International Space Station
Assembly Operations

ISS-1E GROUND

Mission Operations Directorate
Operations Division

14 SEP 07

These procedures are available electronically on the SODF Homepage at http://mod.jsc.nasa.gov/do3
INTERNATIONAL SPACE STATION
ASSEMBLY OPERATIONS
ISS-1E GROUND

14 SEP 07

APPROVED BY:

[Signature]
Audrey K. Ogburn
Book Manager

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

[Signature]
SODF Coordinator

ACCEPTED BY:

[Signature]
Michael T. Hurt
SODF Manager

This document is under the configuration control of the Systems Operations Data File Control Board (SODFCB).
Incorporates the following:

<table>
<thead>
<tr>
<th>CR</th>
<th>Multi_FileU385</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multi_FileU386</td>
</tr>
</tbody>
</table>

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

None
CONTENTS

ACTIVATION AND CHECKOUT

GND

ISS

1 1

3 3

7 7

21 21

23 23

33 33

49 49

69 69

93 93

99 99

113 109

191 155

193 157

193 157

207 171

221 185

227 189

233 193

241 201

245 205

251 211

265 225

269 229

273 233

283 243

291 251

297 257

303 263

311 271

317 277

325 285

329 289

339 299

349 307

355 313

361 319

365 323

373 331

381 339

389 347

395 353

403 361
<table>
<thead>
<tr>
<th>Section</th>
<th>GND</th>
<th>ISS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.105 KNEE BRACE ASSEMBLY REMOVAL WITH ISPR IN THE RACK BAY</td>
<td>421</td>
<td>379</td>
</tr>
<tr>
<td>1.202 COL ISPR ROTATION</td>
<td>437</td>
<td>395</td>
</tr>
<tr>
<td>1.205 COL MOBILE SYSTEM STORAGE PROVISION (MSSP) REMOVAL/INSTALLATION</td>
<td>441</td>
<td>399</td>
</tr>
<tr>
<td>1.207 COLUMBUS ISPR RACK RELOCATION</td>
<td>447</td>
<td>405</td>
</tr>
<tr>
<td>1.208 PIVOT PIN BRACKET INSTALLATION/REMOVAL</td>
<td>461</td>
<td>419</td>
</tr>
<tr>
<td>1.209 K-BAR CAPTURE MECHANISM INSTALLATION/REMOVAL</td>
<td>469</td>
<td>427</td>
</tr>
<tr>
<td>1.210 K-BAR INSTALLATION/REMOVAL</td>
<td>477</td>
<td>435</td>
</tr>
<tr>
<td>1.211 ISPR BONDING INSTALLATION/REMOVAL</td>
<td>485</td>
<td>443</td>
</tr>
<tr>
<td>1.212 COL FLOOR PANEL INTERFACE BAR REMOVAL/INSTALLATION</td>
<td>489</td>
<td>447</td>
</tr>
<tr>
<td>APCU ACTIVATION</td>
<td>493</td>
<td>451</td>
</tr>
<tr>
<td>APCU DEACTIVATION</td>
<td>495</td>
<td>453</td>
</tr>
<tr>
<td>DEORBIT PREPARATION</td>
<td>497</td>
<td>455</td>
</tr>
<tr>
<td>PAYLOAD DEACTIVATION</td>
<td>499</td>
<td>457</td>
</tr>
<tr>
<td>PAYLOAD REACTIVATION</td>
<td>501</td>
<td>459</td>
</tr>
<tr>
<td>PAYLOAD ENTRY SWITCH LIST/VERIFICATION</td>
<td>503</td>
<td>461</td>
</tr>
<tr>
<td>REFERENCE</td>
<td>505</td>
<td>463</td>
</tr>
<tr>
<td>SPEC 200 APCU STATUS</td>
<td>507</td>
<td>465</td>
</tr>
<tr>
<td>SPEC 205 ISS MCS MODING</td>
<td>511</td>
<td>469</td>
</tr>
<tr>
<td>SPEC 211 ISS C&amp;W</td>
<td>519</td>
<td>477</td>
</tr>
<tr>
<td>SPEC 212 OIU</td>
<td>521</td>
<td>479</td>
</tr>
<tr>
<td>STANDARD SWITCH PANEL 1</td>
<td>533</td>
<td>491</td>
</tr>
<tr>
<td>STANDARD SWITCH PANEL 2</td>
<td>537</td>
<td>495</td>
</tr>
</tbody>
</table>
ACTIVATION AND CHECKOUT
OBJECTIVE:
The purpose of this procedure is to leak check the Node 2 O2 Recharge Line after the Node 2/Lab and PMA Vestibule Jumpers are installed.

INITIAL CONDITIONS

The ISS Oxygen System is configured as follows for EVA Operations:
- The O2 LO P (VL009) AND O2 HI P (VL010) Valves → Closed.
- The O2 XOVER (VL011) Valves → Opened.
- The ROOBA (TO: QD11 OR SPARE) QD → QD011.
- The O2 Recharge Line QD → ROOBA (TO: O2 RECHARGE LINE) QD.
- The O2 Lo P Supply Valve → Open
- The O2 HI P Supply Valve → Closed
- The GO2 XFER PANEL FLOW VALVE → Opened.

The Orbiter Oxygen System:

TOOLS AND EQUIPMENT REQUIRED:
None

WARNING
During the overnight leak check, the O2 Lo P Supply Valve and VL009 will be closed. As a result, the PBA Ports cannot be used to provide oxygen to the PBAs. Also, the RSP (Respiratory Support Pack) will not have O2 supplied to it. If hard line oxygen is required to supplement the oxygen supply in the PBA Bottles, perform {3.212 ISS EMERGENCY O2 CONFIGURATION}, all (SODF: ECLSS: MALFUNCTION: ACS).

1. CONFIGURING O2 SYSTEM FOR LEAK CHECK

PCS

1.1 Airlock: ECLSS: Oxygen System

AL Oxygen System

'O2 Low Pressure Supply Valve'

cmd Close (√Actual Position – Closed)

'O2 Hi Pressure Supply Valve'

√Actual Position – Closed

A/L1A2

1.2 VL011 (O2 Xover Vlv) → Closed
2. **INITIATING OVERNIGHT LEAK CHECK**

Airlock: ECLSS: Oxygen System

‘Low Pressure’

Record Supply Press: ____________ kPa

Record Tank Temp: ____________ deg C

Record GMT: ________________

Report above values to **MCC-H**.

Wait at least 10 hours or **On MCC-H GO**, proceed.

3. **TERMINATING LEAK CHECK**

Airlock: ECLSS: Oxygen System

‘Low Pressure’

Record Supply Press: ____________ kPa

Record Tank Temp: ____________ deg C

Record GMT: ________________

Report above values to **MCC-H**.

**On MCC-H GO**, proceed to step 4.

4. **POST LEAK CHECK O2 SYSTEM RECONFIG**

ODS Vest
GO2 Xfer
Panel

A/L1A2

4.1 FLOW → OPEN

4.2 VL011 (O2 Xover Vlv) → OPEN
PCS 4.3  Airlock: ECLSS: Oxygen System

AL Oxygen System

'O2 Low Pressure Supply Valve'

**cmd** Open (Actual Position – Opened)
OBJECTIVE:
The purpose of this procedure is to purge the Node 2 O2 lines of debris, configure for
Prebreathe using shuttle O2 and perform a complete O2 system purge.

TOOLS AND EQUIPMENT REQUIRED:
(NOD1P4_D)
GO2 Transfer Flex Hose Assy P/N V857-643003-002 (MC276-0054/2001)

(A/L1O1)
Powder-Free Gloves
Teflon Bags P/N 300045-08
Clean Room Tape P/N 3M/1251

Wire Ties or Velcro Straps
Flashlight
Earplugs

Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit
Fluid Fitting Torque Device (S/N 001)

ISS IVA Toolbox
Drawer 2:
5/32" Hex Head, 1/4" Drive
Driver Handle, 1/4" Drive
1/4" to 3/8" Adaptor
(10-50 in-lbs) Torque Wrench, 1/4" Drive

Drawer 3:
Inspection Mirror

1. REMOVING CLOSEOUT PANELS

A/L1OA2  1.1 Unfasten A/L1OA2 closeout panel fasteners (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow A/L1OA2 Closeout Panel.

NOTE
VL011 (O2 Xover Vlv) is behind panel A/L1A2; however, once A/L1OA2 is removed, VL011 can be reached from above. Removal of panel A/L1A2 is at the crew’s discretion.

If required, remove panel A/L1A2.

A/L1A1  1.2 Reconfigure/remove EDDA and handrails as necessary for access to the A/L1A2 panel.

17 AUG 07
1.3 Unfasten blue ESSS cover fasteners.
Cover is located deck aft of IV Hatch (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow ESSS cover panel.

1.4 Unfasten A/L1A2 closeout panel fasteners (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow A/L1A2 Closeout Panel.

2. **CONFIGURING ISS O2 SYSTEM**

A/L1OA2

2.1 VL009 (O2 Lo P) → CLOSED

2.2 VL010 (O2 Hi P) → CLOSED

A/L1A2

2.3 √VL011 (O2 Xover Vlv) – CLOSED

PCS

2.4 C&W Summ

<table>
<thead>
<tr>
<th>Caution &amp; Warning Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Event Code Tools'</td>
</tr>
<tr>
<td>sel Inhibit</td>
</tr>
</tbody>
</table>

| Inhibit an Event |

input Event Code – 6 6 0 9 (O2 Hi P Supply Pressure Low - A/L)

**cmd Arm**

**cmd Execute**

2.5 Airlock: ECLSS: Oxygen System

<table>
<thead>
<tr>
<th>AL Oxygen System</th>
</tr>
</thead>
<tbody>
<tr>
<td>'O2 Low Pressure Supply Valve'</td>
</tr>
<tr>
<td>√Actual Position – Open</td>
</tr>
</tbody>
</table>

'O2 Hi Pressure Supply Valve'

**cmd Open (√Actual Position – Open)**
3. REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT

NOTE
1. When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.
2. As the Low Pressure O2 system pressure bleeds down and O2 is introduced into the cabin, the following messages will be received:
   - 'O2 Lo P Supply Pressure Low - A/L'
   - 'PCA O2 Line Pressure Low - A/L'
   - 'PCA O2 Line Pressure Low - LAB'
   - 'O2 UIA Supply Pressure Low - A/L'
3. The messages will return to normal as the O2 system is repressurized (step 6).

3.1 Airlock: ECLSS: Oxygen System
   AL Oxygen System
   'AL PCA O2 Intro Valve'
   cmd Open (√ Position – Open)
   'Low Pressure'
   When PCA O2 Line Press <160 kPa (23 psi) or On MCC-H GO, proceed.
   'AL PCA O2 Intro Valve'
   cmd Close (√ Position – Closed)

C-Lk 3.2 Unstow PHA Bag #1.
A/L1D2 Remove cap from Relief Valve, PHA port.
Inspect for debris.
Relief Valve of PHA Bag #1 →|← PHA port
Quick Don Mask →|← Relief Valve
PHA Mask 3.3 Mask O2 control → EMERGENCY

NOTE
Per SCR 20626, the Airlock O2 High Pressure Supply Pressure sensor (ALEA32SR0001P) has a bias of -669 kPa (-97 psia). The pressure checks in steps 3.4, 3.6, and 6.5 have been adjusted accordingly.

PCS 3.4 Airlock: ECLSS: Oxygen System
   AL Oxygen System
   'High Pressure'
When Supply Press = L and UIA Supply Press < 160 kPa (23 psi) or On MCC-H GO, proceed.

PHA Mask

3.5 Mask O2 control → NORMAL

3.6 Quick Don Mask ←|→ Relief Valve
Relief Valve of PHA Bag #1 ←|→ PHA port
Cap Relief Valve, PHA port.

CAUTION

In order to protect the orbiter O2 system and prevent relief valve cracking in the ISS O2 recharge system, the ISS supply pressures must be below 6136 kPa (890 psia) prior to opening VL011 (O2 Xover Vlv) in step 3.7.

PCS

3.7 Airlock: ECLSS: Oxygen System
AL Oxygen System

'Low Pressure'
Verify Supply Press < 6136 kPa (890 psia).

'High Pressure'
Verify Supply Press < 5467 kPa (793 psia)

A/L1A2

3.8 VL011 (O2 Xover Vlv) → OPEN

4. CONFIGURING PMA/ODS O2 SYSTEM

ODS Vest GO2 Xfer Panel

4.1 √FLOW – CLOSED

WARNING

Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

4.2 Don Earplugs.

4.3 VENT → OPEN

4.4 Check GO2 Xfer Panel Pressure Gauge reading ~0 psi.
Doff Earplugs.
CAUTION

1. Failure to maintain clean environment during oxygen system maintenance could result in fire hazard. If gloves become contaminated, replace immediately with clean gloves.

2. Minimize the amount of time open fluid connectors and caps/plugs are exposed to cabin air to prevent contamination of the oxygen system. Open connectors and caps/plugs can be covered by Teflon Bags or Powder-Free Gloves. Failure to comply could result in a fire hazard.

3. All fittings should be inspected for contaminants before mating. If debris is found, √MCC-H.

4. Inspect GO2 Transfer Flex Hose Assy for any cracks or anomalies. If found, notify MCC-H.

4.5 Inspect GO2 Transfer Flex Hose Assy for any cracks or anomalies. If found, notify MCC-H.

4.6 Don Powder-Free Gloves.

NOTE

QDs must be closed to remove plugs and disconnect lines. As needed, refer to Figures 3 and 4 at the end of this procedure for information on the high-pressure quick disconnects.

4.7 Uncap GO2 Xfer Panel QD.
Close GO2 Transfer Flex Hose Assy bent-end QD.
Remove plug.
Inspect both QDs for debris.

Install hose so that it can be routed along the ODS Flange as shown in Figure 1.

GO2 Transfer Flex Hose Assy bent-end →|← GO2 Xfer Panel QD
Hard mate/open QD.

Cover caps and plugs.
Figure 1. ODS Vestibule Xfer Panel Hose Routing.

PMA

4.8  Uncap Oxygen Recharge QD.  
     Close GO2 Transfer Flex Hose Assy straight-end QD.  
     Remove plug.  
     Inspect both QDs for debris.  
     GO2 Transfer Flex Hose Assy straight-end →|← Oxygen Recharge QD  
     Hard mate/open QD.  
     Cover caps and plugs.

PMA/ODS

4.9  Secure GO2 Transfer Flex Hose Assy to PMA/ODS Extension Duct and ODS Flange with Velcro straps.

ODS Vest  
GO2 Xfer  
Panel

4.10  VENT → CLOSED

4.11  Doff Gloves.
5. SECURING NODE 2/LAB VESTIBULE O2 RECHARGE JUMPER

Figure 2. NOD2 Aft External Bulkhead Location of Feed-throughs. Bold text appears on NOD2 Bulkhead labels next to feed-throughs. (orientation from within LAB1 looking forward)

CAUTION

The O2 Recharge Jumper in the Node2/Lab Vestibule must be physically secured prior to the N2 purge to prevent movement of the jumper and possible hardware damage.

5.1 Remove Axial Port Closeout from Deck area of Node 2/Lab Vestibule (Velcro, 1/4 turn fasteners).

5.2 Locate Node 2/Lab Vestibule O2 Recharge Jumper at A18. Refer to Figure 2. N2 end of jumper will be connected to the N2 bulkhead; the Lab end of jumper will be free.

5.3 Secure free end of jumper to any part of primary structure within reach of jumper (Wire Ties? Velcro Straps?). Ensure jumper cannot move once Node 2 O2 lines are charged.
WARNING

1. The Lab/Node 2 Vestibule Jumper must be secure and directed into the cabin during the purge or the Lab/Node 2 Vestibule Jumper may move, possibly causing crew injury. During the purge, high pressure oxygen and potential debris will be exiting the Lab/Node 2 Vestibule Jumper. As a result, crewmembers should not place any part of their bodies in front of the Lab/Node 2 Vestibule Jumper outlet.

2. Purging through the Lab/Node 2 Vestibule Jumper may cause a loud hissing noise. Crew should don Earplugs.

6. **PURGING NODE 2 O2 LINES**

   6.1 √MCC-H to verify proper cryo configuration

   6.2 Don Ear Plugs.

   **ODS Vest GO2 Xfer Panel**

   6.3 **On MCC-H GO, FLOW → OPEN**

   **Middeck Floor**

   6.4 Verify EMU O2 ISOL VLV – OPEN

   **NOTE**

   The Lab dP/dt will be monitored by **MCC-H** during the 5 minute purge to verify that the Lab/Node2 Vestibule Jumper is purging properly.

   **PCS**

   6.5 Lab: ECLSS

   **Lab ECLSS**

   Verify dP/dt > 0.05 mmHg/min.

   6.6 Wait 5 minutes.

   **ODS Vest GO2 Xfer Panel**

   6.7 FLOW → CLOSED

   **PCS**

   6.8 Lab: ECLSS

   **Lab ECLSS**

   Verify dP/dt < 0.05 mmHg/min.

   6.9 Doff Ear Plugs

   6.10 Report to **MCC-H**, "Node 2 purge is complete."

   **On MCC-H GO**, proceed to step 7.
7. CONNECTING THE NODE 2/LAB O2 VESTIBULE JUMPER

7.1 Release Node 2/Lab Vestibule Jumper from restraint to primary structure (Wire Ties or Velcro Straps).

Table 1. O2 Recharge (Low Pressure) Jumper

<table>
<thead>
<tr>
<th>Jumper Name / Function</th>
<th>NOD2 Aft Blkhd</th>
<th>LAB Fwd Blkhd</th>
<th>Part Number</th>
<th>Input Torque</th>
<th>Output Torque</th>
<th>FFTD Gear Size (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen Recharge</td>
<td>Oxygen Recharge</td>
<td>A18</td>
<td>683-16347-37</td>
<td>38</td>
<td>185</td>
<td>0.875</td>
</tr>
</tbody>
</table>

NOTE

Refer to {A.2.3 Mating/Demate of Gamah Fittings Using the FFTD} (SODF: ISS IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS) for details on Gamah Fittings.

7.2 Inspect jumper for damage to braided hose or gamah fittings. Report any damage to MCC-H.

7.2.1 Loosen LAB Gamah fitting feed-through cap (FFTD; 1/4" to 3/8" Adaptor; (10-50 in-lbs) Torque Wrench, 1/4" Drive).

7.2.2 Loosen jumper Gamah plug by hand.

7.2.3 Don Powder-Free Gloves.

7.2.4 Remove LAB Gamah fitting feed-through cap by hand. Stow cap in Ziplock bag.

7.2.5 Inspect LAB Gamah fitting feed-through for debris, damage. Report any damage to MCC-H.

7.2.6 If required, apply one drop of braycote to feed-through threads. Spread braycote around threads by hand.

7.2.7 Remove jumper Gamah plug by hand. Stow plug in Ziplock bag.

7.2.8 Inspect jumper Gamah fitting for debris, damage, or used seal.
8. CONFIGURING THE O2 RECHARGE LINE

8.1 Don new pair of Powder-Free Gloves.

8.2√O2 Recharge Line →|← ROOBA (TO: O2 Recharge Line) QD√Hard mate/open QD

8.3 Uncap QD011.
Close ROOBA (TO: QD11 or Spare) QD.
ROOBA (TO: QD11 or Spare) QD ←|→ SPARE QD.

Inspect both QDs for debris.

ROOBA (TO: QD11 or Spare) QD →|← QD011
Hard mate/open QD.

Use cap from QD011 to cover SPARE QD.

8.4 Doff Gloves.

9. VERIFYING O2 SYSTEM PRESSURE INTEGRITY PART 1

ODS Vest
GO2 Xfer
Panel Floor

9.1 FLOW → OPEN

9.2 Wait 5 minutes.

PCS

9.3 Airlock: ECLSS: Oxygen System

AL Oxygen System

'Low Pressure'
Verify Supply Press > 5515 kPa (800 psia).
Verify PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia).

'High Pressure'
Verify Supply Press > 4846 kPa (703 psia).
Verify UIA Supply Press: 5343 to 6308 kPa (775 to 915 psia).

AL ECLSS

'Equipment Lock'
Verify dP/dt < 0.05 mmHg/min.

10. **PURGING O2 SYSTEM OF AIR**

10.1 Airlock: ECLSS: Oxygen System

   AL Oxygen System

   'AL PCA O2 Intro Valve'

   **cmd** Open – (√Position – Open)

10.2 Lab: ECLSS: PCA: O2 Intro

   Lab PCA O2 Intro Valve

   'Lab PCA O2 Intro Valve'

   **cmd** Open – (√Position – Open)

   Lab ACS

   'Cabin Press'

Verify dP/dt > 0.05 mmHg/min

Wait 16 minutes

10.3 Airlock: ECLSS: Oxygen System

   AL Oxygen System

   'AL PCA O2 Intro Valve'

   **cmd** Close – (√Position – Close)

10.4 Lab: ECLSS: PCA: O2 Intro

   Lab PCA O2 Intro Valve

   'Lab PCA O2 Intro Valve'

   **cmd** Close – (√Position – Close)

   Lab ACS

   'Cabin Press'

Verify dP/dt < 0.05 mmHg/min

11. **VERIFYING O2 SYSTEM PRESSURE INTEGRITY PART 2**

11.1 Don new pair of Powder-Free Gloves.

A/L1A0

11.2 Remove cap from Relief Valve, A/L PHA port.

Inspect for debris

Relief Valve of PHA Bag #1 →|← A/L PHA port

Quick Don Mask →|← Relief Valve

11.3 Don PHA Mask.
PHA Mask

11.4 Mask O2 control → EMERGENCY

11.5 Momentarily pull Mask away from face. √O2 flow

11.6 Mask O2 control → NORMAL

11.7 Doff Mask.

11.8 Relief Valve of PHA Bag #1 ←|→ PHA port
Depress Mask O2 control to bleed down line.
Quick Don Mask ←|→ Relief Valve
Install cap on Relief Valve, PHA port.
Stow PHA Bag #1 in C-Lk.

PCS

11.9 Airlock: ECLSS: Oxygen System

₁AL Oxygen System

'O2 Hi Pressure Supply Valve'

cmd Close – (√Actual Position – Closed)

12. INSTALLING CLOSEOUT PANELS
If required

A/L1A2

12.1 Install A/L1A2 Closeout Panel, snug fasteners (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

12.2 Install blue ESSS cover, snug fasteners.
Cover installs deck aft of IV Hatch (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

A/L1OA2

12.3 Install A/L1OA2 Closeout Panel, snug fasteners (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

12.4 Stow tools and equipment.

12.5 Notify MCC-H, “Prebreathe Using Shuttle O2 Setup complete.”
VIEW A
In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To "soft-latch," the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

VIEW B
The coupling halves are now latched together, with the valves shut and the flow stopped. To open flow, the detent button is depressed and the actuating sleeve is rotated in the clockwise direction until the detent button pops up again, locking the mated coupling in the full flow condition.

VIEW C
The coupling halves are now locked in the full flow mode, and the two-stage connection is complete. In this condition, unlatching is prevented and the redundant sealing is in effect. To block the flow and close the valves, the detent button is depressed and the actuating sleeve is rotated in the counterclockwise direction until the detent button again pops up. The flow is now blocked and the valves are closed. The internal areas are automatically vented to atmosphere before the coupling halves are unlatched.

VIEW D
To unlatch the coupling halves, the release ring is retracted from the mating end of the coupler and the coupler is pulled away from the nipple.

Figure 3. Two-Stage High-Pressure QDs.
Figure 4. High-Pressure QD.
OBJECTIVE:
Disconnect the MTL and LTL Passive ITCS Lines from the Node 2 IATCS system in preparation for the connection of the Columbus Module IATCS lines in Node 2 Starboard Vestibule.

LOCATION:
Node 2 Starboard Alcove (MTL)
Node 2 Deck Rack (LTL)

DURATION:
1 hour

PARTS:
TCS Plug (two) (P/N 683-16348-811)
TCS Cap (two) (P/N 683-16348-810)

MATERIALS:
Tie Wraps

TOOLS:
ISS IVA TOOL BOX
Drawer 2:
5/32" Hex, 1/4" Drive
Ratchet, 1/4" Drive

REFERENCED PROCEDURE(S):
None

1. **ACCESS MTL QD - PANEL NOD2S0-11**
   1.1 Remove NOD2S0-11, 10 captive fasteners (5/32" Hex, 1/4" Drive, Ratchet, 1/4" Drive).

2. **DEMATE MTL QD**
   2.1 Node 2 MTL QD ←|→ Columbus MTL Passive Line QD
   2.2 Plug (P/N 683-16348-811) →|← Columbus MTL Passive Line QD
   Cap (P/N 683-16348-810) →|← Node 2 MTL QD
   2.3 Secure female QD to secondary structure (tiewraps)

3. **SECURE MTL QD - PANEL NOD2-S011**
   3.1 Install NOD2S0-11, 10 captive fasteners (5/32" Hex, 1/4" Drive, Ratchet, 1/4" Drive).

4. **ACCESS LTL QD - ROTATE NODE 2 DECK RACK**
4.1 Rotate Rack Down \{1.211 Node 2 Rack Rotate\}, step 1 (SODF: STRUC AND MECH: 1. NOMINAL: 1.2 RACK)

5. **DEMATE LTL QD**

5.1 Node 2 MTL QD ←|→ Columbus LTL Passive Line QD

5.2 Plug (P/N 683-16348-811) →|← Columbus LTL Passive Line QD
Cap (P/N 683-16348-810) ←|→ Node 2 MTL QD

5.3 Secure female QD to secondary structure (tiewraps)

6. **SECURING - LTL QD**

6.1 Rotate Rack Up \{1.211 Node 2 Rack Rotate\}, step 2 (SODF: STRUC AND MECH: 1. NOMINAL: 1.2 RACK)
OBJECTIVE:
Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Multimeter, and ISA Scopemeter Pressure Probe to pressurize and verify integrity of pressure in Node 2/COL vestibule to perform a gross and fine leak check of the Node 2/COL vestibule.

INITIAL CONDITIONS:
Node 2 Stbd Hatch Closed.
Node 2 Stbd Aft (Fwd) IMV Valves Closed
A least 1 cabin total pressure sensor available.

LOCATION:
Node 2 Starboard

DURATION:
1 hour 55 minutes Total Crew Time
25 minutes for Multimeter, ISA, VAJ Setup
70 minutes for Equalization and Leak Check Wait Times
20 minutes for Leak Check Term, Multimeter, ISA, VAJ Teardown

CREW:
One

MATERIALS:
9V Alkaline Battery (if Battery changeout required)
Earplugs

TOOLS:
Internal Sampling Adapter (ISA) P/N 97M55830-1
Vacuum Access Jumper-78-1 5ft P/N 683-17111-1
ISA Scopemeter Pressure Probe P/N 1525,760MMHGA/30PSIA
Digital Multimeter Kit: P/N 10118-10018-04
Multimeter
ISS IVA Toolbox:
Drawer 3
#0 Phillips Screwdriver (if Battery changeout required)

1. **SETTING UP ISA**

   **NOTE**
   ISA has two identical ISA VAJ Ports. To ensure proper ISA Scopemeter Pressure Probe accuracy verification, one ISA VAJ Port must be uncapped.

   1.1 Gamah Cap ←|→ ISA VAJ Port
   √Gamah Cap →|← remaining ISA VAJ Port
   Hand tighten.
2. SETTING UP MULTIMETER

NOTE
Plug marked "COM" must be inserted in COM jack on Multimeter. ISA Scopemeter Pressure Probe slide switch will face toward Multimeter Rotary Switch.

2.1 ISA Scopemeter Pressure Probe V plug →|← VΩ jack (right side, red)
    COM plug →|← COM jack

2.2 ISA Scopemeter Pressure Probe – OFF

2.3 Rotary Switch ↷

2.4 Verify voltage reading > 100 mVDC (good ISA Scopemeter Pressure Probe Battery indication).

If voltage reading < 100 mVDC, ISA Scopemeter Pressure Probe Battery must be replaced.
    9V Battery replaced by removing non-captive screw on back of probe (#0 Phillips Screwdriver).

2.5 ISA Scopemeter Pressure Probe → mmHgA

3. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

NOTE
ISA Scopemeter Pressure Probe outputs 1 mV per pressure unit measured. Example: 0.760 V = 760 mV = 760 mmHgA

Multimeter

3.1 Rotary Switch ↷

3.2 Record ISA Scopemeter Pressure Probe \( P_1 \): _____________ mmHg

PCS

3.3 US Lab: ECLSS
    Lab: ECLSS

Record Cab Press \( P_2 \): _____________ mmHg
If $\Delta P = P_2 - P_1 > 20$ mmHg

ISS $\downarrow$ MCC-H, "ISA Scopemeter Pressure Probe inaccurate."

$\sqrt{\text{MCC-H}}$ for further instructions

---

4. CONNECTING VAJ, ISA, POSITIVE PRESSURE RELIEF ASSEMBLY (PPRA)

Node 2 Stbd Hatch

4.1 $\sqrt{\text{Node 2 Starboard PPRV Sample Port Valve – CLOSE}}$

Refer to Figure 3.

4.2 Gamah cap $\leftarrow\rightarrow$ ISA Sampling Port

ISA Sampling Port Valve $\rightarrow$ CLOSED

Refer to Figure 1.

Figure 1. ISA Sampling Port Valve.

4.3 Gamah Cap $\leftarrow\rightarrow$ VAJ-78-1 5ft (both ends)

Inspect seals for any visible damage.

Notify MCC-H if any damage noted to seals.

4.4 VAJ-78-1 5ft (straight end) $\rightarrow\leftarrow$ ISA VAJ Port

Hand tighten.

Refer to Figure 2.

4.5 Gamah cap $\leftarrow\rightarrow$ Node 2 Starboard PPRV Sample Port

VAJ-78-1 5ft (bent end) $\rightarrow\leftarrow$ Node 2 Starboard PPRV Sample Port

Hand tighten.

Refer to Figures 2 and 3.
4.6 Secure ISA/VAJ Assembly.

Figure 2. ISA/VAJ/PPRV/Multimeter Connection.
5. LEAK CHECKING ISA/VAJ CONNECTION

**WARNING**

Opening the PPRV Sample Port Valve will start the depressurization of the ISA/VAJ setup and may cause a loud hissing noise.

5.1 Don Earplugs.

5.2 Node 2 Starboard PPRV Sample Port Valve → OPEN

5.3 Wait 5 minutes to depressurize ISA/VAJ setup.

5.4 Rotary Switch $\rightarrow$ mV

5.5 Record ISA Scopemeter Pressure Probe $P_3$: ________________ mmHg

Record GMT: ________________ GMT

5.6 Node 2 Starboard PPRV Sample Port Valve → CLOSE

5.7 Wait 3 minutes for thermal stabilization.

5.8 Record ISA Scopemeter Pressure Probe $P_4$: ________________ mmHg

Record GMT: ________________ GMT

5.9 Wait 5 minutes for ISA/VAJ leak check.
5.10 Record ISA Scopemeter Pressure Probe $P_5$: ________________ mmHg
Record GMT: ________________ GMT

* If $\Delta P = |P_5 - P_4| > 5$ mmHg during monitoring period
  * ISS $\downarrow$ MCC-H, "Suspected ISA/VAJ leak."
  * $\sqrt{\text{MCC-H}}$ for further instructions

6. PARTIALLY PRESSURIZING VESTIBULE

**WARNING**
Opening the ISA Sampling Port Valve and Node 2 Starboard PPRV Sample Port Valve will equalize ISS with the ISA/VAJ and Vestibule and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

6.1 Don Earplugs.

Node 2 Stbd Hatch

6.2 Node 2 Starboard PPRV Sample Port Valve $\rightarrow$ OPEN.

**NOTE**
1. To obtain accurate measurements, pressure readings should be taken only when ISA Sampling Port Valve is closed.
2. Pressure readings should be noted every 2 minutes, but do not need to be recorded or reported to MCC-H.
3. Vestibule should pressurize to 260 mmHgA in approximately 4 minutes.

6.3 ISA Sampling Port Valve $\rightarrow$ OPEN
Refer to Figure 1.

6.4 Wait 2 minutes to begin incremental pressurization of vestibule.

6.5 ISA Sampling Port Valve $\rightarrow$ CLOSED
Note ISA Scopemeter Pressure Probe reading.

6.6 Repeat steps 6.3 to 6.5 until ISA Scopemeter Pressure Probe $P \sim 260$ mmHgA ($\sim 4$ minutes).

6.7 $\sqrt{\text{ISA Sampling Port Valve – CLOSED}}$

6.8 Doff Ear Plugs.
7. **PERFORMING GROSS LEAK CHECK OF VESTIBULE**

7.1 Record ISA Scopemeter Pressure Probe $P_6$: ____________ mmHgA
   Record GMT: ____________ GMT

7.2 Wait 10 minutes for thermal stabilization.

7.3 Record ISA Scopemeter Pressure Probe $P_7$: ____________ mmHgA
   Record GMT: ____________ GMT

   Notify **MCC-H** of pressure reading.

Node 2 Stbd Hatch

7.4 Node 2 Starboard PPRV Sample Port Valve $\rightarrow$ CLOSE

7.5 Wait 30 minutes for vestibule gross leak check.

7.6 Node 2 Starboard PPRV Sample Port Valve $\rightarrow$ OPEN

7.7 Record ISA Scopemeter Pressure Probe $P_8$: ____________ mmHgA
   Record GMT: ____________ GMT

   Notify **MCC-H** of pressure reading.

7.8 Node 2 Starboard PPRV Sample Port Valve $\rightarrow$ CLOSE

![](https://example.com/latex/eq/eq1.png)

If $|P_8 - P_7| > 5$ mmHg during monitoring period

ISS $\downarrow$ **MCC-H**, "Suspected Vestibule leak."

$\sqrt{MCC-H}$ for further instructions

8. **COMPLETING VESTIBULE PRESSURIZATION**

**WARNING**

Opening the ISA Sampling Port Valve and Node 2 Starboard PPRV Sample Port Valve will equalize ISS with the vestibule and may cause a loud hissing noise. Crew in the vicinity should don Ear Plugs.

8.1 Don Ear Plugs.

Multimeter

8.2 Rotate Switch $\searrow$
8.3 ISA Sampling Port Valve → OPEN

Node 2 Stbd Hatch

8.4 Node 2 Starboard PPRV Sample Port Valve → OPEN

PCS

8.5 US Lab: ECLSS

Monitor LAB Cab Press for 10 minutes

If LAB Cab Press decreases by more than 10 mmHg
ISA Sample Port Valve → CLOSED
Node 2 Starboard PPRV Sample Port Valve → CLOSE
√MCC-H for instructions >>

8.6 When dP/dt ≈ 0, proceed.

8.7 ISA Sampling Port Valve → CLOSED

8.8 Node 2 Starboard PPRV Sample Port Valve → CLOSE

8.9 Doff Ear Plugs.

9. VESTIBULE FINE LEAK CHECK

Node 2 Stbd Hatch

9.1 Node 2 Starboard PPRV Sample Port Valve → OPEN

9.2 Record ISA Scopemeter Pressure Probe $P_9$: ______________ mmHgA
Record GMT: ______________ GMT

Notify MCC-H of pressure reading.

9.3 Node 2 Starboard PPRV Sample Port Valve → CLOSE

9.4 Wait 10 minutes for thermal stabilization.

Node 2 Starboard PPRV Sample Port Valve → OPEN

9.5 Record ISA Scopemeter Pressure Probe $P_{10}$: __________ mmHgA
Record GMT: ______________ GMT

Notify MCC-H of pressure reading.

Node 2 Starboard PPRV Sample Port Valve → CLOSE

9.6 ISA Scopemeter Pressure Probe → OFF
9.7 Rotary Switch ⊗ OFF

9.8 Wait 8 hours.

9.9 Multimeter

9.10 ISA Scopemeter Pressure Probe → mmHgA

9.11 Node 2 Starboard PPRV Sample Port Valve → OPEN

9.12 Record ISA Scopemeter Pressure Probe $P_{11}$:

Record GMT: ________________ GMT

Notify MCC-H of pressure reading.

9.13 Node 2 Starboard PPRV Sample Port Valve → CLOSE

* * * If $|P_{11} - P_{10}| > 20$ mmHg during monitoring period

* ISS ↓ MCC-H, "Suspected Vestibule fine leak."

* √ MCC-H for further instructions

10. DISASSEMBLING AND STOWING EQUIPMENT

10.1 ISA Scopemeter Pressure Probe → OFF

10.2 Multimeter

10.3 Multimeter ←|→ ISA Scopemeter Pressure Probe

10.4 VAJ-78-1 5ft (bent end) ←|→ Node 2 Starboard PPRV Sample Port
Gamah cap →|← Node 2 Starboard PPRV Sample Port
Gamah Cap →|← VAJ-78-1 5ft (bent end)
Hand tighten.

10.5 VAJ-78-1 5ft (straight end) ←|→ ISA VAJ Port
Gamah Cap →|← VAJ-78-1 5ft (straight end)
Hand tighten.
Gamah Cap →|← ISA VAJ Port
Hand tighten.

10.6 ISA Sampling Port Valve → OPEN
Cap →|← ISA Sampling Port
Refer to Figure 1.

10.7 Check for FOD within 1m radius.

10.8 ISS ↓ MCC-H, "Vestibule pressurization and leak check completed."

10.9 Stow tools and materials.
Update IMS with stowage location of hardware

10.10 Open Node 2 Starboard Hatch per decal.
OBJECTIVE:
Prepare Node 2 for utility connectors required to powerup and activate the Columbus module.

NOTE
Do not plug portable fan into Node 2 UOP 3. UOP 3 will be powered down later in this procedure.

1. INSTALL AND ACTIVATE PORTABLE FAN (IF REQUIRED)
   Perform [2.511 PFA SETUP FOR VENTILATION], steps 1 and 2 (SODF: ECLSS: NOMINAL: THC)

2. POWER DOWN EQUIPMENT ON DDCU N2D4B AND N2D1B

   NOTE
   1. Inhibit RT FDIR to RTs that will lose power, but will still be monitored during the powerdown (i.e., RPCMs).
   2. Expect multiple loss of comm messages when DDCU converters are powered off.

2.1 Inhibit Node 2 MTL SFCA Closed Loop Control
   PCS
   Node 2: TCS: MTL SFCA
   Node2 MTL SFCA Commands
   'Commands'
   'MTL SFCA'

   cmd CLC – Inh
   Verify CLC – Inh

2.2 Verify Node 2 MT Loop PPA Inlet Pressure
   Node 2: TCS
   'PPA'
   Verify Pump in Press: 166 to 193 kPa

2.3 Inhibit RPCM N21B4B-B RT FDIR and RT I/O
   CDH Summary: Primary Int
   Primary Int MDM

   sel LB SEPS N2-14
   sel RT Status

   LB SEPS N2 14 RT Status

   cmd 09 RPCM_N21B4B_B RT FDIR Status – Inhibit FDIR
   Execute (Verify – Inh)
2.4 **Inhibit RPCM N21B4B-A RT FDIR**

CDH Summary: Primary PMCU

MDM Primary PMCU

sel LB EPS N2 14
sel RT Status

![LB EPS N2 14 RT Status](image)

**cmd** 13 RPCM_N21B4B_A RT FDIR Status – Inhibit FDIR

Execute (Verify – Inh)

2.5 **Inhibit DDCU N2D1B RT FDIR**

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

**cmd** 24 DDCU N2D1B RT FDIR Status – Inhibit FDIR

Execute (Verify – Inh)

2.6 **Inhibit DDCU N2D4B RT FDIR**

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

**cmd** 25 DDCU N2D4B RT FDIR Status – Inhibit FDIR

Execute (Verify – Inh)

On MCC-H GO

3. **POWER DOWN DDCU N2D4B AND N2D1B**

3.1 Verify starboard CBM Operations must be complete prior to deactivating DDCUs.

3.2 **Deactivate DDCU N2D4B**

NOTE

DDCU N2D4B Output Voltage will read 124V until DDCU N2D1B converter is turned off.

Task: Node 2 COL Reconfig: DDCU N2D4B

sel Converter

![DDCU N2D4B Converter](image)

’Converter Off’

**cmd** Arm

**cmd** Off
'Power Share Ratio, %'
√DDCU N2D4B = 0
√DDCU N2D1B = 100

OR

'Power Share Ratio, %'
√DDCU N2D4B = 0
√DDCU N2D1B = 0

3.3 Deactivate DDCU N2D1B
Task: Node 2 COL Reconfig: DDCU N2D1B

sel Converter

DDCU N2D1B Converter
'Converter Off'

cmd Arm

cmd Off

√Output Voltage < 12.8 V

4. UNPOWER DDCU N2D4B AND N2D1B

NOTE
Expect DDCU Loss of Comm Caution messages when RBIs are opened.

4.1 Unpower DDCU N2D4B
Task: Node 2 COL Reconfig: MBSU 4 RBI 10

MBSU 4 RBI 10

cmd Open

√Cmded Position – Op
√MBSU 4 RBI 10 Voltage: -5 to 5 V

Task: Node 2 COL Reconfig
'DDCU N2D4B'
Verify Integration Counter – <not incrementing>

4.2 Unpower DDCU N2D1B
Task: Node 2 COL Reconfig: MBSU 1 RBI 11
**DEACTIVATE ECLSS EQUIPMENT FOR PORT DDCU POWERDOWNS**

5.1 Ensure that at least one of the Shuttle Booster Fans be running to ensure proper IMV exchange between the Shuttle and ISS due to the Node 2 Fwd Stbd IMV Fan being deactivated.

5.2 **Shutdown Node 2 Fwd Stbd IMV Fan**
   - Node 2: ECLSS: IMV Fwd Stbd Fan
   - Node 2 IMV Fwd Stbd Fan
   - 'State'
   - 'Off'

   **cmd Arm (Verify Status – Arm)**

   **cmd Off**

   Verify State – Off
   Verify Speed: 7164 ± 3 RPM

5.3 **Disable Node 2 Fwd Stbd IMV**
   - Node 2: ECLSS: IMV Fwd Stbd Valve
   - Node 2 IMV Fwd Stbd Vlv
   - 'State'
   - 'Inhibit'

   **cmd Arm (Verify Status – Arm)**

   **cmd Inhibit (Verify State – Inhibited)**
5.4 Disable Node 2 Aft Port IMV
Node 2: ECLSS: IMV Aft Port Valve
Node 2 IMV Aft Port Vlv
'State'
'Inhibit'

**cmd Arm** (Verify Status – Arm)

**cmd Inhibit** (Verify State – Inhibited)

**NOTE**
There will be no smoke detection capability in Node 2 with the CCAA powered down. The crew is the primary method of fire detection.

5.5 Deactivate Node 2 CCAA
Node 2: ECLSS: Node 2 CCAA: CCAA Commands
Node 2 CCAA Commands

**cmd Stop**
Verify State – EIB Off
Verify Command Status – Stop Complete

**sel Node 2 CCAA**
Node 2 CCAA
'Water Separator'
Verify Speed: 4964 RPM

'Fan'
Verify Speed: 2000 RPM

5.6 Inhibiting Node 2 Cabin Smoke Detector 1
Node 2: ECLSS: SD 1
'Monitoring'

**cmd Monitoring – Inhibit** (Verify – Inhibited)

5.7 Deactivate Node 2 Cabin Smoke Detector 2
Node 2: ECLSS: SD 2
'Monitoring'

**cmd Monitoring – Inhibit** (Verify – Inhibited)
sel RPCM N22A3B C RPC 01

**RPCM N22A3B C RPC 01**

√Open Cmd – Ena

**cmd** RPC Position – Open  (Verify – Op)

6. **POWERDOWN ECLSS EQUIPMENT FOR PORT DDCU POWERDOWNS**

6.1 If pressed for time, steps 6.2 through 6.7 can be skipped.

6.2 **Unpower Node 2 Fwd Stbd IMV Fan**

Node 2: ECLSS: IMV Fwd Stbd Fan: RPCM N22A3B A RPC 11

**RPCM N22A3B A RPC 11**

√Open Cmd – Ena

**cmd** RPC Position – Open  (Verify – Op)

6.3 **Unpower Node 2 Fwd Stbd IMV Valve**

Node 2: ECLSS: IMV Fwd Stbd Valve: RPCM N22A3B C RPC 03

**RPCM N22A3B C RPC 03**

√Open Cmd – Ena

**cmd** RPC Position – Open  (Verify – Op)

6.4 **Unpower Node 2 Aft Port IMV Valve**

Node 2: ECLSS: IMV Aft Port Valve: RPCM N22A3B C RPC 04

**RPCM N22A3B C RPC 04**

√Open Cmd – Ena

**cmd** RPC Position – Open  (Verify – Op)

6.5 **Unpower Node 2 CCAA**

Node 2: ECLSS: CCAA: CCAA Commands: RPCM N22A3B C RPC 13

**RPCM N22A3B C RPC 13**

√Open Cmd – Ena

**cmd** RPC Position – Open  (Verify – Op)
Node 2: ECLSS: CCAA: CCAA Commands: RPCM N22A3B C RPC 14
RPCM N22A3B C RPC 14

√ Open Cmd – Ena

**cmd** RPC Position – Open (Verify – Op)

Node 2: ECLSS: CCAA: CCAA Commands: RPCM N22A3B C RPC 15
RPCM N22A3B C RPC 15

√ Open Cmd – Ena

**cmd** RPC Position – Open (Verify – Op)

Node 2: ECLSS: CCAA: CCAA Commands: RPCM N22A3B C RPC 17
RPCM N22A3B C RPC 17

√ Open Cmd – Ena

**cmd** RPC Position – Open (Verify – Op)

C&W Summ

**Caution & Warning Summary**

'Event Code Tools'

sel Inhibit

**Inhibit an Event**

input Event Code – 1 5 0 7 (SDS Aft Vlv Failed – Node 2)

**cmd** Arm

**cmd** Execute

7. **CONFIGURE TCS EQUIPMENT FOR PORT DDCU POWERDOWNS**

7.1 **Inhibit LTL NIA Auto Repress Function**

Node 2: TCS: LTL PPA: Node2 LTL NIA Commands

Node2 LTL NIA Commands

**cmd** LTL NIA State – Inh

Verify LTL NIA State – Inh
7.2 **Inhibit Node 2 LTL Load Shed Function**

Node 2: TCS: Thermal Load Reduction

<table>
<thead>
<tr>
<th>Node2 Thermal Load Reduction</th>
</tr>
</thead>
</table>

'Auto Thermal Load Shed'

**cmd** Inhibit – Arm (Verify – √)

**cmd** Inhibit – Inh

Verify Auto Thermal Load Shed – Inh

7.3 **Shutdown Node 2 LTL**

**NOTE**

Expect **Caution 'Thermal Safing Node 2 LTL Load Shed Timer Started-Node2'** 12288 followed 5 minutes later by **Caution 'Thermal Safing Node 2 Load Shed Inhibited- Node2'** 12293. No further action required.

Node 2: TCS: LTL Software

<table>
<thead>
<tr>
<th>Node2 LTL Software Commands</th>
</tr>
</thead>
</table>

'LTL IATCS'

**cmd** Shutdown – Arm (Verify – X)

**cmd** Shutdown – Shutdown

Verify IATCS Status – Idle

Node 2: TCS: IATCS Details

<table>
<thead>
<tr>
<th>IATCS Details</th>
</tr>
</thead>
</table>

'TWMV Software'

Verify LTL CLC – Inh

'Regen TWMV Software'

Verify LTL CLC – Inh

'SFCA Software'

Verify LTL Mod Vlv CLC – Inh

'PPA Software'

Verify LTL – Shutdown

Node 2: TCS

'PPA'
Verify Pmp Spd < 54 rpm

7.4 Inhibit RT FDIR and RT I/O for LTL PPA
   CDH Summary: Primary Int MDM: LB SYS N2-2: RT Status
   LB SYS N2 2 RT Status

   cmd 09 PPA N2-2 RT FDIR Status – Inhibit FDIR Execute
       (Verify – Inh)
   cmd 09 PPA N2-2 RT Status – Inhibit Execute (Verify – Inh)

8. CONFIGURE NODE 2-2 MDM FOR POWERDOWN

8.1 Inhibit N2 MDM RT FDIR
   CDH: Primary INT
   Primary Int MDM

   Verify Frame Count – incrementing
   Verify Processing State – Operational

   sel LB SYS N2 2
   sel RT Status

   LB SYS N2 2 RT Status

   cmd 24 MDM N2-2 RT FDIR Status – Inhibit FDIR Execute
       (Verify – Inh)

8.2 Inhibit Node 2 MDM RT on Primary INT MDM
   CDH: Primary INT
   Primary Int MDM

   sel LB SYS N2 2
   sel RT Status

   LB SYS N2-2 RT Status

   cmd 24 MDM N2 2 RT Status – Inhibit Execute (Verify – Inh)

8.3 Unpower N2-2 MDM SDO Card
   Node 2: EPS: RPCM N22A3A B: RPC 2
   RPCM N22A3A B RPC 02

   √Open Cmd – Ena

   cmd RPC Position – Open (Verify – Op)
NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
(ASSY OPS/1E/FIN/MULTI E)  Page 10 of 15 pages

Node 2: EPS: RPCM N22A3A B: RPC 4
RPCM N22A3A B RPC 04
√Open Cmd – Ena
cmd RPC Position – Open (Verify – Op)

8.4 Unpower N2-2 MDM
Node 2: EPS: RPCM N22A3A B: RPC 1
RPCM N22A3A B RPC 01
√Open Cmd – Ena
cmd RPC Position – Open (Verify – Op)

9. CONFIGURE NODE 2 EPS FOR PORT DDCU POWERDOWNS

NOTE
1. Inhibit RT FDIR to RTs that will lose power, but will still be monitored during the powerdown (i.e., RPCMs).
2. Expect multiple loss of comm messages when DDCU converters are powered off.

9.1 Deactivate Loads on Node 2 UOP3 (if required)
TBD: shutdown all equipment on N2 UOP3, check PiP

9.2 Unpower Node 2 UOP3 (if required)
Node 2: EPS: UOPs
Node2 UOPs
cmd UOP 3 NOD2PD4 – Open (Verify – Op)

9.3 Inhibit RPCM N22A3A B RT FDIR and RT I/O
CDH Summary: Primary Int
Primary Int MDM

sel LB SEPS N2-23
sel RT Status

CDH Summary: Primary Int: LB SEPS N2-23: RT Status
LB SEPS N2 23 RT Status
cmd 09 RPCM_N22A3A_B RT FDIR Status – Inhibit FDIR
Execute (Verify – Inh)
cmd 09 RPCM_N22A3A_B RT Status – Inhibit Execute (Verify – Inh)
9.4 Inhibit RPCM N22A3A C RT FDIR

LB EPS N2 23 RT Status

**cmd** 11 RPCM_N22A3A_C RT FDIR Status – Inhibit FDIR
**Execute** (Verify – Inh)

9.5 Inhibit RPCM N22A3A A RT FDIR

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

LB EPS N2 23 RT Status

**cmd** 13 RPCM_N22A3A_A RT FDIR Status – Inhibit FDIR
**Execute** (Verify – Inh)

9.6 Inhibit Primary PMCU MDM RT FDIR for Port DDCUs

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

LB EPS N2 23 RT Status

**cmd** 24 DDCU N2P2A RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)
**cmd** 25 DDCU N2P3A RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

10. POWER DOWN C&T EQUIPMENT FOR PORT DDCU POWERDOWNS

10.1 Deactivate Node 2 ATU 2

C&T

**CNT Group Overview**

NOTE

ISS C&W and Voice Communication in Node 2 is now only available from Node 2 ATU 1 (Starboard).

sel Node 2 ATU 2

**Node 2 ATU 2**

'Configuration'

**cmd** State – Standby (Verify – Standby)

Verify which IAC is Active and Powered on.

Use the commands for the Active and Powered IAC.

**cmd** Bus I/O – Inhibit (Verify – Inhibit)

**Node 2 ATU 2**

sel RPCM N22A3A A RPC 02
10.2 Deactivate ABC 4

C&T

CNT Group Overview

sel ABC 4

ABC 4

Verify which IAC is Active and Powered on.
Use the commands for the Active and Powered IAC.

cmd Bus I/O – Inhibit (Verify – Inhibit)

sel RPCM N22A3A A RPC 01

RPCM N22A3A A RPC 01

cmd RPC Position – Open (Verify – Op)

11. POWER DOWN DDCU N2P2A AND N2P3A

NOTE

DDCU N2P2A Output Voltage will read 124V until DDCU N2P3A converter is turned off.

11.1 Deactivate DDCU N2P2A

Task: Node 2 COL Reconf: DDCU N2P2A

sel Converter

DDCU N2P2A Converter

'Converter Off'

cmd Arm

cmd Off

'Power Share Ratio, %'

\sqrt{\text{DDCU N2P2A}} = 0

\sqrt{\text{DDCU N2P3A}} = 100

OR
11.2 **Deactivate DDCU N2P3A**

Task: Node 2 COL Reconfig: DDCU N2P3A

sel Converter

[DDCU N2P3A Converter]

'Converter Off'

**cmd** Arm

**cmd** Off

√Output Voltage < 12.8V

12. **UNPOWER DDCU N2P2A AND N2P3A**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expect DDCU Loss of Comm Caution messages when RBIs are opened.</td>
</tr>
</tbody>
</table>

12.1 **Unpower DDCU N2P2A**

Task: Node 2 COL Reconfig: MBSU 2 RBI 3

[MBSU 2 RBI 3]

**cmd** Open

√Cmded Position – Op

√MBSU 2 RBI 3 Voltage = -5 to 5 V

Task: Node 2 COL Reconfig

'DDCU N2P2A'

Verify Integration Counter – <not incrementing>

12.2 **Unpower DDCU N2P3A**

Task: Node 2 COL Reconfig: MBSU 3 RBI 3

[MBSU 3 RBI 3]

**cmd** Open

√Cmded Position – Op

√MBSU 3 RBI 3 Voltage: -5 to 5 V
Task: Node 2 COL Reconfig
'DDCU N2P3A'

Verify Integration Counter – <not incrementing>

13. **1553 BUS SAFING STEPS**

13.1 **Disable BC Comm Fail FDIR**

CDH: Primary C&C: Recovery Retry: CCS MDM

[CCS Recovery Retry]

**cmd** BC Comm Fail – Inhibit **Execute** (Verify – Inh)

13.2 **Select Channel A for 1553 Bus and Inh Auto Ch Switching**

CDH: Primary C&C

[Primary CCS MDM]

**sel CB Int 1**

[CB Int 1]

**sel Bus Status**

[CB Int 1 Bus Status]

√Channel Selected – A

**cmd** Auto Channel Switch Status – Inhibit **Execute** (Verify – Inh)

CDH: Primary C&C

[Primary CCS MDM]

**sel CB Int 2**

[CB Int 2]

**sel Bus Status**

[CB Int 2 Bus Status]

√Channel Selected – A

**cmd** Auto Channel Switch Status – Inhibit **Execute** (Verify – Inh)
14. **GO FOR COLUMBUS UTILITY CONNECTIONS**
Inform IV crew all inhibits in place, give "Go for Node 2 to Columbus Utility Connectors."

*COLUMBUS VESTIBULE OUTFITTING*, steps 5 thru all (SODF: ASSY OPS: ACTIVATION AND CHECKOUT)
NODE 2 RECOVERY
(ASSY OPS/1E/FIN/MULTI E)

Parameters 1. Table1

<table>
<thead>
<tr>
<th>RPCM [X]</th>
<th>RPC [Y]</th>
<th>Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>[X]</td>
<td>[Y]</td>
<td>Load</td>
</tr>
<tr>
<td>N22B3A_B</td>
<td>3</td>
<td>N2 Three Way Valve REG HX Pwr</td>
</tr>
<tr>
<td>N22A3A_B</td>
<td>16</td>
<td>N2 Three Way Valve CTB Pwr</td>
</tr>
<tr>
<td>N22A3A_B</td>
<td>17</td>
<td>N2 LTL PPA Pwr</td>
</tr>
</tbody>
</table>

Parameters 2. Table2

<table>
<thead>
<tr>
<th>Rack</th>
<th>[X] DDCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rack</td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>N2P3A</td>
</tr>
<tr>
<td>Port</td>
<td>N2P2A</td>
</tr>
<tr>
<td>Ovhd</td>
<td>N2O2B</td>
</tr>
<tr>
<td>Ovhd</td>
<td>N2O3A</td>
</tr>
</tbody>
</table>

OBJECTIVE:
Recover Node 2 after utility connections required to powerup and activate the Columbus module are mated.

INITIAL CONDITIONS:
1. Node 2 DDCUs are deactivated.
2. Node 2 to Columbus power connectors mates are complete.

On MCC-H "GO"

1. **POWER UP DDCU N2P2A AND N2P3A**

1.1 **Power DDCU N2P2A**
   Task: Node2 – Columbus Reconfig: MBSU 2 RBI 3

   ![MBSU 2 RBI 3](image)

   *cmd Close Arm
   *cmd Close
   √cmded Position – Cl

   Task: Node2 – Columbus Reconfig: DDCU N2P2A

   ![DDCU N2P2A](image)

   √Integration Counter – incrementing
   √Input Voltage: 119.2 to 168.8 V

   sel Firmware
DDCU N2P2A Firmware
'Clear Commands'

If Power on Reset – X
cmd Common Clear

✓ Power On Reset – blank

1.2 Power DDCU N2P3A
Task: Node2 – Columbus Reconfig: MBSU 3 RBI 3

MBSU 3 RBI 3

cmd Close Arm
cmd Close
✓ cmded Position – Cl

Task: Node2 – Columbus Reconfig: DDCU N2P3A

DDCU N2P3A
✓ Integration Counter – incrementing
✓ Input Voltage: 119.2 to 168.8 V

sel Firmware

DDCU N2P3A Firmware
'Clear Commands'

If Power on Reset – X
cmd Common Clear

✓ Power On Reset – blank

2. ACTIVATE DDCU N2P2A AND N2P3A

2.1 Activate DDCU N2P2A
Task: Node2 – Columbus Reconfig: DDCU N2P2A

sel Converter

DDCU N2P2A Converter

cmd Converter On – Arm
cmd Converter On – On

DDCU N2P2A
2.2 Activate DDCU N2P3A

Task: Node2 – Columbus Reconfig: DDCU N2P3A

sel Converter

[DDCU N2P3A Converter]

cmd Converter On – Arm

cmd Converter On – On

[DDCU N2P3A]

√Input Current: -4 to 4 A
√Output Current: -4 to 4 A
√Output Voltage: 123.0 to 126.0 V
√Converter Temp < 43.8° C
√Power Supply Temp < 49.5° C
√Baseplate Temp < 40.3° C

3. POWER UP DDCU N2D4B AND N2D1B

3.1 Power DDCU N2D4B

Task: Node2 – Columbus Reconfig: MBSU 4 RBI 10

[MBSU 4 RBI 10]

cmd Close Arm

cmd Close

√cmded Position – Cl

Task: Node2 – Columbus Reconfig: DDCU N2D4B

[DDCU N2D4B]

√Integration Counter – incrementing
√Input Voltage: 119.2 to 168.8 V

sel Firmware
3.2 Power DDCU N2D1B

Task: Node2 – Columbus Reconfig: MBSU 1 RBI 11

MBSU 1 RBI 11

cmd Close Arm

cmd Close

\cmded Position – Cl

Task: Node2 – Columbus Reconfig: DDCU N2D1B

DDCU N2D1B

\Integration Counter – incrementing

\Input Voltage: 119.2 to 168.8 V

sel Firmware

DDCU N2D1B Firmware

'Clear Commands'

If Power on Reset – X

cmd Common Clear

\Power On Reset – blank

4. ACTIVATE DDCU N2D4B AND N2D1B

4.1 Activate DDCU N2D4B

Task: Node2 – Columbus Reconfig: DDCU N2D4B

sel Converter

DDCU N2D4B Converter

\cmd Converter On – Arm

\cmd Converter On – On

DDCU N2D4B
4.2 **Activate DDCU N2D1B**  
Task: Node2 – Columbus Reconfig: DDCU N2D1B

```
  sel Converter

[DDCU N2D1B Converter]
```

```
  cmd Converter On – Arm

[DDCU N2D1B]
```

```
  cmd Converter On – On
```

4.2 **Activate DDCU N2D1B**  
Task: Node2 – Columbus Reconfig: DDCU N2D1B

```
  sel Converter

[DDCU N2D1B Converter]
```

```
  cmd Converter On – Arm

[DDCU N2D1B]
```

```
  cmd Converter On – On
```

5. **ENABLE RT FDIR AND RT I/O FOR PORT AND DECK DDCUS**

5.1 **Enable RT FDIRs on LB EPS N2 14**  
CDH Summary: Primary PMCU: LB EPS N2 14: RT Status

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

[DDCU N2D1B]
```

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

[DDCU N2D4B]
```

```
  cmd 13 RPCM N21B4B_A RT FDIR Status – Enable FDIR Execute (Verify – Ena)
```

5.2 **Enable RT FDIRs on LB EPS N2 23**  
CDH Summary: Primary PMCU: LB EPS N2 23: RT Status

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

[DDCU N2P2A]
```

```
  cmd 25 DDCU N2P3A RT FDIR Status – Enable FDIR Execute (Verify – Ena)
```

[DDCU N2P3A]
**NODE 2 RECOVERY**

(ASSY OPS/1E/FIN/MULTI E)  

Page 6 of 20 pages

---

**cmd 11** RPCM N22A3A_C RT FDIR Status – Enable FDIR **Execute**  
(Verify – Ena)

**cmd 13** RPCM N22A3A_A RT FDIR Status – Enable FDIR **Execute**  
(Verify – Ena)

**cmd 9** RPCM N22A3A_B RT FDIR Status – Enable FDIR **Execute**  
(Verify – Ena)

5.3 **Enable RT I/O AND RT FDIRs on LB SEPS N2 14**

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

[LB SEPS N2 14 RT Status]

**cmd 09** RPCM N21B4B_B RT Status – Enable **Execute** (Verify – Ena)

**cmd 09** RPCM N21B4B_B RT FDIR Status – Enable FDIR **Execute**  
(Verify – Ena)

5.4 **Enable RT I/O AND RT FDIRs on LB SEPS N2 23**

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

[LB SEPS N2 23 RT Status]

**cmd 09** RPCM N22A3A_B RT Status – Enable **Execute** (Verify – Ena)

**cmd 09** RPCM N22A3A_B RT FDIR Status – Enable FDIR **Execute**  
(Verify – Ena)

6. **ACTIVATE AND CHECKOUT N2-2 MDM**

6.1 **Verify Primary Int MDM Status**

CDH Summary: Primary Int

Verify Frame Count – Incrementing
Verify Processing State – Operational

6.2 **Verify RT FDIR for N2-2 MDM is Inhibited**

CDH Summary: Primary Int: LB SYS N2 2: RT Status

√24 MDM N2-2 RT FDIR Status – Inh

6.3 **Power On N2-2 MDM**

CDH Summary: N2-2 MDM

'RPCM N22A3A-B'

sel RPC 01

√Close Cmd – Ena

**cmd** RPC Position – Close (Verify – Cl)
Wait up to 5 minutes for MDM to go through bootup and POST

6.4 **Enable RT for N2-2 MDM**
CDH Summary: Primary Int: LB SYS N2 2: RT Status

[LB SYS N2 2 RT Status]

**cmd** 24 MDM N2-2 RT Status – Enable **Execute** (Verify – Ena)

6.5 **Verify N2-2 MDM Status in Operational State**
CDH Summary: N2-2 MDM

[N2-2 MDM]

Verify Frame Count – Incrementing
Verify Processing State – Operational

'MDM ID Node 2-2'

√ Sync Status – In Sync

********************************************************************************
If not In Sync
* sel Sync Status
* [N2-2 Sync Status]
* **cmd** Sync to BIA **Execute**
* Wait at least 30 seconds.
* [N2-2 MDM]
* Verify Sync Status – In Sync
********************************************************************************

 sel MDM BIT Status

[N2-2 MDM BIT Summary Table A]
'Word 1: Summary'

Verify N2-2 BST-A is clear

********************************************************************************
6.6 **Power On N2-2 MDM SDO Card**

CDH Summary: N2-2 MDM

'RPCM N22A3A-B'

\[
\text{sel RPC [X] where [X] = } \begin{cases} 
02 \\
04
\end{cases}
\]

\[
\sqrt{\text{Close Cmd – Ena}}
\]

\[
\text{cmd RPC Position – Close (Verify – Cl)}
\]

Repeat

6.7 **Enable N2-2 MDM RT FDIR**

CDH Summary: N2-2: LB SYS N2 2: RT Status

\[
\text{LB SYS N2 2 RT Status}
\]

\[
\text{cmd 24 MDM N2-2 RT FDIR Status – Enable FDIR Execute (Verify – Ena)}
\]

7. **RECOVER ECLSS EQUIPMENT AFTER PORT DDCU POWERDOWNS**

7.1 **Activate Node 2 Cabin Smoke Detectors**

Node 2: ECLSS: SD1

\[
\text{Node 2 Smoke Detector 1}
\]

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

\[
\text{NOTE}
\]

If using time tagged commands, wait 2 seconds between issuance of RPC close and SD Monitoring Enable commands.

'Monitoring'

\[
\text{cmd Monitoring – Enable}
\]

\[
\sqrt{\text{Status – Enabled}}
\]

Wait 5 seconds

10 SEP 07
'Active BIT'

√ Failure – blank

'Passive BIT'

√ Lens Status – Clean
√ Failure – blank

7.2 Node 2 Smoke Detector 2 Activation

Node 2: ECLSS: SD2

sel N22A3B C RPC 01

RPCM N22A3B C 01

**cmd** RPC Position – Close (√ RPC Position – Closed)

Node 2 Smoke Detector 2

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

<table>
<thead>
<tr>
<th><strong>NOTE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>If using time tagged commands, wait 2 seconds between issuance of RPC close and SD Monitoring Enable commands.</td>
</tr>
</tbody>
</table>

'Monitoring'

**cmd** Monitoring – Enable

√ Status – Enabled

Wait 5 seconds

'Active BIT'

√ Failure – blank

'Passive BIT'

√ Lens Status – Clean
√ Failure – blank
7.3 **Activate and Checkout Node 2 CCAA**
Perform **{1.5XX NODE 2 CCAA ACTIVATION}**, Steps TBD (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC)

7.4 **Verify Node 2 CCAA Dry Out Valves In Correct Config**
Node 2: EPS: RPCM N22A3B_C

- RPCM N22A3B_C
  - 'RPC'
  - sel RPC [X] where [X] = 8 9 10 11
  - √RPC Position – Open
  - Repeat

    Node 2: ECLSS: Node 2 CCAA

    - Node 2 CCAA
      - 'HX FCV Position'
      - Verify Op – √
      - Verify C – <blank>

    - 'Bypass FCV Position'
      - Verify Op – <blank>
      - Verify Cl – √

7.5 **Activate Node 2 Aft Port IMV Valve**
Node 2: ECLSS: IMV Aft Port Vlv

- Node 2 IMV Aft Port Valve
  - sel RPCM N22A3B C RPC 04
  - √Close Cmd – Ena

    - cmd RPC Position – Close (Verify – Cl)

    - Node 2 IMV Aft Port Valve

    - 'State'
    - 'Enable'

    - cmd Arm
√ Arm Status – Armed

**cmd** Enable

√ State – Enabled

√ Position – Open

### 7.6 **Activate Node 2 Fwd Stbd IMV Valve**
Node 2: ECLSS: IMV Fwd Stbd Valv

Node 2 IMV Fwd Stbd Valve

sel RPCM N22A3B C RPC 03

√ Close Cmd – Ena

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

Node 2 IMV Fwd Stbd Valve

'State'

'Enable'

**cmd** Arm

√ Arm Status – Armed

**cmd** Enable

√ State – Enabled

√ Position – Open

### 7.7 **Repower Node 2 Fwd IMV Fan**
Node 2: ECLSS: IMV Fwd Stbd Fan

Node 2 IMV Fwd Stbd Fan

sel RPCM N22A3B A RPC 11

RPCM N22A3B A RPC 11

√ Close Cmd – Ena

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

Node 2 IMV Fwd Stbd Fan
'On'

\[\text{cmd On}\]

√State – In Transit

Wait 15 seconds.

√State – On
√Speed, rpm: 7462 to 9500

7.8 **Configuring MCA C&W**

sel Enable

Enable an Event

input Event Code – 1 5 0 7 (SDS Aft Vlv Failed – Node 2)

\[\text{cmd Execute}\]

8. **ACTIVATE AND CHECKOUT NODE 2 LOW TEMPERATURE LOOP**

8.1 **Activate Node 2 LTL Components**

<table>
<thead>
<tr>
<th>Table 1. LTL Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPCM [X]</td>
</tr>
<tr>
<td>N22A3A_B</td>
</tr>
<tr>
<td>N22A3A_B</td>
</tr>
<tr>
<td>N22A3A_B</td>
</tr>
</tbody>
</table>

Refer to Table 1 for X and Y references that follow

\[\text{Node 2: EPS: RPCM [X]: RPC [Y]}\]

RPCM [X]: RPC [Y]:

√Close Cmd – Ena

\[\text{cmd RPC Position – Close (Verify – Cl)}\]

Repeat

8.2 **Enable RT I/O for LTL PPA**

Node 2: CDH: Node 2-2 MDM: LB SYS N2-2: RT Status

\[\text{LB SYS N2-2 RT Status}\]
8.3 Configuring Node 2 LTL Three Way Mix Valves

Node 2: TCS: LTL TWMV

**Node2 LTL TWMV Commands**

'**LTL TWMV**'

**cmd** Startup **Execute**
Verify Software – Started

'Temp Setpt'

input – 4 . 5

**cmd** Set **Execute**

√Temp Setpt – 4.5 deg C

Node 2: TCS: LTL Regen TWMV

**Node2 LTL Regen TWMV Commands**

'**LTL Regen TWMV**'

**cmd** Startup **Execute**
Verify Software – Started

'Temp Setpt'

input – 1 7 . 3

**cmd** Set **Execute**

√Temp Setpt – 17.3 deg C

8.4 Checking 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.

**sel** LTL SFCA

**Node2 LTL SFCA Commands**

'**Commands**'

√SFCA Software – Shutdown
8.5 Sending Activation Command

NOTE
The following Caution messages may be annunciated following activation:

'Node 2 LTL Regen TWMV Undertemp-Node2' (EC 2811)
'Node 2 LTL Regen TWMV Overtemp-Node2' (EC 2812)
'Node 2 LTL SFCA Uncontrolled DP-Node2' (EC 2828)

No action is required.

sel Node2 LTL Software Commands

Node2 LTL Software Commands

'LTL IATCS'
'IATCS Activation'

cmd Startup – Startup

\IATCS Activation – In Prog

Wait up to 3 minutes

'LTL IATCS'

Verify IATCS Status – Oper
Verify IATCS Activation – Not in Prog

Node 2: TCS: IATCS Details

IATCS Details
'TWMV Software'

Verify LTL CLC – Ena
'Regen TWMV Software'

Verify LTL CLC – Ena
'SFCA Software'

Verify Mod Vlv CLC – Ena
'PPA Software'

Verify LTL – Started
8.6 Verify LTL Parameters

Node 2: TCS

Node2: TCS

'TWMV'
Verify LTL Out Temp: 0 to 22 deg C

'Regen HX'
Verify LTL Out Temp: 0 to 22 deg C

'PPA'
Verify LTL Avg Accum Qty: 40 to 85%
Verify LTL Pmp In Press: 124 to 193 kPa
Verify LTL HR Flow: 830 to 1284 kg/hr
Verify LTL Out Temp: 0 to 22 deg C
Verify LTL Filter dP: 6.8 to 55.2 kPa
Verify LTL Gas Trap dP: 13.8 to 55.2 kPa

'SFCA'
Verify LTL Mod Vlv dP: 96.5 to 110 kPa

8.7 Enable Node 2 LTL Auto Repress

Node 2: TCS: LTL PPA: Node 2 LTL NIA Commands

Node2 LTL NIA Commands

**cmd** LTL NIA State – Ena (Verify – Ena)

Node 2: TCS

'FDIR'

Verify LTL Leak Rcvry – Ena

8.8 Configuring FDIR

Node 2: TCS

'PPA'

Record LTL Avg Accum Qty: _____________ %
sel LTL Software

**Node2 LTL Software Commands**

'Leak Recovery'

**cmd** Set Normal Leak Limits – Set

'Failure Recovery'

Verify Fail Rcvy – Ena
Verify SFCA Overpress Protection Status – Ena

9. **Give "Go" for Columbus 1E Berthed Survival Mode Activation Start**
   **MCC-H ↑ ISS, "Go to start Columbus Berthed Survival Mode Activation procedure"**

10. **VERIFY ACTIVE COOLING FOR PORT AND OVHD DDCUS**

<table>
<thead>
<tr>
<th>Rack</th>
<th>[X] DDCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port</td>
<td>N2P3A</td>
</tr>
<tr>
<td></td>
<td>N2P2A</td>
</tr>
<tr>
<td>Ovhd</td>
<td>N2O2B</td>
</tr>
<tr>
<td></td>
<td>N2O3A</td>
</tr>
</tbody>
</table>

Refer to Table 2 for X references that follow

Node 2: EPS: DDCU [X]

**DDCU [X]**

Verify Converter Temp < 43.8 deg C
Verify Pwr Supply Temp < 49.5 deg C
Verify Baseplate Temp < 40.3 deg C

Repeat

11. **COMPLETE CONFIGURATION OF RPCMS**
    Perform [5.420 RPCM POWER ON RESET], for RPCMs XXXX (GROUND: EPS: CORRECTIVE: SECONDARY POWER SYSTEM), then:

12. **ACTIVATE REMAINING NODE 2 CHANNEL 23 EQUIPMENT**

12.1 **Activate ABC-4**
    C&T: ABC 4: RPCM N22A3A A RPC 01
12.2 **Activate Node 2 ATU2**

C&T: Node2 ATU2: RPCM N22A3A A RPC 02

```
RPCM N22A3A A RPC 02
```

√Close Cmd – Ena

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

```
ABC 4
```

Verify which IAC is Active and Powered on.
Use the commands for the Active and Powered IAC.

**cmd** Bus I/O – Enable (Verify – Enable)

12.3 **Connect Node 2 ATU 2 to Conferences (as desired)**

C&T

CNT Group Overview

Verify which IAC is Active and Powered on.
Use the commands for the Active and Powered IAC.

```
sel Node 2 ATU 2
```

Node 2 ATU 2

**cmd** Bus I/O – Enable (Verify – Enable)

'Configuration'

**cmd** State – Active (Verify – Active)

```
sel IAC[X] Call Select where [X] = Active and Powered IAC 1(2)
```

IAC[X] Call Select

'Public 1(2,3,4,5)'

```
sel Call Setup
```
Public 1(2,3,4,5) Call Select

`cmd` N2 ATU 2

Repeat call configuration as necessary.

13. **ACTIVATE REMAINING NODE 2 CHANNEL 14 EQUIPMENT**

13.1 Repower Node 2 MTL NIA AVV, NIA NIV and SFCA

Node 2: EPS: RPCM N21B4B B

`RPCM N21B4B_B`

'RPC'

`sel` RPC [X] where [X] = 2 15 16

√ Close Cmd – Ena

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

Repeat

13.2 Enable MTL SFCA Closed Loop Control

Node 2: TCS: MTL SFCA

Node2 MTL SFCA Commands

'MTL SFCA'

`cmd` CLC – Ena (Verify – Ena)

14. **DEINSTALL AND DEACTIVATE PORTABLE FAN (IF REQUIRED)**

Perform {2.XXX PFA TEARDOWN}, all steps (SODF: ECLSS)

15. **SWITCH 1553 BUSES TO CHANNEL A AND ENABLE CH SWITCHING**

15.1 Config CB INT-1 Bus

CDH: Primary C&C

Primary CCS MDM

`sel` CB INT-1

`CB INT-1`

`sel` Bus Status

`CB INT-1 Bus Status`
**cmd** Channel Selected – Select Ch A **Execute** (Verify – A)

**cmd** Auto Channel Switch Status – Enable **Execute** (Verify – Ena)

### 15.2 Config CB INT-2 Bus
CDH: Primary C&C

- **Primary CCS MDM**

- sel CB INT-2
  - **CB INT-2**

- sel Bus Status
  - **CB INT-2 Bus Status**

**cmd** Channel Selected – Select Ch A **Execute** (Verify – A)

**cmd** Auto Channel Switch Status – Enable **Execute** (Verify – Ena)

### 15.3 Config LB CHECS Bus
CDH: Primary PL

- **Primary PL MDM**

- sel LB CHECS-APM
  - **LB_CHECS_APM**

- sel Bus Status
  - **LB_CHECS_APM_Bus_Status**

**cmd** Channel Selected – Select Ch A **Execute** (Verify – A)

**cmd** Auto Channel Switch Status – Enable **Execute** (Verify – Ena)

### 15.4 Config LB PL APM Bus
CDH: Primary PL

- **Primary PL MDM**

- sel LB PL APM
  - **LB_PL_APM**
sel Bus Status

LB_PL_APM_Bus_Status

cmd Channel Selected – Select Ch A **Execute** (Verify – A)

cmd Auto Channel Switch Status – Enable **Execute** (Verify – Ena)

15.5 **Enable BC Comm Fail FDIR**
CDH: Primary C&C: Recovery Retry: CCS MDM

CCS Recovery Retry

**cmd** BC Comm Fail – Enable **Execute** (Verify – Ena)
OBJECTIVE:
Configure the Node 2-to-Columbus Vestibule: Includes Vestibule Operational steps to integrate the Columbus to Node 2 with the exception of Nitrogen Jumper Installation. The Nitrogen Jumper Install in this procedure is for contingency only, since it does not include purging the jumper.

CAUTION
Prior to Jumper installation, inspect Jumper Connector for bent pins and debris. Failure to do so could result in damage to Jumper during installation.

NOTE
This procedure is designed to be worked in conjunction with {COLUMBUS ACTIVATION FLOWCHART}, all (SODF: ASSY OPS: NOMINAL: ACTIVATION AND CHECKOUT)
Fitchecks performed on the ground indicate that some jumpers may have interference problems with connectors on CBM bolt and latch hardware. If interference is seen on-orbit, CBM Powered Bolt Connectors may be removed and cable connectors capped as required.

LOCATION:
 Installed: Node 2, Columbus Vestibule
 Stowed: √Inventory Management System (IMS)

DURATION:
2.0 hours

PARTS:
Mittens (two) (P/N 683-13896-37)
Radial Port Closeout (P/N 683-60461-11)
Vestibule Outfitting Kit (VOK)

NOTE
One Cargo Transfer Bag (CTB, Single) contains the contents of the Vestibule Outfitting Kit listed below.

Ground Straps (two) (P/N 683-13477-7)
12" x 12" Ziplock Bag (4) (P/N 528-50000-5)
 Each 12" x 12" Ziplock Bag (for CPA Removal) contains:
  24" x 24" Ziplock Bag (1) (P/N 528-50000-8)
  Protective Cap (one) (P/N NATC-RPC-N-15-0)
  Protective Cap (one) (P/N NATC-PPC-N-15-0)
  Protective Cap (two) (P/N NATC-RPC-N-11-0)
  Protective Cap (two) (P/N NATC-PPC-N-11-0)
  Protective Cap (six) (P/N NATC-RPC-N-13-0)
  Protective Cap (six) (P/N NATC-PPC-N-13-0)
### Table 1. Power/Data Jumpers

<table>
<thead>
<tr>
<th>Jumper Function</th>
<th>Jumper Nomenclature</th>
<th>Wire Harness Reference Designator</th>
<th>Wire Harness Assembly Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Feed (APM 1, 2A/3A)</td>
<td>EMC EO</td>
<td>W5013</td>
<td>1F46373-1 D</td>
</tr>
<tr>
<td>Power Feed (APM 2, 1A/4A)</td>
<td>EMC EO</td>
<td>W5012</td>
<td>1F46371-1</td>
</tr>
<tr>
<td>1553B, LB-A</td>
<td>EMC RF</td>
<td>W5001</td>
<td>1F46349-1 B</td>
</tr>
<tr>
<td>1553B, LB-B</td>
<td>EMC RF</td>
<td>W5002</td>
<td>1F46351-1</td>
</tr>
<tr>
<td>Hardwired Instrumentation HO-R</td>
<td>EMC HO</td>
<td>W5010</td>
<td>1F46367-1</td>
</tr>
<tr>
<td>PDU1/VTC1 - N and PDU2/VTC2 - R</td>
<td>EMC RF</td>
<td>W5003</td>
<td>1F46353-1</td>
</tr>
<tr>
<td>Hardwired Instrumentation HO-N</td>
<td>EMC HO</td>
<td>W5006</td>
<td>1F46359-1</td>
</tr>
<tr>
<td>PDU1/VTC1 - R and PDU2/VTC2 - N</td>
<td>EMC ML</td>
<td>W5007</td>
<td>1F46361-1</td>
</tr>
<tr>
<td>Hardwired Instrumentation ML-R</td>
<td>EMC ML</td>
<td>W5008</td>
<td>1F46362-1</td>
</tr>
<tr>
<td>VTC1/2 - R and PDU1 Input Current</td>
<td>EMC ML</td>
<td>W5009</td>
<td>1F46365-1</td>
</tr>
<tr>
<td>Hardwired Instrumentation ML-N</td>
<td>EMC ML</td>
<td>W5010</td>
<td>1F46361-1</td>
</tr>
<tr>
<td>VTC1/2 - N and PDU2 Input Current</td>
<td>EMC ML</td>
<td>W5007</td>
<td>1F46361-1</td>
</tr>
<tr>
<td>LAN2 (Ethernet) / OPS LAN</td>
<td>EMC CLASS RF</td>
<td>W5015</td>
<td>1F46377-1</td>
</tr>
<tr>
<td>Fiber Optic 1</td>
<td>FO</td>
<td>W5009</td>
<td>1F46365-1</td>
</tr>
<tr>
<td>Fiber Optic 2</td>
<td>FO</td>
<td>W5004</td>
<td>1F46355-1</td>
</tr>
<tr>
<td>Intravehicular Antenna Assembly</td>
<td>EMC RF</td>
<td>W5005</td>
<td>1F46357-1</td>
</tr>
</tbody>
</table>

### Table 2. Fluid Jumpers

<table>
<thead>
<tr>
<th>Fluid Jumper Function</th>
<th>Jumper Nomenclature</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensate Water</td>
<td>Waste Water</td>
<td>683-13870-71</td>
</tr>
<tr>
<td>LTL Supply</td>
<td>LTCS Supply</td>
<td>683-13896-7</td>
</tr>
<tr>
<td>LTCS Return</td>
<td>MTCS Return</td>
<td>683-13896-8</td>
</tr>
<tr>
<td>Low Pressure Nitrogen</td>
<td>Low Press Nitrogen</td>
<td>683-13870-70</td>
</tr>
<tr>
<td>MTL Supply</td>
<td>MTCS Supply</td>
<td>683-13871-3</td>
</tr>
<tr>
<td>MTL Return</td>
<td>MTCS Return</td>
<td>683-13871-4</td>
</tr>
<tr>
<td>Air Sampling</td>
<td>AR Sample</td>
<td>683-13870-72</td>
</tr>
<tr>
<td>IMV Supply</td>
<td>Node 2 IMV Supply</td>
<td>683-13870-73</td>
</tr>
<tr>
<td>IMV Return</td>
<td>Node 2 IMV Return</td>
<td>683-13870-74</td>
</tr>
</tbody>
</table>

**MATERIALS:**
- Velcro Straps
- Gray Tape
- Marking Pen
- MD WCS Towel
- Braycote

**TOOLS REQUIRED:**
- Mini Maglite
- Portable Fan
- Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit
- Nitrogen Oxygen Purge Adapter (NOPA)

11 SEP 07
USOS IVA TOOL KIT:
Drawer 2:
- Ratchet 1/4" Drive
- 1/4" to 3/8" Adapter
- 4" Ext 1/4" Drive
- 5/32" Hex Head, 1/4" Drive
- 1/4" Hex Head, 1/4" Drive
- 3/16" Hex Head, 1/4" Drive
- 1/4" Socket, 1/4" Drive
- 3/8" Socket, 1/4" Drive
- 7/16" Socket, 1/4" Drive
- 7/16" Deep Socket, 1/4" Drive
- 1/2" Deep Socket, 1/4" Drive
- (5-35 in-lbs) Trq Driver, 1/4" Drive
- (40-200 in-lbs) Trq Wrench, 1/4" Drive
- (40-200 in-lbs) Trq Wrench, 3/8" Drive

Drawer 5:
- Scissors
- Static Wrist Tether

REFERENCED PROCEDURE(S):
1.105 CBM CENTER DISK COVER REMOVAL
1.102 ACBM TO PCBM GROUND STRAP INSTALLATION
1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL - GENERIC

1. OPENING NODE 2 STARBOARD HATCH
   1.1 Open Node 2 Starboard 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).
   ISS Ŷ MCC-H if condensation found.

2. REMOVING CBM CENTER DISK COVER
   2.1 Perform {1.105 CBM CENTER DISK COVER REMOVAL}, all (SODF: S&M: NOMINAL: VESTIBULE), then:
3. REMOVING COLUMBUS PCBM THERMAL BLANKET

3.1 Access ground Fasteners by partially removing Columbus PCBM Thermal Blanket (Velcro). Refer to Figure 1.

3.2 Disengage ground Fasteners from bulkhead, 1/4 Turn Fasteners (4" Common Tip Screwdriver).

**CAUTION**

PCBM Thermal Blanket is rolled instead of folded to prevent damage to the multilayer insulation of the Blanket.

3.3 Pull Blanket from mounting surface (Velcro). Roll Blanket, temporarily stow.

4. INSTALLING ACBM TO PCBM GROUND STRAPS

**NOTE**

To facilitate the installation of two Ground Straps, PCBM Alignment Guides may be removed. Do not re-install the Alignment Guides if removed.
4.1 Perform **{1.102 ACBM TO PCBM GROUND STRAP INSTALLATION}**, all
(SODF: S&M: NOMINAL: VESTIBULE), then:

Figure 2.- NODE 2 STBD Interface (Orientation from Node 2 Looking Stbd).

---

11 SEP 07
5. **INSTALLING COLUMBUS POWER JUMPERS**

**WARNING**

Power must be removed before proceeding with COL Power Jumper installations. Failure to remove power can result in electrical shock hazard.
5.1 MCC-H

Verify GO for Columbus Utility Connections, block 10 of COLUMBUS ACTIVATION FLOWCHART (SODF: ASSY OPS/NOMINAL: ACTIVATION AND CHECKOUT).

Table 3. Columbus Power Jumpers

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL Bulkhead Interface</th>
<th>Wire Harness Reference Designator</th>
<th>Wire Harness Assembly Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER FEEDER (APM 1, 2A/3A)</td>
<td>J99</td>
<td>J02</td>
<td>W5013</td>
<td>1F46373-1</td>
<td>Blue and Yellow</td>
<td>Right Lower</td>
</tr>
<tr>
<td>POWER FEEDER (APM 2, 1A/4A)</td>
<td>J98</td>
<td>J01</td>
<td>W5012</td>
<td>1F46371-1</td>
<td>Blue and Yellow</td>
<td>Right Upper</td>
</tr>
</tbody>
</table>

Figure 4.—Columbus Power Jumper Installation Location.

5.2 Protective Cap ←|→ Node 2 Bulkhead (J99)
Protective Cap ←|→ COL Bulkhead (J02)

Refer to Table 3.
Place untethered caps (Node side) in 12" x 12" Ziplock Bag.

5.3 Protective Caps (two) ←|→ POWER FEEDER APM 1 (W5013)
Stow caps in 12" x 12" Ziplock Bag.

5.4 Install POWER FEEDER APM 1 (W5013).
POWER FEEDER APM 1 (W5013) P99 →|← J99 (Node 2)
POWER FEEDER APM 1 (W5013) P02 →|← J02 (COL)

5.5 Protective Cap ←|→ Node 2 Bulkhead (J98)
Protective Cap ←|→ COL Bulkhead (J01)

Place untethered cap (Node side) in 12" x 12" Ziplock Bag.

5.6 Protective Caps (two) ←|→ POWER FEEDER APM 2 (W5012)
Stow caps in 12" x 12" Ziplock Bag.
5.7 Install POWER FEEDER APM 2 (W5012).
P98 →|← J98 (Node 2 side)
P01 →|← J01 (COL side)

5.8 ISS ↓ MCC-H, “GO for MCC-H DDCU powerup.”

6. **INSTALLING HARDWIRED INSTRUMENTATION JUMPERS**

Table 4. Columbus Hardwired Jumpers

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL Bulkhead Interface</th>
<th>Wire Harness Reference Designator</th>
<th>Wire Harness Assembly Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwired Instrumentation HO-R PDU1/VTC1 - N and PDU2/VTC2 - R</td>
<td>J95</td>
<td>J05</td>
<td>W5010</td>
<td>1F46367-1</td>
<td>Green</td>
<td>Upper Right</td>
</tr>
<tr>
<td>Hardwired Instrumentation ML-R VTC1/2 - R and PDU1 Input Current</td>
<td>J91</td>
<td>J04</td>
<td>W5006</td>
<td>1F46359-1</td>
<td>White</td>
<td>Upper Left</td>
</tr>
<tr>
<td>Hardwired Instrumentation HO-N PDU1/VTC1 - R and PDU2/VTC2 - N</td>
<td>J78</td>
<td>J06</td>
<td>W5003</td>
<td>1F46353-1</td>
<td>Green</td>
<td>Lower Right</td>
</tr>
<tr>
<td>Hardwired Instrumentation ML-N VTC1/2 - N and PDU2 Input Current</td>
<td>J82</td>
<td>J12</td>
<td>W5007</td>
<td>1F46361-1</td>
<td>White</td>
<td>Lower Left</td>
</tr>
</tbody>
</table>

6.1 Protective Cap (4) ←|→ Node 2 Bulkhead (J95, J78, J91, J82)
Protective Cap (4) ←|→ COL Bulkhead (J05, J06, J04, J12)

Refer to Table 4.
Place untethered caps (Node side) in 12" x 12” Ziplock Bag.
6.2 Protective Cap ←— Hardwired Instrumentation HO-R (W5010)
Protective Cap ←— Hardwired Instrumentation HO-N (W5003)
Protective Cap ←— Hardwired Instrumentation ML-R (W5006)
Protective Cap ←— Hardwired Instrumentation ML-N (W5007)
Place caps in 12” x 12” Ziplock Bag.

6.3 Install “HARDWIRED INSTRUMENTATION” Jumpers
Hardwired Instrumentation HO-R (W5010) P95 — J95 (NOD 2)
Hardwired Instrumentation HO-R (W5010) P05 — J05 (COL)
Hardwired Instrumentation ML-R (W5006) P91 — J91 (NOD 2)
Hardwired Instrumentation ML-R (W5006) P04 — J04 (COL)
Hardwired Instrumentation HO-N (W5003) P78 — J78 (NOD 2)
Hardwired Instrumentation HO-N (W5003) P06 — J06 (COL)
Hardwired Instrumentation ML-N (W5007) P82 — J82 (NOD 2)
Hardwired Instrumentation ML-N (W5007) P12 — J12 (COL)

6.4 ISS ↓ MCC-H, “HARDWIRED INSTRUMENTATION Jumper Installation complete.”

7. INSTALLING 1553 DATA JUMPERS

Table 5. 1553B, LB-B Jumper

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL Bulkhead Interface</th>
<th>Wire Harness Reference Designator</th>
<th>Wire Harness Assembly Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1553B, LB-B</td>
<td>J93</td>
<td>J07</td>
<td>W5002</td>
<td>1F46349-1</td>
<td>Orange</td>
<td>Upper Center</td>
</tr>
</tbody>
</table>

Figure 6.- 1553B, LB-B Jumper Installation Location.
7.1 Removing Terminators and Caps

Terminator ←|→ J93 (NOD2)
Terminator ←|→ J07 (COL)

Protective Cap ←|→ P07 (W5002)
Protective Cap ←|→ P93 (W5002)

Place terminators and caps in 24" x 24" Ziplock Bag.

7.2 Installing 1553B, LB-B (W5002)

1553B, LB-B (W5002) P07 ←|→ J07 (COL)
1553B, LB-B (W5002) P93 ←|→ J93 (NOD2)

7.3 Switching CB Int-1 From Channel A to Channel B

PCS

C&DH: MDM C&C Primary
[Primary CCS MDM]

sel CB Int 1

[CB Int 1]

sel Bus Status

[CB Int 1 Bus Status]

‘Channel Selected’

**cmd** Select Ch B (Verify – B)

‘Auto Channel Switch Status’

**cmd** Inhibit (Verify – Inh)

7.4 Switching CB Int-2 From Channel A to Channel B

C&DH: MDM C&C Primary
[Primary CCS MDM]

sel CB Int 2

[CB Int 2]

sel Bus Status

[CB Int 2 Bus Status]

‘Channel Selected’

**cmd** Select Ch B (Verify – B)

‘Auto Channel Switch Status’

**cmd** Inhibit (Verify – Inh)
7.5 Switching LB Checks COL From Channel A to Channel B

C&DH: MDM PL Primary

[Primary PL MDM]

sel LB Checks COL

[LB CHECKS COL]

sel Bus Status

[LB CHECKS COL Bus Status]

'Channel Selected'

**cmd** Select Ch B (Verify – B)

'Auto Channel Switch Status'

**cmd** Inhibit (Verify – Inh)

7.6 Switching LB PL COL From Channel A to Channel B

C&DH: MDM PL Primary

[Primary PL MDM]

sel LB PL COL

[LB PL COL]

sel Bus Status

[LB PL COL Bus Status]

'Channel Selected'

**cmd** Select Ch B (Verify – B)

'Auto Channel Switch Status'

**cmd** Inhibit (Verify – Inh)

### Table 6. 1553B, LB-A Jumper

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL Bulkhead Interface</th>
<th>Wire Harness Reference Designator</th>
<th>Wire Harness Assembly Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1553B, LB-A</td>
<td>J81</td>
<td>J08</td>
<td>W5001</td>
<td>1F46349-1</td>
<td>Orange</td>
<td>Lower Center</td>
</tr>
</tbody>
</table>
Figure 7.- 1553B, LB-A Jumper Installation Location.

7.7 Removing Terminators and Caps
Terminator ←|→ J81 (NOD2)
Terminator ←|→ J08 (COL)

Protective Cap ←|→ P08 (W5001)
Protective Cap ←|→ P81 (W5001)

Place terminators and caps in 24" x 24" Ziplock Bag.

7.8 Installing 1553B, LB-A (W5001)
1553B, LB-A (W5001) ←|→ J08 (COL)
1553B, LB-A (W5001) ←|→ J81 (NOD2)

ISS ⇓ MCC-H, “1553 jumper installation complete.”

8. REMOVING CBM CONTROLLER PANEL ASSEMBLIES
8.1 Remove CBM CPAs in order: Forward and Aft CPAs first, followed by Overhead and Deck CPAs, perform {1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL - GENERIC}, steps 3, 4 and 6; Desiccant Bag is not required (SODF: S&M: NOMINAL: VESTIBULE), then:

9. INSTALLING ITCS JUMPERS

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ITCS jumpers are filled with ITCS fluid. Care must be taken when uncapping and bending the jumper to prevent excess fluid release into the cabin. Safety Goggles must be donned during activity.</td>
</tr>
</tbody>
</table>
CAUTION

1. Inspect fluid connectors for damage and debris. Verify seals are installed at both ends. Failure to comply may result in damage to the fluid connectors.

2. Towels or other absorbent materials should not come in contact with coolant in jumpers or plumbing lines to prevent loss due to wicking. Failure to comply may result in loss of coolant.

NOTE

Fitchecks performed on the ground indicate that LTCS jumper may have interference problems with Power Bolt connectors. If interference is seen on-orbit, CBM Powered Bolt Connectors may be removed and cable connectors capped as required.

Table 7. TCS LTL/MTL Jumpers

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Part Number</th>
<th>Jumper Description</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTCS Supply</td>
<td>A02</td>
<td>A02</td>
<td>683-13896-7</td>
<td>Insulated Straight</td>
<td>Right Upper</td>
</tr>
<tr>
<td>LTCS Return</td>
<td>A05</td>
<td>A05</td>
<td>683-13896-8</td>
<td>Insulated Straight</td>
<td>Right Lower</td>
</tr>
<tr>
<td>MTCS Supply</td>
<td>A09</td>
<td>A09</td>
<td>683-13871-3</td>
<td>Braided Omega</td>
<td>Left Upper</td>
</tr>
<tr>
<td>MTCS Return</td>
<td>A12</td>
<td>A12</td>
<td>683-13871-4</td>
<td>Braided Omega</td>
<td>Left Lower</td>
</tr>
</tbody>
</table>

Figure 8.- TCS Jumper Installation Location.
9.1 Installing LTL Supply Jumper
QD Cap ←|→ A02 (COL)
QD Cap ←|→ A02 (NOD2)
QD Plug (2) ←|→ LTCS Supply

LTCS Supply →|← A02 (COL)
LTCS Supply →|← A02 (NOD2)

Place untethered caps in 12" x 12" Ziplock Bag.

9.2 Installing LTL Return Jumper
QD Cap ←|→ A05 (COL)
QD Cap ←|→ A05 (NOD2)
QD Plug (2) ←|→ LTCS Supply

LTCS Return →|← A05 (COL)
LTCS Return →|← A05 (NOD2)

Place caps and plugs in 12" x 12" Ziplock Bag.

9.3 Install Thermal Mittens on LTL Supply and Return QDs on COL and NOD2.

9.4 Installing MTL Supply Jumper
QD Cap ←|→ A09 (COL)
QD Cap ←|→ A09 (NOD2)
QD Plug (2) ←|→ MTCS Supply

MTCS Supply →|← A09 (COL)
MTCS Supply →|← A09 (NOD2)

Place untethered caps in 12" x 12" Ziplock Bag.

9.5 Installing MTL Return Jumper
QD Cap ←|→ A12 (COL)
QD Cap ←|→ A12 (NOD2)
QD Plug (2) ←|→ MTCS Supply

MTCS Return →|← A12 (COL)
MTCS Return →|← A12 (NOD2)

ISS ↓ MCC-H, “TCS Jumper Installation complete.”
10. **INSTALLING CONDENSATE JUMPER**

Table 8. FFTD Data for Waste Water/Condensate Jumper

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 Starboard Bulkhead Interface</th>
<th>Columbus Port Bulkhead Interface</th>
<th>Part Number</th>
<th>Input Torque (in-lbs)</th>
<th>Output Torque (in-lbs)</th>
<th>FFTD Head Size (inch)</th>
<th>Jumper Description</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Water/Condensate Jumper</td>
<td>A01</td>
<td>A01</td>
<td>683-13870-71</td>
<td>38</td>
<td>185</td>
<td>0.875</td>
<td>0.625</td>
<td>Silver Braid</td>
</tr>
</tbody>
</table>

Figure 9.- Waste Water/Condensate Jumper Installation Location.

10.1 QD Cap ←|→ A01 (NOD2)

Loosen COL A01 Cap (FFTD, Ratchet 3/8" Drive)

Cap ←|→ A01 (COL)

10.2 Cap (2) ←|→ Waste Water Jumper

10.3 Installing Waste Water Jumper

Waste Water →|← A01 (COL): Torque Gamah fittings per Table 8 (FFTD, (30-200 in-lbs) Trq Wrench, 3/8" Drive)

Waste Water →|← A01 (NOD2)

10.4 Female cap →|← Male cap

Stow in Ziplock Bag.

Attach caps, Ziplock Bag to vestibule bulkhead (Gray Tape).

11. **INSTALLING IMV RETURN DUCT (A11)**

Table 9. IMV Return Duct

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Part Number</th>
<th>Jumper Description</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 2 IMV Return</td>
<td>A11</td>
<td>A11</td>
<td>683-13870-74</td>
<td>Gray Duct</td>
<td>Right Center</td>
</tr>
</tbody>
</table>

11 SEP 07
11.1 Manually Cycle (Open then Close) Node 2 IMV Valves.

11.2 Loosen V-Band Clamp and remove IMV Cap from Node Starboard (A11) IMV Flange (Ratchet 1/4", 7/16" Deep Socket). Place IMV Cap in 24" x 24" Ziplock Bag.

11.3 Install IMV Jumper O-Rings (two), one on each end 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.

11.4 Loosen V-Band Clamp and remove IMV Flange Saver from COLUMBUS (A11) IMV Flange (Ratchet 1/4", 1/2" Deepwell Socket). Place IMV Flange Saver in 24" x 24" Ziplock Bag.

NOTE
A small amount of Braycote may be used to help keep IMV Jumper O-rings in place during jumper installation.
Figure 12.- Recommended Method for IMV Duct Installation.

Figure 13.- A11 IMV Duct Installed.
11.5 Install (A11) IMV Return Duct by compressing Return Duct and sliding it into place. Orient flat side of Duct toward the CBM rings.

11.6 Secure Duct to Node 2 IMV Flange with V-Band clamp, tighten to 35 in-lbs (Ratchet 1/4", 7/16" Deep Socket, (5-35 in-lbs) Trq Driver).

11.7 Secure Duct to COLUMBUS IMV Flange with V-Band clamp, tighten to 35 in-lbs (Ratchet 1/4", 1/2" Deep Socket, (40-200 in-lbs) Trq Wrench).

12. **INSTALLING IMV SUPPLY DUCT (A04)**

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Part Number</th>
<th>Jumper Description</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 2 IMV Supply</td>
<td>A04</td>
<td>A04</td>
<td>683-13870-73</td>
<td>Gray Duct</td>
<td>Left Center</td>
</tr>
</tbody>
</table>

Figure 14.- Node 2 IMV Supply Duct Installation Location.

12.1 Using flashlight and dental mirror (if required) verify no threads visible on set screw on IMV Valve. Report results to **MCC-H**.

12.2 Loosen V-Band Clamp and remove IMV Cap from Node Starboard (A04) IMV Flange (Ratchet 1/4", 7/16" Deep Socket). Place IMV Cap in 24" x 24" Ziplock Bag.

12.3 Install IMV Jumper O-Rings (two), one on each end 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.

12.4 Loosen V-Band Clamp and remove IMV Flange Saver from COLUMBUS (A04) IMV Flange (Ratchet 1/4", 1/2" Deepwell Socket). Place IMV Flange Saver in 24" x 24" Ziplock Bag.

12.5 Install (A04) IMV Supply Duct by compressing Supply Duct and sliding it into place. Orient flat side of Duct toward the CBM rings.
12.6 Secure Duct to Node 2 IMV Flange with V-Band clamp, tighten to 35 in-lbs (Ratchet 1/4", 7/16" Deep Socket, (5-35 in-lbs) Trq Driver).

12.7 Secure Duct to COLUMBUS IMV Flange with V-Band clamp, tighten to 35 in-lbs (Ratchet 1/4", 1/2" Deep Socket, (40-200 in-lbs) Trq Wrench).

12.8 Node 2 Starboard Forward IMV RMO ‘Closed’

13. **INSTALLING FIBER OPTIC JUMPERS**

### CAUTION

Minimum allowable bend radius of the fiber optic cable is 2 inches. Failure to comply with minimum bend radius will damage the fiber optic cable.

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Reference Designator</th>
<th>Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>FO / Fiber Optic 1</td>
<td>J83</td>
<td>J10</td>
<td>W5009</td>
<td>1F46365-1</td>
<td>Purple</td>
<td>Lower Left</td>
</tr>
<tr>
<td>FO / Fiber Optic 2</td>
<td>J90</td>
<td>J11</td>
<td>W5004</td>
<td>1F46355-1</td>
<td>Purple</td>
<td>Upper Left</td>
</tr>
</tbody>
</table>

![Figure 15.- Fiber Optic Jumper Installation Location.](image)
13.5 Caps (2) ←|→ FO (W5004) P90, P11

Place caps in 12" x 12" Ziplock Bag.

13.6 FO (W5004) P90 ←|→ J90 (NOD2)
    FO (W5004) P11 ←|→ J11 (COL)

14. INSTALLING AR SAMPLE JUMPER

Table 12. AR Sample Jumper

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Part Number</th>
<th>Jumper Description</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECLSS AR Sample</td>
<td>A13</td>
<td>A13</td>
<td>683-13870-72</td>
<td>Silver Braid</td>
<td>Left Lower</td>
</tr>
</tbody>
</table>

Figure 16.- ECLSS AR Sample Jumper Installation Location.

**NOTE**

The AR Sample Jumper is installed by hand. Fasten AR Sample Jumper fitting to bulkhead by turning ⚙ until Feedthrough Locking Key engages the QD housing.

14.1 Install AR Sample Jumper Assembly (683-13870-72).

Remove COL Feedthrough Cap by hand.

Remove cap from COL side of jumper by hand.

Install jumper onto COL feedthrough until Feedthrough Locking Key engages the QD housing.

Repeat for Node feedthrough.

Place caps in 24" x 24" Ziplock Bag.

15. INSTALLING ETHERNET JUMPER (LAN)

Table 13. LAN Ethernet Jumper

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Reference Designator</th>
<th>Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAN2 Ethernet</td>
<td>J77</td>
<td>J03</td>
<td>W5015</td>
<td>1F46377-1</td>
<td>Green</td>
<td>Lower Right</td>
</tr>
</tbody>
</table>

11 SEP 07
15.1 Cap ←|→ NOD2 J77  
Cap ←|→ COL J03

15.2 Caps (2) ←|→ LAN2 Ethernet (W5015) P77, P03

15.3 LAN2 Ethernet (W5015) P77 →|← J77 (NOD2)  
LAN2 Ethernet (W5015) P03 →|← J03 (COL)

16. **INSTALLING IVA ANTENNA ASSEMBLY**

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 STBD Bulkhead Interface</th>
<th>COL COLUMBUS Bulkhead Interface</th>
<th>Reference Designator</th>
<th>Part Number</th>
<th>Cable Color</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVA Antenna Assembly</td>
<td>J79</td>
<td>J09</td>
<td>W5005</td>
<td>1F46357-1 C</td>
<td>Light Purple</td>
<td>Upper Right</td>
</tr>
</tbody>
</table>

16.1 Cap ←|→ NOD2 J79  
Cap ←|→ COL J09

16.2 Caps (2) ←|→ IVA Antenna Assembly (W5005) P79, P09
16.3 IVA Antenna Assembly (W5005) P79 →|← J79 (NOD2)
IVA Antenna Assembly (W5005) P09 →|← J09 (COL)

16.4 Notify MCC-H of task completion.

NOTE
Fit checks performed on the ground indicate that Low Press Nitrogen jumper may have interference problems with Power Bolt Load Cell connector. If interference is seen on-orbit, CBM Powered Bolt Load Cell Connector may be removed and cable connectors capped as required.

17. INSTALLING NITROGEN JUMPER

CAUTION
Open fluid connectors should be exposed to cabin air for a minimum amount of time to prevent contamination of the Nitrogen system.

NOTE
Installation of the Nitrogen Jumper is for contingency only based on Columbus IATCS Accumulator Nitrogen pressure. Fit checks performed on the ground indicate that this jumper may have interference problems with CBM hardware. If interference is seen on-orbit, perform step 18 to disconnect the CBM hardware.

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 Starboard Bulkhead Interface</th>
<th>Columbus Port Bulkhead Interface</th>
<th>Part Number</th>
<th>Input Torque (in-lbs)</th>
<th>Output Torque (in-lbs)</th>
<th>FFTD Head Size (inch)</th>
<th>Jumper Description</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Press Nitrogen</td>
<td>A08</td>
<td>A08</td>
<td>683-13870-70</td>
<td>38</td>
<td>185</td>
<td>0.875</td>
<td>0.625</td>
<td>Silver Braid</td>
</tr>
</tbody>
</table>

Figure 19.- Low Press Nitrogen Jumper Installation Location.
17.1 \(\sqrt{\text{MCC-H}}\)
Verify if Nitrogen Jumper Installation required at this time.
If required, perform remaining steps of section 17 to install Nitrogen vestibule jumper
without purging.

17.2 Vent Node 2 Nitrogen Low Pressure (Supply) Lines:

Airlock: ECLSS: Nitrogen System
\[\text{AL Nitrogen System}\]
\[\text{'N2 Supply Valve'}\]

\texttt{cmd} Close (\(\sqrt{\text{Actual Position – Closed}}\))

\begin{center}
\textbf{NOTE}
1. Connection and disconnection of QDs requires
   adjoining lines to be at approximately ambient
   pressure on both sides of the QD, when possible.

2. As the N2 system pressure bleeds down and N2
   is introduced into the cabin, the following messages
   may be received:
   \text{'PCA N2 Line Pressure Low – A/L'},
   \text{'PCA N2 Line Pressure Low – LAB'}

3. The messages will return to normal when the N2
   system is repressurized.
\end{center}

Airlock: ECLSS: Nitrogen System
\[\text{AL Nitrogen System}\]
\[\text{'AL PCA N2 Intro Valve'}\]

\texttt{cmd} Open (\(\sqrt{\text{Actual Position – Open}}\))

Wait 2 minutes or \textbf{On MCC-H GO}, proceed.

\texttt{cmd} Close (\(\sqrt{\text{Actual Position – Closed}}\))

17.3 Isolate Node 2 from COL Low Pressure Nitrogen Line:

Open Closeout Panel NOD2SO_24, temp stow.
Demate Low Press QD behind Panel.

17.4 Loosen Node 2 feedthrough cap with FFTD.

17.5 Loosen cap from Node 2 side of jumper by hand.

17.6 Bring jumper end in close proximity to corresponding bulkhead feedthrough.
17.7 √Don Latex Gloves

17.8 Remove Node 2 feedthrough cap by hand.

17.9 Inspect feedthrough for debris.
Report any debris to MCC-H.
Clean as directed (Dry Wipes).

17.10 Inspect feedthrough threads for Braycote Lubricant.
If no Braycote Lubricant present, apply one drop of Braycote Lubricant sparingly to first two threads of feedthrough.
Spread Braycote Lubricant around threads by hand.

17.11 Doff, discard Latex Gloves.
Don new pair of Latex Gloves.

17.12 Remove cap from Node 2 side of jumper by hand (hold cap then twist nut).

17.13 √Unused, undamaged Metal Seal installed on jumper

17.14 Inspect jumper for debris.
Report any debris to MCC-H.
Clean as directed (Dry Wipes).

17.15 Install jumper onto Node 2 feedthrough hand tight.

17.16 Jumper Cap →|← feedthrough cap.
Stow in Ziplock Bag.

17.17 Doff, discard Latex Gloves.

17.18 Repeat for Columbus feedthrough.

17.19 Set Trq Driver to specified input torque.
Refer to Table 15 and FFTD Calibration Card for torque settings.

17.20 Torque both sides of jumper with FFTD.
Refer to Table 15.

18. INSTALLING RADIAL PORT CLOSEOUT
18.1 Install Radial Port Closeout in Vestibule (1/4 Turn Fasteners).

19. VESTIBULE OUTFITTING CLEANUP
19.1 Stow Ziplock Bags with untethered caps in VOK CTB.

19.2 Verify Transfer List for CTB Stowage Locations.

19.3 Stow tools, materials.
**COLUMBUS ACTIVATION FLOWCHART**

(ASY OPS/1E/FIN/MULTI E) Page 1 of 6 pages

**Initial Conditions:**
1. Columbus is berthed to NODE 2 Starboard port.
2. CBM operations are complete and the NODE 2 Starboard CPAs are powered off.
3. Node 2 MTL passive jumper QD disconnect complete.
4. Columbus 24 hour thermal clock started with APCU (SSRMS PL) power removal at ____/___:____ (clock ends at block 17).

---

**Legend:**
- IV Crew: Check when completed
- MCC-H/ COL-CC: MET completed

**Thermal Clock Start/End**

---

**Steps:**

1. **Setup & activate portable fans (if required):**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Step 3
   TBD

2. **Pressurize vestibule & perform gross leak check:**
   NODE 2 TO COLUMBUS PRESSURIZATION AND LEAK CHECK
   Steps TBD
   TBD

3. **Setup PCS for Columbus activation:**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Steps 1, 2
   TBD

4. **Open hatch, remove CBM center disk cover, thermal blanket, & install ground straps:**
   COLUMBUS VESTIBULE OUTFITTING
   Steps 1-4
   00:65

5. **Powerdown equipment on DDCUs N2D4B, N2D1B:**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Step 4
   - THOR (4.1, 4.2),
   - ODIN (4.3-4.6)
   00:15

6. **Powerdown equipment on DDCUs N2P2A, N2P3A:**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Steps 7-11
   - ECLSS (7, 8),
   - THOR (9),
   - ODIN (10),
   - PHALCON (11)
   ~01:00

7. **Verify 1553 config:**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Step 14
   - ODIN
   00:05

8. **Powerdown DDCUs N2D4B, N2D1B:**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Steps 5, 6
   - PHALCON
   00:10

9. **Powerdown DDCUs N2P2A, N2P3A:**
   NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING
   Steps 12-13
   - PHALCON
   00:05

---

**Notes:**
1. Step 7 will shut off the Node 2 CCAA and the Node 2 Fwd Stbd IMV fan. Inform the crew that they are prime for smoke detection. Step 9 will shut off the Node 2 LTL. Step 11 will remove power from Node 2 UOP 3.

2. Steps 12 and 13 will remove power from Node 2 ATU 2, ABC 4 and the LTL PPA. The Node 2 ATU 1, ABC 3 and MTL PPA will remain powered on from DDCU N2S1B and N2S4A. Inform the crew that ATU 2 will not be functional.
10. **GO** for Columbus umbilical connections:

**NODE 2 PREP FOR COLUMBUS VESTIBULE OUTFITTING** Step 15

**COLUMBUS VESTIBULE OUTFITTING** Step 5.1

11. Connect power jumpers:

**COLUMBUS VESTIBULE OUTFITTING**

Steps 5.2 - 5.8

00:15

12. Connect hardline and 1553 jumpers:

**COLUMBUS VESTIBULE OUTFITTING**

Steps 6-7

00:35

13. **GO** for NODE2 DDCU Powerup and MDM activation:

**COLUMBUS VESTIBULE OUTFITTING**

Step 5.8

14. NODE2 DDCU N2P2A, N2P3A, N2D4B, N2D1B powerup and N2-2 MDM activation:

**NODE 2 RECOVERY**

Steps 1-6

− PHALCON (1-4)
− ODIN (5, 6)

00:40

15. Remove CPAs:

**COLUMBUS VESTIBULE OUTFITTING**

Step 8

− Remove CPAs fwd, aft only

01:15

16. Powerup PDUs and VTCs:

**COLUMBUS BERTHED SURVIVAL MODE ACTIVATION**

Steps 1-4

− ODIN (1, 3, 4.1, 4.3)
− PHALCON (2)
− COL-CC (4.2, 4.4-4.6)

00:15

17. Configure VTCs, activate PDU cross-strap bus, module lights and activate heaters:

**COLUMBUS BERTHED SURVIVAL MODE ACTIVATION**

Steps 5-7

− ODIN: steps 5.9 - 5.12
− COL-CC: remaining steps

00:10

3. Hardline and 1553 jumpers can be connected in parallel or before power jumper if there is a problem with the power jumper or inhibits. This flow represents the preferred path.

4. It is highly desired to complete block 16 prior to moving on to the remaining blocks, in order to keep the team focused on critical activation activities.

5. When convenient confirm with the crew that the Columbus lights have been turned on after the completion of block 17.
18. Powerup and activate NODE 2 ECLSS equipment:
   **(NODE 2 RECOVERY)**
   - ECLSS

19. Powerup and activate NODE 2 LTL and MTL equipment:
   **(NODE 2 RECOVERY)**
   - THOR, PHALCON

20. Checkout DDCUs and RPCMs:
    **(NODE 2 RECOVERY)**
    - PHALCON

21. Activate remaining NODE 2 Channel 23 equipment:
    **(NODE 2 RECOVERY)**
    - CATO
    - PHALCON: step 11.4

22. Configure 1553 buses:
    **(NODE 2 RECOVERY)**
    - ODIN

23. Deactivate & deinstall portable fans (if required):
    **(NODE 2 RECOVERY)**
    - Step 13

**Step 7 will restore the Node 2 CCAA, Node 2 IMV and Node 2 smoke detectors. Inform the crew that they are no longer prime for smoke detection in Node 2.**

Crew no longer requires air flow from Node 2 into the vestibule and Columbus module.
24. Install ITCS jumpers:
   COLUMBUS VESTIBULE OUTFITTING
   Step 9
   00:20

25. Remove CPAs:
   COLUMBUS VESTIBULE OUTFITTING
   Step 8
   – Remove CPAs ovhd, deck
   01:15

26. Install Condensate jumper:
   COLUMBUS VESTIBULE OUTFITTING
   Step 10
   00:15

27. Install IMV jumpers:
   COLUMBUS VESTIBULE OUTFITTING
   Steps 11-12
   00:45

28. Install Fiber Optic jumpers:
   COLUMBUS VESTIBULE OUTFITTING
   Step 13
   00:10

29. Install ARS jumper:
   COLUMBUS VESTIBULE OUTFITTING
   Step 14
   00:05

30. Install Ethernet jumper:
   COLUMBUS VESTIBULE OUTFITTING
   Step 15
   00:05

31. Install IVA Antenna jumper:
   COLUMBUS VESTIBULE OUTFITTING
   Step 16
   00:05

Jumper Priority:
1. TCS
2. Condensate
3. IMV
4. Fiber Optic
5. Nitrogen (block 41)
6. ARS
7. Ethernet
8. IVA Antenna

Block 33 (CMU activation) can be performed after ITCS jumper installation, but cooling will not be supplied to CMUs. It is desired to install ITCS jumpers first.
32. Activate PDU outlets:
COLUMBUS FINAL ACTIVATION
Step 1
00:10

33. Activate CMUs and ATU:
COLUMBUS FINAL ACTIVATION
Step 2
00:10

34. Activate water loop:
COLUMBUS FINAL ACTIVATION
Step 3
00:10

35. Activate Columbus DMS:
COLUMBUS FINAL ACTIVATION
Steps 4-9
- Crew: step 8
01:10

36. Activate Columbus HRM:
COLUMBUS FINAL ACTIVATION
Step 10
00:10

37. Activate ECLSS and TCS subsystems:
COLUMBUS FINAL ACTIVATION
Steps 11-15
00:40

38. PLCU and XCMU activation:
COLUMBUS FINAL ACTIVATION
Steps 20-21
00:15
39. Remove NPRVs and install ISSOV:
COL AFT NPRV REMOVAL AND IMV SUPPLY SHUT-OFF VALVE INSTALLATION
00:45

40. Remove NPRVs and install IRSOV:
COL FOWARD NPRV REMOVAL AND IMV RETURN SHUT-OFF VALVE INSTALLATION
00:45

41. Activate Columbus IMV:
COLUMBUS FINAL ACTIVATION
Steps 17-19
00:20

42. Columbus Air Sampling Prep:
COLUMBUS FINAL ACTIVATION
Step 16
00:40

43. Install Nitrogen jumper:
COLUMBUS VESTIBULE OUTFITTING
Step 17
00:15

44. Enable cabin temp monitoring and HCU config:
COLUMBUS FINAL ACTIVATION
Steps 22-24
00:05

45. Disconnect CBM power bolt connectors, install radial port closeout and vestibule cleanup:
COLUMBUS VESTIBULE OUTFITTING
Steps 18-20
TBD
OBJECTIVE:
Initial activation of Columbus module through HCU activation. This procedure will end the thermal clock started when the module is removed from the PL Bay.

INITIAL CONDITIONS:
DDCUs N2D4B and N2D1B repowered (config TBD)
DDCUs N2P2A and N2P3A repowered
N2-1 and N2-2 MDMs nominal
Hardwired connectors mated
1553 connections mated
Power connections mated
VTC Redundancy Management inhibited

1. **VERIFYING NODE MDMS ARE NOMINAL**
   1.1 **Verifying N2-1 MDM**
      PCS
      CDH Summary: N2-1
      Node 2-1 MDM
      Verify Frame Count – <incrementing>
      Verify Processing State – Operational
   1.2 **Verifying N2-2 MDM**
      PCS
      CDH Summary: N2-2
      Node 2-2 MDM
      Verify Frame Count – <incrementing>
      Verify Processing State – Operational

2. **ACTIVATING PDU**
   2.1 **Activating PDU1 Nominal Converter 1**
      PCS
      Task: COL Berthed Survival Mode
      'Power Distribution Unit'
      cmd PDU1 Nom Pwr – On
      Verify PDU1 Nom Pwr Status – On
      Verify PDU1 VTC1 Pwr Bus Status – On
      Verify PDU1 Main Input Current < 5 A
   2.2 **Activating PDU1 Nominal Converter 2**
      COL Berthed Survival Mode
      'Power Distribution Unit'
2.3 **Activating PDU2 Nominal Converter 1**

*COL Berthed Survival Mode*

'Power Distribution Unit'

**cmd** PDU2 Nom Pwr – On

Verify PDU2 Nom Pwr Status – On
Verify PDU2 VTC2 Pwr Bus Status – On
Verify PDU2 Main Input Current < 5 A

2.4 **Activating PDU2 Nominal Converter 2**

*COL Berthed Survival Mode*

'Power Distribution Unit'

**cmd** PDU2 Redun Pwr – On

Verify PDU2 Redun Pwr Status – On
Verify PDU2 VTC1 Pwr Bus Status – On
Verify PDU2 Main Input Current < 5 A

3. **ENABLING COMMUNICATION WITH C&C MDM**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expect C&amp;W messages.</td>
</tr>
</tbody>
</table>

3.1 **Inhibiting VTC Redundancy Management**

**PCS**

Task: COL Berthed Survival Mode

*COL Berthed Survival Mode*

'Vital Telemetry and Telecommand Controller'

'Inhibit VTC Redun Management'

√Master VTC Recovery Step 1 – Inh
√Master VTC Recovery Step 2 – Inh
√Slave VTC Recovery – Inh

3.2 **Enabling RT I/O with VTC1**

Task: COL Berthed Survival Mode: CB INT 1 RT Status

*CB INT 1 RT Status*

**cmd** 21 VTC 1 RT Status – Enable **Execute** (Verify – Ena)
3.3 **Enabling RT I/O with VTC2**

Task: COL Berthed Survival Mode: CB INT 2 RT Status

| CB INT 2 RT Status |

**cmd** 21 VTC 2 RT Status – Enable **Execute** (Verify – Ena)

4. **ACTIVATING AND INITIALIZING VTC1 AND VTC2**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Steps 4.1 through 4.4 require AOS.</td>
</tr>
<tr>
<td>2. VTC1 Ready Status indication can be acquired only when VTC2 is in Idle Mode.</td>
</tr>
</tbody>
</table>

4.1 **Activating VTC1 Idle Mode via Nom Power A**

Task: COL Berthed Survival Mode

| COL Berthed Survival Mode |

| VTC1 Nominal Config |

| cmd VTC1 Nom Pwr A – On |

Verify VTC1 Nom Pwr A Status – On

Verify VTC1 Nom Pwr A Current < 2.14 A

Verify VTC1 Idle Config Mode – Idle Mode

4.2 **Enabling VTC1 Pre-emptive telemetry packets (Ground Only)**

**COL-CC** to enable VTC1 pre-emptive telemetry packets.

Wait for “Go” to continue.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packet swapping initiated from <strong>COL-CC</strong>: Enable VTC1_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)</td>
</tr>
</tbody>
</table>

Perform **[2.2.41 VTC GROUND PACKET SWAPPING]** (EODF: GROUND NOMINAL), then:

**COL-CC** to give a “Go” to continue.

4.3 **Activating VTC2 Idle Mode via Nom Power A**

Task: COL Berthed Survival Mode

| COL Berthed Survival Mode |

| VTC2 Nominal Config |

| cmd VTC2 Nom Pwr A – On |

Verify VTC2 Nom Pwr A Status – On

Verify VTC2 Nom Pwr A Current < 2.14 A

Verify VTC2 Idle Config Mode – Idle Mode
Verify VTC1 Nom Ready Status – Ready
Verify VTC2 Nom Ready Status – Ready

**MCC-H** gives **COL-CC** “Go” to continue

### 4.4 Enabling VTC2 Pre-emptive telemetry packets (Ground Only)

**COL-CC** to enable VTC2 pre-emptive telemetry packets.

Wait for “Go” to continue.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packet swapping initiated from COL-CC: Enable VTC2_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)</td>
</tr>
</tbody>
</table>

Perform (2.2.41 VTC GROUND PACKET SWAPPING) (EODF: GROUND NOMINAL). then:

**COL-CC** to give a “Go” to continue.

### 4.5 Activating VTC1 Nom Power B

**PCS**

**COL Berthed Survival Mode**

‘VTC1 Nominal Config’

- **cmd** VTC1 Nom Pwr B – On
- Verify VTC1 Nom Pwr B Status – On
- Verify VTC1 Nom Pwr A Current < 1.33 A
- Verify VTC1 Nom Pwr B Current < 1.08 A
- Verify VTC1 Nom Temp < 48 °C

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC1_Nom_Pwr_B_On_VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC2</td>
</tr>
</tbody>
</table>

Verify VTC1_Nom_Pwr_B_Stat_VTC – ON
Verify VTC1_Nom_Pwr_A_Current_VTC – <1.33 A
Verify VTC1_Nom_Pwr_B_Current_VTC – <1.08 A
Verify VTC1_Nom_Temp_VTC – < 48 °C

### 4.6 Activating VTC2 Nom Power B

**PCS**

**COL Berthed Survival Mode**

‘VTC2 Nominal Config’

- **cmd** VTC2 Nom Pwr B – On
- Verify VTC2 Nom Pwr B Status – On
- Verify VTC2 Nom Pwr A Current < 1.33 A
- Verify VTC2 Nom Pwr B Current < 1.08 A
Verify VTC2 Nom Temp < 48 °C

\texttt{cmd VTC2\_Nom\_Pwr\_B\_On\_VTC}  
\texttt{data SW\_CMD – VTC\_Disc\_Out\_Cmd\_Cmd\_SW}  
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC1}

Verify VTC2 Nom Pwr B Stat VTC – ON  
Verify VTC2 Nom Pwr A Current VTC – <1.33 A  
Verify VTC2 Nom Pwr B Current VTC – <1.08 A  
Verify VTC2 Nom Temp VTC – <48 °C

5. **CONFIGURING VTC1 TO MASTER AND VTC2 TO SLAVE**

5.1 **Initializing VTC2 in Slave Mode**

\texttt{PCS}  
\texttt{Task: COL Berthed Survival Mode}  
\texttt{COL Berthed Survival Mode}  
\texttt{'Vital Telemetry and Telecommand Controller'}

\texttt{cmd VTC 2 Initialization (Default) – Slave}

Verify VTC2 Mode – Slave  
Verify VTC2 Idle Config Mode – Not Idle

\texttt{cmd VTC\_Initialization\_Cmd\_SW}  
\texttt{prm Init\_Mode – 0 (SLAVE)}  
\texttt{prm Init\_Limit\_Set – 0 (DEFAULT)}  
\texttt{prm Init\_APM\_Mode – 2 (N/A)}  
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC2}

Verify VTC2\_INT\_DATA\_MASTER\_SLAVE\_MODE\_SW – SLAVE  
Verify VTC2\_INT\_DATA\_IDLE\_CONF\_MODE\_SW – NOT\_IDLE

5.2 **Enabling Physical Telemetry Packets**

\texttt{PCS}  
\texttt{COL Berthed Survival Mode}  
\texttt{'Vital Telemetry and Telecommand Controller'}

\texttt{cmd Tlm Packet Physical 4 – Enable}  
\texttt{cmd Tlm Packet Physical 5 – Enable}

\texttt{cmd VTC\_Tlm\_Pkt\_Ena\_Cmd\_SW}  
\texttt{prm Packet\_ID – VTC2\_Tlm\_Pkt\_PHY4\_VTC}  
\texttt{prm Action – 1 (ENABLE)}  
\texttt{prm Checksum\_Flag – 1 (ENABLE)}  
\texttt{prm Dump\_Pipe – 0 (TLM\_P)}  
\texttt{prm APID\_Value – 1268}  
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC2}
5.3 **Notifying VTC1 that VTC2 is in Slave Mode**

`COL Berthed Survival Mode`

'Vital Telemetry and Telecommand Controller'

**Command**

```
cmd VTC_NOTIFY_MODE_Cmd_SW
prm New_Mode – 0 (SLAVE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1
```

5.4 **Initializing VTC1 in Master Mode**

`COL Berthed Survival Mode`

'Vital Telemetry and Telecommand Controller'

**Command**

```
cmd VTC1_Initialization_Cmd_SW
prm Init_Mode – 1 (MASTER)
prm Init_Limit_Set – 0 (DEFAULT)
prm Init_APM_Mode – 1 (VITAL)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1
```

Verify VTC1_INT_DATA_MASTER_SLAVE_MODE_SW – MASTER
Verify VTC1_INT_DATA_APM_MODE_SW – VITAL
Verify VTC1_INT_DATA_IDLE_CONF_MODE_SW – NOT_IDLE

5.5 **Enabling Logical Telemetry Packets**

`COL Berthed Survival Mode`

'Vital Telemetry and Telecommand Controller'

**Command**

```
cmd TLm_Packet_Logical_1 – Enable
cmd TLm_Packet_Logical_2 – Enable
```
### 5.6 Swapping DMS Telemetry Packets (Ground Only)

**COL-CC**

COL-CC to swap nominal DMS telemetry packets.

Wait for "Go" to continue.

#### NOTE

Packet swapping initiated from COL-CC:
- Disable VTC1_Gnd_Tlm_Pkt_PHY2_VTC (1Hz)
- Disable VTC2_Gnd_Tlm_Pkt_PHY2_VTC (1Hz)
- Enable VTC_Gnd_Tlm_Pkt_LOG1_VTC (1Hz)
- Enable VTC_Gnd_Tlm_Pkt_LOG2_VTC (1Hz)

Perform **[2.2.41 VTC GROUND PACKET SWAPPING]** (EODF: GROUND NOMINAL). then:

COL-CC to give a "Go" to continue.

### 5.7 Enabling VTC Vital Bus FDIR

**PCS**

Task: COL Berthed Survival Mode

'COL Activation Overview Displays'

```
sel DMS
DMS Overview Act

sel Vital Bus
COL Vital Bus
```

**cmd** Vital Bus Recon – Enable

Verify Vital Bus Recon – Enable
### Enabling VTC System Bus FDIR

**Task:** COL Berthed Survival Mode

**'COL Activation Overview Displays'**

<table>
<thead>
<tr>
<th>sel DMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMS Overview Act</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>sel System Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>COL System Bus Act</td>
</tr>
</tbody>
</table>

**cmd** System Bus Recon – Enable

Verify System Bus Recon – Enable

<table>
<thead>
<tr>
<th>cmd VTC_Vital_Sys_Bus_Recon_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm BUS_ID – 0 (Vital)</td>
</tr>
<tr>
<td>prm RECONFIGURATION_ENABLE – 1 (Enable)</td>
</tr>
<tr>
<td>data Onboard_Node – SYS_CCSDS_End_Point_VTCM</td>
</tr>
</tbody>
</table>

Verify VTC_MASTER_Vital_Bus_Recon_Ena_SW_PP – ENABLE

### Enabling RT FDIR with VTC1

**Task:** COL Berthed Survival Mode: CB INT 1 RT Status

<table>
<thead>
<tr>
<th>CB INT 1 RT Status</th>
</tr>
</thead>
</table>

**cmd** 21 VTC 1 RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

### Enabling RT FDIR with VTC2

**Task:** COL Berthed Survival Mode: CB INT 2 RT Status

<table>
<thead>
<tr>
<th>CB INT 2 RT Status</th>
</tr>
</thead>
</table>

**cmd** 21 VTC 2 RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)
5.11 **Enabling VTC Redundancy Management**

Task: COL Berthed Survival Mode

’Vital Telemetry and Telecommand Controller’

’Enable VTC Redun Management'

**cmd** Master VTC Recovery Step 1 – Enable (Verify – Ena)

**cmd** Master VTC Recovery Step 2 – Enable (Verify – Ena)

**cmd** Slave VTC Recovery – Enable (Verify – Ena)

5.12 **Enabling C&W For VTC Redundancy Management (Ground Only)**

Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

Perform **{2.101 CAUTION AND WARNING EVENT MANAGEMENT}**, step 2 (SODF: C&DH: NOMINAL) per Table 1, then

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13608</td>
<td>DMS MASTER VTC Recovery Step 1 Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13609</td>
<td>DMS MASTER VTC Recovery Step 2 Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13610</td>
<td>DMS SLAVE VTC Recovery Failure - COL</td>
<td>C</td>
</tr>
</tbody>
</table>

6. **ACTIVATING PDU CROSS STRAPPED POWER BUS**

6.1 **Verifying Microcontroller Status**

Task: COL Berthed Survival Mode

’PDU Redun Pwr Bus Act’

Verify PDU1 Nom Cntl – On
Verify Redun Cntl – Off
Verify PDU2 Nom Cntl – On
Verify Redun Cntl – Off

Verify PDU1_Nom_Cntl_Stat_VTC – ON
6.2 Verifying VTC1 Two-Stage Buffer Status

COL Berthed Survival Mode
'PDU Redun Pwr Bus Act'

\( \sqrt{\text{VTC1 Buffer – Empty}} \)

<table>
<thead>
<tr>
<th>Verification Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>If VTC1 Buffer – Full</td>
</tr>
<tr>
<td>cmd VTC1 Buffer – Clear</td>
</tr>
<tr>
<td>Verify VTC1 Buffer – Empty</td>
</tr>
</tbody>
</table>

\( \sqrt{\text{VTC1_INT_DATA_TWOSTEP_FULL_SW – EMPTY}} \)

If VTC1_INT_DATA_TWOSTEP_FULL_SW – FULL

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd VTC_Cancel_Two_Stage_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
<tr>
<td>Verify VTC1_INT_DATA_TWOSTEP_FULL_SW – EMPTY</td>
</tr>
</tbody>
</table>

6.3 Activating All PDU1 and PDU2 Aux Converters for 120V Outlets

COL Berthed Survival Mode
'PDU Redun Pwr Bus Act'

Record PCS ID: ________________

'Aux Converters Activation'

cmd Start ACS PDU Config – Arm
pick PCS/C-X to VTC-Com1 (where X=PCS ID)

cmd Start ACS PDU Config – Set

COL-CC to verify PDU SSPC Aux Converter status.

Wait for “Go” to continue.

cmd PDU_Config_ACS (ARM)
data SW_CMD – VTC_Start_Terminate_ACS_Cmd_SW
data Action – 1 (START)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify VTC1_INT_DATA_TWOSTEP_FULL_SW – FULL

cmd VTC_Execute_2_Stage_Cmd_SW (EXEC)

Verify PDU1_SSPC_Aux_Conv1_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv2_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv3_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv4_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv5_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv6_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv7_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv8_Stat_VTC – ON
Verify PDU1_SSPC_Aux_Conv9_Stat_VTC – ON

Verify PDU2_SSPC_Aux_Conv1_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv2_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv3_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv4_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv5_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv6_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv7_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv8_Stat_VTC – ON
Verify PDU2_SSPC_Aux_Conv9_Stat_VTC – ON

COL-CC gives “Go” to continue

6.4 Activating PDU1 to PDU2 Power Outlet

COL Berthed Survival Mode
'Cross Strapped Power Bus Act'

cmd PDU 1/2 Redun Pwr Bus – On

Verify PDU 1/2 Redun Pwr Bus Status – On

cmd PDU1_PDU2_Redun_Pwr_Bus_On_VTC
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PDU1_PDU2_Redun_Pwr_Bus_On_Off_Stat_VTC_PP – ON

6.5 Activating PDU2 to PDU1 Power Outlet

COL Berthed Survival Mode
'Cross Strapped Power Bus Act'
**COLUMBUS BERTHED SURVIVAL MODE ACTIVATION**

(ASSY OPS/1E/FIN/MULTI E)  
Page 12 of 14 pages

---

**cmd** PDU 2/1 Redun Pwr Bus – On

Verify PDU 2/1 Redun Pwr Bus Status – On

**cmd** PDU2_PDU1_Redun_Pwr_Bus_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PDU2_PDU1_Redun_Pwr_Bus_On_Off_Stat_VTC_PP – ON

---

**6.6 Activating PDU1 Cross Strapped Converter**

| COL Berthed Survival Mode |
| 'Converter Activation'

**cmd** PDU1 Cross Strapped Conv – On

Verify PDU1 Cross Strapped Conv Status – On

**cmd** PDU1_Cross_Strapped_Conv_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PDU1_Cross_Strapped_Conv_Stat_VTC – ON

---

**6.7 Activating PDU2 Cross Strapped Converter**

| COL Berthed Survival Mode |
| 'Converter Activation'

**cmd** PDU2 Cross Strapped Conv – On

Verify PDU2 Cross Strapped Conv Status – On

**cmd** PDU2_Cross_Strapped_Conv_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify PDU2_Cross_Strapped_Conv_Stat_VTC – ON

---

**6.8 Activating PDU Lights Power Buses**

| PCS |
| COL: EPS: Lights |
| COL PDU 1-2 Lights VTC1 |

**cmd** PDU 2 Outlet 21 – On (Verify – On)
**cmd** PDU 1 Outlet 21 – On (Verify – On)

**cmd** PDU2_MLU_Pwr_Bus_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW

---
7. **ACTIVATING HEATER CONTROL UNIT**

7.1 **Activating HCU1 Power Bus**

PCS

- **Task:** COL Berthed Survival Mode
- 'Heater Control Unit'

**cmd** PDU1 HCU1 Pwr Bus On – On

Verify PDU1 HCU1 Pwr Bus Status – On
Verify PDU1 HCU1 Input Current < 10 A

**cmd** PDU1_HCU1_Pwr_Bus_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PDU1_HCU1_Pwr_Bus_On_Off_Stat_VTC_PP – ON
Verify PDU1_HCU1_Pwr_Bus_Current_VTC_PP – < 10 A

7.2 **Activating HCU2 Power Bus**

- **Task:** COL Berthed Survival Mode
- 'Heater Control Unit'

**cmd** PDU2 HCU2 Pwr Bus – On

Verify PDU2 HCU2 Pwr Bus Status – On
Verify PDU2 HCU2 Input Current < 10 A

**cmd** PDU2_HCU2_Pwr_Bus_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PDU2_HCU2_Pwr_Bus_On_Off_Stat_VTC_PP – ON
Verify PDU2_HCU2_Pwr_Bus_Current_VTC_PP – < 10 A

Verifying Heater Control Loop Status (Ground Only)
**NOTE**

TLM only available after 30 sec delay following HCU power on because of HCU SW initialization.

<table>
<thead>
<tr>
<th>Verify HCU1_AO_Htr_Cntl_Loop Stat_VTC – ENABLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify HCU1_AD_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU1_AR_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU1_FD_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU1_FO_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU1_FR_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU2_AO_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU2_AD_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU2_AR_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU2_FD_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU2_FO_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
<tr>
<td>Verify HCU2_FR_Htr_Cntl_Loop Stat_VTC – ENABLED</td>
</tr>
</tbody>
</table>
OBJECTIVE:
Continuing activation of Columbus Module.

INITIAL CONDITIONS:
Columbus Berthed Survival Mode Activation is complete.

1. **ACTIVATING PDU OUTLET**

   1.1 **Activating PDU1 Subsystem Power Buses 1 thru 5**

   PCS

   Task: COL Final Activation - Part 1
   COL Final Activation - Part 1
   'PDU Outlet Activation'

   PDU1 Subsys Pwr Bus [X] where [X] = [1] [2] [3] [4] [5]

   cmd PDU1 Subsys Pwr Bus [X] – On
   Verify PDU1 Subsys Pwr Bus Posn [X] – On
   Repeat

   cmd PDU1_Subsys_Pwr_Bus1_On_VTC
   data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
   data Onboard_Node – SYS_CCSDS_End_Point_VTC1
   Verify PDU1_Subsys_Pwr_Bus1_On_Off_Stat_VTC_PP – ON

   cmd PDU1_Subsys_Pwr_Bus2_On_VTC
   data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
   data Onboard_Node – SYS_CCSDS_End_Point_VTC1
   Verify PDU1_Subsys_Pwr_Bus2_On_Off_Stat_VTC_PP – ON

   cmd PDU1_Subsys_Pwr_Bus3_On_VTC
   data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
   data Onboard_Node – SYS_CCSDS_End_Point_VTC1
   Verify PDU1_Subsys_Pwr_Bus3_On_Off_Stat_VTC_PP – ON

   cmd PDU1_Subsys_Pwr_Bus4_On_VTC
   data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
   data Onboard_Node – SYS_CCSDS_End_Point_VTC1
   Verify PDU1_Subsys_Pwr_Bus4_On_Off_Stat_VTC_PP – ON

   cmd PDU1_Subsys_Pwr_Bus5_On_VTC
   data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
   data Onboard_Node – SYS_CCSDS_End_Point_VTC1
   Verify PDU1_Subsys_Pwr_Bus5_On_Off_Stat_VTC_PP – ON
1.2 Activating PDU1 Subsystem Power Buses 6 thru 10

PDU1 Subsys Pwr Bus [X] where [X] = [6] [7] [8] [9] [10]

cmd PDU1 Subsys Pwr Bus [X] – On
Verify PDU1 Subsys Pwr Bus Posn [X] – On
Repeat

Verify PDU1_Subsys_Pwr_Bus6_On_Off_Stat_VTC_PP – ON

**cmd** PDU1_Subsys_Pwr_Bus6_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU1_Subsys_Pwr_Bus6_On_Off_Stat_VTC_PP – ON

**cmd** PDU1_Subsys_Pwr_Bus7_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU1_Subsys_Pwr_Bus7_On_Off_Stat_VTC_PP – ON

**cmd** PDU1_Subsys_Pwr_Bus8_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU1_Subsys_Pwr_Bus8_On_Off_Stat_VTC_PP – ON

**cmd** PDU1_Subsys_Pwr_Bus9_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU1_Subsys_Pwr_Bus9_On_Off_Stat_VTC_PP – ON

**cmd** PDU1_Subsys_Pwr_Bus10_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU1_Subsys_Pwr_Bus10_On_Off_Stat_VTC_PP – ON

1.3 Activating PDU2 Subsystem Power Buses 1 thru 5

COL Final Activation - Part 1
‘PDU Outlet Activation’
1.4 Activating PDU2 Subsystem Power Buses 6 thru 10

COL Final Activation - Part 1

‘PDU Outlet Activation’
Activating PDU1 D1 Rack Power

1.5 COL Final Activation - Part 1

'PDU Outlet Activation'

'PDU1'

cmd Rack D1 Pwr Bus – On

Verify Rack D1 Pwr Bus – On
1.6 **Activating PDU2 D1 Rack Power**

**COL Final Activation - Part 1**

'PDU Outlet Activation'

'PDU2'

**cmd** Rack D1 Pwr Bus – On

Verify Rack D1 Pwr Bus – On

<table>
<thead>
<tr>
<th>cmd</th>
<th>PDU2_Rack_D1_Pwr_Bus_On_VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>

Verify PDU2_Rack_D1_Pwr_Bus_On_Off_Stat_VTC_PP – ON

1.7 **Activating WPA1 & WPA2 Accumulator Pressure Sensors (Ground Only)**

**COL-CC**

COL-CC to activate WPA1 and WPA2 Accumulator Pressure Sensors.

Wait for "Go" to continue.

**NOTE**

1. This step can only be performed by COL-CC.

2. If the sensor readings show values below 165 kPa a pressurization of the accumulator is required prior to payload rack connector mate. Continue with step 1.8.

3. If both readings of either pair of WPA Accumulator Pressure sensors are out of limits after the monitoring has been enabled, the system will automatically safe to Berthed Survival Mode.

<table>
<thead>
<tr>
<th>cmd</th>
<th>WPA1_Accum_Press_Snsr1_Pwr_On_VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>

Verify WPA1_Accum_Abs_Press1_VTC – 165 -195 kPa

<table>
<thead>
<tr>
<th>cmd</th>
<th>WPA1_Accum_Press_Snsr2_Pwr_On_VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC2</td>
</tr>
</tbody>
</table>

Verify WPA1_Accum_Abs_Press2_VTC – 165 -195 kPa

<table>
<thead>
<tr>
<th>cmd</th>
<th>WPA2_Accum_Press_Snsr1_Pwr_On_VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC2</td>
</tr>
</tbody>
</table>

Verify WPA2_Accum_Abs_Press1_VTC – 165 -195 kPa
cmd WPA2_Accum_Press_Snsr2_Pwr_On_VTC
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify WPA2_Accum_Abs_Press2_VTC – 165 -195 kPa

Activation of the VTC C&W monitoring for the WPA1 and WPA2 Accumulator Pressure Sensors

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – WPA1_Accum_Abs_Press1_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify WPA1_Accum_Abs_Press1_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – WPA1_Accum_Abs_Press2_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify WPA1_Accum_Abs_Press2_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – WPA2_Accum_Abs_Press1_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify WPA2_Accum_Abs_Press1_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – WPA2_Accum_Abs_Press2_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify WPA2_Accum_Abs_Press2_VTC_MEF – ENABLED

COL-CC gives "Go" to continue.

1.8 Enabling C&W for Previous Monitorings (Ground Only)

Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

Perform [2.101 CAUTION AND WARNING EVENT MANAGEMENT], Step 2 (SODF: C&DH: NOMINAL) per Table 1, then
Table 1. C&W Events for WPA1 and WPA2

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13538</td>
<td>WPA1 Accumulator Pressure Sensor 1 High - COL</td>
<td>W</td>
</tr>
<tr>
<td>13539</td>
<td>WPA1 Accumulator Pressure Sensor 2 High - COL</td>
<td>W</td>
</tr>
<tr>
<td>13540</td>
<td>WPA2 Accumulator Pressure Sensor 1 High - COL</td>
<td>W</td>
</tr>
<tr>
<td>13541</td>
<td>WPA2 Accumulator Pressure Sensor 2 High - COL</td>
<td>W</td>
</tr>
</tbody>
</table>

1.9 Verifying Total Pressure Sensors

PCS

COL Final Activation - Part 1

'Total Pressure Sensor'

Verify TPS1 Air Pressure: 719 to 783 mmHg
Verify TPS2 Air Pressure: 719 to 783 mmHg
Verify TPS3 Air Pressure: 719 to 783 mmHg
Verify TPS4 Air Pressure: 719 to 783 mmHg

Verify TPS1_Air_Press_VTC – 719 - 783 mmHg
Verify TPS2_Air_Press_VTC – 719 - 783 mmHg
Verify TPS3_Air_Press_VTC – 719 - 783 mmHg
Verify TPS4_Air_Press_VTC – 719 - 783 mmHg

2. ACTIVATING CMU 1-4

NOTE

1. CMU4 needs to be activated for CMU1 Ready Status to be available.
2. The water loop must be activated within 5 hours of CMU activation.

2.1 Activating Nominal Power A Supplies

PCS

Task: COL Final Activation - Part 1

'Command and Measurement Unit Activation'

cmd CMU 1 Nom Pwr A – On

Verify CMU 1 Nom Pwr A Status – On
Verify CMU 1 Nom Pwr A Current < 1.35 A

cmd CMU 2 Nom Pwr A – On
Verify CMU 2 Nom Pwr A Status – On
Verify CMU 2 Nom Pwr A Current < 1.35 A
Verify CMU 2 Ready Status – Ready

**cmd** CMU 3 Nom Pwr A – On
Verify CMU 3 Nom Pwr A Status – On
Verify CMU 3 Nom Pwr A Current < 1.35 A
Verify CMU 3 Ready Status – Ready

**cmd** CMU 4 Nom Pwr A – On
Verify CMU 4 Nom Pwr A Status – On
Verify CMU 4 Nom Pwr A Current < 1.35 A
Verify CMU 4 Ready Status – Ready

Verify CMU 1 Ready Status – Ready

**cmd** CMU1_Nom_Pwr_A_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify CMU1_Nom_Pwr_A_Stat_VTC – ON
Verify CMU1_Nom_Pwr_A_Current_VTC – <1.35 A

**cmd** CMU2_Nom_Pwr_A_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify CMU2_Nom_Pwr_A_Stat_VTC – ON
Verify CMU2_Nom_Pwr_A_Current_VTC – <1.35 A
Verify CMU2_Nom_Ready_Stat_ACT_PP – READY

**cmd** CMU3_Nom_Pwr_A_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify CMU3_Nom_Pwr_A_Stat_VTC – ON
Verify CMU3_Nom_Pwr_A_Current_VTC – <1.35 A
Verify CMU3_Nom_Ready_Stat_ACT_PP – READY

**cmd** CMU4_Nom_Pwr_A_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify CMU4_Nom_Pwr_A_Stat_VTC – ON
Verify CMU4_Nom_Pwr_A_Current_VTC – <1.35 A
Verify CMU4_Nom_Ready_Stat_ACT_PP – READY
Verify CMU1_Nom_Ready_Stat_ACT_PP – READY

2.2 **Activating Nominal Power B Supplies**

'Command and Measurement Unit Activation'

**cmd** CMU 1 Nom Pwr B – On
Verify CMU 1 Nom Pwr B Status – On
Verify CMU 1 Nom Pwr B Current < 0.75 A
Verify CMU 1 Nom Pwr A Current < 0.75 A

**cmd** CMU 2 Nom Pwr B – On
Verify CMU 2 Nom Pwr B Status – On
Verify CMU 2 Nom Pwr B Current < 0.75 A
Verify CMU 2 Nom Pwr A Current < 0.75 A

**cmd** CMU 3 Nom Pwr B – On
Verify CMU 3 Nom Pwr B Status – On
Verify CMU 3 Nom Pwr B Current < 0.75 A
Verify CMU 3 Nom Pwr A Current < 0.75 A

**cmd** CMU 4 Nom Pwr B – On
Verify CMU 4 Nom Pwr B Status – On
Verify CMU 4 Nom Pwr B Current < 0.75 A
Verify CMU 4 Nom Pwr A Current < 0.75 A

**cmd** CMU1_Nom_Pwr_B_On_ACT –
**data** SW_CMD = VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node = SYS_CCSDS_End_Point_VTC1

Verify CMU1_Nom_Pwr_B_Stat_ACT_PP – ON
Verify CMU1_Nom_Pwr_B_Current_ACT_PP – <0.75 A
Verify CMU1_Nom_Pwr_A_Current_VTC – <0.75 A

**cmd** CMU2_Nom_Pwr_B_On_ACT
**data** SW_CMD = VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node = SYS_CCSDS_End_Point_VTC1

Verify CMU2_Nom_Pwr_B_Stat_ACT_PP – ON
Verify CMU2_Nom_Pwr_B_Current_ACT_PP – <0.75 A
Verify CMU2_Nom_Pwr_A_Current_VTC – <0.75 A
cmd CMU3_Nom_Pwr_B_On_ACT  
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW  
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CMU3_Nom_Pwr_B_Stat_ACT_PP – ON
Verify CMU3_Nom_Pwr_B_Current_ACT_PP – <0.75 A
Verify CMU3_Nom_Pwr_A_Current_VTC – <0.75 A

cmd CMU4_Nom_Pwr_B_On_ACT  
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW  
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CMU4_Nom_Pwr_B_Stat_ACT_PP – ON
Verify CMU4_Nom_Pwr_B_Current_ACT_PP – <0.75 A
Verify CMU4_Nom_Pwr_A_Current_VTC – <0.75 A

3. ACTIVATING WATER LOOP

NOTE
1. TCS Jumpers must be installed prior to beginning this step.
2. Expect valve operations to take up to 15 seconds for verification.

3.1 Configuring Loop A IFHX and Loop B IFHX for Water Loop Activation

PCS

COL: TCS: MTL IFHX

<table>
<thead>
<tr>
<th>COL MTL IFHX Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'COL MTL IFHX NH3'</td>
</tr>
<tr>
<td>'Isol Vlv'</td>
</tr>
</tbody>
</table>

Verify Position – Closed

cmd Cntrl Avail Open – Ena (Verify Cntrl Avail – Ena)
cmd Position – Open (Verify Position – Open)

'Byp Vlv'

Verify Position – Bypass

cmd Cntrl Avail Flothru – Ena (Verify Cntrl Avail – Ena)
cmd Position – Flothru (Verify Position – Flothru)

COL: TCS: LTL IFHX

<table>
<thead>
<tr>
<th>COL LTL IFHX Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'COL LTL IFHX NH3'</td>
</tr>
<tr>
<td>'Isol Vlv'</td>
</tr>
</tbody>
</table>
Verify Position – Closed

**cmd** Cntrl Avail Open – Ena (Verify – Cntrl Avail Ena)

**cmd** Position – Open (Verify – Position Open)

'Byp Vlv'

Verify Position – Bypass

**cmd** Cntrl Avail Flothru – Ena (Verify – Cntrl Avail Ena)

**cmd** Position – Flothru (Verify – Position Flothru)

### 3.2 Configuring Water On/Off Valve

Task: COL Final Activation - Part 2

- 'Water Loop Activation'
- 'Water On Off Valves'

Verify WOOV1 Posn – Open
Verify WOOV2 Posn – Closed
Verify WOOV3 Posn – Open
Verify WOOV4 Posn – Open
Verify WOOV5 Posn – Open
Verify WOOV6 Posn – Open
Verify WOOV7 Posn – Open
Verify WOOV8 Posn – Open
Verify WOOV9 Posn – Open
Verify WOOV10 Posn – Closed

- **Verify WOOV1_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV2_Close_Stat_VTC_PP** – CLOSED
- **Verify WOOV3_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV4_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV5_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV6_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV7_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV8_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV9_Open_Stat_VTC_PP** – OPEN
- **Verify WOOV10_Close_Stat_VTC_PP** – CLOSED

Water Flow Selection Valve Configuration Verification

- **Verify WFSV_ISPR_A1_Open_Stat_VTC** – OPEN
- **Verify WFSV_ISPR_A2_Open_Stat_VTC** – OPEN
- **Verify WFSV_ISPR_A3_Open_Stat_VTC** – OPEN

3.3 Activating and Verifying WMV1 Shutoff Valve

Here are the steps to activate and verify the WMV1 shutoff valve:

- cmd WMV1 SOV Pwr – On
- Verify WMV1 SOV Pwr – On
- Verify WMV1 SOV1 Posn – Open
- Verify WMV1 SOV2 Posn – Open

3.4 Deactivating WMV1 Shutoff Section

Here are the steps to deactivate the WMV1 shutoff section:

- cmd WMV1 SOV Pwr – Off
- Verify WMV1 SOV Pwr – Off

3.5 Activating and Verifying WMV2 Shutoff Valve

Here are the steps to activate and verify the WMV2 shutoff valve:

- cmd WMV2 SOV Pwr – On
- Verify WMV2 SOV Pwr – On
- Verify WMV2 SOV1 Posn – Open
- Verify WMV2 SOV2 Posn – Open
CMD WMV2 SOV Pwr – On
Verfiy WMV2 SOV Pwr – On
Verfiy WMV2 SOV1 Posn – Closed
Verfiy WMV2 SOV2 Posn – Closed

CMD WMV2 SOV_Pwr_On_ACT
Data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
Data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verfiy WMV2_SOV_Pwr_Stat_ACT_PP – ON
Verfiy WMV2_SOV1_Close_Stat_ACT_PP – CLOSED
Verfiy WMV2_SOV2_Close_Stat_ACT_PP – CLOSED

3.6 Deactivating WMV2 Shutoff Section

COL Final Activation - Part 2
‘3 Way Modulating Valves’
‘WMV2’

CMD WMV2 SOV Pwr – Off
Verfiy WMV2 SOV Pwr – Off

CMD WMV2 SOV_Pwr_Off_ACT
Data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
Data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verfiy WMV2_SOV_Pwr_Stat_ACT_PP – OFF

3.7 Activating and Verifiying WMV3 Shutoff Valve

COL Final Activation - Part 2
‘3 Way Modulating Valves’
‘WMV3’

CMD WMV3 SOV Pwr – On
Verfiy WMV3 SOV Pwr – On
Verfiy WMV3 SOV1 Posn – Open
Verfiy WMV3 SOV2 Posn – Open

CMD WMV3 SOV_Pwr_On_ACT
Data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
Data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verfiy WMV3_SOV_Pwr_Stat_ACT_PP – ON
Verfiy WMV3_SOV1_Open_Stat_ACT_PP – OPEN
Verfiy WMV3_SOV2_Open_Stat_ACT_PP – OPEN
3.8 Deactivating WMV3 Shutoff Section

'3 Way Modulating Valves'
'WMV3'

**cmd** WMV3 SOV Pwr – Off

Verify WMV3 SOV Pwr – Off

**cmd** WMV3_SOV_Pwr_Off_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify WMV3_SOV_Pwr_Stat_ACT_PP – OFF

3.9 Activating and Verifying WMV4 Shutoff Valve

'3 Way Modulating Valves'
'WMV4'

**cmd** WMV4 SOV Pwr – On

Verify WMV4 SOV Pwr – On
Verify WMV4 SOV1 Posn – Closed
Verify WMV4 SOV2 Posn – Closed

**cmd** WMV4_SOV_Pwr_On_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify WMV4_SOV_Pwr_Stat_ACT_PP – ON
Verify WMV4_SOV1_Close_Stat_ACT_PP – CLOSED
Verify WMV4_SOV2_Close_Stat_ACT_PP – CLOSED

3.10 Deactivating WMV4 Shutoff Section

'3 Way Modulating Valves'
'WMV4'

**cmd** WMV4 SOV Pwr – Off

Verify WMV4 SOV Pwr – Off

**cmd** WMV4_SOV_Pwr_Off_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify WMV4_SOV_Pwr_Stat_ACT_PP – OFF

3.11 Closing Bypass Valves WOOV5 and WOOV7

'Closing Bypass Valves'

**cmd** WOOV5 – Close
Verify WOOV5 Posn – Closed

**cmd** WOOV7 – Close
Verify WOOV7 Posn – Closed

**cmd** WOOV5_Vlv_Close_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify WOOV5_Close_Stat_VTC_PP – CLOSED

**cmd** WOOV7_Vlv_Close_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify WOOV7_Close_Stat_VTC_PP – CLOSED

3.12 Activating WMV1 Modulating Section

'Activating WMV1 Modulating Section'

**cmd** WMV1 MDV Pwr – On
Verify WMV1 MDV Pwr – On

**cmd** WMV1_MDV_Pwr_On_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify WMV1_MDV_Pwr_Stat_ACT_PP – ON

3.13 Activating WPA1

'Activating WPA1'

**cmd** WPA1 Pwr – On
Verify WPA1 Pwr – On

**cmd** WPA1_Pwr_On_ACT
3.14 Starting up WPA1 Pump Operation

'WPA1 Pump'

NOTE
This step activates active cooling via the water loop and terminates the thermal clock started with CMU Activation in step 2.

**cmd** WPA1 Pump – Init

Verify Pump dP > 30 kPa
Verify Mass Flow > 230 kg/h
Verify Nom Plenum dP > 18 kPa
Verify Redun Plenum dP > 18 kPa

**cmd** WPA1_Pump_Init_ACT -

**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify WPA1_Pump_DP_ACT_PP – > 30 kPa
Verify WPA1_Mass_Flow_ACT_PP – > 230 kg/h
Verify DPSB1_Nom_Plenum_DP_VTC – > 18 kPa
Verify DPSB2_Redun_Plenum_DP_VTC – > 18 kPa

3.15 Enabling Monitoring of Delta Pressure Sensor Block

'Delta Pressure Sensor Block'

NOTE
If both readings of the DPSB dP are out of limits after the monitoring has been enabled, the system will automatically safe to Berthed Survival Mode.

**cmd** DPSB1 Nom Plenum dP Mon – Enable

Verify DPSB1 Nom Plenum dP Mon Status – Enabled

**cmd** DPSB2 Redun Plenum dP Mon – Enable

Verify DPSB2 Redun Plenum dP Mon Status – Enabled

**cmd** VTC_Monitoring_Ena_Cmd_SW

**prm** Monitored_Item_ID – DPSB1_Nom_Plenum_DP_VTC
3.16 **Verifying Wet Temperatures**

**COL Final Activation - Part 2**

'Wet Temperature Sensor Block'

'WTSB1 Nom Plenum Temp 3'

Verify WTSB1 Nom Plenum Temp 3 < 24 deg C

'WTSB2 Redun Plenum Temp 3'

Verify WTSB2 Redun Plenum Temp 3 < 24 deg C

-------------------------------------------------------------------------

* If WTSB1 Nom Plenum Temp 3 ≥ 24 deg C
* or
* WTSB2 Redun Plenum Temp 3 ≥ 24 deg C
* wait 5 minutes then re-verify

-------------------------------------------------------------------------

Verify WTSB1_Nom_Plenum_Temp3_VTC – < 24°C

Verify WTSB2_Redun_Plenum_Temp3_VTC – < 24°C

3.17 **Enabling Monitoring of WTSB Measurements**

**COL Final Activation - Part 2**

'Wet Temperature Sensor Block'

**NOTE**

If both readings of the WTSB Plenum Temp3 are out of limits after the monitoring has been enabled, the system will automatically safe to Berthed Survival Mode.

**cmd** WTSB1 Nom Plenum Temp 3 Monitor – Enable

Verify WTSB1 Nom Plenum Temp 3 Monitor Status – Enabled

**cmd** WTSB2 Redun Plenum Temp 3 Monitor – Enable
Verify WTSB2 Redun Plenum Temp 3 Monitor Status – Enabled

\texttt{cmd VTC\_Monitoring\_Ena\_Cmd\_SW}
\texttt{prm Monitored\_Item\_ID – WTSB1\_Nom\_Plenum\_Temp3\_VTC}
\texttt{prm Action – 1 (ENABLE)}
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC1}

Verify WTSB1 Nom Plenum Temp3 VTC MEF – ENABLED

\texttt{cmd VTC\_Monitoring\_Ena\_Cmd\_SW}
\texttt{prm Monitored\_Item\_ID – WTSB2\_Redun\_Plenum\_Temp3\_VTC}
\texttt{prm Action – 1 (ENABLE)}
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC2}

Verify WTSB2 Redun Plenum Temp3 VTC MEF – ENABLED

3.18 \textbf{Enabling C&W in USOS for Previous Monitorings (Ground Only)}

Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

\textbf{Perform \{2.101 CAUTION AND WARNING EVENT MANAGEMENT\}, Step 2 (SODF: C&DH: NOMINAL)}

\textbf{per Table 2, then then}

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13534</td>
<td>Cooling Loop Delta Pressure Sensor 1 Low - COL</td>
<td>W</td>
</tr>
<tr>
<td>13535</td>
<td>Cooling Loop Delta Pressure Sensor 2 Low - COL</td>
<td>W</td>
</tr>
<tr>
<td>14165</td>
<td>Cooling Loop Temperature Sensor 1 High - COL</td>
<td>W</td>
</tr>
<tr>
<td>14166</td>
<td>Cooling Loop Temperature Sensor 2 High - COL</td>
<td>W</td>
</tr>
</tbody>
</table>

3.19 \textbf{Activating ATU Power Bus}

\textbf{PCS}

\textbf{COL: EPS: PDU1 120V Outlets Subsys/Payloads:}
\textbf{COL PDU1 120V Outlets VTC1}

'PDU1'

'Outlet Num 20'
cmd ATU1 Pwr Bus – On
Verify ATU1 Pwr Bus – On

COL: EPS: PDU2 120V Outlets Subsys/Payloads:
COL PDU2 120V Outlets VTC1
‘PDU2’
‘Outlet Num 20’

cmd ATU2 Pwr Bus – On
Verify ATU2 Pwr Bus – On

cmd PDU1_ATU1_Pwr_Bus_On_VTC
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU1_ATU1_Pwr_Bus_On_Off_Stat_VTC_PP – ON

cmd PDU2_ATU2_Pwr_Bus_On_VTC
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU2_ATU2_Pwr_Bus_On_Off_Stat_VTC_PP – ON

3.20 Enabling I/O for COL ATU 1 and ATU 2
C&T: COL 1

Verify which IAC is Active and Powered on.
Use the commands for the Active and Powered IAC.

COL ATU 1

cmd BUS I/O – Enable (Verify – Enable)

CNT Group Overview

sel COL ATU 2

COL ATU 2

cmd BUS I/O – Enable (Verify – Enable)
3.21 Configure COL ATU 1 and ATU 2 for Public Call Configuration

**NOTE**
The ATU will go into standby mode 2 minutes after being commanded active if the ATU has not been placed in a public call. The ATU has to be in active mode to placed into a public call.

PCS

C&T: COL 1

Verify which IAC is Active and Powered on. Use the commands for the Active and Powered IAC.

**COL ATU 1**

*Command*: State – Active (Verify – Active)

**CNT Group Overview**

Sel COL ATU 2

**COL ATU 2**

*Command*: State – Active (Verify – Active)

**CNT Group Overview**

Sel 'IAC[X]' Call Select where [X] = Active and Powered IAC 1(2)

**IAC[X] Call Select**

Public 1(2,3,4,5)

Sel Call Setup

Public1(2,3,4,5) Call Select

'Talk/Listen (TL)'

*Command*: ATU COL 1 TL

*Command*: ATU COL 2 TL

Repeat as necessary to achieve the desired configuration.

3.22 Verifying Voice Loop Configuration

**IAC[X] Call Select**

Verify COL1 and COL 2 in Public 1(2,3,4,5)
4. **ACTIVATING NETWORK CLSW**

4.1 **Activating CLSW 1 Power A**

Task: COL Final Activation - Part 3

'Network CLSW'

**cmd** CLSW 1 Pwr A – On

Verify CLSW 1 Pwr A Status – On
Verify CLSW 1 Pwr A Current < 2.5 A
Verify CLSW 1 Pwr A Ready Status – Ready

**cmd** CLSW1_Pwr_A_On_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CLSW1_Pwr_A_Stat_ACT_PP – ON
Verify CLSW1_Pwr_A_Current_ACT_PP – < 2.5 A
Verify CLSW1_Ready_Stat_ACT_PP – READY

4.2 **Activating CLSW 1 Power B**

**cmd** CLSW 1 Pwr B – On

Verify CLSW 1 Pwr B Status – On
Verify CLSW 1 Pwr B Current < 2.2 A
Verify CLSW 1 Pwr A Current < 0.7 A

**cmd** CLSW1_Pwr_B_On_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CLSW1_Pwr_B_Stat_ACT_PP – ON
Verify CLSW1_Pwr_B_Current_ACT_PP – < 2.2 A
Verify CLSW1_Pwr_A_Current_ACT_PP – < 0.7 A

4.3 **Activating CLSW 2 Power A**

**cmd** CLSW 2 Pwr A – On

Verify CLSW 2 Pwr A Status – On
Verify CLSW 2 Pwr A Current < 2.5 A
Verify CLSW 2 Pwr A Ready Status – Ready

\texttt{cmd CLSW2\_Pwr\_A\_On\_ACT}
\texttt{data SW\_CMD – VTC\_Disc\_Out\_Cmd\_Cmd\_SW}
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC1}

Verify CLSW2\_Pwr\_A\_Stat\_ACT\_PP – ON
Verify CLSW2\_Pwr\_A\_Current\_ACT\_PP – < 2.5 A
Verify CLSW2\_Ready\_Stat\_ACT\_PP – READY

4.4 \textbf{Activating CLSW 2 Power B}

'Network CLSW'

\texttt{cmd CLSW 2 Pwr B – On}

Verify CLSW 2 Pwr B Status – On
Verify CLSW 2 Pwr B Current < 2.2 A
Verify CLSW 2 Pwr A Current < 0.7 A

\texttt{cmd CLSW2\_Pwr\_B\_On\_ACT}
\texttt{data SW\_CMD – VTC\_Disc\_Out\_Cmd\_Cmd\_SW}
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC1}

Verify CLSW2\_Pwr\_B\_Stat\_ACT\_PP – ON
Verify CLSW2\_Pwr\_B\_Current\_ACT\_PP – < 2.2 A
Verify CLSW2\_Pwr\_A\_Current\_ACT\_PP – < 0.7 A

5. \textbf{ACTIVATING MASS MEMORY UNIT}

5.1 \textbf{Activating MMU2 Power A}

'Mass Memory Unit'

\texttt{cmd MMU2 Pwr A – On}

Verify MMU2 Pwr A Status – On
Verify MMU2 Pwr A Current < 1.58 A

\texttt{cmd MMU2\_Pwr\_A\_On\_ACT}
\texttt{data SW\_CMD – VTC\_Disc\_Out\_Cmd\_Cmd\_SW}
\texttt{data Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC1}

Verify MMU2\_Pwr\_A\_Stat\_ACT\_PP – ON
Verify MMU2\_Pwr\_A\_Current\_ACT\_PP – <1.58 A
### 5.2 Activating MMU2 Power B

**COL Final Activation - Part 3**

'Mass Memory Unit'

**cmd** MMU2 Pwr B – On

Verify MMU2 Pwr B Status – On
Verify MMU2 Pwr B Current < 0.12 A
Verify MMU2 Pwr A Current < 1.58 A

<table>
<thead>
<tr>
<th>cmd</th>
<th>MMU2 Pwr B On_ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>data SW_CMD</td>
<td>VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data Onboard_Node</td>
<td>SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>

Verify MMU2_Pwr_B_Stat_ACT_PP – ON
Verify MMU2_Pwr_B_Current_ACT_PP – < 0.12 A
Verify MMU2_Pwr_A_Current_ACT_PP – <1.58 A

### 5.3 Commanding MMU2 to Slave Mode

**COL Final Activation - Part 3**

'Mass Memory Unit'

**cmd** Boot MMU 2 – Slave

Wait up to 5 minutes for MMU2 Ready Status to be displayed.

Verify MMU2 Ready Status – Ready

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Boot_SPC_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm RT_Address</td>
<td>27 (RT address of MMU2)</td>
</tr>
<tr>
<td>prm Mode</td>
<td>9 (MMU_SLAVE)</td>
</tr>
<tr>
<td>prm Session Number</td>
<td>1</td>
</tr>
<tr>
<td>data Onboard_Node</td>
<td>SYS_CCSDS_End_Point_VTCM</td>
</tr>
</tbody>
</table>

Verify MMU2_Ready_Stat_ACT_PP – READY

### 5.4 Activating MMU1 Power A

**COL Final Activation - Part 3**

'Mass Memory Unit'

**cmd** MMU1 Pwr A – On

Verify MMU1 Pwr A Status – On
Verify MMU1 Pwr A Current < 1.58 A

<table>
<thead>
<tr>
<th>cmd</th>
<th>MMU1 Pwr A On_ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>data SW_CMD</td>
<td>VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
</tbody>
</table>
5.5 **Activating MMU1 Power B**

**COL Final Activation - Part 3**

'Mass Memory Unit'

**cmd** MMU1 Pwr B – On

Verify MMU1 Pwr B Status – On
Verify MMU1 Pwr B Current < 0.12 A
Verify MMU1 Pwr A Current < 1.58 A

**cmd** MMU1 Pwr B On_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify MMU1 Pwr B Stat_ACT_PP – ON
Verify MMU1 Pwr B Current_ACT_PP – < 0.12 A
Verify MMU1 Pwr A Current_ACT_PP – < 1.58 A

5.6 **Commanding MMU1 to Master Mode**

**COL Final Activation - Part 3**

'Mass Memory Unit'

**cmd** Boot MMU 1 – Master

Wait up to 5 minutes for MMU1 Ready Status to be displayed.

Verify MMU1 Ready Status – Ready

**cmd** VTC_Boot_SPC_Cmd_SW
**prm** RT_Address – 17 (RT address of MMU1)
**prm** Mode – 7 (MMU_MASTER_DEFAULT)
**prm** Session Number – 1
**data** Onboard_Node – SYS_CCSDS_End_Point_VTCM

Verify MMU1 Ready_Stat_ACT_PP – READY

6. **ACTIVATING MISSION MANAGEMENT COMPUTER**

**NOTE**

1. Steps 6.3 through 6.7 require AOS.
2. Expect DMS C&W messages.
6.1 **Inhibiting Redun Management for MMC**

Task: COL Final Activation - Part 3

*Mission Management Computer*

\[\sqrt{\text{MMC Redun Management – Inh}}\]

6.2 **Enabling RT I/O for MMC**

Task: COL Final Activation - Part 3: CB INT 2 RT Status

\[\text{CB INT 2 RT Status}\]

**cmd** 22 MMC RT Status – Enable **Execute** (Verify – Ena)

6.3 **Activating MMC Power A**

Task: COL Final Activation - Part 3

*Mission Management Computer*

**cmd** MMC Pwr A – On

Verify MMC Pwr A Status – On
Verify MMC Pwr A Current < 1.19 A

\[
\begin{align*}
\text{cmd } & \text{ MMC}\_\text{Pwr}\_\text{A}\_\text{On}\_\text{ACT} \\
\text{data } & \text{ SW}\_\text{CMD} – \text{VTC}\_\text{Disc}\_\text{Out}\_\text{Cmd}\_\text{Cmd}\_\text{SW} \\
\text{cmd } & \text{Onboard}\_\text{Node} – \text{SYS}\_\text{CCSDS}\_\text{End}\_\text{Point}\_\text{VTC1} \\
\text{Verify MMC}\_\text{Pwr}\_\text{A}\_\text{Stat}\_\text{ACT}\_\text{PP} – \text{ON} \\
\text{Verify MMC}\_\text{Pwr}\_\text{A}\_\text{Current}\_\text{ACT}\_\text{PP} – < 1.19 A
\end{align*}
\]

6.4 **Activating MMC Power B**

*Mission Management Computer*

**cmd** MMC Pwr B – On

Verify MMC Pwr B Status – On
Verify MMC Pwr B Current < 0.12 A
Verify MMC Pwr A Current < 1.19 A

\[
\begin{align*}
\text{cmd } & \text{ MMC}\_\text{Pwr}\_\text{B}\_\text{On}\_\text{ACT} \\
\text{data } & \text{ SW}\_\text{CMD} – \text{VTC}\_\text{Disc}\_\text{Out}\_\text{Cmd}\_\text{Cmd}\_\text{SW} \\
\text{data } & \text{Onboard}\_\text{Node} – \text{SYS}\_\text{CCSDS}\_\text{End}\_\text{Point}\_\text{VTC1} \\
\text{Verify MMC}\_\text{Pwr}\_\text{B}\_\text{Stat}\_\text{ACT}\_\text{PP} – \text{ON} \\
\text{Verify MMC}\_\text{Pwr}\_\text{B}\_\text{Current}\_\text{ACT}\_\text{PP} – < 0.12 A \\
\text{Verify MMC}\_\text{Pwr}\_\text{A}\_\text{Current}\_\text{ACT}\_\text{PP} – < 1.19 A
\end{align*}
\]
6.5 Initializing Command MMC S/W

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| During the MMC boot process, the configuration FLAPs MMC Cold Start and MMC Start-Up are executed automatically. The MMC Cold Start FLAP:  
Starts monitorings of the MMC node  
Executes the MMC Startup FLAP  
The MMC Start-Up FLAP:  
Resets the station mode compatibility variable and venting valve inhibit status  
Activates MMC hosted application software (COAP IDF task)  
Starts the SNCD CVT packet to the US MDM  
Starts the pre-emptive Tlm packet for DMS data to Col-CC  
Starts the pre-emptive Tlm packet for USM data to Col-CC |

`COL Final Activation - Part 3`  
'Mission Management Computer'

cmd MMC Boot – MMC Default

Verify SPC2 Boot Report – 66048

Wait up to 5 minutes for MMC to boot before checking Ready Status.

Verify MMC Ready Status – Ready

Wait for “Go” to continue.

cmd VTC_Boot_SPC_Cmd_SW  
prm RT_Address – 8 (RT address of SPC2)  
prm Mode – 1 (MMC_DEFAULT)  
prm Session Number – 1 (TBC)  
data Onboard_Node – SYS_CCSDS_End_Point_VTCM

Verify VTC_MASTER_SPC2_Boot_Report_SW_PP – 66048  
Verify MMC_Ready_Stat_ACT_PP – READY

`COL-CC` to give a “Go” to continue.

6.6 Enabling RT FDIR for MMC  
Task: COL Final Activation - Part 3: CB INT 2 RT Status

| CB INT 2 RT Status |

`cmd` 22 MMC RT FDIR Status – Enable FDIR `Execute` (Verify – Ena)
6.7 **Enabling MMC Redundancy Management**  
Task: Columbus Final Act - Part 3  
'Mission Management Computer'  

`cmd` MMC Redun Management – Ena (Verify – Ena)

6.8 **Enabling CCSDS Checksum Validation on MMC (Ground Only)**

`cmd` DMS_CCSDS_Checksum_Ena_Cmd_SW  
`data` ONBOARD_NODE – SYS_CCSDS_End_Point_MMC_DMS_SERV

6.9 **Enabling CCSDS Checksum Validation on MMU (Ground Only)**

`cmd` DMS_CCSDS_Checksum_Ena_Cmd_SW  
`data` ONBOARD_NODE – SYS_CCSDS_End_Point_MMU_DMS_SERV

7. **ACTIVATING DATA MANAGEMENT COMPUTER**

**NOTE**

1. Steps 7.1 through 7.6 require AOS.  
2. Expect DMS C&W messages.

7.1 **Activating DMC Power A**  
Task: COL Final Activation - Part 3  
'Data Management Computer'

`cmd` DMC Pwr A – On  
Verify DMC Pwr A Status – On  
Verify DMC Pwr A Current < 1.19 A

7.2 **Activating DMC Power B**  
‘Data Management Computer’

`cmd` DMC Pwr B – On
Verify DMC Pwr B Status – On
Verify DMC Pwr B Current < 0.12 A
Verify DMC Pwr A Current < 1.19 A

**cmd** DMC_Pwr_B_On_ACT
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify DMC_Pwr_B_Stat_VTC – ON
Verify DMC_Pwr_B_Current_VTC – < 0.12 A
Verify DMC_Pwr_A_Current_VTC – < 1.19 A

7.3 **Initializing DMC S/W**

**COL Final Activation - Part 3**
'Data Management Computer'

**cmd** DMC Boot – DMC Default

Wait up to 5 minutes for DMC to boot before checking the SPC1 Boot Report

Verify SPC1 Boot Report – 4096

**cmd** VTC_Boot_SPC_Cmd_SW
**prm** RT_Address – 7
**prm** Mode – 0
**prm** Session_Number – 1
**data** Onboard_Node – SYS_CCSDS_End_Point_VTCM

Verify VTC_MASTER_SPC1_Boot_Report_SW_PP – 4096

7.4 **Configuring DMC as Bus Controller**

**NOTE**
All activation telemetry on PCS and ground displays will be invalid at the completion of step 7.4. These invalid parameters will be indicated by a cyan telemetry field.
NOTE
During the DMC boot process, the configuration FLAPs ‘DMC Cold Start’ and ‘DMC Start-Up’ are executed automatically.
The DMC Cold Start FLAP:
Starts several monitorings on the DMC node
Starts the RT acquisition of active DMS equipment
Initializes several DMS related S/W variables
Executes the DMC Startup FLAP
The DMC Start-Up FLAP:
Starts several monitoring of system measurements
Starts the RT acquisition of active system equipment
Initializes several S/W variables

COL Final Activation - Part 3
'Data Management Computer'

cmd VTC Vital To Nominal Mode – Nominal
Wait up to 15 minutes for DMC to boot up before checking Ready Status.
Verify DMC Ready Status – Ready

7.5 Enabling DMC and SPARE Monitoring to Support DMC FDIR in VTC (Ground Only)
COL-CC
DMC and SPARE monitoring to be enabled by ground.
Wait for “Go” to continue.

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – DMC_Pwr_A_Current_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify DMC_Pwr_A_Current_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – DMC_Pwr_B_Current_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify DMC_Pwr_B_Current_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – DMC_Temp_VTC
141
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify DMC_Temp_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – DMC_Sec_Voltage_Stat_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify DMC_Sec_Voltage_Stat_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – DMC_Ready_Stat_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify DMC_Ready_Stat_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – SPARE_Pwr_A_Stat_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify SPARE_Pwr_A_Stat_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – SPARE_Pwr_B_Stat_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify SPARE_Pwr_B_Stat_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – SPARE_Temp_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify SPARE_Temp_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – SPARE_Sec_Voltage_Stat_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify SPARE_Sec_Voltage_Stat_VTC_MEF – ENABLED

cmd VTC_Monitoring_Ena_Cmd_SW
**7.6 Enabling DMC FDIR in VTC**

PCS

Col Final Activation - Part 3

'Data Management Computer'

**cmd** Enable DMC FDIR – Enable (Verify – Enabled)

**cmd** VTC_DMC_Recon_Ena_Cmd_SW

prm Action: – 1 = ENABLE

data Onboard_Node: – SYS_CCSDS_End_Point_VTCM

Verify VTC_MASTER_DMC_Recon_Enable_SW_PP – ENABLED

**7.7 Enabling C&W for the DMS and PDU1/2 Cautions (Ground Only)**

MCC-H

Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

Perform **2.101 CAUTION AND WARNING EVENT MANAGEMENT**, Step 2 (SODF: C&DH: NOMINAL) per Table 3, then;
### Table 3. C&W Events for DMS and PDU1/2

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13570</td>
<td>DMS I/O Unit (CMU1) Redundant Branch Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13572</td>
<td>DMS I/O Unit (CMU2) Redundant Branch Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13574</td>
<td>DMS I/O Unit (CMU3) Redundant Branch Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13576</td>
<td>DMS I/O Unit (CMU4) Redundant Branch Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13579</td>
<td>Power Distribution Unit (PDU1) Redundant Controller Failure - COL</td>
<td>C</td>
</tr>
<tr>
<td>13581</td>
<td>Power Distribution Unit (PDU2) Redundant Controller Failure - COL</td>
<td>C</td>
</tr>
</tbody>
</table>

### 7.8 Enabling CCSDS Checksum Validation on DMC (Ground Only)

**cmd** DMS_CCSDS_Checksum_Ena_Cmd_SW  
**data** ONBOARD_NODE – SYS_CCSDS_End_Point_DMC_DMS_SERV

### 7.9 Swapping DMS Telemetry Packets (Ground Only)

**COL-CC** to swap nominal DMS telemetry packets.

Wait for "Go" to continue.

### NOTE

Packet swapping initiated from Col-CC:  
- Disable VTC_Gnd_Tlm_Pkt_LOG1_VTC (1Hz)  
- Disable VTC_Gnd_Tlm_Pkt_LOG2_VTC (1Hz)  
- Disable VTC1_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)  
- Disable VTC2_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)

Perform **[2.2.41 VTC GROUND PACKET SWAPPING]** (EODF: GROUND: NOMINAL), then:
8. **ACTIVATING PORTABLE WORKSTATION**

   NOTE

   1. Steps 1 through 7 must be complete before PWS activation.
   2. Ground can continue to step 9.

   Perform **PWS ACTIVATION**, all (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), then

9. **ENABLING PDU FOR NOMINAL SYSTEM SUPPORT**

   NOTE

   Steps 9.1 through 9.4 can only be verified by the COL-CC.

9.1 **Enabling Nominal System Bus Control for PDU1 Subsys Power Buses**

   Task: COL Final Activation - Part 3: COL EPDS Auto Cmd Sequences

   COL EPDS Automated Command Sequences VTC1

   √ VTC1 Buffer Status – Empty
If VTC1 Buffer – Full

* sel VTC1 Cancel 2 Step Command
* COL Cancel 2 - Stage Cmd VTC 1
* cmd Cancel 2 – Stage Cmd Execute (Verify – Empty)

**********************************************************************

'PDU1'
'Subsys Pwr Bus Control Enable ACS'

Verify Status – Enabled

Record PCS ID: ________________

cmd Start – Arm

pick PCS/C-X to VTC-Com1 (where X=PCS ID)

cmd Start – Set

√ VTC1_Two_Stage_Buffer_Status_SW_PP – EMPTY

If VTC1_Two_Stage_Buffer_Status_SW_PP – FULL

cmd VTC_Cancel_Two_Stage_Cmd_Cmd_SW
data Onboard_Node SYS_CCSDS_End_Point_VTC1

Verify VTC1_Two_Stage_Buffer_Status_SW_PP – EMPTY

cmd PDU1_Subsys_Pwr_Bus_Sys_Cntl_Ena_ACS (ARM)
data SW_CMD – VTC_Start_Terminate_ACS_Cmd_SW
data Action – 1 (START)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify VTC1_Two_Stage_Buffer_Status_SW_PP – FULL

cmd VTC_Execute_2_Stage_Cmd_SW (EXEC)

Verify PDU1_ATU1_Pwr_Bus_Sys_Cntl_Stat_DMC – ENABLED
Verify PDU1_CTCU1_Pwr_Bus_Sys_Cntl_Stat_DMC – ENABLED
Verify PDU1_Rack_D1_Pwr_Bus_Sys_Cntl_Stat_DMC – ENABLED
Verify PDU1_Fan_Pwr_Bus_Sys_Cntl_Stat_DMC – ENABLED

146
9.2 Enabling Nominal System Bus Control for PDU2 Subsys Power Buses

| COL EPDS Automated Command Sequences VTC1 |

√ VTC1 Buffer Status – Empty

147
'PDU2'
'Subsys Pwr Bus Control Enable ACS'

Verify Status – Enabled

Record PCS ID: ________________

**cmd** Start – Arm

pick PCS/C-X to VTC-Com1 (where X=PCS ID)

**cmd** Start – Set

\[ VTC1\_Two\_Stage\_Buffer\_Status\_SW\_PP \] – EMPTY

If \[ VTC1\_Two\_Stage\_Buffer\_Status\_SW\_PP \] – FULL

**cmd** VTC\_Cancel\_Two\_Stage\_Cmd\_Cmd\_SW

**data** Onboard\_Node SYS\_CCSDS\_End\_Point\_VTC1

Verify \[ VTC1\_Two\_Stage\_Buffer\_Status\_SW\_PP \] – EMPTY

**cmd** PDU2\_Subsys\_Pwr\_Bus\_Sys\_Cntl\_Ena\_ACS (ARM)

**data** SW\_CMD – VTC\_Start\_Terminate\_ACS\_Cmd\_SW

**data** Action – 1 (START)

**data** Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC1

Verify \[ VTC1\_Two\_Stage\_Buffer\_Status\_SW\_PP \] – FULL

**cmd** VTC\_Execute\_2\_Stage\_Cmd\_SW (EXEC)

Verify PDU2\_ATU2\_Pwr\_Bus\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_CTCU2\_Pwr\_Bus\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_Rack\_D1\_Pwr\_Bus\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_Fan\_Pwr\_Bus\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_PDU1\_Redun\_Pwr\_Bus\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_Subsys\_Pwr\_Bus1\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_Subsys\_Pwr\_Bus2\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_Subsys\_Pwr\_Bus3\_Sys\_Cntl\_Stat\_DMC – ENABLED

Verify PDU2\_Subsys\_Pwr\_Bus4\_Sys\_Cntl\_Stat\_DMC – ENABLED
9.3 **Enabling Nominal System Bus Control for ECLSS Valves**

Task: COL Final Activation - Part 3: COL ECLSS Auto Cmd Sequences

| ECLSS Automated Command Sequences VTC1 |

\checkmark VTC1 Buffer Status – Empty

```
**********************************************************************
| If VTC1 Buffer - Full |
| sel VTC1 Cancel 2 Step Command |
| COL Cancel 2 - Stage Cmd VTC 1 |
| cmd Cancel 2 – Stage Cmd Execute (Verify – Empty) |

**********************************************************************

'ECLSS Valve System Control'

Verify Enable Status – Ena

Record PCS ID: ________________

21 AUG 07
cmd Start – Arm

pick PCS/C-X to VTC-Com1 (where X=PCS ID)

cmd Start - VTC1 – Set

√VTC1_Two_Stage_Buffer_Status_SW_PP – EMPTY

If VTC1_Two_Stage_Buffer_Status_SW_PP – FULL

  cmd VTC_Cancel_Two_Stage_Cmd_Cmd_SW
  data Onboard_Node SYS_CCSDS_End_Point_VTC1

  Verify VTC1_Two_Stage_Buffer_Status_SW_PP – EMPTY

  cmd ECLSS_Vlv_Sys_Cntl_Ena_ACS (ARM)
  data SW_CMD – VTC_Start_Terminate_ACS_Cmd_SW
  data Action – 1 (START)
  data Onboard_Node – SYS_CCSDS_End_Point_VTC1

  Verify VTC1_Two_Stage_Buffer_Status_SW_PP – FULL

  cmd VTC_Execute_2_Stage_Cmd_SW (EXEC)

  Verify NLSOV1_Sys_Cntl_Stat_DMC – ENABLED
  Verify NLSOV2_Sys_Cntl_Stat_DMC – ENABLED
  Verify NLSOV3_Sys_Cntl_Stat_DMC – ENABLED
  Verify NLSOV4_Sys_Cntl_Stat_DMC – ENABLED
  Verify VADD_Vlv1_Sys_Cntl_Stat_DMC – ENABLED
  Verify VADD_Vlv2_Sys_Cntl_Stat_DMC – ENABLED
  Verify VEDD_Vlv1_Sys_Cntl_Stat_DMC – ENABLED
  Verify VEDD_Vlv2_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_A1_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_A2_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_A3_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_A4_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_F1_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_F2_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_F3_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_F4_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_O1_Sys_Cntl_Stat_DMC – ENABLED
  Verify WLSOV_ISPR_O2_Sys_Cntl_Stat_DMC – ENABLED
9.4 Enabling Nominal System Bus Control for TCS Valves

Task: COL Final Activation - Part 3: COL TCS Auto Cmd Sequences

COL TCS Automated Command Sequences VTC 1

√VTC1 Buffer Status – Empty

***********************************************************************
* If VTC1 Buffer – Full
* sel VTC1 Cancel 2 Step Command
* 
* 
* COL Cancel 2 - Stage Cmd VTC 1
* 
* 
* cmd Cancel 2 – Stage Cmd Execute (Verify
* – Empty)
* 
***********************************************************************

'TCS Valve System Control Enable ACS'

Verify Status – Enabled

Record PCS ID: ________________

cmd Start – Arm

pick PCS/C-X to VTC-Com1 (where X=PCS ID)

cmd Start – Set

Wait for “Go” to continue.

√VTC1 Two Stage Buffer Status_SW_PP – EMPTY

If VTC1 Two Stage Buffer Status_SW_PP – FULL

   cmd VTC_Cancel_Two_Stage_Cmd_Cmd_SW
   data Onboard_Node SYS_CCSDS_End_Point_VTC1

   Verify VTC1 Two Stage Buffer Status_SW_PP – EMPTY

   cmd TCS_Vlv_Sys_Cntr_Ena_ACS (ARM)
   data SW_CMD – VTC_Start_Terminate_ACS_Cmd_SW
   data Action – 1 (START)
   data Onboard_Node – SYS_CCSDS_End_Point_VTC1

   Verify VTC1 Two Stage Buffer Status_SW_PP – FULL
cmd VTC_Execute_2_Stage_Cmd_SW (EXEC)

Verify WOOV1_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV2_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV3_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV4_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV5_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV6_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV7_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV8_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV9_Sys_Cntl_Stat_DMC – ENABLED
Verify WOOV10_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_A1_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_A2_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_A3_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_A4_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_F1_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_F2_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_F3_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_F4_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_O1_Sys_Cntl_Stat_DMC – ENABLED
Verify WFSV_ISPR_O2_Sys_Cntl_Stat_DMC – ENABLED

COL-CC to give a “Go” to continue.

9.5 Activating PDU Outlet via DMC

Activation Part 1

<table>
<thead>
<tr>
<th>COL Activation Part 1</th>
</tr>
</thead>
</table>

'PDU Outlet Activation'
'PDU1 CTCU1 Pwr Bus'

cmd Pwr On Execute (OK)

Verify Pwr – ON

'PDU1 VDPU Pwr Bus'

cmd Pwr On Execute (OK)

Verify Pwr – ON

'PDU1 Fan Pwr Bus'

cmd Pwr On Execute (OK)

Verify Pwr – ON
'PDU2 CTCU2 Pwr Bus'

**cmd** Pwr On **Execute** (OK)
Verify Pwr – ON

'PDU2 VDPU Pwr Bus'

**cmd** Pwr On **Execute** (OK)
Verify Pwr – ON

'PDU2 Fan Pwr Bus'

**cmd** Pwr On **Execute** (OK)
Verify Pwr – ON

**cmd** PDU1_CTCU1_Pwr_Bus_On_AP
**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node – USM SW DMC USS Swoop Instance

Verify PDU1_CTCU1_Pwr_Bus_On_Off_Stat_DMC – ON

**cmd** PDU1_VDPU_Pwr_Bus_On_AP
**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node – USM SW DMC USS Swoop Instance

Verify PDU1_VDPU_Pwr_Bus_On_Off_Stat_DMC – ON

**cmd** PDU1_Fan_Pwr_Bus_On_AP
**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node – USM SW DMC USS Swoop Instance

Verify PDU1_Fan_Pwr_Bus_On_Off_Stat_DMC – ON

**cmd** PDU2_CTCU2_Pwr_Bus_On_AP
**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node – USM SW DMC USS Swoop Instance

Verify PDU2_CTCU2_Pwr_Bus_On_Off_Stat_DMC – ON
10. ACTIVATING AND CONFIGURING HIGH RATE MULTIPLEXER

**NOTE**

1. Fiber Optic Jumper installation must be complete before starting this step.

2. The HRM can route COL data to the USOS Ku Band system upon completion of this step. Downlink of this data stream to COL-CC will require configuration of the Ku-Band system.

10.1 Swapping DMS Telemetry Packets (Ground Only)

COL-CC

COL-CC to swap nominal DMS telemetry packets.

Wait for “Go” to continue.

**NOTE**

Packet swapping initiated from Col-CC:
- Enable MMC_Gnd_Tlm_Pkt_COMMS1_DMC (0.1Hz)
- Enable MMC_Gnd_Tlm_Pkt_HRM_Diagnostics_DMC (0.1Hz)

Perform **2.2.42 NOMINAL DMS PACKET SWAPPING** (EODF: GROUND: NOMINAL), then:

COL-CC to give a “Go” to continue.

10.2 Activating HRM

PWS

Activation Part 1

COL Activation Part 1

'HRM Activation'
NOTE

The following command starts the FLAP 'HRM Activation', which:
- Switches ON both HRM Pwr converters
- Activates the nominal HRM-core, if the nominal HRM-core activation fails, the redundant HRM-core is automatically activated instead
- Starts RT acquisition & monitoring of HRM data
- Enables the HRM-MMU link (Master MMU)

**cmd** Activate **Execute** (OK)

Wait up to one minute for verification

Verify Pwr A – ON
Verify Pwr B – ON
Verify Pwr A Current < 1.07 A
Verify Pwr B Current < 1.07 A
Verify Nom Core Stat – ON
Verify Nom Ready Stat – READY

**cmd** HRM_Activation_AP

**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node – USM SW DMC USS Swop Instance

Verify HRM_Pwr_A_Stat_DMC – ON
Verify HRM_Pwr_B_Stat_DMC – ON
Verify HRM_Pwr_A_Current_DMC – < 1.07 A
Verify HRM_Pwr_B_Current_DMC – < 1.07 A
Verify HRM_Nom_Core_Stat_DMC – ON
Verify HRM_Nom_Ready_Stat_DMC – READY

Verify HRM_Nom_Branch_Avail_Stat_SW – AVAIL
Verify HRM_Nom_Sec_Voltage_Stat_DMC – OK

10.3 **Configuring HRM**

Activation Part 1

**cmd** Configure **Execute** (OK)

Verify Serial Path Tlm Input Selected – AUTO_SEL
Verify Output Datarate = 86 x 0.5 Mbps

**cmd** HRM_Configuration_with_CDI_AP
| **data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV |
| **data** Onboard_Execution_Node – USM SW DMC USS Swop Instance |
| **prm** VCID_CDI – COMMON_ALLOC_VCID |
| **prm** Config_IF_CDI – CONFIG01_CONFIG_HRM |
| **prm** Execute_Setup_Flag – 1 (TRUE) |
| **prm** Command_Delay – 0.1 [s] |
| **prm** Start_Stop_RT_Acq – 0 (FALSE) |
| **prm** Silent – 0 (RECEIVE MESSAGE) |

Verify HRM_Serial_Path_Tlm_Input_Selected_DMC – AUTO_SEL
Verify HRM_Output_Datarate_DMC = 86

Verify HRM_LAN_Input_Selected_DMC – AUTO_SEL
Verify HRM_High_Speed_Output_Selected_DMC – BOTH_ON
Verify HRM_Config_Interface_CDI_SW – 278640513
Verify HRM_VCID_Allocation_CDI_SW – 278640531

After starting Ku band data flow Col-CC has to coordinate the HRM and Ku-Band System configuration with POIC

Wait for “Go” to continue.

11. **ACTIVATING WATER PUMP ASSEMBLY CONDENSING HEAT EXCHANGER CONTROL LOOP**

11.1 **Starting WPA1 RT (Ground Only)**

| **cmd** DMS_RT_Start_RT_Acquisition_Cmd |
| **prm** REMOTE_TERMINAL_ID – MIL 1553B Bus RT Systen Bus WPA1 |
| **data** Onboard_Node – SYS CCSDS End Point DMC DMS SERV |

Verify WPA1_Sys_Bus_Ena_Stat_SW – ENABLED

11.2 **Checking WPA1 Delta Pressure Values**

PWS

TCS:

TCS Functional Overview

'Delta Pressure Sensor Blocks'

Verify DPSB 1 WPA1 DP1 > 18 kPa
Verify DPSB 3 WPA1 DP2 > 18 kPa

Verify WPA1_DPSB1_Plenum_DP1_DMC > 18 kPa
Verify WPA1_DPSB3_Plenum_DP2_DMC > 18 kPa
11.3 **Activating WPA Condensing Heat Exchanger Control Loop**  

**PWS**  

**Activation Part 1**  

**COL Activation Part 1**  

*WPA Final Activation (CHX Cntl Loop Activation)*

**NOTE**

The following command starts the FLAP 'WPA Final Activation' that:

- Determines active WPA
- Starts data acquisition from the WPA
- Enables the plenum delta pressure control loop
- Enables the CHX inlet temperature control loop

During the execution of the FLAP expect the following event message on the System Message Panel:

```
FLAP WPA_Final_Activation_AP RT MIL_1553B_Bus_RT_System_Bus_WPA1 on Node
USM_SW_DMC_USS_Swop_Instance already started, when Receiving a Start Cmd
```

**cmd** Activate **Execute** (OK)

- Verify WPA1 CHX Temp Cntl Loop Stat: ACTIVE
- Verify WPA1 Plenum Delta Press Cntl Loop Stat: ACTIVE
- Verify WMV3 MDV Pwr: ON
- Verify WPA1 Accum Liq Qty1: 1 to 12 L
- Verify WPA1 Accum Liq Qty2: 1 to 12 L

**TCS:**

- **TCS Functional Overview**

"Delta Pressure Sensor Blocks"

- Verify DPSB 1 WPA1 DP1: 40 to 44 kPa
- Verify DPSB 3 WPA1 DP2: 40 to 44 kPa

**cmd** WPA_Final_Activation_AP  

**data** Onboard_Reception_Node –  
SYSCCSDS End Point DMC DMS SERV  
**data** Onboard_Execution_Node –  
USM SW DMC USS Swop Instance

- Verify WPA1_CHX.Temp_Cntl_Loop.Stat_DMC – ACTIVE
- Verify WPA1_Plenum_Delta_Press_Cntl_Loop.Stat_DMC – ACTIVE
- Verify WMV3_MDV_Pwr.Stat_DMC – ON
- Verify WPA1_Accum_Liq_Qty1.DMC = 1 -- 12 L
- Verify WPA1_Accum_Liq_Qty2.DMC = 1 -- 12 L
- Verify WPA1_DPSB1_Plenum_DP1.DMC = 40 -- 44 kPa
Verify WPA1_DPSB3_Plenum_DP2_DMC = 40 -- 44 kPa

Verify WPA_Active_Pump_SW – WPA 1

11.4 Enabling FDIR for Water Loop Reconfiguration

DMS: FDIR Configuration

FDIR Configuration

'Accumulator Overpressure FDIR'

**cmd** Enable **Execute** (OK)
Verify Status – ENABLE

'WPA Switchover FDIR'

**cmd** Enable **Execute** (OK)
Verify Status – ENABLE

'LTHX Overtemperature FDIR'

**cmd** Enable **Execute** (OK)
Verify Status – ENABLE

```plaintext
**cmd** DMS_ACQ_Write_Dis_SW_Variable_Cmd_SW
**prm** Item_SID – WPA Accum Overpressure FDIR Ena Stat SW
**prm** Value: – $ENABLED
**data** Onboard_Node – SYS CCSDS End Point DMC DMS SERV
Verify WPA_Accum_Overpressure_FDIR_Ena_Stat_SW – ENABLED

**cmd** DMS_ACQ_Write_Dis_SW_Variable_Cmd_SW
**prm** Item_SID – WPA Recon FDIR Ena Stat SW
**prm** Value – $ENABLED
**data** Onboard_Node – SYS CCSDS End Point DMC DMS SERV
Verify WPA_Recon_FDIR_Ena_Stat_SW – ENABLED

**cmd** DMS_ACQ_Write_Dis_SW_Variable_Cmd_SW
**prm** Item_SID – WPA Enter BSM FDIR Ena Stat SW
**prm** Value – $ENABLED
**data** Onboard_Node – SYS CCSDS End Point DMC DMS SERV
Verify WPA_Enter_BSM_FDIR_Ena_Stat_SW – ENABLED
```
11.5 Start LTHX Temperature Monitoring

Menu Bar: DMS Monitoring: 5 - COMMS TCS Payload

DMS Monitoring 5 - COMMS TCS Payload

'TCS'

Verify WTSB6 Low HX Temp1: ≤ 7.6 DegC
Verify WTSB6 Low HX Temp2: ≤ 7.6 DegC

'DMS Monitoring'

'Enable/Disable'

sel TCS

DMS Monitoring Enable/Disable 5A

'Enable Monitoring WTSB'

**cmd** WTSB6 Low HX Temp1 **Execute** (OK)

**cmd** WTSB6 Low HX Temp2 **Execute** (OK)

sel Close

DMS Monitoring 5 - COMMS TCS Payload

'TCS'

Verify the background color of measurements

WTSB6 Low HX Temp1: Green
WTSB6 Low HX Temp2: Green

Verifies WTSB6_Low_HX_Temp1_DMC – ≤ 7.6 °C
Verifies WTSB6_Low_HX_Temp2_DMC – ≤ 7.6 °C

**cmd** DMS_MONIT_Ena_Monitoring_Cmd_SW

prm MT_ID – DMC_Sys_Monitoring_Table_SW

prm EI_ID – WTSB6_Low_HX_Temp1_DMC

prm LIMIT_SET_ID – 0 (limit set 1)

data Onboard_Node – SYS_CCSDS_End_Point_DMC_DMS_SERV

Verify WTSB6_Low_HX_Temp1_DMC_MS – NORMAL_1

**cmd** DMS_MONIT_Ena_Monitoring_Cmd_SW

prm MT_ID – DMC_Sys_Monitoring_Table_SW

prm EI_ID – WTSB6_Low_HX_Temp2_DMC

prm LIMIT_SET_ID – 0 (limit set 1)

data Onboard_Node – SYS_CCSDS_End_Point_DMC_DMS_SERV

Verify WTSB6_Low_HX_Temp2_DMC_MS – NORMAL_1
12. ACTIVATING SMOKE DETECTOR

12.1 Swapping DMS Telemetry Packets (Ground Only)

COL-CC

COL-CC to swap nominal DMS telemetry packets.

Wait for “Go” to continue.

**NOTE**
Packet swapping initiated from Col-CC:
Enable VTC1_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)
Enable VTC2_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)

Perform [2.2.41 VTC GROUND PACKET SWAPPING] (EODF: GROUND: NOMINAL), then:

COL-CC to give “Go” to continue.

12.2 Powering Up Smoke Detector 1

PCS

Task: Columbus Final Activation - Part 3: Smoke Detector Activation

‘Smoke Detectors’

SEL Cabin SD1

COL Cabin Smoke Detector 1

SEL PDU1 120V Outlets

COL PDU1 120V Outlets VTC1

‘PDU 1’

**cmd** Outlet No. 24 SD1 Pwr Bus – On (Verify – On)

**cmd** PDU1_SD1_Pwr_Bus_On_VTC

**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW

**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PDU1_SD1_Pwr_Bus_On_Off_Stat_VTC_PP – ON

12.3 Verifying Smoke Detector 1 Power Status

COL Cabin Smoke Detector 1

Verify Obscuration, % Contamination < 25

Verify Scatter, % Obscuration per Meter < 1

Verify Cabin_SD1_Obscuration_VTC_PP – < 25
12.4  **Enabling Smoke Detector 1**

<table>
<thead>
<tr>
<th>COL Cabin Smoke Detector 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Monitoring'</td>
</tr>
</tbody>
</table>

**cmd** Enable

Verify Status – Enabled

'Active BIT'

Verify Failure – blank

'Fire Status'

Verify Lens Status – Clean
Verify Out of Range – blank

**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – Cabin_SD_1
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify Cabin_SD_1_EF – ENABLED
Verify VTC1_Cabin_SD_1_Stat_MVD – OK

12.5  **Powering Up Smoke Detector 2**

Task: Columbus Final Activation - Part 3: Smoke Detector Activation

<table>
<thead>
<tr>
<th>COL Fire Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Smoke Detectors'</td>
</tr>
</tbody>
</table>

**sel** Cabin SD2

| COL Cabin Smoke Detector 2 |

**sel** PDU2 120V Outlets

<table>
<thead>
<tr>
<th>COL PDU2 120V Outlets VTC1</th>
</tr>
</thead>
<tbody>
<tr>
<td>'PDU 2'</td>
</tr>
</tbody>
</table>

**cmd** Outlet No. 24 SD2 Pwr Bus – On (Verify – On)

**cmd** PDU2_SD2_PWR_BUS_ON_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify PDU2_SD2_Pwr_Bus_On_Off_Stat_VTC_PP – ON

12.6 **Verifying Smoke Detector 2 Power Status**

| COL Cabin Smoke Detector 2 |

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

Verify Cabin_SD2_Obscuration_VTC_PP – < 25
Verify Cabin_SD2_Scatter_VTC_PP – <1

12.7 **Enabling Smoke Detector 2**

| COL Cabin Smoke Detector 2 |

'Monitoring'

| cmd Enable |

- Verify Status – Enabled
- 'Active BIT'
- Verify Failure – blank
- 'Fire Status'
- Verify Lens Status – Clean
- Verify Out of Range – blank

| cmd VTC_Monitoring_Ena_Cmd_SW |
| prm Monitored_Item_ID – Cabin_SD_2 |
| prm Action – 1 (ENABLE) |
| data Onboard_Node – SYS_CCSDS_End_Point_VTC2 |

- Verify Cabin_SD_2_EF – ENABLED
- Verify VTC2_Cabin_SD_2_Stat_MVD – OK

12.8 **Enabling US C&W for Columbus Smoke Detectors 1 and 2 (Ground Only)**

| MCC-H |

- Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

- Perform **[2.101 CAUTION AND WARNING EVENT MANAGEMENT]**, Step 2 (SODF: C&DH: NOMINAL) per Table 4, then
### ACTIVATING CONDENSATE WATER SEPARATOR ASSEMBLY

**NOTE**
Condensate Jumper must be installed prior to beginning this step.

13.1 Opening Columbus Condensate Line Shut Off Valve

**PCS**
COL: ECLSS: CLSOV

<table>
<thead>
<tr>
<th>COL CLSOV VTC1</th>
</tr>
</thead>
</table>

**cmd** Position – Open

Verify Position Ind – Open

- **cmd** CLSOV_Vlv_Open_VTC
- **data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
- **data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CLSOV_Vlv_Open_Stat_VTC_PP – OPEN

13.2 Activating CWSA

**PWS**

<table>
<thead>
<tr>
<th>COL Activation Part 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>'CWSA1 Activation'</td>
</tr>
</tbody>
</table>

**NOTE**
The following command starts FLAP 'CWSA1 Activation' that:
- Checks the availability of the CWSA
- Powers on the CWSA
- Enables the monitoring of the CWSA parameters
- Enables the monitoring of the LCOS parameters

**cmd** Activate **Execute** (OK)

Wait 20 seconds for telemetry stabilization.

Verify Pwr: ON
Verify Delta P Air: > 0.5 kPa

---

Table 4. C&W Events for COL Smoke Detectors 1 & 2

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13500</td>
<td>FIRE Smoke Detector 1 Cabin - COL</td>
<td>E</td>
</tr>
<tr>
<td>13501</td>
<td>FIRE Smoke Detector 2 Cabin - COL</td>
<td>E</td>
</tr>
</tbody>
</table>
Verify Motor Speed: 4500 to 6800 rpm
Verify Input Current: < 0.50 A

```
cmd CWSA1_Activation_AP

data Onboard_Reception_Node –
SYS CCSDS End Point DMC DMS SERV

data Onboard_Execution_Node –
USM SW DMC USS Swop Instance

Verify CWSA1_Pwr_Stat_DMC – ON
Verify CWSA1_Delta_P_Air_DMC – >0.5 kPa
Verify CWSA1_Motor_Speed_DMC – 4500-6800 rpm
Verify CWSA1_Input_Current_DMC – <0.5 A
```

13.3 Enabling CWSA FDIR

PWS

DMS: FDIR Configuration

**FDIR Configuration**

'CWSA Switchover FDIR'

**cmd Enable Execute (OK)**

Verify Status – ENABLE

```
cmd DMS_ACQ_Write_Dis_SW_Variable_Cmd_SW
prm Item SID – CWSA_FDIR_Ena_Stat_SW
prm Value – $ENABLED

data Onboard_Node –
SYS CCSDS End Point DMC DMS SERV

Verify CWSA_FDIR_Ena_Stat_SW – ENABLED
```

14. ACTIVATING CABIN FAN ASSEMBLY

PWS


'COL Activation Part 3'

'CFA1 Activation (w/o monitoring)'

**cmd Pwr_On Execute (OK)**

Verify Pwr: ON
Verify Delta P: > 0.25 kPa
Verify Fan Speed: 7500 to 8500 rpm
Verify Input Current: < 1.5A

```
cmd CFA1_Pwr_On_AP

data Onboard_Reception_Node –
SYS CCSDS End Point DMC DMS SERV

data Onboard_Execution_Node – USM_SW_DMC_USS_Swop_Instance

Verify CFA1_Pwr_Stat_DMC – ON
```
Verify CFA1_Delta_P_DMC – >0.25 kPa
Verify CFA1_Fan_Speed_DMC – 7500-8500 rpm
Verify CFA1_Input_Current_DMC – <1.5 A

15. ACTIVATING CABIN TEMP CONTROL UNIT

15.1 Activating CTCU

PWS
COL Activation Part 3
‘CTCU1 Activation’

NOTE
The following command starts the FLAP ‘CTCU1 Activation’ that:
- Checks that the other CTCU is not controlling the TCV
- Checks the availability of the CTCU
- Checks that at least one CFA is active
- Powers on the CTCU
- Enables monitoring of the CTCU parameters
- Activates the TCV
- Enables cabin temperature control

cmd Activate Execute (OK)

NOTE
The cabin temperature may need time to stabilize to the nominal temperature range. If the cabin temperature is out of the expected values, continue with the procedure.

Verify Pwr: ON
Verify Health Stat: OK
Verify Cntl Loop Stat: ENABLED
Verify TCV_Cntl Stat: ENABLED
Verify Avg Cabin Temp: 18 to 27 deg C

cmd CTCU1_Activation_AP
data Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
data Onboard_Execution_Node – USM SW DMC USS Swoop Instance

Verify CTCU1_Pwr_Stat_DMC – ON
Verify CTCU1_Health_Stat_DMC – OK
Verify CTCU1_Cntl_Loop_Stat_DMC – ENABLED
Verify CTCU1_TCV_Cntl_Stat_DMC – ENABLED
Verify CTCU1_Avg_Cabin_Temp_DMC – 18-27 °C
15.2 Enabling FDIR for CTCU Reconfiguration

DMS: FDIR Configuration

FDIR Configuration

‘CTCU Switchover FDIR’

**cmd** Enable **Execute** (OK)
Verify Status – ENABLE

**cmd** DMS_ACQ_Write_Dis_SW_Variable_Cmd_SW
**prm** Item SID – CTCU_FDIR_Ena_Stat_SW
**prm** Value – $ENABLED
**data** Onboard_Node – SYS_CCSDS_End_Point_DMC_DMS_SERV
Verify CTCU_FDIR_Ena_Stat_SW – ENABLED

16. OPENING SAMPLE LINE SHUTOFF VALVE

**NOTE**
1. The AR Sample Jumper must be installed prior to opening the Sample Line Shutoff Valve.
2. Pressure equalization of the Columbus Module must be performed before opening the Sample Line Shutoff Valves.

PCS

COL: ECLSS: Air Loop: SLSOV

**COL SLSOV VTC1**

**cmd** Position – Open
Verify Position Ind – Open

**cmd** SLSOV_Vlv_Open_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1
Verify SLSOV_Vlv_Open_Stat_VTC_PP – OPEN

17. ESTABLISHING INTERMODULE VENTILATION

**NOTE**
1. IMV duct installation must be completed before starting this step.
2. NPRA Valve removal and IMV valve installation must be completed prior to this step.

17.1 Activating Node 2 IMV Stbd Aft Valve

PCS

Node 2: ECLSS: IMV Stbd Aft Vlv
Node 2 IMV Stbd Aft Vlv
sel RPCM N22A3B C RPC 02

RPCM N22A3B C RPC 02

cmd RPC Position – Close (Verify – CI)

Node 2 IMV Stbd Aft Vlv

‘Enable’

cmd Arm (√Arm Status – Armed)
cmd Enable (√State – Enabled)

17.2 Opening Node 2 IMV Stbd Aft Valve

‘Open’

cmd Arm (√Arm Status – Armed)
cmd Open

√Position – In Transit

Wait 25 seconds.

√Position – Open

17.3 Activating Node 2 IMV Stbd Fwd Valve

Node 2: ECLSS: IMV Stbd Fwd Vlv

Node 2 IMV Stbd Fwd Vlv

sel RPCM N22A3B C RPC 06

RPCM N22A3B C RPC 06

cmd RPC Position – Close (Verify – CI)

Node 2 IMV Stbd Fwd Vlv

‘Enable’

cmd Arm (√Arm Status – Armed)
cmd Enable (√State – Enabled)

17.4 Opening Node 2 IMV Stbd Fwd Valve

Node 2 IMV Stbd Fwd Vlv

‘Open’

cmd Arm (√Arm Status – Armed)
cmd Open
Position – In Transit

Wait 25 seconds.

Position – Open

17.5 **Closing Columbus IMV Valves**

| COL: ECLSS: Air Loop: ISSOV |
|-------------------------------|---------------------------|
| COL IMV Valves VTC1           | 'IMV Return Shutoff Valve'|

**cmd** Position – Close

Verify Position Ind – Closed

'IMV Supply Shutoff Valve'

**cmd** Position – Close

Verify Position Ind – Closed

```plaintext
**cmd** IRSOV_Vlv_Close_VTC  
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW 
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify IRSOV_Vlv_Close_Stat_VTC_PP – CLOSED
```

```plaintext
**cmd** ISSOV_Vlv_Close_VTC  
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW 
**cmd** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify ISSOV_Vlv_Close_Stat_VTC_PP – CLOSED
```

17.6 **Opening Columbus IMV Valves**

| COL: ECLSS: Air Loop: ISSOV |
|-------------------------------|---------------------------|
| COL IMV Valves VTC1           | 'IMV Return Shutoff Valve'|

**cmd** Position – Open

Verify Position Ind – Open

'IMV Supply Shutoff Valve'

**cmd** Position – Open

Verify Position Ind – Open
cmd IRSOV_Vlv_Open_VTC
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify IRSOV_Vlv_Open_Stat_VTC_PP – OPEN

cmd ISSOV_Vlv_Open_VTC
data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
cmd Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify ISSOV_Vlv_Open_Stat_VTC_PP – OPEN

17.7 Activating Columbus IMV Supply Fan
COL: ECLSS: Air Loop: ISFA

COL IMV Fans

√'VTC2 Buffer Status – Empty

**********************************************************************
* If VTC2 Buffer – Full
*     sel VTC2 Cancel 2 Step Command
*     
*     COL Cancel 2 - Stage Cmd VTC 2
*     
*     cmd Cancel 2 – Stage Cmd Execute (Verify
*     – Empty)
*     
**********************************************************************

'Set Speed - VTC2 hardwire'

NOTE
The following ACS sets the IMV Supply Fan speed to 9960 rpm.

Record PCS_ID: ________________

cmd Start – Arm

pick PCS/C-X to VTC-Com2 (where X=PCS ID)

cmd Start – Set

'IMV Supply Fan Assembly'

cmd State – On

Verify dP: > 0.4 kPa
Verify Fan Speed: 9460 to 10460 rpm
Verify Fan Temp: < 60 degC
Verify ISFA Power: On

\( \sqrt{VTC2\_Two\_Stage\_Buffer\_Status\_SW\_PP} \) – EMPTY

If VTC2\_Two\_Stage\_Buffer\_Status\_SW\_PP – FULL

\[ \text{cmd} \ VTC\_Cancel\_Two\_Stage\_Cmd\_Cmd\_SW \]
\[ \text{data} \ Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC2 \]

Verify VTC2\_Two\_Stage\_Buffer\_Status\_SW\_PP – EMPTY

\text{cmd} \ ISFA\_SPEED\_SET\_ACS \ (ARM)  
\text{data} \ SW\_CMD – VTC\_Start\_Terminate\_ACS\_Cmd\_SW  
\text{data} \ Action – 1 (START)  
\text{data} \ Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC2

Verify VTC1\_Two\_Stage\_Buffer\_Status\_SW\_PP – FULL

\text{cmd} \ VTC\_Execute\_2\_Stage\_Cmd\_SW \ (EXEC)

\text{cmd} \ ISFA\_On\_VTC
\text{data} \ SW\_CMD – VTC\_Disc\_Out\_Cmd\_Cmd\_SW  
\text{data} \ Onboard\_Node – SYS\_CCSDS\_End\_Point\_VTC2

Verify ISFA\_Delta\_P\_MVD – > 0.4 kPa  
Verify ISFA\_Fan\_Speed\_MVD – 9460 -10460 rpm  
Verify ISFA\_Fan\_Temp\_VTC – < 60 degC  
Verify ISFA\_Pwr\_Stat\_MVD – ON

17.8 \textbf{Activating Columbus IMV Return Fan}

COL: ECLSS: Air Loop: IRFA  
COL IMV Fans

\( \sqrt{VTC1\_Buffer\_Status} \) – Empty

*******************************************************************************
If VTC1 Buffer – Full  
sel VTC1 Cancel 2 Step Command
*******************************************************************************

\text{cmd} \ COL\_Cancel\_2\_Stage\_Cmd\_VTC\_1

*******************************************************************************

COL: ECLSS: Air Loop: IRFA
COL IMV Fans

\( \sqrt{VTC1\_Buffer\_Status} \) – Empty

*******************************************************************************
If VTC1 Buffer – Full  
sel VTC1 Cancel 2 Step Command
*******************************************************************************

\text{cmd} \ COL\_Cancel\_2\_Stage\_Cmd\_VTC\_1

*******************************************************************************
'Set Speed – VTC1 Hardwire'

**NOTE**
The following ACS sets the IMV Return Fan speed to 8800 rpm.

Record PCS ID: ________________

**cmd** Start – Arm

pick PCS/C-X to VTC-Com1 (where X=PCS ID)

**cmd** Start – Set

'IMV Return Fan Assembly'

**cmd** State – On

Verify dP: > 0.3 kPa
Verify Fan Speed: 8300 to 9300 rpm
Verify Fan Temp: < 60 degC
Verify IRFA Power: On

√VTC1_Two_Stage_Buffer_Status_SW_PP – EMPTY

If VTC1_Two_Stage_Buffer_Status_SW_PP – FULL

**cmd** VTC_Cancel_Two_Stage_Cmd_Cmd_SW
**data** Onboard_Node SYS_CCSDS_End_Point_VTC1

Verify VTC1_Two_Stage_Buffer_Status_SW_PP – EMPTY

**cmd** IRFA_SPEED_SET_ACS (ARM)
**data** SW_CMD – VTC_Start_Terminate_ACS_Cmd_SW
**data** Action – 1 (START)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify VTC1_Two_Stage_Buffer_Status_SW_PP – FULL

**cmd** VTC_Execute_2_Stage_Cmd_SW (EXEC)

**cmd** IRFA_On_VTC
**data** SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW
**data** Onboard_Node: – SYS_CCSDS_End_Point_VTC1

Verify IRFA_Delta_P_MVD – >0.3 kPa
Verify IRFA_Fan_Speed_MVD – 8300-9300 rpm
Verify IRFA_Fan_Temp_VTC – < 60 degC
Verify IRFA_Pwr.Stat_MVD – ON

17.9 Enabling VTC Monitoring for IRFA and ISFA Safing (Ground Only)

COL-CC

COL-CC to enable IRFA and ISFA monitoring

Wait for “Go” to continue.

```
<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Monitoring_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>Monitored_Item_ID – ISFA_Fan_Temp_VTC</td>
</tr>
<tr>
<td>prm</td>
<td>Action – 1 (ENABLE)</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC2</td>
</tr>
</tbody>
</table>

Verify ISFA_Fan_Temp_VTC_MEF – ENABLED

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Monitoring_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>Monitored_Item_ID – ISFA_Delta_P_VTC</td>
</tr>
<tr>
<td>prm</td>
<td>Action – 1 (ENABLE)</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC2</td>
</tr>
</tbody>
</table>

Verify ISFA_Delta_P_VTC_MEF – ENABLED

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Monitoring_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>Monitored_Item_ID – ISFA_Fan_Speed_VTC</td>
</tr>
<tr>
<td>prm</td>
<td>Action – 1 (ENABLE)</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC2</td>
</tr>
</tbody>
</table>

Verify ISFA_Fan_Speed_VTC_MEF – ENABLED

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Monitoring_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>Monitored_Item_ID – IRFA_Fan_Temp_VTC</td>
</tr>
<tr>
<td>prm</td>
<td>Action – 1 (ENABLE)</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>

Verify IRFA_Fan_Temp_VTC_MEF – ENABLED

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Monitoring_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>Monitored_Item_ID – IRFA_Delta_P_VTC</td>
</tr>
<tr>
<td>prm</td>
<td>Action – 1 (ENABLE)</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>

Verify IRFA_Delta_P_VTC_MEF – ENABLED

<table>
<thead>
<tr>
<th>cmd</th>
<th>VTC_Monitoring_Ena_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>Monitored_Item_ID – IRFA_Fan_Speed_VTC</td>
</tr>
<tr>
<td>prm</td>
<td>Action – 1 (ENABLE)</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>
```
18. ACTIVATING COLUMBUS ECLSS FDIR FOR NOMINAL OPS

18.1 Configuring for CFA to Nominal Ops

PWS


' Cabin Loop Final Activation'

'CFA1'

**NOTE**

The following command starts the FLAP ‘CFA1 Activation’ that:
- Checks the availability of the CFA
- Sets the Cabin Fan Speed to 9200 rpm
- Powers on the CFA
- Enables monitoring of the CFA parameters

**cmd** Activate **Execute** (OK)

Verify Pwr: ON
Verify Delta P: 0.61 to 1.5 kPa
Verify Fan Speed: 8700 to 9700 rpm
Verify Input Current: < 1.5 A
Verify Cab Air Massflow: 240 to 510 m3/h

**cmd** CFA1_Activation_AP

**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV

**data** Onboard_Execution_Node – USM SW DMC USS Swoop Instance

Verify CFA1_Pwr_Stat_DMC – ON
Verify CFA1_Delta_P_DMC – 0.61 - 1.5 kPa
Verify CFA1_Fan_Speed_DMC – 8700 - 9700 rpm
Verify CFA1_Input_Current_DMC – <1.5 A
Verify AFS1_Cab_Air_Massflow_MVD – 240 - 510 m3/h

18.2 Enabling IMV Monitoring

PWS

ECLSS: ECLSS Commands

'Monitoring Commands'
NOTE
The following command starts the FLAP ‘IMV Ena Fan Mon’ that enables the monitoring of the IRFA and ISFA input currents and delta pressures.

```
cmd IMV Fan Mon Ena Execute (OK)
```

PWS

Main Panel: DMS Monitoring: 2 - ECLSS

```
DMS Monitoring 2 - ECLSS
'System on DMC'
```

Verify the background color of measurements

ISFA Delta P: Green
ISFA Input Current: Green
IRFA Delta P: Green
IRFA Input Current: Green

```
cmd IMV_Ena_Fan_Mon_AP
data Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
data Onboard_Execution_Node – USM SW DMC USS Swop Instance
```

Verify ISFA_Delta_P_MVD_MS – NORMAL_1
Verify ISFA_Input_Current_DMC_MS – NORMAL_1
Verify IRFA_Delta_P_MVD_MS – NORMAL_1
Verify IRFA_Input_Current_DMC_MS – NORMAL_1

18.3 Enabling IMV/CFA FDIR
DMS: FDIR Configuration

```
'IRFA FDIR'
```

```
cmd Enable Execute (OK)
```

Verify Status – ENABLE

'ISFA FDIR'

```
cmd Enable Execute (OK)
```

Verify Status – ENABLE

'CFA Switchover FDIR'

```
cmd Enable Execute (OK)
```

Verify Status – ENABLE
Activating VTC Monitoring for Air Flow Sensors

18.4 Activating VTC Monitoring for Air Flow Sensors

PCS

COL: ECLSS: Atmos

Verify Airflow Sensor 1 Massflow: > 240 m3/hr

cmd Airflow Sensor 1 Massflow Monitoring – Enable (Verify – Enabled)

Verify Airflow Sensor 2 Massflow: > 240 m3/hr

cmd Airflow Sensor 2 Massflow Monitoring – Enable (Verify – Enabled)

Verify AFS1_Cab_Air_Massflow_VTC – > 240 m3/hr

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – AFS1_Cab_Air_Massflow_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify AFS1_Cab_Air_Massflow_VTC_MEF – ENABLED

Verify AFS2_Cab_Air_Massflow_VTC > 240 m3/hr
18.5 Enabling C&W for the Previous Monitorings (Ground Only)

Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

Perform [2.101 CAUTION AND WARNING EVENT MANAGEMENT], Step 2 (SODF: C&DH: NOMINAL) per Table 5, then

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13532</td>
<td>Cabin Air Flow Sensor 1 Low - COL</td>
<td>W</td>
</tr>
<tr>
<td>13533</td>
<td>Cabin Air Flow Sensor 2 Low - COL</td>
<td>W</td>
</tr>
<tr>
<td>13605</td>
<td>Cabin Air Return Grid Clogging - COL</td>
<td>C</td>
</tr>
</tbody>
</table>

18.6 Activating VTC Monitoring for TPS

COL: ECLSS: Atmos

Verify Air Press 1: 719 -- 770 mmHg

cmd Air Press 1 Monitoring Status – Enable (Verify – Enabled)

Verify Air Press 3: 719 -- 770 mmHg

cmd Air Press 3 Monitoring Status – Enable (Verify – Enabled)

Verify TPS1_Air_Press_VTC – 719 -- 770 mmHg

cmd VTC_Monitoring_Ena_Cmd_SW

prm Monitored_Item_ID – TPS1_Air_Press_VTC

prm Action – 1 (ENABLE)

data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify TPS1_Air_Press_VTC_MEF – ENABLED
Verify TPS3_Air_Press_VTC – 719 -- 770 mmHg

**cmd** VTC_Monitoring_Ena_Cmd_SW

**prm** Monitored_Item_ID – TPS3_Air_Press_VTC

**prm** Action – 1 (ENABLE)

**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify TPS3_Air_Press_VTC_MEF – ENABLED

---

### 18.7 Enabling C&W for TPS (Ground Only)

Enable the following events in the Primary and Backup C&C MDMs.

If ground unable to complete,

Perform [2.101 CAUTION AND WARNING EVENT MANAGEMENT], Step 2 (SODF: C&DH: NOMINAL) per Table 6, then

<table>
<thead>
<tr>
<th>Event</th>
<th>Text</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>13526</td>
<td>Total Pressure Sensor 1 Low - COL</td>
<td>W</td>
</tr>
<tr>
<td>13527</td>
<td>Total Pressure Sensor 3 Low - COL</td>
<td>W</td>
</tr>
</tbody>
</table>

---

### 18.8 Enabling Monitoring for PPOS and PPCS

**COL:** ECLSS: Atmos

**COL Atmosphere**

Verify ppO2 Sensor 1: 124 -- 188 mmHg

**cmd** ppO2 Sensor 1 Monitoring Status – Enable (Verify – Enabled)

Verify ppO2 Sensor 2: 124 -- 188 mmHg

**cmd** ppO2 Sensor 2 Monitoring Status – Enable (Verify – Enabled)

Verify ppCO2 Sensor 1: < 10 mmHg

**cmd** ppCO2 Sensor 1 Monitoring Status – Enable (Verify – Enabled)

Verify ppCO2 Sensor 2: < 10 mmHg
cmd ppCO2 Sensor 2 Monitoring Status – Enable (Verify – Enabled)

Verify PPOS1_Press_VTC – 124 -- 188 mmHg

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – PPOS1_Press_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PPOS1_Press_VTC_MEF – ENABLED

Verify PPOS2_Press_VTC – 124 -- 188 mmHg

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – PPOS2_Press_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify PPOS2_Press_VTC_MEF – ENABLED

Verify PPCS1_Press_VTC – < 10 mmHg

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – PPCS1_Press_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify PPCS1_Press_VTC_MEF – ENABLED

Verify PPCS2_Press_VTC – < 10 mmHg

cmd VTC_Monitoring_Ena_Cmd_SW
prm Monitored_Item_ID – PPCS2_Press_VTC
prm Action – 1 (ENABLE)
data Onboard_Node – SYS_CCSDS_End_Point_VTC2

Verify PPCS2_Press_VTC_MEF – ENABLED

18.9 Swapping DMS Telemetry Packets (Ground Only)
COL-CC to swap nominal DMS telemetry packets.

Wait for "Go" to continue.

NOTE
Packet swapping initiated from Col-CC:
Disable VTC1_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)
Disable VTC2_Gnd_Tlm_Pkt_PHY1_VTC (1Hz)
Perform [2.2.41 VTC GROUND PACKET SWAPPING] (EODF: GROUND: NOMINAL), then:

COL-CC to give a “Go” to continue.

19. **DISABLING PPR FUNCTION**

19.1 **Closing PPRA Valves**

PCS

Task: COL Final Activation – Part 3: COL PPRAs

| COL PPRA 1-2 VTC1 |

√PPRA1 Position – Close

√PPRA2 Position – Close

√PPRA1_Vlv_Close_Status_VTC_PP – CLOSED

If PPRA1_Vlv_Close_Status_VTC_PP – OPEN

| cmd PPRA1_Vlv_Close_VTC |
| data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW |
| data Onboard_Node – SYS_CCSDS_End_Point_VTC1 |

Verify PPRA1_Vlv_Close_Status_VTC_PP – CLOSED

√PPRA2_Vlv_Close_Status_VTC_PP – CLOSED

If PPRA2_Vlv_Close_Status_VTC_PP – OPEN

| cmd PPRA2_Vlv_Close_VTC |
| data SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW |
| data Onboard_Node – SYS_CCSDS_End_Point_VTC1 |

Verify PPRA2_Vlv_Close_Status_VTC_PP – CLOSED

19.2 **Enabling VTC Monitoring of PPRAs**

| COL PPRA 1-2 VTC1 |

cmd PPRA1 Close Status Monitoring – Enabled (Verify – Enabled)

cmd PPRA2 Close Status Monitoring – Enabled (Verify – Enabled)

| cmd VTC_Monitoring_Ena_Cmd_SW |
| prm Monitored_Item_ID – PPRA1_Vlv_Close_Status_VTC |
| prm Action – 1 (ENABLE) |
| data Onboard_Node – SYS_CCSDS_End_Point_VTC1 |
Verifying PPRA1_Vlv_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – PPRA2_Vlv_Close_Stat_VTC
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verifying PPRA2_Vlv_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

### 19.3 Enabling VTC Monitoring of CDAs

**COL:** ECLSS: Cabin Depress Assemblies

<table>
<thead>
<tr>
<th>COL Cabin Depress Assemblies</th>
</tr>
</thead>
</table>

Select CDA 1 Vlv 1 Vlv 2

<table>
<thead>
<tr>
<th>COL CDA 1 - 2 Valve Control VTC1</th>
</tr>
</thead>
</table>

- 'CDA 1 Valve 1'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

- 'CDA 1 Valve 2'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

- 'CDA 2 Valve 1'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

- 'CDA 2 Valve 2'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

Select CDA 3 Vlv 1 Vlv 2

<table>
<thead>
<tr>
<th>COL CDA 3 - 4 Valve Control VTC1</th>
</tr>
</thead>
</table>

- 'CDA 3 Valve 1'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

- 'CDA 3 Valve 2'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)
'CDA 4 Valve 1'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

'CDA 4 Valve 2'

**cmd** Close Status Monitoring – Enable (Verify – Enabled)

```plaintext
**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – CDA1_Vlv1_Close_Stat_VTC
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CDA1_Vlv1_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – CDA1_Vlv2_Close_Stat_VTC
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CDA1_Vlv2_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – CDA2_Vlv1_Close_Stat_VTC
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CDA2_Vlv1_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – CDA2_Vlv2_Close_Stat_VTC
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CDA2_Vlv2_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

**cmd** VTC_Monitoring_Ena_Cmd_SW
**prm** Monitored_Item_ID – CDA3_Vlv1_Close_Stat_VTC
**prm** Action – 1 (ENABLE)
**data** Onboard_Node – SYS_CCSDS_End_Point_VTC1

Verify CDA3_Vlv1_Close_Stat_Monitoring_Ena_VTC_PP – ENABLED

**cmd** VTC_Monitoring_Ena_Cmd_SW
```
21 AUG 07

19.4 Enabling VTC monitoring of VVMRVs

COL: ECLSS: Payload VV

Columbus Payload Vacuum and Venting

sel VEMRV

Columbus VEDD - VTC1

'Venting Manual Repressurization Valve'

cmd Close Monitoring – Enable (Verify – Enabled)

Columbus Payload Vacuum and Venting

sel VAMRV

Columbus VADD - VTC1

'Vacuum Manual Repressurization Valve'

cmd Close Monitoring – Enable (Verify – Enabled)

cmd VTC_Monitoring_Ena_Cmd_SW

prm Monitored_Item_ID – VEMRV_Vlv_Close_Stat_VTC

prm Action – 1 (ENABLE)
20. **ACTIVATING PLCU**

PWS


*‘PLCU Activation (In Default Mode)’*

**NOTE**

The following command starts the FLAP ‘PLCU Act In Default Mode’ that:
- Checks that the SPC3 is not active
- Switches SPC3 power A and power B on
- Boot the PLCU in default mode
- Enables the monitoring of the SPC3 ready status

**cmd Activate Execute (OK)**

Verify Pwr A: – On  
Verify Pwr B: – On  
Verify Ready Stat: – Ready  
Verify Pwr A Current: < 1.19 A  
Verify Pwr B Current: < 0.12 A  
Verify Sec Voltage Stat: – OK

**cmd PLCU_Act_In_Default_Mode_AP**

**data Onboard_Reception_Node – SYS_CCSDS_End_Point_DMC DMS SERV**  
**data Onboard_Execution_Node – USM_SW_DMC_USS_Swop_Instance**

Verify PLCU_Pwr_A_Stat_DMC – ON  
Verify PLCU_Pwr_B_Stat_DMC – ON  
Verify PLCU_Ready_Stat_DMC – READY  
Verify PLCU_Pwr_A_Current_DMC – < 1.19 A  
Verify PLCU_Pwr_B_Current_DMC – < 0.12 A  
Verify PLCU_Sec_Voltage_Stat_DMC – OK
20.1 **Enabling CCSDS Checksum Validation on PLCU (Ground Only)**

```plaintext
cmd DMS_CCSDS_Checksum_Ena_Cmd_SW
data ONBOARD_NODE –
SYS_CCSDS_End_Point_PLCU_DMS_SERV
```

21. **ACTIVATING XCMU**


**COL Activation Part 4**

‘XCMU Activation’

**NOTE**
The following command starts the FLAP ‘XCMU Activation’ that:
- Checks that the XCMU is available
- Checks that the redundant XCMU is off
- Switches XCMU nom power A and nom power B on
- Enables the monitoring of the nominal XCMU ready status

```plaintext
cmd Activate Execute (OK)
```

Verify Nom Pwr A – On
Verify Nom Pwr B – On
Verify Nom Ready Stat – Ready
Verify Nom Pwr A Current < 0.64 A
Verify Nom Pwr B Current < 0.64 A
Verify Nom Sec Voltage Stat – OK

```plaintext
cmd XCMU_Activation_AP
data Onboard_Reception_Node –
SYS_CCSDS_End_Point_DMC_DMS_SERV
data Onboard_Execution_Node – USM_SW_DMC_USS_Swap_Instance
```

Verify XCMU_Nom_Pwr_A_Stat_DMC – ON
Verify XCMU_Nom_Pwr_B_Stat_DMC – ON
Verify XCMU_Nom_Ready_Stat_DMC – READY
Verify XCMU_Nom_Pwr_A_Current_DMC – <0.64 A
Verify XCMU_Nom_Pwr_B_Current_DMC – <0.64 A
Verify XCMU_Nom_Sec_Voltage_Stat_DMC – OK

22. **ENABLING CABIN TEMPERATURE MONITORING**

Main Panel: DMS Monitoring: 2 - ECLSS

**DMS Monitoring 2 - ECLSS**

‘System on DMC’

Verify CTCU1 Cabin Temp1: 18 to 27 deg C
Verify CTCU1 Cabin Temp2: 18 to 27 deg C
Verify CTCU1 Cabin Temp3: 18 to 27 deg C
Verify HS1 Air Humidity: 20 to 73 %
Verify HS2 Air Humidity: 20 to 73 %

ECLSS: ECLSS Commands:

'Monitoring Commands'

**cmd** CTCU Cabin Air Mon Ena **Execute** (OK)

Main Panel: DMS Monitoring: 2 - ECLSS

DMS Monitoring 2 - ECLSS

'System on DMC'

Verify the background color of measurements

CTCU1 Cabin Temp1: Green
CTCU1 Cabin Temp2: Green
CTCU1 Cabin Temp3: Green
HS1 Air Humidity: Green
HS2 Air Humidity: Green

Verify CTCU1_Cabin_Temp1_DMC – 18 - 27 °C
Verify CTCU1_Cabin_Temp2_DMC – 18 - 27 °C
Verify CTCU1_Cabin_Temp3_DMC – 18 - 27 °C
Verify HS1_Air_Humidity_DMC – 20 - 73 %
Verify HS2_Air_Humidity_DMC – 20 - 73 %

**cmd** CTCU_Ena_Cabin_Air_Mon_AP

**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV

**data** Onboard_Execution_Node – USM_SW_DMC_USS_Swop_Instance

Verify CTCU1_Cabin_Temp1_DMC_MS – NORMAL_1
Verify CTCU1_Cabin_Temp2_DMC_MS – NORMAL_1
Verify CTCU1_Cabin_Temp3_DMC_MS – NORMAL_1
Verify HS1_Air_Humidity_DMC_MS – NORMAL_1
Verify HS2_Air_Humidity_DMC_MS – NORMAL_1

23. **ENABLE WPA TEMPERATURE & FDIR MONITORINGS**

PWS

Main Panel: DMS Monitoring: 5 – COMMS TCS Payload

DMS Monitoring 5 – COMMS TCS Payload

'System on DMC'

'TCS'
NOTE
The following parameters initiate a Water Pump Switchover if values are out of limits after monitorings are enabled:
- WTSB1/2 Nom/Red Plenum Temp3
- WPA1 WTSB1 Plenum Temp1/2
- WPA1 WTSB3 CHX Temp1/2

Verify WTSB1 Nom Plenum Temp3: > 14 deg C
Verify WTSB2 Redun Plenum Temp3: > 14 deg C
Verify WTSB5 Moderate HX Temp1: < 16 deg C
Verify WTSB5 Moderate HX Temp2: < 16 deg C
Verify WTSB6 Low HX Temp1: < 7.7 deg C
Verify WTSB6 Low HX Temp2: < 7.7 deg C

'WPA1'

Verify WPA1 WTSB1 Plenum Temp1: 15 - 22 deg C
Verify WPA1 WTSB1 Plenum Temp2: 15 - 22 deg C
Verify WPA1 WTSB3 CHX Temp1: < 12 deg C
Verify WPA1 WTSB3 CHX Temp2: < 12 deg C

TCS: TCS Commands:

cmd WTSB Mon Ena Execute (OK)

Main Panel: DMS Monitoring: 5 – COMMS TCS Payload

Verify the background color of measurements
- WTSB1 Nom Plenum Temp3: Green
- WTSB2 Redun Plenum Temp3: Green
- WTSB5 Moderate HX Temp1: Green
- WTSB5 Moderate HX Temp2: Green
- WTSB6 Low HX Temp1: Green
- WTSB6 Low HX Temp2: Green

'WPA1'

Verify the background color of measurements
- WPA1 WTSB1 Plenum Temp1: Green
- WPA1 WTSB1 Plenum Temp2: Green
WPA1 WTSB3 CHX Temp1: Green
WPA1 WTSB3 CHX Temp2: Green

Verify WTSB1_Nom_Plenum_Temp3_MVD > 14 deg C
Verify WTSB2_Redun_Plenum_Temp3_MVD > 14 deg C
Verify WTSB5_Medium_HX_Temp1_DMC < 16 deg C
Verify WTSB5_Medium_HX_Temp2_DMC < 16 deg C
Verify WTSB6_Low_HX_Temp1_DMC < 7.7 deg C
Verify WTSB6_Low_HX_Temp2_DMC < 7.7 deg C

Verify WPA1_WTSB1_Plenum_Temp1_DMC – 15 - 22 deg C
Verify WPA1_WTSB1_Plenum_Temp2_DMC – 15 - 22 degC
Verify WPA1_WTSB3_CHX_Temp1_DMC < 12 deg C
Verify WPA1_WTSB3_CHX_Temp2_DMC < 12 deg C

**cmd** WTSB_Monitoring_Ena_AP
**data** Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node – USM_SW_DMC_USS_Swop_Instance

Verify WTSB1_Nom_Plenum_Temp3_MVD_MS – NORMAL_1
Verify WTSB2_Redun_Plenum_Temp3_MVD_MS – NORMAL_1
Verify WTSB5_Medium_HX_Temp1_DMC_MS – NORMAL_1
Verify WTSB5_Medium_HX_Temp2_DMC_MS – NORMAL_1
Verify WTSB6_Low_HX_Temp1_DMC_MS – NORMAL_1
Verify WTSB6_Low_HX_Temp2_DMC_MS – NORMAL_1

Verify WPA1_WTSB3_CHX_Temp1_DMC_MS – NORMAL_1
Verify WPA1_WTSB3_CHX_Temp2_DMC_MS – NORMAL_1
Verify WPA1_WTSB1_Plenum_Temp1_DMC_MS – NORMAL_1
Verify WPA1_WTSB1_Plenum_Temp2_DMC_MS – NORMAL_1

24. **CONFIGURING HCU FOR NOMINAL OPS**

**NOTE**

HCU monitoring was enabled automatically as part of DMC boot process.

24.1 **Disabling Nominal Monitoring of HCU2**

PWS

Main Panel: DMS Monitoring: 2 - ECLSS

`DMS Monitoring 2 - ECLSS`

'DMS Monitoring'

'Enable/Disable'

sel Enable/Disable ECLSS
21 AUG 07

DMS Monitoring Enable/Disable 2
'Disable Monitoring'

**cmd** HCU2 Health Stat **Execute** (OK)

DMS Monitoring 2 - ECLSS
'System on DMC'

Verify the background color of measurement

HCU2 Health Stat: White

<table>
<thead>
<tr>
<th>cmd</th>
<th>DMS_MONIT_Dis_Monitoring_Cmd_SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>prm</td>
<td>MT_ID – DMC_Sys_Monitoring_Table_SW</td>
</tr>
<tr>
<td>prm</td>
<td>EI_ID – HCU2_Health_Stat_DMC</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_DMC_DMS_SERV</td>
</tr>
</tbody>
</table>

Verify HCU2_Health_Stat_DMC_MS – NOTMON_1

24.2 **Swapping DMS Telemetry Packets (Ground Only)**

COL-CC to swap vital DMS telemetry packet.

Wait for "Go" to continue.

**NOTE**
Packet swapping initiated from Col-CC:
Enable VTC_Gnd_Tlm_Pkt_LOG2_VTC (1Hz)

Perform **{2.2.41 VTC GROUND PACKET SWAPPING}** (EODF: GROUND: NOMINAL), then:

COL-CC to give a "Go" to continue.

24.3 **Deactivating HCU2 Power Bus**

COL: EPS: PDU 2 120 V Subsys/Payloads Switch Details

<table>
<thead>
<tr>
<th>COL PDU2 120V Switch Details VTC1</th>
</tr>
</thead>
<tbody>
<tr>
<td>'PDU2'</td>
</tr>
</tbody>
</table>

**cmd** Outlet No. 28 – Off (Verify – Off)

<table>
<thead>
<tr>
<th>cmd</th>
<th>PDU2_HCU2_Pwr_Bus_Off_VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>SW_CMD – VTC_Disc_Out_Cmd_Cmd_SW</td>
</tr>
<tr>
<td>data</td>
<td>Onboard_Node – SYS_CCSDS_End_Point_VTC1</td>
</tr>
</tbody>
</table>

Verify PDU2_HCU2_Pwr_Bus_On_Off_Stat_VTC_PP – OFF

24.4 **Enabling HCU vital monitoring (ground step only)**

COL-CC to enable HCU Monitoring
Wait for “Go” to continue

```plaintext
21 AUG 07

24.5
Enable PDU1 HCU1 power bus vital system monitoring (ground step only)

COL-CC
COL-CC to enable PDU1 HCU1 Monitoring

Wait for “Go” to continue

```
24.6 **Swapping DMS Telemetry Packets (Ground Only)**

COL-CC to swap vital DMS telemetry packet.

Wait for “Go” to continue.

**NOTE**
Packet swapping initiated from Col-CC:
Disable VTC_Gnd_Tlm_Pkt_LOG2_VTC (1Hz)

Perform [2.2.41 VTC GROUND PACKET SWAPPING] (EODF: GROUND: NOMINAL), then:

COL-CC to give a “Go” to continue.
OBJECTIVE:
Open Columbus Port hatch, evaluate Columbus for obvious FOD, obtain an atmospheric grab sample and ingress Columbus.

LOCATION:
Node2/Columbus

DURATION:
25 minutes for COL Ingress
10 minutes for Hatch Open (Step 1)
15 minutes evaluating Columbus and Grab Sample (Step 2)

CREW:
One

PARTS:
None

MATERIALS:
Dry Wipes
Towels
Surgical Mask
Sharpie

TOOLS:
DCS 760 Camera (for Nominal Ingress)
Eye Protection
Mini-Maglite
ISS Vacuum Cleaner

REFERENCE PROCEDURES:
None

1. **OPENING COLUMBUS PORT HATCH**
   1.1 Temporarily cease Portable Fan air flow into Node 2-Columbus Vestibule area.
   1.2 Don Eye Protection and Surgical Mask.
   1.3 Open Hatch per decal.

2. **EVALUATING COLUMBUS AND OBTAIN GRAB SAMPLE**
   2.1 Visually inspect for FOD in Columbus Module. Vacuum FOD as required.

If no FOD or after any FOD has been vacuumed, doff Eye Protection and Surgical Mask and Restart Portable Fan.
Ingress COL.

Visually inspect COL for condensation, atmosphere quality, general condition. Photo document affected area, if required (DCS 760 Camera).

Unstow Grab Sample Container (GSC) from stowage location.

Remove tethered inlet cap.

**NOTE**
When taking sample, hold GSC far away from body.

Open valve for 10 seconds. (Keep GSC far away from body)

**NOTE**
A click sound occurs when valve has been closed to the proper position.

Close valve until it slips and locks. (Click sound occurs)

Record sampling data on GSC label (Day/HH:MM in GMT and location of sample). (Sharpie)

Replace tethered inlet cap.

Call down S/N of GSC to **MCC-H**

Stow GSC for return.
OBJECTIVE:
To remove the Negative Pressure Relief Valve (NPRV) from the Aft side of Columbus Bulkhead and to install the IMV Return Shut-Off Valve (IRSOV).

LOCATION:
Installed: COL1A0 (NPRV and IRSOV)

DURATION:
45 min

CREW:
One

PARTS:
IRSOV P/N B40482-3
V-Band Clamp P/N M27536/2
FDS Cover COLP0-6 P/N 9233CA721-401
FDS Cover COLP0-6A P/N 9233CA723-401
FDS Cover COLP0-7 P/N 9233CA725-401

MATERIALS:
Braycote 601 Lubricant
Disposable Gloves (powder-free Latex gloves)
Dry Wipes

TOOLS:
Headlamp Light Source Assy P/N SEZ33114010-301
DCS 760 Camera
Scissors
ISS Toolkit:
Drawer 2:
  7/16" Deep Socket, 1/4" Drive
Drawer 3:
  4" Common Tip Screwdriver
Columbus Tool Kit:
Tool Bag 1:
  Ratchet Wrench, 1/4"
  Torque Wrench 4-20 Nm
  Ratchet Tool, 1/4" Drive
1. REMOVING THE AFT NPRV

Figure 1. NPRV/IRSOV Working Location (Columbus Port Cone)

Figure 2. NPRV at COL1A0: view from Hatch (left) and from Columbus Cabin (right)
Figure 3. View of NPRV, Support Bracket and V-Band Clamp

Figure 4. V-Band Clamp in engaged (left) and disengaged (right) configurations.

1.1 Don headlamp.
1.2 Loosen the V-Band clamp nut (5 complete turns, CCW) (Ratchet Wrench, 1/4"; 7/16" Deep Socket, 1/4" Drive), then disengage the locking mechanism. Refer to Figures 3, 4.

1.3 Remove the V-Band Clamp and temporary stow.

**NOTE**
The NPRV is installed on a Support Bracket that interfaces with the Bulkhead flange. The NPRV is removed together with the Bracket.

1.4 Remove the NPRV from the Bulkhead flange. Temporary stow. Refer to Figure 3.

2. **INSPECTING THE HARDWARE**
Figure 6. IMV Duct Flange
Figure 7. IMV Shut Off Valve (Typical)
2.1 Remove the seal protection cap on the IMV Duct Flange.
Temporary stow.
Refer to Figure 6.
2.2 Visually inspect the bulkhead flange and the IMV Duct flange surfaces for damages (Flashlight). Refer to Figures 5, 6.

2.3 Remove the flange protection rings on the IRSOV Flanges. Temporary stow. Refer to Figure 8.

2.4 Inspect the IRSOV flange surfaces and seal for damage and debris. (Visually) Report any damage or debris. Refer to Figure 9.

2.5 IRSOV is in CLOSED position Refer to Figures 8 and 9.

3. INSTALLING THE IRSOV

3.1 Don Disposable Gloves (powder-free Latex gloves).

3.2 Apply small amount of Braycote 601 to fingertip. Work Braycote 601 Lubricant between fingertips until a very thin film is achieved with no visible white pieces of Braycote 601 present.

3.3 Apply thin layer of Braycote 601 on IRSOV flange seal using lubricated fingertips. Wipe off excess (Dry Wipes).

3.4 Doff Disposable Gloves.

3.5 Pre-position V-Band Clamp on the IRSOV Bulkhead side Flange, then align and mate the IRSOV on the Bulkhead flange with V-Band Clamp.

NOTE
To ease following steps, turn the V-Band Clamp until nut and locking mechanism are facing toward Columbus cabin.

3.6 Engage the V-Band Clamp locking mechanism, snug nut (Ratchet Wrench, 1/4”; 7/16” Deep Socket, 1/4” Drive).
3.7 Loosen the IMV Duct Retaining Clamp, fastener (4" Common Tip Screwdriver) and leave on the IMV Duct. Refer to Figure 10.
Figure 11. IMV Duct Launch Fixation Straps

Velcro strips for FDS Covers installation on FDS Support Structure

Launch Fixation Strap
3.8 Remove the launch fixation straps restraining the IMV Duct (Scissors). Temporary stow. Refer to Figure 11.

3.9 Rotate the IMV Duct until the IMV Duct Flange is aligned with the IRSOV Flange (about 45 to 90 degrees).

3.10 Tighten IMV Duct Retaining Clamp, snug fastener (4” Common Tip Screwdriver). Refer to Figure 10.

3.11 Install the V-Band Clamp mating the valve to the IMV Duct. Refer to Figures 9 and 12.

3.12 Engage the V-Band Clamp locking mechanism, snug nut (Ratchet Wrench, 1/4”; 7/16” Deep Socket, 1/4” Drive).
3.13 Torque the two IRSOV V-Band Clamps nut to 4.5 Nm (Torque Wrench 4
-20 Nm; Ratchet Tool, 1/4” Drive; 7/16” Deep Socket, 1/4” Drive).

Figure 13. IRSOV Power and Data Connector (ISOV1 J01) in launch configuration

3.14 Release connector ISOV1 J01 from launch restraints (TBD2), then
remove the connector protection cap and temporary stow.
Refer to Figure 13.

3.15 Remove IRSOV connector protection cap and temporary stow.

3.16 ISOV1 J01 →|← P01 on IRSOV
Refer to Figure 12.

3.17 Photo document the installed IRSOV (DCS 760 Camera).
4. INSTALLING THE FDS COVERS

4.1 For FOD around work area within 1m radius.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The FDS Covers are installed on the FDS support structure by means of &quot;structure to blanket&quot; and &quot;blanket to blanket&quot; Velcro strips. Refer to Figure 11.</td>
</tr>
<tr>
<td>2. FDS Cover COLP0-6A should be already installed on COLP0-6.</td>
</tr>
</tbody>
</table>

4.2 Install FDS Cover COLP0-7, then COLP0-6 (including COLP0-6A) on FDS Support Structure. Refer to Figures 11 and 14.

4.3 Stow hardware per Daily Stowage Note.
4.4 Notify ground when complete.
OBJECTIVE:
To remove the Negative Pressure Relief Valve (NPRV) from the Forward side of Columbus Bulkhead and to install the IMV Supply Shut-Off Valve (ISSOV).

LOCATION:
Installed: COL1F0 (NPRV and ISSOV)

DURATION:
45 min

CREW:
One

PARTS:
ISSOV P/N B40482-3
V-Band Clamp P/N M27536/2
FDS Cover COLP0-9 P/N 9233CA911-401
FDS Cover COLP0-10 P/N 9233CA913-401
FDS Cover COLP0-10A P/N 9233CA915-401

MATERIALS:
Braycote 601 Lubricant
Disposable Gloves (powder-free Latex gloves)
Dry Wipes

TOOLS:
Headlamp Light Source Assy P/N SEZ33114010-301
DCS 760 Camera
Scissors
ISS Toolkit:
Drawer 2:
   7/16" Deep Socket, 1/4" Drive
Drawer 3:
   4" Common Tip Screwdriver
Columbus Tool Kit:
Tool Bag 1:
   Ratchet Wrench, 1/4"
   Torque Wrench 4-20 Nm
1. REMOVING THE FORWARD NPRV

**Figure 1. NPRV/ISSOV Working Location (Columbus Port Cone)**

**Figure 2. NPRV at COL1F0: view from Hatch (left) and from Columbus Cabin (right)**
Figure 3. View of NPRV, Support Bracket and V-Band Clamp

Figure 4. V-Band Clamp in engaged (left) and disengaged (right) configurations.
1.1 Loosen the V-Band clamp nut (5 CCW complete turns) (Ratchet Wrench, 1/4"; 7/16" Deep Socket, 1/4" Drive), then disengage the locking mechanism. Refer to Figures 3, 4.

1.2 Remove the V-Band Clamp and temporary stow.

**NOTE**
The NPRV is installed on a Support Bracket that interfaces with the Bulkhead flange. The NPRV is removed together with the Bracket.

1.3 Remove the NPRV from the Bulkhead flange. Temporary stow. Refer to Figure 3.

2. **INSPECTING THE HARDWARE**

![Bulkhead Flange](image)

Figure 5. Bulkhead Flange
Figure 6. IMV Duct Flange
Figure 7. IMV Shut Off Valve (Typical)
2.1 Remove the seal protection cap on the IMV Duct Flange.
Temporary stow.
Refer to Figure 6.

2.2 Visually inspect the bulkhead flange and the IMV Duct flange surfaces for damages.
Refer to Figures 5 and 6.

2.3 Remove the flange protection rings on the ISSOV Flanges. Temporary stow. Refer to Figure 8.

2.4 Inspect the ISSOV flange surfaces and seal for damage and debris. (Visually) Report any damage or debris. Refer to Figure 9.

2.5 √ ISSOV is in CLOSED position Refer to Figure 8 and 9.

3. INSTALLING THE ISSOV

3.1 Don Disposable Gloves (powder-free Latex gloves).

3.2 Apply small amount of Braycote 601 to fingertip. Work Braycote 601 Lubricant between fingertips until a very thin film is achieved with no visible white pieces of Braycote 601 present.

3.3 Apply thin layer of Braycote 601 on ISSOV flange seal using lubricated fingertips. Wipe off excess (Dry Wipes).

3.4 Doff Disposable Gloves.

**CAUTION**

The ISSOV can be installed with one orientation only: the flange provided with seal shall be installed against the Bulkhead flange (refer to Figure 8). Failure to comply may result in incomplete Columbus isolation from ISS in case of module depressurization.

3.5 The ISSOV shall be installed with the manual override knob facing toward the cabin side. Refer to Figure 12.

3.6 Pre-position V-Band Clamp on the ISSOV Bulkhead side Flange, then align and mate the ISSOV on the Bulkhead flange with V-Band Clamp.

**NOTE**

To ease following steps, turn the V-Band Clamp until nut and locking mechanism are facing toward Columbus cabin.

3.7 Engage the V-Band Clamp locking mechanism, tighten nut (Ratchet Wrench, 1/4"; 7/16" Deep Socket, 1/4" Drive).
Loosen the IMV Duct Retaining Clamp without removing from the IMV Duct, fastener (4" Common Tip Screwdriver) and leave on the IMV Duct. Refer to Figure 10.
Figure 11. IMV Duct Launch Fixation Straps
3.9 Remove the launch fixation straps restraining the IMV Duct. Temporary stow. Refer to Figure 11.

3.10 Rotate the IMV Duct until the IMV Duct Flange is aligned with the ISSOV Flange (about 90 degrees).

3.11 Tighten IMV Duct Retaining Clamp, snug fastener (4" Common Tip Screwdriver). Refer to Figure 10.

3.12 Install the V-Band Clamp mating the valve to the IMV Duct. Refer to Figures 9 and 12.

3.13 Engage the V-Band Clamp locking mechanism, tighten nut (Ratchet Wrench, 1/4"; 7/16" Deep Socket, 1/4" Drive).
3.14  Torque the two ISSOV V-Band Clamps nut to 4.5 Nm (Torque Wrench 4 -20 Nm; Ratchet Tool, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive).

Figure 13. ISSOV Power and Data Connector (ISOV2 J01) in launch configuration

3.15  Release connector ISOV2 J01 from launch restraints (TBD2), then remove the connector protection cap and temporary stow. Refer to Figure 13.

3.16  Remove ISSOV connector protection cap and temporary stow.

3.17  ISOV2 J01 –|← P01 on ISSOV
Refer to Figure 12.

3.18  Photo document the installed ISSOV (DCS 760 Camera).
4. INSTALLING THE FDS COVERS

Figure 14. FDS Covers installed on PF Panel

4.1 √ for FOD around work area within 1m radius.

NOTE
1. The FDS Covers are installed on the FDS support structure by means of “structure to blanket” and “blanket to blanket” Velcro strips. Refer to Figure 11.
2. FDS Cover COLP0-10A should be already installed on COLP0-10.

4.2 Install FDS Cover COLP0-9, then COLP0-10 (including COLP0-10A) on FDS Support Structure. Refer to Figures 11 and 14.
4.3 Stow hardware per Daily Stowage Note

4.4 Stow tools, removed NPRV. Update IMS.

4.5 Notify ground when complete.
**OBJECTIVE:**
Depressurization of the redundant water pump accumulator.

1. **WATER PUMP ASSEMBLY 1 ACCUMULATOR SETUP**

   **NOTE**
   If both pressure sensors are below 165 kPa the accumulator has to be pressurized to its nominal operations range (165 to 195 kPa). The following Initial Conditions are needed for the WPA Accumulator pressurization:
   1. Sufficient Nitrogen Supply (Supply Pressure > 1537 psi (10600 Kpa)
   2. ISS nitrogen supply valve to Columbus is open
   3. NLSOV1 or NLSOV2 are open

   **1.1 Water Pump Assembly 1 Accumulator Check**
   
   PWS
   
   TCS: WPA1:
   | WPA 1 |
   | 'Accumulator' |
   
   Verify Pressure 1: 165 to 195 kPa
   Verify Pressure 2: 165 to 195 kPa
   
   If pressure readings ≥ 165 kPa perform step 2
   
   Verify WPA1_Accum_Pressure1_DMC – 165-195 kPa
   Verify WPA1_Accum_Pressure2_DMC – 165-195 kPa
   
   If pressure readings ≥ 165 kPa perform step 2

   **1.2 NLSOV3 Reconfiguration to open Position**
   
   ECLSS: Payload N2: NLSOV3:
   | NLSOV 3 |
   | 'ECLSS Nitrogen Line Shut Off Valve 3' |
   | 'Commands' |
   
   **cmd Open Execute (OK)**
   
   Verify Posn – OPEN
   
   **cmd NLSOV3_Open_AP**
   **data** Onboard_Reception_Node
   SYS CCSDS End Point DMC DMS SERV
   **data** Onboard_Execution_Node
   USM SW DMC USS Swop Instance
   
   Verify NLSOV3_Vlv_Open_Stat_DMC – OPEN
1.3 Start Accumulator Pressurization

TCS: TCS Commands:

\[\text{TCS Commands}\]

'TCS Configuration Commands'

'WPA Command'

\[\text{NOTE}\]

The following FLAP:
- identifies the currently active WPA
- Checks that the N2 valve supplying the WPA is open
- Pressurizes the WPA Accumulator above 165kPa

\[\text{cmd} \ WPA \text{ Active Accum Repressurization } \text{Execute} \ (OK)\]

TCS: WPA1: WPA1 Commands:

\[\text{WPA1 Commands}\]

'TCS Water Pump Assembly 1 Commands'

Verify Accum Cntl Loop Stat – ACTIVE

\[\text{cmd} \ WPA\textunderscore\_Active\_Accum\textunderscore\_Repressurization\_AP\]

\[\text{prm} \ SILENT \ 0 \ (Send \ messages \ to \ ground)\]

\[\text{data} \ Onboard\textunderscore\_Reception\_Node\]

\[\text{data} \ SYS \ CCSDS \ End \ Point \ DMC \ DMS \ SERV\]

\[\text{data} \ Onboard\textunderscore\_Execution\_Node\]

\[\text{data} \ USM \ SW \ DMC \ USS \ Swoop \ Instance\]

Verify WPA1\_Accum\_Cntl\_Loop\_Stat\_DMC – ACTIVE

1.4 Control Law Termination Verification

Wait up to 14 minutes for following verifications

Verify Accum Cntl Loop Stat – INACTIVE

PWS SMP

Verify "FLAP WPA\_Active\_Accum\_Repressurization\_AP Called FLAP Returned with Status Success"

\[\text{Wait up to 14 minutes for following verifications}\]

Verify WPA1\_Accum\_Cntl\_Loop\_Stat\_DMC – INACTIVE

Verify in the Message Handler:

"FLAP WPA\_Active\_Accum\_Repressurization\_AP Called FLAP Returned with Status Success"

1.5 Accumulator Pressure Verification

PWS

TCS: WPA1:

\[\text{WPA 1}\]

'Accumulator'
One of the following pressure measurements needs to be in the specified range:

Verify Pressure 1: 165 to 195 kPa
Verify Pressure 2: 165 to 195 kPa

One of the following pressure measurements needs to be in the specified range:

Verify WPA1_Accum_Pressure1_DMC – 165-195 kPa
Verify WPA1_Accum_Pressure2_DMC – 165-195 kPa

1.6 Closing of NLSOV3 Valve

ECLSS: Payload N2: NLSOV3:
[NLSOV 3]
'ECLSS Nitrogen Line Shut Off Valve 3'
'Commands'

**cmd** Close **Execute** (OK)

Verify Posn – CLOSED

**cmd** NLSOV3_Vlv_Close_AP
**data** Onboard_Reception_Node
SYS CCSDS End Point DMC DMS SERV
**data** Onboard_Execution_Node
USM SW DMC USS Swop Instance

Verify NLSOV3_Vlv_Close_Stat_DMC – CLOSED

2. WATER PUMP ASSEMBLY2 ACCUMULATOR SETUP

**NOTE**
If both pressure sensors are below 130 kPa the accumulator has to be pressurized to its nominal operations range (130 to 150 kPa).

2.1 Water Pump Assembly 1 Accumulator Check

TCS: WPA2:
[WPA 2]
‘Accumulator’

Verify Abs Press1 Sensor → VTC1: 130 to 150 kPa
Verify Abs Press2 Sensor → VTC2: 130 to 150 kPa

If pressure readings ≥130 kPa and ≤150 kPa terminate procedure

Verify WPA2_Accum.Abs_Press1_MVD – 130-150 kPa
Verify WPA2_Accum_Abs_Press2_MVD – 130-150 kPa

If pressure readings ≥130 kPa and ≤150 kPa terminate procedure

2.2 **NLSOV4 Reconfiguration to open Position**

ECLSS: Payload N2: NLSOV4:

NLSOV 4

'ECLSS Nitrogen Line Shut Off Valve 4'

'Commands'

**cmd** Open **Execute** (OK)

Verify Posn – OPEN

2.3 **Start Accumulator Pressurization**

TCS: TCS Commands:

TCS Commands

'TCS Configuration Commands'

'WPA Commands'

NOTE

The following FLAP:
- identifies the currently active WPA
- Switch on the alternate WPA
- Set the accumulator pressure control set-point
- Pressurizes the WPA Accumulator between 130 to 150 kPa

**cmd** WPA Accum Depressurization **Execute** (OK)

TCS: WPA2: WPA2 Commands:

WPA 2 Commands

'TCS Water Pump Assembly 2 Commands'

Verify Accum Cntl Loop Stat – ACTIVE

**cmd** WPA_Accum_Depressurization_AP

**prm** SILENT 0 (Send messages to ground)

**data** Onboard_Reception_Node

SYS_CCSDS_End_Point_DMC_DMS_SERV

SYS_CCSDS_End_Point_DMC_DMS_SERV
### Control Law Termination Verification

Wait up to 19 minutes for following verifications

Verify Pwr Stat – OFF

#### PWS SMP

Verify "FLAP WPA_Accum_Depressurization_AP Called FLAP Returned with Status Success"

Wait up to 19 minutes for following verifications

Verify in the Message Handler:

"FLAP WPA_Accum_Depressurization_AP Called FLAP Returned with Status Success"

Verify WPA2_Pwr_Stat_DMC – OFF

### Accumulator Pressure Verification

TCS: WPA2:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTC1</td>
<td>130 to 150 kPa</td>
</tr>
<tr>
<td>VTC2</td>
<td>130 to 150 kPa</td>
</tr>
</tbody>
</table>

Verify Abs Press1 Sensor → VTC1: 130 to 150 kPa

Verify Abs Press2 Sensor → VTC2: 130 to 150 kPa

One of the following pressure measurements needs to be in the specified range:

Verify WPA2_Accum_Abs_Press1_MVD – 130-150 kPa

Verify WPA2_Accum_Abs_Press2_MVD – 130-150 kPa

### Closing of NLSOV4 Valve

ECLSS: Payload N2: NLSOV4

<table>
<thead>
<tr>
<th>Valve</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLSOV4</td>
<td>'ECLSS Nitrogen Line Shut Off Valve 4'</td>
</tr>
</tbody>
</table>

'Commands'

**cmd** Close **Execute** (OK)

Verify Posn – CLOSED

**cmd** NLSOV4_Vlv_Close_AP

**data** Onboard_Reception_Node

SYS_CCSDS_End_Point_DMC_DMS_SERV
| data Onboard_Execution_Node |
| USM SW DMC USS Swoo Instance |
| Verify NLSOV4_Vlv_Close_Stat_DMC – CLOSED |
OBJECTIVE:
Install the Nitrogen supply jumper between Node 2 and the Columbus module and purge the nitrogen system to remove any contamination from the lines. Verify that the connection and Columbus Nitrogen system do not increase the nominal leak rate of the integrated Nitrogen system.

INITIAL CONDITIONS:

PARTS:
Low Pressure Nitrogen Jumper - P/N: 683-13870-70

TOOLS:
Fluid Fitting Torque Device (FFTD)
Gamah Seal Maintenance Kit
Nitrogen Oxygen Purge Adapter (NOPA) P/N 683-42344-7
Latex Gloves (4 pairs)
Braycote Lubricant
Ziplock Bag

1. **ISOLATE AND DEPRESSURIZE THE NITROGEN SUPPLY SYSTEM**

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open fluid connectors should be exposed to cabin air for a minimum amount of time to prevent contamination of the Nitrogen system.</td>
</tr>
</tbody>
</table>

1.1 Don Gloves.

If Gloves become contaminated, replace immediately with clean Gloves.

1.2 **Close Nitrogen Low Pressure Supply Valve**

PCS
Airlock: ECLSS: N2 Supply Valve
**AL N2 Supply Valve**

**cmd** AL N2 Supply Valve – Close (Verify Ind – √)

1.3 **Vent Nitrogen Supply Line**

US Lab: ECLSS: PCA: N2 Intro Valve
**LAB PCA N2 Intro Valve**

**cmd** LAB PCA N2 Intro Valve – Open (Verify Position – Open)
Wait 10 seconds

**cmd** LAB PCA N2 Intro Valve – Close (Verify Position – Close)

2. **REMOVE VESTIBULE BARRIER**
Remove Node 2-to-Columbus Vestibule Barrier Assembly (quarter turn fasteners)(16)
3. INSTALL COLUMBUS NITROGEN JUMPER

Table 1. Nitrogen Low Pressure Jumper

<table>
<thead>
<tr>
<th>Jumper Name/Function</th>
<th>Node 2 Starboard Bulkhead Interface</th>
<th>Columbus Port Bulkhead Interface</th>
<th>Part Number</th>
<th>Input Torque (in-lbs)</th>
<th>Output Torque (in-lbs)</th>
<th>FTFD Head Size (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Pressure Nitrogen</td>
<td>A08</td>
<td>A08</td>
<td>683-13870-70</td>
<td>38</td>
<td>185</td>
<td>0.875</td>
</tr>
</tbody>
</table>

3.1 Remove Node 2 feedthrough cap with FTFD.

3.2 Remove cap from Node 2 side of jumper by hand.

3.3 Bring jumper end in close proximity to corresponding bulkhead feedthrough.

3.4 Don Latex Gloves

3.5 Remove Node 2 feedthrough cap by hand.

3.6 Inspect feedthrough for debris. Report any debris to MCC-H. Clean as directed (Dry Wipes).

3.7 Inspect feedthrough threads for Braycote Lubricant. If no Braycote Lubricant present, apply one drop of Braycote Lubricant sparingly to first two threads of feedthrough. Spread Braycote Lubricant around threads by hand.

3.8 Doff, Latex Gloves. Don new pair of Latex Gloves.

3.9 Remove cap from Node 2 side of jumper by hand (hold cap then twist nut).

3.10 Unused, undamaged Metal Seal installed on jumper

3.11 Inspect jumper for debris. Report any debris to MCC-H. Clean as directed (Dry Wipes).

3.12 Install jumper onto Node 2 feedthrough hand tight.

3.14 Doff Latex Gloves

3.15 Repeat steps 3.1 through 3.14 for Columbus feedthrough.

3.16 Set Trq Driver to specified input torque
Refer to Table 1 and FFTD Calibration Card for torque settings.

3.17 Torque both sides of jumper with FFTD.
Refer to Table 1.

---

4. PURGE NITROGEN SYSTEM

4.1 Open Nitrogen Line Shut Off Valves
Columbus: ECLSS: Payload N2: NLSOV1
| Columbus Nitrogen Line Shutoff Valves 1 and 2

`cmd` NLSOV1 Position – Open (Verify Ind – Open)
`cmd` NLSOV2 Position – Open (Verify Ind – Open)
4.2 **Install NOPA in Columbus**
Remove cap from Nitrogen QD on Utility Interface Panel
Connect NOPA to Nitrogen QD

4.3 **Purge Nitrogen Lines**
Airlock: ECLSS: N2 Supply Valve
AL N2 Supply Valve

<table>
<thead>
<tr>
<th>cmd</th>
<th>AL N2 Supply Valve – Open (Verify Ind – √)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait</td>
<td>30 seconds</td>
</tr>
<tr>
<td>cmd</td>
<td>AL N2 Supply Valve – Close (Verify Ind – √)</td>
</tr>
</tbody>
</table>

4.4 **Reconnect Nitrogen Line**
Disconnect NOPA from Nitrogen line QD
Connect Nitrogen line QD to Utility Interface Panel

4.5 **Close Redundant Nitrogen Line Shut Off Valve**
Columbus: ECLSS: Payload N2: NLSOV2

<table>
<thead>
<tr>
<th>cmd</th>
<th>Columbus Nitrogen Line Shutoff Valves 1 and 2</th>
</tr>
</thead>
</table>

5. **NITROGEN SYSTEM LEAK CHECK**
5.1 **Open Nitrogen Supply Valve**

Airlock: ECLSS: N2 Supply Valve

[AL N2 Supply Valve]

**cmd** AL N2 Supply Valve – Open (Verify Ind – √)

5.2 **Monitor Nitrogen Pressure**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100 mmHg loss in 30 minutes is acceptable.</td>
</tr>
</tbody>
</table>

Ground will monitor Nitrogen Low pressures for 30 minutes.
OBJECTIVE:
The purpose of this procedure is to purge the Nitrogen Recharge System and setup the Nitrogen System to transfer nitrogen from the shuttle nitrogen tanks to the ISS Airlock nitrogen tanks via equalization.

TOOLS AND EQUIPMENT REQUIRED:

(NOD1P4_D)
GN2 Transfer Flex Hose Assy P/N V857-643003-008 (MC276-0054/1001)
High Pressure N2 Male Purge Adapter (NOPA) (PN 683-42344-4)

Flashlight
Earplugs
Gray Tape

(NOD1D4_G2)
ISS IVA Toolbox
Drawer 2:
  5/32" Hex Head, 1/4" Drive
  Ratchet, 1/4" Drive
Drawer 3:
  Inspection Mirror

1. CONFIGURING ISS N2 SYSTEM

1.1 √MCC-H for ISS payload nitrogen configuration

A/L1OA2

1.2 VL013 (N2) → CLOSED

PCS

1.3 Airlock: ECLSS: Nitrogen System
   AL Nitrogen System
   'N2 Supply Valve'
   √Actual Position – Open

2. REDUCING ISS N2 SYSTEM PRESSURE TO AMBIENT

NOTE
1. Connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD, when possible.
2. As the N2 system pressure bleeds down and N2 is introduced into the cabin, the following messages may be received:
   'N2 Supply Pressure Low – A/L'
   'PCA N2 Line Pressure Low – A/L'
   'PCA N2 Line Pressure Low – LAB'
3. The messages will return to normal as the N2 system is repressurized (step 4).
Airlock: ECLSS: Nitrogen System

[AL Nitrogen System]

'AL PCA N2 Intro Valve'

**cmd** Open (√Actual Position – Open)

Wait 2 minutes or **On MCC-H GO**, proceed.

'AL PCA N2 Intro Valve'

**cmd** Close (√Actual Position – Closed)

3. **CONFIGURING PMA/ODS FOR N2 TRANSFER**

<table>
<thead>
<tr>
<th>ODS Vest</th>
<th>GN2 Xfer Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.1 <strong>FLOW – CLOSED</strong></td>
</tr>
</tbody>
</table>

**WARNING**

1. Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don ear plugs.

2. Inspect GN2 Transfer Flex Hose Assy for any cracks or anomalies. If so, √MCC-H.

3.2 Don ear plugs

3.3 **VENT → OPEN**

3.4 √GN2 Xfer Panel pressure gauge reading ~0 psi, doff Earplugs

**CAUTION**

Minimize the amount of time open fluid connectors are exposed to cabin air to prevent contamination. If debris is found during inspections, √MCC-H.

3.5 Inspect GN2 Transfer Flex Hose Assy for any cracks or anomalies. If so, √MCC-H.

3.6 Uncap GN2 Xfer Panel QD.

**NOTE**

QDs must be closed to remove caps. As needed, refer to Figure 2 at the end of this procedure for reference information on the high pressure quick disconnects.
3.7 Close GN2 Transfer Flex Hose Assy bent-end QD. Remove plug. Inspect both QDs for debris.

3.8 Install hose so that it can be routed along the ODS Flange as shown in Figure 1.

GN2 Transfer Flex Hose Assy bent-end →|← GN2 Xfer Panel QD
Hard mate/open QD.

Figure 1. ODS Vestibule Xfer Panel Hose Routing.

PMA

3.9 Uncap Nitrogen Recharge QD.

3.10 Close GN2 Transfer Flex Hose Assy straight-end QD. Remove plug. Inspect both QDs for debris.

3.11 GN2 Transfer Flex Hose Assy straight-end →|← Nitrogen Recharge QD
Hard mate/open QD.

PMA/ODS

3.12 Secure GN2 Transfer Flex Hose Assy to PMA/ODS Extension Duct and ODS Flange with Velcro straps.
4. PURGING NITROGEN RECHARGE SYSTEM

**NOTE**
The N2 Recharge QD will be labeled "QD012" and will be closest to you when reaching into the A/L1OA0 volume.
WARNING

The next steps will initiate flow from the Shuttle Tanks through the purge adapter attached to N2 Recharge Line in the airlock into the cabin and may cause a loud hissing noise. Crew in the vicinity should don earplugs.

4.2 N2 Recharge Line ←|→ QD012.
High Pressure N2 Male Purge Adapter →|← N2 Recharge Line.
Refer to Figure 3.
Secure flexible line to structure with Gray Tape.

4.3 cb MN A MMU GN2 SPLY ISOL VLV A – cl

4.4 MMU GN2 SPLY ISOL VLV A – OP (tb-OP)

4.5 Shuttle inform ISS "Ready to flow N2."

4.6 FLOW → OPEN

4.7 ISS inform Shuttle "Flowing N2."
Wait TBD minutes

4.8 FLOW → CLOSED

Report results to MCC-H.

4.9 High Pressure N2 Male Purge Adapter ←|→ N2 Recharge Line

4.10 N2 Recharge Line →|← QD012 (Visually inspect before mating)

4.11 Verify QD012 Fully Mated

5. **VERIFYING N2 TRANSFER SYSTEM PRESSURE INTEGRITY**

- **ML86B:D**
  - 5.1 cb MN A MMU GN2 SPLY ISOL VLV A ← cl
- **R13L**
  - 5.2 MMU GN2 SPLY ISOL VLV A → OP (tb-OP)
- **ODS Vest GN2 Xfer Panel**
  - 5.3 FLOW → OPEN

5.4 Wait 5 minutes.

5.5 PCS

- 5.5 Airlock: ECLSS
  - AL ECLSS
  - ‘Equipment Lock’

Verify dP/dt < 0.05 mmHg/min

5.6 A/L1OA0

- 5.6 Replace Closeout Panel A/L1OA0
  - Fasten Closeout Panel fasteners (ten) (Ratchet, 1/4" Drive, 5/32" Hex Head)

5.7 Inform MCC-H when complete with panel installation.

6. **INITIATING N2 TRANSFER**

6.1 A/L1OA2

- 6.1 On MCC-H GO, VL013 (N2) → OPEN

Notify MCC-H of task completion

**NOTE**

Nitrogen transfer normally occurs for several hours or days and termination will be scheduled via a separate activity.

6.2 On MCC-H GO, go to {3.103 NITROGEN TRANSFER TERMINATION} (SODF: JNT OPS: MATED OPERATIONS).
VIEW A
In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To "soft-latch," the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

VIEW B
The coupling halves are now latched together, with the valves shut and the flow stopped. To open flow, the detent button is depressed and the actuating sleeve is rotated in the clockwise direction until the detent button pops up again, locking the mated coupling in the full flow condition.

VIEW C
The coupling halves are now locked in the full flow mode, and the two-stage connection is complete. In this condition, unlatching is prevented and the redundant sealing is in effect. To block the flow and close the valves, the detent button is depressed and the actuating sleeve is rotated in the counterclockwise direction until the detent button again pops up. The flow is now blocked and the valves are closed. The internal areas are automatically vented to atmosphere before the coupling halves are unlatched.

VIEW D
To unlatch the coupling halves, the release ring is retracted from the mating end of the coupler and the coupler is pulled away from the nipple.

Figure 4. Two-Stage High Pressure QDs.
OBJECTIVE:
To deploy SSC in Columbus module using nominal SUP 2 connection.

NOTE
Procedure assumes that the laptop is already configured with an A31p 60 GB Hard Drive, loaded with the current increment software, and configured for use on ISL.

UNSTOW
Multi-Use Bracket P/N: SEG33107631-301
Laptop Desk P/N: SED33108703-302
A31P 120V DC Power Supply P/N: SEG33116412-303
A31P 16V DC Power Cable P/N: SDG33115374-301
120VDC Pwr/Ethernet Cable P/N: SEG39131206-303
A31p Laptop P/N: SEG33115360-302, - 303

1. VERIFYING POWER OFF

PWS
EPDS: 120V Payload: PDU1 Outlets 16
PDU1 Outlets 16
'SSPC1'

√Pwr – OFF

'SSPC2'

√Pwr – OFF

2. INSTALL LAPTOP / MATE CABLE CONNECTIONS

COL
2.1 Multi-Use Bracket ⋮ COL seat-track in desired location
2.2 Laptop Desk ⋮ Multi-Use Bracket
2.3 A31P 16V DC Power Cable ⋮ A31P 120V DC Power Supply
2.4 120VDC Pwr/Ethernet Cable ⋮ A31P 120V DC Power Supply
2.5 120VDC Pwr/Ethernet Cable ⋮ A31P Laptop Ethernet Port
    (reference Figure 1)

Figure 1. A31p Ethernet Port circled in green.
2.6 A31P 16V DC Power Cable →|← A31P Laptop

2.7 A31P Laptop →|← Laptop Desk

**WARNING**

Do not connect or disconnect loads when the SUP Power light is illuminated. Power output is enabled and this presents a shock hazard. Loads should be connected or disconnected only when the SUP Power light is not illuminated.

---

**Figure 2. SUP Panel, J03 port circled**

3. **MATE POWER CABLE TO SUP 2**

COL SUP 2

3.1 √SUP 2 J03 Power On Lt – Off

3.2 120VDC Pwr/Ethernet Cable →|← SUP 2 J03 (reference Figure 2)

4. **POWERING ON SUP 2**

PWS

4.1 **SUP 2 POWER ON FOR SSC**

EPDS: 120V Payload: PDU1 Outlets 16

PDU1 Outlets 16

'Commands'

`cmd Pwr On    Execute (OK)`

'SSPC1'

√Pwr – ON
'SSPC2'

√Pwr – ON

5. **POWERING ON COLUMBUS SSC**

| COL SUP 2 | 5.1 | SUP 2 J03 Power On Lt – On |
| SSC | 5.2 | A31P 120V DC Power Supply → On |
|  | 5.3 | A31p Laptop power → On |
|  | 5.4 | At Login, press [Ctrl+Alt+Delete]. |
|  | 5.5 | Input standard crew personal logon information. For appropriate logon information, refer to [5.202 SSC USER LOGON ACCOUNTS], all (SODF: POC: REFERENCE: OPS LAN). |
|  | 5.6 | sel OK |
OBJECTIVE:
Remove the Stbd PPRV from Node 2 and install a Manual Pressure Equalization Valve (MPEV).

LOCATIONS:
Stowed: √Inventory Management System (IMS)
Installed: Node 2 Stbd Hatch

DURATION:
30 minutes

CREW:
One

PARTS:
MPEV P/N 2353028-2-1

MATERIALS:
Dry Wipes
Braycote Lubricant
Gray Tape
Latex Gloves
Sharpie
Ziploc Bag

TOOLS:
ISS IVA Toolbox:
Drawer 2:
  5/32" Hex Head Driver, 1/4" Drive
  Ratchet, 1/4" Drive
  4" Ext, 1/4" Drive
  (40-200 in-lb) Trq Wrench, 1/4" Drive

REFERENCED PROCEDURE(S):
None

NOTE
1. Removal/installation both occur on cabin (dome) side of Hatch.
2. Hatch should remain open, stowed throughout procedure.
1. PPRV REMOVAL

1.1 Remove PPRV, fasteners (six) (Ratchet, 1/4" Drive; 4" Ext; 5/32" Hex Head).
Label, temporary stow (Gray Tape, Sharpie).
Record part number of PPRV: ________________
Record serial number of PPRV: ________________
Refer to Figure 1.

1.2 Remove PPRV Spacer.

1.3 Clean Hatch at PPRV removal location (Dry Wipes).

1.4 Temporarily stow PPRV.
2. UNSTOW MPEV FROM NODE 2 STARBOARD MIDBAY

Figure 2. Starboard Midbay with closeout
2.1 Remove Starboard Midbay closeout panel NOD2S3-01, fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head Driver).

2.2 Remove MPEV from stowed location at NOD2S3-01, fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head Driver). Refer to Figure 3.

2.3 Record part number of MPEV: ________________
Record serial number of MPEV: ________________

2.4 Place PPRV snd spacer in Ziploc bag. Temp stow Ziploc bag.

2.5 Replace Starboard Midbay closeout panel NOD2S3-01, fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head Driver).

3. **MPEV INSTALLATION**
3.1 √ Replacement MPEV – OPEN, cap removed

NOTE
Equalization valve must be oriented correctly. Refer to Figure 1 for proper installation orientation (nozzle toward bottom).

Two captive O-Rings that require use of Braycote

EVA Side (Un-installed)

Figure 4. MPEV Shown in Closed Position.

3.2 Don latex gloves.

3.3 Apply a small amount of Braycote to MPEV seals and position MPEV in proper installation orientation (Latex gloves, Braycote Lubricant). Refer to Figures 1, 4.

3.4 Doff latex gloves.

3.5 Tighten, torque fasteners (six) in star pattern, to 66 in-lbs [Ratchet, 1/4" Drive; 5/32" Hex Head; 4" Ext; (40-200 in-lbs) Trq Wrench].

WARNING
MPEV must be closed for module pressure, equalization to be prepared for emergency Hatch closing.

3.6 MPEV → CLOSED, capped.

3.7 Check for FOD around work area within 3' radius.

3.8 Photo document final configuration (DCS 760 Camera).

4. POST MAINTENANCE

4.1 ISS ↓ MCC-H task completion, part numbers, serial numbers

4.2 Update IMS with stowage locations.
Stow tools, equipment.
OBJECTIVE:
Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Multimeter, ISA Scopemeter Pressure Probe to depress Node2/Lab vestibule for overnight leak check.

LOCATION:
Lab Forward Endcone

DURATION:
1 hours
20 minutes for Vestibule Leak Check Setup
30 minute - wait for Vestibule Depressurization
10 minutes for Overnight Teardown
20 minutes for Vestibule Leak Check Setup
8 hours - wait for Vestibule Leak Check
20 minutes for Multimeter, ISA, VAJ Teardown

CREW:
One

MATERIALS:
9V Alkaline Battery (if Battery changeout required)
Gray Tape
Ear Plugs

TOOLS:
Internal Sampling Adapter (ISA) P/N 97M55830-1
Vacuum Access Jumper-78-1 5ft P/N 683-17111-1
Vacuum Access Jumper-83-1 35ft P/N 683-17111-2
ISA Scopemeter Pressure Probe P/N 1525,760MMHGA/30PSIA
Digital Multimeter Kit:
P/N 10118-10018-04
   Multimeter
ISS IVA Toolbox:
Drawer 3
   #0 Phillips Screwdriver (if Battery change out required)

1. **COLUMBUS EGRESS/CLOSEOUT**

   COL
   1.1 **1.201 POSITIVE PRESSURE RELIEF ASSEMBLY (PPRA) ACTIVATION**, all (ESA SODF:ECLSS:Activation & Checkout)
   1.2 Close COL Hatch per decal
   1.3 Close Node 2 Stbd Hatch per decal

13 SEP 07
2. **SETTING UP ISA**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA has two identical ISA VAJ Ports. To ensure proper ISA Scopemeter Pressure Probe accuracy verification, one ISA VAJ Port must be uncapped.</td>
</tr>
</tbody>
</table>

2.1 Gamah Cap ← ISA VAJ Port

2.2 √ISA Scopemeter Pressure Probe → ISA

3. **SETTING UP MULTIMETER**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug marked &quot;COM&quot; must be inserted in COM jack on Multimeter. ISA Scopemeter Pressure Probe slide switch will face toward Multimeter Rotary Switch.</td>
</tr>
</tbody>
</table>

3.1 ISA Scopemeter Pressure Probe V plug → VΩ jack (right side, red)

   COM plug → COM jack

3.2 √ISA Scopemeter Pressure Probe – OFF

3.3

   | mV |

3.4 Verify voltage reading > 100 mV DC (good ISA Scopemeter Pressure Probe Battery indication).

   If voltage reading < 100 mV DC, ISA Scopemeter Pressure Probe Battery must be replaced.

   Replace 9V Battery by removing noncaptive screw on back of probe (#0 Phillips Screwdriver).

3.5 ISA Scopemeter Pressure Probe → mm HgA

4. **VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
   | ISA Scopemeter Pressure Probe outputs 1 mV per pressure unit measured.
   | Example: 0.760V = 760 mV = 760 mm HgA |

   Multimeter

4.1

   | V |

13 SEP 07 252
4.2 Record ISA Scopemeter Pressure Probe $P_1$: __________________ mmHgA0.

4.3 US Lab: ECLSS

Record Cab Press P2: ________________ mmHgA

Verify $\Delta P |P_2 - P_1| < 20$ mmHg

5. **CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE (MPEV)**

Node 2 Stbd Hatch

5.1 $\sqrt{}$ Node 2 Stbd MPEV – CLOSED

5.2 Gamah Cap ←|→ VAJ-78-1 5ft (both ends)
Verify seals are not damaged (visually).

5.3 VAJ-78-1 5ft (straight end) →|← ISA VAJ Port
Hand tighten.
(Refer to Figure 1.)

![Figure 1. ISA/VAJ/MPEV Connection.](image)

5.4 Cap ←|→ Node 2 Stbd MPEV
VAJ-78-1 5ft (bent end) →|← Node 2 Stbd MPEV
Hand tighten.
(Refer to Figure 1.)
5.5 Verifying Vent Relief Isolation Valve (VRIV) and Vent Relief Control Valve (VRCV) Closed

MCC-H

Lab: ECLSS: PCA

Lab ACS

"Pressure Control Assembly"

sel VRIV (Icon)

LAB PCA VRIV

√ Position – Closed

Lab: ECLSS: PCA

Lab ACS

"Pressure Control Assembly"

sel VRCV (Icon)

LAB PCA VRCV

√ Position – Closed

5.6 Remove closeout panel LAB1D0-02, 1/4-turn fasteners (nine).

5.7 Gamah Cap ←|→ PCA Vacuum Access Port (VAP)
Temporarily stow Gamah Cap on closeout panel (Gray Tape).

5.8 Gamah Cap ←|→ VAJ-83-1 35ft (both ends)
Verify seals are not damage (Visually).

5.9 VAJ-83-1 35ft (bent end) →|← PCA VAP
Hand tighten.
(Refer to Figure 1.)

5.10 Gamah Cap ←|→ ISA VAJ Port (capped)
VAJ-83-1 35ft (straight end) →|← ISA VAJ Port
Hand tighten.
(Refer to Figure 1.)

WARNING

VAJ will move when pressurized or evacuated. Failure to secure ISA/VAJ Assembly may result in injury to crew and/or damage to equipment.

5.11 Secure ISA/VAJ Assembly.
6. INHIBITING POSITIVE PRESSURE RELIEF

**NOTE**

'Positive P Relief Failure - LAB' caution will be received after PPR is inhibited. No action required. This message will return to normal once PPR is re-enabled.

**On MCC-H GO**

PCS

US Lab: ECLSS: PCA: PCA Commands

LAB PCA Commands

'Positive Press Relief'

'Inhibit'

**cmd** Arm (√Status – Armed)

**cmd** Inhibit

√Positive Pressure Relief Status – Inhibited

7. LEAK CHECKING ISA/VAJ CONNECTION

7.1 ISA Sampling Port Valve → CLOSED

(Refer to Figure 2.)

7.2 Don Ear Plugs.

---

**WARNING**

Opening the VRIV will vent the ISA and VAJs to space and may cause a loud hissing noise.

---

Figure 2. ISA Sampling Port Valve.
7.3 **Opening PCA VRIV**

US Lab: ECLSS: PCA
Lab ACS
‘Pressure Control Assembly’

sel VRIV

LAB PCA VRIV
‘Open’

**cmd** Arm (√Status – Armed)

**cmd** Open

√Position – Open
√Open Indicator – √

7.4 Wait 10 minutes to depressurize ISA/VAJ setup.

7.5 Doff Ear Plugs.

7.6 **Closing PCA VRIV**

US Lab: ECLSS: PCA
Lab ACS
‘Pressure Control Assembly’

sel VRIV

LAB PCA VRIV
‘Close’

**cmd** Close

√Position – Closed
√Closed Indicator – √

7.7 Wait 3 minutes for thermal stabilization.

7.8 Rotary Switch ‘mV’

Multimeter

7.9 Record ISA Scopemeter Pressure Probe $P_3$:
________________ mmHg

Record GMT: ________________ GMT

7.10 Wait 5 minutes for leak check.
7.11 Record ISA Scopemeter Pressure Probe $P_3$: 
\[ \text{mmHg} \]
Record GMT: \[ \text{GMT} \]

\[ \text{***********************************************************************} \]
\[ \text{If } |P_4 - P_3| > 20 \text{ mmHg during monitoring period} \]
\[ \text{ISS } \downarrow \text{MCC-H of suspected ISA/VAJ leak.} \]
\[ \sqrt{\text{MCC-H}} \text{ for further instructions} \]
\[ \text{***********************************************************************} \]

8. DEPRESSURIZING VESTIBULE

**WARNING**
Opening the Node 2 Stbd MPEV will vent vestibule to space and may cause a loud hissing noise.

8.1 Don Ear Plugs.

8.2 Opening PCA VRIV

PCS

US Lab: ECLSS: PCA
Lab ACS
‘Pressure Control Assembly’

sel VRIV

LAB PCA VRIV
‘Open’

\[ \text{cmd Arm (√Status – Armed)} \]
\[ \text{cmd Open} \]
\[ \sqrt{\text{Position – Open}} \]
\[ \sqrt{\text{Open Indicator – √}} \]

Node 2 Stbd Hatch

8.3 Node 2 Stbd MPEV → OPEN

8.4 Wait approximately 30 minutes or until ISA Press < 10 mmHgA.

Multimeter

8.5 $\sqrt{\text{ISA Pressure}} < 10 \text{ mmHgA}$

8.6 Node 2 Stbd MPEV → CLOSED

8.7 Doff Ear Plugs.

13 SEP 07

257
8.8 Wait an additional 10 minutes for thermal stabilization.

8.9 Closing PCA VRIV

US Lab: ECLSS: PCA
Lab ACS
'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV
'Close'

cmd Close

√ Position – Closed
√ Closed Indicator – √

9. VESTIBULE PRESSURE CHECK 1

9.1 Node 2 Stbd MPEV → OPEN

9.2 Record ISA Scopemeter Pressure Probe $P_5$: 
________________ mmHg
Record GMT: ________________ GMT

9.3 Node 2 Stbd MPEV → CLOSED

10. ENABLING POSITIVE PRESSURE RELIEF

PCS
US Lab: ECLSS: PCA: PCA Commands
LAB PCA Commands
'Positive Press Relief'

cmd Enable (Positive Pressure Relief Status – Enabled)

11. DISASSEMBLING EQUIPMENT FOR LEAK CHECK CONFIG

11.1 ISA Scopemeter Pressure Probe ← OFF

Multimeter
11.2 Rotary Switch ← OFF
Multimeter ←|→ ISA Scopemeter Pressure Probe

11.3 Cap ←|→ ISA Sampling Port
ISA Sample Port → OPEN (for pressurization, stowage)
Cap ↔ ISA Sampling Port
Refer to Figure 2.

11.4 VAJ-83-1 35ft (bent end) ←|→ PCA VAP
Gamah Cap ←|← VAJ-83-1 35ft
NODE2/COLUMBUS VESTIBULE DEPRESSURIZATION AND LEAK CHECK
(ASSY OPS/1E/FIN/MULTI E)  Page 9 of 14 pages

11.5 Inspect seal on PCA VAP Gamah Cap for any visible damage. Notify MCC-H if any damage noted to seals.
Gamah Cap →|← PCA VAP
Hand tighten.

11.6 Install closeout panel LAB1D0-02, 1/4-turn fasteners (nine).

11.7 Wait 8 hours for leak check.

12. SETTING UP MULTIMETER

12.1 Rotary Switch ▼

12.2 Verify voltage reading > 100 mV DC (good ISA Scopemeter Pressure Probe Battery indication).
If voltage reading < 100 mV DC, ISA Scopemeter Pressure Probe Battery must be replaced.
9V Battery replaced by removing noncaptive screw on back of probe (#0 Phillips Screwdriver).

12.3 ISA Scopemeter Pressure Probe → mm HgA

13. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

NOTE
ISA Scopemeter Pressure Probe outputs 1 mV per pressure unit measured. Example: 0.760V = 760 mV = 760 mm HgA

Multimeter

13.1 Rotary Switch ▼

13.2 Record ISA Scopemeter Pressure Probe \( P_6 \):
\[ \underline{\text{mm HgA}} \]

PCS

13.3 US Lab: ECLSS
Lab: ECLSS

Record Cab Press \( P_7 \):
\[ \underline{\text{mm HgA}} \]
Verify \( \Delta P = |P_7 - P_6| < 20 \text{ mmHg} \)

14. CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE (MPEV)

14.1 Remove closeout panel LAB1D0-02, 1/4-turn fasteners (nine).
14.2 Gamah Cap ←|→ PCA Vacuum Access Port (VAP)
Temporarily stow Gamah Cap on closeout panel (Gray Tape).

14.3 Gamah Cap ←|→ VAJ-83-1 35ft (bent end)
Verify seals are not damaged (Visually).

14.4 VAJ-83-1 35ft (bent end) →|← PCA VAP
Hand tighten.
(Refer to Figure 1.)

**WARNING**

VAJ will move when pressurized or evacuated. Failure to secure ISA/VAJ Assembly may result in injury to crew and/or damage to equipment.

14.5 Secure ISA/VAJ Assembly.

15. **INHIBITING POSITIVE PRESSURE RELIEF**

**NOTE**

'Positive P Relief Failure - LAB' caution will be received after PPR is inhibited. No action required. This message will return to normal once PPR is re-enabled.

PCS
US Lab: ECLSS: PCA: PCA Commands

LAB PCA Commands

'Positive Press Relief'

'Inhibit'

\(\text{cmd Arm (\checkmark \text{Status – Armed})}\)
\(\text{cmd Inhibit}\)

\(\checkmark \text{Positive Pressure Relief Status – Inhibited}\)

16. **LEAK CHECKING ISA/VAJ CONNECTION**

16.1 ISA Sampling Port Valve → CLOSED
Refer to Figure 2.

16.2 \(\checkmark \text{Node 2 Stbd MPEV – CLOSED}\)

**WARNING**

Opening the VRIV will vent the ISA and VAJs to space and may cause a loud hissing noise.

16.3 Don Ear Plugs.
16.4 **Opening PCA VRIV**

US Lab: ECLSS: PCA

Lab ACS

‘Pressure Control Assembly’

sel VRIV

**LAB PCA VRIV**

‘Open’

**cmd** Arm (√Status – Armed)

**cmd** Open

√Position – Open

√Open Indicator – √

16.5 Wait 10 minutes to depressurize ISA/VAJ setup.

16.6 Doff Ear Plugs.

16.7 **Closing PCA VRIV**

US Lab: ECLSS: PCA

Lab ACS

‘Pressure Control Assembly’

sel VRIV

**LAB PCA VRIV**

‘Close’

**cmd** Close

√Position – Closed

√Closed Indicator – √

16.8 Wait 3 minutes for thermal stabilization.

16.9 Rotary Switch ☺ Multimeter

16.10 Record ISA Scopemeter Pressure Probe $P_8$: __________ mmHg

Record GMT: _______________ GMT

16.11 Wait 5 minutes for leak check.
16.12 Record ISA Scopemeter Pressure Probe $P_9$: 
\[
\text{________________ mmHg}
\]
Record GMT: ________________ GMT

* If $\Delta P \mid P_9 - P_8 \mid > 10 \text{ mmHg during monitoring period}$
* ISS $\downarrow$ MCC-H of suspected ISA/VAJ leak.
* $\sqrt{\text{MCC-H}}$ for further instructions

17. VESTIBULE PRESSURE CHECK 2

17.1 Node 2 MPEV $\rightarrow$ OPEN

17.2 Record ISA Scopemeter Pressure Probe $P_{10}$:
\[
\text{________________ mmHg}
\]
Record GMT: ________________ GMT

* If $\Delta P \mid P_{10} - P_5 \mid > 20 \text{ mmHg during 8 hour monitoring period}$
* ISS $\downarrow$ MCC-H of suspected vestibule leak.
* $\sqrt{\text{MCC-H}}$ for further instructions

17.3 Node 2 Stbd MPEV $\rightarrow$ CLOSED

17.4 Notify MCC-H of pressures, GMTs recorded

18. ENABLING POSITIVE PRESSURE RELIEF

PCS US Lab: ECLSS: PCA: PCA Commands
LAB PCA Commands
'Positive Pressure Relief'

cmd Enable ($\sqrt{\text{Positive Pressure Relief Status – Enabled}}$)

19. DISASSEMBLING AND STOWING EQUIPMENT

Node 2 Stbd Hatch

19.1 $\sqrt{\text{Node 2 Stbd MPEV – CLOSED}}$

19.2 ISA Scopemeter Pressure Probe $\rightarrow$ OFF

13 SEP 07 262
Multimeter

19.3 Rotary Switch → OFF
Multimeter ←|→ ISA Scopemeter Pressure Probe

19.4 Cap ←|→ ISA Sampling Port
ISA Sample Port → OPEN (for pressurization, stowage)
Cap →|← ISA Sampling Port
(Refer to Figure 2.)

19.5 VAJ-78-1 5ft (straight end) ←|→ ISA VAJ Port
VAJ-78-1 5ft (bent end) ←|→ Node 2 Stbd MPEV
Gamah Cap →|← VAJ-78-1 5ft (both ends)
Hand tighten.
Gamah Cap →|← ISA VAJ Port
Hand tighten.

19.6 Verify seal on Node 2 Stbd MPEV Cap is not damaged (Visually).
Cap →|← Node 2 Stbd MPEV
Hand tighten.

19.7 VAJ-83-1 35ft ←|→ PCA VAP
VAJ-83-1 35ft ←|→ ISA VAJ Port
Gamah Cap →|← VAJ-83-1 35ft (both ends)
Hand tighten.
Gamah Cap →|← ISA VAJ Port
Hand tighten.

19.8 Verify seal on PCA VAP Gamah Cap is not damaged (Visually).
Gamah Cap →|← PCA VAP
Hand tighten.

19.9 Check for FOD within 1m radius.

19.10 Install closeout panel LAB1D0-02, 1/4-turn fasteners (nine).

19.11 ISS ⇓ MCC-H, “Vestibule depressurization and leak check completed.”

19.12 Stow tools and materials.
Update IMS with stowage location of hardware.

20. **INGRESS COLUMBUS**

20.1 Node 2 Stbd MPEV → OPEN

20.2 US Lab: ECLSS
[LAB ECLSS]
When \( \frac{dp}{dt} \approx 0 \) (approximately 30 seconds).

CONTINUE

20.3 Open Node 2 Stbd Hatch per decal

20.4 Open COL Hatch per decal

**COL**

20.5 \{1.202 POSITIVE PRESSURE RELIEF ASSEMBLY (PPRA) DEACTIVATION\}, all (ESA SODF:ECLSS:Activation & Checkout)

20.6 ISS \( \Downarrow \ \text{MCC-H}, \) “COL Hatch is open.”
OBJECTIVE:
Established the data and power connection for the COL PWS to the Node 2 UOP.

NOTE
Precondition: PWS installation performed according to procedure {3.103 COL PCS/SSC/PWS INSTALLATION/REMOVAL}, all (ESA SODF: MSM: NOMINAL)

LOCATION:
N2: UOP 1(2) /J4

DURATION:
15 minutes

PARTS:
COL PWS A31P Laptop P/N SEG33115360-303
A31p 16V DC Power Cable P/N SEG33116459-301
120VDC Pwr/Ethernet Cable P/N SEG39131206-303
US DC Power Supply (120VDC) P/N SEG33116412-302 or -303

WARNING
Failure to remove power and apply close inhibit could result in electrical shock hazard.

NODE2  1.  VERIFYING POWER REMOVED
UOP
√POWER OUT – RESET (illuminated white)
√FAULT/TEST – not illuminated

Refer to Figure 1

√TEST SELECT – not illuminated

sw US DC input Power Supply (120V) - Off
(P/N SEG33116412-302 or P/N SEG33116412-303)
2. MAKING COL PWS POWER AND DATA CABLE CONNECTIONS

NOTE
Figure 2 at the end of this procedure illustrates the cable connections to be made by crew.

PWS

2.1 120VDC Pwr/Ethernet Cable →|← COL PWS, A31P Laptop Ethernet connector

2.2 A31p 16V DC Power Cable →|← COL PWS, A31P Laptop power inlet

2.3 Connect 16V Cable Assembly A31p with DC Power supply
DC Power Cable A31p 16V P/N SEG33116459-301 →|← A31P 120VDC Power Supply P/N SEG33116412-302 or P/N SEG33116412-303 in connector J2

2.4 Connect Power Cable Assembly Data /120V with DC Power supply
120VDC Pwr/Ethernet Cable →|← A31P 120VDC Power Supply P/N SEG33116412-302 or P/N SEG33116412-303 in connector J1

NODE2

2.5 Connect Power/Data cable with UOP Data Outlet

UOP1(2)

266

3. TURNING POWER ON FOR COL PWS

POWER OUT → Press (switch depress)
√POWER OUT – ENABLE (illuminated green)
√FAULT/TEST – OK (illuminated green)
TEST SELECT – not illuminated

4. **TURNING ON A31P DC CONVERTER**

Pwr Sply sw US DC Input Power Supply (120V) - On (Lt On)

**Figure 2. COL PWS Configuration**
OBJECTIVE:
Power off Node 2 UOP outlets and A31P power converter. Disconnect cable assemblies from COL PWS and Node 2.

WARNING
Failure to remove power and apply close inhibit could result in electrical shock hazard

1. **A31P POWER SUPPLY OFF**
   √ COL-PWS Powered Off
   Pwr Supply A31p 120V DC Power Supply Input Power sw → OFF (Lt Off)
   Refer to Figure 1.

![Figure 1. USOS A31p120V DC Power Supply Input Side with Power Switch on Left, Output Side with Output Power Light on Right.](image)

2. **NODE2 UOP POWER AND DATA CONNECTION FOR PWS**
   NODE2
   UOP1(2)
   Record the number of the Node 2 UOP which provides Data and Power to that COL PWS which shall be disconnected according to table 1

<table>
<thead>
<tr>
<th>Pwr and Data (Nom)</th>
<th>UOP 1</th>
<th>J4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pwr and Data (Red)</td>
<td>UOP 2</td>
<td>J4</td>
</tr>
</tbody>
</table>

   Table 1. NODE 2 UOP power and data provision

   Record the Node 2 UOP number [x] UOP: ________________
   with [x ] = 1 to 2

3. **NODE2 UOP(X) POWER OFF FOR PWS**
   NODE2
   UOP[x]
   Refer to Figure 2.
4. **VERIFYING POWER OFF**

   - UOP[x] Power Light – Lt Off

5. **DISCONNECTING PWS POWER AND DATA CABLE**

   **NOTE**
   
   Figure 3 at the end of this procedure illustrates the cable and interfaces

PWS

5.1 Disconnect power cable, 120VDC Pwr/Ethernet Cable from PWS

   - 120VDC Pwr/Ethernet Cable P/N SEG39131206-303 ↔ COL-PWS, A31P Laptop P/N SEG33115360-303 Ethernet connector

5.2 A31p 16V DC Power Cable P/N SEG33116459-301 ↔ COL-PWS, A31P Laptop P/N SEG33115360-303 power inlet

5.3 DC Power Cable A31p 16V P/N SEG33116459-301 ↔ A31P 120VDC Power Supply P/N SEG33116412-302(-303) in connector J2

5.4 Disconnect 120VDC Pwr/Ethernet Cable from DC Power supply

   - 120VDC Pwr/ Ethernet Cable P/N SEG39131206-303 ↔ A31P
   - 120VDC Power Supply P/N SEG33116412-302(-303) in connector J1

 NODE2 UOP[x]  

5.5 Disconnect 120VDC Pwr/ Ethernet Cable from UOP

12 SEP 07
120VDC Pwr/Ethernet Cable P/N SEG39131206-303 ←|→ UOP J4 according to Table 1

Figure 3. COL PWS Configuration.
OBJECTIVE:
Install a fully assembled Portable Breathing Apparatus (PBA) to an empty stowage bracket and verify that it is free of damage to ensure its functionality.

LOCATION:
Stowed: √Inventory Management System (IMS)
Installed:
   COL1PF (PBA1)
   COL1SD (PBA2)

DURATION:
10 minutes

CREW
One

PARTS:
Portable Breathing Apparatus (P/N 105428)

MATERIALS:
Dry Wipes
Sharpie
Kapton Tape

TOOLS:
DCS 760 CAMERA
Figure 0-1  PBA Installation Location (Port Cone)
Figure 0-2  PBA Installation Location (Starboard Cone)

1. ACCESSING

Figure 1-1  PBA1(2) Stowage Bracket Assembly (Covers Installed)
1.1 Release (tethered) pip-pins (2) and remove mask and bottle cover, (tmpy stow).
Refer to Figure 1-1.
1.2 Release (tethered) pip-pins (2) and remove cylinder fastening clamp upper & lower part. 
Refer to Figure 1-3.

1.3 Re-insert upper / lower part cylinder fastening clamp upside down into clamp bracket, secure with pip-pins (2). 
Refer to Figure 1-4.

2. **INSPECTION**

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not activate any of the PBA hardware. Activation of this hardware could leave it in an off nominal configuration for emergency response.</td>
</tr>
</tbody>
</table>
2.1 Inspect Reducer / Cylinder (O2 Bottle)

2.1.1 Verify oxygen bottle does not have any obvious physical damage, corrosion, or audible leakage.

2.1.2 Apply Kapton tape to pressure gauge. Mark needle position using extra fine point Sharpie pen. Refer to Figure 2-2.

2.1.3 Verify oxygen bottle pressure gauge needle in the GREEN zone (≥ 3000 psig). Bottle is considered acceptable if needle between the GREEN and RED zones. Refer to Figure 2-1.
If needle is in the RED zone
Mark new needle position on Kapton tape
(extra fine point Sharpie pen),
Photograph gauge, including bar code label
in photograph,
Notify COL-CC.
Refer to Figures 2-1 / Figure 2-2.

2.2 Inspect Mask / Hose

2.2.1 Verify mask pressure harness, visor does not have any obvious physical damage, deterioration, tears, debris, scratches, or cracking.

2.2.2 Verify the length of the PBA hose from mask to bottle does not have any obvious physical damage, deterioration, cuts, flattening, kinking, or cracking around the mating area of the hose.

2.2.3 Verify mask regulator does not have any obvious physical damage, and that it is set in the NORMAL mode.

2.2.4 If required, clean mask visor using Dry Wipes.

2.2.5 Verify microphone module, microphone, communication cable, and earphone cable assembly are secure and free of damage.

2.2.6 Pack inflatable harness into mask.

3. INSTALLATION

3.1 Remove Locking Pin with ring from each PBA Unit (ref Figure 3-2).
Discard Locking Pin with Ring.
3.2 Place Oxygen bottle on holder and into clamp. Refer to Figure 3-2.

3.3 Place quick-don mask on mask holder, secure by strap. Refer to Figure 3-2.
3.4 Restrain O2 hose to hose holder.

4. **CLOSEOUT**

4.1 Phoyo document the PBA1(2) as installed (DCS 760 Camera)

4.2 Attach mask and bottle cover, secure by inserting pip-pins (2).

4.3 Verify hose is not pinched/kinked and the cover is free of obstruction. Refer to Figure 4-1.
OBJECTIVE:
Install a Portable Fire Extinguisher (PFE) to an empty stowage support bracket and verify that it is free of damage to ensure functionality. Procedure is applicable for both PFEs.

LOCATION:
Installed:
  COL1PF (PFE1)
  COL1SD (PFE2)
Stowed: √Inventory Management System (IMS)

DURATION:
10 minutes

CREW
One

PARTS:
Portable Fire Extinguisher (P/N 683-10050-1)

TOOLS:
LAB1
  DCS 760 CAMERA
Figure 0-1  PFE Installation Location (Port Cone)
1. ACCESSING

1.1 Release fastening strap and remove kick-load protection, temporary stow.
Refer to Figure 1-1.

1.2 Release ¼-turn fastener (captive) and open upper clamp. Refer to Figure 1-2.

1.3 Release pip-pin (tethered) from lower adapter. Refer to Figure 1-3.

1.4 Rotate lower adapter outwards and into cabin.

2. **INSPECTION**

![Figure 2-1 PFE1(2) Details](image)

- Nozzle I/F
- Pressure Gauge
- Nozzle Pouch
- Handle
- Bottle Cover
- Nozzle
2.1 Verify both nozzles are tethered to bottle and are inserted in cover pockets. Refer to Figure 2-1.

2.2 Verify no obvious physical damage to bottle or cover, or audible leakage.

2.3 Verify area nozzle pockets are securely fastened and that both nozzles are free of damage. Refer to Figure 2-1.

2.4 Verify that pressure gauge needle is in GREEN zone (800 to 900 psig). Refer to Figure 2-2.

2.5 Apply Kapton tape to pressure gauge. Mark needle position using extra fine point Sharpie pen.

2.6 Verify that locking pin is inserted through hole in handle trigger and is fully seated to prevent unintentional discharge. Refer to Figure 2-2.
3. **INSTALLATION**

3.1 Place PFE1(2) on lower adapter by inserting bottle pin into recess. Refer to Figure 3-1.

3.2 Rotate PFE1(2) into stowed position.

3.3 Stow lower adapter pip-pin, attach to velcro.

![Figure 3-1 Details of Lower Adapter](image_url)
4. **CLOSEOUT**

![Image of a fire extinguisher with kick-load protection](image)

**Figure 4-1 PFE1(2) on Stowage Bracket**
(Bottle cover not installed)

4.1 Verify PFE1(2) is correctly located on support bracket and free of obstruction.
Refer to Figure 4-1.

4.2 Photo document the PFE1(2) as installed (DCS 760 Camera)

4.3 Install kick-load protection.
Refer to Figure 4-1.
OBJECTIVE:
Activate the Emergency Light function inside Columbus by enabling the Emergency Light Power Supply (ELPS) unit.

LOCATION:
COL1PDC

DURATION:
10 minutes

CREW:
One

PARTS:
None

MATERIALS:
- Ziplock Bag 4x4
- Sharpie

TOOLS:
- Maglite
- ISS IVA Toolbox
- Drawer 3:
  - Inspection Mirror
Figure 0-1  Emergency Light Power Supply Unit
(Typical Configuration, not installed)
1. ACCESSING

1.1 Remove closeout cover COLP0-8.
Temporarily stow.
Refer to Figure 0-2.
2. CHECKOUT / ENABLE

ELPS

2.1 Remove protection cap from TEST / DISABLE / ENABLE switch, stow in Ziplock bag.

| NOTE |
| Protection cap shall not be reinstalled on ELPS. |

2.2 Label Ziplock bag, temporary stow (Sharpie).

2.3 \( \text{sw TEST / DISABLE / ENABLE } \rightarrow \text{TEST} \) (hold switch until proper indication).
   Refer to Figure 2-1.

| NOTE |
| Flashing LED indicates battery charging only, if charge capacity is > 80% LED will remain ON. |

2.4 √ELPS Status LED – illuminated (Inspection Mirror, Maglite).
   Verify ELPS Status LED – not flashing.

2.5 √Emergency Egress Light Strip – illuminated.

2.6 \( \text{sw TEST / DISABLE / ENABLE } \rightarrow \text{ENABLE} \).
   Refer to Figure 2-1.

3. POST MAINTENANCE

3.1 Install closeout cover COLP0-8.
3.2 ISS ↓ **COL-CC** of task completion.

3.3 Update IMS, stow tools / equipment.
OBJECTIVE:
Destow the four Portable Foot Loops from the launch stowage position, install and set the inclination of the foot plate.

LOCATION:
Stowed: COL1D2

DURATION:
20 min

CREW:
One

PARTS:
None

MATERIALS:
None

TOOLS:

Columbus Tool Kit:
Tool Bag 1:
   Ratchet Wrench 1/4"
   102mm Extension, 1/4" Drive

Tool Bag 3:
   M5 (4mm) Hex Head Driver, 1/4" Drive

REFERENCED PROCEDURE(S):
None
1. **DESTOWING PORTABLE FOOT LOOPS**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Two couples of Portable Foot Loops are installed onto D2 Rack: following steps are repeated for both the locations.</td>
</tr>
<tr>
<td>2. Portable Foot Loops are restrained by mean of a removable Rod and three removable Plates.</td>
</tr>
<tr>
<td>3. Rod and Plates fasteners are captive.</td>
</tr>
<tr>
<td>4. One Rod restrains a couple of Portable Foot Loops.</td>
</tr>
<tr>
<td>5. For this section refer to Figures 2 and 3.</td>
</tr>
</tbody>
</table>
1.1 Remove restraining Rod, fasteners (four) (Ratchet Wrench 1/4"; 102 mm Extension, 1/4” Drive; M5 (4mm) Hex Head Driver 1/4” Drive) Temporary stow.

**NOTE**
To complete the Portable Foot Loop destowage, plates (three) installed onto D2 Rack are removed.

1.2 Remove Portable Foot Loops (two) from the stowage position. Temporary stow.

1.3 Remove Plates (two), fasteners (four each) (Ratchet Wrench 1/4"; 102 mm Extension, 1/4” Drive; M5 (4 mm) Hex Head Driver 1/4” Drive). Temporary stow.

1.4 Remove Central Plate, fasteners (two) (Ratchet Wrench 1/4"; 102 mm Extension, 1/4” Drive; M5 (4 mm) Hex Head Driver 1/4” Drive). Temporary stow.

1.5 Repeat for the other launch stowage location.
2. **INSTALLING THE PORTABLE FOOT LOOP**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Portable Foot Loop can only be installed on handrails. It does not fit on Columbus Banisters.</td>
</tr>
<tr>
<td>2. Following steps are repeated for each Portable Foot Loop.</td>
</tr>
<tr>
<td>3. For this section refer to Figures 4 and 5.</td>
</tr>
</tbody>
</table>

![Figure 4. Portable Foot Loop Configuration](image)

2.1 Push Handle down 1/4 turn to open clamp.

![Figure 5. Portable Foot Loop Clamp Operations](image)
2.2 Install Portable Foot Loop on the selected handrail.

2.3 Pull handle up 1/4 turn to close clamp.

2.4 Adjust Foot Restraint to accommodate foot.

3. **SETTING FOOT PLATE INCLINATION**

![Image of Portable Foot Loop Inclination](image)

3.1 Remove Pip-Pin to unlatch Inclination Mechanism. Refer to Figure 4.

3.2 Slide the Inclination Mechanism to one of the three predefined positions.

3.3 Install Pip-Pin to latch Inclination Mechanism.

4. **POST REMOVAL**
4.1 ISS ⇓ COL-CC of task completion, stowage location of Rod and Plates and installation location of Portable Foot Loops.
Stow tools.
OBJECTIVE:
Destow the three Columbus Partition Posts from their launch stowage position and install in dedicated Columbus locations.

LOCATION:
Stowed: COL1D2

DURATION:
25 min

CREW:
One

PARTS:
None

MATERIALS:
None

TOOLS:

Columbus Tool Kit:
Tool Bag 1:
   Ratchet Wrench 1/4”
Tool Bag 2:
   6” Extension, 1/4” Drive
Tool Bag 3:
   M5 (4mm) Hex Head Driver, 1/4” Drive

ITEMS TO UNSTOW WITHIN PROCEDURE:
None

REFERENCED PROCEDURE(S):
None
1. **DESTOWING PARTITION POST**

   **NOTE**
   1. Partition Posts are stowed onto D2 Rack by mean of two removable brackets. Refer to Figure 2.
   2. Each Partition Post is folded in two pieces at launch.
   3. All fasteners on brackets are captive.
1.1 Remove Bracket Assemblies (two), fasteners (four each) (Ratchet Wrench 1/4"; 6" Extension, 1/4" Drive; M5 (4mm) Hex Head Driver 1/4" Drive). Temporary stow. Refer to Figure 1-1.

1.2 Remove Partition Post (three) from the stowage position. Temporary stow.

**NOTE**

To complete the Partition Post destowage task, Rack Plates (two) installed onto D2 Rack front panel have to be removed.

1.3 Remove Rack Plates (two), fasteners (four each) (Ratchet Wrench 1/4"; M5 (4mm) Hex Head Driver, 1/4" Drive). Temporary stow. Refer to Figure 1-1.
2. INSTALLING THE PARTITION POST

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Each Partition Post has to be unfolded before installation. Refer to Figure 2-1.</td>
</tr>
<tr>
<td>2. When unfolded the Partition Post is divided in two semi Partition Posts. Refer to Figure 2-2.</td>
</tr>
<tr>
<td>3. Partition Post Quick Release Pins are tethered to the Partition Post.</td>
</tr>
</tbody>
</table>

![Diagram of Partition Post]

**Figure 2-1** Folded Partition Post

2.1 Remove central quick release pin, then unfold Partition Post. Refer to Figure 2-1.
2.2 Insert semi Partition Post A in semi Partition Post B, then secure with central quick release pin. Refer to Figure 2-2.
Release both external quick release pins from the Partition Post. Refer to Figure 1-2.

**NOTE**

1. The Partition Post Seat Track shall face the Columbus cabin.
2. The Partition Post is installed on two opposite rack bay stand off links. Refer to Figure 2-3.
3. For initial Columbus outfitting, the three Partition Posts are installed according to Table 1 locations.

**Table 1. Initial Partition Post Locations**

<table>
<thead>
<tr>
<th>Locations</th>
<th>Rack Bay side</th>
</tr>
</thead>
<tbody>
<tr>
<td>COL1A1</td>
<td>Port side</td>
</tr>
<tr>
<td>COL1F2</td>
<td>Stbd side</td>
</tr>
<tr>
<td>COL1A4</td>
<td>Stbd side</td>
</tr>
</tbody>
</table>
2.4 Install Partition Post sliding sideway into the Standoff Links. Refer to Figures 2-3 and 2-4. Partition Post locations according to Table 1.

2.5 Secure the Partition Post to the stand off links (external quick release pins). Refer to Figure 2-4.

2.6 Photo document the installed Partition Post (DCS 760 Camera).

2.7 Repeat steps 2.1 to 2.6 for all location.

2.8 ISS ↓ COL-CC of task completion. Stow tools, Partition Post Bracket Assemblies.
OBJECTIVE:
Remove and install the Partition Post from/onto the stand off links.

LOCATION:
Installed: COL1A[X], COL1F[X], COL1O[X] and COL1D4 where [X] = 1 to 4
Stowed: Inventory Management System (IMS)

DURATION:
Removal: 10 min
Installation: 10 min

CREW:
One

PARTS:
Partition Post P/N 9231CA101-401

MATERIALS:
None

REFERENCED PROCEDURE(S):
1.208 PIVOT PIN BRACKET INSTALLATION/REMOVAL
1.209 K-BAR CAPTURE MECHANISM INSTALLATION/REMOVAL

1. REMOVING THE PARTITION POST
   1.1 If required remove Crew Mobility Aids from Partition Post Seat Track. Refer to Figure 1.
Figure 1. Partition Post installed at rack bay A1 (training Mock Up)

| NOTE |
| Pip-pins are tethered to the Partition Post. |

1.2 Remove Partition Post External Pip-pin from upper standoff link. Refer to Figure 1.

1.3 Remove Partition Post External Pip-pin from lower standoff link,

1.4 Remove Partition Post sliding sideways out from the standoff link.

| NOTE |
| In case the Partition Post needs to be stowed, perform steps 1.5, 1.6 and 1.7. |
1.5 Insert External Pip-pin into their dedicated holes on the Partition Post. Refer to Figure 2.

1.6 Remove Central Pip-pin from the Partition Post and disassemble the Semi Partition Post A and B. Refer to Figure 2.
1.7 Fold the Semi Partition Post A and B and install Central Pip-pin. Refer to Figure 3.

1.8 ISS ↓ **COL-CC** of task completion.
Stow Partition Post as required, then update IMS.

2. **INSTALLING THE PARTITION POST**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The installation location of the Partition Post on the Standoff Link is the same of the K-Bar Capture Mechanism and of the Pivot Pin Bracket. To install the Partition Post it is necessary to remove either the K-Bar Capture Mechanism or the Pivot Pin Bracket.</td>
</tr>
</tbody>
</table>

2.1 If necessary remove K-Bar Capture Mechanism (Left or Right) from the standoff link, perform [1.209 K-BAR CAPTURE MECHANISM INSTALLATION/REMOVAL], step 2 (ESA SODF: MSM: NOMINAL: RACK)
Temporary stow.

2.2 If necessary remove Pivot Pin Bracket (Left or Right) from the standoff link, perform [1.208 PIVOT PIN BRACKET INSTALLATION/REMOVAL], step 2 (ESA SODF: MSM: NOMINAL: RACK)
Temporary stow.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Each Partition Post has to be unfolded before installation. If Partition Post are already unfolded steps 2.3 and 2.4 are not necessary. Refer to Figure 4.</td>
</tr>
<tr>
<td>2. When unfolded the Partition Post is divided in two semi Partition Posts. Refer to Figure 5.</td>
</tr>
<tr>
<td>3. Partition Post Pip-pins are tethered to the Partition Post.</td>
</tr>
</tbody>
</table>
2.3 Unfold the Partition Post by removing the Central Pip-pin. Refer to Figure 4.

2.4 Insert semi Partition Post A in semi Partition Post B, then secure with Central Pip-pin.
Refer to Figure 5.

2.5 Release both External Pip-pins from the Partition Post. Refer to Figure 4.

NOTE
1. The Partition Post Seat Track shall face the Columbus cabin.
2. The Partition Post is installed on two opposite rack bay stand off links. Refer to Figure 1.

2.6 Install Partition Post sliding sideway into the Standoff Links. Refer to Figure 1.

2.7 Secure the Partition Post to the standoff links (External Pip-pins, two). Refer to Figure 1.

2.8 ISS ⇓ COL-CC of task completion and installation location of Partition Post.

2.9 Update IMS.
OBJECTIVE:
Remove or install a Partition Soft Cover from/in an empty ISPR rack bay.

LOCATION:
Installed: COL1A[X], COL1F[X], COL1O[X], COL1D4 where [X] = 1 to 4
Stowed: \Inventory Management System (IMS)

DURATION:
Removal: 10 min (each Partition Soft Cover)
Installation: 10 min (each Partition Soft Cover)

CREW:
One

PARTS:
Partition Soft Cover P/N 9231CA311-401

MATERIALS:
None

TOOLS:
None

REFERENCED PROCEDURE(S):
None
1. REMOVING PARTITION SOFT COVER

Figure 1. Location of Partition Soft Cover installation brackets on stand offs, typical
Figure 2. Single Bracket.
Figure 3. Two adjacent Partition Soft Covers installed on a single bracket.
Figure 4. Adjacent Partition Soft Covers installed on a double bracket.
NOTE

1. Following steps are repeated for all the locations where a Partition Soft Covers is to be removed from.
2. Pip-pins are tethered to the Partition Soft Cover.
3. Partition Soft Covers are installed on double and single installation brackets. The single brackets installed between bays 1, 2 and 3, 4 are provided with 1 single pip-pin interface hole. Partition Soft Covers of these adjacent bays are installed on the brackets sharing the same pip-pin of one of the two covers. Refer to figures 2 and 3.

1.1 Release Partition Soft Cover corners from installation brackets (Pip-Pins), then remove. Refer to Figures 1 and 5.

1.2 If adjacent Partition Soft Covers are installed
   Check for their correct fastening to the single brackets with pip-pins.
1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

1.102 PARTITION SOFT COVER REMOVAL/INSTALLATION

Figure 6. Partition Soft Cover Stowage Configuration.

1.3 Record S/N of removed Partition Soft Cover: ________________

1.4 Roll removed Partition Soft Cover, then fasten with Velcro strap.
   Refer to Figure 6.

1.5 Stow Partition Soft Cover.

1.6 ISS ⇓ COL-CC of task completion, S/N and stowage location of
   Partition Soft Cover.

2. INSTALLING PARTITION SOFT COVER

   NOTE

1. Following steps are repeated for all the locations where a Partition Soft
   Covers is to be installed.
2. Pip-pins are tethered to the Partition Soft Cover.
3. Partition Soft Covers are installed on double or single installation brackets.
   The single brackets installed between bays 1, 2 and 3, 4 are provided with 1
   single pip-pin interface hole. Partition Soft Covers of these adjacent bays are
   installed on the brackets sharing the same pip-pin of one of the two covers.
   Refer to figures 2 and 3.

2.1 Undo Velcro strap and unroll Partition Soft Cover.
   Refer to Figures 5 and 6.

2.2 Record S/N of Partition Soft Cover: ________________

2.3 Install Partition Soft Cover on the installation brackets, Pip Pins (4).
   Refer to Figures 1, 3 and 4.

2.4 ISS ⇓ COL-CC of task completion, S/N and installation location of
   Partition Soft Cover.
OBJECTIVE:
Establish access to deck rack internal volume by removing either one or two deck rack floor panels and to re-install the floor panel(s) to close-out the rack internal volume.

LOCATION:
Installed:
  - COL1D1 (Forward / Aft)
  - COL1D2 (Forward / Aft)
  - COL1D3 (Forward / Aft)
Stowed:
  - 

\Inventory Management System (IMS)

DURATION:
5 minutes (single panel)

CREW
One

PARTS:
None

MATERIALS:
None

TOOLS:
COL1
  - Tool Bag 1
    - Ratchet Wrench, 1/4" Drive
    - Ratchet Tool, 1/4" Drive
    - 102 mm Extension 1/4" Drive
    - 4-20 Nm Torque Wrench 1/4" Drive
    - T30 Torx Head 1/4" Drive
    - Adjustable Tether
    - Eyelet (2)
    - Portable Handle
LAB1
  - Deployed:
    - DCS Camera

ITEMS TO UNSTOW WITHIN PROCEDURE:
None

REFERENCED PROCEDURE
None
1. **REMOVAL**

- **NOTE**
  1. Floor panels can be removed in any order.
  2. Floor panels are not interchangeable on deck rack structure.

1.1 Install portable handle to floor panel seatrack.

1.2 Unscrew panel fasteners (9), any order (Ratchet Wrench 1/4" Drive; 102 mm Extension 1/4" Drive; T30 Torx Head 1/4" Drive). Fasteners are captive.

Refer to Figure 1-1 / Figure 1-2.

**WARNING**

Removal of floor panel COL_D2_A or floor panel COL_D3_F grants direct access to PDU1(2) wire harness outlets. Outlets may of extreme temperature of > 100° C. Contact must be avoided, warning labels to be observed strictly.
1.3 Remove panel, temporarily stow (adjustable tether, eyelets).

1.4 ISS ⇓ COL-CC of task completion, temporarily stow tools / equipment as necessary.

2. INSTALLATION

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Floor panels can be installed in any order.</td>
</tr>
<tr>
<td>2. Floor panels are not interchangeable on deck rack structure.</td>
</tr>
</tbody>
</table>

2.1 No FOD around work area.

2.2 Remove floor panel from stowage and place on deck rack, check for correct key pin orientation on rack structure and panel label. Install portable handle to floor panel seat track if not present.

2.3 Screw-in panel fasteners (9), any order, no torque tightening (Ratchet Wrench 1/4" Drive; 102 mm Extension 1/4" Drive; T30 Torx Head 1/4" Drive).

2.4 Torque tighten panel fasteners (9), any order at 5 Nm (44.2 in-lbs) (4-20 Nm Torque Wrench; Ratchet Tool 1/4" Drive; 102 mm Extension 1/4" Drive; T30 Torx Head 1/4" Drive).

3. CLOSEOUT

3.1 Take photograph of installed floor panels (DCS camera)

3.2 ISS ⇓ COL-CC of task completion.

3.3 Stow tools / equipment, update IMS for stowage locations.
OBJECTIVE:
Assemble and install a single Video Camera Assembly (VCA) inside the starboard / port cone of Columbus.

LOCATION:
Stowed: √Inventory Management System (IMS)
Installed:
  - COL1PAM (VCA1)
  - COL1SCOF (VCA2)

DURATION:
1 hour (single camera)

CREW:
One

PARTS:
Camera Body (P/N 20130C18311A)
Zoom Lens (P/N 53901H006001)
View Finder (P/N 53904H004001)
Pan / Tilt Unit (P/N 00630C18661A)
Power / Data Harness (P/N 48030D103140)
Zip Lock Bag (P/N 528-50000-5)

MATERIALS:
None

TOOLS:
LAB1

DEPLOYED:
DCS Camera

ITEMS TO UNSTOW WITHIN PROCEDURE:
None

REFERENCED PROCEDURES:
None
Figure 0-1 VCA1 Installation Location (Port Cone)
1. **INSTALL PAN / TILT UNIT**

**NOTE**
Each VCA is stored disassembled inside a dedicated transport container. Components shall be removed from the container only for immediate installation.
1. Install Pan / Tilt Unit on seattrack.

2. Install Camera Body on Pan / Tilt Unit

   2.1 Align the suitable side of the camera shoe under the dovetail sled of the quick adapter.
2.2 Lean camera shoe against quick adapter while pressing on it.
2.3 Locking knob of quick adapter has turned into LOCK position.
2.4 Camera shoe is fitted completely to mounting surface of quick adapter.
2.5 Turn safety knob at bottom of quick adapter to LOCK position.

3. ADJUST VIEW FINDER

![View Finder](image)

**Figure 3-1 View Finder**

**NOTE**
View Finder, installed on the camera body, is in stowed configuration and needs adjustment only, it shall not be removed.

3.1 Turn horizontal locking knob to unlock. Refer to Figure 3-1.
3.2 Rotate view finder around vertical axis, stop at suitable position.
3.3 Check position by looking through the view finder.
3.4 Turn horizontal locking knob to lock.
3.5 Turn vertical locking knob to unlock Refer to Figure 3-1.
3.6 Slide view finder, stop at suitable position.
3.7 Check position by looking through the view finder.
3.8 Turn vertical locking knob to lock
3.9 Connect view finder pig-tail.
Remove protective caps (two) from pig-tail and camera body connector and place into Ziplock bag.
Connect View Finder pig-tail → View Finder connector (on camera body).
Refer to Figure 3-1.

4. MOUNT & SET-UP LENS

![Figure 4-1 Lens](image-url)
**CAUTION**

Camera and pig-tail connectors are highly sensitive for damages. Prior to installation carefully inspect connectors on pig-tail and on camera body for bent pins and/or debris. Failure to do so could result in damage to pig-tail and camera body connector.

**NOTE**

Focus remote / zoom remote cable is not labeled, connectors are identified by color:
- White connector → Focus Remote
- Black Connector → Zoom Remote

4.1 Mount lens on camera body
Remove protective caps from lens and camera body and place into Ziplock bag.
Align positioning pin on lens mount to slot on camera mount, press lens into camera mount surface.

4.2 Turn camera bayonet ring ⬇ ⬆ until lens mount is firmly fixed.

4.3 Connect lens pig-tail to camera body
Remove protective caps (two) from pig-tail and camera body connector and place into Ziplock bag.
Lens pig-tail →⌈⌉ lens connector (on camera body).
Refer to Figure 4-2.

4.4 Connect focus remote connector to lens drive unit
Remove protective cap from cable and place into Ziplock bag.  
White marked connector (on cable) →|← white receptacle (of lens drive unit).  
Turn locking ring ↷ to tighten.  
Refer to Figure 4-2.

4.5 Connect zoom remote connector to lens drive unit  
Remove protective cap from cable and place into Ziplock bag.  
Black marked connector (on cable) →|← black receptacle (of lens drive unit).  
Turn locking ring ↷ to tighten.  
Refer to Figure 4-2.

5. CONNECT POWER / DATA HARNESS

**NOTE**

VCA1 connects to SUP4 / J08, VCA2 connects to SUP1 / J08.

---

5.1 Connect power / data harness to camera  
Remove protective caps from harness and camera body and place into Ziplock bag.
P01 (cable) → J01 (camera body).
Turn locking ring ↟ to tighten.
Refer to Figure 5-1.

5.2 Connect power / data harness to SUP [X] where [X] = [1][4]
Remove protective caps from harness place into Ziplock bag.
P08 (cable) → J08 (SUP).
Turn locking ring ↟ to tighten.

6. CLOSEOUT

6.1 Take picture of installed VCA (DCS 760 Camera)

6.2 ISS ↓ COL-CC of task completion.

6.3 Stow equipment.

6.4 Ziplock bag placed in VCA transport container.

6.5 √IMS for VCA transport bag stowage location.
This Page Intentionally Blank
OBJECTIVE:
This procedure activates the VDPU, VCA1&2, VMN1&2 and VCR1&2 separated from the Columbus Final Activation procedure and will be performed after Video Camera installation.

1. **VDPU ACTIVATION**

1.1 **Swapping DMS telemetry packets (Ground-only)**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Crew activity required.</td>
</tr>
<tr>
<td>Packet swapping initiated from Col-CC:</td>
</tr>
<tr>
<td>Disable MMC_Gnd_Tlm_Pkt_COMMS1_DMC (0.1Hz)</td>
</tr>
<tr>
<td>Enable MMC_Gnd_Tlm_Pkt_COMMS1_DMC (1Hz)</td>
</tr>
<tr>
<td>Enable MMC_Gnd_Tlm_Pkt_COMMS2_DMC (1Hz)</td>
</tr>
</tbody>
</table>

COL-CC to swap nominal DMS telemetry packets, wait for “GO” to continue

1.2 **Verify PDU1 Outlet status**

PWS

EPDS: 120 V Subsys
PDU1-2 120V Subsys

Verify PDU1 VDPU Pwr Bus (Status, Current) – ON, < 0.38 A

Verify PDU1_VDPU_PWR_Bus_On_Off_Stat_DMC – ON
Verify PDU1_VDPU_PWR_Bus_Current_DMC < 0.38 A

1.3 **Activate the VDPU in Nominal Configuration**

COMMS: VDPU Commands

<table>
<thead>
<tr>
<th>VDPU Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>'commands'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following command starts the FLAP VDPU Activation, which performs:</td>
</tr>
<tr>
<td>- establish the selected PDU1 - CU1 configuration</td>
</tr>
<tr>
<td>- switch on internal power</td>
</tr>
<tr>
<td>- select the CU1</td>
</tr>
<tr>
<td>- update the VDPU context information (FLAP S/W variables)</td>
</tr>
<tr>
<td>- start RT acquisition &amp; monitoring of VDPU data</td>
</tr>
<tr>
<td>- switch on the VDU subunits</td>
</tr>
</tbody>
</table>
Wait up to 2 minutes for VDPU start-up. |

**cmd** Activation-PDU1 Cntl Unit1 **Execute** (OK)

'VDPU Power'
Verify Pwr1 Stat1 – ON
Verify Pwr1 Stat2 – ON
Verify Pwr2 Stat1 – OFF
Verify Pwr2 Stat2 – OFF

'Cntl Unit'
Verify Nom Pwr Stat1 – ON
Verify Nom Pwr Stat2 – ON
Verify Redun Pwr Stat1 – OFF
Verify Redun Pwr Stat2 – OFF

Verify Act Pwr Channel – PDU1
Verify Act Cntl Unit – CU1

COMMS: VDPU Sections

Verify Cntl Unit Act Nom – ON
Verify Cntl Unit Act Redun – OFF
Verify Health Stat1 Nom – OK
Verify Health Stat1 Redun – NOT_OK
Verify Health Stat2 Nom – OK
Verify Health Stat2 Redun – NOT_OK
Verify I/F Unit Pwr – ON

COMMS: VDPU Sections: VDPU Subunits

Verify I/F Unit Sec 3.3 V:  3.3 V ± 0.3 V
Verify I/F Unit Sec 5 V:  5.0 V ± 0.5 V
Verify SW Mode – SWITCH
Verify Switch Auto Test Stat – OK

**cmd** VDPU_Activation.AP
**prm** Constellation $PDU1_CU1
**data** Onboard-Reception-Node - SYS CCSDS End Point DMC DMS SERV
**data** Onboard-Execution-Node - USM SW DMC USS Swoop Instance

Verify VDPU_Pwr1_Stat1_DMC – ON
Verify VDPU_Pwr1_Stat2_DMC – ON
Verify VDPU_Pwr2_Stat1_DMC – OFF
Verify VDPU_Pwr2_Stat2_DMC – OFF
Verify VDPU_Nom_Cntl_Unit_Pwr_Stat1_DMC – ON
Verify VDPU\_Nom\_Cntl\_Unit\_Pwr\_Stat2\_DMC – ON
Verify VDPU\_Redun\_Cntl\_Unit\_Pwr\_Stat1\_DMC – OFF
Verify VDPU\_Redun\_Cntl\_Unit\_Pwr\_Stat2\_DMC – OFF

Verify VDPU\_Active\_Pwr\_Channel\_Stat\_SW – PDU1
Verify VDPU\_Active\_Cntl\_Unit\_Stat\_SW – CU1
Verify VDPU\_Nom\_Cntl\_Unit\_Act\_DMC – ON
Verify VDPU\_Redun\_Cntl\_Unit\_Act\_DMC – OFF
Verify VDPU\_Nom\_Health\_Stat1\_DMC – OK
Verify VDPU\_Nom\_Health\_Stat2\_DMC – OK
Verify VDPU\_Redun\_Health\_Stat1\_DMC – NOT\_OK
Verify VDPU\_Redun\_Health\_Stat2\_DMC – NOT\_OK
Verify VDPU\_I\_F\_Unit\_Pwr\_Stat\_DMC – ON
Verify VDPU\_I\_F\_Unit\_Sec\_3.3\ V\_DMC: 3.3 V ± 0.3 V
Verify VDPU\_I\_F\_Unit\_Sec\_5V\_DMC: 5.0 V ± 0.5 V
Verify VDPU\_SW\_Mode\_DMC – SWITCH
Verify VDPU\_Nom\_Input\_Current1\_DMC < 1.12 A
Verify VDPU\_Nom\_Input\_Current2\_DMC < 1.12 A
Verify VDPU\_Redun\_Input\_Current1\_DMC < 0.1 A
Verify VDPU\_Redun\_Input\_Current2\_DMC < 0.1 A
Verify VDPU\_Switch\_Auto\_Test\_Stat\_DMC – OK

2. **VCA1 ACTIVATION**

2.1 **Activate the VCA1**

COMMS: VCA1

| VCA1 |

Verify Pwr – OFF

**NOTE**

1: FLAP performs:
Check that VDPU subunits have been activated, check that VCA 1 not already switched ON, set the switch to route a synchronization signal to the VCA 1, set the switch to route VCA 1 signal via line 1 to USOS VSU, switch the corresponding VCA 1 power outlet ON, update the VDPU context information.

The VDPU default configuration after the VCA Activation FLAP is: VCA1 Sync line is connected to SSMB Sync (1 = SSMB Sync) and ISS line 1 video signal connected to VCA1 line (19 = VCA1)

'Commands'  

**cmd** Activation **Execute** (OK)
Verify Pwr – ON
Verify Act Stat – ON
Verify Sync Connected: 1
Verify ISS Line1 Connected: 19
Verify Pwr Stat1 – ON
Verify Pwr Stat2 – ON

Verify VDPU_VCA1_Pwr_Stat_DMC – OFF
Verify VDPU_VCA1_Pwr_Stat_SW – OFF

```
cmd VCA1_Activation_AP
data Onboard_Execution_Node –
  USM SW DMC USS Swoo Instance
data Onboard_Reception_Node –
  SYS CCSDS End Point DMC DMS SERV
```

Verify VDPU_VCA1_Pwr_Stat_DMC – ON
Verify VDPU_VCA1_Pwr_Stat_SW – ON
Verify VDPU_VCA1_Sync_Cnct_DMC: 1 (SSMB Sync)
Verify VDPU_SSMB_Line1_Cnct_DMC: 19 (VCA1)
Verify VDPU_VCA1_Pwr_Stat1_DMC – ON
Verify VDPU_VCA1_Pwr_Stat2_DMC – ON

3. **VCA2 ACTIVATION**

3.1 **Activate the VCA2**

COMMS: VCA2

```
VCA2
```

Verify Pwr – OFF

---

**NOTE**

1. FLAP performs:
   Check that VDPU subunits have been activated, check that VCA 2 not already switched ON, set the switch to route a synchronization signal to the VCA 2, set the switch to route VCA 2 signal via line 2 to USOS VSU, switch the corresponding VCA 2 power outlet ON, update the VDPU context information.

   The VDPU default configuration after the VCA Activation FLAP is : VCA2 Sync line is connected to SSMB Sync (1 = SSMB Sync) and ISS line 2 video signal connected to VCA 2 line (20 = VCA 2)

'Commands'  

```
cmd Activation Execute (OK)
```
4. **VMN1 ACTIVATION**

**NOTE**
Crew has to activate Video Monitors manually.

4.1 **Verify PDU1 Power Outlets**

EPDS: PDU1 28V Subsys

- PDU1 28V Subsys

Verify Subsys Pwr Bus1 – ON

- Verify PDU1_Subsys_Pwr.Bus1_On_Off_Stat_DMC – ON

4.2 **Activate the VMN1**

- SCM
  - VMN Toggle Switch → ON
  - Verify Power ON/OFF LED – ON (green)

- PWS
  - COMMS: VMN1
  - VMN1

Verify Pwr – ON
5. **VMN2 ACTIVATION**

NOTE
Crew has to activate Video Monitors manually.

5.1 **Verify PDU2 Power Outlets**

EPDS: PDU2 28V Subsys

Verify Subsys Pwr Bus2 – ON

Verify PDU2_Subsys_Pwr_Bus2_On_Off_Stat_DMC – ON

5.2 **Activate the VMN2**

Verify Power ON/OFF LED – OFF

SCM
VMN Toggle Switch → ON

Verify Power ON/OFF LED – ON (green)

PWS
COMMS: VMN2

Verify Pwr – ON
Verify Input Current < 1.1 A
Verify Temp < 55° C

Verify VMN2_Pwr_Stat_DMC – OFF

**cmd** VMN2_Activation_AP
**data** Onboard_Execution_Node - USM SW DMC USS Swop Instance
**data** Onboard_Reception_Node - SYS CCSDS End Point DMC DMS SERV

Verify VMN1_Pwr_Stat_DMC – ON
Verify VMN1_Input_Current_DMC < 1.1 A
Verify VMN1_Temp_DMC < 55 °C
6. **VCR1 ACTIVATION**

6.1 **Verify PDU1 Power Outlets**

- **EPDS**: PDU1 28V Subsys
- **PDU2 28V Subsys**

Verify Subsys Pwr Bus4 – ON

**NOTE**

VCR1 Activation FLAP performs: Power on VCR 1, enable monitoring, activate acquisition from VCR 1, switch VCR 1 to nominal mode, check that recorder is in remote mode.

**cmd Activation Execute** (OK)

- Verify Pwr – ON
- Verify Act Stat – OK
- Verify Input Current < 1.37 A
- Verify Temp < 55° C
- Verify Operate Stat – NOMINAL
- Verify Remote Local Stat – REMOTE

**cmd VCR1_Activation_AP**

**data** Onboard_Execution_Node -
- USM SW DMC USS Swop Instance
**data** Onboard_Reception_Node -
- SYS CCSDS End Point DMC DMS SERV

Verify VCR1_Pwr_Stat_DMC – OFF

Verify VCR1_Pwr_Stat_DMC – ON

Verify VCR1_Act_Stat_DMC – OK

Verify VCR1_Input_Current_DMC < 1.37 A

Verify VCR1_Temp_DMC < 55 °C

Verify VCR1_Ops_Stat_DMC – NOMINAL
7. **VCR2 ACTIVATION**

7.1 **Verify PDU2 Power Outlets**

EPDS: PDU2 28V Subsys

PDU2 28V Subsys

Verify Subsys Pwr Bus2 – ON

7.2 **Activate the VCR2**

COMMS: VCR2

VCR2

'Commands'

Verify Pwr – OFF

**NOTE**

VCR2 Activation FLAP performs: Power on VCR 2, enable monitoring, activate acquisition from VCR 2, switch VCR 2 to nominal mode, check that recorder is in remote mode.

**cmd** Activation **Execute** (OK)

Verify Pwr – ON
Verify Act Stat – OK
Verify Input Current < 1.37 A
Verify Temp < 55° C
Verify Operate Stat – NOMINAL
Verify Remote Local Stat – REMOTE

Verify VCR2_Pwr_Stat_DMC – OFF

**cmd** VCR2_Activation_AP

**data** Onboard_Execution_Node -

USM SW DMC USS Swop Instance

**data** Onboard_Reception_Node -

SYS CCSDS End Point DMC DMS SERV

Verify VCR2_Pwr_Stat_DMC – ON
Verify VCR2_Act_Stat_DMC – OK
Verify VCR2_Input_Current_DMC < 1.37 A
Verify VCR2_Temp_DMC < 55 °C
Verify VCR2_Ops_Stat_DMC – NOMINAL
Verify VCR2_Remote_Local_Stat_DMC – REMOTE

NOTE
VCR 2 is now ready for tape insertion and VCR operation (record / playback)

7.3 Swapping DMS telemetry packets (Ground-only)

NOTE
No Crew activity required.

Packet swapping initiated from Col-CC:
Disable MMC_Gnd_Tlm_Pkt_COMMS1_DMC (1Hz)
Disable MMC_Gnd_Tlm_Pkt_COMMS2_DMC (1Hz)
Enable MMC_Gnd_Tlm_Pkt_COMMS1_DMC (0.1Hz)
Enable MMC_Gnd_Tlm_Pkt_COMMS2_DMC (0.1Hz)

COL-CC to swap nominal DMS telemetry packets, wait for “GO” to continue
OBJECTIVE:
To establish connection link between COL SUPs and COL PWS.

NOTE
Precondition: PWS installation performed according to procedure 3.103 COL PCS/SSC/PWS INSTALLATION/REMOVAL, all (ESA SODF: MSM: NOMINAL)

LOCATION:
COL: SUP 1(2,3,4)

DURATION:
15 minutes

PARTS:
COL PWS, A31P Laptop P/N SEG33115360-303
A31P 16V DC Power Cable P/N SEG33116459-301
Power Cable Assembly, PCS UOP 120VDC P/N SEZ 39129260-311
Columbus Ethernet Cable P/N SEG33115757-301
A31P 120VDC Power Supply P/N SEG33116412-302

WARNING
Failure to remove power and apply close inhibit could result in electrical shock hazard!

1. VERIFYING POWER OFF
SUP
\[\checkmark\] COL SUP [X] Power Light PWR 2(3), J02(3) – Lt Off

Refer to Figure 1 and Table 3

PCS
COL: EPS: SUPs (UOPs)
\[\checkmark\] COL PDU 1-2 SUPs VTC1

Off / On Status

Verify SUP [X] Outlet 2 – Off
2. MAKING COL PWS POWER AND DATA CABLE CONNECTIONS

<table>
<thead>
<tr>
<th>2.1 Connect LAN cable with COL PWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus Ethernet Cable P/N SEG33115757-301 →</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.2 Connect 16V Cable Assembly A31p with COL PWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Cable A31p 16VDC P/N SEG33116459-301 →</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.3 Connect 16V Cable Assembly A31p with DC Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Cable A31p 16VDC P/N SEG33116459-301 →</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4 Connect Cable Assembly 120VDC with DC Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Cable Assembly, PCS UOP 120VDC P/N SEZ 39129260 -311 →</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.5 Connect Columbus Ethernet cable with SUP Data Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus Ethernet Cable P/N SEG33115757-301 →</td>
</tr>
</tbody>
</table>
Table 1. COL SUP data provision.

<table>
<thead>
<tr>
<th>SUP</th>
<th>DMS LAN</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP 1</td>
<td>Nominal</td>
<td>DATA 2, J05</td>
</tr>
<tr>
<td></td>
<td>Redundant</td>
<td>DATA 6, J09</td>
</tr>
<tr>
<td>SUP 2</td>
<td>Nominal</td>
<td>DATA 2, J05</td>
</tr>
<tr>
<td></td>
<td>Redundant</td>
<td>DATA 6, J09</td>
</tr>
<tr>
<td>SUP 3</td>
<td>Nominal</td>
<td>DATA 2, J05</td>
</tr>
<tr>
<td></td>
<td>Redundant</td>
<td>DATA 6, J09</td>
</tr>
<tr>
<td>SUP 4</td>
<td>Nominal</td>
<td>DATA 2, J05</td>
</tr>
<tr>
<td></td>
<td>Redundant</td>
<td>DATA 6, J09</td>
</tr>
</tbody>
</table>

Figure 2. SUP J05 and J09 location

2.6 Connect DC Power Cable 120VDC with SUP [X] 120VDC Power outlets

COL SUP Power Cable Assembly, PCS UOP 120VDC P/N SEZ 39129260 -311 →|← SUP [X] High Voltage outlets according to Table 2 and Figure 2.

Table 2. COL SUP power provision.

<table>
<thead>
<tr>
<th>SUP</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP 1</td>
<td>PWR 2, J02</td>
</tr>
<tr>
<td>SUP 2</td>
<td>PWR 2, J02</td>
</tr>
<tr>
<td>SUP 3</td>
<td>PWR 3, J03</td>
</tr>
<tr>
<td>SUP 4</td>
<td>PWR 2, J02</td>
</tr>
</tbody>
</table>
3. **SUP [X] POWER ON FOR PWS**

| NOTE | Crew to inform Ground to perform the step if no PWS is active, either in Node 2 or in Columbus.

Activate PDU Outlet according used SUP PWR Connector as provided by Table 3.

**Table 3. COL SUP power provision.**

<table>
<thead>
<tr>
<th>SUP</th>
<th>Connector</th>
<th>PDU</th>
<th>Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP 1</td>
<td>PWR 2, J02</td>
<td>PDU 1</td>
<td>Outlet 12</td>
</tr>
<tr>
<td>SUP 2</td>
<td>PWR 2, J02</td>
<td>PDU 1</td>
<td>Outlet 15</td>
</tr>
<tr>
<td>SUP 3</td>
<td>PWR 3, J03</td>
<td>PDU 2</td>
<td>Outlet 11</td>
</tr>
<tr>
<td>SUP 4</td>
<td>PWR 2, J02</td>
<td>PDU 2</td>
<td>Outlet 15</td>
</tr>
</tbody>
</table>

**PWS**

EPDS: 120V Payload: PDU1(2) Outlets 11(12,15)

PDU1(2) Outlets 11(12,15)

'Commands'

**cmd Pwr On Execute (OK)**

'SSPC1'

√Pwr – ON

'SSPC2'

√Pwr – ON

**SUP**

√SUP [X] Power Light PWR 2(3), J02(J03) – Lt On

**cmd**

PDU1(2)_SUP[X]_Pwr_Out2(3)_On_AP

data Onboard_Reception_Node – SYS CCSDS End Point DMC DMS SERV

data Onboard_Execution_Node – USM_SW_DMC_USS_Swap_Instance

For SUP1:

√PDU1_SUP1_Pwr_Out2_SSPC1_On_Off_Stat_DMC – ON

√PDU1_SUP1_Owr_Out2_SSPC2_On_Off_Stat_DMC – ON

For SUP2:

√PDU1_SUP2_Pwr_Out2_SSPC1_On_Off_Stat_DMC – ON

√PDU1_SUP2_Owr_Out2_SSPC2_On_Off_Stat_DMC – ON

For SUP3:

√PDU2_SUP3_Pwr_Out3_SSPC1_On_Off_Stat_DMC – ON

√PDU2_SUP3_Owr_Out3_SSPC2_On_Off_Stat_DMC – ON
For SUP4:
√PDU2_SUP4_Pwr_Out2_SSPC1_On_Off_Stat_DMC – ON
√PDU2_SUP4_Pwr_Out2_SSPC2_On_Off_Stat_DMC – ON

Figure 3. COL PWS Configuration
1.100 PWS ACTIVATION

ASSY OPS/1E/FIN/MULTI E

Page 1 of 5 pages

OBJECTIVE:
Power On of related SUP power outlet and PWS and further Activation of COL-PWS for executing Columbus Laptop Application (LAPAP) Software.

NOTE
Precondition: PWS installation performed according to PWS location, either COL or Node2:

{1.500 COL PWS INSTALLATION SETUP}, all (SODF:POC: ACTIVATION & CHECKOUT)
or

{1.501 NODE 2 PWS INSTALLATION SETUP}, all (SODF:POC: ACTIVATION & CHECKOUT)

1. SUP [X] POWER ON FOR PWS

NOTE
Crew to inform Ground to perform the step if no PWS is active, either in Node 2 or in Columbus.

Activate PDU Outlet according used SUP PWR Connector as provided by Table 1.

Table 1. COL SUP power provision.

<table>
<thead>
<tr>
<th>SUP</th>
<th>Connector</th>
<th>PDU</th>
<th>Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP 1</td>
<td>PWR 2, J02</td>
<td>PDU 1</td>
<td>Outlet 12</td>
</tr>
<tr>
<td>SUP 2</td>
<td>PWR 2, J02</td>
<td>PDU 1</td>
<td>Outlet 15</td>
</tr>
<tr>
<td>SUP 3</td>
<td>PWR 3, J03</td>
<td>PDU 2</td>
<td>Outlet 11</td>
</tr>
<tr>
<td>SUP 4</td>
<td>PWR 2, J02</td>
<td>PDU 2</td>
<td>Outlet 15</td>
</tr>
</tbody>
</table>

PWS

EPDS: 120V Payload: PDU1(2) Outlets 11(12,15)
PDU1(2) Outlets 11(12,15)

'Commands'

**cmd** Pwr On **Execute** (OK)

'SSPC1'

√Pwr – ON

'SSPC2'

√Pwr – ON

COL SUP

√SUP [x] Power Light PWR 2(3), J02(J03) – Lt On

**cmd** PDU1(2)_SUP[x]_Pwr_Out2(3)_On_AP

**data** Onboard_Reception_Node – SYS CCSDS_End Point DMC DMS SERV

**data** Onboard_Execution_Node – USM_SW_DMC_USS_Swop_Instance
1.100 PWS ACTIVATION

For SUP1:
√PDU1_SUP1_Pwr_Out2_SSPC1_On_Off_Stat_DMC – ON
√PDU1_SUP1_Owr_Out2_SSPC2_On_Off_Stat_DMC – ON

For SUP2:
√PDU1_SUP2_Pwr_Out2_SSPC1_On_Off_Stat_DMC – ON
√PDU1_SUP2_Pwr_Out2_SSPC2_On_Off_Stat_DMC – ON

For SUP3:
√PDU2_SUP3_Pwr_Out3_SSPC1_On_Off_Stat_DMC – ON
√PDU2_SUP3_Pwr_Out3_SSPC2_On_Off_Stat_DMC – ON

For SUP4:
√PDU2_SUP4_Pwr_Out2_SSPC1_On_Off_Stat_DMC – ON
√PDU2_SUP4_Pwr_Out2_SSPC2_On_Off_Stat_DMC – ON

PWS 2. **PWS POWER ON**
sw PWS Laptop Power → On
√A31p Power Lt – On (Lt ON)

3. **PWS OPERATING SYSTEM (OS) BOOT UP**

3.1 Boot of Operating System
Verify Appearance of SunOS messages

3.2 PWS LAN link to DMS
At backside of A31p at ethernet connector line indicator:
Verify Green LED – On

4. **PWS COL CD-ROM DISK SETUP**

**NOTE**
1. Step 3 only to be performed if a new version of the Columbus CD-ROM contents requires an exchange of the Disk.
2. The Disk exchange has to be performed before finalization of the SunOS Boot-Up.

Push PWS CD-ROM Drive OPEN button → Cartridge Opens
Insert COLUMBUS ODF CD-ROM DISK into Cartridge
Close PWS CD-ROM Drive Cartridge
√PWS CD-ROM Drive LED – On
NOTE
1. Laptop desktop environment appearance and Laptop Application starts.
2. Total PWS Application S/W initialization will need 8 minutes.

5. **COLUMBUS LAPTOP APPLICATION BOOT**
   At backside of A31p at ethernet connector traffic indicator:
   Verify Yellow LED – Blinking
   √ Middle of Screen – COL Synoptic Home Page
   √ Bottom of Screen – SMP Window
   √ Top of Screen – Date&Time Window
   In the order of appearance:
   √ Left Side of Screen – ANNOTATION Icon
   √ Left Side of Screen – MASTER TIME Icon
   √ Left Side of Screen – Netscape Icon

6. **DATE TIME GROUP (DTG) APPLICATION CHECKOUT**
   Verify in DTG – Time increments constantly

7. **SYSTEM MESSAGE PANEL (SMP) APPLICATION CHECKOUT**
   Verify in SMP – Appearance of System Messages

8. **MONITORING AND CONTROL DISPLAY (MCD) APPLICATION CHECKOUT**
   Verify Counter in upper right corner – Incrementing

9. **CREW DOCUMENTATION APPLICATION CHECKOUT**
   9.1 Select Netscape
      If Netscape is an Icon
      Restore the 'Netscape' Window
      √ 'Columbus Crew Documentation' page
   9.2 Select Documentation Help
      sel Button: Help (Help)
      √ Operation of CD-ROM drive – Short blink of LED
      √ Appearance of Online-Help – Help on Online Help page
   9.3 Minimize Netscape Window
1.100 PWS ACTIVATION
(ASY OPS/1E/FIN/MULTI E) Page 4 of 5 pages

sel Minimize button in Window Decoration Line
√Netscape Icon

10. **MASTER TIMELINE VIEWER APPLICATION CHECKOUT**

10.1 Restore/Open MTL Viewer

Verify in MTL-Viewer Window – Time indicator updating once per minute

10.2 Request new MTL data

sel 'Display' button

√MTL Display Request Window

10.3 Set timeslice for new MTL Viewer data

Set Block Size: 01:00

10.4 Confirm Request

sel YES

Verify Appearance of Question Window

sel YES in Question Window

If a Warning Box is displayed indication that in the timeframe no activity is scheduled

sel OK button

continue with step 10.5

If a Warning Box is displayed indicating 'Error updating MTL subset data'

sel OK button

click on Cancel button in MTL Display Request Window

continue with step 10.6

10.5 MTL Data

Verify in MTL Viewer Window – MTL data for time range 01:00h

10.6 Minimize MTL Viewer Window

sel Minimize button in Window Decoration Line

17 AUG 07 358
11. **ANNOTATION APPLICATION CHECKOUT**

11.1 Restore/Open ANNOTATION application Window  
\(\checkmark\) Annotation Box Window Open

11.2 Get Annotation File List  
\(\text{sel LIST}\)  
\(\checkmark\) 'Annotation File List' Window open  
\(\checkmark\) Names of currently existing Annotation Files listed

11.3 Deselect Annotation List  
\(\text{sel Cancel}\)  
\(\checkmark\) 'Annotation File List' Window closed

11.4 Minimize Annotation Window  
\(\text{sel Minimize button in Window Decoration Line}\)  
\(\checkmark\) ANN Icon
OBJECTIVE:
Final deactivation of the COL PWS application software and run down of PWS operating system. Switch off A31P power supply and related SUP power outlet.

1. **STOP PWS APPLICATION SOFTWARE**

   PWS
   If PWS does not accept inputs from keyboard or mouse
   Go to step 3

   1.1 **Annotation**
   If Annotation Files are open
   sel save
   Iconize Annotation Window

   1.2 **Monitoring and Control Displays**
   √MCD – Only COL Synoptics Home Page

   1.3 **Master Timeline**
   sel MTL
   sel Quit
   On MTL Question Window:
   sel YES
   √MTL window – Closed

2. **POWERING DOWN PWS**

   Right Mouse Click and Hold in the Root Window area:
   In the Columbus Segment Menu,
   sel Shutdown
   sel Application Shutdown
   On LAPAP Shutdown Confirmation Window:
   sel YES
   Wait until workspace contains no window
   Right Mouse Click and Hold in the Root Window area:
   In the Columbus Segment Menu,
   sel Shutdown
   sel Laptop Shutdown
   On Quit MWM Confirmation Window:
   sel YES
Verify the appearance of the Operating System message – 'Type any key to continue'

**NOTE**
Do not perform any typing after appearance of the message 'Type any key to continue'. This will lead to a not desired reboot of the Laptop. If message does not appear within 90 seconds, then proceed anyway.

3. **TURNING OFF POWER**

   Inform Ground prior performing the step.

   Press PWS power button → Off

   √PWS Power Light – Off (Lt Off)

4. **A31P POWER SUPPLY OFF**

   √COL-PWS Powered Off

   Pwr Supply A31p 120V DC Power Supply Input Power sw → OFF (Lt Off)

   Refer to Figure 1.

![Figure 1. USOS A31p120V DC Power Supply Input Side with Power Switch on Left, Output Side with Output Power Light on Right.](image)

5. **SUP [X] POWER OFF TO PWS RELATED OUTLETS**

   If no COL-PWS is active, ground will perform step

   Select SUP in Columbus to which deactivated PWS is connected to
   o SUP 1 o SUP 2 o SUP 3 o SUP 4"

   **NOTE**
   Deactivate PDU Outlet related to the COL PWS which shall be disconnected from SUP, with used PWR Connector indicating the Outlet as provided by table 1.
Table 1. COL SUP power provision.

<table>
<thead>
<tr>
<th>SUP</th>
<th>Connector</th>
<th>PDU</th>
<th>Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP 1</td>
<td>PWR 2, J02</td>
<td>PDU 1</td>
<td>Outlet 12</td>
</tr>
<tr>
<td>SUP 2</td>
<td>PWR 2, J02</td>
<td>PDU 1</td>
<td>Outlet 15</td>
</tr>
<tr>
<td>SUP 3</td>
<td>PWR 3, J03</td>
<td>PDU 2</td>
<td>Outlet 11</td>
</tr>
<tr>
<td>SUP 4</td>
<td>PWR 2, J02</td>
<td>PDU 2</td>
<td>Outlet 15</td>
</tr>
</tbody>
</table>

EPDS: 120V Payload: PDU1(2) Outlets

PDU1(2) Outlet 11 (12,15)

'commands'

**cmd Pwr Off Execute (OK)**

'SSPC1'

√Pwr – Off

'SSPC2'

√Pwr – Off

√SUP[x] Power Light PWR1, J02(J03) – Lt Off

Refer to Figure 2

Figure 2. COL SUP with Output Power Light on left Side

PCS

COL: EPS: SUPs (UOPs)

COL PDU 1-2 SUPs VTC1

'Off / On Status'

Verify SUP [x] Outlet 2(3) – Off
2.199 PWS DEACTIVATION

(cmd) PDU1(2)_SUP1(2,3,4)_Pwr_Out2(3)_Off_AP
(data) Onboard_Reception_Node: –
SYS CCSDS_End_Point DMC DMS SERV
(data) Onboard_Execution_Node: – USM_SW_DMC_USS_Swop_Instance

For SUP1:
√ PDU1_SUP1_Pwr_Out2_SSPC1_On_Off_Stat_DMC – OFF
√ PDU1_SUP1_Pwr_Out2_SSPC2_On_Off_Stat_DMC – OFF

For SUP2:
√ PDU1_SUP2_Pwr_Out2_SSPC1_On_Off_Stat_DMC – OFF
√ PDU1_SUP2_Pwr_Out2_SSPC2_On_Off_Stat_DMC – OFF

For SUP3:
√ PDU2_SUP3_Pwr_Out3_SSPC1_On_Off_Stat_DMC – OFF
√ PDU2_SUP3_Pwr_Out3_SSPC2_On_Off_Stat_DMC – OFF

For SUP4:
√ PDU2_SUP4_Pwr_Out2_SSPC1_On_Off_Stat_DMC – OFF
√ PDU2_SUP4_Pwr_Out2_SSPC2_On_Off_Stat_DMC – OFF
UNLOCK IMV SUPPLY FAN LAUNCH AVM
(ASSY OPS/1E/FIN/MULTI E)  Page 1 of 7 pages

OBJECTIVE:
Unlock the Intermodule Ventilation (IMV) Supply Fan Assembly (ISFA) launch Anti Vibration Mounts (AVM).

LOCATION:
Installed: COL1PFC
Stowed: √Inventory Management System (IMS)

DURATION:
15 minutes

CREW:
One

PARTS:
N/A

MATERIALS:
None

TOOLS:
Headlamp Light Source Assy P/N SEZ33114010-301
Columbus Tool Kit:
Tool Bag 1:
   Ratchet Wrench, 1/4"
Tool Bag 2:
   10" Extension, 1/4" Drive
Tool Bag 3:
   M6 (5 mm) Hex Head Driver, 1/4" Drive

REFERENCED PROCEDURE(S):
None

SAFING:
None
1. ACCESSING

Figure 1: Columbus Port Cone Layout (view from Starboard)
### NOTE

FDS Cover Panel COLPO-10A is removed together with COLPO-10.

1.1 Remove FDS Cover Panel COLPO-10 then COLPO-9.
   Refer to Figure 2.
   Temporarily stow.
2. **LAUNCH AVM UNLOCKING**

![Image](image_url)

Figure 3: ISFA installation location on COL1PFC

Velcro strips for FDS Covers installation on FDS Support Structure
Figure 4: ISFA AVM Launch locking bolts location

AVM Launch Locking Bolts (4 Red, 4 Blue)
NOTE
1. To improve the working location lighting, don the Headlamp Light Source Assy.
2. The AVM Locking Bolts are colour coded (4 blue and 4 red) to ease their identification.
3. The 8 AVM locking bolts are spring loaded. When completely loosened, the bolts are pushed up by the spring. Refer to Figure 5.

2.1 Release ISFA AVM locking bolts (4 red, 4 blue) (Ratchet Wrench, 1/4”; 10” Extension, 1/4” Drive; M6 (5 mm) Hex Head Driver, 1/4” Drive). Refer to Figure 4 and Figure 5.

3. **CLOSEOUT**

3.1 √ For FOD around work area within 1 m radius.

NOTE
1. The FDS Covers are installed on the support structure by means of “structure to blanket” and “blanket to blanket” Velcro strips. Refer to Figure 3.
2. FDS Cover COLPO-10A should be already installed on COLPO-10.
3.2 Install FDS Cover Panel COLPO-9, then COLPO-10 (including COLPO-10A) on FDS Structure. Refer to Figure 2.

3.3 ISS ⇓ **COL-CC**: task completion. Stow tools, equipment.
OBJECTIVE:
Unlock the Intermodule Ventilation (IMV) Return Fan Assembly (IRFA) Anti Vibration Mounts (AVM) launch locking bolts.

LOCATION:
Installed: COL1PAC
Stowed: \Inventory Management System (IMS)

DURATION:
15 minutes

CREW:
One

PARTS:
None

MATERIALS:
None

TOOLS:
Headlamp Light Source Assy P/N SEZ33114010-301
Columbus Tool Kit:
Tool Bag 1:
   Ratchet Wrench, 1/4"
Tool Bag 2:
   10" Extension, 1/4" Drive
Tool Bag 3:
   M6 (5 mm) Hex Head Driver, 1/4" Drive

REFERENCED PROCEDURE(S):
None
1. ACCESSING

Figure 1. Columbus Port Cone Layout (view from Starboard)
Figure 2. COL1PA FDS Cover Panels

NOTE
FDS Cover Panel COLP0-6A is removed together with COLP0-6.

1.1 Remove FDS Cover Panel COLP0-6, then COLP0-7.
Refer to Figure 2.
Temporarily stow.
2. UNLOCKING AVM LAUNCH LOCKING BOLTS

Figure 3. IRFA installation location on COL1PAC
Figure 4. IRFA AVM Launch locking bolts location
Figure 5. IRFA spring loaded locking bolts before installation

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To improve the working location lighting, don the Headlamp Light Source Assy.</td>
</tr>
<tr>
<td>2. The AVM launch locking bolts are colour coded (4 blue and 4 red) to ease their identification.</td>
</tr>
<tr>
<td>3. The 8 AVM launch locking bolts are spring loaded. When completely loosened, the bolts are pushed up by the spring. Refer to Figure 5.</td>
</tr>
</tbody>
</table>

2.1 Completely loosen IRFA AVM launch locking bolts (4 red, 4 blue) (Ratchet Wrench, 1/4”; 10” Extension, 1/4” Drive; M6 (5 mm) Hex Head Driver, 1/4” Drive) Refer to Figures 4 and 5.

3. **CLOSEOUT**

3.1 √For FOD around work area within 1 m radius.
NOTE
1. The FDS Covers are installed on the support structure by means of “structure to blanket” and “blanket to blanket” Velcro strips. Refer to Figure 3.
2. FDS Cover COLP0-6A should be already installed on COLP0-6.

3.2 Install FDS Cover COLP0-7, then COLP0-6 (including COLP0-6A) on FDS Support Structure. Refer to Figure 2.

3.3 ISS ⇓ COL-CC of task completion. Stow tools.
UNLOCK CABIN FAN LAUNCH AVM
(ASYY OPS/1E/FIN/MULTI E) Page 1 of 7 pages

OBJECTIVE:
Unlock the Anti Vibration Mounts (AVM) launch locking bolts of Cabin Fan Assembly (CFA) 1, 2.

LOCATION:
Installed: COL1PDM

DURATION:
15 minutes

CREW:
One

PARTS:
None

MATERIALS:
None

TOOLS:
Headlamp Light Source Assy P/N SEZ33114010-301
Columbus Tool Kit
Tool Bag 1:
   Ratchet Wrench 1/4"
Tool Bag 2:
   10" Extension, 1/4" Drive
   M6 (5mm) Hex Head Driver 1/4" Drive

REFERENCED PROCEDURE(S):
1.203 COL DECK RACK D1 ROTATE
4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS
1. SAFING AND ACCESSING

Figure 1. Columbus Port Cone Panels (viewing from starboard, racks not shown)

1.1 Rotate down Rack D1, perform \{1.203 COL DECK RACK D1 ROTATE\}, steps 1 to 5.3 (ESA SODF: MSM: NOMINAL: RACK), then:
Figure 2. COL1PDM FDS Cover Panels Configuration

Figure 3. CFA1 and CFA2 on PDM Panel
WARNING

PDM panel enclosed volume can be saturated with GN2 from the Nitrogen Line Shut Off Valves (NLSOV). GN2 can displace the atmospheric oxygen resulting in possible crew illness. A Portable Fan for ventilating the volume shall be used for at least 2 minutes after FDS covers removal and prior to accessing the working location when performing activities on equipment installed on the PDM panel.

NOTE

Position the Portable Fan Assembly (PFA) to blow on the PDM panel.

1.2 Setup a PFA near working location, perform [4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS], steps 1 to 2.8 (ESA SODF: IFM: ECLSS: REFERENCE), then:

1.3 PFA Speed Control Knob → Half Flow

1.4 √PFA is running.

NOTE

1. To get access to the two CFAs it is sufficient to remove the Fire Detection and Suppression (FDS) Cover Panel COLP01-16. To ease re-installation do not completely detach the cover from the PDM panel support structure.

2. The FDS Cover is installed on the PDM panel support structure by means of “structure to blanket” and “blanket to blanket” Velcro strips.

1.5 Remove FDS Cover Panel COLP01-16.

Refer to Figures 2 and 3.

1.6 PFA Speed Control Knob → Full Flow

Wait 2 to 3 minutes.

1.7 sw PFA Power → OFF
2. **UNLOCKING AVM LOCKING BOLTS**

![Figure 4. Identification of CFA AVM Locking Bolts, Typical](image)

**Figure 4. Identification of CFA AVM Locking Bolts, Typical**

![Figure 5. Close view on the CFA AVM Locking Bolts](image)

**Figure 5. Close view on the CFA AVM Locking Bolts**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The AVM locking bolts are colour coded (blue and red) to ease their identification.</td>
</tr>
<tr>
<td>2. The 8 AVM locking bolts are spring loaded. When completely loosened, the bolts are pushed up by the spring. Refer to Figure 6.</td>
</tr>
<tr>
<td>3. To improve the working location lighting, don the Headlamp Light Source Assy.</td>
</tr>
</tbody>
</table>
Figure 6. CFA before installation: view of the spring loaded locking bolts

2.1 Completely loosen CFA1 AVM locking bolts (eight, red and blue) (Ratchet Wrench 1/4"; 10" Extension, 1/4" Drive; M6 (5mm) Hex Head Driver 1/4" Drive). Refer to Figures 4, 5 and 6.

2.2 Completely loosen CFA2 AVM locking bolts (eight, red and blue) (Ratchet Wrench 1/4"; 10" Extension, 1/4" Drive; M6 (5mm) Hex Head Driver 1/4" Drive).

3. CLOSEOUT

3.1 √ For FOD around work area within 1 m radius.

3.2 Install FDS Cover Panel COLP01-16.
3.3 Remove PFA, perform {4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS}, steps 3.2 to 4.1 (ESA SODF: IFM: ECLSS: REFERENCE), then:

3.4 Rotate Rack D1 up, perform {1.203 COL DECK RACK D1 ROTATE}, steps 6 to 9.1 (ESA SODF: MSM: NOMINAL: RACK), then:

3.5 ISS ↓ COL-CC for task completion.
Stow tools, equipment.
UNLOCK WPA1 AND WPA2 AVM

OBJECTIVE:
Unlock the Columbus Water Pump Assemblies (WPA1 and WPA2) Anti-Vibration Mount (AVM) in the Columbus D1 Rack.

LOCATION:
Installed: COL1D1

DURATION:
35 minutes

CREW:
One

PARTS:
None

MATERIALS:
None

TOOLS:
Columbus Tool Kit
Adjustable Tethers (2)
Eyelets (4)
Portable Handle
Tool Bag 1:
   Ratchet Wrench 1/4"
   Torque Wrench 4-20 Nm
   Ratchet Tool, 1/4" Drive
   M8 (13 mm) Socket, 1/4" Drive
   T30 Torx Driver, 1/4" Drive
Tool Bag 2:
   6" Extension, 1/4" Drive

REFERENCED PROCEDURE(S):
4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS

1. SAFING AND ACCESSING

WARNING
D1 rack volume can be saturated with GN2 from the WPA accumulators. GN2 can displace the atmospheric oxygen resulting in possible crew illness. When performing activities on equipment installed inside D1 rack a Portable Fan for ventilating the rack volume shall be used for at least 2 minutes after floor panels removal and prior to accessing the working location.
1.1 Setup a Portable Fan Assembly near COL1D1 location, perform [PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS], steps 1 to 2.7 (ESA SODF: IFM: ECLSS: REFERENCE), then:

Figure 1. D1 Rack Floor Panels And Internal Layout
1.2 Install Portable Handle on D1 panel COL_D1_A seat track.

1.3 Loosen panel fasteners (9), any order (Ratchet Wrench 1/4"; 6" Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive). Fasteners are captive. Refer to Figure 2.

1.4 Remove panel, temporarily stow and restrain, as required (adjustable tether, eyelets).

1.5 Repeat steps 1.2 to 1.4 for panel COL_D1_F.

1.6 Position the PFA to blow inside the D1 internal volume.

1.7 sw PFA power switch → ON

1.8 PFA Speed Control Knob → Full Flow Wait 2 to 3 minutes.

1.9 sw PFA power switch → OFF
2. UNLOCKING WPA AVM

Figure 3. AVM Locking Device on WPA, view from top of D1 Rack
NOTE
1. It is not required to stop the running WPA to unlock the AVM.
2. The AVM Locking Device Nut is provided with a hard stop to prevent its complete removal.

2.1 WPA1, 2 AVM Locking Device Nut \( \approx \) (about 3 complete turns) (Ratchet Wrench 1/4”; 6” Extension, 1/4” Drive; M8 (13 mm) Socket, 1/4” Drive). Refer to Figures 3 and 4.

3. **CLOSEOUT**

3.1 √ For FOD inside D1 Rack.

3.2 Remove PFA, perform \{4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS\}, steps 3.2 to 4.1 (ESA SODF: IFM: ECLSS: REFERENCE), then:
NOTE
1. Floor panels can be installed in any order.
2. Floor panels are not interchangeable on deck rack structure. Refer to Figure 2 for correct orientation.

3.3 Retrieve floor panels and place on deck rack, aligning and inserting on alignment pins on rack structure.

3.4 Snug fasteners (9 each panel), any order (Ratchet Wrench 1/4"; 6" Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive).

3.5 Torque fasteners (9 each panel, any order) to 5 Nm (Torque Wrench 4-20 Nm; Ratchet Tool, 1/4" Drive; 6" Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive).

3.6 √ For FOD around work area within 1 m radius

3.7 Stow tools and PFA.
ISS ↓ COL-CC for task completion.
UNLOCK CWSA SA LAUNCH AVM
(ASSY OPS/1E/FIN/MULTI E)  Page 1 of 8 pages

OBJECTIVE:
To unlock the launch Anti Vibration Mounts (AVM) locking bolts of both Columbus Condensate Water Separator Assembly – Fan Sub-Assemblies (CWSA SA).

LOCATION:
Installed: COL1D1

DURATION:
35 minutes

CREW:
One

PARTS:
None

MATERIALS:
None

TOOLS:
Headlamp Light Source Assy P/N SEZ33114010-301
Columbus Tool Kit:
Adjustable Tethers (2)
Eyelets (4)
Tool Bag 1:
  Ratchet Wrench 1/4”
  Torque Wrench 4-20 Nm
  Ratchet Tool, 1/4” Drive
  T30 Torx Driver, 1/4” Drive
Tool Bag 2:
  T-Handle Square 3/8”
  10” Extension, 1/4” Drive
  455 mm Extension, 3/8” Drive
  6” Extension, 1/4” Drive
Tool Bag 3:
  M5 (4mm) Hex Head Driver 1/4” Drive
  Adaptor 3/8” to 1/4”
  M6 (5mm) Hex Head Driver 1/4” Drive

REFERENCED PROCEDURE(S):
4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS

14 AUG 07  395
1. **SAFING AND ACCESSING RACK D1**

**WARNING**

D1 rack volume can be saturated with GN2 from the WPA accumulators. GN2 can displace the atmospheric oxygen resulting in possible crew illness. When performing activities on equipment installed inside D1 rack a Portable Fan for ventilating the rack volume shall be used for at least 2 minutes after floor panels removal and prior to accessing the working location.

1.1 Setup a Portable Fan Assembly near COL1D1 location, perform [4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS], steps 1 to 2.7 (ESA SODF: IFM: ECLSS: REFERENCE), then:

![Figure 1. D1 Rack Floor Panels And Internal Layout](image)
1.2 Install Portable Handle on D1 panel COL_D1_A seat track.

1.3 Loosen panel fasteners (9), any order (Ratchet Wrench 1/4"; 6" Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive). Fasteners are captive. Refer to Figure 2.

1.4 Remove panel, temporarily stow (adjustable tether, eyelets).

1.5 Position the PFA to blow inside the D1 internal volume.

1.6 sw PFA power switch → ON

1.7 PFA Speed Control Knob → Full Flow Wait 2 to 3 minutes.

1.8 sw PFA power switch → OFF
2. **ACCESSING CWSA SA**

![Figure 3. Flexible TCS piping over CWSA Sub Assemblies covers](image)

*Figure 3. Flexible TCS piping over CWSA Sub Assemblies covers*
Figure 4. CWSA with covers installed (TCS piping not shown for clarity)
NOTE
1. The 3 TCS lines passing over the CWSA covers are flexible. Move them as required to improve accessibility to the CWSA.
2. Each CWSA SA cover is provided with a flex handle to allow for its removal.

2.1 Loosen both CWSA1 SA and CWSA2 SA cover fasteners (four each) (Ratchet Wrench 1/4"; M5 (4mm) Hex Head Driver 1/4" Drive). Refer to Figure 4.
2.2 Remove CWSA1 SA cover, then CWSA2 SA cover. Temporarily stow.
3. **UNLOCKING AVM LOCKING BOLTS**

**NOTE**

1. The AVM Locking Bolts are colour coded (pink) to ease their identification.
2. The AVM locking bolts are spring loaded. When completely loosened, the bolts are pushed up by the spring.
3. To improve the working location lighting, don the Headlamp Light Source Assy.

3.1 Completely loosen AVM Locking Bolts (ten) (T-Handle Square 3/8"; 455 mm Extension, 3/8" Drive; Adaptor 3/8" to 1/4"; M6 (5mm) Hex Head Driver 1/4" Drive).

Refer to Figure 6.

4. **CLOSEOUT**

4.1 √ For FOD within the CWSA casing.

4.2 Install CWSA2 SA cover, snug fasteners (four) (Ratchet Wrench 1/4"; M5 (4mm) Hex Head Driver 1/4" Drive).

4.3 Install CWSA1 SA cover, snug fasteners (four) (Ratchet Wrench 1/4"; 10" Extension, 1/4" Drive; M5 (4mm) Hex Head Driver 1/4" Drive).
4.4    Torque CWSA1, 2 SA cover fasteners (four each cover) to 5 Nm (Torque Wrench 4-20 Nm; Ratchet Tool, 1/4" Drive; M5 (4mm) Hex Head Driver 1/4" Drive).

4.5    √For FOD inside D1 Rack.

4.6    Remove PFA, perform \(4.301\) PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS, steps 3.2 to 4.1 (ESA SODF: IFM: ECLSS: REFERENCE), then:

4.7    Retrieve floor panel COL_D1_A and place on deck rack, align alignment label on panel with alignment pin on rack structure.

4.8    Snug fasteners (nine), any order (Ratchet Wrench 1/4"; 6" Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive).

4.9    Torque fasteners (nine, any order) to 5 Nm (Torque Wrench 4-20 Nm; Ratchet Tool, 1/4" Drive; 6" Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive).

4.10   √For FOD around work area within 1 m radius

4.11   Stow tools and PFA.
ISS ↓ COL-CC for task completion.
OBJECTIVE:
Remove gas bubbles from the Columbus Active Thermal Control System water loop, using the On-Orbit Support Equipment (OSE) WPA Hydrocyclone installed on the running Water Pump Assembly (WPA).

LOCATIONS:
Installed: COL1D1
Stowed: √Inventory Management System (IMS)

DURATION:
75 minutes

CREW:
One

PARTS:
None

MATERIALS:
Disposable Plastic Bag P/N 2AK-7646-420
Marking Pen
Dry Wipes
Gray Tape
Ziplock Bag

TOOLS:
WPA Hydrocyclone P/N C157115-1
Portable Fan Assembly P/N 96M52440-1
DCS 760 Camera
Flashlight

ISS IVA Toolbox:
Drawer 4:
  6" Long Mini Pliers Straight

Columbus Tool Kit
Tool Bag 1:
  Ratchet Wrench, 1/4"
  Torque Wrench 4-20 Nm
  Ratchet Tool, 1/4" Drive
  102 mm Extension, 1/4" Drive
  M8 (13 mm) Socket, 1/4" Drive
  T30 Torx Driver, 1/4" Drive
Tool Bag 1A:
  Adjustable Tether
  Portable Handle

17 AUG 07
1.602 WPA1(2) TCS LOOP DEGASSING
(assy ops/1e/fin/hc/multi e)  Page 2 of 18 pages

Eyelet (2)

Referenced Procedure(s):
4.301 Portable Fan Assembly Installation in Columbus

1. Checking the System Configuration Status

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating the WPA Hydrocyclone with a Water Pump Assembly water flow rate &lt; 525 Kg/h may result in a non-effective functioning of the WPA Hydrocyclone itself, leading to a longer time to complete the water loop degassing.</td>
</tr>
</tbody>
</table>

Table 1. Running WPA and related hardware identification

<table>
<thead>
<tr>
<th>Running WPA[X]</th>
<th>NLSOV[Y]</th>
<th>D1 Rack Floor Panel COL D1_[Z]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPA1</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>WPA2</td>
<td>4</td>
<td>F</td>
</tr>
</tbody>
</table>

1.1 Identifying running WPA[X], where X = Refer to Table 1.

PWS

COL: TCS Functional Overview

TCS Functional Overview

'Water Pump Assemblies'

Active WPA - WPA[X]

Record ACTIVE WPA[X]: ____________

Caution

The WPA Accumulator control law shall be disabled and the NLSOV 3(4) shall be closed before installation of the WPA Hydrocyclone. Failure to comply may result in WPA Hydrocyclone over pressurization with consequent equipment damage and possible water leakage in Columbus cabin.

1.2 Verifying following parameters of running WPA[X].

COL: TCS Functional Overview: WPA[X]

TCS Functional Overview

Sel WPA[X]

WPA[X]

'Accumulator'
Verify Cntl Loop Stat: INACTIVE
Verify Abs Press1: 165 to 195 kPa
Verify Abs Press2: 165 to 195 kPa

'Filter'

Verify Delta Press1 < 30 kPa
Verify Delta Press2 < 30 kPa

1.3 Verifying NLSOV[Y] status, where [Y] = Refer to Table 1.

COL: ECLSS Functional Overview
ECLSS Functional Overview

sel Payload N2

Payload N2

sel NLSOV[Y]

NLSOV[Y]

'ECLSS Nitrogen Line Shut Off Valve[Y]'

Verify Posn – CLOSED
2. **ACCESSING THE RUNNING WPA**

2.1 Install a PFA near COL1D1 location, perform [4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS](#), steps 1 to 2.7 (ESA SODF: IFM: ECLSS: REFERENCE), then:

**NOTE**
The Portable Fan Assembly (PFA) is installed but not switched ON at this point of the procedure.
NOTE
It is sufficient to remove one floor panel only to access the running WPA where to install the WPA Hydrocyclone. Refer to Table 2 for panel identification.

Figure 2. Deck Rack Floor Panels (Fastener Locations, Typical)

2.2 Install portable handle on floor panel COL_D1_[Z] seat track. Refer to Table 2 for panel identification.

2.3 Unscrew panel fasteners (9), any order (Ratchet Wrench, 1/4"; 102 mm Extension, 1/4" Drive; T30 Torx Driver, 1/4" Drive). Refer to Figure 2.

2.4 Remove panel, temporarily stow (adjustable tether, eyelets).

2.5 Position the PFA to blow inside the D1 internal volume.

2.6 sw PFA Power → ON

2.7 PFA Speed Control Knob → Full Flow
Wait 2 to 3 minutes.

2.8 sw PFA Power → OFF
2.9 Disconnect WPA[X] N2 QD.
Refer to Figure 3.
3. INSTALLING THE WPA HYDROCYCLONE

3.1 Connect a Disposable Plastic Bag to the outlet port of the Hydrocyclone Separator (HCS) Vent Valve. Refer to Figure 5.
1.602 WPA1(2) TCS LOOP DEGASSING

(assy ops/1e/fiN/Hc/multi e)  Page 8 of 18 pages

Figure 6. WPA Hydrocyclone Installation Location, Typical

**NOTE**

1. To prevent misalignment the thumbnuts of the two tie-bolts should be loosened progressively one turn each.
2. The thumbnuts are tethered to the tie-bolts.

3.2 Progressively loosen the WPA tie-bolt thumbnuts (two) about 20 turns until the tie-bolts tilt outward (Ratchet Wrench, 1/4"; 102 mm Extension, 1/4" Drive; M8 (13 mm) Socket, 1/4" drive). Refer to Figure 6.

3.3 Remove WPA Protection Cap from Water Pump Assembly. Refer to Figure 6.
NOTE
The WPA Hydrocyclone protective cap is tethered to the interface block. The cap is provided with metal clips to keep it in place when installed on the OSE and can be removed pulling by hand.

3.4 Remove the WPA Hydrocyclone protective cap and inspect WPA Hydrocyclone sealing surfaces for damage and debris. Refer to Figure 7.
Figure 8. WPA Hydrocyclone installed on the WPA.

**CAUTION**

Avoid kickloads while moving around an installed WPA Hydrocyclone since the WPA Hydrocyclone itself exceeds the height of the D1 Rack floor panels level.

3.5 Align and install the WPA Hydrocyclone on the WPA with the By-pass tubing oriented against the WPA Filter. Refer to Figure 6 and 8.

3.6 Engage the WPA tie-bolts (two) on the OSE tie-bolt interface progressively one turn each to prevent excessive misalignment, then tighten nuts (about 20 turns ∼) (Ratchet Wrench, 1/4"; 102 mm Extension, 1/4" Drive; M8 (13 mm) Socket, 1/4" Drive).
3.7 Torque tie-bolt thumbnuts (2) to 5.5 Nm (Torque Wrench 4-20 Nm, 1/4" Drive; Ratchet Tool, 1/4" Drive; 102 mm Extension, 1/4" Drive; M8 (13 mm) Socket, 1/4" Drive).

3.8 No open gap is visible at the interface plane between the WPA Hydrocyclone and the WPA (Flashlight).

4. DEGASSING THE WATER LOOP

![Diverter Valve Handle positions](image)

Figure 9. Diverter Valve Handle positions

**NOTE**

1. As soon as the Diverter Valve Handle is moved in the Air Trap Flow position, water will start running through the WPA Hydrocyclone loop and the degassing process will start.

2. The Diverter Valve locking pin remains in the unlocked position when pulled.
4.1 Pull the Diverter Valve locking pin then move the Diverter Valve Handle 1/4 turn ↷ from BYPASS to AIR TRAP FLOW position. Refer to Figure 9.

4.2 Push and insert the Diverter Valve locking pin.

4.3 Verify absence of water leakage at the WPA Hydrocyclone/WPA interface (Flashlight).

***********************************************************************
If water leakage is identified at the WPA Hydrocyclone/WPA interface:
Pull the Diverter Valve locking pin then move the Diverter Valve Handle 1/4 turn ↷ from AIR TRAP FLOW to BYPASS position. Refer to Figure 9.
Push and insert the Diverter Valve locking pin.
Wipe off any spilled out water drop (Dry Wipes).
ISS ↓ COL-CC for identified leakage.
***********************************************************************

4.4 ISS ↓ COL-CC "Beginning to remove air from TCS loop."

NOTE
1. To ensure that also the TCS Water Loop branches providing cooling to the Payloads are degassed, the Water Flow Selection Valves (WFSV) of the locations corresponding to installed ISPRs shall be in OPEN position.
2. The correct WFSV OPEN/CLOSE command can only be issued by COL-CC.

4.5 Photodocument installed WPA Hydrocyclone (DCS 760 Camera).


COL: TCS Functional Overview: WPA[X]
TCS Functional Overview

sel WPA[X]

WPA[X]
'Flowmeter'

Verify Water flow: 800 to 900 kg/h

4.7 Record Starting Time $T_S$: ____________

4.8 Determine Degassing Completion Time $T_{DE} = T_S + 45$ minutes

$T_{DE}__/__:__:

Figure 10. Cross section of the Hydrocyclone Separator (HCS)

NOTE

1. Due to the centrifuge effects, the air bubbles are expected to be collected along the Vent Valve axis, on the upper third of the HCS. Refer to Figure 10.

2. Air bubbles shall not outgrow the dotted red circle on the HCS transparent window (refer to Figure 5). If larger than the dotted red circle diameter, bubbles will be carried over again into the water stream and back into the water loop, thus making the degassing process longer.

4.9 Wait until small air bubbles form in the HCS and coalesce into larger bubbles before continuing.

4.10 Twist the Vent Valve along the spiral guide, thus moving the tip of the valve needle until it reaches the bubble position. Refer to Figure 10.
CAUTION
The Vent Valve is life limited to 150 actuation cycles. To extend the life span of the WPA Hydrocyclone, operate the Vent Valve only when the gas bubbles have a \( \varnothing \) close to the maximum allowed, corresponding to the red dotted line on the transparent window.

NOTE
1. The WPA Hydrocyclone can not capture bubbles with a \( \varnothing \) < 4 mm.
2. Loss of a small amount of water from the loop is to be expected and is allowed during the degassing process.
3. The Disposal Plastic Bag capacity is 1 liter. This volume should be sufficient for one complete water loop degassing.
4. The number of Vent Valve actuation cycles shall be recorded to keep trace of WPA Hydrocyclone remaining life time.

4.11 Press the HCS Vent Valve Command Button to purge the bubble into the bag. Count the number of times the button is actuated. The total count will be recorded in step 4.9. Release the command button as soon as water starts spraying into the Disposable Bag. Repeat this step until no residual bubbles are capturable with the WPA Hydrocyclone.

**********************************************************************

If the Disposal Plastic Bag maximum capacity is reached and the degassing is not complete:

NOTE
Use caution to avoid cutting the Disposable Plastic Bag pipe.

Pinch the Disposable Plastic Bag pipe at a distance of about 1/3 from the bag (6" Long Mini Pliers Straight).

Pull off the Disposable Plastic Bag from the HCS Vent Valve outlet port.
Temporary stow.

Retrieve a new Disposal Plastic Bag and connect to the HCS Vent Valve outlet port.

**********************************************************************

4.12 Record HCS Vent Valve actuation cycles: ________________:

\( C_{\text{TOTAL}}: \) __________

17 AUG 07

416

1.602_M_18709.xml
5. **REMOVING THE WPA HYDROCYCLONE**

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>The WPA Hydrocyclone shall not be removed if the Diverter Valve is in the AIR TRAP FLOW position. Failure to comply will result in a WPA dead head condition with no water flow.</td>
</tr>
</tbody>
</table>

5.1 Pull the Diverter Valve locking pin and move the Diverter Valve Handle 1/4 turn \( \leftarrow \) from AIR TRAP FLOW to BYPASS position. Refer to Figure 9.

5.2 Push and insert the Diverter Valve locking pin.

5.3 Unscrew the tie-bolts thumb nuts (two) by progressively unfastening one turn on each to prevent misalignment, about 20 turns until the tie-bolts can tilt outward (Ratchet Wrench, 1/4"; 102 mm Extension, 1/4" Drive; M8 (13 mm) Socket, 1/4" Drive).

5.4 Remove the WPA Hydrocyclone, then wipe off any residual water from the WPA Hydrocyclone QDs (Dry Wipes).

5.5 Check the WPA Hydrocyclone fluid interfaces are visibly clean and there is no leakage, then install the tethered protective cap on the WPA Hydrocyclone interface block until the metal clips clicks in.

Tempry stow.
Refer to Figure 4 and 7.
5.6 Wipe off any residual water from the WPA QDs (Dry Wipes), then verify no contamination on seals. Align and install WPA Protection Cover on the WPA with the label THIS SIDE FACES INWARD facing the WPA Filter. Refer to Figure 11.

5.7 Engage the WPA tie-bolts (two) on the WPA protection cap by progressively fastening one tie-bolt at a time then tighten nuts (about 20 turns \( \sim \)) (Ratchet Wrench, 1/4"; 102 mm Extension, 1/4" Drive; M8 (13 mm) Socket, 1/4" Drive).

5.8 Torque tie-bolt thumbnuts (2) to 5.5 Nm (Torque Wrench 4-20 Nm, 1/4" Drive; Ratchet Tool, 1/4" Drive; 102 mm Extension, 1/4" Drive; M8 (13 mm) Socket, 1/4" Drive).

5.9 Verify absence of water leakage at the WPA /WPA Protection Cover interface (Flashlight).

5.10 Press once the Vent Valve to release any WPA Hydrocyclone residual pressure within the Disposable Plastic Bag.
If only one Disposal Plastic Bag has been used
Continue with step 5.12.

If more than one Disposable Plastic Bag has been used
Retrieve the first Disposable Plastic Bag from tempy stowage.
Perform steps 5.12, 5.14 to 5.16, then
Continue from step 5.12 on the Disposable Plastic Bag attached to the WPA Hydrocyclone.

**NOTE**
Use caution to avoid cutting the Disposable Plastic Bag pipe.

Pinch the Disposable Plastic Bag pipe at a distance of about 1/3 from the bag (6" Long Mini Pliers Straight).
Refer to Figure 12.

Pull off the Disposable Plastic Bag from the HCS Vent Valve outlet port.
Refer to Figure 5.

Fold the final part of the Disposable Plastic Bag pipe twice, wrap tight (Gray Tape), then remove the pliers.
Refer to Figure 12.

No water leakage out of the Disposable Plastic Bag.

Seal Disposable Plastic bag in Ziplock bag.
Tempry stow.

Seal WPA Hydrocyclone in Ziplock bag.
Tempry stow.

5.18 Connect WPA[X] N2 QD
Refer to Figure 3.

6. **CLOSEOUT**

6.1 √ For FOD inside D1 rack work area.

6.2 Retrieve floor panel COL_D1_[Z] and place on deck rack, check for correct alignment pin orientation on rack structure and panel label.

6.3 Screw-in two panel fasteners at two opposite corners of the floor panel, no torque tightening (Ratchet Wrench, 1/4"; 102 mm Extension, 1/4" Drive; T30 Torx Head, 1/4" Drive).

6.4 Torque tighten panel fasteners, any order at 5 Nm (Torque Wrench 4-20 Nm; Ratchet Tool, 1/4" Drive; 102 mm Extension, 1/4" Drive; T30 Torx Head, 1/4" Drive).

6.5 Remove PFA, perform {4.301 PORTABLE FAN ASSEMBLY INSTALLATION IN COLUMBUS}, steps 3.2 and 4.1 (ESA SODF: IFM: ECLSS: REFERENCE), then:

7. **POST MAINTENANCE**

7.1 Stow WPA Hydrocyclone, expended Disposable Plastic Bags, tools.
Update IMS with stowage locations.

7.2 ISS ⇑ COL-CC and report the total number of Vent Valve cycles \( C_{\text{total}} + 1 \). The \( C_{\text{total}} \) were recorded in step 4.12.
OBJECTIVE:
This procedure is applicable to the locations in which an ISPR rack remains installed and is not relocated after launch.

The procedure includes the installation of the Pivot Pin Brackets, the removal of the Knee Brace Assembly, the installation of the K-BAR Assy and of the K-BAR Capture Mechanism to complete the rack bay and rack mechanical configuration.

LOCATION:
Installed: COL1O1 (FSL)
Stowed: √Inventory Management System (IMS)

DURATION:
65 min

CREW:
One – First 20 minutes (steps 1 to 3)
Two – 45 minutes for rack rotations and closeout (steps 4 to 9)

PARTS:
Capture Mechanism, Right P/N 683-62201-28
Capture Mechanism, Left P/N 683-62201-27
K-BAR Assy, Right P/N 683-62201-4
K-BAR Assy, Left P/N 683-62201-3
Pivot Pin Bracket, Right P/N 1100CA101-401
Pivot Pin Bracket, Left P/N 1100CA101-402

MATERIALS:
Earplugs

TOOLS:
DCS 760 Camera
Flashlight
Columbus Tool Kit:
ISPR Locking Pin Tool for EPM/FSL P/N C31C939001-100
Tool Bag 1:
   Torque Wrench 4-20 Nm
   Ratchet Wrench 1/4"
   Eyelet (2)
   Adjustable Tether (2)
   Flat Screw Driver 4 mm
Tool Bag 2:
   Ratchet Wrench 3/8"
   3/16" Hex Head Driver 3/8" Drive
   3/8" Hex Head Driver 3/8" Drive
1.105 KNEE BRACE ASSEMBLY REMOVAL WITH ISPR IN THE RACK BAY

 Sexo OPS/1E/FIN/MULTI E) Page 2 of 15 pages

Tool Bag 3:
   Ratchet Tool 3/8" Drive

ISS IVA Toolbox
   Drawer 3:
       6" Long, 5/32" Hex Head, 3/8" Drive

REFERENCED PROCEDURE(S):
None

1. **DISENGAGING RACK LAUNCH RESTRAINTS**

![Diagram of FSL location identification]

Figure 1. FSL location identification
Figure 2. ISPR Rack Attachment Mechanisms.

NOTE
All directional references (up, down, left, right) are with respect to front face of rack, as facing the installed rack.
1.105 KNEE BRACE ASSEMBLY REMOVAL WITH ISPR IN THE RACK BAY

(ASSY OPS/1E/FIN/MULTI E)  Page 4 of 15 pages

1.105_M_18123.xml

Figure 3. ISPR Rack Launch Restraint (Left), Typical.

**CAUTION**

Disengagement sequence must be followed exactly to allow any induced loads to be released safely back into structure.

**NOTE**

Expect loud "pop" during release of first Rack Launch Restraint.

1.1  Unfasten Left Locking Screw until loose (Ratchet Wrench 1/4"; FSL ISPR Tool).
    Refer to Figure 3.

1.2  Left Rack Launch Restraint Screw (10 to 12 turns) (Ratchet Wrench 3/8"; 3/8" Hex Head Driver 3/8" Drive)
    Refer to Figure 3.

1.3  Unfasten Right Locking Screw until loose (Ratchet Wrench 1/4"; FSL ISPR Tool).
    Refer to Figure 3.

2. INSTALLING PIVOT PIN BRACKETS

**NOTE**
Refer to Figures 3, 4, 5 and 6 during following section.

![Diagram of Pivot Pin Bracket]

Figure 4. Pivot Pin Bracket, Right (P/N 1100CA101-401)
NOTE
The Pivot Pin Bracket is provided with 2 alignment pins to allow its correct installation on stand off links.

2.1 Loosen from latched down position, then tighten in unlatched up position both Right and Left Pivot Mechanism Knobs (one full turn).
Figure 6. Typical Installation of Pivot Pin Brackets (two) at Columbus Standoff (racks not installed).

2.2 Record IMS barcode number of Pivot Pin Brackets.
   Right: ___________
   Left: ___________

2.3 Install Pivot Pin Bracket, Right tighten fastener (one) (Ratchet Wrench 3/8"; 3/16" Hex Head Driver, 3/8" Drive).

2.4 Install Pivot Pin Bracket, Left tighten fastener (one) (Ratchet Wrench 3/8"; 3/16" Hex Head Driver 3/8" Drive).

2.5 Torque both Left and Right Pivot Pin Bracket fastener to 9 Nm (Torque Wrench 4-20Nm; Ratchet Tool, 3/8" Drive; 3/16" Hex Head Driver, 3/8" Drive).

   NOTE
   When loosened, the Pivot Mechanism Knob moves automatically to the latched position by mean of the internal spring.

2.6 Loose both Right and Left Pivot Mechanism Knobs (one full turn), then tighten in latched, down position.
3. **DISENGAGING UPPER ATTACH MECHANISM**

![Diagram of Knee Brace Assembly](Figure 7. Knee Brace Assembly)
Figure 8. ISPR Upper Attach Mechanism (Left), Typical.

**NOTE**

1. The Center Knee Brace Strut has been pre-loaded on ground by turning strut CCW to shorten. In order to help rack re-engagement, this strut should be re-adjusted CW on-orbit prior to rotating down.

2. The Pinion is maintained in the latched position by mean of an internal spring.

3.1 Adjust Center Knee Brace Strut 1-2 turns CW, until loose.

3.2 Loosen left Upper Attach Mechanism Stopper Knob (Ratchet Wrench 3/8"; 6" Long, 5/32" Hex Head, 3/8" Drive).
Move to the right to allow Pinion unlatching.
Refer to Figure 8.

3.3 Left Pinion → Unlatched.
Refer to Figure 8.

Move to the left to allow Pinion unlatching.

3.5 Right Pinion → Unlatched.
4. INSTALLING THE K-BAR ASSEMBLY

![Diagram of K-BAR Assy, Left]

**Figure 9. K-BAR Assy, Left**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the execution of following steps refer to Figures 8 and 9.</td>
</tr>
</tbody>
</table>

4.1 √ Rack rotation path is unobstructed.

4.2 Rotate rack down about 15 cm.

4.3 √ Left Upper Attach Mechanism Pinion is in unlatched position.

4.4 √ Left Stopper Knob is in unlocked position.

4.5 Install K-BAR Assy, Left into left Upper Attach Mechanism Shear Pin View Hole.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not force Upper Attach Mechanism Pinions. Mechanism should easily engage K-BAR Assy. Failure to comply may result in equipment damage.</td>
</tr>
</tbody>
</table>

4.6 Left Pinion → Latched.
√ Shear Pin is visible at top of mechanism.


4.9 K-BAR Thumb Latch → Down.

4.10 Repeat steps 4.2 to 4.8 for K-BAR Assy, Right.

5. ROTATING ISPR DOWN

5.1 Rack rotation path unobstructed.

5.2 Slowly rotate rack down to a controlled stop, temporarily restrain, as required (Eyelets, Adjustable Tethers).

5.3 After the Rack is tilted down, it shall be properly restrained to avoid any obstruction of the passage to Node 2 due to uncontrolled rack rotation.

6. REMOVING THE KNEE BRACE ASSEMBLY

Figure 10. Knee Brace Assembly Installed, Typical.
Figure 11. Knee Brace Attachment to Stand-off, Typical.

6.1 Remove Single, Double Rod Knee Brace Assembly sections by pulling captive pip-pins (three) from Stand-off Clevis.  
Temporarily stow.  
Refer to Figures 10 and Figure 11.
7. **INSTALLING THE K-BAR CAPTURE MECHANISM**

![Figure 12. Columbus K-BAR Capture Mechanism](image)

**NOTE**

1. K-BAR Capture Mechanism is provided with a locating pin to fit in the appropriate Stand-Off Link seat.
2. Tool for fastening the Installation Fastener must be inserted between the mechanism latches.
3. For the execution of following steps refer to Figure 12.


7.3 Torque both K-BAR Capture Mechanisms fastener (one each) to 6 Nm (Torque Wrench 4-20 Nm; Ratchet Tool 3/8" Drive; 6" Long, 5/32" Hex Head, 3/8" Drive).
8. **ROTATING ISPR UP**

Figure 13. Typical Lower Rear Attachment on Columbus Longeron

8.1 Left and Right K-BAR Thumb Latches → Up

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Spherical Bearings are not straight, it may prevent rack mechanism re-engagement. A common tip screwdriver can be used to straighten Spherical Bearings.</td>
</tr>
</tbody>
</table>

8.2 √Standoff Lower Rear Spherical Bearings straight (Flashlight, Flat Screw Driver, 4 mm). Refer to Figure 13.

8.3 √Rack rotation path is unobstructed, then release from restraints.

8.4 Slowly rotate rack up to a controlled stop, until K-BAR Thumb Latches (two) engage with K-BAR Capture Mechanism on Stand-off.
If K-BAR Thumb Latch does not align with Capture Mechanism

Refer to Figure 10.

Adjust the K-BAR Capture Mechanism as required.

Tighten Adjustment Fastener (Ratchet Wrench 3/8"; 5/32" Hex Head 3/8" Drive).

9. **POST MAINTENANCE**

9.1 ISS ⇓ **COL-CC** "All Rack to Module Restraints have been released".

9.2 Photo document the new rack configuration (DCS 760 Camera).

9.3 √Transfer List for stowage location of Knee Brace Assembly.

9.4 Stow tools, then update IMS with Parts installation location.
OBJECTIVE:
Rotate an ISPR installed in Columbus aft, forward or overhead rack bays to access the ISPR rear, the standoff bays, the primary shell or cone panel areas.

LOCATION:
Installed: Refer to Table 1

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>ISPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>COL1F1</td>
<td>EDR</td>
</tr>
<tr>
<td>COL1O1</td>
<td>FSL</td>
</tr>
<tr>
<td>COL1D4</td>
<td>ETC</td>
</tr>
<tr>
<td>COL1A2</td>
<td>BIOLAB</td>
</tr>
<tr>
<td>COL1A3</td>
<td>EPM</td>
</tr>
</tbody>
</table>

DURATION:
10 minutes for ISPR rotation down (not includes time required for removal of hardware installed on ISPR front)
10 minutes for ISPR rotation up (not includes time required for installation of hardware on ISPR front)

CREW:
Two

TOOLS:
Columbus Tool Kit
Eyelet (2)
Adjustable Tether (2)

1. **ROTATING ISPR DOWN**

   1.1 Remove any equipment and restraints and mobility aids installed on the ISPR front panel.
   Temporary stow.
Figure 1. ISPR Attachment Mechanisms
Verify Pivot Pin Brackets, Left and Right are installed on Stand Off Links.
Refer to Figure 1.
1.202 COL ISPR ROTATION
(ASSY OPS/1E/FIN/HC/MULTI E)  Page 4 of 4 pages

1.3 √ISPR rotation path unobstructed.

1.4 ISPR K-BAR Thumb Latches (two) → Down position.

1.5 Slowly rotate ISPR down to a controlled stop, temporarily restrain, as required (Eyelets, Adjustable Tethers).

Refer to Figure 2.

2. **ROTATING ISPR UP**

2.1 √Rack rotation path is unobstructed, then release ISPR from restraints.

2.2 Slowly rotate ISPR up to a controlled stop, until K-BAR Thumb Latches (two) engage with K-BAR Capture Fittings on Stand Off.

2.3 ISPR K-BAR Thumb Latches (two) → Up position.

Refer to Figure 3.
OBJECTIVE:
To remove a single Mobile System Stowage Provision (MSSP) from either D2 or D3, stow temporarily inside Columbus and re-installing the MSSP back into the original deck rack.

LOCATION:
Installed:
COL1D2
COL1D3

DURATION:
1 hour
30 minutes removal
30 minutes installation

CREW
One

TOOLS:
COL1
Tool Bag 1
Eyelets (2)
Adjustable Tether (1)
T30 Torx® Head 1/4" Drive

Tool Bag 2
T-Handle 3/8" Drive
455 mm Extension 3/8" Drive

Tool Bag 3
3/8" to 1/4" Adapter
LAB1

Deployed
DCS 760 Camera

REFERENCED PROCEDURE(S):
1.201 COL DECK RACK D1 / D2 / D3 OPEN & CLOSE
1.212 COL FLOOR INTERFACE BAR REMOVAL / INSTALLATION
1. ACCESSING

1.1 √Floor Panels → Installed, perform {1.201 COL DECK RACK D1 / D2 / D3 OPEN & CLOSE} (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), step 1 and step 2 only, remove both panels.

1.2 √Floor Interface Bar → Installed, perform {1.212 COL FLOOR PANEL INTERFACE BAR REMOVAL / INSTALLATION} (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), step 1 to step 3

NOTE

Figure 1-1 following shows the typical FSSP and MSSP deck rack installation, any stowed equipment is not shown.
2. **REMOVAL**

2.1 Check MSSP fasteners (4) for tool accessibility. Remove equipment from MSSP and temporary stow as necessary.

2.2 Unscrew MSSP fasteners (4) in any order (T-Handle 3/8" Drive; 455mm Extension 3/8" Drive; 3/8"-to-1/4" Adapter; T30 Torx Head 1/4" Drive). Fasteners are captive. Refer to Figure 2-1.
2.3 Remove MSSP from deck rack using soft handles and temporary stow (Adjustable Tether, Eyelets).

2.4 Stow tools and equipment.

3. INSTALLATION

3.1 Check MSSP fasteners (4) for tool accessibility. Remove equipment from MSSP and temporary stow as necessary.

   NOTE  
   MSSP installed inside deck rack with its long edges oriented in parallel with Columbus x-axis.

3.2 √ For FOD inside deck rack.

3.3 Release MSSP from stowage and insert into deck, align MSSP using guiding pins.

3.4 Screw-in MSSP fasteners (4) in any order, no torque tightening (T-Handle 3/8" Drive; 455mm Extension 3/8" Drive; 3/8"-to-1/4" Adapter; T30 Torx Head 1/4" Drive).

4. CLOSEOUT

4.1 Photo document MSSP installed inside deck rack (DCS 760 camera).

4.2 Reload equipment into MSSP as necessary.

4.3 Install Floor Interface Bar, perform {1.212 COL FLOOR INTERFACE BAR REMOVAL / INSTALLATION} (SODF: ASSY OPS: ACTIVATION AND CHECKOUT) step 4 and step 5 only, then
4.4 Install floor panels, perform **[1.201 COL DECK RACK D1 / D2 / D3 OPEN & CLOSE]** (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), step 3 and step 4 only, then

4.5 Stow per Daily Stowage Note.
This Page Intentionally Blank
OBJECTIVE:
To relocate Columbus ISPR racks from the launch to the stage locations.

LOCATION:
Installed: Refer to Table 1.

Table 1. Columbus ISPR locations

<table>
<thead>
<tr>
<th>ISPR[X]</th>
<th>FROM BAY COL1[Y]</th>
<th>TO BAY COL1[Z]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPM</td>
<td>O3</td>
<td>A3</td>
</tr>
<tr>
<td>BIOLAB</td>
<td>O2</td>
<td>A2</td>
</tr>
<tr>
<td>EDR</td>
<td>O4</td>
<td>F1</td>
</tr>
</tbody>
</table>

DURATION:
65 minutes (each location)

CREW:
Two

PARTS:
Handrails (two) P/N 9221CA101-401
Pivot Pin Bracket, Right P/N 1100CA101-401
Pivot Pin Bracket, Left P/N 1100CA101-402

TOOLS:
DCS 760 Camera
ISS IVA Toolbox:
Drawer 1:
  Combination wrench, 12 point, 9/16"
Drawer 2:
  1/8" Hex Head, 1/4" Drive
Drawer 3:
  Inspection Mirror

Columbus Tool Kit
Tool Bag 1:
1.207 COLUMBUS ISPR RACK RELOCATION

Ratchet Wrench 1/4"
Torque Wrench 4-20 Nm
M8 (13 mm) Socket 1/4" Drive

Tool Bag 2:
Ratchet Wrench 3/8"
3/8" Hex Head Driver, 3/8" Drive
3/16" Hex Head Driver 3/8" Drive

Tool Bag 3:
5/32" Hex Head Driver, 3/8" Drive
Ratchet Tool 3/8" Drive

ISPR Locking Pin Tool For EPM/FSL
ISPR Locking Pin Tool For ETC/BIOLAB

REFERENCED PROCEDURE(S):
1.101 PARTITION POST REMOVAL / INSTALLATION
1.102 PARTITION SOFT COVER REMOVAL / INSTALLATION
1.209 K-BAR CAPTURE MECHANISM INSTALLATION / REMOVAL

1. DISENGAGING RACK LAUNCH RESTRAINTS

NOTE
Following steps are repeated for all the Columbus ISPR Rack requiring relocation.

Figure 1. Columbus ISPR racks location at launch
Figure 2. Columbus ISPR Racks location after on-orbit relocation

Figure 3. ISPR Rack Attachment Mechanisms.
NOTE
1. The interface size of the Rack Launch Restraint Locking Screws of Columbus ISPRs is slightly different from rack to rack. To operate the Locking Screws, the use of a dedicated ISPR Tool is required for each different Columbus ISPR. Refer to Table 2 for the identification of the tool to be used.
2. Expect loud "pop" during release of first Rack Launch Restraint.
3. For following steps refer to Figure 4.

Table 2. ISPR Rack and relevant ISPR Tool identification

<table>
<thead>
<tr>
<th>ISPR[X]</th>
<th>ISPR TOOL [W]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPM</td>
<td>ISPR Locking Pin Tool For EPM/FSL</td>
</tr>
<tr>
<td>BIOLAB</td>
<td>ISPR Locking Pin Tool For ETC/BIOLAB</td>
</tr>
<tr>
<td>EDR</td>
<td>1/8&quot; Hex Head, 1/4&quot; Drive</td>
</tr>
</tbody>
</table>
1.1 Unfasten left Locking Screw until loose (Ratchet Wrench 1/4”; ISPR Tool [W]).
Refer to Tables 1 and 2.

1.2 Left Rack Launch Restraint Screw (10 to 12 turns) (Ratchet Wrench 3/8”; 3/8” Hex Head Driver, 3/8” Drive).

1.3 Unfasten right Locking Screw until loose (Ratchet Wrench 1/4”; ISPR Tool [W]).

1.4 Right Rack Launch Restraint Screw (10 to 12 turns) (Ratchet Wrench 3/8”; 3/8” Hex Head Driver 3/8” Drive).

1.5 Loose then snug in unlatched, up position both Right and Left Pivot Mechanism Knobs (one full turn).

2. **DISENGAGING UPPER ATTACH MECHANISM**

![Figure 5. Knee Brace Assembly](image)

*Turn Center Knee Brace Strut CW to extend*
2.1 Adjust Center Knee Brace Strut 1-2 turns CW, until loose. Refer to Figure 5.

2.2 Loosen left Upper Attach Mechanism Stopper Knob (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive). Move to the right to allow Pinion unlatching. Refer to Figure 6.

2.3 Left Pinion → Unlatched. Refer to Figure 6.

2.4 Loosen right Upper Attach Mechanism Stopper Knob (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive). Move to the left to allow Pinion unlatching.
3. RELOCATING THE ISPR[X]

**NOTE**
For following steps, refer to Table 1.

3.1 Install handrails (two) on ISPR [X] Seat Tracks.

3.2 If installed, remove the Partition Post from rack bay COL1[Z],
perform [1.101 PARTITION POST REMOVAL / INSTALLATION], step 2 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), then:

3.3 If installed, remove the Partition Soft Cover from rack bay COL1[Z],
perform [1.102 PARTITION SOFT COVER REMOVAL / INSTALLATION], step 1 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), then:

![Figure 7. Columbus K-BAR Capture Mechanism Installed On Stand Off Link](image)
Refer To Figure 7.

If K-BAR Capture Mechanisms not installed,
perform 1.209 K-BAR CAPTURE MECHANISM INSTALLATION / REMOVAL, step 1 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), then:

3.5 Loosen the ISPR[X] Bonding Strap from the Stand Off interface, quarter-turn fastener (one) (Ratchet Wrench 1/4"; 102 mm Extension 1/4" Drive; M8 (13 mm) Socket 1/4" Drive).
Refer to Figure 8.

3.6 Remove ISPR[Y] from COL1[X] rack bay.

3.7 Move rack to rack bay COL1[Y].

Figure 8. ISPR Bonding Strap interface on Stand Off

NOTE
The Inspection Mirror can be used to get a better view of the ISPR Bonding Strap installation interface on the Stand Off.
4. **INSTALLING THE PIVOT PIN BRACKETS**

**NOTE**
Refer to Figures 4, 9, 10 and 11 during following section.

**Figure 9. Pivot Pin Bracket, Right (P/N 1100CA101-401)**

**Figure 10. Columbus Stand Off Link**
NOTE
The Pivot Pin Bracket is provided with 2 alignment pins to allow its correct installation on stand off links.

Figure 11. Typical Installation of Pivot Pin Brackets (two) at Columbus Standoff (rack not installed).

4.1 Record IMS barcode number of Pivot Pin Brackets. Barcodes will be reported to ground.
   Right: ___________
   Left: ___________

4.2 Install Pivot Pin Bracket, Right snug fastener (one) (Ratchet Wrench 3/8"; 3/16" Hex Head Driver, 3/8" Drive).

4.3 Install Pivot Pin Bracket, Left snug fastener (one) (Ratchet Wrench 3/8"; 3/16" Hex Head Driver 3/8" Drive).

4.4 Torque both Left and Right Pivot Pin Brackets fastener to 9 Nm (Torque Wrench 4-20 Nm; Ratchet Tool, 3/8" Drive; 3/16" Hex Head Driver, 3/8" Drive).

4.5 Loosen both right and left Pivot Mechanism Knobs (one full turn), then tighten in latched, down position.
5. INSTALLING THE K-BAR ASSY

NOTE
For the execution of following steps refer to Figures 6 and 12.

5.1 Rotate ISPR[X] rack down about 15 cm.

5.2 √ Left Upper Attach Mechanism Pinion is in unlatched position.

5.3 √ Left Stopper Knob is in unlocked position.

5.4 Install K-BAR Assy, Left into left Upper Attach Mechanism Shear Pin View Hole.

CAUTION
Do not force Upper Attach Mechanism Pinions. Mechanism should easily engage K-BAR Assy. Failure to comply may result in equipment damage.

5.5 Left Pinion → Latched
√ Shear Pin is visible at top of mechanism.

5.6 Set Stopper Knob in locked position, snug fastener (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).

5.8 K-BAR Thumb Latch → Up.

5.9 Repeat steps 5.2 to 5.8 for K-BAR Assy, Right.

5.10 Slowly rotate ISPR[X] rack up to a controlled stop, until K-BAR Thumb Latches (two) engage with K-BAR Capture Mechanism on Stand-off.

Figure 13. Adjustment Fastener on K-BAR Capture Mechanism
5.11 Remove handrails, tempy stow.

6. **INSTALLING THE ISPR BONDING STRAP ON STAND OFF**

   **NOTE**
   The Inspection Mirror can be used to get a better view of the ISPR Bonding Strap installation interface on the Stand Off.

   6.1 Install ISPR Bonding Strap on ISPR Bonding Strap Interface on Stand Off, quarter-turn fastener (one) (Combination wrench, 12 point, 9/16"). Refer to Figure 8.

   6.2 Photo document ISPR[X] in the new installation location. (DCS 760 Camera)

7. **REMOVING THE KNEE BRACE ASSEMBLY**
Figure 15. Knee Brace Attachment to Stand-off.

7.1 Remove Single, Double Rod Knee Brace Assembly sections from empty COL1[Y] rack bay by pulling captive pip-pins (three) from Stand-off Clevis. Refer to Figures 14 and Figure 15.

7.2 Stow hardware per Daily Stowage Note.
OBJECTIVE:
Install/remove the Pivot Pin Brackets for ISPR racks on/from the Standoff Links.

LOCATION:
Installed: COL1A[X], COL1F[X], COL1O[X], COL1D4 where [X] = 1 to 4
Stowed: √Inventory Management System (IMS)

DURATION:
Installation: 10 min (each couple)
Removal: 10 min (each couple)

CREW:
One

PARTS:
Pivot Pin Bracket, Right P/N 1100CA101-401
Pivot Pin Bracket, Left P/N 1100CA101-402

MATERIALS:
None

TOOLS:
Columbus Tool Kit:
Tool Bag 1:
  Torque Wrench 4-20 Nm
Tool Bag 2:
  Ratchet Wrench 3/8"
  3/16" Hex Head Driver 3/8" Drive
Tool Bag 3:
  Ratchet Tool 3/8" Drive

REFERENCED PROCEDURE(S):
None

1. **INSTALLING PIVOT PIN BRACKETS**

   NOTE
   Directional references left and right are defined with respect to front face of rack bay, as facing an installed rack.
Figure 1. ISPR Pivot Mechanism location identification.
NOTE
Step 1.1 is not required if Pivot Pin Brackets are installed in a location corresponding to an empty bay.

1.1 Loosen then tighten in unlatched, up position both right and left ISPR Pivot Mechanism Knobs (one full turn).
Refer to Figure 1 and Figure 2.
Figure 3. Stand Off Links location on FD Stand Off (Typical for all Stand Offs)

Figure 4. View of Detail A: Standoff Links identification
1.208 PIVOT PIN BRACKET INSTALLATION/REMOVAL

The Pivot Pin Bracket is provided with 2 alignment pins to allow its correct installation on stand off links.

Figure 5. Pivot Pin Bracket (Right Assembly)

Figure 6. Columbus Stand Off Link
1.2 Record IMS barcode number of Pivot Pin Brackets.
Right: ___________
Left: ___________

1.3 Install Pivot Pin Bracket, Right, tighten fastener (one) (Ratchet Wrench 3/8"; 3/16" Hex Head Driver, 3/8" Drive).
Refer to Figures 2, 5, and 6.

1.4 Install Pivot Pin Bracket, Left, tighten fastener (one) (Ratchet Wrench 3/8"; 3/16" Hex Head Driver 3/8" Drive).
Refer to Figures 2, 5, and 6.

1.5 Torque both left and right Pivot Pin Brackets fastener to 8.7 Nm (Torque Wrench 4-20 Nm; Ratchet Tool 3/8" Drive; 3/16" Hex Head Driver 3/8" Drive).
Refer to Figures 2, 5, and 6.

NOTE
The Pivot Mechanism Knob moves automatically to the latched position after release.

If Pivot Pin Brackets are installed in a location corresponding to an empty bay, step 1.6 is not required.

1.6 Turn both right and left Pivot Mechanism Knobs (one full turn), then tighten in latched, down position.
Refer to Figure 2.

1.7 ISS ⇓ COL-CC of task completion, IMS barcode number and installation location of Pivot Pin Brackets.
Stow tools.
2. REMOVING PIVOT PIN BRACKETS

Figure 7. Pivot Pin Brackets Installed in two adjacent Stand-Off bays

If Pivot Pin Brackets are removed from a location corresponding to an empty bay, step 2.1 is not required.

2.1 Loosen then tighten in unlaunched, up position both right and left ISPR Pivot Mechanism Knobs (one full turn). Refer to Figures 1 and 2.

2.2 Loosen both right and left Pivot Pin Brackets fastener (Ratchet Wrench 3/8"; 3/16" Hex Head Driver 3/8" Drive). Refer to Figure 7.

2.3 Remove right and left Pivot Pin Brackets.

2.4 Record IMS barcode number of removed Pivot Pin Brackets.
   Right: ___________
   Left: ___________

   Temporarily stow.

If Pivot Pin Brackets are removed from a location corresponding to an empty bay, step 2.5 is not required.

2.5 Loosen both right and left Pivot Mechanism Knobs (one full turn), then tighten in latched, down position.
Refer to Figure 2.

2.6 Stow tools, removed Pivot Pin Brackets.

2.7 ISS ↓ COL-CC of task completion, IMS barcode number and stowage location of removed Pivot Pin Bracket.
OBJECTIVE:
Install the K-BAR Capture Fittings on the Standoff Links configuring a rack bay to allow on-orbit installation of an ISPR. Remove the K-BAR Capture Fittings from the Standoff Links configuring a rack bay for on-orbit installation of the ARIS provisions or for the installation of Partition Post(s).

LOCATION:
Stowed: √ Inventory Management System (IMS)
Installed: COL1A[X], COL1F[X], COL1O[X] and COL1D4 where [X] = 1 to 4

DURATION:
Installation: 10 min (each couple)
Removal: 10 min (each couple)

CREW:
One

PARTS:
K-BAR Capture Fitting, Right P/N 683-62201-28
K-BAR Capture Fitting, Left P/N 683-62201-27

MATERIALS:
None

TOOLS:
DCS Camera
Columbus Tool Kit:
Tool Bag 1:
   Torque Wrench 4-20 Nm
Tool Bag 2:
   Ratchet Wrench 3/8"
Tool Bag 3:
   Ratchet Tool 3/8" Drive
Tool Bag 3:
   5/32" Hex Head Driver 3/8" Drive

REFERENCED PROCEDURE(S):
None
1. INSTALLING THE K-BAR CAPTURE MECHANISM

Figure 1. Columbus ISPR Rack rotation directions – Looking Starboard
Figure 2. Detail A - Hardware installation on Standoff links AD
Figure 3. Detail B - Hardware installation on Standoff links OA
Figure 4. Detail C - Hardware installation on Standoff links OF
Figure 5. Detail D - Hardware installation on Standoff links FD

NOTE

1. Following steps are applicable to all locations.
2. Directional references left and right are defined with respect to front face of rack bay, as facing an installed rack.
3. For stand off AD, K-BAR Capture Fittings are installed on D4 bay only.
4. The K-BAR Capture Fitting is provided with a locating pin to fit in the appropriate Standoff Link seat.

1.1 Record K-BAR Capture Fitting, Right S/N: ________________
    Record K-BAR Capture Fitting, Left S/N: ________________

1.2 Install K-BAR Capture Fitting, Right on the Stand-Off Link, snug fastener (one) (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).
    Refer to Figure 1 and Figure 2 to 5.

1.3 Install K-BAR Capture Fitting, Left on the Stand-Off Link, snug fastener (one) (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).
    Refer to Figure 1 and Figure 2 to 5.
1. **K-BAR CAPTURE MECHANISM INSTALLATION/REMOVAL**

1.4 Torque both K-BAR Capture Fittings, Left and Right fastener (one) to 6 Nm (Torque Wrench 4-20 Nm; Ratchet Tool 3/8" Drive; 5/32" Hex Head Driver, 3/8" Drive).

1.5 Photo document the installed K-BAR Capture Fittings.

1.6 Repeat steps 1.1 to 1.5 for all the locations.

1.7 **ISS ⇓ COL-CC** of task completion, S/Ns and installation locations of K-BAR Capture Fittings.
   Stow tools.

2. **REMOVING THE K-BAR CAPTURE MECHANISM**

   **NOTE**
   1. Following steps are applicable to all locations.
   2. Directional references left and right are defined with respect to front face of rack bay, as facing an installed rack.

   2.1 Remove K-BAR Capture Fitting, Right from Standoff Link, fastener (one) (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).
   Refer to Figure 1 and Figure 2 to 5.

   2.2 Remove K-BAR Capture Fittings, Left from Standoff Link, fastener (one) (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).
   Refer to Figure 1 and Figure 2 to 5.

   2.3 Record removed K-BAR Capture Fitting, Right S/N: ______________
   Record removed K-BAR Capture Fitting, Left S/N: ______________

   2.4 Stow tools, removed K-BAR Capture Fittings.

   2.5 **ISS ⇓ COL-CC** of task completion, S/Ns and stowage locations of K-BAR Capture Fittings.
OBJECTIVE:
Install and remove the K-BAR Assemblies on/from the ISPR Upper Attach Mechanisms.

LOCATION:
Stowed: √Inventory Management System (IMS)
Installed: COL1A[X], COL1F[X], COL1O[X], COL1D4 where [X] = 1 to 4

DURATION:
Install: 15 minutes (each couple)
Remove: 10 minutes (each couple)

CREW:
One

PARTS:
IHI K-BAR Assy, Left P/N 683-62201-3
IHI K-BAR Assy, Right P/N 683-62201-4

MATERIALS:
None

TOOLS:
DCS 760 Camera
Columbus Tool Kit:
Tool Bag 2:
- Ratchet Wrench 3/8"
- 3/8" Hex Head Driver, 3/8" Drive
Tool Bag 3:
- 5/32" Hex Head Driver, 3/8" Drive

REFERENCED PROCEDURE(S):
1.208 PIVOT PIN BRACKET INSTALLATION / REMOVAL
1.209 K-BAR CAPTURE MECHANISM INSTALLATION / REMOVAL
1. INSTALLING THE K-BAR ASSY

Figure 1. ISPR Attachment Mechanisms
Figure 2. Detail A – Left Rack Upper Attach Mechanism, Typical.

**CAUTION**

Do not force Upper Attachment Mechanism Pinions. Mechanism should easily engage K-Bar. Ensure Stopper Knob unlocked. Failure to comply may result in equipment damage.

**NOTE**

1. IHI K-BAR Assy can be installed only if the rack has been disengaged from the Knee Brace and rotated down of about 15 cm.
2. If installed in rack bay the Knee Brace Assembly shall be removed, since this would prevent the complete rack rotation to the up position.

1.1 Loosen left Upper Attach Mechanism Stopper Knob (Ratchet Wrench 3/8”; 5/32” Hex Head Driver, 3/8” Drive).

Move to the right to allow Pinion unlatching.

Refer to Figure 2.

1.2 Left Pinion → Unlatched.
1.210 K-BAR INSTALLATION/REMOVAL

Refer to Figure 2.

1.3 Loosen right Upper Attach Mechanism Stopper Knob (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive). Move to the left to allow Pinion unlatching.

1.4 Right Pinion → Unlatched.

1.5 Verify Pivot Pin Brackets are installed.

If Pivot Pin Brackets are not installed, perform {1.208 PIVOT PIN BRACKET INSTALLATION / REMOVAL}, step 1 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), then:

1.6 Record IHI K-BAR Assy, Left S/N: ________________

1.7 Rotate rack down of about 15 cm.

1.8 Install IHI K-BAR Assy, Left into left Upper Attach Mechanism Shear Pin View Hole. Refer to Figure 2.
CAUTION

Do not force Upper Attach Mechanism Pinions. Mechanism should easily engage K-BAR Assy. Failure to comply may result in equipment damage.

NOTE

The Pinion is maintained in the latched position by mean of an internal spring.

1.9  Left Pinion → Latched.

\ Shear Pin is visible at top of mechanism.

1.10  Set Stopper Knob in locked position, snug fastener (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).


1.12  IHI K-BAR Thumb Latch → Up.

1.13  Repeat steps 1.6 --- 1.12 for IHI K-BAR Assy, Right.

1.14  Verify K-BAR Capture Fittings are installed on Stand Off links.

**************************************************************************************************
* If K-BAR Capture Fittings are not installed,
*    perform {1.209 K-BAR CAPTURE MECHANISM
*    INSTALLATION / REMOVAL}, step 1 (SODF: ASSY
*    OPS: ACTIVATION AND CHECKOUT), then:
**************************************************************************************************
1.210 K-BAR INSTALLATION/REMOVAL

1.210 K-BAR INSTALLATION/REMOVAL (ASSY OPS/1E/FIN/MULTI E)  Page 6 of 7 pages

1.210 K-BAR INSTALLATION/REMOVAL

1.15 Slowly rotate rack up to a controlled stop, until IHI K-BAR Assy Thumb Latches (two) engage with K-BAR Capture Fittings on Stand-off.

******************************************************************************************
* If IHI K-BAR Thumb Latch does not align with K-BAR Capture Fitting
* 
* Refer to Figure 3.
* Adjust the K-BAR Capture Fittings as required.
* 
* Snug Adjustment Fasteners (two) (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).
******************************************************************************************

1.16 Photo document the installed K-BAR Assemblies (DCS 760 Camera).

1.17 ISS ↓ COL-CC for task completion, S/N and installation location of IHI K-BAR Assemblies.
Stow tools.

2. REMOVING THE IHI K-BAR ASSY

NOTE

K-Bar can be removed only if disengaged from the K-BAR Capture Fittings.

2.1 IHI K-BAR Assy, Left Thumb Latch → Down.
Refer to Figure 2.

2.3 Loosen left Upper Attach Mechanism Stopper Knob (until threads completely disengaged) (Ratchet Wrench 3/8"; 5/32" Hex Head Driver, 3/8" Drive).
Move to the right to allow Pinion unlatching.
Refer to Figure 2.

2.4 Left Pinion → Unlatched.
Refer to Figure 2.

2.5 Remove IHI K-BAR Assy, Left.

2.6 Record removed IHI K-BAR Assy, Left S/N: ________________
Temporary stow.

2.7 Repeat steps 2.1 to 2.6 for IHI K-BAR Assy, Right.

2.8 √ For FOD within a 1 m radius.

2.9 Stow tools, removed IHI K-BAR Assemblies.

2.10 ISS ‡ COL-CC for task completion, S/N and stowage location of removed IHI K-BAR Assemblies.
OBJECTIVE:
Install/remove the ISPR Bonding Straps in/from the Columbus rack bays.

LOCATION:
Installed: Refer to Table 1
Stowed: \Inventory Management System (IMS)

Table 1. Columbus ISPR Bonding Strap Available Installation Locations

<table>
<thead>
<tr>
<th>Aft Rack Bays</th>
<th>Forward Rack Bays</th>
<th>Overhead Rack Bays</th>
</tr>
</thead>
<tbody>
<tr>
<td>COL1A1</td>
<td>COL1F1</td>
<td>COL1O1</td>
</tr>
<tr>
<td>COL1A2</td>
<td>COL1F2</td>
<td>COL1O2</td>
</tr>
<tr>
<td>COL1A3</td>
<td>COL1F3</td>
<td>-</td>
</tr>
<tr>
<td>COL1A4</td>
<td>COL1F4</td>
<td>-</td>
</tr>
</tbody>
</table>

DURATION:
Installation: 10 min each
Removal: 10 min each

CREW:
One

PARTS:
Bonding Strap P/N 3000CA001-001

MATERIALS:
None

TOOLS:
ISS Tool Kit:
Drawer 1
Combination wrench, 12 Point, 9/16"
102mm Extension, 1/4" Drive

Columbus Tool Kit:
Tool Bag 1:
  Ratchet Wrench 1/4"
  M8 (13 mm) Socket 1/4" Drive

REFERENCED PROCEDURE(S):
None
1. INSTALLING A BONDING STRAP

Figure 1. Bonding Strap Configuration, Typical

Figure 2. ISPR Bonding Strap Installation location on Standoff (Typical)
Following steps are repeated for all the locations where an ISPR Bonding Strap is installed.

1. Record P/N of ISPR Bonding Strap: ________________
   Record S/N of ISPR Bonding Strap: ________________

2. Install ISPR Bonding Strap on standoff, quarter-turn fastener (one)
   (Ratchet Wrench 1/4"; 102 mm Extension 1/4" Drive; M8 (13 mm)
   Socket 1/4" Drive).
   Refer to Figures 1 and 2.

3. Install ISPR Bonding Strap on ISPR Bonding Strap Interface, quarter-
   turn fastener (one) (Combination wrench, 12 Point, 9/16").
   Refer to Figure 3.

4. ISS ↓ COL-CC of task completion, P/N, S/N and installation location of
   Bonding Strap.
   Stow tools.
2. **REMOVING A BONDING STRAP**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Following steps are repeated for all the locations where an ISPR Bonding Strap is removed from.</td>
</tr>
</tbody>
</table>

2.1 Remove Bonding Strap from ISPR Bonding Strap Interface, quarter-turn fastener (one) (Ratchet Wrench 1/4”; 102 mm Extension 1/4” Drive; M8 (13 mm) Socket 1/4” Drive). Refer to Figure 3.

2.2 Remove Bonding Strap from stand off, quarter-turn fastener (one) (Ratchet Wrench 1/4”; 102 mm Extension 1/4” Drive; M8 (13 mm) Socket 1/4” Drive). Refer to Figures 1 and 3.

2.3 Record P/N of removed Bonding Strap: ________________
Record S/N of removed Bonding Strap: ________________

2.4 Stow tools and parts.

2.5 ISS ↓ **COL-CC** of task completion, P/N and S/N of removed Bonding Strap.
OBJECTIVE:
Remove a Floor Panel Interface Bar from either deck rack D1, D2 or D3 and stow temporarily inside Columbus, re-install Floor Panel Interface Bar to either deck rack D1, D2 or D3.

LOCATION:
Installed:
  COL1D1
  COL1D2
  COL1D3

DURATION:
20 minutes

CREW
One

PARTS:
None

MATERIALS:
None

TOOLS:
COL1
  Tool Bag 1
    Ratchet Wrench, 1/4" Drive
    Ratchet Tool, 1/4" Drive
    102 mm Extension 1/4" Drive
    4-20 Nm Torque Wrench 1/4" Drive
    T30 Torx Head 1/4" Drive
    Portable Handle

LAB1
Deployed:
  DCS 760 Camera

REFERENCED PROCEDURE:
1.201 COL DECK RACK D1 / D2 / D3 OPEN & CLOSE

1. ACCESSING

NOTE
Access to a Floor Panel Interface Bar requires removal of both floor panels covering the deck rack.
1.212 COL FLOOR PANEL INTERFACE BAR REMOVAL/INSTALLATION

1.1 Check for floor panels, when present remove floor panels (2), perform {1.201 COL DECK RACK D1 / D2 / D3 OPEN & CLOSE} (SODF: ASSY OPS: ACTIVATION AND CHECKOUT) step 1 and step 2 only

2. REMOVAL

2.1 Unscrew Floor Interface Bar fasteners (2) in any order (Ratchet Wrench 1/4" Drive; 102mm Extension 1/4" Drive; T30 Torx Head 1/4" Drive). Fasteners are captive. Refer to Figure 2.

2.2 Remove Floor Interface Bar from deck rack, temporary stow.

2.3 Temporarily stow tools / equipment as necessary.
3. **INSTALLATION**

3.1 Check for FOD around work area within 3’ radius to reduce risk of crew injury by FOD hazard.

3.2 Remove Floor Interface Bar from temporary stowage.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor Interface Bar can be installed to deck rack regardless of its aft / forward orientation.</td>
</tr>
</tbody>
</table>

3.3 Fasten Floor Interface Bar to deck rack structure. Screw-in Floor Interface Bar fasteners (2) in any order, no torque tightening (Ratchet Wrench 1/4" Drive; 102mm Extension 1/4" Drive; T30 Torx Head 1/4" Drive). Fasteners are captive.

3.4 Torque tighten fasteners (2) in any order at 5 Nm (44.2 in-lbs) (4-20 Nm Torque Wrench; Ratchet Tool 1/4” Drive; 102mm Extension 1/4” Drive; T30 Torx Head 1/4” Drive). Fasteners are captive.

4. **CLOSEOUT**

4.1 Photo Document the Floor Interface Bar as installed on deck rack structure. (DCS 760 Camera)

4.2 Check with COL-CC for installation of floor panels, when required perform **{1.201 COL DECK RACK D1 / D2 / D3 OPEN & CLOSE}**, (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), step 3 and step 4 only

5. **POST MAINTENANCE**

5.2 Stow tools / equipment.
1. **VERIFYING ORBITER PAYLOAD BUS CONFIGURATION**
   - R1
     - √ tb PL PRI MNC – ON
     - √ PL CAB – MNA(MNB)
     - √ PL AUX – ON

2. **VERIFYING SWITCH POWER**
   - SSP 1
     - √ cb SW PWR 1 – cl

3. **CLOSING APCU OUTPUT RELAY**
   - √ tb APCU 1(2) CONV – bp
     - APCU 1(2) OUTPUT RLY – cl

4. **TURNING APCU CONVERTER(S) ON**
   - APCU 1(2) CONV – ON
     - √ tb APCU 1(2) CONV – gray
     - √ tb APCU 1(2) OUTPUT RLY – gray

   **CRT**
   - [SM 200 APCU Status]

   √ APCU 1(2) OUT VOLTS RES HIGH: 122 to 126.5 V
NOTE

Expect 'S200 APCU 1(2) VOLT LMT' message when APCU Converters are powered OFF.

CRT

SM 200 APCU Status

1. TURNING APCU CONVERTER(S) OFF
   
   APCU 1(2) CONV – OFF
   
   √tb APCU 1(2) CONV – bp
   √tb APCU 1(2) OUTPUT RLY – bp

2. OPENING APCU OUTPUT RELAY
   
   APCU 1(2) OUTPUT RELAY – OP
DEORBIT PREPARATION
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L12U</td>
<td>1. cb SW PWR 1 - op</td>
</tr>
<tr>
<td></td>
<td>cb PDIP 1 PWR 2/KuBAND RLY - op</td>
</tr>
<tr>
<td></td>
<td>cb X1/X2 SW - op</td>
</tr>
<tr>
<td></td>
<td>cb X1/X2 SW PDIP 1 PWR 1 - op</td>
</tr>
<tr>
<td>L12L</td>
<td>2. cb PDIP 2 PWR 2 - op</td>
</tr>
<tr>
<td></td>
<td>cb PDIP 2 PWR 1 - op</td>
</tr>
<tr>
<td>L12</td>
<td>3. Ku BAND RATE – OFF</td>
</tr>
<tr>
<td>R1</td>
<td>4. PL CAB – OFF</td>
</tr>
<tr>
<td>ML86B:E</td>
<td>5. cb MNB MAR 2 – op</td>
</tr>
</tbody>
</table>
This Page Intentionally Blank
N/A
This Page Intentionally Blank
PAYLOAD ENTRY SWITCH LIST/VERIFICATION

PAYLOAD PWR CONFIG

TIG-1:55 R1
1. √ PL CAB – OFF
2. √ PL PRI MNC – ctr (tb-OFF)
3. √ PL PRI MNB – ctr (tb-OFF)
4. √ PL PRI FC3 – ctr (tb-OFF)
5. √ PL AUX – ON
6. √ PL AFT MNB – OFF
7. √ PL AFT MNC – OFF

L12U (SSP 1)
2. √ APCU 1 CONV – OFF (tb-bp)
3. √ APCU 1 OUTPUT RLY – OPEN (tb-bp)
4. √ APCU 2 CONV – OFF (tb-bp)
5. √ APCU 2 OUTPUT RLY – OPEN (tb-bp)
6. √ cb SW PWR 1 – op
7. √ cb PDIP 1 PWR 2/KuBAND RLY – op
8. √ tb OIU PWR – bp
9. √ TCS PWR – OFF (tb-bp)
10. √ cb X1/X2 SW PDIP1 PWR1 – op
11. √ ODS CONN MATE X1 TLM PWR – OFF
12. √ ODS CONN MATE X2 TLM PWR – OFF
13. √ OIU PWR – OFF

L12L (SSP 2)
3. √ cb PDIP 2 PWR 2 – op
4. √ C/L CAM PWR – OFF
5. √ cb PDIP 2 PWR 1 – op

L12 (PDIP 1)
4. √ Ku BAND RATE – OFF
5. √ DC PWR 1 – OFF
6. √ DC PWR 2 – OFF

L11 (PDIP 2)
5. √ DC PWR 1 – OFF
6. √ DC PWR 2 – OFF

ML86B:E
6. √ cb MNB MAR 1 – cl
7. √ cb MNB MAR 2 – op

ML85E
7. √ DC 10 AMP MNB S2 – OFF
8. √ DC 10 AMP MNB S3 – ON
9. √ DC 10 AMP MNB S4 – OFF
10. √ DC 10 AMP MNB S5 – OFF
11. √ cb DC 10 AMP MNB CB2 – op
12. √ cb DC 10 AMP MNB CB3 – cl

21 AUG 07

503
PAYLOAD ENTRY SWITCH LIST/VERIFICATION

√ cb DC 10 AMP MNB CB4 – op
√ cb DC 10 AMP MNB CB5 – op
OBJECTIVE:
This display monitors health and status of the two APCUs and is available in SM OPS 2. The APCUs are used to power the Columbus Launch To Activation (LTA) heaters while the element is in the PLB as well OBSS heaters. The display is generic and has been used on several missions. Figure 1 is a view of this display.

Figure 1. APCU Status - MCDS Display.

TITLE: APCU STATUS

TYPE: SPEC 200

PARAMETER CHARACTERISTICS
Table 1. Parameter Characteristics

<table>
<thead>
<tr>
<th>CRT Name</th>
<th>MSI D</th>
<th>UNIT S</th>
<th>DISPLAY RANGE</th>
<th>STATUS IND [3]</th>
<th>FDA LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>APC U 1 CONV A OUT AMP S</td>
<td>P50 C90 03V</td>
<td>amp s</td>
<td>0 to 12.0</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>APC U 1 CONV A TEM P</td>
<td>P50 T900 2V</td>
<td>deg F</td>
<td>0 to 212.0</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>APC U 1 CONV B OUT AMP S</td>
<td>P50 C90 04V</td>
<td>amp s</td>
<td>0 to 12.0</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>APC U 1 CONV B TEM P</td>
<td>P50 T900 5V</td>
<td>deg F</td>
<td>0 to 212.0</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>APC U 1 OUT VOL TS RES LOW [1]</td>
<td>P50 V900 1V</td>
<td>volts</td>
<td>0 to 180.0</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>APC U 1 OUT VOL TS RES HIG H [1]</td>
<td>P50 V900 0V</td>
<td>volts</td>
<td>-110 to 160.0</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>APC U 1 TRIP [2]</td>
<td>P50 V900 6V</td>
<td>volts</td>
<td>-5.00 to 5.00</td>
<td>M</td>
<td>H</td>
</tr>
</tbody>
</table>
Continuation of Table ...

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>amp</th>
<th>deg</th>
<th></th>
<th>M</th>
<th>H</th>
<th>L</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>APC U 2 CONV A</td>
<td>P50 C90 09V</td>
<td>0 to 12.0</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>↑</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>OUT AMP S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APC U 2 CONV A</td>
<td>P50 T901 0V</td>
<td>0 to 212.0</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>↑</td>
<td>20</td>
<td>130</td>
</tr>
<tr>
<td>CON V TEMP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APC U 2 CONV B</td>
<td>P50 C90 11V</td>
<td>0 to 12.0</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>↑</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>OUT AMP S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APC U 2 CONV B</td>
<td>P50 T901 2V</td>
<td>0 to 212.0</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>↑</td>
<td>20</td>
<td>130</td>
</tr>
<tr>
<td>CON V TEMP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APC U 2 OUT</td>
<td>[1] P50 V900</td>
<td>0 to 180.0</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLTS RES LOW</td>
<td>7V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APC U 2 OUT</td>
<td>[1] P50 V900</td>
<td>110</td>
<td></td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>↑</td>
<td>122</td>
</tr>
<tr>
<td>VOLTS RES HIG</td>
<td>8V</td>
<td>to 160.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APC U 2 TRIP</td>
<td>[2] P50 V901</td>
<td>-5.00</td>
<td></td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>OUT TRIP</td>
<td>3V</td>
<td>to 5.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS

[1] OUT VOLTS LOW displays the measurements from the low-resolution voltage sensor. OUT VOLTS HIGH displays the measurements from the high-resolution voltage sensor.
[2] APCU TRIP indicates the status of the APCU shutdown logic. This status can be interpreted using Table 2.

### Table 2.

<table>
<thead>
<tr>
<th>TRIP (STATUS VOLTAGE)</th>
<th>TRIP CAUSE (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OV</td>
</tr>
<tr>
<td>+4.88</td>
<td>X</td>
</tr>
<tr>
<td>+4.23</td>
<td>X</td>
</tr>
<tr>
<td>+3.59</td>
<td>X</td>
</tr>
<tr>
<td>+2.95</td>
<td>X</td>
</tr>
<tr>
<td>+2.27</td>
<td>X</td>
</tr>
<tr>
<td>+1.62</td>
<td>X</td>
</tr>
<tr>
<td>+0.98</td>
<td>X</td>
</tr>
<tr>
<td>+0.34</td>
<td></td>
</tr>
<tr>
<td>-0.30</td>
<td>X</td>
</tr>
<tr>
<td>-0.95</td>
<td></td>
</tr>
<tr>
<td>-1.59</td>
<td>X</td>
</tr>
<tr>
<td>-2.23</td>
<td></td>
</tr>
<tr>
<td>-2.91</td>
<td></td>
</tr>
<tr>
<td>-3.56</td>
<td></td>
</tr>
<tr>
<td>-4.20</td>
<td></td>
</tr>
<tr>
<td>-4.86 (no trip)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

OV: Output Overvoltage  
OUV: Output Undervoltage  
OC: Output Overcurrent  
IUV: Input Undervoltage  

Tolerance for all reported voltages is 0.20 V.

[3] The parameter status field for all parameters will be blank for normal operation or will display an "M" for missing data. For analog parameters, this field will also display an "H" or "L" for offscale data. Some parameters displayed will be limit-sensed for SM alerts or C&W alarms. For discretes that are limit-sensed, the undesirable state is defined in the FDA low limit field and the FDA high limit field is left blank. Satisfaction of the undesirable state triggers a "↓" indication. For analogs that are limit-sensed, an "↑" or a "↓" will be displayed when the parameter exceeds either an upper or lower limit. The symbols driven in the parameter status field have the following display priority from highest to lowest: "M", "H", "L", "↑", "↓". All symbols driven in the parameter status column will be displayed four times the normal intensity.
For 12A thru 10A, there was no planned use of this display. For all flights after 10A, the purpose of this display is to allow the orbiter crew to command the ISS at dock and undock and provide the capability to execute the attitude control handover procedures. Specifically, the orbiter crew can command the ISS to free drift upon contact, or to activate attitude control upon separation. The orbiter crew could command at dock and undock from this display starting at 12A, however there is full redundancy in the ISS MCS moding system at that point until the redundancy is removed during Stage 10A. Stage 10A places Node 2 between the Lab and PMA2, and Node 2 does not contain any automatic ACS Moding wiring for undocking and only one string for docking, as opposed to two strings for each prior to Node 2.

For the capability of executing the attitude control handover procedures, the communication link will nominally be through the OIU / GNC Hardline. Therefore, all the commands on Spec 205 have a routing code for the OIU / GNC Hardline. For commanding the ISS at dock and undock, the communication link will nominally be through the SSOR. Since all the Spec 205 commands have a routing code through the OIU / GNC Hardline, the orbiter crew will send a reroute command that reroutes all Hardline commands to the SSOR.

PARAMETER CHARACTERISTICS

![ISS MCS Moding Display - SPEC 205](image)
<table>
<thead>
<tr>
<th>CRT NAME</th>
<th>MSID</th>
<th>UNIT</th>
<th>DISPLAY RANGE</th>
<th>STATUS IND</th>
<th>FDA LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M H L ↑ ↓ LO HI</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>STATUS [1]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US GNC MOD E [2]</td>
<td>P79X 0845 E</td>
<td>P79X 0846 E</td>
<td>P79X 0847 E</td>
<td>Refer to remarks</td>
<td></td>
</tr>
<tr>
<td>RS GNC MOD E [3]</td>
<td>P79X 0842 E</td>
<td>P79X 0843 E</td>
<td>P79X 0844 E</td>
<td>Refer to remarks</td>
<td></td>
</tr>
<tr>
<td>GNC MDM FRAME COUNT [5]</td>
<td>P79U 0856 D</td>
<td></td>
<td></td>
<td>Refer to remarks</td>
<td></td>
</tr>
<tr>
<td>US PRI GNC MDM [6]</td>
<td>P79X 0854 E</td>
<td></td>
<td></td>
<td>0 = 'GOOD' 1 = over right 'FAIL'</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1.**
<table>
<thead>
<tr>
<th>CMG ATT CNTL [7]</th>
<th>P79X 0853 E</th>
<th>0 = 'GOOD'</th>
<th>1 = over right 'LOS'</th>
<th>↓ 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO OP COMMAND</td>
<td>P79U 0855 D</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INHIBITS</th>
<th>P79X 0807 E</th>
<th>0 = 'ENA'</th>
<th>1 = 'INH'</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE XTION</td>
<td>P79X 0812 E</td>
<td>0 = 'ENA'</td>
<td>1 = 'INH'</td>
<td></td>
</tr>
<tr>
<td>ATT MNVR</td>
<td>P79X 0813 E</td>
<td>0 = 'ENA'</td>
<td>1 = 'INH'</td>
<td></td>
</tr>
<tr>
<td>DES AT REQ</td>
<td>P79X 0806 E</td>
<td>0 = 'ENA'</td>
<td>1 = 'INH'</td>
<td></td>
</tr>
<tr>
<td>ATT CNTL SHD N</td>
<td>P79X 0814 E</td>
<td>0 = 'NO'</td>
<td>1 = 'YES'</td>
<td></td>
</tr>
</tbody>
</table>

| HANDOVER CNTL TO ORB | P79X 0815 E | 0 = 'blank' | 1 = " " |     |

| CONTINGENCY DOCKING [9] | P79X 0858 E | 0 = 'blank' | 1 = " " |     |

| CONTINGENCY UNDOCKING [11] | P79X 0819 E | Refer to remarks |     |
Continuation of Table ...

<table>
<thead>
<tr>
<th>UND OCK SEQ UEN</th>
<th>INIT</th>
<th>TIME SINC E SEP [13]</th>
<th>P79X 0859 E</th>
<th>0 = blank</th>
<th>1 = “ * ”</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OFF NOMINAL COMMANDS [14]**

<table>
<thead>
<tr>
<th>DOC KED IND</th>
<th>P79X 0811 E</th>
<th>0 = blank</th>
<th>1 = “ * ”</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UND OCK ED IND</th>
<th>P79X 0811 E</th>
<th>0 = “ * ”</th>
<th>1 = blank</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**HANOVER CONTL TO ISS**

<table>
<thead>
<tr>
<th>THR STR AVAIL FOR DES AT [15]</th>
<th>P79X 0805 E</th>
<th>0 = ‘NO’</th>
<th>1 = ‘YES’</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS**

[1] The US (United States) GNC MODE and the RS (Russian Segment) GNC MODE allow the orbiter crew to know how the station is controlling attitude. For nominal ISS attitude control, the US GNC Mode = CMG TA, and the RS GNC Mode = CMG TA. If the RS was controlling, the US GNC Mode = Drift (although depending on the failure scenario, it could be any one of the modes), and the RS GNC Mode = Thruster. If the Orbiter was controlling, the US GNC Mode = Drift (although depending on the failure scenario, it could be any one of the modes), and the RS GNC Mode = CMG TA or Indicatr.

[2] The US GNC MODE allows the orbiter crew to know how the US station is controlling attitude.
Table 2.

<table>
<thead>
<tr>
<th>MSID</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P79X0 845E</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>P79X0 846E</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Displayed Text:</td>
<td>DEFA</td>
<td>ULT</td>
<td>WAIT</td>
<td>RESE</td>
<td>RVED</td>
<td>STAN</td>
</tr>
</tbody>
</table>

[3] The RS GNC MODE allows the orbiter crew to know how the RS station is controlling attitude.

Table 3.

<table>
<thead>
<tr>
<th>MSID</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P79X0 842E</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>P79X0 843E</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Displayed Text:</td>
<td>RESE</td>
<td>RVED</td>
<td>THRU</td>
<td>STER</td>
<td>GY</td>
<td>ONLY</td>
</tr>
</tbody>
</table>

[4] The US/RS GNC LOSS COMM: This Caution and Warning (C&W) is used in the handover of attitude control from Orbiter to CMG TA procedure, and if it is in alarm, the handover will not work. This C&W is coded on this Spec as conditional, which utilizes the overbright and flash functionality.

[5] GNC MDM FRAME COUNT: This parameter is used to determine if the entire Spec in general is getting updated data from the ISS. This parameter is normally displayed in decimal form resulting in an increment counter. But due to flight software constraints, this parameter will be displayed in hex form. Hex is sufficient because this parameter just needs to update.

[6] US PRI GNC MDM FAIL: This Caution and Warning (C&W) is used in the handover of attitude control from Orbiter to CMG TA procedure, and if it is in alarm, the handover will not work. This C&W is FDA’d as a Class 3 Alert, which when TMBU enabled, will have an onboard audible alarm, a light indication, an Onboard Fault Summary message, and a down arrow on the Spec parameter status field. This C&W is coded on this Spec as conditional, which utilizes the overbright and flash functionality.
[7] LOSS CMG ATT CNTL: This Caution and Warning (C&W) is used in the handover of attitude control from Orbiter to CMG TA procedure, and if it is in alarm, the handover will not work. This C&W is FDA'd as a Class 3 Alert, which when TMBU enabled, will have an onboard audible alarm, a light indication, an Onboard Fault Summary message, and a down arrow on the Spec parameter status field. This C&W is coded on this Spec as conditional, which utilizes the overbright and flash functionality.

[8] US DRIFT AVAIL: If this parameter, US Drift Available = Yes, then the command Item 9 MODE TO DRIFT will be accepted by the ISS US GNC MDM.

[9] CONTINGENCY DOCKING: These commands do not have any nominally planned use, but if there is a loss of redundancy to mode the ISS to free drift at docking, then MCC may decide to use this section.

[10] DOCK SEQUENCE INIT: This parameter is set high if item 11 was commanded to start the manual ACS Moding software to execute and mode the ISS to free drift.

[11] CONTINGENCY UNDOCKING: These commands do not have any nominally planned use, but if there is a loss of redundancy to mode the ISS to attitude control after undocking, then MCC may decide to use this section.

[12] POST DEP CNTL MODE: The Post Departure Control Mode can be set to CMG TA, CMG Only, or RS CNTL. If this parameter reads RS CNTL, then after undocking, if the ACS Moding software properly executes, the ISS will resume control on Russian thruster control.

<table>
<thead>
<tr>
<th>MSID</th>
<th>P79X0818E</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P79X0819E</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>Displayed Text:</td>
<td>CMG TA</td>
<td>CMG ONLY</td>
</tr>
</tbody>
</table>

[13] TIME SINCE SEP: When the manual software is initiated or when the automatic software is initiated by the sensors, this time since separation parameter begins to count up from zero to a commanded value (typically 100 seconds) at which time the ISS will resume attitude control using the control method defined by the Post Departure Control Mode parameter.

[14] OFF NOMINAL COMMANDS: These commands do not have any nominally planned use, but may be used in MCC determined contingencies.

[15] THRSTR AVAIL FOR DESAT: telemetry feedback for Item 19 RS PREP FOR CMG DESAT. If that command is successful, then this parameter will show YES, and the RS is prepared to enter CMG TA mode.

**ITEM ENTRY CHARACTERISTICS**
Item 1: REROUTE TO SSOR: All the commands on this Spec are hardcoded with a routing code = 1, which is for the OIU / GNC Hardline. If the commands are to be sent through the SSOR, then this reroute command will tell the OIU that for any command with a routing code of 1, to change it to 2, which is the routing code for SSOR.

Item 2: ROUTE TO NORMAL HARDLINE: If there was an activity that required commanding from Spec 205 through the SSOR and that commanding activity is complete, then this route to normal command should be sent. All the commands on this Spec are hardcoded with a routing code = 1, which is for the OIU / GNC Hardline. But, for commanding through the SSOR, the OIU can be configured to take all routing codes of 1 and change it to 2, which is SSOR. So, to return the OIU to a nominal configuration, this command will tell the OIU that for all commands with routing code of 1, to assign it a routing code of 1.

Item 3: NO OP COMMAND: The commands to reroute to SSOR and route to normal hardline do not have any telemetry feedback. As a form of feedback, this no op command is sent and the command accept counter telemetry will increment, thus verifying the routing commands success.

Item 4: MODE XTION ENA is used to command the Mode Transition Inhibit to a status of either enabled. The telemetry feedback is ENA.

Item 5: ATT MNVR ENA is used to command the Attitude Maneuver Inhibit to a status of enabled. The telemetry feedback is ENA or INH.

Item 6: DESAT REQ ENA is used to command the Desat Request Inhibit to a status of enabled. The telemetry feedback is ENA or INH.

Item 7: ATT CNTL SHDN ENA is used to command the Attitude Control Shutdown Inhibit to a status of enabled. The telemetry feedback is ENA or INH.

Item 8: MODE XTION INH is used to command the Mode Transition Inhibit to a status of either inhibited. The telemetry feedback is INH.

Item 9: MODE TO DRIFT commands the ISS US GNC Mode to Drift.

Item 10: DOCK SOFTWARE ENA commands the manual dock software within the ACS Moding software to be enabled.

Item 11: DOCK SEQUENCE INIT commands the manual dock software within the ACS Moding software to execute, if the manual dock software is enabled per Item 10. The software that executes is the same software that the automatic ACS Moding software executes if the Capture Long sensors worked.

Item 12: UNDOCK SOFTWARE ENA commands the manual undock software within the ACS Moding software to be enabled.
Item 13: UNDOCK SEQUENCE INIT commands the manual undock software within the ACS Moding software to execute, if the manual undock software is enabled per Item 12. The software that executes is the same software that the automatic ACS Moding software executes if the Interface Sealed sensors and Separation sensors worked.

Item 14: INCORP MASS PROP is a command that incorporates the US GNC mass properties from a buffer location to active use.

Item 15, 16: DOCKED IND and UNDOCKED IND are manual commands that toggle a bit in the Primary C&C MDM automatic ACS Moding software. This bit is used by the Russian Segment to update their mass properties.

Item 17: HOLD CURRENT ATTITUDE is a command to the US GNC MDM that performs a snap and hold at the current attitude, assuming the US GNC Mode is already in CMG TA and controlling attitude.

Item 18: RS TAKE LVLH ATT CNTL is an ISS Tier 1 command that tells the Russian Segment to take attitude control in Thrusters in the LVLH reference frame. This command is an off nominal command without handshake between the US GNC MDM and the RS TBM. The nominal command to have the Russian Segment take control 6-17 is with handshake, which means there is some Tier 2 communication between the US GNC MDM and the RS TBM.

Item 19 RS PREP FOR CMG DESAT is a Tier 1 command that prepares the Russian Segment for CMG TA mode.

Item 20: MODE TO CMG TA is a command that changes the US GNC Mode to CMG TA using CCDB slot number 1, and also will change the RS GNC Mode to CMG TA if it is not already so.
Figure 1. ISS C&W Display - SPEC 211.

The SM 211 ISS C&W display is available in SM OPS 2 and is used for monitoring pertinent ISS C&W telemetry. Since the PCS does not have the capacity to annunciate alarm tones, the tone status flag from the ISS will be used to trigger the orbiter C&W system.

PARAMETER CHARACTERISTICS
1. **ASDA**

<table>
<thead>
<tr>
<th>CRT NAME</th>
<th>MSID</th>
<th>UNIT</th>
<th>DISPLAY RANGE</th>
<th>STATUS IND [1]</th>
<th>FDA LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>FIRE</td>
<td>P79X 0803 E</td>
<td></td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>PRESS</td>
<td>P79X 0801 E</td>
<td></td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>TOX ATM</td>
<td>P79X 0802 E</td>
<td></td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>CAUT</td>
<td>P79X 0830 E</td>
<td></td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>WARN</td>
<td>P79X 0831 E</td>
<td></td>
<td></td>
<td>M</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS**

1] The parameter status field for all parameters will be blank for normal operation or will display an "M" for missing data. For analog parameters, this field will also display an "H" or "L" for offscale data. Some parameters displayed will be limit-sensed for SM alerts or C&W alarms. For discretes that are limit-sensed, the undesirable state is defined in the FDA low limit field and the FDA high limit field is left blank. Satisfaction of the undesirable state triggers a "↓" indication. For analogs that are limit-sensed, an "↑" or a "↓" will be displayed when the parameter exceeds either an upper or lower limit. The symbols driven in the parameter status field have the following display priority from highest to lowest: "M", "H", "L", "↑", "↓". All symbols driven in the parameter status column will be displayed four times normal intensity.

2] When the tone status flag is set for any FIRE, pressure (PRESS), toxic atmosphere (TOX ATM), caution (CAUT), or warning (WARN) event, a "↓" will be displayed in the appropriate status field. The FIRE, PRESS, and TOX ATM events will initiate a master alarm light and tone, B/U C&W light on panel F7, and a fault message. WARN and CAUT events will initiate an alert light, tone, and fault message. The PCS can be referenced for additional details on the fault condition.
The SM 212 OIU display is available in SM OPS 2 and is used to configure the OIU for cargo element operations, monitor OIU status, and monitor relevant PDI, PSP, and SSOR statuses.

**PARAMETER CHARACTERISTICS**

---

**Figure 1. OIU Display - SPEC 212.**
### SDFS

<table>
<thead>
<tr>
<th>CRT NAME</th>
<th>MSID</th>
<th>UNIT S</th>
<th>DISPLAY RANGE</th>
<th>STATUS IND</th>
<th>FDA LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIU 1 TEMP</td>
<td>P50T</td>
<td>deg F</td>
<td>-23.4 to +304.3</td>
<td>M H L ↑ ↓</td>
<td>LO HI 212</td>
</tr>
<tr>
<td>P [1]</td>
<td>4000V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OIU 2 TEMP</td>
<td>P50T</td>
<td>deg F</td>
<td>-23.4 to +304.3</td>
<td>M H L ↑ ↓</td>
<td>LO HI 212</td>
</tr>
<tr>
<td>P [1]</td>
<td>4001V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OIU STATUS CTR</td>
<td>P50U</td>
<td>sec</td>
<td>00 to 59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US CTR [2]</td>
<td>4106 D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS BC TIME</td>
<td>P50U</td>
<td>time</td>
<td>Refer to remarks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[2]</td>
<td>4112 D, P50U 4113 D, P50U 4111 D, P50U 4114 D, P50U 4115 D, P50U 4116 D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Continuation of Table...

<table>
<thead>
<tr>
<th>AD 1 PD [3]</th>
<th>P50X 4401 E, P50X 4402 E, P50X 4403 E, P50X 4404 E, P50X 4405 E, P50X 4406 E</th>
<th>Refer to remarks</th>
<th>↓</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD 2 PD [3]</td>
<td>P50X 4411 E, P50X 4412 E, P50X 4413 E, P50X 4414 E, P50X 4415 E, P50X 4416 E</td>
<td>Refer to remarks</td>
<td>↓</td>
<td>1</td>
</tr>
</tbody>
</table>
Continuation of Table ...

<table>
<thead>
<tr>
<th>AD 3 PD [3]</th>
<th>P50X 4421 E, P50X 4422 E, P50X 4423 E, P50X 4424 E, P50X 4425 E, P50X 4426 E</th>
<th>Refer to remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD 4 PD [3]</td>
<td>P50X 4431 E, P50X 4432 E, P50X 4433 E, P50X 4434 E, P50X 4435 E, P50X 4436 E</td>
<td>Refer to remarks</td>
</tr>
<tr>
<td>AD 1 BUS [4]</td>
<td>P50U 4055 D</td>
<td>n/a</td>
</tr>
<tr>
<td>AD 2 BUS [4]</td>
<td>P50U 4065 D</td>
<td>n/a</td>
</tr>
<tr>
<td>AD 3 BUS [4]</td>
<td>P50U 4075 D</td>
<td>n/a</td>
</tr>
<tr>
<td>AD 4 BUS [4]</td>
<td>P50U 4085 D</td>
<td>n/a</td>
</tr>
</tbody>
</table>
## Continuation of Table ...

| AD 1 LOC K [5] | P50X 4440 E, P50X 4441 E | 0,0 = ‘NON E’ 0,1 = ‘YES’ 1,0 = ‘NO’ 1,1 = ‘N/A’ | M | ↓ | 1,0 |
| AD 2 LOC K [5] | P50X 4450 E, P50X 4451 E | 0,0 = ‘NON E’ 0,1 = ‘YES’ 1,0 = ‘NO’ 1,1 = ‘N/A’ | M | ↓ | 1,0 |
| AD 3 LOC K [5] | P50X 4460 E, P50X 4461 E | 0,0 = ‘NON E’ 0,1 = ‘YES’ 1,0 = ‘NO’ 1,1 = ‘N/A’ | M | ↓ | 1,0 |
| AD 4 LOC K [5] | P50X 4470 E, P50X 4471 E | 0,0 = ‘NON E’ 0,1 = ‘YES’ 1,0 = ‘NO’ 1,1 = ‘N/A’ | M | ↓ | 1,0 |
| PDI DCM 1 B,W,F SY NC [13] | V75X 6403 D, V75X 6402 D, V75X 6401 D | 0 = blank 1 = ‘’ 0 = blank 1 = ‘’ 0 = blank 1 = ‘’ | M | M | ↓ | 0 0 0 |
| PDI DCM 2 | V75X 6407 D, V75X 6406 D, V75X 6405 D | 0 = blank, 1 = "*" | M | M | ↓ | 0 |
| PDI DCM 3 | V75X 6411 D, V75X 6410 D, V75X 6409 D | 0 = blank, 1 = "*" | M | 0 | ↓ | 0 |
| PDI DCM 4 | V75X 6415 D, V75X 6414 D, V75X 6413 D | 0 = blank, 1 = "*" | M | 0 | ↓ | 0 |
| OIU CMD CTR [6] | P50U 4132 A | n/a | 0 to 255 |
| OIU PSP I/F [7] | P50X 4283 E | 0 = 'OK', 1= 'ERR' |
| FLOA T POIN T [8] | P50X 4288 E | 0 = 'OK', 1= 'ERR' | M | ↓ | 1 |
Continuation of Table ...

<table>
<thead>
<tr>
<th>PSP LAST CMD [10]</th>
<th>V92X 1102 X, V92X 1116 X, V92X 1129 X</th>
<th>1,0,1 = 'REJ' 0,1,1 = 'INC' else = 'OK'</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIU LAST CMD [11]</td>
<td>P50X 4281 E, P50X 4303 E, P50X 4287 E</td>
<td>1,0,0 or 0,1,0 or 1,1,0 or 0,0,1 or 1,0,1 or 0,1,1 or 1,1,1 = 'REJ' else = 'OK'</td>
</tr>
<tr>
<td>SSO R PRI FRM SYM C [12]</td>
<td>V74X 2050 E</td>
<td>0 = 'NO', 1 = 'YES'</td>
</tr>
<tr>
<td>SSO R PRI STAT US [12]</td>
<td>V74X 2051 E</td>
<td>0 = 'BAD', 1 = 'OK'</td>
</tr>
<tr>
<td>SSO R B/U FRM SYM C [12]</td>
<td>V74X 2053 E</td>
<td>0 = 'NO', 1 = 'YES'</td>
</tr>
<tr>
<td>SSO R B/U STAT US [12]</td>
<td>V74X 2052 E</td>
<td>0 = 'BAD', 1 = 'OK'</td>
</tr>
</tbody>
</table>
Continuation of Table ...

<table>
<thead>
<tr>
<th>FOR MAT [14]</th>
<th>P50U 4010 A</th>
<th>n/a</th>
<th>0 to 255</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 1 RT [15]</td>
<td>P50X 4021 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
<td></td>
</tr>
<tr>
<td>BUS 1 BC [15]</td>
<td>P50X 4021 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
<td></td>
</tr>
<tr>
<td>BUS 1 A [15]</td>
<td>P50X 4041 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
<td></td>
</tr>
<tr>
<td>BUS 1 B [15]</td>
<td>P50X 4041 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
<td></td>
</tr>
<tr>
<td>BUS 2 RT [15]</td>
<td>P50X 4022 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
<td></td>
</tr>
<tr>
<td>BUS 2 BC [15]</td>
<td>P50X 4022 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
<td></td>
</tr>
<tr>
<td>BUS 2 A [15]</td>
<td>P50X 4042 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
<td></td>
</tr>
<tr>
<td>BUS 2 B [15]</td>
<td>P50X 4042 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
<td></td>
</tr>
<tr>
<td>BUS 3 RT [15]</td>
<td>P50X 4023 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
<td></td>
</tr>
<tr>
<td>BUS 3 BC [15]</td>
<td>P50X 4023 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
<td></td>
</tr>
<tr>
<td>BUS 3 A [15]</td>
<td>P50X 4043 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
<td></td>
</tr>
<tr>
<td>BUS 3 B [15]</td>
<td>P50X 4043 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
<td></td>
</tr>
</tbody>
</table>
Continuation of Table...

<table>
<thead>
<tr>
<th>BUS 4 RT [15]</th>
<th>P50X 4024 E</th>
<th>0 = &quot;*&quot;, 1 = blank</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 4 BC [15]</td>
<td>P50X 4024 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
</tr>
<tr>
<td>BUS 4 A [15]</td>
<td>P50X 4044 E</td>
<td>0 = &quot;*&quot;, 1 = blank</td>
</tr>
<tr>
<td>BUS 4 B [15]</td>
<td>P50X 4044 E</td>
<td>0 = blank, 1 = &quot;*&quot;</td>
</tr>
<tr>
<td>SPA RE CMD [16]</td>
<td>P93J 0101 C</td>
<td>n/a 1 to 12</td>
</tr>
</tbody>
</table>

REMARKS

[1] The OIU TEMP parameters will read 140° F when the OIU associated with that measurement is OFF. Note that this is the only sure method to determine which OIU is powered up from this display alone. Additional insight is available via the panel L12 OIU PWR tb.

[2] OIU STATUS CTR displays the OIU time parameter for seconds, reading from 00 to 59 and resetting to 00 again. This indicates OIU health by constantly counting from 00 to 59 and recycling when the OIU telemetry is being processed by the PDI. ISS BC TIME follows the format MM-DD-YY/HH:MM:SS and comes from whichever device is BC to the OIU. This parameter will read all zeros at powerup, will show the correct BC time at the time the BC comes up and starts sending telemetry to the OIU, and will remain static at the last good sample when the incoming telemetry from that BC goes away.

[3] ACTIVE DEVICES: The OIU active device (AD) status section provides insight for OIU processing on the external telemetry sources with which the OIU can interface. Status shown for each AD (1 to 4) includes the physical device (PD) assigned to that AD, the BUS being used to acquire that device’s telemetry, and a LOCK status indication. The computation used to drive the PD field is defined in the following table:
If none of the above conditions are met, the default text displayed is ERR. Note that PD = OIU when no active device is assigned and is also displayed when OIU format supports an OIU error log dump, GNC1 and GNC2 are the ISS Tier 2 Guidance, Navigation and Control MDMs, SR-1 and SR-2 are the Space to Space Orbiter Radios (SSOR), MP-1 and MP-2 are the MPLM MDMs, N1-1 and N1-2 are the Node MDMs, and FGB1 and FGB2 are the ISS FGB MDMs.

[4] BUS: Indicates the OIU bus 1 to 7, 0 indicates OIU bus 8. Note that the OIU hardware currently supports only buses 1 to 4.

[5] LOCK: ‘NONE’ if the current OIU format does not have an AD for this display location. ‘YES’ if the OIU is RT and in sync with the AD (ISS BC or SSOR). ‘YES’ if the AD is OIU in error log dump format (OIU must be in sync with itself). ‘NO’ if the OIU is RT and was in sync with the AD but has lost lock on the AD (ISS BC or SSOR). N/A if the OIU is BC to the AD, except if the AD is SSOR. Note that if LOCK goes from ‘YES’ to ‘NO’, the OIU stops attempting to acquire sync with that AD. To force the OIU to attempt to resync with an AD, the OIU format must be reloaded.

[6] OIU CMD CTR will start at 000 at powerup, and will increment by one whenever the OIU receives a valid command from the PSP. The counter reads in decimal, and will count from 000 to 255 and roll over to 000. All commands, whether from the MCC or the MCDS, will cause the counter to increment if received and processed by the OIU.

[7] PSP I/F indicates OK if the OIU is receiving the 16 Khz command carrier from either PSP1 or PSP2. ERR is displayed if no command carrier is being received.
[8] The OIU can convert one ISS floating point parameter value per PDI minor frame (maximum of 100 per major frame) into a shuttle PDI-compatible parameter value. If an ISS floating point value is invalid or results in an invalid floating point value/operation during the conversion process, the OIU annunciates an error. The FLOAT POINT display parameter will read ERR for this condition or ‘OK’ if no floating point error/operation is detected.

[9] The parameter status field for all parameters will be blank for normal operation or will display an “M” for missing data. For analog parameters, this field will also display an “H” or “L” for offscale data. Some parameters displayed will be limit-sensed for SM alerts or C&W alarms. For discretes that are limit-sensed, the undesirable state is defined in the FDA low limit field and the FDA high limit field is left blank. Satisfaction of the undesirable state triggers a “↓” indication. For analogs that are limit-sensed, an “↑” or a “↓” will be displayed when the parameter exceeds either an upper or lower limit. The symbols driven in the parameter status field have the following display priority from highest to lowest: “M”, “H”, “L”, “↑”, “↓”. All symbols driven in the parameter status column will be displayed four times normal intensity.

[10] PSP LAST CMD indicates the command acceptance for crew originated command: ‘OK’ if the PSP has not rejected a crew command, REJ if the PSP rejected the last crew command, or INC of the PSP was not able to complete the transfer of the last crew command. The REJ and INC indications are cleared by the next successfully processed PSP command from either crew or ground.

[11] OIU LAST CMD indicates the command acceptance by the OIU. REJ is displayed if the OIU has detected either a parity error or an incorrect byte count in a command received from the PSP. Otherwise, ‘OK’ is displayed.

[12] For both the primary (PRI) and a backup (B/U) Space to Space Orbiter Radio (SSOR), the FRM SYNC indication gives the status of the frame synchronizer. YES indicates SSOR frame sync with the ISS Space to Space Station Radio (SSSR), ‘NO’ indicates no SSOR frame sync, or the SSOR is off, or the SSOR is not present. The STATUS indication yields ‘OK’ if the SSOR is operating normally, or indicates ‘BAD’ if the SSOR BITE has sensed a failure.

[13] PDI DCM SYNC gives indication of the Bit (B), Word (W), and Frame (F) synchronizer statuses for all four PDI decommutators. For each DCM, the B, W, and F columns will be blank if the decom is not in bit, word, or frame sync, respectively. An asterisk will be displayed in each of the B, W, or F columns if the sync conditions do exist. Note that the decom actually processing OIU telemetry is dependent on orbiter PDI/PCMMU config.

[14] FORMAT: Indicates the currently loaded OIU format.

[15] BUS 1 to 4: The OIU bus processing state [Bus Controller (BC) or Remote Terminal (RT)] and channelization (A or B) is indicated by asterisks for each of buses 1 to 4.

[16] SPARE CMD: Displays the item entry index associated with the last Item 18.
ITEM ENTRY CHARACTERISTICS

Item 1: FORMAT: indexed command item entry used to changing the OIU format (ITEM 1 + XXX EXEC). The valid decimal format numbers for entry via MCDS on STS-117 are 001 to 020, 250, 251, 254, and 255.

Item 2 to 17: BUS 1 to BUS 4: This section allows changing the OIU’s current bus processing state [Bus Controller (BC) or Remote Terminal (RT)] and bus channel (A or B) for any of the currently implemented four OIU buses. For example, if Bus 3 is BC, and using Channel A, there will be an asterisk next to Items 11 and 12. To change Bus 3 to RT, an ITEM 10 EXEC is performed. In the case of the bus channelization (A or B), the displayed telemetry indicates which channel is prime for command and telemetry transactions on that bus if the OIU is BC on that bus. If the OIU is BC on a bus, it will try to send a command for an AD using the prime channel. If the OIU receives no status message from that AD, it tries again on the prime channel, then it tries on the alternate channel. If the AD has not responded, it declares failure and stops trying to send a command to that AD. When the OIU is RT on a bus, it will respond on either channel, depending on which channel received a transaction from the BC; therefore, the channel indication has no meaning when the OIU is RT on a bus.

Item 18: SPARE CMD: an indexed command that allows performing the following internal OIU function mapping:

Item 18 + 1: Change FGB MDM active device to FGB-2 MDM physical device*.
Item 18 + 2: Change FGB MDM active device to FGB-1 MDM physical device*.
Item 18 + 3: Change Node 1 MDM active device to N1-2 MDM physical device*.
Item 18 + 4: Change Node 1 MDM active device to N1-1 MDM physical device*.
Item 18 + 5: Move FGB -2 MDM physical device to OIU Bus 4 *.
Item 18 + 6: Move FGB -2 MDM physical device to OIU Bus 3 *.
Item 18 + 7: Move FGB -1 MDM physical device to OIU Bus 4 *.
Item 18 + 8: Move FGB -1 MDM physical device to OIU Bus 3 *.
Item 18 + 9: Move N1-1 MDM physical device to OIU Bus 4 *.
Item 18 + 10: Move N1-1 MDM physical device to OIU Bus 3 *.
Item 18 + 11: Move N1-2 MDM physical device to OIU Bus 4 *.
Item 18 + 12: Move N1-2 MDM physical device to OIU Bus 3 *.
Item 18 + 13: Change GNC MDM active device to GNC-2 MDM physical device.
Item 18 + 14: Change GNC MDM active device to GNC-1 MDM physical device.
Item 18 + 15: Move GNC-1 MDM physical device to OIU Bus 4 (LB ORB N2-2).
Item 18 + 16: Move GNC-1 MDM physical device to OIU Bus 3 (LB ORB N2-1).
Item 18 + 17: Move GNC-2 MDM physical device to OIU Bus 4 (LB ORB N2-2).
Item 18 + 18: Move GNC-2 MDM physical device to OIU Bus 3 (LB ORB N2-1).

Items accompanied by “*” are not used on STS-117.
### Figure 1. Standard Switch Panel 1.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DEVICE TYPE</th>
<th>FUNCTION</th>
</tr>
</thead>
</table>
| CB2 Switch PWR 1       | Circuit breaker, 5 amp      | closed (in) - Applies orbiter CAB PL1 power to SSP1 S3 and S4, and SSP2 S12.  
                        |                             | open (out) - Removes power from SSP1 S3 and S4, and SSP2 S12.             |
| CB1 PDIP 1 PWR 2/ KuBAND RLY | Circuit breaker, 5 amp      | closed (in) - Applies orbiter CAB PL2 power to the PDIP1 DC PWR 2 outlet and KuBAND RATE switch.  
                        |                             | open (out) - Removes power from PDIP DC PWR 2 outlet and KuBAND RATE switch.  |
| S3 APCU 1 CONV         | Toggle switch, two - position (Maintained - Maintained) | ON (up) - Applies power to the APCU 1 converter  
                        |                             | OFF (dn) - Removes power from the APCU 1 converter                      |
| DS3 APCU 1 CONV        | Event indicator, two - position | gray - Indicates APCU 1 converter powered  
                        |                             | bp - Indicates APCU 1 converter not powered                              |
| S4 APCU 1 OUTPUT RLY   | Toggle switch, two - position (Maintained - Maintained) | CLOSE (up) - Closes the APCU 1 output relay  
<pre><code>                    |                             | OPEN (dn) - Opens the APCU 1 output relay                                |
</code></pre>
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DEVICE TYPE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS4</td>
<td>Event indicator, two - position</td>
<td>gray - Indicates APCU 1 output relay is closed&lt;br&gt;bp - Indicates APCU 1 output relay is open</td>
</tr>
<tr>
<td>S6</td>
<td>Toggle switch, two - position (Maintained - Maintained)</td>
<td>ON (up) - Applies power to the APCU 2 converter&lt;br&gt;OFF (dn) - Removes power from the APCU 2 converter</td>
</tr>
<tr>
<td>DS6</td>
<td>Event indicator, two - position</td>
<td>gray - Indicates APCU 2 converter powered&lt;br&gt;bp - Indicates APCU 2 converter not powered</td>
</tr>
<tr>
<td>S7</td>
<td>Toggle switch, two - position (Maintained - Maintained)</td>
<td>CLOSE (up) - Closes the APCU 2 output relay&lt;br&gt;OPEN (dn) - Opens the APCU 2 output relay</td>
</tr>
<tr>
<td>DS7</td>
<td>Event indicator, two - position</td>
<td>gray - Indicates APCU 2 output relay is closed&lt;br&gt;bp - Indicates APCU 2 output relay is open</td>
</tr>
<tr>
<td>DS13</td>
<td>Event indicator, three - position</td>
<td>UP - Indicates that CAB PL3 power is being supplied to OIU 1.&lt;br&gt;bp - Indicates power is removed from OIU 1 and OIU 2.&lt;br&gt;DN - Indicates that AUX PLB power is being supplied to OIU 2.</td>
</tr>
<tr>
<td>S15</td>
<td>Toggle switch, two - position (Maintained - Maintained)</td>
<td>ON (up) - Applies power to TCS.&lt;br&gt;OFF (dn) - Removes power from TCS.</td>
</tr>
<tr>
<td>DS15</td>
<td>Event indicator, two - position</td>
<td>gray - Indicates TCS powered.&lt;br&gt;bp - Indicates TCS not powered.</td>
</tr>
<tr>
<td>CB4</td>
<td>Circuit breaker, 5 amp</td>
<td>closed (in) - Applies orbiter CAB PL3 power to SSP1 S20 and S22.&lt;br&gt;open (out) - Removes power from SSP1 S20 and S22.</td>
</tr>
</tbody>
</table>
### Continuation of Table...

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DEVICE TYPE</th>
<th>FUNCTION</th>
</tr>
</thead>
</table>
| CB3  | Circuit breaker, 5 amp | closed (in) - Applies orbiter CAB PL2 to PDIP1 DC PWR 1 outlet and redundant power to SSP1 S20 and S22.  
open (out) - Removes power from PDIP DC PWR 1 outlet and redundant power from SSP1 S20 and S22. |
| S20  | Toggle switch, two -position (Maintained - Maintained) | ON (up) - Supplies CAB PL2 and CAB PL3 power for PMA 2 X1 connector mate signal.  
OFF (dn) - Removes power for PMA 2 X1 connector mate signal. |
| S22  | Toggle switch, two -position (Maintained - Maintained) | ON (up) - Supplies CAB PL2 and CAB PL3 power for PMA 2 X2 connector mate signal.  
OFF (dn) - Removes power for PMA 2 X2 connector mate signal. |
| S24  | Toggle switch, three -position (Maintained - Maintained) | OIU 1 ON (up) - Provides CAB PL3 power to OIU 1.  
OFF (ctr) - Removes power from OIU 1 and OIU 2.  
OIU 2 ON (dn) - Provides AUX PLB power to OIU 2. |
### Figure 1. Standard Switch Panel 2.

<table>
<thead>
<tr>
<th>Item</th>
<th>Device Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB1 PDIP 2 PWR 2</td>
<td>Circuit breaker, 5 amp</td>
<td>closed (in) - Applies orbiter CAB PL2 power to PDIP2 DC PWR 1 outlet. open (out) - Removes power from PDIP2 DC PWR 1 outlet.</td>
</tr>
<tr>
<td>S12 C/L CAM PWR</td>
<td>Momentary switch</td>
<td>PRI - Applies CAB PL3 power to PRI C/L CAM. SEC - Applies CAB PL 1 power to SEC C/L CAM.</td>
</tr>
<tr>
<td>CB3 PDIP 2 PWR 1</td>
<td>Circuit breaker, 5 amp</td>
<td>closed (in) - Applies orbiter CAB PL2 power to PDIP2 DC PWR 1 outlet open (out) - Removes power from PDIP2 DC PWR 1 outlet.</td>
</tr>
</tbody>
</table>