



International Space Station Assembly Operations Book

ISS-ULF3

Mission Operations Directorate
Operations Division

09 NOV 09

*These procedures are available
electronically on the SODF Homepage
at <http://mod.jsc.nasa.gov/do3>*

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

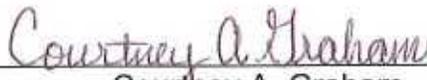


United Space Alliance

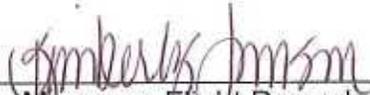
**INTERNATIONAL SPACE STATION
ASSEMBLY OPERATIONS BOOK
ISS-ULF3**

29 OCT 09

APPROVED BY:



Courtney A. Graham
Book Manager



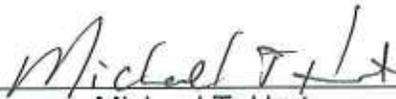
Manager, Flight Procedures

RMR



SODF Coordinator

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	Assy_OpsU1399A	Assy_OpsU1413	Assy_OpsU1424
	Assy_OpsU1400A	Assy_OpsU1414 (P)	Assy_OpsU1425
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	Assy_OpsU1409 (P)	Assy_OpsU1418	Assy_OpsU1429
	Assy_OpsU1410	Assy_OpsU1419	Assy_OpsU1430
	Assy_OpsU1411	Assy_OpsU1420	Assy_OpsU1434

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

None

**INTERNATIONAL SPACE STATION
ASSEMBLY OPERATIONS
ISS-ULF3**

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**INTERNATIONAL SPACE STATION
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ACTIVATION AND CHECKOUT

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1.100 NODE 1 PREP FOR NODE 3 – MIDBAY HARDWARE INSTALLATION

(ASSY OPS/ULF3/FIN 2)

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OBJECTIVE:

Install equipment in Node 1 Midbay area to support installation on Node 3 on Node 1 Port. New equipment includes cables, hoses, ducting, IMV Valve, and a new Closeout Panel.

LOCATION:

Node 1

DURATION:

6 hours, 30 minutes (Two Crew - Mod Kit Install)

1 hour 10 minutes (One Crew - Access)

CREW:

Two

PARTS:

Node 1 Avionics and Fluids Modification Kit [Refer to Table 1]

Node 1 IMV Modification Kit [Refer to Table 1]

MATERIALS:

Velcro Ties

Dry Wipes

Nitrile Gloves

Clean Room Gloves

Kapton Tape

Dust Mask

ALSP Kit:

Povidone Iodine Pads

TOOLS:

Flashlight

CSA-O2

Vacuum Cleaner

Digital Camera

Gamah Seal Maintenance Kit:

Fluid Fitting Torque Device

1.00" Drive Gear

0.625" Reaction Gear

ISS IVA Toolbox:

Drawer 2:

Driver Handle, 1/4" Drive

Ratchet, 1/4" Drive

Ratchet, 3/8" Drive

3/8" Socket, 1/4" Drive

5/32" Hex Head, 1/4" Drive

4" Ext, 1/4" Drive

6" Ext, 1/4" Drive

10" Ext, 1/4" Drive

1/4" Deep Socket, 1/4" Drive

1/2" Deep Socket, 1/4" Drive

(40-200 in-lbs) Trq Wrench, 3/8" Drive

1.100 NODE 1 PREP FOR NODE 3 – MIDBAY HARDWARE INSTALLATION

(ASSY OPS/ULF3/FIN 2)

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(10-50 in-lbs) Trq Wrench, 1/4" Drive

(5-35 in-lbs) Trq Driver, 1/4" Drive

1/4" to 3/8" Adapter

7/16" Deep Socket, 1/4" Drive

Drawer 3:

4" Common Tip Screwdriver

#6 Long Torq Driver, 3/8" Drive

6" Long, 3/8" Hex Head, 3/8" Drive

REFERENCED PROCEDURE(S):

1.401 SMOKE DETECTOR ACTIVATION

1.402 SMOKE DETECTOR DEACTIVATION

1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS

2.506 IMV VALVE RECONFIGURATION

A.2.1 FLUID FITTING TORQUE DEVICE (FFTD) ASSEMBLY AND USAGE

A.2.3 MATING GAMAH FITTING USING THE FFTD

A.2.13 GAMAH SEAL R&R

1.100 NODE 1 PREP FOR NODE 3 – MIDBAY HARDWARE INSTALLATION

(ASSY OPS/ULF3/FIN 2)

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Table 1. Node 1 Mod Kit Midbay Hardware

#	Part Name	Part Number	Serial Number	Barcode Number	Qty
1	RMO (Handle)	683-99532-1	000001	00115701H	1
2	NOD1P3-01 Closeout Panel	683-99519-1	000001	00106759H	1
3	NOD1P3-02 Closeout Panel	683-99519-2	000001	00115727H	1
4	NOD1P3-01 Closeout Panel	683-99519-6	000001	00109152H	1
5	NOD1 IMV Valve Power Cable (W9436)	683-99436-1	000001	00106730H	1
6	NOD1 IMV Valve Data Cable (W9437)	683-99437-1	000001	00106731H	1
7	NOD1O2 IMV Duct	683-99516-1	000001	00106749H	1
8	Band Clamp 4"	NAS1922-0400-3	N/A	N/A	6
9	IMV Duct Clamp	NAS1922-0525-3	N/A	N/A	1
10	IMV Duct Sleeve 4" Diameter (for contingency IMV use)	BACD40R16A30	N/A	N/A	1
11	NOD1P2 IMV Duct	683-99516-2	000001	00106750H	1
12	NOD1 IMV Diffuser Cover	683-99518-2	1001 1002	N/A	2
13	IMV Diffuser Gasket	683-15116-2	2001 2002 2003	N/A	3
14	NOD1 Waste Water Hose	683-99511-3	00001	00106739H	1
15	NOD1 Potable Water Hose	683-99511-4	00001	00106740H	1
16	NOD1 Video/Audio Bus A Cable (W9423)	683-99423-1	00001	00106719H	1
17	NOD1 ISL Ethernet Cable (W9426)	683-99426-1	00001	00106722H	1
18	NOD1 1553 CH A Cable (W9421)	683-99421-1	00001	00106717H	1
19	NOD1 1553 Termination Plug (W9427)	683-99427-1	00001	00106746H	1
20	NOD1 Wireless Audio Cable (W9425)	683-99425-1	00001	00106721H	1
21	NOD1 Wireless Audio Loopback Plug (W9428)	683-99428-1	00001	00106748H	1
22	EVA Tape (1 roll)	P-213	N/A	N/A	AR
23	Braycote (1 tube)	601-EF	N/A	N/A	AR
24	Cable Tie (100)	T50R2HAL	N/A	N/A	AR
25	Releaseable Wire Tie (60)	REZ200	N/A	N/A	AR

AR = As Required

1.100 NODE 1 PREP FOR NODE 3 – MIDBAY HARDWARE INSTALLATION
(ASSY OPS/ULF3/FIN 2) Page 4 of 55 pages

1. ACCESS

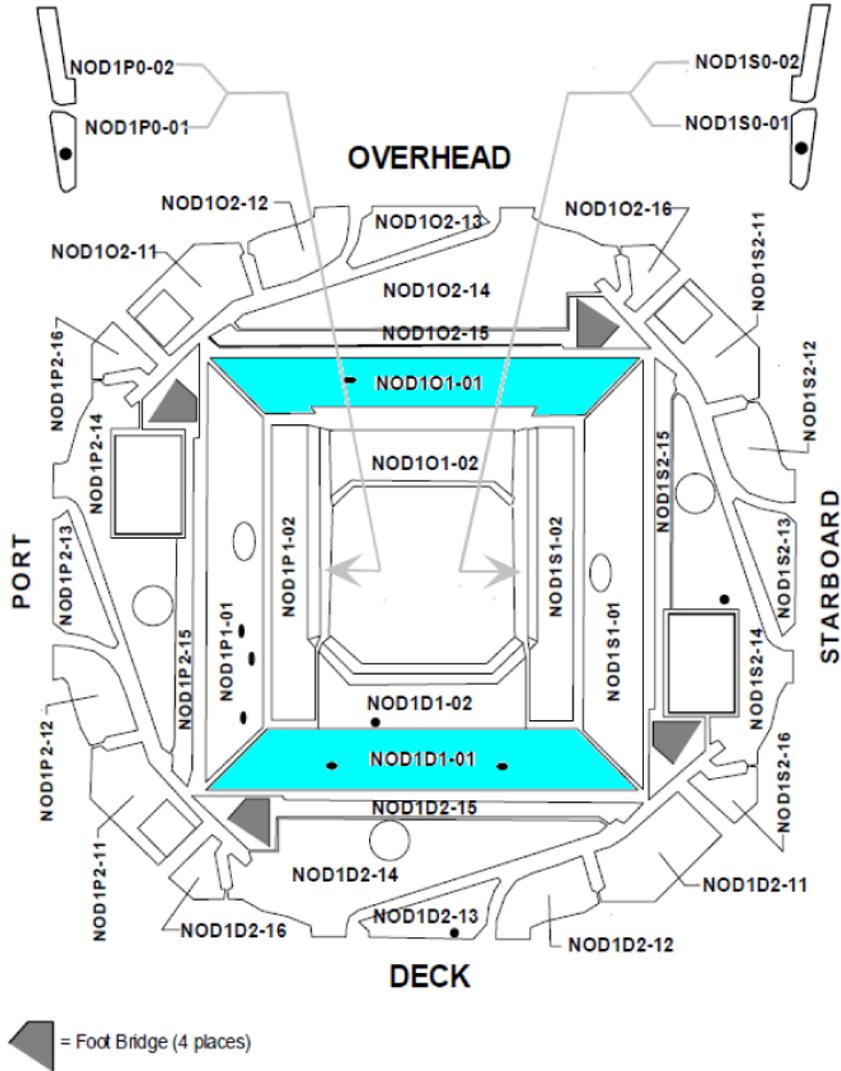


Figure 1.- Alcove Closeout Panel Removal.

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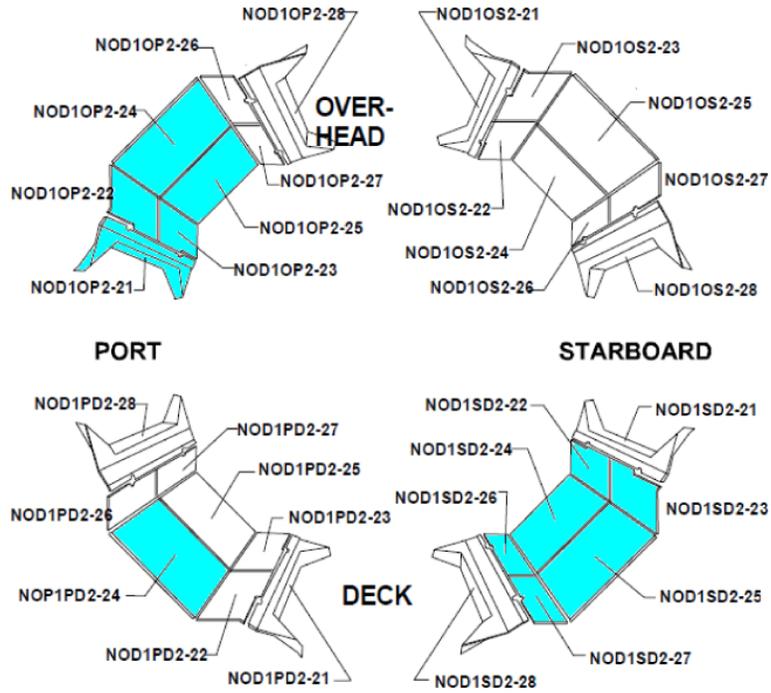


Figure 2.- Radial Closeout Panel Removal.

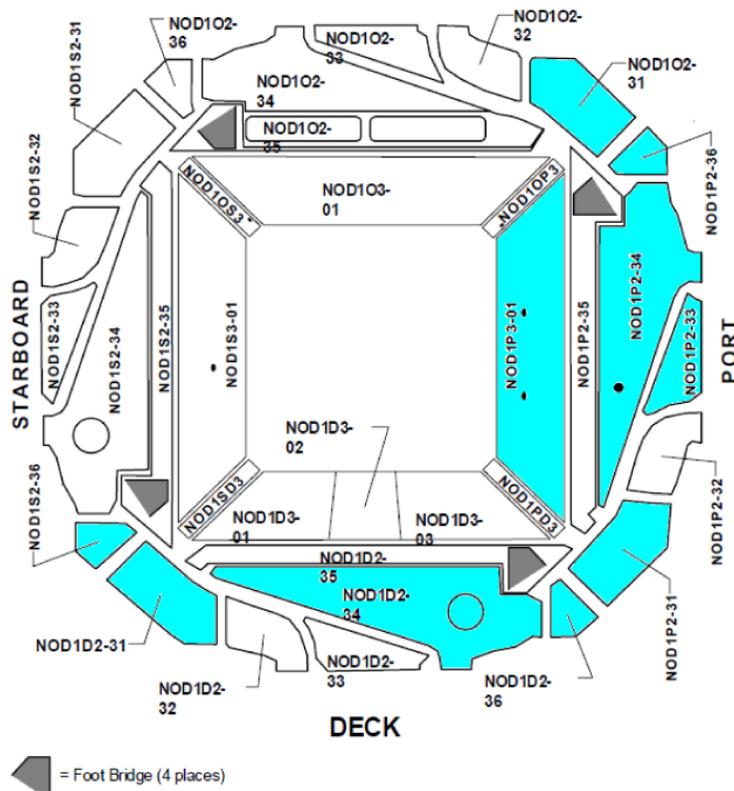


Figure 3.- Midbay Closeout Panel Removal.



Figure 4.- Closeout Seam Supports.

- 1.1 Remove the Closeout Panels listed in Table 2 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figures 1, 2, 3, and 4.

Table 2. Closeout Panels to be Removed

Closeout Panel	Fasteners	Notes
NOD1O1-01	8	
NOD1D1-01	8	
NOD1OP2-21	15	
NOD1OP2-22	3	Remove panels as a group
NOD1OP2-23	3	
NOD1OP2-24	6	
NOD1OP2-25	8	
NOD1PD2-24	6	
NOD1SD2-22	3	Remove panels as a group
NOD1SD2-23	3	
NOD1SD2-24	8	
NOD1SD2-25	6	
NOD1SD2-26	3	Remove panels as a group
NOD1SD2-27	3	
NOD1O2-31	6	Remove panels as a group
NOD1P2-36	5	
NOD1P2-33	5	
NOD1P2-34	24	
NOD1P3-01	6	
NOD1D2-36	5	Remove panels as a group
NOD1P2-31	6	
NOD1D2-34	24	
NOD1S2-36	5	Remove panels as a group
NOD1D2-31	6	

1.100 NODE 1 PREP FOR NODE 3 – MIDBAY HARDWARE INSTALLATION

(ASSY OPS/ULF3/FIN 2)

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- * If required for removal of Closeout Panels
- * | Remove L-shaped Closeout Seam Supports (two), fasteners
- * | (four each) (Ratchet, 1/4" Drive; 1/8" Hex Head, 1/4" Drive).
- * | Remove T-shaped Closeout Seam Support, fasteners (eight)
- * | (Ratchet, 1/4" Drive; 1/8" Hex Head, 1/4" Drive).

WARNING
CSA-O2 readings are required to insure O2 % is not above flammability levels or N2 pockets do not exist that can cause crew asphyxiation.

1.2 Perform CSA-O2 sampling in open cabin, then record: _____.

1.3 Comparison to MCA Sampling

US LAB: ECLSS: AR Rack: MCA

Lab MCA

'(ORU 2) Mass Spectrometer Assembly'

Record O2 %: _____

√Difference between CSA-O2 and MCA O2 percentages is less than or equal to 1.1 %

1.4 Perform CSA-O2 sampling in areas where Closeout Panel was removed for 1 minute.

If O2 % is between 16.5 and 23.3 %, proceed.

1.5 √NOD1P4 Rack rotation path unobstructed

NOD1P4

1.6 Disengage K-BAR Thumb Latches (two) from Standoff.
Slowly rotate Rack down to a controlled stop.
Temporarily restrain as required.

2. INSTALLING NODE 1 PORT-AFT IMV VALVE

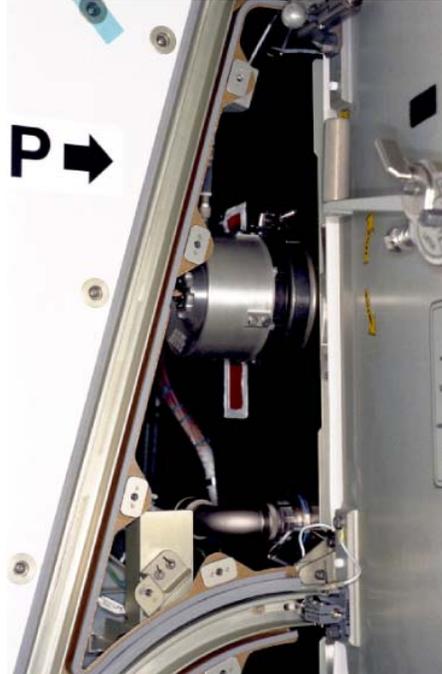


Figure 5.- Node 1 Port Aft NPRV.

NOD1P2-Aft 2.1 Loosen, remove V-Band Clamp and stow on Bulkhead flange.
Remove NPRV (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 7/16" Deep Socket,
1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
Temporarily stow NPRV.
Refer to Figure 5.

2.2 Inspect Node 1 Port-Aft IMV flange for FOD or damage (Flashlight).
If required, wipe sealing surface with Dry Wipe.

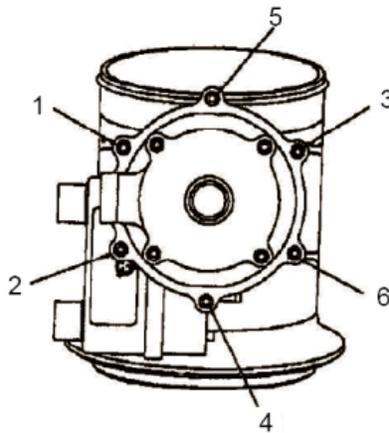


Figure 6.- IMV Valve RMO Flex Shaft Interface Noncaptive Fasteners.

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NOTE

IMV Valve RMO Flex Shaft Interface will be temporarily loosened to allow realignment for proper orientation of RMO Flex Shaft interface. These fasteners will be tightened and torqued after the RMO Handle is properly adjusted.

- 2.3 Loosen (do not remove) IMV Valve RMO Flex Shaft Interface noncaptive fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 6.

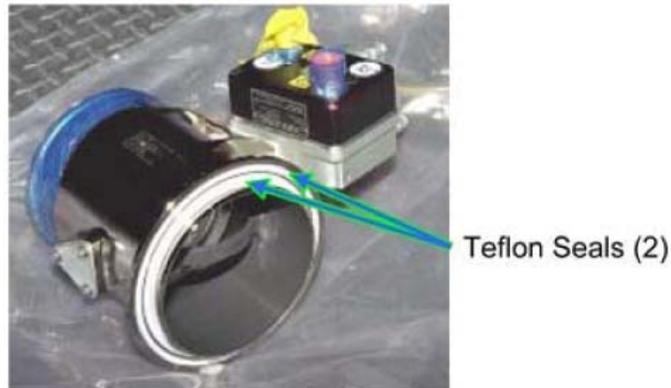


Figure 7.- Typical View IMV Teflon Seals.

- 2.4 ✓ Teflon Seal (two) on mating surface of IMV Valve flange clean, free of debris. Clean, if required, by wiping around circumference of seal (Dry Wipes). Refer to Figure 7.



Figure 8.- Example of Closed IMV Valve.

- 2.5 Visually verify IMV Valve is in Closed position. Refer to Figure 8.
- 2.6 Don Nitrile Glove.
- 2.7 Apply small amount of Braycote to fingertip. Work Braycote between fingertips until a very thin film is achieved with no visible pieces of Braycote present.

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2.8 Use lubricated fingertip to apply thin film of Braycote to seal crowns.

If Glove begins to stick to seal surface
Repeat step 2.7 for relubrication of Glove.

2.9 Verify no visible white Braycote clumps on seals; clumping can prevent proper seal performance.

2.10 Doff Nitrile Glove.

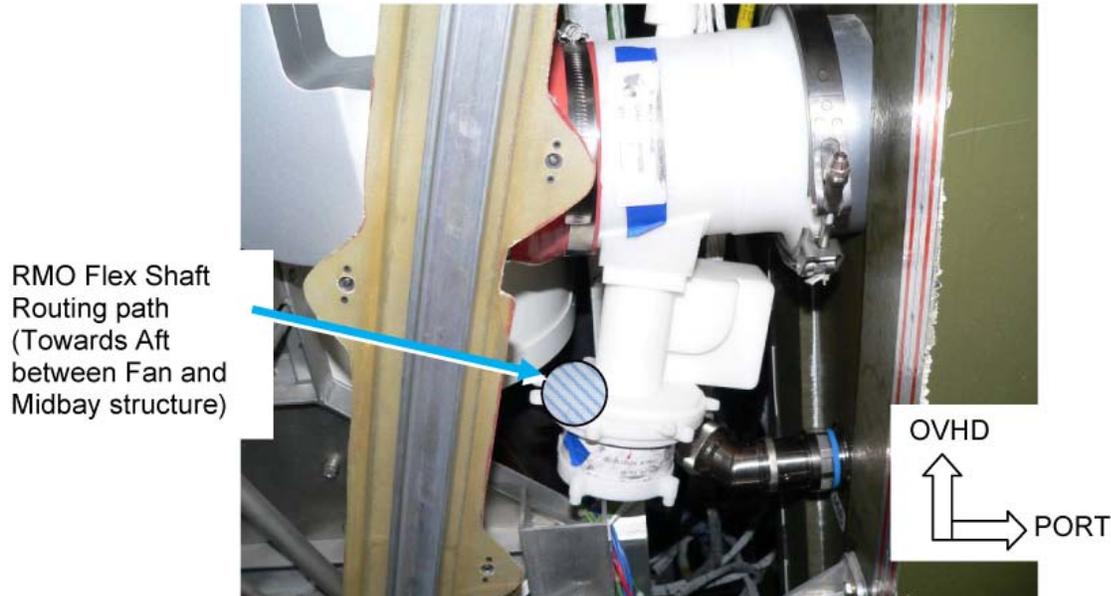


Figure 9.- IMV Valve Installed on Node 1 Port Bulkhead (Mockup in B9).

2.11 Align IMV Valve on Node 1 Port-Aft Bulkhead with mechanism housing and electronics assembly oriented slightly forward (12 degrees) of nadir. Minimize rubbing Teflon seals on Bulkhead. Refer to Figure 9.

2.12 RMO Flex Shaft will be routed between Node 1 Cabin Fan and Midbay structure. Rotate RMO Flex Shaft Interface to align with RMO Flex Shaft routing path: slightly starboard (11 degrees) of aft. Refer to Figure 9.

2.13 Install V-Band Clamp, tighten enough to keep IMV Valve in place but loose enough to allow IMV Valve rotation, if required, during RMO Flex Shaft connection (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).

3. INSTALLING IMV VALVE REMOTE MANUAL OVERRIDE (RMO)

NOTE
New NOD1P3-01 Panel must be assembled prior to installation. Once assembled, upper and lower segments will not need to be separated for subsequent access to Node 1 Port Midbay.

- 3.1 Align new NOD1P3-01 upper and middle Closeout Panels.
- 3.2 Tighten, torque NOD1P3-01 fasteners (six) joining upper and lower panels to 27 in-lbs [Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].

NOD1P3 3.3 Install new NOD1P3-01 Closeout Panel, fasteners (four) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

- 3.4 Remove tethered cap from RMO Flex Shaft.

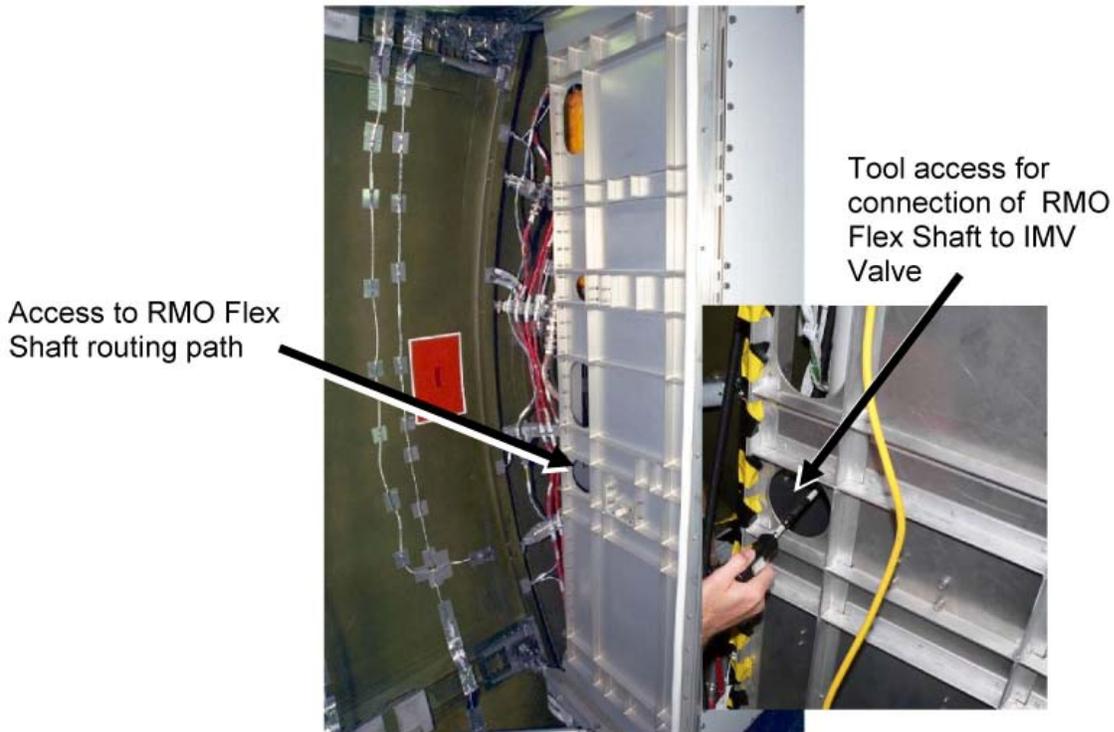


Figure 10.- Access Holes on Aft Side of Port Midbay.

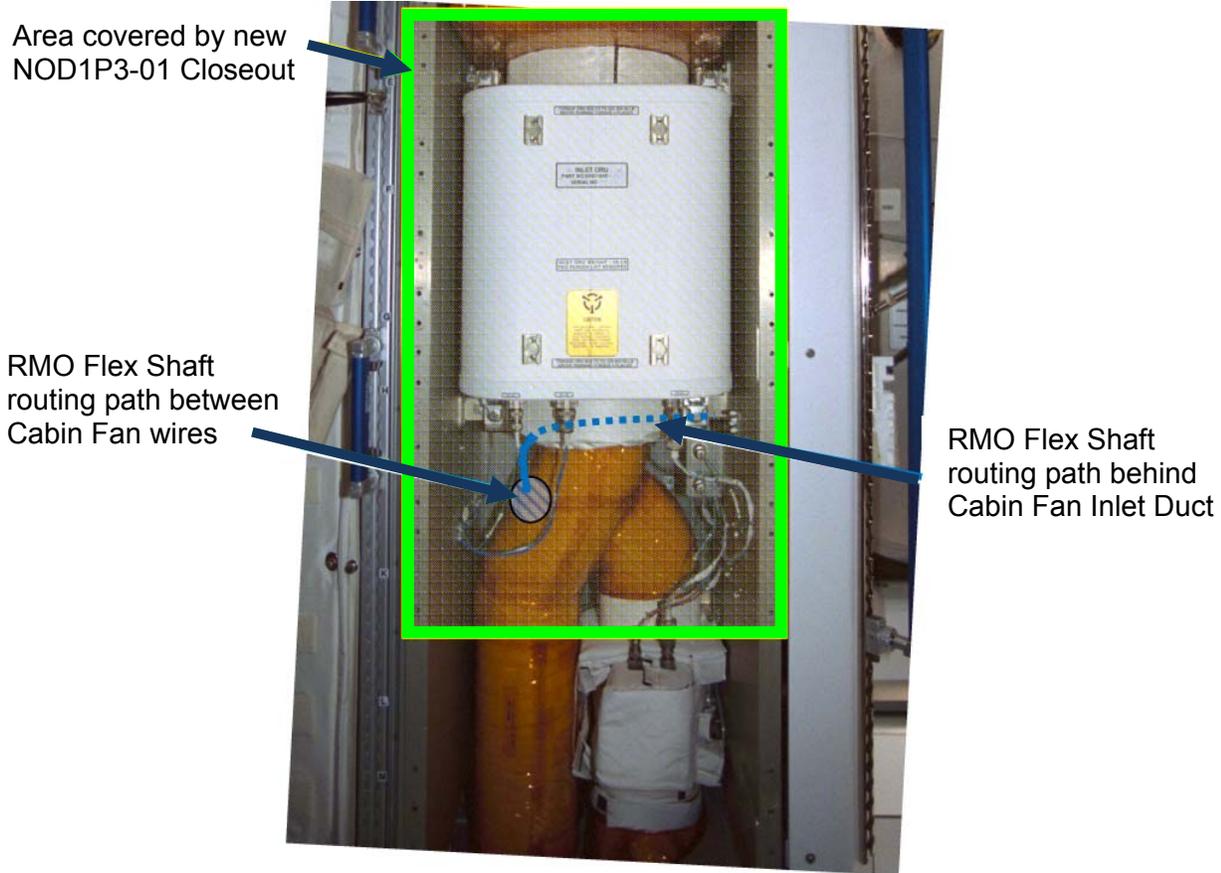


Figure 11.- Node 1 Port Midbay.

CAUTION

RMO Flex Shaft cable has a minimum bend radius of 8 inches. To prevent hardware damage, do not subject Flex Shaft to a bend radius of less than 8 inches.

- 3.5 Position RMO Handle below new NOD1P3-01 Closeout Panel. Feed free end of RMO Flex Shaft between Node 1 Cabin Fan Wire Harnesses (W0307 and W0137). Using a second crewmember accessing midbay volume from aft and port sides, continue feeding RMO Flex Shaft around Node 1 Cabin Fan towards IMV Valve. Maintain RMO Flex Shaft bend radius > 8 inches. Refer to Figures 10 and 11.
- 3.6 Align RMO Handle with cutout in new NOD1P3-01. Snug RMO Handle attachment fasteners (four) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figures 10 and 11.

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Figure 12.- RMO Handle.

- 3.7 Deploy RMO Handle and align indicator with “C” in “CLOSED.”
Refer to Green Line on Figure 12.
- 3.8 While maintaining RMO Flex Shaft bend radius > 8 inches, attempt alignment of the RMO Flex Shaft with IMV Valve RMO Flex Shaft Interface.

If alignment is not possible while maintaining proper bend radius

Rotate IMV RMO Flex Shaft Interface \curvearrowright or \curvearrowleft relative to valve body as required.

Loosen IMV Valve V-Band Clamp, rotate IMV Valve on Bulkhead flange for proper alignment (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).

Minimize scrubbing of IMV Valve Teflon seals.

Tighten IMV Valve V-Band Clamp (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).

- 3.9 Attach RMO Flex Shaft, fasteners (two) to IMV Valve.
Tighten, torque to 39 in-lbs [Ratchet, 1/4" Drive; 10" Ext, 1/4" Drive; 6" Ext, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
Refer to Figure 10.

NOTE

Some IMV Valve RMO Flex Shaft Interface fasteners will not be accessible due to adjacent hardware. A minimum of two opposing fasteners should be tightened.

- 3.10 Snug all accessible IMV Valve RMO Flex Shaft Interface fasteners (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 3.11 Create alignment mark on IMV Valve and Node 1 Port Bulkhead to ensure IMV Valve could be reinstalled on Bulkhead in same position (Sharpie).

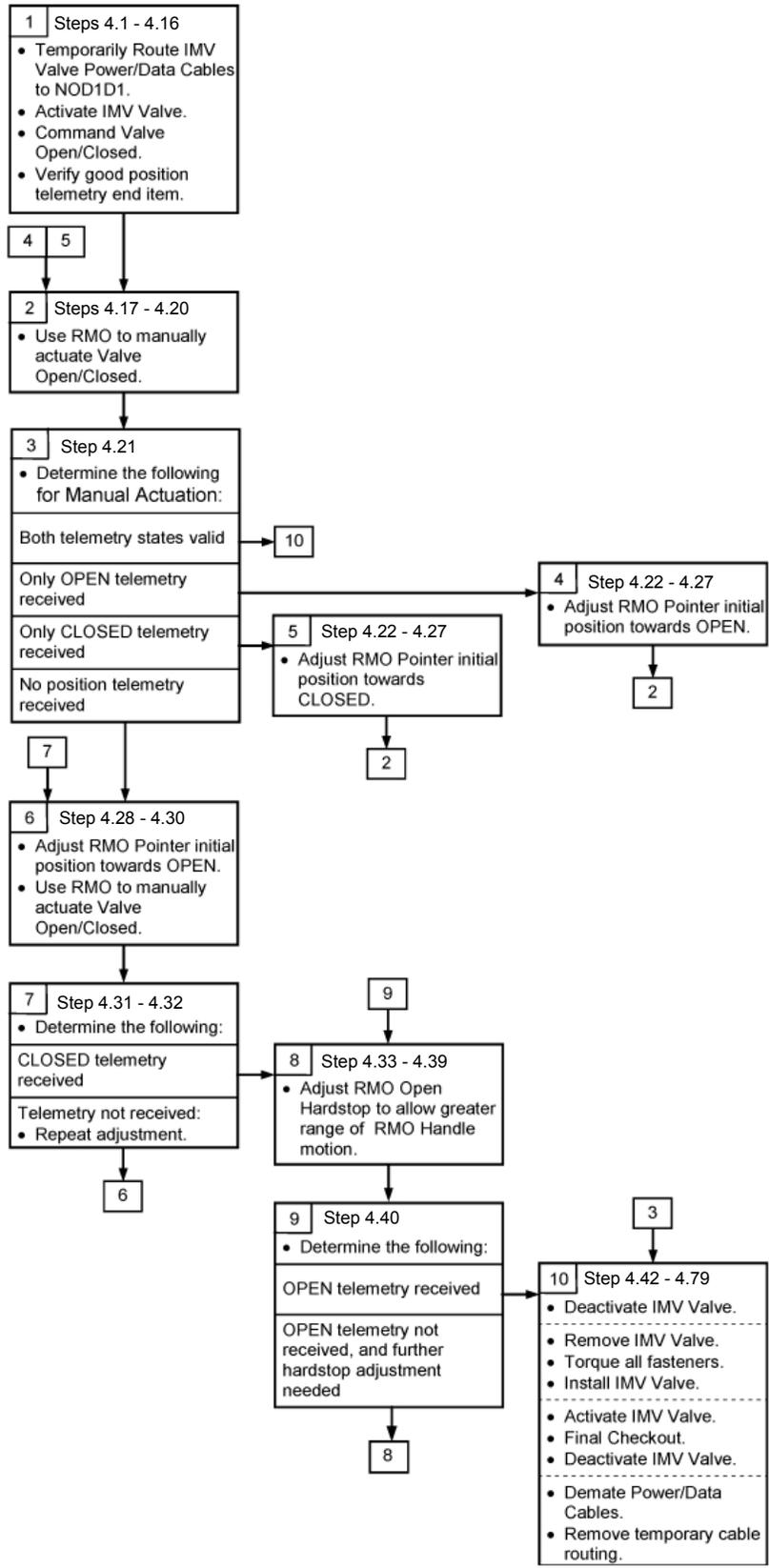


Figure 13.- RMO Checkout Overview.

4. RMO CHECKOUT AND ADJUSTMENT

NOTE

1. Figure 13 provides a graphical overview of the RMO Checkout and Adjustment activities performed in step 4.
2. The goal of step 4 is to adjust interface between the RMO and IMV Valve to enable manual actuation of the IMV Valve so that the physical position of the valve is fully open or fully closed. Until this step is completed, the RMO cannot be relied upon to fully close the IMV Valve or verify the valve position (via RMO Pointer).
3. The PCS Telemetry of valve position should be considered “truth”:
 Open: IMV Valve is fully open
 In Transit: IMV Valve is between fully open and fully closed (this indication does not require that the valve be in motion)
 Closed: IMV Valve is fully closed
4. If adjustments result in mismatch between RMO pointer and PCS telemetry, new RMO positions will be marked on the Closeout Panel.
5. If multiple attempts to adjust the RMO are unsuccessful at matching both open and closed telemetry states, the minimal required configuration is adjustment so that the valve can be manually closed (as indicated on the PCS telemetry). It is less critical to have a manual open actuation be completely successful.

4.1 ✓ **MCC-H** to verify following safing complete:
 RPCM N13BB RPC 16 Open and Close Command Inhibited

NOD1P3 4.2 Protective Cap ←|→ P1 of NOD1 IMV Valve Power Cable (W9436)
 Protective Cap (or Kapton Tape) ←|→ J1 of Node 1 Port-Aft IMV Valve

 Stow Protective Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

4.3 NOD1 IMV Valve Power Cable (W9436) P1 →|← J1 of Node 1 Port-Aft IMV Valve

 Temporarily stow Wire Harness.

4.4 Protective Cap ←|→ P2 of NOD1 IMV Valve Data Cable (W9437)
 Protective Cap (or Kapton Tape) ←|→ J2 of Node 1 Port-Aft IMV Valve

 Stow Protective Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

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- 4.5 NOD1 IMV Valve Data Cable (W9437) P2 →|← J2 of Node 1 Port-Aft IMV Valve

Temporarily stow Wire Harness.

- 4.6 Route NOD1 IMV Valve Power Cable (W9436) and NOD1 IMV Valve Data Cable (W9437) from port midbay to nadir alcove.
This routing is temporary for the purpose of the IMV Valve checkout.

- NOD1D1 4.7 Protective Cap ←|→ J426 of NOD1 IMV Valve Power Cable (W9436)
Protective Cap (or Kapton Tape) ←|→ P426 of W0136

Stow Protective Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

- 4.8 NOD1 IMV Valve Power Cable (W9436) J426 →|← P426 of W0136

- 4.9 Protective Cap ←|→ J427 of NOD1 IMV Valve Data Cable (W9437)
Protective Cap (or Kapton Tape) ←|→ P427 of W0308

Stow Protective Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

- 4.10 NOD1 IMV Valve Data Cable (W9437) J427 →|← P427 of W0308

Table 3. IMV Valve RMO Initial Condition

Action	RMO Pointer Position	IMV Valve Telemetry
Commanded Open		
Commanded Close		
Manually Open		
Manually Close		

NOTE

IMV Valve telemetry indicates the true hardware state of the IMV Valve. RMO pointer position is only valid after RMO adjustments are made. If pointer does not match telemetry after RMO adjustments, its final location will be marked by Sharpie.

- 4.11 Activating Node 1 Port Aft IMV Valve
Node 1: ECLSS: IMV Port Aft Valve
Node 1 IMV Port Aft Vlv

sel RPCM N13BB RPC 16

RPCM N13BB RPC 16

cmd Close Cmd – Enable (Verify – Ena)
cmd RPC Position – Close (Verify – Cl)

Node 1 IMV Port Aft Vlv

'State'
'Enable'

cmd Arm

√Arm Status – Armed

cmd Enable

√State – Enabled

4.12 Opening Node 1 Port Aft IMV Valve

Node 1 IMV Port Aft Vlv

'Position'
'Open'

cmd Arm

√Arm Status – Armed

cmd Open

√Position – In Transit

Wait 25 Seconds.

√Position – Open

Record PCS telemetry for Commanded Open in Table 3.

4.13 Verify RMO Pointer contacts OPEN position range.

Record RMO Pointer Position data in Table 3.

4.14 Closing Node 1 Port Aft Valve

MCC-H

Node 1: ECLSS: IMV Port Aft Valve

Node 1 IMV Port Aft Vlv

'Close'

cmd Arm

√Arm Status – Armed

cmd Close

√Position – In Transit

Wait 25 seconds.

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√Position – Closed

Record PCS telemetry for Command Close in Table 3.

- 4.15 Verify RMO Pointer contacts “CLOSED” position range.

Record RMO Pointer Position data in Table 3.

- 4.16 Verify commanded positions and PCS telemetry match in Table 3.

If valve commanding did not produce expected valve telemetry

| position
| Notify **MCC-H**.

NOTE

Expect suppressed ‘**IMV Deck Fwd Valve Failure-Node 1**’ Caution when valve is manually opened. Caution should clear when valve returns to Close (commanded) position. The Caution text is incorrect, as it refers to the IMV Valve’s old location in Node 1.

- 4.17 Deploy RMO Handle, rotate ↻ to hard stop until pointer contacts RMO “OPEN” position.

Allow handle to return to neutral position.

Note position of pointer at neutral position.

Record whether pointer contacts “OPEN” position range in Table 3.

- 4.18 Node 1 IMV Port Aft Vlv

Verify Position – Open

Record PCS telemetry for “Manually Open” in Table 3.

- 4.19 Deploy RMO Handle, rotate ↻ to hard stop until pointer contacts RMO “CLOSED” position.

Allow handle to return to neutral position.

Note position of pointer at neutral position.

Record whether pointer contacts “CLOSED” position range in Table 3.

- 4.20 Node 1 IMV Port Aft Vlv

Verify Position – Closed

Record PCS telemetry for “Manually Close” in Table 3.

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4.21 Assessing RMO Functionality

For manual IMV Valve open and close attempts

If telemetry matches for both manual inputs
Go to step 4.42.

If telemetry matches “OPEN” manual input only
Go to step 4.22 to rotate IMV Valve RMO Flex Shaft Interface
towards “OPEN” (↺) to hard stop.

If telemetry matches “CLOSED” manual input only
Go to step 4.22 to rotate IMV Valve RMO Flex Shaft Interface
towards “CLOSED” (↻) to hard stop.

If telemetry does not match for either manual input
Go to step 4.28.

4.22 Closing and Deactivating Node 1 Port Aft Valve

Node 1: ECLSS: IMV Port Aft Valve

Node 1 IMV Port Aft Vlv

‘Close’

cmd Arm

√Arm Status – Armed

cmd Close

√Position – In Transit

Wait 25 seconds.

√Position – Closed

‘State’

‘Inhibit’

cmd Arm

√Arm Status – Armed

cmd Inhibit

√State – Inhibited

sel RPCM N13BB RPC 16

RPCM N13BB RPC 16

cmd RPC Position – Open (Verify – Op)

cmd Close Cmd – Inhibit (Verify – Inh)

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- 4.23 Loosen, but do not remove IMV Valve RMO Flex Shaft Interface noncaptive fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 6.
- 4.24 While observing RMO pointer position, rotate IMV Valve RMO Flex Shaft Interface to achieve approximately 1/4" travel of RMO Pointer in direction described in step 4.21.
- 4.25 Snug all accessible IMV Valve RMO Flex Shaft Interface fasteners (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

4.26 Activating Node 1 Port Aft IMV Valve

Node 1: ECLSS: IMV Port Aft Valve

Node 1 IMV Port Aft Vlv

sel RPCM N13BB RPC 16

RPCM N13BB RPC 16

cmd Close Cmd – Enable (Verify – Ena)

cmd RPC Position – Close (Verify – Cl)

Node 1 IMV Port Aft Vlv

'State'

'Enable'

cmd Arm

√Arm Status – Armed

cmd Enable

√State – Enabled

- 4.27 Go to step 4.17 to repeat manual IMV Valve position; additional adjustments may be required.

NOTE

If neither manual input achieves proper telemetry indication, IMV Valve Flex Shaft Interface will be configured to achieve proper "CLOSED" telemetry after manual close input. Once IMV Valve Flex Shaft Interface is configured for proper functionality in Close direction, the RMO Handle hardstop will be adjusted to allow additional travel in Open direction (↷) to hard stop.

- 4.28 To adjust initial RMO pointer position towards "OPEN" direction (↷) to hard stop, perform steps 4.22 to 4.26.

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- 4.29 Deploy RMO Handle, rotate ↻ to hard stop until pointer contacts RMO “OPEN” position.
Allow handle to return to neutral position.
- 4.30 Rotate RMO Handle ↻ to hard stop until pointer contacts RMO “CLOSED” position.
Allow handle to return to neutral position.
- 4.31 Node 1 IMV Port Aft Vlv

Verify Position – Closed
- 4.32 If telemetry position does not indicate “CLOSED”, repeat steps 4.28 to 4.31.



Figure 14.- Front side of RMO Handle.

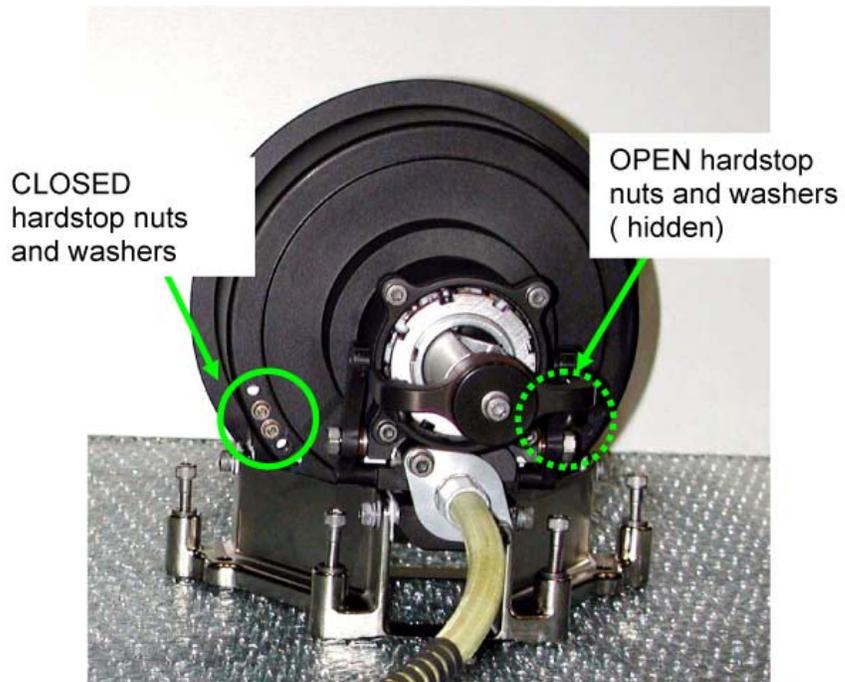


Figure 15.- Rear of RMO Handle.

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NOTE

Hardstop fasteners consist of a noncaptive fastener, nut, and washer.

- 4.33 Note initial position of RMO “OPEN” hardstop.
- 4.34 Supporting noncaptive hardware on rear of RMO, remove noncaptive fasteners, washers, nuts (two each) (#6 Long Torq Driver, 3/8" Drive; 1/4" to 3/8" Adapter; Ratchet, 1/4" Drive).
Refer to Figure 14 and 15.
- 4.35 Install RMO Open hardstop, noncaptive fasteners, washers, nuts (two each) one position further in “OPEN” direction (↺) to hard stop as compared to initial position (#6 Long Torq Driver, 3/8" Drive; 1/4" to 3/8" Adapter; Ratchet, 1/4" Drive).
Refer to Figures 14 and 15.
- 4.36 Deploy RMO Handle, rotate ↺ to hard stop until pointer contacts RMO “OPEN” position.
Allow handle to return to neutral position.
- PCS 4.37 Node 1 IMV Port Aft Vlv
Verify Position – Open
- 4.38 Deploy RMO Handle, rotate ↻ to hard stop until pointer contacts RMO “CLOSED” position.
Allow handle to return to neutral position.
- 4.39 Node 1 IMV Port Aft Vlv
Verify Position – Closed
- 4.40 If telemetry does not match manual inputs, repeat steps 4.33 to 4.39.
- 4.41 Torque RMO Open hardstop fasteners to 20 in-lbs (two) [#6 Long Torq Driver, 3/8" Drive; 1/4" to 3/8" Adapter; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
- 4.42 Mark final position of IMV Valve RMO Flex Shaft Interface (Sharpie).
- 4.43 If all six IMV Valve RMO Flex Shaft Interface fasteners can be accessed while valve is installed, go to step 4.51.
- MCC-H 4.44 Closing and Deactivating Node 1 Port Aft Valve
Node 1: ECLSS: IMV Port Aft Valve
Node 1 IMV Port Aft Vlv
'Close'

cmd Arm

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√Arm Status – Armed

cmd Close

√Position – In Transit

Wait 25 seconds.

√Position – Closed

4.45 Deactivating Node 1 Port Aft Valve

'State'

'Inhibit'

cmd Arm

√Arm Status – Armed

cmd Inhibit

√State – Inhibited

sel RPCM N13BB RPC 16

RPCM N13BB RPC 16

cmd RPC Position – Open (Verify – Op)

cmd Close Cmd – Inhibit (Verify – Inh)

- 4.46 NOD1 IMV Valve Power Cable (W9436) P1 ←|→ J1 of Node 1 Port-Aft IMV Valve
- 4.47 NOD1 IMV Valve Data Cable (W9437) P2 ←|→ J2 of Node 1 Port-Aft IMV Valve
- 4.48 Note position of RMO pointer, this position must be maintained for reinstallation of RMO Flex Shaft.
- 4.49 Release RMO Flex Shaft from IMV Valve, fasteners (two) (Ratchet, 1/4" Drive; 10" Ext, 1/4" Drive; 6" Ext, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 4.50 Remove IMV Valve, V-Band Clamp (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
- 4.51 Verify alignment mark made in step 4.42 is still properly aligned. Snug IMV Valve RMO Flex Shaft Interface noncaptive fasteners (six) in an X-pattern per Figure 6 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Torque noncaptive fasteners to 23 in-lbs in an X-pattern [(10-50 in-lbs) Trq Wrench, 1/4" Drive; 5/32" Hex Head, 1/4" Drive].

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Refer to Figure 6.

- 4.52 If IMV Valve not removed from Bulkhead, go to step 4.58.
- 4.53 Install IMV Valve, V-Band Clamp onto Bulkhead, aligning marks made in step 3.11 (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
- 4.54 Attach RMO Flex Shaft, fasteners (two) to IMV Valve (Ratchet, 1/4" Drive; 10" Ext, 1/4" Drive; 6" Ext, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 4.55 NOD1 IMV Valve Power Cable (W9436) P1 →|← J1 of Node 1 Port-Aft IMV Valve
- 4.56 NOD1 IMV Valve Data Cable (W9437) P2 →|← J2 of Node 1 Port-Aft IMV Valve
- 4.57 Activating Node 1 Port Aft IMV Valve
Node 1: ECLSS: IMV Port Aft Valve
- sel RPCM N13BB RPC 16
-
- cmd** Close Cmd – Enable (Verify – Ena)
cmd RPC Position – Close (Verify – Cl)
-
- 'State'
'Enable'
- cmd** Arm
- √Arm Status – Armed
- cmd** Enable
- √State – Enable
- 4.58 If 1/2" Nut on V-Band Clamp, torque to 135 in-lbs [Ratchet, 1/4" Drive; 1/2" Deep Socket, 1/4" Drive; (40-200 in-lbs) Trq Wrench, 1/4" Drive].
If 7/16" Nut on V-Band Clamp, torque to 35 in-lbs [Ratchet, 1/4" Drive; 7/16" Deep Socket; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
- 4.59 Tighten, torque RMO Flex Shaft fasteners (two) to 39 in-lbs [Ratchet, 1/4" Drive; 10" Ext, 1/4" Drive; 6" Ext, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].

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NOTE

Steps 4.60 to 4.71 perform a final checkout of the IMV Valve and RMO.

4.60 Opening Node 1 Port Aft IMV Valve

Node 1 IMV Port Aft Vlv

'Position'

'Open'

cmd Arm

√Arm Status – Armed

cmd Open

√Position – In Transit

Wait 25 Seconds.

√Position – Open

4.61 Verify RMO Handle commanded to “OPEN” position range.
If RMO Handle does not point to open range, create temporary “OPEN” label (Gray Tape, Sharpie).

4.62 Photo document RMO showing pointer position (Digital Camera).

4.63 Closing Node 1 Port Aft IMV Valve

Node 1: ECLSS: IMV Port Aft Valve

Node 1 IMV Port Aft Vlv

'Close'

cmd Arm

√Arm Status – Armed

cmd Close

√Position – In Transit

Wait 25 seconds.

√Position – Closed

4.64 Verify RMO Handle commanded to “CLOSED” position range.
If RMO Handle does not point to closed range, create temporary “CLOSED” label (Gray Tape, Sharpie).

4.65 Photo document RMO showing pointer position (Digital Camera).

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NOTE

Expect suppressed 'IMV Deck Fwd Valve Failure- Node 1' Caution when valve is opened. Caution should clear when valve returned to Close (commanded) position. The Caution text is incorrect, as it refers to the IMV Valve's old location in Node 1.

4.66 Deploy RMO Handle, rotate ↻ to hard stop until pointer contacts RMO "OPEN" position.
Allow handle to return to neutral position.

4.67 Note position of pointer at neutral position.
Determine whether pointer contacts "OPEN" position range.

Node 1 IMV Port Aft Vlv

Verify Position – Open

4.68 Photo document RMO showing pointer position (Digital Camera).

4.69 Deploy RMO Handle, rotate ↻ to hard stop until pointer contacts RMO "CLOSED" position.
Allow handle to return to neutral position.

4.70 Note position of pointer at neutral position.
Determine whether pointer contacts "CLOSED" position range.

Node 1 IMV Port Aft Vlv

Verify Position – Closed

4.71 Photo document RMO showing pointer position (Digital Camera).

4.72 **On MCC-H GO**
Node 1: ECLSS: IMV Port Aft Valve

Node 1 IMV Port Aft Vlv

'State'

'Inhibit'

cmd Arm

√Arm Status – Armed

cmd Inhibit

√State – Inhibited

sel RPCM N13BB RPC 16

RPCM N13BB RPC 16

cmd RPC Position – Open (Verify – Op)

cmd Close Cmd – Inhibit (Verify – Inh)

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NOD1D1 4.73 NOD1 IMV Valve Power Cable (W9436) J426 ←|→ P426 of W0136

4.74 Protective Cap →|← J426 of NOD1 IMV Valve Power Cable (W9436)
Protective Cap (or Kapton Tape) →|← P426 of W0136

Retrieve Protective Caps from Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

4.75 NOD1 IMV Valve Data Cable (W9437) J427 ←|→ P427 of W0308

4.76 Protective Cap →|← J427 of NOD1 IMV Valve Data Cable (W9437)
Protective Cap (or Kapton Tape) →|← P427 of W0308

Retrieve Protective Caps from Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

4.77 Coil and temporarily stow NOD1 IMV Valve Data Cable (W9437) and NOD1 IMV Valve Power Cable (W9436) behind Port Midbay.
The cable will be permanently routed in a subsequent step.

4.78 Install NOD1D1-01 Closeout Panel, fasteners (eight) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

4.79 Install new NOD1P3-02 Closeout Panel, fasteners (four) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

5. RECONFIGURING IMV FLOW

NOTE

To stop airflow through NOD1O2 IMV duct to be replaced, while maintaining minimal level of IMV into Node 1, several IMV reconfiguration steps are required.

PMA1 5.1 Open PMA1 IMV Duct Grill (Velcro cover).

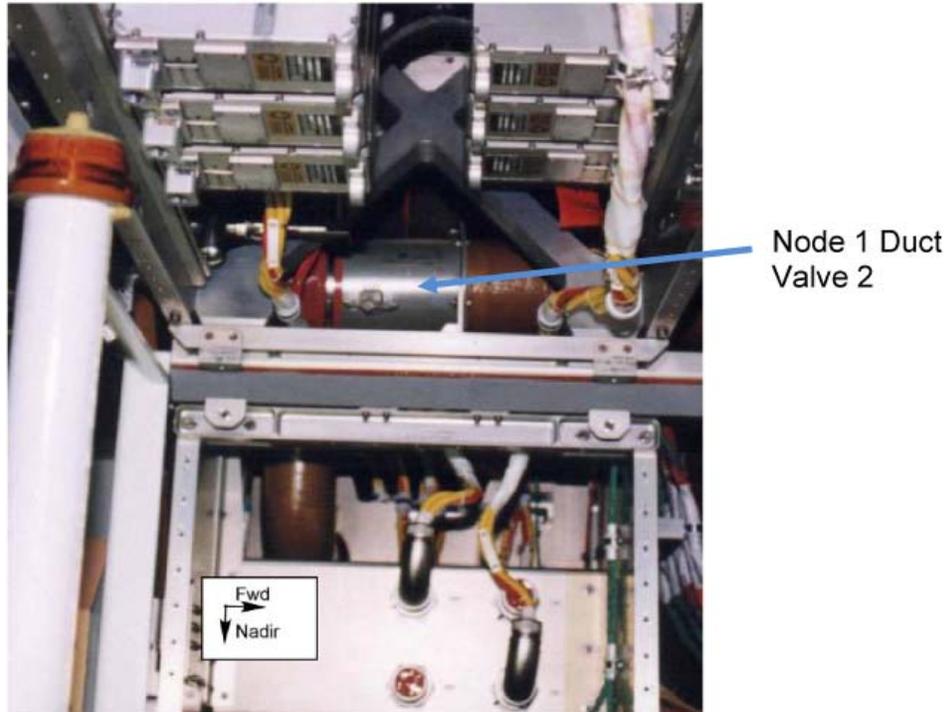


Figure 16.- Node 1 Duct Valve 2 (located at NOD1OP1).

NOD1O1-01 5.2 Node 1 IMV Duct Valve 2 → Open

- MCC-H** 5.3 To turn off Node 1 Aft Port IMV Fan, perform [1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS](#), step 3.1 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:
- 5.4 To close Node 1 Aft Port IMV Valve, perform [2.506 IMV VALVE RECONFIGURATION](#), step 3 (SODF: ECLSS: NOMINAL: THC), then:

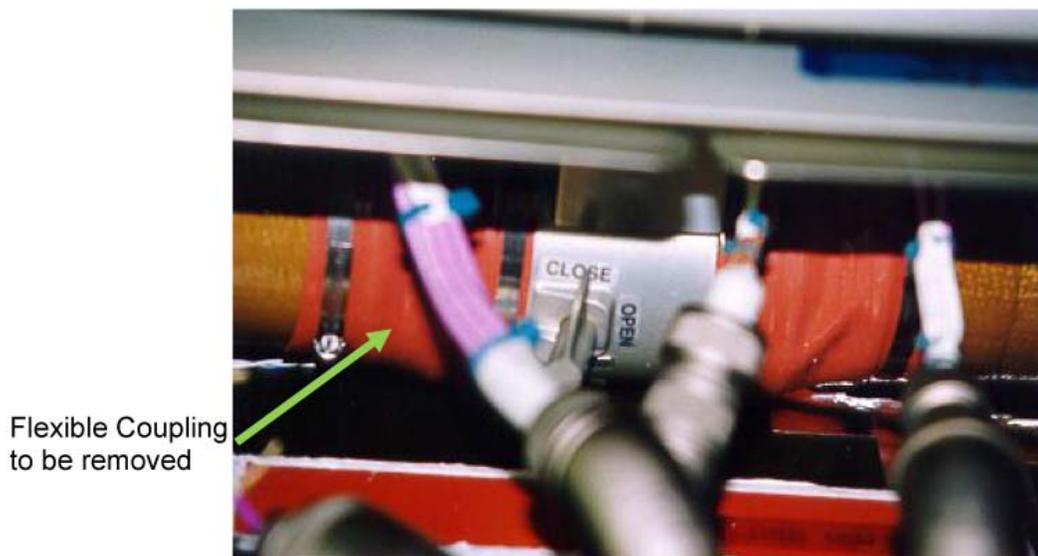


Figure 17.- Node 1 Duct Valve 4 (Located at NOD1OP2).

5.5 **On MCC-H GO**
 NOD1OP2 Node 1 IMV Duct Valve 4 → CLOSE

6. [REPLACING NOD1OP2 IMV DUCT](#)

NOTE

Removal of IMV duct will likely release FOD and dust into cabin. Use appropriate PPE and prepare Vacuum Cleaner to capture loose dust. To ensure loose dust will not annunciate a false fire in Node 1, **MCC-H** will inhibit all Node 1 cabin smoke detection for the duration of this activity.

WARNING

Node 1 Smoke Detection will be inhibited during steps 6 and 7. Crew is prime for smoke detection in Node 1 until it is enabled post activity.

- MCC-H**
- 6.1 To inhibit Node 1 Smoke Detection, perform [1.402 SMOKE DETECTOR DEACTIVATION](#), step 1 for Node 1 SD1 and Node 1 SD2 (SODF: ECLSS: ACTIVATION AND CHECKOUT: FDS), then:
 - 6.2 Configure Vacuum Cleaner in Node 1.
 Use Vacuum Cleaner as required.

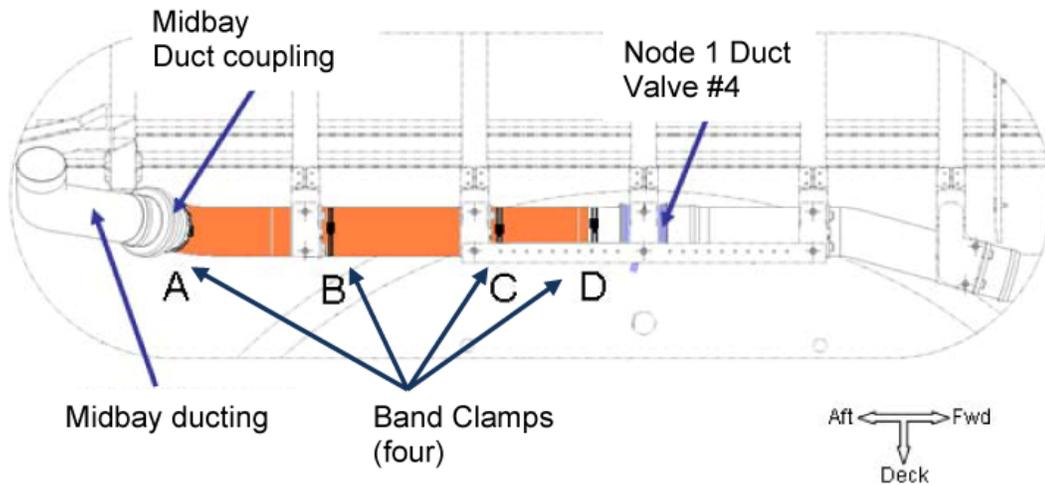


Figure 18.- Original NOD102 IMV Duct.

- NOD1OP2
- 6.3 **On MCC-H GO**
 Loosen band clamps (four) holding original NOD102 IMV Ducting (Driver Handle, 1/4" Drive; 1/4" Deep Socket, 1/4" Drive; 4" Common Tip Screwdriver).

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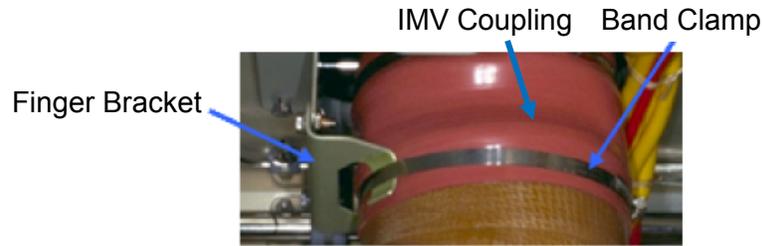


Figure 19.- IMV Duct Finger Bracket.

- 6.4 Move loosened Band Clamps away from IMV couplings and finger brackets.
- 6.5 Don Goggles, Dust Mask.
- 6.6 Position crewmembers at NOD1P2 and NOD1P4.
- 6.7 Remove original NOD1O2 IMV duct by rotating down and away from midbay ducting.
Once free of midbay ducting, slide original NOD1O2 IMV duct towards aft to release from Node 1 IMV Duct Valve 4 coupling.
Remove duct segment through NOD1P4 Rack bay area.
- 6.8 If original NOD1O2 IMV Duct is full of dust and FOD, cover both ends of duct (Ziplock Bags, Gray Tape).
- 6.9 Remove 4" Band Clamps (four) from original NOD1O2 IMV Duct.
Stow Band Clamps in Ziplock Bag labeled "Spare IMV Parts."
Stow original NOD1O2 IMV duct.
- 6.10 Remove Flexible Coupling, 4" Band Clamp from Node 1 IMV Duct Valve 4 (Driver Handle, 1/4" Drive; 1/4" Deep Socket, 1/4" Drive; 4" Common Tip Screwdriver).
Stow Flexible Coupling, Band Clamp in Ziplock Bag labeled "Spare IMV Parts."
Refer to Figure 17.
- 6.11 Loosely install new 4" Band Clamps (four) onto new NOD1O2 IMV Duct.
Three Band Clamps should be installed on long segment of duct, one Band Clamp should be installed on short curved segment of duct.

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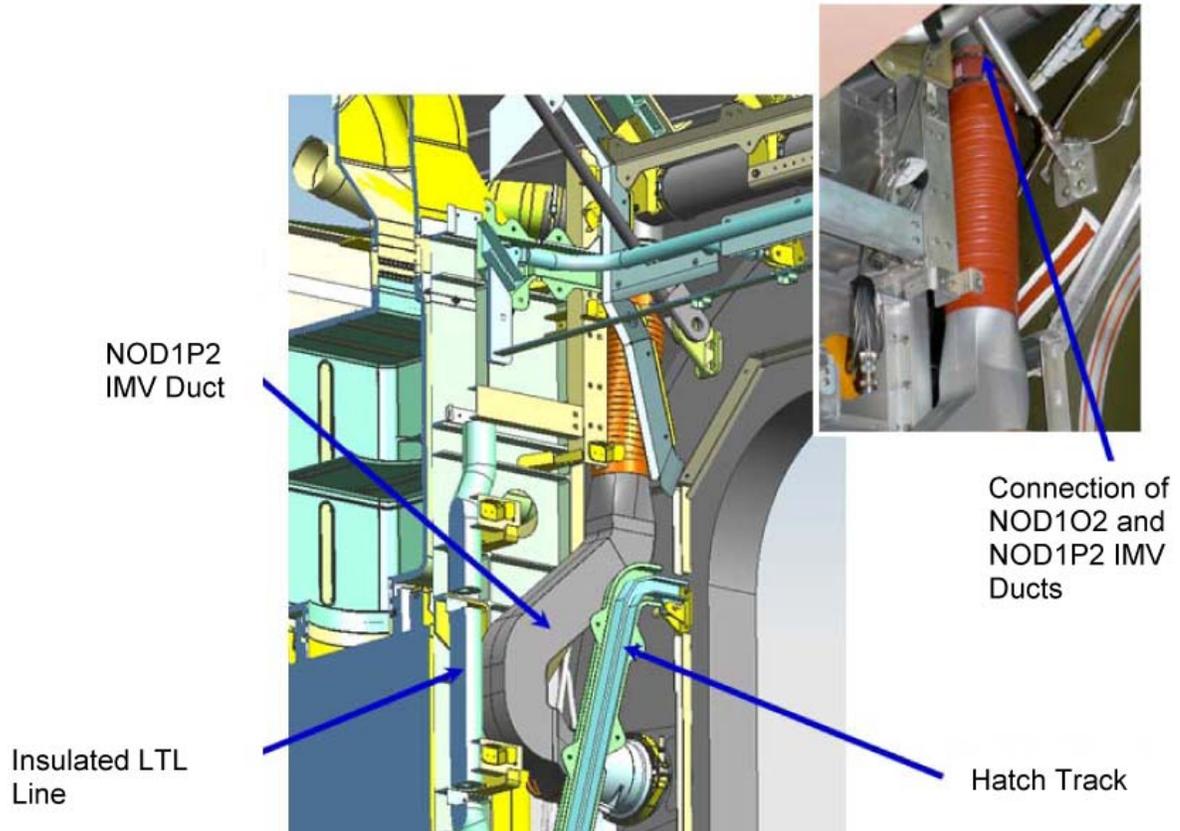


Figure 20.- New IMV Ducting Installed Behind Node 1 Port Midbay.

- 6.12 Performing opposite motion of step 6.6, install new NOD1O2 IMV Duct. When mating Flexible Coupling to Node 1 IMV Duct Valve 4, ensure minimum 1.25" overlap is present.
Mate new NOD1O2 IMV Duct to midbay duct with a rotational motion, ensuring minimum 1.25" coupling overlap is present.
Verify "T" outlet oriented Nadir.
- 6.13 Position 4" Band Clamps over Flexible Couplings and Finger Brackets. Snug Band Clamps (Driver Handle, 1/4" Drive; 1/4" Deep Socket, 1/4" Drive; 4" Common Tip Screwdriver).
- 6.14 Remove temporary covering from Port-Aft IMV Valve. Inspect IMV Valve for FOD or damage.
- 6.15 Loosely install new 4" Band Clamp onto Flexible end of new NOD1P2 IMV Duct.
Loosely install IMV Duct Clamp (5" diameter) onto rigid end of new NOD1P2 IMV Duct.
- 6.16 Avoiding contact with Insulated LTL Line, install new NOD1P2 IMV Duct by guiding flexible segment behind secondary structure towards NOD1O2 IMV Duct "T" outlet.
Rigid ducting will fit behind Hatch Track.

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- 6.17 Overlap flexible couplings (two) between NOD1P2 IMV Duct and IMV Valve (NOD1O2 IMV Duct) by 1.25".
Snug Band Clamps (two) (Driver Handle, 1/4" Drive; 1/4" Deep Socket, 1/4" Drive; 4" Common Tip Screwdriver).
- 6.18 Tighten, torque Band Clamps (six) to 16 in-lbs [1/4" Deep Socket, 1/4" Drive; (5-35 in-lbs) Trq Driver, 1/4" Drive].
- 6.19 Doff Goggles, Dust Mask.
- 6.20 Photo document newly installed hardware (Digital Camera).
- 6.21 Install following Closeout Panels (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
NOD1P2-34 (twenty-four fasteners)
NOD1P2-33 (five fasteners)

7. INSTALLING NOD1P4 IMV DIFFUSER COVERS

- NOD1OP3/
NOD1OP4
- 7.1 Remove, discard temporary diffuser covers from NOD1OP3 and NOD1OP4 diffusers.
 - 7.2 Remove Diffuser Grilles (two), fasteners (six each) from NOD1OP3 and NOD1OP4 (Ratchet, 1/4" Drive; 3/8" Socket, 1/4" Drive).
Stow Diffuser Grilles.
 - 7.3 Install Diffuser Covers (two), IMV Diffuser Gaskets (two), fasteners (six each) at NOD1OP3 and NOD1OP4 (Ratchet, 1/4" Drive; 3/8" Socket, 1/4" Drive).
Torque fasteners (six each) to 22 in-lbs [Ratchet, 1/4" Drive; 3/8" Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
 - 7.4 Photo document newly installed hardware.

8. ENABLING NODE 1 IMV FLOW

- NOD1OP2
- 8.1 Node 1 IMV Duct Valve 4 → OPEN
Refer to Figure 17.
 - 8.2 ISS ↓ **MCC-H**: "Node 1 Midbay IMV Reconfiguration complete. Ready for Node 1 IMV and Smoke Detector activation."
- MCC-H**
- 8.3 To enable Node 1 Smoke Detection, perform [1.401 SMOKE DETECTOR ACTIVATION](#), steps 2 and 3 for Node 1 SD1 and Node 1 SD2 (SODF: ECLSS: ACTIVATION AND CHECKOUT: FDS), then:
 - 8.4 To open Node 1 Aft Port IMV Valve, perform [2.506 IMV VALVE RECONFIGURATION](#), step 2 (SODF: ECLSS: NOMINAL: THC), then:
 - 8.5 To turn on Node 1 Aft Port IMV Fan, perform [1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS](#), step 2.2 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:

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NOD1OP1 8.6 **On MCC-H GO**
Node 1 IMV Duct Valve 2 → Close
Refer to Figure 16.

PMA1 8.7 Cover PMA1 IMV Duct Grill (Velcro cover).

8.8 Install NOD1O1-01 Closeout Panel, fasteners (eight) (Ratchet, 1/4" Drive;
5/32" Hex Head, 1/4" Drive).

9. FLUID HOSE ROUTING AND CONNECTION

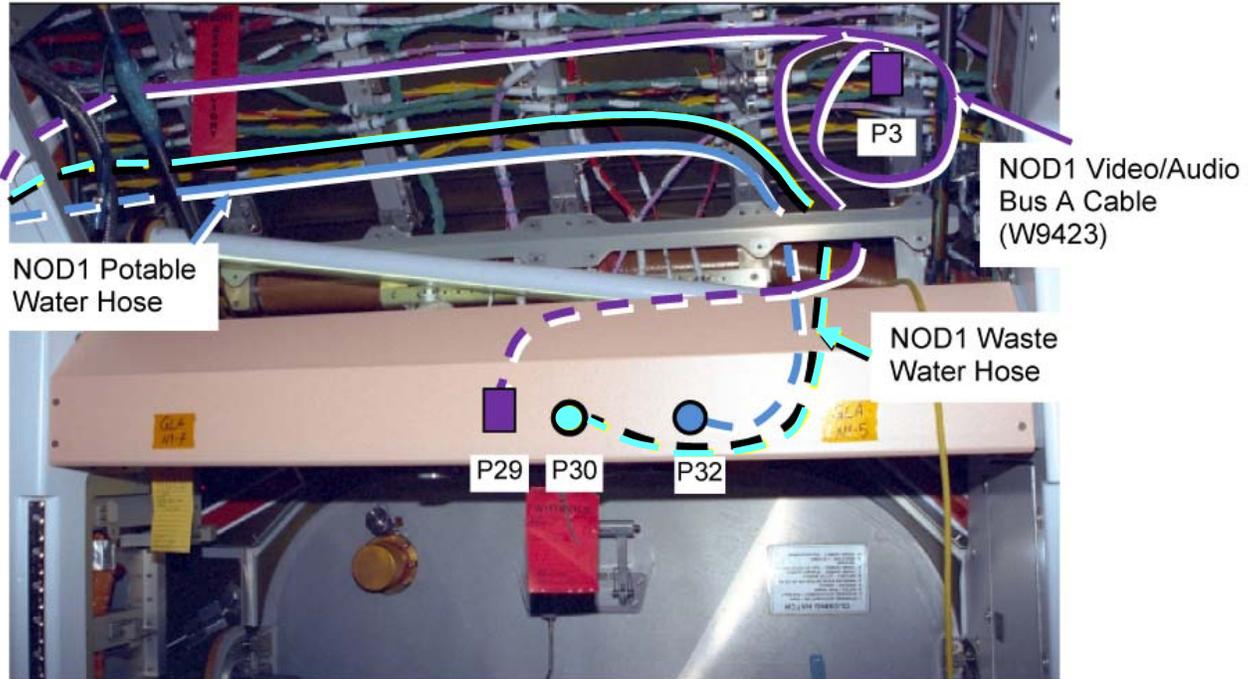


Figure 21.- Routing of Fluid Hoses in NOD1OP2 Area.

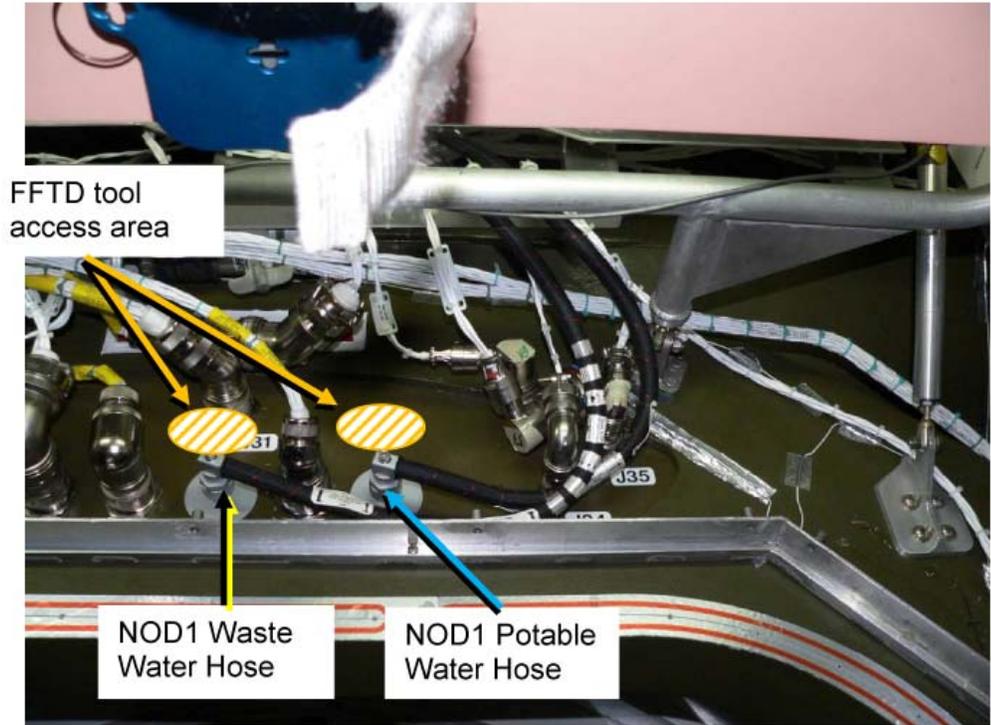


Figure 22.- Routing of Fluid Hoses.

- 9.1 Locate NOD1 Waste Water Hose and NOD1 Potable Water Hose. Stage hoses in NOD1P4 Rack bay.

NOTE
 Proper routing of fluid hoses will ensure sufficient access to worksite for FFTD torquing of fluid fittings.

- NOD1P4 9.2 Route 90-degree Gamah connector of NOD1 Waste Water Hose from NOD1P4 to NOD1OP2 Bulkhead connector J30 - Waste Water. Refer to Figures 21 and 22 for recommended routing.
- NOD1OP2 9.3 Route 90-degree Gamah connector of NOD1 Potable Water Hose from NOD1P4 to NOD1OP2 Bulkhead connector J33 - Fuel Cell H2O. Refer to Figures 21 and 22 for recommended routing.
- 9.4 Verify hose routing will not interfere with installation of Closeout Panels.
- 9.5 Verify no sharp edges along hose routing path.

If sharp edge located
 | Relocate hose or cover sharp edge with multiple layers of EVA Tape and wrap hose with EVA Tape to prevent abrasion.

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- 9.6 Verify sufficient access to actuate J27, J29, J31 and J32 in subsequent steps.

NOTE

Gamah fitting and FFTD reference information can be found in:
[A.2.1 FLUID FITTING TORQUE DEVICE \(FFTD\) ASSEMBLY AND USAGE](#) (SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)
[A.2.3 MATING GAMAH FITTING USING THE FFTD](#) (SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)
[A.2.13 GAMAH SEAL R&R](#) (SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS) (Gamah Seal R&R is not expected for this activity)

- 9.7 Gamah Cap ←|→ J30 (Waste Water) on Bulkhead (by hand)
Gamah Plug ←|→ TO: NOD1 Port Bulkhead J30 on NOD1 Waste Water Hose (by hand)

Stow Gamah Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

- 9.8 NOD1 Waste Water Hose TO: NOD1 Port Bulkhead J30 →|← J30 (Waste Water) on Bulkhead
Hand Tighten.

WARNING

Skin contact with the fluid-contacting surfaces of the potable water system (i.e., “Fuel Cell Water”) QDs or gamah fittings can potentially lead to contamination of water supply and crew illness.

- * If skin contact is made with fluid-contacting surface of potable water system
- * Clean surfaces with Povidone Iodine Pads from the ALSP Kit.
- * Notify **MCC-H**.

- 9.9 Don Clean Room Gloves.
- 9.10 Gamah Cap ←|→ J33 (Fuel Cell H2O) on Bulkhead (by hand)
Gamah Plug ←|→ TO: NOD1 Port Bulkhead J33 on NOD1 Potable Water Hose (by hand)
- Stow Gamah Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”
- 9.11 NOD1 Potable Water Hose TO: NOD1 Port Bulkhead J33 →|← J33 (Fuel Cell H2O) on Bulkhead
Hand Tighten.
- 9.12 Doff Clean Room Gloves.

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- 9.13 Set torque wrench per FFTD Calibration Card for Output Torque of 345 in-lbs [FFTD; (40-200 in-lbs) Trq Wrench, 3/8" Drive; 1.00" Drive Gear, 0.625" Reaction Gear].
Torque J30, J33 gamah connections.
Refer to Table 2 of FFTD Calibration Card on FFTD Kit Lid.
- 9.14 Restrain hoses in NOD1OP2 and NOD1OP3 area to secondary structure per crew preference (minimum every 3 feet).
Routing from NOD1OP3 to NOD1PD3 will occur in a subsequent step.

10. CONNECTION SAFING FOR W0201 P31

10.1 INH BC Comm Fail

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

CCS Recovery Retry

cmd BC Comm Fail – Inhibit **Execute** ($\sqrt{\text{Inh}}$)

10.2 CDH: C&C Primary: CB Int 2: Bus Status

CB INT 2 Bus Status

'Channel Selected'

cmd Select Ch B **Execute** ($\sqrt{\text{B}}$)

'Auto Channel Switch Status'

cmd Inhibit **Execute** ($\sqrt{\text{Inh}}$)

10.3 CNT: CUP

CUP1

$\sqrt{\text{Bus}}$ I/O (two) – Inhibit

- 10.4 Verify Robotics system is ready to support Robotics 1553 bus disruption during cable connections on the following buses:
BCU LB 2
HC LB 2

11. AVIONICS WIRE HARNESS ROUTING AND CONNECTION

NOTE

1. During Wire Harness routing in subsequent steps, precautions must be taken to prevent Electromagnetic Interference (EMI) issues. Incompatible Wire Harnesses must be separated by 2 inches when routed parallel for more than 1 foot, Wire Harnesses must be separated by 3 inches when routed parallel for more than 3 feet. There are no constraints for the routing of the NOD1 Waste Water Hose or NOD1 Potable Water Hose.

2. While routing Wire Harnesses in this procedure, the following routing is recommended:

- a) NOD1 1553 CH A Cable (W9421)
NOD1 Video/Audio Bus A Cable (W9423)
NOD1 Wireless Audio Cable (W9425)
NOD1 ISL Ethernet Cable (W9426)

These Wire Harnesses are compatible with each other and existing Node 1 1553 cabling. These Wire Harnesses will be bundled together and routed with existing 1553 lines.

- b) NOD1 IMV Valve Power Cable (W9436)
This Wire Harness is not compatible with others being installed in this procedure. This Wire Harness should be routed with existing Node 1 power Wire Harnesses.
- c) NOD1 IMV Valve Data Cable (W9437)
This Wire Harness is not compatible with others being installed in this procedure. This Wire Harness should be routed with existing Node 1 instrumentation Wire Harnesses.
- d) Crossing of incompatible Wire Harnesses is acceptable as long as the Wire Harnesses are not within 2 inches of each other for more than 1 foot.

11.1 For all cable routing, maintain Bend Radius greater than six times diameter of Harness.

Prior to connector mating, inspect both connectors for FOD, damage.

11.2 Locate following Wire Harnesses:

- NOD1 1553 CH A Cable (W9421)
- NOD1 Video/Audio Bus A Cable (W9423)
- NOD1 Wireless Audio Cable (W9425)
- NOD1 ISL Ethernet Cable (W9426)

Stage Wire Harnesses in NOD1P4 Rack bay.

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CAUTION

When routing and connecting NOD1 Video/Audio Bus A Cable (W9423), use caution to avoid damage to fiber optic lines. Do not subject Harness to bend radius less than six times cable diameter, compression or high tension forces.

- NOD1P4 11.3 Locate P3 and P29 of NOD1 Video/Audio Bus A Cable (W9423). Route P3 and P29 from NOD1P4 to NOD1OP2 as shown in Figure 21.
- NOD1OP2 11.4 Coil and stow P3 leg of NOD1 Video/Audio Bus A Cable (W9423) at location shown in Figure 21.
Restrain coiled Harness loosely with Velcro Straps.
- 11.5 Route P29 leg of NOD1 Video/Audio Bus A Cable (W9423) to J29 of Bulkhead.
Verify routing will not interfere with Closeout Panel installation.
- 11.6 W0401 P29 ←|→ J29 of Bulkhead
- 11.7 Transfer Protective Cap from NOD1 Video/Audio Bus A Cable (W9423) P29 to W0401 P29.
- 11.8 Restrain W0401 P29 away from worksite (Cable Tie).
- 11.9 NOD1 Video/Audio Bus A Cable (W9423) P29 →|← J29 of Bulkhead

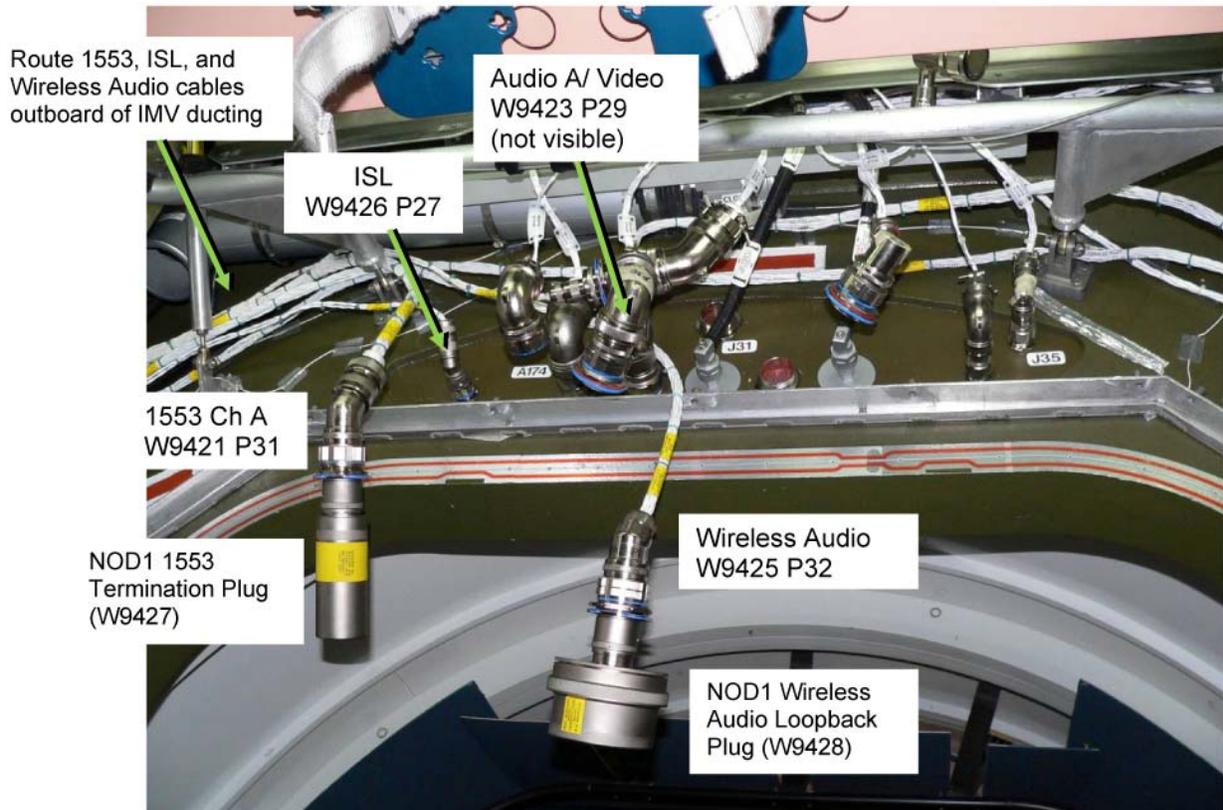


Figure 23.- Node 1 Port Overhead Bulkhead (B9 Photo).

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- NOD1P4 11.10 Locate P27 of NOD1 ISL Ethernet Cable (W9426).
Route P27 from NOD1P4 to NOD1OP2 near J27 of Bulkhead as shown in Figure 23.
- NOD1OP2 11.11 Protective Cap ←|→ J27 of Bulkhead
Protective Cap ←|→ P27 of NOD1 ISL Ethernet Cable (W9426)

Stow Protective Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”
- 11.12 NOD1 ISL Ethernet Cable (W9426) P27 →|← J27 of Bulkhead
- 11.13 ✓**MCC-H** verify safing complete per step 10
- NOD1P4 11.14 Locate P31 and J31 of NOD1 1553 CH A Cable (W9421).
Route P31 and J31 from NOD1P4 to NOD1OP2 near J31 of Bulkhead as shown in Figure 23.
- 11.15 Locate NOD1 1553 Termination Plug (W9427).
- NOD1OP2 11.16 Protective Cap ←|→ NOD1 1553 Termination Plug (W9427)
Protective Cap ←|→ P31 of NOD1 1553 CH A Cable (W9421)

Stow Protective Cap in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”
- NOTE

NOD1 1553 CH A Cable (W9421) P31 will be connected to the Node 1 Port Bulkhead during vestibule outfitting of Flight 20A. To prevent 1553 transaction errors until that connection is made, NOD1 1553 Termination Plug (W9427) must be connected.
- 11.17 NOD1 1553 CH A Cable (W9421) P31 →|← NOD1 1553 Termination Plug (W9427)
- 11.18 W0201 P31 ←|→ J31 of Bulkhead
- 11.19 Transfer Protective Cap from J31 of NOD1 1553 CH A Cable (W9421) to J31 of Bulkhead.
- 11.20 W0201 P31 →|← J31 of NOD1 1553 CH A Cable (W9421)
- 11.21 Stow terminated P31 of NOD1 1553 CH A Cable (W9421) near J31 of Bulkhead.
- NOD1P4 11.22 Locate P32 of NOD1 Wireless Audio Cable (W9425).
Route P32 from NOD1P4 to NOD1OP2 near J32 of Bulkhead as shown in Figure 23.
- NOD1OP2 11.23 W0410 P32 ←|→ J32 of Bulkhead

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- 11.24 Transfer Protective Cap from NOD1 Wireless Audio Cable (W9425) P32 to W0410 P32.
- 11.25 Restrain W0410 P32 away from worksite (Cable Tie).
- 11.26 Locate NOD1 Wireless Audio Loopback Plug (W9428).
- 11.27 Transfer Protective Cap from NOD1 Wireless Audio Loopback Plug (W9428) to J32 of Bulkhead.
- 11.28 NOD1 Wireless Audio Cable (W9425) P32 →|← NOD1 Wireless Audio Loopback Plug (W9428)

Stow terminated NOD1 Wireless Audio Cable (W9425) P32 near J32 of Bulkhead.
- 11.29 Restrain all Wire Harnesses per crew preference, with a minimum spacing of 3 feet (Cable Ties).
Do not tighten Zip Ties on NOD1 Video/Audio Bus A Cable (W9423), as this may damage the fiber optic lines.
- 11.30 Photo document all connections and cable routing.
- 11.31 Install following Closeout Panels (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive):
 - NOD1OP2-25 (eight fasteners)
 - NOD1OP2-24 (six fasteners)
 - NOD1OP2-22, -23 (three fasteners each) (install panels as a group)
 - NOD1OP2-21 (fifteen fasteners)
 - NOD1O2-31 (six fasteners), NOD1P2-36 (five fasteners) (install panels as a group)
- 11.32 If complete for the day
 - Coil Wire Harnesses and fluid hoses behind Node 1 Port Midbay.
 - √NOD1P4 Rack rotation path unobstructed
 - K-BAR Thumb Latches (two) → up position
 - Slowly rotate Rack up.
 - Engage K-BAR Thumb Latches (two) into Standoff Capture Mechanism.

12. NORMALIZING 1553 SAFING

12.1 CDH: C&C Primary: CB Int 2: Bus Status

CB INT 2 Bus Status

'Channel Selected'

cmd Select Ch A **Execute** (√A)

'Auto Channel Switch Status'

cmd Enable **Execute** (√Ena)

12.2 Enabling BC Comm Fail

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

CCS Recovery Retry

cmd BC Comm Fail – Enable **Execute** (√Ena)

13. PORT MIDBAY WIRE HARNESS ROUTING

- * If insufficient space is available in Standoff between Node 1 Port and
- * Nadir Midbays to allow temporary placement of Wire Harnesses
- * and fluid hoses during subsequent routing steps
- * Partially rotate NOD1P4 up.
- *
- * Perform steps 15.1 to 15.5 to partially rotate NOD1D4 down.
- *
- * Avoid obstruction of Node 1 - PMA1 translation path.
- *
- * Pass end of Wire Harness between crewmembers.
- * Temporarily stow coiled Harness behind Node 1 Deck Midbay.
- *
- * Perform steps 17.1 to 17.7 to rotate NOD1D4 up.

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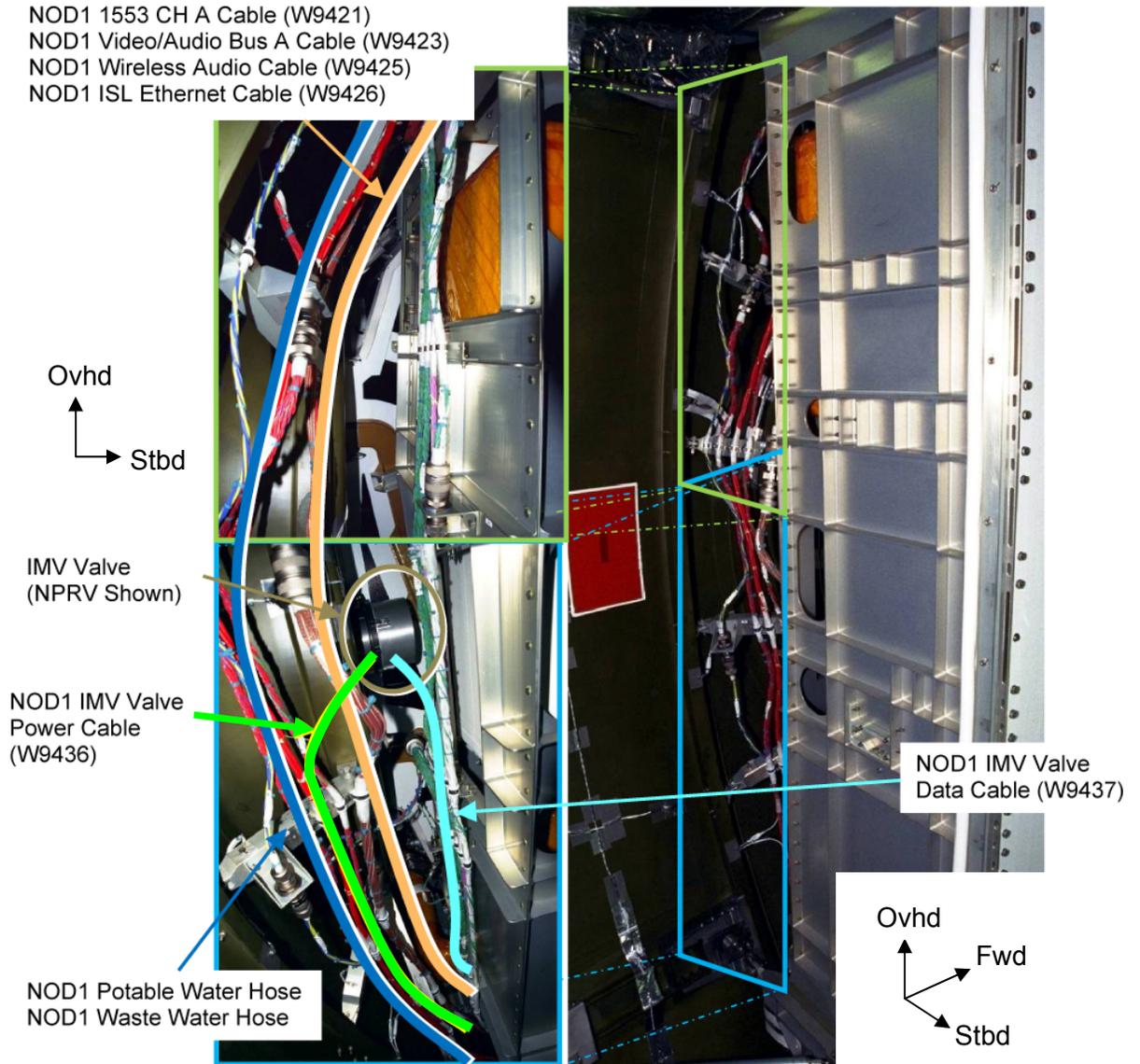


Figure 24.- Node 1 Port Midbay.

- NOD1P4 13.1 ✓ NOD1P4 Rack rotated down
- 13.2 Route fluid hoses (two) from top to bottom of Node 1 Port Midbay; these hoses have no EMI routing constraints. Recommend routing per Figure 24, near red cables. Restrain to secondary structure, as required (Cable Ties).
- 13.3 Verify no sharp edges along hose routing path.
- If sharp edge located
 | Relocate hose or cover sharp edge with multiple layers of EVA Tape and wrap hose with EVA Tape to prevent abrasion.

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- 13.4 Coil, temporarily restrain remaining fluid hose in Standoff between Port and Deck Midbays (Velcro Ties).
- 13.5 Bundle the following cables to aid routing in Node 1 Port Midbay:
 - NOD1 1553 CH A Cable (W9421)
 - NOD1 Video/Audio Bus A Cable (W9423)
 - NOD1 Wireless Audio Cable (W9425)
 - NOD1 ISL Ethernet Cable (W9426)
- 13.6 Route bundle as shown in Figure 24, following existing W0205 Harness from top to bottom of Node 1 Port Midbay.
Keep bundle away from red-insulated wires to prevent EMI concerns.
Restrain loosely to secondary structure as required (Cable Ties).
- 13.7 Coil, temporarily restrain remaining length of wire bundle in Standoff between Port and Deck Midbays (Velcro Ties).
- 13.8 Route NOD1 IMV Valve Power Cable (W9436) from newly installed IMV Valve to bottom of Node 1 Port Midbay as shown in Figure 24.
Follow W0115 (red cables) to prevent EMI concerns.
Restrain loosely to secondary structure as required (Cable Ties).
- 13.9 Coil, temporarily restrain remaining length of Wire Harness in Standoff between Port and Deck Midbays (Velcro Ties).
- 13.10 Route NOD1 IMV Valve Data Cable (W9437) from newly installed IMV Valve to bottom of Node 1 Port Midbay as shown in Figure 24.
Follow W0303 (green cables) on Port face of Midbay structure to prevent EMI concerns.
Restrain loosely to secondary structure, as required (Cable Ties).
- 13.11 Photo document cable routing (Digital Camera).
- 13.12 ✓NOD1P4 Rack rotation path unobstructed
 - K-BAR Thumb Latches (two) → up position
 - Slowly rotate Rack up.
 - Engage K-BAR Thumb Latches (two) into Standoff Capture Mechanism.
14. CONNECTION SAFING FOR W0205 P106
 - 14.1 INH BC Comm Fail
 - CDH: Primary C&C: Recovery Retry: CCS MDM
 - CCS Recovery Retry
 - cmd BC Comm Fail – Inhibit Execute** (✓lnh)

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14.2 [Inhibiting Auto Transition to Diagnostics in PMCU MDM](#)

CDH: Primary PMCU: MDM FDIR

cmd Auto Transition Diag – Inhibit **Execute** (√Inh)

14.3 [Inhibiting Comm Safing Response in INT MDM](#)

CDH: Primary INT: MDM FDIR

cmd Comm Safing Response – Inhibit **Execute** (√Inh)

Table 4. Buses in W0205 P106 Connector

Bus Name [YY]	Controlling MDM
LB ORB HAB 1	Prime GNC
LB ORB HAB 2	Prime GNC
LB EPS HAB 23	Prime PMCU
LB EPS HAB 14	Prime PMCU
LB SYS HAB 1	Prime INT
LB SYS HAB 2	Prime INT
LB SEPS HAB 23	Prime INT
LB SEPS HAB 14	Prime INT
CB CT BIA 23	Prime C&C
CB CT 4	Prime C&C
CB INT 2	Prime C&C
LB CheCS HAB	Prime PL

14.4 Use Table 4 to switch channels to B and inhibit channel switching.

sel [YY] where [YY] = Bus Name from Table 4

'Channel Selected'

cmd Select Ch B **Execute** (√B)

'Auto Channel Switch Status'

cmd Inhibit **Execute** (√Inh)

Repeat

14.5 Verify Robotics system is ready to support Robotics 1553 bus disruption during cable connections on MSS PDGF LB.

15. DECK MIDBAY ROUTING

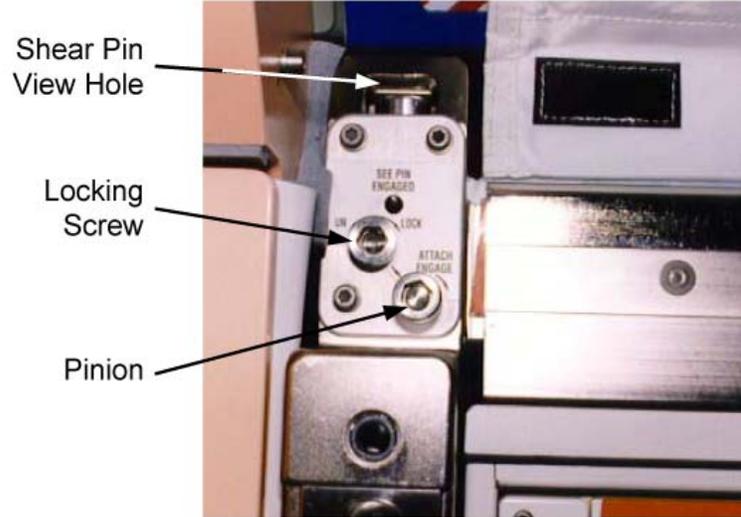


Figure 25.- Upper Attach Mechanism (Left Side).

- NOD1D4 15.1 Loosen left locking screw 10 to 12 turns, or until threads completely disengage (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive). Refer to Figure 25.

NOTE

Left, right pinions have reverse gearing:
To disengage left pinion, turn ↺.
To disengage right pinion, turn ↻.

- 15.2 Disengage left pinion one full turn until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 15.3 Repeat steps 15.1, 15.2 for right Upper Attach Mechanism.
- 15.4 ✓NOD1D4 Rack rotation path unobstructed
- 15.5 Slowly rotate Rack Down to a controlled stop.
Temporarily restrain as required.
- 15.6 Retrieve Wire Harnesses and hoses from Standoff between Node 1 Port and Deck Midbays.

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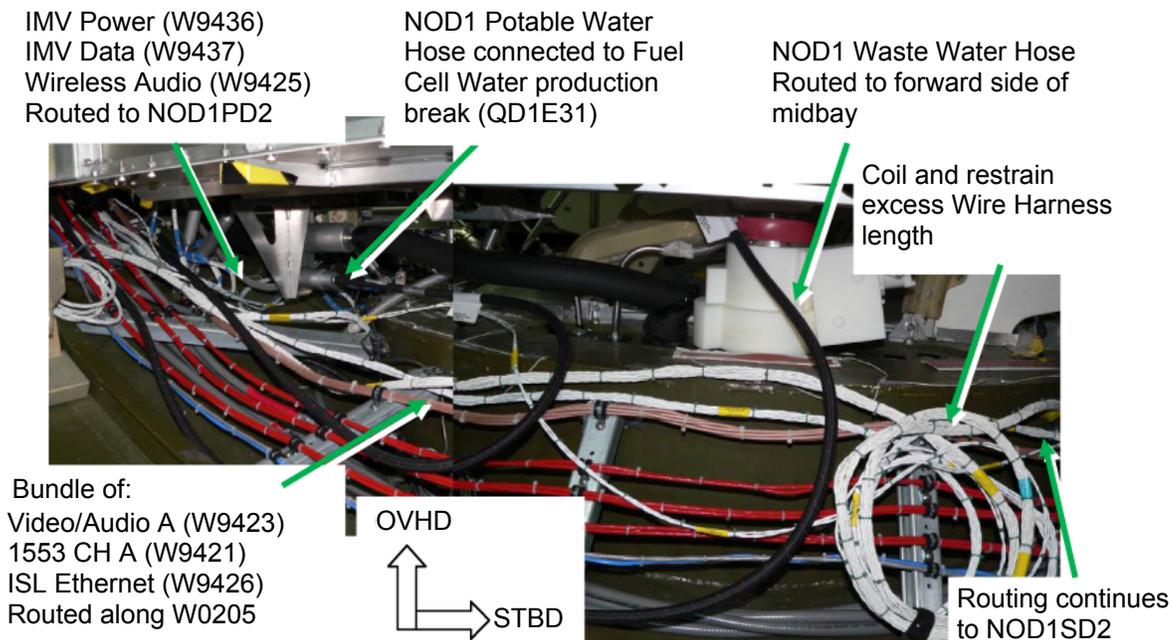


Figure 26.- Routing of Cables/Hoses in Nadir Midbay (View Looking Forward, B9 Mockup).

- 15.7 Locate and route NOD1 Potable Water Hose to Fuel Cell Water Hose production break.
Refer to Figure 26.

WARNING
Skin contact of the wetted surfaces of the potable water system (i.e., “Fuel Cell Water”) QDs or gamah fittings can potentially lead to contamination of water supply and crew illness.

- * If skin contact is made with fluid-contacting surface of potable water system
- * Clean surfaces with Povidone Iodine Pads from the ALSP Kit.
- * Notify **MCC-H**.

- 15.8 Fuel Cell Water Hose ←|→ QD1E31 (Node 1 Production Break)
- 15.9 Transfer Protective Cap from NOD1 Potable Water Hose to Fuel Cell Water Hose.
Restrain Fuel Cell Water Hose (Zip Ties).
- 15.10 NOD1 Potable Water Hose →|← QD1E31 (Node 1 Production Break)
- 15.11 Route any excess length of NOD1 Potable Water Hose along secondary structure toward center of module.
Restrain hose to secondary structure (Cable Ties).

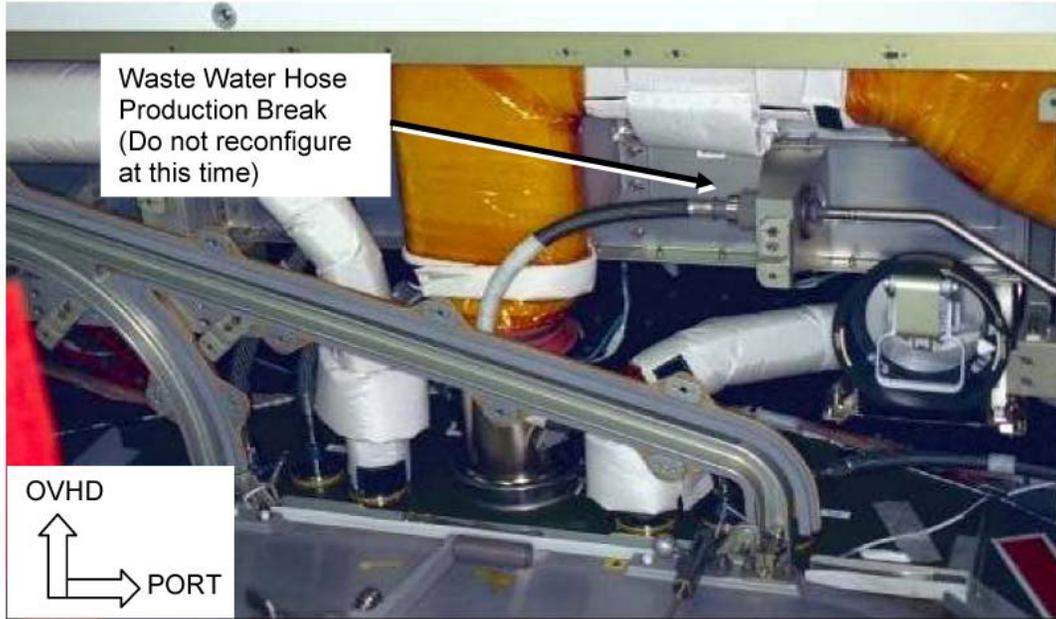


Figure 27.- Node 1 Nadir Midbay, Forward Side.

- 15.12 Locate and route NOD1 Waste Water Hose to center of Nadir Midbay. Keeping hose to the port side of the Node 1 Nadir-aft IMV Valve, pass QD to second crewmember in Node 1 Deck Radial bay. Restrain NOD1 Waste Water Hose to currently installed hose at production break (QD1E30) (Velcro Tie). Do not reconfigure Waste Water QDs at this time. Refer to Figure 27.

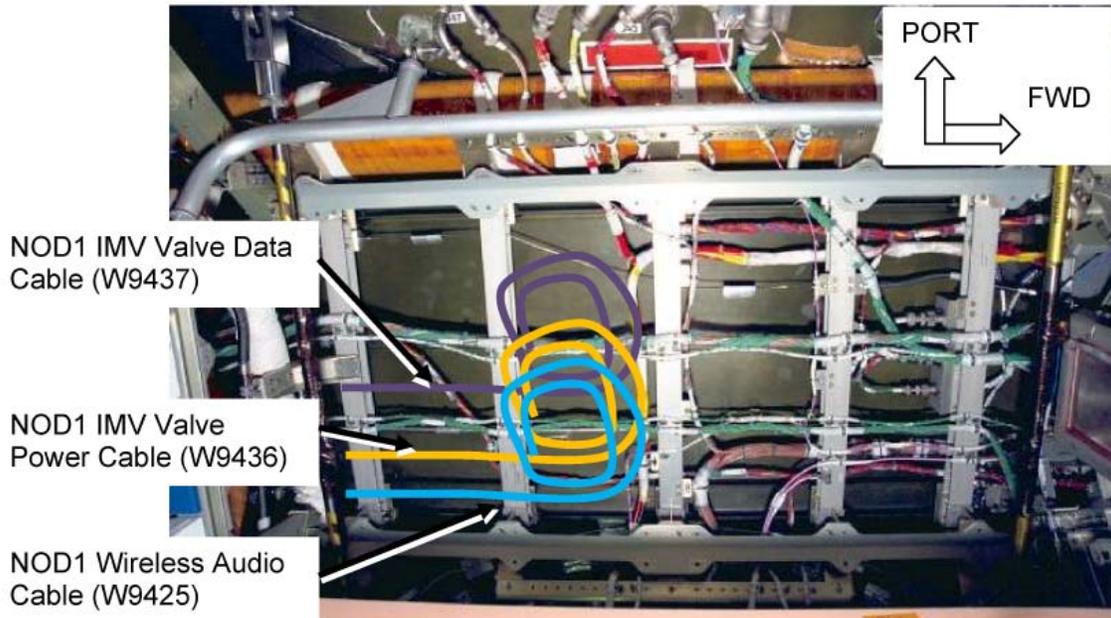


Figure 28.- NOD1PD2 Area.

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- 15.13 Locate and route the following three Harnesses from Deck Midbay to NOD1PD2 area:
- NOD1 Wireless Audio Cable (W9425)
 - NOD1 IMV Valve Data Cable (W9437)
 - NOD1 IMV Valve Power Cable (W9436)
- Maintain 3 inch spacing between all adjacent parallel Wire Harnesses while routing forward through midbay.
- 15.14 Coil and restrain Wire Harnesses in NOD1PD2 area for later routing and connection.
- During this temporary stowage, no EMI constraints exist, so cables may be positioned adjacent to any other Wire Harnesses.

Route all three cables from Deck Midbay into NOD1SD2 area outboard of secondary structure. Route along W0205

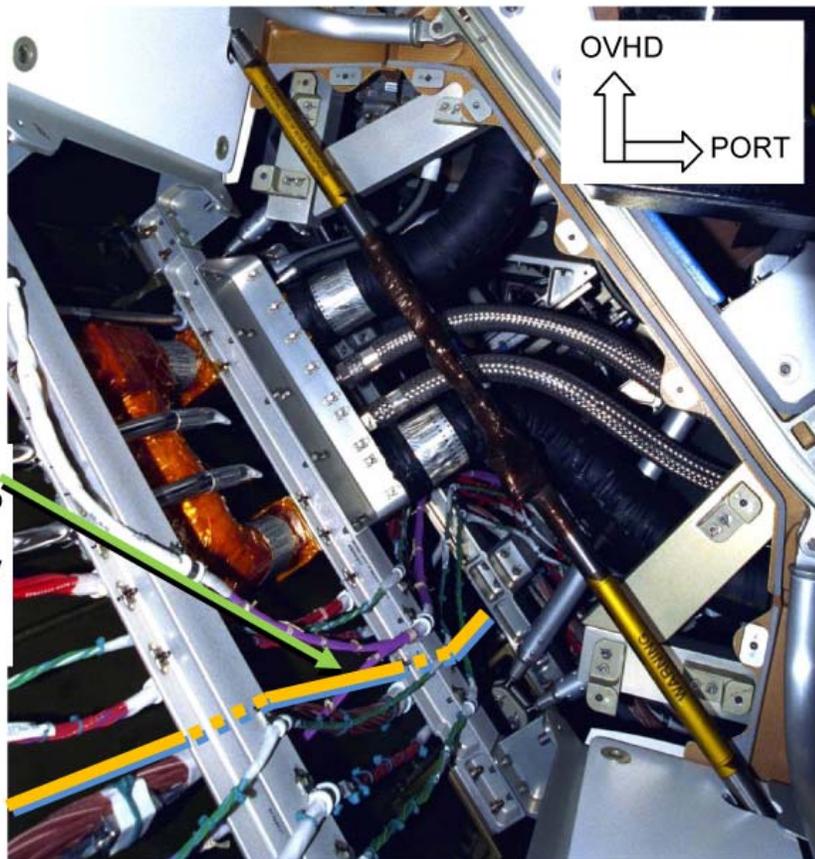


Figure 29.- NOD1SD2 Area, Looking Aft.

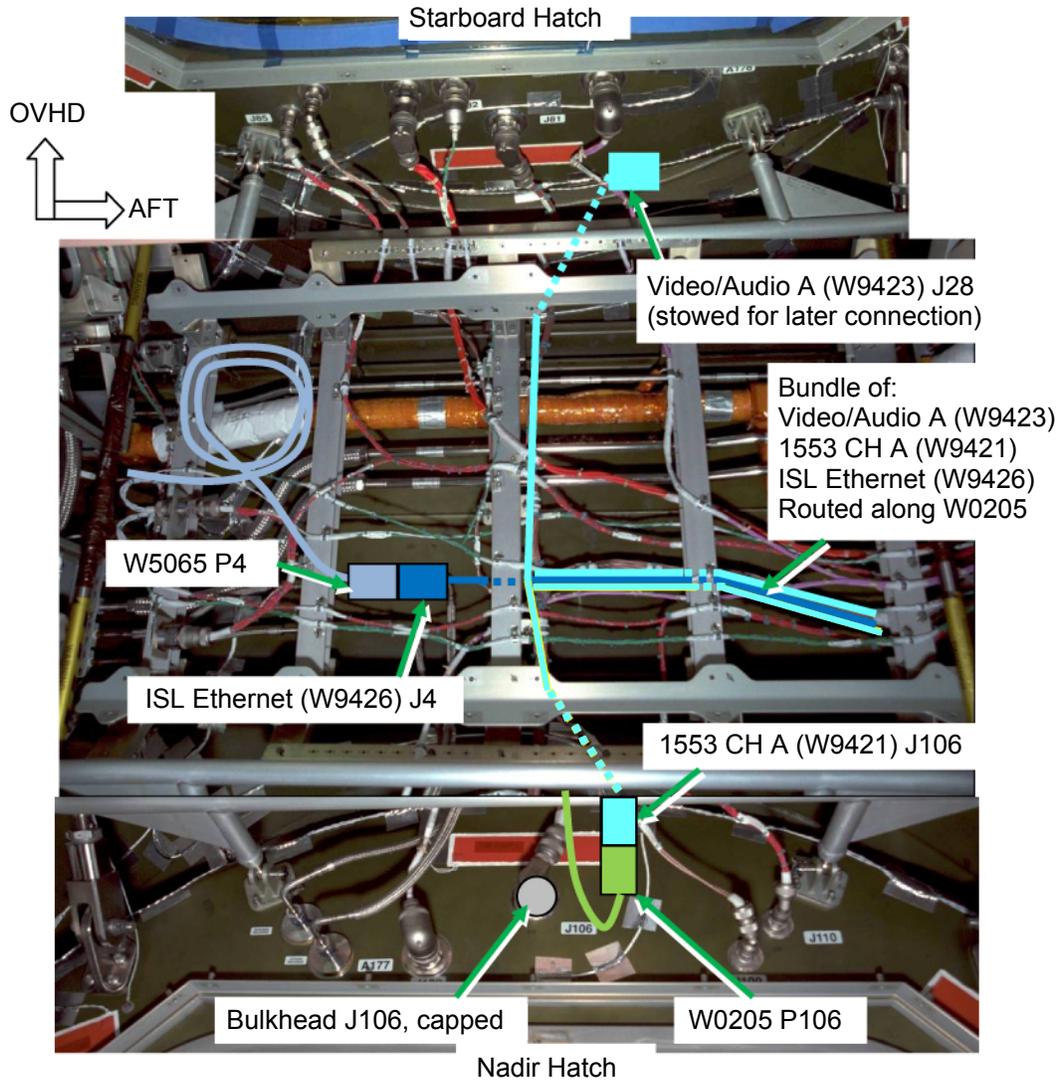


Figure 30.- Routing Cables in NOD1SD2 Area.

NOTE

NOD1 ISL Ethernet Cable (W9426), NOD1 1553 CH A Cable (W9421), and NOD1 Video/Audio A Cable (W9423) will initially be routed separately to allow management of excess Wire Harness length.

- 15.15 Locate and route J4 of NOD1 ISL Ethernet Cable (W9426) from Port to Starboard of Node 1 Nadir Midbay.
Do not restrain Wire Harness at this time.
- 15.16 Route approximately 2 feet of NOD1 ISL Ethernet Cable (W9426) into NOD1SD2 area, staying outboard of secondary structure to avoid EMI concerns.
Route along W0205 Wire Harness.
Leave any excess cable in Nadir Midbay area.

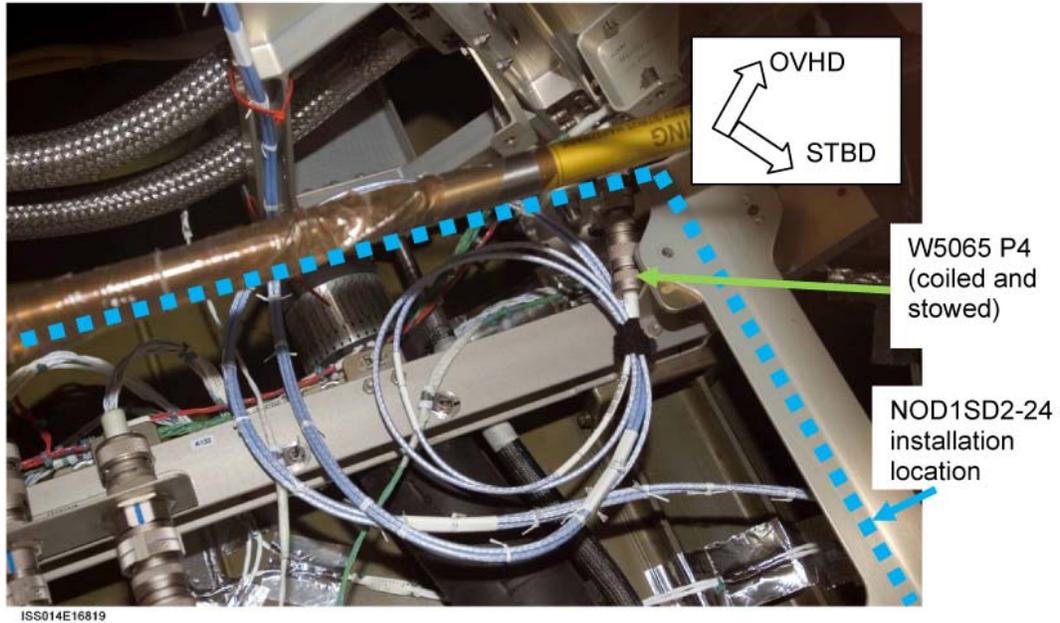


Figure 31.- W5065 Stowed in NOD1SD2 Area.

- 15.17 Locate P4 of W5065 Node 1 ISL Ethernet Cable, which was coiled and stowed during Expedition 14.
 Refer to Figure 31.

NOTE
 No system safing is required for ethernet connections.

- 15.18 Protective Cap ←|→ J4 of NOD1 ISL Ethernet Cable (W9426)
 Protective Cap ←|→ P4 of W5065

Stow Protective Caps in Ziplock Bag labeled “NOD 1 Mod Kit Caps and Plugs.”

- 15.19 W5065 P4 →|← J4 of NOD1 ISL Ethernet Cable (W9426)

- 15.20 Pull any excess wire length back into Node 1 Nadir Midbay.

- 15.21 Restrain NOD1 ISL Ethernet Cable (W9426) on same routing path as W0205 in NOD1SD2 area as shown in Figure 30.

Nadir
 Midbay

- 15.22 Route NOD1 ISL Ethernet Cable (W9426) along W0205, gathering excess wire length near center of Midbay. Coil excess wire length, maintaining minimum bend radius of six times the harness diameter. Coiled Wire Harness may cross any other Wire Harness without EMI risk. Restrain Wire Harness to secondary structure (Cable Ties). Refer to Figure 26.

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- 15.23 Locate and route J106 of NOD1 1553 CH A Cable (W9421) from Port to Starboard of Node 1 Nadir Midbay.
Do not restrain Wire Harness at this time.
- NOD1SD2 15.24 Route approximately 4 feet of NOD1 1553 CH A Cable (W9421) into NOD1SD2 area, staying outboard of secondary structure to avoid EMI concerns.
Route along W0205 Wire Harness.
Leave any excess cable in Nadir Midbay area.
- 15.25 ✓ **MCC-H** to verify 1553 bus safing complete per step 14
- 15.26 W0205 P106 ←|→ J106 of Nadir Bulkhead
- 15.27 Transfer Protective Cap from J106 of NOD1 1553 CH A Cable (W9421) to J106 of Nadir Bulkhead.
- 15.28 W0205 P106 →|← J106 of NOD1 1553 CH A Cable (W9421)
- 15.29 Pull any excess wire length into Node 1 Nadir Midbay.
- 15.30 Restrain NOD1 1553 CH A Cable (W9421) on same routing path as W0205 in NOD1SD2 area as shown in Figure 30.
- Nadir Midbay 15.31 Route NOD1 1553 CH A Cable (W9421) along W0205, gathering excess wire length near center of Midbay.
Coil excess wire length, maintaining minimum bend radius of six times the Harness diameter; coiled Wire Harness may cross any other Wire Harness without EMI risk.
Restrain Wire Harness to secondary structure (Cable Ties).
Refer to Figure 26.
- 15.32 Locate and route P78 of NOD1 Video/Audio Bus A Cable (W9423) from Port to Starboard of Node 1 Nadir Midbay.
Do not restrain Wire Harness at this time.
- NOD1SD2 15.33 Route approximately 4 feet of NOD1 Video/Audio Bus A Cable (W9423) into NOD1SD2 area, staying outboard of secondary structure to avoid EMI concerns.
Route along W0205 Wire Harness.
Leave any excess cable in Nadir Midbay area.
- 15.34 Stow P78 of NOD1 Video/Audio Bus A Cable (W9423) near J78 of starboard Bulkhead.
Do not make connections at this time. In a subsequent procedure, P78 of NOD1 Video/Audio Bus A Cable will be connected to the starboard Bulkhead.
- 15.35 Pull any excess wire length into Node 1 Nadir Midbay.

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- 15.36 Loosely restrain NOD1 Video/Audio Bus A Cable (W9423) on same routing path as W0205 in NOD1SD2 area as shown in Figure 31.
- Nadir
Midbay
- 15.37 Route NOD1 Video/Audio Bus A Cable (W9423) along W0205, gathering excess wire length near center of Midbay. Coil excess wire length, maintaining minimum bend radius of six times the Harness diameter; coiled Wire Harness may cross any other Wire Harness without EMI risk. Restrain Wire Harness to secondary structure (Cable Ties). Refer to Figure 26.
- 15.38 Photo document all routings and connections.

16. NORMALIZING 1553 BUSES

- 16.1 Use Table 4 to swap channels to A and enable channel switching.

```
sel [YY] where [YY] = Bus Name from Table 4
  [YY] Bus Status
  'Channel Selected'

  cmd Select Ch A Execute (√A)

  'Auto Channel Switch Status'

  cmd Enable Execute (√Ena)
Repeat
```

16.2 Enabling BC Comm Fail

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

CCS Recovery Retry

cmd BC Comm Fail – Enable Execute (√Ena)

16.3 Enabling Auto Transition to Diagnostics in PMCU MDM

CDH: Primary PMCU: MDM FDIR

Primary PMCU MDM FDIR

cmd Auto Transition Diag – Enable Execute (√Ena)

16.4 Enabling Comm Safing Response in INT MDM

CDH: Primary INT: MDM FDIR

Primary INT MDM FDIR

cmd Comm Safing Response – Enable Execute (√Ena)

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17. CLOSEOUT

NOD1D4 17.1 ✓NOD1D4 Rack rotation path unobstructed

17.2 ✓Knee Brace Spherical Bearings (two) are straight

17.3 Slowly rotate Rack up to a controlled stop.
Place Knee Brace Spherical Bearings into rack Upper Attach Mechanism Shear Pin view holes (two).

17.4 Verify left Upper Attach Mechanism Locking Screw is fully unlocked.

CAUTION

Do not force Upper Attach Mechanism Pinions. Mechanism should easily engage Knee Brace Spherical Bearings. Forcing the Mechanism could result in stripping the gear teeth or driving the mechanism assembly apart.

NOTE

1. To engage left pinion, turn ↺.
2. To engage right pinion, turn ↻.

17.5 Engage left Upper Attach Mechanism pinion into Knee Brace Spherical Bearings until Shear Pin is visible at top of mechanism (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).

17.6 Tighten left upper attach mechanism locking screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).

17.7 Repeat steps 17.4 to 17.6 for right Upper Attach Mechanism.

NOTE

All Closeout Panels except NOD1PD2-24 may be reinstalled at this time.

17.8 Install Closeout Panels (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive) listed below:

- NOD1SD2-22, -23 (three fasteners each, install as a group)
- NOD1SD2-24 (eight fasteners)
- NOD1SD2-25 (six fasteners)
- NOD1SD2-26, -27 (three fasteners each, install as a group)
- NOD1D2-36 (five fasteners), NOD1P2-31 (six fasteners)
(install as a group)
- NOD1D2-34 (twenty-four fasteners)
- NOD1S2-36 (five fasteners), NOD1D2-31 (six fasteners)
(install as a group)

17.9 Restow items listed in Table 5 per stowage note.

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Table 5. Node 1 Mod Kit Midbay Hardware To Be Restowed

#	Part Name	Part Number	Qty	Stowage Info	Disposition
1	Flexible coupling from NOD1OP2	1F89144-1	1	Place items one to two together in Ziplock Bag. Label Ziplock Bag "Spare IMV parts." Report any Qty deltas.	Kept as spare IMV parts
2	Band Clamp 4" (five used, one new)	NAS1922-0400-3	6		
3	Negative Pressure Relief Valve (NPRV)	683-16322-3	1	Stow items three to six per Stowage Note.	Position for Return
4	NOD1P3-01 Closeout Panel	1F66319-1	1		
5	NOD1O2 IMV Duct	1F89179-1	1		
6	IMV Diffuser Grilles	683-15110-4	2		
7	Protective Cap	NATC-PPC-N-25-0	1	Place items seven to fourteen together in Ziplock Bag. Label Ziplock Bag "NOD1 Mod Kit Caps and Plugs."	Kept for future IFM usage
8	Protective Cap	NATC-RPC-N-25-0	1		
9	Gamah Caps	683-19347-841	2		
10	Gamah Plugs	683-16347-818	2		
11	Protective Cap	NATC-RPC-N-13-0	1		
12	Protective Cap	NATC-PPC-N-13-0	1		
13	Protective Cap	NATC-RPC-N-11-0	3		
14	Protective Cap	NATC-PPC-N-11-0	3		

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OBJECTIVE:

To perform installation of a portion of the Node 1 Modification Kit into the Node 1 Alcove area. The Mod Kit installs hardware into Node 1 to redirect Wire Harnesses, fluids, Intra Module Ventilation (IMV), and other utilities to allow Node 3 to be physically installed onto the Radial Port CBM instead of the Radial Nadir CBM. Installs hardware into the physical portion of the Node "Alcove" area, which is in the forward portion of Node 1.

LOCATION:

Node 1 Alcove, Node 1 Port Deck Radial area

DURATION:

6 hours (two crewmembers)

CREW:

Two

PARTS:

Node 1 Avionics and Fluids Modification Kit (Refer to Table 1.)

Node 1 IMV Modification Kit (Refer to Table 1.)

MATERIALS:

Kapton Tape

Aluminum Tape

Ziplock Bags

Sharpie

Clean Room Gloves

Braycote (from Mod Kit Midbay Hardware Bag)

Releasable Wire Tie (from Mod Kit Midbay Hardware Bag)

TOOLS:

Flashlight (crew preference)

Digital Camera

CSA-O2

MRK Fan (if required for added ventilation)

Fluid Fitting Torque Device and Gamah Seal Maintenance Kit:

Fluid Fitting Torque Device S/N 001

0.875" Drive Gear S/N 001

0.625" Reaction Gear S/N 001

Brass Picks (if required)

ISS IVA Toolbox:

Drawer 1:

1/4" Combination Wrench (if preferred to 1/4" Deep Socket)

5/16" Combination Wrench

5/16" Crowfoot Wrench, 1/4" Drive

Drawer 2:

Driver Handle, 1/4" Drive

Ratchet, 1/4" Drive

1/8" Hex Head

Ratchet, 3/8" Drive

1/4" to 3/8" Adapter

6" Ext, 1/4" Drive

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10" Ext, 1/4" Drive
5/32" Hex Head, 1/4" Drive
Driver Handle, 1/4" Drive
1/4" Deep Socket, 1/4" Drive
5/16" Socket, 1/4" Drive
7/16" Deep Socket, 1/4" Drive
3/8" Socket, 1/4" Drive
(10-50 in-lbs) Trq Wrench, 1/4" Drive
(40-200 in-lbs) Trq Wrench, 1/4" Drive

Drawer 3:

#10 Long Torq Driver, 3/8" Drive

REFERENCED PROCEDURE(S):

1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS

2.506 IMV VALVE RECONFIGURATION

A.2.1 FLUID FITTING TORQUE DEVICE (FFTD) ASSEMBLY AND USAGE

A.2.3 MATING GAMAH FITTING USING THE FFTD

A.2.13 GAMAH SEAL R&R

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Table 1. Node 1 Mod Kit Alcove Hardware

#	Part Name	Part Number	Serial Number	Barcode Number	Qty
1	NOD1D1 to NOD1P1 IMV Duct	683-99516-3	000001	00106751H	1
2	IMV Duct Cap	BOE2221-0015	N/A	N/A	2
3	IMV Hose Clamp (5.25")	NAS1922-0525-3	N/A	N/A	6
4	IMV Duct Sleeve 5" Diameter Short (for contingency IMV use)	BACD40R20A30	N/A	N/A	2
5	IMV Duct Sleeve 5" Diameter Long (for contingency IMV use)	BACD40R20A42	N/A	N/A	3
6	NOD1 IMV Diffuser Cover	683-99518-1	001001	00106752H	1
7	Bolt, #10-32 (for Diffuser Cover)	NAS1580C3T4	N/A	N/A	9
8	Washer (for Diffuser Cover)	NAS1587-3	N/A	N/A	9
9	Lock Nut, #10-32 (for Diffuser Cover)	MS21043-3	N/A	N/A	10
10	Node 1 IMV Valve RMO Cover	683-60444-1	N/A	N/A	1
11	Protective Cap	NATC-RPC-N-11-0	N/A	N/A	3
12	Protective Cap	NATC-PPC-N-11-0	N/A	N/A	3
13	Protective Cap	NATC-RPC-N-13-0	N/A	N/A	1
14	Protective Cap	NATC-PPC-N-13-0	N/A	N/A	1
15	NOD1 MTL Supply Hose	683-99511-6	000001	00106742H	1
16	NOD1 MTL Return Hose	683-99511-7	000001	00106743H	1
17	MTL Supply label	683-56471-15	N/A	N/A	2
18	MTL Return label	683-56471-10	N/A	N/A	2
19	To NOD3 label (left arrow)	683-99512-1	N/A	N/A	1
20	To NOD3 label (right arrow)	683-99512-2	N/A	N/A	1
21	To PMA3 label (down arrow)	683-99512-3	N/A	N/A	2
22	NOD1 Oxygen Hose	683-99511-1	000001	00106737H	1
23	NOD1 Nitrogen Hose	683-99511-2	000001	00106738H	1
24	NOD1 1553 CH B Cable (W9422)	683-99422-1	000001	00106718H	1
25	NOD1 1553 Termination Plug (W9427)	683-99427-1	000002	00106747H	1
26	NOD1 Audio Bus B Cable (W9424)	683-99424-1	000001	00106720H	1
27	EVA Tape (one roll)	P-213	N/A	N/A	AR
28	Cable Tie (one hundred)	T50R2HAL	N/A	N/A	AR

AR = As Required

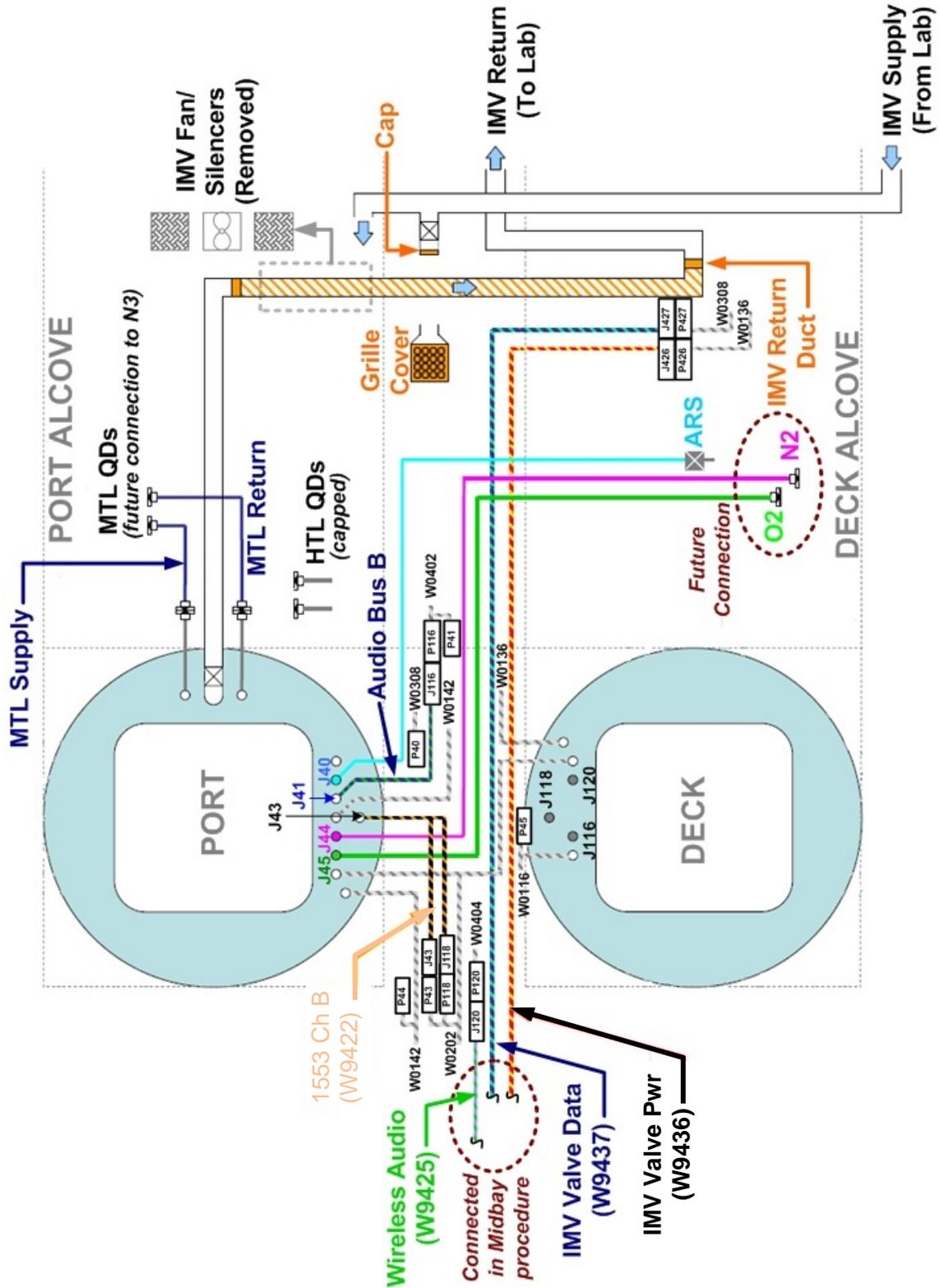


Figure 1.- Node 1 Alcove Hardware Installation Overview.

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1. [SAFING AND RECONFIGURING IMV](#)

NOTE

To stop airflow through Node 1 Port/Deck Alcove while IMV Fan is being removed and new IMV ducting is being installed, several IMV reconfiguration steps are required.

- ISS 1.1 **MCC-H** to confirm the following safing actions have been completed:
Verify Node 1 Port Fwd IMV Fan is deactivated.
Verify RPCM N13B C RPC 16 (N1 Port Fwd IMV Fan) is Open and Close command Inhibited.
- PMA1 1.2 Open PMA1 IMV Duct Grill (Velcro cover).
- MCC-H** 1.3 To turn off LAB Aft Port IMV Fan, perform [1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS](#), step 3.1 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:
- 1.4 To turn off Node 1 Aft Port IMV Fan, perform [1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS](#), step 3.1 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:
- 1.5 To close Node 1 Aft Port IMV Valve, perform [2.506 IMV VALVE RECONFIGURATION](#), step 3 (SODF: ECLSS: NOMINAL: THC), then:

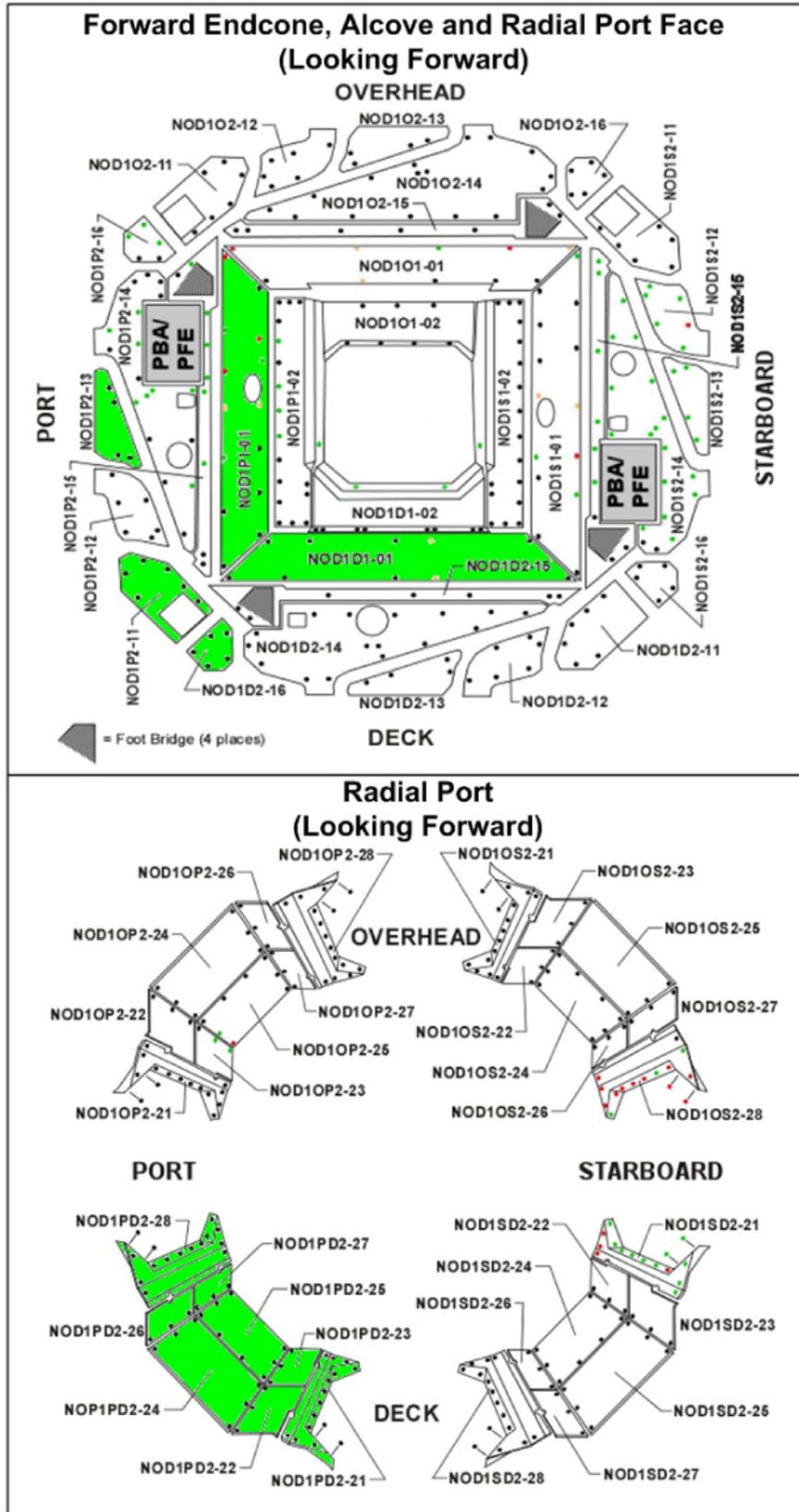


Figure 2.- Node 1 Closeout Panels to be Removed.

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2. REMOVING CLOSEOUT PANELS AND CHECKING VENTILATION

- NOD1 2.1 Relocate any items from front of affected Closeout Panels.
Refer to Figure 2.

WARNING

CSA-O2 sampling is required to insure O2% is not above flammability levels or N2 pockets do not exist that can cause crew asphyxiation.

- 2.2 Perform CSA-O2 sampling in open cabin and record: _____.

- PCS 2.3 Comparison to MCA sampling
US LAB: ECLSS: AR Rack: MCA
LAB MCA
'(ORU2) Mass Spectrometer Assembly'

Record O2 %: _____

√Difference between CSA-O2 and MCA O2 percentage is less than or equal to 1.1

NOTE

1. Closeout Panels NOD1P2-11 and NOD1D2-16 are joined together with a seam support so panels should be removed together as a single unit.
2. Closeout Panels NOD1PD2-22(NOD1PD2-23) and NOD1PD2-26(NOD1PD2-27) are joined together with a T-shaped seam support and have L-shaped seam supports on either end. Both sets of panels should be able to be removed together as a single unit without removing any seam supports.

- NOD1 2.4 Remove NOD1P2-11(NOD1D2-16) Closeout Panels, fasteners (eleven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
Temporarily stow.
Refer to Figure 2.

- 2.5 Remove the following Closeout Panels (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive):
NOD1PD2-22 and NOD1PD2-23 (together – three fasteners each)
NOD1PD2-26 and NOD1PD2-27 (together – three fasteners each)

Temporarily stow.
Refer to Figure 2.

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* If required for removal of NOD1PD2-22, NOD1PD2-23,
* NOD1PD2-26, or NOD1PD2-27
* Remove T-shaped Closeout Seam Support, fasteners (eight)
* (Ratchet, 1/4" Drive; 1/8" Hex Head).
* Remove L-shaped Closeout Seam Supports (two), fasteners
* (four each) (Ratchet, 1/4" Drive; 1/8" Hex Head).

2.6 Remove following Closeout Panels (5/32" Hex Head, 1/4" Drive;
Driver Handle, 1/4" Drive):

- NOD1PD2-24 (eight fasteners)
- NOD1PD2-25 (eight fasteners)
- NOD1PD2-28 (fifteen fasteners)
- NOD1PD2-21 (fifteen fasteners)
- NOD1P2-13 (three fasteners)
- NOD1D1-01 (eight fasteners)
- NOD1P1-01 (twelve fasteners)

Temporarily stow.
Refer to Figure 2.

2.7 Perform CSA-O2 sampling in each area where a Closeout Panel was
removed for 1 minute.

If O2 % is between 16.5 to 23.3 %, proceed.

If O2 % is not between 16.5 to 23.3 %

√MCC-H

3. REMOVING NODE 1 PORT FORWARD IMV FAN AND SILENCERS

NOTE

1. The Node 1 Port Forward IMV Fan and Silencers are being removed and replaced with new ducting. The IMV Fan will be kept onboard as a spare.
2. The duct couplings (P/N 1F89029-1) directly above and below the IMV Fan are wrapped with two layers of acoustic covering. The outer layer, consisting of two to three revolutions of acoustic insulation tape, covers the inner layer, consisting of two to three revolutions of acoustic isolator tape. It may be necessary to cut the insulation layer(s) in order to remove the duct couplings from the IMV Fan.

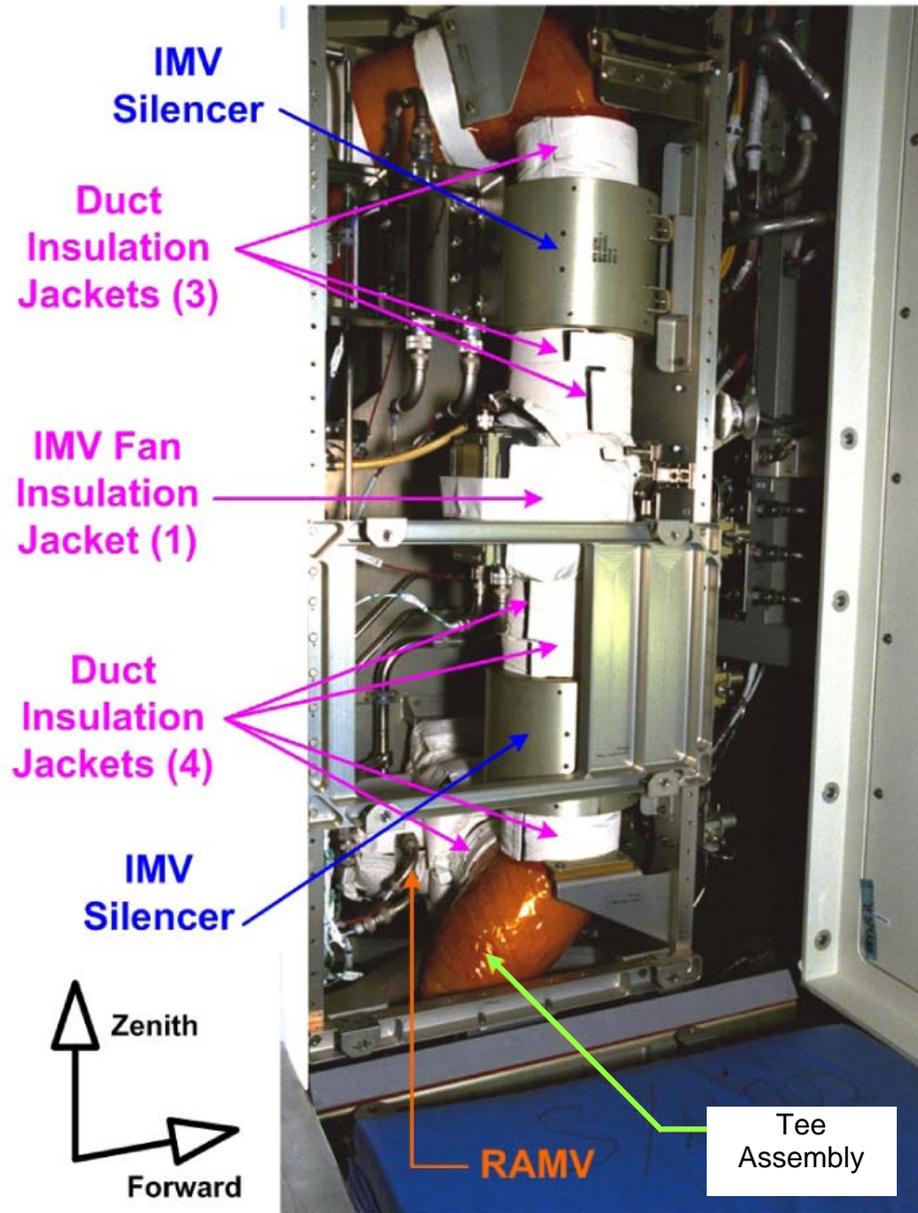


Figure 3.- Node 1 Port Forward IMV Insulation Jacket Locations.

LAB1P1

- 3.1 Remove Insulation Jackets (eight total) (held in place with Velcro) in the following locations:
 - above top IMV Silencer (one),
 - above IMV Fan (two),
 - below IMV Fan (two),
 - around IMV Fan (one),
 - below bottom IMV Silencer (one),
 - between Tee Assembly and the RAMV (one).

Temporarily stow insulation.
Refer to Figure 3.

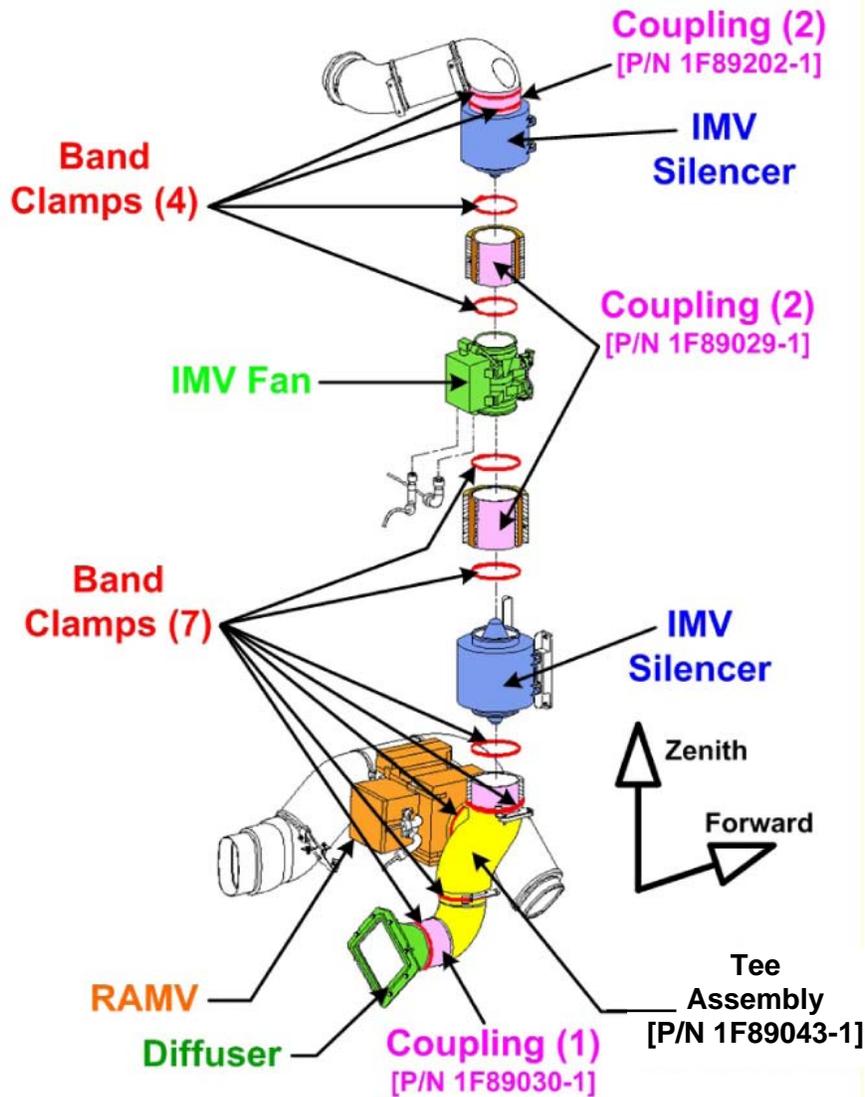


Figure 4.- Node 1 Port Forward IMV ducting Band Clamp Locations.

- 3.2 Loosen and remove Band Clamps (eleven total) (1/4" Deep Socket, 1/4" Drive; 6" Ext, 1/4" Drive; Ratchet, 1/4" Drive) in the following locations:
- above upper IMV Silencer (two),
 - between upper IMV Silencer and IMV Fan (two),
 - between lower IMV Silencer and IMV Fan (two),
 - below lower IMV Silencer (two),
 - in middle of Tee Assembly (one),
 - connecting Tee Assembly (with Coupling) to the RAMV (one),
 - connecting Tee Assembly Coupling to diffuser (one).

Temporarily stow clamps [5.25" (seven) and 5.75" (four)]. Refer to Figure 4.

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- 3.3 Free Coupling above upper IMV Silencer and remove from Silencer and duct.
Temporarily stow.
Refer to Figure 4.
- 3.4 Loosen upper IMV Silencer fasteners (four) and remove Silencer (5/16" Socket, 1/4" Drive; 10" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
Temporarily stow.
Refer to Figure 4.
- 3.5 Free duct Coupling from top of IMV Fan and remove, cutting acoustic insulation wrapping(s), if required.
Temporarily stow.
- 3.6 W0308 P412 ←|→ IMV Fan J1
W0308 P412 →|← Protective Cap (P/N NATC-PPC-N-11-0)
IMV Fan J1 →|← Protective Cap (P/N NATC-RPC-N-11-0)
W0136 P413 ←|→ IMV Fan J2
W0136 P413 →|← Protective Cap (P/N NATC-PPC-N-13-0)
IMV Fan J2 →|← Protective Cap (P/N NATC-RPC-N-13-0)
- 3.7 Loosen IMV Fan fasteners (four) and remove IMV Fan (7/16" Deep Socket, 1/4" Drive; 10" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
Temporarily stow.
- 3.8 Free Coupling from bottom of IMV Fan or from lower IMV Silencer.
Temporarily stow.
- 3.9 Loosen lower IMV Silencer fasteners (four) and remove Silencer (5/16" Socket, 1/4" Drive; 10" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
Temporarily stow.
Refer to Figure 4.
- 3.10 Free Coupling from top of Tee Assembly and remove from finger brackets holding it to structure.
Temporarily stow.
Refer to Figure 4.
- 3.11 Free Tee Assembly from RAMV leaving Coupling attached to Tee.
Free Tee Assembly Coupling from Diffuser, which should allow entire Tee Assembly to be removed.
If possible, loosen Band Clamps attaching Couplings to Tee Assembly.
Temporarily stow.
Refer to Figure 4.

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- 3.12 Install Duct Cap (P/N BOE221-0016) onto RAMV duct opening where Tee Assembly was removed.
Install Band Clamp over Duct Cap, ensuring there is at least ~1/8" overlap from end of cap, and tighten (snug) (1/4" Deep Socket, 1/4" Drive; 6" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
- 3.13 Loosen and remove noncaptive bolts and washers (eight) connecting Diffuser to square mounting plate (3/8" Socket, Ratchet, 1/4" Drive).
Remove Diffuser from mounting plate, reinstall bolts and washers (eight) onto loose Diffuser and tighten (hand-tight).
Temporarily stow Diffuser.

4. ROUTING MTL JUMPERS IN PORT ALCOVE

NOTE

1. Two Moderate Temperature Loop (MTL) hoses with Quick Disconnects (QD) on both ends will be routed in Port Alcove prior to installation of new IMV ducting for better access.
2. Only one end of MTL hoses will be connected in this procedure to QD ports in Port Alcove, which in turn connect to hoses that go to Node 1 Port bulkhead. Free end of MTL hoses will not be connected until after Node 3 is mated to Node 1 Port, lines in Node 1 and Node 3 have been filled with ITCS fluid, and reconfigurations have been made to allow transition of Node 1/Airlock MTL cooling from LAB to Node 3.
3. The new MTL hoses launched dry and the hoses that they are connecting to in Node 1 are dry since they were originally designated for High Temperature Loop (HTL) function that was never utilized (not filled with ITCS fluid).
4. New labels for MTL Supply and Return functions will be installed over existing High Temp labels on Node 1 Port bulkhead. Due to Node 3 becoming the ITCS MTL source, what was previously labeled as Supply becomes Return and vice versa.
5. New MTL labels are not wide enough to completely cover old labels so Aluminum Tape is used to cover old labels and then new labels are applied onto the tape.

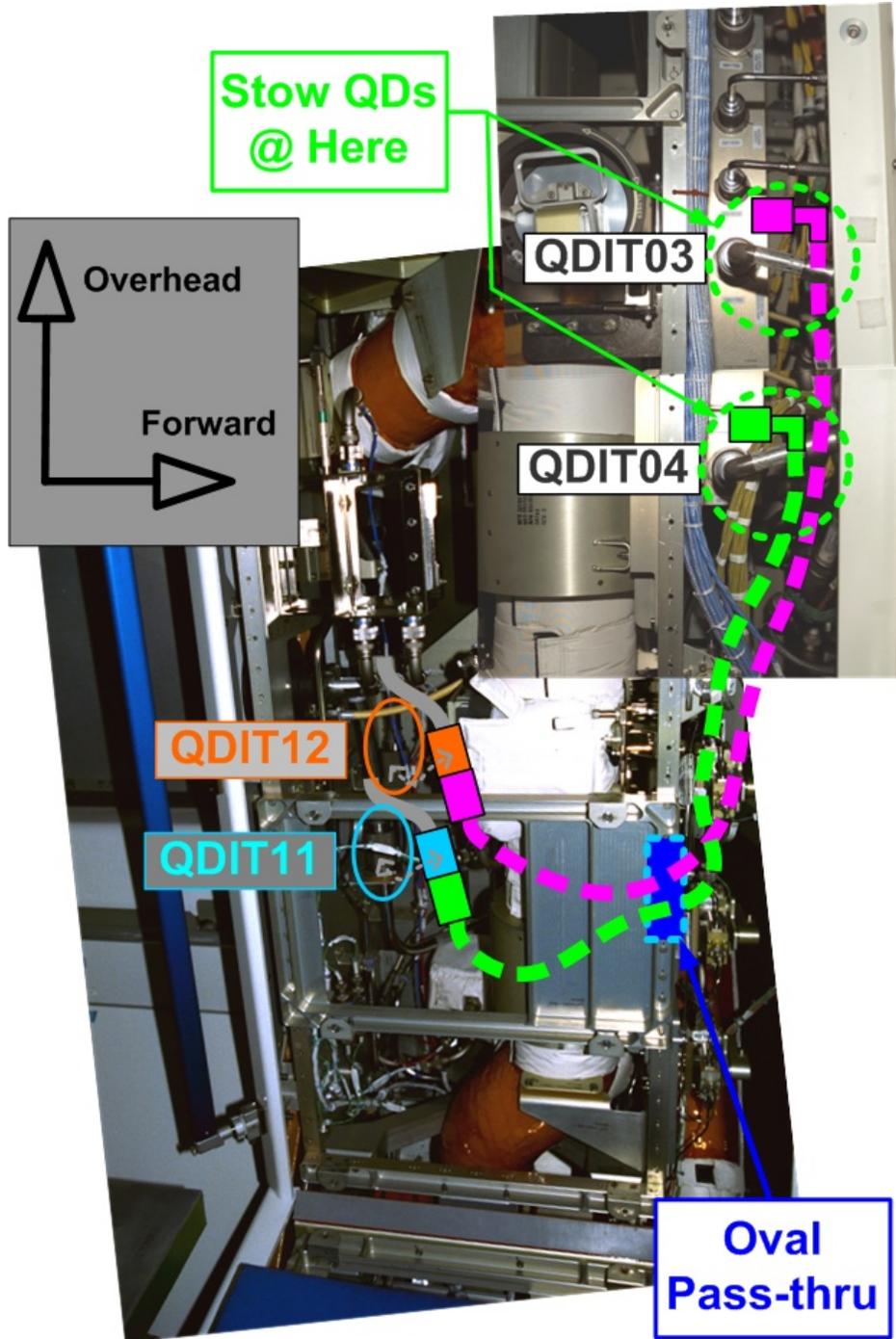


Figure 5.- NOD1 MTL Supply and Return Hose Routing in N1 Port Alcove.

- NOD1P1 4.1 Locate the oval shaped pass-thru on the forward face of the Port Alcove box structure.
Route NOD1 MTL Supply Hose (straight end) from area forward of box structure through pass-thru and into Port Alcove.
Refer to Figure 5.

- 4.2 QDIT12 Female Quick Disconnect ←|→ QDIT12 Male Fitting
Protective Cap ←|→ NOD1 MTL Supply Hose (straight end)
NOD1 MTL Supply Hose (straight end) →|← QDIT12 Female QD
Protective Cap →|← QDIT12 Male Fitting
Refer to Figure 5.
- 4.3 Route NOD1 MTL Return Hose (straight end) from area forward of box
structure through pass-thru and into Port Alcove.
Refer to Figure 5.
- 4.4 QDIT11 Female Quick Disconnect ←|→ QDIT11 Male Fitting
Protective Cap ←|→ NOD1 MTL Return Hose (straight end)
NOD1 MTL Return Hose (straight end) →|← QDIT11 Female QD
Protective Cap →|← QDIT11 Male Fitting
Refer to Figure 5.
- 4.5 Place the NOD1 MTL Supply Hose (90 degree end) near QDIT03.
Place the NOD1 MTL Return Hose (90 degree end) near QDIT04.
Restrain hoses and connectors with Cable Ties or Releasable Wire Ties.
Refer to Figure 5.

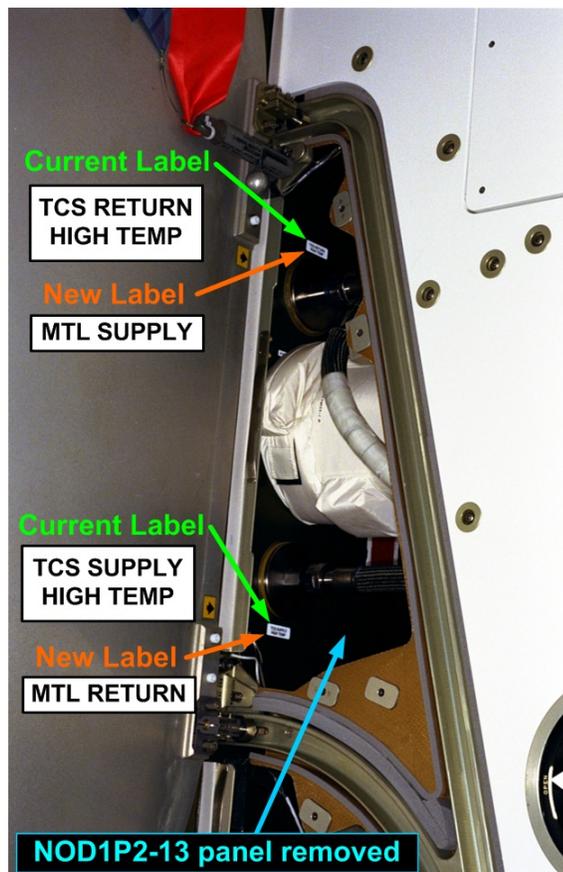


Figure 6.- NOD1 MTL Supply and Return Label Replacement Locations.

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- 4.6 Cover existing High Temp labels (Aluminum Tape).
Install new MTL Supply or MTL Return labels.
Refer to Figure 6.

5. INSTALLING REPLACEMENT IMV DUCT

NOTE

1. A tape-reinforced Ziplock Bag is expected to be in place covering the IMV port in the deck Alcove where one end of the new duct is being installed. The cap originally intended to serve this function is launching on ULF-3 and will not arrive in time since the IMV Valve and ducting is expected to be removed prior to ULF-3 (prior to PMA 3 Relocate).
2. When installing duct couplers, try to have at least ~1.25" of coupler surface installed onto duct.
3. Reuse of Band Clamps removed from IMV Fan and Silencers is allowed as long as clamps are undamaged, but new clamps (including extras) were flown and are preferred for installing new duct.
4. Installing Band Clamps around IMV duct support brackets is not required since these are for support during launch.
5. Two Duct Insulation Jackets removed from IMV Fan (Silencers) are reused and placed around both couplers on the new duct.

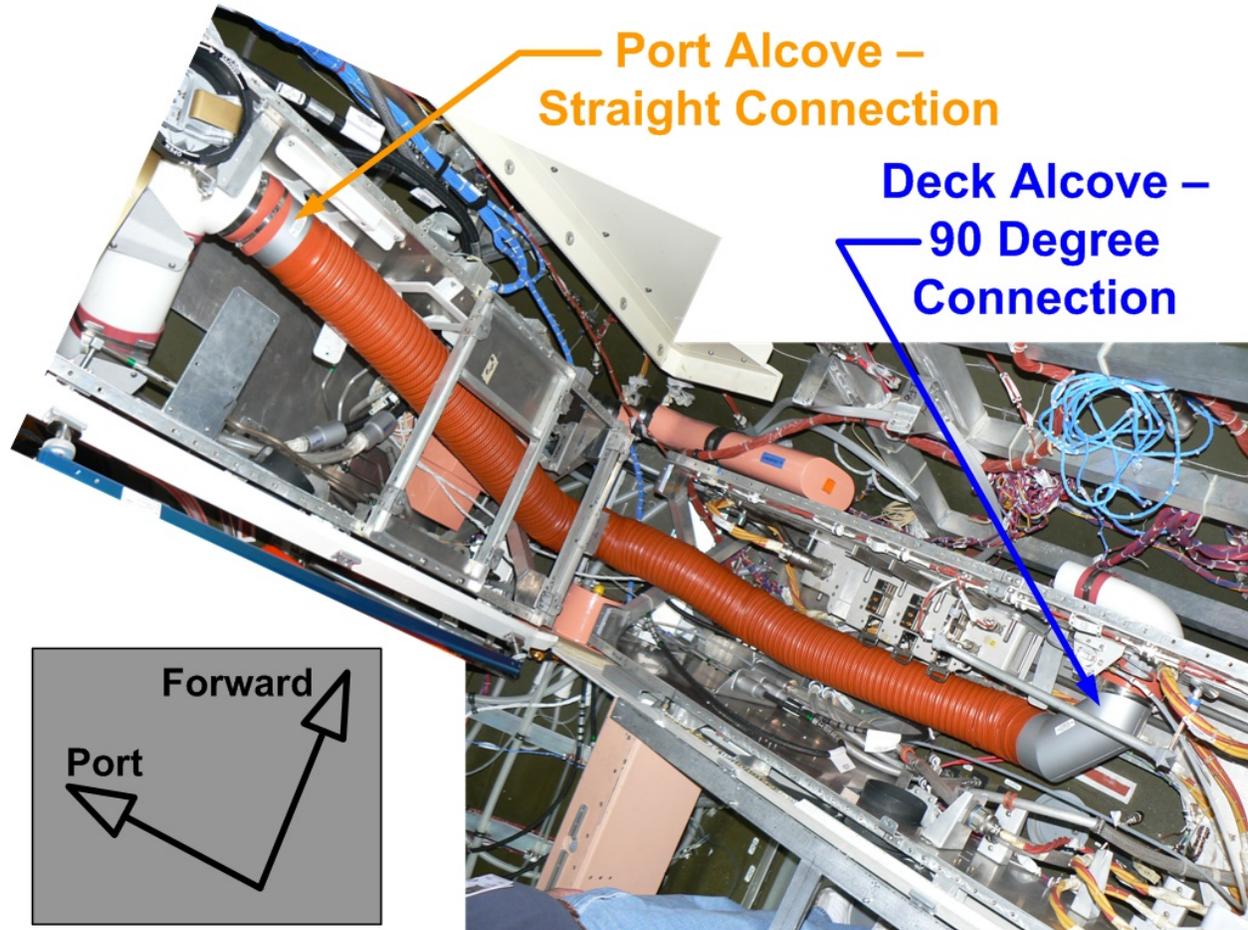


Figure 7.- NOD1D1 to NOD1P1 IMV Duct Routing and Installation.

- NOD1D1
- 5.1 Loosen and remove Band Clamp (one) holding tape-reinforced bag over Deck Alcove IMV Return duct (1/4" Deep Socket, 1/4" Drive; 6" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
Temporarily stow Band Clamp and trash Ziplock Bag.
Refer to Figure 7.
 - 5.2 Slide IMV Hose Clamp (5.25") onto 90 degree end of NOD1D1 to NOD1P1 IMV Duct.
Install duct (90 degree end) onto Deck Alcove IMV Return duct by using attached coupler.
Install Hose Clamp onto coupler, ensuring there is at least ~1/8" overlap from end of coupler and tighten (snug) (1/4" Deep Socket, 1/4" Drive; 6" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
Refer to Figure 7.
- NOD1P1
- 5.3 Route remaining end of duct into Port Alcove through the x-shaped crossmembers.
 - 5.4 Slide IMV Hose Clamp (5.25") onto end of duct.
Install duct onto Port Alcove IMV Return duct by using attached coupler.

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Install Hose Clamp onto coupler, ensuring there is at least ~1/8" overlap from end of coupler and tighten (snug) (1/4" Deep Socket, 1/4" Drive; 6" Ext, 1/4" Drive; Ratchet, 1/4" Drive).
Refer to Figure 7.

- 5.5 Install duct Insulation Jacket (one) around duct coupler in Port Alcove (attached by Velcro).
Repeat for duct coupler in Deck Alcove.

MCC-H

- 5.6 To open Node 1 Aft Port IMV Valve, perform [2.506 IMV VALVE RECONFIGURATION](#), step 2 (SODF: ECLSS: NOMINAL: THC), then:
- 5.7 To turn on LAB Aft Port IMV Fan, perform [1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS](#), step 2.2 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:
- 5.8 To turn on Node 1 Aft Port IMV Fan, perform [1.504 IMV FAN ACTIVATION/DEACTIVATION POST CCS](#), step 2.2 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:

PMA1

- 5.9 Cover PMA1 IMV Duct Grill (Velcro cover).

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6. ROUTING AND CONNECTING AIR SAMPLE, OXYGEN, AND NITROGEN HOSES

CAUTION

Failure to prevent contact of metal braided ARS and O2/N2 hoses with power cables by proper routing or not using protective Glass Tape may cause hardware damage as hoses rub/chafe against power cables.

NOTE

1. The Air Resource Sample (ARS) bulkhead feedthru connector contains a hose that was pre-integrated with the new feedthru. After feedthru was installed, hose was coiled and stowed in Node 1 Port/Deck radial area behind Closeout Panels. The steps below route hose to the Deck Alcove and connect to the ARS Valve.
2. The metal braided ARS, Oxygen (O2), and Nitrogen (N2) hoses should be kept at least 2 inches from any power cables, where possible. Power cables typically have red or yellow wire insulation.
3. O2 and N2 hoses have Gamah Fittings on one end that will be connected to bulkhead feedthrus that were installed previously. The other end of each hose has a Quick Disconnect that will be routed to the Deck Alcove but will not be connected until after Node 3 is installed. All of the Node 1 and Node 3 O2/N2 lines must be purged prior to connection into the O2/N2 system.
4. The N2 hose is connected before the O2 hose at Node 1 bulkhead in order to provide adequate access for the Fluid Fitting Torque Device (FFTD).
5. Torque input values for Gamah fittings in this step are written for the Prime FFTD (Serial Number 001).
6. Gamah fitting and FFTD reference information can be found in the following procedures:
[A.2.1 FLUID FITTING TORQUE DEVICE \(FFTD\) ASSEMBLY AND USAGE](#)
[A.2.3 MATING GAMAH FITTING USING THE FFTD](#)
[A.2.13 GAMAH SEAL R&R](#) (SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)
7. Hose routings depicted in the figures below have been chosen to provide the best potential for adequate clearance around power lines.

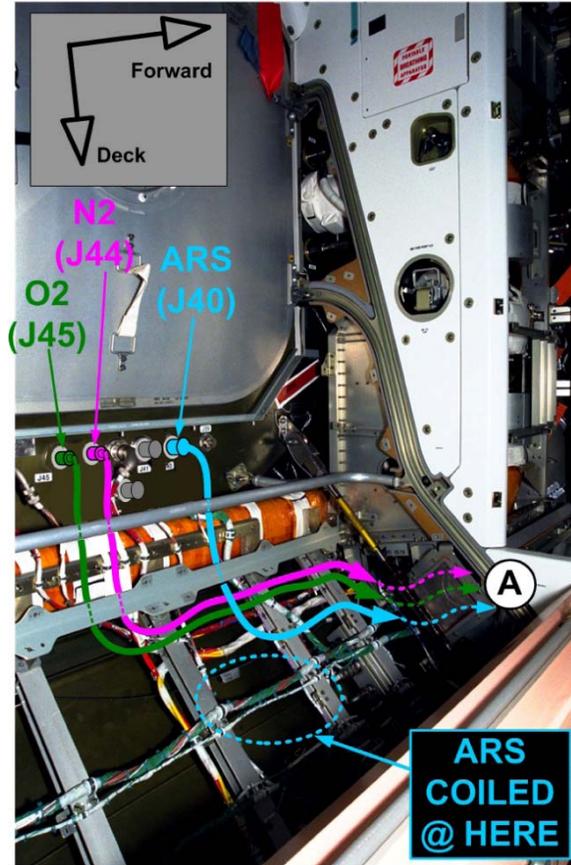


Figure 8.- ARS and O2/N2 Hose Routing in Port Deck Radial Area.

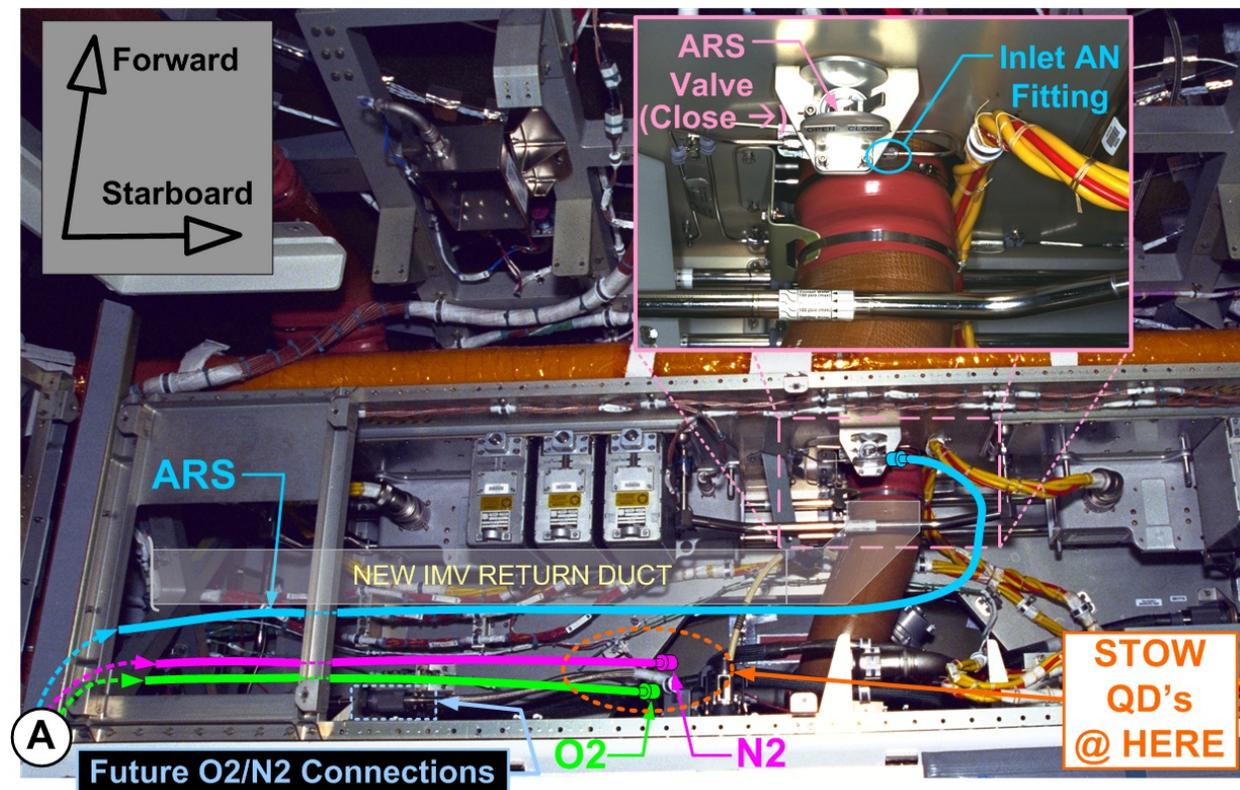


Figure 9.- ARS and O2/N2 Hose Routing in Deck Alcove Area.

6.1 ARS HOSE ROUTING AND CONNECTION

NOD1PD2

- 6.1.1 Uncoil pre-positioned NOD1 Air Sample Hose (ARS) and route free end toward Deck Alcove area. Route hose just under the square-shaped diffuser bracket and into area between Port and Deck Alcoves. Refer to Figure 8.

- 6.1.2 Restrain hose, as necessary, with Cable Ties and wrap metal braided hose with Glass Tape anywhere it crosses or contacts other cables and hoses.

NOD1D1

- 6.1.3 Route NOD1 Air Sample Hose (ARS) into Deck Alcove through zenith opening in the X-shaped structural member. Route NOD1 Air Sample Hose (ARS) hose parallel to new IMV duct installed in a previous step. Refer to Figure 9.

- 6.1.4 Node 1 Nadir Alcove ARS Valve is in “CLOSE” position (Switch rotated toward Starboard)
 Refer to Figure 9.

- 6.1.5 Existing ARS hose ←|→ Node 1 Nadir Alcove ARS Valve Inlet by loosening AN fitting (5/16" Combination Wrench)
 Refer to Figure 9.

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- 6.1.6 ARS Protective Plug ←|→ NOD1 Air Sample Hose (ARS)
ARS Protective Plug →|← Existing ARS hose (hand-tight)
- 6.1.7 NOD1 Air Sample Hose (ARS) →|← Node 1 Nadir Alcove ARS Valve
Inlet
Torque Inlet AN fitting to 70 in-lbs [5/16" Crowfoot Wrench,
1/4" Drive; (40-200 in-lbs) Trq Wrench, 1/4" Drive].

6.2 NITROGEN HOSE CONNECTION AND ROUTING

- 6.2.1 To set up Prime FFTD (S/N 001) utilizing 0.625" Reaction Gear and
0.875" Drive Gear (FFTD and Gamah Seal Maintenance Kit),
perform [A.2.1 FLUID FITTING TORQUE DEVICE \(FFTD\)
ASSEMBLY AND USAGE](#), all (SODF: IFM: REFERENCE:
APPENDIX A), then:
 - 6.2.2 During Nitrogen and Oxygen hose connections steps
 - Inspect both sides of each gamah fitting for damage, debris
before mating.
 - Report damage, debris to **MCC-H**.
 - Inspect male threads for absence of Braycote before mating.

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Table 2. O2, N2 Hose Information

Jumper Name	NOD1 Blkhd	Hose End	Part Number	Input Torque	Output Torque	FFTD Gear Size (in)	
				(in-lbs)	(in-lbs)	Drive	Reaction
NOD1 Nitrogen Hose	J44	P44	683-99511-2	38	185	0.875	0.625
NOD1 Oxygen Hose	J45	P45	683-99511-1	38	185	0.875	0.625

NOD1PD2

6.2.3 Route NOD1 Nitrogen Hose P44 end (90 degree end) below Closeout Panel support bracket and above ducting or clamp bracket.

Refer to Figure 8.

6.2.4 Don Clean Room Gloves.

6.2.5 3/8" Gamah Cap ←|→ J44 Nitrogen Feedthru (Node 1 Port Bulkhead)

3/8" Gamah Plug ←|→ NOD1 Nitrogen Hose P44

Stow cap and plug in Ziplock Bag.

Refer to Figure 8 and Table 2.

If required, apply one drop of Braycote to exposed threads on bulkhead fitting; spread around threads by gloved hand.

6.2.6 NOD1 Nitrogen Hose P44 →|← J44 Nitrogen Feedthru Hand tighten Gamah fitting

Refer to Figure 8 and Table 2.

6.2.7 Tighten, torque P44/J44 Nitrogen to 38 in-lbs (Input Torque) [Fluid Fitting Torque Device; 0.875" Drive Gear, 0.625" Reaction Gear; 1/4" to 3/8" Adapter, (10-50 in-lbs) Trq Wrench, 1/4" Drive].

Refer to Table 2.

6.2.8 Route NOD1 Oxygen Hose P45 end (90 degree end) below Closeout Panel support bracket and above ducting or clamp bracket.

Refer to Figure 8 and Table 2.

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6.3 OXYGEN HOSE CONNECTION AND O2/N2 HOSE ROUTING

WARNING

Failure to maintain clean environment during oxygen hose connection could result in a future fire hazard.

To prevent fire hazard during the Oxygen hose connection:
Minimize the time connectors and caps or plugs are open or cover using Teflon Bags or Disposable Gloves.

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

If contaminants are found

Notify **MCC-H**.

Photo document (Digital Camera).

Remove using Brass Picks and retain for return to ground.

If contaminants cannot be completely removed

Reapply caps or plugs and hold for detailed **MCC-H** analysis.

6.3.1 3/8" Gamah Cap ←|→ J45 Oxygen Feedthru (Node 1 Port Bulkhead)

3/8" Gamah Plug ←|→ NOD1 Oxygen Hose P45

Stow cap and plug in Ziplock Bag.

Refer to Figure 8 and Table 2.

If required, apply one drop of Braycote to exposed threads on bulkhead fitting; spread around threads by gloved hand.

6.3.2 NOD1 Oxygen Hose P45 →|← J45 Oxygen Feedthru

Hand tighten Gamah fitting.

Refer to Figure 8 and Table 2.

6.3.3 Tighten, Torque P45/J45 Oxygen to 38 in-lbs (Input Torque)

[Fluid Fitting Torque Device; 0.875" Drive Gear, 0.625" Reaction Gear; 1/4" to 3/8" Adapter, (10-50 in-lbs) Trq Wrench, 1/4" Drive].

Refer to Table 2.

6.3.4 Doff Clean Room Gloves.

6.3.5 Route NOD1 Oxygen Hose and NOD1 Nitrogen Hose free ends toward Deck Alcove area.

Route hoses just under the square-shaped diffuser bracket and into area between Port and Deck Alcoves.

Refer to Figure 8 and Table 2.

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6.3.6 Restrain hoses, as necessary, with Cable Ties and wrap metal braided hoses with Glass Tape anywhere hoses cross or contact other cables and hoses to prevent damage from rubbing or chafing.

NOD1D1

6.3.7 Route O2 and N2 hoses into Deck Alcove through aft opening in X-shaped structural member.

Route both hoses on aft side of alcove box and position Quick Disconnects (QD) with enough slack to allow future connection to O2/N2 ports on aft port end of alcove box.

Restrain hoses and QDs with Releasable Cable Ties, as necessary.

Refer to Figure 9.

7. ROUTING AND CONNECTING IMV POWER AND DATA CABLES

NOTE

1. The NOD1 IMV Valve Power Cable (W9436) and NOD1 IMV Valve Data Cable (W9437) were connected to the IMV Valve in the Midbay Hardware Installation procedure. The other ends of the cables are left stowed in the Node 1 Port Deck Radial area and the steps below route cables to the old IMV location in the Deck Alcove to make the final connections.
2. The IMV Power Cable (W9436) should be routed with at least 2 inch clearance from other cables when it is running parallel with other cables or metal braided hoses. The recommended routing in Port Deck area is in between the green cables running aft to forward.
3. The IMV Data Cable (W9437) can be routed near other cables of similar type (green cables). The recommended routing in Port Deck area is just above upper green cable.

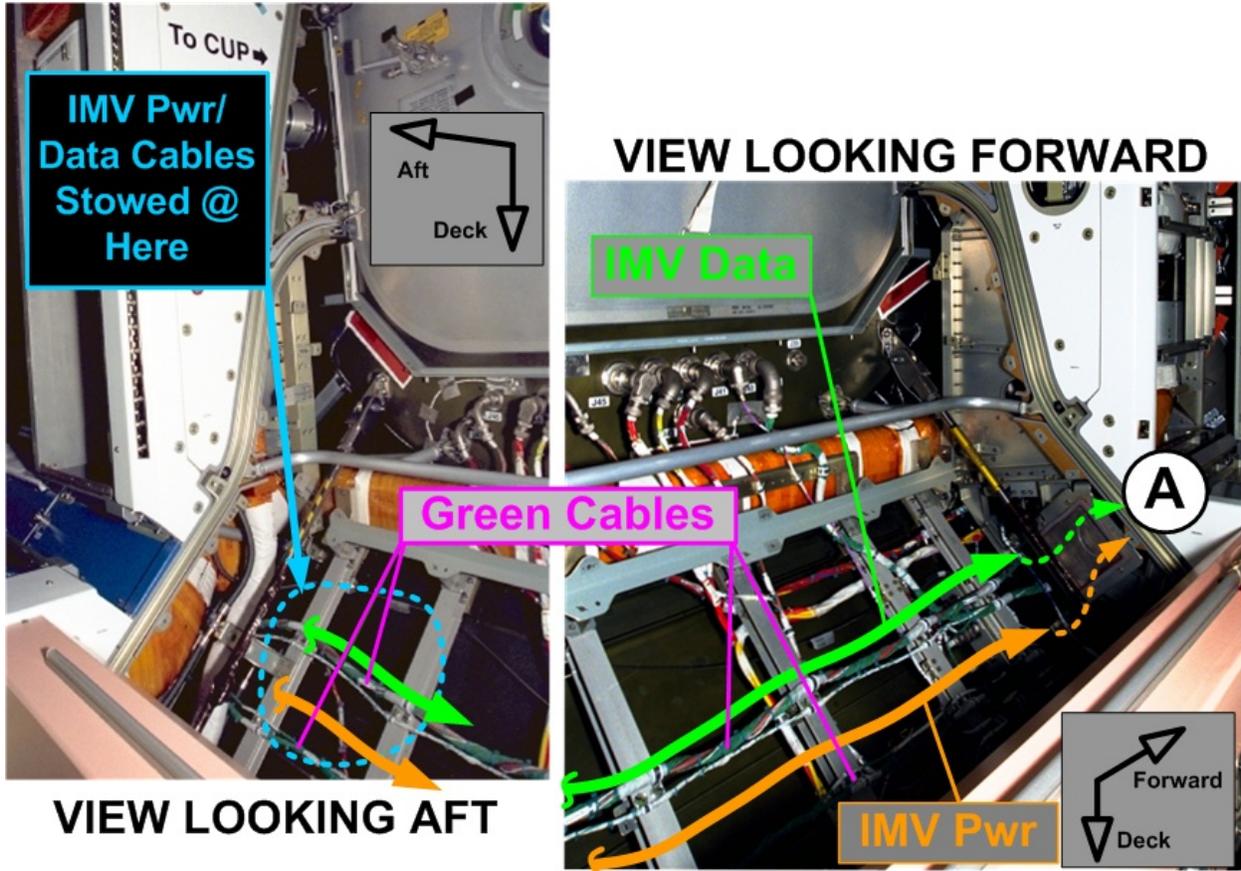


Figure 10.- IMV Valve Power and Data Routing in Port Deck Area.

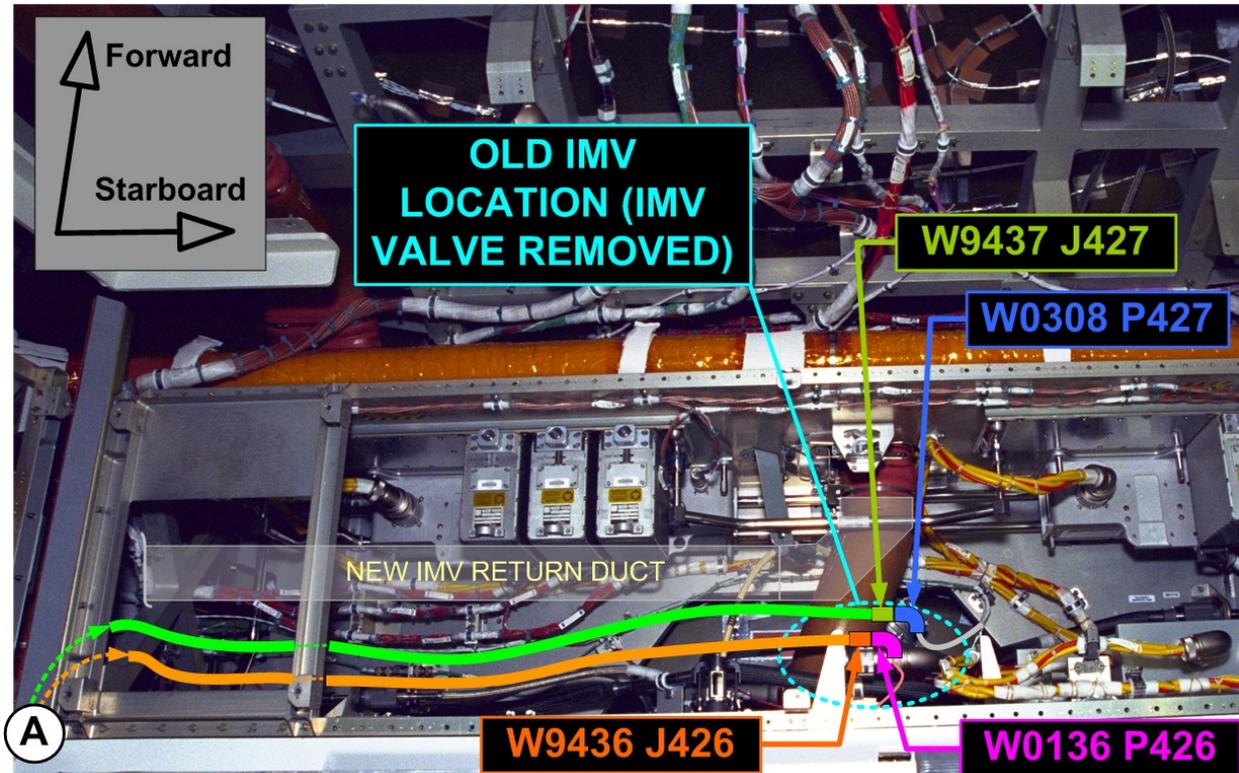


Figure 11.- IMV Valve Power and Data Routing in Port Deck Area.

- | | |
|---------|--|
| NOD1PD2 | <p>7.1 Uncoil pre-positioned IMV Valve Power/Data Cables and route forward toward Deck Alcove area.
Route cables under the square-shaped diffuser bracket and into area between Port and Deck Alcoves.
Refer to Figure 10.</p> |
| NOD1D1 | <p>7.2 Route cables into Deck Alcove through zenith opening in the X-shaped structural member.
Route cables toward area where IMV Valve was removed.
Refer to Figure 11.</p> <p>7.3 Protective Cap ← → W0136 P426
Protective Cap ← → NOD1 IMV Valve Power Cable (W9436) J426
W0136 P426 → ← NOD1 IMV Valve Power Cable (W9436) J426
Temporarily stow caps.
Refer to Figure 11.</p> <p>7.4 Protective Cap ← → W0308 P427
Protective Cap ← → NOD1 IMV Valve Data Cable (W9437) J427
W0308 P427 → ← NOD1 IMV Valve Data Cable (W9436) J427
Temporarily stow caps.
Refer to Figure 11.</p> |

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- 7.5 Restrain cables with Cable Ties, as necessary, trying to keep at least a 2 inch separation around IMV Power Cable from other metal braided hoses and any of the green colored Wire Harnesses or the IMV Data Cable.

8. CONNECTING WIRELESS AUDIO CABLE (UHF)

NOTE

1. The NOD1 Wireless Audio Cable (W9425) was routed and a Loopback Plug was installed on one end of the cable in the Midbay Hardware Installation procedure. The other end of the cable is left stowed in the Node 1 Port Deck Radial area and the steps below make the final connections.
2. No safing is required for this cable connection and there are no known impacts to Wireless Audio (UHF) communication during the connection.

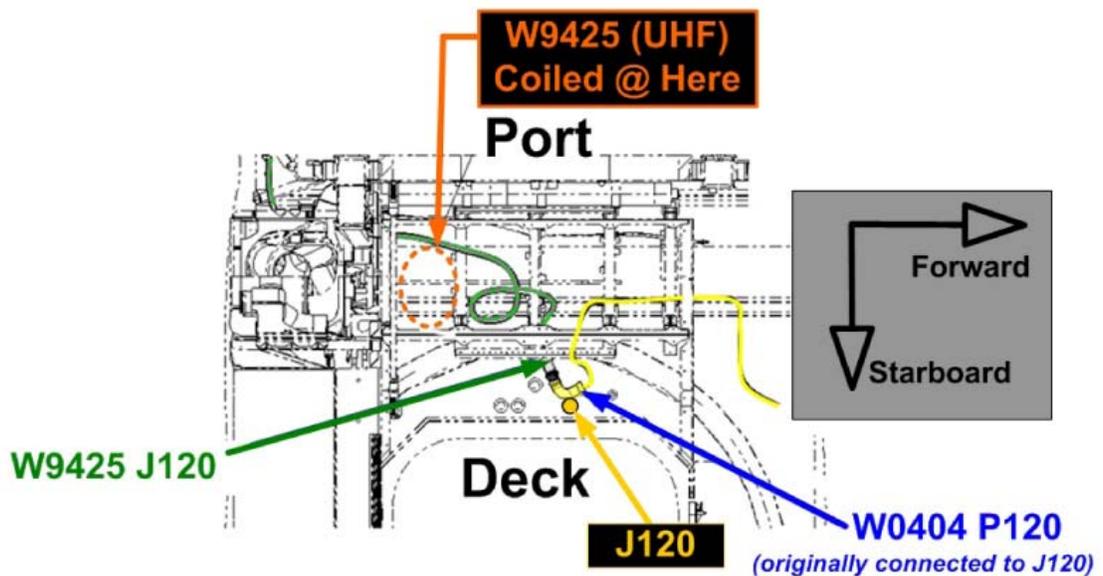


Figure 12.- Wireless Audio Cable Connection in Port(Deck) Area.

- 8.1 Locate stowed coil of NOD1 Wireless Audio Cable (W9425) in Port Deck Radial area.
Uncoil cable and route underneath Closeout Panel support brackets routing cable toward deck Hatch area.
Route free end to proximity of J120 bulkhead connection.
Refer to Figure 12.
- 8.2 W0404 P120 ←|→ J120 (Deck Bulkhead)
Protective Cap ←|→ NOD1 Wireless Audio Cable (W9425) J120
Protective Cap →|← J120 (Deck Bulkhead)
W0404 P120 →|← NOD1 Wireless Audio Cable (W9425) J120
Refer to Figure 12.

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9. [INSTALLING 1553 CHANNEL B HARNESS](#)

NOTE

1. Prior to installation of 1553 Channel B Wire Harness, all buses contained in harness are verified to be on channel (A) and controlling MDM FDIR response is reconfigured.
2. Tables 3 and 4 contain the 1553 buses contained in NOD1 1553 CH B CABLE (W9422).

Table 3. CDH 1553 Buses in NOD1 1553 CH B CABLE (W9422)

Bus Name [XX]	Controlling MDM
LB ORB HAB 1	Prime GNC
LB ORB HAB 2	Prime GNC
LB EPS HAB 23	Prime PMCU
LB EPS HAB 14	Prime PMCU
LB SYS HAB 1	Prime INT
LB SYS HAB 2	Prime INT
LB SEPS HAB 23	Prime INT
LB SEPS HAB 14	Prime INT
CB CT BIA 23	Prime C&C
CB CT 4	Prime C&C
CB INT 2	Prime C&C
LB CheCS HAB	Prime PL

Table 4. Robotics 1553 Buses in NOD1 1553 CH B CABLE (W9422)

Bus Name [YY]	Controlling Device
MSS PDGF LB	Prime CEU
HC LB 2	Cupola CEU
MSS BUD LB	Prime BCU
BCU LB 2	Cupola BCU

MCC-H

9.1 [INH BC Comm Fail](#)

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

CCS Recovery Retry

cmd BC Comm Fail – Inhibit Execute (√Inh)

9.2 [Inhibiting Auto Transition to Diagnostics in PMCU MDM](#)

CDH: Primary PMCU: MDM FDIR

Primary PMCU MDM FDIR

cmd Auto Transition Diag – Inhibit Execute (√Inh)

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9.3 Inhibiting Comm Safing Response in INT MDM

CDH: Primary INT: MDM FDIR

Primary INT MDM FDIR

cmd Comm Safing Response – Inhibit **Execute** (√Inh)

9.4 Inhibiting Channel Switching and Verifying CDH Buses on Channel A

Use Table 3 to verify channels are on A and inhibit channel switching.

sel [XX] where [XX] = Bus Name from Table 3

[XX] Bus Status

Verify Channel Selected – A

'Auto Channel Switch Status'

cmd Inhibit **Execute** (√Inh)

Repeat

9.5 Verify Robotics system is ready to support Robotics 1553 bus disruption during cable connections.

Use Table 4 to verify or place Robotics channels on A.

ISS

9.6 √MCC-H to confirm all 1553 bus reconfigurations are ready to support connection of 1553 B Wire Harness

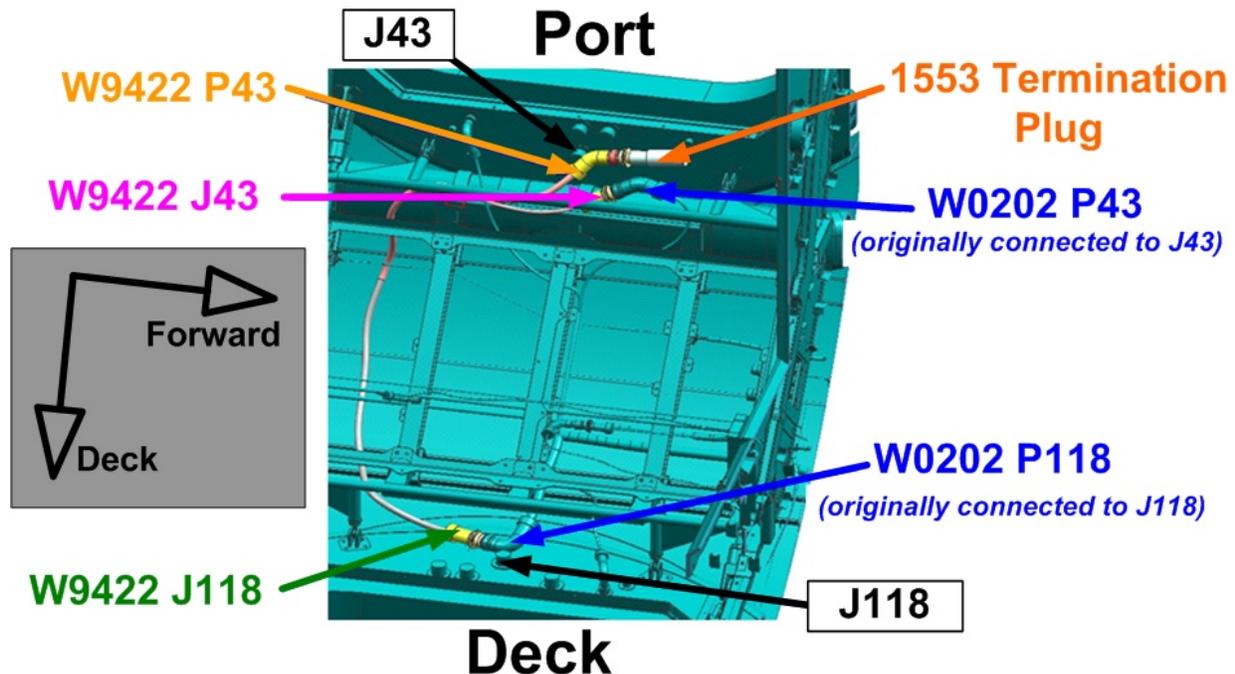


Figure 13.- 1553 Channel B Routing and Connections in Port/Deck Area.

1.102 NODE 1 PREP FOR NODE 3 – ALCOVE HARDWARE INSTALLATIONS

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NOD1PD2

- 9.7 After **MCC-H** GO
Protective Cap ←|→ NOD1 1553 Termination Plug (W9427)
Protective Cap ←|→ NOD1 1553 CH B Cable (W9422) P43
NOD1 1553 Termination Plug (W9427) →|← NOD1 1553 CH B Cable (W9422) P43
Temporarily stow Protective Caps (two).
Refer to Figure 13.
- 9.8 W0202 P43 ←|→ J43 (Port Bulkhead)
Protective Cap ←|→ NOD1 1553 CH B Cable (W9422) J43
Protective Cap →|← J43 (Port Bulkhead)
NOD1 1553 CH B Cable (W9422) J43 →|← W0202 P43
Refer to Figure 13.
- 9.9 Route free end (J118 end) of NOD1 1553 CH B Cable (W9422) around ducting/connector clamp bracket (below the connectors) and underneath Closeout Panel support brackets routing cable toward deck Hatch area.
Route free end to proximity of J118 bulkhead connection.
Refer to Figure 13.
- 9.10 W0202 P118 ←|→ J118 (Deck Bulkhead)
Protective Cap ←|→ NOD1 1553 CH B Cable (W9422) J118
Protective Cap →|← J118 (Deck Bulkhead)
W0202 P118 →|← NOD1 1553 CH B Cable (W9422) J118
Refer to Figure 13.
- 9.11 Restrain cable, as necessary, with Cable Ties and stow cable end with 1553 Termination Plug in proximity to J43 (Port Bulkhead) connector.
- 9.12 Give **MCC-H** GO to reconfigure 1553 buses to nominal configuration.

MCC-H

- 9.13 [Reenabling Channel Switching](#)
Use Table 3 to reenable channel switching.

sel [XX] where [XX] = Bus Name from Table 3

[XX] Bus Status
'Auto Channel Switch Status'

cmd Enable **Execute** (√Ena)

Repeat

- 9.14 [Enabling BC Comm Fail](#)
CDH: Primary C&C: Recovery Retry: CCS MDM
 CCS Recovery Retry
- cmd** BC Comm Fail – Enable **Execute** (√Ena)

9.15 [Enabling Auto Transition to Diagnostics in PMCU MDM](#)

CDH: Primary PMCU: MDM FDIR

Primary PMCU MDM FDIR

cmd Auto Transition Diag – Enable **Execute** (√Ena)

9.16 [Enabling Comm Safing Response in INT MDM](#)

CDH: Primary INT: MDM FDIR

Primary INT MDM FDIR

cmd Comm Safing Response – Enable **Execute** (√Ena)

10. [ROUTING AND CONNECTING AUDIO BUS B HARNESS](#)

NOTE

1. Prior to installation of NOD1 Audio Bus B Cable (W9424), the Audio Bus Controller (ABC) in the LAB attached to channel B (ABC 2) will be deactivated and unpowered. This will result in a loss of redundancy for communication equipment.
2. Deactivating ABC 2 will cause some downstream ORUs to declare a PBIT Fault associated with the loss of Fiber Optic B channel. Downstream ORUs are completely functional with only Fiber Optic A (ABC1) being active.
3. After the new Audio Bus B Cable is connected, the ABC will be reactivated. After reactivation, the fiber optic I/O is cycled in order to clear transient PBIT faults on ORUs. A short loss of communication with the affected ORU is expected during this process.

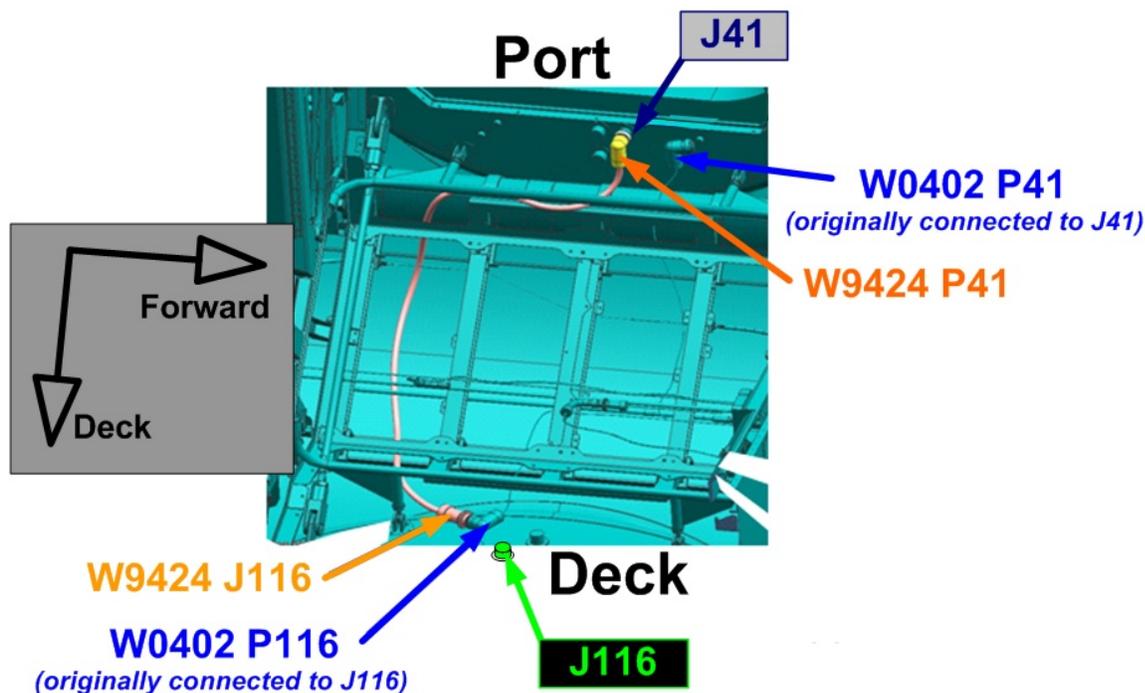


Figure 14.- Audio Bus B Cable Routing and Connections in Port(Deck) Area.

1.102 NODE 1 PREP FOR NODE 3 – ALCOVE HARDWARE INSTALLATIONS

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- MCC-H** 10.1 [Powering Down LAB ABC 2](#)
C&T
CNT Group Overview
- sel ABC2
- ABC2**
'IAC[X]' where [X] = Active and Powered IAC 1(2)
- cmd** Inhibit (Verify Bus I/O – Inhibit)
- sel RPCM LAD52B A RPC 07
- RPCM LAD52B A RPC 07**
- cmd** RPC Position – Open (Verify – Op)
cmd Close Cmd – Inhibit (Verify – Inh)
- ISS 10.2 **MCC-H** to confirm all Audio Bus B safing is in place to support connection of Audio Bus B Wire Harness
- NOD1PD2 10.3 After **MCC-H** GO
W0402 P41 ←|→ J41 (Port Bulkhead)
Protective Cap ←|→ NOD1 Audio Bus B Cable (W9424) P41
Protective Cap →|← W0402 P41
NOD1 Audio Bus B Cable (W9424) P41 →|← J41 (Port Bulkhead)
Refer to Figure 14.
- 10.4 Route free end (J116 end) of NOD1 Audio Bus B Cable (W9424) around ducting/connector clamp bracket (below the connectors) and underneath Closeout Panel support brackets routing cable toward deck Hatch area.
Route free end to proximity of J116 bulkhead connection.
Refer to Figure 14.
- 10.5 W0402 P116 ←|→ J116 (Deck Bulkhead)
Protective Cap ←|→ NOD1 Audio Bus B Cable (W9424) J116
Protective Cap →|← J116 (Deck Bulkhead)
W0402 P116 →|← NOD1 Audio Bus B Cable (W9424) J116
Refer to Figure 14.
- 10.6 Restrain cable, as necessary, with Cable Ties and stow W0402 P41 cable end out of the way in the Port bulkhead.
- 10.7 Give **MCC-H** GO to reactivate LAB ABC 2.
- MCC-H** 10.8 [Powering Up LAB ABC 2](#)
C&T: ABC2
ABC 2

1.102 NODE 1 PREP FOR NODE 3 – ALCOVE HARDWARE INSTALLATIONS

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sel RPCM LAD52B A RPC 07

RPCM LAD52B A RPC 07

cmd Close Cmd – Enable (Verify – Ena)

cmd RPC Position – Close (Verify – Cl)

ABC 2

'IAC [X]' where [X] = Active and Powered IAC 1(2)

cmd Enable (Verify Bus I/O – Enable)

10.9 Clearing Audio PBIT Faults

At the appropriate time, go to [2.310 AUDIO DETAILED TROUBLESHOOTING](#), step 3 (SODF: GND AVIONICS: MALFUNCTION).

11. PHOTO DOCUMENTING INSTALLED HARDWARE

11.1 Prior to reinstallation of Closeout Panels, photo document all of the installed and reconfigured hardware (Digital Camera).

12. INSTALLING IMV GRILLE AND RMO COVERS ONTO CLOSEOUT PANELS

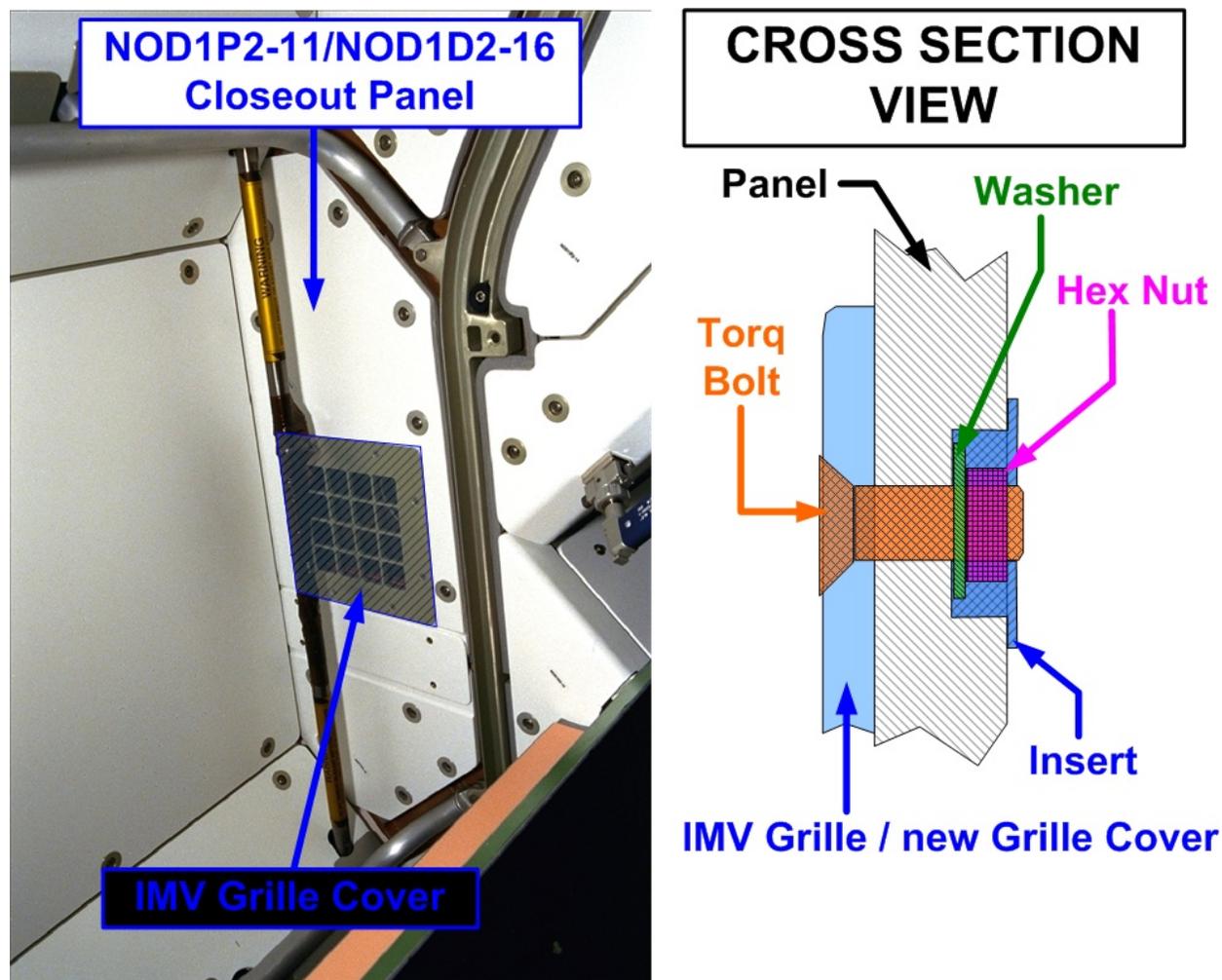


Figure 15.- Port Deck IMV Grille Cover Installation Details.

12.1 Loosen and remove noncaptive bolts, washers, and nuts (eight) holding square grille onto NOD1P2-11 Closeout Panel (#10 Long Torq Driver, 3/8" Drive; Ratchet, 3/8" Drive; 1/4" Deep Socket, 1/4" Drive; Ratchet, 1/4" Drive).
Temporarily stow any bolts, washers, and nuts (will be reused).

12.2 Remove Grille from NOD1P2-11 Closeout Panel.
Temporarily stow.

NOTE

1. The 1/4" Ratchet and 1/4" Deep Socket is called out to help remove/install nuts on inside of Closeout Panel since it is handy (used in previous steps). If a 1/4" Combination Wrench fits better or is preferred, it can be substituted.
2. During removal of Grille, using the 1/4" socket/wrench to remove nuts while using Torq Driver to prevent bolt turning can reduce potential of stripping the Torq bolt heads.

1.102 NODE 1 PREP FOR NODE 3 – ALCOVE HARDWARE INSTALLATIONS

(ASSY OPS/ULF3/FIN 2)

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12.3 Install NOD1 IMV Diffuser Cover in place of removed grille (on cabin side of Closeout Panel) and use bolts, washers, and nuts (eight) removed from grille.

Tighten (snug) fasteners (eight) (#10 Long Torq Driver, 3/8" Drive; Ratchet, 3/8" Drive; 1/4" Deep Socket, 1/4" Drive; Ratchet, 1/4" Drive).

- * If any of the Torq bolts are damaged or if any of the bolts, nuts, or
- * washers are lost
- * A full complement, including extras of each flown with the new
- * Diffuser Cover, can be used to replace any damaged or
- * missing parts.

12.4 Torque NOD1 IMV Diffuser Cover fasteners (eight) to 23 in-lbs [#10 Long Torq Driver, 3/8" Drive; 1/4" Deep Socket, 1/4" Drive; Ratchet; (10-50 in-lbs) Trq Wrench, 1/4" Drive; 1/4" to 3/8" Adapter (if required)].

NOD1PD2

12.5 Reinstall NOD1P2-11(NOD1D2-16) Closeout Panels, and tighten (snug) fasteners (eleven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).

Refer to Figure 2.

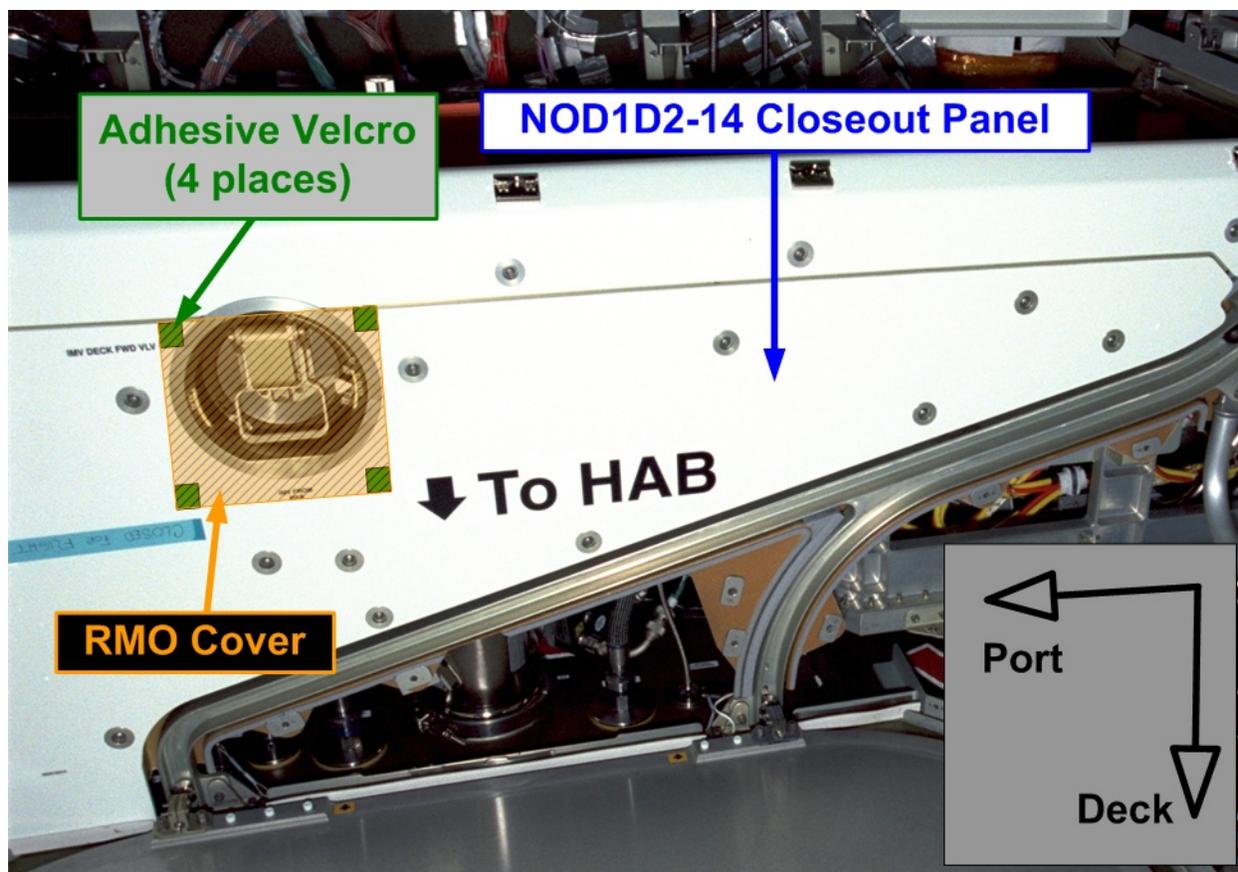


Figure 16.- Deck Forward Node 1 IMV Valve RMO Cover Installation Details.

- NOD1D2 12.6 Install Node 1 IMV Valve RMO Cover over location of removed IMV RMO on NOD1D2-14 Closeout Panel (attached by adhesive-backed Velcro).
 Refer to Figure 16.
13. REINSTALLING REMAINING CLOSEOUT PANELS
- 13.1 Reinstall all remaining Closeout Panels from this procedure, and tighten (snug) fasteners (eleven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
 Refer to Figure 2.
- 13.2 Reinstall any remaining Closeout Panels and tighten (snug) fasteners (eleven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
 Refer to Figures 1, 2, and 3 in [NODE 1 PREP FOR NODE 3 – ALCOVE HARDWARE INSTALLATIONS](#) (SODF: ASSY OPS: ULF3).

14. [INSTALLING NEW NODE 3 LABELS](#)

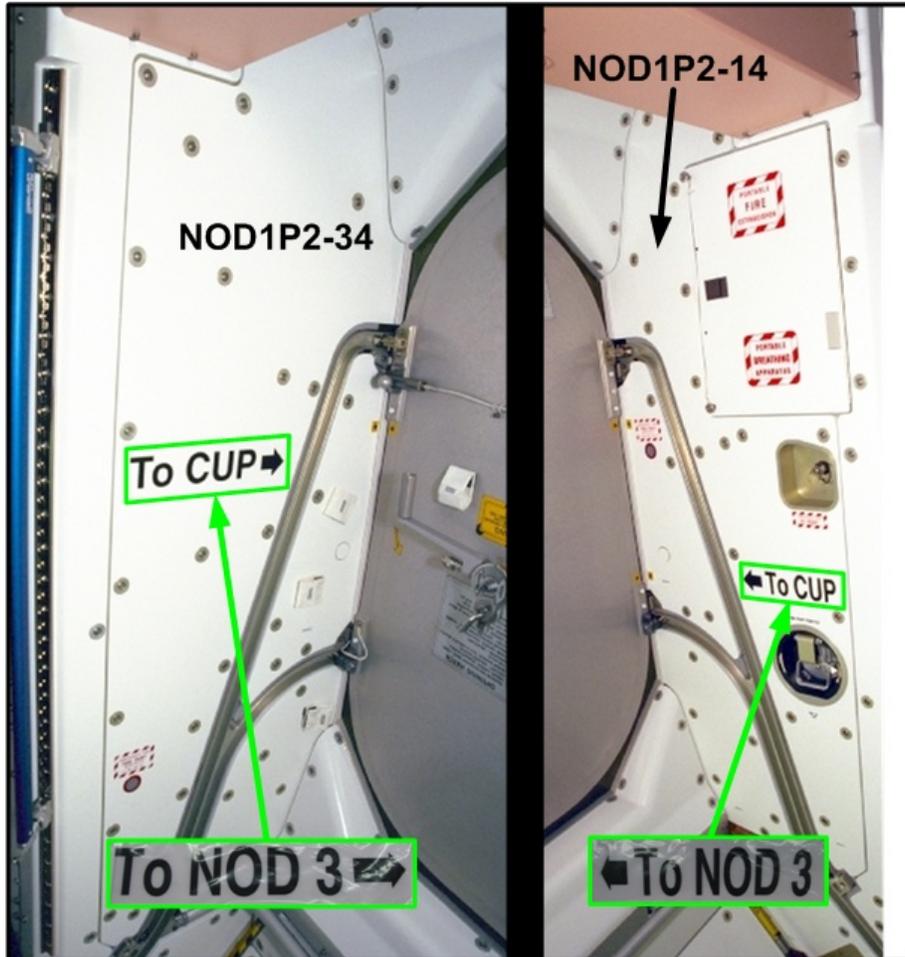


Figure 17.- New Node 3 Direction Labels Installation Details.

- 14.1 Install new Node 3 label (arrow toward Hatch) over existing Cupola label on NOD1P2-34 Closeout Panel.
Install new Node 3 label (arrow toward Hatch) over existing Cupola label on NOD1P2-14 Closeout Panel.
Refer to Figure 17.

15. [CLEANUP](#)

- 15.1 Notify **MCC-H** of task completion.
- 15.2 Record IMV Fan Serial Number: _____
- 15.3 Stow tools, materials.
- 15.4 Stow removed and extra Mod Kit hardware per Table 5.
Refer to official Stowage Note for final recommended stowage locations of Bags or CTBs.

1.102 NODE 1 PREP FOR NODE 3 – ALCOVE HARDWARE INSTALLATIONS

(ASSY OPS/ULF3/FIN 2)

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Table 5. Node 1 Mod Kit Alcove Hardware Stowage Matrix

#	Part Name	Part Number	Qty	Stowage Info	Disposition
1	IMV Fan	SV809111-6	1	Place items one to three together in Ziplock Bag. Label Ziplock Bag "Spare IMV Fan."	Kept onboard as spare
2	IMV Fan Insulation Jacket	1F98924-1	1		
3	IMV Hose Clamp (5.75")	NAS1922-0575-3	2		
4	IMV Hose Clamp (5.75")	NAS1922-0575-3	2	Place items four to eight together in Ziplock Bag. Label Ziplock Bag "Spare IMV parts." Report any Qty deltas.	Kept as spare IMV parts
5	IMV Hose Clamp (5.25")	NAS1922-0525-3	12		
6	IMV Duct Cap	BOE2221-0016	1		
7	IMV Duct Sleeve 5" Diameter Long	BACD40R20A42	3		
8	IMV Duct Sleeve 5" Diameter Short	BACD40R20A30	2		
9	IMV Silencer	683-15023-1	2	Place items nine to sixteen in an empty CTB. Report CTB S/N. _____	Position for Return
10	IMV Coupling (including acoustic insulation)	1F89029-1	2		
11	IMV Coupling	1F89030-1	1		
12	IMV Coupling	1F89202-1	3		
13	Diffuser	1F70847-1	1		
14	Intermodule Return Grille	683-15196-1	1		
15	Tee Assembly	1F89043-1	1		
16	IMV Duct Insulation Jacket	1F89204-1	5		
17	Protective Cap (from W9422)	NATC-PPC-N-25-0	1	Place items seventeen to twenty-two together in Ziplock Bag. Label Ziplock Bag "NOD1 Mod Kit Caps and Plugs."	Kept for future IFM usage
18	Protective Cap (from W9427)	NATC-RPC-N-25-0	1		
19	Protective Cap (from W9436, W9437, and two extra from Kit)	NATC-RPC-N-11-0	4		
20	Threaded Fluid Fitting (from N2 hose)	683-16347-822	1		
21	3/8" Gamah Plug (from O2 hose)	683-16347-825	1		
22	Feedthrough Cap (from O2 and N2 feedthru)	683-16347-845	2		
23	To PMA 3 Label (down arrow)	683-99512-3	2	Stow for future use	Keep for final location of PMA 3
24	EVA Tape	P-213	any	Stow in Tape Pantry	Keep any unused and stow with existing onboard inventory
25	Cable Tie	T50R2HAL	any	Stow in Tie Pantry	
26	Torq Bolt, #10-32 (Diffuser Cover)	NAS1580C3T4	9	Place items 26 to 28 together in Ziplock Bag. Label Ziplock Bag "Spare Diffuser Cover Hardware."	Position for Return or Trash
27	Washer (Diffuser Cover)	NAS1587-3	9		
28	Nut, #10-32 (Diffuser Cover)	MS21043-3	10		

1.103 NODE 1 PREP FOR NODE 3 – VIDEO/AUDIO BUS A CONNECTION

(ASSY OPS/ULF3/FIN 1)

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OBJECTIVE:

To perform the final connection of the Video/Audio Bus Channel A cable. The routing of the cable was performed as part of the Midbay Hardware Installation procedure. The final connections of this cable were placed into a stand-alone procedure due to the safing and coordination required in order to make the connections since the Node 1 Forward Hatch is closed during the cable connections.

LOCATION:

Node 1 Starboard Deck Radial area, Node 1 Fwd Endcone (above Hatch)

DURATION:

90 minutes

PARTS:

Node 1 Avionics and Fluids Modification Kit:

Wire Ties P/N T50R2HALC2

TOOLS:

Flashlight (crew preference)

Digital Camera

CSA-O2

ISS IVA Toolbox:

Drawer 2:

Driver Handle, 1/4" Drive

Ratchet, 1/4" Drive

5/32" Hex Head, 1/4" Drive

1/8" Hex Head, 1/4" Drive

REFERENCED PROCEDURE(S):

2.310 AUDIO DETAILED TROUBLESHOOTING

1.103 NODE 1 PREP FOR NODE 3 – VIDEO/AUDIO BUS A CONNECTION

(ASSY OPS/ULF3/FIN 1)

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NOTE

1. Prior to connection of NOD1 Video/Audio Bus A Cable (W9423), the Airlock Common Video Interface Unit (CVIU) and the Audio Bus Controller (ABC) in the Lab attached to audio channel A (ABC 1) will be deactivated and un-powered. This will result in a loss of redundancy for audio communication equipment and a loss of video from Airlock.
2. Deactivating ABC 1 will cause some downstream ORUs to declare a PBIT Fault associated with the loss of Fiber Optic A Channel. Downstream ORUs are completely functional with only Fiber Optic B (ABC 2) being active.
3. The NOD1 Video/Audio Bus A Cable (W9423) and the existing cabling it replaces (W0401) contain fiber optic cable; therefore, care should be taken to handle carefully and to prevent bending into a tight bend radius.
4. After the new Video/Audio Bus A Cable is connected, the CVIU and ABC will be reactivated. After reactivation, the fiber optic I/O is cycled in order to clear transient PBIT faults on ORUs. A short loss of communication with affected ORU is expected during this process.

1. SAFING

MCC-H

1.1 Powering Down CVIU 7 (Airlock Camcorder)

C&T: Video: CVIU

sel CVIU 7

cmd RPC Position – Open (Verify – Op)

cmd Close Cmd – Inhibit (Verify – Inh)

1.2 Powering Down LAB ABC 1

C&T

sel ABC1

'IAC[X]' where [X] = Active and Powered IAC 1(2)

cmd Inhibit (Verify Bus I/O – Inhibit)

sel RPCM LAD11B A RPC 01

cmd RPC Position – Open (Verify – Op)

cmd Close Cmd – Inhibit (Verify – Inh)

- ISS
- 1.3 ✓**MCC-H** to confirm all Video/Audio Bus A safing is in place to support connection of Video/Audio Bus A cable.

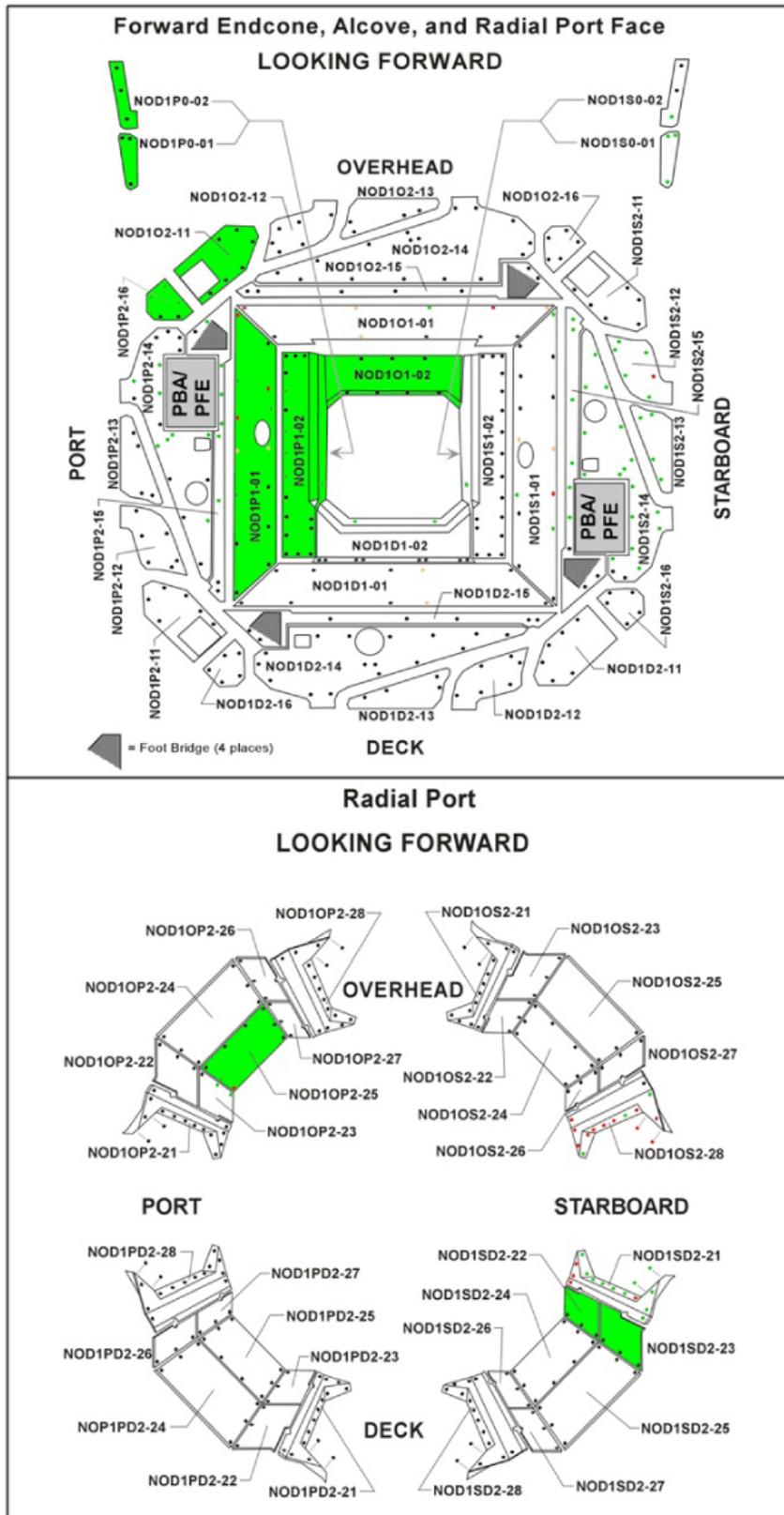


Figure 1. Node 1 Closeout Panels to be Removed.

2. REMOVING CLOSEOUT PANELS AND CHECKING VENTILATION

1.103 NODE 1 PREP FOR NODE 3 – VIDEO/AUDIO BUS A CONNECTION

(ASSY OPS/ULF3/FIN 1)

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- 2.1 Relocate any items from front of affected Closeout Panels. Refer to Figure 1.

WARNING

CSA-O2 sampling is required to insure O2% is not above flammability levels or N2 pockets do not exist that can cause crew asphyxiation.

- 2.2 Perform CSA-O2 sampling in open cabin, then record: _____.

PCS

- 2.3 Comparison to MCA Sampling

US LAB: ECLSS: AR Rack: MCA

LAB MCA

'(ORU2) Mass Spectrometer Assembly'

Record O2 %: _____

✓Difference between CSA-O2 and MCA O2 percentage is less than or equal to 1.1

NOTE

- 1. Closeout Panels NOD1SD2-22/NOD1SD2-23 are joined together with a T-shaped seam support and have L-shaped seam supports on either end. Both panels should be able to be removed together as a single unit without removing any seam supports.
- 2. Closeout Panels NOD1O2-11 and NOD1P2-16 are joined together with a seam support so panels should be removed together as a single unit.

- 2.4 Remove NOD1SD2-22/NOD1SD2-23 Closeout Panels, fasteners (six) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive) Temporarily stow. Refer to Figure 1.

1.103 NODE 1 PREP FOR NODE 3 – VIDEO/AUDIO BUS A CONNECTION

(ASSY OPS/ULF3/FIN 1)

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*
* If required for removal of NOD1SD2-22, NOD1SD2-23
* | Remove T-shaped Closeout Seam Support, fasteners (eight)
* | (Ratchet, 1/4" Drive; 1/8" Hex Head, 1/4" Drive).
* | Remove L-shaped Closeout Seam Supports (two), fasteners
* | (four each) (Ratchet, 1/4" Drive; 1/8" Hex Head, 1/4" Drive).
*

2.5 Remove NOD1O2-11/NOD1P2-16 Closeout Panels, fasteners (eleven), (5/32" Hex Head, 1/4" Drive, Driver Handle, 1/4" Drive).
Temporarily stow.
Refer to Figure 1.

2.6 Remove the following Closeout Panels, (5/32" Hex Head, 1/4" Drive, Driver Handle, 1/4" Drive):
NOD1OP2-25 (eight fasteners)
NOD1P1-01 (twelve fasteners)
NOD1P0-01 (three fasteners)
NOD1P0-02 (three fasteners)

Temporarily stow.
Refer to Figure 1.

2.7 Removing Closeout Panel NOD1P1-02
Remove Handrail from NOD1P1-02.
Remove Seat Track brackets (two), fasteners (two each), (1/8" Hex Head, 1/4" Drive; Ratchet, 1/4" Drive).
Remove NOD1P1-02 Closeout Panel, fasteners (eighteen), (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
Temporarily stow Handrail, Seat Track brackets, Closeout Panel.
Refer to Figure 1.

2.8 Perform CSA-O2 sampling in each area where a Closeout Panel was removed for 1 minute.

If O2 % is between 15.7 to 24.1 %, proceed.

|

If O2 % is not between 15.7 to 24.1 %

| ✓MCC-H

3. CONNECTING VIDEO/AUDIO A CABLE AT 1 STARBOARD

NOTE

1. The NOD1 Video/Audio Bus A Cable (W9423) was routed and the P78 end of cable was stowed behind Closeout Panels near the final connection location.
2. It should be possible to remove the two flat panels just under the Node 1 Starboard Hatch in order to locate the connector on the bulkhead (J78).

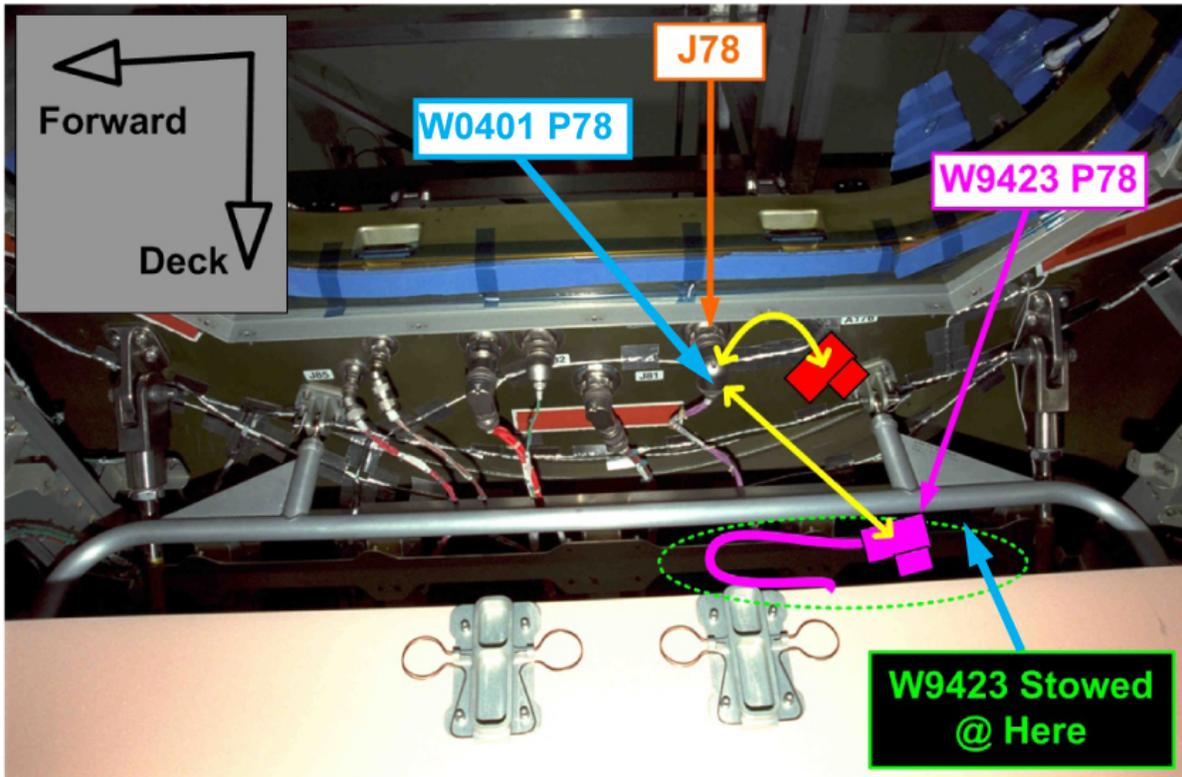


Figure 2. Video/Audio Bus A Cable Connections at Node 1 Starboard Deck.

- NOD1SD2
- 3.1 W0401 P78 \leftrightarrow J78 (Starboard bulkhead)
 Protective Cap \leftrightarrow NOD1 Video/Audio Bus A Cable (W9423) P78
 Protective Cap \rightarrow | \leftarrow W0401 P78
 NOD1 Video/Audio Bus A Cable (W9423) P78 \rightarrow | \leftarrow J78 (Starboard bulkhead)
 Refer to Figure 2.
 - 3.2 Stow W0401 P78 connector and restrain connector (Wire Ties).
 Restrain Video/Audio Bus A Cable as necessary (Wire Ties).
 - 3.3 Photo document new cable connection and stowage of old connector (Digital Camera).
4. ROUTING VIDEO/AUDIO A CABLE TOWARD FWD HATCH AREA

NOTE

1. The NOD1 Video/Audio Bus A Cable (W9423) was routed and the P3 end of cable was stowed in the Overhead Port Radial area.
2. The cable will be routed behind the Port Alcove area and over toward the Node 1 Forward Hatch. The cable will be routed to the area underneath the NOD1P1-02 Closeout Panel in preparation for closing the Node 1 Forward Hatch and removing the Closeout Panel above the Hatch.

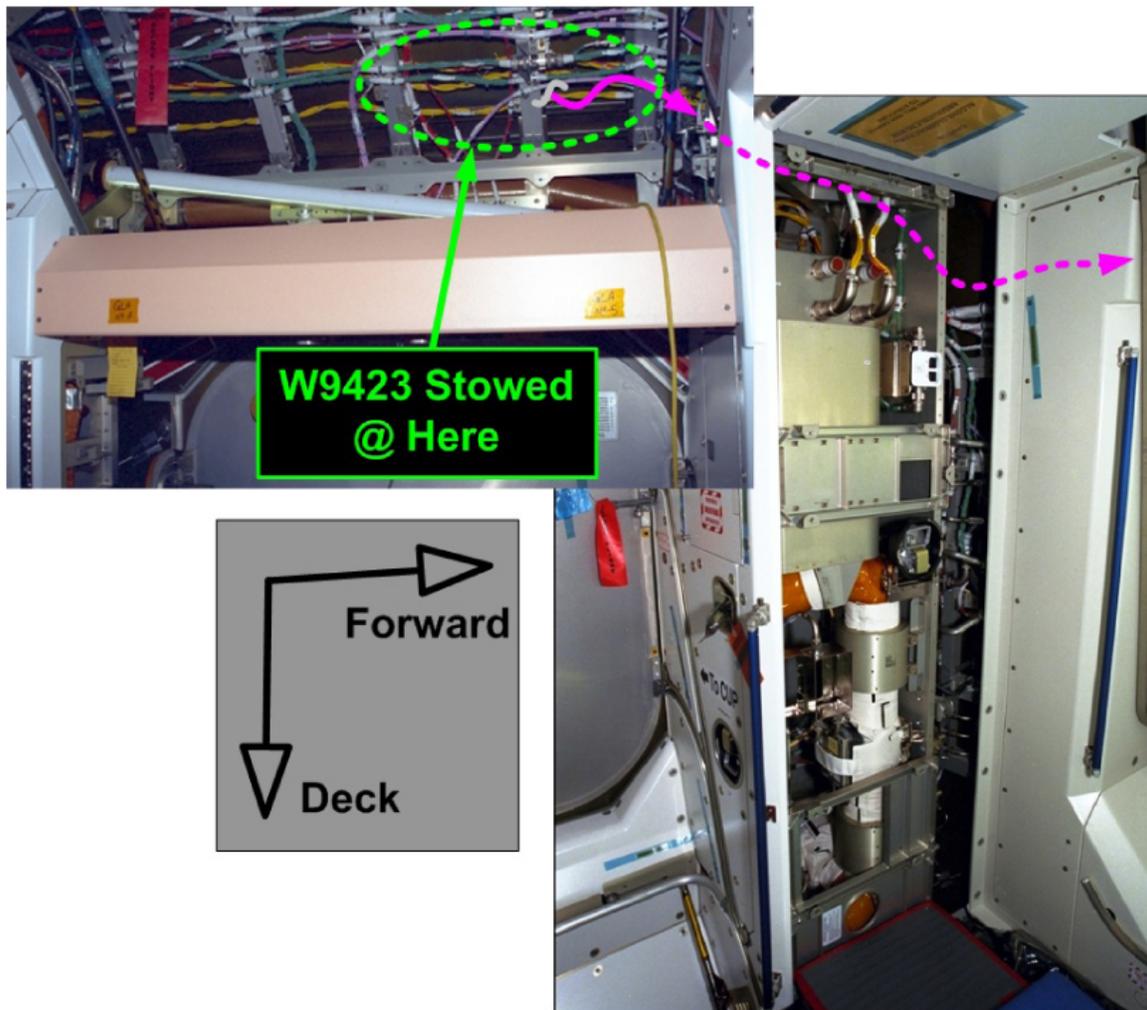


Figure 3. Video/Audio Bus A Cable Routing in Overhead Port and Port Alcove.

- NOD1OP21 4.1 Locate stowed coil of NOD1 Video/Audio Bus A Cable (W9423) in Overhead Port Radial area. Uncoil cable and route behind Port Alcove box structure and around to forward endcone area to port of the Node 1 Forward Hatch. Refer to Figure 3.
5. CLOSING NODE 1 FORWARD HATCH AND CONNECTING VIDEO/AUDIO A CABLE ABOVE HATCH

WARNING

Removing NOD1O1-02 Closeout Panel requires moving Node 1 Forward Hatch to the closed position. Ensure crewmembers are not isolated from return vehicle.

1.103 NODE 1 PREP FOR NODE 3 – VIDEO/AUDIO BUS A CONNECTION

(ASSY OPS/ULF3/FIN 1)

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NOTE

1. Procedure is written to minimize time that Node 1 Forward Hatch is closed while cable reconfigurations above Hatch are being performed.
2. Past crews have had difficulty getting NOD1O1-02 Closeout Panel reinstalled. Rubber gaskets were noted to get wedged in between panel and other surrounding panels causing an extremely tight fit. It may be necessary to cut the rubber gaskets from panel in order to get panel reinstalled in a timely manner.
3. New Video/Audio Bus A cable should be restrained to the existing fiber optic cable (purple insulation) in the forward endcone because both cables are the same type/EMI classification.

5.1 Closing Node 1 Forward Hatch

✓No Crewmembers in LAB, Node 2, JEM, or Columbus

Close Node 1 Forward Hatch per decal steps 1 to 3; do not engage Hatch Latches.

NOD1O1

5.2 Removing Closeout Panel NOD1O1-02

Remove NOD1O1-02 Closeout Panel, fasteners (seven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
Temporarily stow.
Refer to Figure 1.

5.3 Perform CSA-O2 sampling behind Closeout Panel for 1 minute.

If O2 % is between 15.7 to 24.1 %, proceed.

|

If O2 % is not between 15.7 to 24.1 %

| ✓MCC-H

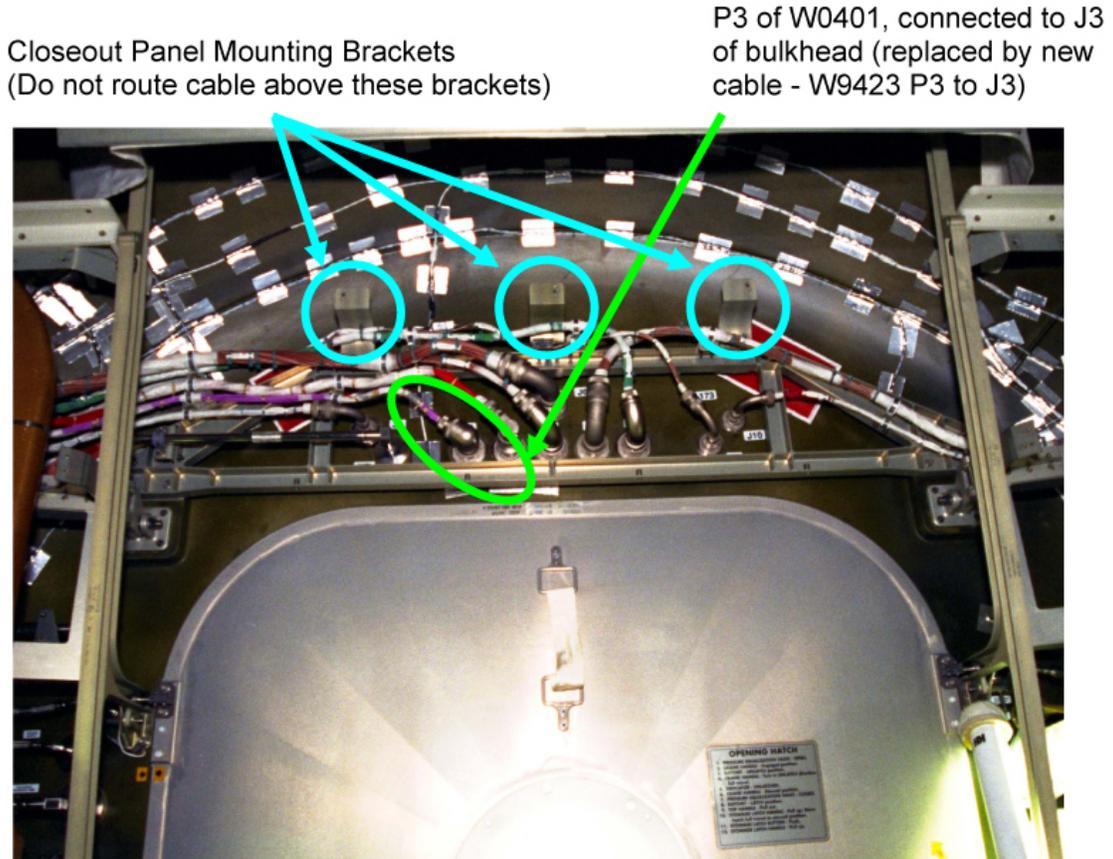


Figure 4. W0401 P3 Disconnection Above Forward Hatch.

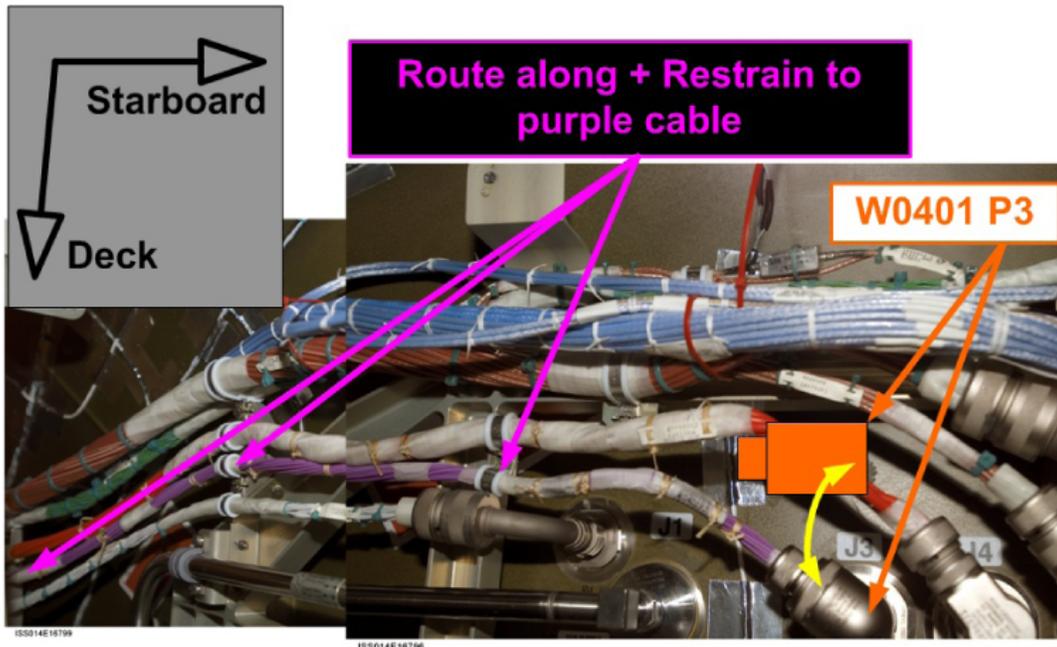


Figure 5. Video/Audio Bus A Cable Routing and Restraint in Forward Endcone.

5.4 Route NOD1 Video/Audio Bus A Cable (W9423) from area to port of Node 1 Forward Hatch to proximity of existing P3/J3 connection.

1.103 NODE 1 PREP FOR NODE 3 – VIDEO/AUDIO BUS A CONNECTION

(ASSY OPS/ULF3/FIN 1)

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Refer to Figures 4 and 5.

- 5.5 W0401 P3 ←|→ J3 (Forward bulkhead)
Protective Cap ←|→ NOD1 Video/Audio Bus A Cable (W9423) P3
Protective Cap →|← W0401 P3
NOD1 Video/Audio Bus A Cable (W9423) P3 →|← J3 (Forward bulkhead)
Refer to Figures 4 and 5.
- 5.6 Stow W0401 P3 connector and restrain connector out of way of Closeout (Wire Ties).
Restrain Video/Audio Bus A Cable to the old W0401 cable (purple insulation) where possible (Wire Ties).
Refer to Figure 5.
- 5.7 Photo document new cable connection and stowage of old connector above Node 1 Forward Hatch (Digital Camera).
- 5.8 Install NOD1O1-02 Closeout Panel and tighten (snug) fasteners (seven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
- 5.9 Open Node 1 Forward Hatch per decal.
- 5.10 Give **MCC-H** GO to reactivate LAB ABC 1(Airlock CVIU).

MCC-H

- 5.11 Powering On CVIU 7 (Airlock Camcorder)

C&T: Video: CVIU

sel CVIU 7

cmd Close Cmd – Enable (Verify – Ena)

cmd RPC Position – Close (Verify – Cl)

- 5.12 Powering Up LAB ABC 1

C&T: ABC1

sel RPCM LAD11B A RPC 0

cmd Close Cmd – Enable (Verify – Ena)

cmd RPC Position – Close (Verify – Cl)

'IAC[X]' where [X] = Active and Powered IAC 1(2)

cmd Enable (Verify Bus I/O – Enable)

5.13 Clearing Audio PBIT Faults

At appropriate time, go to [2.310 AUDIO DETAILED TROUBLESHOOTING](#), step 3 (SODF: GND AVIONICS: MALFUNCTION).

6. COMPLETING CABLE RESTRAINT AND PHOTO DOCUMENTATION

- NOD1OP
- 6.1 Restrain cable as necessary with Wire Ties in Overhead Port Radial Area and behind Port Alcove to existing fiber optic cables (purple insulation).
If necessary, any extra length of cable should be coiled into a round coil of bend radius at least 10 times diameter of cable with coil stowed in Overhead Port(Port Alcove) area.
Restrain coil (Wire Ties).
- 6.2 Photo document finished routing and restraint of cables (Digital Camera).

7. INSTALLING CLOSEOUT PANELS

- NOD1P1
- 7.1 Installing Closeout Panel NOD1P1-02
Install NOD1P1-02 Closeout Panel and tighten (snug) fasteners (eighteen) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
Install Seat Track brackets (two), tighten (snug) fasteners (two each), (1/8" Hex Head, 1/4" Drive; Ratchet, 1/4" Drive).
Install Handrail on NOD1P1-02.
- NOD1SD2
- 7.2 Install NOD1SD2-22(NOD1SD2-23) Closeout Panels and tighten (snug) fasteners (six) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
- NOD1OP
- 7.3 Install NOD1O2-11(NOD1P2-16) Closeout Panels and tighten (snug) fasteners (eleven) (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive).
- 7.4 Install the following Closeout Panels and tighten (snug) fasteners (5/32" Hex Head, 1/4" Drive; Driver Handle, 1/4" Drive):
NOD1OP2-25 (eight fasteners)
NOD1P1-01 (twelve fasteners)
NOD1P0-01 (three fasteners)
NOD1P0-02 (three fasteners)

8. CLEANUP

- 8.1 Notify **MCC-H** of task completion.
- 8.2 Stow tools.

1.104 ULF-3 AIRLOCK BATTERY CHARGER MODULE (BCM) R&R

(ASSY OPS/ULF3/FIN) Page 1 of 16 pages

OBJECTIVE:

During the ULF3 docked mission, remove Battery Charger Modules (BCM), BCM-3 and BCM-4 from the Airlock Avionics Rack (A/L1F1). Install the BCM removed from BCM-4 location in BCM-1 location (which is currently empty). Install two new BCMS launching on ULF3 in BCM-3 and BCM-4 locations. BCM R&R requires rotation of the A/L1F1 Rack.

LOCATION:

Installed: Airlock Avionics Rack (A/L1F1)

DURATION:

2 hours, 30 minutes total crew time
45 minutes to rotate A/L1F1 down
60 minutes to R&R BCMS
45 minutes to rotate A/L1F1 up

CREW:

Two

PARTS:

Battery Charger (two) P/N SEG39128256-306, S/N 1001, 1003

MATERIALS:

Gray Tape
Sharpie
24" x 24" Ziplock Bags (two)
6" x 6" Ziplock Bag (one)

TOOLS:

Digital Camera

ISS IVA Toolbox:

Drawer 2:

5/32" Hex Head, 1/4" Drive
5/16" Socket, 1/4" Drive
Ratchet, 1/4" Drive
Ratchet, 3/8" Drive
1/4" to 3/8" Adapter
(40-200 in-lbs) Trq Wrench, 1/4" Drive
(10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 3:

#2 Long Trq Driver, 3/8" Drive
6" Long, 3/8" Hex Head, 3/8" Drive
Speed Handle Assy

Drawer 5:

Static Wrist Tether

1. SAFING

WARNING
 Failure to remove power can result in electrical shock hazard.

- BCMs 1 to 4 1.1 √sw MAIN POWER – OFF
 √MAIN POWER LED – Off
- PSA 1.2 √sw MAIN POWER – OFF
 √MAIN POWER LED – Off
 √sw EMU MODE EMU 1, 2 (two) – PWR
- MCC-H** 1.3 Opening and Closing Inhibit BCM RPCs
PCS Airlock: EPS: RPCM AL1A4A B
RPCM_AL1A4A_B

sel RPC [X] where [X] =

√RPC Position – Open
 √Close Cmd – Inhibit

Repeat

- 1.4 Opening and Closing Inhibit PSA RPC
 Airlock: EPS: RPCM AL2A3B B
RPCM_AL2A3B_B

sel RPC 18

cmd RPC Position – Open (Verify – Op)
cmd Close Cmd – Inhibit (Verify – Inh)



Figure 1.- Battery Charger Module Reference Designations and Current Configuration.

2. CONFIGURING A/L1F1 FOR RACK ROTATION

- 2.1 ✓ Both EMUs removed from Airlock
Temporarily stow.
- 2.2 Remove EDDA from Rack being rotated (leaving seat track anchors attached to Rack).
Temporarily stow.
- 2.3 Open BSA door.

 ✓ No Batteries installed

 Close BSA door.
- 2.4 Remove Utility Interface Panel (UIP) Closeout from Rack, 1/4 Turn Fasteners (two).

3. REMOVING AV RACK CLOSEOUT PANELS FOR ROTATION

NOTE

The following Closeout Panels interfere with rotating A/L1F1 Rack and must be removed.

Table 1. Airlock Closeout Panels

Removal Order	Panel	Fasteners (5/32" Hex Head)
1	Small blue Panel (no label) next to A/L1F2	2
2	A/L1F2	25
3	A/L1FD2	13

- 3.1 Remove Airlock Closeout Panels in order per Table 1 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).



Figure 2.- J62 Connector Mounted to A/L1OF2 Closeout Panel.

1.104 ULF-3 AIRLOCK BATTERY CHARGER MODULE (BCM) R&R

(ASSY OPS/ULF3/FIN) Page 4 of 16 pages

3.2 Disengage J62 connector fasteners (four) on A/L1OF2 Closeout Panel (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 2.

3.3 Remove A/L1OF2 Closeout Panel, fasteners (twelve) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

4. DISENGAGING LOWER LAUNCH RESTRAINTS

Refer to Figures 3, 4.

NOTE

All directional references (up, down, left, right) are with respect to front face of Rack, as you face Rack.

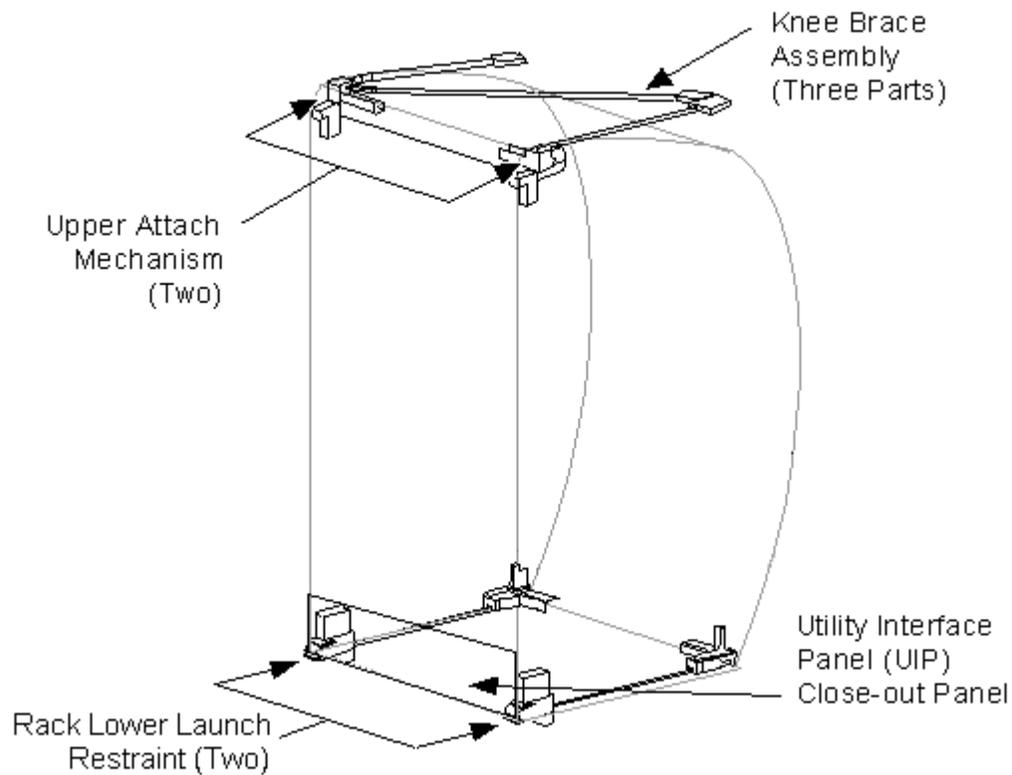


Figure 3.- Location of Rack Attachment Mechanisms.

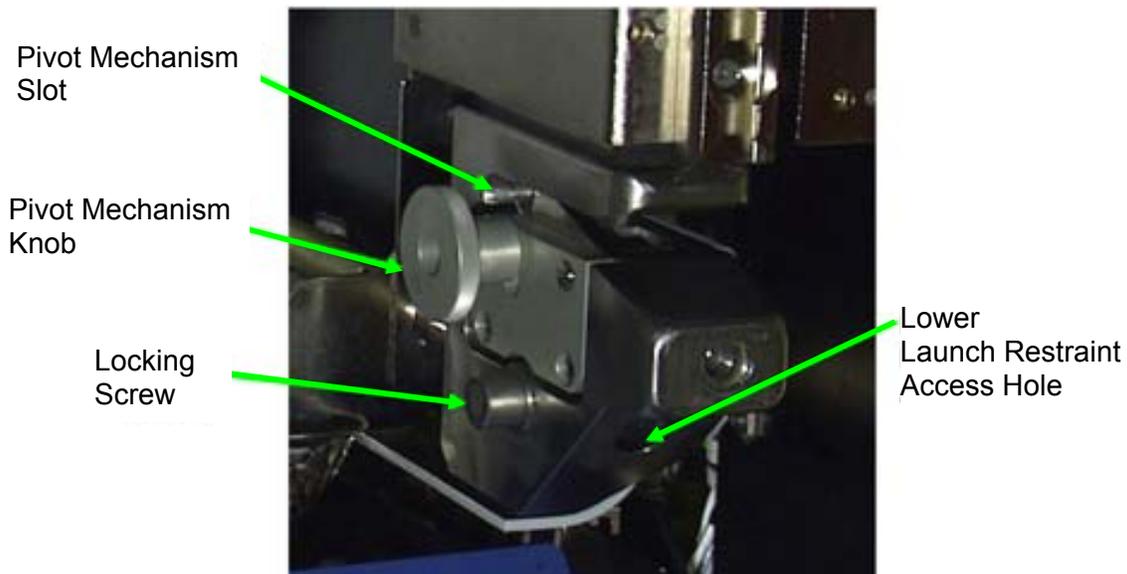


Figure 4.- Lower Launch Restraint (Left Side).

NOTE

1. Begin with Rack left Lower Launch Restraint.
2. Previous crews have indicated that left Lower Launch Restraint may require more force than expected to disengage.
3. Lower Launch Restraint locking screw is noncaptive. It is completely removed to prevent binding during Launch Restraint disengagement and then reinstalled.

- 4.1 Remove left Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 4.2 Disengage left Lower Launch Restraint 10 to 12 turns until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 4.3 Install, snug left Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 4.4 Repeat steps 4.1 to 4.3 for right Lower Launch Restraint.

5. DISENGAGING UPPER ATTACH MECHANISMS

Refer to Figures 3, 5.

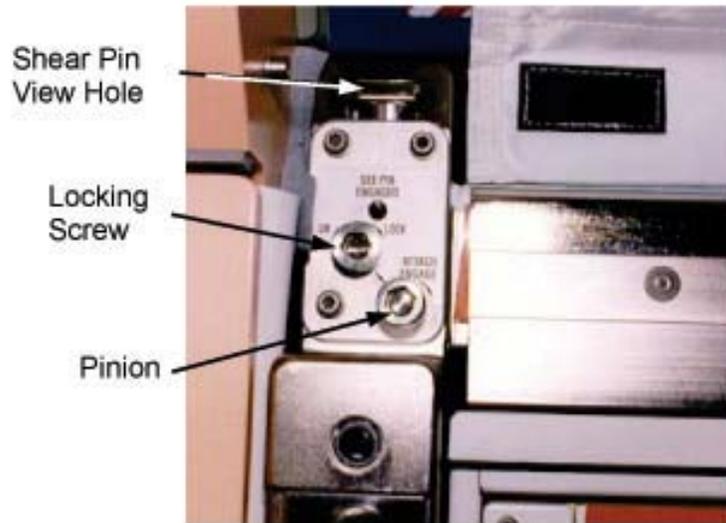


Figure 5.- Left Upper Attach Mechanism.

NOTE

Begin with Rack left Upper Attach Mechanism.

- 5.1 Loosen Locking Screw 10 to 12 turns or until threads completely disengage (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).

NOTE

To disengage left pinion, turn ↺

To disengage right pinion, turn ↻

- 5.2 Disengage pinion one full turn until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).

- 5.3 Repeat steps 5.1 and 5.2 for right Upper Attach Mechanism.

6. ROTATING RACK DOWN

WARNING

A/L1F1 Ground Strap must remain mated to both Rack and structure to avoid a potential shock hazard.

CAUTION

A/L1F1 does not have Pivot Fittings and will be free floating; care must be taken not to damage Rack umbilicals during Rack rotation.

- 6.1 Check Rack rotation path unobstructed.
Remove any unnecessary equipment.
- 6.2 Slowly rotate Rack down to a controlled stop.
Temporarily restrain Rack, as required.

7. DEMATING BCM CONNECTORS

- 7.1 Unfasten rear access panel fasteners (forty-four) (Speed Handle Assy; 5/32" Hex Head, 1/4" Drive).
Remove from Rack.
Temporarily stow.
- 7.2 Don Static Wrist Tether.
Secure to unpainted, unanodized metal surface.

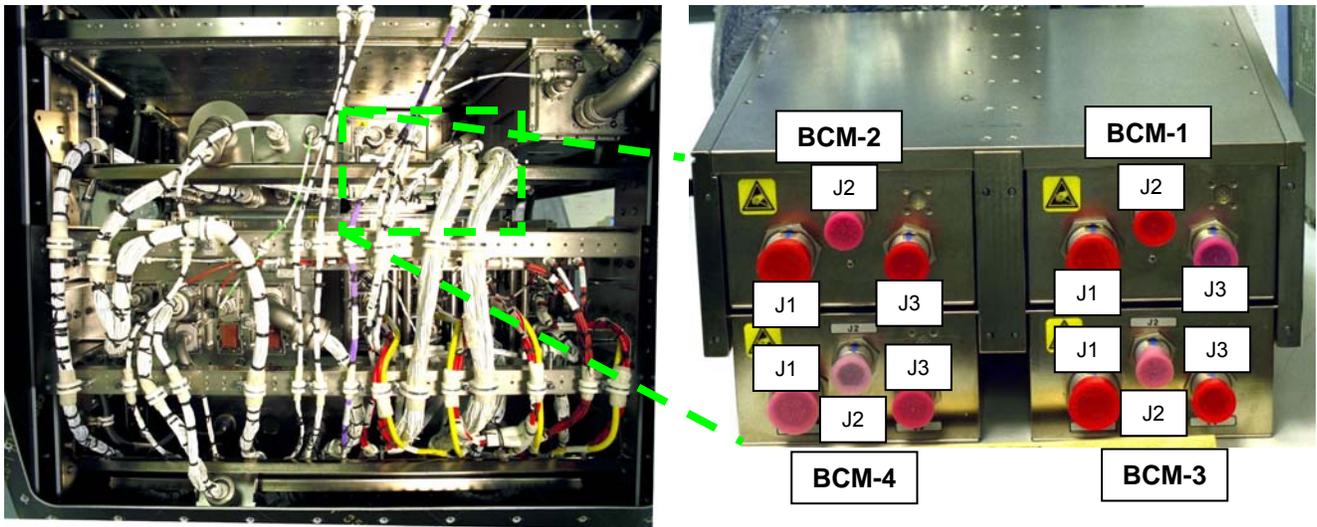


Figure 6.- BCM Connectors (Rear View).

- 7.3 Demating Cables (three) from BCM-3
GW007-P1 ←|→ J1
W075-P5 ←|→ J2
W082-P7 ←|→ J3
Refer to Figure 6.
- 7.4 Demating Cables (three) from BCM-4
GW008-P1 ←|→ J1
W075-P4 ←|→ J2
W082-P7 ←|→ J3
Refer to Figure 6.

8. TEMPORARILY ROTATING RACK UP

8.1 ✓ Rack rotation path unobstructed

Remove any unnecessary equipment.

CAUTION

A/L1F1 does not have Pivot Fittings and will be free floating; care must be taken not to damage Rack umbilicals during Rack rotation.

8.2 Slowly rotate Rack up to a controlled stop.
Temporarily restrain Rack.

9. REMOVING BCM-3, BCM-4



Figure 7.- BCM Housing Assembly Captive Fasteners.

NOTE

BCM-3 P/N: SEG39128256-303, S/N: 1006

9.1 Loosen BCM-3 fasteners (four) (Ratchet, 3/8" Drive; #2 Long Trq Driver, 3/8" Drive).
Refer to Figure 7.

NOTE

1. When Clamp Fasteners are tightened, they drive a wedge on the BCM rack structure rail in the overhead direction, which ensures that the BCM is flush with its coldplate for proper cooling.
2. If high running torque is noted during loosening of Clamp Fasteners, they may be too far disengaged and will need to be retightened before BCM can be removed.
3. Ground testing has shown that approximately ten turns should disengage the Clamp Fasteners enough to slide out the BCM.

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(ASSY OPS/ULF3/FIN) Page 9 of 16 pages

- 9.2 Loosen Clamp Fasteners (two) ten turns (or as required) clamping BCM-3 to Housing Assembly Coldplate (Ratchet, 1/4" Drive; 5/16" Socket, 1/4" Drive).
Refer to Figure 7.
- 9.3 Remove BCM-3 by grasping handle then pulling forward.
Label BCM-3 (Gray Tape, Sharpie).
Temporarily stow.
- 9.4 Double bag BCM-3 (P/N SEG39128256-303) (24" x 24" Ziplock Bags).
Stow for return.

NOTE

BCM-4 P/N: SEG39128256-305, S/N: 1004

- 9.5 Loosen BCM-4 fasteners (four) (Ratchet, 3/8" Drive; #2 Long Trq Driver, 3/8" Drive).
Refer to Figure 7.
- 9.6 Loosen Clamp Fasteners (two) ten turns (or as required), clamping BCM-4 to Housing Assembly Coldplate (Ratchet, 1/4" Drive; 5/16" Socket, 1/4" Drive).
Refer to Figure 7.
- 9.7 Remove BCM-4 by grasping handle then pulling forward.
Label BCM-4 "Removed from BCM-4" (Gray Tape, Sharpie).
Temporarily stow for installation into BCM-1 location.

10. REMOVING BCM SERIAL JUMPER FROM EMPTY BCM-1 LOCATION



Figure 8.- FDF Cover for BCM-1 Opening.

1.104 ULF-3 AIRLOCK BATTERY CHARGER MODULE (BCM) R&R

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- 10.1 Remove FDF Cover, Kapton Tape from BCM-1 opening.
Refer to Figure 8.
 - 10.2 Label 6" x 6" Ziplock Bag, "Battery Charger Module Removal Kit:
P/N SJG39137954-301."
 - 10.3 BCM Serial Data Connector J3 ←|→ BCM-1 W082-P4
BCM Connector Cap J1 ←|→ BCM-1 GW005-P1
BCM Connector Cap J2 ←|→ BCM-1 W075-P7
Stow in Ziplock Bag labeled "Battery Charger Module Removal Kit:
P/N SJG39137954-301."
Photo document Ziplock Bag (Digital Camera).
 - 10.4 Remove Kapton Tape from BCM-1 Wire Harnesses (three).
11. [INSTALLING BCM-1, BCM-3, BCM-4](#)
- 11.1 Retrieve BCM removed from BCM-4 location (P/N SEG39128256-305, labeled "Removed from BCM-4").
Position BCM in BCM-1 installation location.
 - 11.2 Tighten, torque Clamp Fasteners (two) to 50 in-lbs [Ratchet, 1/4" Drive; 5/16" Socket, 1/4" Drive; (40-200 in-lbs) Trq Wrench, 1/4" Drive].
 - 11.3 Tighten, torque BCM fasteners (four), to 22 in-lbs [Ratchet, 1/4" Drive; 1/4" to 3/8" Adapter; #2 Long Trq Driver, 3/8" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
 - 11.4 Repeat steps 11.1 to 11.3 to install new BCM (P/N SEG39128256-306, S/N 1001) in BCM-3 location.
 - 11.5 Repeat steps 11.1 to 11.3 to install new BCM (P/N SEG39128256-306, S/N 1003) in BCM-4 location.
 - 11.6 Doff Static Wrist Tether.

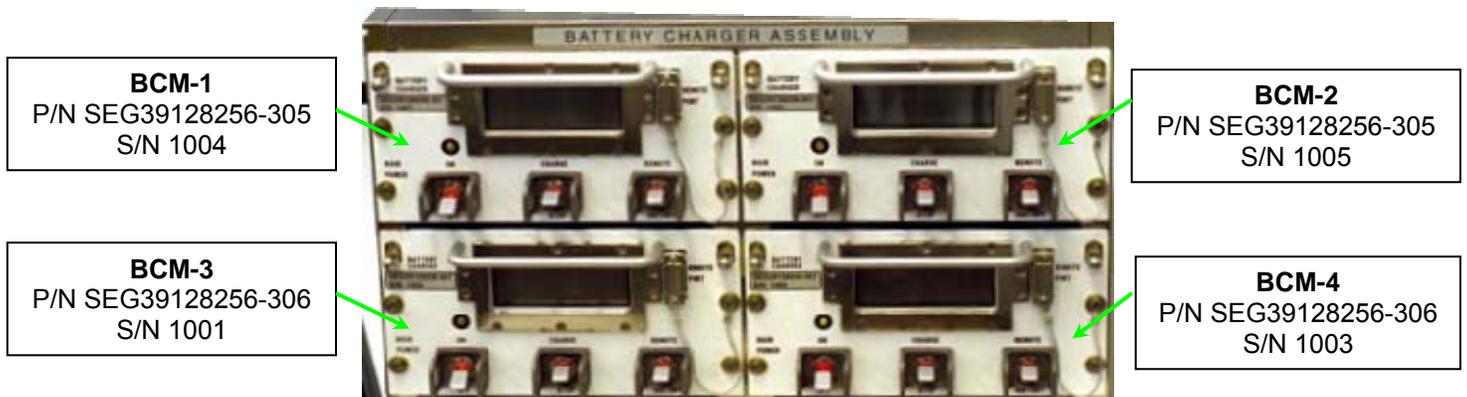


Figure 9.- Final BCM Configuration.

11.7 Verify BCM Configuration per Figure 9.

12. REMATING CABLES TO REAR OF BCM-1, BCM-3, BCM-4

12.1 ✓ Rack rotation path unobstructed

Remove any unnecessary equipment.

CAUTION

A/L1F1 does not have Pivot Fittings and will be free floating; care must be taken not to damage Rack umbilicals during Rack rotation.

12.2 Slowly rotate Rack down to a controlled stop.
As required, temporarily restrain Rack.

12.3 Mating Cables (three) to BCM-1

GW005-P1 →|← J1

W075-P7 →|← J2

W082-P4 →|← J3

Refer to Figure 6.

12.4 Mating Cables (three) to BCM-3

GW007-P1 →|← J1

W075-P5 →|← J2

W082-P7 →|← J3

Refer to Figure 6.

12.5 Mating Cables (three) to BCM-4

GW008-P1 →|← J1

W075-P4 →|← J2

W082-P7 →|← J3

Refer to Figure 6.

13. INSTALLING RACK ACCESS PANEL

13.1 Photo document rear of BCMs (Digital Camera).

13.2 Check for FOD around work area within 1 m radius.

13.3 Install rack access panel.

Tighten fasteners (forty-four) securing rear access panel to Rack
(Speed Handle Assy; 5/32" Hex Head, 1/4" Drive).

14. ROTATING A/L1F1 UP

14.1 Check Rack rotation path unobstructed.

Remove any unnecessary equipment.

✓ No interference with Lower Launch Restraints

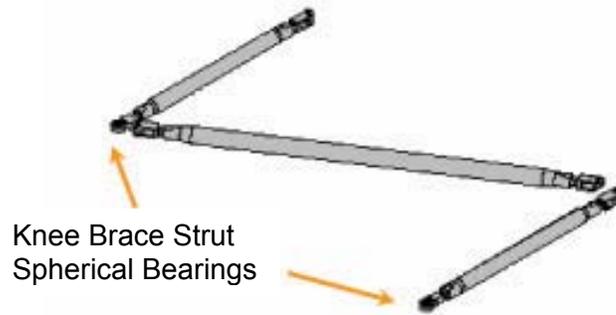


Figure 10.- Rack Knee Brace Assembly.

- 14.2 Verify Knee Brace Strut Spherical Bearings (two) straight.
Refer to Figure 10.
- 14.3 Slowly rotate Rack up until Knee Brace Strut Spherical Bearings (two) slide inside Rack Upper Attach Mechanism.
Refer to Figures 3, 5, 10.
15. ENGAGING LOWER LAUNCH RESTRAINTS
Refer to Figures 3, 4.
 - 15.1 Remove right Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
 - 15.2 Engage right Lower Launch Restraint 10 to 12 turns until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
 - 15.3 Reinstall, snug right Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
Verify Locking Screw flush with Rack structure.
 - 15.4 Repeat steps 15.1 to 15.3 for left Lower Launch Restraint.
16. ENGAGING UPPER ATTACH MECHANISMS
Refer to Figures 3, 5.

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NOTE

1. Begin with left Upper Attach Mechanism.
2. If Upper Attach Mechanisms cannot be fully engaged, past crews have recommended the following:
 - a. Remove Locking Screws.
 - b. Disengage left Lower Launch Restraint approximately 2/3 (between 6 and 8 turns).
 - c. Disengage right Lower Launch Restraint approximately 1/2 (between 5 and 6 turns).
 - d. Engage Upper Attach Mechanisms.
 - e. Retighten Lower Launch Restraints to hard stop and install Locking Screws.

- 16.1 Verify Locking Screw fully unlocked.

CAUTION

Do not force Upper Attach Mechanism pinions. Mechanism should easily engage Knee Brace Spherical Bearings.

NOTE

To engage left pinion, turn ↺

To engage right pinion, turn ↻

- 16.2 Engage pinion into Knee Brace Spherical Bearing until Shear Pin visible at top of mechanism (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head).
- 16.3 Tighten Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 16.4 Repeat steps 16.1 to 16.3 for right Upper Attach Mechanism.

17. POST MAINTENANCE

- 17.1 Update BCM labels for new configuration (Gray Tape, Sharpie). Refer to Figure 9.
- 17.2 Photo document new BCM configuration (front side) (Digital Camera).
- 17.3 Stow BCM (one) for return, tools, materials.
Stow Ziplock Bag labeled "Battery Charger Module Removal Kit: P/N SJG39137954-301."

18. REINSTALLING AV RACK CLOSEOUT PANELS

- 18.1 Check for FOD around work area within 1 m radius.
- 18.2 Attach UIP Closeout to Rack, 1/4 Turn Fasteners (two).

1.104 ULF-3 AIRLOCK BATTERY CHARGER MODULE (BCM) R&R

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- 18.3 Retrieve A/L1OF2 Closeout Panel.
Tighten J62 connector fasteners (four) on A/L1OF2 Closeout Panel (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Refer to Figure 2.
- 18.4 Reinstall A/L1OF2 Closeout Panel, fasteners (twelve) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

Table 2. Airlock Closeout Panels

Installation Order	Panel	Fasteners (5/32" Hex Head)
1	A/L1FD2	13
2	A/L1F2	25
3	Small blue Panel (no label) next to A/L1F2	2

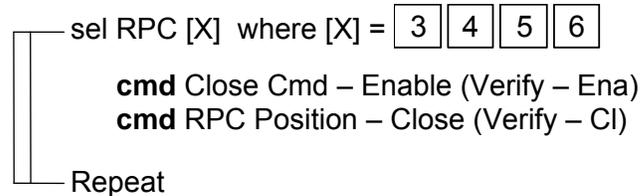
- 18.5 Reinstall Airlock Closeout Panels, in order per Table 2 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

19. CHECKING OUT BCMs

- 19.1 ISS ↓ **MCC-H**, "GO for BCM Checkout."

MCC-H
PCS

- 19.2 Close Enabling and Closing BCM RPCs
Airlock: EPS: RPCM AL1A4A B
RPCM_AL1A4A_B



- 19.3 √ **MCC-H** to verify BCM RPCs closed

BCMs
1 to 4

- 19.4 sw MAIN POWER → ON

Verify MAIN POWER LED – illuminated
Verify nominal boot-up screen.

PSA

- 19.5 sw MAIN POWER → ON

Verify MAIN POWER LED – illuminated
Verify nominal boot-up screen.

BCMs
1 to 4

- 19.6 **On MCC-H GO**

sw MAIN POWER → OFF

Verify MAIN POWER LED – Off

PSA 19.7 sw MAIN POWER → OFF

Verify MAIN POWER LED – OFF

20. REINSTALLING EDDA AND EMUs

20.1 Reinstall EDDA onto A/L1F1 Rack.

20.2 Reinstall EMUs onto EDDAs, as required.

21. POWERING ON AIRLOCK ATUs FOR VOICE CHECK

MCC-H

21.1 Powering On ATU AL1

C&T: AL1: RPCM AL2A3B A RPC 01

RPCM AL2A3B A RPC 01

√RPC Position – Close

AL1

'IAC[X]' where [X] = Active and Powered IAC 1(2)

√Bus I/O – Enable

21.2 Powering On ATU EMU1

C&T: EMU1: RPCM AL2A3B A RPC 14

RPCM AL2A3B A RPC 14

cmd RPC Position – Close (Verify – CI)

EMU1

'IAC[X]' where [X] = Active and Powered IAC 1(2)

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

21.3 Powering On ATU EMU2

C&T: EMU2: RPCM AL2A3B B RPC 01

RPCM AL2A3B B RPC 01

cmd RPC Position – Close (Verify – CI)

EMU2

'IAC[X]' where [X] = Active and Powered IAC 1(2)

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

22. PERFORMING AIRLOCK ATU VOICE CHECK

A/L1F1

22.1 pb ATU EMU1 → 1(2)

Perform voice check.

Hang up ATU EMU1.

22.2 pb ATU EMU2 → 1(2)

Perform voice check.
Hang up ATU EMU2.

22.3 pb ATU AL1 → 1(2)

Perform voice check.

MCC-H 23. POWERING OFF ATU EMU1 AND EMU2

23.1 Powering Off ATU EMU1

C&T: EMU1

'IAC[X]' where [X] = Active and Powered IAC 1(2)

'ATU EMU1 State'

cmd Standby (Verify ATU AL1 State – Standby)

'Bus I/O'

cmd Inhibit (Verify Bus I/O – Inhibit)

sel RPCM AL2A3B A RPC 14

cmd RPC Position – Open (Verify – Op)

23.2 Powering Off ATU EMU2

C&T: EMU2

'IAC[X]' where [X] = Active and Powered IAC 1(2)

'ATU EMU2 State'

cmd Standby (Verify ATU AL1 State – Standby)

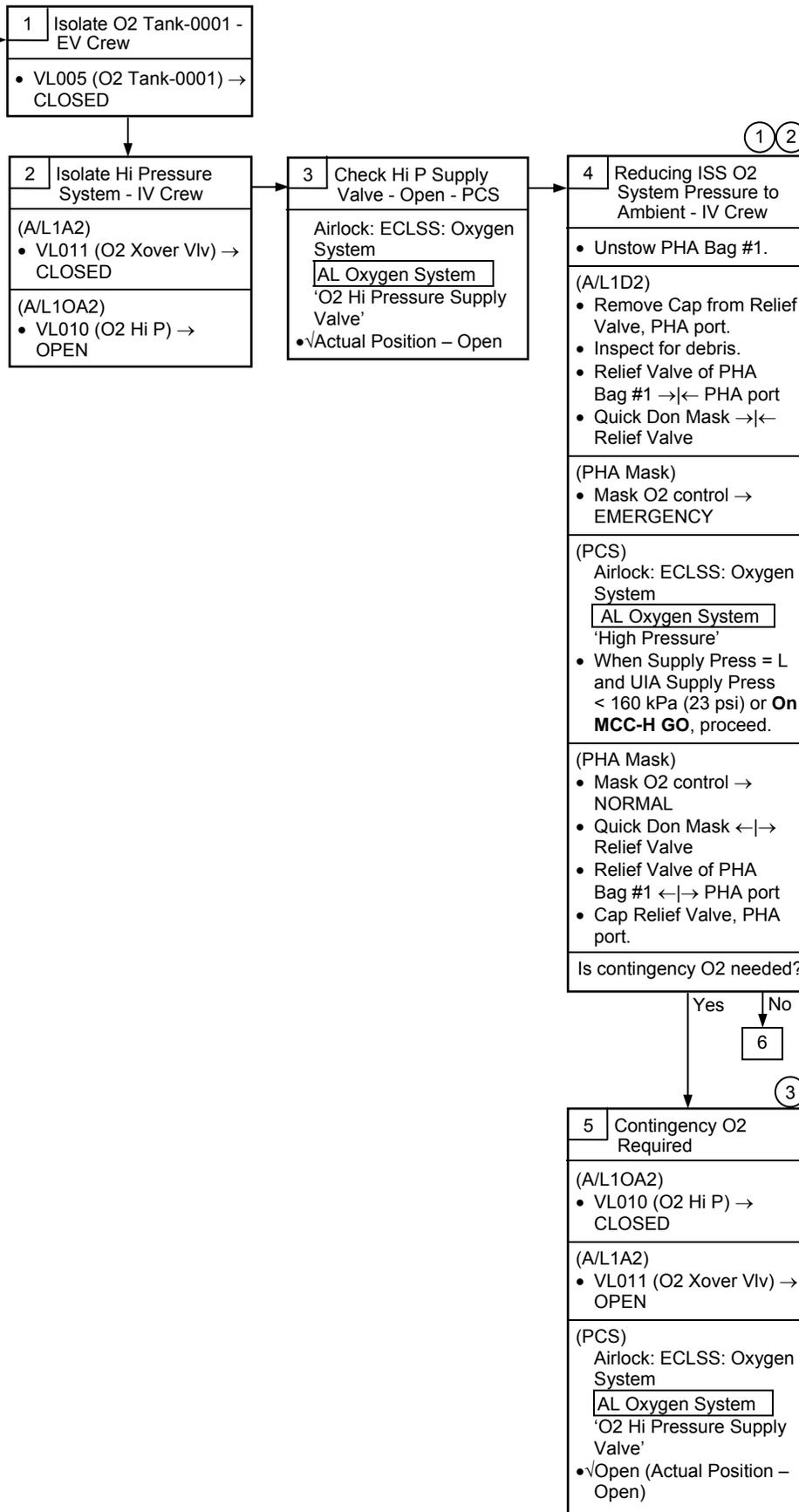
'Bus I/O'

cmd Inhibit (Verify Bus I/O – Inhibit)

sel RPCM AL2A3B B RPC 01

cmd RPC Position – Open (Verify – Op)

Configuration and leak check of new Hi Pressure O2 Tank



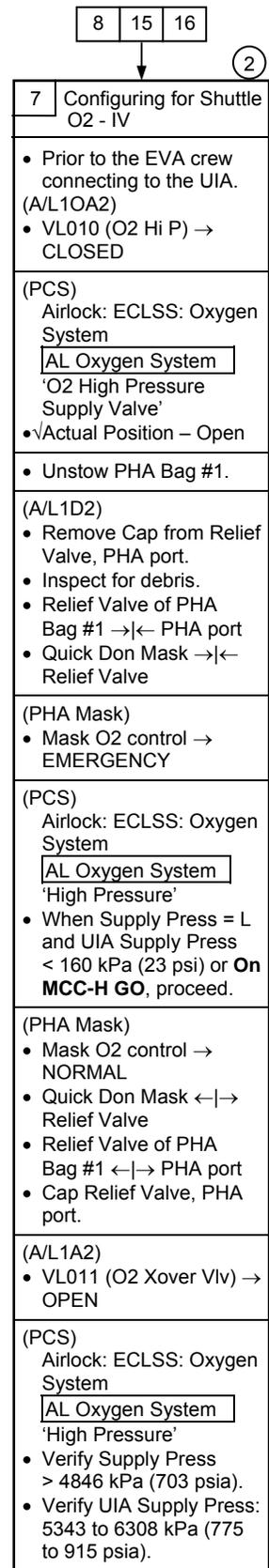
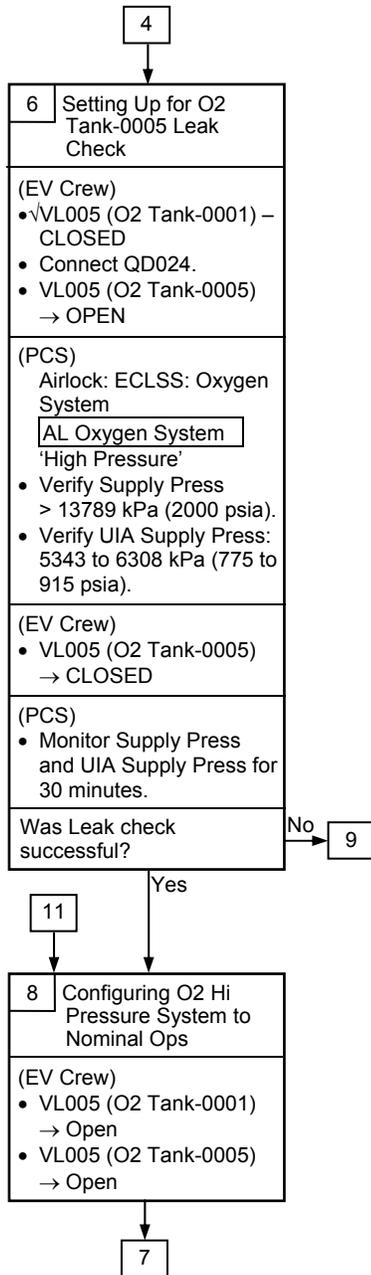
1 When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.

2 Expect Advisory 'O2 Hi P Supply Pressure Below Normal-A/L'. Associated caution events should be inhibited.

3 This block can be performed at any time to reestablish Oxygen supply to the UIA. Expect airlock relief valves to cycle briefly if the recharge line is still at ISS tank pressure.

1.105 NEW HI PRESSURE O2 TANK LEAK CHECK

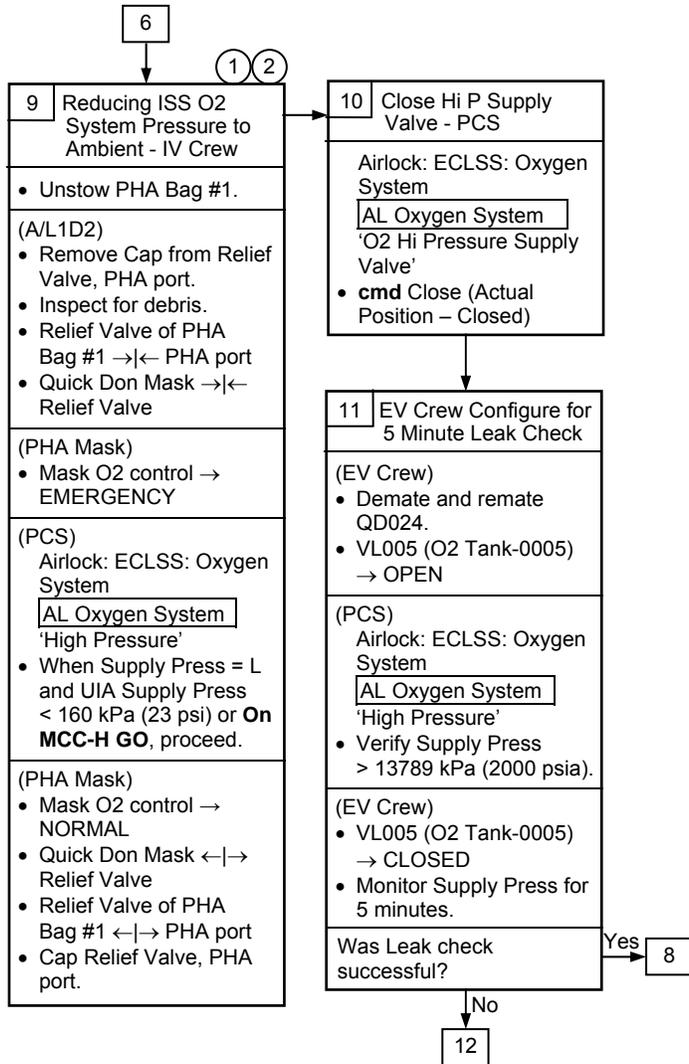
(ASSY OPS/ULF3/FIN)



② Expect Advisory 'O2 Hi P Supply Pressure Below Normal-A/L'. Associated caution events should be inhibited.

1.105 NEW HI PRESSURE O2 TANK LEAK CHECK

(ASSY OPS/ULF3/FIN)

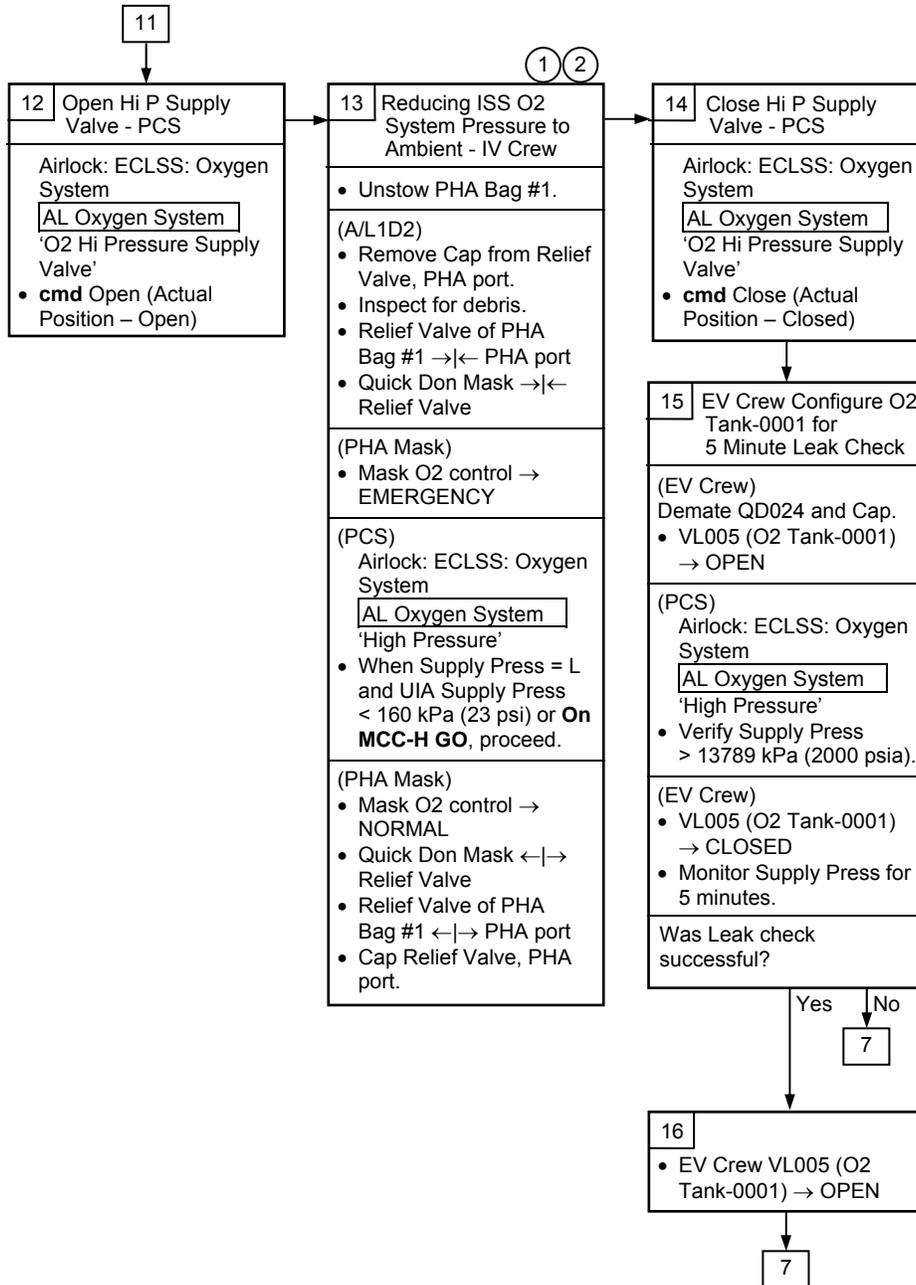


① When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.

② Expect Advisory 'O2 Hi P Supply Pressure Below Normal-A/L'. Associated caution events should be inhibited.

1.105 NEW HI PRESSURE O2 TANK LEAK CHECK

(ASSY OPS/ULF3/FIN)



① When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.

② Expect Advisory 'O2 Hi P Supply Pressure Below Normal-A/L'. Associated caution events should be inhibited.

TRANSFER

TRANSFER

TRANSFER

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2.100 ULF-3 DESCENT SAMPLE TRANSFER FROM MELFI TO GLACIER

(ASSY OPS/ULF3/FIN 1/HC)

Page 1 of 6 pages

OBJECTIVE:

This procedure will be used to transfer the frozen HRP Blood vial bags, HRP Urine bags, Rad Silk Egg Cases, Lada VPU samples, Solo and Card science samples from ISS MELFI to Glacier using a Double Coldbag and two Icepac Belts in preparation for Glacier's descent on ULF-3. This activity is performed by ISS and shuttle crewmembers. The Glacier door will be locked after sample transfer is complete.

IFM Tool Locker (MF28K):

3/16" Hex Head, 3/8" Drive

1/4" - 3/8" adapter

4" Extension, 1/4" Drive

Trq Wrench 1/4" Drive (40 to 200 in-lbs)

PARTS:

Double Coldbag S/N TBD

Light Duty Cryo Gloves (from ISS)

Small Coldplate/Wiretray Cover P/N SEG33111361-301

ITEMS TO UNSTOW WITHIN PROCEDURE:

Icepac Belt -32°C (two)

HRP Urine (nine bags)

HRP Blood (twenty-two bags)

Rad Silk (three egg cases)

SOLO (two bags)

CARD (one bag)

LADA VPU (two ziplocks)

MELFI 1. PACKING MELFI SAMPLES INTO DOUBLE COLDBAG

WARNING

Protective Gloves must be worn when manipulating MELFI trays or samples to prevent injury to exposed skin.

CAUTION

1. Minimize exposure of MELFI trays, frozen Icepacs, and samples to ambient air to prevent increased sample temperatures.
2. Double Coldbag lid should remain closed when the internal volume is not being accessed.

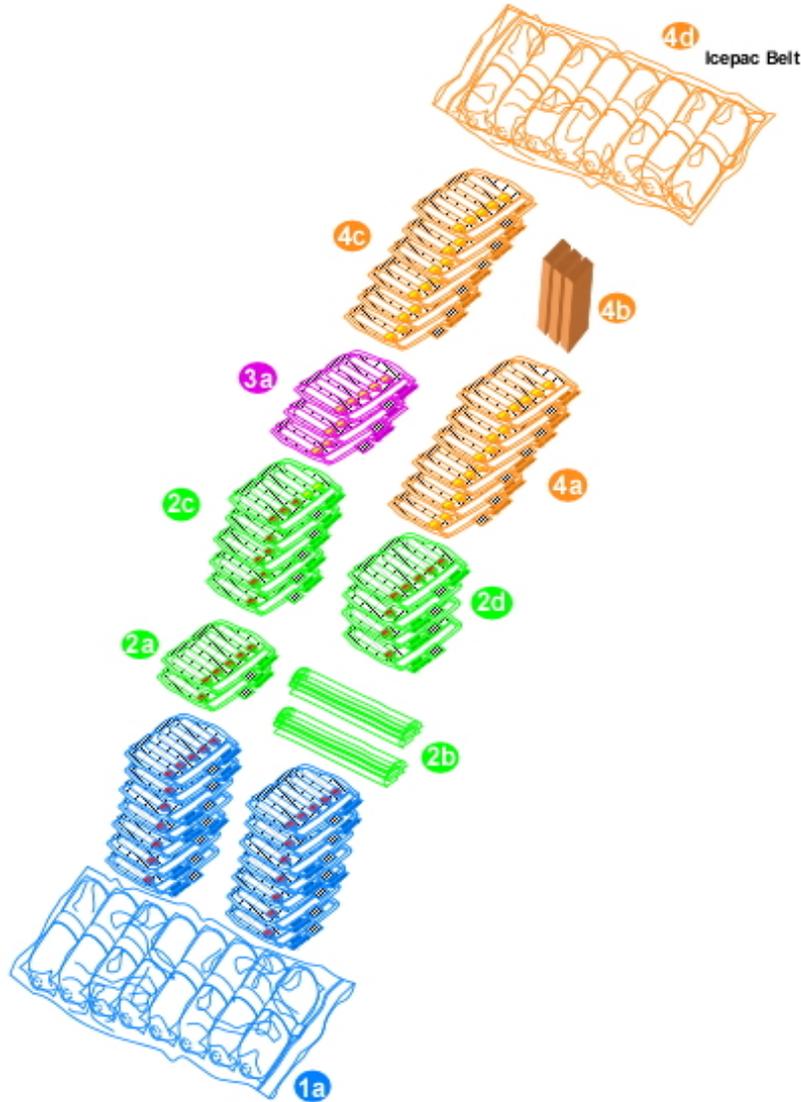
NOTE

60 seconds & 45 minute MELFI Dewar opening rules do not apply during packing of the Coldbag.

1.1 Don Light Duty Cryo Gloves

1.2 Perform Double Coldbag packing per Figure 1.

* If Tray is stuck,
* | Insert Small Coldplate/Wireway Cover completely between Tray
* | and Dewar wall. Firmly holding both Small Coldplate/Wireway
* | Cover and Tray Handle, remove Tray from Dewar.
* | Reference: [4.010 MELFI REMOVAL OF A STUCK TRAY](#), (US
* | PODF: MELFI) if needed



Step	From MELFI Location *	Description
1a, 1b	1-A-1 1-B-1,2	Insert Icepac Belt -32° C (pink) on bottom; Insert HRP blood (fourteen bags)
2a, 2b, 2c,	2-A-2,3 2-B-2,3 2-D-2	Insert HRP blood (two bags); Insert Lada VPU (two bags); Insert SOLO samples; Insert CARD samples;
2d	2-B-4	Insert HRP blood (four bags)
3a	3-A-2	Insert HRP urine (three bags)
4a, 4b, 4c, 4d	1-C-1 1-C-2 1-C-3 1-A-2	Insert HRP urine (six bags); Insert Rad Silk (three egg cases); Insert HRP urine (six bags); Insert Icepac Belt -32° C (pink) on top

* Dewar-Tray-Tray Section (3-A-1 = Dewar 3, Tray A, Tray Section 1)

Figure 1.- Samples in Double Cold Bag.

2. TRANSFERRING DOUBLE COLDBAG FROM ISS TO SHUTTLE

2.1 Transfer Double Coldbag to Glacier.

3. INSERTING SAMPLES INTO GLACIER

WARNING

Protective gloves must be worn when handling frozen samples or manipulating inner doors, cold trays or samples in Glacier to prevent injury to exposed skin.

CAUTION

1. Minimize exposure of Glacier trays and samples to ambient air to prevent increased sample temperatures.
2. Glacier inner doors should remain closed when the internal volume is not being accessed.

- 3.1 Don Light Duty Cryo Gloves (from ISS).
- 3.2 Open Glacier.
- 3.3 Insert into Tray A: HRP blood (six bags) and Rad Silk (three egg cases).
- 3.4 Insert into Tray B: HRP Urine (nine bags), SOLO samples, and CARD samples.
- 3.5 Insert into Tray C: HRP blood (fourteen bags) and Lada VPU (two ziplocks).
- 3.6 Insert into Tray D: HRP blood (two bags).

4. LOCK GLACIER DOOR

4.1 ✓ Glacier door – Closed

* If Outer Door does not close,
* | Press on top left corner and bottom left corner of door to
* | assist with closure.

4.2 ✓ Door Latch – Locked (finger latches fully spread apart and locking flap positioned between finger latches)

WARNING

Glacier Door Captive Locks (two) must be torqued to 75 in-lbs to prevent door opening during ascent and entry.

6. GROUND UPDATES FOR IMS (GROUND-ONLY)

Ground updates IMS for the following parts:

Double Cold Bag S/N TBD TO: per crew call down (step 5.4)

PAYLOADS

PAYLOADS

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OBJECTIVE:

This procedure will be used for both National Laboratory Pathfinder (NLP) Cells-2 and Vaccine-6 activities.

For NLP-Cells-2 the entire procedure will be executed to access the Group Activation Pack (GAP) inside Commercial Generic Bioprocessing Apparatus (CGBA). This includes powering down CGBA, accessing the internal volume of CGBA, and retrieving and activating of NLP-Cells-2 GAPs. It also contains the proper steps to close CGBA and restore power.

For NLP-Vaccine-6, only steps 2, 6 and 11 of this procedure will be executed because these GAPs are stowed at ambient.

PARTS:

NLP-Cells-2

- Group Activation Packs (GAPs)
- Hand Crank (located in foam on left side of CGBA unit)
- Ziplock Bag (if required)

NLP-Vaccine-6

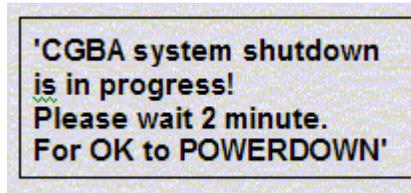
- Group Activation Packs (GAPs)
- Hand Crank
- Ziplock Bag (if required)

1. If Vaccine-6 activity
| Perform only steps 2, 6, 11.
If Cells-2 activity, perform all.
2. Check Flight Plan Detail Page or OSTPV Execution Notes for which GAPs to activate.
Record information in Table 1 in step 6.1.

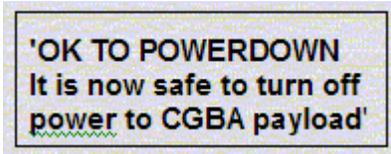
CAUTION
To protect science, the CGBA power off time should not exceed 30 minutes.

MF71E
(CGBA)

3. CGBA POWEROFF
 - 3.1 On Keypad:
pb MENU → Press
pb 7 Shutdown → Press
pb ENTER → Press
 - 3.2 On Shutdown CGBA screen:
pb 1 Shutdown system → Press
pb ENTER → Press
 - 3.3 Verify CGBA display indicates the following:



3.4 Verify CGBA display indicates the following:



```
*
*****
*
* If CGBA Computer display does not indicate above information
* |
* | Notify MCC-H and continue.
*
*****
```

3.5 cb MAIN POWER → Open

3.6 ✓LED-MAIN POWER – Off

4. CGBA POWER OFF AND DISCONNECTION

MO63P

4.1 sw 10A J4 → OFF
cb CB4/J4 → Open

CGBA

4.2 DC JUMPER CGBA ←|→ POWER-IN 28 VDC J1

4.3 Tether Power Cable out of the way as needed.

5. CGBA REMOVAL FROM MIDDECK LOCKER

5.1 Unlatch, open CGBA locker door.

5.2 Grasp CGBA, pull unit out of locker using side handles.
If needed, pull Velcro tabs to deploy CGBA recessed handles (push recessed handles back into place when done).

5.3 Temporarily stow CGBA in a secure location for access operations.

5.4 Open CGBA lid by lifting Velcro tabs on each side (two) of Nomex Cover.

CGBA or MF71K

6. ACTIVATING NLP EXPERIMENT

6.1 Record Activation Start MET in Table 1.

Table 1.

GAPs Cells-2 (1-16) Vaccine-6 (A-H)	Activation Start MET	Activation Stop MET
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

WARNING
Do not process GAP if external leakage is evident. Seal GAP in Ziplock bag and stow.

6.2 Remove one GAP listed in Table 1 from Foam.

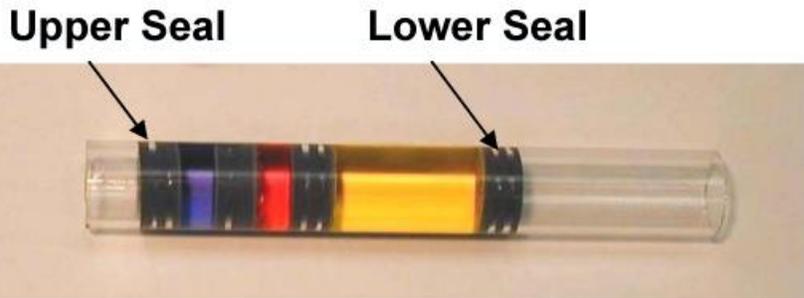


Figure 1. Loaded Glass Barrel.

6.3 Verify visually:
No Leakage from GAP.
No fluid outside of the upper or lower seals within the Glass Barrels
(Figure 1).

*
* If any external leakage is evident
* | Immediately seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with GAP number.
*
*
* If any leakage is evident in more than two Glass Barrels
* | Immediately seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with Glass Barrel and GAP number(s).
*
*
* If any leakage is evident in two or fewer Glass Barrel(s)
* | Complete step 6, then seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with Glass Barrel and GAP number(s).
*

6.4 Unstow Hand Crank and attach to GAP.
Slowly rotate the Hand Crank ↻ until lower edge of pressure plate aligns with lower edge of the first mark labeled "ACTIVATION" on the side of GAP housing.

6.5 Detach Hand Crank.

6.6 Shake GAP firmly by accelerating in a back and forth motion along the lengthwise axis of the GAP four times.

6.7 Verify visually:
No leakage from GAP.
No fluid outside of the upper or lower seals within the Glass Barrels (Figure 1).

*
* If any leakage from GAP or leakage within the Glass Barrel(s) is evident,
* | Immediately seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with GAP number.
*

6.8 Restow GAP in original location.

6.9 Repeat step 6.2 to 6.8 until all GAPs identified in Table 1 are activated.

6.10 Record Activation Stop MET Table 1.

6.11 Restow Hand Crank in original location.

7. INSERTION OF CGBA INTO MIDDECK

7.1 Close CGBA lid, attach Velcro tabs.

WARNING
CGBA must be inserted with both latches closed for safe entry.

7.2 Slide CGBA into locker, close locker door, and latch.

8. CONNECTING POWER TO CGBA

8.1 ✓cb MAIN POWER – Open
✓LED-MAIN POWER – Off

MO63P 8.2 ✓cb CB4/J4 – Open
✓sw 10A J4 – OFF

CGBA 8.3 Connect Power cable:
DC JUMPER CGBA →|← POWER-IN 28 VDC J1

9. CGBA POWERON

MO63P 9.1 cb CB4/J4 → Close
sw 10A J4 → ON

CGBA 9.2 cb MAIN POWER → Close
✓LED-MAIN POWER – On

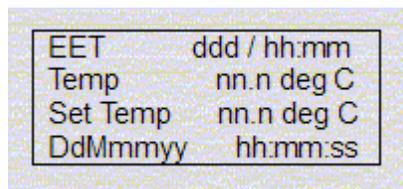
*
* If no LED
* | Perform [CGBA INCORRECT \(NO\) DISPLAY](#), all (SODF:
* | ASSY OPS: PAYLOADS: CGBA), then:
*

10. CGBA CHECKOUT

10.1 Verify CGBA fan is running (check airflow at EXHAUST)

*
* If CGBA fan is not running
* | ✓MCC-H
*

10.2 Verify CGBA display indicates the following:



```
*
*****
*
* If display is incorrect or no display
*
* | Notify MCC-H.
*
*****
```

11. ✓MCC-H and provide METs recorded in Table 1.

OBJECTIVE:

This procedure will be used for both National Laboratory Pathfinder (NLP) Cells-2 and Vaccine-6 activities.

For NLP-Cells-2 the entire procedure will be executed to access the Group Activation Pack (GAP) inside Commercial Generic Bioprocessing Apparatus (CGBA). This includes powering down CGBA, accessing the internal volume of CGBA, and retrieving and terminating of NLP-Cells-2 GAPs. It also contains the proper steps to close CGBA and restore power.

For NLP-Vaccine-6, only steps 2, 6 and 11 of this procedure will be executed because these GAPs are stowed at ambient.

PARTS:

NLP-Cells-2

- Group Activation Packs (GAPs)
- Hand Crank (located in foam on left side of CGBA unit)
- Ziplock Bag (if required)

NLP-Vaccine-6

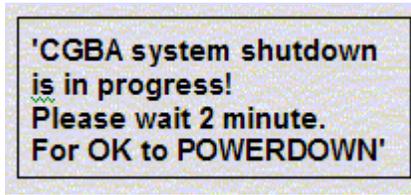
- Group Activation Packs (GAPs)
- Hand Crank
- Ziplock Bag (if required)

1. If Vaccine-6 activity
| Perform only steps 2, 6, 11.
If Cells-2 activity, perform all.
2. Check Flight Plan Detail Page or OSTVP Execution Notes for which GAPs to terminate.
Record information in Table 1 in step 6.1.

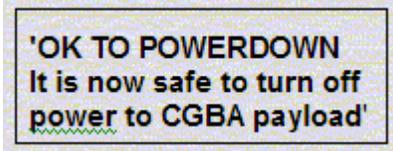
CAUTION
To protect science, the CGBA power off time should not exceed 30 minutes.

MF71E
(CGBA)

3. CGBA POWEROFF
 - 3.1 On Keypad:
pb MENU → Press
pb 7 Shutdown → Press
pb ENTER → Press
 - 3.2 On Shutdown CGBA screen:
pb 1 Shutdown system → Press
pb ENTER → Press
 - 3.3 Verify CGBA display indicates the following:



3.4 Verify CGBA display indicates the following:



```

*****
*
*
* If CGBA Computer display does not indicate above information
* |
* | Notify MCC-H and continue.
*
*****

```

3.5 cb MAIN POWER → Open

3.6 ✓LED-MAIN POWER – Off

4. CGBA POWER OFF AND DISCONNECTION

MO63P

4.1 sw 10A J4 → OFF
cb CB4/J4 → Open

CGBA

4.2 DC JUMPER CGBA ←|→ POWER-IN 28 VDC J1

4.3 Tether Power Cable out of the way as needed.

5. CGBA REMOVAL FROM MIDDECK LOCKER

5.1 Unlatch, open CGBA locker door.

5.2 Grasp CGBA, pull unit out of locker using side handles.
If needed, pull Velcro tabs to deploy CGBA recessed handles (push recessed handles back into place when done).

5.3 Temporarily stow CGBA in a secure location for access operations.

5.4 Open CGBA lid by lifting Velcro tabs on each side (two) of Nomex Cover.

CGBA or MF71K

6. TERMINATING NLP EXPERIMENT

6.1 Record Termination Start MET in Table 1.

Table 1.

GAPs Cells-2 (1-16) Vaccine-6 (A-H)	Termination Start MET	Termination Stop MET
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

WARNING
Do not process GAP if external leakage is evident. Seal GAP in Ziplock bag and stow.

6.2 Remove one GAP listed in Table 1 from Foam.

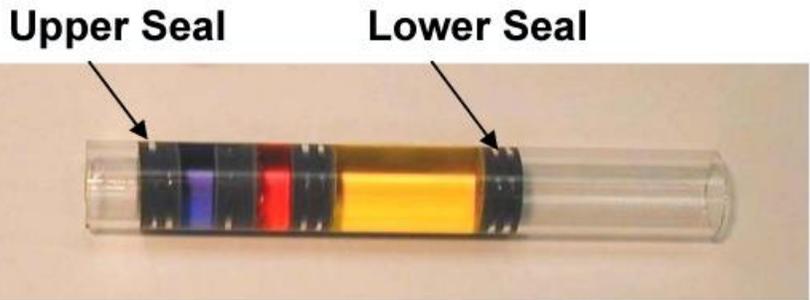


Figure 1. Loaded Glass Barrel

6.3 Verify visually:
No Leakage from GAP.
No fluid outside of the upper or lower seals within the Glass Barrels
(Figure 1).

*
* If any external leakage is evident
* | Immediately seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with GAP number.
*
*
* If any leakage is evident in more than two Glass Barrels
* | Immediately seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with Glass Barrel and GAP number(s).
*
*
* If any leakage is evident in two or fewer Glass Barrel(s)
* | Complete step 6, then seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with Glass Barrel and GAP number(s).
*

- 6.4 Unstow Hand Crank and attach to GAP.
Slowly rotate the Hand Crank ↻ until lower edge of pressure plate aligns with lower edge of the first mark labeled "TERMINATION" on the side of GAP housing.
- 6.5 Detach Hand Crank.
- 6.6 Shake GAP firmly by accelerating in a back and forth motion along the lengthwise axis of the GAP four times.
- 6.7 Verify visually:
No leakage from GAP.
No fluid outside of the upper or lower seals within the Glass Barrels (Figure 1).

*
* If any leakage from GAP or leakage within the Glass Barrel(s) is evident
* | Immediately seal GAP in Ziplock Bag, stow.
* | ✓ **MCC-H** with GAP number.
*

- 6.8 Restow GAP in original location.
- 6.9 Repeat steps 6.2 to 6.8 until all GAPs identified in Table 1 are terminated.
- 6.10 Record Termination Stop MET in Table 1.
- 6.11 Restow Hand Crank in original location.

CGBA 7. INSERTION OF CGBA INTO MIDDECK

- 7.1 Close CGBA lid, attach Velcro tabs.

WARNING
CGBA must be inserted with both latches closed for safe entry.

7.2 Slide CGBA into locker, close locker door, and latch.

8. CONNECTING POWER TO CGBA

8.1 ✓cb MAIN POWER – Open
✓LED-MAIN POWER – Off

MO63P 8.2 ✓cb CB4/J4 – Open
✓sw 10A J4 – OFF

CGBA 8.3 Connect Power cable:
DC JUMPER CGBA →|← POWER-IN 28 VDC J1

9. CGBA POWERON

MO63P 9.1 cb CB4/J4 → Close
sw 10A J4 → ON

CGBA 9.2 cb MAIN POWER → Close
✓LED-MAIN POWER – On

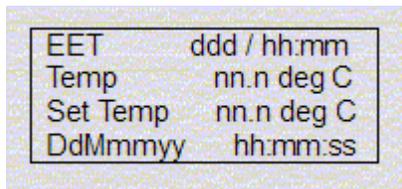
*
* If no LED
* | Perform CGBA INCORRECT (NO) DISPLAY, all (SODF:
* | ASSY OPS: PAYLOADS: CGBA), then:
*

10. CGBA CHECKOUT

10.1 Verify CGBA fan is running (check airflow at EXHAUST).

*
* If CGBA fan is not running
* | ✓MCC-H
*

10.2 Verify CGBA display indicates the following:



```
*
*****
*
* If display is incorrect or no display
*
* | ✓MCC-H.
*
*****
```

11. ✓MCC-H and provide METs recorded in Table 1.

OBJECTIVE:

Commercial Generic Bioprocessing Apparatus (CGBA). This procedure will direct the crew on the proper steps for adjusting the set temperature.

NOTE
If MENU selection is not made within 30 seconds, computer will time out and return to status display.

MF71E

1. On keypad
pb MENU → Press

pb 4 → Press

pb ENTER → Press
2. Verify display indicates
Enter new Set Temp

Temp: nn.n
3. Enter new Set Temp (nn.n)
pb ENTER → Press
4. Verify display indicates
New Set Temp

nn.n deg C

1 = Save Temp
9 = Reenter Temp

```

*****
*
* If displayed Set Temp is incorrect
* | pb 9 → Press
* | pb ENTER → Press
* | Repeat steps 3 and 4.
*
*****

```

5. pb 1 → Press
pb ENTER → Press

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ABRS ASCENT FILTER CHANGEOUT

(ASSY OPS/ULF3/FIN 1)

Page 1 of 6 pages

OBJECTIVE:

Replace Advanced Biological Research System (ABRS) Ascent Air Filter Cartridge with two ABRS Air Filter Cartridges.

PARTS

ABRS Air Filter Cartridge (two) P/N 1020-M-3060-00

TOOLS

#1 Phillips Head Screwdriver

Gray Tape

Scissors

MATERIALS

6x6 Ziplock Bag P/N 528-50000-2

Dry Wipes

1. REMOVE ABRS ASCENT FILTER CARTRIDGE

- MF28E 1.1 Remove Latch Safety Bolts (two) from ABRS door. Tape bolts to door with gray tape. Leave bolts in place until ABRS transfer complete (#1 Phillips screwdriver). Refer to Figure 1.

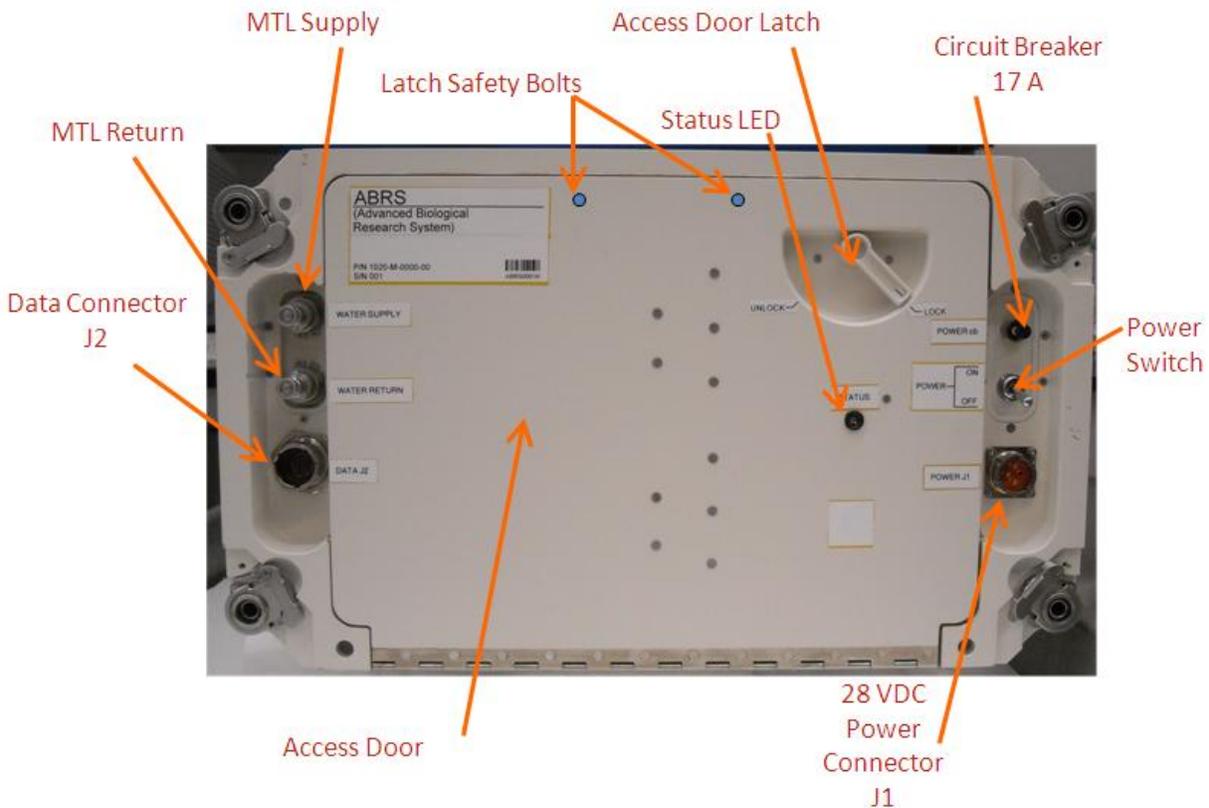


Figure 1. ABRS Access Door.

- 1.2 Toggle Door latch cw to unlock and open Door.

ABRS ASCENT FILTER CHANGEOUT

(ASSY OPS/ULF3/FIN 1)

Page 2 of 6 pages

- 1.3 Loosen Velcro strap over ABRS Air Ascent Filter Cartridge (see Figure 2).

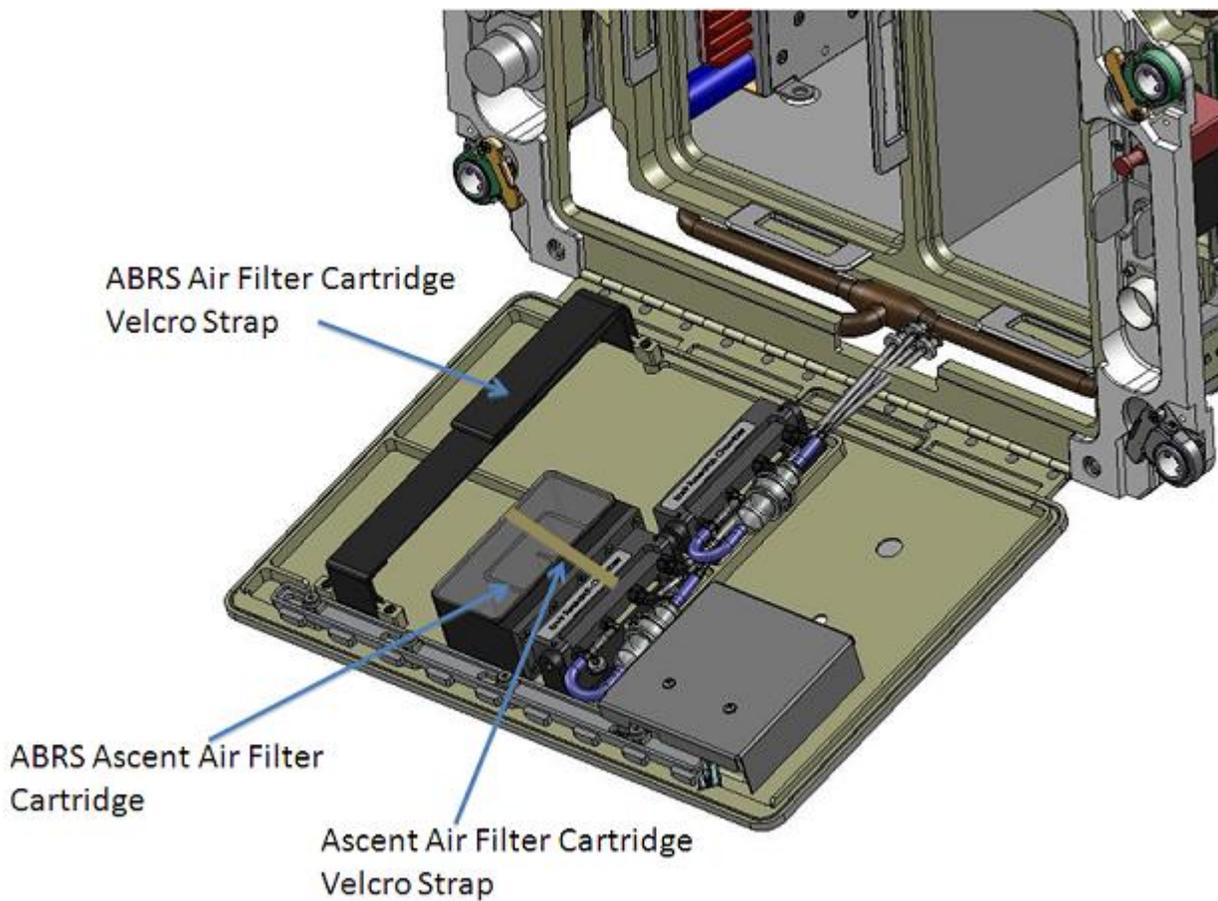
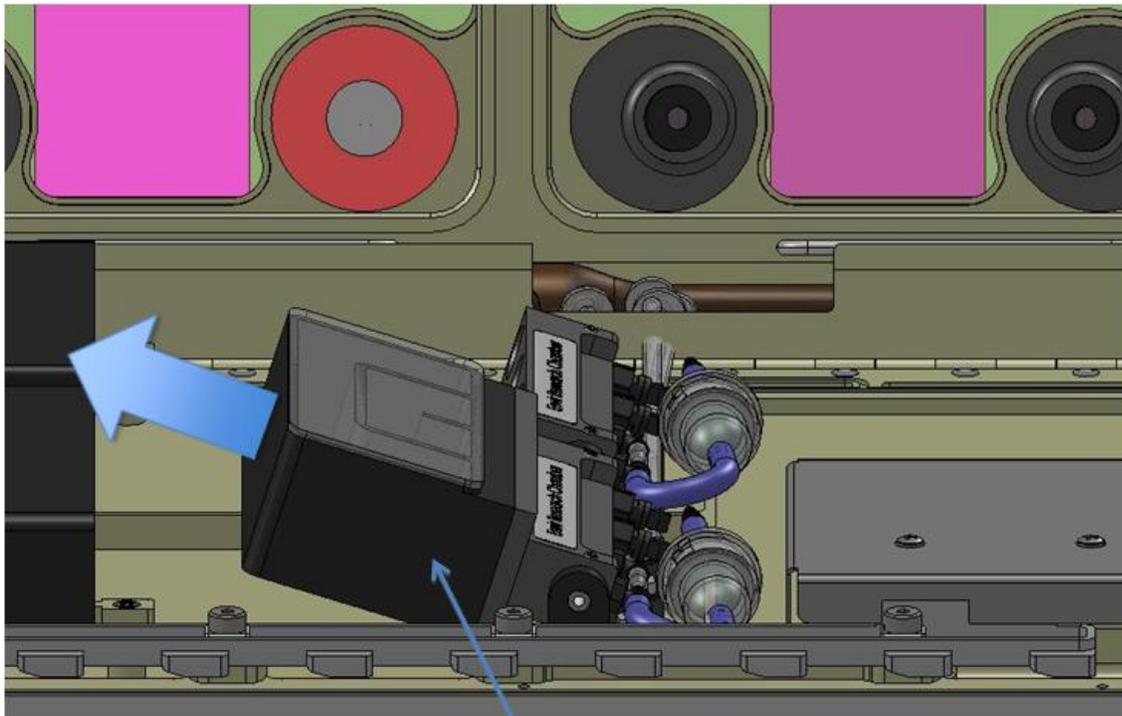


Figure 2. Air Filter Cartridge Velcro Straps.

- 1.4 Remove ABRS Ascent Air Filter Cartridge by lifting cartridge up along pivoting manifold and pulling until it is unseated (see Figure 3).



ABRS Ascent Air Filter Cartridge

Figure 3. Ascent Air Filter Cartridge Removal.

- 1.5 Insert used ABRS Ascent Air Filter Cartridge into 6x6 Ziplock Bag.
- 1.6 Label the Ziplock Bag, "ABRS Ascent Air Filter Cartridge".
Place in dry trash

2. INSTALL NEW ABRS AIR FILTER CARTRIDGE

- 2.1 Loosen Velcro strap that will hold down two ABRS Air Filter Cartridges
- MF28G 2.2 Retrieve ABRS Air Filter Cartridge in sealed plastic bag.
- 2.3 Carefully inspect unopened plastic bag for loose particles.
If loose particles are seen inside plastic bag containing ABRS Air Filter Cartridge
| Do not open bag.
| ✓MCC-H
- 2.4 Cut bag between heat seal and zipper to remove heat seal portion of bag (Scissors).
Remove ABRS Air Filter Cartridge from bag.

ABRS ASCENT FILTER CHANGEOUT

(ASSY OPS/ULF3/FIN 1)

Page 4 of 6 pages

- 2.5 Inspect the four connector O-rings on ABRS Air Filter Cartridge (see Figure 4) and the manifold for debris or damage (see Figure 3). Clean with Dry Wipes, if necessary.

If connections cannot be cleared

| ✓MCC-H

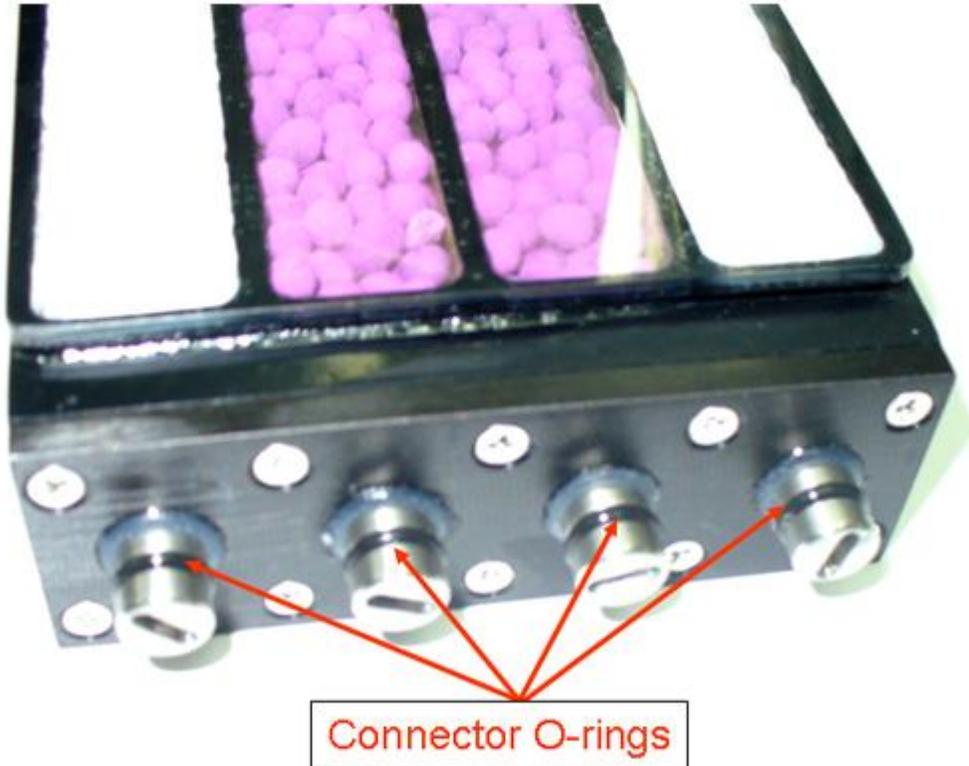


Figure 4. Connector O-rings on ABRS Air Filter Cartridge.

- 2.6 Insert ABRS Air Filter Cartridge by lifting manifold upward (see Figure 3) and inserting new Cartridge with transparent filtration module cover facing up, ensuring alignment marks match per Figure 5. Rotate Cartridge downward into place.

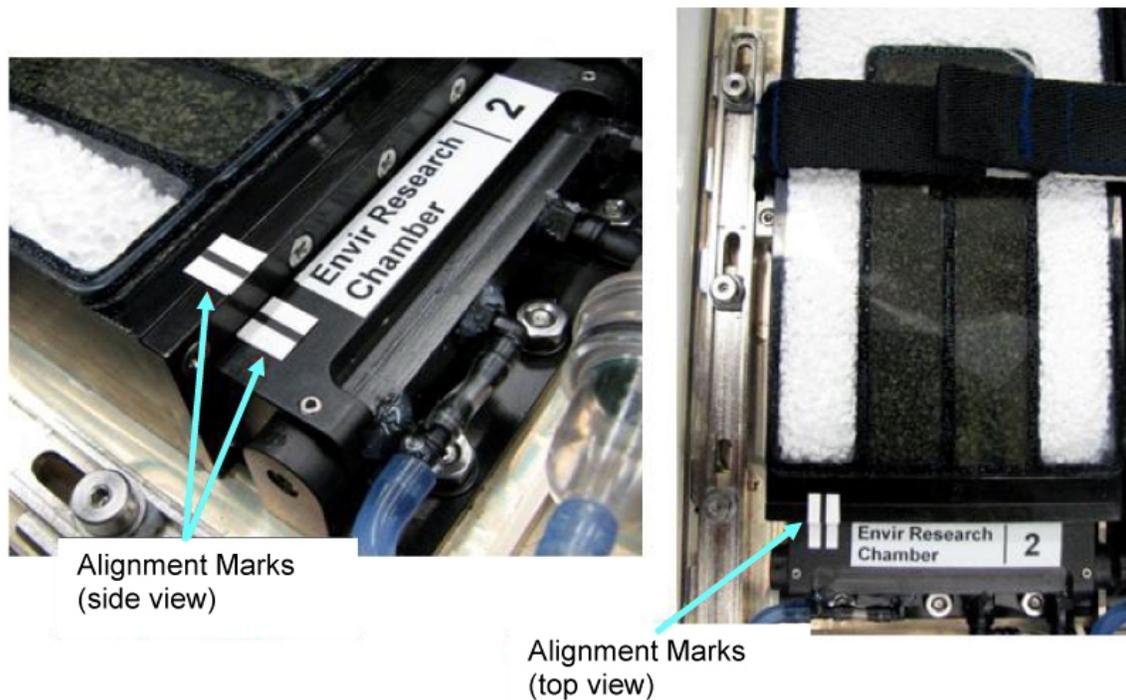


Figure 5. Two Views of ABRS Air Filter Cartridge Alignment Marks.

- 2.7 Retrieve second filter from bag and repeat steps 2.5 to 2.6 for second ABRS Air Filter Cartridge.
- 2.8 Notify **MCC-H** of the Serial Number and Envir Research Chamber position of each new ABRS Air Filter Cartridge just installed.
- 2.9 ✓ABRS Air Filter Cartridges are within the inside of the periphery wall (see Figure 6).

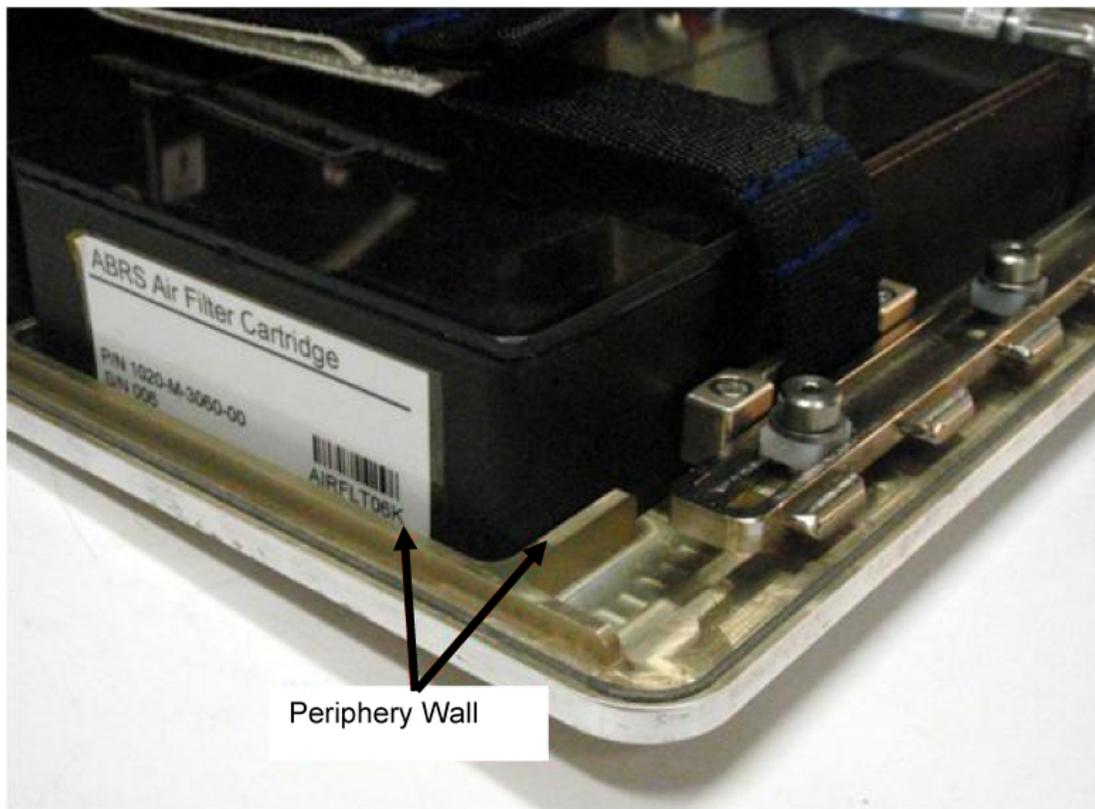


Figure 6. Periphery Wall Around ABRS Filter Cartridges Installed in ABRS.

- 2.10 Tighten strap over the two ABRS Air Filter Cartridges.

CAUTION

Ensure that no cables or hoses are protruding when ABRS Door is closed. Pinching or trapping cables or hoses in Door may result in permanent damage.

- 2.11 Close Door. Toggle latch ccw to lock door.
- 2.12 Stow parts, tools, materials to proper locations.

3. GROUND UPDATES TO IMS

Ground should update IMS for the following parts:
ABRS Air Filter Cartridge P/N 1020-M-3060-00 (two) To: Installed in ABRS (step 2.6)

ABRS TRANSFER MDDK TO ISS

(ASSY OPS/ULF3/FIN 1) Page 1 of 9 pages

OBJECTIVE:

Transfer Advanced Biological Research System (ABRS) from the shuttle middeck to the ISS (US LAB, EXPRESS-2 RACK). This activity removes a locker from EXPRESS-2 Rack, retrieves the ABRS payload from the shuttle middeck, removes launch lock bolts, powers it off, transfers it to the EXPRESS-2 Rack (where the locker was removed) and powers it to a survival state and then installs it.

LOCATION:

Removed: MF28E

Installed: EXPRESS-2 RACK LAB101_D1

PARTS:

Required at EXPRESS-2 Rack:

EXPRESS Rack Power Cable (38") (683-44024-2) (JPM1F6_F1)

EXPRESS Rack Data Cable (38") (683-44267-2) (JPM1F6_F1)

ABRS MTL Supply Hose (P/N 1020-M-0001-00) with Volume Compensator (P/N PCG-F10052-1) (located in ABRS Stowage Bag, see Transfer List)

ABRS MTL Return Hose P/N 1020-M-0002-00 with Volume Compensator (P/N PCG-F10052-1) (located in ABRS Stowage Bag, see Transfer List)

ABRS Refurbishment Kit P/N 1020-M-6013-00 (located in ABRS Stowage Bag, see Transfer List)

ABRS AAA Inlet Debris Filter (one) P/N 1020-M1010-00 (filter stowed inside kit)

Required at Shuttle Middeck:

Vented Payload Mounting Panel (VPMP) Cover (one) P/N (V733-334014-005)
(stowed in Window Shade Bag)

TOOLS:

Required in shuttle middeck (MF28K):

Ratchet Wrench, 1/4" Drive

1/4" Socket, 1/4" Drive

3/8" Socket, 1/4" Drive

Gray Tape

High Torque Locker Tool (MD23R - Volume H, taped to inboard wall)

Required at EXPRESS-2 Rack:

High Torque Locker Tool

Gray Tape

IVA Toolbox:

1/4" Socket, 1/4 " Drive

(5-35 in-lbs) Trq Driver, 1/4 " Drive

1. EXPRESS RACK 2 LOCKER 2 PREP

LAB101_D1 1.1 ✓Locker door latched, Red Dot not visible (Refer to Figure 1)

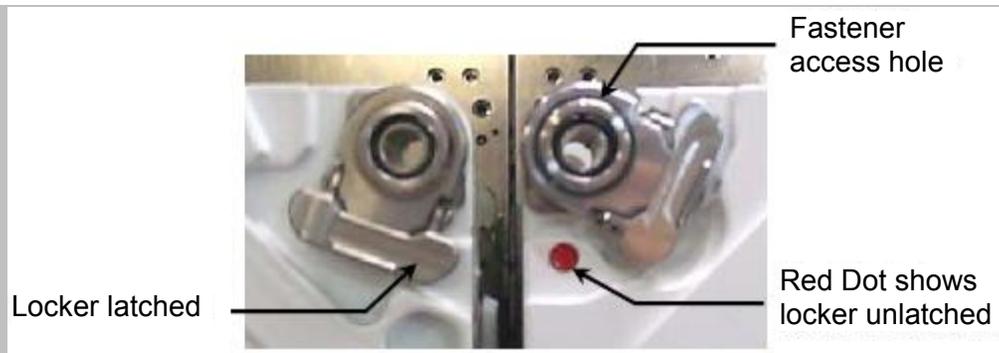


Figure 1.- Locker Latches.

- 1.2 Unfasten Locker fasteners (four) from EXPRESS-2 Rack (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive).
 - 1.3 Remove and transfer Locker to temporary stowage location in the JEM near EXPRESS Rack 4.
 - LAB101_A1 1.4 sw LOCKER-2 POWER → OFF
√LOCKER-2 POWER Lt – Off
 - 1.5 EXPRESS Rack Power Cable (38") →|← LOCKER-2 POWER-J1
 - 1.6 EXPRESS Rack Data Cable (38") →|← LOCKER-2 DATA-J2
 - 1.7 Tether cables out of way as required
 - 1.8 √Transfer path is clear between EXPRESS-2 Rack and middeck
2. REMOVE ABRS FROM MIDDECK
- MF28G 2.1 Retrieve ABRS stowage bag and temp stow on front of Middeck lockers

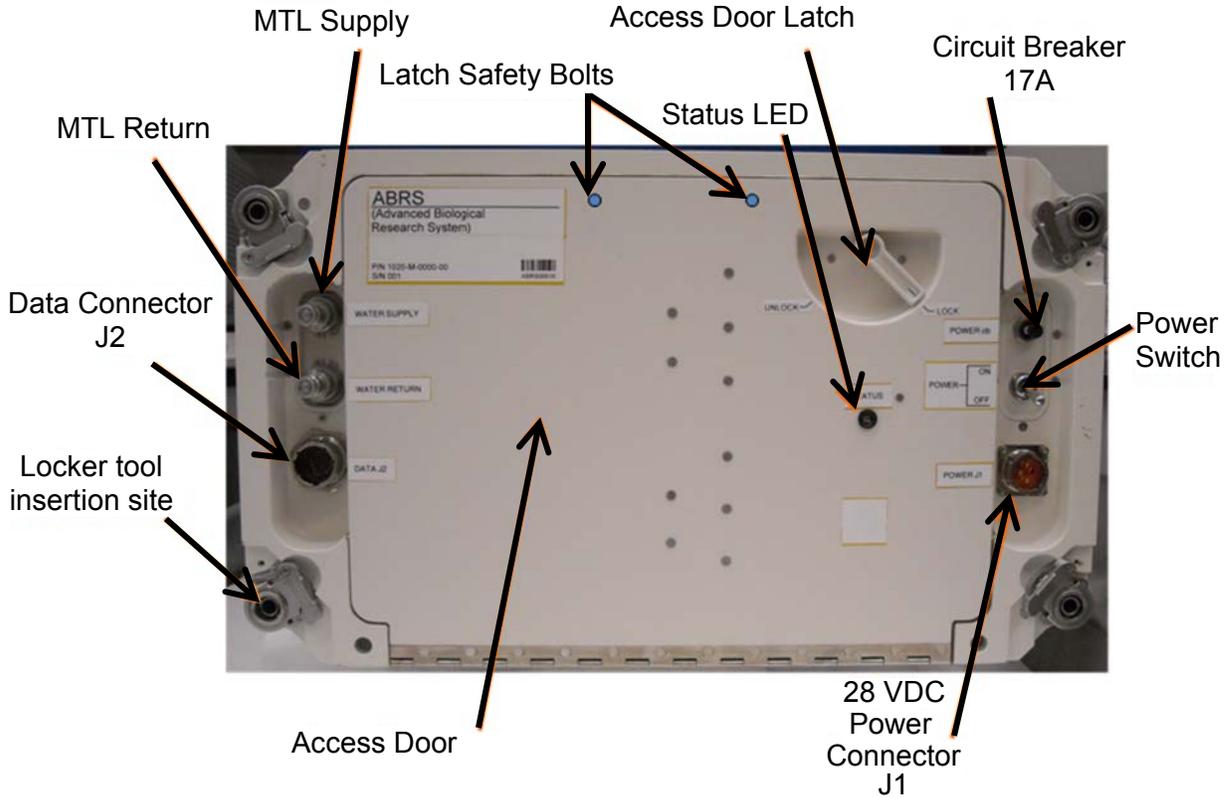


Figure 2.- ABRS Access Door.

- MF28E 2.2 Unfasten ABRS fasteners (four) from Vented Payload Mounting Panel (VPMP) mounted in wire tray (High Torque Locker Tool, 1/4" Socket, 1/4" Drive, Ratchet, 1/4" Drive). Pull out ABRS to access Launch Safety Bolts.

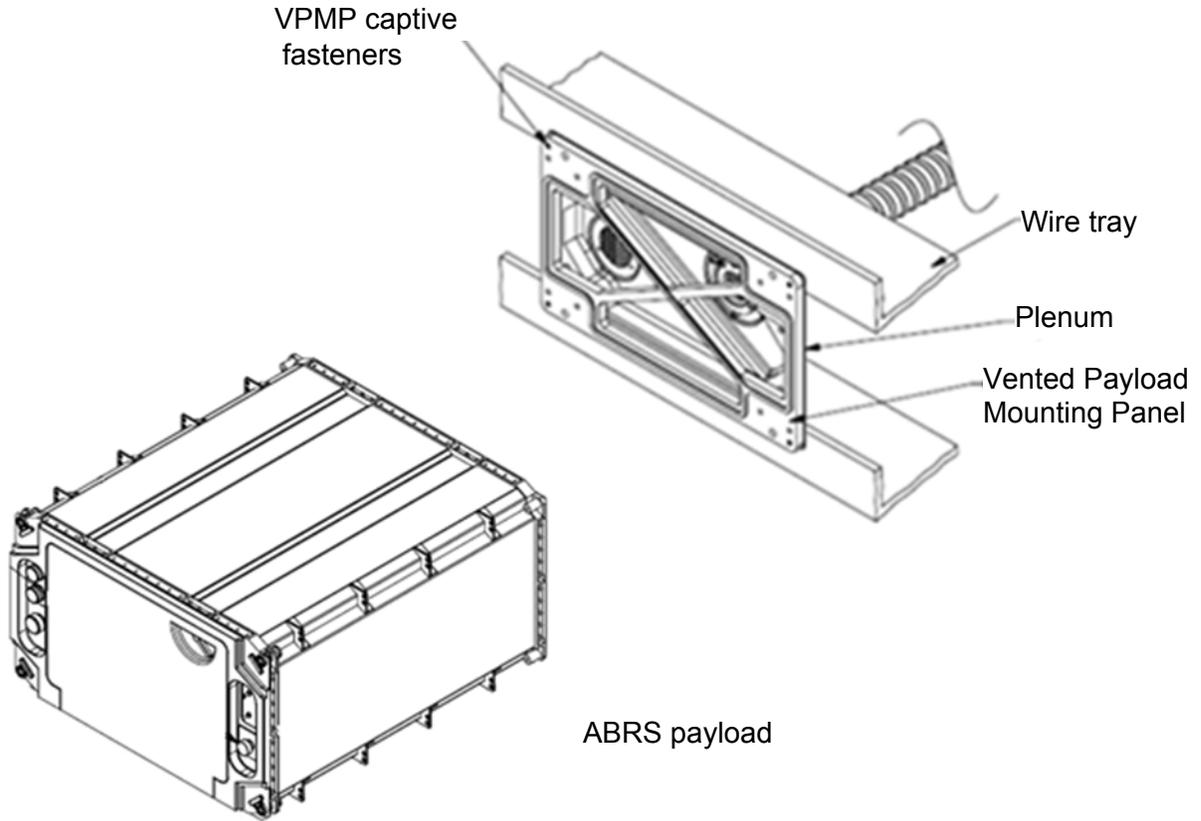


Figure 3.- ABRs interface to middeck.

- 2.3 Remove Launch Safety Bolts (six) three from each side, roll up in gray tape and place in trash (3/8" Socket, 1/4" Drive, Ratchet 1/4" Drive). Refer to Figure 4.

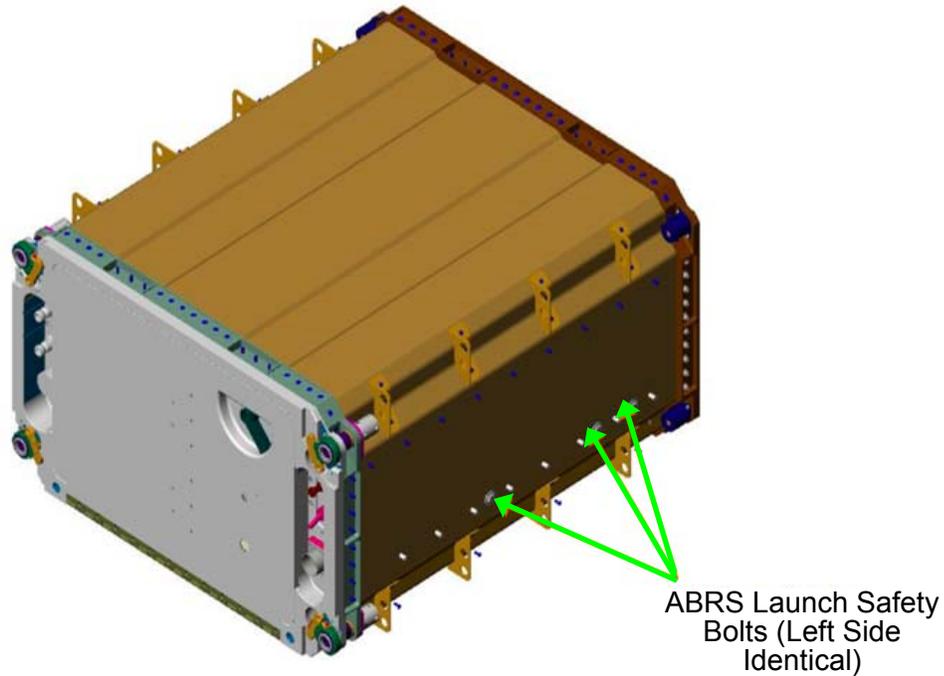


Figure 4.- ABRs Launch Safety Bolts.

2.4 Temporarily stow all tools

CAUTION	
To prevent a loss of science, power interrupt time should not exceed 30 minutes.	
Due to power quality issues, the ABRs power switch will remain in the ON position and the ABRs circuit breaker will be used to apply and remove power.	

- MF28E 2.5 Verify sw POWER → ON
cb POWER → Open
- 2.6 Record Power Off Time: _____ (GMT)
- ML85E 2.7 sw DC10 AMP MNB S4 → OFF
cb DC10 AMP MNB CB4 → Open
- 2.8 DC Jumper (21') ←|→ POWER J1
- 2.9 Remove payload from middeck location.

ABRS TRANSFER MDDK TO ISS

(ASSY OPS/ULF3/FIN 1) Page 6 of 9 pages

3. INSTALL ABRS AAA INLET DEBRIS FILTER

- ABRS 3.1 Inspect INLET and OUTLET ducts on rear of ABRS. If debris present, clean using gray tape. Refer to Figure 5.

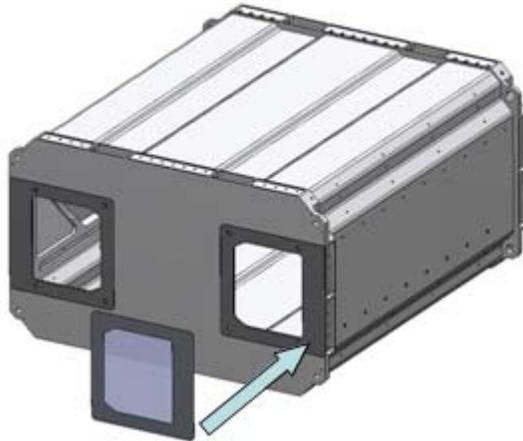


Figure 5.- Inlet/Outlet Ducts on Rear of ABRS.

- 3.2 Remove ABRS AAA Inlet Debris Filter from ABRS Stowage Bag
Remove backing from ABRS AAA Inlet Debris Filter.
Apply ABRS AAA Inlet Debris Filter to INLET duct on the rear of
ABRS. Refer to Figure 5.
Place backing in dry trash.

- 3.3 Remove gray tape with bolts from locker front and place in dry trash.

4. ABRS INSTALL

- LAB101 4.1 Transfer ABRS and Stowage Bag to US Lab, EXPRESS-2 RACK.
Shuttle crew proceed to Step 7, Middeck Closeout

- 4.2 Temp stow Stowage Bag to front of EXPRESS-2 RACK.

- LAB101_D1 4.3 Slide ABRS into position in EXPRESS-2 Rack.

- LAB101_A1 4.4 \checkmark sw LOCKER-2 POWER – OFF (Power Lt - Off)

- LAB101_D1 4.5 \checkmark sw POWER – ON
(ABRS) \checkmark cb POWER – Open

- 4.6 EXPRESS Rack Power Cable (38") →|← POWER J1
EXPRESS Rack Data Cable (38") →|← DATA J2

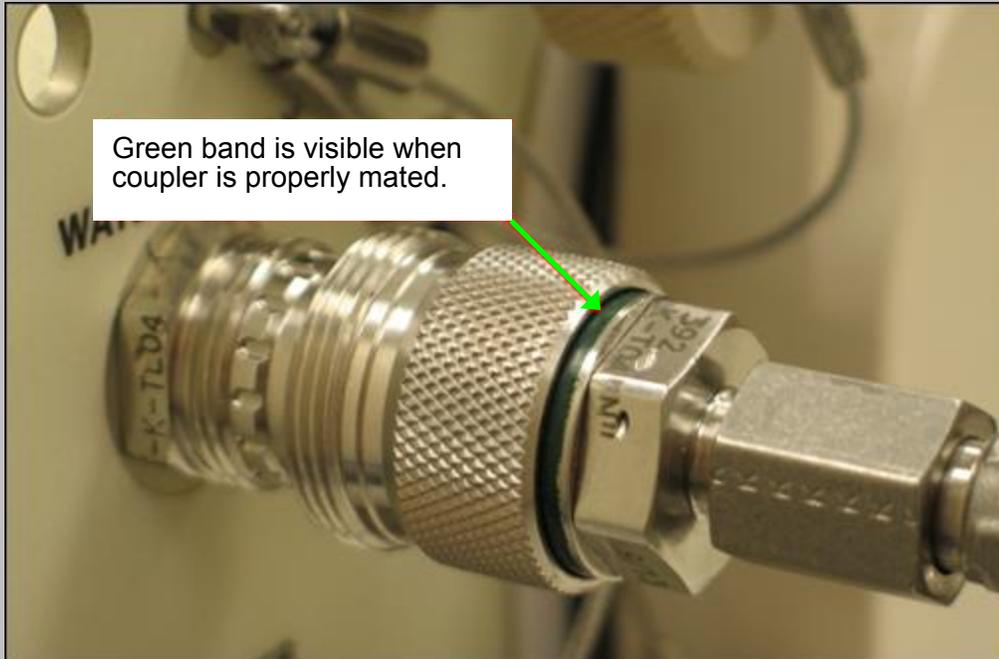


Figure 6.- Properly mated small QD Connector.

- 4.7 Retrieve the Water Return Hose from the ABRS stowage bag and with one hand gripping the Water Return Hose Connector, remove Volume Compensator. Place Volume Compensator back into bag.

ABRS

- 4.8 ABRS MTL Return Hose →|← WATER RETURN
 Verify that the QD coupler snaps into place and the green band is visible. See Figure 6.

 * If green band is not visible,
 * | Pull back on the coupler locking sleeve and de-mate
 * | from the ABRS water return nipple. Reconnect the
 * | water return line by pushing the small female QD
 * | coupler onto the water return nipple until the coupler
 * | snaps into place and the green band is shown.

LAB101_A1

- 4.9 ABRS MTL Return Hose →|← COOLANT WATER RETURN
 Verify that the locking tang is engaged with the large QD collar.

 * If locking tang is not engaged,
 * | Rotate the large QD collar clock-wise until the locking
 * | tang snaps into place.

- 4.10 Retrieve the Water Supply Hose from the ABRS stowage bag and with one hand gripping the Water Return Hose Connector, remove Volume Compensator. Place Volume Compensator back into bag.

ABRS 4.11 ABRS MTL Supply Hose →|← WATER SUPPLY
Verify that the QD coupler snaps into place and the green band is visible. See Figure 6.

* If green band is not visible,
* | Pull back on the coupler locking sleeve and de-mate
* | from the ABRS water supply nipple. Reconnect the
* | water supply line by pushing the small female QD
* | coupler onto the water supply nipple until the coupler
* | snaps into place and the green band is shown.

LAB1O1_A1 4.12 ABRS MTL Supply Hose →|← COOLANT WATER SUPPLY

* If locking tang is not engaged,
* | Rotate the large QD collar clock-wise until the
* | locking tang snaps into place.

4.13 Verify no leakage at connectors.

* If leakage at connectors,
* | Clean up with Dry Wipes.

5. ACTIVATE THERMAL FLOW

LAB1O1_ELC 5.1 EXPedite the PROcessing of Experiments for Space Station
(EXPRESS) Rack 2

sel EXPRESS TCS button

5.2 EXPRESS TCS

sel F2

5.3 EXPRESS TCS: F2
'Flow Rate Setting'

input Commanded – 2 4

sel Execute

6. ACTIVATE PAYLOAD POWER

LAB1O1_A1 6.1 sw LOCKER-2 POWER → ON (Power Lt-On)

LAB1O1_D1 6.2 √sw POWER → ON
(ABRS) cb POWER → Close

ABRS TRANSFER MDDK TO ISS

(ASSY OPS/ULF3/FIN 1) Page 9 of 9 pages

6.3 ✓ Status Lt – On

6.4 Record Power On Time: _____ (GMT)

6.5 Fasten ABRS fasteners (four) in a diagonal pattern into EXPRESS-2 Rack, torque to 30 in-lbs (High Torque Locker Tool, 1/4" Socket, 1/4" Drive, (5-35 in-lbs) Trq Driver, 1/4" Drive).

7. MIDDECK CLOSEOUT

7.1 Retrieve Vented Payload Mounting Panel (VPMP) Cover from Window Shade Bag

MF28E 7.2 Install VPMP Cover finger tight (1/4" Socket, if needed)

7.3 Stow:
All IVA and IFM Tools, parts and materials

7.4 Notify **MCC-H** ABRS installation complete and report Power Off, On times from steps 2.6 and 6.4.

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OBJECTIVE:

Place Advanced Biological Research System (ABRS) in a science safe mode if the front panel status LED is illuminated amber while ABRS is on shuttle.

TOOLS

PGSC

PARTS

ABRS Comm Cable P/N 1020-M-0003-00 (in ABRS Stowage Bag)

1. PGSC CONNECTION

1.1 Remove PGSC from network by disconnecting the RJ-45 cable from back of PGSC

MF28E

1.2 Connect ABRS Ethernet Cable between ABRS and PGSC
ABRS Comm Cable →|← DATA J2
ABRS Comm Cable →|← PGSC Ethernet

2. PGSC RECONFIG FOR ABRS

2.1 Power up PGSC, if PGSC not already powered, and locate Shuttle Applications Icon

2.2 Double click 'Shuttle Apps' > 'ABRS' > 'ABRS RJ-45 Network Setup' icon to run the ABRS Network Setup script

2.3 Enter "1" in the dialog and click OK button, click OK button again on the next window when prompted

✓Msg: '**RJ-45 Port Configured for ABRS Ops**' appears on Desktop

3. ABRS APPLICATION LOAD AND CONFIGURATION CHECK

PGSC

3.1 Double click 'Shuttle Apps' > 'ABRS' > 'ABRS' icon to run the ABRS application
✓Msg: '**ABRS APPLICATION LOADING**'
✓Health & Status display appears

3.2 Advanced Biological Research System (ABRS)

Note which parameters have background field colors that are amber (see Figure 1)

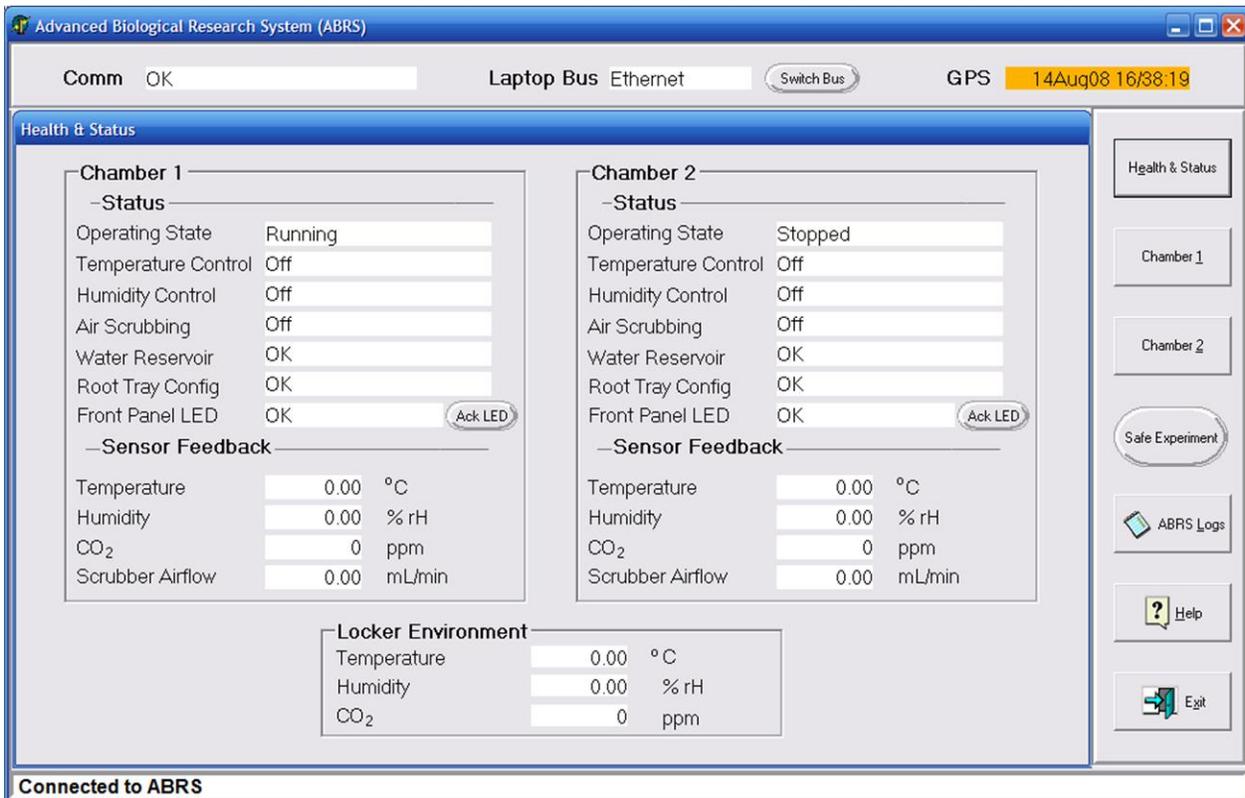


Figure 1. ABRS Safing Display

If either 'Chamber 1(2) - Temperature Control' parameter background color is amber,
 | Proceed to step 3.3 and continue Safing experiment

If neither 'Chamber 1(2) - Temperature Control' parameter is amber,
 note which other parameters are amber and report
 | ✓MCC-H

3.3 Advanced Biological Research System (ABRS)

cmd Safe Experiment

Confirm Safe Experiment

'This will put the payload into a limited operations mode and deviate from Chamber 1 and Chamber 2 experiment protocols. Are you sure you want to continue'

cmd Yes

3.4 Health and Status

'Chamber 1'

cmd Ack LED

'Chamber 2'

cmd Ack LED

MF28E 3.5 ✓STATUS Lt – On (green)

PGSC 3.6 Advanced Biological Research System (ABRS)

sel Exit

✓Msg: **'This will close the ABRS Laptop Software. Are you sure you want to exit?'**

sel Yes

4. PGSC RECONFIG TO NETWORK

4.1 Disconnect ABRS Ethernet Cable from PGSC and return to ARBS Stowage Bag
 ABRS Comm Cable ←|→ DATA J2
 ABRS Comm Cable ←|→ PGSC Ethernet

4.2 Reconnect PGSC to Network by reconnecting RJ-45 cable

4.3 Double click 'Shuttle Apps' > 'ABRS' > 'ABRS RJ-45 Network Setup' icon to restore the nominal configuration

4.4 Enter "2" in the dialog and click OK button. Click the OK button again on the next window when prompted

✓Msg: **'RJ-45 Port Configured for ABRS Ops'** disappears on Desktop

4.5 ✓**MCC-H** and report amber parameters noted from step 3.2

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SPINAL ELONGATION OPERATOR PROCEDURE

(ASSY OPS/ULF3/FIN 1)

Page 1 of 12 pages

OBJECTIVE:

This procedure defines the steps needed for an operator to correctly set-up an Anthropometer Base and D2Xs Camera, correctly measure subject data, and then correctly take down and stow Anthropometer Base and D2Xs Camera for the Spinal Elongation investigation.

PARTS:

Spinal Elongation Kit

TOOLS:

12-24mm Lens

4GB EVA Flash Card (empty)

CF Card Adapter

D2Xs Camera

Multi-Use Arm (Shuttle)

SB-800 Flash

Shutter Release Cable (labeled Remote Cord Assembly)

1. UNSTOW HARDWARE

- 1.1 If first session for Spinal Elongation,
| Unstow from ISS (consult stowage notes):
| Spinal Elongation Kit
| Retrieve from Shuttle Location:
| Multi-Use Arm

If subsequent session for Spinal Elongation,
| Retrieve from tmpiry stow location on Shuttle:
| Spinal Elongation Kit
| Multi-Use Arm

- 1.2 Retrieve from Shuttle:
12-24mm Lens
CF Card Adapter
D2Xs Camera
SB-800 Flash

2. SETUP SPINAL ELONGATION HARDWARE ON CREW SEAT

- 2.1 CDR SEAT PWR BUS SEL - AC 2 (up)
- 2.2 Remove parachute from CDR seat (attached by velcro strap) and tmpiry stow.
- 2.3 Configure CDR seat back in entry configuration and move seat all the way forward.

SPINAL ELONGATION OPERATOR PROCEDURE

(ASSY OPS/ULF3/FIN 1)

Page 2 of 12 pages

- 2.4 Wrap shoulder harness around back of CDR seat and tie. Remove seat pan cushion and place on top of tied shoulder harness to line up with Velcro on back of seat. Refer to Figure 1.



Figure 1. Shoulder Harness Wrapped Around CDR Seat Back.

- 2.5 Remove head rest from top of CDR seat and tmpy stow.
2.6 Unstow:

Spinal
Elongation
Kit

Anthropometer Base
Slider Post
Head Bar

Place hardware in CDR seat for setup.

WARNING

Pinch point is possible between Anthropometer Base and top of seat during insertion of the Anthropometer Base.

- 2.6.1 Remove seat cover enough that Anthropometer Base will lay flat against the top of the seat.

- 2.6.2 To setup Anthropometer Base, hold Anthropometer Base by the anchor point, sliding the legs of the Anthropometer Base into the head rest holes on top of the seat. Refer to Figure 2.
- 2.6.3 ✓Anthropometer leg with the hole is oriented closest to the headrest release knob.
- 2.6.4 ✓Anthropometer Base label and lanyard face aft.

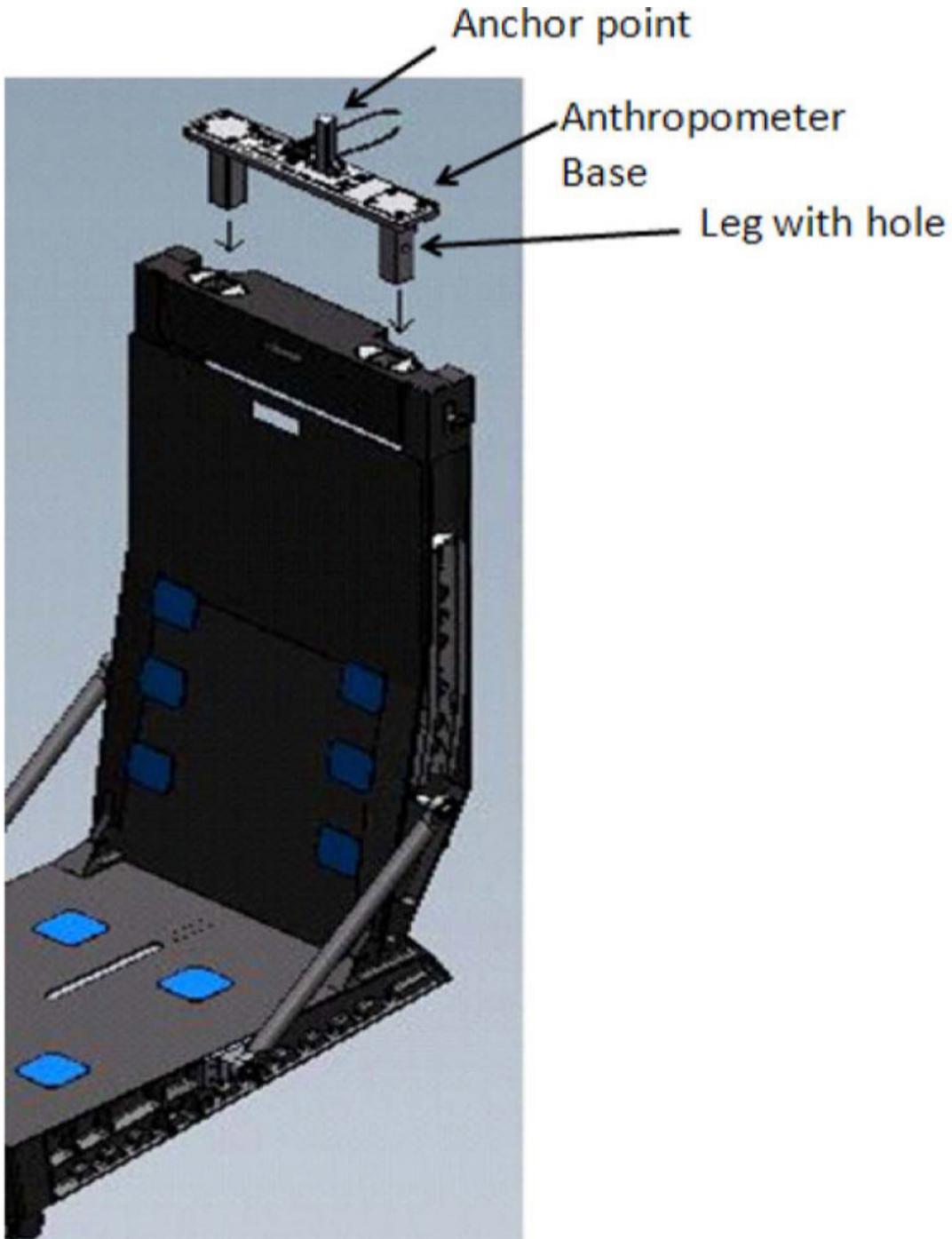


Figure 2. Anthropometer Base on CDR Seat.

SPINAL ELONGATION OPERATOR PROCEDURE

(ASSY OPS/ULF3/FIN 1)

Page 4 of 12 pages

- 2.6.5 Remove pin from Anthropometer Base.
- 2.6.6 Attach Slider Post onto anchor point of Anthropometer Base (ensure numbers face forward toward PLT seat).
- 2.6.7 Reinstall pin to secure Slider Post.
- 2.6.8 Insert Head Bar into slot on Slider Post (loosen adjustment screw if necessary to insert Head Bar). Refer to Figure 3.

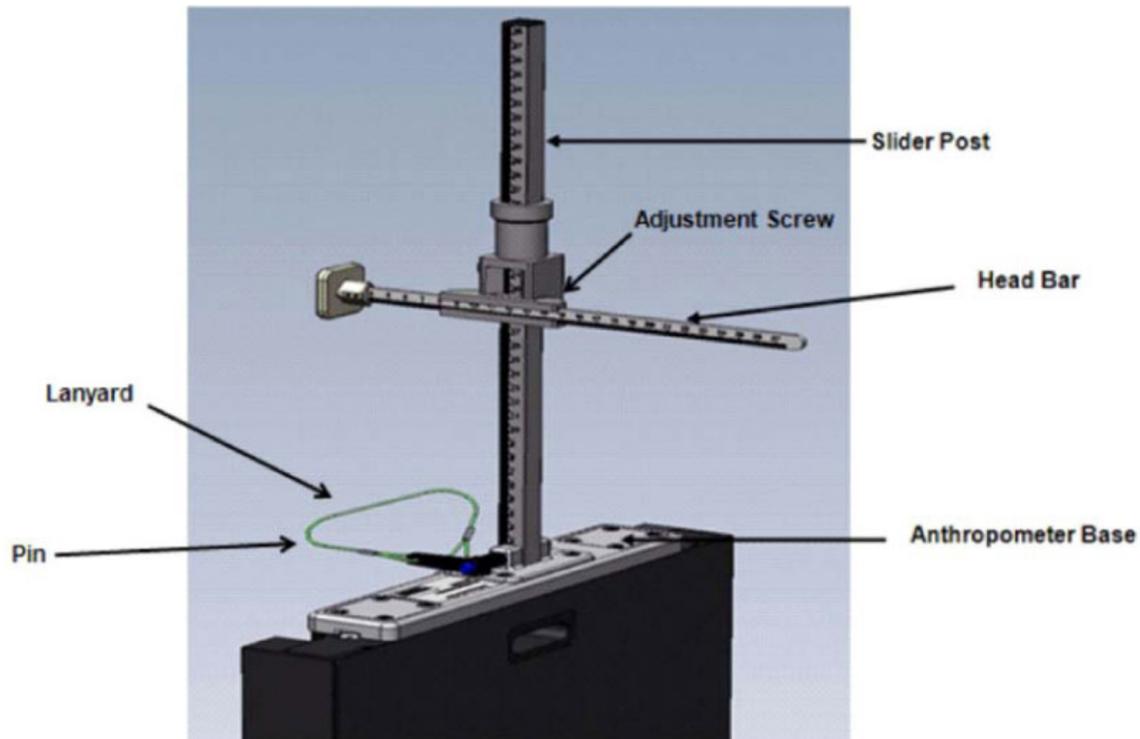


Figure 3. Final Assembly of Anthropometer Base on CDR Seat.

3. LAP BELT SETUP

- 3.1 Lengthen lap belt straps and wrap lap belt straps around the joint between the seat and the seat back (black metal frame) by wrapping from the inside of the frame then around the joint (point A to point B in Figure 4).
 - 3.1.1 Ensure that lap belt adjustment is accessible and possible. Refer to Figures 4 and 5.

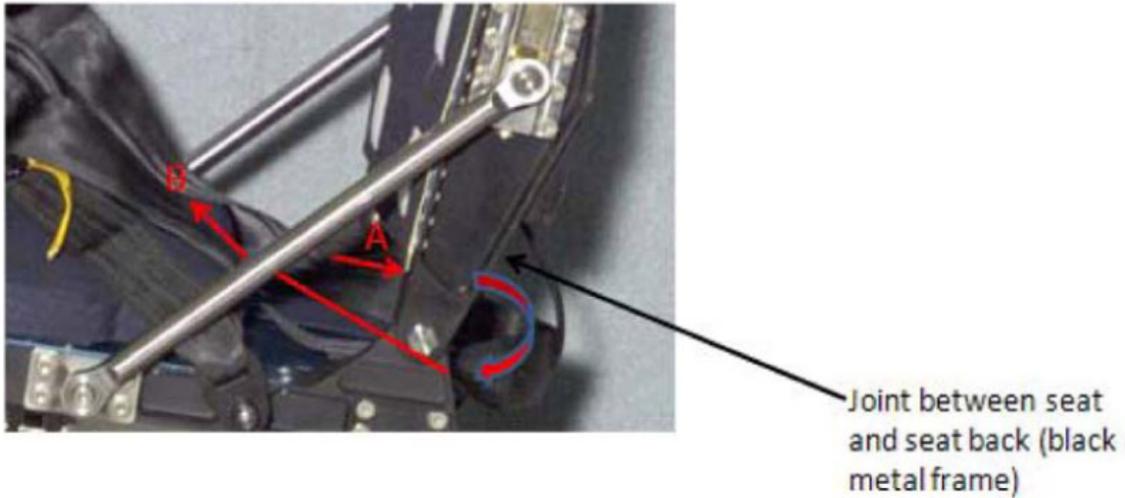


Figure 4. Lap Belt and Seat Back Joint Illustration.

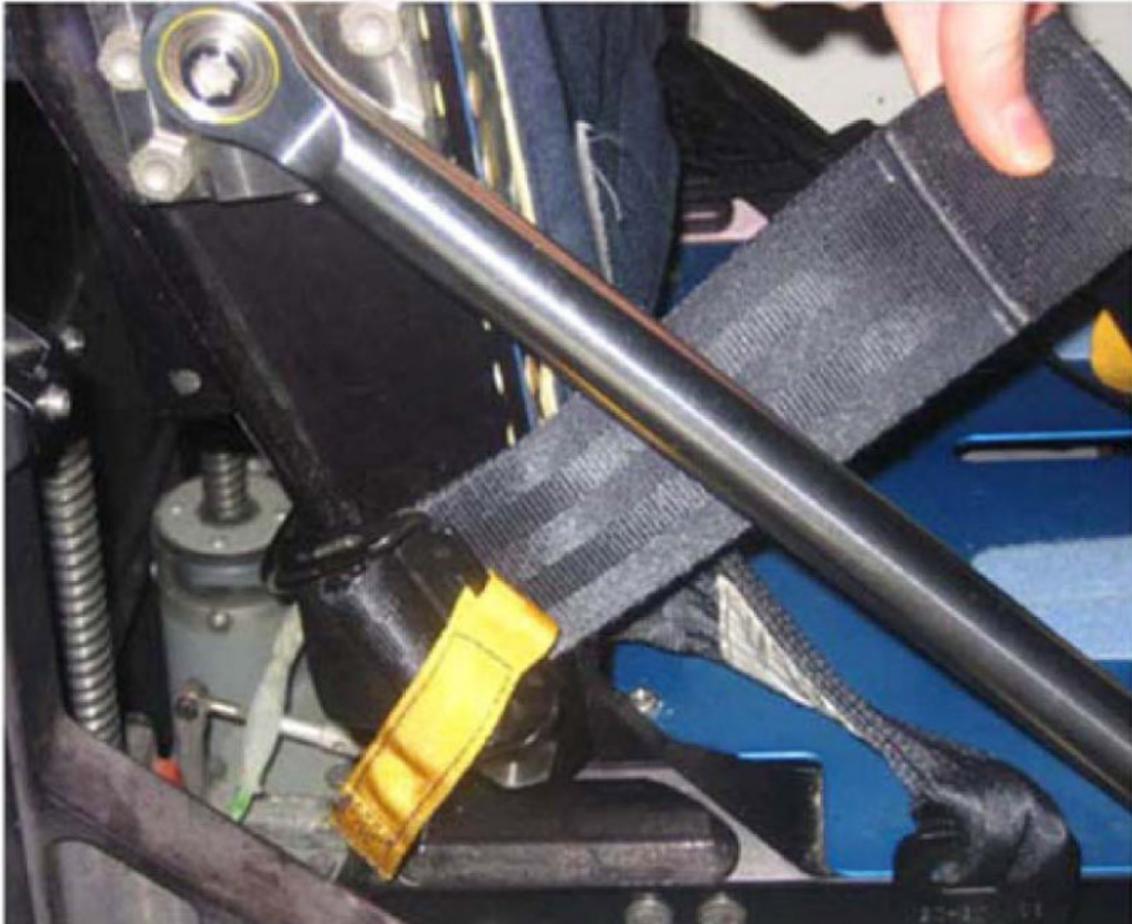


Figure 5. Joint Between Seat and Seat Back (Black Metal Frame).

4. D2XS CAMERA SETUP AND CONFIGURE

- 4.1 Install SB-800 Flash onto D2Xs Camera (if not installed).
Install 12-24mm Lens onto D2Xs Camera (if not installed).
- 4.2 Install Shutter Release Cable onto D2Xs Camera (if not installed).

- 4.3 Check memory of 4GB EVA Flash Card in D2Xs Camera is empty.
If memory of 4GB EVA Flash Card in D2Xs Camera is not empty,
| Remove 4GB EVA Flash Card from D2Xs Camera and tmp
| stow.
| Retrieve 4GB EVA Flash Card with empty memory and install in
| D2Xs Camera.

- 4.4 D2Xs Camera settings should be as follows:

Lens - 12-24mm Lens, set at 15mm

Lens Focus Mode - M/A

Body Focus Mode - S

✓Batt installed

✓Flash Card installed

Pwr - ON

Top LCD:

✓Batt

✓Frames remaining sufficient

Exp Comp - 0.0

Exp Mode - A

f/stop - 11

Meter - Matrix

Diopter - Adjust

Frame Rate - S

✓BKT disabled – 0F

Rear LCD:

✓ISO – 100

✓QUAL – RAW

✓WB – 0, A

AF Area Mode - []]

✓Focus Area – Center

✓Focus Selector Lock – L

SB-800 Flash Settings:

✓Diffuser Dome installed

pb ON/OFF → ON

✓MODE – TTL BL

✓Exp Comp – 0 EV

Tilt - Direct

NOTE

Multi-Use Arm may have to be adjusted to achieve the correct angle.

- 4.5 Position D2Xs Camera on Multi-Use Arm in a vertical orientation (SB-800 Flash towards forward) and install Multi-Use Arm to R6 camera shoe (forward towards window as seen in Figure 6).

Mount D2Xs Camera on Multi-Use Arm such that D2Xs Camera is orthogonal to CDR seat. Refer to Figure 6.

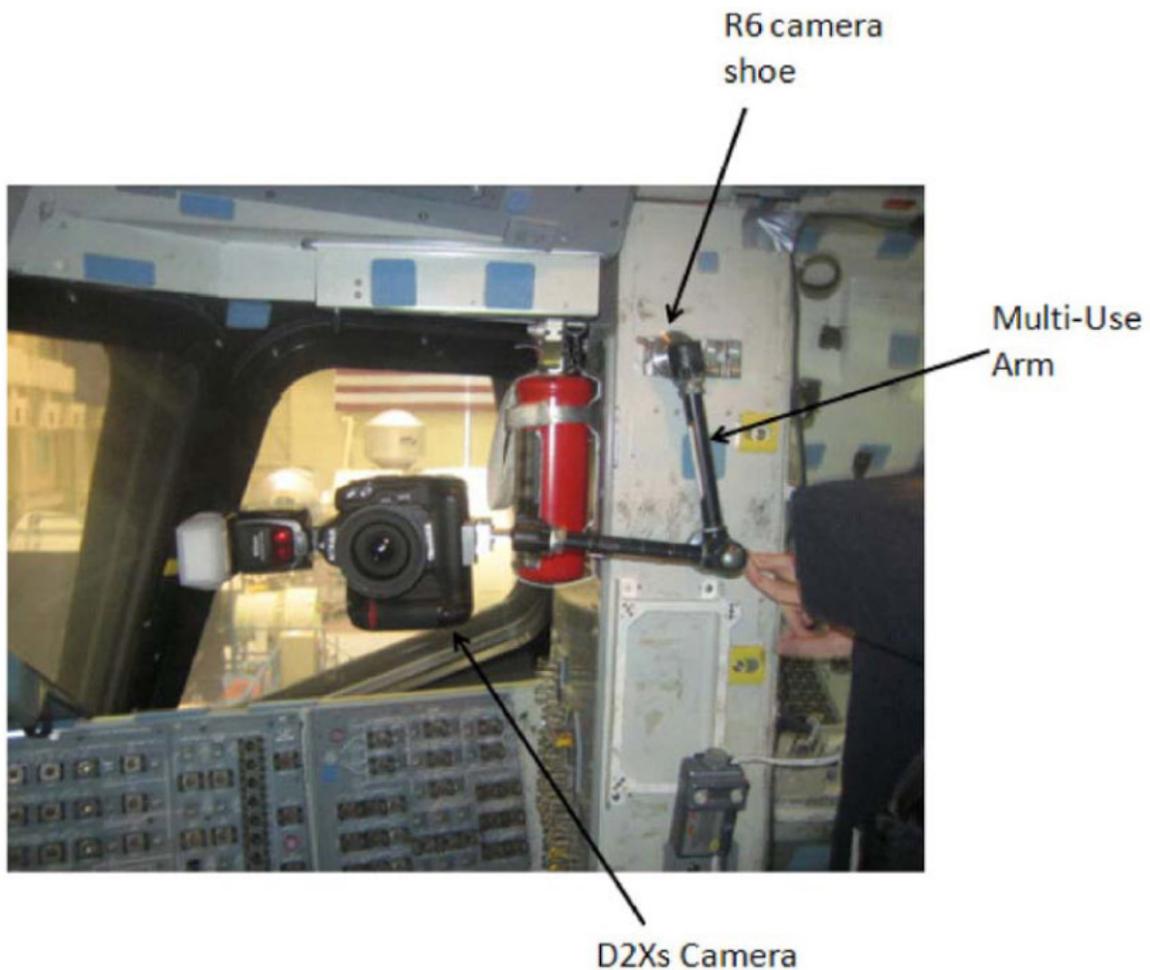


Figure 6. D2Xs Camera Positioned on R6 Camera Shoe.

- 4.6 Autofocus on CDR seat (specifically on the side of the seat with the circle as seen in Figure 7).

NOTE

Body Focus Mode - M will eliminate the possibility of the focus shifting to another subject.

- 4.7 After autofocusing on the seat, change Body Focus Mode - M.

NOTE

Ensure D2Xs Camera is parallel to R6 wall and not pitched forward or backward.

- 4.8 Take a test photograph. Entire profile of the CDR seat should appear in the picture. Refer to Figure 7 for an example.

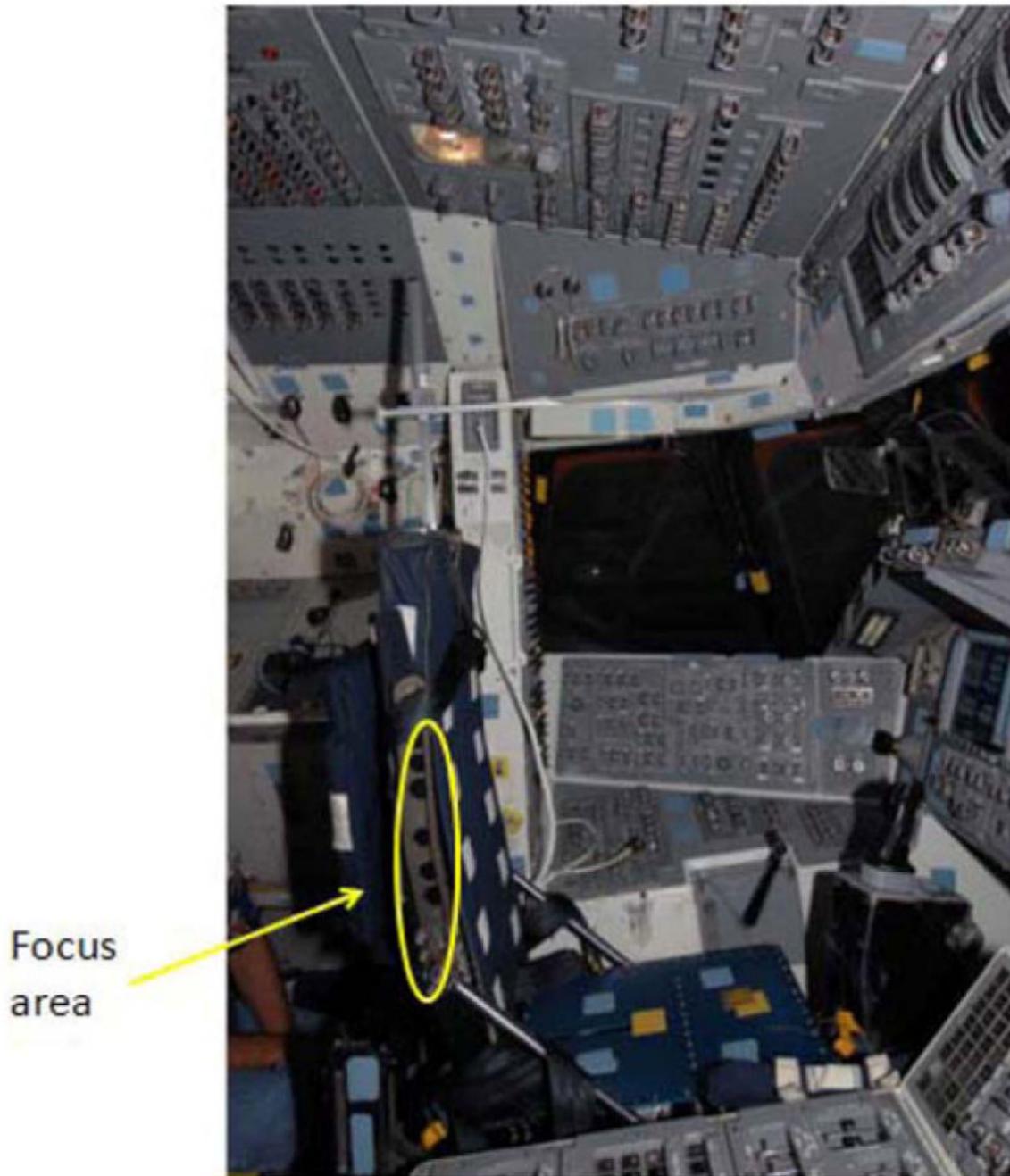


Figure 7. Correct D2Xs Camera Image Capture Area.

5. SUBJECT POSITIONING

CAUTION

Do not take nominal Spinal Elongation measurements within one hour of compression exercise or countermeasures (Penguin Suit, EVA, weight exercises, ARED, IRED, etc.) as exercise would adversely affect the measurements being taken in this activity.

5.1 Before proceeding with this step,
~

~
| subject should wear light-weight clothing.

- 5.2 Remove and tmpy stow Head Bar.

CAUTION

There must be sufficient clearance for the Slider Post from the ceiling. Be careful not to extend Slider Post to where it can come in contact with cabin ceiling.

- 5.3 Subject should sit in CDR seat and fasten lap belt and crotch strap ensuring a tight fit (ensure positive contact between buttocks and seat pan).

Ensure seat height is high enough that subject's thighs are at a 90 degree angle (feet touching the floor).

- 5.4 Operator will ensure subject sits erect and gazes directly ahead (head lines up, not looking at an angle) at the HUD reference object. Operator should also ensure subject is centered between the left and right sides of the seat.

- 5.5 Retrieve Head Bar from tmpy stow and insert into slot on Slider Post, ensuring that numbers on the Head Bar and slot on the Slider Post are facing the D2Xs Camera. Refer to Figure 8.

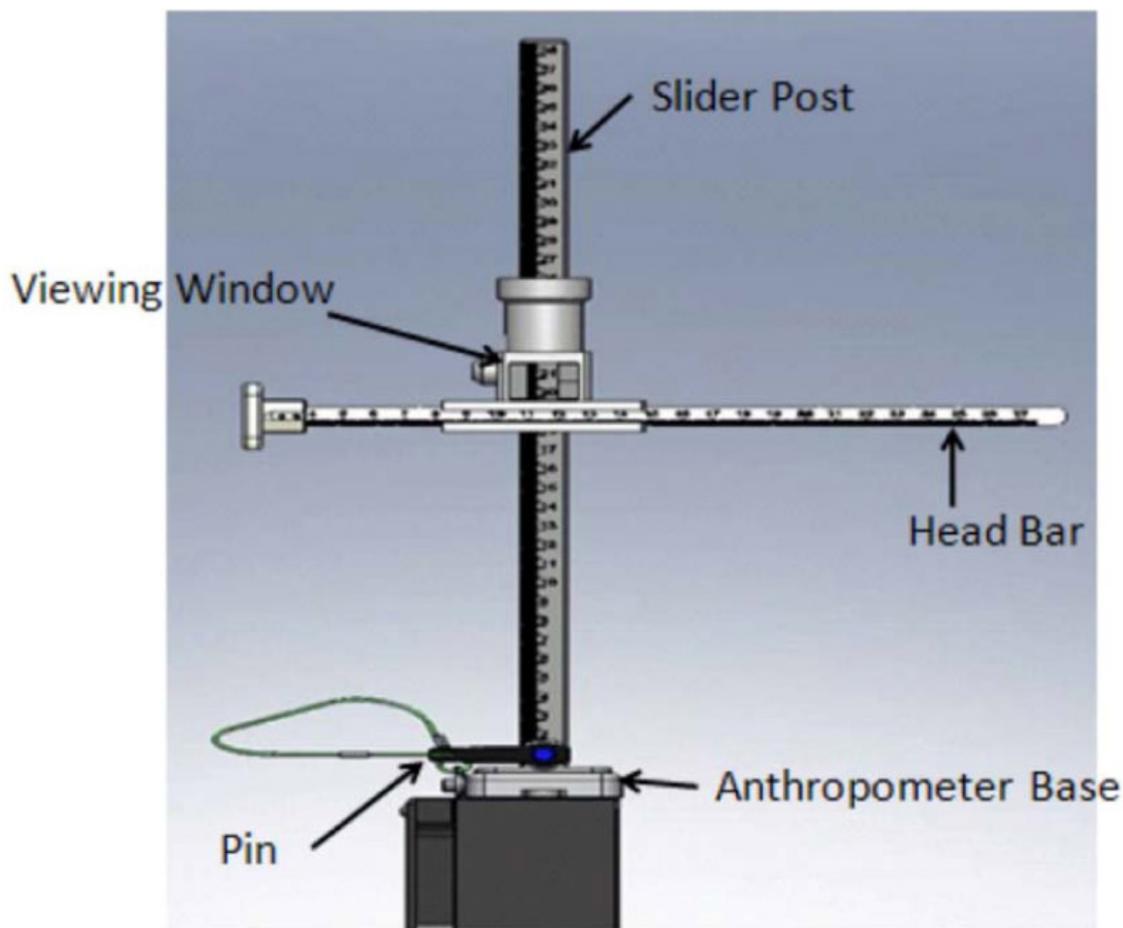


Figure 8. Head Bar Connected to Slider Post.

5.6 Ensure Head Bar is in firm contact with the top of subject's head.

6. DATA COLLECTION

6.1 Record measurement on SPINAL ELONGATION LOG.

Measurements should be taken as the number between the marks on the viewing window of the Slider Post.

6.2 Operator should take photograph of subject using D2Xs Camera.

6.3 Remove Head Bar and tmpy stow.

6.4 Subject should exit CDR seat and stretch. Subject should then return to seat.

6.5 Repeat step 5.3 through step 6.3 to complete the second measurement (for a total of two measurements per subject).

6.6 Repeat step 5.3 through step 6.5 for each additional subject (ensure new subjects wear light-weight clothing).

7. DISASSEMBLY

SPINAL ELONGATION OPERATOR PROCEDURE

(ASSY OPS/ULF3/FIN 1)

Page 11 of 12 pages

- 7.1 Remove D2Xs Camera from Multi-Use Arm.
Remove Multi-Use Arm with D2Xs Camera attached from R6 camera shoe.
Put away Multi-Use Arm to original location.
- 7.2 Remove 4GB EVA Flash Card from D2Xs Camera.
Retrieve CF Card Adapter.
Insert 4GB EVA Flash Card into CF Card Adapter.
Insert CF Card Adapter into any networked PGSC.
✓MCC-H (specify which PGSC file resides on)
- 7.3 Disassemble Spinal Elongation hardware from CDR seat.
 - 7.3.1 Remove pin from Anthropometer Base and remove Slider Post from anchor point. Install pin back into Anthropometer Base.
 - 7.3.2 Retrieve Head Bar from tmpy stow,
 - 7.3.3 Remove Anthropometer Base from top of the seat. Restore seat cover to original placement on the top of the seat.
- 7.4 Reconfigure CDR seat to nominal configuration.
 - 7.4.1 Retrieve head rest and seat pan cushion from tmpy stow.
 - 7.4.2 Install head rest on top of CDR seat
 - 7.4.3 Put seat pan cushion back in place. Untie and unwrap shoulder harness from back of CDR seat. Return lap belt to nominal configuration.
 - 7.4.4 Retrieve parachute from tmpy stow and install on back of CDR seat.
 - 7.4.5 CDR SEAT PWR BUS SEL - OFF (ctr)

8. CONCLUDING OPERATIONS

- 8.1 Remove SPINAL ELONGATION LOG from Payloads section of the Assembly Operations book, place in manilla envelope, and place envelope in FDF.

Spinal
Elongation
Kit

- 8.2 Stow:

Anthropometer Base
Slider Post
Head Bar

If Spinal Elongation Kit is being tmpy stowed on Shuttle for subsequent sessions,
~

SPINAL ELONGATION OPERATOR PROCEDURE

(ASSY OPS/ULF3/FIN 1)

Page 12 of 12 pages

~
| Crew should inform ground of tmpiry stow location.

- 8.3 | When all sessions for this mission are concluded,
| Spinal Elongation Kit must be restowed on ISS prior to undocking
| (consult Stowage Notes).

SPINAL ELONGATION LOG

(ASSY OPS/ULF3/FIN)

Page 1 of 1 page

	Subject ID	Session #	GMT/MET	Measurement	Notes
1				1st Sitting:	
				2nd Sitting:	
2				1st Sitting:	
				2nd Sitting:	
3				1st Sitting:	
				2nd Sitting:	
4				1st Sitting:	
				2nd Sitting:	
5				1st Sitting:	
				2nd Sitting:	
6				1st Sitting:	
				2nd Sitting:	
7				1st Sitting:	
				2nd Sitting:	
8				1st Sitting:	
				2nd Sitting:	
9				1st Sitting:	
				2nd Sitting:	
10				1st Sitting:	
				2nd Sitting:	
11				1st Sitting:	
				2nd Sitting:	
12				1st Sitting:	
				2nd Sitting:	
13				1st Sitting:	
				2nd Sitting:	
14				1st Sitting:	
				2nd Sitting:	
15				1st Sitting:	
				2nd Sitting:	
16				1st Sitting:	
				2nd Sitting:	

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GLACIER UNPACK AND POWER UP

(ASSY OPS/ULF3/FIN 1)

Page 1 of 3 pages

OBJECTIVE:

This procedure will be used to unlock the Glacier door, unpack the ascent items from the unpowered Glacier, and activate the Glacier unit.

STS IFM Toolbox (MF28K):

3/16" Hex Head, 3/8" Drive

4" Extension, 1/4" Drive

1/4" to 3/8" Adapter (1/4" Drive)

Ratchet, 1/4" Drive

PARTS:

MELFI Desiccant Kit (contains 4 dessicant packs) (JPM1F6_B2)

ITEMS TO UNSTOW WITHIN PROCEDURE:

APEX Cambium KFTs (17 qty) (unstow in Step 1)

1. UNLOCK GLACIER DOOR

MA16F/G
(GLACIER)

- 1.1 Unlock Glacier Door Captive Locks (two) (3/16" Hex Head, 3/8" Drive, 1/4" to 3/8" Adapter, 1/4" Drive, 4" Extension, 1/4" Drive, Ratchet, 1/4" Drive) (see Figure 1)

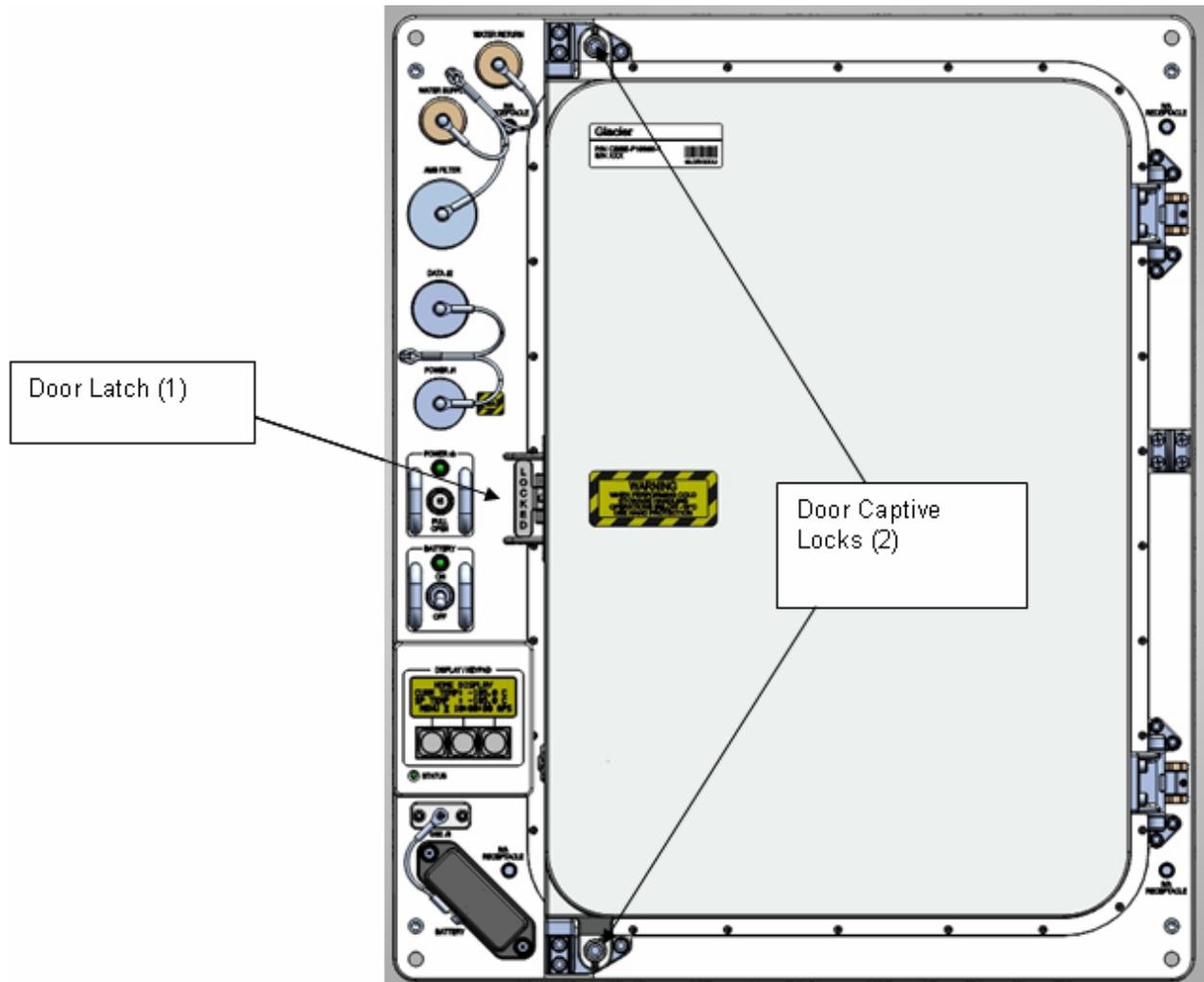


Figure 1. Glacier Configuration

- 1.2 Open Glacier door and remove all Apex Cambium KFTs (qty 17) from trays A, B, and C and transfer per Transfer List.
- 1.3 Place loose Desiccant from each tray back into Glacier Tray A.
- 1.4 Retrieve and open MELFI Dessicant Kit and place Dessicant Packs (4) into Glacier Tray D. Discard Humidity Indicator Cards.
- 1.5 Replace each Glacier tray and close inner and outer doors.

JPM1F6_B2

2. GLACIER POWER UP

MA16F/G
(GLACIER)

- 2.1 ✓cb POWER Open (lt off)
- 2.2 ✓sw BATTERY OFF (lt off)
- 2.3 ✓SHUTTLE PAYLOAD DC PWR CABLE →|← POWER J1

GLACIER UNPACK AND POWER UP

(ASSY OPS/ULF3/FIN 1)

Page 3 of 3 pages

ML85E 2.4 ✓SHUTTLE PAYLOAD DC PWR CABLE →|← DC 20 AMP J11

ML86B:E 2.5 cb MNB MAR 1 → Close

<p><u>NOTE</u></p> <p>System initialization may take up to 3 minutes. Initialization complete once Line 1 of front panel display reads 'HOME'.</p>
--

MF16F/G (GLACIER) 2.6 cb POWER → Close (It on)

2.7 sw BATTERY → ON (It on)

2.8 ✓Display 'HOME'

```
*****  
*  
* If 'HOME' not shown,  
* | Perform GLACIER FAIL TO REPOWER (SODF: ASSY OPS:  
* | PAYLOADS), then:  
*  
*****
```

```
*****  
*  
* If Display - ***Error Pending***  
* | Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:  
* | PAYLOADS), then:  
*  
*****
```

2.9 Record the following from the front panel:

CURR TEMP _____.____ °C

GPS ____:____:____

✓Display Line 3 – IDLE MODE

2.10 Notify **MCC-H** GLACIER UNPACK AND POWERUP complete and data recorded in step 2.9.

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OBJECTIVE:

This procedure will perform a manual reconfigure of the Glacier System setting it to Set Point mode using the front panel and display buttons.

Glacier

1. ✓Display (Line 1) – 'HOME'

```

*****
*
* If display —'***Error Pending**'
*
* | Perform GLACIER ERROR MESSAGE, all (SODF: ASSY OPS:
* | PAYLOADS), then:
*
*
* If 'HOME' not shown:
* | pb Right (EXIT) → Press until 'HOME' appears
*
*****

```

2. Open Glacier door and remove dessicant packs from trays A and D. Return trays and close inner and outer doors. Discard dessicant packs in trash.

3. TEMPERATURE CONTROL MODE

- 3.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 3.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 3.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 3.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
'-095.0 °C'
- 3.5 pb Left (NEXT) → Press (one time), following appears:
'Temp Control'
'Control Mode 2/18'
'IDLE'

NOTE

1. There are 3 options for setting the Control Mode (IDLE, SET POINT, and MANUAL).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the Mode, and the right pushbutton (CANCEL) returns to the previous Mode.

- 3.6 pb Center (SELECT) → Press (one time), following appears:
'Control Mode'

- 'IDLE'
- 3.7 pb Left (NEXT) → Press as required to select the SET POINT Control Mode
 - 3.8 pb Center (APPLY) → Press (one time)
 - 3.9 ✓Confirm Temp Control
'Old: IDLE'
'New: SETPOINT'
 - 3.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Control Mode 2/18'
'SET POINT'
 - 3.11 pb Right (EXIT) → Press until 'HOME' appears
4. AIR MANAGEMENT PROCEED MESSAGE
- 4.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 4.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
 - 4.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
 - 4.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
'-095.0 °C'
 - 4.5 pb Left (NEXT) → Press (three times), following appears:
'Temp Control'
'AirMgmt Proceed 4/18'
 - 4.6 pb Center (SELECT) → Press (one time), following appears:
'AirMgmt Proceed'
'PROCEED'
 - 4.7 pb Center (APPLY) → Press (one time)
 - 4.8 ✓Display line 3 – PROCEED
 - 4.9 pb Right (EXIT) → Press until 'HOME' appears
 - 4.10 Verify by listening – the coolers turn on
5. Record the following from the front panel:
CURR TEMP _____ °C

SET POINT _____.____ °C

GPS ____:____:____

6. Notify **MCC-H** GLACIER SETPOINT complete and data recorded in step 5.

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GLACIER RECORD QUICK DIAGNOSTIC DATA (NOMINAL)

(ASSY OPS/ULF3/FIN)

Page 1 of 1 page

OBJECTIVE:

The following steps allow the recording of some Glacier data for diagnostic purposes.

```
*****
*
* If Display - ***Error Pending***:
* |   Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* |   PAYLOADS), then:
*
*****
```

Glacier

1. ✓Display – 'HOME'

```
*****
*
* If 'HOME' not shown:
* |   pb Right (EXIT) → push until 'HOME' appears
*
*****
```

2. Record from front panel 'CURR TEMP', 'SET POINT', and 'GPS' in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

3. pb Left (MENU) → push (one time), following appears:

'MAIN MENU'
'QUICK STATUS 1/5'

4. pb Center (SELECT) → push (one time), following appears:

'QUICK STATUS'
'Cold Head 1A 1/16'

NOTE

1. The center pushbutton (NEXT) moves to next status display.
2. The left pushbutton (PREV) moves to previous status display.

5. Record Quick Status data in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

6. pb Center (NEXT) → push until Quick Status data items 1 through 7 have been recorded.

7. pb Right (EXIT) → push until 'HOME'

8. Notify **MCC-H** to report log values from [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

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OBJECTIVE:

The following steps will perform a reboot of Glacier Systems.

Glacier

1. ✓ Display 'HOME'

*
* If 'HOME' not shown:
* |
* | pb Right (EXIT) → Press until 'HOME' appears
*

2. Log from Glacier front panel:
GPS: _____:_____:_____
CURR TEMP: _____.____ °C
3. pb Left (MENU) → Press (one time), following appears:

'MAIN MENU'
'QUICK STATUS 1/5'
4. pb Left (NEXT) → Press (four times), following appears:

'MAIN MENU'
'SHUTDOWN 5/5'
5. pb Center (SELECT) → Press (one time), following appears:

'SHUTDOWN'
'SHUTDOWN 1/2'
6. pb Left (NEXT) → Press (one time), following appears:
'SHUTDOWN'
'REBOOT 2/2'
7. pb Center (SELECT) → Press (one time), following appears:
'Confirm Shutdown'
'REBOOT'
8. pb Left (APPLY) → Press (one time), following appears:
'Glacier'
'System'
'Shutting Down'
'Please wait...'
9. Verify Display—
'Glacier'
'System'
'Rebooting'
'Please wait...'

NOTE

System initialization may take up to 3 minutes. Initialization is complete once Line 1 of front panel display reads 'HOME'.

10. ✓ Display 'HOME'

```
*****
*
*
* If 'HOME' not shown:
* |
* | ✓MCC-H
*
*****
*
*
* If Display - ***Error Pending***
* |
* | Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* | PAYLOADS), then:
*
*****
```

11. Notify MCC-H of recorded data in step 2.

OBJECTIVE:

The following steps will perform a shutdown of Glacier Systems. Commanded shutdowns prevent loss of data and system errors and are the desired nominal method of shutdown.

CAUTION
Due to possible loss of experiment payload(s), Glacier should not be shutdown for more than 30 minutes, unless necessary for Orbiter contingency operations.

Glacier

1. ✓Display 'HOME'


```

      *****
      *
      * If Display - '**Error Pending**'
      * |   Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
      * |   PAYLOADS), then:
      *
      *****
      *
      * If 'HOME' not shown:
      * |   pb Right (EXIT) → push until 'HOME' appears
      *
      *****
      
```
2. Log Glacier front panel:

GPS: _____:_____:

CURR TEMP: _____.____°C
3. pb Left (MENU) → Press (one time), following appears:

'MAIN MENU'
'QUICK STATUS 1/5'
4. pb Left (NEXT) → Press (four times), following appears:

'MAIN MENU'
'SHUTDOWN 5/5'
5. pb Center (SELECT) → Press (one time), following appears:

'SHUTDOWN'
'SHUTDOWN 1/2'
6. pb Center (SELECT) → Press (one time), following appears:

'Confirm Shutdown'
'SHUTDOWN'
7. pb Left (APPLY) → Press (one time), following appears:

'Glacier'
'System'
'Shutting Down'
'Please wait...'

8. Verify—
'Glacier'
'Shutdown Complete'
'TURN POWER OFF'

NOTE

Power light can take up to 2 minutes to fully extinguish. OK to proceed without waiting.

9. Wait 5 seconds before proceeding.
10. sw BATTERY → OFF (It off)
11. cb POWER → Open (It off)
12. cb MNB MAR 1 → Open
13. Notify **MCC-H** of recorded data and time in step 2.

ML86B

GLACIER MAX POWER RECONFIGURE

(ASSY OPS/ULF3/FIN)

Page 1 of 2 pages

OBJECTIVE:

This procedure checks the state of the Glacier and changes the system's power draw limit from ISS to Shuttle Configuration.

MA16F/G 1. GLACIER CHECK

1.1 ✓cb POWER – Close (It on)

1.2 ✓sw BATTERY – ON (It on)

1.3 ✓Display – 'HOME'

```
*****
*
* If Display - '**Error Pending**'
* |   Perform GLACIER ERROR MESSAGE, all (SODF: ASSY
* |   OPS: PAYLOADS), then:
*
*****
*
* If 'HOME' not shown:
* |   pb Right (EXIT) → push until 'HOME' appears
*
*****
```

NOTE

After door openings and/or power off events, CURR TEMP may be out of range ramping toward set point. CURR TEMP may be as warm as -70 °C.

1.4 ✓Display – 'CURR TEMP' is ramping toward -95.0°C.
✓Display – 'SET POINT' is -95.0 °C.

1.5 Log from Glacier front panel the start 'GPS' and 'CURR TEMP' in Table 1 Glacier Log.

2. MAX POWER RECONFIGURATION

2.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

2.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

2.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

2.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'

2.5 pb Left (NEXT) → Press (twelve times), following appears:

GLACIER MAX POWER RECONFIGURE

(ASSY OPS/ULF3/FIN)

Page 2 of 2 pages

'Temp Control'
'Max Power Draw 13/18'
'220 W'

- 2.6 pb Center (SELECT) → Press (one time), following appears:
'Max Power Draw'
'XXX W'
'000 to 420'

NOTE

1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases selected digit field by 1.

- 2.7 Using the PLUS and CURSOR pushbuttons, enter Max Power Draw value of 160 W.
- 2.8 pb Right (DONE) → Press (one time)
- 2.9 ✓Confirm New Max Power = 160
- 2.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Max Power Draw 13/18'
'160 W'
- 2.11 pb Right (EXIT) → Press until 'HOME' appears
3. Log from Glacier front panel the end 'GPS' and 'CURR TEMP' in Table 1 Glacier Log.
4. ✓MCC-H with data recorded in Table 1 Glacier Log and any off-nominal conditions.

Table 1. Glacier Log.

GPS	CURR TEMP
Start: _____ / ____ : ____	Start: _____ . ____ °C
End: _____ / ____ : ____	End: _____ . ____ °C

GLACIER TRANSFER MIDDECK TO ISS

(ASSY OPS/ULF3/FIN 1)

Page 1 of 11 pages

OBJECTIVE:

To remove two lockers from EXPRESS Rack 2 in the US LAB in preparation for Glacier transfer from the Shuttle middeck. The middeck Glacier is powered down, transferred and installed in locker positions 3 and 4 of EXPRESS Rack 2, then re-powered.

PARTS:

Glacier IVA Handle P/N CBSE-F10075-1 (reference Stow Note)

EXPRESS Rack Power Cable 24" P/N 683-44024-1 (reference Stow Note)

EXPRESS Rack Data Cable 24" P/N 683-44267-1 (reference Stow Note)

Glacier Water Return Line P/N CBSE-F10066-1 with Volume Compensator attached (reference Stow Note)

Glacier Water Supply Line P/N CBSE-F10065-1 with Volume Compensator attached (reference Stow Note)

Any EXPRESS Rack Utility Drawer:

High Torque Locker Tool

Shuttle Middeck:

High Torque Locker Tool (Volume H, taped to wall)

VPMP Closeout Covers (two)

ISS IVA Toolbox:

1/4" Socket, 1/4" Drive

Ratchet, 1/4" Drive

(40-200 in-lbs) Trq Wrench, 1/4" Drive

STS IFM Toolbox:

1/4" Socket, 1/4" Drive

Ratchet, 1/4" Drive

(10-50 in-lbs) Trq Wrench, 1/4" Drive

(40-200 in-lbs) Trq Wrench, 1/4" Drive

1. REMOVAL OF TWO ISS LOCKERS

LAB101_G 1.1 ✓Locker door latched, Red Dot not visible (Refer to Figure 1)

1

LABO1_J1

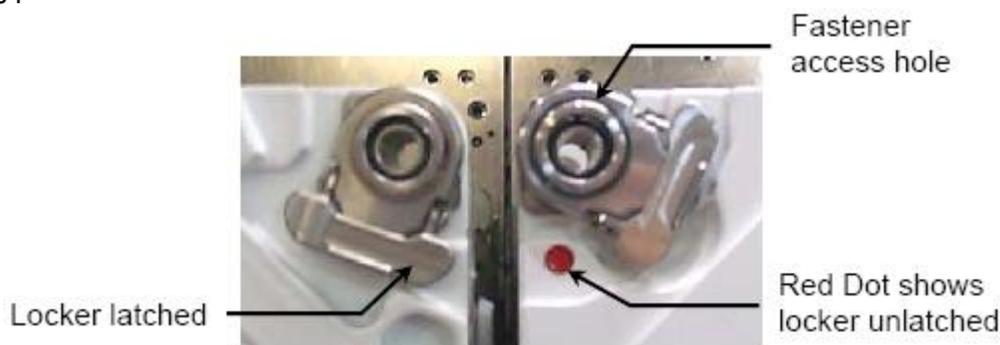


Figure 1. Locker Latches

GLACIER TRANSFER MIDDECK TO ISS

(ASSY OPS/ULF3/FIN 1)

Page 2 of 11 pages

- 1.2 Unfasten Locker fasteners (four) from EXPRESS-2 Rack (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive).
- 1.3 Repeat steps 1.1 to 1.2 for second Locker.
- 1.4 Remove and transfer Lockers to temporary stowage location.

LAB101_F1

- 1.5 sw LOCKER-4 POWER → OFF
✓LOCKER-4 POWER Lt – Off
- 1.6 EXPRESS Rack Power Cable (24") →|← LOCKER-4 POWER J1
- 1.7 EXPRESS Rack Data Cable (24") →|← LOCKER-4 DATA J2
- 1.8 ✓Transfer path is clear between EXPRESS-2 Rack and middeck

2. GLACIER PREP

MA16F/G
(Glacier)

- 2.1 Verify front door latch is in LOCKED position.
- 2.2 Connect Glacier IVA Handle diagonally to front face of Glacier at locations marked IVA Receptacle (two of four).

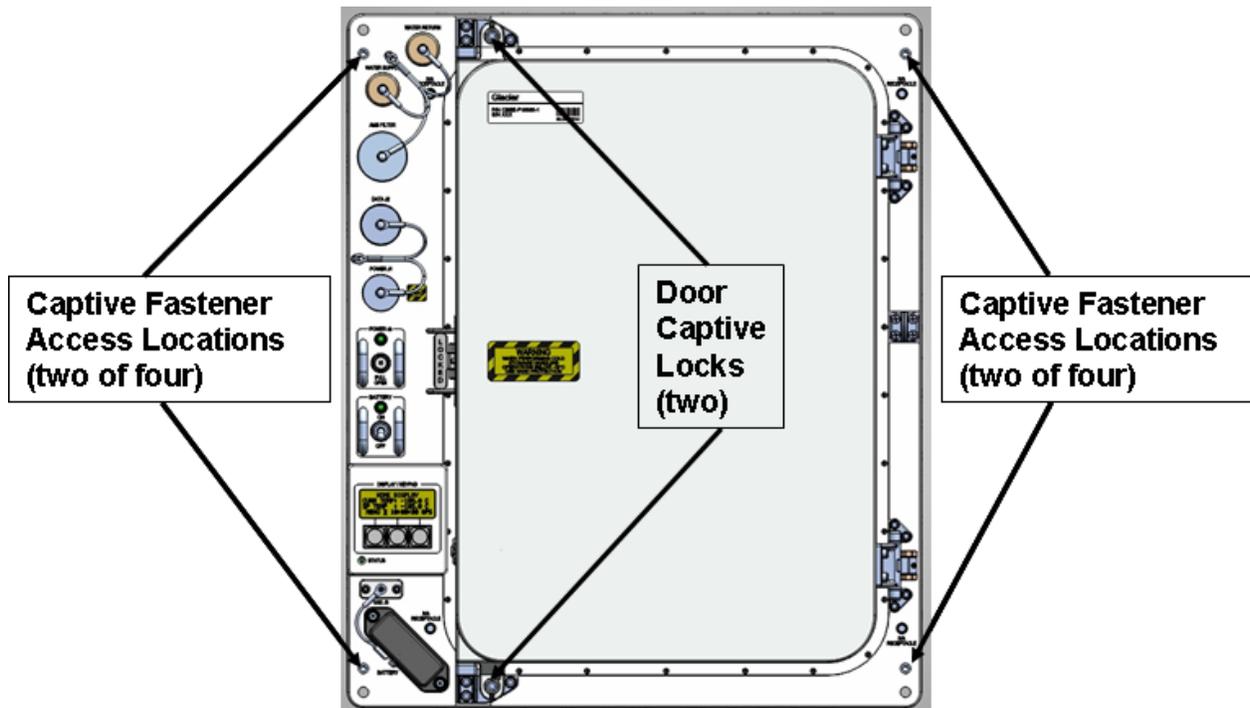


Figure 2. Glacier Configuration

- 2.3 Unfasten Glacier from Shuttle VPMP (four) (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive)

3. GLACIER SHUTDOWN

MA16F/G
(Glacier)

3.1 ✓Display (Line 1) – 'HOME'

```

*****
*
* If display -'***Error Pending**'
* |   Perform GLACIER ERROR MESSAGE, all (SODF: ASSY
* |   OPS: PAYLOADS), then:
*
* If 'HOME' not shown
* |   pb Right (EXIT) → Press until 'HOME' appears
*
*****

```

3.2 Record front panel display GPS time: _____

3.3 pb Left (MENU) → Press (one time), following messages appear:
'MAIN MENU'
'QUICK STATUS 1/5'

3.4 pb Left (NEXT) → Press (four times), following messages appear:
'MAIN MENU'
'SHUTDOWN 5/5'

3.5 pb Center (SELECT) → Press (one time), following messages appear:
'SHUTDOWN'
'SHUTDOWN 1/2'

3.6 pb Center (SELECT) → Press (one time), following messages appear:
'Confirm Shutdown'
'SHUTDOWN'

3.7 pb Left (APPLY) → Press (one time), following messages appear:
'Glacier'
'System'
'Shutting Down'
'Please wait...'

3.8 ✓Display shows the following messages
'Glacier'
'Shutdown Complete'
'TURN POWER OFF'

3.9 Wait 5 seconds.

<p><u>NOTE</u></p> <ol style="list-style-type: none"> 1. Power off should be no longer than 30 minutes in order to preserve optimum science. 2. Power down begins when Glacier POWER cb is open. 3. Power light can take up to 2 minutes to fully extinguish. 4. BATTERY sw is left on to power data logger during transfer.
--

3.10 ✓sw BATTERY ON

GLACIER TRANSFER MIDDECK TO ISS

(ASSY OPS/ULF3/FIN 1)

Page 4 of 11 pages

- 3.11 cb POWER → Open
- ML86B:E 3.12 cb MNB MAR 1 → Open
- 4. GLACIER REMOVE AND TRANSFER
- MA16F/G 4.1 SHUTTLE PAYLOAD DC PWR CABLE ←|→ POWER J1
- 4.2 Tether cables out of the way.
- 4.3 Carefully slide Glacier out of the middeck position.
- 5. GLACIER INSTALL AND ACTIVATION IN EXPRESS RACK
- 5.1 Transfer Glacier to EXPRESS-2 Rack and carefully slide the unit into the locker position.
- LAB101_F1 5.2 ✓sw LOCKER-4 POWER – OFF
- Glacier ✓cb POWER – OPEN

CAUTION
1. When routing cables, minimum inside bend radius is: 4.0" for the water (TCS) hoses and .75" for the power cables.
2. Cables and hoses should not block Glacier Door, fire access holes, smoke detection light, C & W labels, rack power switch, and payload controls and display.
3. When mating cables, verify power source off, cb off, pins straight, inspect both connector halves for debris, mate dust caps if applicable.

- 5.3 EXPRESS Rack Power Cable (24")→|← POWER J1
- 5.4 EXPRESS Rack Data Cable (24")→|← DATA J2
- 5.5 Retrieve the Glacier Water Return line and Glacier Water Supply Line (with Volume Compensators attached).
- 5.6 Inspect the female large QD of the Glacier Water Supply Line and Glacier Water Return Line for foreign material and verify that the internal sleeve is in the nominal, closed position (See Figure 3).

*
* If the QD internal sleeve is not in the nominal, closed position
* (see Figure 4).
*
* | Perform [B.4 IVA QD LEAKAGE TROUBLESHOOTING](#), all
* | (SODF: IFM: REFERENCE: APPENDIX B: MECHANICAL
* | HARDWARE).
*

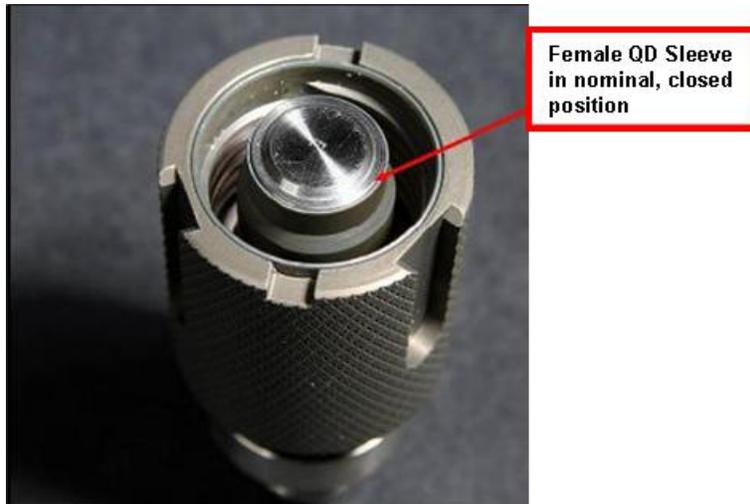


Figure 3. Large Female QD (Parker) with sleeve in nominal position

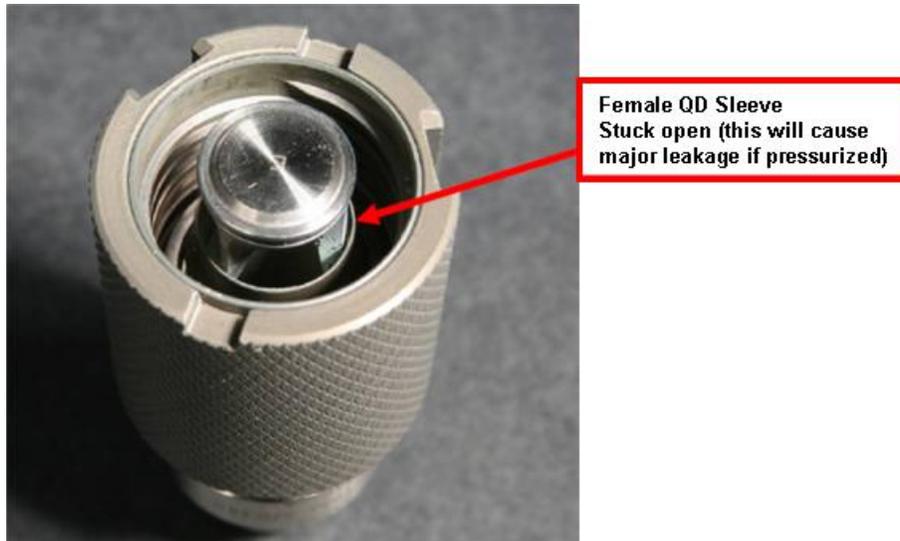


Figure 4. Large Female QD (Parker) with sleeve stuck in open position

- 5.7 Remove Volume Compensator from small female QD coupler on both the Glacier Water Supply Line and Glacier Water Return Line. Temporarily stow Volume Compensators.
- 5.8 Inspect the small female QD coupler of the Glacier Water Supply Line and Glacier Water Return Line and verify that outer locking sleeve completely covers the green band. See Figure 5.

 *
 * If the QD locking sleeve does not cover the green band,
 * |
 * | Pull back on the locking sleeve until the sleeve snaps into
 * | place.
 * |
 *



Figure 5. Properly de-mated small QD coupler.

5.9 Glacier Water Return Line →|← WATER RETURN

Verify that the small QD coupler snaps into place and that the green band is visible. See Figure 6.

 *
 * If green band is not visible,
 * |
 * | Pull back on the coupler locking sleeve and de-mate from the
 * | Glacier water return nipple. Reconnect the water return line
 * | by pushing the small female QD coupler onto the water
 * | return nipple until the coupler snaps into place and the green
 * | band is shown.
 * |
 *

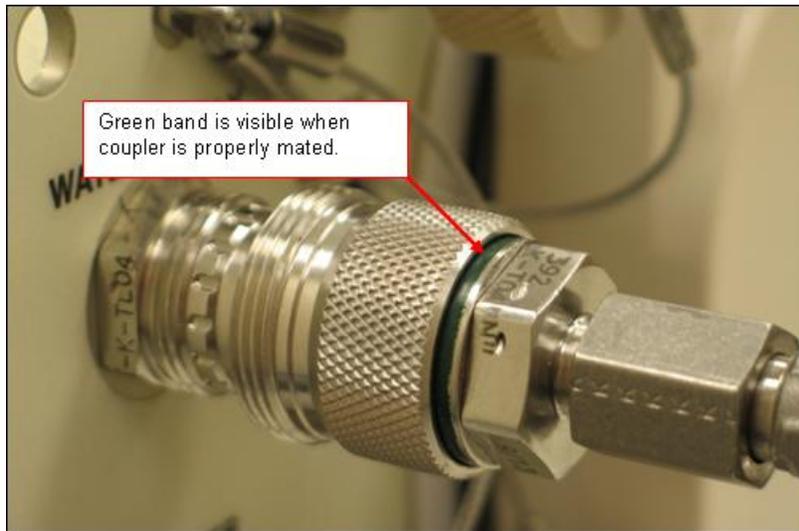


Figure 6. Properly mated small QD Connector.

LAB1O1_F1

5.10 Glacier Water Return Line →|← COOLANT WATER RETURN

5.11 Verify that the locking tang is engaged with the large QD collar.

 *
 * If locking tang is not engaged,
 * | Rotate the large QD collar clock-wise until the locking tang
 * | snaps into place.
 *

Glacier

5.12 Glacier Water Supply Line →|← WATER SUPPLY

Verify that the small QD coupler snaps into place and that the green band is visible. See Figure 6.

```

*****
*
* If green band is not visible,
*
* | Pull back on the coupler locking sleeve and de-mate from the Glacier
* | water supply nipple. Reconnect the water supply line by pushing the
* | small female QD coupler onto the water supply nipple until the
* | coupler snaps into place and the green band is shown.
*
*****

```

LAB1O1_F1

5.13 Glacier Water Supply Line →|← COOLANT WATER SUPPLY

5.14 Verify that the locking tang is engaged with the large QD collar.

```

*****
*
* If locking tang is not engaged,
*
* | Rotate the large QD collar clock-wise until the locking tang
* | snaps into place.
*
*****

```

5.15 Verify no leakage at connectors.

```

*****
*
* If leakage is present,
*
* | Clean up with Dry Wipes.
*
*****

```

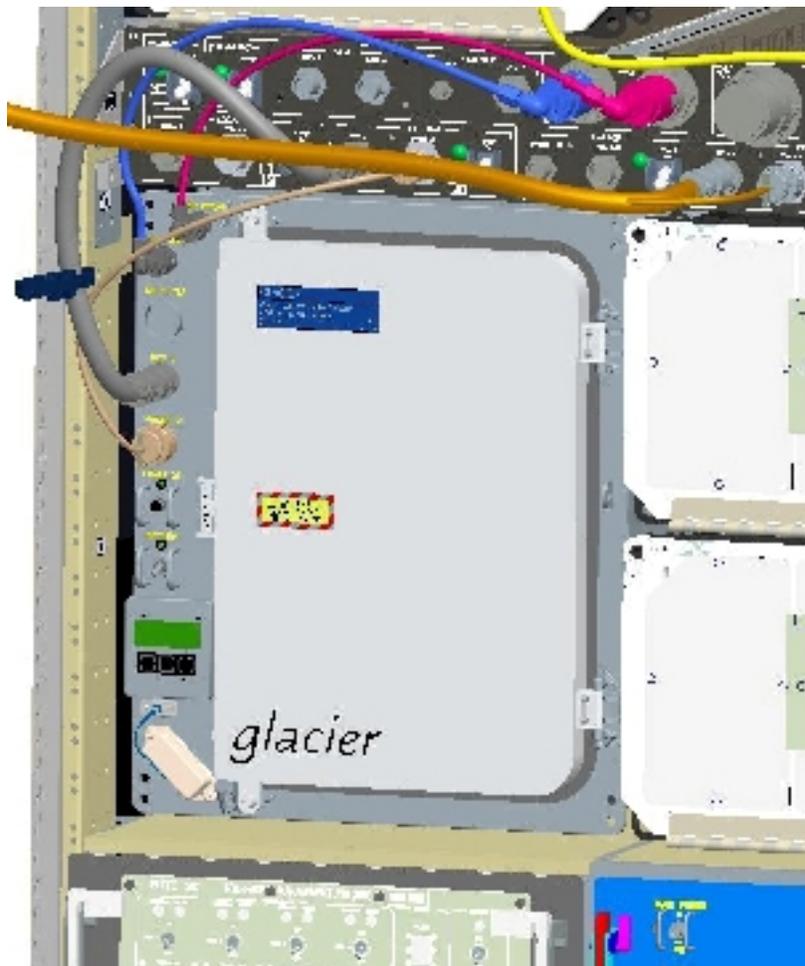


Figure 7. Glacier installed in EXPRESS-2 Rack.

- LAB101_F1 5.16 sw LOCKER-4 POWER → ON (It on)
- Glacier 5.17 cb POWER → Close (It on)
 ✓sw BATTERY – ON (It on)
- 5.18 Record GMT time: _____

```

*****
*
* If POWER It off
* |   Perform 3.004 GLACIER FAIL TO REPOWER, all (PODF:
* |   GLACIER: MALFUNCTION), then:
*
*****

```

<p><u>NOTE</u></p> <p>1. Glacier power up occurs when POWER cb is closed.</p> <p>2. System Initialization could take up to 3 minutes. Initialization complete once Line 1 of front panel display reads 'HOME'.</p>

LAB101_G
1

5.19 Fasten Glacier fasteners (four) in a diagonal pattern into EXPRESS-2 Rack, torque to 75 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (40-200 in-lbs) Trq Wrench, 1/4" Drive].

Glacier

5.20 ✓Display – '**HOME**'

```

*****
*
* If display -'Error Pending'
* |   Perform 3.003 GLACIER MANUAL ERROR MESSAGE, all
* |   (PODF: GLACIER: MALFUNCTION), then:
*
* If 'HOME' not shown
* |   Perform 3.001 GLACIER LCD BLANK, all (PODF: GLACIER:
* |   MALFUNCTION), then:
*
*****

```

6. MIDDECK CLOSEOUTS

6.1 Retrieve VPMP covers (two) from location TBD

MA16F/G

6.2 Fasten both VPMP covers using VPMP fasteners (four) in a diagonal pattern and torque to 14-17 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive]

7. Stow:
All IVA and IFM Tools
ISS Lockers (two) per Stow Note
IVA Handle per Stow Note
Volume Compensators B/C GLCR 1000J, GLCR 1001J per Stow Note

8. Notify **MCC-H** Glacier Transfer to ISS is complete.
Report power-off time from step 3.2 and power-on time from step 5.18

9. GROUND UPDATES FOR IMS

<p>Ground to update IMS for the following: EXPRESS Rack Power Cable 24" P/N 683-44024-1 To: Glacier EXPRESS Rack Data Cable 24" P/N 683-44267-1 To: Glacier Glacier Water Return Line P/N CBSE-F10066-1 To: Glacier Glacier Water Supply Line P/N CBSE-F10065-1 To: Glacier</p>

GLACIER TRANSFER MIDDECK TO ISS

(ASSY OPS/ULF3/FIN 1)

Page 11 of 11 pages

Volume Compensators B/C GLCR 1000J, GLCR 1001J To: Stow

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GLACIER TRANSFER ISS TO MIDDECK

(ASSY OPS/ULF3/FIN 1)

Page 1 of 6 pages

OBJECTIVE:

To configure Glacier for descent by powering off the unit, disconnecting the resources, and removing it from EXPRESS Rack 2 in the US LAB, then transferring and installing it in the Shuttle middeck for return. Once activation of Glacier is complete in the middeck, two lockers will be mounted back into the EXPRESS Rack where Glacier was removed.

PARTS:

Glacier IVA Handle P/N CBSE-F10075-1 (reference Stow Note)

EXPRESS Rack Power Cable 24" P/N 683-44024-1 (reference Stow Note)

EXPRESS Rack Data Cable 24" P/N 683-44267-1 (reference Stow Note)

Glacier Water Return Line P/N CBSE-F10066-1 (reference Stow Note)

Glacier Water Supply Line P/N CBSE-F10065-1 (reference Stow Note)

ISS Locker (two)

Volume Compensator B/C GLCR 1000J, GLCR 1001J (reference Stow Note)

Any EXPRESS Rack Utility Drawer:

High Torque Locker Tool

Shuttle Middeck:

High Torque Locker Tool (Volume H, taped to wall)

VPMP Closeout Covers (two)

ISS IVA Toolbox:

1/4" Socket, 1/4" Drive

Ratchet, 1/4" Drive

(40-200 in-lbs) Trq Wrench, 1/4" Drive

(5-35 in-lbs) Trq Wrench, 1/4" Drive

STS IFM Toolbox:

1/4" Socket, 1/4" Drive

Ratchet, 1/4" Drive

(40-200 in-lbs) Trq Wrench, 1/4" Drive

1. MIDDECK PREP

MA16F/G 1.1 Remove VPMP Cover (two) from VPMP and temporarily stow (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive).

1.2 ✓Transfer path is clear between middeck and EXPRESS-2 Rack.

2. GLACIER PREP

LAB101
(Glacier) 2.1 Verify front door latch is in LOCKED position

2.2 Connect Glacier IVA Handle diagonally to front face of Glacier at locations marked IVA Receptacle (two of four).

2.3 Unfasten Glacier from EXPRESS Rack Backplate (four) (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive).

3. GLACIER SHUTDOWN

LAB101
(Glacier)

3.1 ✓Display (Line 1) – 'HOME'

```

*****
*
* If display -'***Error Pending**'
* |   Perform 3.003 GLACIER MANUAL ERROR MESSAGE, all
* |   (PODF: GLACIER: MALFUNCTION), then:
*
* If 'HOME' not shown
* |   pb Right (EXIT) → Press until 'HOME' appears
*
*****

```

3.2 Record front panel display GPS time: _____

3.3 pb Left (MENU) → Press (one time), following messages appear:
'MAIN MENU'
'QUICK STATUS 1/5'

3.4 pb Left (NEXT) → Press (four times), following messages appear:
'MAIN MENU'
'SHUTDOWN 5/5'

3.5 pb Center (SELECT) → Press (one time), following messages appear:
'SHUTDOWN'
'SHUTDOWN 1/2'

3.6 pb Center (SELECT) → Press (one time), following messages appear:
'Confirm Shutdown'
'SHUTDOWN'

3.7 pb Left (APPLY) → Press (one time), following messages appear:
'Glacier'
'System'
'Shutting Down'
'Please wait...'

3.8 ✓Display shows the following messages
'Glacier'
'Shutdown Complete'
'TURN POWER OFF'

3.9 Wait 5 seconds.

NOTE

- 1. Power off should be no longer than 30 minutes in order to preserve optimum science.
- 2. Power down begins when Glacier POWER cb is open.
- 3. Power light can take up to 2 minutes to fully extinguish.
- 4. BATTERY sw is left on to power data logger during transfer.

3.10 ✓sw BATTERY ON

3.11 cb POWER → Open

LAB101_F1 3.12 sw LOCKER-4 POWER → OFF
 ✓LOCKER-4 POWER Lt – Off

4. RESOURCE DISCONNECTS FROM GLACIER UNIT

- LAB101_G
1 (Glacier)
- 4.1 EXPRESS Rack Power Cable (24") ←|→ POWER J1
 - 4.2 EXPRESS Rack Data Cable (24") ←|→ DATA J2
 - 4.3 Disconnect water lines from front of Glacier:
 Glacier Water Supply Line ←|→ WATER SUPPLY
 Glacier Water Return Line ←|→ WATER RETURN

Verify no leakage at connectors.

```

*****
*
* If leakage is present
* | Clean up with Dry Wipes.
*
*****

```

4.4 Tether cables out of the way.

5. GLACIER MOVE

- 5.1 Carefully slide Glacier out of the locker position.
- 5.2 Transfer Glacier to Shuttle Middeck and carefully slide into position.

6. GLACIER POWER ON IN ORBITER MIDDECK

ML86B:E 6.1 ✓cb MNB MAR1 – Open

MA16F/G 6.2 ✓cb POWER – Open
 ✓sw BATTERY – ON

6.3 SHUTTLE PAYLOAD DC PWR CABLE →|← POWER J1

ML86B:E 6.4 cb MNB MAR1 → Close

NOTE

System Initialization could take up to 3 minutes. Initialization complete once Line 1 of front panel display reads 'HOME'.

MA16F/G

6.5 cb POWER → Close (It on)

6.6 Record GMT time: _____

 *
 * If POWER It off
 * | Perform GLACIER FAIL TO REPOWER, all (SODF: ASSY OPS:
 * | PAYLOADS), then:
 *

WARNING

Glacier requires four fasteners torqued to 75 in-lbs to be properly fastened onto VPMP for structural and safety purposes.

7. GLACIER INSTALLATION IN MIDDECK

7.1 Fasten Glacier fasteners (four) to Middeck locker VPMP mounted on wire tray using following pattern: upper left, lower right, upper right, lower left and torque to 75 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (40-200 in-lbs) Trq Wrench, 1/4" Drive].

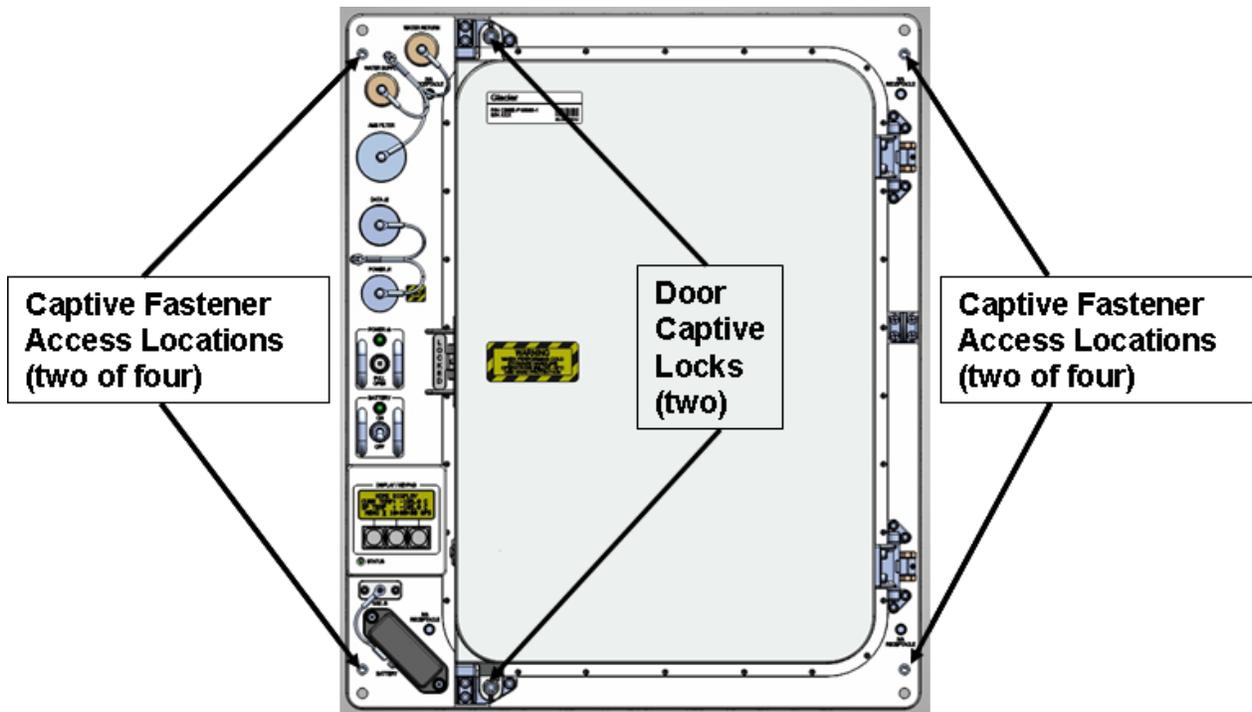


Figure 1. Glacier Configuration.

- 7.2 Disconnect Glacier IVA Handle from Glacier front face and temporarily stow
- 7.3 Verify front door is closed.
- Glacier 7.4 ✓Display – 'HOME'
 - *****
 - *
* If display –'***Error Pending**'
 - * | Perform [GLACIER ERROR MESSAGE](#), all (SODF: ASSY
 - * | OPS: PAYLOADS), then:
 - *
 - *
* If 'HOME' not shown
 - * | Perform [GLACIER LCD BLANK](#), all (SODF: ASSY OPS:
 - * | PAYLOADS), then:
 - *
 - *****
- 7.5 Record from front panel display:
 - Record CURR TEMP: _____
 - Record SET POINT: _____
 - Record GPS time: _____

8. CABLE DISCONNECTS FROM RACK

- LAB101_F1 8.1 EXPRESS Rack Power Cable (24") ←|→ LOCKER-4 POWER J1
- 8.2 EXPRESS Rack Data Cable (24") ←|→ LOCKER-4 DATA J2
- 8.3 Stow Power and Data cables

9. WATER DISCONNECTS FROM RACK

- 9.1 Glacier Water Supply Line←|→COOLANT WATER SUPPLY
- 9.2 Glacier Water Return Line←|→COOLANT WATER RETURN
- 9.3 Connect Volume Compensator to each Water Line
 - Glacier Water Supply Line (small connector, Preece)→|←Volume Compensator
 - Glacier Water Return Line (small connector, Preece)→|←Volume Compensator
- Verify no leakage at connectors

```

*****
*
* If leakage is present
* |   Clean up with Dry Wipes.
*
*****

```

9.4 Stow Water Lines with Volume Compensators per Stow Note

10. ISS LOCKER INSTALL

10.1 Retrieve ISS Locker (two) from temporary stowage

LAB101_G
1

10.2 Carefully Insert Locker into EXPRESS-2 Rack Locker 3 location. Tighten, torque fasteners (four) on each locker to 30 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (5-35 in-lbs) Trq Driver, 1/4" Drive] in a diagonal pattern.

LAB101_J1

10.3 Carefully Insert Locker into EXPRESS-2 Rack Locker 4 location. Tighten, torque fasteners (four) on each locker to 30 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (5-35 in-lbs) Trq Driver, 1/4" Drive] in a diagonal pattern.

11. Stow:

All IVA and IFM Tools

IVA Handle per Stow Note

EXPRESS Rack Power Cable 24" P/N 683-44024-1

EXPRESS Rack Data Cable 24" P/N 683-44267-1

Glacier Water Return Line P/N CBSE-F10066-1 with Volume Compensator attached

Glacier Water Supply Line P/N CBSE-F10065-1 with Volume Compensator attached

12. Notify **MCC-H** Glacier Transfer to Shuttle is complete.

Report power-off time from step 3.2; power-on time from step 6.6; and CURR TEMP, SET POINT and GPS time from step 7.5.

13. GROUND UPDATES FOR IMS

Ground to update IMS for the following:

EXPRESS Rack Power Cable 24" P/N 683-44024-1 To: Stow

EXPRESS Rack Data Cable 24" P/N 683-44267-1 To: Stow

Glacier Water Return Line P/N CBSE-F10066-1 with Volume Compensator attached To: Stow

Glacier Water Supply Line P/N CBSE-F10065-1 with Volume Compensator attached To: Stow

Volume Compensators B/C GLCR 1000J, GLCR 1001J To: Stow

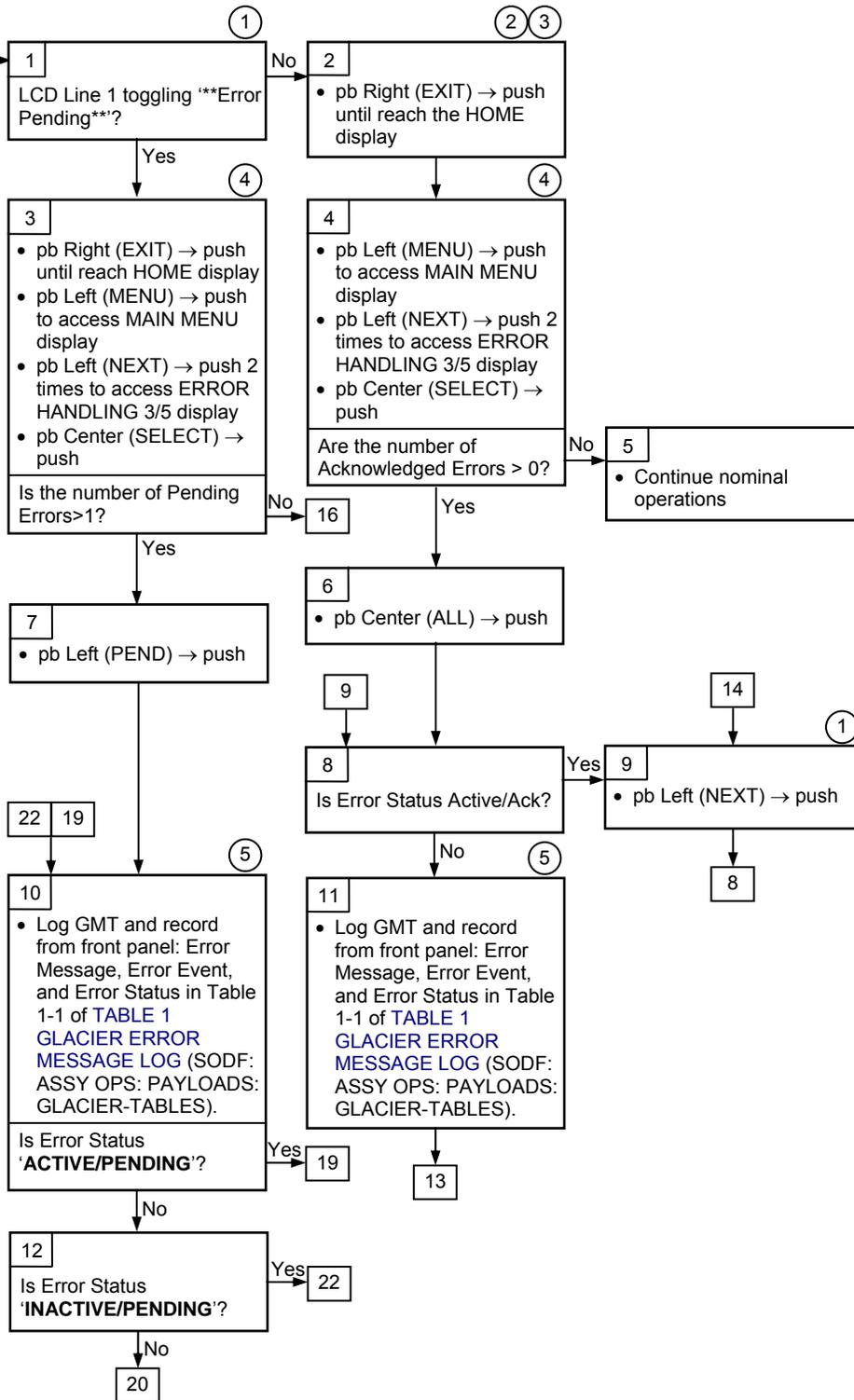
GLACIER

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 1 of 17 pages

Glacier System Error

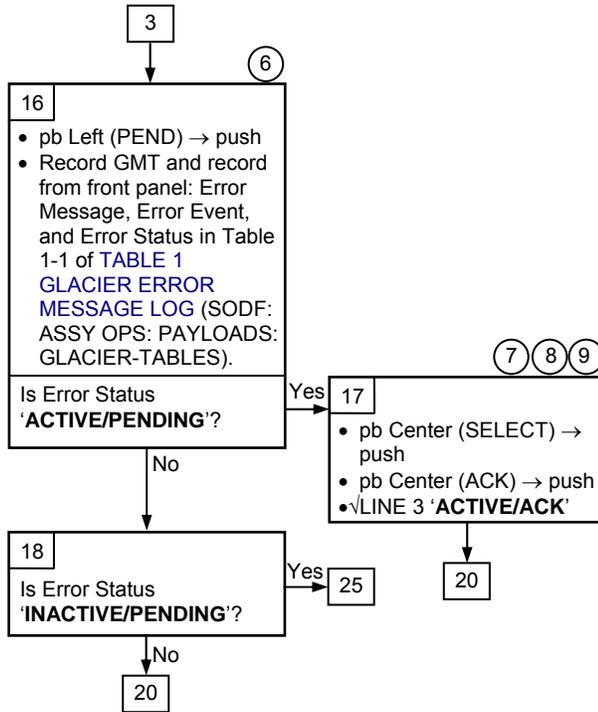
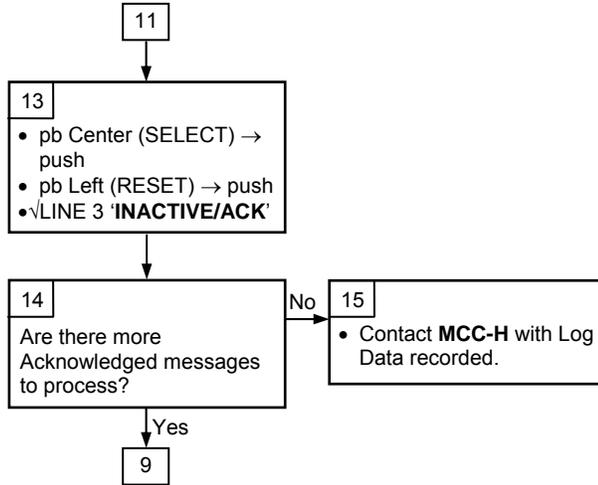
Nominal Config:
 (MA16F/G)
 cb POWER – Close (It on)
 sw BATTERY – ON (It on)
 (ML86B:E)
 cb MNB MAR 1 – Close



- ① Contact **MCC-H** before proceeding.
- ② Operator can always exit sub menus by pressing Right (EXIT) pb until 'HOME' display is reached.
- ③ ERROR HANDLING: display will identify Event on Line 2 and Status on Line 3. 'ACTIVE/PENDING' indicates that error is still occurring and should be acknowledged. 'INACTIVE/PENDING' indicates the Error is no longer occurring and can be Reset.
- ④ Menus are circular. If a display is passed, operator can keep pressing the button until desired display is reached.
- ⑤ GPS is only visible in HOME display. Record GMT from wristwatch.

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 2 of 17 pages



⑥
GLACIER RECORD DIAGNOSTIC DATA procedure may be performed to capture states of key data elements per **MCC-H** direction.

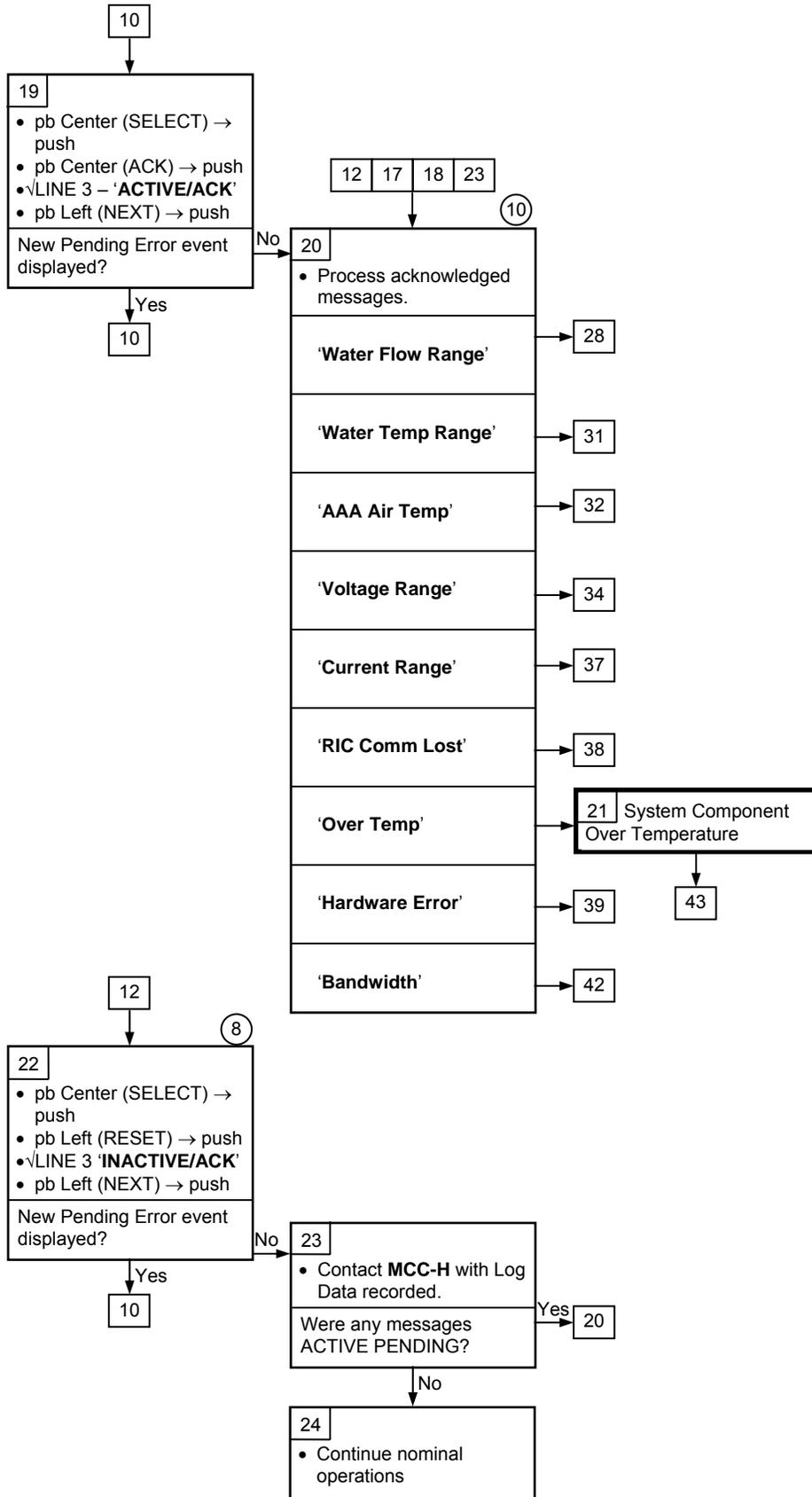
⑦
Power cycle requires **MCC-H** approval. Note: Set Point temperature control mode will require initialization upon restart

⑧
Software Errors may not reset or may be persistent due to: Frequent intermittent power failure. Single Event Upset. Electromagnetic interference

⑨
Internal voltage takes approximately 2 min to dissipate. Power LED will remain dimly illuminated

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 3 of 17 pages

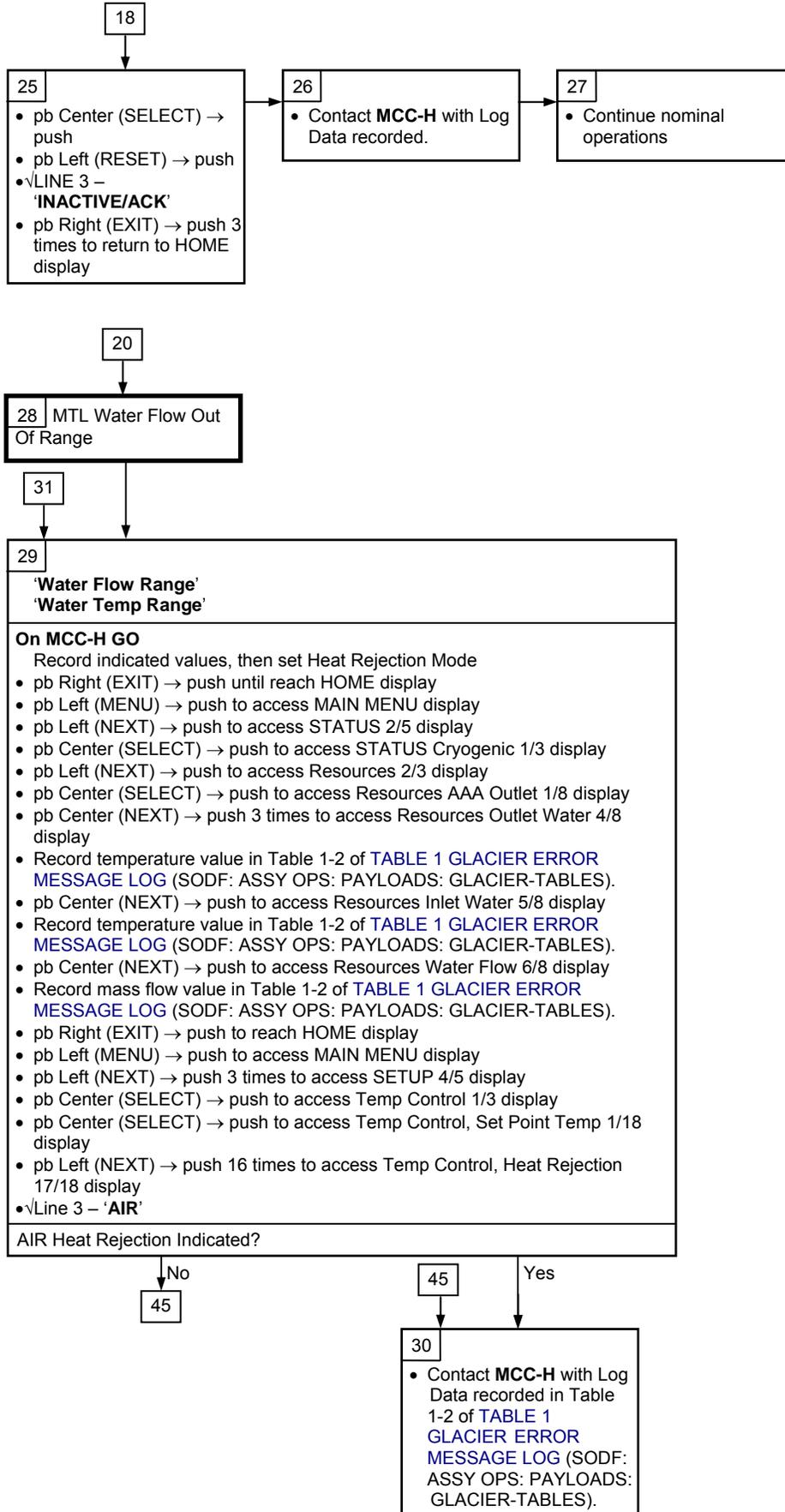


⑧ Software Errors may not reset or may be persistent due to: Frequent intermittent power failure. Single Event Upset. Electromagnetic interference

⑩ Initialization takes approximately 3 minutes and is complete when LCD Line 1 reads 'HOME'

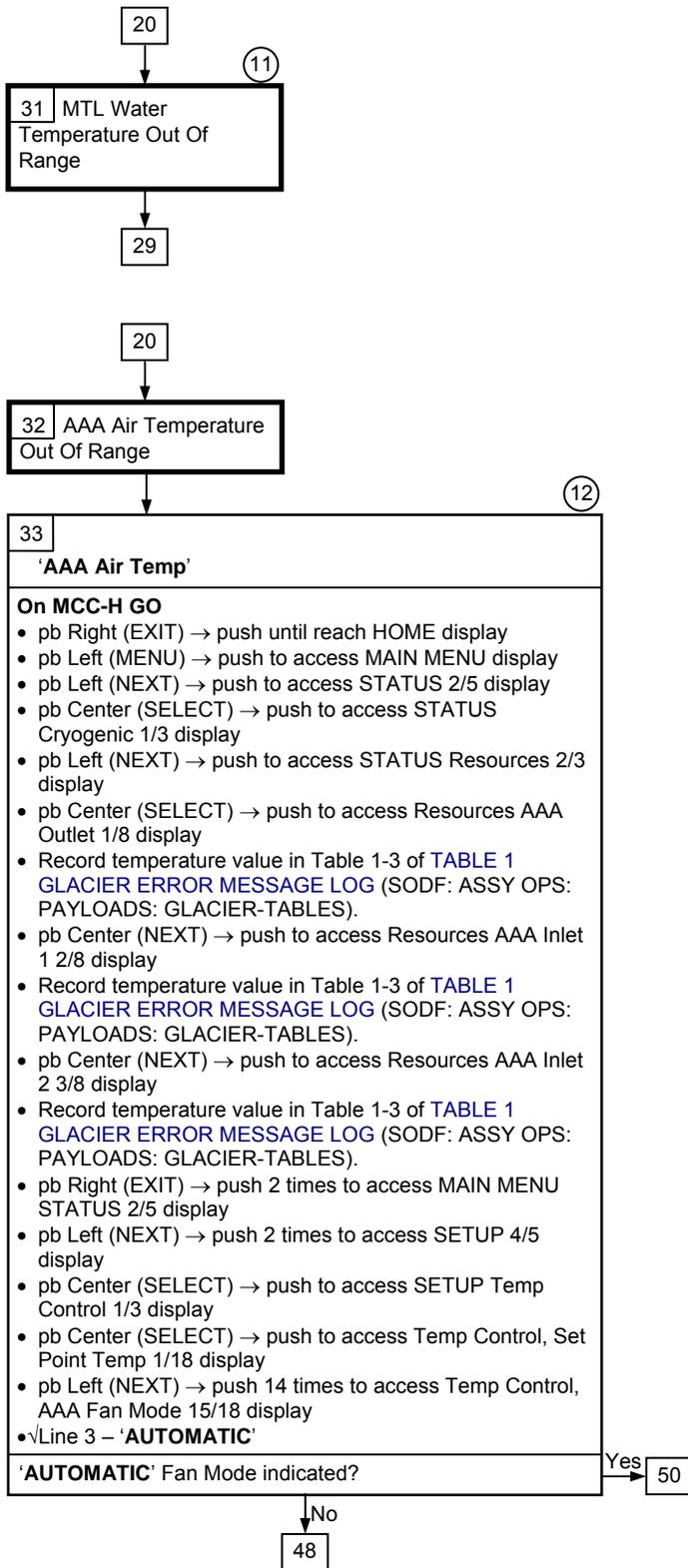
GLACIER ERROR MESSAGE

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GLACIER ERROR MESSAGE

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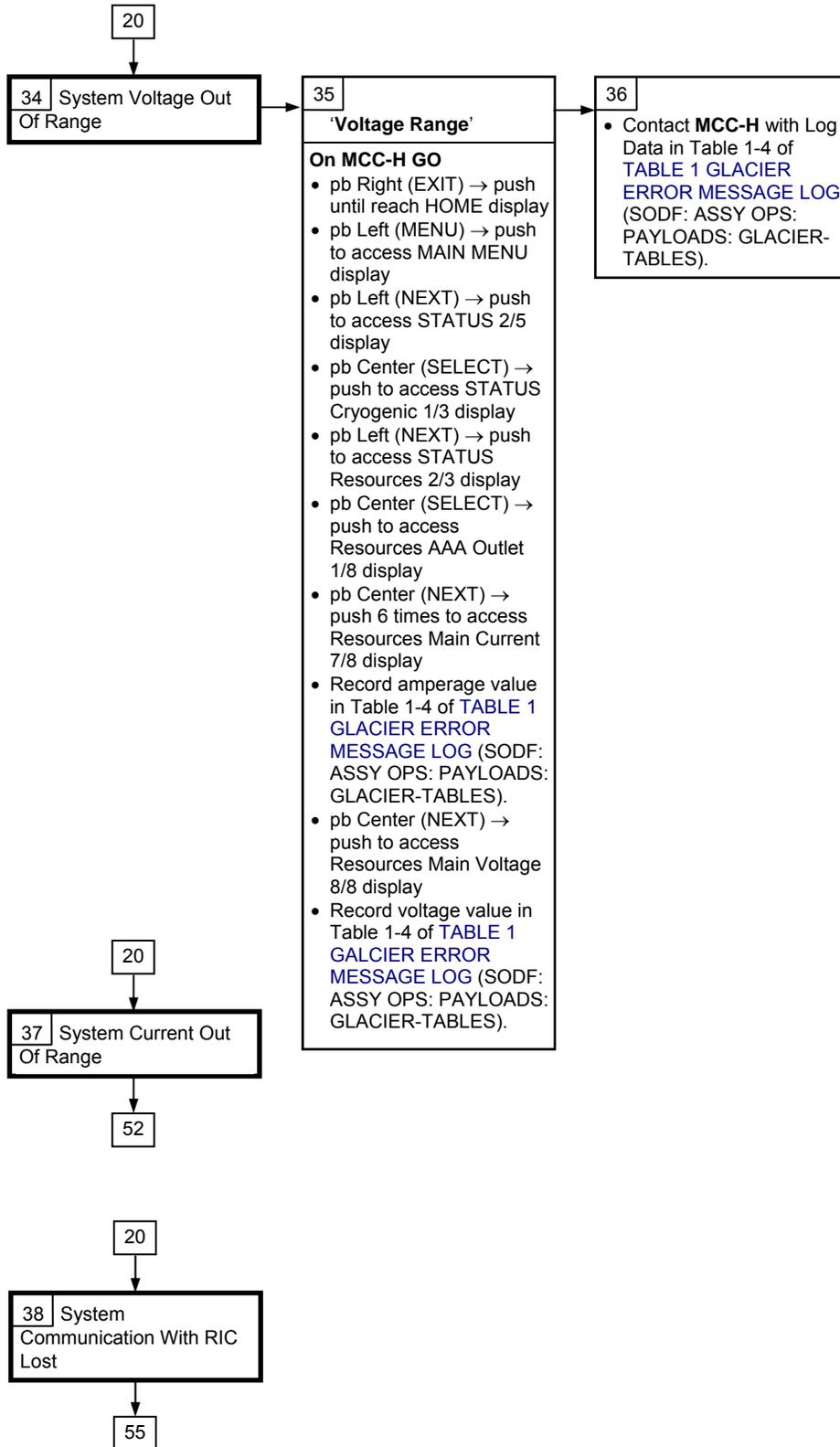


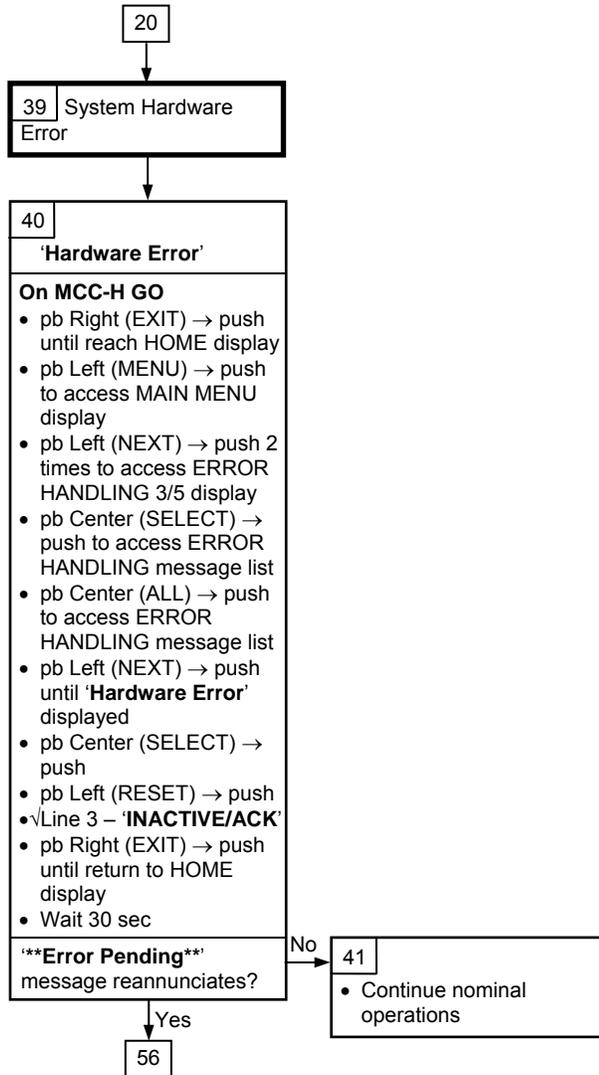
①
AAA Air Temp value may take a long time to reflect change in fan mode.

②
MCC-H will evaluate Av Bay temps

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 6 of 17 pages





20

42

'Bandwidth'

Record indicated values

- pb Right (EXIT) → push until reach HOME display
- Record from Front Panel CURR TEMP, SET POINT, GPS values in Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Left (MENU) → push once until QUICK STATUS 1/5
- pb Center (CENTER) → push once until QUICK STATUS Cold Head 1A 1/16
- Record value in Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push once until QUICK STATUS Cold Head 1B 2/16
- Record value in Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push once until QUICK STATUS Cold Head 2A 3/16
- Record value in Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push once until QUICK STATUS Cold Head 2B 4/16
- Record value in Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push nine times until QUICK STATUS CircFan Speed 13/16
- Record value in Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Right (EXIT) → push until HOME display
- Notify **MCC-H** to report log values from Table 1-6 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES) and receive further direction.

21

43

'Over Temp'

On MCC-H GO

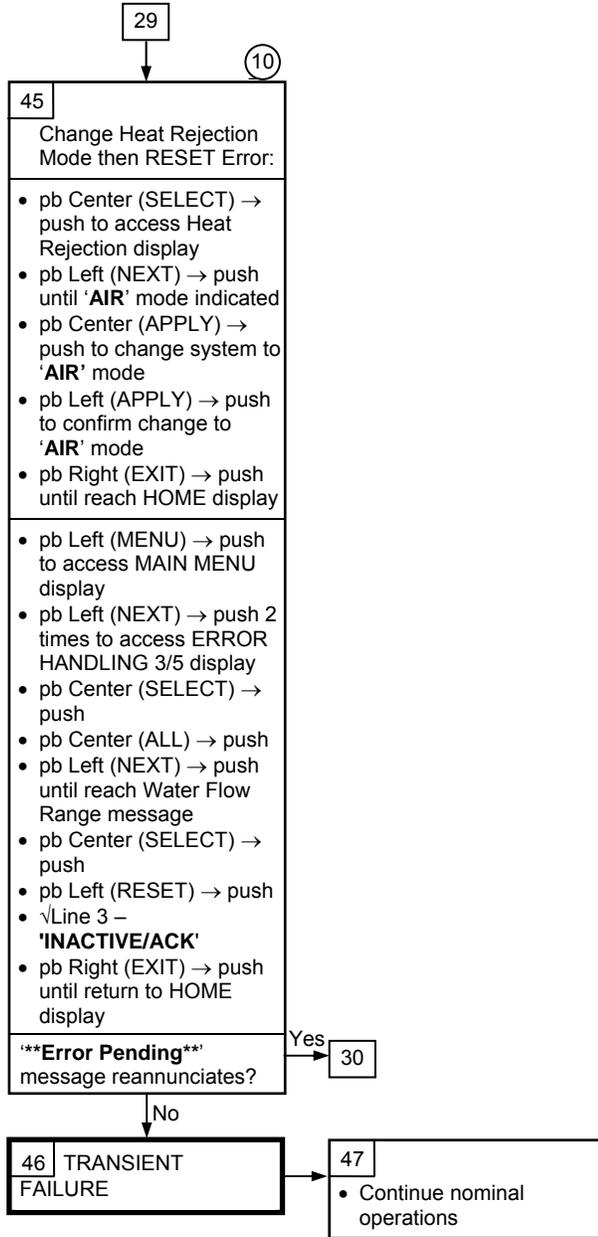
- pb Right (EXIT) → push until reach HOME display
- pb Left (MENU) → push to access MAIN MENU display
- pb Left (NEXT) → push to access STATUS 2/5 display
- pb Center (SELECT) → push to access STATUS Cryogenic 1/3 display
- pb Left (NEXT) → push 2 times to access STATUS System 3/3 display
- pb Center (SELECT) → push to access System CPU 1/9 display
- Record temperature value in Table 1-5 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push to access System Capacitors A 2/9 display
- Record temperature value in Table 1-5 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push to access System Capacitors B 3/9 display
- Record temperature value in Table 1-5 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push to access System Data Logger 4/9 display
- Record temperature value in Table 1-5 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).

44

- Contact **MCC-H** with Log Data Recorded in Table 1-5 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).

GLACIER ERROR MESSAGE

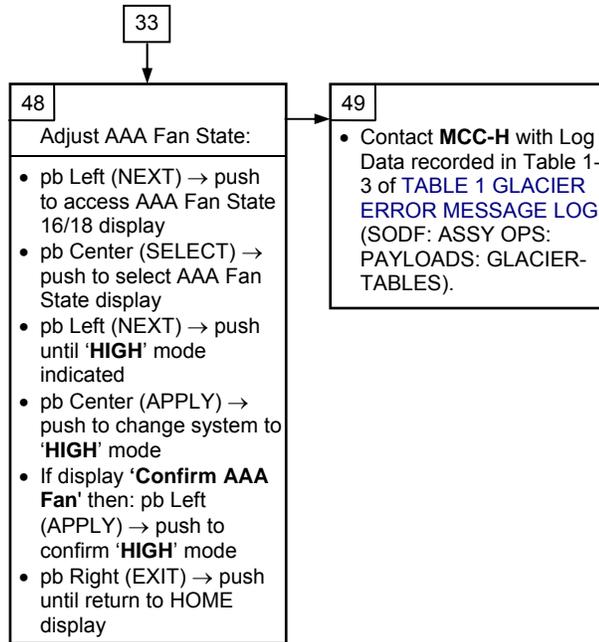
(ASSY OPS/ULF3/FIN 1) Page 10 of 17 pages

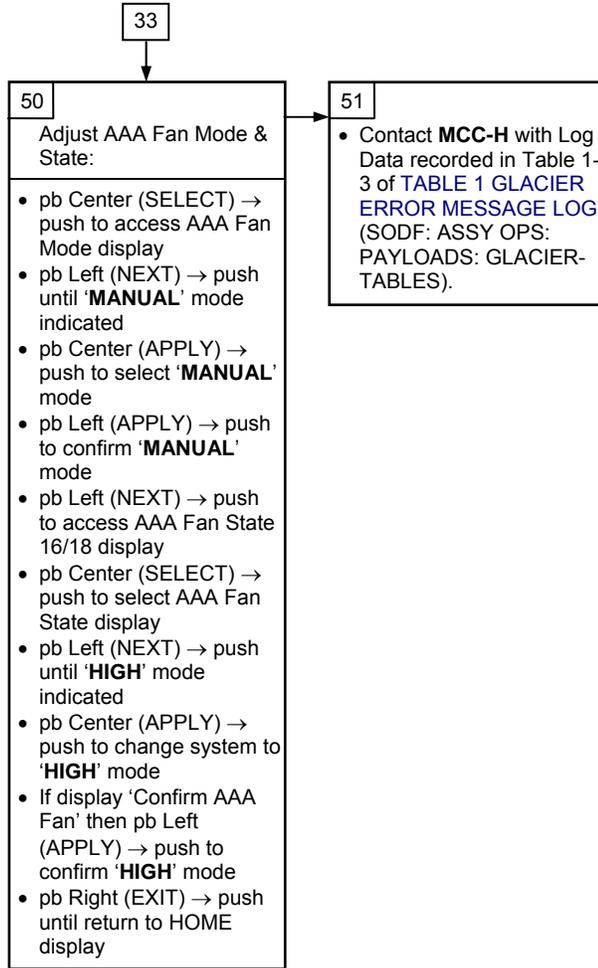


10 Initialization takes approximately 3 minutes and is complete when LCD Line 1 reads 'HOME'

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 11 of 17 pages





37

52

'Current Range'

On MCC-H GO

- pb Right (EXIT) → push until reach HOME display
- pb Left (MENU) → push to access MAIN MENU display
- pb Left (NEXT) → push to access STATUS 2/5 display
- pb Center (SELECT) → push to access STATUS Cryogenic 1/3 display
- pb Left (NEXT) → push to access STATUS Resources 2/3 display
- pb Center (SELECT) → push to access Resources AAA Outlet 1/8 display
- pb Center (NEXT) → push 6 times to access Resources Main Current 7/8 display
- Record amperage value in Table 1-4 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Center (NEXT) → push to access Resources Main Voltage 8/8 display
- Record voltage value in Table 1-4 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- pb Right (EXIT) → push 2 times to reach MAIN MENU STATUS 2/5 display
- pb Left (NEXT) → push 2 times to access SETUP 4/5 display
- pb Center (SELECT) → push to access Temp Control 1/3 display
- pb Center (SELECT) → push to access Temp Control, Set Point Temp 1/18 display
- pb Left (NEXT) → push 13 times to access Temp Control, Over Current 14/18 display
- Record amperage value in Table 1-4 of [TABLE 1 GLACIER ERROR MESSAGE LOG](#) (SODF: ASSY OPS: PAYLOADS: GLACIER-TABLES).
- √Line 3 – '30.0 A'

'30.0 A' Over Current Limit indicated?

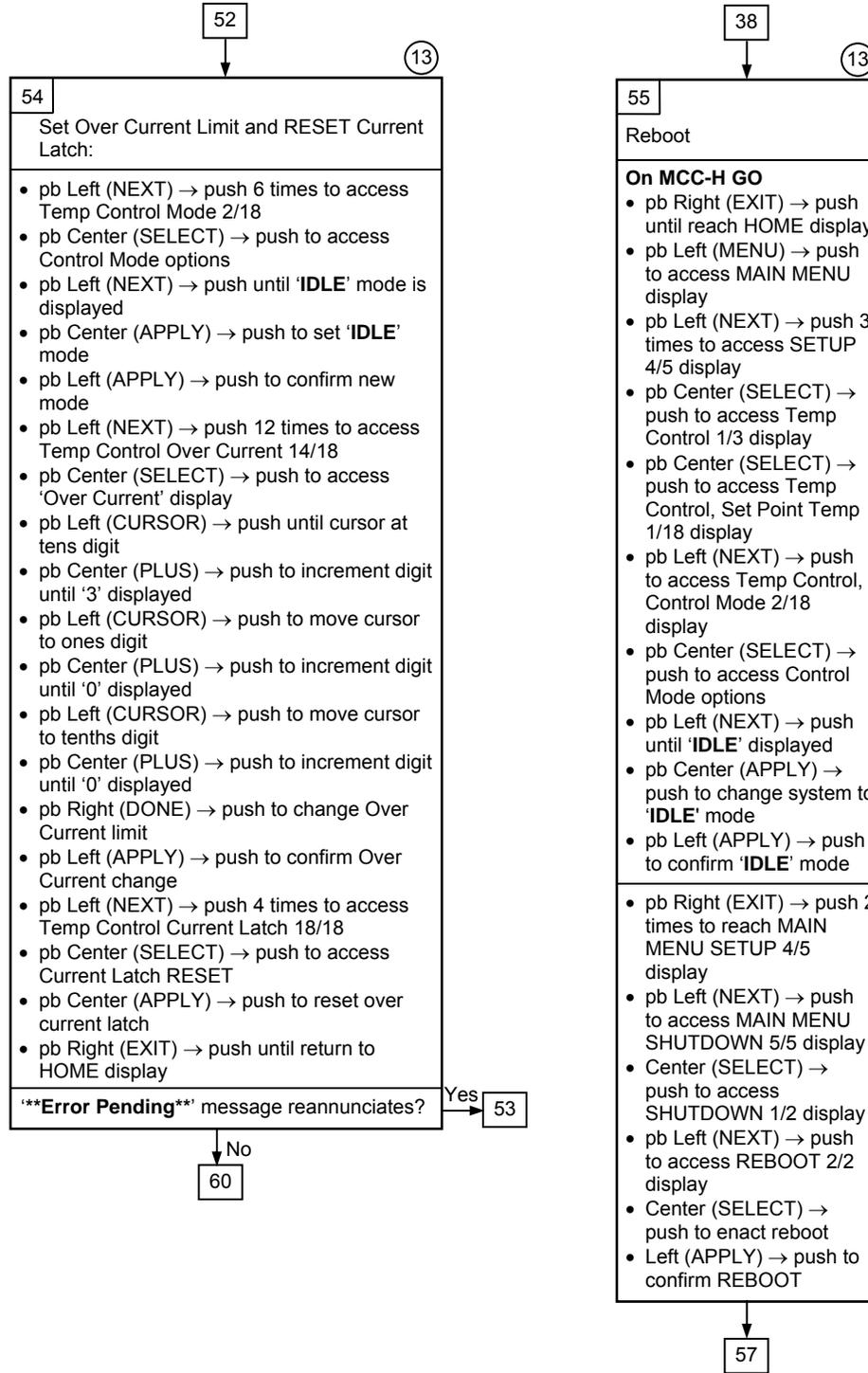
No
54

Yes

53

- Contact **MCC-H** with Log Data recorded.

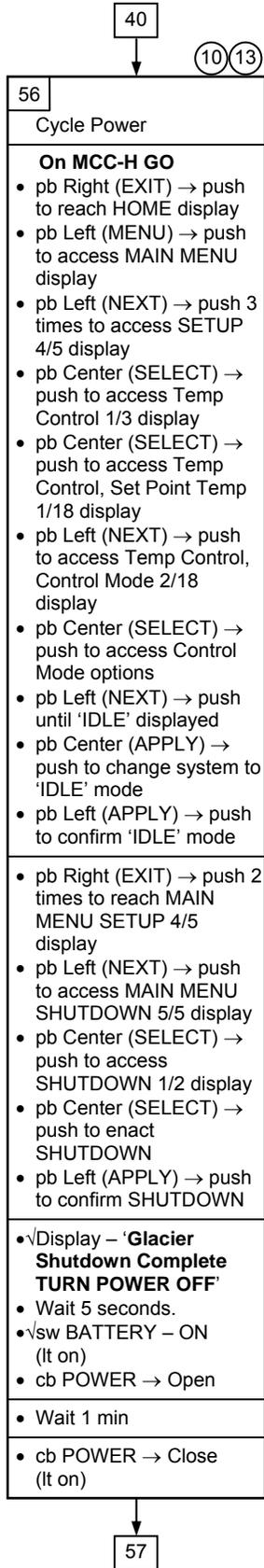
54



13
If parameters already set, the confirmation screen will not be displayed.

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 15 of 17 pages



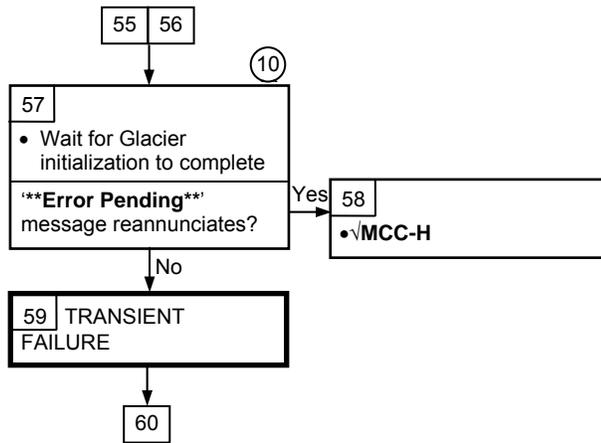
⑩ Initialization takes approximately 3 minutes and is complete when LCD Line 1 reads '**HOME**'

⑬ If parameters already set, the confirmation screen will not be displayed.

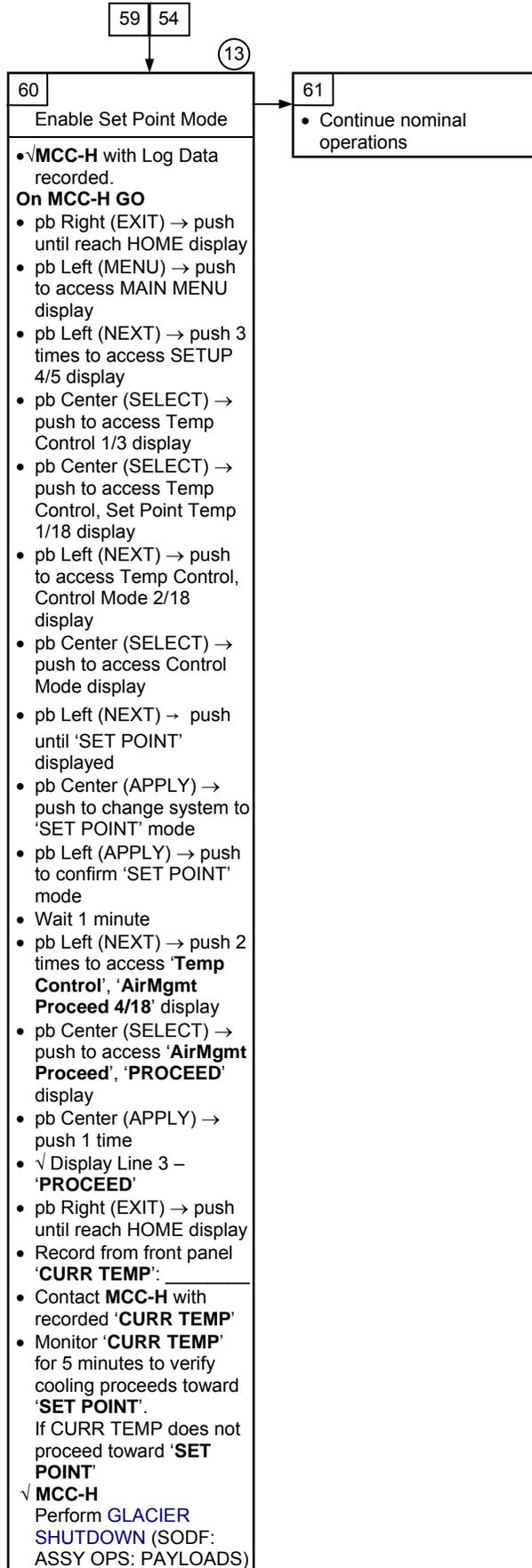
GLACIER

GLACIER ERROR MESSAGE

(ASSY OPS/ULF3/FIN 1) Page 16 of 17 pages



⑩ Initialization takes approximately 3 minutes and is complete when LCD Line 1 reads 'HOME'



13
If parameters already set, the confirmation screen will not be displayed.

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GLACIER FAIL TO HOLD SET POINT

(ASSY OPS/ULF3/FIN)

Page 1 of 9 pages

OBJECTIVE:

This procedure is required when the Glacier fails to hold set point. It performs a check of some critical parameters then directs the manual reconfiguration of some key controls as required.

Glacier

1. RECORD DATA

```
*****
*
* If Display-'**Error Pending**'
*
* | Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* | PAYLOADS: GLACIER), then:
*
*****
```

1.1 ✓Display – 'HOME'

```
*
*
* If 'HOME' not shown:
*
* | pb Right (EXIT) → push until 'HOME' appears
*
*****
```

1.2 Record from front panel start 'CURR TEMP', 'SET POINT', 'GPS' in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS: GLACIER)

2. CHECK STATUS OF KEY PARAMETERS

2.1 pb Left (MENU) → push (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

2.2 pb Center (SELECT) → push (one time), following appears:
'QUICK STATUS'
'Cold Head 1A 1/16'

NOTE

1. The center pushbutton (NEXT) moves to next status display.
2. The left pushbutton (PREV) moves to previous status display.

2.3 Record Cold Head 1A, Cold Head 1B, Cold Head 2A, Cold Head 2B, and CircFan Speed in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS: GLACIER)

2.4 pb Center (NEXT) → push until all data has been recorded.

2.5 pb Right (EXIT) → push until 'HOME'

2.6 ✓MCC-H to report log values from Table 3 and get direction.

2.7 Record any ground supplied data in [TABLE 2 GLACIER RESET LOG FILE](#) (SODF: ASSY OPS: PAYLOADS: GLACIER)

3. SET TEMPERATURE CONTROL MODE TO IDLE

- 3.1 pb Left (MENU) → push (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 3.2 pb Left (NEXT) → push (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 3.3 pb Center (SELECT) → push (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 3.4 pb Center (SELECT) → push (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 3.5 pb Left (NEXT) → push (one time), following appears:
'Temp Control'
'Control Mode 2/18'

NOTE

1. There are 3 options for setting the Control Mode (IDLE, SET POINT and MANUAL).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the mode and the right pushbutton (CANCEL) returns to the previous mode.

- 3.6 pb Center (SELECT) → Press (one time), following appears:
'Control Mode'
'XXXX'
- 3.7 pb Left (NEXT) → press as required to select desired Temperature Control Mode to **IDLE**
- 3.8 pb Center (APPLY) → push (one time)
- 3.9 ✓Confirm New Control Mode = **IDLE**
- 3.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Control Mode 2/18'
- 3.11 ✓Control Mode = **IDLE**
- 3.12 pb Right (EXIT) → Press until '**HOME**' appears
4. SET SETPOINT TEMP
- 4.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

- 4.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'
- 4.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'
- 4.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'
'Set Point Temp 1/18'
- 4.5 pb Center (SELECT) → push (one time) following appears:
'Set Point Temp'

'XXXX.X °C'
'-160.0 to +004.0'

NOTE

1. The left pushbutton (CURSOR) moves cursor between New Set Point Temp fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases New Set Point Temp selected digit field value by 1.

- 4.6 Enter desired Set Point temperature per **MCC-H**.
- 4.7 pb Right (DONE) → push (one time)
- 4.8 ✓Confirm New Set Point = desired Set Point
- 4.9 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 4.10 ✓Set Point Temp = desired Set Point
- 4.11 pb Right (EXIT) → push until '**HOME**' appears

5. SET TEMP CONTROL SENSORS

- 5.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 5.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'
- 5.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'
- 5.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'

GLACIER FAIL TO HOLD SET POINT

(ASSY OPS/ULF3/FIN)

Page 4 of 9 pages

'Set Point Temp 1/18'

- 5.5 pb Left (NEXT) → push (two times) following appears:
'Temp Control'
'Control Sensors 3/18'
- 5.6 pb Center (SELECT) → push (one time) following appears
'Control Sensors'
'INNER OUTLET INLET'

NOTE

1. The left pushbutton (CURSOR) moves cursor between Control Sensor fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) changes the values of the Control Sensor fields from 0 to 1 or vice versa.

- 5.7 Enter desired combination of Temp Control Sensors per **MCC-H**.
 - 5.8 pb Right (DONE) → push (one time)
 - 5.9 ✓Confirm New Control Sensors = desired Control Sensors
 - 5.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Control Sensors 3/18'
 - 5.11 ✓Control Sensors = desired Control Sensors
 - 5.12 pb Right (EXIT) → Press until '**HOME**' appears
6. SET TEMPERATURE CONTROL BANDWIDTH

- 6.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 6.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'
- 6.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'
- 6.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'
'Set Point Temp 1/18'
- 6.5 pb Left (NEXT) → push (four times) following appears:
'Temp Control'
'Bandwidth 5/18'
'XX.X°C'
- 6.6 pb Center (SELECT) → push (one time) following appears:

GLACIER FAIL TO HOLD SET POINT

(ASSY OPS/ULF3/FIN)

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'Bandwidth'
'XX.X°C'
'00.1 TO 25.5'

NOTE

1. The left pushbutton (CURSOR) moves cursor between Bandwidth fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases Temperature Control Bandwidth selected digit field value by 1.

6.7 Enter desired Temperature Control Bandwidth per **MCC-H**

6.8 pb Right (DONE) → push (one time)

6.9 ✓Confirm New Bandwidth = desired Bandwidth

6.10 pb Left (APPLY) → Press (one time), following appears:

'Temp Control'
'Bandwidth 5/18'

6.11 ✓Bandwidth = desired Bandwidth

6.12 pb Right (EXIT) → Press until '**HOME**' appears

7. SET PRIMARY COOLER

7.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

7.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'

7.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'

7.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'
'Set Point Temp 1/18'

7.5 pb Left (NEXT) → push (five times) following appears:
'Temp Control'
'Primary Cooler 6/18'
'COOLER X'

7.6 pb Center (SELECT) → push (one time) following appears:
'Primary Cooler'
'COOLER X'

NOTE

1. There are 2 options for Primary Cooler (COOLER 1 and COOLER 2).
2. The left pushbutton (NEXT) changes the Primary Cooler to either COOLER 1 or COOLER 2, the center pushbutton (APPLY) selects the presently displayed Primary Cooler and the right pushbutton (CANCEL) returns to the previous display.

- 7.7 pb Left (NEXT) → push as required to select desired Primary Cooler per **MCC-H**
- 7.8 pb Center (APPLY) → push (one time)
- 7.9 ✓Confirm New Primary Cooler = desired Cooler
- 7.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Primary Cooler 6/18'
- 7.11 ✓Primary Cooler = desired Cooler
- 7.12 pb Right (EXIT) → Press until '**HOME**' appears
8. SET MAXIMUM POWER DRAW SETTING
 - 8.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 8.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'
 - 8.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'
 - 8.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 8.5 pb Left (NEXT) → push (twelve times) following appears:
'Temp Control'
'Max Power Draw 13/18'
'XXX W'
 - 8.6 pb Center (SELECT) → push (one time) following appears:
'Max Power Draw'
'XXX W'
'000 to 420'

NOTE

1. The left pushbutton (CURSOR) moves the cursor between Maximum Power Draw fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases the Maximum Power Draw selected digit field value by 1.

- 8.7 Enter desired Maximum Power Draw per **MCC-H**.
- 8.8 pb Right (DONE) → push (one time)
- 8.9 ✓Confirm New Max Power = desired Max Power Draw
- 8.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Max Power Draw 13/18'
- 8.11 ✓Max Power Draw = desired Max Power Draw
- 8.12 pb Right (EXIT) → push until **'HOME'** appears
9. SET OVER CURRENT
 - 9.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 9.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'
 - 9.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'
 - 9.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 9.5 pb Left (NEXT) → push (thirteen times) following appears:
'Temp Control'
'Over Current 14/18'
'XX.X A'
 - 9.6 pb Center (SELECT) → push (one time) following appears:
'Over Current'
'XX.X W'
'00.0 to 30.0'

GLACIER FAIL TO HOLD SET POINT

(ASSY OPS/ULF3/FIN)

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NOTE

1. The left pushbutton (CURSOR) moves the cursor between Over Current fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases the Maximum Power Draw selected digit field value by 1.

- 9.7 Enter desired Over Current Limit per **MCC-H**.
 - 9.8 pb Right (DONE) → push (one time)
 - 9.9 ✓Confirm New Over Current = desired Over Current
 - 9.10 pb Left (APPLY) → push (one time), following appears:
'Temp Control'
'Over Current 14/18'
 - 9.11 ✓Over Current = desired Over Current
 - 9.12 pb Right (EXIT) → Press until **'HOME'** appears
10. SET TEMPERATURE CONTROL MODE
- 10.1 pb Left (MENU) → push (one time) following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 10.2 pb Left (NEXT) → push (three times) following appears:
'MAIN MENU'
'SETUP 4/5'
 - 10.3 pb Center (SELECT) → push (one time) following appears:
'SETUP'
'Temp Control 1/3'
 - 10.4 pb Center (SELECT) → push (one time) following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 10.5 pb Left (NEXT) → push (one time) following appears:
'Temp Control'
'Control Mode 2/18'
 - 10.6 pb Center (SELECT) → push (one time), following appears:
'Control Mode'
'XXXX'

NOTE

1. There are 3 options for setting the Control Mode (IDLE, SET POINT and MANUAL).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the mode and the right pushbutton (CANCEL) returns to the previous mode.

GLACIER FAIL TO HOLD SET POINT

(ASSY OPS/ULF3/FIN)

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- 10.7 pb Left (NEXT) → push as required to selected desired Temperature Control Mode per **MCC-H**.
- 10.8 pb Center (APPLY) → push one time
- 10.9 ✓Confirm New Control Mode = desired Control Mode
- 10.10 pb Left (APPLY) → push (one time), following appears:
 'Temp Control'
 'Control Mode 2/18'
- 10.11 ✓Control Mode = desired Control Mode
- 10.12 pb Right (EXIT) → push until 'HOME' appears.

11. CHECK GLACIER STATUS

- 11.1 ✓cb POWER – Close (It on)
- 11.2 ✓sw BATTERY – ON (It on)
- 11.3 ✓Display – 'HOME'

```
*****
*
* If Display-***Error Pending**
*
* | Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* | PAYLOADS: GLACIER), then:
*
*****
*
* If 'HOME' not shown:
*
* | pb Right (EXIT) → push until 'HOME' appears
*
*****
```

- 11.4 ✓Display – 'CURR TEMP: XXXX.X °C' ±5.0°C or ramping toward expected temperature.

12. RECORD END DATA

- 12.1 Record from front panel end 'CURR TEMP', 'SETPOINT', 'GPS' in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS: GLACIER)
- 12.2 Notify **MCC-H** of logged values in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS: GLACIER)

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Glacier initialization not successfully completed when power applied during Glacier POWER UP procedure

Nominal Config:
 (MA16F/G)
 cb POWER- Close (It on)
 sw BATTERY-ON (It on)
 (ML86B:E)
 cb MNB MAR 1- Close

① ②

1	Switch to Alternate Power Source <ul style="list-style-type: none"> Contact MCC-H for alternate power source (fill in data below). _____ (Glacier) <ul style="list-style-type: none"> cb POWER → Open (It off) (ML86B:E) <ul style="list-style-type: none"> cb MNB MAR 1 → Open (ML85E) <ul style="list-style-type: none"> A/E PAYLOAD DC PWR (20') → J11 (Alternate Power Source J_) <ul style="list-style-type: none"> ✓cb _____ - Open ✓sw _____ - OFF A/E PAYLOAD DC PWR (20') → Alternate Power Source J
---	---

③

2	Repower from Alternate Power Source <ul style="list-style-type: none"> (_____) cb _____ - Close sw _____ -ON (Glacier) <ul style="list-style-type: none"> cb POWER → Close (It on) After Initialization does display read 'HOME'?
---	---

3	PRIMARY OUTLET FAILURE
---	------------------------

4	<ul style="list-style-type: none"> Record power-on time (GPS): _____ Record power-on CURR TEMP: _____ Record power-on SET POINT: _____ Notify MCC-H of resolution and data
---	---

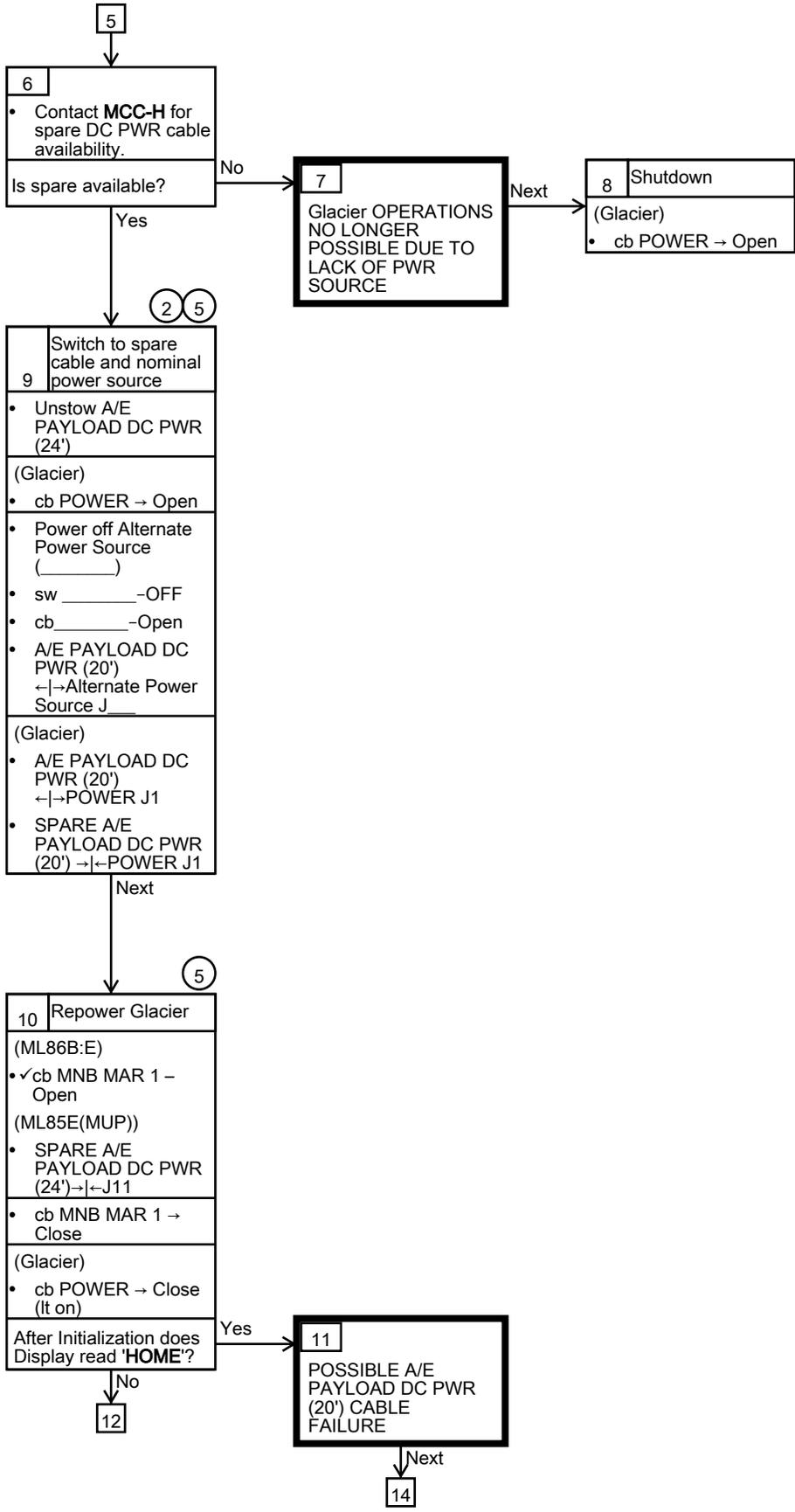
5	POSSIBLE DOWNSTREAM FAILURE
---	-----------------------------

⑥

- ① Always deadface DC power source when disconnecting/connecting power cable
- ② Verify connectors are properly mated and seated securely when switching to alternate power source
- ③ Glacier will take approximately 2 min to initialize after power on; after initialization is successfully completed, LCD Line 1 will read 'HOME'

GLACIER FAIL TO REPOWER

(ASSY OPS/ULF3/FIN 1) Page 2 of 3 pages

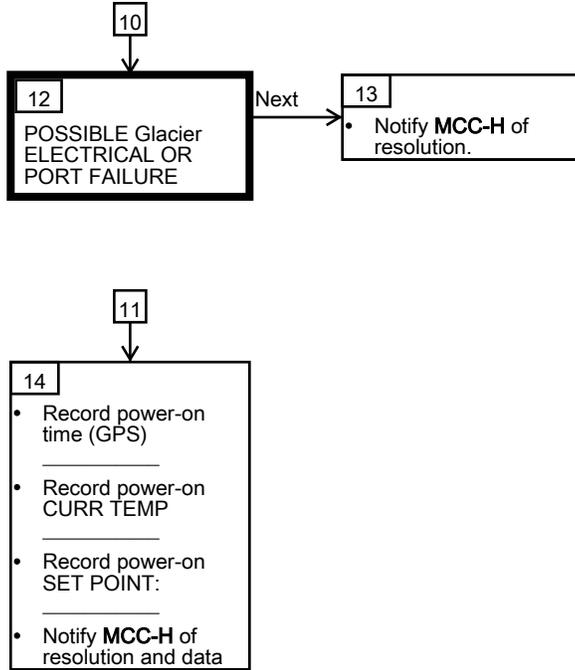


2
Verify connectors are properly mated and seated securely when switching to alternate power source

5
Alternate power source is detailed in block 1.

GLACIER FAIL TO REPOWER

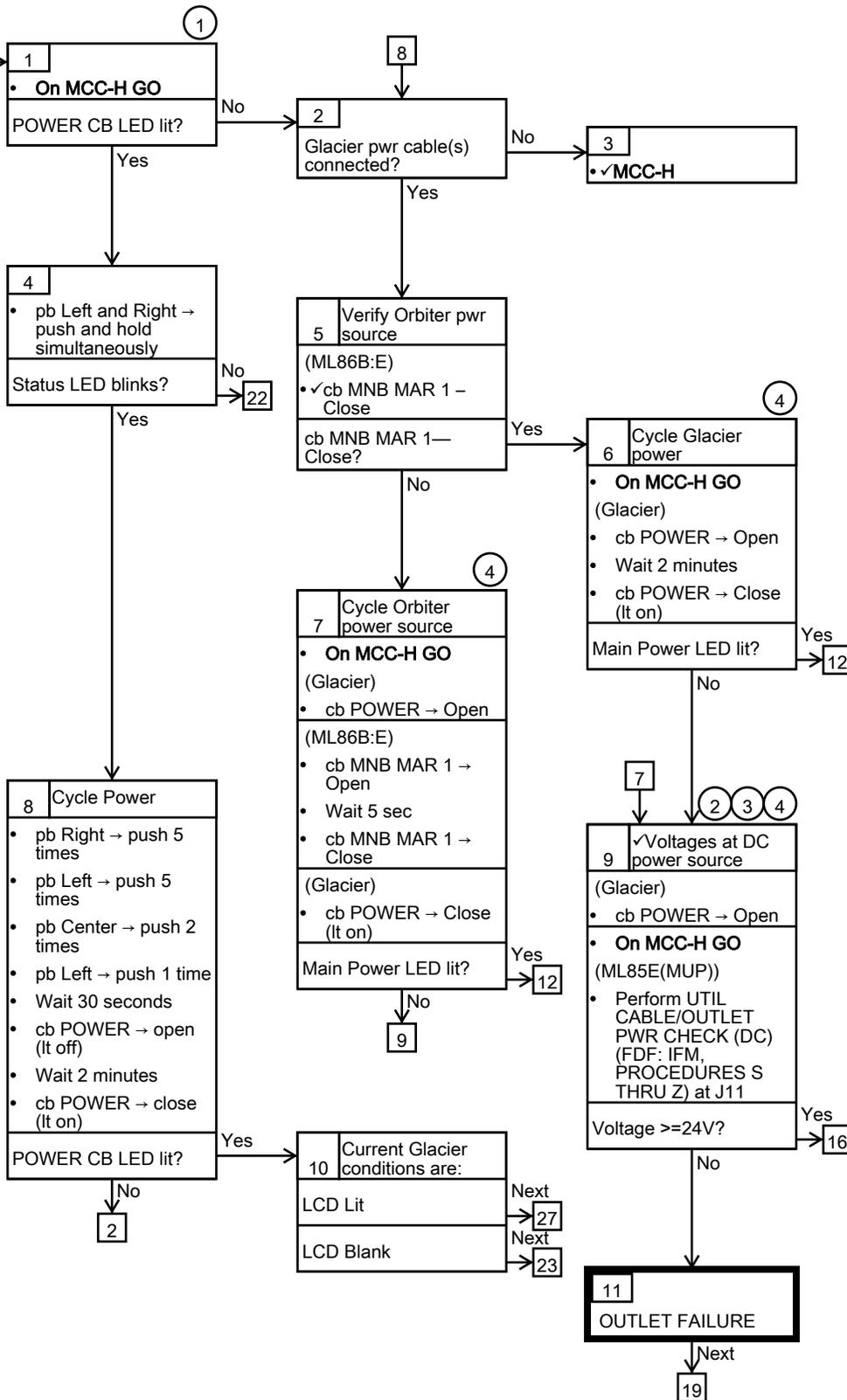
(ASSY OPS/ULF3/FIN 1) Page 3 of 3 pages



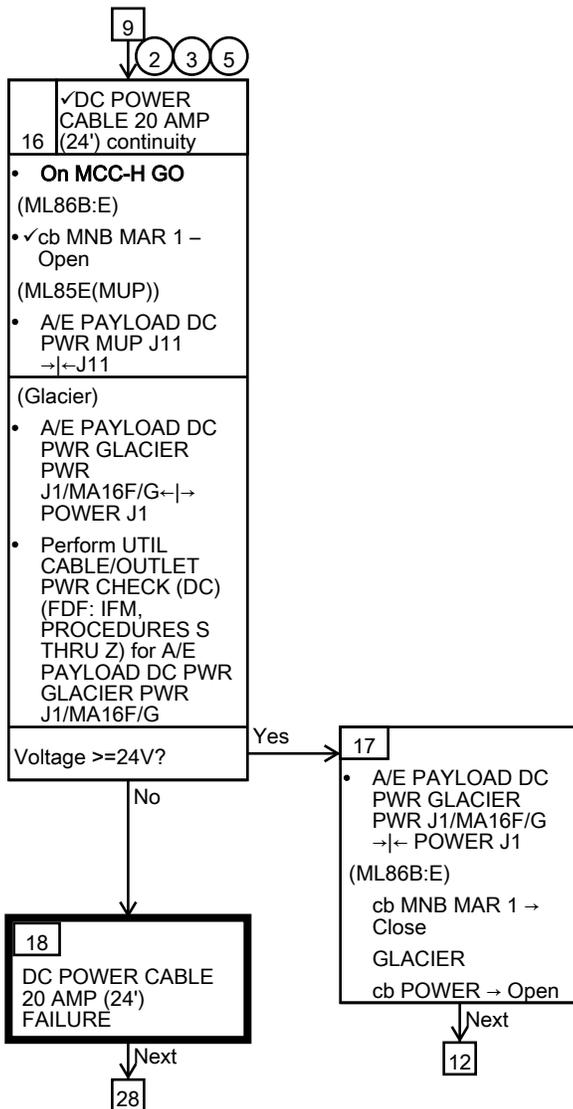
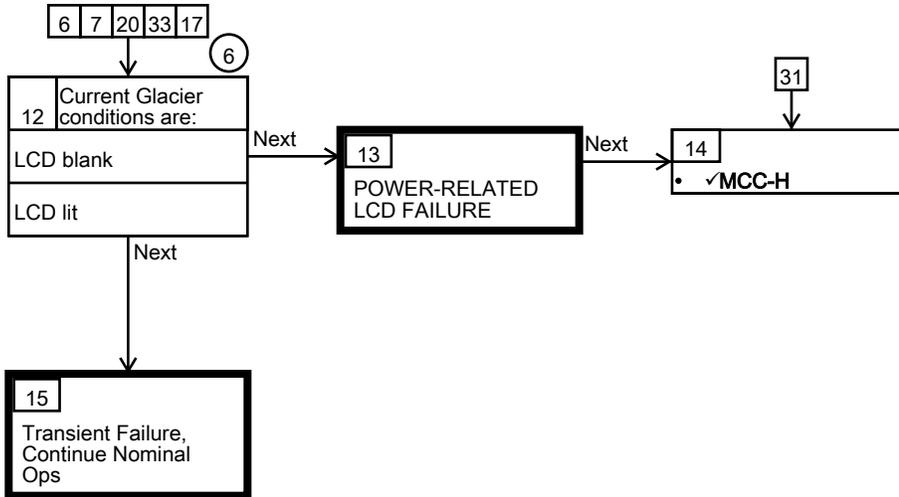
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LCD Blank

Nominal Config:
(MA16F/G)
cb POWER – Close (It on)
sw BATTERY – ON (It on)
(ML86B:E)
cb MNB MAR 1 – Close



- ① Fan running indicates Glacier on STS power.
- ② Always deadface DC Power source when disconnecting/connecting power cable.
- ③ Verify connectors are properly mated and seated securely.
- ④ Internal voltages require approximately 2 min to dissipate upon cb open. Dissipation complete when Power LED extinguishes.



- ② Always deadface DC Power source when disconnecting/connecting power cable.
- ③ Verify connectors are properly mated and seated securely.
- ⑤ Verify connectors are properly mated and seated securely when reconnecting.
- ⑥ Initialization takes approximately 2 min. Initialization is complete when LCD Line 1 reads 'HOME'.

11
2 3 4 5

19	Switch to Alternate Power Source
<ul style="list-style-type: none"> Contact MCC-H for alternate power source (Fill in data below) 	
(Glacier)	
<ul style="list-style-type: none"> cb POWER → Open 	
(ML86B:E)	
<ul style="list-style-type: none"> ✓cb MNB MAR 1 – Open 	
(ML85E(MUP))	
<ul style="list-style-type: none"> ✓A/E PAYLOAD DC PWR MUP J11 ← →J11 	
<ul style="list-style-type: none"> Alternate Power source () J_ ✓cb _____ Open _____ ✓sw _____ —OFF _____ 	
<ul style="list-style-type: none"> ✓A/E PAYLOAD DC PWR GLACIER PWR J1/MA16F/G→ ←POWER J1 	
<ul style="list-style-type: none"> A/E PAYLOAD DC PWR GLACIER PWR J1/MA16F/G → ←Alternate Power Source J_ 	

Next

2 5

20	Repower from Alternate Power Source
<ul style="list-style-type: none"> () cb _____ Close sw _____ ON 	
(Glacier)	
<ul style="list-style-type: none"> cb POWER → Close (It on) 	
Main Power LED lit?	
No	Yes → 12
<div style="border: 2px solid black; padding: 5px; display: inline-block;"> 21 SYSTEM FAILURE </div>	
Next	
31	

2

Always deadface DC Power source when disconnecting/connecting power cable.

3

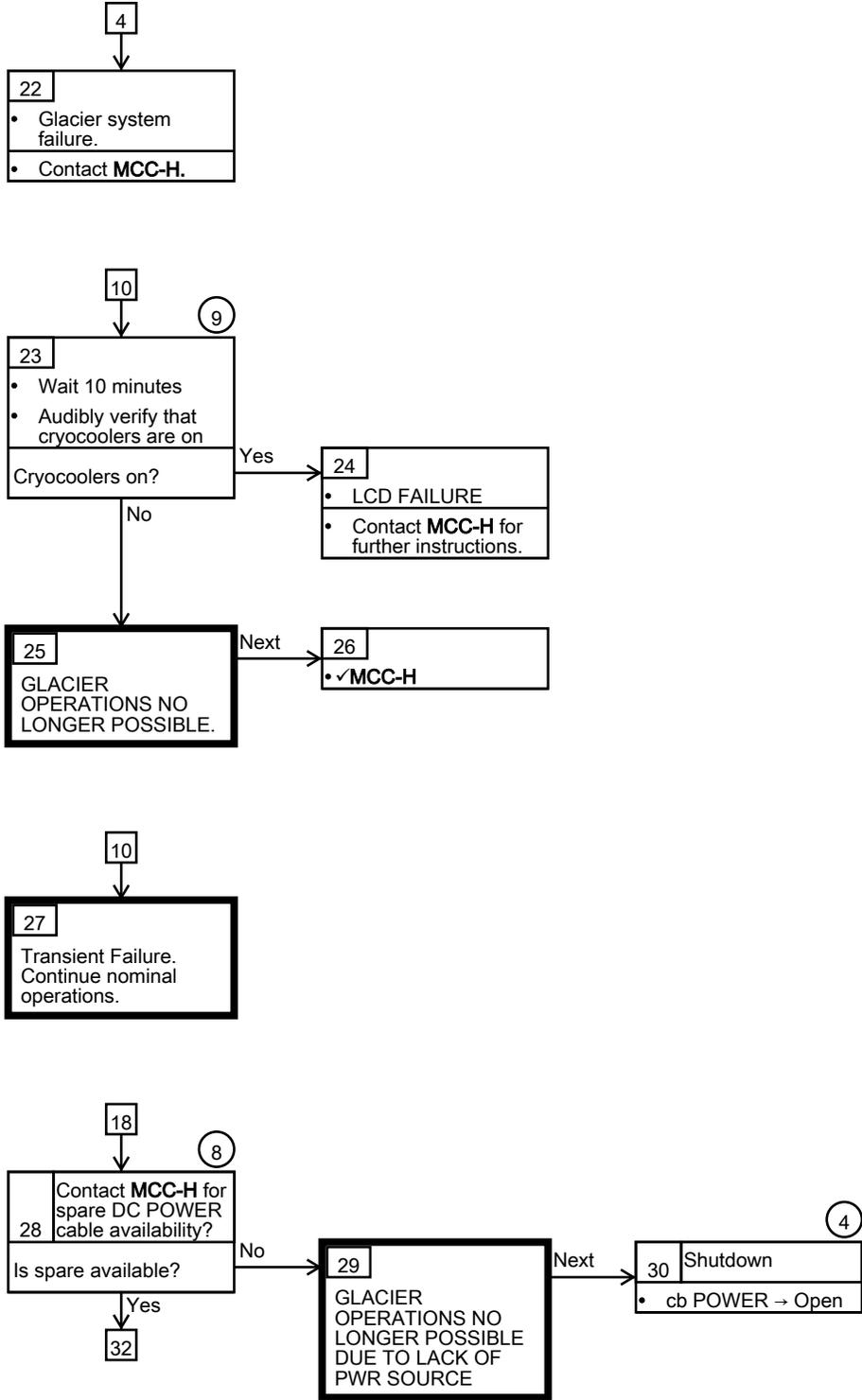
Verify connectors are properly mated and seated securely.

4

Internal voltages require approximately 2 min to dissipate upon cb open. Dissipation complete when Power LED extinguishes.

5

Verify connectors are properly mated and seated securely when reconnecting.



4 Internal voltages require approximately 2 min to dissipate upon cb open. Dissipation complete when Power LED extinguishes.

8 Spare Cable stowed in IFM Contingency Hose and Cable Kit (CHCK).

9 Glacier will return to previous state approximately 3 minutes after initialization.

21

31	Turn off system
<ul style="list-style-type: none"> • On MCC-H GO • cb POWER → Open (It off) 	
<ul style="list-style-type: none"> • Alternate Power source () J_ • ✓cb Open • ✓sw —OFF 	

Next

14

28

2 3 4

32	Switch to spare cable
<ul style="list-style-type: none"> • Unstow spare DC POWER cable 	
(Glacier)	
<ul style="list-style-type: none"> • cb POWER → Open 	
(ML86B:E)	
<ul style="list-style-type: none"> • ✓cb MNB MAR 1 – Open 	
(ML85E(MUP))	
<ul style="list-style-type: none"> • A/E PAYLOAD DC PWR MUP J11 → ←J11 • SPARE DC POWER CABLE → ←J11 	
(Glacier)	
<ul style="list-style-type: none"> • ✓A/E PAYLOAD DC PWR GLACIER PWR J1/MA16F/G → ←POWER J1 • SPARE DC PWR CABLE → ←POWER J1 	

Next

33	Repower Glacier
(ML86B:E)	
<ul style="list-style-type: none"> • cb MNB MAR 1 → Close 	
(Glacier)	
<ul style="list-style-type: none"> • cb POWER → Close (It on) 	
Main Power LED lit?	
Yes	→ 12

No

34

2

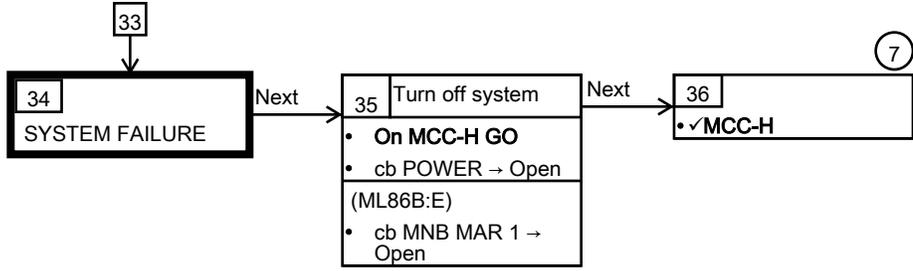
Always deadface DC Power source when disconnecting/connecting power cable.

3

Verify connectors are properly mated and seated securely.

4

Internal voltages require approximately 2 min to dissipate upon cb open. Dissipation complete when Power LED extinguishes.



7
The Glacier payload may continue to function if LCD fails.

OBJECTIVE:

This procedure will perform a manual reconfigure of the Glacier System using the front panel and display buttons.

Glacier

1. ✓Display – 'HOME'

```
*****
*
* If display —'***Error Pending**'
*
* | Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* | PAYLOADS), then:
*
*
* If 'HOME'not shown:
* | pb Right (EXIT) → Press until 'HOME' appears
*
*****
```

2. Record front panel display 'CURR TEMP', 'SET POINT', and 'GPS' and any ground supplied data in [TABLE 2 GLACIER RESET LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

3. SET CONTROL MODE TO IDLE

- 3.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 3.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 3.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 3.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 3.5 pb Left (NEXT) → Press (one time), following appears:
'Temp Control'
'Control Mode 2/18'
- 3.6 pb Center (SELECT) → Press (one time), following appears:
'Control Mode'
'XXXX'

NOTE

1. There are 3 options for setting the Control Mode (IDLE, SET POINT, and MANUAL).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the Mode, and the right pushbutton (CANCEL) returns to the previous Mode.

3.7 pb Left (NEXT) → Press as required to select desired Temperature Control Mode to Idle

3.8 pb Center (APPLY) → Press (one time)

3.9 ✓Confirm New Control Mode = Idle

3.10 pb Left (APPLY) → Press (one time), following appears:
 'Temp Control'
 'Control Mode 2/18'

3.11 ✓Control Mode = Idle

3.12 pb Right (EXIT) → Press until 'HOME' appears

4. SETPOINT TEMPERATURE

4.1 pb Left (MENU) → Press (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'

4.2 pb Left (NEXT) → Press (three times), following appears:
 'MAIN MENU'
 'SETUP 4/5'

4.3 pb Center (SELECT) → Press (one time), following appears:
 'SETUP'
 'Temp Control 1/3'

4.4 pb Center (SELECT) → Press (one time), following appears:
 'Temp Control'
 'Set Point Temp 1/18'

4.5 pb Center (SELECT) → Press (one time), following appears:
 'Set Point Temp'
 'XXXXX °C'
 '-160.0 to +004.0'

NOTE

1. The left pushbutton (CURSOR) moves cursor between New Set Point Temp fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases New Set Point Temp selected digit field value by 1.

4.6 Enter desired Set Point Temperature per **MCC-H**

- 4.7 pb Right (DONE) → Press (one time)
- 4.8 ✓Confirm New Set Point = desired Set Point
- 4.9 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 4.10 ✓Set Point Temp = desired Set Point
- 4.11 pb Right (EXIT) → Press until **'HOME'** appears
5. TEMPERATURE CONTROL SENSORS
- 5.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 5.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 5.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 5.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 5.5 pb Left (NEXT) → Press (two times), following appears:
'Temp Control'
'Control Sensors 3/18'
- 5.6 pb Center (SELECT) → Press (one time), following appears:
'Control Sensors'
'INNER OUTLET INLET'

NOTE

1. The left pushbutton (CURSOR) moves cursor between Control Sensor fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) changes the values of the Control Sensor fields from 0 to 1 or vice versa.

- 5.7 Enter desired combination of Control Sensors per **MCC-H**
- 5.8 pb Right (DONE) → Press (one time)
- 5.9 ✓Confirm New Control Sensors = desired Control Sensors
- 5.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Control Sensors 3/18'

- 5.11 ✓Control Sensors = desired Control Sensors
- 5.12 pb Right (EXIT) → Press until '**HOME**' appears
- 6. AIR MANAGEMENT PROCEED MESSAGE
 - 6.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 6.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
 - 6.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
 - 6.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 6.5 pb Left (NEXT) → Press (three times), following appears:
'Temp Control'
'AirMgmt Proceed 4/18'
 - 6.6 pb Center (SELECT) → Press (one time), following appears:
'AirMgmt Proceed'
'PROCEED'
 - 6.7 pb Center (APPLY) → Press (one time)
 - 6.8 ✓Display line 3 – PROCEED
 - 6.9 pb Right (EXIT) → Press until '**HOME**' appears
- 7. TEMPERATURE CONTROL BANDWIDTH
 - 7.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 7.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
 - 7.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
 - 7.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 7.5 pb Left (NEXT) → Press (four times), following appears:

'Temp Control'
'Bandwidth 5/18'
'XX.X °C'

- 7.6 pb Center (SELECT) → Press (one time), following appears:
'Bandwidth'
'XX.X °C'
'00.1 to 25.5'

NOTE

1. The left pushbutton (CURSOR) moves cursor between Bandwidth fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases Bandwidth selected digit field value by 1.

- 7.7 Enter desired Bandwidth per **MCC-H**
- 7.8 pb Right (DONE) → Press (one time)
- 7.9 ✓Confirm New Bandwidth = desired Bandwidth
- 7.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Bandwidth 5/18'
- 7.11 ✓Bandwidth = desired Bandwidth
- 7.12 pb Right (EXIT) → Press until '**HOME**' appears
8. PRIMARY COOLER
- 8.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 8.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 8.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 8.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 8.5 pb Left (NEXT) → Press (five times), following appears:
'Temp Control'
'Primary Cooler 6/18'
- 8.6 pb Center (SELECT) → Press (one time), following appears:
'Primary Cooler'
'COOLER X'

NOTE

1. There are 2 options for Primary Cooler (COOLER 1 and COOLER 2).
2. The left pushbutton (NEXT) changes the Primary Cooler, the center pushbutton (APPLY) selects the Primary Cooler, and the right pushbutton (CANCEL) returns to the previous display.

- 8.7 pb Left (NEXT) → Press as required to select desired Primary Cooler per **MCC-H**
- 8.8 pb Center (APPLY) → Press (one time)
- 8.9 ✓Confirm New Primary Cooler = desired Cooler
- 8.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Primary Cooler 6/18'
- 8.11 ✓Primary Cooler = desired Cooler
- 8.12 pb Right (EXIT) → Press until **'HOME'** appears
9. COOLER 1 STROKE
 - 9.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 9.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
 - 9.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
 - 9.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 9.5 pb Left (NEXT) → Press (six times), following appears:
'Temp Control'
'Cooler 1 Stroke 7/18'
 - 9.6 pb Center (SELECT) → Press (one time), following appears:
'Cooler 1 Stroke'
'XX'
'03 to 63'

NOTE

1. The left pushbutton (CURSOR) moves cursor between Stroke fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases Cooler Stroke selected digit field by 1.

- 9.7 Enter desired Cooler 1 Stroke value per **MCC-H**
- 9.8 pb Right (DONE) → Press (one time)
- 9.9 ✓Confirm New Cooler 1 Stroke = desired Cooler 1 Stroke
- 9.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Cooler 1 Stroke 7/18'
- 9.11 ✓Cooler 1 Stroke = desired Cooler 1 Stroke
- 9.12 pb Right (EXIT) → Press until '**HOME**' appears
10. COOLER 1 STATE
 - 10.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
 - 10.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
 - 10.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
 - 10.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
 - 10.5 pb Left (NEXT) → Press (seven times), following appears:
'Temp Control'
'Cooler 1 State 8/18'
 - 10.6 pb Center (SELECT) → Press (one time), following appears:
'Cooler 1 State'
'XX'

NOTE

1. There are 2 options for Cooler 1 State (ON and OFF).
2. The left pushbutton (NEXT) changes the Cooler 1 State, the center pushbutton (APPLY) selects the State, and the right pushbutton (CANCEL) returns to the previous display.

- 10.7 pb Left (NEXT) → Press as required to select desired Cooler 1 State per **MCC-H**
- 10.8 pb Center (APPLY) → Press (one time)
- 10.9 ✓Confirm New Cooler 1 State = desired State
- 10.10 pb Left (APPLY) → Press (one time), following appears:
 'Temp Control'
 'Cooler 1 State 8/18'
- 10.11 ✓Cooler 1 State = desired Cooler 1 State
- 10.12 pb Right (EXIT) → Press until '**HOME**' appears

11. COOLER 2 STROKE

- 11.1 pb Left (MENU) → Press (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'
- 11.2 pb Left (NEXT) → Press (three times), following appears:
 'MAIN MENU'
 'SETUP 4/5'
- 11.3 pb Center (SELECT) → Press (one time), following appears:
 'SETUP'
 'Temp Control 1/3'
- 11.4 pb Center (SELECT) → Press (one time), following appears:
 'Temp Control'
 'Set Point Temp 1/18'
- 11.5 pb Left (NEXT) → Press (eight times), following appears:
 'Temp Control'
 'Cooler 2 Stroke 9/18'
- 11.6 pb Center (SELECT) → Press (one time), following appears:
 'Cooler 2 Stroke'
 'XX'
 '03 to 63'

NOTE

- 1. The left pushbutton (CURSOR) moves cursor between Stroke fields. The default cursor position will be blinking.
- 2. The center pushbutton (PLUS) increases Cooler Stroke selected digit field by 1.

- 11.7 Enter desired Cooler 2 Stroke value per **MCC-H**
- 11.8 pb Right (DONE) → Press (one time)
- 11.9 ✓Confirm New Cooler 2 Stroke = desired Cooler 2 Stroke

11.10 pb Left (APPLY) → Press (one time), following appears:
 'Temp Control'
 'Cooler 2 Stroke 9/18'

11.11 ✓Cooler 2 Stroke = desired Cooler 2 Stroke

11.12 pb Right (EXIT) → Press until '**HOME**' appears

12. COOLER 2 STATE

12.1 pb Left (MENU) → Press (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'

12.2 pb Left (NEXT) → Press (three times), following appears:
 'MAIN MENU'
 'SETUP 4/5'

12.3 pb Center (SELECT) → Press (one time), following appears:
 'SETUP'
 'Temp Control 1/3'

12.4 pb Center (SELECT) → Press (one time), following appears:
 'Temp Control'
 'Set Point Temp 1/18'

12.5 pb Left (NEXT) → Press (nine times), following appears:
 'Temp Control'
 'Cooler 2 State 10/18'

12.6 pb Center (SELECT) → Press (one time), following appears:
 'Cooler 2 State'
 'XX'

NOTE

1. There are 2 options for Cooler 2 State (ON and OFF).
2. The left pushbutton (NEXT) changes the Cooler 2 State, the center pushbutton (APPLY) selects the State, and the right pushbutton (CANCEL) returns to the previous display.

12.7 pb Left (NEXT) → Press as required to select desired Cooler 2 State per **MCC-H**

12.8 pb Center (APPLY) → Press (one time)

12.9 ✓Confirm New Cooler 2 State = desired State

12.10 pb Left (APPLY) → Press (one time), following appears:
 'Temp Control'
 'Cooler 2 State 10/18'

12.11 ✓Cooler 2 State = desired Cooler 2 State

12.12 pb Right (EXIT) → Press until '**HOME**' appears

13. MAXIMUM POWER DRAW

- 13.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 13.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 13.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 13.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 13.5 pb Left (NEXT) → Press (twelve times), following appears:
'Temp Control'
'Max Power Draw 13/18'
- 13.6 pb Center (SELECT) → Press (one time), following appears:
'Max Power Draw'
'XXX W'
'000 to 420'

NOTE

- 1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
- 2. The center pushbutton (PLUS) increases selected digit field by 1.

- 13.7 Enter desired Max Power Draw value per **MCC-H**
- 13.8 pb Right (DONE) → Press (one time)
- 13.9 ✓Confirm New Max Power = desired Max Power Draw
- 13.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Max Power Draw 13/18'
- 13.11 ✓Max Power Draw = desired Max Power Draw
- 13.12 pb Right (EXIT) → Press until '**HOME**' appears

14. OVER CURRENT

- 14.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 14.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'

'SETUP 4/5'

- 14.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 14.4 pb Center (SELECT) → Press (one time), following appears:
'Temp Control'
'Set Point Temp 1/18'
- 14.5 pb Left (NEXT) → Press (thirteen times), following appears:
'Temp Control'
'Over Current 14/18'
- 14.6 pb Center (SELECT) → Press (one time), following appears:
'Over Current'
'XX.X A'
'00.0 to 30.0'

NOTE

- 1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
- 2. The center pushbutton (PLUS) increases selected digit field by 1.

- 14.7 Enter desired Over Current value per **MCC-H**
- 14.8 pb Right (DONE) → Press (one time)
- 14.9 ✓Confirm New Over Current = desired Over Current
- 14.10 pb Left (APPLY) → Press (one time), following appears:
'Temp Control'
'Over Current 14/18'
- 14.11 ✓Over Current = desired Over Current
- 14.12 pb Right (EXIT) → Press until '**HOME**' appears

15. AIR MANAGEMENT MODE

- 15.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 15.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 15.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 15.4 pb Left (NEXT) → Press (one time), following appears:
'SETUP'

'Air Management 2/3'

15.5 pb Center (SELECT) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

15.6 pb Center (SELECT) → Press (one time), following appears:
'Air Mgmt Mode'
'XXXXX'

NOTE

1. There are 2 options for Air Mgmt Mode (MANUAL and AUTOMATIC).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the Mode, and the right pushbutton (CANCEL) returns to the previous display.

15.7 pb Left (NEXT) → Press as required to select desired Air Mgmt Mode per **MCC-H**

15.8 pb Center (APPLY) → Press (one time)

15.9 ✓Confirm New Air Mgmt Mode = desired Air Mgmt Mode

15.10 pb Left (APPLY) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

15.11 ✓Air Mgmt Mode = desired Air Mgmt Mode

15.12 pb Right (EXIT) → Press until **'HOME'** appears

16. AIR MANAGEMENT HUMIDITY

16.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

16.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

16.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

16.4 pb Left (NEXT) → Press (one time), following appears:
'SETUP'
'Air Management 2/3'

16.5 pb Center (SELECT) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

16.6 pb Left (NEXT) → Press (one time), following appears:

'Air Management'
'Humidity Config 2/6'

- 16.7 pb Center (SELECT) → Press (one time), following appears:
'Humidity Config'
'Pump: 12 Valve: 1234'
'XX XXXX'

NOTE

1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) toggles the selected Pump (1 or 2) or Valve (1-4) between 0 and 1 (OFF/ON).

- 16.8 Enter desired Humidity Config per **MCC-H**

- 16.9 pb Right (DONE) → Press (one time)

- 16.10 ✓ Confirm New Humidity Config = desired Humidity Config

- 16.11 pb Left (APPLY) → Press (one time), following appears:
'Air Management'
'Humidity Config 2/6'

- 16.12 ✓ Humidity Config = desired Humidity Config

- 16.13 pb Right (EXIT) → Press until '**HOME**' appears

17. AIR MANAGEMENT PRESSURE CONFIGURATION

- 17.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

- 17.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

- 17.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

- 17.4 pb Left (NEXT) → Press (one time), following appears:
'SETUP'
'Air Management 2/3'

- 17.5 pb Center (SELECT) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

- 17.6 pb Left (NEXT) → Press (two times), following appears:
'Air Management'
'Pressure Config 3/6'

- 17.7 pb Center (SELECT) → Press (one time), following appears:
'Pressure Config'
'Pump: 12 Valve: 1234'
'XX XXXX'

NOTE

1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) toggles the selected Pump (1 or 2) or Valve (1-4) between 0 and 1 (OFF/ON).

- 17.8 Enter desired Pressure Config per **MCC-H**

- 17.9 pb Right (DONE) → Press (one time)

- 17.10 ✓ Confirm New Pressure Config = desired Pressure Config

- 17.11 pb Left (APPLY) → Press (one time), following appears:
'Air Management'
'Pressure Config 3/6'

- 17.12 ✓ Pressure Config = desired Pressure Config

- 17.13 pb Right (EXIT) → Press until **'HOME'** appears

18. AIR MANAGEMENT MANUAL CONFIGURATION

- 18.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

- 18.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

- 18.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

- 18.4 pb Left (NEXT) → Press (one time), following appears:
'SETUP'
'Air Management 2/3'

- 18.5 pb Center (SELECT) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

- 18.6 pb Left (NEXT) → Press (three times), following appears:
'Air Management'
'Manual Config 4/6'

- 18.7 pb Center (SELECT) → Press (one time), following appears:
'Manual Config'

'Pump: 12 Valve: 1234'
'XX XXXX'

NOTE

1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) toggles the selected Pump (1 or 2) or Valve (1-4) between 0 and 1 (OFF/ON).

18.8 Enter desired Manual Config per **MCC-H**

18.9 pb Right (DONE) → Press (one time)

18.10 ✓ Confirm New Manual Config = desired Manual Config

18.11 pb Left (APPLY) → Press (one time), following appears:
'Air Management'
'Manual Config 4/6'

18.12 ✓ Manual Config = desired Manual Config

18.13 pb Right (EXIT) → Press until '**HOME**' appears

19. START HUMIDITY MONITORING TIME

19.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

19.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

19.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

19.4 pb Left (NEXT) → Press (one time), following appears:
'SETUP'
'Air Management 2/3'

19.5 pb Center (SELECT) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

19.6 pb Left (NEXT) → Press (four times), following appears:
'Air Management'
'Start Humidity 5/6'

19.7 pb Center (SELECT) → Press (one time), following appears:
'Start Humidity'
'XXXXX seconds'
'00000 to 65535'

NOTE

1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases the selected digit field value by 1.

19.8 Enter desired Start Humidity per **MCC-H**

19.9 pb Right (DONE) → Press (one time)

19.10 ✓ Confirm New Start Humidity = desired Start Humidity

19.11 pb Left (APPLY) → Press (one time), following appears:
'Air Management'
'Start Humidity 5/6'

19.12 ✓ Start Humidity = desired Start Humidity

19.13 pb Right (EXIT) → Press until **'HOME'** appears

20. START PRESSURE MONITORING TIME

20.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

20.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

20.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

20.4 pb Left (NEXT) → Press (one time), following appears:
'SETUP'
'Air Management 2/3'

20.5 pb Center (SELECT) → Press (one time), following appears:
'Air Management'
'Air Mgmt Mode 1/6'

20.6 pb Left (NEXT) → Press (five times), following appears:
'Air Management'
'Start Pressure 6/6'

20.7 pb Center (SELECT) → Press (one time), following appears:
'Start Pressure'
'XXXXX seconds'
'00000 to 65535'

NOTE

1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
2. The center pushbutton (PLUS) increases the selected digit field value by 1.

20.8 Enter desired Start Pressure per **MCC-H**

20.9 pb Right (DONE) → Press (one time)

20.10 ✓ Confirm New Start Pressure = desired Start Pressure

20.11 pb Left (APPLY) → Press (one time), following appears:
'Air Management'
'Start Pressure 6/6'

20.12 ✓ Start Pressure = desired Start Pressure

20.13 pb Right (EXIT) → Press until **'HOME'** appears

21. CIRCULATION FAN MODE

21.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'

21.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'

21.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'

21.4 pb Left (NEXT) → Press (two times), following appears:
'SETUP'
'Auxiliary 3/3'

21.5 pb Center (SELECT) → Press (one time), following appears:
'Auxiliary'
'Circ Fan Mode 1/7'

21.6 pb Center (SELECT) → Press (one time), following appears:
'Circ Fan Mode'
'XXXXX'

NOTE

1. There are 2 options for Circ Fan Mode (MANUAL and AUTOMATIC).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the Mode, and the right pushbutton (CANCEL) returns to the previous display.

- 21.7 pb Left (NEXT) → Press as required to select desired Circ Fan Mode per **MCC-H**
- 21.8 pb Center (APPLY) → Press (one time)
- 21.9 ✓Confirm New Circ Fan Mode = desired Circ Fan Mode
- 21.10 pb Left (APPLY) → Press (one time), following appears:
'Auxiliary'
'Circ Fan Mode 1/7'
- 21.11 ✓Circ Fan Mode = desired Circ Fan Mode
- 21.12 pb Right (EXIT) → Press until '**HOME**' appears

22. CIRCULATION FAN POWER

- 22.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 22.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 22.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 22.4 pb Left (NEXT) → Press (two times), following appears:
'SETUP'
'Auxiliary 3/3'
- 22.5 pb Center (SELECT) → Press (one time), following appears:
'Auxiliary'
'Circ Fan Mode 1/7'
- 22.6 pb Left (NEXT) → Press (one time), following appears:
'Auxiliary'
'Circ Fan Power 2/7'
- 22.7 pb Center (SELECT) → Press (one time), following appears:
'Circ Fan Power'
'XXX %'
'000 to 090'

NOTE

- 1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
- 2. The center pushbutton (PLUS) increases the selected digit field value by 1.

- 22.8 Enter desired Circ Fan Power per **MCC-H**

- 22.9 pb Right (DONE) → Press (one time)
- 22.10 ✓ Confirm New Circ Fan Power = desired Circ Fan Power
- 22.11 pb Left (APPLY) → Press (one time), following appears:
'Auxiliary'
'Circ Fan Power 2/7'
- 22.12 ✓ Circ Fan Power = desired Circ Fan Power
- 22.13 pb Right (EXIT) → Press until 'HOME' appears

23. DATA STORAGE INTERVAL

- 23.1 pb Left (MENU) → Press (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 23.2 pb Left (NEXT) → Press (three times), following appears:
'MAIN MENU'
'SETUP 4/5'
- 23.3 pb Center (SELECT) → Press (one time), following appears:
'SETUP'
'Temp Control 1/3'
- 23.4 pb Left (NEXT) → Press (two times), following appears:
'SETUP'
'Auxiliary 3/3'
- 23.5 pb Center (SELECT) → Press (one time), following appears:
'Auxiliary'
'Circ Fan Mode 1/7'
- 23.6 pb Left (NEXT) → Press (two times), following appears:
'Auxiliary'
'Data Storage 3/7'
- 23.7 pb Center (SELECT) → Press (one time), following appears:
'Data Storage'
'XXXX seconds'
'0000 to 3600'

NOTE

- 1. The left pushbutton (CURSOR) moves cursor between fields. The default cursor position will be blinking.
- 2. The center pushbutton (PLUS) increases the selected digit field value by 1.

- 23.8 Enter desired Data Storage per **MCC-H**
- 23.9 pb Right (DONE) → Press (one time)
- 23.10 ✓ Confirm New Store Period = desired Store Period

23.11 pb Left (APPLY) → Press (one time), following appears:
 'Auxiliary'
 'Data Storage 3/7'

23.12 ✓Data Storage = desired Data Storage

23.13 pb Right (EXIT) → Press until 'HOME' appears

24. TEMPERATURE CONTROL MODE

24.1 pb Left (MENU) → Press (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'

24.2 pb Left (NEXT) → Press (three times), following appears:
 'MAIN MENU'
 'SETUP 4/5'

24.3 pb Center (SELECT) → Press (one time), following appears:
 'SETUP'
 'Temp Control 1/3'

24.4 pb Center (SELECT) → Press (one time), following appears:
 'Temp Control'
 'Set Point Temp 1/18'

24.5 pb Left (NEXT) → Press (one time), following appears:
 'Temp Control'
 'Control Mode 2/18'

24.6 pb Center (SELECT) → Press (one time), following appears:
 'Control Mode'
 'XXXX'

NOTE

1. There are 3 options for setting the Control Mode (IDLE, SET POINT, and MANUAL).
2. The left pushbutton (NEXT) changes the Mode, the center pushbutton (APPLY) selects the Mode, and the right pushbutton (CANCEL) returns to the previous Mode.

24.7 pb Left (NEXT) → Press as required to select desired Temperature Control Mode per **MCC-H**

24.8 pb Center (APPLY) → Press (one time)

24.9 ✓Confirm New Control Mode = desired Control Mode

24.10 pb Left (APPLY) → Press (one time), following appears:
 'Temp Control'
 'Control Mode 2/18'

24.11 ✓Control Mode = desired Control Mode

GLACIER MANUAL RECONFIGURE

(ASSY OPS/ULF3/FIN 1)

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- 24.12 pb Right (EXIT) → Press until '**HOME**' appears
25. Notify **MCC-H** GLACIER MANUAL RECONFIGURATION is complete.

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OBJECTIVE:

The following steps will perform a power cycle of the Glacier System.

On MCC-H GO

```

*****
*
* If Display - ***Error Pending***
*
* | Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* | PAYLOADS), then:
*
*****
    
```

Glacier

1. ✓Display 'HOME'


```

*****
*
* If 'HOME' not shown:
* | pb Right (EXIT) → Press until 'HOME' appears
*
*****
            
```
2. pb Left (MENU) → Press (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'
3. pb Left (NEXT) → Press (four times), following appears:
 'MAIN MENU'
 'SHUTDOWN 5/5'
4. pb Center (SELECT) → Press (one time), following appears
 'SHUTDOWN'
 'SHUTDOWN 1/2'
5. pb Center (SELECT) → Press (one time), following appears:
 'Confirm Shutdown'
 'SHUTDOWN'
6. pb Left (APPLY) → Press (one time), following appears:
 'Glacier'
 'System'
 'Shutting Down'
 'Please wait...'
7. Verify –
 'Glacier'
 'Shutdown Complete'
 'TURN POWER OFF'
8. Wait 5 seconds.

NOTE

Power light can take up to 2 minutes to fully extinguish. Once main power has been removed, the battery light will start to flash.

- 9. ✓BATTERY – ON (It on)
- 10. cb POWER → Open (It off)
- 11. Wait 1 minute. (No need to wait for POWER light to extinguish)
- 12. cb POWER → Close (It on)

NOTE

System Initialization may take up to 3 minutes. Initialization complete once Line 1 of front panel display reads 'HOME'.

- 13. ✓Display 'HOME'

*
* If 'HOME' not shown,
* | Perform [GLACIER FAIL TO REPOWER](#) (SODF: ASSY OPS:
* | PAYLOADS), then:
*

*
* If Display —'***Error Pending***'
* |
* | Perform [GLACIER ERROR MESSAGE](#) (SODF: ASSY OPS:
* | PAYLOADS), then:
*

- 14. Log from Glacier front panel:
CURR TEMP: _____ °C
GPS: _____ / _____ : _____
- 15. Notify MCC-H of Power Cycle completion and data recorded in step 14.

OBJECTIVE:

The following steps allow the recording of some Glacier data for diagnostic purposes.

```

*****
*
* If Display – ***Error Pending***:
* |
* |   Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* |   PAYLOADS), then:
*
*****

```

1. RECORDING DATA

- 1.1 ✓MCC-H for parameters to record in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

Glacier

- 1.2 ✓DISPLAY – 'HOME'

```

*****
*
* If 'HOME' not shown:
* |   pb Right (EXIT) → push until 'HOME' appears
*
*****

```

2. RECORDING CRYOGENIC STATUS

- 2.1 Record from front panel 'CURR TEMP', 'SET POINT', and 'GPS' in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.2 pb Left (MENU) → push (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'
- 2.3 pb Left (NEXT) → push (one time), following appears:
 'MAIN MENU'
 'STATUS 2/5'
- 2.4 pb Center (SELECT) → push (one time), following appears:
 'STATUS'
 'Cryogenic 1/3'
- 2.5 pb Center (SELECT) → push (one time), following appears:
 'Cryogenic'
 'Cooler 1 Stroke 1/21'
 'XX'

GLACIER RECORD CRYOGENIC DIAGNOSTIC DATA

(ASSY OPS/ULF3/FIN 1)

Page 2 of 2 pages

NOTE

1. The center pushbutton (NEXT) moves to next status display.
2. The left pushbutton (PREV) moves to previous status display.

- 2.6 Record Cryogenic data per **MCC-H** direction in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.7 pb Center (NEXT) → press until all Cryogenic Status data has been recorded per **MCC-H** direction
- 2.8 pb Right (EXIT) → push until '**HOME**'
- 2.9 Notify **MCC-H** to report log values from [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

GLACIER RECORD QUICK DIAGNOSTIC DATA

(ASSY OPS/ULF3/FIN 1)

Page 1 of 2 pages

OBJECTIVE:

The following steps allow the recording of some Glacier data for diagnostic purposes.

```
*****
*
* If Display – ***Error Pending***:
* |   Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* |   PAYLOADS), then:
*
*****
```

1. RECORDING DATA

- 1.1 ✓MCC-H for parameters to record in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

Glacier

- 1.2 ✓Display – 'HOME'

```
*****
*
* If 'HOME' not shown:
* |   pb Right (EXIT) → push until 'HOME' appears
*
*****
```

2. RECORDING QUICK STATUS

- 2.1 Record from front panel 'CURR TEMP', 'SET POINT', and 'GPS' in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.2 pb Left (MENU) → push (one time), following appears:
'MAIN MENU'
'QUICK STATUS 1/5'
- 2.3 pb Center (SELECT) → push (one time), following appears:
'QUICK STATUS'
'Cold Head 1A 1/16'

NOTE

- 1. The center pushbutton (NEXT) moves to next status display.
- 2. The left pushbutton (PREV) moves to previous status display.

- 2.4 Record Quick Status data per MCC-H direction in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.5 pb Center (NEXT) → push until all Quick Status data has been recorded per MCC-H direction.

- 2.6 pb Right (EXIT) → push until **'HOME'**
- 2.7 Notify **MCC-H** to report log values from [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

OBJECTIVE:

The following steps allow the recording of some Glacier data for diagnostic purposes.

```
*****
*
* If Display – ***Error Pending***:
* |   Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* |   PAYLOADS), then:
*
*****
```

1. RECORDING DATA

- 1.1 ✓MCC-H for parameters to record in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

Glacier

- 1.2 ✓DISPLAY – 'HOME'


```
*****
*
* If 'HOME' not shown:
* |   pb Right (EXIT) → push until 'HOME' appears
*
*****
```

2. RECORDING RESOURCES STATUS

- 2.1 Record from front panel 'CURR TEMP', 'SET POINT', and 'GPS' in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.2 pb Left (MENU) → push (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'
- 2.3 pb Left (NEXT) → push (one time), following appears:
 'MAIN MENU'
 'STATUS 2/5'
- 2.4 pb Center (SELECT) → push (one time), following appears:
 'STATUS'
 'Cryogenic 1/3'
- 2.5 pb Left (NEXT) → push (one time), following appears:
 'STATUS'
 'Resources 2/3'
- 2.6 pb Center (SELECT) → push (one time), following appears:
 'Resources'

GLACIER RECORD RESOURCES DIAGNOSTIC DATA

(ASSY OPS/ULF3/FIN 1)

Page 2 of 2 pages

'AAA Outlet 1/8'
'XX.X° C'

NOTE

1. The center pushbutton (NEXT) moves to next status display.
2. The left pushbutton (PREV) moves to previous status display.

- 2.7 Record Resource data per **MCC-H** direction in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.8 pb Center (NEXT) → push until all Resource data has been recorded per **MCC-H** direction.
- 2.9 pb Right (EXIT) → push until '**HOME**'
- 2.10 Notify **MCC-H** to report log values from [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

OBJECTIVE:

The following steps allow the recording of some Glacier data for diagnostic purposes.

```
*****
*
* If Display – ***Error Pending***:
* |   Perform GLACIER ERROR MESSAGE (SODF: ASSY OPS:
* |   PAYLOADS), then:
*
*****
```

1. RECORDING DATA

1.1 ✓MCC-H for parameters to record in TABLE 3 GLACIER DIAGNOSTIC LOG FILE (SODF: ASSY OPS: PAYLOADS).

Glacier

1.2 ✓DISPLAY – 'HOME'
 *
 * If 'HOME' not shown:
 * | pb Right (EXIT) → push until 'HOME' appears
 *

2. RECORDING SYSTEM STATUS

2.1 Record from front panel 'CURR TEMP', 'SET POINT', and 'GPS' in TABLE 3 GLACIER DIAGNOSTIC LOG FILE (SODF: ASSY OPS: PAYLOADS).

2.2 pb Left (MENU) → push (one time), following appears:
 'MAIN MENU'
 'QUICK STATUS 1/5'

2.3 pb Left (NEXT) → push (one time), following appears:
 'MAIN MENU'
 'STATUS 2/5'

2.4 pb Center (SELECT) → push (one time), following appears:
 'STATUS'
 'Cryogenic 1/3'

2.5 pb Left (NEXT) → push (two times), following appears:
 'STATUS'
 'System 3/3'

2.6 pb Center (SELECT) → push (one time), following appears:

'System'

'CPU 1/9'

'XX.X° C'

NOTE

1. The center pushbutton (NEXT) moves to next status display.
2. The left pushbutton (PREV) moves to previous status display.

- 2.7 Record System Status data per **MCC-H** direction in [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).
- 2.8 pb Center (NEXT) → push until all System Status data has been recorded per **MCC-H** direction.
- 2.9 pb Right (EXIT) → push until '**HOME**'
- 2.10 Notify **MCC-H** to report log values from [TABLE 3 GLACIER DIAGNOSTIC LOG FILE](#) (SODF: ASSY OPS: PAYLOADS).

TABLE 1 GLACIER ERROR MESSAGE LOG

(ASSY OPS/ULF3/FIN) Page 1 of 3 pages

Table 1-1 Glacier Error Log File

GMT	Error Message	Error Event	Error Status
Hours: Minutes: Seconds	Text	X of Total Number	(IP) INACTIVE / PENDING (AP) ACTIVE / PENDING (IA) INACTIVE / ACK (AA) ACTIVE / ACK (R) RESET
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____
__ : __ : __	_____	__ / __	_____

TABLE 1 GLACIER ERROR MESSAGE LOG

(ASSY OPS/ULF3/FIN) Page 2 of 3 pages

Possible Glacier Error Messages:

- (1) '**N/A**' (Ground Message Only)
- (2) '**Water Flow Range**'
- (3) '**Water Temp Range**'
- (4) '**AAA Air Temp**'
- (5) '**Voltage Range**'
- (6) '**Current Range**'
- (7) '**RIC Comm Loss**'
- (8) '**Over Temp**'
- (9) '**Hardware Error**'
- (10) '**Bandwidth**'

Table 1-2 (002) Water Flow Range/(003) Water Temp Range Error Data

Sensor	Value	Units
Outlet Water		°C
Inlet Water		°C
Flow Rate		kg/h

Table 1-3 (004) AAA Air Temp Error Data

Sensor	Value	Units
AAA Outlet		°C
AAA Inlet 1		°C
AAA Inlet 2		°C

Table 1-4 (005) Voltage Range/(006) Current Range Error Data

Sensor	Value	Units
Main Current		Amperes
Main Voltage		Volts
Over Current		Amperes

TABLE 1 GLACIER ERROR MESSAGE LOG

(ASSY OPS/ULF3/FIN) Page 3 of 3 pages

Table 1-5 (008) Over Temp Error Data

Sensor	Value	Units
CPU		°C
Capacitors A		°C
Capacitors B		°C
Data Logger		°C

Table 1-6 Bandwidth Error Data

Parameter	Value	Units
CURR TEMP		°C
SET POINT		°C
GPS		HH:MM:SS
Cold Head 1A		°C
Cold Head 1B		°C
Cold Head 2A		°C
Cold Head 2B		°C
Circ Fan Speed		RPM

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TABLE 2 GLACIER RESET LOG FILE
 (ASSY OPS/ULF3/FIN) Page 1 of 5 pages

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Parameter		Event 1	Event 2	Definition or Options
1	CURR TEMP	Start ____ . ____ °C End ____ . ____ °C	Start ____ . ____ °C End ____ . ____ °C	GLACIER Current Temperature XXXX.XX °C
2	SET POINT	Start ____ . ____ °C End ____ . ____ °C	Start ____ . ____ °C End ____ . ____ °C	-160.0 to +4.0° C
3	GPS	Start ____ : ____ : ____ GPS End ____ : ____ : ____ GPS	Start ____ : ____ : ____ GPS End ____ : ____ : ____ GPS	Hours: Min: Sec
4	Expected CURR TEMP	____ . ____ °C	____ . ____ °C	Expected Glacier Current Temperature per MCC-H (-160.0 to +4.0° C)
5	Expected SET POINT	____ . ____ °C	____ . ____ °C	Expected Set Point Temperature per MCC-H (-160.0 to +4.0° C)
Values for Reconfiguration of Setup: Temperature Control:				
6	Set Point Temp	____ . ____ °C	____ . ____ °C	-160.0 to +4.0° C

TABLE 2 GLACIER RESET LOG FILE
 (ASSY OPS/ULF3/FIN) Page 2 of 5 pages

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Parameter		Event 1	Event 2	Definition or Options
7	Control Mode	IDLE <input type="checkbox"/> SET POINT <input type="checkbox"/> MANUAL <input type="checkbox"/>	IDLE <input type="checkbox"/> SET POINT <input type="checkbox"/> MANUAL <input type="checkbox"/>	
8	Control Sensors	INNER <input type="checkbox"/> OUTLET <input type="checkbox"/> INLET <input type="checkbox"/>	INNER <input type="checkbox"/> OUTLET <input type="checkbox"/> INLET <input type="checkbox"/>	
9	AirMgmt Proceed	PROCEED <input type="checkbox"/>	PROCEED <input type="checkbox"/>	
10	Bandwidth	____. ____ °C	____. ____ °C	00.1 to 25.5° C
11	Primary Cooler	COOLER 1 <input type="checkbox"/> COOLER 2 <input type="checkbox"/>	COOLER 1 <input type="checkbox"/> COOLER 2 <input type="checkbox"/>	
12	Cooler 1 Stroke	____	____	03 to 63

TABLE 2 GLACIER RESET LOG FILE
 (ASSY OPS/ULF3/FIN) Page 3 of 5 pages

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Parameter	Event 1	Event 2	Definition or Options
13 Cooler 1 State	ON <input type="checkbox"/> OFF <input type="checkbox"/>	ON <input type="checkbox"/> OFF <input type="checkbox"/>	
14 Cooler 2 Stroke	_____	_____	03 to 63
15 Cooler 2 State	ON <input type="checkbox"/> OFF <input type="checkbox"/>	ON <input type="checkbox"/> OFF <input type="checkbox"/>	
16 Heater 1 Duty	_____ %	_____ %	Percent Duty Cycle
17 Heater 2 Duty	_____ %	_____ %	Percent Duty Cycle
18 Max Power Draw	_____ W	_____ W	Max Watts
19 Over Current	_____ A	_____ A	Over Current Ampere
20 AAA Fan Mode	AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/>	AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/>	

TABLE 2 GLACIER RESET LOG FILE
 (ASSY OPS/ULF3/FIN) Page 4 of 5 pages

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Parameter		Event 1		Event 2		Definition or Options
21	AAA Fan State	LOW	<input type="checkbox"/>	LOW	<input type="checkbox"/>	
		HIGH	<input type="checkbox"/>	HIGH	<input type="checkbox"/>	
22	Heat Rejection	AIR	<input type="checkbox"/>	AIR	<input type="checkbox"/>	
		WATER	<input type="checkbox"/>	WATER	<input type="checkbox"/>	
Values for Reconfiguration of Setup: Air Management						
23	Air Mgmt Mode	AUTOMATIC	<input type="checkbox"/>	AUTOMATIC	<input type="checkbox"/>	
		MANUAL	<input type="checkbox"/>	MANUAL	<input type="checkbox"/>	
24	Humidity Config	Pump: 1 2	Valve: 1 2 3 4	Pump: 1 2	Valve: 1 2 3 4	
		<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
25	Pressure Config	Pump: 1 2	Valve: 1 2 3 4	Pump: 1 2	Valve: 1 2 3 4	
		<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
26	Manual Config	Pump: 1 2	Valve: 1 2 3 4	Pump: 1 2	Valve: 1 2 3 4	
		<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

TABLE 2 GLACIER RESET LOG FILE
 (ASSY OPS/ULF3/FIN) Page 5 of 5 pages

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Parameter		Event 1	Event 2	Definition or Options
27	Start Humidity	_____ Seconds	_____ Seconds	00000 to 65535 Seconds
28	Start Pressure	_____ Seconds	_____ Seconds	00000 to 65535 Seconds
29	Circ Fan Mode	AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/>	AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/>	
30	Circ Fan Power	_____ %	_____ %	000 to 100 %
31	Data Storage	_____ Seconds	_____ Seconds	0 to 3600 seconds
32	Ethernet Addr	____ . ____ . ____ . ____	____ . ____ . ____ . ____	TCP IP Address
33	Function Code	_____ Hex Value	_____ Hex Value	0x000A to 0xFFFE Hex Value
34	RIC Port	_____	_____	6212 to 6999
35	Remote Command	ENABLE <input type="checkbox"/> INHIBIT <input type="checkbox"/>	ENABLE <input type="checkbox"/> INHIBIT <input type="checkbox"/>	

Note: These items may need to be entered for multiple events.

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TABLE 3 GLACIER DIAGNOSTIC LOG FILE

(ASSY OPS/ULF3/FIN) Page 1 of 3 pages

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Parameter		Definition	Event 1	Event 2	Event 3	Event 4
HOME MENU (Front panel)						
1	CURR TEMP	Current Temperature °C	Start: End:	Start: End:	Start: End:	Start: End:
2	SET POINT	Set Point °C	Start: End:	Start: End:	Start: End:	Start: End:
3	GPS	Hours: Minutes: Seconds	Start: __ : __ : __ End: __ : __ : __	Start: __ : __ : __ End: __ : __ : __	Start: __ : __ : __ End: __ : __ : __	Start: __ : __ : __ End: __ : __ : __
QUICK STATUS						
1	Cold Head 1A	Temperature °C				
2	Cold Head 1B	Temperature °C				
3	Cold Head 2A	Temperature °C				
4	Cold Head 2B	Temperature °C				
5	Cold Vol Outlet	Temperature °C				
6	Cold Vol Inlet	Temperature °C				
7	Cold Vol Inner	Temperature °C				
8	Cold Vol DeltaP	psi				
9	Outlet Water	Temperature °C				
10	Inlet Water	Temperature °C				
11	Humidity 1	% Humidity				
12	Humidity 2	% Humidity				
13	Circ Fan Speed	RPM				
14	Battery	0 to greater than 9 Volts				
15	Main Current	0 to 20 Amps				
16	Total Run Time	Hours: Minutes: Seconds				

TABLE 3 GLACIER DIAGNOSTIC LOG FILE

(ASSY OPS/ULF3/FIN) Page 2 of 3 pages

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Parameter		Definition	Event 1	Event 2	Event 3	Event 4
STATUS: Cryogenic						
1	Cooler 1 Stroke					
2	Cooler 2 Stroke					
3	HX 1	Heat Exchanger Temperature °C				
4	HX 2	Heat Exchanger Temperature °C				
5	Cold Head 1A	Temperature °C				
6	Cold Head 1B	Temperature °C				
7	Cold Head 2A	Temperature °C				
8	Cold Head 2B	Temperature °C				
9	Cold Vol Outlet	Temperature °C				
10	Cold Vol Inlet	Temperature °C				
11	Cold Vol Outer	Temperature °C				
12	Cold Vol Inner	Temperature °C				
13	Vac Jacket 1	Torr				
14	Vac Jacket 2	Torr				
15	Heat Sink	Temperature °C				
16	Col Vol Vac 1	Torr				
17	Col Vol Vac 2	Torr				
18	Circ Fan Speed	RPM				
19	Heater 1 Power	%				
20	Heater 2 Power	%				
21	Circ Fan Power	%				

TABLE 3 GLACIER DIAGNOSTIC LOG FILE

(ASSY OPS/ULF3/FIN) Page 3 of 3 pages

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Parameter	Definition	Event 1	Event 2	Event 3	Event 4
STATUS: Resources					
1	AAA Outlet	Temperature °C			
2	AAA Inlet 1	Temperature °C			
3	AAA Inlet 2	Temperature °C			
4	Outlet Water	Temperature °C			
5	Inlet Water	Temperature °C			
6	Water Flow	kg/h			
7	Main Current	Amps			
8	Main Voltage	Volts			
STATUS: System					
1	CPU	Temperature °C			
2	Capacitors A	Temperature °C			
3	Capacitors B	Temperature °C			
4	Data Logger	Temperature °C			
5	Battery	Volts			
6	Total Run Time	Hours: Minutes: Seconds			
7	Glacier Version	##.## Day/Month/Year Hour: Minutes			
8	Logger Version	##.## Day/Month/Year Hour: Minutes			
9	Circ Fan Version	##.## Day/Month/Year Hour: Minutes			

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OBJECTIVE

Commercial Generic Bioprocessing Apparatus (CGBA). This procedure resets the internal clock's GMT time.

<u>NOTE</u> Menu option will time out after 30 seconds and return to status display.

MF71E
(CGBA)

1. On keypad:

pb MENU → Press

pb 3 → Press

pb ENTER → Press
2. Verify display indicates the following:
'Enter GMT month'
'(mm:dd:yy)'

'XX/dd/yy'
3. Enter GMT month.
pb ENTER → Press

Enter GMT day.
pb ENTER → Press

Enter GMT year.
pb ENTER → Press
4. Verify Display indicates the following:
'GMT date is now'

'mm/dd/yy'

'1 = Update GMT date'
'9 = Reenter date'

*
*
* If displayed GMT is incorrect
*
* | pb 9 → Press
* |
* | pb ENTER → Press
* |
* | Repeat steps 3 to 4.
* |
*

5. pb 1 → Press
pb ENTER → Press
6. Verify display indicates the following:

'Enter GMT hour'
'(hh:mm) (24-hour format)'

'XX:mm'

7. Enter GMT hour.
pb ENTER → Press

Enter GMT minute.
pb ENTER → Press

8. Verify display indicates the following:
'GMT time is now'

'hh:mm:00'

'1 = Update Time'

'9 = Reenter Time'

```
*****  
*  
* If displayed time is incorrect  
* |  
* | pb 9 → Press  
* |  
* | pb ENTER → Press  
* |  
* | Repeat steps 6 to 8.  
* |  
*****
```

9. pb 1 → Press
pb ENTER → Press

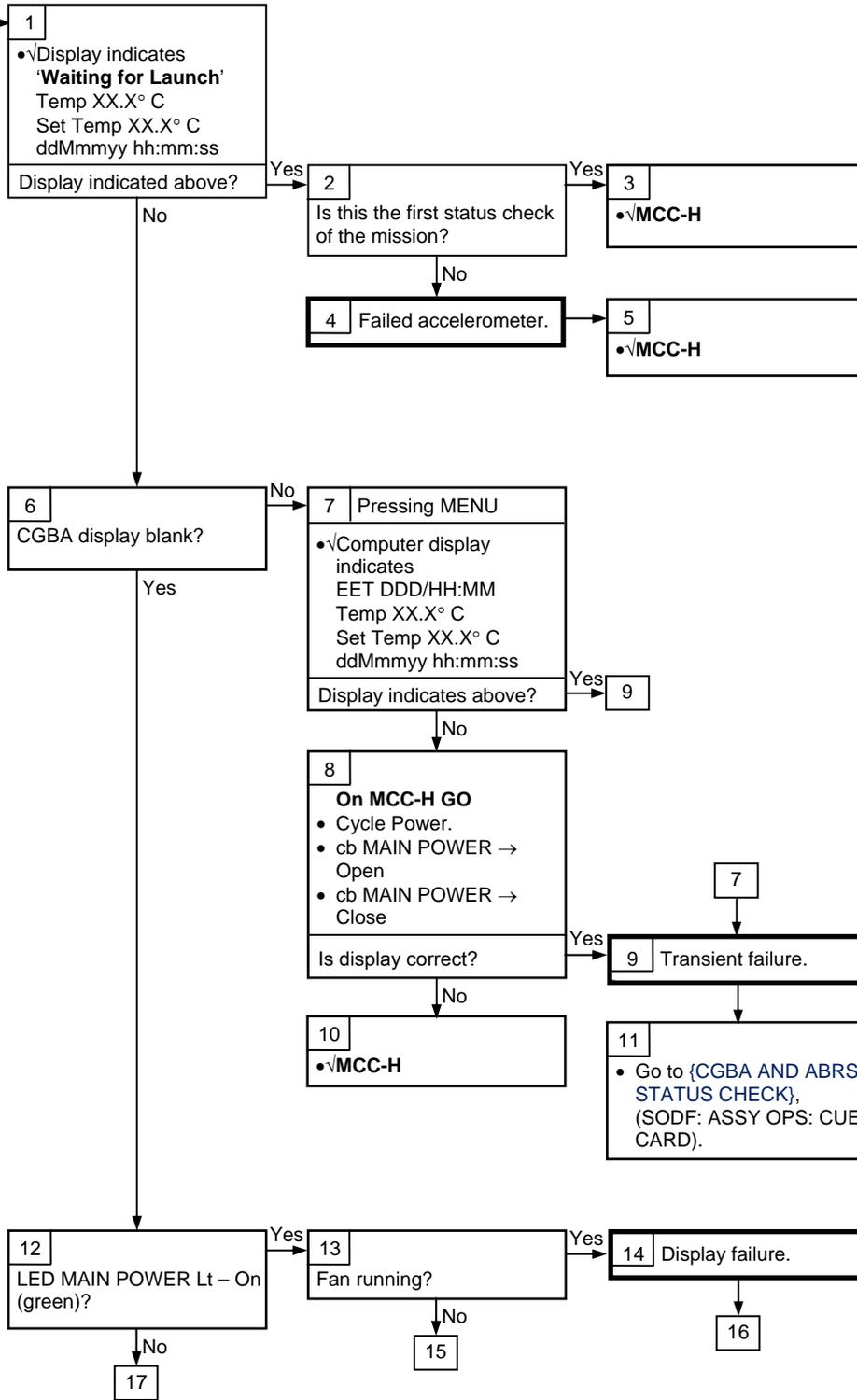
CGBA

CGBA INCORRECT (NO) DISPLAY

(ASSY OPS/ULF3/FIN 1) Page 1 of 2 pages

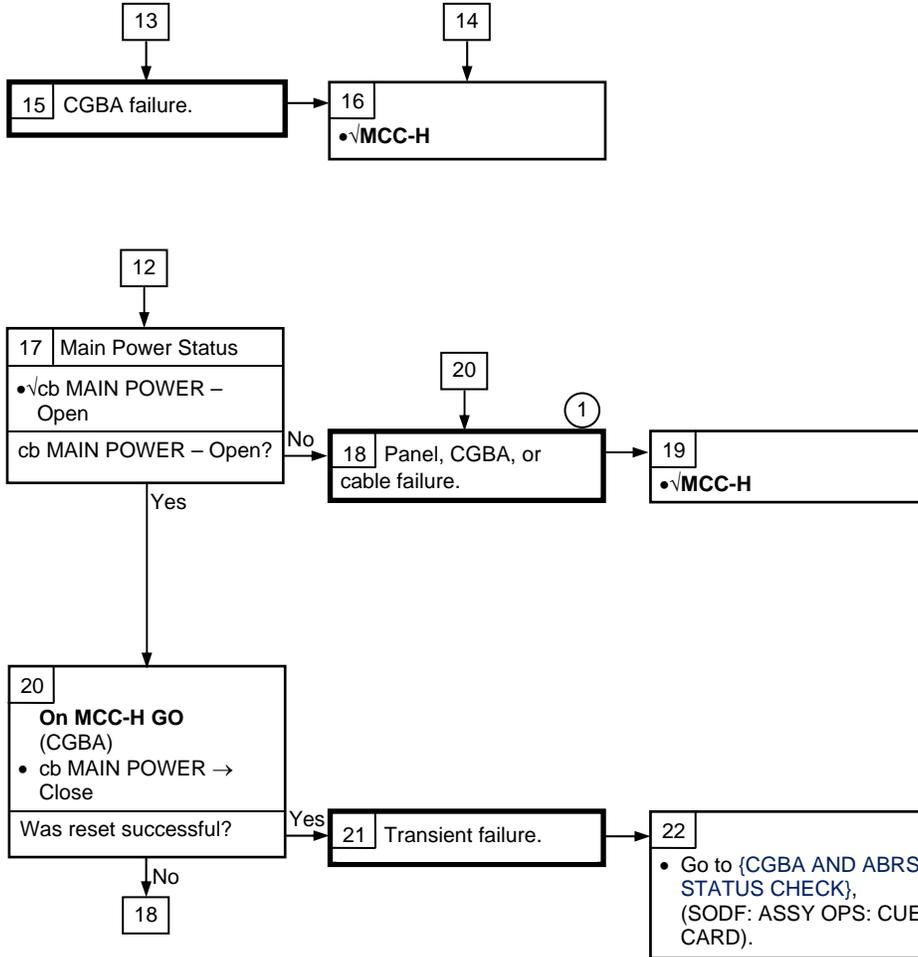
Incorrect or No Computer Display

Nominal Config:
(MO63P)
sw 10 AMP J4 – ON
cb CB4/J4 – Close
(CGBA)
cb MAIN POWER – Close
LED MAIN POWER Lt - On

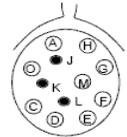


CGBA INCORRECT (NO) DISPLAY

(ASSY OPS/ULF3/FIN 1) Page 2 of 2 pages



① Cable can be checked via UTIL CABLE/OUTLET PWR CHECK (DC), (FDF: IFM, PROCEDURES S THRU Z)



J = +28 VDC
K = Return
L = GND

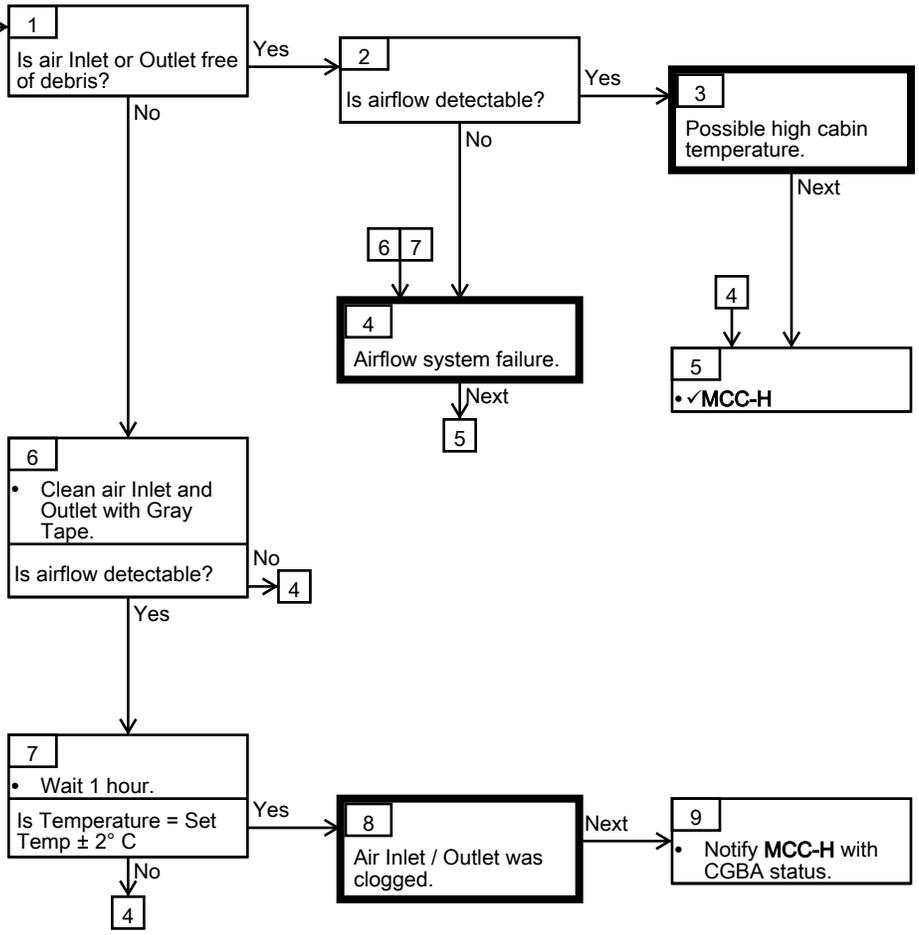
CGBA

CGBA INCORRECT TEMP

(ASSY OPS/ULF3/FIN) Page 1 of 1 page

Temperature is \neq to Set TEMP $\pm 2^{\circ}\text{C}$

Nominal Config:
 (MO63P)
 sw 10A J4 - ON
 cb CB4/J4 - Close
 (CGBA)
 cb MAIN POWER - Close
 LED MAIN POWER Lt - On



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MDS TRANSFER TO SHUTTLE

(ASSY OPS/ULF3/FIN 1) Page 1 of 6 pages

OBJECTIVE:

This procedure removes an ISS Locker from the Shuttle middeck in prep for MDS transfer. The locker is transferred to the EXPRESS-4 Rack and stowed. Then MDS is powered down, removed from EXPRESS-4 Rack, transferred inside the Double Payload Container to Shuttle where it is installed in the middeck, cabled and powered back on. The Mice Drawer System (MDS) Installation Brackets, vent closeout and tape are removed from the back wall of the EXPRESS Rack. Finally, two ISS lockers (one from the ABRS transfer and one from middeck) are retrieved and installed where MDS was removed.

TOOLS:

Any EXPRESS Rack Utility Drawer:
High Torque Locker Tool

Shuttle Middeck:

High Torque Locker Tool (MD23R - Volume H, taped to inboard wall)

ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive
1/4" Socket, 1/4" Drive
(40-200 in-lbs) Trq Wrench, 1/4" Drive
(5-35 in-lbs) Trq Wrench, 1/4" Drive

IFM Tool Locker:

Ratchet, 1/4" Drive
1/4" Socket, 1/4" Drive
(40-200 in-lbs) Trq Wrench, 1/4" Drive

PARTS:

8.5" Handrail Assembly (two), (if not attached) P/N SEG33117290-301

1. REMOVING LOCKER FROM MIDDECK

MF28G 1.1 ✓Locker door latched, Red Dot not visible, (see Figure 1)

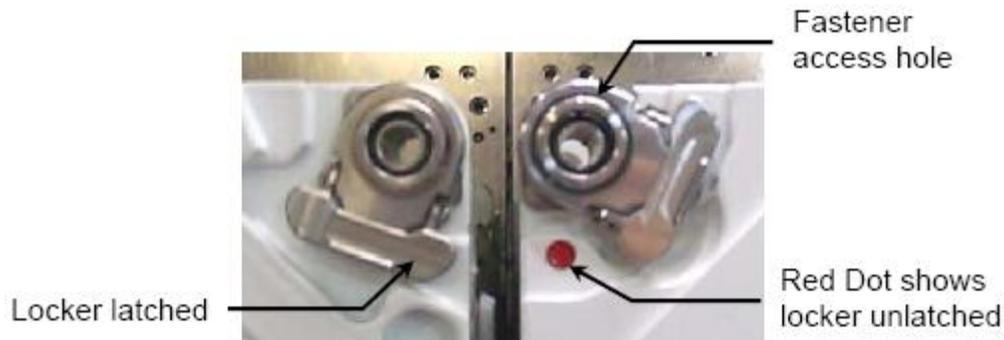


Figure 1.- Locker Latches.

1.2 Unfasten Locker fasteners (four) from Adapter Plate (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive). Remove locker and temporary stow in middeck.

MDS TRANSFER TO SHUTTLE

(ASSY OPS/ULF3/FIN 1) Page 2 of 6 pages

- 1.3 Unfasten Adapter Plate fasteners (four) from Vented Payload Mounting Panel (VPMP) (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive). Temporary stow Adapter Plate in with ISS Locker previously removed.

- MF28E
- 1.4 Unfasten VPMP Cover fasteners (four) (1/4" Socket), remove and temp stow.

MDS descent configuration

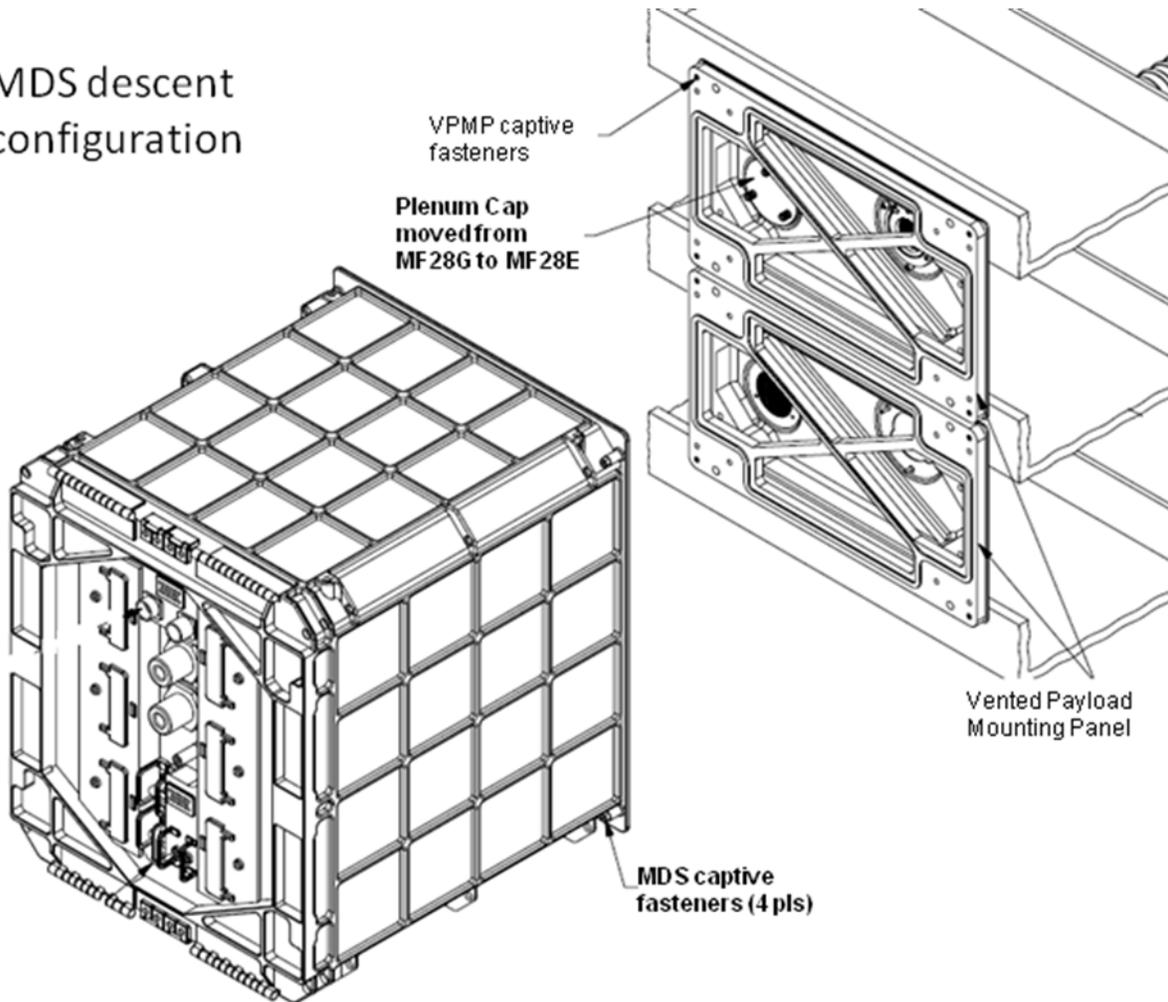


Figure 2.- MDS Descent Configuration.

- 1.5 Remove Air Inlet Plenum Cap by loosening knurled screws (three) (using 5/32" allen driver if needed) from the MF28G location and reinstall the cap (finger tight) in the MF28E location.

- 1.6 Retrieve ISS Locker from middeck temporary stowage and transfer to EXPRESS-4 Rack in the JEM. Check transfer path is clear for return with MDS.

- JPM1F5
- 1.7 Temporary stow ISS Locker near EXPRESS-4 Rack. Shuttle Crew proceed to Step 5 Middeck Installation.

MDS TRANSFER TO SHUTTLE

(ASSY OPS/ULF3/FIN 1) Page 3 of 6 pages

2. MDS PREP FOR TRANSFER

JPM1F5_G1
(J1) (MDS)

- 2.1 Retrieve 8.5" Handrail Assembly (two) if not already attached.
- 2.2 While upper and lower MDS Double Payload Container doors are closed, mount 8.5" Handrail Assembly (two) to the seat track located on the front panel of the MDS facility as shown in Figure 3.

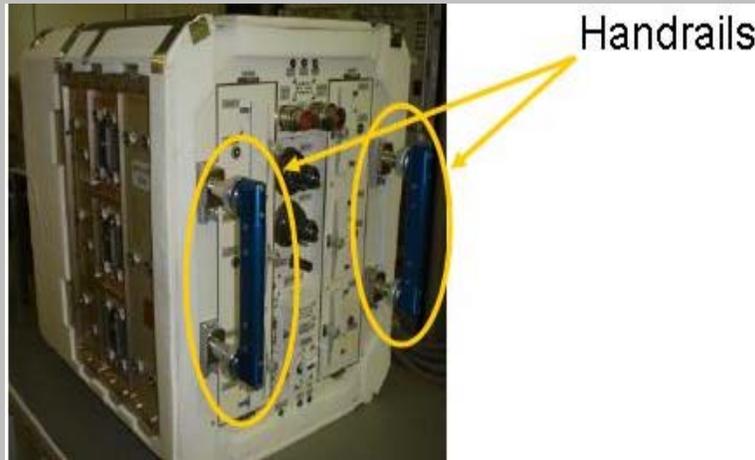


Figure 3. - Handrail Placement.

- 2.3 cb POWER cb → OPEN, (unit off)
Verify MDS POWER LED – Off
Verify PRIMARY POWER LED – Off
- 2.4 sw OPERATING MODE → SURVIVAL
- 2.5 Disconnect MDS Y Data Cable and temporarily stow:
MDS P02 EXP-MDS ←|→ DATA J02
JPM1F5_F1 PA I/F RACK ISS ←|→ LOCKER-4 DATA-J2
PB I/F RACK ISS ←|→ LOCKER-3 DATA-J2
- 2.6 MDS cb POWER cb → CLOSE
Verify MDS POWER LED – On
Verify PRIMARY POWER LED – On
Verify MODE & STATUS LED – Off

3. DEACTIVATE AND DECABLE THERMAL

JPM1F5_ELC 3.1 EXpedite the PROcessing of Experiments for Space Station
(EXPRESS) Rack 4

sel EXPRESS TCS button

3.2 EXPRESS TCS

sel F2

MDS TRANSFER TO SHUTTLE

3.3 EXPRESS TCS: F2

input Commanded – 0

sel Execute

JPM1F5_A1 3.4 EXPRESS Rack P/L TCS Supply Line (60")←|→COOLANT WATER SUPPLY

MDS EXPRESS Rack P/L TCS Supply Line (60")←|→MTL Supply

JPM1F5_A1 EXPRESS Rack P/L TCS Return Line (60")←|→COOLANT WATER RETURN

MDS EXPRESS Rack P/L TCS Return Line (60")←|→MTL Return

Verify connectors – no leakage

* If leakage is present

* | clean up with Dry Wipes

3.5 Temporarily stow Water Lines

4. TRANSFER MDS FACILITY

4.1 Unfasten captive fasteners (four) on MDS Double Payload Container from the MDS Installation Brackets (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive).

CAUTION

Power off should be no longer than 15 minutes in order to maintain Oxygen concentration above 19% and MDS internal air temperature below 37°C.

4.2 Record MET: ____/____:____

4.3 cb POWER cb → OPEN, (unit off)
Verify MDS POWER LED – Off
Verify PRIMARY POWER LED – Off

JPM1F5_F1 4.4 sw LOCKER-3 POWER → OFF
Verify LOCKER-3 POWER It – Off

MDS 4.5 Disconnect power cable and temporarily stow
EXPRESS Rack Power Cable (38")←|→PWR J01
JPM1F5_F1 EXPRESS Rack Power Cable (38")←|→LOCKER-3 POWER-J1

MF28E/G 4.6 Transfer MDS facility, inside Double Payload Container, to Shuttle middeck and slide into position

MDS TRANSFER TO SHUTTLE

(ASSY OPS/ULF3/FIN 1) Page 5 of 6 pages

5. MIDDECK INSTALLATION

- ML85E (MUP) 5.1 √sw DC 10 AMP MNB S4 → OFF
√cb DC 10 AMP MNB CB4 → Open
- MF28E/G (MDS) 5.2 √cb POWER cb – OPEN
5.3 √sw OPERATING MODE – SURVIVAL
5.4 √sw MAINTENANCE – NOMINAL
5.5 SHUTTLE PAYLOAD DC PWR CABLE Wire Harness
Assy→|←PWR J01
- ML85E (MUP) 5.6 cb DC 10 AMP MNB CB4 → Close
sw DC 10 AMP MNB S4 → ON
- MF28E/G (MDS) 5.7 cb POWER cb → CLOSE
Verify MDS POWER LED – On
Verify PRIMARY POWER LED – On
Verify MODE & STATUS LED – Off
- 5.8 Record MET: ____/____:____
- 5.9 Using a diagonal pattern, partially fasten captive fasteners (four) on MDS Double Payload Container to VPMP (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive).
- 5.10 Fully torque fasteners (four) to 75 in-lbs using 40-200 in-lbs Trq Wrench, 1/4" Drive.
- 5.11 Remove 8.5" Handrail assembly (two) from the MDS front panel and stow.

6. EXPRESS RACK 4 LOCKER INSTALL

- JPM1F5_G1 (J1) 6.1 Remove upper and lower MDS Installation Brackets from EXPRESS-4 Rack (High Torque Locker Tool; 1/4" Socket, 1/4" Drive; Ratchet, 1/4" Drive) and temporarily stow.
- 6.2 Remove gray tape (two places) from back plate of rack and dispose of in trash
- 6.3 Remove Vent Closeout Panel (four) from back of rack and temporarily stow.
- 6.4 Retrieve ISS Locker from temporary stow location (Step 1)
- JPM1F5_G1 6.5 Slide MF28E locker into EXPRESS-4 Rack Locker 3 location. Tighten, torque fasteners (four) on each locker to 30 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (5-35 in-lbs) Trq Driver, 1/4" Drive] in a diagonal pattern.

MDS TRANSFER TO SHUTTLE

(ASSY OPS/ULF3/FIN 1) Page 6 of 6 pages

- JPM1F5_J1
- 6.6 Retrieve Locker from temporary stow location near EXPRESS 4 Rack (previously stowed during ABRS transfer)
 - 6.7 Slide MF28G locker into EXPRESS-4 Rack Locker 4 location. Tighten, torque fasteners (four) on each locker to 30 in-lbs [High Torque Locker Tool; 1/4" Socket, 1/4" Drive; (5-35 in-lbs) Trq Driver, 1/4" Drive] in a diagonal pattern.
 - 6.8 Retrieve temporarily stowed Data Cable (in Step 2.5), Water Lines (in Step 3.5) and Power cable (in Step 4.5) and MDS Installation Brackets (in Step 6.1) and Vent Closeout Panel (four) (in Step 6.3) and stow per Stowage notes.
 - 6.9 Notify **MCC-H** MDS Transfer to Shuttle is complete.
- Report MET times from steps 4.2 and 5.8

7. GROUND TO UPDATE IMS FOR THE FOLLOWING (GROUND-ONLY):
 - 8.5" Handrail Assembly (two) (if attached) P/N GF11F5200-3 To: Stow
 - MDS Y Data Cable P/N 750980195-01C To: Stow
 - EXPRESS Rack P/L TCS Supply Line (60") P/N 683-46094-8 To: Stow
 - EXPRESS Rack P/L TCS Return Line (60") P/N 683-46094-9 To: Stow
 - EXPRESS Rack Power Cable 38" P/N 683-44024-2 To: Stow
 - MDS Installation Brackets (two) P/N 750600510-01D To: Stow
 - Vent Closeout Panel (four) P/N 683-46111-1 To: Stow

OBJECTIVE:

Check the status of the Mice Drawer System (MDS) and visually monitor mice well-being.

TOOLS:

8.5" Handrail Assembly (two) P/N SEG33117290

- MF28E/G
1. ✓sw OPERATING MODE – SURVIVAL

*
* If OPERATING MODE not in SURVIVAL mode,
* | Turn power off on payload before correcting switch position:
* | cb POWER cb → OPEN
* | Verify MDS POWER LED – Off
* | sw OPERATING MODE → SURVIVAL
* | cb POWER cb → CLOSE
* | Verify MDS POWER LED – On
*

 2. ✓sw MAINTENANCE – NOMINAL
 3. ✓cb POWER cb – CLOSE
Verify MDS POWER LED – On
Verify PRIMARY POWER LED – On
 4. Verify SYSTEM FAILURE LED – OFF

*
* If SYSTEM FAILURE LED — On or Blinking, (yellow),
* | Power Cycle:
* | cb POWER cb → OPEN
* | Verify MDS POWER LED – Off
* | cb POWER cb → CLOSE
* | Verify MDS POWER LED – On
* | ✓MCC-H if SYSTEM FAILURE LED still on or blinking.
*

 5. ✓FOOD BAR STATUS LEDs (six) – Off

WARNING
A high temperature has occurred if all 6 FOOD BAR STATUS LEDs are blinking.

```
*****
*
* If all 6 FOOD BAR STATUS LEDs are blinking, indicating a high
* temperature:
*   Turn MDS off:
*   cb POWER cb → OPEN
*   Verify MDS POWER LED – Off
*   Remove power at the MUP (ML85E):
*   DC 10 AMP MNB S4 – OFF
*   cb DC 10 AMP MNB CB4 → op
*   ✓MCC-H
*
*****
```

6. Destow 8.5" Handrail Assembly (two).
7. Open the upper and lower Double Payload Container doors as shown in Figure 1.

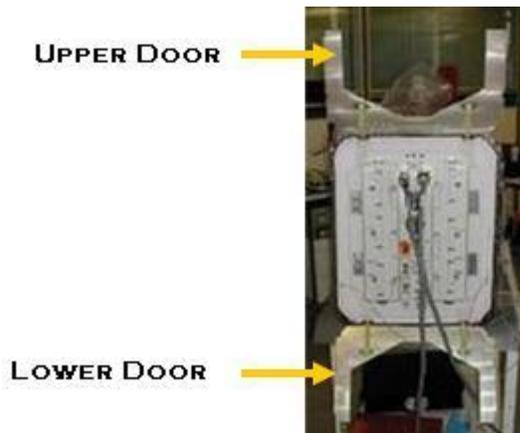


Figure 1. Double Payload Container Doors Open

8. Mount 8.5" Handrail Assembly (two) to the seat track located on the front panel of the MDS facility as shown in Figure 2.

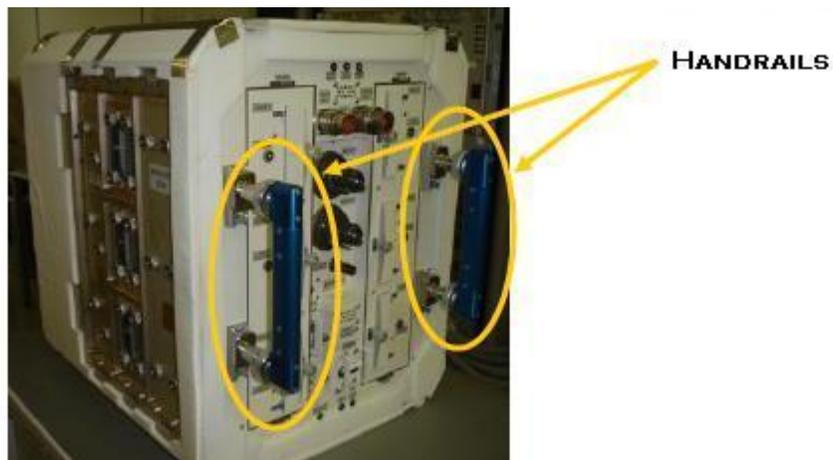


Figure 2. Handrail Placement


```
*****  
*  
*  
* If mice appear stressed:  
* | Increase airflow to mice habitat:  
* | sw MAINTENANCE → SIDE  
* |  
* | Allow no longer than 2 minutes of higher air flow, then switch back to  
* | NOMINAL mode:  
* | sw MAINTENANCE → NOMINAL  
* |  
* | Visually check to see if mice have improved.  
*  
*****
```

11. Slide the MDS facility back into the Double Payload Container.

WARNING
For structural and safety purposes 6 out of 8 door latches are required for safe return configuration.

12. Close and latch the upper and lower doors of the MDS Double Payload Container.
13. Remove and stow 8.5" Handrail Assembly (two).
14. Notify **MCC-H** with MET and any off-nominal status.

CONTINGENCY EVA PL CONFIGURATION

**CONTINGENCY EVA
PL CONFIGURATION**

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PRE-EVA PL CONFIGURATION
(ASSY OPS/ULF3/FIN 1) Page 1 of 1 pages

N/A

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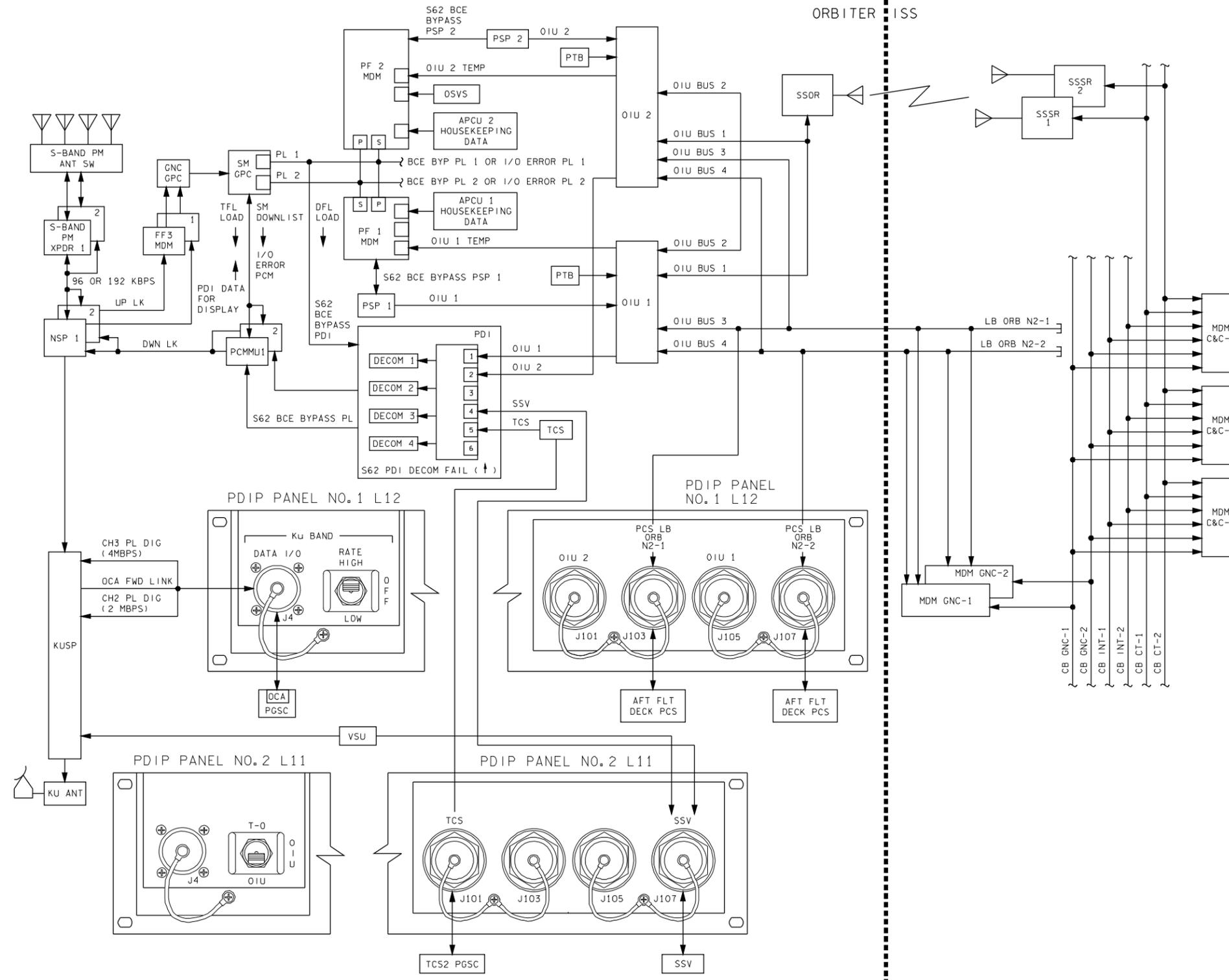
POST EVA PL CONFIGURATION
(ASSY OPS/ULF3/FIN 1) Page 1 of 1 pages

N/A

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MALFUNCTION

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4850201_127, SCH 1

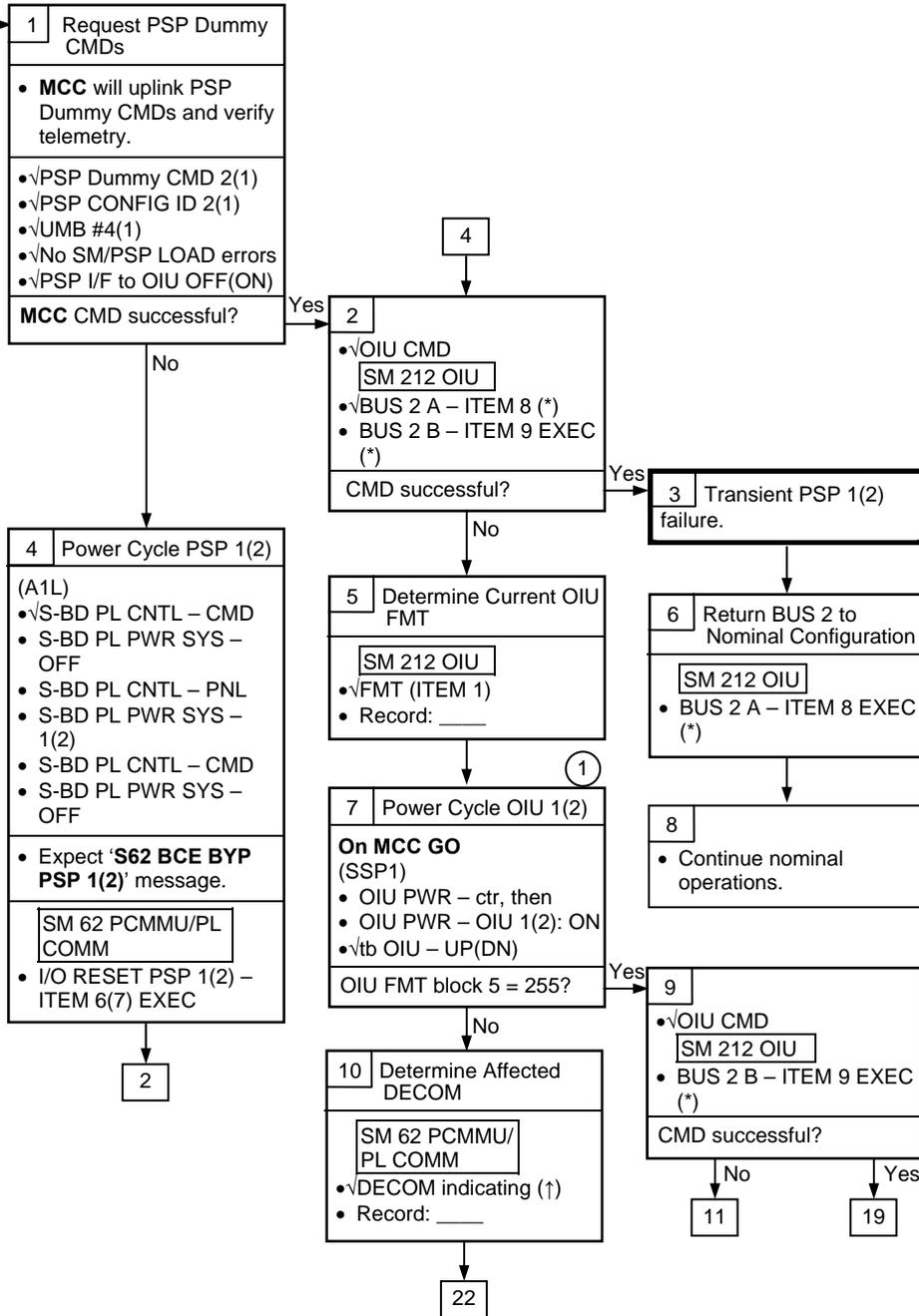
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COMM

OIU FAIL TO COMMAND
(ASSY OPS/ULF3/FIN) Page 1 of 3 pages

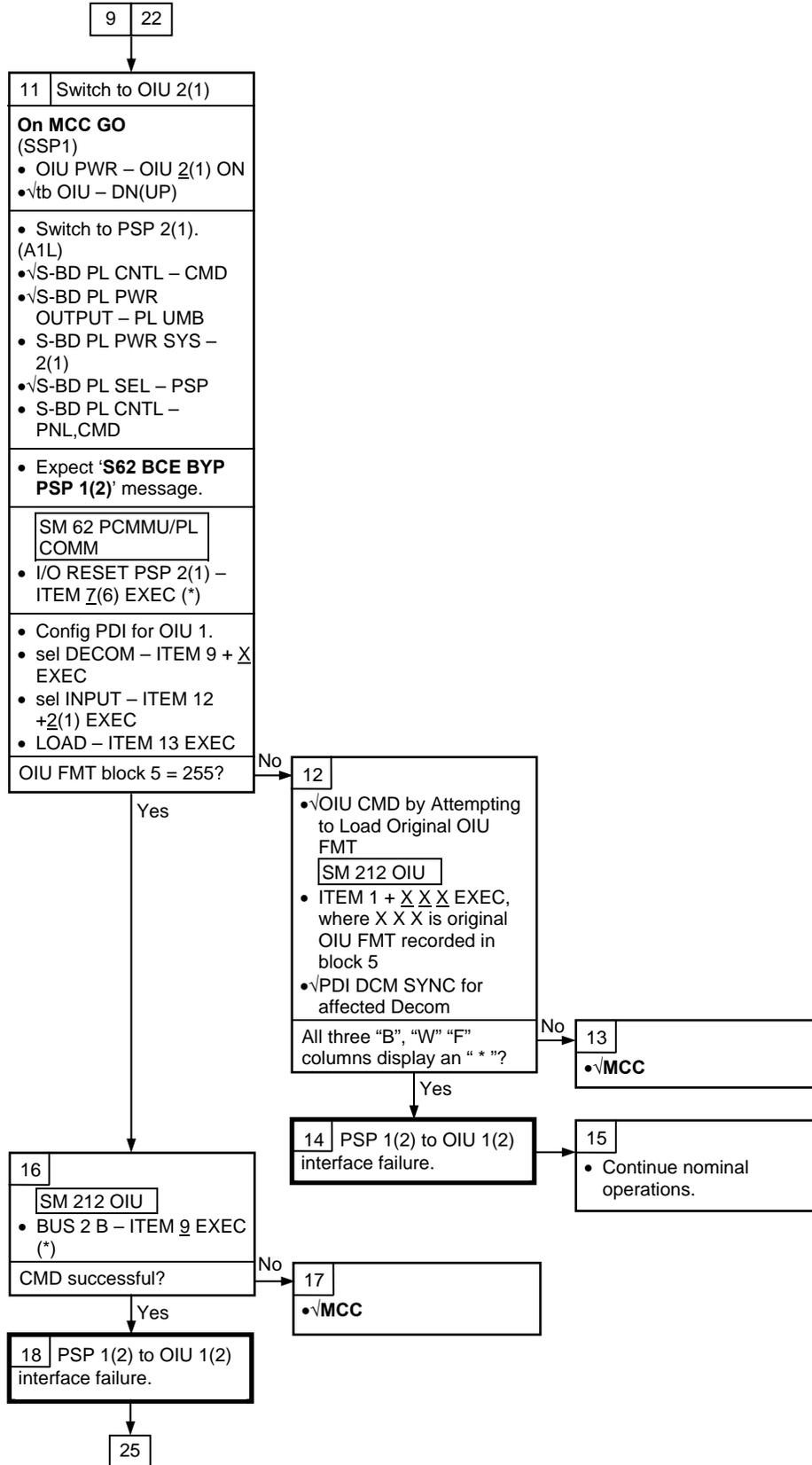
No Response to OIU Configuration or Routed Commands

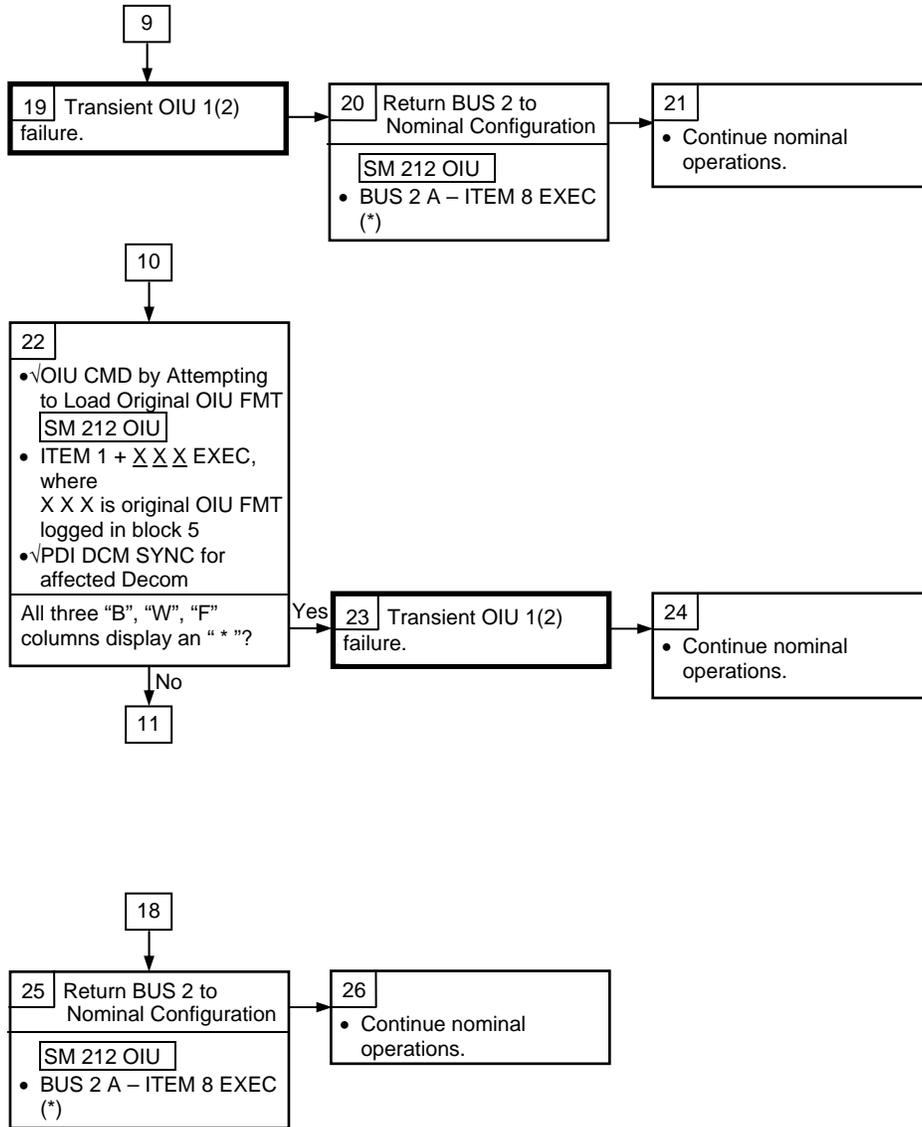
Nominal Config:
(A1L)
S-BD PL
CNTL – CMD
PWR SYS – 1
PWR SEL – PSP
PSP OUTPUT – PL
UMB
(SSP1)
OIU PWR – OIU 1(2)
ON
tb OIU – UP(DN)
(R1)
PL CAB –
MNA(MNB)
PL AUX – ON



① Power cycle will place OIU in Format 255. OIU Station TLM will be lost until OIU CMD is recovered. OIU H&S TLM will also be lost if PDI is not configured for OIU FMT 255.

OIU FAIL TO COMMAND





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ASSY OPS

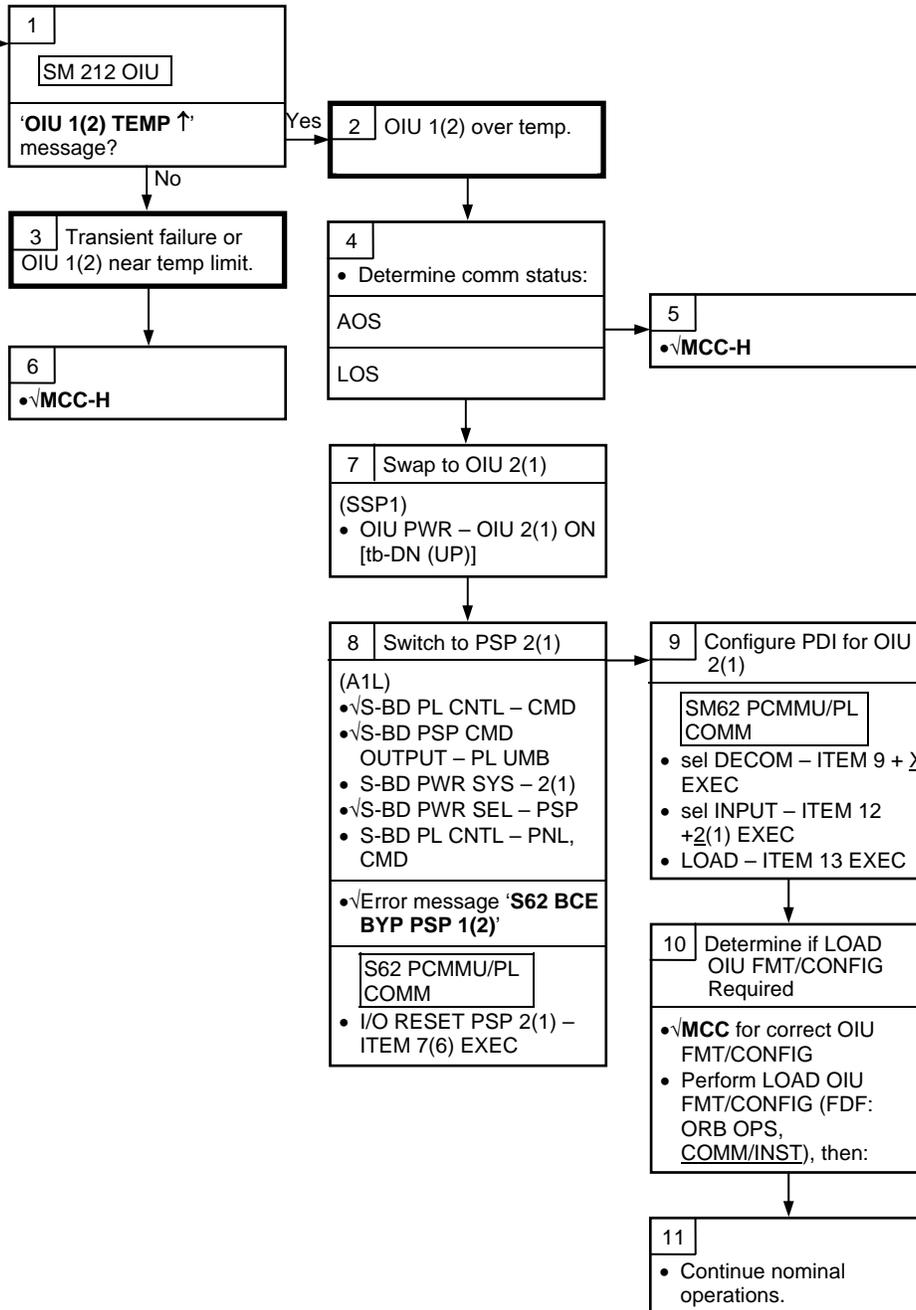
OIU TEMP HIGH MALFUNCTION

(ASSY OPS/ULF3/FIN 1) Page 1 of 1 page

SM 212 OIU
TEMP

OIU message: 'OIU
TEMP > 212'

Nominal Config:
(R1)
PL CAB –
MNA(MNB)
PL AUX – ON
(SSP 1)
OIU PWR – OIU 1(2)
ON
tb OIU – UP(DN)



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COMM

S212 OIU AD 1 NOLK/LOSS OF ISS OR SSOR TELEMETRY
(ASSY OPS/ULF3/FIN) Page 1 of 3 pages

SM ALERT

S212 OIU AD1 NOLK

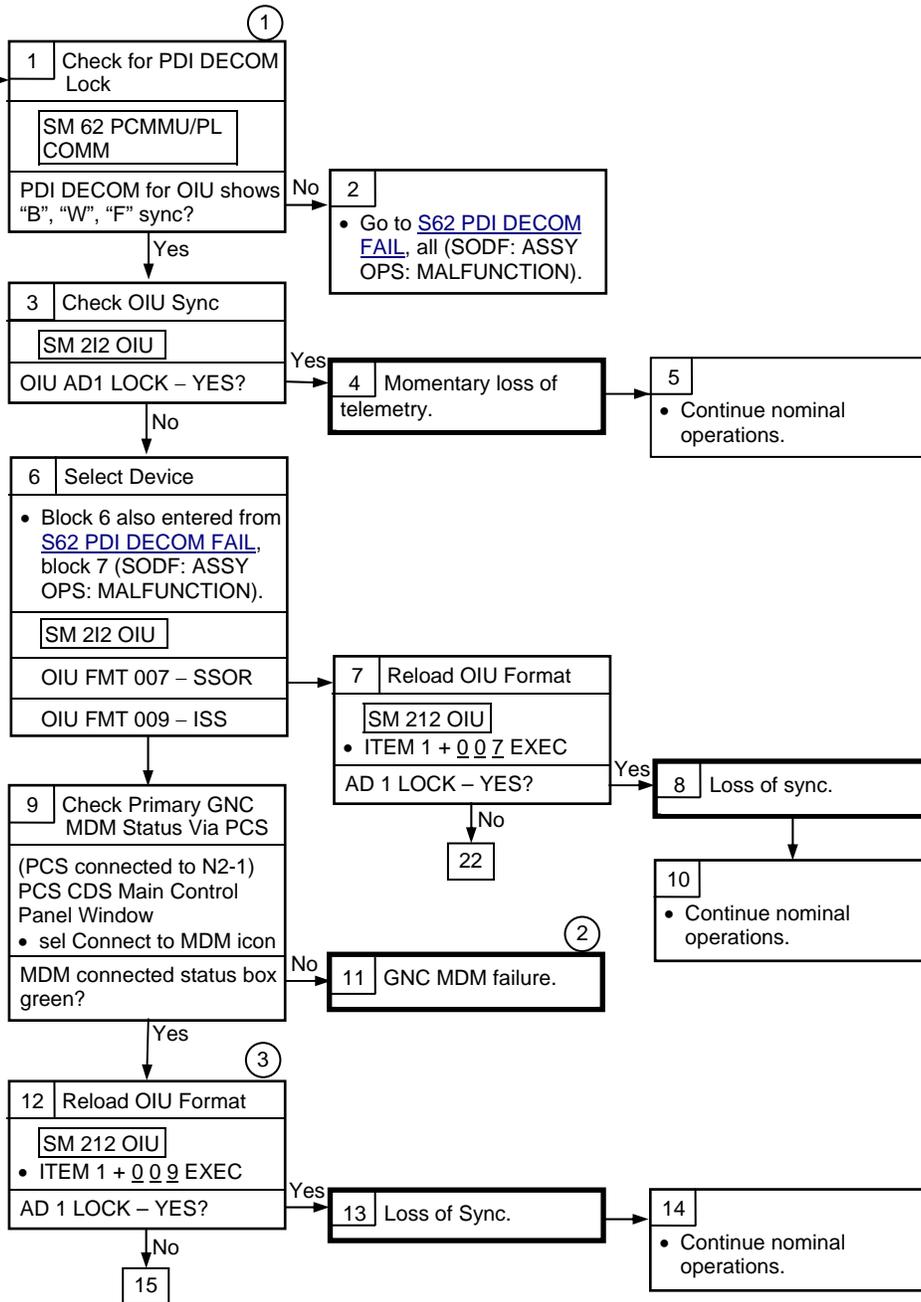
Loss of Data On SPEC 205 During Undocking

MCC-H Reports Loss of ISS Data To Ground Via OIU

Nominal Config:
(R1)
PL CAB – MNA(MNB)
PL AUX – ON (SSP1)
OIU PWR – OIU 1(2) ON
tb OIU – UP(DN)

For ISS:
One PCS connected to Primary GNC MDM
SM 212 OIU
OIU FMT: 009

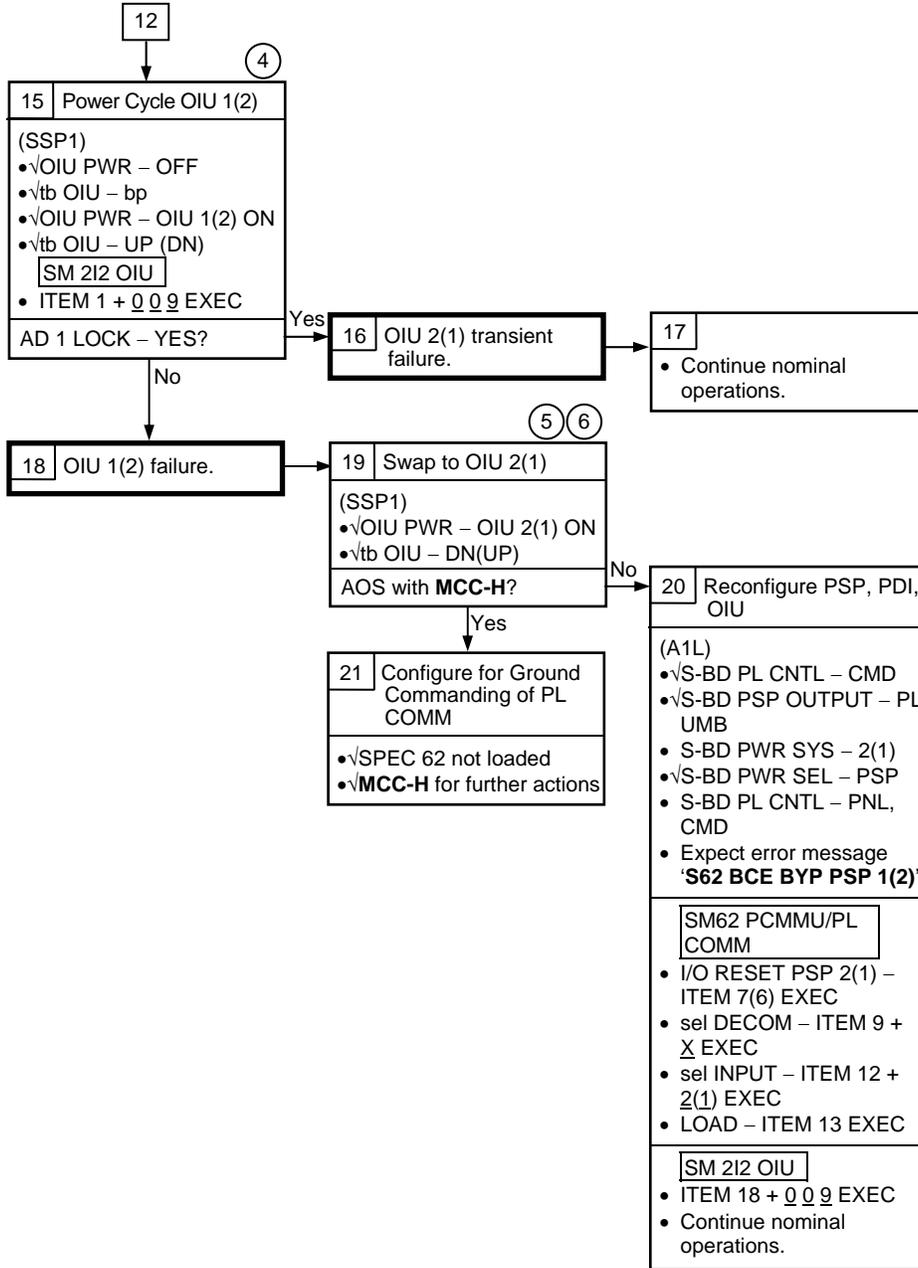
For SSOR:
(R14)
cb MNA UHF
EVA – cl
cb MNC UHF
EVA – cl (O6)
EVA STRING: 1(2)
UHF MODE – EVA
SM 212 OIU
OIU FMT – 007



① OIU to PDI problems would annunciate a 'S62 PDI DECOM FAIL' message if FDA enabled.

② MCC-H will likely direct STS or ISS crew to perform 3.301 LOSS OF PCS TELEMETRY (SODF: POC: MALFUNCTION).

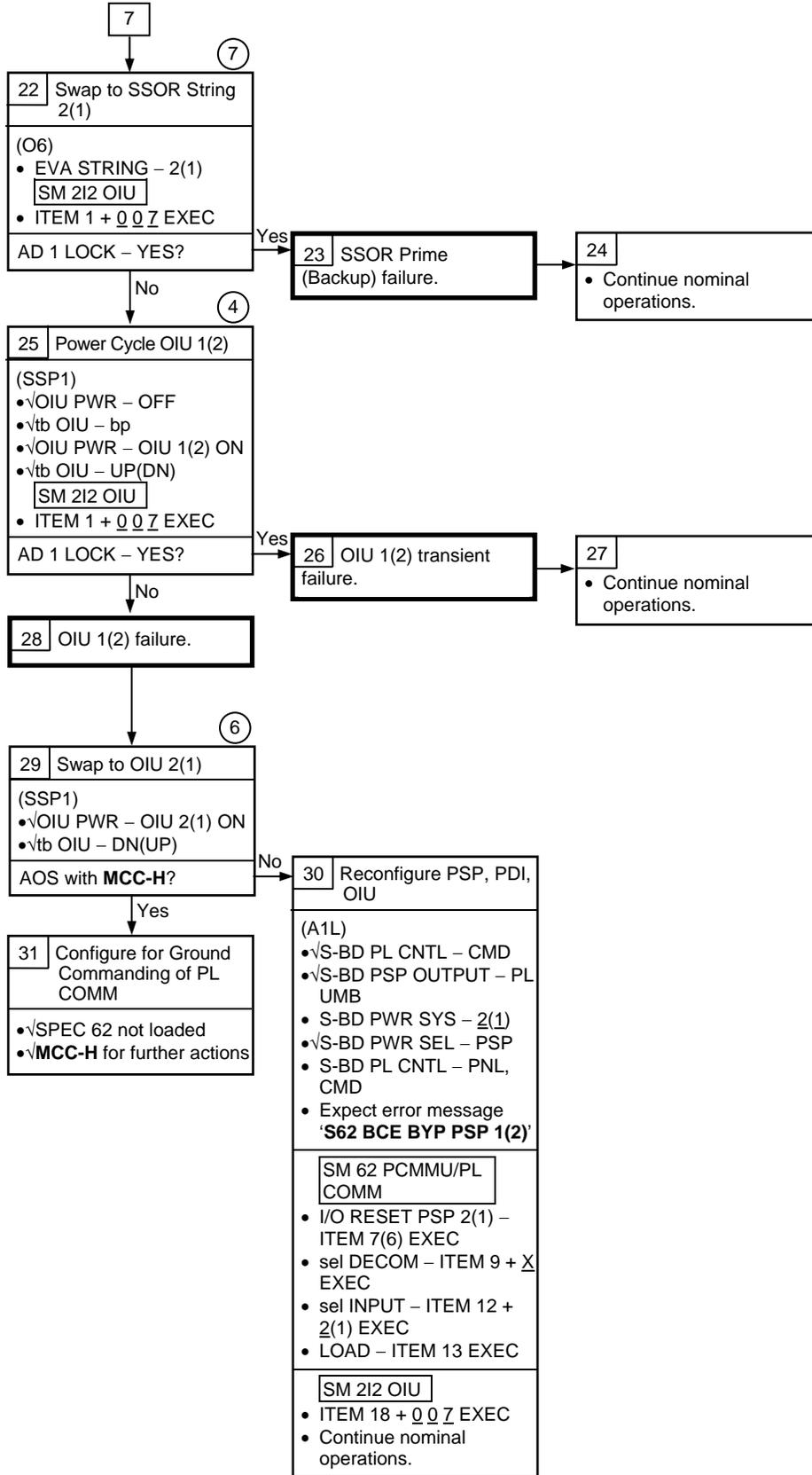
③ Reloading the OIU format forces a resync with the GNC MDM or SSOR.



④ OIU active device mapping occurs with format load.

⑤ Malfunction restores operational capability; additional troubleshooting to determine BIA failure may be performed later.

⑥ OIU powerup config on OIU BUS 3 is RT on ch A.



④ OIU active device mapping occurs with format load.

⑥ OIU powerup config on OIU BUS 3 is RT on ch A.

⑦ Reloading the OIU format forces a resync with the SSOR.

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COMM

S62 PDI DECOM FAIL
(ASSY OPS/ULF3/FIN 1) Page 1 of 3 pages

SM
ALERT

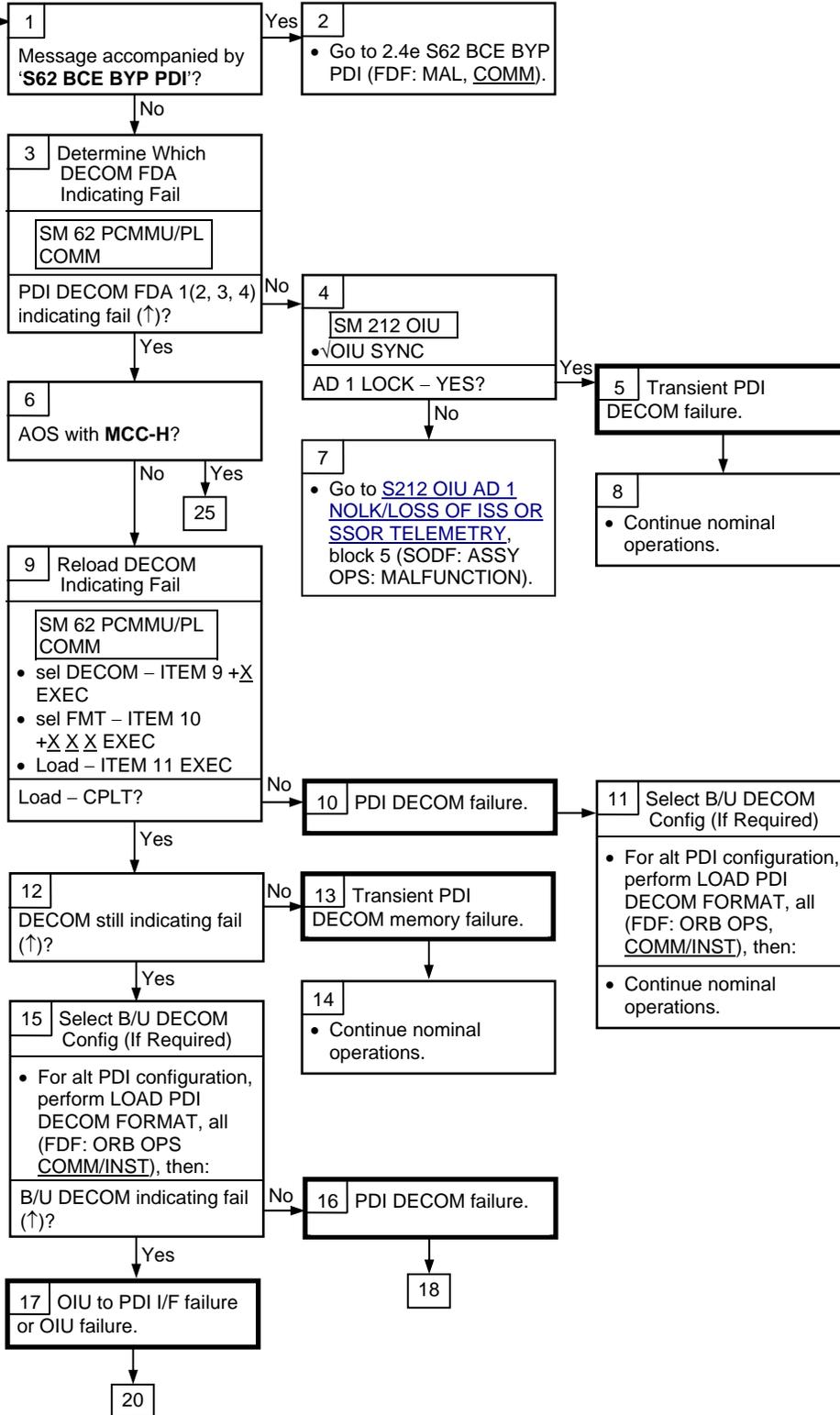
S62 PDI
DECOM FAIL

S212 OIU AD 1
NOLK/LOSS OF
ISS or SSOR
TELEMETRY,
block 1 (SODF:
ASSY OPS:
MALFUNCTION)
or 2.4g S62 PDI
DECOM FAIL
(FDF: MAL,
COMM)

Nominal Config:
(A1L)
PL DATA INTLVR
PWR – ON

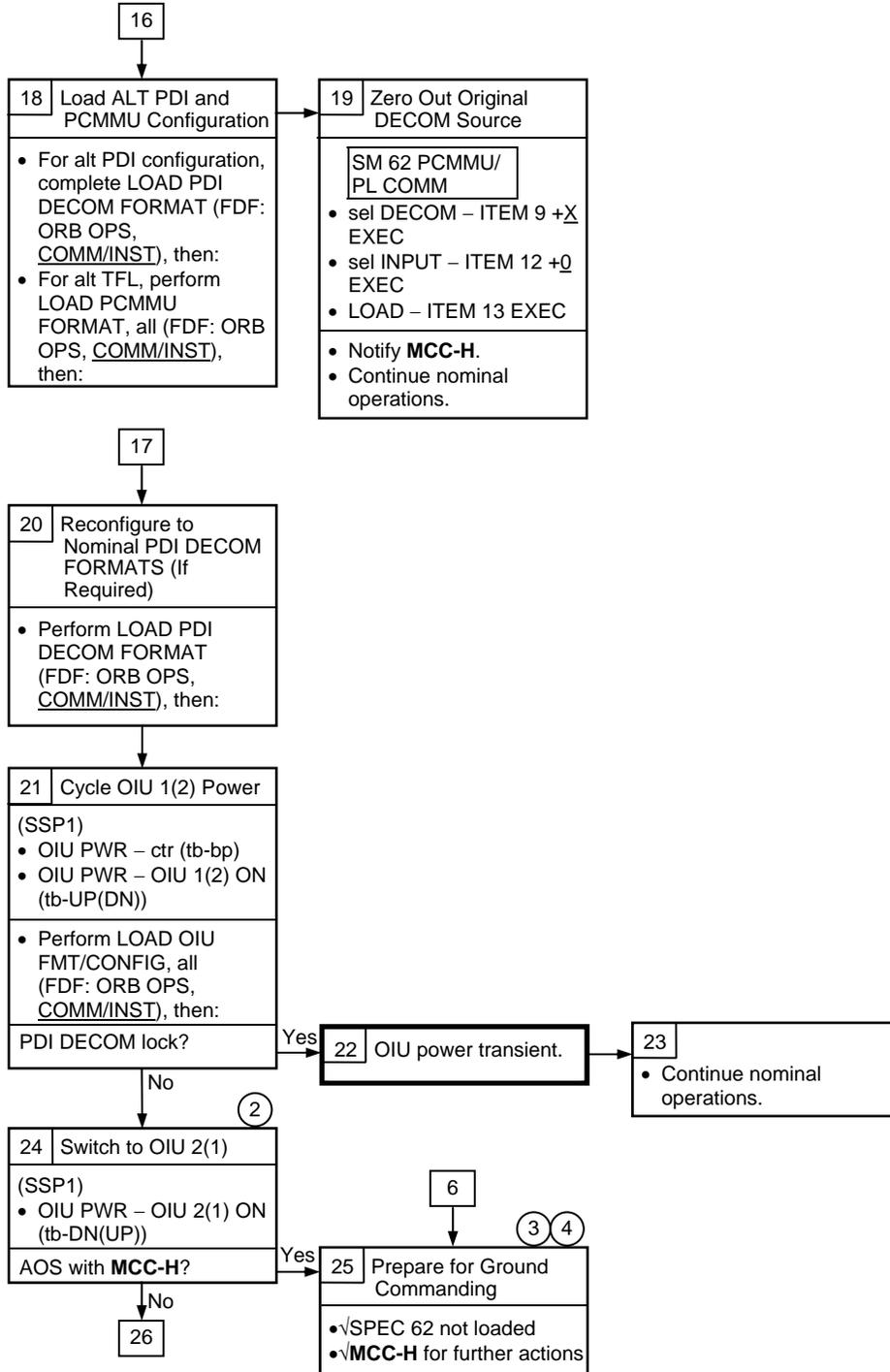
(R1)
PL CAB – MNA(MNB)
PL AUX – ON

(SSP1)
OIU PWR – OIU 1(2)
ON tb-UP(DN)



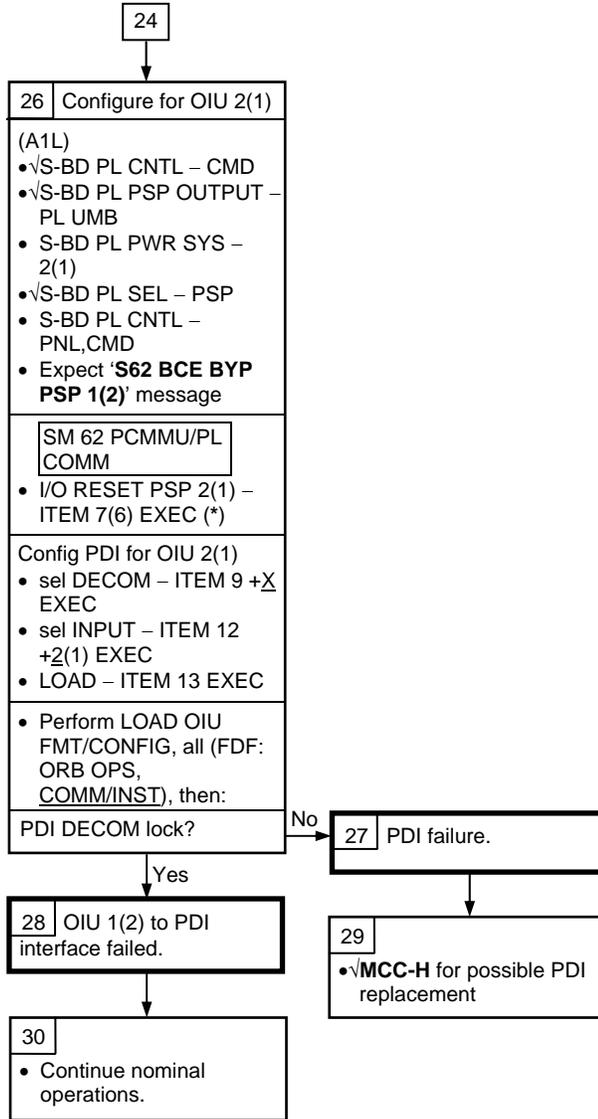
①
TCS and SSV not
addressed in MAL;
FDA not nominally
enabled.

S62 PDI DECOM FAIL
(ASSY OPS/ULF3/FIN 1) Page 2 of 3 pages



- ② Alternate (OIU 1) requires PSP 1.
- ③ For ground commanding of PL COMM system, SPEC 62 must not be loaded.
- ④ **MCC-H** can perform all PL COMM reconfig, except OIU PWR cycle and swap steps.

S62 PDI DECOM FAIL
 (ASSY OPS/ULF3/FIN 1) Page 3 of 3 pages



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APCU ACTIVATION

(ASSY OPS/ULF3/FIN)

Page 1 of 1 page

- R1
1. VERIFYING ORBITER PAYLOAD BUS CONFIGURATION
√tb PL PRI MNC – ON
√PL CAB – MNA(MNB)
√PL AUX – ON
- SSP 1
2. VERIFYING SWITCH POWER
√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

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APCU DEACTIVATION

(ASSY OPS/ULF3/FIN)

Page 1 of 1 page

NOTE

Expect '**S200 APCU 1(2) VOLT LMT**' message when APCU Converters are powered OFF.

CRT

SM 200 APCU Status

SSP 1

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 RLY – OP

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APCU

APCU TEMP ↓↑

(ASSY OPS/ULF3/FIN 1) Page 1 of 1 page

SM ALERT

S200 APCU 1(2)
TEMP HIGH

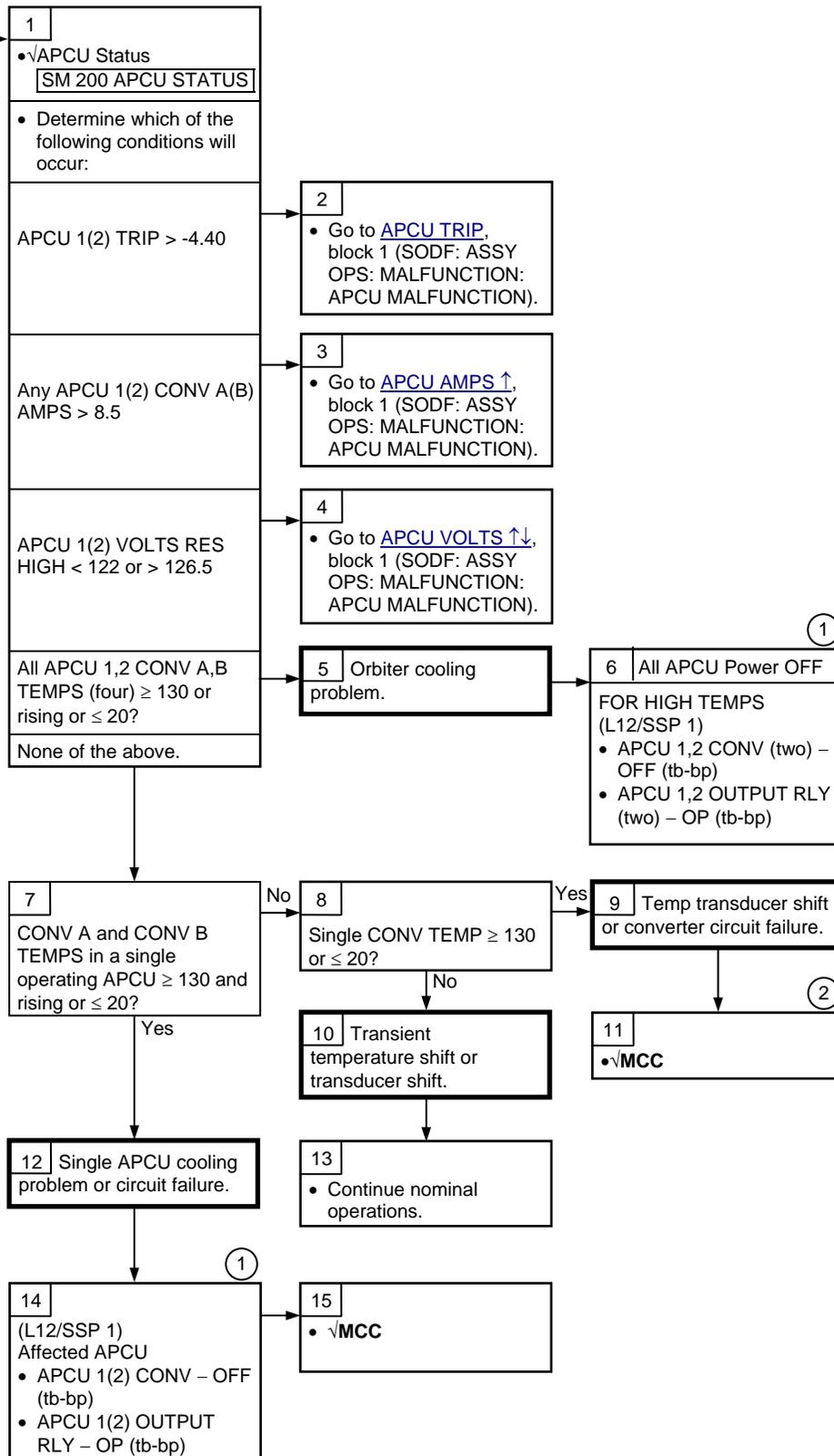
If: APCU 1(2)
CONV TEMP A(B)
≤ 20 or ≥ 130

Nominal Config:
(R1)
PRI PL MNC – ON
(tb-ON)
PL CAB
– MNA(MNB)
PL AUX – ON
L12 (SSP 1)
cb SW PWR 1 – cl

**Nominal APCU
Activated Config:**
L12 (SSP 1)

APCU 1,2
CONV(two)
– ON (tb-gray)

APCU 1,2 OUTPUT
RLY (two) – CL
(tb-gray)



① Loss of APCU 2 results in loss of orbiter 120 V power to LCS/IDC.

② MCC will determine between a transducer shift and a real circuitry failure.

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APCU

APCU TRIP

(ASSY OPS/ULF3/FIN 2) Page 1 of 4 pages

SM
ALERT

- S200 APCU 1(2)
TRIP
- APCU TEMP ↓↑,
block 2 (SODF:
ASSY OPS:
MALFUNCTION:
APCU
MALFUNCTION)
- APCU VOLTS
↑↓, block 2
(SODF: ASSY
OPS:
MALFUNCTION:
APCU
MALFUNCTION)
- APCU AMPS ↑,
block 2 (SODF:
ASSY OPS:
MALFUNCTION:
APCU
MALFUNCTION)

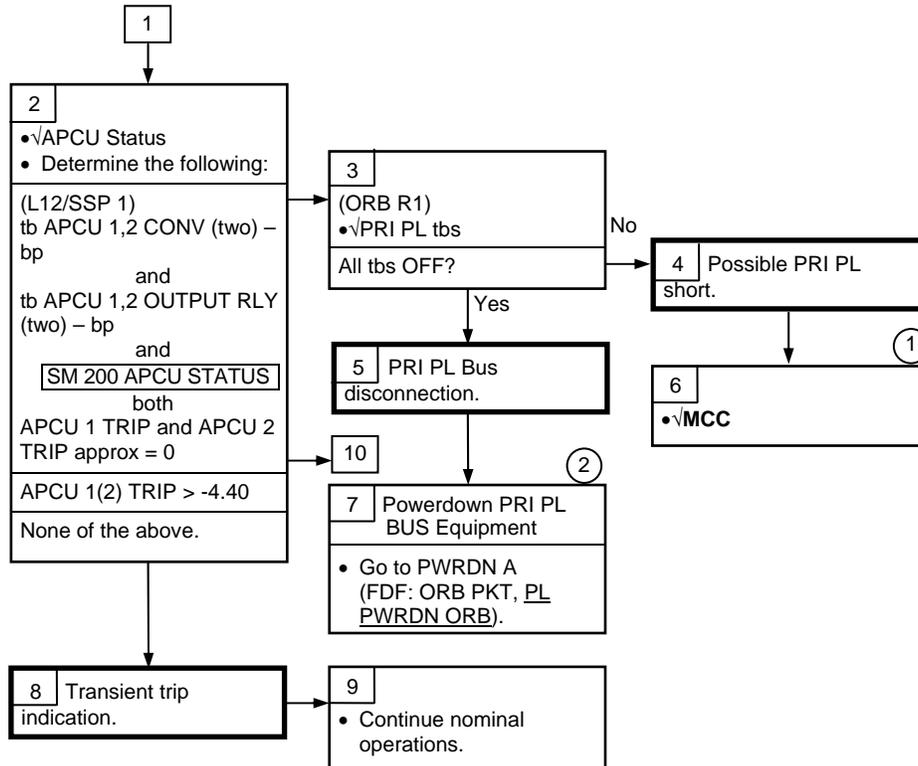
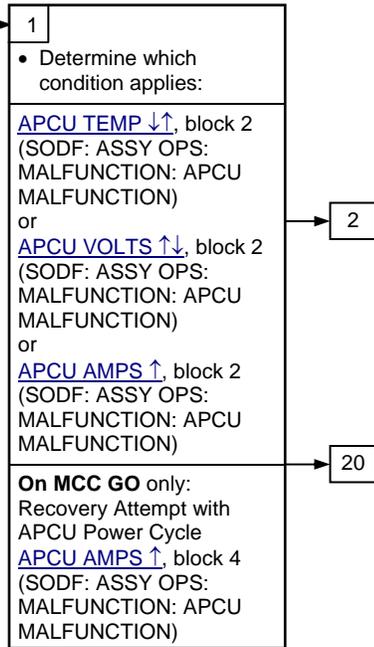
If APCU TRIP
> -4.4
√APCU TRIP
STATUS TABLE

Nominal Config:
R1
PRI PL MNC – ON
(tb-ON)
PL CAB – MNA(MNB)
PL AUX – ON
L12 (SSP 1)
cb SW PWR 1 – cl

**Nominal APCU
Activated Config:**
L12 (SSP 1)

APCU 1,2 CONV
(two) – ON (tb-gray)

APCU 1,2 OUTPUT
RLY (two) – CL
(tb-gray)

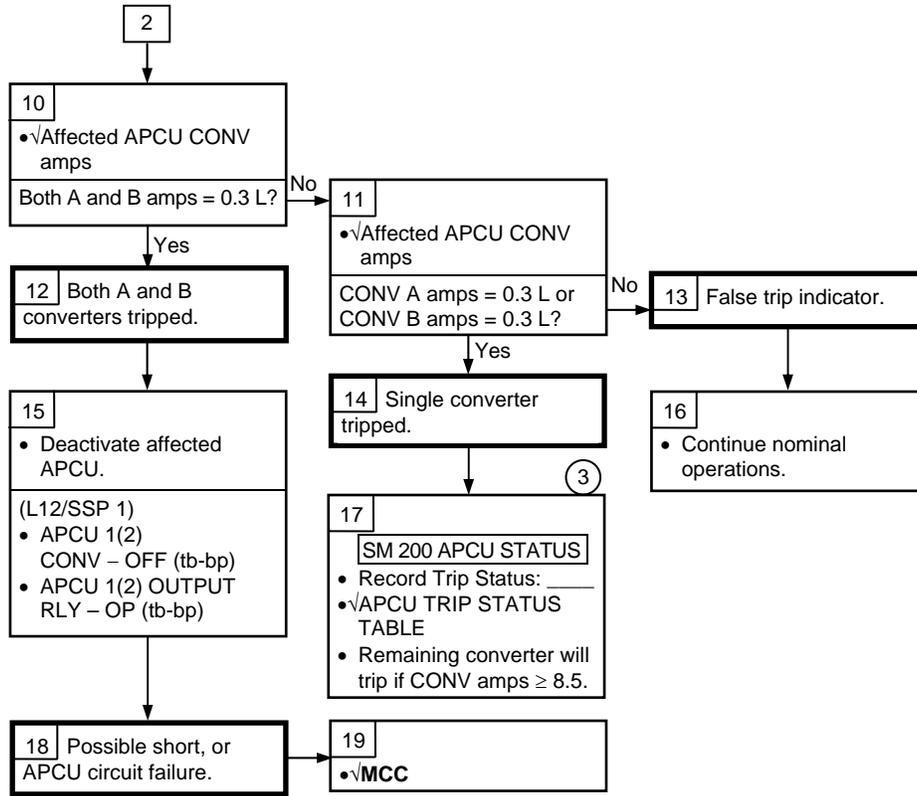


①
MCC will determine cause of interruption of power or signal to the APCUs.

②
MCC will coordinate recovery of the PRI PL bus and equipment.

APCU

APCU TRIP
(ASSY OPS/ULF3/FIN 2) Page 2 of 4 pages



③
LCS/IDC receives
power through
APCU 2.

④
Loss of APCU 2 results in loss of 120 V power to LCS/IDC.

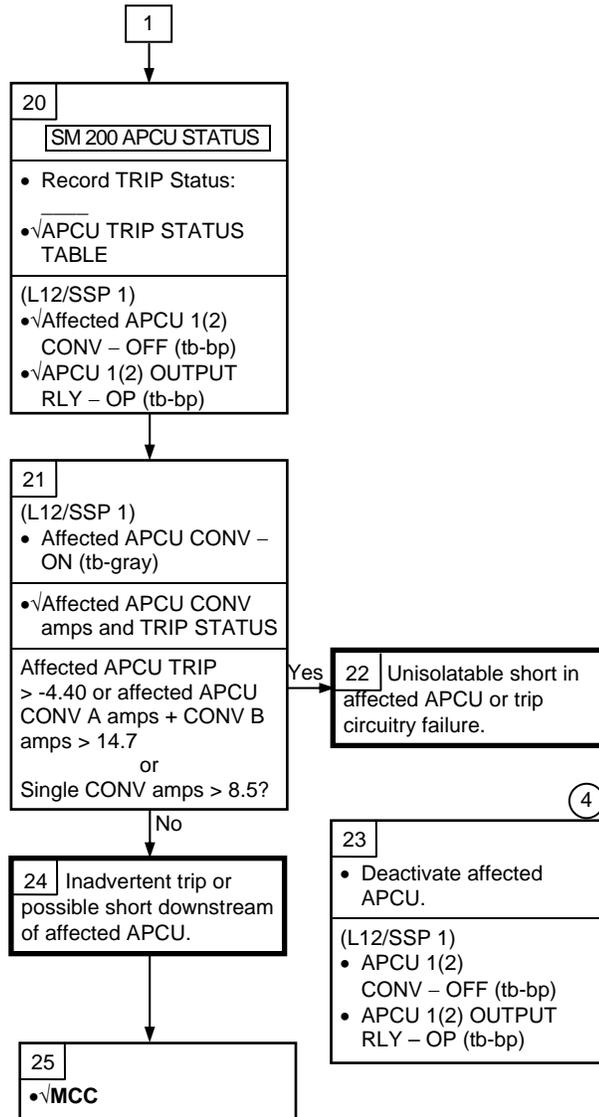


Table 1. APCU TRIP Status

TRIP (STATUS VOLTAGE)	TRIP CAUSE(S)			
	OV	OUV	OC	IUV
+4.88	X	X	X	X
+4.23	X	X	X	
+3.59	X	X		X
+2.95	X	X		
+2.27	X		X	X
+1.62	X		X	
+0.98	X			X
+0.34	X			
-0.30		X	X	X
-0.95		X	X	
-1.59		X		X
-2.23		X		
-2.91			X	X
-3.56			X	
-4.20				X
-4.86 (no trip)				

NOTE
 OV: Output Overvoltage
 OUV: Output Undervoltage
 OC: Output Overcurrent
 IUV: Input Undervoltage
 Tolerance for all reported voltages is ± 0.20 V

APCU

APCU VOLTS \updownarrow

(ASSY OPS/ULF3/FIN 1) Page 1 of 3 pages

SM
ALERT

S200 APCU 1(2)
VOLT LMT

APCU TEMP \updownarrow ,
block 4 (SODF:
ASSY OPS:
MALFUNCTION:
APCU
MALFUNCTION)

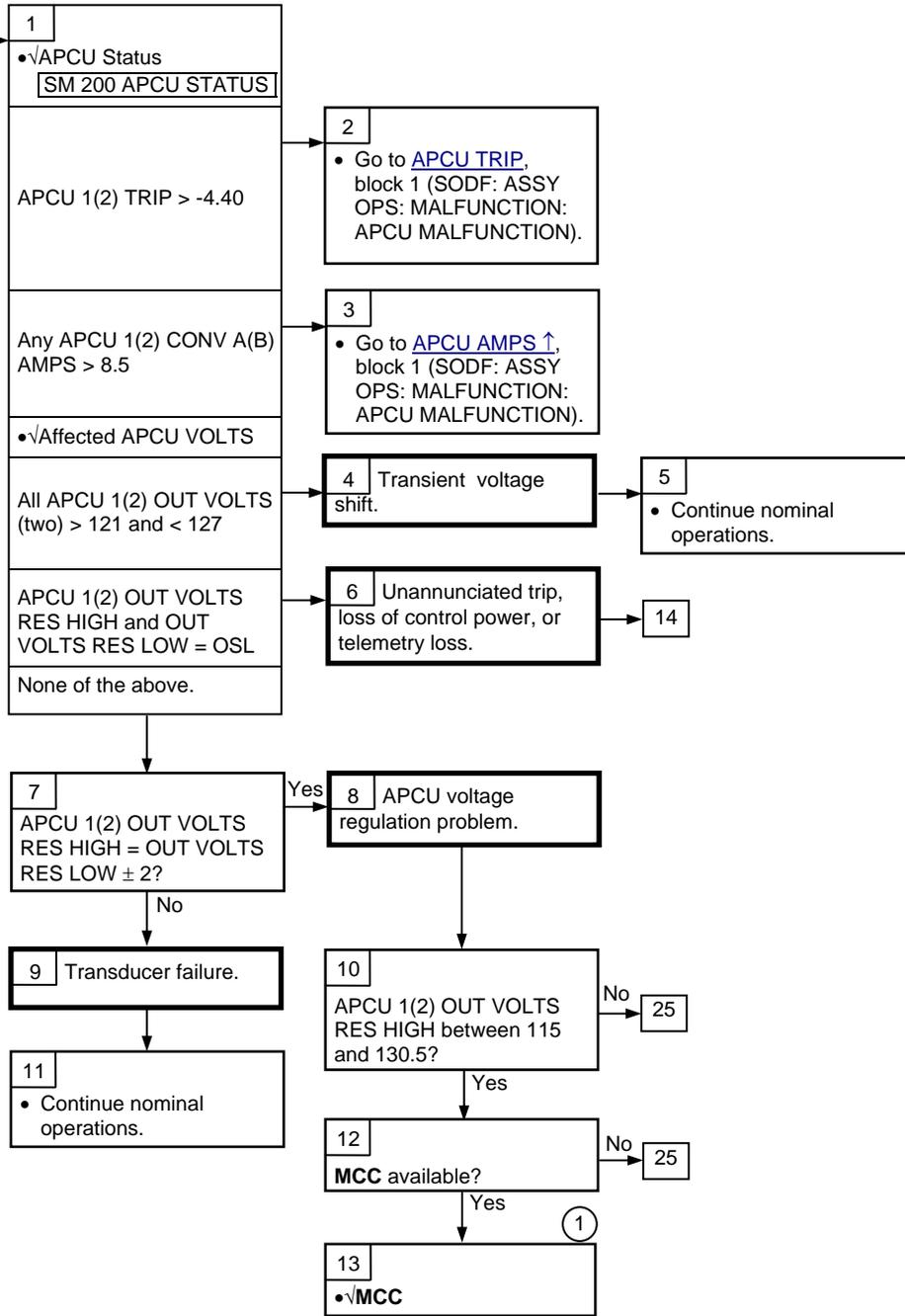
If: APCU VOLTS
RES HIGH \geq
126.5 or \leq 122

Nominal Config:
R1
PRI PL MNC – ON
(tb-ON)
PL CAB –
MNA(MNB)
PL AUX – ON
L12 (SSP 1)
cb SW PWR 1 – cl

**Nominal APCU
Activated Config:**
L12 (SSP 1)

APCU 1,2 CONV
(two) – ON (tb-gray)

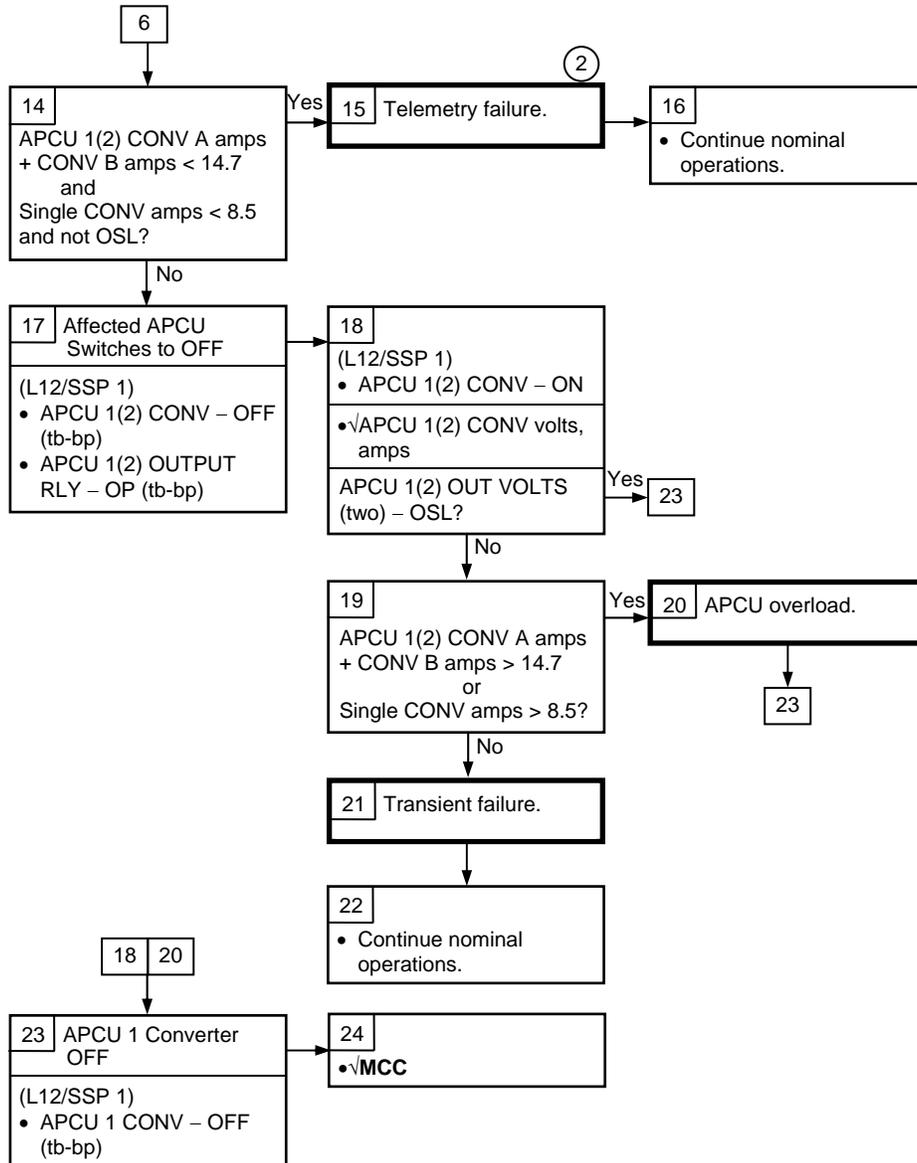
APCU 1,2 OUTPUT
RLY (two) – CL
(tb-gray)



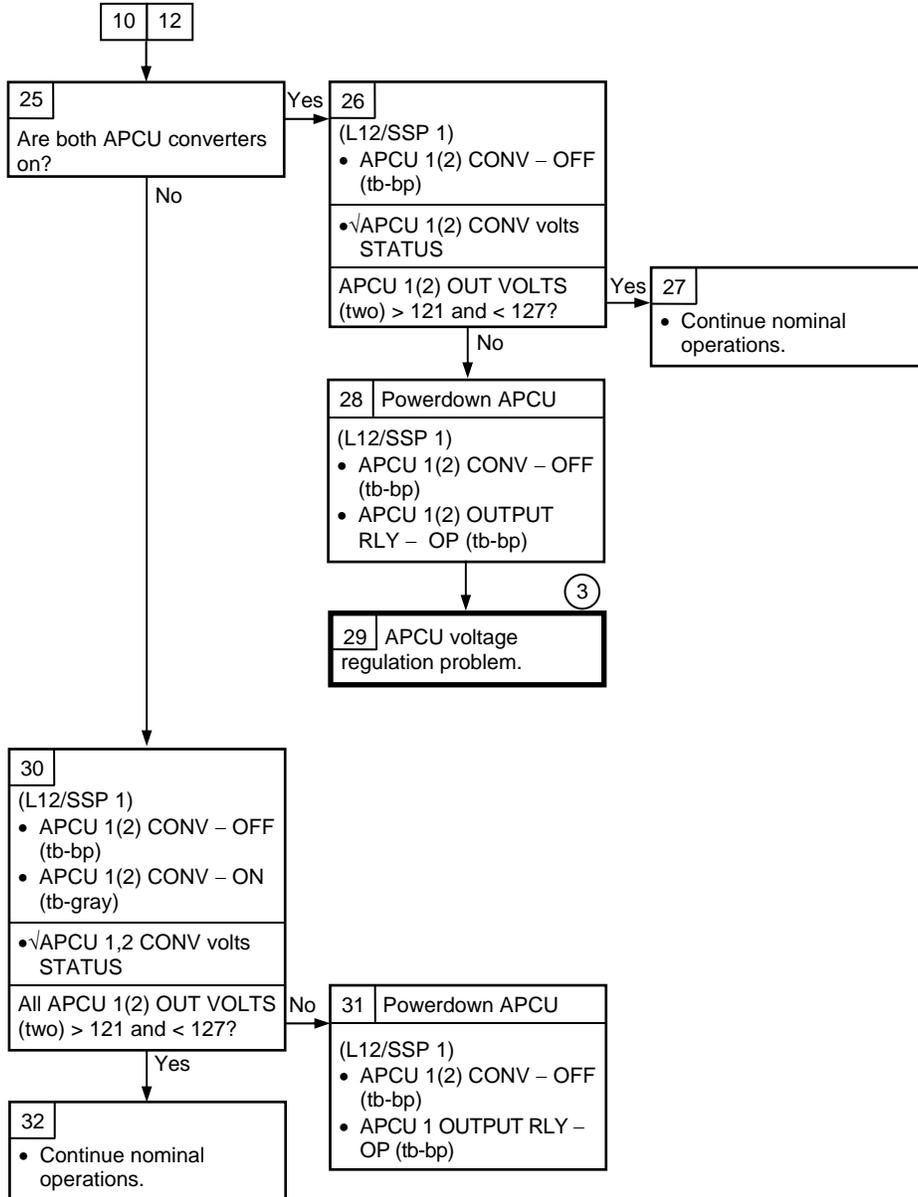
①
SPEC voltage for APCU is 122 to 126.5 volts. If APCU volts are outside this range but stable and usable, consideration will be given to continuing APCU operation.

APCU

APCU VOLTS \updownarrow
 (ASSY OPS/ULF3/FIN 1) Page 2 of 3 pages



②
 There is a single point failure that will cause both the HIGH and LOW RES VOLTS to read low (broken wire).



③
 Loss of APCU 2 results in loss of 120 V orbiter power to LCS/IDC.

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PL/DPS RECONFIGURATION

(ASSY OPS/ULF3/FIN 1) Page 1 of 2 pages

PROCEDURE	SECURE ACTION	RECOVERY ACTION	INFO
PL 1(2) MDM I/O ERROR; PL 1(2) MDM OUTPUT (FDF: ORB PKT, <u>DPS</u>)	N/A	N/A	A
5.3c I/O ERROR PL 1(2); MDM OUTPUT PL 1(2) (FDF: MAL, <u>DPS</u>)	N/A*	N/A	A
PASS SM GPC FAIL (FDF: ORB PKT, <u>DPS</u>)	N/A	D	B
GNC RECOVERY VIA G2FD (FDF: ORB PKT, <u>DPS</u>)	N/A	C,D	B
5.1a CS SPLIT(FDF: MAL, <u>DPS</u>)	N/A	C,D,E**	B
5.3g BCE BYP PL1(2) (FDF: MAL, <u>DPS</u>)	N/A*	N/A	A
GPC FRP-4 PASS RECOVERY AFTER BFS ENGAGE (ASCENT/ORBIT/ENTRY) (FDF: MAL, <u>DPS</u>)	N/A*	C,D	B
GPC FRP-7 DPS RECONFIG FOR LOSS OF AV BAY COOLING (FDF: MAL, <u>DPS</u>)	N/A*	C,D	B
DPS SSR-3 GNC REASSIGNMENT (FDF: MAL, <u>DPS</u>)	N/A*	N/A	B
DPS SSR-4 SM REASSIGNMENT (FDF: MAL, <u>DPS</u>)	N/A	C,D	B
ECLSS SSR-10 H2O PUMP OPS VIA GPC (FDF: MAL, <u>ECLSS</u>)	N/A	C,D,E**	B

*NOTE: Procedure does not call out PL/DPS RECONFIG, Secure

**NOTE: Procedure does not call out PL/DPS RECONFIG, Recovery

ACTION A

If 'I/O ERROR PL1' message:

Loss of ground and orbiter MCDS command interface to ISS via PSP 1/OIU 1
 For additional impacts, refer to [ORBITER MDM LOSS IMPACTS](#)
 (SODF: ASSY OPS: MALFUNCTION: CRITICAL EQUIPMENT LOSS)

If failure at IOP XMTR/RCVR at SM GPC:

If PL2 interface with SM GPC failed:

√**MCC** for SM GPC reassignment

PF1 interface can be recovered by port moding PL 1/2 buses

If 'I/O ERROR PL2' message:

Loss of ground and orbiter MCDS command interface to ISS via PSP 2/OIU 2
 For additional impacts, refer to [ORBITER MDM LOSS IMPACTS](#)
 (SODF: ASSY OPS: MALFUNCTION: CRITICAL EQUIPMENT LOSS)

If failure at IOP XMTR/RCVR at SM GPC:

If PL1 interface with SM GPC failed:

√**MCC** for SM GPC reassignment

PF2 interface can be recovered by port moding PL 1/2 buses

PL/DPS RECONFIGURATION

(ASSY OPS/ULF3/FIN 1) Page 2 of 2 pages

ACTION B

If SM GPC affected:

Note PL/ISS commanding via SM GPC (ground and orbiter MCDS) not possible until SM machine is restored and PL 1(2) MDM I/F is restored

If GNC GPC affected:

Ground commanding not possible until GNC machine is restored

ACTION C

If PSP I/O reset not previously performed

SM 62 PCMMU/PL COMM

I/O RESET PSP 1(2) – ITEM 6(7) EXEC

Notify **MCC** when complete

ACTION D

Reload PDI DECOM FORMAT (FDF: ORB OPS FS, COMM/INST)

As required, reenable PDI DECOM FDA

Resume SPEC 62

ACTION E

Reload PCMMU TFLs, load PCMMU FORMAT (FDF: ORB OPS, COMM/INST)

ORBITER MDM LOSS IMPACTS

(ASSY OPS/ULF3/FIN 1)

Page 1 of 2 pages

FF1	Uplink through NSP 1 (secondary)
FF3	Uplink through NSP 2 (primary) FRCS Vernier command path (loss of verns)
FA1	LRCS Vernier command path (loss of verns)
FA2	RRCS Vernier command path (loss of verns)
PF1	ISS Primary command path (via PSP 1 – UMB 1/OIU 1) OIU 1 tlm Ku-Band command and tlm APCU 1 tlm X1/X2 CONN MATE Tlm (redundant)
PF2	ISS Redundant command path (via PSP 2 – UMB 1/OIU 2) OIU 2 tlm CCTV Command Path from MCC (crew still has control from PNL A7) C/W Annunciation (PL Caution, B/U C/W Alarm) APCU 2 tlm X1/X2 CONN MATE Tlm (redundant)
OF1	PCMMU 1 – mode select tlm PCMMU 1,2 – RPC A tlm PDI – RPC A tlm PL AUX A – RPC ON/OFF tlm MID MCA 1 OP STATUS 1, 2, 3, 4 tlm MID MCA 3 OP STATUS 1, 2, 3, 4 tlm PL BAY MECH PWR SYS 1, 2 tlm PL RETEN LOGIC PWR SYS 1, 2 tlm ELC2 LATCH 1,2,3,4 (LAT/REL/RDY-TO-LAT) Sys B Tlm (PL SEL 3) ELC1 ROEU (MATE/DEMATE) Sys B Tlm (PL SEL 2) ELC2 ROEU (LAT/REL/MATE/DEMATE) Sys B Tlm (PL SEL 2) ELC2 ROEU (RELAX) Sys B Tlm (PL SEL 3)
OF2	PSP 1,2 – bit and frame sync PCMMU 2 – mode select tlm PCMMU 2 RPC B tlm PL AUX B – RPC ON/OFF tlm MID MCA 1 OP STATUS 5, 6 tlm MID MCA 3 OP STATUS 5, 6, 7, 8 tlm ELC2 LATCH 1,2,3,4 (LAT/REL/RDY-TO-LAT) Sys A Tlm (PL SEL 3) ELC2 ROEU (RELAX) Sys A Tlm (PL SEL 3) ELC1 LATCH 1,2,3,4 (LAT/REL/RDY-TO-LAT) Sys B Tlm (PL SEL 1) ELC1 ROEU (LAT/REL) Sys B Tlm (PL SEL 2) ELC1 ROEU (RELAX) Sys B Tlm (PL SEL 1)
DSC OF2	FRCS Vernier Inj Temps (loss of verns)

ORBITER MDM LOSS IMPACTS

(ASSY OPS/ULF3/FIN 1)

Page 2 of 2 pages

- OF3 Orbiter Comm system tlm (refer to OI MDM/DSC Failure Impacts)
PL PRI MNC, MNB, FC3 – ON/OFF tlm
PCMMU 1 RPC B tlm
PDI – RPC B tlm
- OF4 Ku-Band – RADAR mode and output power
S-Band, Ku-Band – PNL/CMD switch position
PSP, GCIL – ON/OFF tlm
PDI Power Switch position indication
Orbiter Comm system tlm (refer to OI MDM/DSC Failure Impacts)
CAB PL (MNA, MNB), PL AUX – ON/OFF tlm
P/L SEL posn tlm System A
ELC1 ROEU (MATE/DEMATE) Sys A Tlm (PL SEL 2)
ELC2 ROEU (LAT/REL/MATE/DEMATE/ELEC CONN) Sys A Tlm (PL SEL 2)
- OA1 ODS X4/PMA X3 connector mate tlm
PMA 2/3 GRP 1 passive hooks (1,3,5,7,9,11) Close tlm
- DSC OA1 ODS X4/PMA X3 connector mate tlm
PMA 2/3 GRP 1 passive hooks (1,3,5,7,9,11) Close tlm
- OA2 AFT PL MNB PWR ON tlm
AFT PL MNB amps
ODS X3/PMA X4 connector mate tlm
PMA 2/3 GRP 2 passive hooks (2,4,6,8,10,12) Close tlm
- DSC OA2 ODS X3/PMA X4 connector mate tlm
PMA 2/3 GRP 2 passive hooks (2,4,6,8,10,12) Close tlm
Vernier R5D Inj Temps (loss of verns)
- OA3 AFT PL MNC PWR ON tlm
AFT PL MNC amps
ELC1 LATCH 1,2,3,4 (LAT/REL/RDY-TO-LAT) Sys A Tlm (PL SEL 1)
ELC1 ROEU (LAT/REL/ELEC CONN) Sys A Tlm (PL SEL 2)
ELC1 ROEU (RELAX) Sys A Tlm (PL SEL 1)
- DSC OL1 LRCS Vernier Inj Temps (loss of verns)
- DSC OR1 RRCS Vernier Inj Temps (loss of verns)

DEORBIT PREP

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PAYLOAD DEACTIVATION

(ASSY OPS/ULF3/FIN 1)

Page 1 of 1 pages

- | | | |
|-----------------|----|---|
| L12U
(SSP 1) | 1. | cb SW PWR 1 – op
cb PDIP 1 PWR 2/KuBAND RLY – op
cb X1/X2 SW PDIP1 PWR 1 – op |
| L12L
(SSP 2) | 2. | cb PDIP 2 PWR 2 – op
cb PDIP 2 PWR 1 – op |
| L12 (PDIP 1) | | Ku BAND RATE – OFF |
| R1 | 3. | PL CAB – OFF |

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PAYLOAD REACTIVATION

(ASSY OPS/ULF3/FIN 1)

Page 1 of 1 pages

- R1 1. PL CAB – MNA

- L12L 2. cb PDIP 2 PWR 2 - cl
(SSP 2)

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PAYLOAD ENTRY SWITCH LIST/VERIFICATION

(ASSY OPS/ULF3/FIN 1)

Page 1 of 1 page

PAYLOAD PWR CONFIG

- | | |
|---------------------------------|---|
| TIG-1:55 R1 | 1. <input checked="" type="checkbox"/> PL CAB – OFF
<input checked="" type="checkbox"/> PL PRI MNC – ctr (tb-OFF)
<input checked="" type="checkbox"/> PL PRI MNB – ctr (tb-OFF)
<input checked="" type="checkbox"/> PL PRI FC3 – ctr (tb-OFF)
<input checked="" type="checkbox"/> PL AUX – ON
<input checked="" type="checkbox"/> PL AFT MNB – OFF
<input checked="" type="checkbox"/> PL AFT MNC – OFF |
| L12U
(SSP1) | 2. <input checked="" type="checkbox"/> cb SW PWR 1 – op
<input checked="" type="checkbox"/> cb PDIP 1 PWR 2/KuBAND RLY – op
<input checked="" type="checkbox"/> TCS PWR – OFF (tb-bp)
<input checked="" type="checkbox"/> cb X1/X2 SW PDIP 1 PWR 1 – op
<input checked="" type="checkbox"/> OIU PWR – OFF (tb-bp) |
| L12L
(SSP2) | 3. <input checked="" type="checkbox"/> cb PDIP 2 PWR 2 – op
<input checked="" type="checkbox"/> C/L CAM PWR – OFF
<input checked="" type="checkbox"/> cb PDIP 2 PWR 1 – op |
| L12
(PDIP1) | 4. <input checked="" type="checkbox"/> Ku BAND RATE – OFF
<input checked="" type="checkbox"/> DC POWER 1 – OFF
<input checked="" type="checkbox"/> DC POWER 2 – OFF |
| L11
(PDIP2) | 5. <input checked="" type="checkbox"/> SW – OIU
<input checked="" type="checkbox"/> DC POWER 1 – OFF
<input checked="" type="checkbox"/> DC POWER 2 – OFF |
| MA16F/G
(GLACIER)
ML86B:E | 6. <input checked="" type="checkbox"/> cb POWER – cl (lt on)
<input checked="" type="checkbox"/> BATTERY – ON (lt on)
<input checked="" type="checkbox"/> cb MNB MAR 1 – cl |
| MF28E/G

(MDS)
ML85E | 7. <input checked="" type="checkbox"/> cb POWER cb – cl
<input checked="" type="checkbox"/> MDS POWER lt – on
<input checked="" type="checkbox"/> PRIMARY POWER lt – on

<input checked="" type="checkbox"/> DC 10 AMP MNB S4 – ON
<input checked="" type="checkbox"/> cb DC 10 AMP MNB CB4 – cl |
| MF71E
(CGBA)
MO63P | 8. <input checked="" type="checkbox"/> cb MAIN POWER – cl (lt on)

<input checked="" type="checkbox"/> 10A J4 – ON
<input checked="" type="checkbox"/> cb CB4/J4 – cl |

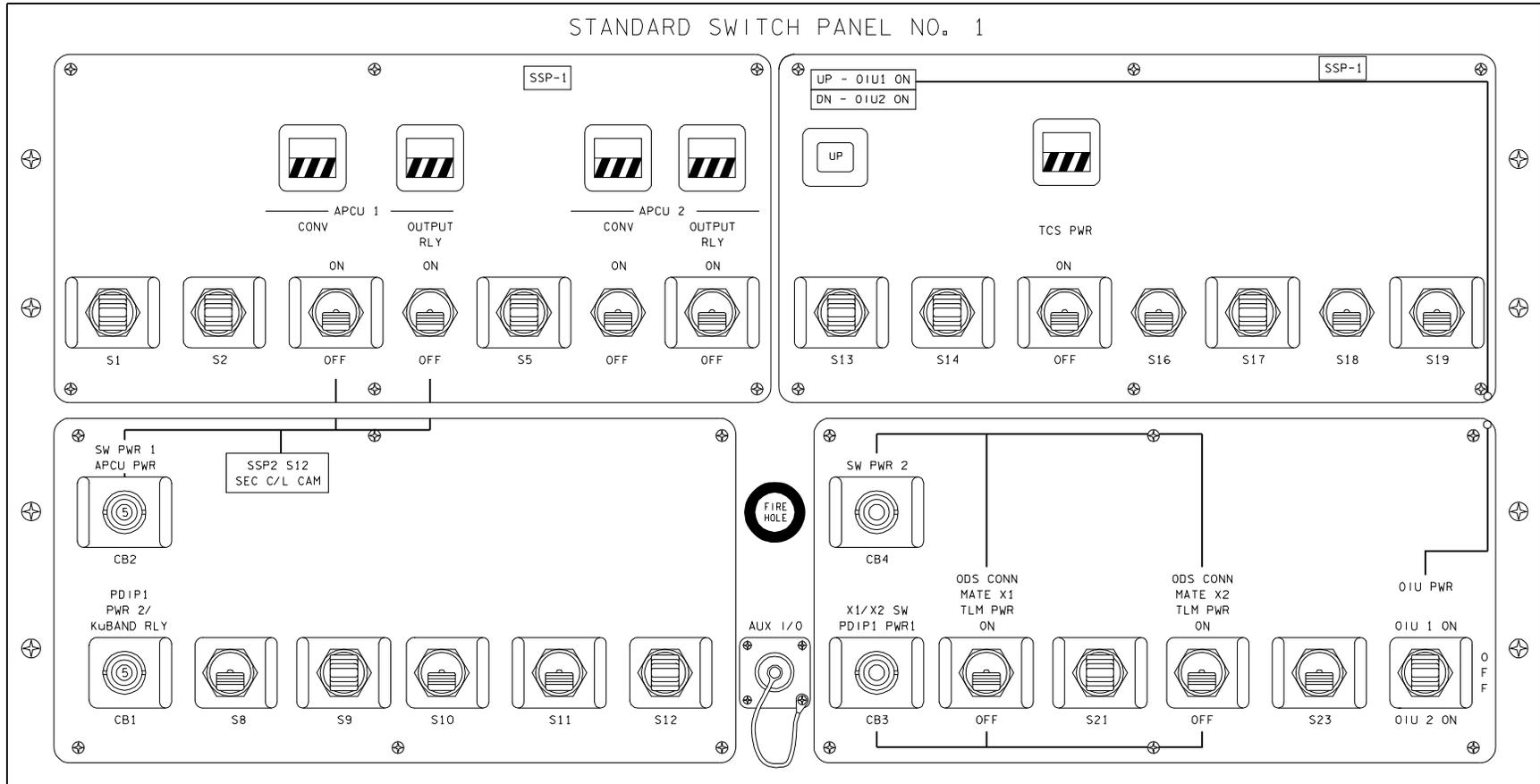
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REFERENCE

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STANDARD SWITCH PANEL 1
(ASSY OPS/ULF3/FIN)

363



48502003_129.PNL 1

STANDARD SWITCH PANEL 1

(ASSY OPS/ULF3/FIN)

Page 2 of 3 pages

ITEM	DEVICE TYPE	FUNCTION
CB1 PDIP 1 PWR2/ KuBAND RLY	Two-position circuit breaker (5 amp): In Out	Closed (in) – Applies orbiter CAB PL2 power to the PDIP1 DC PWR 2 switch outlet and KuBAND RATE switch. Open (out) – Removes power from PDIP1 DC PWR 2 outlet and KuBAND RATE switch.
CB2 SW PWR 1	Two-position circuit breaker (5 amp): In Out	Closed (in) – Applies orbiter power to SSP1 S3 and S4, and SSP2 S12. Open (out) – Removes power from SSP1 S3 and S4, and SSP2 S12.
S3 APCU 1 CONV	Two-position toggle switch: ON OFF	ON(up) – Applies power to the APCU 1 converter. OFF(dn) – Removes power from the APCU 1 converter.
DS3 APCU 1 CONV	Talkback – two-position Gray Barberpole	gray – Indicates APCU 1 converter powered. bp – Indicates APCU 1 converter not powered.
S4 APCU 1 OUTPUT RLY	Two-position toggle switch: CLOSE OPEN	CLOSE(up) – Closes the APCU 1 output relay. OPEN(dn) – Opens the APCU 1 output relay.
DS4 APCU 1 OUTPUT RLY	Talkback – two-position Gray Barberpole	gray – Indicates APCU 1 output relay is closed. bp – Indicates APCU 1 output relay is open.
S6 APCU 2 CONV	Two-position toggle switch: ON OFF	ON(up) – Applies power to the APCU 2 converter. OFF(dn) – Removes power from the APCU 2 converter.
DS6 APCU 2 CONV	Talkback – two-position Gray Barberpole	gray – Indicates APCU 2 converter powered. bp – Indicates APCU 2 converter not powered.
S7 APCU 2 OUTPUT RLY	Two-position toggle switch: CLOSE OPEN	CLOSE(up) – Closes the APCU 2 output relay. OPEN(dn) – Opens the APCU 2 output relay.
DS7 APCU 2 OUTPUT RLY	Talkback – two-position Gray Barberpole	gray – Indicates APCU 2 output relay is closed. bp – Indicates APCU 2 output relay is open.

STANDARD SWITCH PANEL 1

(ASSY OPS/ULF3/FIN)

Page 3 of 3 pages

ITEM	DEVICE TYPE	FUNCTION
DS13	Talkback – three-position:	UP – OIU 1 is powered On.
OIU PWR	UP – OIU 1 Barberpole – Off DN – OIU 2	BP – OIU 1 and OIU 2 powered Off. DN – OIU 2 is powered On.
S15	Two-position toggle switch:	ON – Applies power to TCS.
TCS PWR	ON OFF	OFF – Removes power from TCS.
DS15	Talkback - two-position:	Gray – Indicates TCS is powered.
TCS PWR	Gray Barberpole	BP – Indicates TCS is not powered.
CB3	Two-position circuit breaker (5 amp):	Closed (in) – Applies orbiter CAB PL2 to PDIP1 DC PWR 1 outlet.
X1/X2 SW PDIP1 PWR 1	In Out	Open (out) – Removes power from PDIP1 DC PWR1 outlet.
CB4	Two-position circuit breaker (5 amp):	Closed (in) – Applies orbiter CAB PL3 power to SSP1 S20 and S22.
SW PWR 2	In Out	Open (out) – Removes power from SSP1 S20 and S22.
S20	Two-position toggle switch:	ON (up) – Applies CAB PL2 and CAB PL3 power to ODS X1 Connector Mate.
ODS CONN MATE X1 TLM PWR	ON OFF	OFF (dn) – Removes CAB PL3 power from ODS X1 Connector Mate.
S22	Two-position toggle switch:	ON (up) – Applies CAB PL2 and CAB PL3 power to X2 Connector Mate.
ODS CONN MATE X2 TLM PWR	ON OFF	OFF (dn) – Removes CAB PL3 power from ODS X2 Connector Mate.
S24	Three-position toggle switch:	OIU 1 ON – Provides CAB PL3 power to OIU 1.
OIU PWR	OIU 1 ON OFF OIU 2 ON	OFF – Removes power from OIU 1 and OIU 2. OIU 2 ON – Provides AUX PLB power to OIU 2.

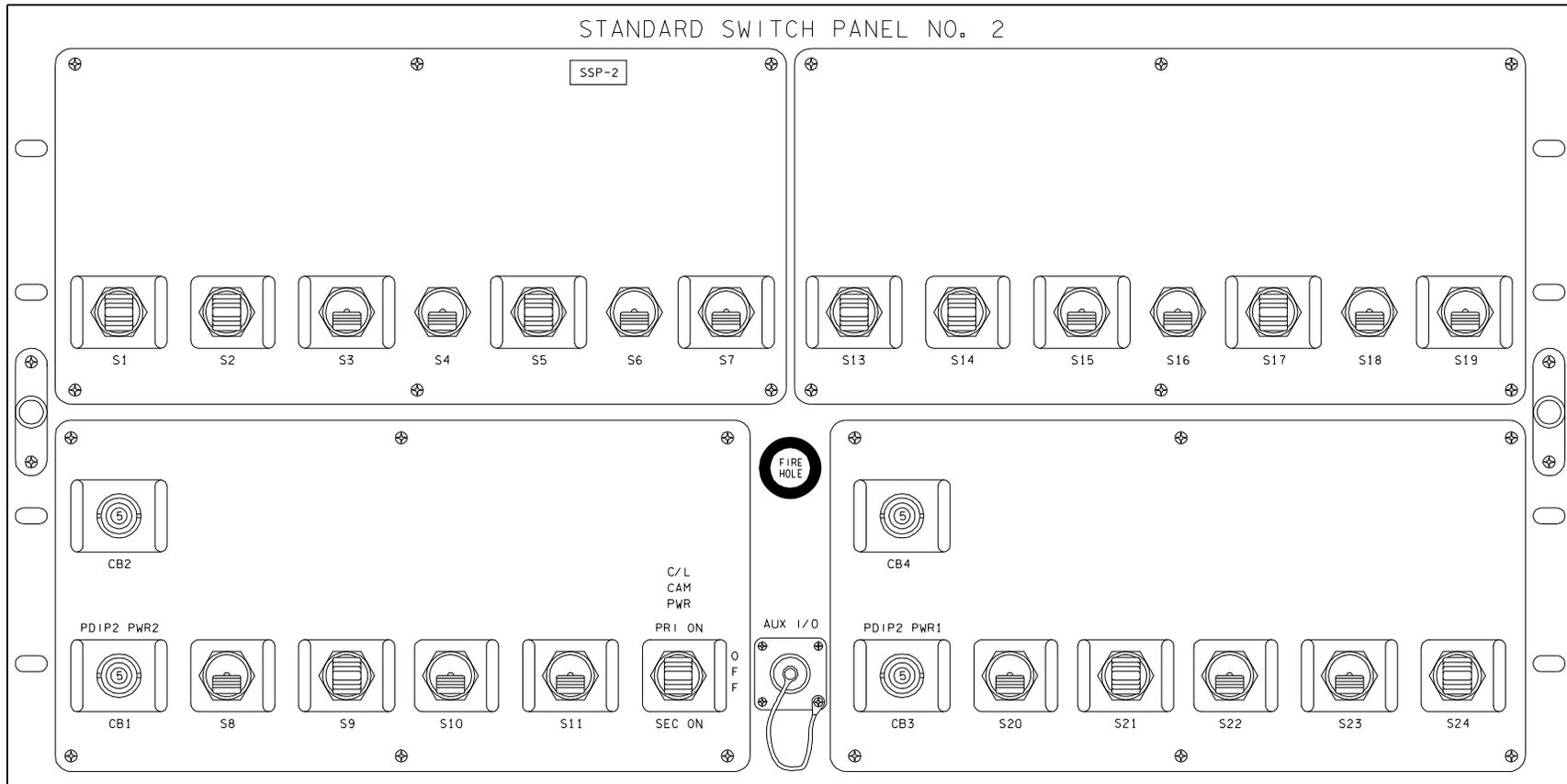
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STANDARD SWITCH PANEL 2

(ASSY OPS/ULF3/FIN)

Page 1 of 2 pages

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STANDARD SWITCH PANEL 2

(ASSY OPS/ULF3/FIN)

Page 2 of 2 pages

ITEM	DEVICE TYPE	FUNCTION
CB1 PDIP2 PWR2	Two-position circuit breaker (5 amp): In Out	Closed (in) – Applies orbiter CAB PL2 power to PDIP2 DC PWR 2 outlet. Open (out) – Removes power from PDIP2 DC PWR 2.
S12 C/L CAM PWR	Three-position toggle switch: PRI ON OFF SEC ON	PRI ON (up) – Applies CAB PL3 power to primary centerline Camera. OFF (ctr) – Disables power to both primary and secondary centerline Camera. SEC ON (dn) – Applies CAB PL 1 power to secondary centerline Camera.
CB3 PDIP2 PWR1	Two-position circuit breaker (5 amp): In Out	Closed (in) – Applies orbiter CAB PL2 power to PDIP2 DC PWR 1 outlet. Open (out) – Removes power from PDIP2 DC PWR 1 outlet.

SPEC 200 APCU STATUS

(ASSY OPS/ULF3/FIN)

Page 1 of 3 pages

OBJECTIVE:

This display monitors health and status of the two APCUs and is available in SM OPS 2. The APCUs are used to power OBSS heaters. The display is generic and has been used on several missions. Figure 1 is a view of this display.

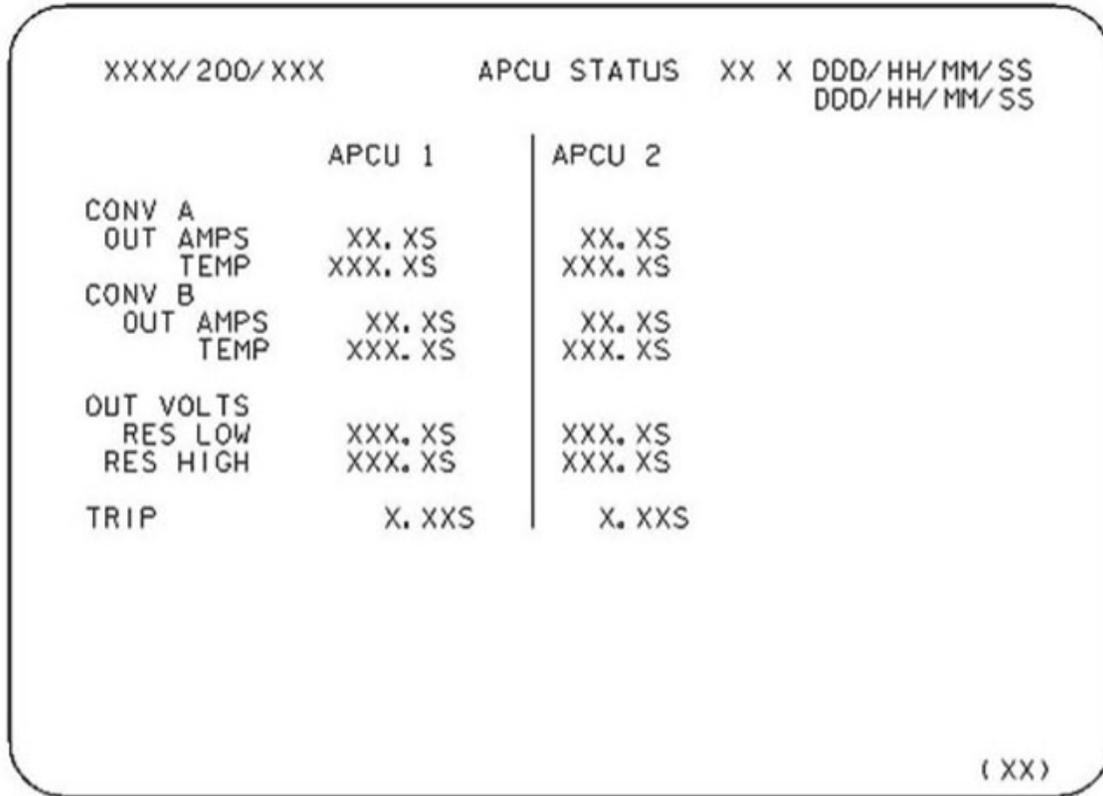


Figure 1.- APCU Status - MCDS Display.

TITLE: APCU STATUS

TYPE: SPEC 200

SPEC 200 APCU STATUS

PARAMETER CHARACTERISTICS

Table 1. Parameter Characteristics

CRT Name		MSID	UNITS	DISPLAY RANGE	STATUS IND [3]					FDA LIMITS	
					M	H	L	↑	↓	LO	HI
APCU 1 CONV A OUT AMPS		P50C9003V	amps	0 to 12.0	M	H	L	↑			8.5
APCU 1 CONV A TEMP		P50T9002V	deg F	0 to 212.0	M	H	L	↑	↓	20	130
APCU 1 CONV B OUT AMPS		P50C9004V	amps	0 to 12.0	M	H	L	↑			8.5
APCU 1 CONV B TEMP		P50T9005V	deg F	0 to 212.0	M	H	L	↑	↓	20	130
APCU 1 OUT VOLTS RES LOW	[1]	P50V9001V	volts	0 to 180.0	M	H	L				
APCU 1 OUT VOLTS RES HIGH	[1]	P50V9000V	volts	110 to 160.0	M	H	L	↑	↓	122	126.5
APCU 1 TRIP	[2]	P50V9006V	volts	-5.00 to 5.00	M	H	L	↑			-4.40
APCU 2 CONV A OUT AMPS		P50C9009V	amps	0 to 12.0	M	H	L	↑			8.5
APCU 2 CONV A TEMP		P50T9010V	deg F	0 to 212.0	M	H	L	↑	↓	20	130
APCU 2 CONV B OUT AMPS		P50C9011V	amps	0 to 12.0	M	H	L	↑			8.5
APCU 2 CONV B TEMP		P50T9012V	deg F	0 to 212.0	M	H	L	↑	↓	20	130
APCU 2 OUT VOLTS RES LOW	[1]	P50V9007V	volts	0 to 180.0	M	H	L				
APCU 2 OUT VOLTS RES HIGH	[1]	P50V9008V	volts	110 to 160.0	M	H	L	↑	↓	122	126.5
APCU 2 TRIP	[2]	P50V9013V	volts	-5.00 to 5.00	M	H	L	↑			-4.40

SPEC 200 APCU STATUS

(ASSY OPS/ULF3/FIN)

Page 3 of 3 pages

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. APCU TRIP Status

TRIP (STATUS VOLTAGE)	TRIP CAUSE (S)			
	OV	OUV	OC	IUV
+4.88	X	X	X	X
+4.23	X	X	X	
+3.59	X	X		X
+2.95	X	X		
+2.27	X		X	X
+1.62	X		X	
+0.98	X			X
+0.34	X			
-0.30		X	X	X
-0.95		X	X	
-1.59		X		X
-2.23		X		
-2.91			X	X
-3.56			X	
-4.20				X
-4.86 (no trip)				
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.

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CUE CARD

CUE CARD

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HOOK
VELCRO

HOOK
VELCRO

CGBA AND ABRs STATUS CHECK

(ASSY OPS/ULF3/FIN 1) Page 1 of 2 pages

OBJECTIVE:

The following steps will perform a status check on the Commercial Generic Bioprocessing Apparatus (CGBA) and verify Advanced Biological Research System (ABRS) LED Status on the front panel.

MF28E 1. ABRS STATUS CHECK

1.1 ✓ Status Lt – green

1.2 ✓ MCC-H of status

2. CGBA STATUS CHECK

NOTE

1. MENU Option will time out after 30 seconds and return to status display.
2. Keypad goes into sleep mode if not pressed within 10 minutes. Pressing any key when display is in sleep mode will reactivate keypad to receive input.

MF71E
(CGBA)

2.1 ✓ LED-MAIN POWER – On (green)

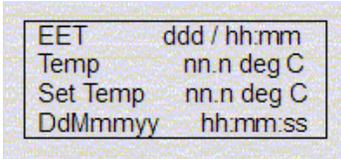
* If no LED
* | Perform CGBA INCORRECT (NO) DISPLAY, all (SODF:
* | ASSY OPS: PAYLOADS: CGBA: MALFUNCTION), then:

2.2 ✓ CGBA fan running and airflow at AIR OUTLET

2.3 Clean Air Inlet Screen with Gray Tape, as required.

2.4 pb ENTER → Press (to disable screen saver)

2.5 ✓ CGBA display indicates the following:



* If data incorrect or no display
* | Perform CGBA INCORRECT (NO) DISPLAY, all (SODF:
* | ASSY OPS: PAYLOADS: CGBA: MALFUNCTION), then:

2.6 ✓ Temp = Set Temp ± 2° C

HOOK
VELCROHOOK
VELCRO**GLACIER STATUS CHECK**

(ASSY OPS/ULF3/FIN) Page 1 of 2 pages

OBJECTIVE:

The following steps will perform a status check on the Glacier.

1. GLACIER STATUS CHECK
- MA16F/G (Glacier)
- 1.1 √cb POWER – Close (It on)
 - 1.2 √sw BATTERY – ON (It on)
 - 1.3 √Display – ‘HOME’

* If Display – ‘**Error Pending**’

* | Perform [GLACIER ERROR MESSAGE](#), all (SODF: ASSY

* | OPS: PAYLOADS: GLACIER: MALFUNCTION), then:

*

* If ‘HOME’ not shown

* pb Right (EXIT) → Press until ‘HOME’ appears

NOTE

After door openings, CURR TEMP may be out of range ramping toward set point.

- 1.4 If ascent Glacier
 - √Display – ‘CURR TEMP:’ is $+4.0^{\circ}\text{C} \pm 5.0^{\circ}\text{C}$

If descent Glacier

 - √Display – ‘CURR TEMP:’ is $-95.0^{\circ}\text{C} \pm 5.0^{\circ}\text{C}$
- 1.5 Record from Glacier front panel ‘GPS’, ‘CURR TEMP’ in Table 1 (Glacier Log).
- 1.6 Notify **MCC-H** of data recorded in Table 1 and any off-nominal conditions.

TOP
BACK OF "GLACIER STATUS CHECK"

HOOK
VELCRO

HOOK
VELCRO

GLACIER STATUS CHECK

(ASSY OPS/ULF3/FIN)

Page 2 of 2 pages

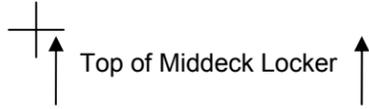
Table 1. Glacier Log

GPS	CURR TEMP	GPS	CURR TEMP
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C
____:____:____	____.____°C	____:____:____	____.____°C

ASSY OPS-2b/ULF3/A

SPINAL ELONGATION STANDING HEIGHT LOG

(ASSY OPS/ULF3/FIN)



SPINAL ELONGATION STANDING HEIGHT LOG

- 1) Velcro cue card to the farthest right column of the middeck lockers ensuring that the top of the page lines up with the top of the middeck locker.
- 2) Subject holds self with his/her back against the middeck lockers and holds self down.
- 3) Operator helps to ensure feet are flush with the ground.
- 4) Operator marks height of subject using a cue card as a flat edge on paper with a pen and labels with Subject ID and date.
- 5) Repeat steps 2-4 for each subject.
- 6) After all subjects have been completed, remove Spinal Elongation Height Log from middeck lockers and place in the Spinal Procedure manila envelope for return.

ASSY OPS-3a/17A - ALL/A



HINGE



SPINAL ELONGATION STANDING HEIGHT LOG
(ASSY OPS/ULF3/FIN)



HINGE

ASSY OPS-3b/17A - ALL/A



TOP
HINGED AT BOTTOM OF
'SPINAL ELONGATION STANDING HEIGHT LOG'
HINGE

SPINAL ELONGATION STANDING HEIGHT LOG
(ASSY OPS/ULF3/FIN)



ASSY OPS-3aa/17A - ALL/A



TOP
HINGED AT BOTTOM OF
BACK OF 'SPINAL ELONGATION STANDING HEIGHT LOG'
HINGE

SPINAL ELONGATION STANDING HEIGHT LOG
(ASSY OPS/ULF3/FIN)

+

ASSY OPS-3bb/17A - ALL/A





INTERNATIONAL SPACE STATION

ASSEMBLY OPERATIONS

Return on
STS-129



