Stow tools, materials.
OBJECTIVE:
Install/remove temporary ducting in Node 2 for initial outfitting while docked to Node 1 Port using a PMA IMV Flex Duct Extension as well as a new Flexible Ventilation Duct flown up on 10A inside Node 2.

LOCATION:
Installed: Node 2 Aft-Starboard End Cone

DURATION:
Installation: 1 hour
Removal: 1 hour

CREW:
One

PARTS:
PMA IMV Flex Duct Extension   P/N 1F94509-1
Flexible Ventilation Duct (13 ft)   P/N 683-51988-1
V-Band Clamp   P/N MS27115-21R

MATERIALS:
Gray Tape
Dry Wipes
6” x 6” Ziplock Bag labeled “NOD2S6-02”
6” x 6” Ziplock Bag labeled “NOD2S6-51”
6” x 6” Ziplock Bag labeled “NOD2S3-01”

TOOLS:
DCS 760 Camera
Static Wrist Tether
ISS IVA Toolbox:
Drawer 2:
   Ratchet, 1/4” Drive
   5/32” Hex Head, 1/4” Drive
   7/16” Deep Socket, 1/4” Drive
   1/2” Deep Socket, 1/4” Drive
   1/4” Socket, 1/4” Drive
   Driver Handle, 1/4” Drive
   4” Ext, 1/4” Drive
   (10-50 in-lbs) Trq Wrench, 1/4” Drive
Drawer 5:
   2” Cut Scissors

REFERENCED PROCEDURE(S):
None
1. **ACCESSING**

1.1 Remove launch restraint bolts (two) from Closeout Panel NOD2S6-02 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Stow Bolts and Washers in labeled 6 x 6 Ziplock Bag.

**NOTE**
There is a gray dot beside each non-captive Launch Restraint Bolt.
1.2 Remove Closeout Panel NOD2S6-02, Fasteners (four) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow. Refer to Figure 1.

1.3 Remove launch restraint bolts (eight) from Closeout Panel NOD2S6-51 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Stow Bolts and Washers in labeled 6" x 6" Ziplock Bag.

1.4 Remove Closeout Panel NOD2S6-51, Beta Cloth and Fasteners (ten) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow. Refer to Figure 1.

2. INSPECTING NEGATIVE PRESSURE RELIEF VALVE (NPRV)

2.1 Verify NPRV fully seated. Notify MCC-H. Refer to Figures 2, 3.

2.2 If NPRV deployed, press external cover toward bulkhead until cover snaps into place against base assembly.
3. **REMOVING NPRV**

Figure 4.- Aft-Starboard Bulkhead IMV Location with NPRV Installed (looking aft).

Figure 5.- Aft-Starboard Bulkhead IMV Location with NPRV Installed (looking starboard).

3.1 Loosen V-Band Clamp Fastener (one) (Ratchet, 1/4” Drive; 7/16” Deep Socket, 1/4” Drive or 1/2” Deep Socket, 1/4” Drive). Remove V-Band Clamp, NPRV. Temporarily stow NPRV and V-Band Clamp. Refer to Figure 4,5.
4. **INSTALLING VENTILATION DUCTING**

Flexible Ventilation Duct (13 ft)  PMA IMV Flex Duct Extension  
P/N 683-51988-1  P/N 1F94509-1

**NOTE**
Closeout Panels will remain temporarily stowed while ducting is installed. Ducting is to be routed from the Aft-Starboard bulkhead IMV location through the NOD2S6-51 panel location and on through the module.

Figure 6.- Ventilation Ducting Installed Configuration.

Figure 7.- Flanged ends of PMA IMV Flex Duct Extension.

4.1 Align Off-set end of PMA IMV Flex Duct Extension to Aft-Starboard bulkhead IMV location.
Install V-Band Clamp, Fastener (one) (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
Refer to Figures 6, 7.
4.2 Remove Flexible Ventilation Duct (13 ft) from stowed location in NOD2P4 (2" Cut Scissors).
Refer to Figure 8.

4.3 Secure Non-Velcro end of Flexible Ventilation Duct (13 ft) inside straight-flanged end of PMA IMV Flex Duct Extension (Gray Tape).
Refer to Figure 6,7.

4.4 Secure free end of Flexible Ventilation Duct (13 ft) to structure (Velcro).

5. **REMOVING VENTILATION DUCTING**

5.1 Remove Gray Tape securing Flexible Ventilation Duct (13 ft) to PMA IMV Flex Duct Extension (2" Cut Scissors).
Temporarily stow.

5.2 Inspect PMA IMV Flex Duct Extension straight flange sealing surface for tape residue.
If necessary, clean flange.
5.3 Remove Off-set end of PMA IMV Flex Duct Extension from 
Aft-Starboard bulkhead IMV location. 
V-Band Clamp, Fastener (one) (Ratchet, 1/4" Drive, 7/16" Deep 
Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive). 
Temporarily stow.

6. **INSTALLING IMV VALVE**

![Figure 9.- NOD2S3 Closeout.](image)

**NOTE**
There is a gray dot beside each non-captive 
Launch Restraint Bolt.
6.1 Remove launch restraint bolts (thirty) from Closeout Panel NOD2S3-01 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Stow Bolts and Washers in labeled 6" x 6" Ziplock Bag. Refer to Figure 9.

6.2 Remove Closeout Panel NOD2S3-01, Fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow. Refer to Figure 9.

6.3 Don Static Wrist Tether. Secure to unpainted, unanodized metal surface.

<table>
<thead>
<tr>
<th>Table 1. IMV Valve Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMV Valve Stowage Label</td>
</tr>
<tr>
<td>IMV VLV AFT STBD CONE</td>
</tr>
</tbody>
</table>

Figure 10.- IMV Valve Aft Starboard Cone Stowed Location (NOD2S3-01).

6.4 Remove IMV Valve and V-Band Clamp from stowed location NOD2S3-01 (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive). Refer to Table 1. Refer to Figure 10.
6.5 Teflon Seals (two) on mating surface of IMV Valve Flange are present

Clean with Dry Wipes if necessary.
Verify valve flap is in closed position.
Refer to Figure 11.

**CAUTION**

IMV Valve should be installed in an orientation to provide optimum bend radius for RMO cable. Installation with valve and bulkhead alignment marks aligned should provide this optimal bend radius. RMO will not operate without optimum bend radius.
6.6 Verify RMO cable has optimum bend radius.
Refer to Figure 12.

If optimum bend radius, proceed to step 6.9.
If not optimum bend radius, proceed to the following off-nominal situation (starred block).
NOTE

1. If necessary, adjust clocking of RMO Cable interface on valve actuator. Interface can be relocated by loosening, but not removing, noncaptive actuator bolts on IMV Valve.

2. The IMV Valve actuator bolts are not captive. Loosen but do not remove.

Figure 13.- IMV Actuator Bolt Tightening Pattern.

6.7 Loosen IMV Valve actuator noncaptive bolts (six) on top of actuator located on upper end of valve (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

Refer to Figure 13.

6.8 Carefully turn actuator clockwise or counterclockwise and relocate RMO interface connection for optimum cable bend radius.

6.9 Tighten actuator bolts in star pattern and torque to 23 in-lbs [Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; (10-50 in-lbs) Trq Wrench].

Refer to Figure 13.
6.10 Using reference marks, align IMV Valve to bulkhead and install V-Band Clamp, torque to 35 in-lbs [Ratchet, 1/4” Drive, 7/16” Deep Socket, 1/4” Drive or 1/2” Deep Socket, 1/4” Drive; (10-50 in-lbs) Trq Wrench, 1/4” Drive]. Refer to Figure 14.

6.11 Remove Tethered Cap from end of RMO flex shaft (Ratchet, 1/4” Drive; 4” Ext, 1/4” Drive; 5/32” Hex Head, 1/4” Drive).

6.12 Remove RMO flex cable from launch configuration (2” Cut Scissors).

6.13 Install RMO flex cable. Verify acceptable bend radius, Fasteners (two) (Driver Handle, 1/4” Drive; 4” Ext, 1/4” Drive; 5/32” Hex Head, 1/4” Drive). Refer to Figure 12.

6.14 P1AFT(IMVVS HMU253) →|← J1
P2AFT(IMVVS HMU612) →|← J2
6.15 Remove protective cloth from flexible coupling (2" Cut Scissors). Refer to Figure 15.

6.16 Slide IMV Valve Band Clamp over flexible coupling, tighten (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 1/4" Socket, 1/4" Drive).

6.17 Doff Static Wrist Tether.

7. **POST MAINTENANCE**
   7.1 Photo document final configuration (DCS 760 Camera).
   
   7.2 Notify **MCC-H** of task completion.
   
   7.3 Stow tools, materials, equipment.
       Update IMS with stowage locations.
1.3.454 P6 SAW XX RE-DEPLOY
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OBJECTIVE:
This procedure supports the re-deployment of a single USOS Solar Array Wing (SAW) and it is applicable to all arrays located on the main truss. Solar array re-deployment can be performed in any attitude that supports the visual verification requirements.

NOTE
1. Crew will be primary for performing steps 18.3, 18.7 and 18.10. **MCC-H** will be primary for performing all remaining steps.

Overview of Steps for SAW Deploy
a. Unlatch Left Blanket Box (LBB) and Right Blanket Box (RBB) for high tension deploy.
b. Deploy 1 Bay of Mast, then stop deploy.
c. Latch LBB and RBB for high tension deploy.
d. Deploy Mast to 100 %

2. Refer to this procedure for all applicable SAWs. Refer to Table 1 for PVM power channel connectivity.

Table 1. PVM Connectivity

<table>
<thead>
<tr>
<th>PVM</th>
<th>[XX]</th>
<th>[YY]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P6</td>
<td>2B</td>
<td>4B</td>
</tr>
<tr>
<td>P6</td>
<td>4B</td>
<td>2B</td>
</tr>
</tbody>
</table>

CAUTION
1. Steps that involve mechanical motion of the mast must be performed during insolation to support crew visual cues.
2. Steps that involve mechanical motion of the mast or latches must be performed with ISS and orbiter thrusters inhibited to avoid damage to solar array mechanisms.
1. VERIFYING SARJ CONFIGURATION

The SARJ nearest the SAW to be re-deployed must be stopped and locked. The SARJ farthest from the SAW to be deployed can continue to be rotated. These configurations are required to minimize dynamic loading on the array and to support visual verification requirements.

PCS

P4 : EPS: Port SARJ

Verify Position, deg: P6 Array Deployment Position
Verify DLA 1(2) Position – Locked

S4: EPS: Stbd SARJ

Verify DLA 1(2) Position – Engaged(Locked) (No restrictions to SARJ rotation during SAW deploy.)

2. CONFIRMING SSU [XX] SHUNTED

PVMEP: SSU [XX]

‘SSU’

Verify Integration Counter – incrementing
Verify Shunt Current 1 (LBB), A: ~0.0
Verify Shunt Current 2 (RBB), A: ~0.0

‘PVCE’
‘Error Voltage’

Verify 1: -0.7 to 0.7 V
Verify 2: -0.7 to 0.7 V
Verify 3: -0.7 to 0.7 V

‘Output’

Verify Error Bus Voltage, V: < 0.6
1.3.454  P6 SAW XX RE-DEPLOY
(EPS/10A - ALL/FIN/HC) Page 3 of 49 pages

******************************************************************************************
* If SSU is not shunted, then Shunt SSU at this time
*    PVM: EPS: SSU [XX]
*    [SSU [XX]]
*    sel PVCE
*    [SSU [XX] PVCE]
*    cmd All PVCE Off – Off (single-step command – arm not required)
*    \PVCE 1 Error Voltage: < 5 Volts
*    \PVCE 2 Error Voltage: < 5 Volts
*    \PVCE 3 Error Voltage: < 5 Volts
******************************************************************************************

3. **VERIFYING COMM WITH BGA CONTROLLER**
PVM: EPS: BGA [XX]
    [BGA [XX]]
    'ECU [XX]'

Verify ECU/BGA Integ Cnt – incrementing

4. **VERIFYING COMM WITH SAW CONTROLLER**
   sel SAW [XX]
    [SAW [XX]]
    'ECU [XX]'

Verify ECU/SAW Integ Cnt – incrementing

5. **REDUCING LOAD ON SUPPORTING CHANNEL PRIOR TO SAW DEPLOY OPERATIONS**

5.1 Verifying Which Support Channel [ZZ] is Providing Prime Power to ECU [XX]

NOTE
It is possible for both ECUs on a particular PVM to be powered from the same channel. This configuration will determine which channel should be powered down to support the peak power load of 580 watts.

PVM: EPS: BGA [XX]
    [BGA [XX]]

sel RPCM [XX] A RPC 01
    [RPCM [XX] A RPC 01]

Verify RPC Position – Close (Verify – Cl)
1.3.454 P6 SAW XX RE-DEPLOY
(EPS/10A - ALL/FIN/HC) Page 4 of 49 pages

BGA [XX]

sel RPCM [YY] A RPC 02

RPCM [YY] A RPC 02

Verify RPC Position – Close (Verify – Cl)

If ECU [XX] is receiving power from one closed RPC, use Table 2 to determine which support channel is affected.

If both RPCs, providing input power to ECU [XX], are closed, RPCM [XX] A and RPCM [YY] A input current must be used to determine which source is providing prime power to ECU [XX].

Once this is determined, use Table 2 to determine which support Channel is affected.

NOTE
Table 2 provides expected support channel connectivity. A support channel provides initial power to the channel being activated until the SAW is deployed and the batteries are charged (e.g., Ch 4A supports Ch 4B until Ch 4B is fully activated).

Table 2. Support Power Channel Connectivity

<table>
<thead>
<tr>
<th>[XX]</th>
<th>[YY]</th>
<th>[ZZ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2B</td>
<td>4B</td>
<td>2A</td>
</tr>
<tr>
<td>4B</td>
<td>2B</td>
<td>4A</td>
</tr>
</tbody>
</table>

Record the following:
RPCM [XX][YY] - A, Providing Prime Power to ECU [XX]: __________
DDCU [XX][YY] Supporting the RPCM: ________________
Supporting Power Channel [ZZ]: ______________________

5.2 Terminating All Battery Charging or Warming on Channel [XX]
(Same Channel That the SAW is to be Deployed, If Required)

NOTE
1. Reducing load on the supporting power channel protects for a peak power load of 580 watts during SAW deployment operations. When arrays are feathered, load reduction also protects for power balance of the supporting channel.

2. BCDU/Battery caution messages are suppressed to prevent nuisance tones, during initial battery charging.

Confirm the following Caution messages are suppressed where [Y] = 1 2 3
BCDU [XXY] Battery SOC Low Failure
BCDU [XXY] Trip
Batt [XXY]1(XXY2) Undervoltage Condition
Battery [XXY]1(XXY2) Trip

If batteries are charging
PVM: EPS: Energy Storage [XX]
[Energy Storage [XX]]
‘BCDU [XXY]’

Perform for BCDU [XXY], where [Y] = \boxed{1\ 2\ 3} (as required)

sel Conv

BCDU [XXY] Converter FI

‘Converter’

\textbf{cmd} Converter Off – Arm
\textbf{cmd} Converter Off – Off (Verify – Off)

‘Fault Isolator’

\textbf{cmd} Open – Arm
\textbf{cmd} Open – Open (Verify – Op)

Repeat
If Batteries are warming, √MCC-H for warming status.
PVM: EPS: Energy Storage [XX]
   Energy Storage [XX]

Perform for BCDU [XXY], where [Y] = 1 2 3 and
[Z] = 1 2 (as required)

‘BCDU [XXY]’

Verify Htr Sw A(B) – On (green icon)

sel Software Inhibits

BCDU [XXY] Software

**cmd** Batt [XXYZ] Htr Cntl Inhibit – Arm
**cmd** Batt [XXYZ] Htr Cntl Inhibit – Inhibit (Verify – Inh)

sel BCDU [XXY] SoftwareBU

BCDU [XXY] SoftwareBU

**cmd** Batt [XXYZ] Htr Cntl Inhibit – Arm
**cmd** Batt [XXYZ] Htr Cntl Inhibit – Inhibit (Verify – Inh)

‘Battery [XXYZ]’

sel BSCCM

Battery [XXY]

**cmd** Battery [XXYZ] Heater 1,2; Off – Arm
**cmd** Battery [XXYZ] Heater 1,2; Off – Off (Verify – Off)

Repeat

5.3 Powering Down ISS (If Required)

**NOTE**

When arrays are feathered, loads may be reduced to protect overall ISS energy balance.

Powerdown ISS loads so that energy balance is maintained while the array are feathered for SAW Deploy operations.
5.4 Reducing Load on DDCU [XX]\(\text{YY}\) Prior to SAW Deploy

**NOTE**

Power can be supplied to ECU [XX] from DDCU [XX] or DDCU [YY] for the solar array deploy. Therefore, it may be necessary to reduce loads on the appropriate DDCU to support a peak power load of 580 watts during array deployment.

Verify enough margin exist on DDCU [XX]\(\text{YY}\) to support a potential peak power load of 580 watts during array deployment. Reduce load as necessary to meet this requirement.

6. **VERIFYING ECU POWER SUPPLY TEMPERATURES AND VOLTAGE STATUS**

PVM: EPS: BGA [XX]

- BGA [XX]
- ‘ECU [XX]’

Verify SAW PS Temp, deg C: -33 to 51
Verify SAW PS Voltage, V: 115 to 125
Verify BGA PS Temp, deg C: -33 to 51
Verify BGA PS Voltage, V: 115 to 125

7. **VERIFYING CHANNEL MODE AND BGA MODE**

- BGA [XX]
- ‘BGA [XX]’

Verify PV Ch [XX] Mode, Primary PVCU – Non-Solar Tracking
Verify BGA Mode, Primary PVCU – Directed Position or Null

8. **CONFIGURING BGA [XX] FOR SAW RE-DEPLOY**

8.1 Configuring BGA Position for Visual Verification

**CAUTION**

Prior to deploying the solar array, the BGAs must be prepositioned in order to support visual verification requirements during deployment. If re-deploying a P6 array, the nearest P4 array must also be feathered to support visual requirements.

**NOTE**

BGA positions assume the Port SARJ is at 90 degrees. If the SARJ is at a different position, different BGA positions may be required to support P6 array viewing during IVA operations. BGA positions for EVA support will remain the same.
If SAW 2B(4B) is to be re-deployed by IVA
Position BGA 2B(4B) to 200(180) degrees.
Perform **{2.102  PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**

Position BGA 4A(2A) to 75(110) degrees.
Perform **{2.102  PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**

If SAW 2B(4B) is to be re-deployed with EVA assistance
Position BGA 4A, 2A to 90 or 270 degrees and Latch BGAs on Latch 1 for EVA translation, P6 array viewing and best power generation.

Perform **{2.102  PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**
Perform **{2.101  PVM BGA XX ENGAGE ANTIROTATION LATCH}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**

If Left Blanket Box (LBB) access required, position BGA [XX] to 270 degrees and latch BGA on Latch 1.
Perform **{2.102  PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**
Perform **{2.101  PVM BGA XX ENGAGE ANTIROTATION LATCH}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**

If Right Blanket Box (RBB) access required, position BGA [XX] to 101.25 degrees and latch BGA on Latch 1.
Perform **{2.102  PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**
Perform **{2.101  PVM BGA XX ENGAGE ANTIROTATION LATCH}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:**
8.2 Inhibiting Motor Velocity Safing to Support BGA Wiggle Technique

NOTE
1. SCR 19659 - If the array is parked at 0 deg, motor velocity safing may be triggered due to angle oscillations between 0 and 359. Software interprets this as a large angle movement in a short time period. Inhibit motor velocity safing to prevent the RPCs supplying the ECU from being opened.

2. SCR 28128 - The following Caution messages may also be triggered if the array is commanded to 0.
   - ‘BGA XX Observed vs Last Commanded State Discrepancy - PVM’
   - ‘BGA XX Pointing Control Command Response Failed - PVM’

PVM: EPS: BGA [XX]

BGA [XX]

sel Motor

BGA [XX] Motor
‘Velocity Limit Safing, Primary PVCU’

cmd Inhibit – Arm

Verify Primary PVCU – Inh

‘Velocity Limit Safing, Backup PVCU’

cmd Inhibit – Arm

Verify Backup PVCU – Inh

9. VERIFYING SAW STATUS
9.1 Configuring for DBCL Dump of SAW Data

MCC-H

Confirm with ODIN that SAW 2B or 4B DBCL is loaded in P6 PVCUs. This DBCL corresponds to PPL 71 Version 801.

Configure for continuous data dump of SAW 2B/4B.

To build dump command, perform \{1.230 CCS BUILD DATA DUMP COMMAND\}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

For start location addresses, use 255D2C and for number of words use 86.

Verify initial SAW C&W flags and MDA data on SAW XX DBCL MSK displays.
9.2 Verifying SAW Operational Ranges and Limit Switch Status

**NOTE**
Disconnects are present in the MDA Over Temp Trip FDIR. The software implements an MDA Over Temp Trip at 77.8°C. The ECU firmware implements an MDA Over Temp Trip at 140°C. These FDIR responses remove power to the MDA. Potential damage to hardware occurs at 120°C. MDA upper limit temperatures indicated in this step are conservative. At a minimum, a 30°C mast MDA temperature increase should be protected for during mast deployment.

sel SAW [XX]

**SAW [XX]**

‘LBB’

**NOTE**
SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.

Verify SW01,02 Pin Released – Yes
Verify SW01,02 Latched – Yes
Verify SW01,02 Unlatched – No
Verify MDA Slow Alert – Nominal
Verify MDA Voltage: 000.0 (±2.8)
Verify MDA Temp, deg C: -54 to 48
Verify MDA Over Temp Trip – blank

‘MAST’

**NOTE**
SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

Verify SW01,02 Retracted – Yes
Verify SW01,02 Deployed – No
Verify MDA Slow Alert – Nominal
Verify MDA Voltage: 000.0 (±2.8)
Verify MDA Temp, deg C: -54 to 48
Verify MDA Over Temp Trip – blank

‘RBB’

**NOTE**
SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.
Verify SW01,02 Pin Released – Yes
Verify SW01,02 Latched – Yes
Verify SW01,02 Unlatched – No
Verify MDA Slow Alert – Nominal
Verify MDA Voltage: 000.0 (± 2.8)
Verify MDA Temp, deg C: -54 to 48
Verify MDA Over Temp Trip – blank

‘ECU [XX]’

Verify MDA Current, A: 0.00 (± 0.4)
Verify MDA Over Current Trip – blank

* **************************************************************************
* If any MDA Temp is out of range, √MCC-H before proceeding.
* **************************************************************************
* NOTE
* PVCU software implements an MDA Over Temp Trip at 77.8° C which will remove power from the motor.
* **************************************************************************
* If MCC-H unavailable and MDA Temp is greater than 48° C
* Inhibit MDA Over Temp Safing.
* ‘ECU [XX]’
* sel SAW Software Inhibits
* SAW [XX] Software Inhibits
* sel SAW [XX] Temp Safing
* SAW [XX] Temp Safing
* ‘LBB (RBB)(Mast) Over Temp Safing’
* ‘Primary PVCU’
* cmd Inhibit – Arm
* cmd Inhibit – Inhibit
* √Over Temp Safing, Primary PVCU – Inh
* ‘Backup PVCU’
* cmd Inhibit – Arm
* cmd Inhibit – Inhibit
* √Over Temp Safing, Backup PVCU – Inh
* **************************************************************************
10. **VERIFYING SAW FDIR STATUS**

10.1 Verifying SABB Limit Switch Override

**NOTE**
The following steps must be performed nominally if the mast will be deployed or retracted while an SABB is in an undetermined state. These steps will also verify the override of a failed Latched, Unlatched, or Pin Released limit switch.

PVM: EPS: SAW [XX]

![SAW [XX]](SAW [XX])

‘ECU [XX]’

sel SAW Software Inhibits

![SAW [XX] Software Inhibits](SAW [XX] Software Inhibits)

‘Deploy Reject’

√Deploy Reject – Inh (Allows deploy or retract commands when SABB state is undetermined)

10.2 Verifying Mast Limit Switch Override

**NOTE**
These steps must be performed nominally if the SABBs are latched or unlatched or if the BGA may be moved while the mast is in an undetermined (partially deployed) state. These steps will also be performed to verify the override of a failed limit switch (e.g., SAW 2B Sw 02 Deployed Limit Switch).

PVM: EPS: SAW [XX]

![SAW [XX]](SAW [XX])

‘ECU [XX]’

sel SAW Software Inhibits

![SAW [XX] Software Inhibits](SAW [XX] Software Inhibits)

‘Latch Reject’

√Latch Reject – Inh (Allows SABB unlatch or latch commands when mast state is undetermined)

10.3 Verifying Multi MDA On Reject

**NOTE**
These steps must be performed nominally to command 2B and 4B MDAs simultaneously.

PVM: EPS: SAW [XX]

![SAW [XX]](SAW [XX])

‘ECU [XX]’

sel SAW Software Inhibits
SAW [XX] Software Inhibits
'Multi MDA On Reject'

√Multi MDA On Reject – Inh (Allows Multiple MDAs to be powered on simultaneously)

10.4 Verifying BGA Software Configuration
PVM: EPS: BGA [XX]

 sel BGA Software Inhibits

BGA [XX] Software Inhibits
'SAW Deployment'
'Primary PVCU'

√SAW Deployment, Primary PVCU – Ena (Allows BGA to be operated when SAW Mast is in an undetermined state.)

‘Backup PVCU’

SAW Deployment, Backup PVCU – Ena

11. VERIFYING MDA HI TEMP REJECT FUNCTION INHIBITED
PVM: EPS: SAW [XX]

 sel SAW Software Inhibits

SAW [XX] Software Inhibits

 sel SAW [XX] Temp Safing

SAW [XX] Temp Safing
‘Hi Temp Reject’

√Hi Temp Reject – Inh (Allows unlatch or latch and deploy or retract commands when MDA Temp > 30° C)

12. VERIFYING MDA SAFING CONFIGURATION

 sel SAW Software Inhibits

SAW [XX] Software Inhibits

√Config Complete MDA Off Safing, Primary PVCU – Ena

√Config Complete MDA Off Safing, Backup PVCU – Ena

Turns motor off upon limit switch contact, if MDA current above limit.

√Limit Sw Turnoff Function – Ena
Stops motor upon limit switch contact but does not turn motor off.

sel SAW [XX] Motor Stall Safing

√ Motor Stall Safing, Primary PVCU – Ena
√ Motor Stall Safing, Backup PVCU – Ena

Turns motor off if Slow is indicated when between limit switches, and if MDA current above limit.

If deploying both arrays on a PVM the same day
Perform steps 1 to 12 for both Channels before proceeding to step 13.

13. UNLATCHING LEFT BLANKET BOX (LBB)
13.1 Verifying Temperatures are Within Nominal Ranges Prior to Unlatch
PVM: EPS: SAW [XX]

SAW [XX] ‘ECU [XX]’

Verify SAW PS Temp, deg C: -33 to 51
Verify BGA PS Temp, deg C: -33 to 51

‘LBB’

Verify MDA Temp, deg C: -54 to 48

13.2 Powering On LBB Motor Drive Assembly (MDA)

NOTE
MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX] ‘LBB’

sel LBB Commands

SAW [XX] LBB Commands
‘MDA’
‘Power’

cmd On – Arm
cmd On – On

√ MDA Voltage: 120 to 125

13.3 Performing Visual Verification Via Cameras
Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation.
There are eight latches to be unlatched for each blanket box prior to SAW retract. Only four of eight latches are visible at a time.

Verify Camera configuration correct for solar array retraction before proceeding. Verify latch position (four of eight) latched (tensioned).

For crew:
- If orbiter is performing mated attitude control
  Proceed to step 13.5.
- If orbiter is not performing mated attitude control
  Proceed to step 13.6.
  Wait for **On MCC-H GO** for left blanket box un latch.

### 13.4 Verifying Initial SAW Left Blanket Box Configuration

**SAW [XX] LBB Commands**

Verify parameters in LATCHED column in step 13.7 before executing unlatch command.

### 13.5 Preventing Thruster Firings

**CAUTION**

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)

**MCC-H**

MCS: MCS Configuration: Manual CMG Desat

[Manual CMG Desat]

\[\checkmark\]

Desat Request – Inh

**MCC-H** \[\checkmark\] ISS, orbiter, “Desats are Inhibited.”

Go to step 13.6.
1.3.454 P6 SAW XX RE-DEPLOY
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******************************************************************************
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* Perform (2.404 MODING CMG TA TO FREE DRIFT), all (SODF:
* MCS: NOMINAL: GNC MODING), then:
* MCC-H \ iss, orbiter, “ISS is in Free Drift.”
* Go to step 13.6.
******************************************************************************

C3(A6)
* If orbiter is performing mated attitude control
* DAP: FREE
* Orbiter ⇒ ISS, MCC-H, “Orbiter is in Free Drift.”
* Go to step 13.6.

13.6 Unlatching SAW Left Blanket Box

CAUTION
Confirm no crew exercise or maximum EVA loads before proceeding.

NOTE
Upon successful unlatch command, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

MCC-H \ iss, orbiter, “We are ready to unlatch the left blanket box, please monitor Cameras.”

PCS
PVM: EPS: SAW [XX]
[B]SAW [XX][/B]
‘LBB’
sel LBB Commands

[SAW [XX] LBB Commands
‘LBB’

[b]cmd[/b] Unlatch – Arm
[b]cmd[/b] Unlatch – Unlatch

13.7 Monitoring LBB Latch Parameters During Unlatch (Detension)
(Approximately 14 Seconds)
Refer to Table 3.
Table 3. LBB Parameters

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>LATCHED</th>
<th>TRANSITION →</th>
<th>UNLATCHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBB SW01,02 Pin Released</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LBB SW01,02 Latched</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>LBB SW01,02 Unlatched</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MDA Slow Alert</td>
<td>Slow</td>
<td>Nominal</td>
<td>Slow</td>
</tr>
<tr>
<td>MDA Voltage, V</td>
<td>120 to 125</td>
<td>120 to 125</td>
<td>120 to 125</td>
</tr>
<tr>
<td>MDA Temp, deg C</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
</tr>
<tr>
<td>MDA Over Temp Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
<tr>
<td>MDA Current, A</td>
<td>~0.10 (± 0.4)</td>
<td>0.20 to 2.00 (± 0.4)</td>
<td>~0.10 (± 0.4)</td>
</tr>
<tr>
<td>MDA Over Current Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
</tbody>
</table>

For crew:
- If orbiter is performing mated attitude control
  Proceed to step 13.8.
- If orbiter is not performing mated attitude control
  Proceed to step 13.9.

* If one Latched, Unlatched, or Pin Released limit switch fails
  Confirm configuration visually and notify MCC-H before proceeding.
* SABB limit switch status that would restrict Mast commanding has already been overridden in step 10.1.
* If two Latched, Unlatched, or Pin Released limit switches fail
  Perform steps 13.8 and 13.9; then, notify MCC-H before proceeding.

13.8 Configuring for Nominal Attitude Control

MCC-H
If ISS is performing attitude control and ISS is in TEA (MCC-H)
Go to step 13.9.
13.454 P6 SAW XX RE-DEPLOY
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**********************************************************************
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)  *
* Perform (2.405 MODING FREE DRIFT TO CMG TA) (SODF:              *
*       MCS: NOMINAL: GNC MODING), then:                          *
*     MCC-H ↑ ISS, orbiter, “ISS is in Attitude Control.”         *
*     Go to step 13.9.                                            *
**********************************************************************

C3(A6) *

* If orbiter is performing mated attitude control               *
* Perform DOCKED DAP REFERENCE, RATE DAMPING                    *
* (FDF: ORB OPS FS, REBOOST/DAP), then:                         *
*     Go to step 13.9.                                          *
**********************************************************************

13.9 Performing Visual Verification Via Cameras
Verify latch position (four of eight) unlatched.

ISS ↓ MCC-H, “We confirm the left blanket box is unlatched.”

MCC-H ↑ ISS, “We confirm nominal unlatch.”

Crew: proceed to step 14.3.

**********************************************************************
* If unlatch sequence is not successful, notify MCC-H before     *
* proceeding.                                                   *
*                                                            *
* If MCC-H unavailable, perform (3.190 SAW XX FAILURE           *
* TO UNLATCH SABB REMOTELY), all (SODF: EPS:                  *
*     MALFUNCTION: PRIMARY POWER SYSTEM), then:                 *
**********************************************************************

13.10 Power Off Left Blanket Box MDA

PCS
PVM: EPS: SAW [XX]

SAW [XX] sel LBB Commands

SAW [XX] LBB Commands
'MDA'
'MDA'

cmd Off – Off

√ MDA Voltage < 10 (± 2.8)
14. **UNLATCHING RIGHT BLANKET BOX (RBB)**

14.1 **Verifying Temperatures are Within Nominal Ranges Prior to Unlatch**

PVM: EPS: SAW [XX]

[SAW [XX]]

‘ECU [XX]’

Verify SAW PS Temp, deg C: -33 to 51
Verify BGA PS Temp, deg C: -33 to 51

‘RBB’

Verify MDA Temp, deg C: -54 to 48

14.2 **Powering On RBB Motor Drive Assembly (MDA)**

**NOTE**

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

[SAW [XX]]

‘RBB’

sel RBB Commands

[SAW [XX] RBB Commands]

‘MDA’

‘Power’

**cmd** On – On Arm

**cmd** On – On

√MDA Voltage, V: 120 to 125

14.3 **Performing Visual Verification Via Cameras**

Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation.

There are eight latches to be unlatched for each blanket box prior to SAW retract.

Only four of eight latches are visible at a time.

Verify Camera configuration correct for solar array retraction before proceeding.

Verify Latch Position (four of eight) – latched
For crew:

- If orbiter is performing mated attitude control
  Proceed to step 14.5.
- If orbiter is not performing mated attitude control
  Proceed to step 14.6.
- Wait for MCC-H right blanket box unlatch.

14.4 Verifying Initial SAW Right Blanket Box Configuration

SAW [XX] RBB Commands

Verify parameters in LATCHED column in step 14.7 before executing unlatch command.

14.5 Preventing Thruster Firings

**CAUTION**

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

If ISS is performing attitude control and ISS is in TEA (MCC-H)

MCC-H

MCS: MCS Configuration: Manual CMG Desat

| Manual CMG Desat |

√Desat Request – Inh

MCC-H ✐ ISS, orbiter, “Desats are Inhibited.”

Go to step 14.6.

********************************************************************************

* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
  * Perform [2.404 MODING CMG TA TO FREE DRIFT], all
    (SODF: MCS: NOMINAL: GNC MODING), then:
      * MCC-H ✐ ISS, orbiter, “ISS is in Free Drift.”
      * Go to step 14.6.

********************************************************************************

C3(A6)

* If orbiter is performing mated attitude control
  * DAP: FREE
  * Orbiter ➔ ISS, MCC-H, “Orbiter is in Free Drift.”
  * Go to step 14.6.

********************************************************************************
14.6 Unlatching SAW Right Blanket Box

**CAUTION**

Confirm no crew exercise or maximum EVA loads before proceeding.

Upon successful unlatch commanding, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

**NOTE**

MCC-H ¤ ISS, orbiter, “We are ready to unlatch the right blanket box, please monitor Cameras.”

PCS

PVM: EPS: SAW [XX]

[SAW [XX]]

‘RBB’

sel RBB Commands

[SAW [XX] RBB Commands]

‘RBB’

**cmd** Unlatch – Arm

**cmd** Unlatch – Unlatch

14.7 Monitoring RBB Latch Parameters During Unlatch (Detension)

(Approximately 14 seconds)

Refer to Table 4.

**NOTE**

SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.
Table 4. RBB Parameters

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>LATCHED →</th>
<th>TRANSITION → Approx. 14 Seconds</th>
<th>UNLATCHED D</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBB SW01,02 Pin Released</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>RBB SW01,02 Latched</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>RBB SW01,02 Unlatched</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MDA Slow Alert</td>
<td>Slow</td>
<td>Slow</td>
<td>Slow</td>
</tr>
<tr>
<td>MDA Voltage, V</td>
<td>120 to 125</td>
<td>120 to 125</td>
<td>120 to 125</td>
</tr>
<tr>
<td>MDA Temp, deg C</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
</tr>
<tr>
<td>MDA Over Temp Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
<tr>
<td>MDA Current, A</td>
<td>~0.10 (± 0.4)</td>
<td>0.20 to 2.00 (± 0.4)</td>
<td>~0.10 (± 0.4)</td>
</tr>
<tr>
<td>MDA Over Current Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
</tbody>
</table>

For crew:
- If orbiter is performing mated attitude control
  Proceed to step 14.8.
- If orbiter is not performing mated attitude control
  Proceed to 14.9.

*************************************************************************
* If one Latched, Unlatched, or Pin Released limit switch fails
  * Confirm configuration visually and notify MCC-H before proceeding.
  * SABB limit switch status that would restrict Mast commanding has already been overridden in step 10.1.
* If two Latched, Unlatched, or Pin Released limit switches fail
  * Perform steps 14.8 and 14.9; then, notify MCC-H before proceeding.
*************************************************************************

14.8 Enabling Thrusters (or Configuring for Attitude Control)

MCC-H
- If ISS is performing attitude control and ISS is in TEA (MCC-H)
  Go to step 14.9.

*************************************************************************
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
  * Perform [2.405 MODING FREE DRIFT TO CMG TA], all (SODF: MCS: NOMINAL: GNC MODING), then:
  * MCC-H ↑ ISS, orbiter, “ISS is in Attitude Control.”
* Go to step 14.9.
*************************************************************************
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C3(A6)
* If orbiter is performing mated attitude control
* Perform DOCKED DAP REFERENCE, RATE DAMPING
  *(FDF: ORB OPS FS, REBOOST/DAP), then:
* Go to step 14.9.
************************************************************************

14.9 Performing Visual Verification Via Cameras
Verify latch position (four of eight) unlatched (detensioned).

ISS ↓ MCC-H, “We confirm the right blanket box is unlatched.”

MCC-H ↑ ISS, “We confirm nominal unlatch.”

Crew: proceed to step 15.3 and provide Camera support as necessary.

************************************************************************

* If unlatch sequence is not successful, notify MCC-H before proceeding.
* If MCC-H unavailable, perform {3.190 SAW XX FAILURE
  TO UNLATCH SABB REMOTELY}, all (SODF: EPS:
  MALFUNCTION: PRIMARY POWER SYSTEM), then:
************************************************************************

14.10 Powering Off Right Blanket Box MDA

PCS
PVM: EPS: SAW [XX]
[SAW [XX]]
‘RBB’

sel RBB Commands

[SAW [XX] RBB Commands
  ‘MDA’
  ‘Power’

cmd Off – Off

\MDA Voltage < 10 (± 2.8)

15. DEPLOYING FIRST BAY OF SOLAR ARRAY

WARNING
All SABB unlatch activities must be completed prior to performing
the following steps. Verify EVA crew is clear of SAW
mechanisms before proceeding.
15.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy

PVM: EPS: SAW [XX]

[SAW [XX]]

Verify SAW PS Temp, deg C: -33 to 51
Verify BGA PS Temp, deg C: -33 to 51
Verify Mast MDA Temp, deg C: -54 to 48

15.2 Powering on Mast Motor Drive Assembly (MDA)

NOTE

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

[SAW [XX]]

'Mast'

sel Mast Commands

[SAW [XX] Mast Commands]

'MDA'

'MPower'

cmd On – Arm

cmd On – On

√MDA Voltage, V: 120 to 125
√MDA Current, A: ~0.10 (± 0.4)
√MDA Slow Alert – Slow

15.3 Verifying Camera Configuration

ISS must be in insolation to perform this verification.

NOTE

Perform a visual verification prior to, during, and at the completion of the mast deploy operation. This ensures all launch restraints have been removed, minimizes the risk of potential collision hazards, and monitor for any obvious anomalies. Total number of visible Mast Bays is 31.5, 1 Bay is rigid batten to rigid batten.

Verify Camera configuration correct for solar array deployment before proceeding.
If orbiter is performing mated attitude control
   Proceed to step 15.6.
If orbiter is not performing mated attitude control
   Proceed to step 15.7.
   Wait for **On MCC-H GO** for 1 Mast Bay deployment.

**MCC-H** proceed to step 15.4.

### 15.4 Verifying Initial SAW Mast Configuration

**NOTE**
SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

**SAW [XX] Mast Commands**

\√ Mast SW01,SW02 Retracted – Yes
\√ Mast SW01,SW02 Deployed – No

### 15.5 Verifying Conditions are Correct for Visual Verification

**CAUTION**
Steps 15.7 and 15.9 are to be performed during insolation to support crew visual cues used to determine when to abort the solar array deployment.

Verify ISS is in insolation.

### 15.6 Preventing Thruster Firings

**CAUTION**
To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. At any time array deployment is stopped or aborted, thrusters may be enabled.

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)

**MCC-H**

MCS: MCS Configuration: Manual CMG Desat

[Manual CMG Desat]

\√ Desat Request – Inh

**MCC-H** \ו ISS, orbiter, “Desats are Inhibited.”

Go to step 15.7.
1.3.454 P6 SAW XX RE-DEPLOY
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******************************************************************************
  * If ISS is performing attitude control and ISS is not in TEA (MCC-H)
  * Perform (2.404 MODING CMG TA TO FREE DRIFT), all
  * (SODF: MCS: NOMINAL: GNC MODING), then:
  * MCC-H 🌈 ISS, orbiter, “ISS is in Free Drift.”
  * Go to step 15.7.
******************************************************************************

******************************************************************************
  * If orbiter is performing mated attitude control
  * DAP: FREE
  * Orbiter ⇒ ISS, MCC-H, “orbiter is in Free Drift.”
  * Go to step 15.7. and wait for MCC-H to deploy Mast 1 Bay.
******************************************************************************

15.7 Deploying First Bay of SAW

CAUTION
Confirm no crew exercise or Max EVA loads before proceeding.

NOTE
Upon successful deploy commanding, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition. Once power is removed from the MDA, the Slow alert will indicate Nominal.

MCC-H 🌈 ISS, orbiter, “Ground Deploying First Mast Bay.”

PCS
PVM: EPS: SAW [XX]

[SAW [XX]]

‘Mast’

sel Mast Commands

[SAW [XX] Mast Commands]

‘Mast’

NOTE
To reduce the risk of damage to the blanket leaders, springs and hinges, the following three commands will be built and executed as time tagged commands. When the Abort command is issued, only 1/4 of the first Bay will be visible. This equates to 5 seconds between the Deploy command and the Abort command.
**cmd** Deploy – Arm
**cmd** Deploy – Deploy

Wait approximately 5 seconds until blanket leaders and springs are just visible.

**cmd** Abort – Abort

[NOTE]
The Mast – Abort command removes power from the MDA.

‘MDA’

√Voltage < 10 (± 2.8) (MDA – Off)

IVA or EVA crew:
Visually verify good separation between the top and bottom blanket panels, springs, and leaders.

**SAW [XX] Mast Commands**

‘Power’

**cmd** On – Arm
**cmd** On – On

√MDA Voltage, V: 120 to 125
√MDA Current, A: ~0.10 (± 0.4)
√MDA Slow Alert – Slow

**SAW [XX] Mast Commands**

‘Mast’

**cmd** Deploy – Arm
**cmd** Deploy – Deploy

**************************************************************
* If at any time during the array deploy the blanket box begins to distort
* ‘Mast’
* **cmd** Abort – Abort
* √MCC-H before proceeding
**************************************************************

Wait approximately 15 seconds (~1 Bay visible).

‘Mast’
**cmd** Abort – Abort

If orbiter is performing mated attitude control
   Proceed to step 15.8.
If orbiter is not performing mated attitude control
   Proceed to step 15.9.

---

**NOTE**
1. The Mast - Abort command removes power from the MDA.
2. SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

√ MDA Voltage, V: < 10 (± 2.8)
√ Mast SW01,SW02 Retracted – No
√ Mast SW01,SW02 Deployed – No

MCC-H proceeds to step 15.8.

15.8 Enabling Thrusters (or Configuring for Attitude Control)

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)
   Go to step 15.9.

******************************************************************************
* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)
* Perform [2.405 MODING FREE DRIFT TO CMG TA], all
* (SODF: MCS: NOMINAL: GNC MODING), then:
* MCC-H ↑ ISS, orbiter, “ISS is in Attitude Control.”
* Go to step 15.9.
******************************************************************************

C3(A6) *
* If orbiter is performing mated attitude control
* Perform DOCKED DAP REFERENCE, RATE DAMPING
* (FDF: ORB OPS FS, REBOOST/DAP), then:
* Go to step 15.9.
******************************************************************************

15.9 Performing Visual Verification Via Cameras

Verify blanket box covers clear of latch hooks (left and right SABB).
Verify number of visible mast bays ~1.

ISS ↓ **MCC-H**, “We confirm 1 mast bay deployed.”

**MCC-H** ↑ ISS, “We confirm nominal mast deployment.”
If orbiter is performing mated attitude control
Proceed to step 16.5.
If orbiter is not performing mated attitude control
Proceed to step 16.8.
Wait for MCC-H to latch the left blanket box.

MCC-H proceeds to step 16.1.

************************************************************************
* If deploy sequence is not successful, √MCC-H before proceeding.
* If MCC-H unavailable, perform {3.191 SAW XX FAILURE TO EXTEND MAST REMOTELY}, all (SODF: EPS: MALFUNCTION: PRIMARY POWER SYSTEM), then:
************************************************************************

16. LATCHING LEFT SOLAR ARRAY BLANKET BOX (ENGAGING HIGH TENSION MODE)

16.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy

PCS

PVM: EPS: SAW [XX]

SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51
Verify BGA PS Temp, deg C: -33 to 51
Verify LBB MDA Temp, deg C: -54 to 48

16.2 Powering On LBB Motor Drive Assembly (MDA)

NOTE
MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

‘LBB’

sel LBB Commands

SAW [XX] LBB Commands
‘MDA’
‘Power’

cmd On – Arm
cmd On – On

√MDA Voltage, V: 120 to 125
16.3 Verifying SAW Left Blanket Box Configuration
Verify parameters in UNLATCHED column in step 16.7 before executing latch command.

16.4 Verifying Conditions are Correct for Visual Verification

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steps 16.6 and 16.8 are to be performed during insolation, to support crew visual cues use to determine correct SABB latch configuration.</td>
</tr>
</tbody>
</table>

Verify ISS is in insolation.

16.5 Preventing Thruster Firings

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.</td>
</tr>
</tbody>
</table>

If ISS is performing attitude control and ISS is in TEA (MCC-H)

MCC-H

MCS: MCS Configuration: Manual CMG Desat

- Manual CMG Desat

√ Desat Request – Inh

MCC-H  ISS, orbiter, “Desats are Inhibited.”

Go to step 16.6.

**********************************************************************************

* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* Perform **2.404 MODING CMG TA TO FREE DRIFT**, all
  (SODF: MCS: NOMINAL: GNC MODING), then:
  *
  * MCC-H  ISS, orbiter, “ISS is in Free Drift.”
  *
  * Go to step 16.6.

**********************************************************************************
**C3(A6)**

* If orbiter is performing mated attitude control
  DAP: FREE
  Orbiter \(\Rightarrow\) ISS, MCC-H, “orbiter is in Free Drift.”
  Go to step 16.6.

****************************************************************************************************************************

**16.6 Latch SAW Left Blanket Box (Engage High Tension Mode)**

**CAUTION**

Confirm no crew exercise or max EVA loads before proceeding.

**NOTE**

1. Latching the blanket box engages high tension mode (75 lbs) and provides more control over stiction between blanket panels during array deployment.

2. Upon successful Latch commanding, the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

MCC-H \(\uparrow\) ISS, orbiter, “Ready to latch the left blanket box.”

PCS

PVM: EPS: SAW [XX]

SAW [XX]

‘LBB’

**sel LBB Commands**

**SAW [XX] LBB Commands**

‘LBB’

**cmd** Latch – Arm

**cmd** Latch – Latch

Be ready to visually monitor latch motion and check parameters in step 16.7 before sending this command.

Latch nominally takes 14 seconds to complete.

**16.7 Monitoring LBB Latch Parameters During Latch**

(Approximately 14 seconds)

Refer to Table 5.
NOTE
1. Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation. Monitor for any obvious anomalies and verify blanket box latching operation.

2. SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.

Table 5. LBB Parameters

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNLATCHED</th>
<th>TRANSITION →</th>
<th>LATCHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBB SW01,02 Pin Released</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LBB SW01,02 Latched</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>LBB SW01,02 Unlatched</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>MDA Slow Alert</td>
<td>Slow</td>
<td>Nominal</td>
<td>Slow</td>
</tr>
<tr>
<td>MDA Voltage, V</td>
<td>120 to 125</td>
<td>120 to 125</td>
<td>120 to 125</td>
</tr>
<tr>
<td>MDA Temp, deg C</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
</tr>
<tr>
<td>MDA Over Temp Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
<tr>
<td>MDA Current, A</td>
<td>~0.10 (+ 0.4)</td>
<td>0.20 to 3.00 (± 0.4)</td>
<td>~0.10 (+ 0.4)</td>
</tr>
<tr>
<td>MDA Over Current Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
</tbody>
</table>

*******************************************************************************
* If one Latched, Unlatched, or Pin Released limit switch fails
* Confirm configuration visually and √MCC-H before proceeding.
* SABB limit switch status that would restrict mast commanding
* has already been overridden in step 10.1.

* If two Latched, Unlatched, or Pin Released limit switches fail
* Perform step 16.8 and 16.9 (if orbiter performing attitude control), then √MCC-H before proceeding.
*******************************************************************************

16.8 Performing Visual Verification Via Cameras
Verify latch position (four of eight) latched (tensioned position).

ISS ↓ MCC-H, “We confirm the left blanket box is latched.”

MCC-H ↑ ISS, “We confirm nominal Latch.”
If orbiter is performing mated attitude control
  Proceed to step 16.9.
If orbiter is not performing mated attitude control
  Proceed to step 17.8.
  Wait for MCC-H to latch the right blanket box.

**MCC-H** proceed to step 16.9.

******************************************************************************
* If latch sequence is not successful, \[MCC-H\] before proceeding.
* ...
* If **MCC-H** unavailable, perform \[3.193 SAW XX FAILURE TO LATCH (TENSION) SABB REMOTELY\], all (SODF: EPS: MALFUNCTION: PRIMARY POWER SYSTEM), then:
******************************************************************************

**16.9 Enabling Thrusters (or Configuring for Attitude Control)**

**MCC-H**
If ISS is performing attitude control and ISS is in TEA (**MCC-H**)
  Go to step 16.10.

******************************************************************************
* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)
  Perform \[2.405 MODING FREE DRIFT TO CMG TA\], all (SODF: MCS: NOMINAL: GNC MODING), then:
* ...
* **MCC-H** \[ISS, orbiter, “ISS is in Attitude Control.”\]
  Go to step 16.10.
******************************************************************************

**C3(A6)**
* If orbiter is performing mated attitude control
  Perform DOCKED DAP REFERENCE, RATE DAMPING (FDF: ORB OPS FS, REBOOST/DAP), then:
  ...
  If orbiter continues to perform mated attitude control
  Proceed to step 17.5.
  Wait for **On MCC-H GO**.
  If orbiter does not continue to perform mated attitude control
  Proceed to step 17.8.
  Wait for **MCC-H** to latch the right blanket box.
  ...
  **On MCC-H GO** to step 16.10.
******************************************************************************

**16.10 Powering Off Left Blanket Box MDA**

**PCS**
* PVM: EPS: SAW [XX] [SAW [XX]]
  ‘LBB’

  sel LBB Commands
SAW [XX] LBB Commands

'MDA'

'Power'

\[ \text{cmd Off – Off} \]

\[ \sqrt{\text{MDA Voltage, V: } < 10 \ (\pm 2.8)} \]

17. LATCHING RIGHT SOLAR ARRAY BLANKET BOX (ENGAGING HIGH TENSION MODE)

17.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy

PVM: EPS: SAW [XX]

SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51
Verify BGA PS Temp, deg C: -33 to 51
Verify RBB MDA Temp, deg C: -54 to 48

17.2 Powering On RBB Motor Drive Assembly (MDA)

\[ \text{NOTE} \]

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

'RBB'

sel RBB Commands

SAW [XX] RBB Commands

'MDA'

'Power'

\[ \text{cmd On – Arm} \]

\[ \text{cmd On – On} \]

\[ \sqrt{\text{MDA Voltage, V: } 120 \text{ to } 125} \]

17.3 Verifying SAW Right Blanket Box Configuration

Verify parameters in UNLATCHED column in step 17.7 before executing latch command.

17.4 Verifying Conditions are Correct for Visual Verification

\[ \text{CAUTION} \]

Steps 17.6 and 17.8 are to be performed during insolation, to support crew visual cues use to determine correct SABB latch configuration.

Verify ISS is in insolation.
17.5 Preventing Thruster Firings

**CAUTION**

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

If ISS is performing attitude control and ISS is in TEA (MCC-H)

- **MCS: MCS Configuration:** Manual CMG Desat
- Manual CMG Desat
- √Desat Request – Inh

**MCC-H**

ISS, orbiter, “Desats are Inhibited.”

Go to step 17.6.

********************************************************************************

* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* Perform (2.404 MODING CMG TA TO FREE DRIFT), all
* (SODF: MCS: NOMINAL: GNC MODING), then:
*  
*  
* **MCC-H**
*  
*  
* ISS, orbiter, “ISS is in Free Drift.”
*  
* Go to step 17.6.

********************************************************************************

**C3(A6)**

* If orbiter is performing mated attitude control
* DAP: FREE
*  
* Orbiter ⇒ ISS, **MCC-H**, “Orbiter is in Free Drift.”
*  
* Go to step 17.8. and wait for **MCC-H** to latch RBB.
*  
* **MCC-H** proceed to step 17.6.

********************************************************************************

17.6 Latching SAW Right Blanket Box (Engage High Tension Mode)

**CAUTION**

Confirm no crew exercise or Max EVA loads before proceeding.
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NOTE
1. Latching the blanket box engages high tension mode (75 lbs) and provides more control over stiction between blanket panels during array deployment.

2. Upon successful latch commanding, the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

**MCC-H** \(\uparrow\) ISS, orbiter, “Ready to latch the right blanket box.”

**PCS**

PVM: EPS: SAW [XX]

SAW [XX]

‘RBB’

sel RBB Commands

<table>
<thead>
<tr>
<th>SAW [XX] RBB Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘RBB’</td>
</tr>
</tbody>
</table>

**cmd** Latch – Arm

**cmd** Latch – Latch

Be ready to visually monitor latch motion and check parameters in step 17.7 before sending this command. Latch nominally takes 14 seconds to complete.

17.7 **Monitoring RBB Latch Parameters During Latch**

(Approximately 14 seconds)

Refer to Table 6.

NOTE
1. Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation. Monitor for any obvious anomalies and verify blanket box latching operation.

2. SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.
### Table 6. RBB Parameters

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNLATCHED →</th>
<th>TRANSITION →</th>
<th>LATCHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBB SW01,02 Pin Released</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>RBB SW01,02 Latched</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>RBB SW01,02 Unlatched</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>MDA Slow Alert</td>
<td>Slow</td>
<td>Nominal</td>
<td>Slow</td>
</tr>
<tr>
<td>MDA Voltage, V</td>
<td>120 to 125</td>
<td>120 to 125</td>
<td>120 to 125</td>
</tr>
<tr>
<td>MDA Temp, deg C</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
<td>-54 to 48</td>
</tr>
<tr>
<td>MDA Over Temp Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
<tr>
<td>MDA Current, A</td>
<td>~0.10 (± 0.4)</td>
<td>0.20 to 3.00</td>
<td>~0.10 (± 0.4)</td>
</tr>
<tr>
<td>MDA Over Current Trip</td>
<td>blank</td>
<td>blank</td>
<td>blank</td>
</tr>
</tbody>
</table>

**************************************************************************

* If one Latched, Unlatched, or Pin Released limit switch fails
  * Confirm configuration visually and √MCC-H before proceeding.
  * SABB limit switch status that would restrict mast commanding has already been overridden in step 10.1.
  * If two Latched, Unlatched, or Pin Released limit switches fail
    * Perform step 17.8 and 17.9 (if orbiter performing attitude control), then √MCC-H before proceeding.

**************************************************************************

17.8 Performing Visual Verification Via Cameras
Verify latch position (four of eight) latched (tensioned position).

ISS ↓ MCC-H, “We confirm the right blanket box is latched.”

MCC-H ↑ ISS, “We confirm nominal latch.”

If orbiter is performing mated attitude control
  Proceed to step 17.9.
If orbiter is not performing mated attitude control
  Proceed to step 18.4.

MCC-H proceed to step 17.9.
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If latch sequence is not successful, √MCC-H before proceeding.

If MCC-H unavailable, perform 3.193 SAW XX FAILURE TO LATCH (TENSION) SABB REMOTELY, all (SODF: EPS: MALFUNCTION: PRIMARY POWER SYSTEM), then:

*****************************************************************
C3(A6)
If orbiter is performing mated attitude control
Perform DOCKED DAP REFERENCE, (FDF: ORB OPS FS, REBOOST/DAP), then:
Proceed to step 18.3.
MCC-H proceed to step 17.10.
*****************************************************************

17.9 Enabling Thrusters (or Configuring for Attitude Control)
MCC-H
If ISS is performing attitude control and ISS is in TEA (MCC-H)
Go to step 17.10.

*****************************************************************
If ISS is performing attitude control and ISS is not in TEA (MCC-H)
Perform 2.405 MODING FREE DRIFT TO CMG TA, all (SODF: MCS: NOMINAL: GNC MODING), then:
MCC-H ↑ ISS, orbiter, “ISS is in Attitude Control.”
Go to step 17.10.
*****************************************************************

17.10 Powering Off Right Blanket Box MDA
PCS
PVM: EPS: SAW [XX]

‘RBB’

sel RBB Commands

[SAW [XX] RBB Commands
‘MDA’
‘Power’

cmd Off – Off

√MDA Voltage, V: < 10 (± 2.8)

If deploying both arrays on a PVM the same day
Perform steps 13 to 17 for both Channels before proceeding to step 18.
18. **COMPLETING SOLAR ARRAY DEPLOYMENT**

**MCC-H** 🔄 **ISS**, “Steps 1 to 17 of the Solar Array Re-Deploy procedure have been completed. Proceed to step 18.3 and confirm correct Camera and RWS configuration for solar array XX re-deploy.”

---

**WARNING**

Verify EVA crew is clear of SAW mechanisms before proceeding.

---

18.1 **Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy**

PVM: EPS: SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51
Verify BGA PS Temp, deg C: -33 to 51
Verify Mast MDA Temp, deg C: -54 to 48

18.2 **Powering On Mast Motor Drive Assembly (MDA)**

**NOTE**

1. Mast MDA temperatures may be high due to direct sunlight in deploy configuration. MDA Over Temp Trip occurs at 77.8° C. At a minimum, a 30° C mast MDA temperature increase should be protected for during mast deployment. Delay MDA activation, until just prior to deploy time to minimize temperature increase if necessary.

2. MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

```
SAW [XX]
'Mast'
```

```
sel Mast Commands
```

```
SAW [XX] Mast Commands
'MDA'
'Power'
cmd On – Arm
cmd On – On
```

√ MDA Voltage, V: 120 to 125
√ MDA Current, A: ~0.10 (± 0.4)
√ MDA Slow Alert – Slow
18.3 Verifying Camera Configuration

ISS must be in insolation to perform this verification.

**NOTE**
Perform a visual verification prior to, during, and at the completion of the mast deploy operation to minimize the risk of potential collision hazards, monitor for any obvious anomalies, and to verify solar array deployment. Total number of visible Mast Bays is 31.5, 1 Bay is rigid batten to rigid batten.

Verify Camera configuration is correct for solar array deploy to 100 %, before proceeding.

If orbiter is performing mated attitude control
  - Wait for deploy time from **MCC-H**.
  - Proceed to step 18.6.

If orbiter is not performing mated attitude control
  - Proceed to step 18.7.
  - Wait for **On MCC-H GO** to complete Mast re-deploy.

**MCC-H** proceed to step 18.4.

18.4 Verifying Initial SAW Mast Configuration

**NOTE**
SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

**SAW [XX] Mast Commands**

√ Mast SW01,SW02 Retracted – No
√ Mast SW01,SW02 Deployed – No

18.5 Verifying Conditions are Correct for Visual Verification

Verify ISS is in insolation

18.6 Preventing Thruster Firings

**CAUTION**
To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. At any time array deployment is stopped or aborted, thrusters may be enabled.
If ISS is performing attitude control and ISS is in TEA (MCC-H)

MCC-H

MCS: MCS Configuration: Manual CMG Desat

Manual CMG Desat

√Desat Request – Inh

MCC-H † ISS, orbiter, “Desats are Inhibited.”

Go to step 18.7.

**********************************************************************

* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* Perform (2.404  MODING CMG TA TO FREE DRIFT), all
  (SODF: MCS: NOMINAL: GNC MODING), then:
* MCC-H † ISS, orbiter, “ISS is in Free Drift.”
* Go to step 18.7.
**********************************************************************

C3(A6)

* If orbiter is performing mated attitude control
  DAP: FREE
* Orbiter ⇒ ISS, MCC-H, “Orbiter is in Free Drift.”
* Go to step 18.7, notify MCC-H before sending the deploy command.

**********************************************************************

18.7 Deploying 100 % of SAW (Approximately 31.5 Bays Visible)

WARNING

If deploying a solar array during EVA operations, confirm EV crew clear of solar array mechanisms and mast interface.

CAUTION

1. Confirm no crew exercise or maximum EVA loads before proceeding.

2. If the mast is in motion and the re-deploy will not be completed (100 %) before entering eclipse, the deploy must be stopped using the Mast – Abort command upon entering eclipse due to loss of visual insight. Once deploy is stopped, crew will perform step 18.9, if orbiter is performing attitude control. Otherwise, crew will hold in step 18.7 and wait for MCC-H GO to complete mast deploy.
NOTE
Upon successful deploy commanding, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

PCS
PVM: EPS: SAW [XX]
SAW [XX]
'Mast'

sel Mast Commands

SAW [XX] Mast Commands
'Mast'

**cmd** Deploy – Arm
**cmd** Deploy – Deploy (Nominal re-deploy takes ~13 minutes.)

Monitor RBB and LBB tension bars for motion until the last Mast Bay begins to deploy.

NOTE
During deployment of the last half Mast Bay (at Mast Bay 31) the tension bars of both blankets will rise off the blanket box sill (~20 inches).
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******************************************************************************
* If either tension bar rises up more than 1.5" immediately abort 
* the deploy.
* ‘Mast’
* 
* cmd Abort – Abort
* 
* If either tension bar rises up excessively (> 3") from the 
* blanket box sill and does not return to the sill after the abort 
* is issued, then immediately
* 
* SAW [XX] Mast Commands
* ‘MDA’
* ‘Power’
* 
* cmd On – Arm
* cmd On – On
* 
* √ MDA Voltage, V: 120 to 125
* ‘Mast’
* 
* cmd Retract – Arm
* cmd Retract – Retract
* 
* Retract the mast until the tension bar reaches the sill.
* ‘Mast’
* 
* cmd Abort – Abort
* 
* √ MDA Voltage, V: < 10 (± 2.8)
* 
* √ MCC-H before proceeding
******************************************************************************
If guidewires become significantly hung up on panel grommets, abort the deploy.

' Mast'

**cmd** Abort – Abort

(MCC-H only)

Perform the BGA Wiggle Technique to distribute blanket panels.

NOTE

The PCS displays cannot be used to perform the BGA Wiggle technique, it must be executed by **MCC-H** utilizing a time tagged script.

P6: EPS: BGA 2B (BGA 4B)

'BGA 2B (BGA 4B)'

Monitor Actual Angle, as the BGA 2B (BGA 4B) sweeps between 195 and 205 deg (175 and 185 deg).

If more than 24 bays remain deployed, perform the following sequence

Command BGA 2B(BGA 4B) to 195 deg(175 deg) then to 205 deg(185 deg) in 26-second increments for 5 periods.

Finish sequence with BGA 2B(BGA 4B) at 200 deg(180 deg).

If more than 14 but less than 24 bays remain deployed, perform the following sequence

Command BGA 2B(BGA 4B) to 195 deg(175 deg) then to 205 deg(185 deg) in 22-second increments for 6 periods.

Finish sequence with BGA 2B(BGA 4B) at 200 deg(180 deg).

If less than 14 bays remain deployed, perform the following sequence

Command BGA 2B(BGA 4B) to 195 deg(175 deg) then to 205 deg(185 deg) in 15-second increments for 8 periods.

Finish sequence with BGA 2B(BGA 4B) at 200 deg(180 deg).

If grommet released

Perform step 18.2 and begin 18.7 again.

If grommet is not released

Repeat BGA wiggle technique.

**************************************************************************

Wait approximately 13 minutes until 100 % deployed (confirm 31.5 bays are visible).
If orbiter is performing mated attitude control
| Proceed to step 18.9.

If orbiter is not performing mated attitude control
Proceed to step 18.10.

**MCC-H** proceed to step 18.8.

### 18.8 Verifying Final SAW Mast Configuration

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.</td>
</tr>
</tbody>
</table>

#### SAW [XX] Mast Commands

- √ Mast SW01,SW02 Retracted – No
- √ Mast SW01,SW02 Deployed – Yes
- √ MDA Voltage, V: 120 to 125
- √ MDA Current, A: ~0.10 (± 0.4
- √ MDA Slow Alert – Slow

* If one Deployed or Retracted limit switch fails
  * Confirm configuration visually and √**MCC-H** before proceeding.
  * Mast limit switch status that would restrict SABB and BGA commanding has already been overridden in step 10.2.
  * If two Deployed or Retracted limit switches fail
    * Perform steps 18.9 (if orbiter performing attitude control) and 18.10, then √**MCC-H** before proceeding.

### 18.9 Enabling Thrusters (or Configuring for Attitude Control)

**MCC-H**
If ISS is performing attitude control and ISS is in TEA (**MCC-H**)
Go to step 18.10.

* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)
  * Perform [2.405 MODING FREE DRIFT TO CMG TA], all (SODF: MCS: NOMINAL: GNC MODING), then:
    * **MCC-H** ¡ ISS, orbiter, “ISS is in Attitude Control.”
  * Go to step 18.10.
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************************************************************************

C3(A6)
** If orbiter is performing mated attitude control
* Perform DOCKED DAP REFERENCE, RATE DAMPING
  (FDF: ORB OPS FS, REBOOST/DAP), then:
* Go to step 18.10.
************************************************************************

18.10 Performing Visual Verification Via Cameras
Verify mast position – Deployed
Verify tension bar – Pulled away from blanket box ~20”
(as last mast bay deploys)
Verify number of visible mast bays – 31.5
Verify solar array blanket – Flat
Verify guide rollers on final bay – Visible (final yellow flex batten)
or
Verify Last Bay barber pole decal – Visible

NOTE
Last Bay barber pole indication can be seen with the cameras only when the array is positioned at or near 180 degrees (Mast MDA side).

ISS ↓ MCC-H, “Solar Array XX deploy complete.”

MCC-H ↑ ISS, “We confirm solar array fully deployed.”

MCC-H proceed to 18.11.

Crew: if deploying both arrays on a PVM the same day, return to step 18.3 and reconfigure Cameras for deploy of the next array.

************************************************************************

* If deploy sequence is not successful, √MCC-H before proceeding.
* If MCC-H unavailable, perform {3.191 SAW XX FAILURE TO EXTEND MAST REMOTELY}, all (SODF: EPS: MALFUNCTION: PRIMARY POWER SYSTEM), then:
************************************************************************

18.11 Powering Off Mast MDA

PCS
PVM: EPS: SAW [XX]
[Saw [XX]]
‘Mast’

sel Mast Commands
SAW [XX] Mast Commands

‘MDA’

‘Power’

\[ cmd \text{ Off – Off} \]

\[ \text{MDA Voltage, } V: < 10 (\pm 2.8) \]

19. FEATHERING SOLAR ARRAY TO PROTECT AGAINST ISS/ORBITER PLUME LOADS

**WARNING**

Confirm EVA, SSRMS, and SRMS, clear of solar array rotation path before unlatching and rotating BGA.

**CAUTION**

Once deployed, the solar array must be placed edge-on to ISS and orbiter thruster plume, to minimize array structural loads and contamination. The active surface of the array will be pointed toward the Sun.

PVM: EPS: BGA [XX]

BGA [XX]

‘BGA [XX]’

Refer to Table 7.

sel the best power generation position for the BGA [XX] Cmd Angle

Perform \{2.102  PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE\}, steps 5 to 8 (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

Table 7. Solar Array Feather Angles

<table>
<thead>
<tr>
<th>PVM</th>
<th>BGA/SAW (XX)</th>
<th>Cmd Angle, deg</th>
</tr>
</thead>
<tbody>
<tr>
<td>P6</td>
<td>2B</td>
<td>90 or 270</td>
</tr>
<tr>
<td>P6</td>
<td>4B</td>
<td>90 or 270</td>
</tr>
</tbody>
</table>

If deploying both arrays on a PVM the same day
Perform steps 18 to 19 for both Channels before proceeding to step 20.

20. ENABLING MOTOR VELOCITY SAFING

**NOTE**

If BGA is at 0 degrees, then delay this velocity limit safing - enable step until next time the BGA is reconfigured.
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PVM: EPS: BGA [XX]

BGA [XX]

sel Motor

BGA [XX] Motor

'Velocity Limit Safing, Primary PVCU'

**cmd** Enable – Arm

**cmd** Enable – Enable

Verify Primary PVCU – Ena

‘Velocity Limit Safing, Backup PVCU’

**cmd** Enable – Arm

**cmd** Enable – Enable

Verify Backup PVCU – Ena

21. **POST SAW DEPLOY RECONFIGURATION**

**NOTE**

1. Once this procedure is complete, SSU XX is still shunted, and the array is not yet supporting channel XX. Channel XX IEA hardware is still receiving power from a support channel.

2. Table 8 provides support channel connectivity. A support channel provides initial power to the channel being activated until the SAW is deployed and the batteries are charged (e.g., Ch 4A supports Ch 4B until Ch 4B is fully activated).

Table 8. Support Power Channel Connectivity

<table>
<thead>
<tr>
<th>XX</th>
<th>YY</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2B</td>
<td>4B</td>
<td>2A</td>
</tr>
<tr>
<td>4B</td>
<td>2B</td>
<td>4A</td>
</tr>
</tbody>
</table>

21.1 **Powering Up Loads on ISS (If Necessary)**

**NOTE**

Loads previously powered down, while array were feathered may be reactivated.

Reactivate those loads previously deactivated for array deployment.
21.2 Recover Loads on DDCU [XX](YY) After SAW Deploy

**NOTE**
Power can be supplied to ECU XX from DDCU XX or DDCU YY for the solar array deploy. Therefore, it may have been necessary to reduce loads on the appropriate DDCU to support a peak power load of 580 watts during array deployment.

Reactivate those loads previously deactivated on DDCU [XX](YY) for array deployment.

21.3 Configure for Charging Batteries from Channel XX Array (Same Channel the SAW was Deployed, If Necessary)

Go to procedure {1.3.100 PRIMARY POWER CHANNEL ACTIVATION}, step 74 (SODF: EPS: ACTIVATION AND CHECKOUT: CHANNEL ACTIVATION).