



International Space Station Assembly Operations

ISS-10A

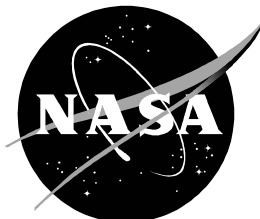
Mission Operations Directorate
Operations Division

09 OCT 07

This publication replaces
all previous publications.
These procedures are available
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National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

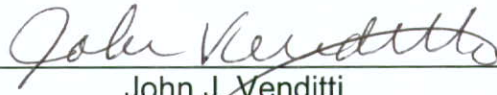


United Space Alliance

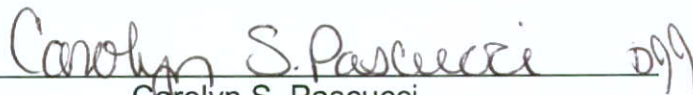
**INTERNATIONAL SPACE STATION
ASSEMBLY OPERATIONS
ISS-10A**

09 OCT 07

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CR:	Assy_OpsU967	Assy_OpsU985	Assy_OpsU998A (P)
	Assy_OpsU968	Assy_OpsU986	Assy_OpsU999
	Assy_OpsU969	Assy_OpsU987	Assy_OpsU1000A
	Assy_OpsU970	Assy_OpsU988	Assy_OpsU1001
	Assy_OpsU972	Assy_OpsU990	Assy_OpsU1003
	Assy_OpsU973	Assy_OpsU993	Assy_OpsU1005
	Assy_OpsU975	Assy_OpsU994	Assy_OpsU1006A
	Assy_OpsU977	Assy_OpsU995	Assy_OpsU1007
	Assy_OpsU983A	Assy_OpsU996	Assy_OpsU1013
	Assy_OpsU984	Assy_OpsU997	Assy_OpsU1014

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

None

**INTERNATIONAL SPACE STATION
ASSEMBLY OPERATIONS
ISS-10A**

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ACTIVATION AND CHECKOUT

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NODE 2 INTERIM ACTIVATION

(ASSY OPS/10A/FIN)

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OBJECTIVE:

To establish secondary power distribution when Node 2 installed in interim configuration on Node 1 portside or LAB forward (no permanent external utilities connected)

INITIAL CONDITIONS:

Node 1 (or LAB) to Node 2 vestibule utilities are connected (power, data, and heater instrumentation)

If Node 2 on Node 1:

LAB RPCM LA1A4A_F RPC 2 is Open

LAB RPCM LA2A3B_D RPC 4 is Open

If Node 2 on LAB:

LAB RPCM LA1A4A_D RPC 2 is Open

LAB RPCM LA2A3B_D RPC 2 is Open

NODE 2 POWER BUS N21A4A ACTIVATION

1. CLOSING LAB RPCM LA1A4A_F RPC 2

If Node 2 is attached to Node 1

LAB: EPS: DDCU LA1A

DDCU LA1A4A Dist

'RPCM LA1A4A'

sel RPCM LA1A4A F

RPCM LA1A4A F

sel RPC 2

RPCM LA1A4A F RPC 02

√Close Cmd – Ena

'RPC Position'

cmd Close (Verify – CI)

2. CLOSING LAB RPCM LA1A4A_D RPC 2

If Node 2 is attached to LAB

LAB: EPS: DDCU LA1A

DDCU LA1A4A Dist

'RPCM LA1A4A'

sel RPCM LA1A4A D

~

sel RPC 2

√Close Cmd – Ena

'RPC Position'

cmd Close (Verify – Cl)

3. [ENABLING RT I/O COMM FOR RPCM N21A4A-A](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

sel RT Status

cmd 20 RPCM N21A4A A RT Status – Enable **Execute** (Verify – Ena)

4. [ENABLING RT I/O COMM FOR RPCM N21A4A-B](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

sel RT Status

cmd 19 RPCM N21A4A B RT Status – Enable **Execute** (Verify – Ena)

5. [ENABLING RT I/O COMM FOR RPCM N21A4A-C](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

sel RT Status

LB SEPS N2 14 RT Status

cmd 18 RPCM N21A4A C RT Status – Enable **Execute** (Verify – Ena)

6. [ENABLING RT I/O COMM FOR RPCM N21A4A-D](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

LB SEPS N2 14

sel RT Status

LB SEPS N2 14 RT Status

cmd 22 RPCM N21A4A D RT Status – Enable **Execute** (Verify – Ena)

7. [VERIFYING INTEGRATION COUNTER RPCM N21A4A](#)

Node 2: EPS

Node 2: EPS

sel RPCM N21A4A [X] where [X] =

A	B	C	D
---	---	---	---

RPCM N21A4A [X]

Verify Integration Counter – incrementing

Repeat

8. [ENABLING RT FDIR FOR RPCM N21A4A-A](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

LB SEPS N2 14

sel RT Status

LB SEPS N2 14 RT Status

cmd 20 RPCM N21A4A A RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

9. [ENABLING RT FDIR FOR RPCM N21A4A-B](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

LB SEPS N2 14

sel RT Status

LB SEPS N2 14 RT Status

cmd 19 RPCM N21A4A B RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

10. ENABLING RT FDIR FOR RPCM N21A4A-C

CDH: Primary INT MDM

sel LB SEPS N2 14

LB SEPS N2 14

sel RT Status

LB SEPS N2 14 RT Status

cmd 18 RPCM N21A4A C RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

11. ENABLING RT FDIR FOR RPCM N21A4A-D

CDH: Primary INT MDM

sel LB SEPS N2 14

LB SEPS N2 14

sel RT Status

LB SEPS N2 14 RT Status

cmd 22 RPCM N21A4A D RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

12. PERFORMING RPCM N21A4A POWER ON RESETS

For RPCMs N21A4A A, B, C, and D

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

NODE 2 POWER BUS N22A3B ACTIVATION

13. CLOSING LAB RPCM LA2A3B_D RPC 4

If Node 2 is attached to Node 1

|

~
LAB: EPS: DDCU LA2A

'RPCM LA2A3B'

sel RPCM LA2A3B D

sel RPC 4

√Close Cmd – Ena

'RPC Position'

cmd Close (Verify – CI)

14. [CLOSING LAB RPCM LA2A3B_D RPC 2](#)

If Node 2 is attached to LAB
LAB: EPS: DDCU LA2A

'RPCM LA2A3B'

sel RPCM LA2A3B D

sel RPC 2

√Close Cmd – Ena

'RPC Position'

cmd Close (Verify – CI)

15. [ENABLING RT I/O COMM FOR RPCM N22A3B-A](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 20 RPCM N22A3B A RT Status – Enable **Execute** (Verify – Ena)

16. [ENABLING RT I/O COMM FOR RPCM N22A3B-B](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 19 RPCM N22A3B B RT Status – Enable **Execute** (Verify – Ena)

17. [ENABLING RT I/O COMM FOR RPCM N22A3B-C](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 18 RPCM N22A3B C RT Status – Enable **Execute** (Verify – Ena)

18. [ENABLING RT I/O COMM FOR RPCM N22A3B-D](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 22 RPCM N22A3B D RT Status – Enable **Execute** (Verify – Ena)

19. [VERIFYING INTEGRATION COUNTER RPCM N22A3B](#)

Node 2: EPS

sel RPCM N22A3B [X] where [X] =

Verify Integration Counter – incrementing

Repeat

20. [ENABLING RT FDIR FOR RPCM N22A3B-A](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 20 RPCM N22A3B A RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

21. [ENABLING RT FDIR FOR RPCM N22A3B-B](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 19 RPCM N22A3B B RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

22. [ENABLING RT FDIR FOR RPCM N22A3B-C](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 18 RPCM N22A3B C RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

23. [ENABLING RT FDIR FOR RPCM N22A3B-D](#)

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 22 RPCM N22A3B D RT FDIR Status – Enable FDIR **Execute** (Verify – Ena)

24. [PERFORMING RPCM N22A3B POWER ON RESETS](#)

For RPCMs N22A3B A, B, C, and D

| Go to [{5.420 RPCM POWER ON RESET}](#) (SODF: GND SYSTEMS: EPS: CORRECTIVE).

NODE 2 INTERIM DEACTIVATION

(ASSY OPS/10A/FIN)

Page 1 of 5 pages

OBJECTIVE:

To terminate secondary power distribution when Node 2 installed in interim configuration on Node 1 portside or LAB forward (no permanent external utilities connected).

INITIAL CONDITIONS:

Node 1 (or LAB) to Node 2 vestibule utilities are connected (power, data, and heater instrumentation).

Node 2 power buses N21A4A and N22A3B are energized and RPCMs are active on 1553 buses.

NODE 2 POWER BUS N21A4A DEACTIVATION

1. [INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N21A4A-A](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

sel RT Status

cmd 20 RPCM N21A4A A RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 20 RPCM N21A4A A RT Status – Inhibit **Execute** (Verify – Inh)

2. [INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N21A4A-B](#)

CDH: Primary INT MDM

sel LB SEPS N2 14

sel RT Status

cmd 19 RPCM N21A4A B RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 19 RPCM N21A4A B RT Status – Inhibit **Execute** (Verify – Inh)

3. [INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N21A4A-C](#)

CDH: PRIMARY INT MDM

sel LB SEPS N2 14

sel RT Status

cmd 18 RPCM N21A4A C RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 18 RPCM N21A4A C RT Status – Inhibit **Execute** (Verify – Inh)

4. [INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N21A4A-D](#)

CDH: PRIMARY INT MDM

sel LB SEPS N2 14

sel RT Status

cmd 22 RPCM N21A4A D RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 22 RPCM N21A4A D RT Status – Inhibit **Execute** (Verify – Inh)

5. [OPENING LAB RPCM LA1A4A_F RPC 2](#)

If Node 2 is attached to Node 1

LAB: EPS: DDCU LA1A

'RPCM LA1A4A'

sel RPCM LA1A4A F

sel RPC 2

'RPC Position'

cmd Open – (Verify – Op)

6. [OPENING LAB RPCM LA1A4A_D RPC 2](#)

If Node 2 is attached to LAB

LAB: EPS: DDCU LA1A

'RPCM LA1A4A'

sel RPCM LA1A4A D

~

sel RPC 2

'RPC Position'

cmd Open – (Verify – Op)

NODE 2 POWER BUS N22A3B DEACTIVATION

7. INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N22A3B-A

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 20 RPCM N22A3B A RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 20 RPCM N22A3B A RT Status – Inhibit **Execute** (Verify – Inh)

8. INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N22A3B-B

CDH: Primary INT MDM

sel LB SEPS N2 23

sel RT Status

cmd 19 RPCM N22A3B B RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 19 RPCM N22A3B B RT Status – Inhibit **Execute** (Verify – Inh)

9. INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N22A3B-C

CDH: Primary INT MDM

sel LB SEPS N2 23

LB SEPS N2 23

sel RT Status

LB SEPS N2 23 RT Status

cmd 18 RPCM N22A3B C RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 18 RPCM N22A3B C RT Status – Inhibit **Execute** (Verify – Inh)

10. INHIBITING RT FDIR AND RT I/O COMM FOR RPCM N22A3B-D

CDH: Primary INT MDM

sel LB SEPS N2 23

LB SEPS N2 23

sel RT Status

LB SEPS N2 23 RT Status

cmd 22 RPCM N22A3B D RT FDIR Status – Inhibit FDIR **Execute** (Verify – Inh)

cmd 22 RPCM N22A3B D RT Status – Inhibit **Execute** (Verify – Inh)

11. OPENING LAB RPCM LA2A3B_D RPC 4

If Node 2 is attached to Node 1

LAB: EPS: DDCU LA2A

DDCU LA2A3B Dist

'RPCM LA2A3B'

sel RPCM LA2A3B D

RPCM LA2A3B D

sel RPC 4

RPCM LA2A3B D RPC 04

'RPC Position'

cmd Open (Verify -Op)

12. OPENING LAB RPCM LA2A3B_D RPC 2

If Node 2 is attached to LAB

LAB: EPS: DDCU LA2A

DDCU LA2A3B Dist

'RPCM LA2A3B'

NODE 2 INTERIM DEACTIVATION

(ASSY OPS/10A/FIN)

Page 5 of 5 pages

sel RPCM LA2A3B D

RPCM LA2A3B D

sel RPC 2

RPCM LA2A3B D RPC 02

'RPC Position'

cmd Open (Verify -Op)

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NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN)

Page 1 of 28 pages

OBJECTIVE:

To perform powerup and functional activation of Node 2 equipment tied to the LTL (ETCS Loop B) and EPS Channel 2/3.

INITIAL CONDITIONS:

Node 2 Interim Activation complete.

DDCU SPC parallel connectors installed

MBSU 3 RBI 3 is Open

MBSU 2 RBI 3 is Open

MBSU 2 RBI 10 is Open

MBSU 3 RBI 2 is Open

ACTIVATING 2A3A POWER SUPPLY OUTPUT

1. SUPPRESSING PMCU RT CAUTIONS AND WARNINGS

The following Caution and Warning messages in Table 1 should be suppressed during Node 2 activation to prevent nuisance tones.

Table 1. Caution and Warning to be Suppressed/Inhibited

Event Code	Class	Message Text	State
5740	C	DDCU N2D1B Loss of Comm – Node 2	SUPP
5743	C	DDCU N24B Loss of Comm – Node 2	SUPP
5731	C	DDCU N24A Loss of Comm – Node 2	SUPP
5728	C	DDCU N2S1B Loss of Comm – Node 2	SUPP
5722	C	DDCU N22A Loss of Comm – Node 2	SUPP
5725	C	DDCU N2P3A Loss of Comm – Node 2	SUPP
5734	C	DDCU N22B Loss of Comm – Node 2	SUPP
5737	C	DDCU N203A Loss of Comm – Node 2	SUPP

2. [INHIBITING PMCU RT FDIR , if necessary](#)

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

LB EPS N2 23 RT Status

'RT [X]' where [X] =

11	13	16	24	25	26	27
----	----	----	----	----	----	----

cmd Inhibit FDIR Execute

Verify RT FDIR Status – Inh

Repeat

3. [CLOSING MBSU 2 RBI 3](#)

S0: EPS: MBSU 2: RBI 3

MBSU 2 RBI 3

'Cmdded Position'

cmd Close – Arm

cmd Close (Verify – CI)

Verify voltage > 145 V

4. [ENABLING RT I/O COMM FOR DDCU N2P2A](#)

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

input the following values in the command template:

sel PM_ORU_x: 26 – DDCU N2PRT-2A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P2A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 26 – DDCU N2PRT-2A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_DDCU_N2P2A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P2A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P2A_Execute – (LADD96IM1136K)>

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

Verify 24 DDCU N2P2A Exist – Y

5. [VERIFYING INTEGRATION COUNTER DDCU N2P2A](#)

Node 2: EPS: DDCU N2P2A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

6. [ENABLING RT FDIR FOR DDCU N2P2A](#)

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

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

7. [SETTING PARALLEL STATUS FOR DDCU N2P2A](#)

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

input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2PRT-2A

sel DDCU_Setpt_Cmd_Hdr: 1 – Arm

sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2P2A_Set_Status_Parallel_Arm

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

input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2PRT-2A

sel DDCU_Setpt_Cmd_Hdr: 2 – Fire

sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2P2A_Set_Status_Parallel_Set

cmd <Cmd Inv: DDCU_N2P2A_Set_Status_Parallel_Arm – (LAPC96IM0138K)>

cmd <Cmd Inv: DDCU_N2P2A_Set_Status_Parallel_Set – (LAPC96IM0138K)>

8. [CLEARING DDCU N2P2A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2P2A: Firmware

DDCU N2P2A Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

sel Trip Status

DDCU N2P2A Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

cmd Inhibit – Arm

cmd Inhibit – Inhibit

Verify Trip Function – Inh

9. [CLOSING MBSU 3 RBI 3](#)

S0: EPS: MBSU 3: RBI 3

MBSU 3 RBI 3

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – CI)

Verify voltage > 145 V

10. [ENABLING RT I/O COMM FOR DDCU N2P3A](#)

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

input the following values in the command template:

sel PM_ORU_x: 27 – DDCU N2PRT-3A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P3A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 27 – DDCU N2PRT-3A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2P3A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P3A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P3A_Execute – (LADD96IM1136K)>

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

Verify 25 DDCU N2P3A Exist – Y

11. [VERIFYING INTEGRATION COUNTER DDCU N2P3A](#)

Node 2: EPS: DDCU N2P3A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

12. [ENABLING RT FDIR FOR DDCU N2P3A](#)

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

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

13. [SETTING PARALLEL STATUS FOR DDCU N2P3A](#)

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

input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2PRT-3A

sel DDCU_Setpt_Cmd_Hdr: 1 – Arm

sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2P3A_Set_Status_Parallel_Arm

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

input the following values in the command template:

sel DDCUIP_x: 30 - DDCU N2PRT-3A

sel DDCU_Setpt_Cmd_Hdr: 2 - Fire

sel PM_DDCUI_Parallel: 1 - Parallel

Name command instance: DDCU_N2P3A_Set_Status_Parallel_Set

cmd <Cmd Inv: DDCU_N2P3A_Set_Status_Parallel_Arm – (LAPC96IM0138K)>

cmd <Cmd Inv: DDCU_N2P3A_Set_Status_Parallel_Set – (LAPC96IM0138K)>

14. [CLEARING DDCU N2P3A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2P3A: Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

sel Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

cmd Inhibit – Arm

cmd Inhibit – Inhibit

Verify Trip Function – Inh

CAUTION

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

ACTIVATING NODE 2 DDCU N2P2A

NOTE

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

15. [POWERING ON NODE 2 DDCU N2P2A](#)

Node 2: EPS: DDCU N2P2A

sel DDCU N2P2A Converter

cmd Converter On – Arm

cmd Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

ACTIVATING NODE 2 DDCU N2P3A

16. [POWERING ON NODE 2 DDCU N2P3A](#)

Node 2: EPS: DDCU N2P3A

sel DDCU N2P3A Converter

cmd Converter On – Arm

cmd Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

'Power Sharing, %'

Verify DDCU N2P2A: 50

Verify DDCU N2P3A: 50

17. [ENABLING RT I/O COMM FOR RPCM N22A3A-A](#)

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

input the following values in the command template:

sel PM_ORU_x: 70 – RPCM N2PRT-2A3A-A
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_RPCM_N22A3A_A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 70 – RPCM N2PRT-2A3A-A
sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_RPCM_N22A3A_A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N22A3A_A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N22A3A_A_Execute – (LADD96IM1136K)>

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

Verify 13 RPCM N22A3A_A Exist – Y

18. [ENABLING RT I/O COMM FOR RPCM N22A3A-C](#)

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

input the following values in the command template:

sel PM_ORU_x: 75 – RPCM N2PRT-2A3A-C
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_RPCM_N2P2A3A_C_Arm

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

input the following values in the command template:

sel PM_ORU_x: 75 – RPCM N2PRT-2A3A-C
sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_RPCM_N2P2A3A_C_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2P2A3A_C_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2P2A3A C_Execute – (LADD96IM1136K)>

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

Verify 11 RPCM N22A3A_C Exist – Y

19. [ENABLING RT I/O COMM FOR RPCM N22A3A-B](#)

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

LB SEPS N2 23 RT Status

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

20. [VERIFYING RPCM INTEGRATION COUNTERS](#)

Node 2: EPS

Node 2: EPS

sel RPCM N22A3A [X] where [X] = ABC

RPCM N22A3A X

Verify Integration Counter – incrementing

Repeat

21. [PERFORMING RPCM POWER ON RESET](#)

For RPCMs N22A3A A, B, and C

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

22. [ENABLING RT FDIR FOR RPCM N22A3A-A, B, C](#)

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

LB EPS N2 23 RT Status

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

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

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

RT Status

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

N2-2 MDM POWER ON AND CHECKOUT

23. [POWERING ON N2-2 MDM](#)

Node 2: EPS: RPCM N22A3A B: RPC 01

cmd RPC Position Close (Verify – Cl)

Wait 5 minutes before performing the next step.

24. [ENABLING I/O TO THE N2-2 MDM](#)

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

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

25. [VERIFYING N2-2 MDM STATUS](#)

CDH: N2-2 MDM

Verify Frame Count – incrementing

Verify Processing State – Operational

√Sync Status – In Sync

26. [POWERING N2-2 MDM SDO CARD](#)

Node 2: EPS: RPCM N22A3A B: RPC 02

cmd RPC Position Close (Verify – Cl)

27. [POWERING N2-2 MDM SDO CARD](#)

Node 2: EPS: RPCM N22A3A B: RPC 04

cmd RPC Position Close (Verify – Cl)

28. [ENABLING RT FDIR FOR THE N2-2 MDM](#)

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

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

NOTE

The next 4 commands will inhibit the close command for power application to CCAA solenoid valves. This is done to preclude inadvertent commanding to the circuits.

29. EXECUTING CLOSE CMD INHIBIT TO CCAA H2O VALVES

29.1 Bypass Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 8

RPCM N22A3B C RPC 08

cmd Close Cmd – Inhibit (Verify – Inh)

29.2 Bypass Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 9

RPCM N22A3B C RPC 09

cmd Close Cmd – Inhibit (Verify – Inh)

29.3 Normal Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 10

RPCM N22A3B C RPC 10

cmd Close Cmd – Inhibit (Verify – Inh)

29.4 Normal Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 11

RPCM N22A3B C: RPC 11

cmd Close Cmd – Inhibit (Verify – Inh)

POWERING ON DDCU N2O3A

30. CLOSING MBSU 3 RBI 2

S0: EPS: MBSU 3: RBI 2

MBSU 3 RBI 2

'Cmdded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify voltage > 145 V

31. ENABLING RT I/O COMM FOR DDCU N2O3A

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

input the following values in the command template:

sel PM_ORU_x: 33 – DDCU N2ZEN-3A
 sel PM_CMD_Hdr: 1 – Arm
 sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O3A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 33 – DDCU N2ZEN-3A
 sel PM_CMD_Hdr: 2 – Fire
 sel PM_ORU_Exist: 1 – Exists

Name command instance:
 Prim_PMCA_Ena_RT_DDCU_N2O3A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O3A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O3A_Execute – (LADD96IM1136K)>

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

Verify 27 DDCU N2O3A Exist – Y

32. [VERIFYING INTEGRATION COUNTER DDCU N2O3A](#)

Node 2: EPS: DDCU N2O3A

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

33. [ENABLING RT FDIR FOR DDCU N2O3A](#)

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

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

34. [SETTING PARALLEL STATUS FOR DDCU N2O3A](#)

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

input the following values in the command template:

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

Name command instance: DDCU_N2O3A_Set_Status_Parallel_Arm

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

input the following values in the command template:

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

Name command instance: DDCU_N2O3A_Set_Status_Parallel_Set

cmd <Cmd Inv: DDCU_N2O3A_Set_Status_Parallel_Arm - (LAPC96IM0138K)>

cmd <Cmd Inv: DDCU_N2O3A_Set_Status_Parallel_Set - (LAPC96IM0138K)>

35. [CLEARING DDCU N2O3A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2O3A: Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset - blank

sel Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

cmd Inhibit - Arm

cmd Inhibit - Inhibit

Verify Trip Function - Inh

POWERING ON DDCU N2O2B

36. [CLOSING MBSU 2 RBI 10](#)

S0: EPS: MBSU 2: RBI 10

MBSU 2 RBI 10

'Cmdded Position'

cmd Close – Arm

cmd Close (Verify – CI)

Verify voltage > 145 V

37. [ENABLING RT I/O COMM FOR DDCU N2O2B](#)

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

input the following values in the command template:

sel PM_ORU_x: 32 – DDCU N2ZEN-2B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O2B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 32 – DDCU N2ZEN-2B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2O2B_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O2B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O2B_Execute – (LADD96IM1136K)>

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

Verify 26 DDCU N2O2B Exist – Y

38. [VERIFYING INTEGRATION COUNTER DDCU N2O2B](#)

Node 2: EPS: DDCU N2O2B

DDCU N2O2B

Verify Integration Counter – incrementing

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

39. [ENABLING RT FDIR FOR DDCU N2O2B](#)

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

cmd 26 DDCU N2O2B RT FDIR Status – Enable **Execute** (Verify – Ena)

40. [SETTING PARALLEL STATUS FOR DDCU N2O2B](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2O2B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2ZEN-2B

sel DDCU_Setpt_Cmd_Hdr: 1 – Arm

sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2O2B_Set_Status_Parallel_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2O2B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP_x: 30 – DDCU N2ZEN-2B

sel DDCU_Setpt_Cmd_Hdr: 2 – Fire

sel PM_DDCUI_Parallel: 1 – Parallel

Name command instance: DDCU_N2O2B_Set_Status_Parallel_Set

cmd <Cmd Inv: DDCU_N2O2B_Set_Status_Parallel_Arm – (LAPC96IM0138K)>

cmd <Cmd Inv: DDCU_N2O2B_Set_Status_Parallel_Set – (LAPC96IM0138K)>

41. [CLEARING DDCU N2O2B POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2O2B: Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

sel Trip Status

DDCU N2O2B Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

cmd Inhibit – Arm

cmd Inhibit – Inhibit

Verify Trip Function – Inh

ACTIVATING NODE 2 DDCU N2O3A

NOTE

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

42. POWERING ON NODE 2 DDCU N2O3A

Node 2: EPS: DDCU N2O3A

DDCU N2O3A

sel DDCU N2O3A Converter

DDCU N2O3A Converter

cmd Converter On – Arm

cmd Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

ACTIVATING NODE 2 DDCU N2O2B

43. POWERING ON NODE 2 DDCU N2O2B

Node 2: EPS: DDCU N2O2B

DDCU N2O2B

sel Converter

DDCU N2O2B Converter

cmd Converter On – Arm

cmd Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

'Power Sharing, %'

Verify DDCU N2O2B: 50

Verify DDCU N2O3A: 50

44. [ENABLING RT I/O COMM FOR RPCM N22B3A-A](#)

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

LB SEPS N2 23 RT Status

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

45. [ENABLING RT I/O COMM FOR RPCM N22B3A-B](#)

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

input the following values in the command template:

sel PM_ORU_x: 72 – RPCM N2ZEN-2B3A-B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 72 – RPCM N2ZEN-2B3A-B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2O2B3A_B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_RPCM_N2O2B3A B_Execute – (LADD96IM1136K)>

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

Verify 16 RPCM N22B3A_B Exist – Y

46. VERIFYING RPCM INTEGRATION COUNTERS

Node 2: EPS

Node 2: EPS

sel RPCM N22B3A [X] where [X] = AB

RPCM N22B3A [X]

Verify Integration Counter – incrementing

Repeat

47. PERFORMING RPCM POWER ON RESET

For RPCMs N22B3A A and B

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

48. ENABLING RT FDIR FOR RPCM N22B3A-B

CDH: Primary PMCU MDM

Primary PMCU MDM

sel LB EPS N2 23

LB EPS N2 23

sel RT Status

LB EPS N2 23 RT Status

cmd 16 RPCM N22B3A_B RT FDIR Status – Enable **Execute** (Verify – Ena)

49. ENABLING RT FDIR FOR RPCM N22B3A-A

CDH: Primary INT MDM

Primary INT MDM

sel LB SEPS N2 23

LB SEPS N2 23

sel RT Status

LB SEPS N2 23 RT Status

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

PERFORMING AUTOMATED ACTIVATION OF NODE-2 IATCS LT LOOP

50. PROCEEDING WITH NODE 2 IATCS LT LOOP ACTIVATION

<u>NOTE</u>
LTL Accumulator launch level is 85%

Node 2: TCS

Node 2: TCS

'PPA LTL'

Verify Avg Accum Qty > 70 %

51. APPLYING POWER TO LTL IATCS COMPONENTS

51.1 LTL Shutoff Valve

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

RPCM N22B3A A RPC 01

cmd RPC Position – Close (Verify – CI)

51.2 LTL SFCA Mod Valve

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

RPCM N22B3A A RPC 16

cmd RPC Position – Close (Verify – CI)

51.3 LTL TWMV

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

RPCM N22A3A B RPC 16

cmd RPC Position – Close (Verify – CI)

51.4 LTL Regen TWMV

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

RPCM N22A3A B RPC 03

cmd RPC Position – Close (Verify – CI)

51.5 LTL NIA Vent Valve

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

RPCM N22B3A A RPC 02

cmd RPC Position – Close (Verify – Cl)

51.6 [LTL NIA Isol Valve](#)

Node 2: TCS: LTL PPA: Node2 LTL NIA Commands: RPCM N22B3A A RPC 15

RPCM N22B3A A RPC 15

cmd RPC Position – Close (Verify – Cl)

51.7 [LTL PPA](#)

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

RPCM N22A3A B RPC 17

cmd RPC Position – Close (Verify – Cl)

NOTE

LTL PPA COMM W/INTSYS must be enabled prior to LT loop activation

52. [VERIFYING CCAA H2O VALVE POSITION](#)

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

Node2 CCAA H2O Valve Commands

'Node2 CCAA H2O Valves'

Verify Normal Valve Open Posn – ✓

53. [ENABLING RT I/O COMM BETWEEN INT & LTL PPA](#)

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

LB SYS N2 2 RT Status

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

54. [LATCHING LT ACCUM](#)

Node 2: TCS: LTL Software

Node2 LTL Software Commands

'LTL IATCS'

'Leak Recovery'

cmd Set Normal Leak Limits – Set

55. [SETTING LTL TWMV SETPOINT](#)

Node 2: TCS: LTL TWMV

Node2 LTL TWMV Commands

'Commands'

'LTL TWMV'

input Temp Setpt – 17.3 deg C

cmd Temp Setpt – Set **Execute**

Verify Temp Setpt – 17.2 deg C

56. [VERIFYING LTL FDIR STATUS](#)

Node 2: TCS: LTL Software

Node2 LTL Software Commands

'LTL IATCS'

√Leak Recovery Auto Shutdown – Ena

√Failure Recovery Fail Rcvy – Ena

√SFCA Overpress Protection Status – Ena

57. [VERIFYING LTL SFCA SOFTWARE STATUS](#)

NOTE

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

PCS

Node 2: TCS: LTL SFCA

Node2 LTL SFCA Commands

'Commands'

'LTL SFCA'

√SFCA Software – Shutdown

58. [COMMANDING LTL STARTUP](#)

NOTE

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

Node 2: TCS: LTL Software

Node2 LTL Software Commands

'LTL IATCS'

Verify IATCS Status – Idle

Verify IATCS Activation – Not In Prog

cmd Startup – Startup

Verify IATCS Activation – In Prog

NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN)

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Wait up to 3 minutes, then

Verify IATCS Status – Oper

Node 2: TCS: LTL PPA

'Commands'

'LTL PPA'

Verify Pump Software – Started

Verify Pump Speed: 13325 ± 1250 rpm

59. [ENABLING RT FDIR FOR LTL PPA](#)

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

'RT FDIR Status'

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

'Rt Comm Failed Status'

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

60. [SETTING LEAK LIMIT FOR THE LTL PPA](#)

Node 2: TCS

'PPA'

Record LTL Avg Accum Qty: _____ %

sel LTL Software

'LTL IATCS'

cmd Set Normal Leak Limits – Set

ACTIVATING CCAA

If Node 1 Activation and Checkout Part 1 not complete,

| Go to step 67.

61. [ACTIVATING NODE 2 SMOKE DETECTOR 1](#)

Node 2: ECLSS: SD1: RPCM N21A4A C RPC 06

cmd RPC Position – Close (Verify – CI)

Node 2: ECLSS: SD1

Verify Obscuration, % Contamination < 25

Verify Scatter, % Obscuration per Meter < 1

'Monitoring'

cmd Enable

√Status – Enabled

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean

√Failure – blank

62. [ACTIVATING NODE 2 SMOKE DETECTOR 2](#)

Node 2: ECLSS: SD2

sel RPCM N22A3B C RPC 01

cmd RPC Position – Close (Verify – CI)

Node 2: ECLSS: SD2

Verify Obscuration, % Contamination < 25

Verify Scatter, % Obscuration per Meter < 1

'Monitoring'

cmd Enable

√Status – Enabled

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean

√Failure – blank

63. [CONFIGURING CCAA H2O VALVE](#)

NOTE

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

63.1 [Verifying CCAA H2O Normal Valve Open](#)

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

Node2 CCAA H2O Valve Commands

'Node2 CCAA H2O Valves'

'Normal Valve'

Verify Open Posn – √ and Close Posn – blank

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

Node2 CCAA H2O Valve Commands

'Node2 CCAA H2O Valves'

'Bypass Valve'

Verify Open Posn – blank and Close Posn – √

64. [POWERING UP CCAA](#)

Node 2: ECLSS: Node 2 CCAA: CCAA Commands

Node 2 CCAA Commands

```

sel RPCM N22A3B C RPC [X]   13 14 15 17
where [X] =
    RPCM N22A3B C RPC [X]
cmd RPC Position – Close (Verify – Cl)
Repeat
    
```

65. [INITIALIZING CCAA](#)

Node 2 CCA Commands

cmd Initialize [$\sqrt{\text{State}}$ – Reset, Test, Off (< 2 minutes)]

65.1 [Inhibiting CCAA Liquid Sensor Bits](#)

sel Node 2 CCAA

Node 2 CCAA

sel Water Separator

Node 2 CCAA WS

'Liquid Sensor BIT'

'Inhibit'

cmd Arm ($\sqrt{\text{Status}}$ – Armed)

cmd Inhibit ($\sqrt{\text{Command Status}}$ – Sep Liquid BIT Confirm Complete)

sel Node 2 CCAA

Node 2 CCAA

'Heat Exchanger Liquid Sensor'

sel HX LS

Node 2 CCAA HX LS

'BIT'

'Inhibit'

cmd Arm ($\sqrt{\text{Status}}$ – Armed)

cmd Inhibit ($\sqrt{\text{Command Status}}$ – HX Liquid BIT Confirm Complete)

65.2 [Overriding CCAA Fan Speed](#)

If commanding from **MCC-H**

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

NOTE

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

sel CCAA Commands

Node 2 CCAA Commands

'Overrides'

input Fan Normal Speed - 4 9 2 0rpm

input Fan Lock Rotor - 4 4 2 0rpm

input Fan Overspeed - 5 4 2 0rpm

cmd Set

'Incorporate Overrides'

cmd Incorporate (√Override Type - Hazardous)

cmd Hazardous Ovrdr Confirm (√Command Status - Confirm Analog Complete)

65.3 [Configuring CCAA TCCV to Full Bypass](#)

'Temperature'

input Temperature - 3 2deg C

cmd Set (√Command Status - Temp Setpoint Complete)

sel Node 2 CCAA

Node 2 CCAA

If TCCV Position < 82 deg

sel TCCV

Node 2 CCAA TCCV

'Sweep'

cmd Arm (√Status - Armed)

cmd Sweep

Wait for TCCV Position ≥ 82 deg, then

cmd Normal (√Command Status - TCCV Auto Normal Complete)

65.4 [Activating CCAA](#)

sel CCAA Commands

Node 2 CCAA Commands

cmd Operate [√State - Startup, On (< 2 minutes)]

sel Node 2 CCAA

Node 2 CCAA

'Fan'

√Speed: 4920 ± 100 rpm

√Fan dp: < 6 mmHg

65.5 [Changing CCAA Temp Setpoint](#)

sel CCAA Commands

Node 2 CCAA Commands

'Temperature'

input Temperature – 2 5deg C (or other temp per crew preference)

cmd Set (√Command Status – Temp Setpoint Complete)

66. [SETTING LTL TWMV SETPOINT](#)

Node 2: TCS: LTL TWMV

Node 2 LTL TWMV Commands

'Commands'

'LTL TWMV'

cmd CLC – Inh **Execute** (√ – Inh)

input Temp Setpt – 10.1 deg C

cmd Temp Setpt – Set **Execute**

Verify Temp Setpt – 10.0 deg C

cmd CLC – Ena **Execute** (√ – Ena)

67. [LOADING NEW DEFAULT ORU EXISTENCE PPL TO PMCU MDM](#)

If necessary:

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

Destination Device – PMCU Primary

Storage Type – EEPROM and DRAM

File to Load – pmca_ppl_0003_4_a_03116

Perform [{1.236 CCS DATA LOAD MANAGEMENT}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN)

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Perform [{4.413 PMCU MDM TRANSITION B: TRANSITIONING BACKUP MDM 1\(2\) FROM OFF TO WAIT WHILE MDM 2\(1\) IS OPERATIONAL}](#), all (SODF: C&DH: CORRECTIVE), then:

MCC-H

Perform [{1.231 CCS BUILD DATA LOAD COMMAND}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

Destination Device – PMCU Backup

Storage Type – EEPROM

File to Load – pmca_ppl_0003_4_a_03116

Perform [{1.236 CCS DATA LOAD MANAGEMENT}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

Go to [{4.414 PMCU MDM TRANSITION C: TRANSITIONING BACKUP MDM 1\(2\) FROM WAIT TO DIAGNOSTIC/OFF WHILE MDM 2\(1\) IS OPERATIONAL}](#), steps 1 to 3,6 (SODF: C&DH: CORRECTIVE: MDM STATE TRANSITIONS TIER II).

NODE 2 INGRESS – NODE 2 ON NODE 1 PORT

(ASSY OPS/10A/FIN)

Page 1 of 15 pages

OBJECTIVE:

Initial ingress of Node 2 after berthing to Node 1 Port. Including atmosphere readings and sampling, NPRV and PPRV configuration, followed by ventilation setup.

DURATION

1 hour 55 minutes

30 minutes for Node 2 initial Ingress

15 minutes for NPRV inspect

70 minutes for Node 2 Ventilation setup and flow check

CREW:

Two

MATERIALS:

Earplugs (one pair per crew performing equalization)

PPE

Surgical Masks (for each crew ingressing Node 2)

Eye Protection (goggles) (for each crew ingressing Node 2)

Grab Sample Container (GSC) P/N SDD46108778-301

PPRV Caps (two) P/N PPRV-1-915

CSA-CPs (two units)

CSA-O2

Crew Preference Hatch Decals from Crew Support Locker in Shuttle

TOOLS

DCS 760 Camera

(LAB1P5_A2)

Velocicalc with probe P/N 8386A

(LAB1P6)

If Batteries need to be replaced

Good Battery Bag

AA Batteries [four]

Ziplock Bag for used Batteries

ISS IVA TOOLBOX

Drawer 2:

Ratchet, 1/4" Drive

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

Driver Handle, 1/4" Drive

REFERENCED PROCEDURE(S):

NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

- 1. PROVIDING POWER TO N2 INTERNAL LIGHTS
 Node 2: EPS: Lights
 Node2 Lights

‘GLA [X]’ where [X] = All GLAs
 Repeat cmd RPC Position – Close (Verify – Cl)

- Node 2 Aft Hatch 2. Visually inspect Node 2 Interior through hatch window.
 Report any Hatch significant debris or contamination to **MCC-H**.

WARNING

Opening the PPRV may cause a loud hissing noise. Crew in the vicinity should don earplugs.

- 3. Don Earplugs.

NOTE

The “Override” setting on the PPRV is equivalent to “Open”. The “Normal” setting is equivalent to “Close”.

- 4. PPRV ↻ Override
- 5. Wait 2 minutes for equalization, or **On MCC-H GO**, continue.
- 6. Doff Earplugs.

- CSA-CPs 7. If deactivated

Activate both CSA-CP units:

NOTE

Audible beeps occur when pb MODE is pressed during activation.

- 7.1 pb MODE → Press (hold until '**RELEASE**' displayed)

NOTE

Unit self-check routine will take approximately 1 minute. A single beep occurs when the self-check routine is complete. Node 2 should not be entered until the self-check routine is complete.

- 7.2 Wait 1 minute for self-check routine.

- 7.3 Check display indicates readings for OXYGEN, CO, HCN, HCL.

WARNING
1. Node 2 interior may contain excessive FOD. PPE is required while Ingressed in Node 2 until 2.5 hours of active ventilation has occurred and FOD is no longer visible.
2. While Node 2 is docked to Node 1, Crew is prime for smoke detection. Node 2 does not have C&W, smoke detection or data monitoring capability.

- 8. Don PPE (Goggles, Surgical Masks).

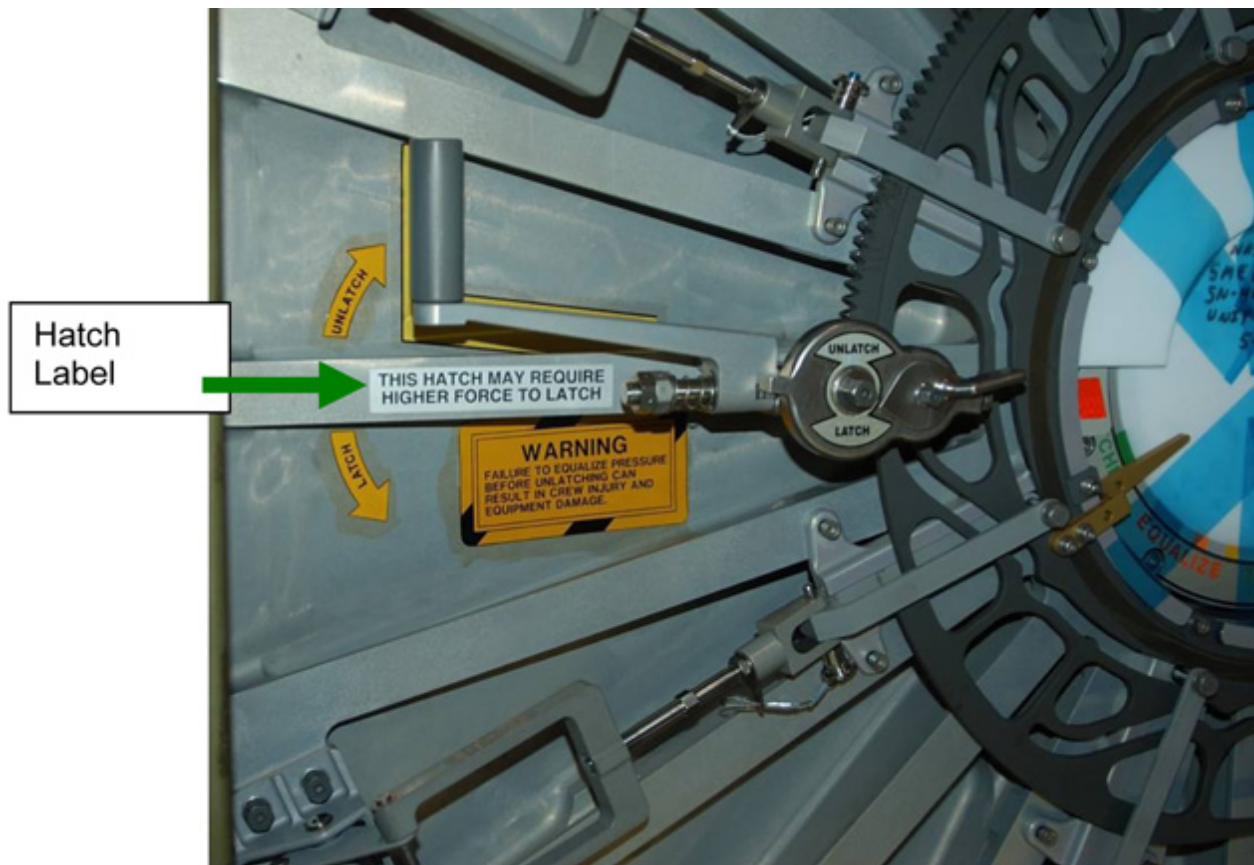


Figure 1. Installation location of hatch label.

- 9. Install crew preference hatch decal on Node 2 aft hatch Refer to Figure 1.
- 10. Open Node 2 Aft Hatch per decal, at step 7 of the Hatch Open decal, take PPRV \odot Normal
- 11. Ingress Node 2.

12. [NODE 2 ATMOSPHERE CSA-CP SAMPLING](#)

Table 1. Node 2 Contaminant Level Readings

EQUIPMENT	CONSTITUENTS	MASKING (EGRESS) LEVELS	Reading CSA-CP#1	Reading CSA-CP#2
CSA-CP	HCl	10 ppm		
	CO	200 ppm		
	HCN	5 ppm		

12.1 Perform Node 2 atmosphere test using CSA-CPs (two) from the center of the Node 2 module. Record CSA-CP readings in Table 1.

```

*****
*       If either CSA-CP CO, HCl, HCN readings are above
*       masking (egress) levels
*       |       Egress Node 2 and notify MCC-H.
*
*****
    
```

ISS ↓ **MCC-H**, recorded values in Table 1

12.2 Visually inspect Node 2 for condensation, atmosphere quality, general condition.
 Photo document affected area, if required (DCS 760 Camera).
 ISS ↓ **MCC-H** condition.

13. [NODE 2 ATMOSPHERE GSC SAMPLING](#)

- 13.1 Remove tethered inlet cap from GSC.
- 13.2 Holding GSC far away from body, open valve for 10 seconds.
- 13.3 Close valve until it slips and locks (click sound occurs).
- 13.4 ✓Valve is closed and locked
 Record sampling data on GSC Label (Day/HH:MM in GMT and location of sample).
- 13.5 Replace tethered inlet cap.
- 13.6 Call down S/N of GSC to **MCC-H**.
- 13.7 Stow GSC for return to Houston on shuttle.

14. [INSTALLING CAPS ON PORT PPRV AND STARBOARD PPRV](#)

14.1 Screw and hand tighten cap onto PPRV on Port Hatch.

14.2 Screw and hand tighten cap onto PPRV on Starboard Hatch.

15. INSPECTING PORT NPRVs

15.1 Accessing Port Aft NPRV

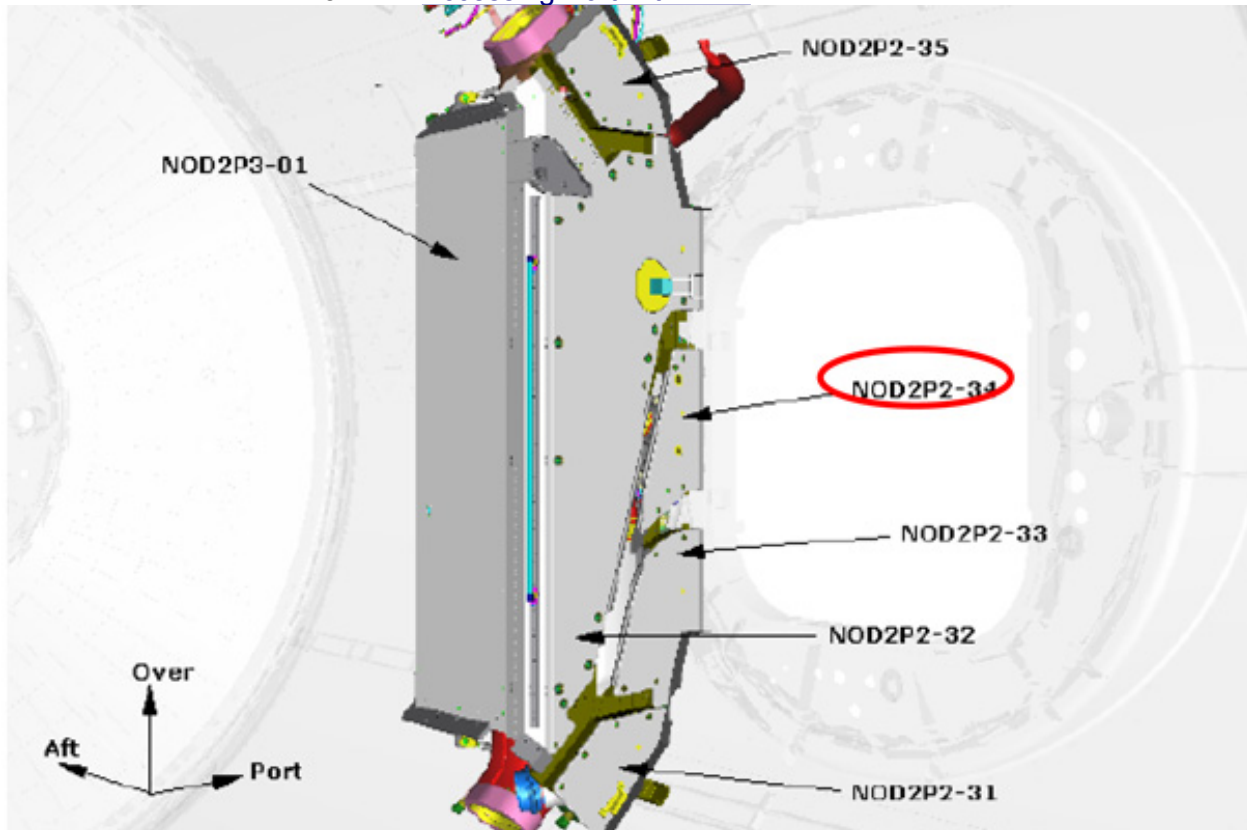


Figure 2. Node 2 Port Aft Closeout Panels.

- 15.1.1 Remove Closeout Panel, NOD2P2-34, fasteners (four), (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 2.

15.2 [Inspecting Port Aft NPRV](#)



Figure 3. Deployed NPRV.



Figure 4. Fully Seated NPRV.

15.2.1 Verify NPRV fully seated.
Refer to Figures 3, 4.

15.2.2 If NPRV deployed
| Press external cover toward bulkhead until
| cover snaps into place against base
| assembly.

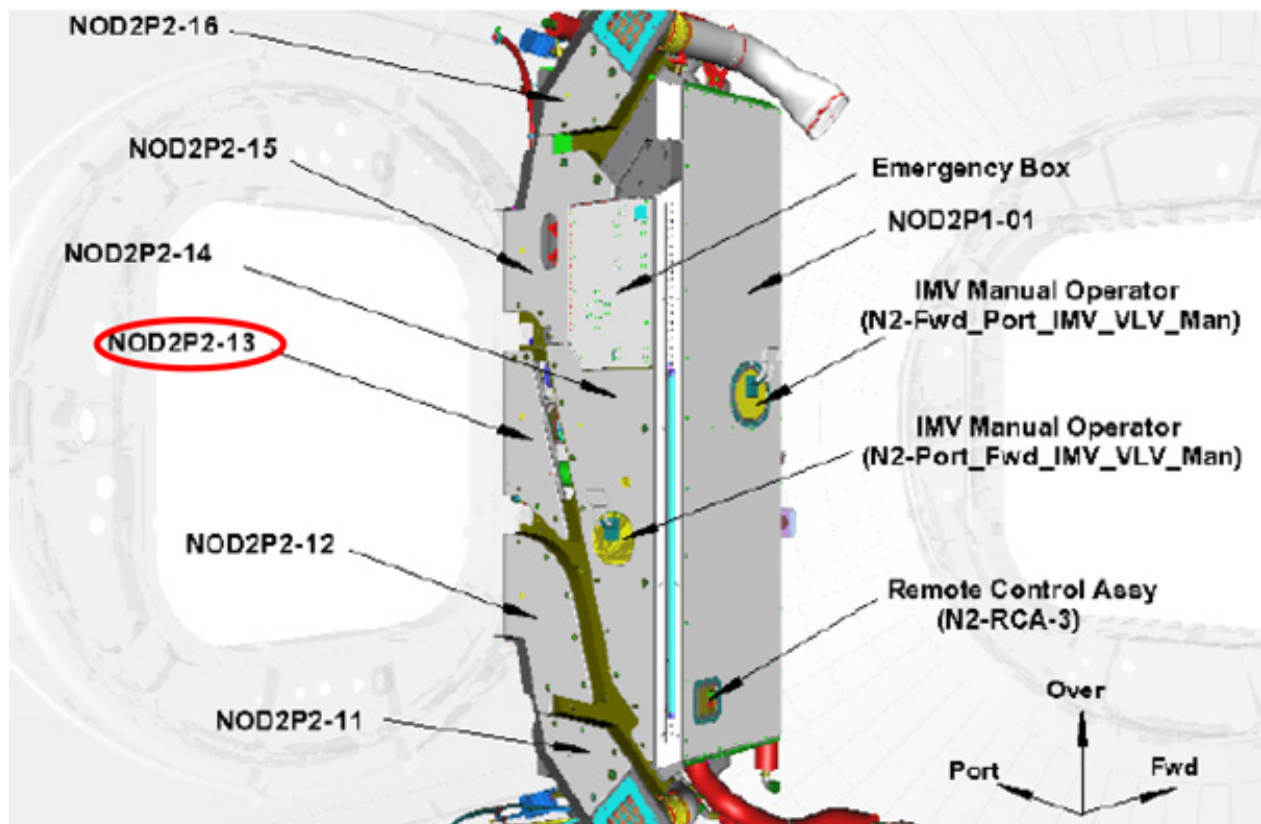


Figure 5. Node 2 Port Forward Closeout Panels.

15.3 [Accessing Port Forward NPRV](#)

- 15.3.1 Remove Closeout Panel, NOD2P2-13, Fasteners (four), (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Refer to Figure 5.

15.4 [Inspecting Port Forward NPRV](#)

- 15.4.1 Verify NPRV fully seated.
Refer to Figures 3, 4.
- 15.4.2 If NPRV deployed
 - Press external cover toward bulkhead until cover snaps into place against base assembly.

15.5 [Closeout](#)

- 15.5.1 Check for FOD within 1 meter of work area.
- 15.5.2 Photo document NPRVs (two) (DCS 760 Camera).
- 15.5.3 Reinstall Closeout Panels.
Refer to Figures 2, 5.

16. [INITIATING VENTILATION FROM NODE 1 TO NODE 2](#)

16.1 Perform [{NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL}](#), steps 1 to 4 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT: MODULE OUTFITTING), then:

PCS

16.2 [ACTIVATING NODE 1 PORT Fwd IMV VALVE](#)

Node 1: ECLSS: IMV Port Fwd Valve

sel RPCM N14B C RPC 14

cmd RPC Position – Close (Verify – Cl)

'Enable'

cmd Arm

√Arm Status – Armed

cmd Enable

√State – Enabled

16.3 [Opening Node 1 Port Fwd IMV Valve](#)

'Open'

cmd Arm

√Arm Status – Armed

cmd Open

√Position – In Transit

Wait 25 seconds, then:

√Position – Open

16.4 [Activating Node 1 IMV Port Fwd Fan](#)

Node 1: ECLSS: IMV Port Fwd Fan

sel RPCM N13B C RPC 16

cmd RPC Position – Close (Verify – Cl)

Node 1 IMV Port Fwd Fan

'On'

cmd On

√State – In Transit

Wait 15 seconds.

√State – On

√Speed, rpm: 7745 to 9278

16.5 [Increasing Node 1 Fan Speed](#)

Node 1: ECLSS: Cab Fan

Node 1 Cabin Fan

√State – On

'Speed'

input – 6 2 0 0rpm

cmd Set

√Speed, rpm – 6200 ± 550 rpm

16.6 [Node1 Cupola RAMV Activation](#)

Node 1: ECLSS: Cup RAMV

Node 1 Cupola RAMV

sel RPCM N13B C RPC 15

RPCM N13B C RPC 15

cmd RPC Position – Close (Verify – Cl)

Node 1 Cupola RAMV

'State'

cmd Enable

Wait 5 seconds, then:

√State – Enabled

- NOD1P1-01 16.7 Remove Closeout Panel, Fasteners (12) (Driver Handle, 1/4" Drive, 5/32" Hex Head, 1/4" Drive).
Temporarily stow.



Figure 6. Cupola RAMV (NOD1P1-01).

- 16.8 Measure O2 % with a CSA-O2 in closeout volume.
If O2 % is not within 16.5 to 23.3 %, √MCC-H before continuing.
- 16.9 Cupola RAMV → COLDER
Refer to Figure 6.
- 16.10 Install Closeout Panel, Fasteners (12) (Driver Handle, 1/4" Drive, 5/32" Hex Head, 1/4" Drive).
- NOD 1 S4-02 16.11 Node 1 RAMV Temperature Control → Full Warm (☺)
17. [VELOCICALC MEASUREMENTS](#)
- 17.1 Install four AA Batteries per the drawing on the inside of the battery compartment.

17.2 [Setting UP Velocicalc](#)

CAUTION
<p>1. Metal probe is conductive and contains delicate sensors. Damage may cause electronics to overheat and/or off-gas. Do not contact power sources. Exercise caution when using Velocicalc out of visual scope. Do not expose to temperatures greater than 140 degrees F.</p>
<p>2. Do not breathe near the sensor/probe tip. This will bias readings.</p>

17.2.1 Remove Red Probe Sensor Protector.
Press ON/OFF key.

17.2.2 If time and date are to be updated

During powerup, the display MENU will cycle through several items.

When time is displayed (format is HH.MM), press and hold both the "▲" and "▼" keys.

Release the keys when the unit beeps twice.

Update hour, minute, year, month and day using the "▲" and "▼" keys and pressing ENTER after each entry.

17.2.3 Wait for powerup to complete (~30 seconds).
If the unit has not been used for at least 2 weeks, allow the unit to rest for 5 minutes.

17.2.4 If display reads LO, replace Batteries per the drawing on the inside of the battery compartment.
Stow used Batteries in Ziplock Bag and label Bag as "used."
Stow Bag in Trash Bag.

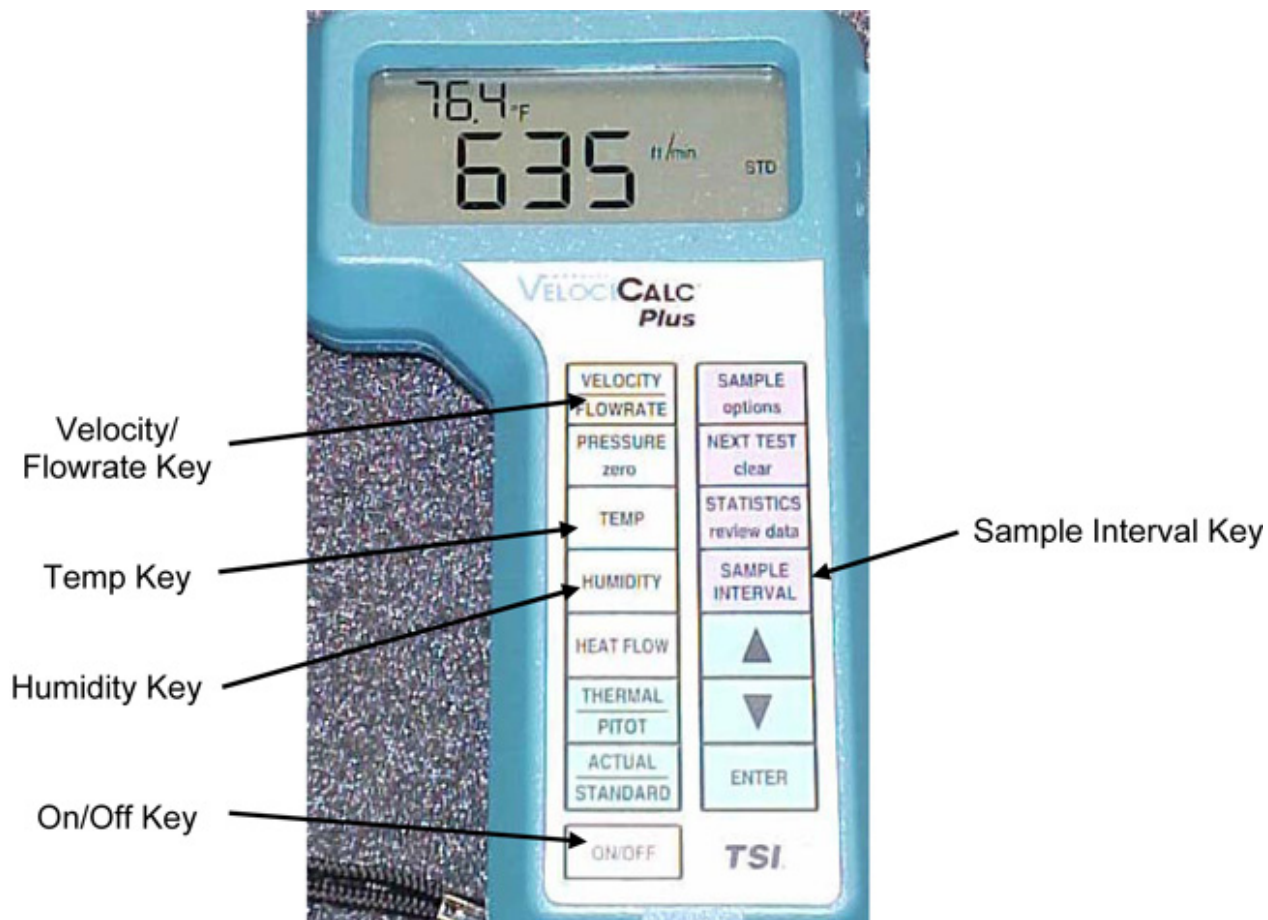


Figure 7. Velocicalc.

17.3 [Velocicalc Setup for Measuring Air Velocity/Flowrate](#)

Press and release the SAMPLE INTERVAL key.

Use the "▲" and "▼" keys to select a 1 second interval and then press ENTER.

Press and release the VELOCITY/FLOWRATE key and toggle to measure velocity as ft/min.

Refer to Figure 7.

17.4 [Guidelines for Using Velocity Measurement Probe](#)

Extend probe enough to avoid crew interference with airstream.

Hold probe perpendicular to airflow direction and rotate probe until direction dimple faces into airstream.

Refer to Figures 8 and 9 for probe orientation to airflow.

For diffuser measurements, hold the probe against the grille face.

Wait for reading to stabilize (approximately 10 seconds).

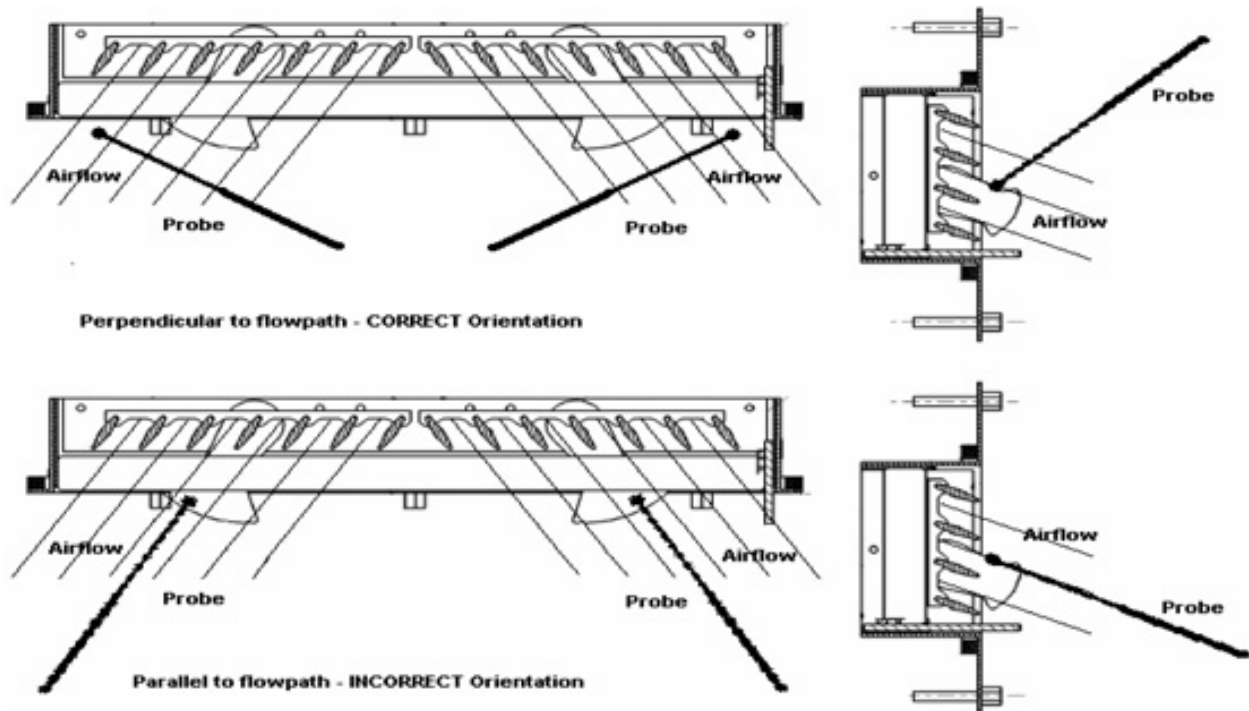


Figure 8. Examples of Correct and Incorrect Probe Orientations.

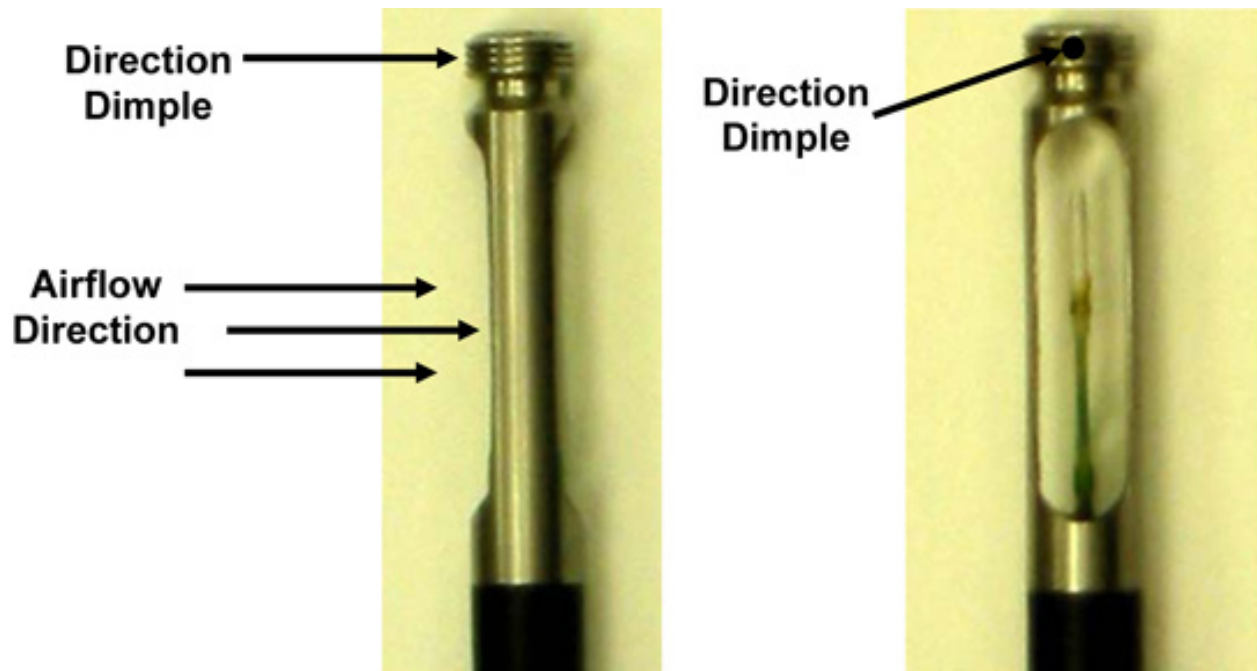


Figure 9. Air Flow measurement Probe.

- 17.4.1 Hold probe tip up against the Node 2 flex duct outlet, perpendicular to airflow, with the direction dimple facing into airstream. Refer to Figure 9 for probe orientation to airflow.

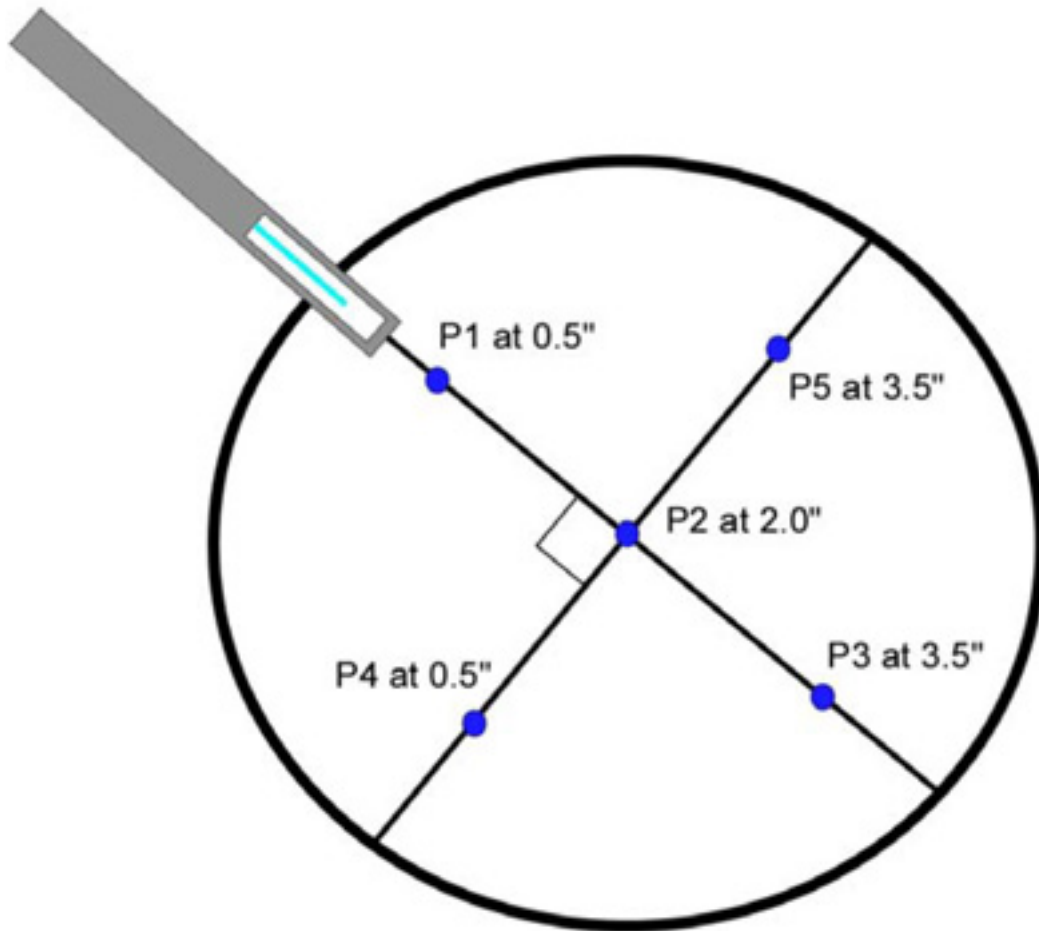


Figure 10. Measurement Locations for Node 2 Flex Duct.

17.4.2 Using the ruler, take 5 measurements along 2 diameters perpendicular to one another from the outer edge of the Node 2 flex duct outlet. Refer to figure 10.

Record measurements in Table 2.

Report measurements to **MCC-H**.

Table 2. Node 2 Flex Duct Airflow Measurements (ft/min)

Measurement	Duct Outlet Velocity
P1	
P2	
P3	
P4	
P5	
Average	

17.4.3 Velocity Conversion Measurements for Node 2 Flex Duct IMV Outlet Only

To convert Velocicalc readings only for Node 2 Flex Duct IMV outlet in Table 2 from ft/min into Cubic Feet per Minute (CFM), multiply the average velocity by 0.087.

17.5 Deactivation and Stowage of Velocicalc

17.5.1 Press the ON/OFF key to turn unit off.
Replace Red Probe Sensor Protector.

17.5.2 Remove Batteries from Velocicalc and stow with instrument.

17.5.3 Stow unit after use.

18. Position ventilation duct as required for adequate ventilation.

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OBJECTIVE:

Ingress Node 2 after relocation to LAB Forward.

PCS

1. PROVIDING POWER TO N2 INTERNAL LIGHTS AND EMERGENCY EGRESS LIGHTING

Node 2: EPS: Lights

Node2 Lights

'GLA [X]' where [X] = All GLAs
cmd Close
Verify RPC Position – CI
Repeat

Node2 Lights

'EEL PS Power Source [X]' where [X] = All EEL PS Power Sources
cmd Close
Verify RPC Position – CI
Repeat

2. NODE 2 INGRESS

2.1 Node 2 Aft Hatch PPRV → Override

2.2 US LAB: ECLSS

LAB ECLSS

When dP/dT=0 open Node 2 Aft Hatch per decal.

3. INSTALLING CAPS ON PORT PPRV AND STARBOARD PPRV

3.1 Screw Cap onto PPRV on Port Hatch.

3.2 Hand tighten Cap on PPRV.

3.3 Repeat steps 3.1 and 3.2 for Starboard PPRV and Cap.

4. To verify NPRVs did not deploy during vestibule pressurization, perform {NODE 2 PORT NPRV INSPECTION}, all (SODF: ASSY OPS: ACTIVATION AND CHECKOUT: MODULE OUTFITTING), then:

5. DESICCANT AND PORTABLE FAN DISASSEMBLY

5.1 Fan Power (three) → Off

5.2 Desiccant Bag Assembly (three) ←|→ Fan (three)

NODE 2 INGRESS - NODE 2 ON LAB FWD

(ASSY OPS/10A/FIN)

Page 2 of 2 pages

- 5.3 Place used Desiccant Bag Assemblies in Plastic Bags secured to Handrails during Egress.
Stow in trash.
- 5.4 Portable Fan Assemblies (three) ←|→ Flexible Brackets
Stow equipment, materials.

NODE 2 PORT AVIONICS CONNECTOR ALIVENESS TESTS

(ASSY OPS/10A/FIN)

Page 1 of 11 pages

NOTE

The following connectors and equipment are verified during this procedure:
P660 / J660: MBSU 1 power to DDCU N2S1B
P661 / J661: MBSU 1 power to DDCU N2D1B
P662 / J662: MBSU 4 power to DDCU N2S4A
P663 / J663: MBSU 4 power to DDCU N2D4B
P664 / J664: ETCS Loop A IFHX valve posn telemetry

Functions not verified: ETCS Loop A IFHX valve commanding, MBSU 1 pass-through power to Centrifuge, Node 2 camera port 11 video, PDGF connectivity

NODE 2 LOOP A IFHX ALIVENESS TESTS (P664 / J664)

1. VERIFYING VALID NODE 2 MTL IFHX TELEMETRY

Node 2: TCS

Node 2: TCS

'IFHX'

Verify NH3 Byp Vlv Posn MTL – Byp

Verify NH3 Isol Vlv Posn MTL – Open

2. VERIFYING VALID COLUMBUS MTL IFHX TELEMETRY

COL: TCS: MTL IFHX

COL MTL IFHX Commands

'Commands'

Verify COL MTL IFHX NH3 Isol Vlv Position – Open

Verify COL MTL IFHX NH3 Byp Vlv Position – Bypass

3. VERIFYING VALID JEM LTL IFHX TELEMETRY

JEM: TCS: LTL IFHX

JEM LTL IFHX Commands

'Commands'

Verify JEM LTL IFHX NH3 Isol Vlv Position – Open

Verify JEM LTL IFHX NH3 Byp Vlv Position – Bypass

NODE 2 DDCU N2S1B ALIVENESS TEST (P660 / J660)

4. APPLYING POWER TO DDCU N2S1B

S0: EPS: MBSU 1: RBI 10

MBSU 1 RBI 10

'Cmded Position'

NODE 2 PORT AVIONICS CONNECTOR ALIVENESS TESTS

(ASSY OPS/10A/FIN)

Page 2 of 11 pages

cmd Close – Arm
cmd Close (Verify – CI)

Verify Voltage > 145 V

5. [VERIFYING RT FDIR INHIBITED FOR DDCU N2S1B](#)
CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

LB EPS N2 14 RT Status

Verify 27 DDCU N2S1B RT FDIR – Inh

6. [ENABLING RT I/O COMM FOR DDCU N2S1B](#)
To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM_ORU_x: 30 – DDCU N2STB-1B
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2S1B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 30 – DDCU N2STB-1B
sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2S1B_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S1B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S1B_Execute – (LADD96IM1136K)>

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

Verify 27 DDCU N2S1B Exist – Y

7. [VERIFYING INTEGRATION COUNTER DDCU N2S1B](#)
Node 2: EPS: DDCU N2S1B

DDCU N2S1B

Verify Integration Counter – incrementing

NODE 2 PORT AVIONICS CONNECTOR ALIVENESS TESTS

(ASSY OPS/10A/FIN)

Page 3 of 11 pages

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

sel Firmware

DDCU N2S1B Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

8. [INHIBITING RT I/O COMM FOR DDCU N2S1B](#)

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

input the following values in the command template:

sel PM_ORU_x: 30 – DDCU N2STB-1B
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 0 – Not Exists

Name command instance:

Prim_PMCA_Inh_RT_DDCU_N2S1B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 30 – DDCU N2STB-1B
sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 0 – Not Exists

Name command instance:

Prim_PMCA_Inh_RT_DDCU_N2S1B_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2S1B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2S1B_Execute – (LADD96IM1136K)>

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

Verify 27 DDCU N2S1B Exist – N

9. [REMOVING POWER FROM DDCU N2S1B](#)

S0: EPS: MBSU 1: RBI 10

MBSU 1 RBI 10

'Cmded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

NODE 2 DDCU N2D1B ALIVENESS TEST (P661 / J661)

10. [APPLYING POWER TO DDCU N2D1B](#)

S0: EPS: MBSU 1: RBI 11

MBSU 1 RBI 11

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify Voltage > 145 V

11. [VERIFYING RT FDIR INHIBITED FOR DDCU N2D1B](#)

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

LB EPS N2 14 RT Status

Verify 24 DDCU N2D1B RT FDIR – Inh

12. [ENABLING RT I/O COMM FOR DDCU N2D1B](#)

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

input the following values in the command template:

sel PM_ORU_x: 34 – DDCU N2NAD-1B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2D1B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 34 – DDCU N2NAD-1B

NODE 2 PORT AVIONICS CONNECTOR ALIVENESS TESTS

(ASSY OPS/10A/FIN)

Page 5 of 11 pages

sel PM_CMD_Hdr: 2 – Fire
sel PM_ORU_Exist: 1 – Exists

Name command instance:
Prim_PMCA_Ena_RT_DDCU_N2D1B_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D1B_Arm –
(LADD96IM1136K)>
cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D1B_Execute –
(LADD96IM1136K)>

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

Verify 24 DDCU N2D1B Exist – Y

13. [VERIFYING INTEGRATION COUNTER DDCU N2D1B](#)

Node 2: EPS: DDCU N2D1B

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

sel Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

14. [INHIBITING RT I/O COMM FOR DDCU N2D1B](#)

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

input the following values in the command template:

sel PM_ORU_x: 34 – DDCU N2NAD-1B
sel PM_CMD_Hdr: 1 – Arm
sel PM_ORU_Exist: 0 – Not Exists

Name command instance:
Prim_PMCA_Inh_RT_DDCU_N2D1B_Arm

NODE 2 PORT AVIONICS CONNECTOR ALIVENESS TESTS

(ASSY OPS/10A/FIN)

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

input the following values in the command template:

sel PM_ORU_x: 34 – DDCU N2NAD-1B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 0 – Not Exists

Name command instance:

Prim_PMCA_Inh_RT_DDCU_N2D1B_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2D1B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2D1B_Execute – (LADD96IM1136K)>

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

Verify 24 DDCU N2D1B Exist – N

15. [REMOVING POWER FROM DDCU N2D1B](#)

S0: EPS: MBSU 1: RBI 11

'Cmded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

NODE 2 DDCU N2S4A ALIVENESS TEST (P662 / J662)

16. [APPLYING POWER TO DDCU N2S4A](#)

S0: EPS: MBSU 4: RBI 2

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify Voltage > 145 V

17. [VERIFYING RT FDIR INHIBITED FOR DDCU N2S4A](#)

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

Verify 26 DDCU N2S4A RT FDIR – Inh

18. [ENABLING RT I/O COMM FOR DDCU N2S4A](#)

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

input the following values in the command template:

sel PM_ORU_x: 31 – DDCU N2STB-4A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2S4A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 31 – DDCU N2STB-4A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2S4A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S4A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2S4A_Execute – (LADD96IM1136K)>

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

Verify 26 DDCU N2S4A Exist – Y

19. [VERIFYING INTEGRATION COUNTER DDCU N2S4A](#)

Node 2: EPS: DDCU N2S4A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

sel Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

20. [INHIBITING RT I/O COMM FOR DDCU N2S4A](#)

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

input the following values in the command template:

sel PM_ORU_x: 31 – DDCU N2STB-4A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2S4A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 31 – DDCU N2STB-4A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 0 – Not Exists

Name command instance:

Prim_PMCA_Inh_RT_DDCU_N2S4A_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2S4A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2S4A_Execute – (LADD96IM1136K)>

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

Verify 26 DDCU N2S4A Exist – N

21. [REMOVING POWER FROM DDCU N2S4A](#)

S0: EPS: MBSU 4: RBI 2

MBSU 4 RBI 2

'Cmded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

NODE 2 DDCU N2D4B ALIVENESS TEST (P663 / J663)

22. [APPLYING POWER TO DDCU N2D4B](#)

S0: EPS: MBSU 4: RBI 10

MBSU 4 RBI 10

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify Voltage > 145 V

23. [VERIFYING RT FDIR INHIBITED FOR DDCU N2D4B](#)

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

LB EPS N2 14 RT Status

Verify 25 DDCU N2D4B RT FDIR – Inh

24. [ENABLING RT I/O COMM FOR DDCU N2D4B](#)

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

input the following values in the command template:

sel PM_ORU_x: 35 – DDCU N2NAD-4B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2D4B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 35 – DDCU N2NAD-4B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance:

Prim_PMCA_Ena_RT_DDCU_N2D4B_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D4B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2D4B_Execute – (LADD96IM1136K)>

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

Verify 25 DDCU N2D4B Exist – Y

25. [VERIFYING INTEGRATION COUNTER DDCU N2D4B](#)

Node 2: EPS: DDCU N2D4B

DDCU N2D4B

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

sel Firmware

DDCU N2D4B Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

26. [INHIBITING RT I/O COMM FOR DDCU N2D4B](#)

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

input the following values in the command template:

sel PM_ORU_x: 35 – DDCU N2NAD-4B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 0 – Not Exists

Name command instance:

Prim_PMCA_Inh_RT_DDCU_N2D4B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 35 – DDCU N2NAD-4B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 0 – Not Exists

Name command instance:

Prim_PMCA_Inh_RT_DDCU_N2D4B_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2D4B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2D4B_Execute – (LADD96IM1136K)>

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

Verify 25 DDCU N2D4B Exist – N

27. REMOVING POWER FROM DDCU N2D4B

S0: EPS: MBSU 4: RBI 10

MBSU 4 RBI 10

'Cmdded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

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NODE 2 STARBOARD AVIONICS CONNECTOR ALIVENESS TESTS

(ASSY OPS/10A/FIN)

Page 1 of 10 pages

NOTE

The following connectors and equipment are verified during this procedure:
P670 / J670: MBSU 2 power to DDCU N2P2A
P671 / J671: MBSU 2 power to DDCU N2O2B
P672 / J672: MBSU 3 power to DDCU N2P3A
P673 / J673: MBSU 3 power to DDCU N2O3A
P674 / J674: ETCS Loop B IFHX valve posn telemetry
Functions not verified: ETCS Loop B IFHX valve commanding, MBSU 3 pass-through power to Centrifuge

NODE 2 LOOP B IFHX ALIVENESS TESTS (P674 / J674)

1. VERIFYING VALID NODE 2 LTL IFHX TELEMETRY

Node 2: TCS

Node 2: TCS

'IFHX'

Verify NH3 Byp Vlv Posn LTL – Byp

Verify NH3 Isol Vlv Posn LTL – Open

2. VERIFYING VALID COLUMBUS LTL IFHX TELEMETRY

COL: TCS: LTL IFHX

COL LTL IFHX Commands

'Commands'

Verify COL LTL IFHX NH3 Isol Vlv Position – Open

Verify COL LTL IFHX NH3 Byp Vlv Position – Bypass

3. VERIFYING VALID JEM MTL IFHX TELEMETRY

JEM: TCS: MTL IFHX

JEM MTL IFHX Commands

'Commands'

Verify JEM MTL IFHX NH3 Isol Vlv Position – Open

Verify JEM MTL IFHX NH3 Byp Vlv Position – Bypass

NODE 2 DDCU N2P2A ALIVENESS TEST (P670 / J670)

4. APPLYING POWER TO DDCU N2P2A

S0: EPS: MBSU 2: RBI 3

MBSU 2 RBI 3

'Cmdded Position'

cmd Close – Arm

cmd Close (Verify – CI)

Verify Voltage > 145 V

5. [VERIFYING RT FDIR INHIBITED FOR DDCU N2P2A](#)

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

Verify 24 DDCU N2P2A RT FDIR – Inh

6. [ENABLING RT I/O COMM FOR DDCU N2P2A](#)

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

input the following values in the command template:

sel PM_ORU_x: 26 – DDCU N2PRT-2A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P2A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 26 – DDCU N2PRT-2A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P2A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P2A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P2A_Execute – (LADD96IM1136K)>

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

Verify 24 DDCU N2P2A Exist – Y

7. [VERIFYING INTEGRATION COUNTER DDCU N2P2A](#)

Node 2: EPS: DDCU N2P2A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C
Verify Baseplate Temp: -37.3 to 40.3 C

sel Firmware

DDCU N2P2A Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

8. [INHIBITING RT I/O COMM FOR DDCU N2P2A](#)

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

input the following values in the command template:

sel PM_ORU_x: 26 – DDCU N2PRT-2A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2P2A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 26 – DDCU N2PRT-2A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2P2A_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2P2A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2P2A_Execute – (LADD96IM1136K)>

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

Verify 24 DDCU N2P2A Exist – N

9. [REMOVING POWER FROM DDCU N2P2A](#)

S0: EPS: MBSU 2: RBI 3

MBSU 2 RBI 3

'Cmded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

NODE 2 DDCU N2O2B ALIVENESS TEST (P671 / J671)

10. APPLYING POWER TO DDCU N2O2B

S0: EPS: MBSU 2: RBI 10

MBSU 2 RBI 10

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify Voltage > 145 V

11. VERIFYING RT FDIR INHIBITED FOR DDCU N2O2B

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

LB EPS N2 23 RT Status

Verify 26 DDCU N2O2B RT FDIR – Inh

12. ENABLING RT I/O COMM FOR DDCU N2O2B

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

input the following values in the command template:

sel PM_ORU_x: 32 – DDCU N2ZEN-2B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O2B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 32 – DDCU N2ZEN-2B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O2B_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O2B_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O2B_Execute - (LADD96IM1136K)>

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

Verify 26 DDCU N2O2B Exist – Y

13. [VERIFYING INTEGRATION COUNTER DDCU N2O2B](#)

Node 2: EPS: DDCU N2O2B

DDCU N2O2B

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

sel Firmware

DDCU N2O2B Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

14. [INHIBITING RT I/O COMM FOR DDCU N2O2B](#)

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

input the following values in the command template:

sel PM_ORU_x: 32 – DDCU N2ZEN-2B

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2O2B_Arm

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

input the following values in the command template:

sel PM_ORU_x: 32 – DDCU N2ZEN-2B

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2O2B_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2O2B_Arm - (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2O2B_Execute - (LADD96IM1136K)>

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

Verify 26 DDCU N2O2B Exist – N

15. [REMOVING POWER FROM DDCU N2O2B](#)

S0: EPS: MBSU 2: RBI 10

MBSU 2 RBI 10

'Cmded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

NODE 2 DDCU N2P3A ALIVENESS TEST (P672 / J672)

16. [APPLYING POWER TO DDCU N2P3A](#)

S0: EPS: MBSU 3: RBI 3

MBSU 3 RBI 3

'Cmded Position'

cmd Close – Arm

cmd Close (Verify – Cl)

Verify Voltage > 145 V

17. [VERIFYING RT FDIR INHIBITED FOR DDCU N2P3A](#)

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

LB EPS N2 23 RT Status

Verify 25 DDCU N2P3A RT FDIR – Inh

18. [ENABLING RT I/O COMM FOR DDCU N2P3A](#)

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

input the following values in the command template:

sel PM_ORU_x: 27 – DDCU N2PRT-3A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P3A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 27 - DDCU N2PRT-3A

sel PM_CMD_Hdr: 2 - Fire

sel PM_ORU_Exist: 1 - Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2P3A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P3A_Arm - (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2P3A_Execute - (LADD96IM1136K)>

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

Verify 25 DDCU N2P3A Exist – Y

19. [VERIFYING INTEGRATION COUNTER DDCU N2P3A](#)

Node 2: EPS: DDCU N2P3A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

sel Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

20. [INHIBITING RT I/O COMM FOR DDCU N2P3A](#)

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

input the following values in the command template:

sel PM_ORU_x: 27 - DDCU N2PRT-3A

sel PM_CMD_Hdr: 1 - Arm

sel PM_ORU_Exist: 0 - Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2P3A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 27 - DDCU N2PRT-3A

sel PM_CMD_Hdr: 2 - Fire

sel PM_ORU_Exist: 0 - Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2P3A_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2P3A_Arm - (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2P3A_Execute - (LADD96IM1136K)>

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

Verify 25 DDCU N2P3A Exist - N

21. [REMOVING POWER FROM DDCU N2P3A](#)

S0: EPS: MBSU 3: RBI 3

'Cmdded Position'

cmd Open (Verify - Op)

Verify Voltage < 10 V

NODE 2 DDCU N2O3A ALIVENESS TEST (P673 / J673)

22. [APPLYING POWER TO DDCU N2O3A](#)

S0: EPS: MBSU 3: RBI 2

'Cmdded Position'

cmd Close - Arm

cmd Close (Verify - Cl)

Verify Voltage > 145 V

23. [VERIFYING RT FDIR INHIBITED FOR DDCU N2O3A](#)

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

Verify 27 DDCU N2O3A RT FDIR – Inh

24. [ENABLING RT I/O COMM FOR DDCU N2O3A](#)

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

input the following values in the command template:

sel PM_ORU_x: 33 – DDCU N2ZEN-3A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O3A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 33 – DDCU N2ZEN-3A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 1 – Exists

Name command instance: Prim_PMCA_Ena_RT_DDCU_N2O3A_Execute

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O3A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Ena_RT_DDCU_N2O3A_Execute – (LADD96IM1136K)>

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

Verify 27 DDCU N2O3A Exist – Y

25. [VERIFYING INTEGRATION COUNTER DDCU N2O3A](#)

Node 2: EPS: DDCU N2O3A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

sel Firmware

'Clear Commands'

cmd Common Clear

Verify Power On Reset – blank

26. [INHIBITING RT I/O COMM FOR DDCU N2O3A](#)

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

input the following values in the command template:

sel PM_ORU_x: 33 – DDCU N2ZEN-3A

sel PM_CMD_Hdr: 1 – Arm

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2O3A_Arm

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

input the following values in the command template:

sel PM_ORU_x: 33 – DDCU N2ZEN-3A

sel PM_CMD_Hdr: 2 – Fire

sel PM_ORU_Exist: 0 – Not Exists

Name command instance: Prim_PMCA_Inh_RT_DDCU_N2O3A_Execute

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2O3A_Arm – (LADD96IM1136K)>

cmd <Cmd Inv: Prim_PMCA_Inh_RT_DDCU_N2O3A_Execute – (LADD96IM1136K)>

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

Verify 27 DDCU N2O3A Exist – N

27. [REMOVING POWER FROM DDCU N2O3A](#)

S0: EPS: MBSU 3: RBI 2

MBSU 3 RBI 2

'Cmded Position'

cmd Open (Verify – Op)

Verify Voltage < 10 V

NODE2 SAMPLE DELIVERY ACTIVATION AND CHECKOUT

(ASSY OPS/10A/FIN/SPN)

Page 1 of 6 pages

OBJECTIVE:

This procedure configures the LAB Fwd and Node 2 Aft SDS manual valves for sampling the Node 2 atmosphere.

TOOLS REQUIRED:

None

ISS IVA Toolbox

Drawer 2:

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

Driver Handle, 1/4" Drive

1. CONFIGURING LAB SAMPLE DELIVERY SYSTEM VALVES

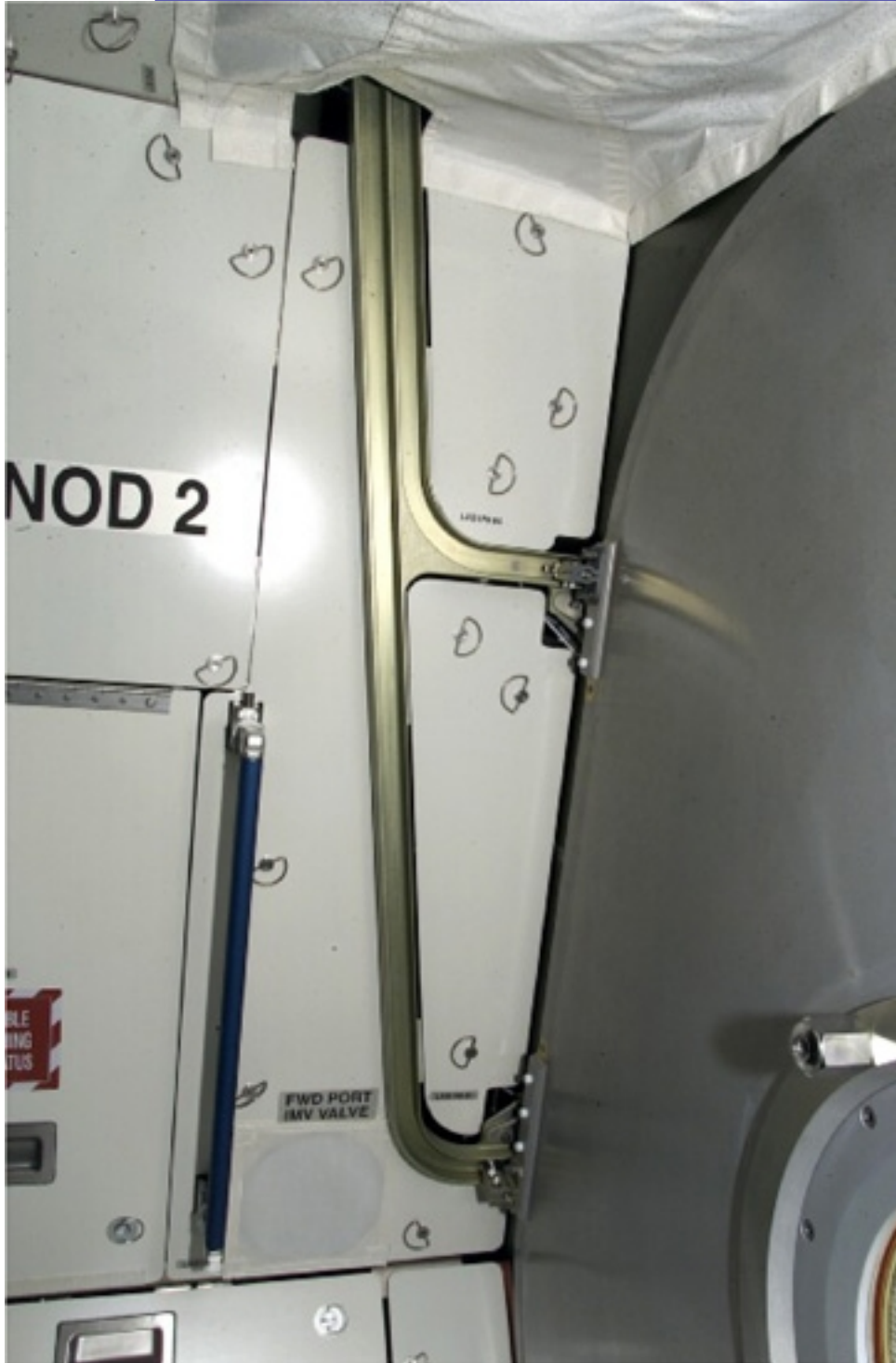


Figure 1. Closeout Panel LAB1PØ-Ø2.

LAB1PØ-Ø2

- 1.1 Remove port alcove closeout panel LAB1PØ-Ø2 1/4 Turn Fasteners (4).
Remove Handrails as necessary.
Temporarily stow.

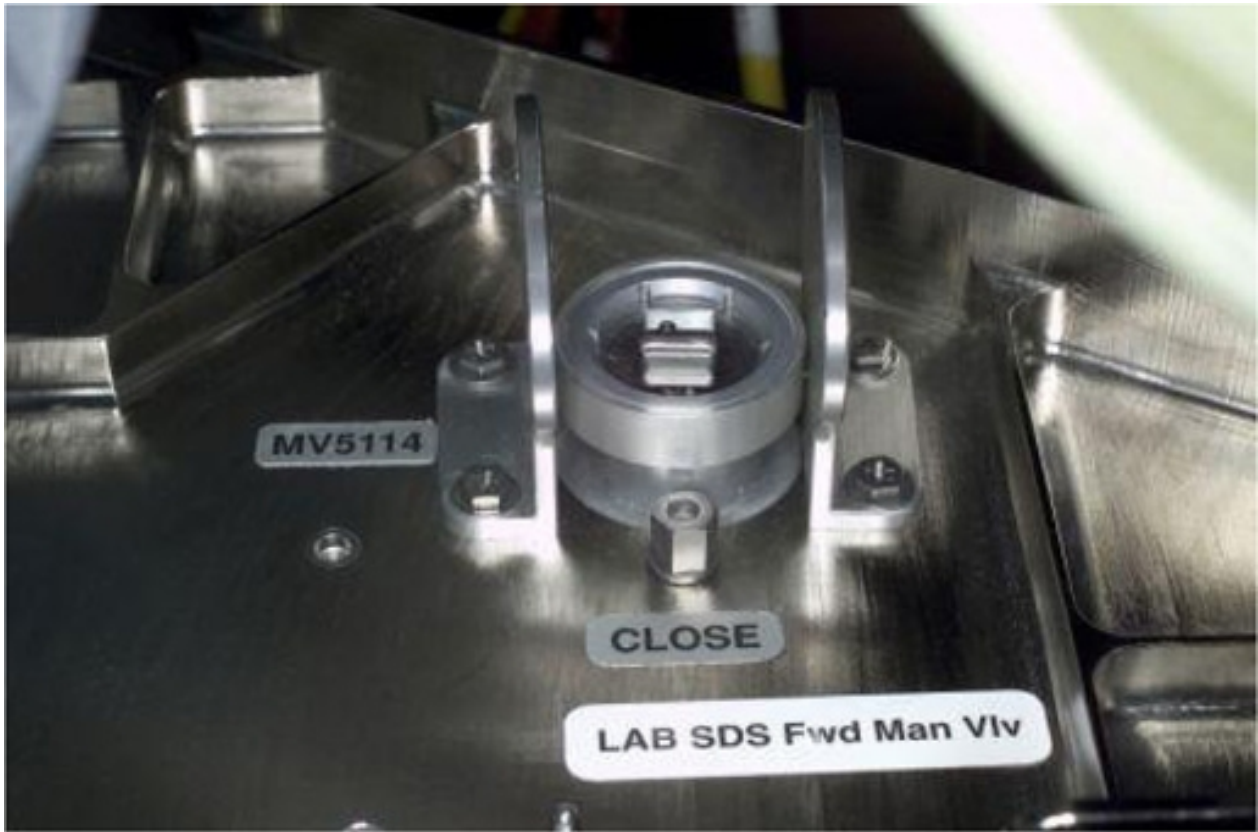


Figure 2. LAB Fwd SDS Manual Valve.

- | | | |
|-----------|-----|---|
| SDS Valve | 1.2 | LAB Fwd SDS Manual Vlv (MV5114) → OPEN
Refer to Figure 2. |
| LAB1PØ-Ø2 | 1.3 | Replace port alcove closeout panel LAB1PØ-Ø2, 1/4 Turn Fasteners (4). |

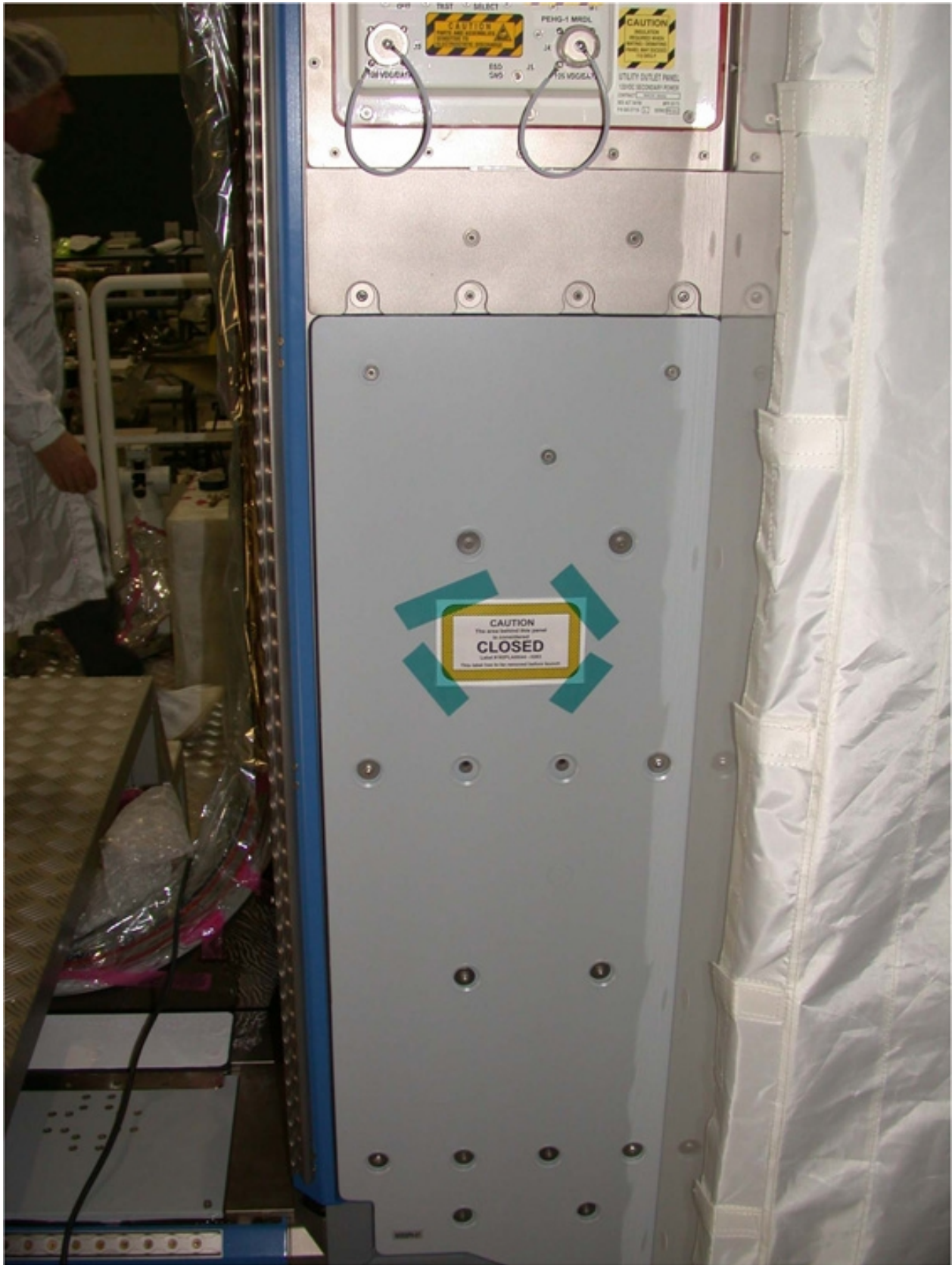


Figure 3. Closeout Panel NOD2P6-51.

2. CONFIGURING NODE 2 SAMPLE DELIVERY SYSTEM VALVES

- NOD2P6-51 2.1 Remove port alcove panel NOD2P6-51, Fasteners (8) (Driver Handle, 1/4" Drive; 5/32" Hex Head).
 Temporarily stow.



Figure 4. Node 2 Aft SDS Manual Valve.

- SDS Valve 2.2 Node 2 Aft SDS Manual Vlv (MVXXX) → OPEN
 Refer to Figure 4.
- NOD2P6-51 2.3 Replace port alcove panel NOD2P6-51, Fasteners (8) (Driver Handle, 1/4" Drive; 5/32" Hex Head).

3. CHECKOUT NODE 2 SAMPLE DELIVERY SYSTEM

NOTE

The nominal autosequence list will include Node 1, Node 2, Airlock, and LAB modules when MPLM is not available.

If desired autosequence list is LAB/Node1/Airlock/Node2 or LAB/Node1/Airlock/Node2/MPLM, then

NODE2 SAMPLE DELIVERY ACTIVATION AND CHECKOUT

(ASSY OPS/10A/FIN/SPN)

Page 6 of 6 pages

PCS

NOTE

Per SPN 3572 (5A - x2 INTR3), the MCA can get out of sync with the INT SYS after an autosequence command. To prevent this, a Standby Immediate command should be issued first.

US Lab: ECLSS: AR Rack

[LAB AR Rack Overview](#)

'MCA'

'Standby Immediate'

cmd Standby Immediate

√State – Standby

'Auto Sequence'

cmd

LAB/Node1/Airlock/Node2(LAB/Node1/Airlock/Node2/MPLM)

√State – Operate

US Lab: ECLSS: AR Rack: MCA: Additional TIm

[LAB MCA Additional TIm](#)

√Invalid Sequence – blank

If another autosequence list is desired

Go to [{2.301 MCA AUTO SEQUENCE LIST CHANGE}](#), all (SODF: ECLSS: NOMINAL: ARS).

NODE2/LAB VESTIBULE DEPRESSURIZATION AND LEAK CHECK

(ASSY OPS/10A/FIN)

Page 1 of 14 pages

OBJECTIVE:

Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Multimeter, ISA Scopemeter Pressure Probe to depress Node2/LAB vestibule for overnight leak check of vestibule and Node 2 aft hatch interface.

LOCATION:

Lab Forward Endcone

DURATION:

1 hour

- 20 minutes for Vestibule Leak Check Setup
- 5 minute - wait for Vestibule Depressurization
- 10 minutes for Overnight Teardown
- 20 minutes for Vestibule Leak Check Setup
- 8 hours - wait for Vestibule Leak Check
- 20 minutes for Multimeter, ISA, VAJ Teardown

CREW:

One

MATERIALS:

9V Alkaline Battery (if Battery changeout required)

Gray Tape

TOOLS:

Internal Sampling Adapter (ISA) P/N 97M55830-1

Vacuum Access Jumper-78-1 5 ft P/N 683-17111-1

Vacuum Access Jumper-83-1 35 ft P/N 683-17111-2

ISA Scopemeter Pressure Probe P/N 1525,760MMHGA/30PSIA

Digital Multimeter Kit: P/N 10118-10018-04

Multimeter

ISS IVA Toolbox:

Drawer 3

#0 Phillips Screwdriver (if Battery change out required)

1. [NODE 2 EGRESS/CLOSEOUT](#)

Node 2
Stbd Hatch

- 1.1 Uncap PPRV.
Temporarily stow cap.
- 1.2 Close Node 2 Aft Hatch per decal
- 1.3 Close LAB Fwd Hatch per decal

2. SETTING UP ISA

NOTE

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

2.1 Gamah Cap ←|→ ISA VAJ Port

2.2 ISA Scopemeter Pressure Probe →|← ISA (Verify connection)


3. SETTING UP MULTIMETER

NOTE

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

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

3.2 √ISA Scopemeter Pressure Probe – OFF

3.3 Rotary Switch ↻ 

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

If voltage reading < 100 mVDC, ISA Scopemeter Pressure Probe Battery must be replaced.

9V Battery replaced by removing noncaptive screw on back of probe (#0 Phillips Screwdriver).

3.5 ISA Scopemeter Pressure Probe → mm HgA

4. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

NOTE

ISA Scopemeter Pressure Probe outputs 1 mV per pressure unit measured.

Example: 0.760V = 760 mV = 760 mm HgA

Multimeter

4.1 Rotary Switch ↻ 

4.2 Record ISA Scopemeter Pressure Probe P1: _____
mmHgA0.

PCS

4.3 US Lab: ECLSS

Lab: ECLSS

Record Cab Press P2: _____ mmHgA

```

*****
*       If  $\Delta P$   $|P2 - P1| > 20$  mmHg
*       |
*       |       ISS  $\downarrow$  MCC-H ISA Scopemeter Pressure
*       |       |       Probe inaccurate.
*       |
*       |        $\sqrt$ MCC-H for further instructions
*       |
*****
    
```

5. CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE (MPEV)

LAB Fwd Hatch

5.1 \sqrt LAB Fwd MPEV – CLOSED

5.2 Gamah Cap \leftarrow VAJ-78-1 5 ft (both ends)
 Inspect seals for any visible damage.

Notify MCC-H if any damage noted to seals.

5.3 VAJ-78-1 5 ft (straight end) \rightarrow ISA VAJ Port
 Hand tighten.
 Refer to Figure 1.

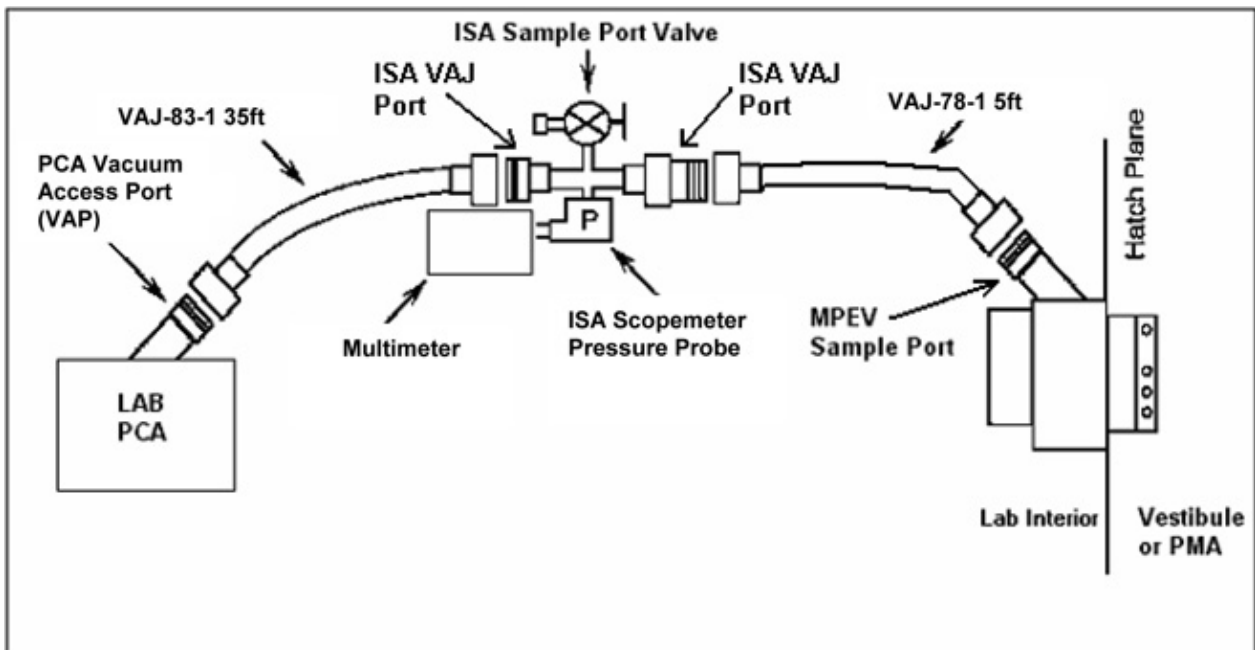


Figure 1. ISA/VAJ/MPEV Connection.

5.4 Cap \leftarrow LAB Fwd MPEV

MCC-H

VAJ-78-1 5 ft (bent end) →|← LAB Fwd MPEV
Hand tighten.
Refer to Figure 1.

5.5 [Verifying Vent Relief Isolation Valve \(VRIV\) and Vent Relief Control Valve \(VRCV\) Closed](#)

Lab: ECLSS: PCA

'Pressure Control Assembly'

sel VRCV (Icon)

√Position – Closed

Lab: ECLSS: PCA

'Pressure Control Assembly'

sel VRIV (Icon)

√Position – Closed

5.6 Remove Closeout Panel LAB1D0-02, 1/4 Turn Fasteners (nine).

5.7 Gamah Cap ←|→ PCA Vacuum Access Port (VAP)
Temporarily stow Gamah Cap on Closeout Panel (Gray Tape).

5.8 Gamah Cap ←|→ VAJ-83-1 35 ft (both ends)
Inspect seals for any visible damage.

Notify **MCC-H** if any damage noted to seals.

5.9 VAJ-83-1 35 ft (bent end) →|← PCA VAP
Hand tighten.
Refer to Figure 1.

5.10 Gamah Cap ←|→ ISA VAJ Port (capped)
VAJ-83-1 35 ft (straight end) →|← ISA VAJ Port
Hand tighten.
Refer to Figure 1.

WARNING
VAJ will move when pressurized or evacuated. Failure to secure ISA/VAJ Assembly may result in injury to crew and/or damage to equipment.

5.11 Secure ISA/VAJ Assembly.

6. INHIBITING POSITIVE PRESSURE RELIEF

NOTE
'Positive P Relief Failure - LAB' Caution will be received after PPR is inhibited. No action required. This message will return to normal once PPR is reenabled.

PCS

On MCC-H GO

US Lab: ECLSS: PCA: PCA Commands

LAB PCA Commands

'Positive Press Relief'

'Inhibit'

cmd Arm (√Status – Armed)

cmd Inhibit

√Positive Pressure Relief Status – Inhibited

7. LEAK CHECKING ISA/VAJ CONNECTION

7.1 ISA Sampling Port Valve → CLOSED

Refer to Figure 2.

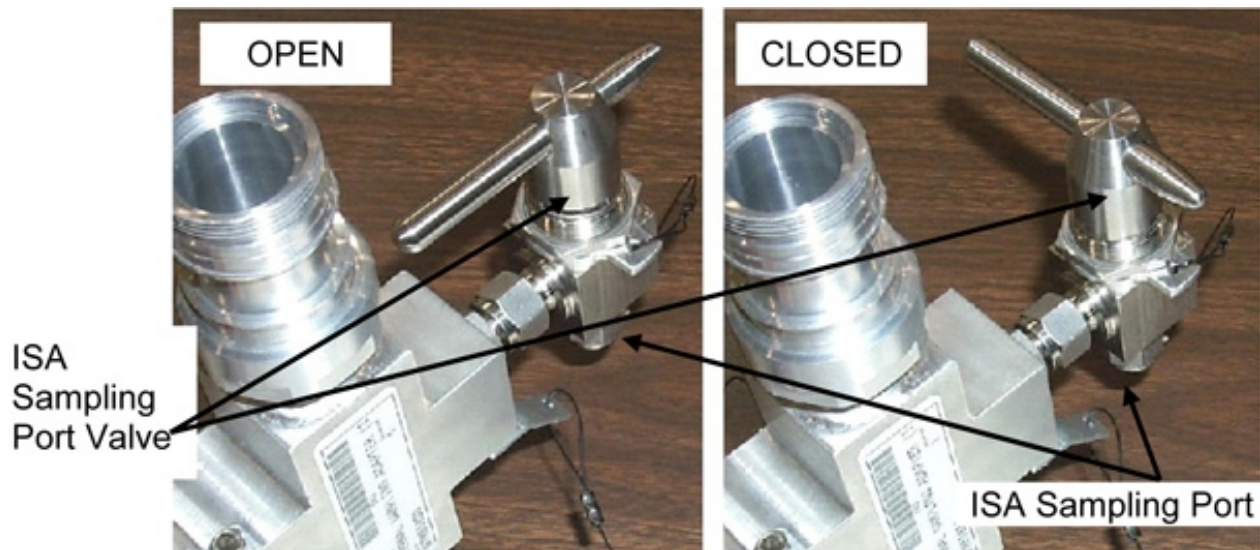


Figure 2. ISA Sampling Port Valve.

WARNING

Opening the VRIV will vent the ISA and VAJs to space and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

7.2 Don Earplugs.

7.3 [Opening PCA VRIV](#)

US Lab: ECLSS: PCA

Lab ACS

'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open

√Position – Open

√Open Indicator – √

7.4 Wait 10 minutes to depressurize ISA VAJ setup.

7.5 Doff Earplugs.

7.6 [Closing PCA VRIV](#)

US Lab: ECLSS: PCA

Lab ACS

'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV

'Close'


cmd Close

√Position – Closed

√Closed Indicator – √

7.7 Wait 3 minutes for thermal stabilization.

7.8

Rotary Switch 

- Multimeter 7.9 Record ISA Scopemeter Pressure Probe P3: _____
 mmHg
 Record GMT: _____ GMT
- 7.10 Wait 5 minutes for leak check.
- 7.11 Record ISA Scopemeter Pressure Probe P4: _____
 mmHg
 Record GMT: _____ GMT

```

*****
*      If ΔP | P4 - P3| > 10 mmHg during monitoring period
*      |
*      |      ISS ↓ MCC-H of suspected ISA VAJ leak.
*      |
*      |      √MCC-H for further instructions
*      |
*****
  
```

8. DEPRESSURIZING VESTIBULE

WARNING

Opening the LAB Fwd MPEV will vent vestibule to space and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

- 8.1 Don Earplugs.
- 8.2 [Opening PCA VRIV](#)
 US Lab: ECLSS: PCA
Lab ACS
 'Pressure Control Assembly'
- sel VRIV
- LAB PCA VRIV
- 'Open'
- cmd** Arm (√Status – Armed)
cmd Open
- √Position – Open
 √Open Indicator – √
- LAB Fwd Hatch 8.3 LAB Fwd MPEV → OPEN
- 8.4 Wait approximately 5 minutes or until ISA Press < 250 mmHgA.
- Multimeter 8.5 √ISA Pressure < 250 mmHgA

- 8.6 LAB Fwd MPEV → CLOSED
- 8.7 Doff Earplugs.
- 8.8 Wait an additional 10 minutes for thermal stabilization.
- 8.9 [Closing PCA VRIV](#)
US Lab: ECLSS: PCA
Lab ACS
'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV
'Close'

cmd Close

√Position – Closed
√Closed Indicator – √

9. [VESTIBULE PRESSURE CHECK 1](#)

- 9.1 LAB Fwd MPEV → OPEN
- 9.2 Record ISA Scopemeter Pressure Probe P5: _____
mmHg
Record GMT: _____ GMT
- 9.3 LAB Fwd MPEV → CLOSED

PCS

10. [ENABLING POSITIVE PRESSURE RELIEF](#)

- US Lab: ECLSS: PCA: PCA Commands
LAB PCA Commands
'Positive Press Relief'

cmd Enable (√Positive Pressure Relief Status – Enabled)

11. [DISASSEMBLING EQUIPMENT FOR LEAK CHECK CONFIG](#)


Multimeter

- 11.1 ISA Scopemeter Pressure Probe → OFF
- 11.2 Rotary Switch ↻ OFF
Multimeter ←|→ ISA Scopemeter Pressure Probe
- 11.3 Cap ←|→ ISA Sampling Port
ISA Sample Port → OPEN (for pressurization, stowage)

Cap →|← ISA Sampling Port
Refer to Figure 2.

- 11.4 VAJ-83-1 35 ft (bent end) ←|→ PCA VAP
Gamah Cap →|← VAJ-83-1 35 ft
Hand tighten.
Secure VAJ-83-1 35 ft (bent end) for overnight stowage.
- 11.5 Inspect seal on PCA VAP Gamah Cap for any visible damage.
Notify **MCC-H** if any damage noted to seals.
Gamah Cap →|← PCA VAP
Hand tighten.
- 11.6 Install Closeout Panel LAB1D0-02, 1/4 Turn Fasteners (nine).
- 11.7 Wait 8 hours for leak check.

12. SETTING UP MULTIMETER

12.1 Rotary Switch ↻ 

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

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

12.3 ISA Scopemeter Pressure Probe → mmHgA

13. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

<u>NOTE</u> ISA Scopemeter Pressure Probe outputs 1 mV per pressure unit measured. Example: 0.760V = 760 mV = 760 mm HgA
--

13.1 Rotary Switch ↻ 

13.2 Record ISA Scopemeter Pressure Probe P6: _____
mmHgA

PCS

13.3 US Lab: ECLSS
Lab: ECLSS
Record Cab Press P7: _____ mmHgA

```
*****  
*          If  $\Delta P$  |P7 - P6| > 20 mmHg  
*          |  
*          ISS  $\downarrow$  MCC-H ISA Scopemeter Pressure  
*          Probe inaccurate.  
*          |  
*           $\sqrt$ MCC-H for further instructions  
*          |  
*****
```

14. [CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE \(MPEV\)](#)

- 14.1 Remove Closeout Panel LAB1D0-02, 1/4 Turn Fasteners (nine).
- 14.2 Gamah Cap \leftarrow PCA Vacuum Access Port (VAP)
Temporarily stow Gamah Cap on Closeout Panel (Gray Tape).
- 14.3 Gamah Cap \leftarrow VAJ-83-1 35 ft (bent end)
Inspect seals for any visible damage.

Notify MCC-H if any damage noted to seals.
- 14.4 VAJ-83-1 35 ft (bent end) \rightarrow PCA VAP
Hand tighten.
Refer to Figure 1.

WARNING

VAJ will move when pressurized or evacuated. Failure to secure ISA/VAJ Assembly may result in injury to crew and/or damage to equipment.

- 14.5 Secure ISA/VAJ Assembly.

15. [INHIBITING POSITIVE PRESSURE RELIEF](#)

NOTE

'Positive P Relief Failure - LAB' Caution will be received after PPR is inhibited. No action is required. This message will return to normal once PPR is reenabled.

US Lab: ECLSS: PCA: PCA Commands

LAB PCA Commands

'Positive Press Relief'

'Inhibit'

cmd Arm (\sqrt Status – Armed)

cmd Inhibit

√Positive Pressure Relief Status – Inhibited

16. [LEAK CHECKING ISA/VAJ CONNECTION](#)

16.1 ISA Sampling Port Valve → CLOSED
Refer to Figure 2.

16.2 √LAB Fwd MPEV – CLOSED

WARNING
Opening the VRIV will vent the ISA and VAJs to space and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

16.3 Don Earplugs.

16.4 [Opening PCA VRIV](#)

US Lab: ECLSS: PCA

'Pressure Control Assembly'

sel VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open

√Position – Open

√Open Indicator – √

16.5 Wait 10 minutes to depressurize ISA/VAJ setup.

16.6 Doff Earplugs.

16.7 [Closing PCA VRIV](#)

US Lab: ECLSS: PCA

'Pressure Control Assembly'


sel VRIV

'Close'

cmd Close

√Position – Closed
 √Closed Indicator – √

16.8 Wait 3 minutes for thermal stabilization.

16.9 Rotary Switch 

Multimeter

16.10 Record ISA Scopemeter Pressure Probe P8: _____
 mmHg
 Record GMT: _____ GMT

16.11 Wait 5 minutes for leak check.

16.12 Record ISA Scopemeter Pressure Probe P9: _____
 mmHg
 Record GMT: _____ GMT

```

*****
*           If ΔP |P9 - P8| > 10 mmHg during monitoring period
*           |
*           |           ISS ↓ MCC-H of suspected ISA/VAJ leak.
*           |
*           |           √MCC-H for further instructions
*           |
*           |
*****
    
```

17. VESTIBULE PRESSURE CHECK 2

17.1 LAB Fwd MPEV → OPEN

17.2 Record ISA Scopemeter Pressure Probe P10:
 _____ mmHg
 Record GMT: _____ GMT

```

*****
*      If ΔP |P10 - P5| > 30 mmHg during 8 hour monitoring
*      period
*      |
*      |      ISS ↓ MCC-H of suspected vestibule leak.
*      |
*      |      √MCC-H for further instructions
*      |
*****
    
```

- 17.3 LAB Fwd MPEV → CLOSED
- 17.4 Notify **MCC-H** of pressures and GMTs recorded.
- 18. ENABLING POSITIVE PRESSURE RELIEF
 PCS US Lab: ECLSS: PCA: PCA Commands
LAB PCA Commands
 'Positive Press Relief'

cmd Enable (√Positive Pressure Relief Status – Enabled)
- 19. DISASSEMBLING AND STOWING EQUIPMENT
 - 19.1 √LAB Fwd MPEV → CLOSED
 - 19.2 ISA Scopemeter Pressure Probe → OFF
 - 19.3 Rotary Switch ↻ OFF
 Multimeter ←|→ ISA Scopemeter Pressure Probe
 - 19.4 Cap ←|→ ISA Sampling Port
 ISA Sample Port → OPEN (for pressurization, stowage)
 Cap →|← ISA Sampling Port
 Refer to Figure 2.
 - 19.5 VAJ-78-1 5 ft (straight end) ←|→ ISA VAJ Port
 VAJ-78-1 5 ft (bent end) ←|→ LAB Fwd MPEV
 Gamah Cap →|← VAJ-78-1 5 ft (both ends)
 Hand tighten.
 Gamah Cap →|← ISA VAJ Port
 Hand tighten.
 - 19.6 Inspect seal on LAB Fwd MPEV Cap for any visible damage.
 Notify **MCC-H** if any damage noted to seals.
 Cap →|← LAB Fwd MPEV
 Hand tighten.

- 19.7 VAJ-83-1 35 ft ←|→ PCA VAP
VAJ-83-1 35 ft ←|→ ISA VAJ Port

Gamah Cap →|← VAJ-83-1 35 ft (both ends)
Hand tighten.
Gamah Cap →|← ISA VAJ Port
Hand tighten.
- 19.8 Inspect seal on PCA VAP Gamah Cap for any visible damage.
Notify **MCC-H** if any damage noted to seals.
Gamah Cap →|← PCA VAP
Hand tighten.
- 19.9 Check for FOD within 1m radius.
- 19.10 Install Closeout Panel LAB1D0-02, 1/4 Turn Fasteners (nine).
- 19.11 ISS ↓ **MCC-H**, "Vestibule depressurization and leak check completed."
- 19.12 Stow tools and materials.
Update IMS with stowage location of hardware.

20. [INGRESS NODE 2](#)

- 20.1 LAB Fwd MPEV → OPEN
- 20.2 US Lab: ECLSS
LAB ECLSS
When dp/dt ~ 0 (approximately 30 seconds), continue.
- 20.3 Open LAB Fwd Hatch per Decal.
- 20.4 Open Node 2 Aft Hatch per Decal.
- 20.5 Cap PPRV.
- 20.6 ISS ↓ **MCC-H**, "Node 2 Aft Hatch is open."

Node 2
Stbd Hatch

LAB/NODE 2 VESTIBULE PRESSURIZATION AND LEAK CHECK

(ASSY OPS/10A/FIN)

Page 1 of 8 pages

OBJECTIVE:

Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Multimeter, and ISA Scopemeter Pressure Probe to pressurize and verify integrity of pressure in LAB/Node 2 vestibule.

LOCATION:

LAB Forward

DURATION:

1 hour, 35 minutes Total Crew Time

25 minutes for Multimeter, ISA, VAJ Setup

20 minutes for Multimeter, ISA, VAJ Teardown

50 minutes for Equalization and Leak Check Wait Times

CREW:

One

MATERIALS:

9V Alkaline Battery (if Battery changeout required)

Earplugs

TOOLS:

Internal Sampling Adapter (ISA) P/N 97M55830-1

Vacuum Access Jumper-78-1 5 ft P/N 683-17111-1

ISA Scopemeter Pressure Probe P/N 1525,760MMHGA/30PSIA

Digital Multimeter Kit: P/N 10118-10018-04

Multimeter

ISS IVA Toolbox:

Drawer 3

#0 Phillips Screwdriver (if Battery changeout required)

1. SETTING UP ISA

NOTE

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

1.1 Gamah Cap ←|→ ISA VAJ Port

√Gamah Cap →|← remaining ISA VAJ Port
Hand tighten.

1.2 √ISA Scopemeter Pressure Probe →|← ISA


2. SETTING UP MULTIMETER

NOTE

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

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

2.2 √ISA Scopemeter Pressure Probe – OFF

2.3 Rotary Switch ↻ 

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

If voltage reading < 100 mVDC, ISA Scopemeter Pressure Probe Battery must be replaced.

| The 9V Battery is replaced by removing non-captive screw on back of probe (#0 Phillips Screwdriver).


2.5 ISA Scopemeter Pressure Probe → mmHgA

3. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

NOTE

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

Multimeter

3.1 Rotary Switch ↻ 

3.2 Record ISA Scopemeter Pressure Probe P1: _____ mmHg

PCS

3.3 US Lab: ECLSS

Lab: ECLSS

Record Cab Press P2: _____ mmHg

```

*****
*       If  $\Delta P |P2 - P1| > 20$  mmHg
*       |
*       |       ISS  $\downarrow$  MCC-H, "ISA Scopemeter Pressure
*       |       Probe inaccurate."
*       |
*       |        $\surd$ MCC-H for further instructions
*       |
*****
    
```

4. [CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE \(MPEV\)](#)

LAB Fwd Hatch

4.1 \surd LAB Fwd MPEV – CLOSED

4.2 Cap \leftrightarrow ISA Sampling Port

ISA Sampling Port Valve \rightarrow CLOSED
Refer to Figure 1.

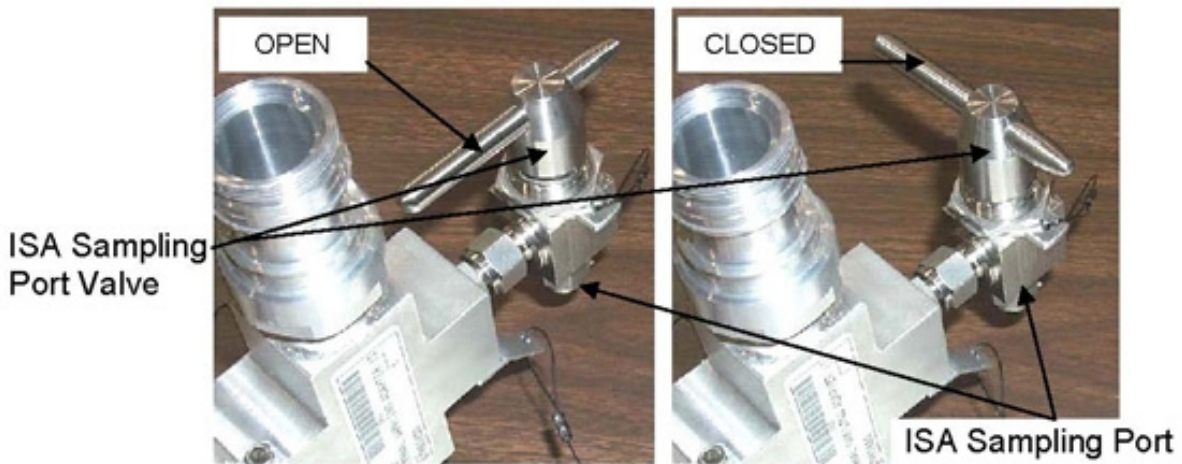


Figure 1. ISA Sampling Port Valve.

4.3 Gamah Cap \leftrightarrow VAJ-78-1 5 ft (both ends)

Inspect seals for any visible damage.
Notify MCC-H if any damage noted to seals.

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

Hand tighten.
Refer to Figure 2.

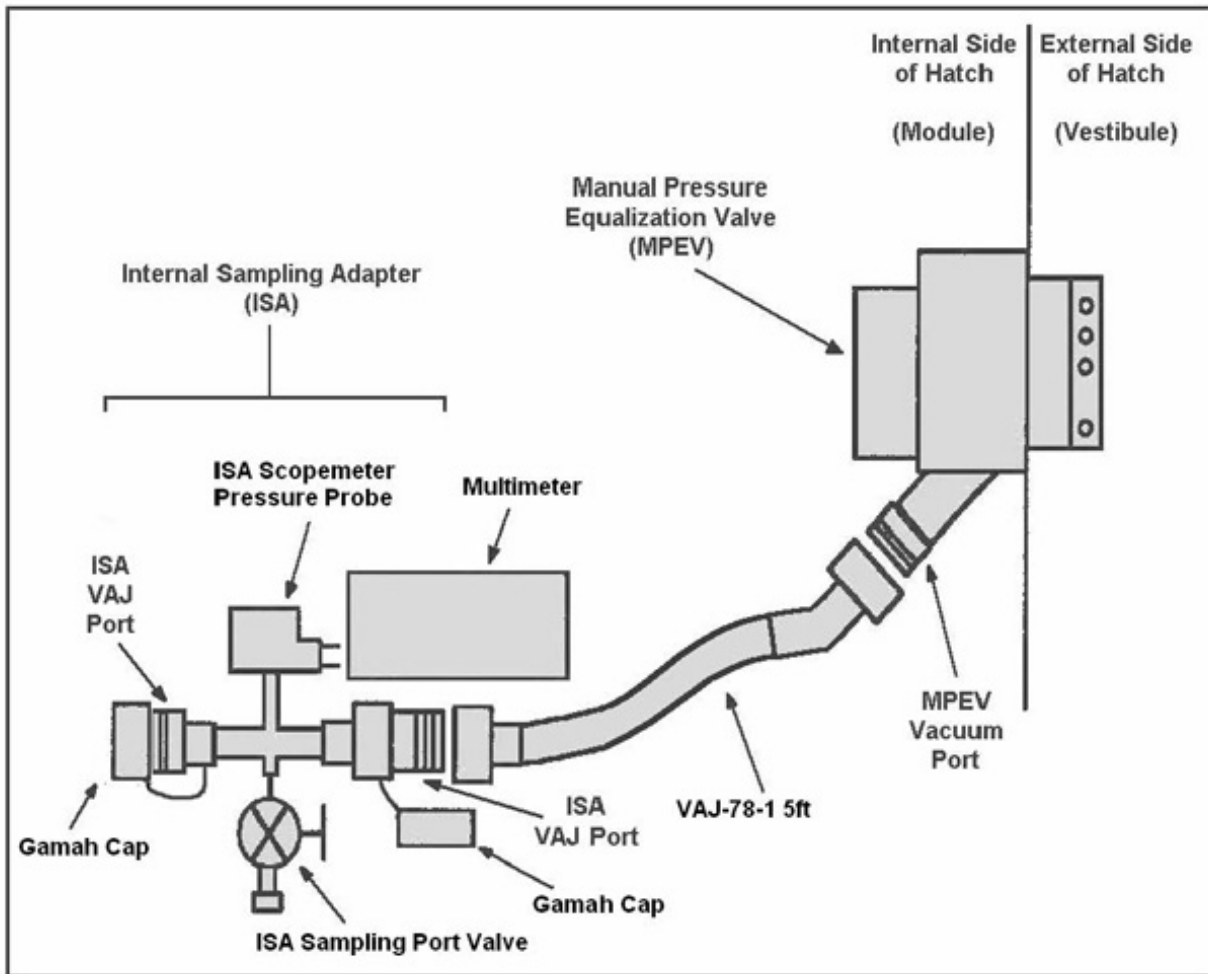


Figure 2. ISA/VAJ/MPEV Connection.

- 4.5 Cap \leftrightarrow LAB Fwd MPEV
 VAJ-78-1 5 ft (bent end) \rightarrow | \leftarrow LAB Fwd MPEV

Hand tighten.
 Refer to Figure 2.

WARNING

VAJ will move when pressurized or evacuated. Failure to secure ISA/VAJ Assembly may result in injury to crew or damage to equipment.


- 4.6 Secure ISA/VAJ Assembly.

5. LEAK CHECKING ISA/VAJ CONNECTION

WARNING
Opening the MPEV will start the depressurization of the ISA/VAJ setup and may cause a loud hissing noise.

- 5.1 Don Earplugs.
- 5.2 LAB Fwd MPEV → OPEN
- 5.3 Wait 5 minutes to depressurize ISA VAJ setup.
- 5.4 LAB Fwd MPEV → CLOSED
- 5.5 Wait 3 minutes for thermal stabilization.

Multimeter

- 5.6  Rotary Switch ↻
- 5.7 Record ISA Scopemeter Pressure Probe P3: _____
mmHg
Record GMT: _____ GMT
- 5.8 Wait 5 minutes for ISA/VAJ leak check.
- 5.9 Record ISA Scopemeter Pressure Probe P4: _____
mmHg
Record GMT: _____ GMT

```
*****  
*      If  $\Delta P | P4 - P3| > 5$  mmHg during monitoring period  
*      |      ISS  $\downarrow$  MCC-H, "Suspected ISA VAJ leak."  
*      |  
*      |       $\sqrt{\text{MCC-H}}$  for further instructions  
*      |  
*****
```

6. PRESSURIZING ISA VAJ SETUP

WARNING
Opening the ISA Sample Port, LAB Fwd MPEV will equalize ISS with the ISA/VAJ, Vestibule and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

- 6.1 Don Earplugs.
- 6.2 ISA Sampling Port Valve → OPEN
- 6.3 Wait 10 seconds for ISA/VAJ equalization.


7. PRESSURIZING VESTIBULE

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

- 7.1 LAB Fwd MPEV → OPEN
- 7.2 ISA Sampling Port Valve → OPEN
Refer to Figure 1.
- 7.3 Wait 2 minutes to begin incremental pressurization of vestibule.
- 7.4 ISA Sampling Port Valve → CLOSED
Note ISA Scopemeter Pressure Probe reading.
- 7.5 Repeat steps 7.2 to 7.4 until ISA Scopemeter Pressure Probe P ~260 mmHgA (~4 minutes).
- 7.6 LAB Fwd MPEV → CLOSED
- 7.7 Doff Earplugs.

8. PERFORMING LEAK CHECK OF VESTIBULE

Multimeter

- 8.1 Wait 10 minutes for thermal stabilization.
- 8.2 ISA Sampling Port Valve → CLOSED
- 8.3 LAB Fwd MPEV → OPEN
- 8.4 Rotary Switch ↻ 
- 8.5 Record ISA Scopemeter Pressure Probe P5: _____ mmHgA
 Record GMT: _____ GMT
 Notify **MCC-H** of pressure reading.
- 8.6 LAB Fwd MPEV → CLOSED
- 8.7 Wait 30 minutes for vestibule leak check.
- 8.8 LAB Fwd MPEV → OPEN
- 8.9 Record ISA Scopemeter Pressure Probe P6: _____ mmHgA
 Record GMT: _____ GMT
 Notify **MCC-H** of pressure reading.
- 8.10 LAB Fwd MPEV → CLOSED

```

*****
*      If  $\Delta P | P6 - P5 | > 5$  mmHg during monitoring period
*      |
*      |      ISS ↓ MCC-H, "Suspected Vestibule leak."
*      |
*      |      √MCC-H for further instructions
*      |
*****
    
```

- 8.11 ISA Scopemeter Pressure Probe → OFF
- 8.12 Rotary Switch ↻ OFF
- 9. [EQUALIZING VESTIBULE PRESSURE POST LEAK CHECK](#)

WARNING

Opening the ISA Sample Port and LAB Fwd MPEV will equalize ISS with the vestibule and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

- 9.1 Don Earplugs.

LAB/NODE 2 VESTIBULE PRESSURIZATION AND LEAK CHECK

(ASSY OPS/10A/FIN)

Page 8 of 8 pages

- LAB Fwd Hatch
- 9.2 LAB Fwd MPEV → CLOSED
 - 9.3 ISA Sampling Port Valve → OPEN
 - 9.4 Wait 10 seconds for ISA/VAJ equalization.
 - 9.5 VAJ-78-1 (5 ft) (bent end) ←|→ LAB Fwd MPEV
Gamah Cap →|← VAJ-78-1 (5 ft) (bent end)
Hand tighten.
 - 9.6 LAB Fwd MPEV → OPEN
- PCS
- 9.7 US Lab: ECLSS
Lab: ECLSS
When dp/dt ~0 (approximately 30 seconds)
LAB Fwd MPEV → CLOSED

If LAB Cab Press decreases by more than 10 mmHg
| LAB Fwd MPEV → CLOSED
| √**MCC-H** for instructions >>
 - 9.8 Doff Earplugs.
10. [DISASSEMBLING AND STOWING EQUIPMENT](#)
- 10.1 Multimeter ←|→ ISA Scopemeter Pressure Probe
 - 10.2 VAJ-78-1 5ft (straight end) ←|→ ISA VAJ Port
Gamah Cap →|← VAJ-78-1 5 ft (straight end)
Hand tighten.

Gamah Cap →|← ISA VAJ Port
Hand tighten.
 - 10.3 ISA Sampling Port Valve → OPEN

Cap →|← ISA Sampling Port
Refer to Figure 1.
 - 10.4 Check for FOD within 1 m radius.
 - 10.5 ISS ↓ **MCC-H**, "Vestibule pressurization and gross leak check completed."
 - 10.6 Stow tools and materials.
Update IMS with stowage location of hardware.

NODE 1/NODE 2 VESTIBULE PRESSURIZATION AND LEAK CHECK

(ASSY OPS/10A/FIN)

Page 1 of 8 pages

OBJECTIVE:

Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Multimeter, and ISA Scopemeter Pressure Probe to pressurize and verify integrity of pressure in Node 1/Node 2 vestibule.

LOCATION:

Node 1 Port

DURATION:

1 hour, 15 minutes Total Crew Time

25 minutes for Multimeter, ISA, VAJ Setup

20 minutes for Multimeter, ISA, VAJ Teardown

30 minutes for Equalization and Leak Check Wait Times

CREW:

One

MATERIALS:

9V Alkaline Battery (if Battery changeout required)

Earplugs

TOOLS:

Internal Sampling Adapter (ISA) P/N 97M55830-1

Vacuum Access Jumper-78-1 5ft P/N 683-17111-1

ISA Scopemeter Pressure Probe P/N 1525,760MMHGA/30PSIA

Digital Multimeter Kit: P/N 10118-10018-04

Multimeter

ISS IVA Toolbox:

Drawer 3

#0 Phillips Screwdriver (if Battery changeout required)

1. SETTING UP ISA

NOTE

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

- 1.1 Gamah Cap ←|→ ISA VAJ Port
√Gamah Cap →|← remaining ISA VAJ Port
Hand tighten.
- 1.2 √ISA Scopemeter Pressure Probe →|← ISA

2. SETTING UP MULTIMETER

NOTE

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

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

2.2 √ISA Scopemeter Pressure Probe – OFF

2.3 Rotary Switch ↻ **mV**

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

If voltage reading < 100 mVDC, ISA Scopemeter Pressure Probe Battery must be replaced.

| 9V Battery replaced by removing non-captive screw on back of probe (#0 Phillips Screwdriver).

2.5 ISA Scopemeter Pressure Probe → mmHgA

3. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

NOTE

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

Multimeter

3.1 Rotary Switch ↻ **V**

3.2 Record ISA Scopemeter Pressure Probe **P₁**:
 _____ mmHg

PCS

3.3 US Lab: ECLSS
 Lab: ECLSS

Record Cab Press **P₂**: _____ mmHg

```

*****
*
*   If  $\Delta P |P_2 - P_1| > 20$  mmHg
*
*       ISS  $\downarrow$  MCC-H, "ISA Scopemeter Pressure
*       Probe inaccurate."
*
*        $\checkmark$ MCC-H for further instructions
*
*****
    
```

4. CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE (MPEV)

Node 1 Port Hatch

4.1 \checkmark Node 1 Port MPEV – CLOSED

4.2 Gamah Cap \leftrightarrow ISA Sampling Port
 ISA Sampling Port Valve \rightarrow CLOSED
 Refer to Figure 1.

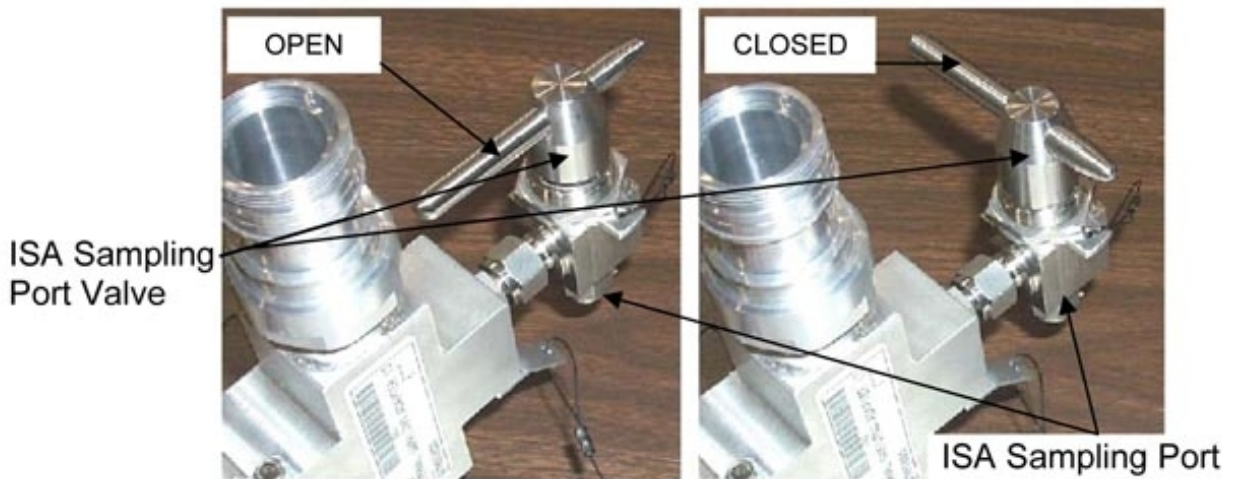


Figure 1. ISA Sampling Port Valve.

4.3 Gamah Cap \leftrightarrow VAJ-78-1 5 ft (both ends)

Inspect seals for any visible damage.
 Notify MCC-H if any damage noted to seals.

4.4 VAJ-78-1 5 ft (straight end) \rightarrow ISA VAJ Port
 Hand tighten.
 Refer to Figure 2.

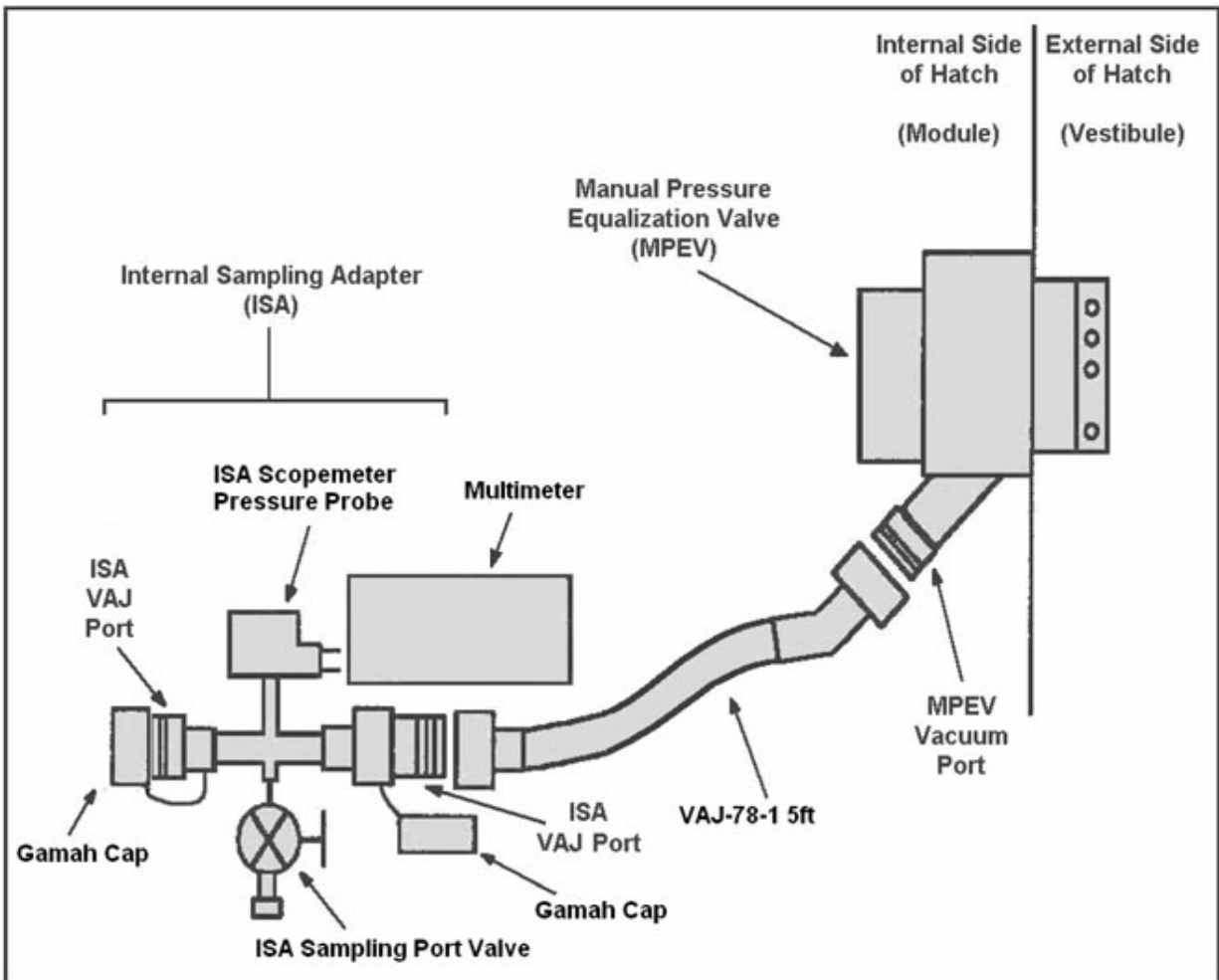


Figure 2. ISA/VAJ/MPEV Connection.

- 4.5 Gamah Cap \leftrightarrow Node 1 Port MPEV
VAJ-78-1 5 ft (bent end) \rightarrow Node 1 Port MPEV
Hand tighten.
Refer to Figure 2.

WARNING

VAJ will move when pressurized or evacuated. Failure to secure ISA/VAJ Assembly may result in injury to crew or damage to equipment.


- 4.6 Secure ISA/VAJ Assembly.

5. LEAK CHECKING ISA/VAJ CONNECTION

WARNING
Opening the MPEV will start the depressurization of the ISA/VAJ setup and may cause a loud hissing noise.

- 5.1 Don Earplugs.
- 5.2 Node 1 Port MPEV → OPEN
- 5.3 Wait 1 minute to depressurize ISA/VAJ setup.
- 5.4 Node 1 Port MPEV → CLOSED
- 5.5 Wait 3 minutes for thermal stabilization.

Multimeter

- 5.6 Rotary Switch 
- 5.7 Record ISA Scopemeter Pressure Probe **P₃**:
_____ mmHg
Record GMT: _____ GMT
- 5.8 Wait 5 minutes for ISA/VAJ leak check.
- 5.9 Record ISA Scopemeter Pressure Probe **P₄**:
_____ mmHg
Record GMT: _____ GMT

```

*****
*
*   If  $\Delta P | P_4 - P_3 | > 5$  mmHg during monitoring
*   period
*
*       ISS  $\downarrow$  MCC-H, "Suspected ISA/VAJ leak."
*
*        $\sqrt$ MCC-H for further instructions
*
*****
    
```

6. PRESSURIZING VESTIBULE

NOTE

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

- 6.1 Node 1 Port MPEV → OPEN
- 6.2 ISA Sampling Port Valve → OPEN
Refer to Figure 1.
- 6.3 Wait 2 minutes to begin incremental pressurization of vestibule.
- 6.4 ISA Sampling Port Valve → CLOSED

Note ISA Scopemeter Pressure Probe reading.
- 6.5 Repeat steps 6.2 to 6.4 until ISA Scopemeter Pressure Probe P ~260 mmHgA (~4 minutes).
- 6.6 Doff Earplugs.
- 6.7 Node 1 Port MPEV → CLOSED

7. PERFORMING LEAK CHECK OF VESTIBULE

- 7.1 Wait 10 minutes for thermal stabilization.
- 7.2 Node 1 Port MPEV → OPEN

Multimeter

7.3 
Rotary Switch ↻

7.4 Record ISA Scopemeter Pressure Probe P_5 :
_____ mmHgA
Record GMT: _____ GMT

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

7.5 Node 1 Port MPEV → CLOSED

7.6 Wait 10 minutes for vestibule leak check.

7.7 Node 1 Port MPEV → OPEN

7.8 Record ISA Scopemeter Pressure Probe P_6 :
 _____ mmHgA
 Record GMT: _____ GMT

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

7.9 Node 1 Port MPEV → CLOSED

```

*****
*      If  $\Delta P | P_6 - P_5 | > 5$  mmHg during monitoring
*      period
*      |
*      |      ISS ↓ MCC-H, "Suspected Vestibule leak."
*      |
*      |      ✓MCC-H for further instructions
*
*****
    
```

7.10 ISA Scopemeter Pressure Probe → OFF

7.11 Rotary Switch ↻ OFF

8. EQUALIZING VESTIBULE PRESSURE POST LEAK CHECK

WARNING

Opening the Node 1 Port MPEV will equalize ISS with the vestibule and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

8.1 Don Earplugs.

8.2 ISA Sampling Port Valve → OPEN

8.3 Wait 10 seconds for ISA/VAJ equalization.

8.4 VAJ-78-1 (5 ft) (bent end) ←|→ Node 1 Port MPEV
 Gamah Cap →|← VAJ-78-1 (5 ft) (bent end)
 Hand tighten.

PCS 8.5 US Lab: ECLSS
Lab: ECLSS
Record Cabin Press: _____ mmHg

Node 1 Port Hatch 8.6 Node 1 Port MPEV → OPEN

PCS 8.7 US Lab: ECLSS
Lab: ECLSS
When dp/dt ~0 (approximately 30 seconds)
| Node 1 Port MPEV → CLOSED

If LAB Cab Press decreases by more than 4 mmHg from Cabin Press recorded in step 8.5

| Node 1 Port MPEV → CLOSED

| √MCC-H for instructions >>

8.8 Doff Earplugs.

9. DISASSEMBLING AND STOWING EQUIPMENT

9.1 Multimeter ←|→ ISA Scopemeter Pressure Probe

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

Gamah Cap →|← ISA VAJ Port
Hand tighten.

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

9.3 Check for FOD within 1 m radius.

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

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

9.6 Open Node 1 Port Hatch per decal.

NODE 2 EGRESS AND ISOLATION

(ASSY OPS/10A/FIN)

Page 1 of 2 pages

OBJECTIVE:

To egress and isolate Node 2.

TOOLS AND EQUIPMENT REQUIRED:

Flashlight

Braycote Lubricant (from IMV Cap O-Ring Replacement Kit)

Rubber Gloves

Dry Wipes

General Purpose Tape, 2"

Desiccant Bag Assembly (three)

Portable Fan Assembly (three)

CAUTION

Verification that caps are removed from each PPRV is required in order to provide fault tolerance to an overpressure relief condition

- | | |
|----------------------------------|---|
| Node 2
Port,
Stbd
Hatch | 1. Remove PPRV Caps (two).
Temporarily stow. |
| Node 2
Aft
Hatch | 2. Inspect hatch seals and seal surfaces for condensation, contamination, or damage (nicks, cuts, etc.).
If seals are wet, blot (do not wipe) dry using Dry Wipes.
Report any condensation or seal damage to MCC-H . |

CAUTION

Desiccants should be left in Plastic Bags until crew is ready to close Node 2 Aft Hatch so as not to waste desiccant absorption capacity.

NOTE

The exact locations of the portable fans in Node 2 are not critical.

3. Using Handrail Clamps and Flexible Brackets, mount the three Portable Fan Assemblies on Flexible Brackets in Node 2 (three).
4. √Fan Pwr – Off

If required, replace Batteries.
5. Remove Desiccant Bag Assembly from Plastic Bag and secure Plastic Bag to Handrail with Tape.
6. Desiccant Bag Assembly →|← Fan
7. Fan Power → High

NODE 2 EGRESS AND ISOLATION

(ASSY OPS/10A/FIN)

Page 2 of 2 pages

NOTE

Low power position setting has been disabled.

8. ✓ Fan RPM control position – Full CW ↻

9. ✓ Fan is running

Once desiccants are deployed, promptly egress Node 2.

10. Close Node 2 Aft Hatch per decal.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

Page 1 of 11 pages

OBJECTIVE:

Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Multimeter, ISA Scopemeter Pressure Probe to depress the Node 1/Node 2 vestibule in preparation for Node 2 unberthing.

LOCATION:

Node 1 Port Hatch

DURATION:

2 hours Total Crew Time

20 minutes for Multimeter, ISA, VAJ Setup

10 minutes for Multimeter, ISA, VAJ Teardown

1 hour 30 minutes for Equalization and Leak Check Wait Times

MATERIALS:

9V Alkaline Battery (if Battery changeout required)

Earplugs

Gray Tape

TOOLS:

Internal Sampling Adapter (ISA) P/N 97M55830-1

Vacuum Access Jumper 5 ft P/N 683-17111-1

Vacuum Access Jumper 35 ft P/N 683-17111-2

ISA Scopemeter Pressure Probe P/N 1525,760MMHGA/30PSIA

Digital Multimeter Kit: P/N 10118-10018-04

Multimeter

ISS IVA Toolbox:

Drawer 3

#0 Phillips Screwdriver (if Battery changeout required)

1. SETTING UP ISA

NOTE

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

1.1 Gamah Cap ←|→ ISA VAJ Port

1.2 √ISA Scopemeter Pressure Probe →|← ISA

2. SETTING UP MULTIMETER

NOTE

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

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

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

Page 2 of 11 pages

2.2 √ISA Scopemeter Pressure Probe – OFF

2.3 Rotary Switch ↻ $\overline{\overline{mV}}$

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

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

2.5 ISA Scopemeter Pressure Probe → mm HgA

3. VERIFYING ISA SCOPEMETER PRESSURE PROBE ACCURACY

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

Multimeter 3.1 Rotary Switch ↻ $\overline{\overline{V}}$

3.2 Record ISA Scopemeter Pressure Probe P₁ : _____ mmHgA

PCS 3.3 US Lab: ECLSS
Lab: ECLSS

Record Cab Press P₂ : _____ mmHgA

* If $\Delta P |P_2 - P_1| > 20$ mmHg
* | ISS ↓ **MCC-H** ISA Scopemeter Pressure Probe inaccurate.
* |
* | √**MCC-H** for further instructions

4. CONNECTING VAJ, ISA, MANUAL PRESSURE EQUALIZATION VALVE (MPEV)

Node 1 Port Hatch 4.1 √Node 1 Port MPEV – CLOSED

4.2 Gamah Cap ←|→ VAJ-78-1 (5 ft) (both ends)
Inspect seals for any visible damage.

Notify **MCC-H** if any damage noted to seals.

4.3 VAJ-78-1 (5 ft) (straight end) →|← ISA VAJ Port
Hand tighten.
Refer to Figure 2.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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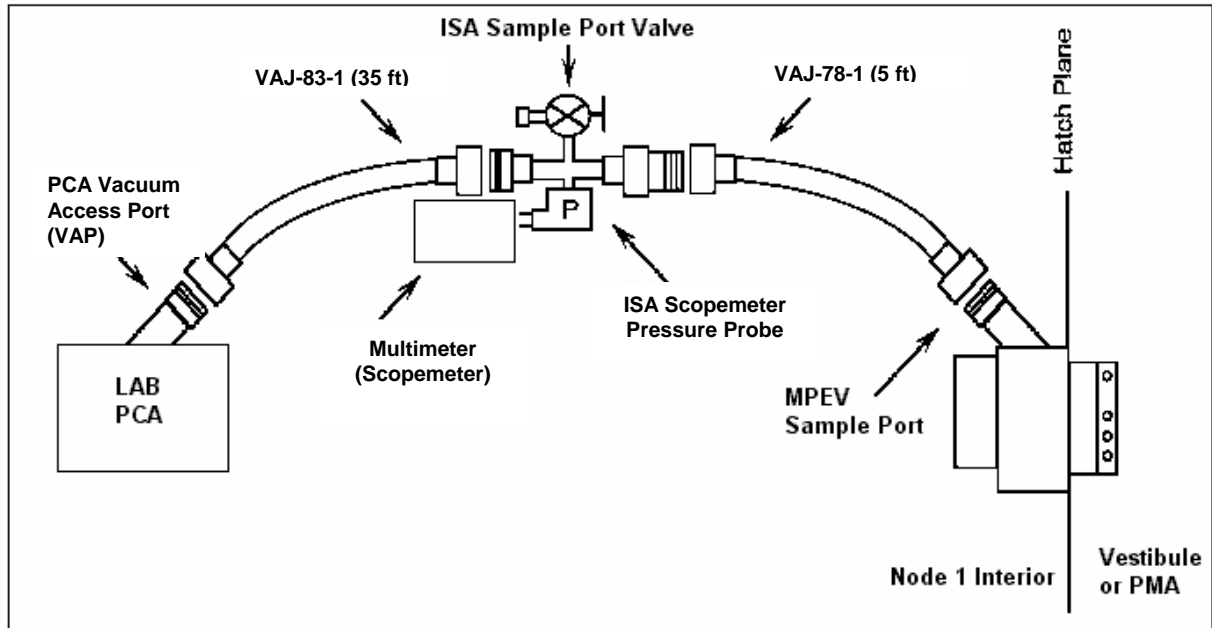


Figure 1.- ISA VAJ MPEV Connection.

- 4.4 Cap ←|→ Node 1 Port MPEV (Verify disconnection)
VAJ-78-1 (5 ft) (bent end) →|← Node 1 Port MPEV
Hand tighten.
Refer to Figure 1.

4.5 Verifying Vent Relief Isolation Valve (VRIV) and Vent Relief Control Valve (VRCV) Closed

MCC-H

Lab: ECLSS: PCA

'Pressure Control Assembly'

sel VRCV (Icon)

√Position – Closed

Lab: ECLSS: PCA

'Pressure Control Assembly'

sel VRIV (Icon)

√Position – Closed

- 4.6 Remove Closeout Panel LAB1D0-02, 1/4 Turn Fasteners (nine).

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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- 4.7 Gamah Cap ←|→ PCA Vacuum Access Port (VAP)
Temporarily stow Gamah Cap on closeout panel (Gray Tape).
- 4.8 Gamah Cap ←|→ VAJ-83-1 (35 ft) (both ends)
Inspect seals for any visible damage.
- Notify **MCC-H** if any damage noted to seals.
- 4.9 VAJ-83-1 (35 ft) (bent end) →|← PCA VAP
Hand tighten.
Refer to Figure 1.
- 4.10 Gamah Cap ←|→ ISA VAJ Port (capped)
VAJ-83-1 (35 ft) (straight end) →|← ISA VAJ Port
Hand tighten.
Refer to Figure 1.

WARNING

VAJ will move when pressurized or evacuated. Failure to secure ISA VAJ Assembly may result in injury to crew or damage to equipment.

- 4.11 Secure ISA VAJ Assembly.

5. INHIBITING POSITIVE PRESSURE RELIEF

NOTE

'Positive P Relief Failure - LAB' Caution will be received after PPR is inhibited. No action required. Message will return to normal once PPR is reenabled.

PCS

US Lab: ECLSS: PCA: PCA Commands

LAB PCA Commands

'Positive Press Relief'

'Inhibit'

cmd Arm (√Status – Armed)

cmd Inhibit

√Positive Pressure Relief Status – Inhibited

6. LEAK CHECKING ISA VAJ CONNECTION

- 6.1 ISA Sampling Port Valve → CLOSED
Refer to Figure 2.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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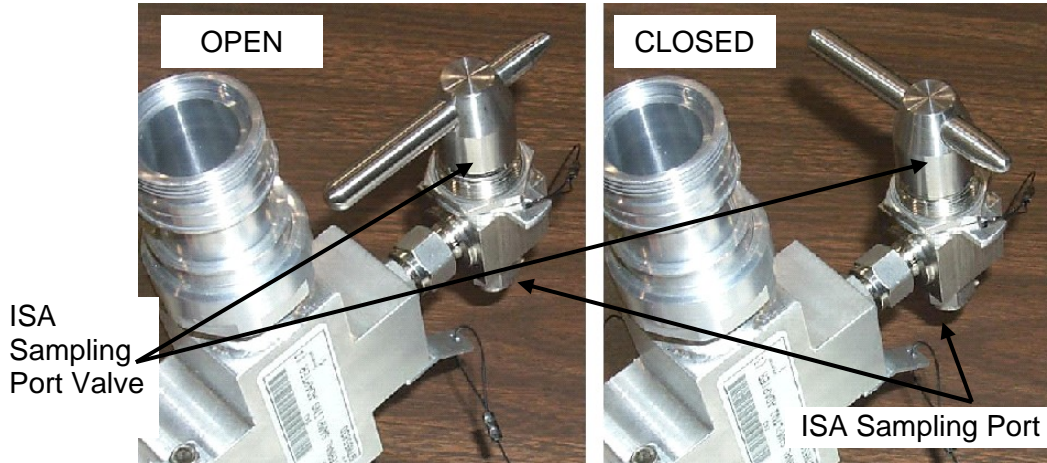


Figure 2.- ISA Sampling Port Valve.

WARNING

Opening the VRIV will vent the ISA and VAJs to space and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

6.2 Don Earplugs.

6.3 Opening PCA VRIV

US Lab: ECLSS: PCA

Lab ACS

'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open

√Position – Open

√Open Indicator – √

6.4 Wait 10 minutes to depressurize ISA VAJ setup.

6.5 Doff Earplugs.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

Page 6 of 11 pages

6.6 Closing PCA VRIV
US Lab: ECLSS: PCA
Lab ACS
'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV
'Close'

cmd Close

√Position – Closed

√Closed Indicator – √

6.7 Wait 3 minutes for thermal stabilization.

Multimeter

6.8 Rotary Switch \curvearrowright mV

6.9 Record ISA Scopemeter Pressure Probe P₃: _____ mmHg
Record GMT ____/____:____:____ GMT

6.10 Wait 5 minutes for leak check.

6.11 Record ISA Scopemeter Pressure Probe P₄: _____ mmHg
Record GMT ____/____:____:____ GMT

* If ΔP | P₄ - P₃ | > 10 mmHg during monitoring period
* | ISS ↓ **MCC-H** of suspected ISA VAJ leak.
* |
* | √**MCC-H** for further instructions

7. DEPRESSURIZING VESTIBULE

WARNING

Opening the Node 1 Port MPEV will vent the vestibule to space and may cause a loud hissing noise. Crew in the vicinity should don Earplugs.

7.1 Don Earplugs.

PCS

7.2 Opening PCA VRIV
US Lab: ECLSS: PCA
Lab ACS
'Pressure Control Assembly'

sel VRIV

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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LAB PCA VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open

√Position – Open

√Open Indicator – √

Node 1
Port
Hatch

7.3 Node 1 Port MPEV → OPEN

7.4 Wait 30 minutes for depressurization or until ISA Press
< 1.8 mmHgA.

Multimeter

7.5 Record ISA Scopemeter Pressure Probe P₅: _____ mmHg
Record GMT ____/____:____:____ GMT

ISS ↓ **MCC-H** pressure reading.

7.6 Node 1 Port MPEV → CLOSED

7.7 Doff Earplugs.

7.8 Wait an additional 10 minutes for thermal stabilization.

7.9 Closing PCA VRIV
US Lab: ECLSS: PCA

Lab ACS

'Pressure Control Assembly'

sel VRIV

LAB PCA VRIV

'Close'

cmd Close

√Position – Closed

√Closed Indicator – √

8. LEAK CHECKING VESTIBULE

8.1 Node 1 Port MPEV → OPEN

8.2 Record ISA Scopemeter Pressure Probe P₆: _____ mmHg
Record GMT ____/____:____:____ GMT

8.3 Node 1 Port MPEV → CLOSED

8.4 Wait 30 minutes for leak check.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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- PCS 8.5 Opening PCA VRIV
US Lab: ECLSS: PCA
Lab ACS
'Pressure Control Assembly'
- sel VRIV
- LAB PCA VRIV
'Open'
- cmd** Arm ($\sqrt{\text{Status}} - \text{Armed}$)
cmd Open
- $\sqrt{\text{Position}} - \text{Open}$
 $\sqrt{\text{Open Indicator}} - \sqrt{}$
- 8.6 Wait 30 seconds for VAJ to vent.
- 8.7 Closing PCA VRIV
US Lab: ECLSS: PCA
Lab ACS
'Pressure Control Assembly'
- sel VRIV
- LAB PCA VRIV
'Close'
- cmd** Close
- $\sqrt{\text{Position}} - \text{Closed}$
 $\sqrt{\text{Closed Indicator}} - \sqrt{}$
- 8.8 Node 1 Port MPEV → OPEN
- Multimeter 8.9 Record ISA Scopemeter Pressure Probe P₇: _____ mmHg
Record GMT ____/____:____:____ GMT
- *****
* If $\Delta P |P_7 - P_6| > 2$ mmHg during monitoring period
* | ISS ↓ **MCC-H** of suspected vestibule leak.
* |
* | $\sqrt{\text{MCC-H}}$ for further instructions

- 8.10 Node 1 Port MPEV → CLOSED
- 8.11 At earliest convenience
ISS ↓ **MCC-H** of pressures and GMT in steps 3, 6, and 8.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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9. VENTING VESTIBULE RESIDUAL

If P₇ reading > 1.8 mmHgA

PCS

9.1 Opening PCA VRIV
 US Lab: ECLSS: PCA
 Lab ACS
 'Pressure Control Assembly'

 sel VRIV

 LAB PCA VRIV
 'Open'

cmd Arm (√Status – Armed)
cmd Open

 √Position – Open
 √Open Indicator – √

Node 1
Port
Hatch

9.2 Node 1 Port MPEV → OPEN

 9.3 Wait 5 minutes for vestibule to depressurize.

 9.4 Closing PCA VRIV
 US Lab: ECLSS: PCA
 Lab ACS
 'Pressure Control Assembly'

 sel VRIV

 LAB PCA VRIV
 'Close'

cmd Close

 √Position – Closed
 √Closed Indicator – √

Multimeter

9.5 Record ISA Scopemeter Pressure Probe P₈: _____ mmHg
 Record GMT ____/____:____:____ GMT

 ISS ↓ **MCC-H** of pressure reading.

 * If P₈ > 4.9 mmHg
 * |
 * | √**MCC-H** for further instructions

9.6 Node 1 Port MPEV → CLOSED

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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- PCS 10. ENABLING POSITIVE PRESSURE RELIEF
US Lab: ECLSS: PCA: PCA Commands
LAB PCA Commands
'Positive Press Relief'
- cmd** Enable (√Positive Pressure Relief Status – Enabled)
- Node 1 11. DISASSEMBLING AND STOWING EQUIPMENT
Port 11.1 √Node 1 Port MPEV → CLOSED
Hatch
- 11.2 ISA Scopemeter Pressure Probe → OFF
- Multimeter 11.3 Rotary Switch ↻ OFF
- Multimeter ←|→ ISA Scopemeter Pressure Probe
- 11.4 Cap ←|→ ISA Sampling Port
- ISA Sample Port → OPEN (for pressurization, stowage)
- Cap →|← ISA Sampling Port
 Refer to Figure 2.
- 11.5 VAJ-78-1 (5 ft) (straight end) ←|→ ISA VAJ Port
 VAJ-78-1 (5 ft) (bent end) ←|→ Node 1 Port MPEV
- Gamah Cap →|← VAJ-78-1 (5 ft) (both ends)
 Hand tighten.
 Gamah Cap →|← ISA VAJ Port
 Hand tighten.
- 11.6 Inspect seal on Node 1 Port MPEV Cap for any visible damage.
 Notify **MCC-H** if any damage noted to seals.
 Cap →|← Node 1 Port MPEV
 Hand tighten.
- 11.7 VAJ-83-1 (35 ft) ←|→ PCA VAP
 VAJ-83-1 (35 ft) ←|→ ISA VAJ Port
- Gamah Cap →|← VAJ-83-1 (35 ft) (both ends)
 Hand tighten.
 Gamah Cap →|← ISA VAJ Port
 Hand tighten.
- 11.8 Inspect seal on PCA VAP Gamah Cap for any visible damage.
 Notify **MCC-H** if any damage noted to seals.
 Gamah Cap →|← PCA VAP
 Hand tighten.

NODE 1/NODE 2 VESTIBULE DEPRESS

(ASSY OPS/10A/FIN)

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- 11.9 Check for FOD within 1 m radius.
- 11.10 Install Closeout Panel LAB1D0-02, 1/4 Turn Fasteners (nine).
- 11.11 ISS ↓ **MCC-H**, "Node 1/Node 2 vestibule depress completed."
- 11.12 Stow tools and materials.
Update IMS with stowage location of hardware.

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VESTIBULE OUTFITTING LAB1 TO NOD2 – PART 1

(ASSY OPS/10A/FIN)

Page 1 of 16 pages

Parameters 1. choice1

	MDM [XX]	SPD Card [YY]	Bus [ZZ]
	[XX]	[YY]	[ZZ]
1	Primary CCS MDM	5	CB_CT_4
2	Primary CCS MDM	5	CB_CT_BIA_23
3	Primary CCS MDM	2	CB_EXT_1
4	Primary CCS MDM	1	CB_EXT_2
5	Primary CCS MDM	3	CB_INT_1
6	Primary CCS MDM	5	CB_INT_2
7	Primary PMCU MDM	1	LB_EPS_CAM_14
8	Primary PMCU MDM	2	LB_EPS_CAM_23
9	Primary PMCU MDM	5	LB_EPS_N2_14
10	Primary PMCU MDM	0	LB_EPS_N2_23
11	Primary PL MDM	5	LB_CHECS_COL
12	Primary PL MDM	3	LB_CHECS_JEM
13	Primary PL MDM	0	LB_PL_3
14	Primary PL MDM	1	LB_PL_4
15	Primary PL MDM	2	LB_PL_COL
16	Primary PL MDM	2	LB_PL_JEM
17	Primary INT MDM	3	LB_SEPS_N2_14
18	Primary INT MDM	1	LB_SEPS_N2_23
19	Primary INT MDM	5	LB_SYS_N2_1
20	Primary INT MDM	0	LB_SYS_N2_2

OBJECTIVE:

This procedure will outfit the vestibule between the LAB1 and NOD2 modules with power, data, and instrumentation jumpers essential for NOD2 heater activation.

LOCATION:

LAB1-NOD2 Vestibule

DURATION:

4 hours

CREW

Two

PARTS:

Table 1. LAB1 to NOD2 Vestibule Outfitting Kit (VOK)

Vestibule Jumper Label	Jumper Function	P/N	Harness #
Data Jumper 4	C&DH – 1553A	1F46393-1	W7001
Data Jumper 3	C&DH – 1553B	1F46395-1	W7002
Secondary N2-1A4A Pwr	EPS (N2-1A4A)	1F46413-1	W7011
Secondary N2-2A3B Pwr	EPS (N2-2A3B)	1F46415-1	W7012
Data Jumper 2	C&DH Instr. (Apas, PMA Htr)	1F46397-1	W7003
Data Jumper 1	C&DH Instr.	1F46399-1	W7004

CBM Ground Straps (two) P/N 683-13477-7

MATERIALS:

12" x 12" Ziplock Bags P/N 528-50000-5

Towel

TOOLS:

Mini Maglite

ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive

3/16" Hex Head, 1/4" Drive

3/8" Socket, 1/4" Drive

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

1/4" to 3/8" Adapter

Drawer 3:

#6 Long Torq Driver, 3/8" Drive

REFERENCED PROCEDURE(S):

1.602 LAB FWD HATCH THERMAL COVER
 REMOVAL/INSTALLATION

1.102 ACBM TO PCBM GROUND STRAP INSTALLATION

1. OPENING HATCH

1.1 Opening LAB1 Fwd Hatch Per Decal

CAUTION

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

1.2 Inspect vestibule for condensation.
If required, wipe any condensate from vestibule (Towel).
Report to **MCC-H**.

2. REMOVAL OF HATCH THERMAL COVER

2.1 Perform {1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION}, removal steps only (SODF: S&M: HATCH: VESTIBULE), then:

3. REMOVAL OF NOD2 THERMAL BLANKET

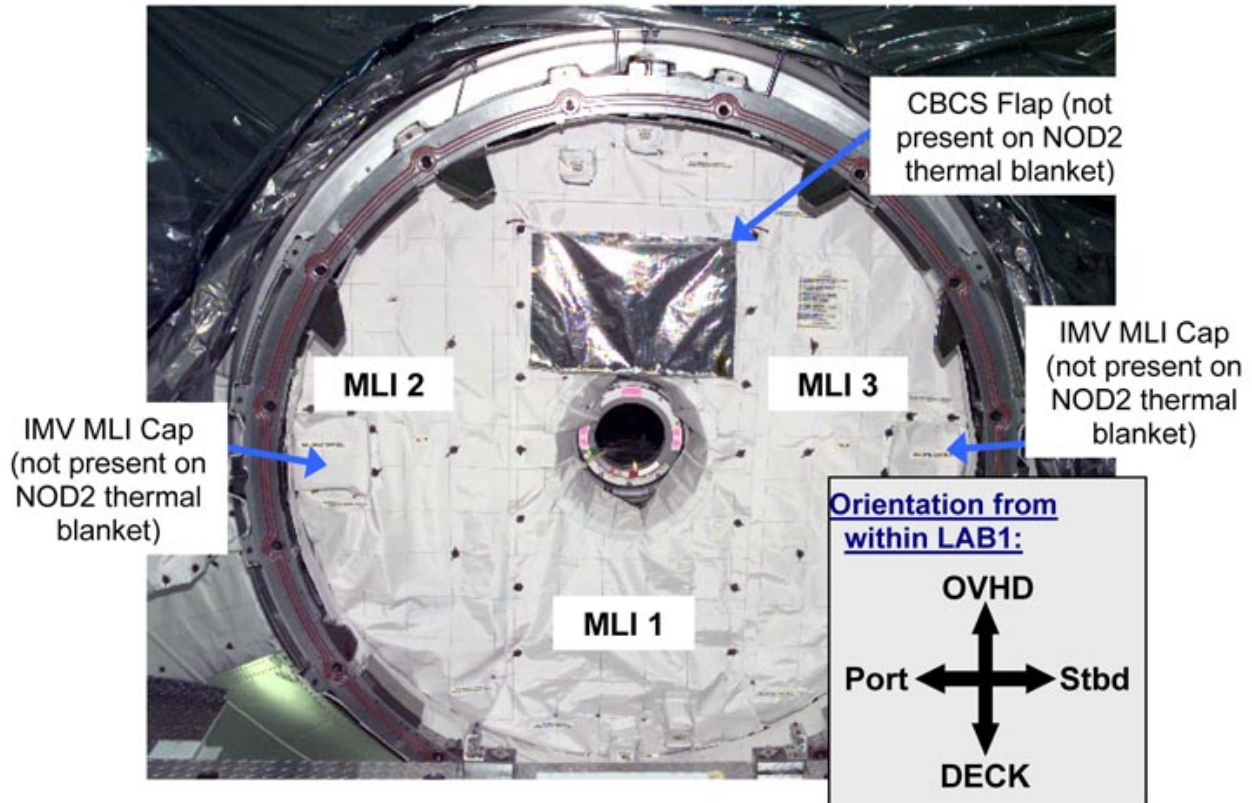


Figure 1. MPLM Thermal Blanket Installed on MPLM Bulkhead and Hatch. NOD2 Thermal blanket is similar, but does not have a CBCS flap or IMV MLI caps.

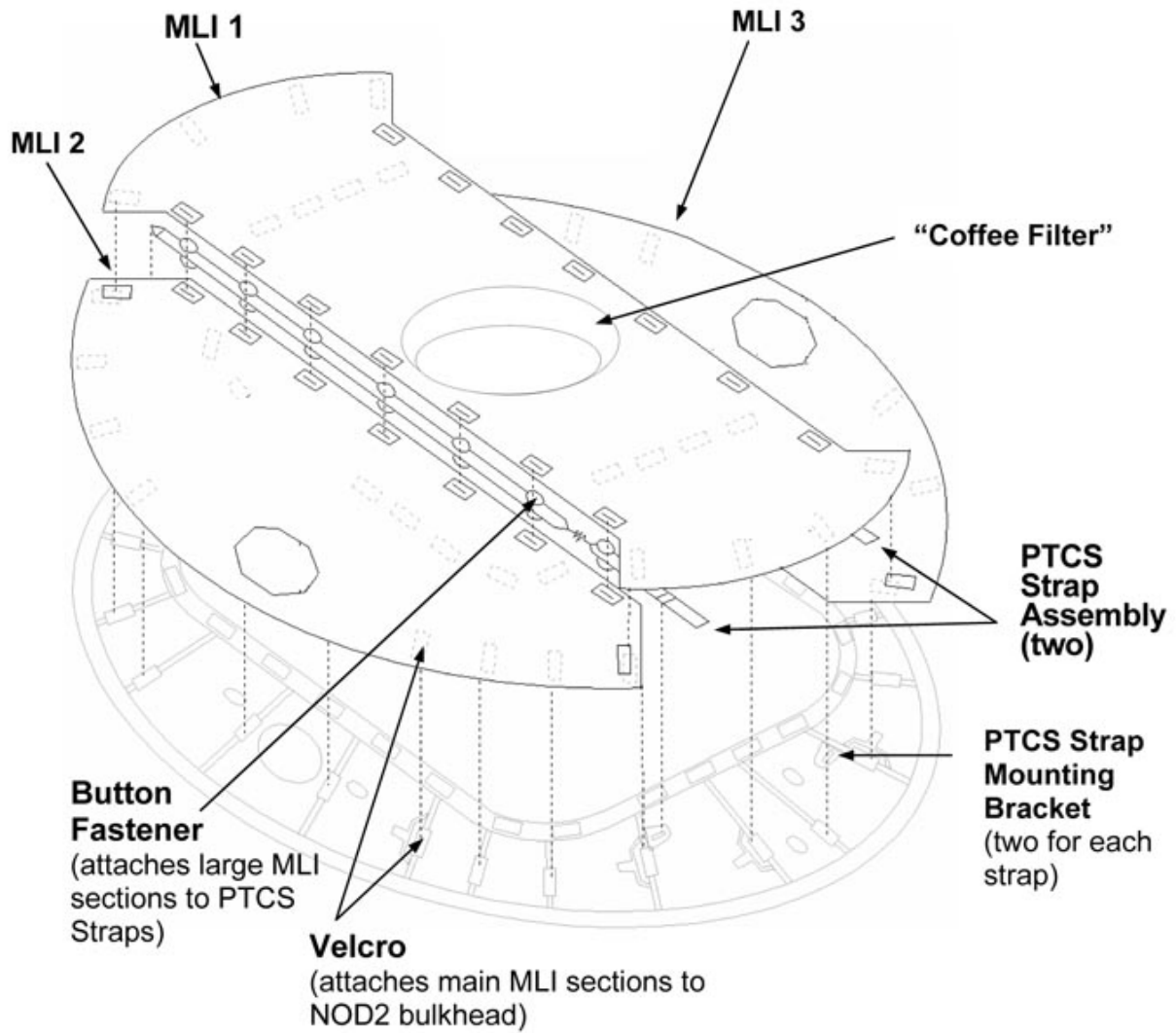


Figure 2. NOD2 Thermal MLI Blanket.

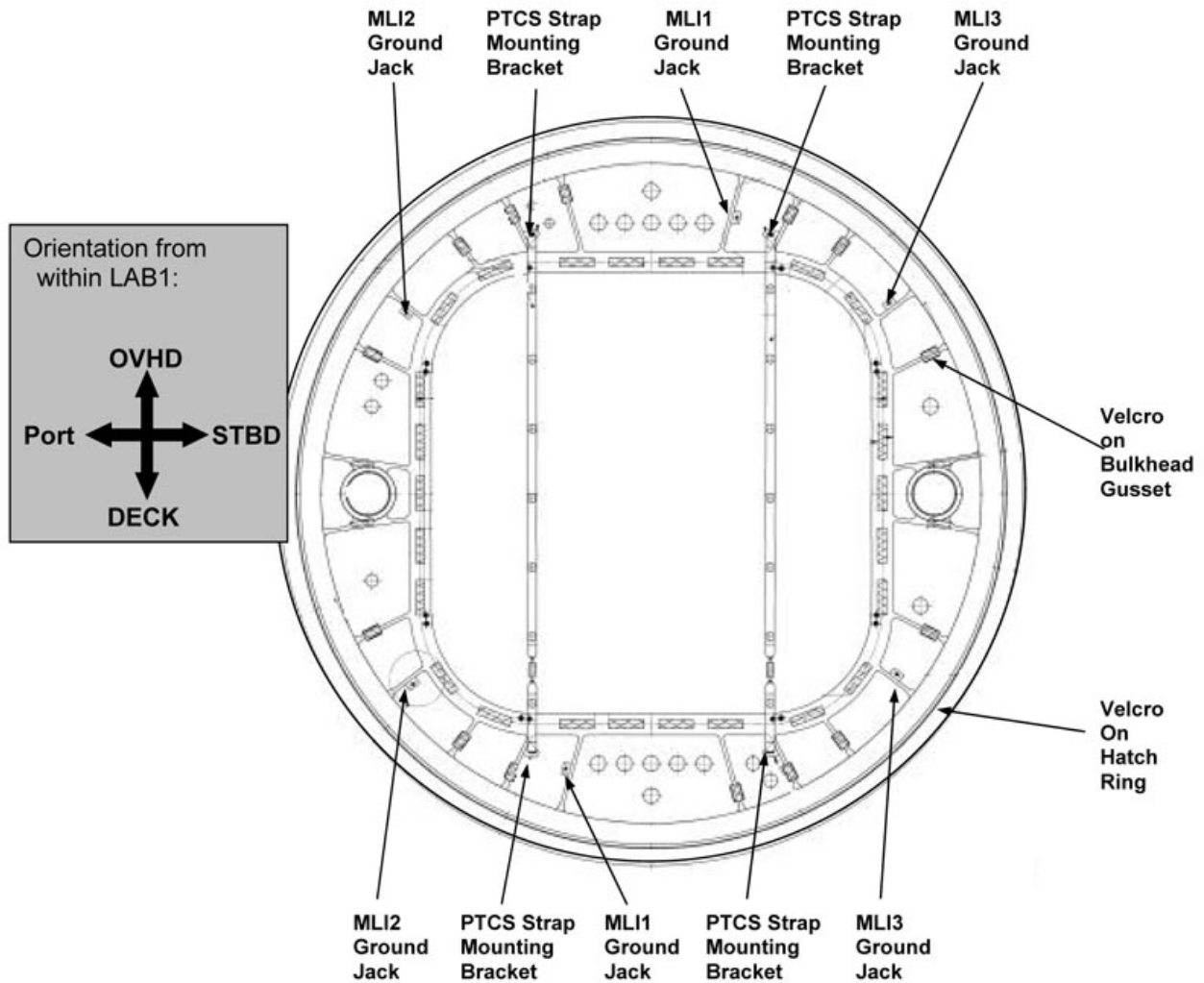


Figure 3. Bulkhead Interfaces for the NOD2 Thermal Blanket and PTCS Strap Assemblies.



Figure 4. MLI and PTCS Interfaces on NOD2 Bulkhead (MLI removed).

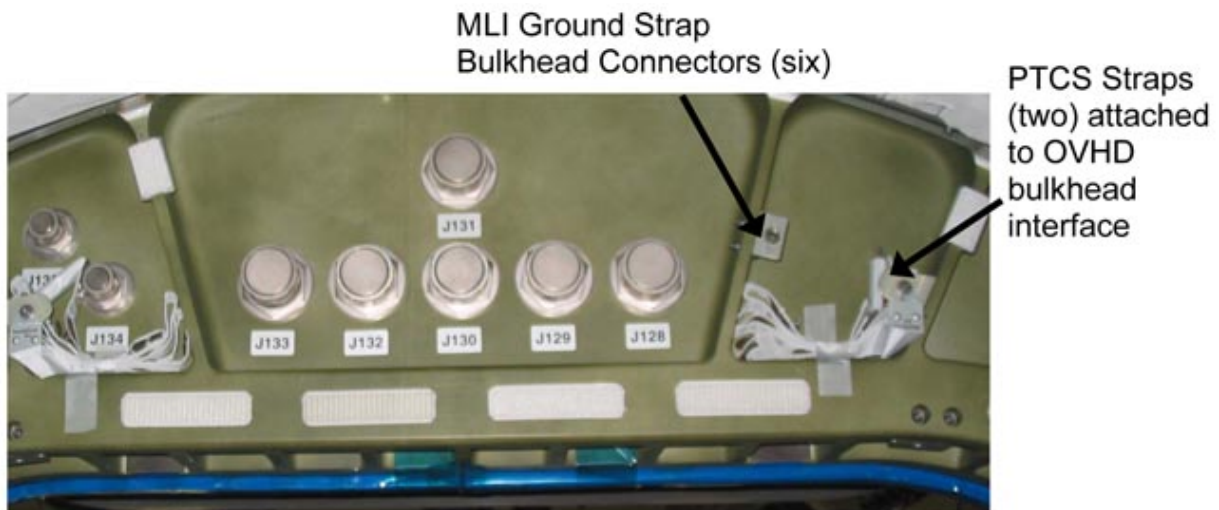


Figure 5. PTCS Strap (stowed).

CAUTION

NOD2 Thermal Blanket is rolled instead of folded to prevent damage to the multilayer insulation of the blanket.

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

- 3.2 1/4 Turn Grounding Connectors (two per MLI section) ←|→ Bulkhead bracket
 Refer to Figures 1 to 5.
- 3.3 Remove upper PTCS strap fasteners (two) (#6 Long Trq Driver, 3/8" Drive; 1/4" to 3/8" Adapter; Ratchet, 1/4" Drive).
 Temporarily stow fasteners by installing in mounting brackets (hand tighten).
 Refer to Figures 1 to 5.
- 3.4 Unhook lower end of PTCS strap from bulkhead bracket, two places, to release blanket.
 Refer to Figures 1 to 5.
- 3.5 Release remaining Velcro, remove MLI blanket from vestibule, roll up.
 Temporarily stow.

4. GROUND STRAP INSTALLATION

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

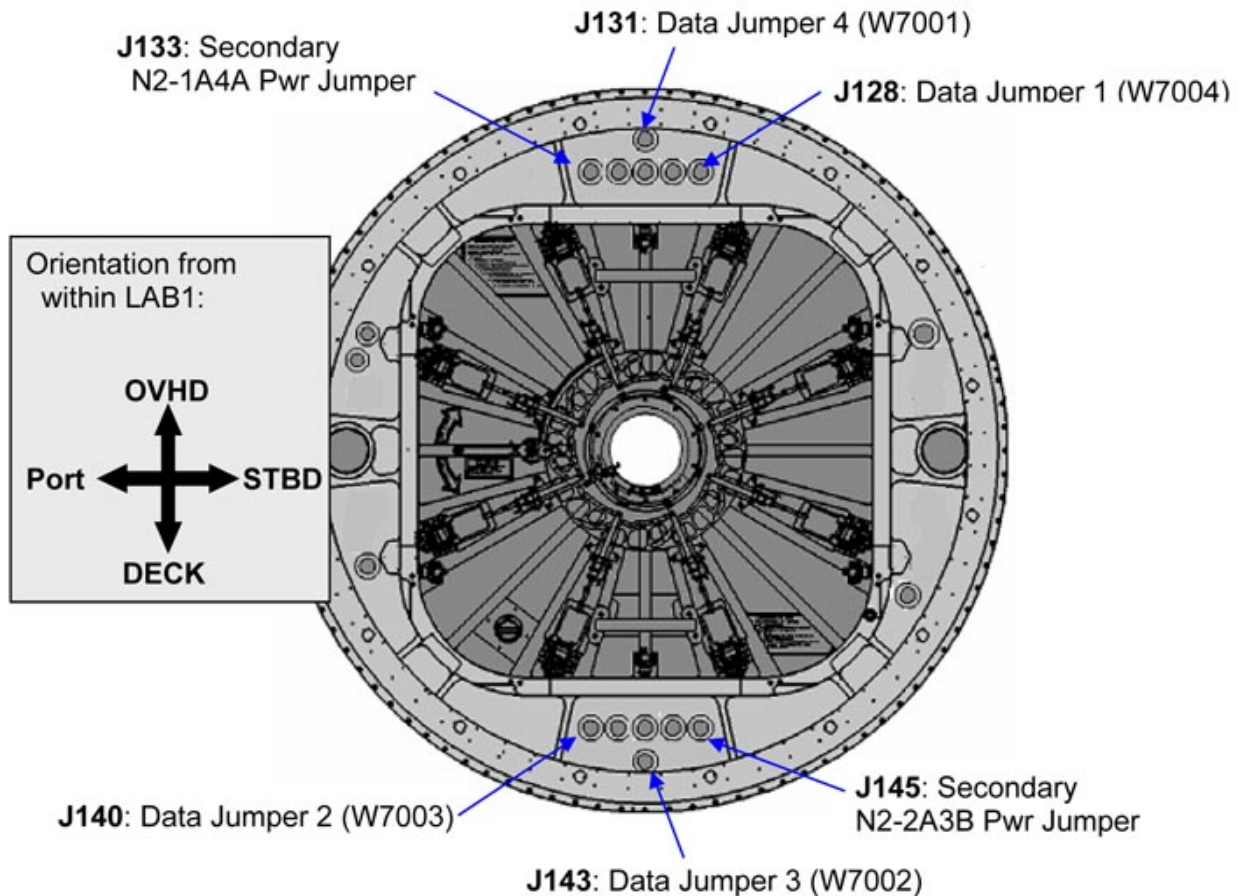


Figure 6. NOD2 Aft Bulkhead, External View Looking forward when NOD2 is mated to LAB1 Port. Bolded text appears on bulkhead label next to feed-through.

CAUTION

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

5. INSTALLATION OF POWER JUMPERS

5.1 Verifying ISS Power to NOD2 is Safed

√**MCC-H** for which parallel DDCUs to powerdown

PCS

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

DDCU LA1A (LA4A)

sel Converter

DDCU LA1A (LA4A) Converter

cmd Converter – Off

Verify Output Current: 0 ± 3.75 A

Verify Power Sharing, % DDCU LA1A (LA4A) < 10

US Lab: EPS: Lab Rack LAB1P3

Lab Rack LAB1P3

sel DDCU LA1A

DDCU LA1A

'RPCM LA1A4A'

sel D

RPCM LA1A4A_D

Verify Integ Counter – incrementing

sel RPC 02

RPCM LA1A4A_D RPC 02

Verify RPC Position – Op

Verify Close Cmd – Inh

US Lab: EPS: LAB106: DDCU LA2A (LA3B)

DDCU LA2A (LA3B)

sel Converter

DDCU LA2A (LA3B) Converter

cmd Converter – Off

Verify Output Current: 0 ± 3.75 A

Verify Power Sharing, % DDCU LA1A (LA4A) < 10

LAB: EPS: Lab Rack LAB1O6

Lab Rack LAB1O6

sel DDCU LA3B

DDCU LA3B

'RPCM LA2A3B'

sel D

RPCM LA2A3B_D

Verify Integ Counter – incrementing

sel RPC 02

RPCM LA2A3B_D RPC 02

Verify RPC Position – Op

Verify Close Cmd – Inh

Table 2. Secondary N2-1A4A Pwr Jumper Information

Jumper Label	Function	P/N	Harness #	LAB1	NOD2
Secondary N2-1A4A Pwr	EPS (N2-1A4A)	1F46413-1	W7011	J1	J133

- 5.2 Protective Caps \leftrightarrow LAB1 J1, NOD2 J133 feedthroughs
 Protective Plugs \leftrightarrow Secondary N2-1A4A Pwr W7011
 Temporarily stow Protective Caps in 12"x12" Ziplock Bag.
 Refer to Figure 6, Table 2.
- 5.3 Secondary N2-1A4A Pwr W7011 P1 \rightarrow LAB1 J1
 Secondary N2-1A4A Pwr W7011 P133 \rightarrow NOD2 J133

Table 3. Secondary N2-2A3B Pwr Jumper Information

Jumper Label	Function	P/N	Harness #	LAB1	NOD2
Secondary N2-2A3B Pwr	EPS (N2-2A3B)	1F46415-1	W7012	J14	J145

- 5.4 Protective Caps ↔ LAB1 J14, NOD2 J145 feedthroughs
 Protective Plugs ↔ Secondary N2-2A3B Pwr W7012
 Temporarily stow Protective Caps in 12"x12" Ziplock Bag.
 Refer to Figure 6, Table 3.
- 5.5 Secondary N2-2A3B Pwr W7012 P14 →|← LAB1 J14
 Secondary N2-2A3B Pwr W7012 P145 →|← NOD2 J145

6. INSTALLATION OF 1553 DATA JUMPERS

<u>NOTE</u>	
1. The following steps reconfigure the C&DH buses to install 1553 Jumpers by verifying all buses are on bus channel A and inhibiting Auto Channel Switching.	
2. Table 4 provides values for variables [XX], [YY], and [ZZ] for use in navigating to the four buses to be safed.	

- 6.1 Notify MCC-H go for MDM Bus Safing.

Table 4. 1553 Busses Being Safed for Data Jumper 3 (1553B Jumper) Installation

	MDM [XX]	SPD Card [YY]	Bus [ZZ]
1	Primary CCS MDM	SPD 5	CB_CT_4
2	Primary CCS MDM	SPD 5	CB_CT_BIA_23
3	Primary CCS MDM	SPD 2	CB_EXT_1
4	Primary CCS MDM	SPD 1	CB_EXT_2
5	Primary CCS MDM	SPD 3	CB_INT_1
6	Primary CCS MDM	SPD 5	CB_INT_2
7	Primary PMCU MDM	SPD 1	LB_EPS_CAM_14
8	Primary PMCU MDM	SPD 2	LB_EPS_CAM_23
9	Primary PMCU MDM	SPD 5	LB_EPS_N2_14

Continuation of Table ...

10	Primary PMCU MDM	SPD 0	LB_EPS_N2_23
11	Primary PL MDM	SPD 5	LB_CHECS_C OL
12	Primary PL MDM	SPD 3	LB_CHECS_J EM
13	Primary PL MDM	SPD 0	LB_PL_3
14	Primary PL MDM	SPD 1	LB_PL_4
15	Primary PL MDM	SPD 2	LB_PL_COL
16	Primary PL MDM	SPD 2	LB_PL_JEM
17	Primary INT MDM	SPD 3	LB_SEPS_N2_14
18	Primary INT MDM	SPD 1	LB_SEPS_N2_23
19	Primary INT MDM	SPD 5	LB_SYS_N2_1
20	Primary INT MDM	SPD 0	LB_SYS_N2_2

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

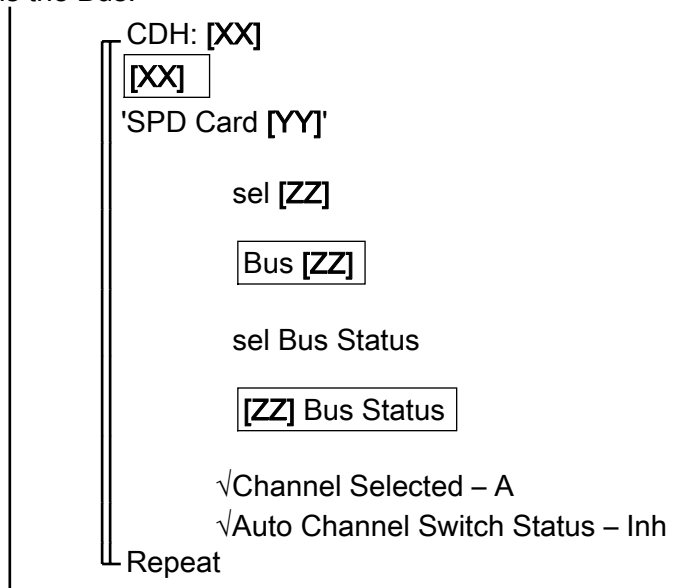


Table 5. Data Jumper 3 Information

Jumper Label	Function	P/N	Harness #	LAB1	NOD2
Data Jumper 3	C&DH - 1553B Data	1F46395 -1	W7002	J12	J143

- 6.3 Protective Caps ←|→ LAB1 J12, NOD2 J143 feedthroughs
 Protective Plugs ←|→ Data Jumper 3 (W7002)
 Temporarily stow Caps in 12"x12" Ziplock Bag.
 Refer to Figure 6, Table 5.
- 6.4 Data Jumper 3 (W7002) P12 →|← LAB1 J12
 Data Jumper 3 (W7002) P143 →|← NOD2 J143

NOTE

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

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

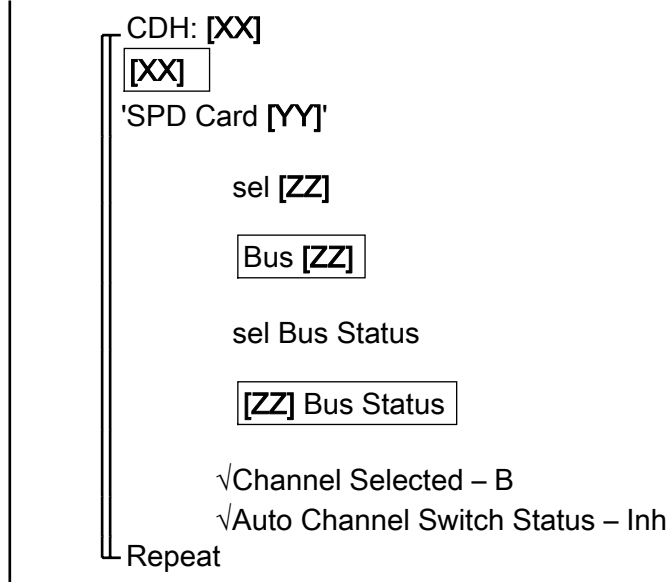


Table 6. Data Jumper 4 Information

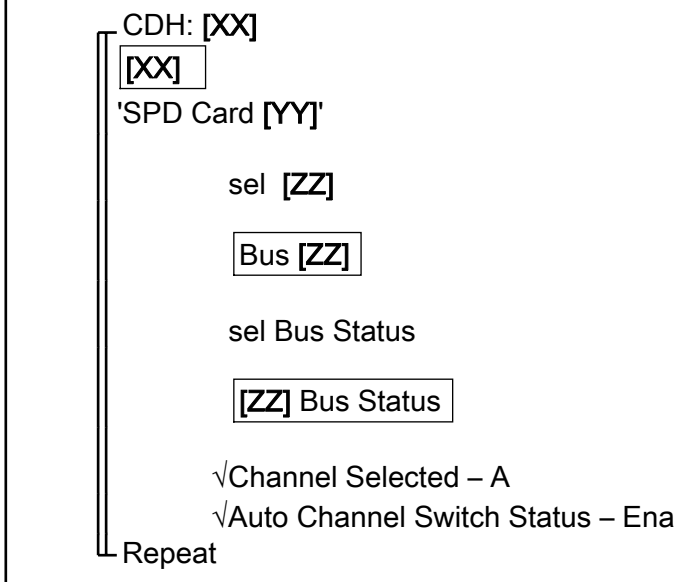
Jumper Label	Function	P/N	Harness #	LAB1	NOD2
Data Jumper 4	C&DH - 1553A Data	1F46393 -1	W7001	J3	J131

- 6.6 Protective Caps ←|→ LAB1 J3, NOD2 J131 feedthroughs
 Protective Plugs ←|→ Data Jumper 4 (W7001)
 Temporarily stow Protective Caps in 12"x12" Ziplock Bag.
 Refer to Figure 6, Table 6.
- 6.7 Data Jumper 4 (W7001) →|← LAB1 J3
 Data Jumper 4 (W7001) P131 →|← NOD2 J131

NOTE

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

6.8 For all buses in Table 4, where [XX] is the MDM, [YY] is the SPD Card and [ZZ] is the Bus:



7. INSTALLATION OF INSTRUMENTATION JUMPERS

Table 7. Instrumentation Jumpers

Jumper Label	Function	P/N	Harness #	LAB1	NOD2
Data Jumper 2	C&DH Instr	1F46399-1	W7003	J22	J140
Data Jumper 1	C&DH Instr. (APAS, PMA Htr)	1F46397-1	W7004	J20	J128

- 7.1 Protective Caps ←|→ LAB1 J22, NOD2 J140 feedthroughs
 Protective Plugs ←|→ Data Jumper 2 (W7003)
 Stow in Vestibule Outfitting Kit (VOK) CTB.
 Refer to Figure 6, Table 7.
- 7.2 Data Jumper 2 (W7003) P22 →|← LAB1 J22
 Data Jumper 2 (W7003) P140 →|← NOD2 J140
- 7.3 Protective Caps ←|→ LAB1 J20, NOD2 J128 feedthroughs
 Protective Plugs ←|→ Data Jumper 1 (W7004)
 Temporarily stow Protective Caps in 12"x12" Ziplock Bag.
 Refer to Figure 6, Table 7.

- 7.4 Data Jumper 1 (W7004) P20 →|← LAB1 J20
Data Jumper 1 (W7004) P128 →|← NOD2 J128

8. **REMOVING HATCH LAUNCH RESTRAINT PIP PIN**

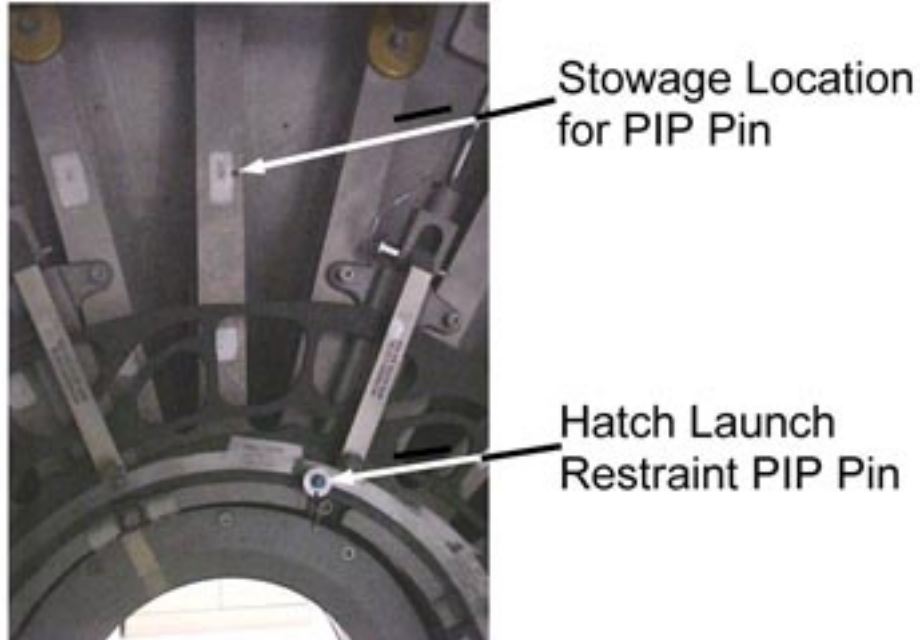


Figure 7. Removal of NOD2 Hatch Launch Restraint PIP Pin.

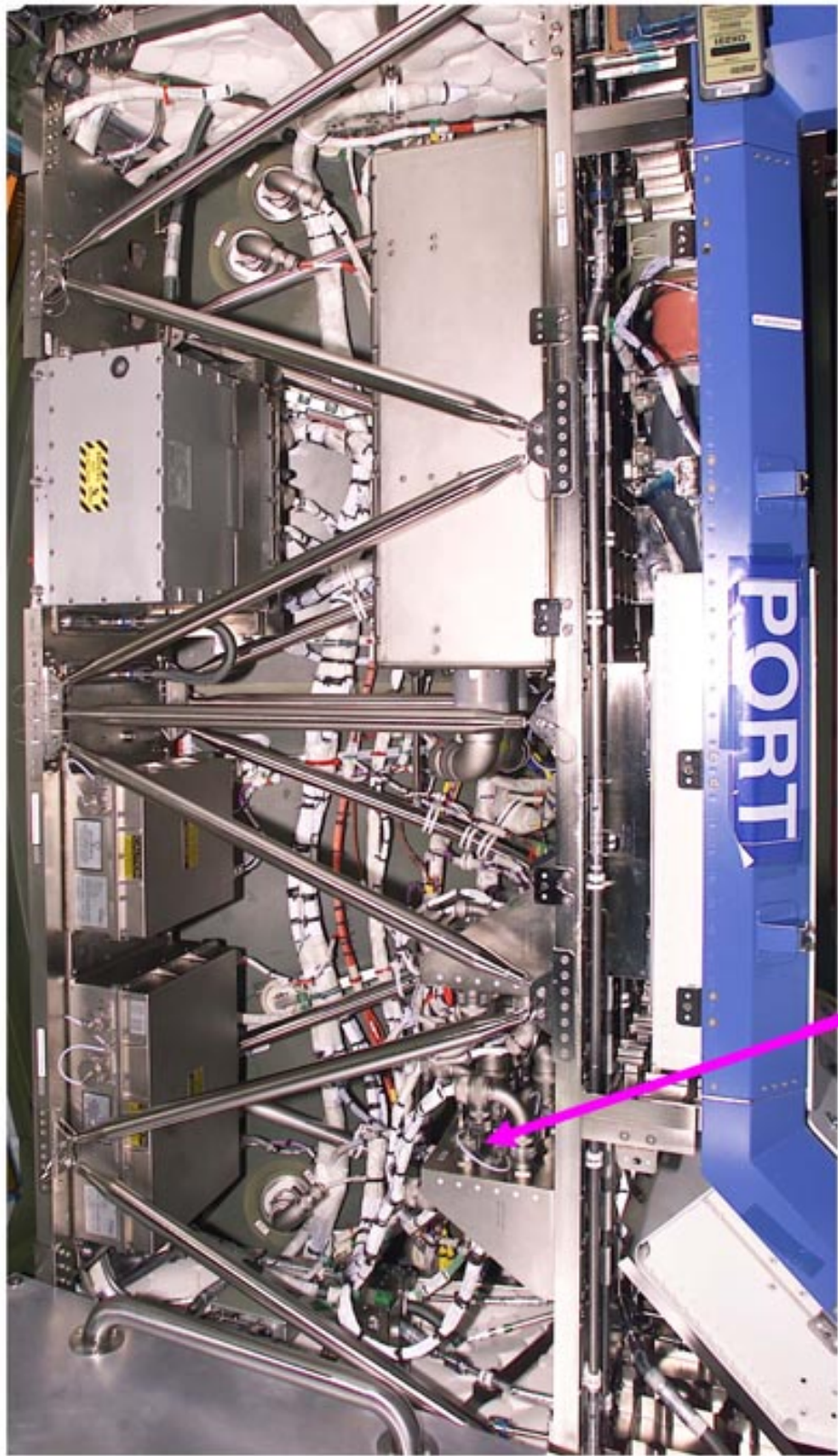
- 8.1 Verify Launch Restraint Pip Pin near NOD2 Aft hatch window has been removed.
If required, stow PIP Pin in stowage hole on rib in upper area of Hatch.
Refer to Figure 7.

9. **RECONFIGURING LAB ENDCONE CONNECTOR**

NOTE

The following steps will rotate the OGS rack to access a connector shelf in the endcone in order to reconfigure PMA2 heater cables.

- 9.1 Perform [{1.201 LAB RACK ROTATE}](#), steps to rotate LAB1P1 (OGS) Rack down (SODF: S&M: NOMINAL: RACK), then:



Lower
Disconnect
Shelf J160,
J161

Figure 8. LAB Fwd Port Endcone indicating Lower Disconnect Shelf.

9.2 Locate Lower Disconnect Shelf.

Tethered Protective Cap ←|→ J160
Tethered Protective Cap ←|→ J115
Refer to Figure 8.

9.3 W2356 P160 ←|→ J161
W2464 P115 ←|→ J116

9.4 W2356 P160 →|← J160
W2464 P115 →|← J115

9.5 Tethered Protective Cap →|← J160
Tethered Protective Cap →|← J115

9.6 Perform [{1.201 LAB RACK ROTATE}](#), steps to rotate LAB1P1
(OGS) Rack up (SODF: S&M: NOMINAL: RACK), then:

10. [POST MAINTENANCE](#)

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

10.2 Stow Ziplock Bag with caps in VOK CTB.
Update IMS for stowage location of materials, tools.

VESTIBULE OUTFITTING LAB1 TO NOD2 – PART 2

(ASSY OPS/10A/FIN)

Page 1 of 10 pages

Parameters 1. Tbl2

Vestibule Jumper Label	Function	P/N	Harness Number [XX]	LAB1 [YY]	NOD2 [ZZ]
Vestibule Jumper Label	Function	P/N	[XX]	[YY]	[ZZ]
Lab-Node2 ISL Ethernet Cable	Ethernet (PEHG, PCS LAN)	683-95075-1	W5075	J9	J135
DAIU Audio Jumper	Audio (DAIU)	1F46417-1	W7013	J8	J134
Wireless Ant Audio Jumper	Audio (WAA)	1F46409-1	W7009	J2	J132
Data Jumper 7	Audio	1F46405-1	W7007	J4	J130
Data Jumper 5	Video	1F46401-1	W7005	J5	J129
Bus B Audio/Video Jumper	Audio (Audio Bus B)	1F46411-1	W7010	J13	J144
Data Jumper 8	HRDL (APM, JEM, Cent)	1F46407-1	W7008	J11	J142
Data Jumper 6	HRDL (APM, JEM, Cent)	1F46403-1	W7006	J10	J141

OBJECTIVE:

This procedure will outfit the vestibule between the LAB1 and NOD2 modules with remaining avionics and life support jumpers. This procedure will also remove the CBM Controller Panel Assemblies (CPAs). Oxygen and Nitrogen jumpers will be installed in a separate procedure.

LOCATION:

LAB1-NOD2 Vestibule

DURATION:

4 hours

CREW:

Two

PARTS:

VESTIBULE OUTFITTING LAB1 TO NOD2 – PART 2

(ASSY OPS/10A/FIN)

Page 2 of 10 pages

Table 1. LAB1 to NOD2 Vestibule Outfitting Kit (VOK)

Vestibule Jumper Label	Jumper Function	P/N	Harness Number
Lab-Node2 ISL Ethernet Cable	Ethernet (PEHG, PCS LAN)	683-95075-1	W5075
DAIU Audio Jumper	Audio (DAIU)	1F46417-1	W7013
Wireless Ant Audio Jumper	Audio (WAA)	1F46409-1	W7009
Data Jumper 7	Audio	1F46405-1	W7007
Data Jumper 5	Video	1F46401-1	W7005
Bus B Audio/Video Jumper	Audio (Audio Bus B)	1F46411-1	W7010
Data Jumper 8	HRDL (APM, JEM, Cent)	1F46407-1	W7008
Data Jumper 6	HDRL (APM, JEM)	1F46403-1	W7006
IMV Supply	IMV Supply (to LAB)	683-13870-34	N/A
Waste Water Jumper	Waste Water	683-13870-39	N/A
Fuel Cell Water Jumper	Fuel Cell Water	683-13870-40	N/A
IMV Return	IMV Return (to NOD2)	683-13870-35	N/A
Air Sample Jumper	ARS	683-13870-36	N/A

MATERIALS:

12" x 12" Ziplock Bags P/N 528-50000-5

Towel

Clean Room Gloves

Braycote

IMV Jumper O-Rings (four) (P/N 2-16150604-70)

TOOLS:

DCS 760 Camera

Mini Maglite

Fluid Fitting Torque Device and Gamah Seal Maintenance Kit:

Fluid Fitting Torque Device (S/N 001)

1.00" Drive Gear (S/N 001)

0.625" Drive Gear (S/N 001)

ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive

- 3/16" Hex Head, 1/4" Drive
- 3/8" Socket, 1/4" Drive
- (10-50 in-lbs) Trq Wrench, 1/4" Drive
- (40-200 in-lbs) Trq Wrench, 3/8" Drive
- 7/16" Deep Socket, 1/4" Drive
- 1/2" Deep Socket, 1/4" Drive
- 1/4" to 3/8" Adapter

REFERENCED PROCEDURE(S):

1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL - GENERIC

1. [REMOVING CBM CPAS](#)

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

NOTE
CBM CPA Removal procedure is generically written to be used for contingency maintenance. Do not install the Axial Closeout Blanket at this time.

Perform [{1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL – GENERIC}](#), steps 2.2 to 5.2 (SODF: S&M: NOMINAL: VESTIBULE), then:

CAUTION
1. FOD can be generated whenever any connector with a broken EMI Ring is mated or demated. Inspect all connectors for broken EMI Rings. If a broken EMI Ring is found, report cable part number to MCC-H . Remove EMI Ring if it interferes with mating of the cable.
2. Care must be taken not to bend or kink vestibule jumpers as some contain fiber optic cabling. Failure to comply may damage cables.

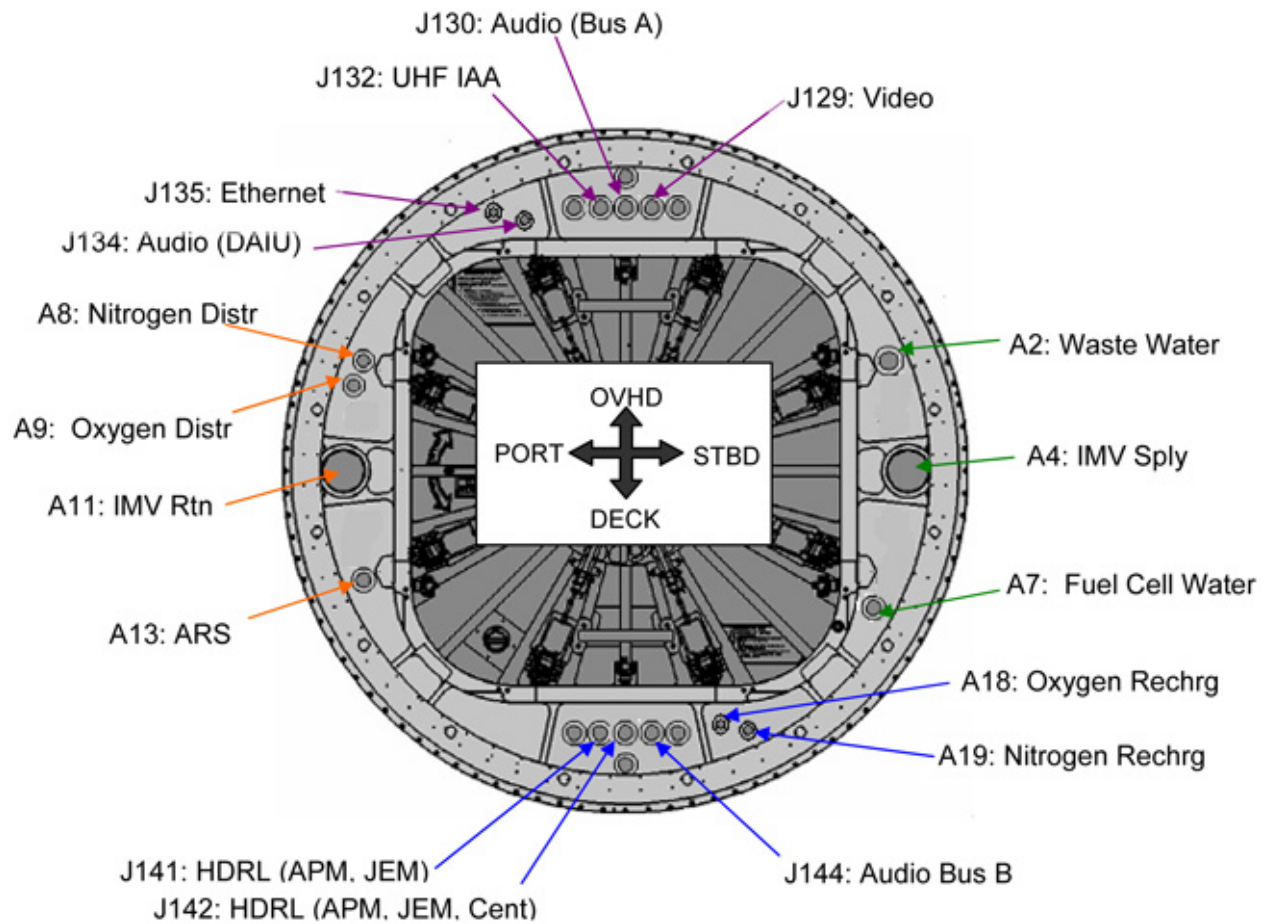


Figure 1. NOD2 Aft Bulkhead, External View Looking Fwd When NOD2 is Mated to LAB FWD
 (Bolded text appears on labels next to Feedthrough).

2. INSTALLING REMAINING AVIONICS JUMPERS PER TABLE 2, FIGURE 2

Table 2. Remaining Avionics Vestibule Jumpers

Vestibule Jumper Label	Function	P/N	Harness Number [XX]	LAB1 [YY]	NOD2 [ZZ]
Lab-Node2 ISL Ethernet Cable	Ethernet (PEHG, PCS LAN)	683-95075-1	W5075	J9	J135
DAIU Audio Jumper	Audio (DAIU)	1F46417-1	W7013	J8	J134
Wireless Ant Audio Jumper	Audio (WAA)	1F46409-1	W7009	J2	J132
Data Jumper 7	Audio	1F46405-1	W7007	J4	J130
Data Jumper 5	Video	1F46401-1	W7005	J5	J129
Bus B Audio/Video Jumper	Audio (Audio Bus B)	1F46411-1	W7010	J13	J144
Data Jumper 8	HRDL (APM, JEM, Cent)	1F46407-1	W7008	J11	J142
Data Jumper 6	HRDL (APM, JEM, Cent)	1F46403-1	W7006	J10	J141

NOTE

Ground fitchecks indicated that a CBM load cell connector (683-13497) may need to be demated to install jumper W5075).

2.1 For each vestibule jumper in Table 2

[XX] is the wire harness

[YY] is the corresponding LAB1 feedthrough

[ZZ] is the corresponding NOD2 feedthrough

2.1.1 Protective Caps ←|→ LAB1 [YY] and NOD2 [ZZ] feedthroughs

Protective Plugs ←|→ [XX] jumper (both ends)

Cap →|← Plugs wherever possible

Stow Caps, Plugs in 12"x12" Ziplock Bag.

2.1.2 Avionics Jumper [XX] →|← LAB1 [YY]

Avionics Jumper [XX] →|← NOD2 [ZZ]

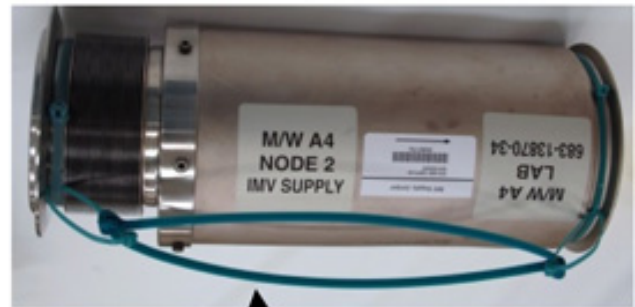
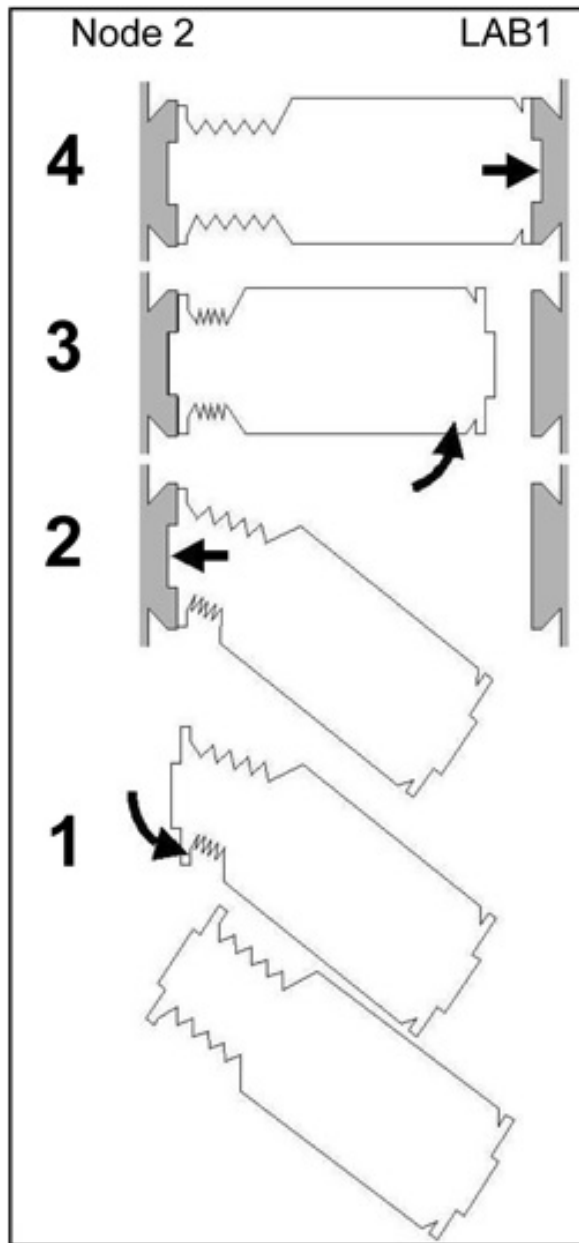
3. INSTALLING OF FLUID JUMPERS

CAUTION
1. Care must be taken while installing the IMV Duct between the IMV Flanges. Damaging the sealing surfaces of the IMV Flanges could prevent the IMV Jumper, once reinstalled, from maintaining pressure.
2. V-Band Clamps may have a 7/16" or 1/2" nut. Use appropriate tool as needed. The 7/16" V-Band Clamps should be tightened to 35 in-lbs. The 1/2" V-Band Clamps should be tightened to 135 in-lbs. Overtightening or undertightening V-Band Clamps may damage V-Band or prevent duct from adequately sealing.

Table 3. IMV Duct Jumper Connection Data

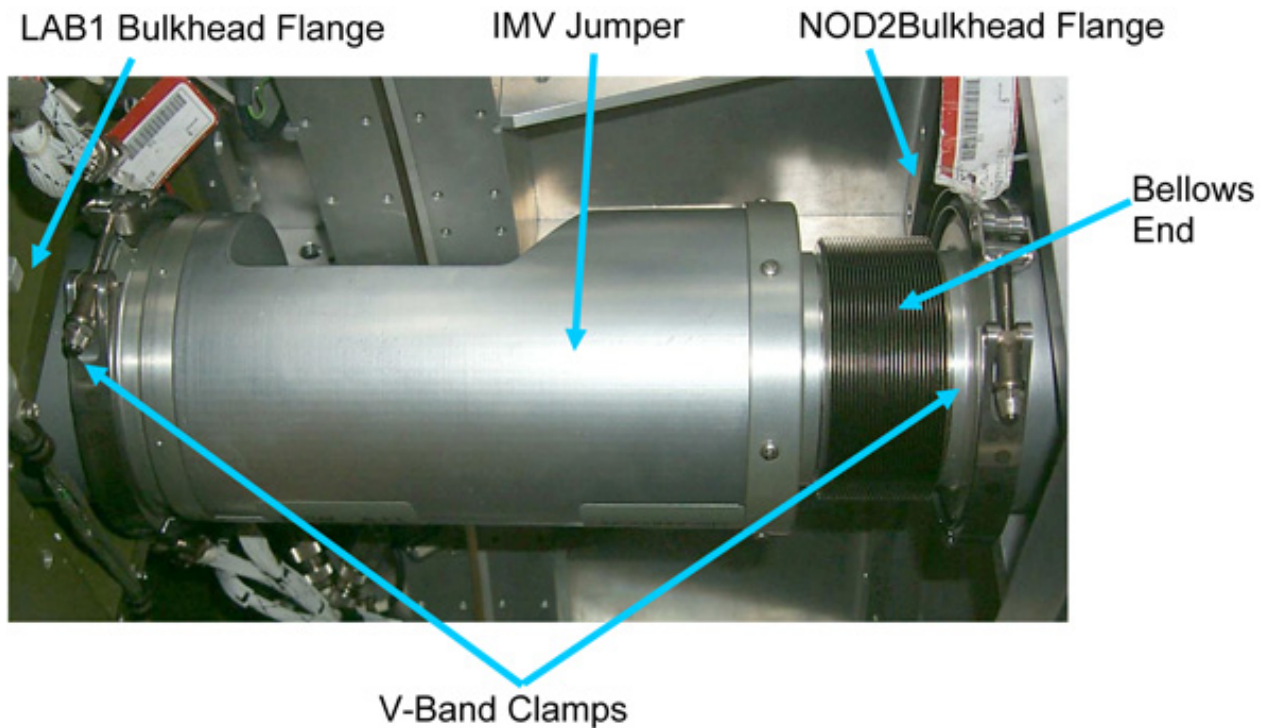
Function	P/N	LAB1	NOD2
IMV Supply (To LAB)	683-13870-34	A4	A4: IMV Sply
IMV Return (To NOD2)	683-13870-35	A11	A11: IMV Rtn

- 3.1 Cycle LAB1 Fwd Stbd and LAB1 Fwd Port IMV Valves open then back to close using RMO, to equalize pressure between IMV Caps and IMV Valves.
- 3.2 Loosen, remove V-Band Clamp on LAB1 Fwd Stbd (A4) IMV Flange (Ratchet, 1/4" Drive; 1/2" Deep Socket, 1/4" Drive).
 Remove IMV Cap from LAB1 (A4) IMV Flange.
 Place IMV Cap in 12" x 12" Ziplock Bag.
 Stow in VOK CTB.
 Refer to Figure 1, Table 3.
- 3.3 Loosen, remove V-Band Clamp on NOD2 Aft Stbd IMV Flange (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive).
 Remove IMV Cap from NOD2 A4 IMV Flange.
 Place IMV Cap in 12" x 12" Ziplock Bag.
 Stow in VOK CTB.
 Refer to Figure 1, Table 3.



IMV Duct Insallation Aid
(Pull to compress flange)

Figure 2. Recommended Steps for IMV Duct Installation.



V-Band Clamps
Figure 3. IMV Jumper Installed.

- 3.4 Verify O-Ring is installed on both ends of IMV Jumper.
If required
| Apply small amount of Braycote in two to three places around O-Ring grooves to prevent O-Rings from floating out.
- 3.5 Install IMV Supply (to LAB) Jumper by sliding bellows end of jumper in first.
Orient flat side of jumper toward the CBM Rings.
Refer to Figures 1, 2, 3.
- 3.6 Secure jumper to LAB1 IMV Flange with 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, 3/8" Drive].
- 3.7 Secure jumper to NOD2 IMV Flange with V-Band Clamp.
Torque to 35 in-lbs [Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive, (10-50 in-lbs) Trq Wrench, 1/4" Drive].
- 3.8 Repeat steps 3.2 to 3.7 for IMV Return (to NOD2) (A11) Jumper.

NOTE

1. The Fuel Cell Water and Waste Water Jumpers have a Quick Disconnect on the LAB1 side and a Gamah Fitting on the NOD2 side. The FFTD will be used to tighten the NOD2 side Gamah Fitting.
2. 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)
3. The symbol "M/W" indicated on jumper labels stands for "Mates With."

Table 4. Waste Water Jumper Connection Data

Jumper Label	Part Number	FFTD Drive Gear	FFTD Reaction Gear	FFTD Input Torque	FFTD Output Torque	LAB1 or NOD2
Waste Water	683-13870-39	1.00	0.625	60 in-lbs	345 in-lbs	A2
Fuel Cell Water	683-13870-40	1.00	0.625	60 in-lbs	345 in-lbs	A7

- 3.9 Protective Caps ←|→ LAB1 A2, A7 and NOD2 A2, A7 bulkhead feedthroughs
 Protective Plugs ←|→ Waste Water, Fuel Cell Water Jumpers
 Cap →|← Plug, wherever possible

Stow Caps and Plugs in 12"x12" Ziplock Bag.
 Refer to Figure 1, Table 4.

- 3.10 Don Clean Room Gloves.
 Apply a thin coat of Braycote to exposed male threads at bulkhead.
 Doff Clean Room Gloves.
- 3.11 Waste Water Jumper M/W A2 LAB →|← LAB A2
 Waste Water Jumper M/W A2 NODE 2 →|← NOD2 A2
 Hand tighten.
- 3.12 Fuel Cell Water Jumper M/W A7 LAB →|← LAB A7
 Fuel Cell Water Jumper M/W A7 NODE 2 →|← NOD2 A7
 Hand tighten.

- 3.13 Tighten, torque NOD2 A2, A7 to 60 in-lbs (Input Torque) [Fluid Fitting Torque Device; 1.00" Drive Gear; 0.625" Reaction Gear; (40-200 in-lbs) Trq Wrench, 3/8" Drive].
 Refer to Figure 1, Table 4.

Table 5. AR Sample Jumper Connection Data

Function	P/N	LAB1	NOD2
AR Sample	683-13870-36	A13	A13: ARS

- 3.14 Protective Caps ←|→ LAB1 A13, NOD2 A13 feedthroughs
 Protective Caps ←|→ AR Sample Jumper (both ends)

Place Protective Caps in 12" x 12" Ziplock Bag.
 Refer to Figure 1 and Table 5.

- 3.15 AR Sample Jumper M/W A13 LAB →|← LAB1 A13
 AR Sample Jumper M/W A13 NODE 2 →|← NOD2 A13

4. POST MAINTENANCE

- 4.1 Photo document final installation of vestibule jumpers (DCS 760 Camera).
- 4.2 Notify **MCC-H** of task completion.
- 4.3 Stow 12" x 12" Ziplock Bag of Protective Caps in VOK.
 Update IMS for stowage location of materials, tools.

VESTIBULE OUTFITTING LAB1 TO NOD2 – PART 3

(ASSY OPS/10A/FIN)

Page 1 of 7 pages

OBJECTIVE:

Install LAB1 to NOD2 Oxygen and Nitrogen Vestibule jumpers (four).

LOCATION:

Installed: NOD2, LAB1 Vestibule

Stowed: √IMS

DURATION:

1 hour 30 minutes

CREW:

Two

PARTS:

Refer to Table 1.

Table 1. Vestibule Outfitting Kit (VOK) Components

Jumper Name	Part Number
HIGH PRESSURE OXYGEN	683-13870-37
HIGH PRESSURE NITROGEN	683-13870-38
LOW PRESSURE OXYGEN	683-13870-42
LOW PRESSURE NITROGEN	683-13870-41
AXIAL PORT CLOSEOUT	683-60461-10

MATERIALS:

Clean Room Gloves P/N SEG33116979-301

Dry Wipes

6" x 6" Ziplock Bags (two) P/N 528-21039-3

Braycote 601

0.375" Gamah Seal (four) P/N S14704C

0.375" Retaining Ring (four) P/N R14104C

TOOLS:

Mini Maglite

Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit:

Fluid Fitting Torque Device S/N 001

Brass Picks

0.875" Drive Gear

0.625" Reaction Gear

0.375" Gamah Seal Removal Tool

0.375" Retaining Ring Removal/Installation Tool

ISS IVA Tool Box:

DCS760 Camera

Drawer 2:

1/4" to 3/8" Adapter

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

Ratchet, 1/4" Drive

1. OXYGEN SAFETY STEPS

To prevent fire hazard during this procedure

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

If Clean Room Gloves become contaminated or damaged

Replace immediately with new Clean Room Gloves.

If contaminants are found

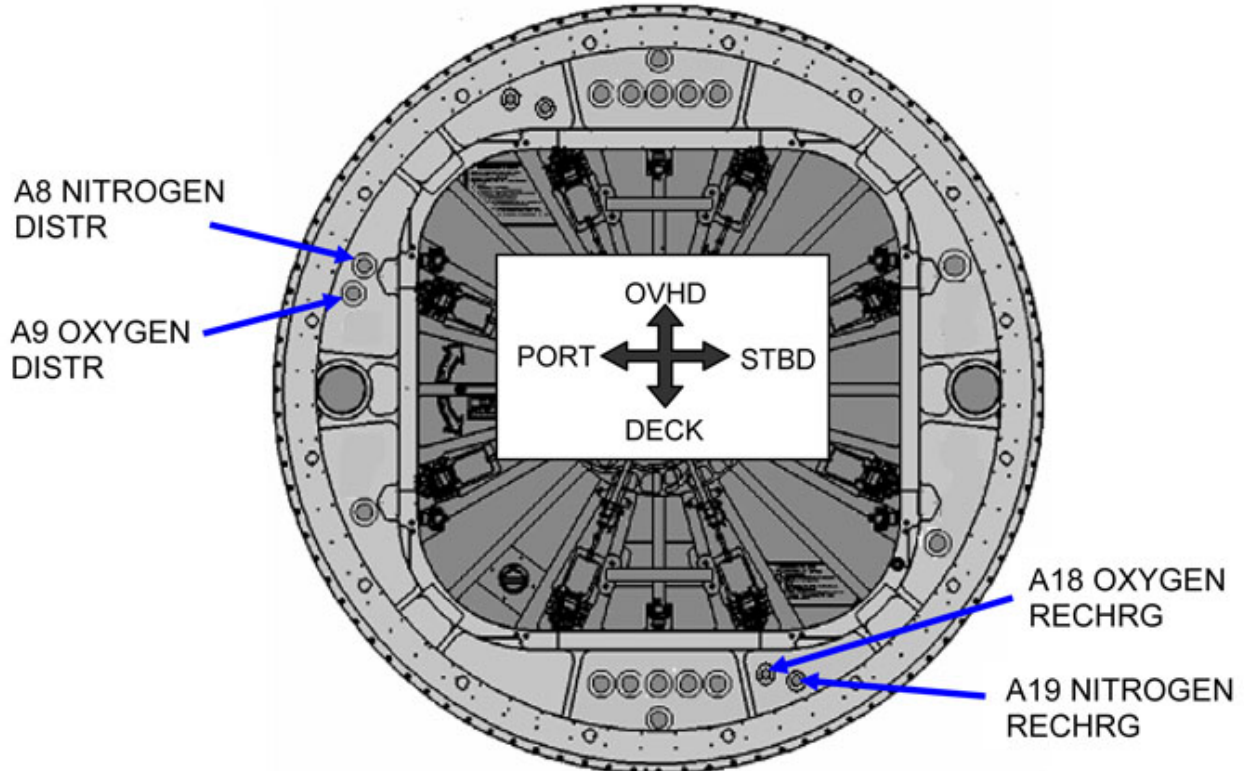
Notify **MCC-H**.

Photo document (DCS 760 Camera).

Remove using Brass Picks and retain for return to ground.

If contaminants cannot be completely removed

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



(orientation from within LAB1 looking forward)

Figure 1. NOD2 Aft External Bulkhead Location of Feedthroughs. (Bold text appears on NOD2 Bulkhead labels next to feedthroughs.)

Table 2. O2, N2 Low Pressure and High Pressure Jumpers

Jumper Name	NOD2 Aft Blkhd	LAB Fwd Blkhd	Part Number	Input Torque	Output Torque	FFTD Gear Size (in)	
				(in-lbs)	(in-lbs)	Drive	Reaction
LOW PRESSURE NITROGEN	A8 Nitrogen Distr	A8	683-13870-41	38	185	0.875	0.625
LOW PRESSURE OXYGEN	A9 Oxygen Distr	A9	683-13870-42	38	185	0.875	0.625
HIGH PRESSURE NITROGEN	A19 Nitrogen Rechr	A19	683-13870-38	38	185	0.875	0.625
HIGH PRESSURE OXYGEN	A18 Oxygen Rechr	A18	683-13870-37	38	185	0.875	0.625

WARNING

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

NOTE

- Gamah fitting and FFTD reference information can be found in:
 - [{A.2.1 FLUID FITTING TORQUE DEVICE \(FFTD\) ASSEMBLY AND USAGE}](#)
 - [{A.2.3 MATING GAMAH FITTING USING THE FFTD}](#)
 - [{A.2.13 GAMAH SEAL R&R}](#) (SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)
- In order to minimize exposure time, jumper will be installed one end at a time. The cap on the feed-through and the plug on the jumper will be loosened first, then after donning Clean Room Gloves, they will be removed one at a time and inspected before mating.
- The symbol "M/W" used on jumper end labels stands for "Mates With," indicating where the jumper connects.

2. [INSTALLING OXYGEN AND NITROGEN VESTIBULE JUMPERS](#)

- 2.1 During Oxygen and Nitrogen jumper steps
- Inspect both sides of each gamah fittings for damage, debris before mating.
 - Report damage, debris to **MCC-H**.
 - Inspect male threads for absence of Braycote before mating.

If required, apply one drop of Braycote to male threads. Spread around threads by gloved hand.
Refer to Figure 1, Table 2.

- 2.2 Loosen LAB1 and NOD2 A8, A9, A18, A19 Gamah fitting feedthrough caps (eight) Fluid Fitting Torque Device; 1/4" to 3/8" Adapter; Ratchet, 3/8" Drive).

- 2.3 Don Clean Room Gloves.

- 2.4 Gamah Cap ←|→ LAB1 A8
Stow cap in Ziplock Bag.

Gamah Cap ←|→ LOW PRESSURE NITROGEN Jumper M/W LAB A8
Stow plug in Ziplock Bag.

LOW PRESSURE NITROGEN Jumper M/W LAB A8 →|← LAB1 A8
Hand tighten.
Repeat for NOD2 end of LOW PRESSURE NITROGEN Jumper.

- 2.5 Gamah Cap ←|→ LAB1 A9
Stow cap in Ziplock Bag.

Gamah Cap ←|→ LOW PRESSURE OXYGEN Jumper M/W LAB A9
Stow plug in Ziplock Bag.

LOW PRESSURE OXYGEN Jumper M/W LAB A9 →|← LAB1 A9
Hand tighten.
Repeat for NOD2 end of LOW PRESSURE OXYGEN Jumper.

- 2.6 Gamah Cap ←|→ LAB1 A19
Stow cap in Ziplock Bag.

Gamah Cap ←|→ HIGH PRESSURE NITROGEN Jumper M/W LAB A19
Stow plug in Ziplock Bag.

HIGH PRESSURE NITROGEN Jumper M/W LAB A19 →|← LAB1 A19
Hand tighten.
Repeat for NOD2 end of HIGH PRESSURE NITROGEN Jumper.

NOTE

The LAB1 end of the OXYGEN RECHARGE jumper is not mated to the LAB1 at this time to allow for a system purge during 1E.

- 2.7 Gamah Cap \leftrightarrow NOD2 A18
Stow cap in Ziplock Bag.

Gamah Cap \leftrightarrow HIGH PRESSURE OXYGEN Jumper M/W NOD2 A18
Stow plug in Ziplock Bag.

HIGH PRESSURE OXYGEN Jumper M/W NOD2 A18 \rightarrow NOD2 A18
Hand tighten.
- 2.8 Torque LAB1 A8, A9, A18 and NOD2 A8, A9, A18, A19 gamah connections to 38 in-lbs (input torque) [Fluid Fitting Torque Device; 1/4" to 3/8" Adapter; (10-50 in-lbs) Trq Wrench, 1/4" Drive]. Refer to Table 2.
- 2.9 Photo document installed oxygen and nitrogen jumpers (DCS 760 Camera).

3. INSTALLING AXIAL PORT CLOSEOUT

- 3.1 Remove Axial Port Closeout from stowage.

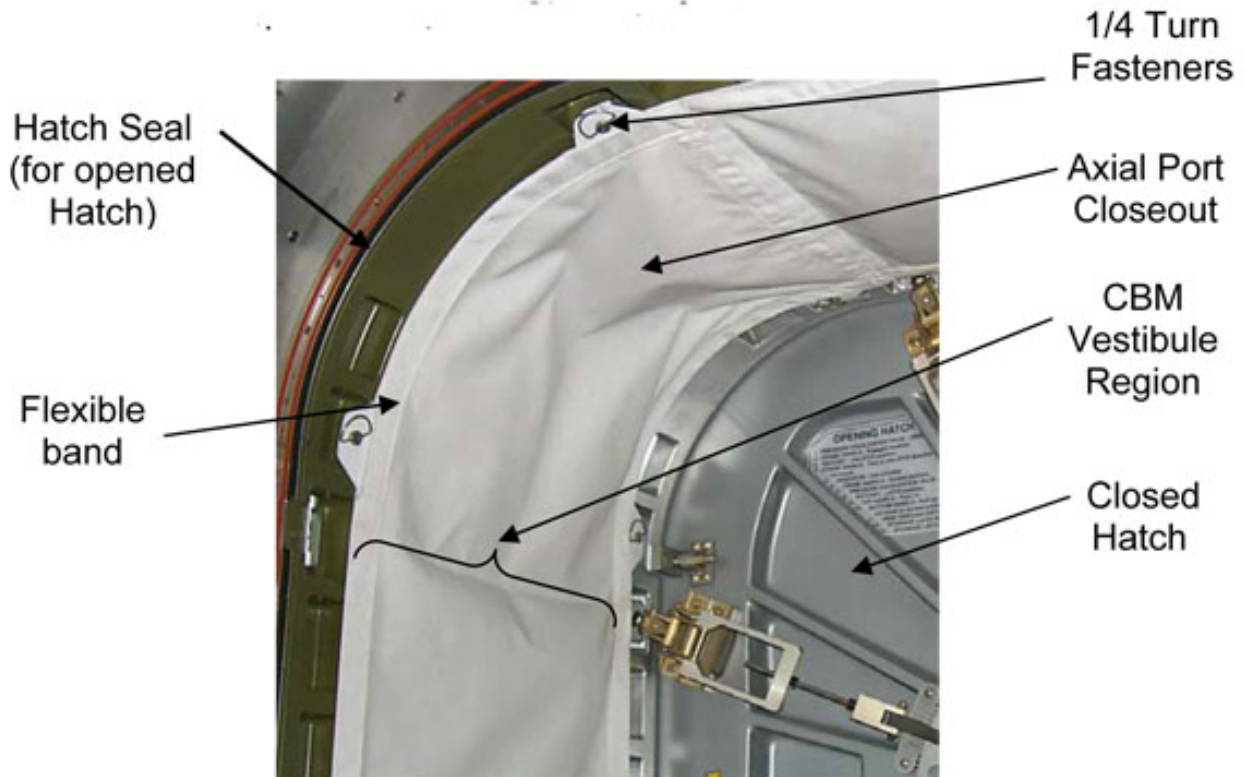


Figure 2. Installation of Axial Port Closeout.

NOTE

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

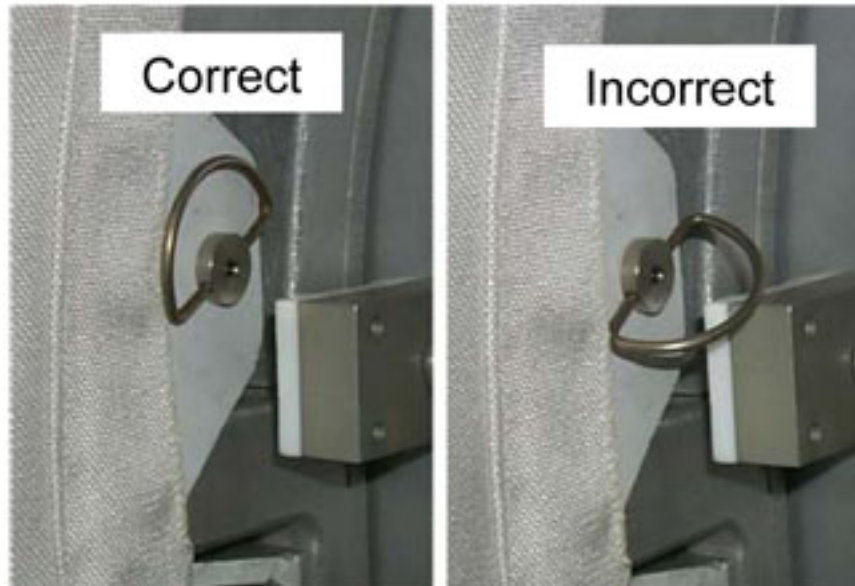


Figure 3. D-Rings for Closeout.

CAUTION

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

- 3.2 Unroll closeout while installing over CBM Vestibule.
Engage 1/4 Turn Fasteners with mounting brackets, making sure to flatten the D-Rings against the Closeout.
Refer to Figures 2, 3.

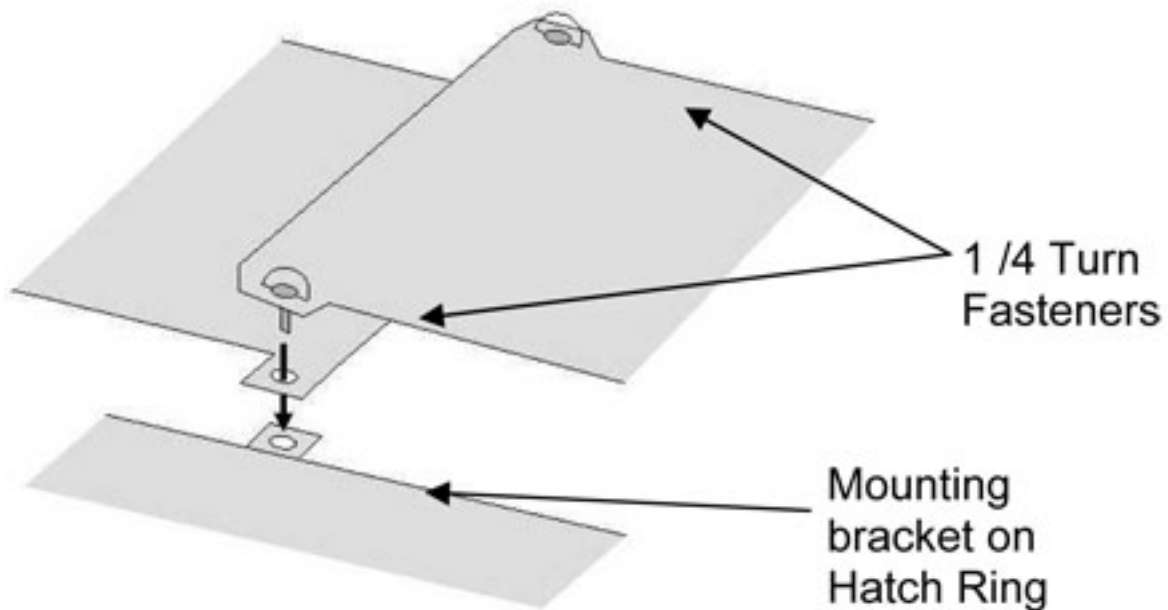


Figure 4. Overlapping Ends of Closeout for Final Attachment.

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

4. POST MAINTENANCE

- 4.1 Notify **MCC-H** of task completion.
- 4.2 Check IMS for stowage location of materials.
Stow tools, materials.

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NITROGEN SYSTEM QD12 DISCONNECT/RECONNECT

(ASSY OPS/10A/FIN)

Page 1 of 6 pages

OBJECTIVE:

This procedure is to demate/connect QD12 to isolate the High Pressure (Recharge) Nitrogen system. This procedure assumes the N2 system is not set up for Shuttle to ISS N2 transfer operations.

TOOLS:

Ratchet, 1/4" Drive

4" Ext, 1/4" Drive

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

CSA-O2

1. CONFIGURING ISS N2 SYSTEM

AL10A2

1.1 VL013 (N2) → CLOSED

PCS

1.2 Airlock: ECLSS: Nitrogen System

'N2 Supply Valve'

√Actual Position – Open

2. REDUCING ISS N2 SYSTEM PRESSURE TO AMBIENT

NOTE

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

2.1 C&W Summ

'Event Code Tools'

sel Suppress

input Event Code – 6 2 4 0 ('N2 Supply Pressure Low – A/L')

cmd Arm

cmd Execute

2.2 Airlock: ECLSS: Nitrogen System

'AL PCA N2 Intro Valve'

cmd Open (√Position – Open)

When PCA N2 Line Press < 160 kPa (23 psi) or On MCC-H
GO, proceed (~15 minutes).

'AL PCA N2 Intro Valve'

cmd Close (√Position – Closed)

3. ACCESSING QD12

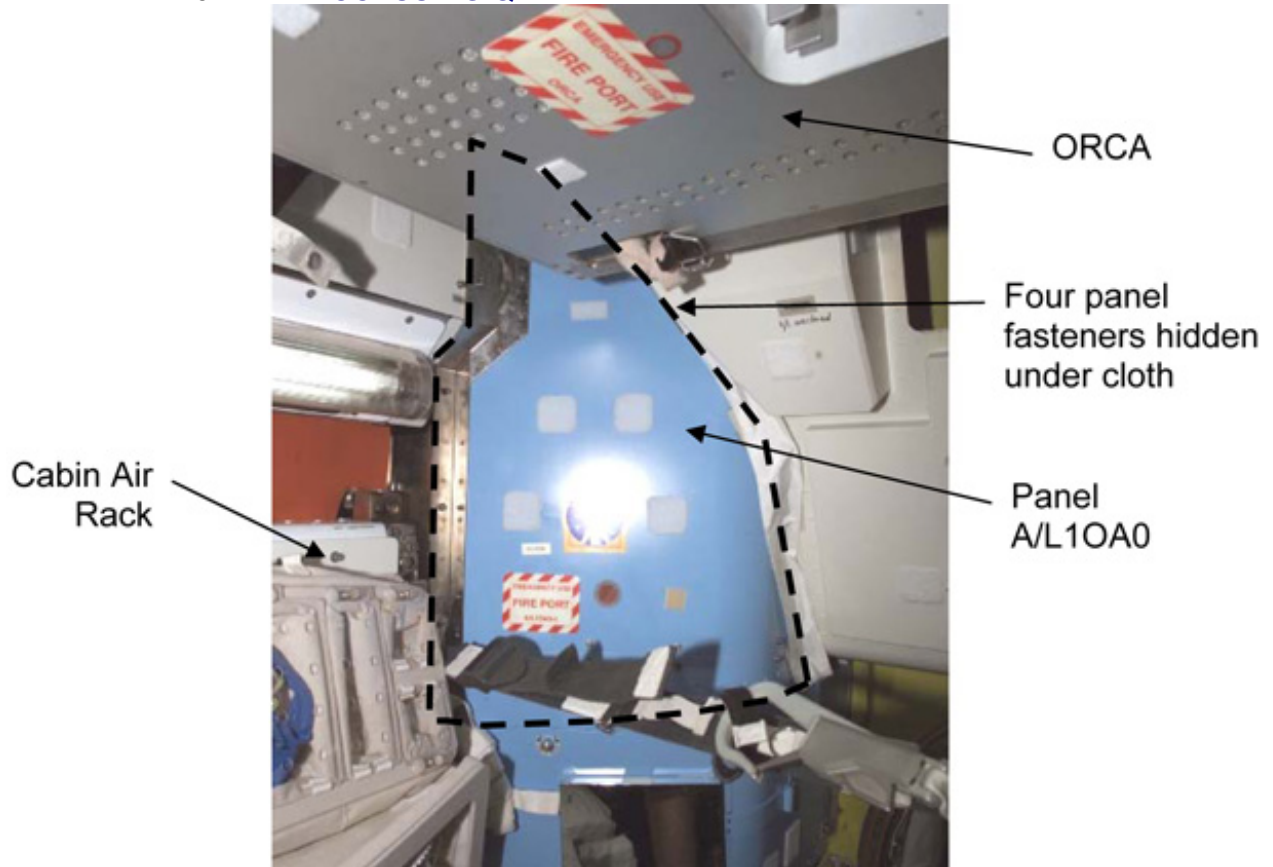


Figure 1. Panel A/L10A0 Access.

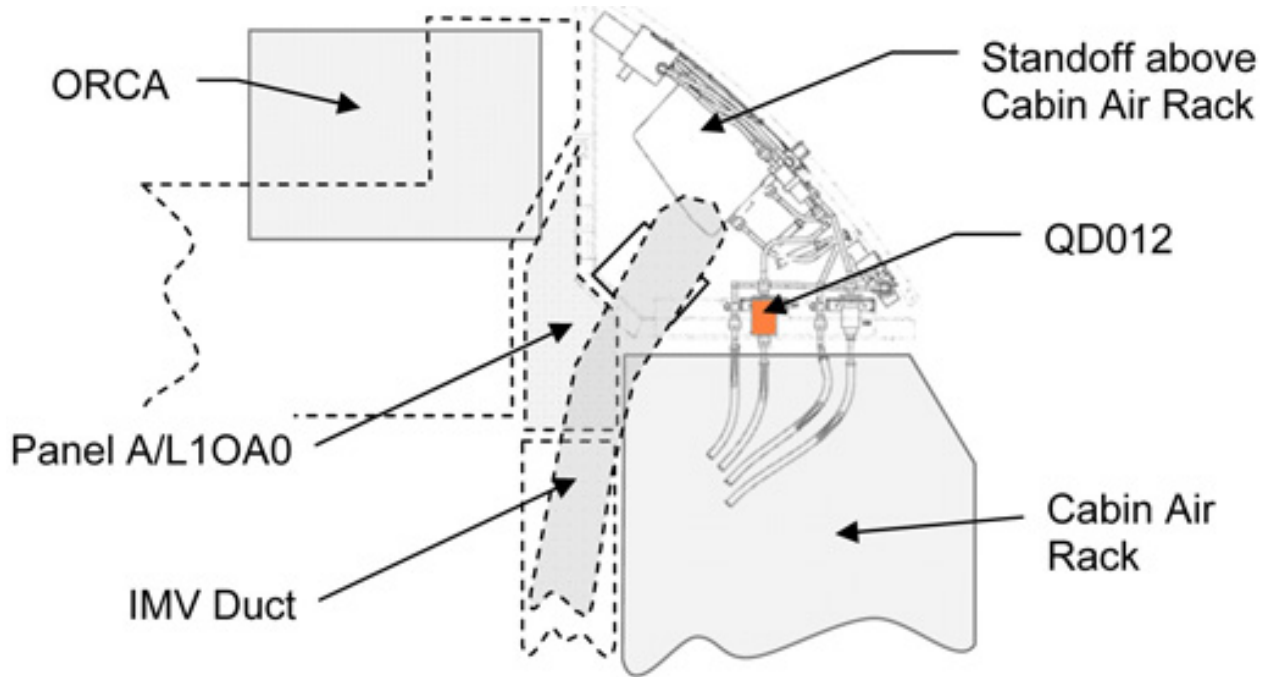


Figure 2. QD012 Location (Side View).

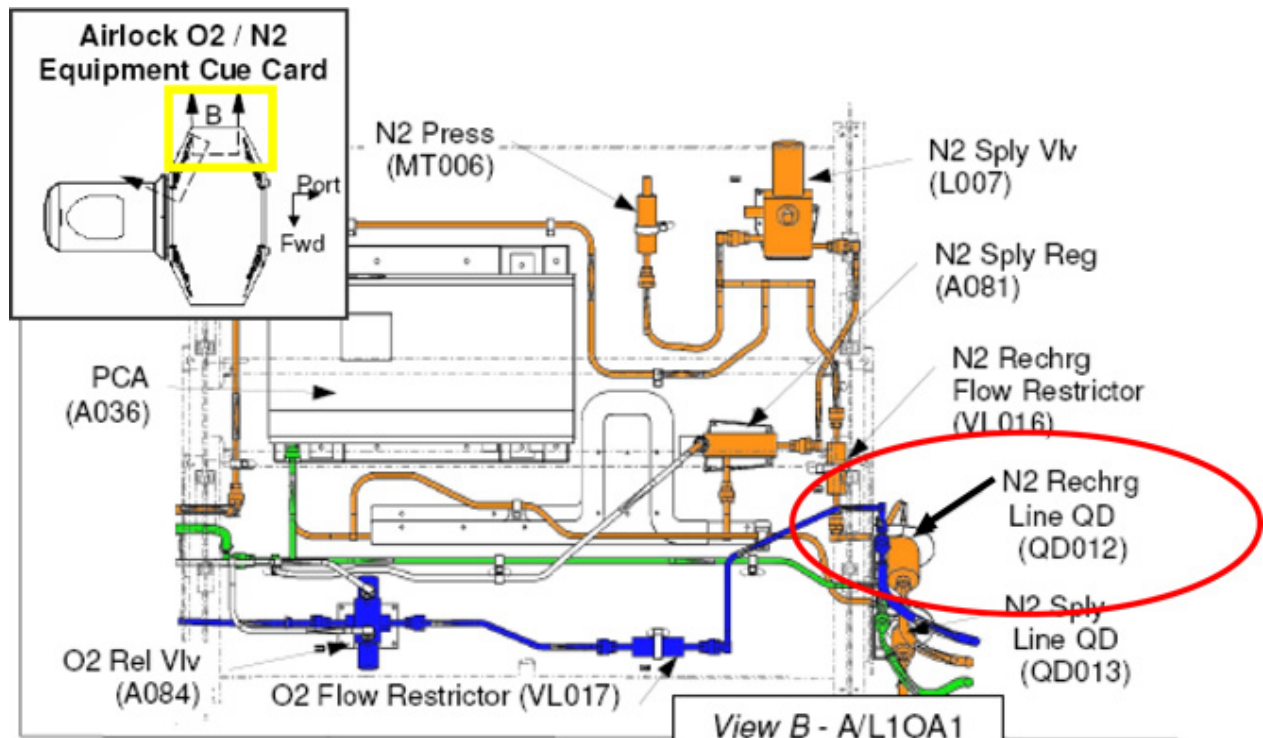


Figure 3. Behind Panel AL10A1 (from Airlock O2/N2 Equipment Cue Card).

NOTE

QD012 access will be behind an IMV duct. If not accessible via panel A/L10A0, removal of panel A/L10A1, A/L10A2 and the ORCA may be required.

NITROGEN SYSTEM QD12 DISCONNECT/RECONNECT

(ASSY OPS/10A/FIN)

Page 4 of 6 pages

- 3.1 If accessible around ORCA
- Loosen panel A/L10A0 Fasteners (fourteen)
 - Remove panel (Ratchet, 1/4" Drive; 4" Ext; 5/32" Hex Head).

If panel A/L10A0 not accessible or QD012 not accessible via panel A/L10A0

Perform [{E.4.015 JOINT A/L A/L10A1 CLOSEOUT PANELS}](#), steps 1 to 7 (SODF: IFM: REFERENCE: APPENDIX E), then:

- 3.2 Measure O2 % with a CSA-O2 in closeout volume.
If O2 % is not within 16.5 to 23.3 %, check with **MCC-H** before continuing.

4. [DISCONNECT QD12](#)

NOTE

QD must be closed to disconnect lines. As needed, refer to Figure 4 at the end of this procedure for reference information on the high pressure quick disconnects.

- 4.1 QD012 ←|→ MWQD012 N2 Supply Line

PCS

- 4.2 Airlock: ECLSS

'Equipment Lock'
Verify dP/dt ~ 0 mmHg/min

- 4.3 Report to **MCC-H**, "QD12 Disconnect Complete."

5. [REPRESSURIZING NITROGEN DISTRIBUTION SYSTEM](#)

A/L10A2

- 5.1 VL013 (N2) → OPEN

PCS

- 5.2 Verify dP/dt still ~ 0 mmHg/min

- 5.3 C&W Summ

'Event Code Tools'
sel Enable

input Event Code - 6 2 4 0 ('N2 Supply Pressure Low - A/L')
cmd Arm
cmd Execute

NITROGEN SYSTEM QD12 DISCONNECT/RECONNECT

(ASSY OPS/10A/FIN)

Page 5 of 6 pages

NOTE

The Nitrogen System will remain in this configuration, with QD12 demated, for several days in order to isolate the Nitrogen lines prior to PMA2/LAB Vestibule Config for Demate. The system will be returned to its nominal configuration after the Node 2 Nitrogen Recharge System is configured.

6. CONFIGURING ISS NITROGEN SYSTEM TO RECONNECT QD12

6.1 Perform steps 1 and 2 to vent N2 system to ambient pressure.

6.2 QD012 →|← MWQD012 N2 Supply Line

6.3 Perform step 5.

7. CLOSEOUT

7.1 If required to closeout QD012

Go to [{E.4.015 JOINT A/L A/L10A1 CLOSEOUT PANELS}](#), steps 8 to 13 (SODF: IFM: REFERENCE: APPENDIX E).

If not required to closeout QD012

Replace panel A/L10A0, tighten Fasteners (fourteen) (Ratchet, 1/4" Drive; 4" Ext; 5/32" Hex Head).

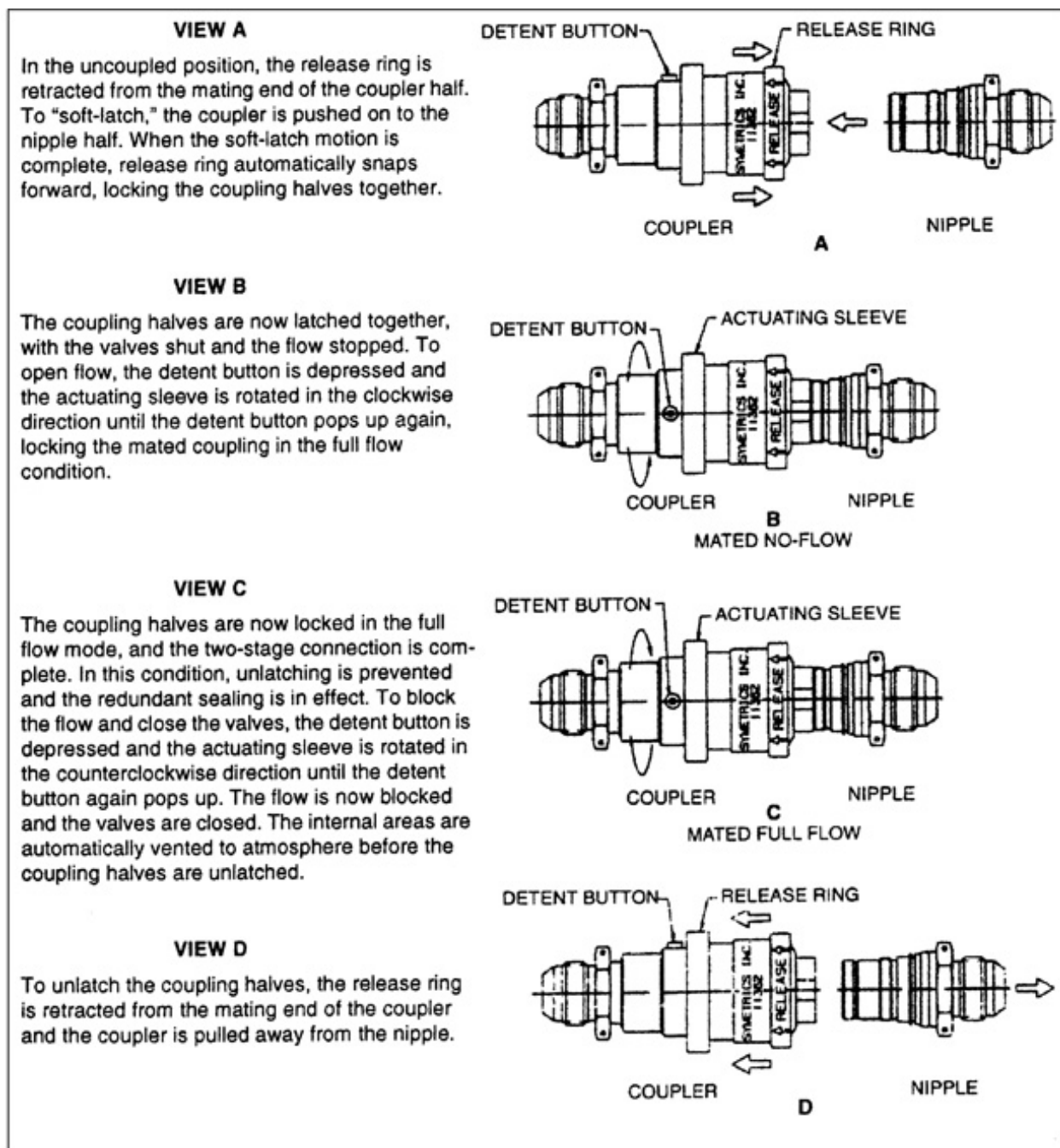


Figure 4. Two-Stage High-Pressure QDs.

NODE 2 AVIONICS RACKS OUTFITTING

(ASSY OPS/10A/FIN)

Page 1 of 10 pages

Parameters 1. DDCU Parallel Connector Connections for Rack Locations

Rack Location	Parallel Cable [XX]	DDCU [YY]
	[XX]	[YY]
NOD2O4	HMU 692 P4ZEN-3A	DDCU N2O2B
NOD2D4	HMU 693 P4NAD-1B	DDCU N2D4B
NOD2P4	HMU 694 P4PRT-2A	DDCU N2P3A
NOD2S4	HMU 691 P4STB-4A	DDCU N2S1B

OBJECTIVE:

Configure Node 2 Avionics Racks for on-orbit operations. Includes installation of left and right Pivot Pins, K-Bars, DDCU Parallel Connector and removal of Knee Braces for each Node 2 Rack in Bay 4.

LOCATION:

Node 2 Rack Bay 4

DURATION:

1 hour 15 minutes per Rack

CREW:

One

PARTS:

Pivot Fitting Bottom Left (four) P/N 683-61711-31

Pivot Fitting Bottom Right (four) P/N 683-61711-32

K-BAR, Left (four) P/N 683-62201-33

K-BAR, Right (four) P/N 683-62201-34

DDCU Parallel Connector (four) P/N RM3697-001

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 2:

Ratchet, 3/8" Drive

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

5/32" Hex Head, 3/8" Drive

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

Drawer 3:

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

5" Long, 3/8" Ball Tip Hex Head, 3/8" Drive

Speed Handle Assy

Drawer 5:

Static Wrist Tether

NODE 2 AVIONICS RACKS OUTFITTING

(ASSY OPS/10A/FIN)

Page 2 of 10 pages

NOTE

This procedure can be run as a stand-alone procedure for each individual Rack.

1. LOWER LAUNCH RESTRAINT DISENGAGEMENT

- 1.1 Select one of the four Node 2 Avionics Racks to outfit (NOD2D4, NOD2S4, NOD2O4, NOD2P4).
- 1.2 Notify **MCC-H** of selected Rack so that ground can complete proper safing steps required for DDCU Parallel Connector installation in step 6.



Figure 1. Example of lower closeout on Avionics Racks (Launch Restraint Bolts circled in green).

- 1.3 If required, unfasten, remove launch bolts/washers (seven) from lower Closeout Panel (Ratchet, 3/8" Drive; 5/32" Hex head).
Stow launch bolts.
Remove Closeout Panel, Fasteners (four) (Ratchet, 3/8" Drive; 5/32" Hex Head).
Temporarily Stow.
Refer to Figure 1.

CAUTION

Disengagement sequence must be followed exactly to allow any induced loads to be released safely back into structure. Start on either left or right side of rack.

NOTE

All directional references (up, down, left, right) are with respect to front face of rack (crewmember facing rack).

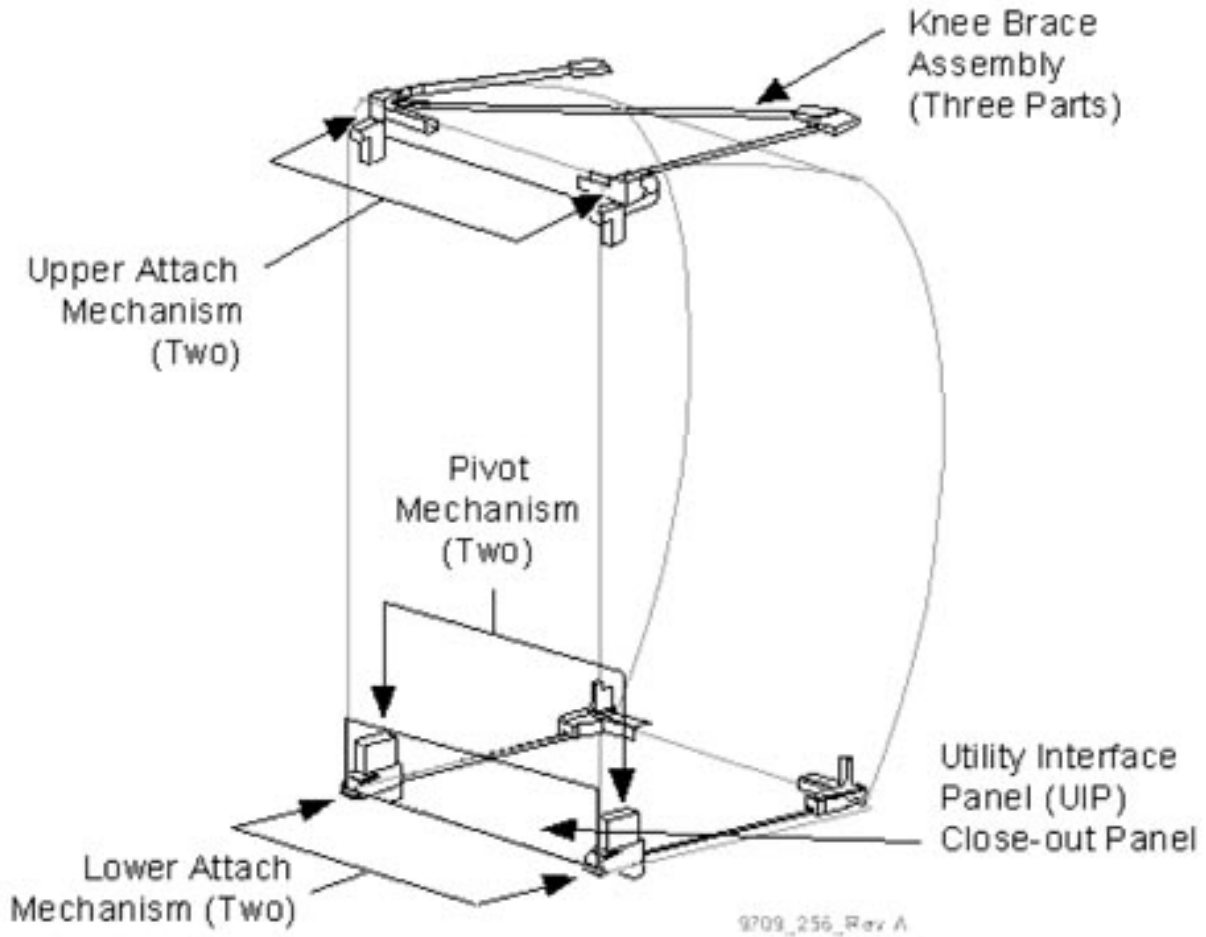


Figure 2. Location of Rack Attachment Mechanisms.

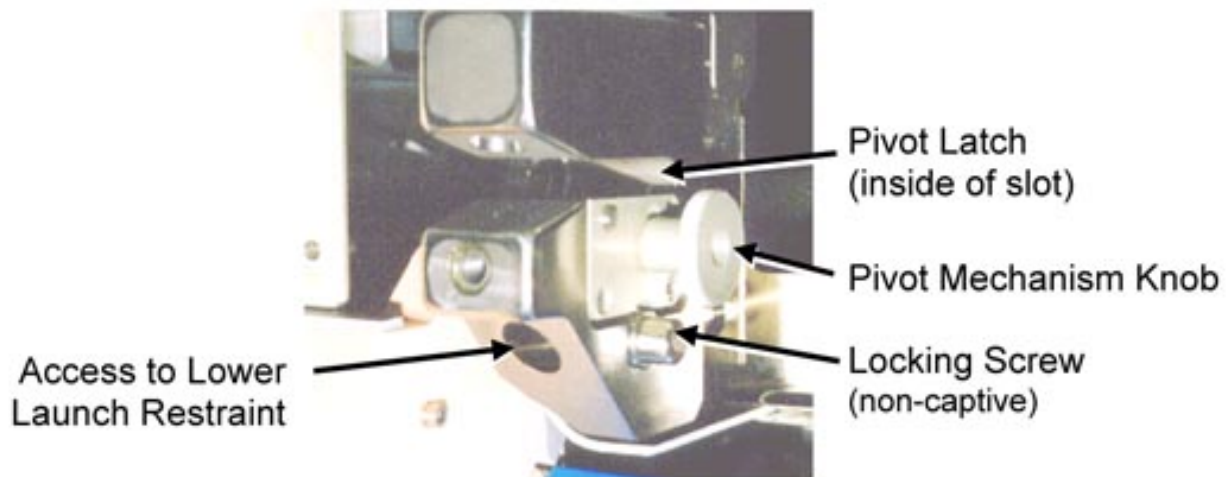


Figure 3. Lower Launch Restraint (Left Side).

NOTE

A loud pop may occur during release of first Lower Launch Restraint.

- 1.4 Remove non-captive Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
Refer to Figures 2, 3.
- 1.5 Disengage Lower Launch Restraint 10 to 12 turns until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 1.6 Reinstall, snug Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 1.7 Repeat steps 1.4 to 1.6 for opposite side.

2. PIVOT FITTING INSTALLATION

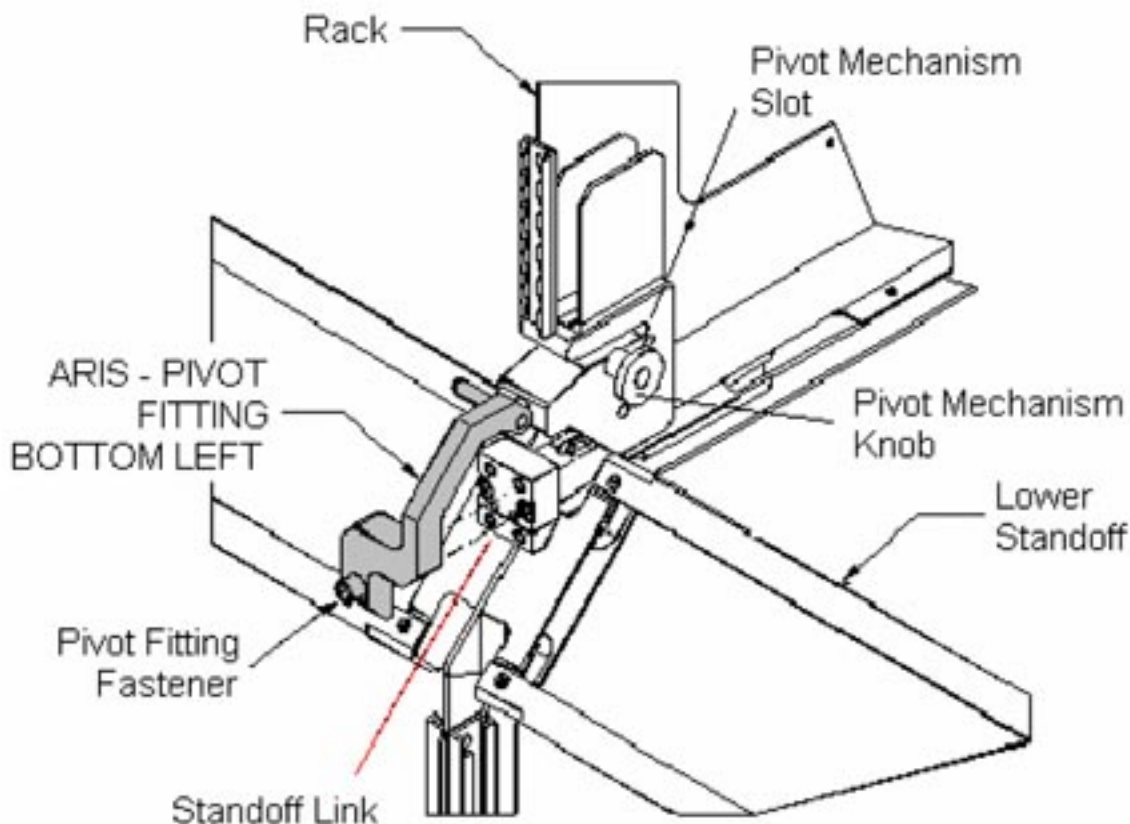


Figure 4. Installation of Pivot Fitting, Left Side.

- 2.1 Loosen both left and right Pivot Mechanism Knobs one turn then snug in the unlatched, down position.
Refer to Figure 4.
- 2.2 Install Pivot Fitting Bottom Left (P/N 683-61711-31) onto Standoff Link located on lower left Standoff.
- 2.3 Tighten, torque Fastener to 150 in-lbs [Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive; (40-200 in-lbs) Trq Wrench, 3/8" Drive].

- 2.4 Install Pivot Fitting Bottom Right (P/N 683-61711-32) onto Standoff Link located on lower right Standoff.
- 2.5 Tighten, torque Fastener to 150 in-lbs [Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive; (40-200 in-lbs) Trq Wrench, 3/8" Drive].
- 2.6 Loosen both left and right Pivot Mechanism Knobs one turn, then snug in latched, up position.

3. **UPPER ATTACH MECHANISM DISENGAGEMENT**

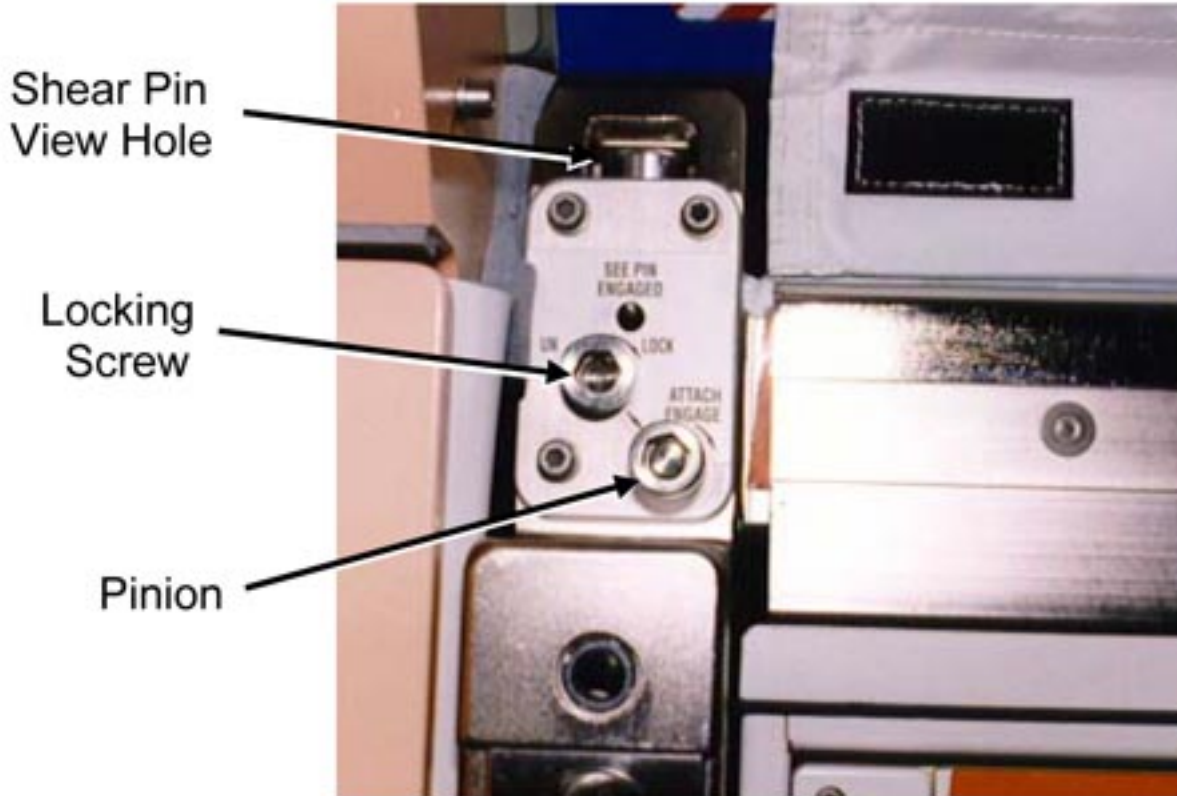


Figure 5. Upper Attach Mechanism, Left Side, Typical.

- 3.1 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 5.

NOTE

To disengage left Pinion, turn ↺.
 To disengage right Pinion, turn ↻.

- 3.2 Disengage left Pinion one full turn until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive). Refer to Figure 5.
- 3.3 Repeat for opposite side.

4. K-BAR INSTALLATION

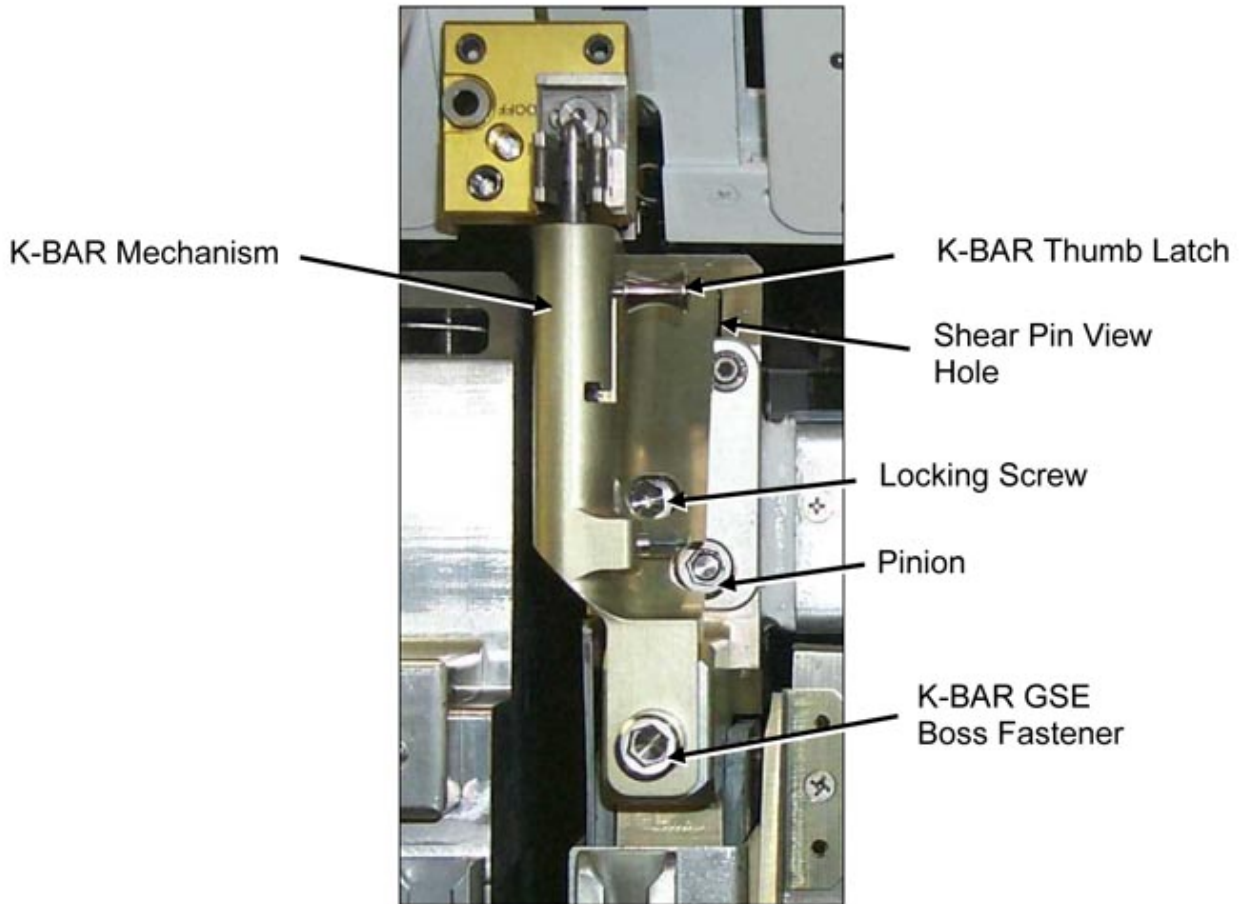


Figure 6. K-BAR Assembly Installed (Rack Upper Left).

- 4.1 Rotate Rack down only ~15 cm (~5 in).

CAUTION
Do not force Upper Attach Mechanism Pinions. Mechanism should easily engage K-BAR.

<u>NOTE</u>
To engage left Pinion, turn ↺. To engage right Pinion, turn ↻.

- 4.2 Place K-BAR, Left (P/N 683-62201-33), into left Upper Attach Mechanism Shear Pin View Hole. Refer to Figure 6.
- 4.3 Verify Locking Screw fully unlocked. Refer to Figure 6.
- 4.4 Engage Pinion, one full turn, into K-BAR (Ratchet, 3/8" Drive; 5" Long, 3/8" Ball Tip Hex Head, 3/8" Drive).

Refer to Figure 6.

4.5 Snug Locking Screw and K-BAR GSE Boss Fastener (Ratchet, 3/8" Drive; 5" Long, 3/8" Ball Tip Hex Head, 3/8" Drive).
Refer to Figure 6.

4.6 K-BAR Thumb Latch → down position
Refer to Figure 6.

4.7 Repeat steps 4.2 to 4.6 for right K-BAR (P/N 683-62201-34).

5. KNEE-BRACE REMOVAL

5.1 Check rack rotation path unobstructed.

5.2 Slowly rotate rack down to a controlled stop.

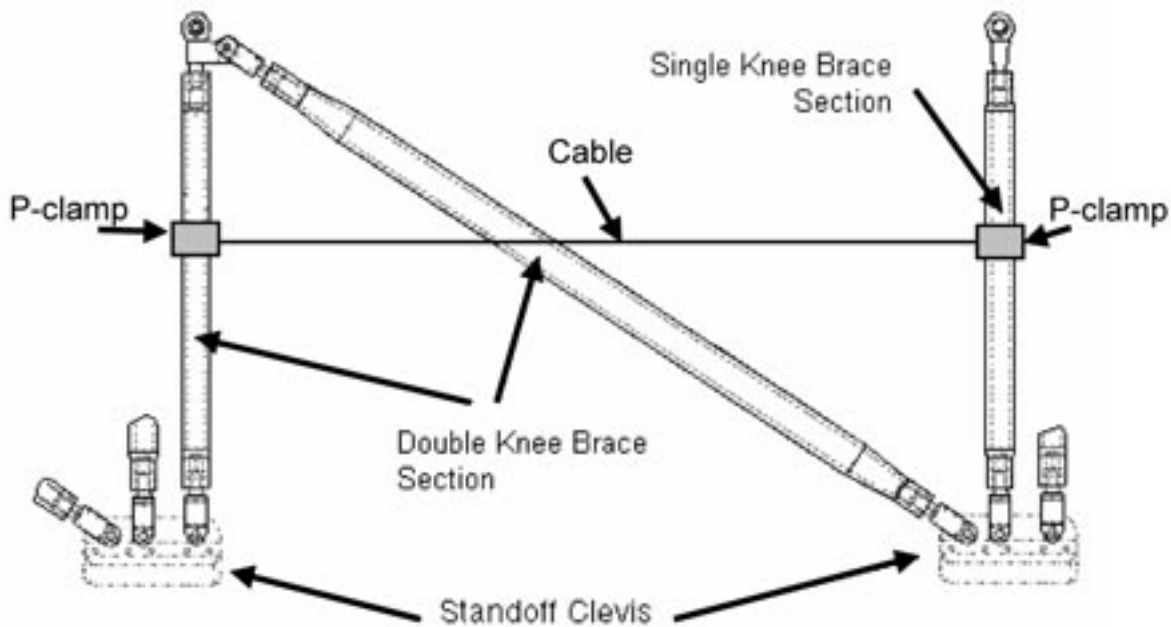


Figure 7. Rack Knee Brace Assembly.

NOTE

A cable has been attached to the Node 2 Knee Braces by two P-clamps (Fig. 7) to mitigate low running torque in the Knee Brace struts which reduce vibration in the racks during launch loads. This cable requires no crew interaction, will tie all three Knee Brace struts together, and can be used to wrap the struts together when stowed.

5.3 Remove Knee-Brace Assembly sections (P/N 683-50249-3) by pulling captive PIP Pins (three) from Standoff Clevis.
Refer to Figure 7.

5.4 Temporarily stow Knee-Brace Assembly.

6. DDCU PARALLEL CONNECTOR INSTALLATION

- 6.1 Unfasten, remove Rack Rear Access Panel, fasteners (forty-four) (Speed Handle Assy; 5/32" Hex Head, 1/4" Drive). Temporarily stow.
- 6.2 Don Static Wrist Tether. Secure to unpainted, unanodized metal surface.

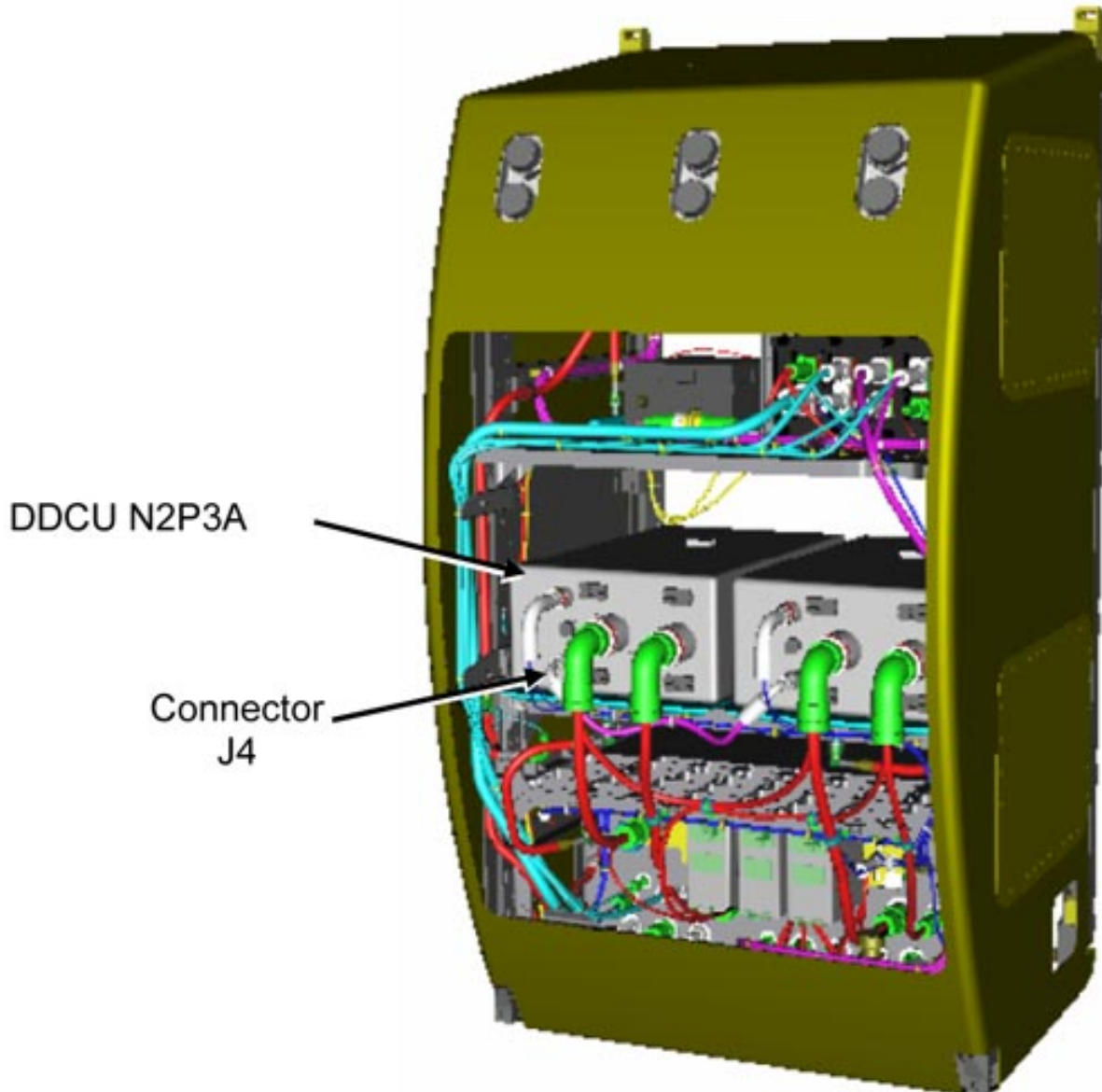


Figure 8. Rear view of Avionics Rack with Rear Access Panel Removed. (Port rack shown, other racks similar).



Figure 9. DDCU Parallel Connector.

- 6.3 Remove, discard Protective Caps from DDCU Parallel Connector. Refer to Figure 9.

Table 1. DDCU Parallel Connector Connections for Rack Locations

Rack Location	Parallel Cable [XX]	DDCU [YY]
NOD2O4	HMU 692 P4ZEN-3A	DDCU N2O2B
NOD2D4	HMU 693 P4NAD-1B	DDCU N2D4B
NOD2P4	HMU 694 P4PRT-2A	DDCU N2P3A
NOD2S4	HMU 691 P4STB-4A	DDCU N2S1B

- 6.4 Refer to Table 1 for **Parallel Cable [XX]** and **DDCU [YY]**.

Parallel Cable [XX] ↔ DDCU [YY] J4

DDCU Parallel Connector P4 →|← **DDCU [YY] J4**

Parallel Cable [XX] →|← DDCU Parallel Connector J1

Refer to Figure 8.

- 6.5 Doff Static Wrist Tether.
- 6.6 Photo document installed DDCU Parallel Connector (DCS 760 Camera).
- 6.7 Replace Rack Rear Access Panel, tighten Fasteners (forty-four) (Speed Handle Assy; 5/32" Hex Head, 1/4" Drive).

7. ROTATING RACK UP

- 7.1 K-BAR Thumb Latches (two) → up position
- 7.2 Check Rack Rotation path unobstructed
- 7.3 Slowly rotate Rack up to a controlled stop.

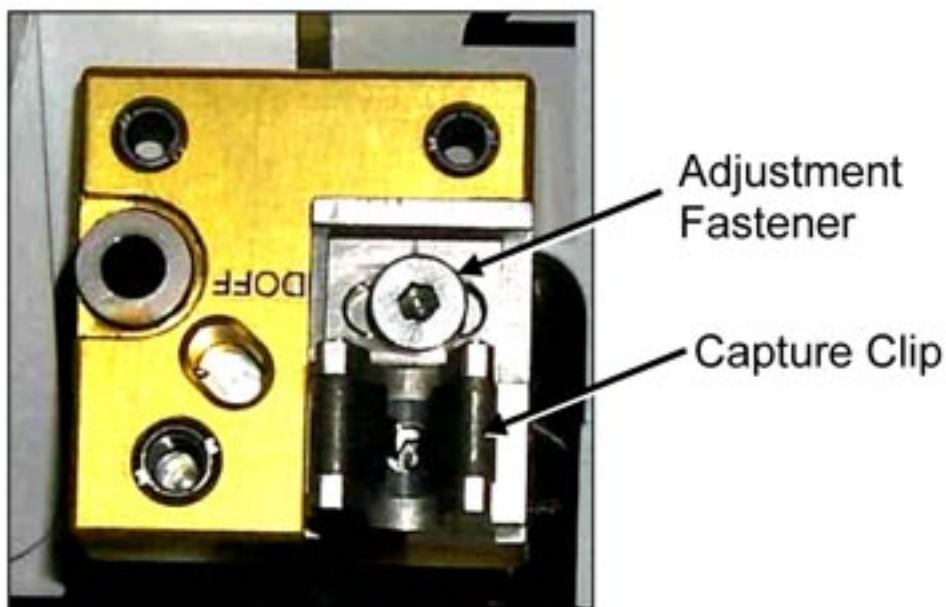


Figure 10. K-BAR Capture Mechanism, Installed on Standoff.

- 7.4 Engage Rack K-BAR Thumb Latches (two) into Capture Mechanism located on LAB Standoff. Refer to Figure 10.

```

*****
*      If K-BAR does not align with Capture Mechanism:
*      |
*      |      Loosen Adjustment Fastener (Ratchet, 3/8" Drive;
*      |      |      5/32" Hex Head).
*      |      |      Slide capture clip left/right, as required to engage K-
*      |      |      BAR.
*      |      |      Once K-BAR engaged, re-tighten Adjustment
*      |      |      Fastener (Ratchet, 3/8" Drive; 5/32" Hex Head).
*      |
*      |
*      |      Refer to Figure 10.
*****

```

8. CLOSEOUT

- 8.1 Photo document newly installed hardware (DCS 760 Camera).
- 8.2 Install Closeout Panel, Fasteners (four) (Ratchet, 3/8" Drive; 5/32" Hex Head).

9. CONTINUING OUTFITTING OF REMAINING RACKS

Repeat steps 1 to 8 for each Rack in Node 2 Rack Bay 4 (NOD2D4, NOD2S4, NOD2O4, NOD2P4).

10. POST OUTFITTING

Notify MCC-H that Node 2 Rack Bay 4 outfitting activity is complete.
 Stow tools, knee braces, DDCU Parallel Connector protective caps.
 Update IMS.

NODE 2 CCAA ANTI-VIBRATION MODULE (AVM) LAUNCH BRACKET REMOVAL
(ASSY OPS/10/FIN) Page 1 of 5 pages

OBJECTIVE:

To engage the Node 2 Common Cabin Air Assembly (CCAA) Anti-Vibration Mounts (AVMs) by removing six (6) Launch Brackets that will not be reinstalled.

LOCATION:

Installed: NOD2P3

Stowed: √Inventory Management System

DURATION:

1 hour

CREW:

One

PARTS:

None

MATERIALS:

None

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 2:

3/16" Hex Head, 1/4" Drive

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

10" Ext, 1/4" Drive

Univ Joint, 1/4" Drive

1/4" to 3/8" Adapter

Ratchet, 1/4" Drive

Driver Handle, 1/4" Drive

Drawer 3:

6" Long, 3/16" Ball Tip Hex head, 3/8" Drive

REFERENCED PROCEDURE(S):

None

1. [ACCESSING NODE 2 CCAA](#)
Remove NOD2P3-01 Closeout Panel, Fasteners (six) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow.

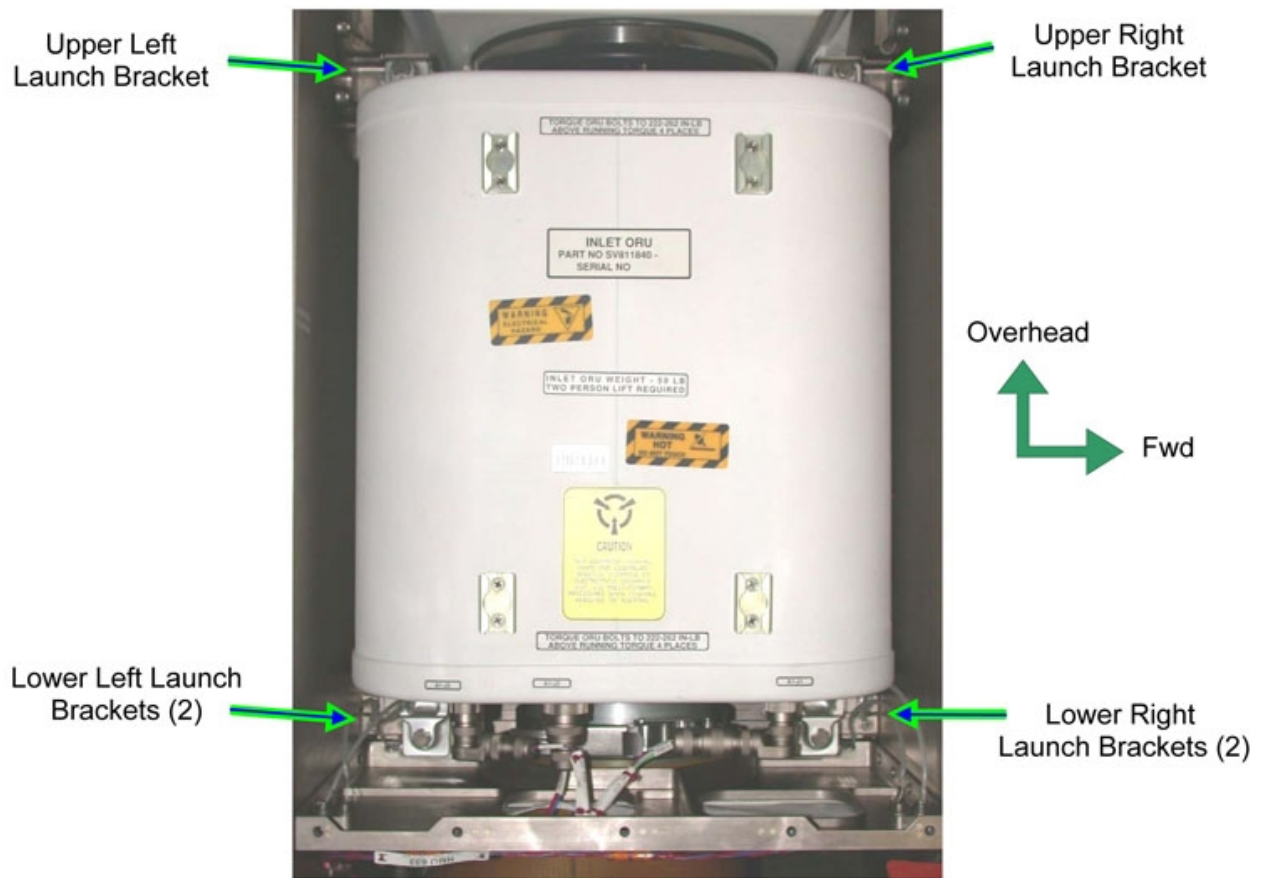


Figure 1. View of Node 2 CCAA Cabin Fan.

2. REMOVING THE CCAA UPPER AVM LAUNCH BRACKETS

NOTE

1. Fasteners A to D attach AVM Launch Bracket to midbay secondary structure while Fasteners in group E attach AVM Launch bracket to CCAA Fan mounting structure.
2. Fasteners are captive on their relevant Brackets.

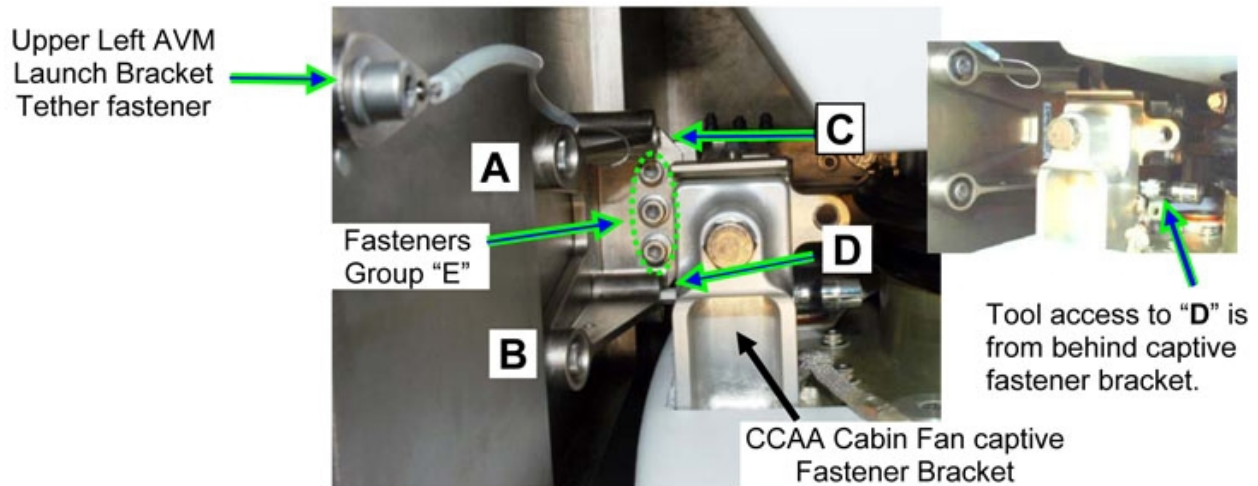


Figure 2. CCAA Upper Left AVM Launch Bracket (Upper Right Bracket is similar).

- 2.1 Unfasten CCAA Upper Left AVM Launch Bracket fasteners "A" and "B" (Ratchet, 1/4" Drive; 3/16" Hex Head, 1/4" Drive).
Refer to Figures 1, 2.
- 2.2 Unfasten CCAA Upper Left AVM Launch Bracket fastener "C" (Ratchet, 1/4" Drive; 3/16" Hex Head, 1/4" Drive).
Refer to Figures 1, 2.

NOTE

CCAA Upper Left AVM Launch Bracket fastener "D" is accessible from behind the CCAA Cabin Fan captive fastener bracket.

- 2.3 Unfasten CCAA Upper Left AVM Launch Bracket fastener "D" (Ratchet, 1/4" Drive; Univ Joint ; 3/16" Hex Head, 1/4" Drive).
Refer to Figures 1, 2.
- 2.4 Unfasten CCAA Upper Left AVM Launch Bracket fasteners (three) in Group "E" (Ratchet, 1/4" Drive; 3/16" Hex Head, 1/4" Drive; 10" Ext, 1/4" Drive).
Refer to Figures 1, 2.
- 2.5 Move the CCAA Upper Left AVM Launch Bracket upward and pull it out of the Midbay Port secondary structure using the tether.
- 2.6 Unfasten CCAA Upper Left AVM Launch Bracket Tether fastener (one) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Refer to Figures 1, 2.
Stow Launch Bracket.
- 2.7 Repeat steps 2.1 to 2.6 for CCAA Upper Right AVM Launch Bracket.

3. REMOVAL OF CABIN FAN LOWER AVM LAUNCH BRACKETS

CCAA Lower Left AVM
Launch Bracket #1 with
Group "F" fasteners (6)

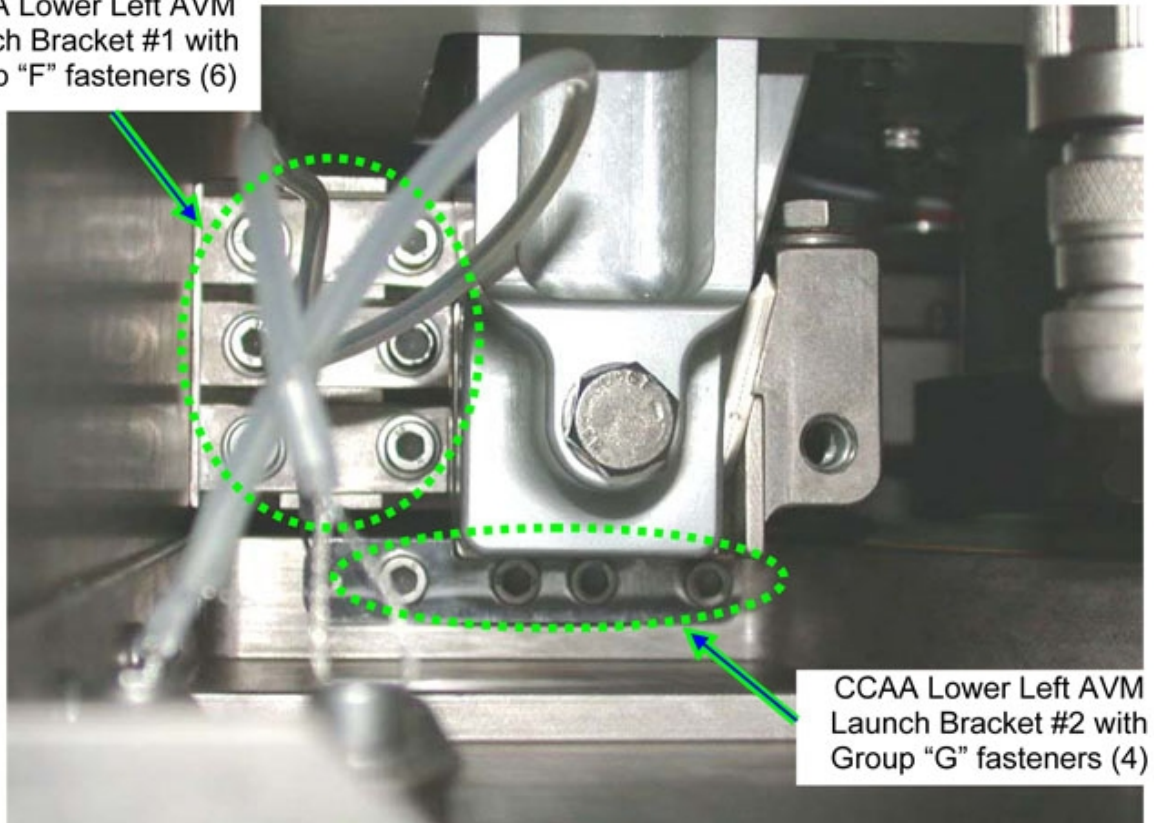


Figure 3. View of CCAA Lower Left AVM Launch Brackets.

NOTE

Fasteners are captive on their relevant brackets.

- 3.1 Remove CCAA Lower Left AVM Launch Bracket #1, Group "F" fasteners (six) (Ratchet, 1/4" Drive; 3/16" Hex Head, 1/4" Drive; 10" Ext, 1/4" Drive).
Refer to Figures 1, 3.
- 3.2 Remove CCAA Lower Left AVM Launch Bracket #1 by pulling it out of the Midbay port secondary structure using its dedicated tether.
- 3.3 Remove CCAA Lower Left AVM Launch Bracket #1 tether fastener (one) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Stow Launch Bracket.
- 3.4 Remove CCAA Lower Left AVM Launch Bracket #2, Group "G" fasteners (four) (Ratchet, 1/4" Drive; 3/16" Hex Head, 1/4" Drive; 10" Ext, 1/4" Drive).
If required use (6" Long, 3/16" Ball Tip Hex Head, 3/8" Drive; 1/4" to 3/8" Adapter)

Refer to Figures 1, 3.

- 3.5 Remove CCAA lower Left AVM Launch Bracket #2 by pulling it out of the Midbay port secondary structure using its dedicated tether.
- 3.6 Remove CCAA Lower Left AVM Launch Bracket #2 tether fastener (one) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Stow Launch Bracket.
- 3.7 Repeat steps 3.1 to 3.6 for CCAA Lower Right AVM Launch Brackets #1, #2.

4. CLOSEOUT

- 4.1 Check for FOD within 3' radius.
- 4.2 Photo document final configuration prior to closeout (DCS 760 Camera)
- 4.3 Install NOD2P3-01 Closeout Panel, Fasteners (six) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 4.4 Notify **MCC-H** of task completion.

Stow tools, Launch Brackets (six).
Update IMS.

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NODE 2 ELPS ENABLE POWER SENSING

(ASSY OPS/10A/FIN)

Page 1 of 4 pages

OBJECTIVE:

Test and Enable Node 2 Emergency Lighting Power Supplies (ELPS)

LOCATION:

Node 2 Forward, Aft Endcones

DURATION:

20 minutes (for both ELPS in Node 2)

CREW:

One

PARTS:

None

MATERIALS:

None

TOOLS:

ISS IVA Toolbox:

Drawer 2:

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

4" Ext, 1/4" Drive

Ratchet, 1/4" Drive

REFERENCED PROCEDURE(S):

None

1. [PROVIDING POWER TO NODE 2 EMERGENCY LIGHTING POWER SUPPLIES \(ELPS\)](#)

Table 1. Node 2 ELPS Power Sources

EEL Location	ELPS	Closeout Panel	Power Source [X]
Node 2 Forward	N2-ELPS-1	NOD2SD5-01	RPCM N21A4A_A RPC 11
			RPCM N22A3B_B RPC 7
Node 2 Aft	N2-ELPS-2	NOD2PD5-01	RPCM N21A4A_A RPC 12
			RPCM N22A3B_B RPC 11

√MCC-H - RPCs powering Node 2 ELPS have been Closed per Table 1

2. ACCESSING NODE 2 ELPS

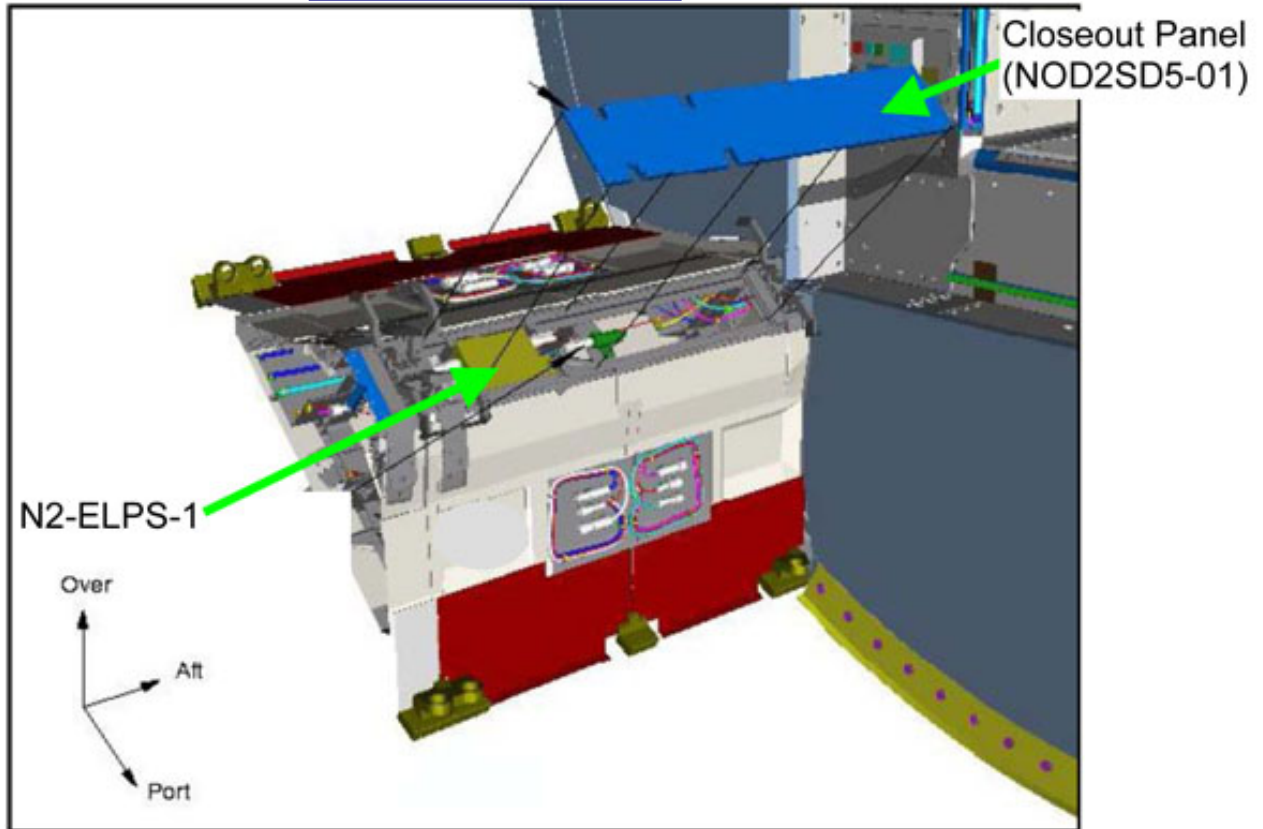


Figure 1. N2-ELPS-1 Location.

NODE 2 ELPS ENABLE POWER SENSING

(ASSY OPS/10A/FIN)

Page 3 of 4 pages

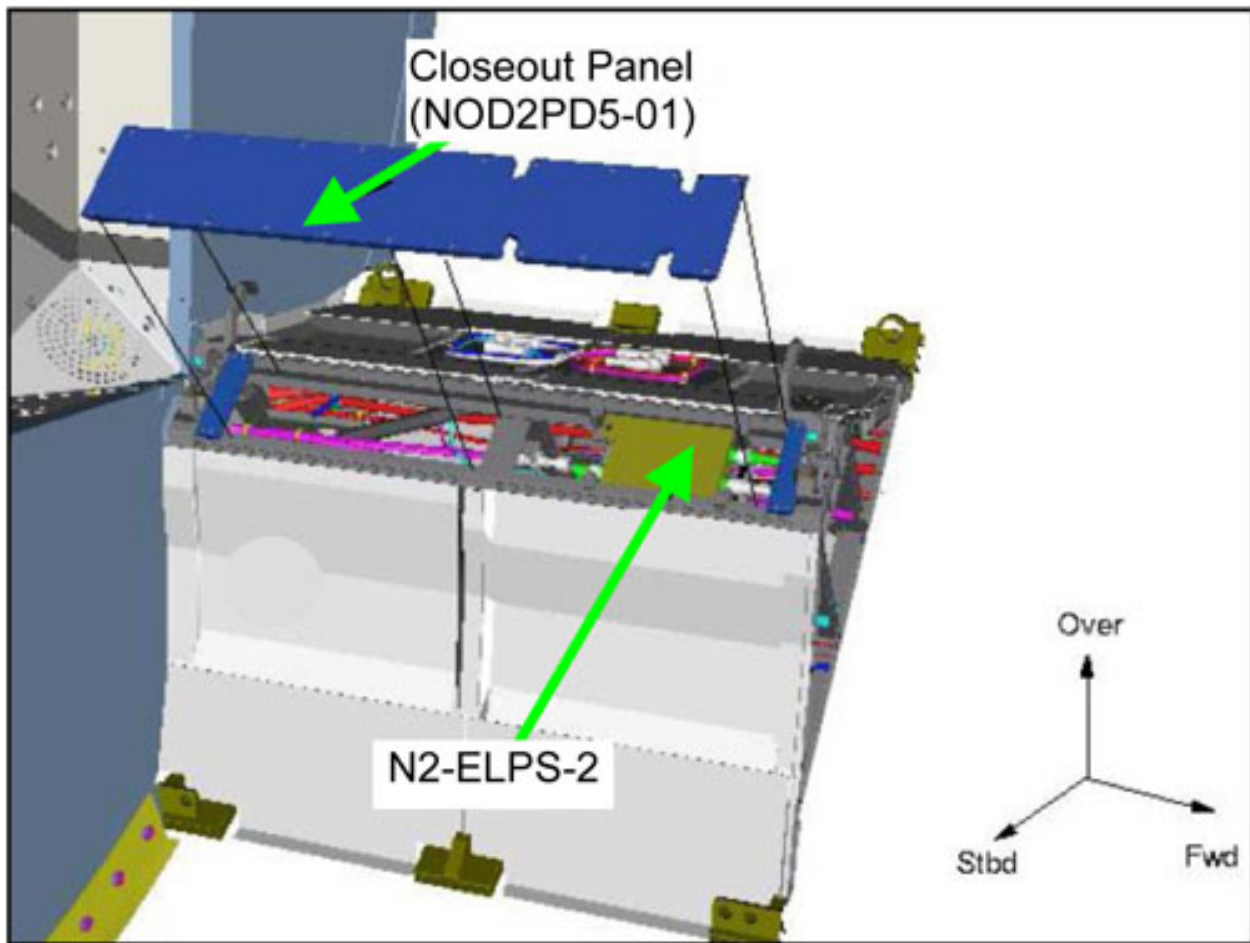


Figure 2. N2-ELPS-2 Location.

Remove Closeout Panel NOD2SD5-01(NOD2PD5-01), Fasteners (twenty-two) (Ratchet, 1/4" Drive; 1/8" Hex Head, 1/4" Drive, 4" Ext, 1/4" Drive).

Temporarily stow Closeout Panel.

Refer to Table 1 and Figures 1, 2.

3. ENABLING ELPS



Figure 3. N2-ELPS-1 Switch Location.

- ELPS 3.1 sw ELPS → TEST (must hold switch in this position)
Refer to Figure 3.
- 3.2 √ELPS LED – illuminated
 If ELPS LED – flashing
 | Notify **MCC-H**.
- EEL 3.3 √Emergency Egress Light Strip illuminates
 If the light strip does not illuminate, notify **MCC-H**.
- ELPS 3.4 sw ELPS → Enable
 Refer to Figure 3 for switch location.

4. CLOSEOUT

- 4.1 Install Closeout Panel NOD2SD5-01(NOD2PD5-01), Fasteners (twenty-two) (Ratchet, 1/4" Drive; 1/8" Hex Head, 1/4" Drive, 4" Ext, 1/4" Drive).
- 4.2 Repeat steps 2 to 4.1 for remaining ELPS.

5. POST MAINTENANCE

- 5.1 Notify **MCC-H** of task completion, stow tools.

NODE 2 PORT NPRV INSPECTION

(ASSY OPS/10A/FIN)

Page 1 of 4 pages

OBJECTIVE:

Inspect Negative Pressure Relief Valves (NPRVs) in the Node 2 Port Aft and Port Forward locations, and reseal valve if deployed during launch.

LOCATION:

Installed: NOD2P2

DURATION:

15 minutes

CREW:

One

PARTS:

None

MATERIALS:

None

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 2:

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

Driver Handle, 1/4" Drive

REFERENCED PROCEDURE(S):

None

1. ACCESSING PORT AFT NPRV

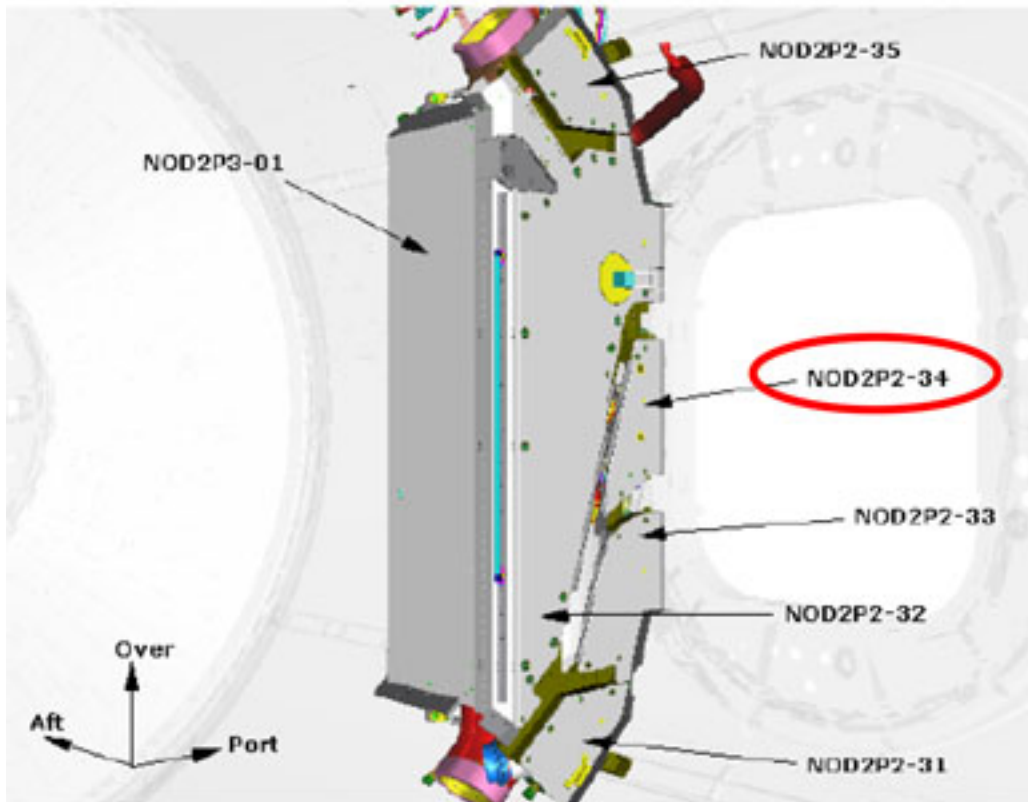


Figure 1. Node 2 Port Aft Closeout Panels.

- 1.1 Remove Closeout Panel, NOD2P2-34, Fasteners (four), (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 1.

2. INSPECTING PORT AFT NPRV



Figure 2.- Deployed NPRV.



Figure 3.- Fully Seated NPRV.

NODE 2 PORT NPRV INSPECTION

(ASSY OPS/10A/FIN)

Page 3 of 4 pages

- 2.1 Verify NPRV is fully seated.
Refer to Figures 2, 3.
- 2.2 If NPRV deployed
| Press external cover toward bulkhead until cover snaps into
| place against base assembly.

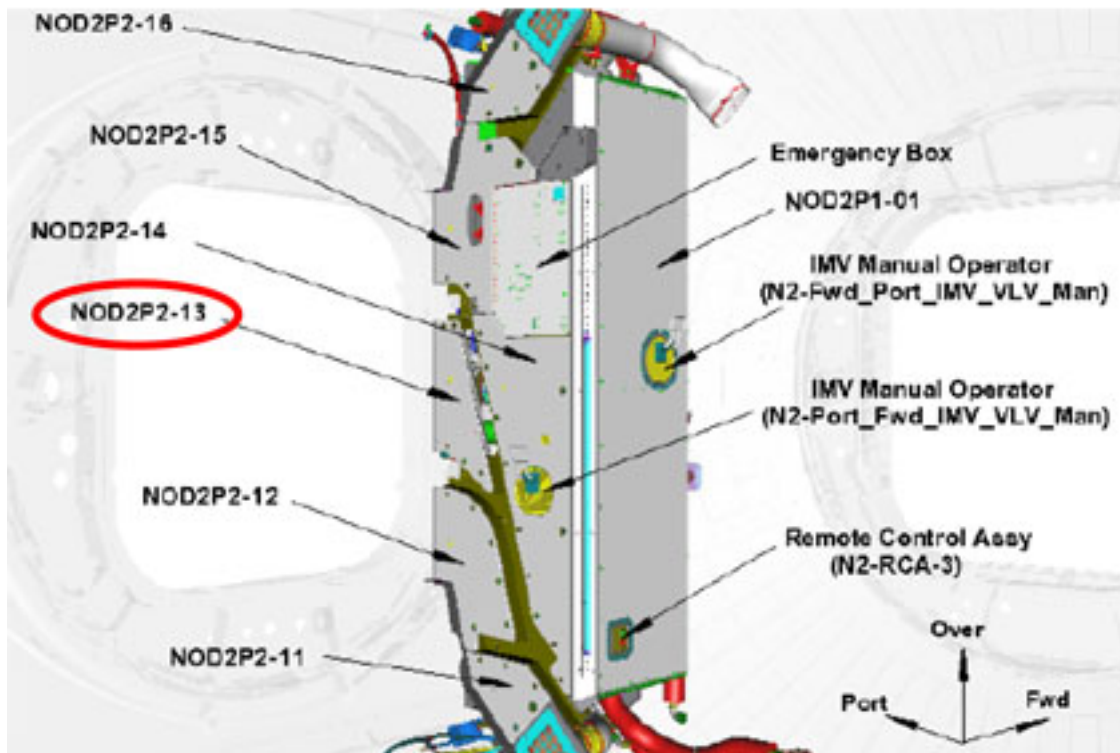


Figure 4. Node 2 Port Forward Closeout Panels.

3. ACCESSING PORT FORWARD NPRV

- 3.1 Remove Closeout Panel, NOD2P2-13, Fasteners (four), (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Refer to Figure 4.

4. INSPECTING PORT FORWARD NPRV

- 4.1 Verify NPRV fully seated
Refer to Figures 2, 3.
- 4.2 If NPRV deployed
| Press external cover toward bulkhead until cover snaps into
| place against base assembly.

5. CLOSEOUT

- 5.1 Check for FOD within 1 meter of work area.

NODE 2 PORT NPRV INSPECTION

(ASSY OPS/10A/FIN)

Page 4 of 4 pages

5.2 Photo document NPRVs (two) (DCS 760 Camera).

5.3 Reinstall Closeout Panels.
Refer to Figures 1, 4.

6. POST MAINTENANCE

6.1 Notify **MCC-H** of task completion

6.2 Stow tools and equipment.

NODE 2 ITCS SAMPLING ADAPTER INSTALLATION

(ASSY OPS/10A/FIN)

Page 1 of 4 pages

OBJECTIVE:

Install NOD2D4 MTL ITCS Sampling Adapter and the NOD2O4 LTL ITCS Sampling Adapter. Procedure assumes launch bolts have been removed from the NOD2O4-01 and NOD2D4-01 Closeout Panels.

LOCATION:

Installed: NOD2D4 (MTL), NOD2O4 (LTL)

Stowed: √Inventory Management System

DURATION:

30 minutes

CREW:

One

PARTS:

ITCS Sampling Adapter (two) P/N 683-56147-13

DDCU Rack Protective Plate (two) P/N SEG33115771-701

MATERIALS:

None

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 2:

Driver Handle, 1/4" Drive

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

REFERENCED PROCEDURE(S):

None



Figure 1. ITCS Sampling Adapter.

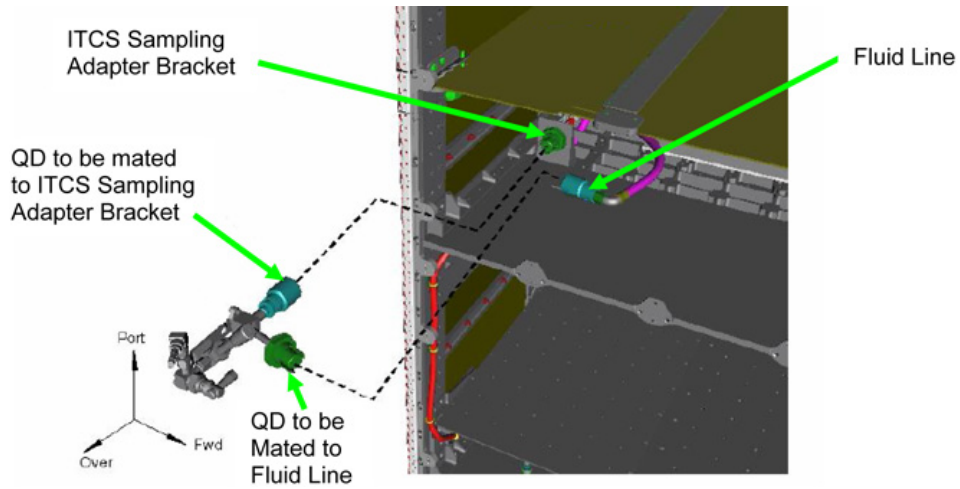


Figure 2. ITCS Sampling Adapter Installation.

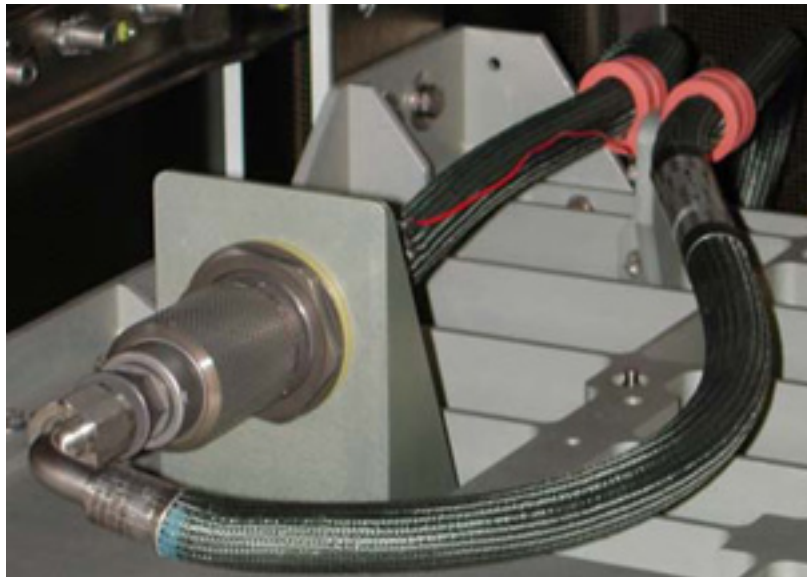


Figure 3. ITCS Sampling Adapter Install Location in Launch Configuration.

1. [OPENING LTL\(MTL\) SFCA](#)
 If installing sample tool at NOD2O4
 | Perform step 1 for LTL.

 If installing sample tool at NOD2D4
 | Perform step 1 for MTL.

PCS

Node 2: TCS: LTL(MTL) SFCA

Node2 LTL(MTL) SFCA Commands

'Commands'

'LTL(MTL) SFCA'

cmd CLC – Inh (√ – Inh)

'Mod Vlv'
'Direct Vlv'

input drive voltage - - 5V
input drive duration - 2 1s

Verify Mod Vlv dP < 7 kPa

2. INSTALLING NOD2D4 (NOD2O4) ITCS SAMPLING ADAPTER

- 2.1 Remove NOD2D4-01 (NOD2O4-01) Closeout Panel, Fasteners (four) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 2.2 Record ITCS Sampling Adapter serial number:
NOD2D4 S/N: _____
NOD2O4 S/N: _____
- 2.3 √ITCS Sampling Adapter Shutoff Valve in closed position
- 2.4 Fluid Line ←|→ ITCS Sampling Adapter Bracket
Refer to Figures 1 to 3.
- 2.5 Protective Caps (two) ←|→ ITCS Sampling Adapter QDs
Temporarily stow Protective Caps.
- 2.6 ITCS Sampling Adapter →|← ITCS Sampling Adapter Bracket
Fluid Line →|← ITCS Sampling Adapter
- 2.7 √Insulation installed on ITCS Sampling Adapter Luer Lock Interface, Metering Valve

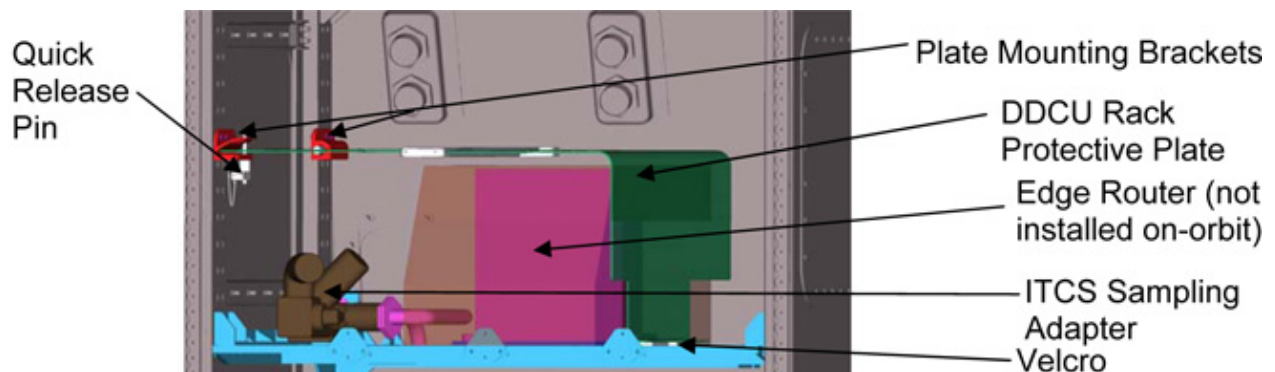


Figure 4. DDCU Rack Protective Plate Installation.

- 3. ENABLING LTL(MTL) SFCA CLC
If installing sample tool at NOD2O4
| Perform step 3 for LTL.

If installing sample tool at NOD2D4
| Perform step 3 for MTL.

Node 2: TCS: LTL(MTL) SFCA

Node2 LTL(MTL) SFCA Commands

'Commands'

'LTL(MTL) SFCA'

cmd CLC – Ena (√ – Ena)

4. INSTALLING DDCU RACK PROTECTIVE PLATE

- 4.1 Unfold DDCU Rack Protective Plate and slide plate lock to LOCKED position.
- 4.2 Remove Quick Release Pin from front Mounting Bracket. Slide DDCU Rack Protective Plate into front, rear Mounting Brackets.
- 4.3 Secure DDCU Rack Protective Plate onto Velcro. Install Quick Release Pin on front Mounting Bracket.
- 4.4 Photo document final configuration prior to Closeout (DCS 760 Camera).
- 4.5 Install NOD2D4-01(NOD2O4-01) Closeout Panel, Fasteners (four) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive)

5. POST-MAINTENANCE

- 5.1 ISS ↓ **MCC-H** of task completion, NOD2D4, NOD2O4 ITCS Sampling Adapter S/Ns.
- 5.2 Stow Protective Caps (two), plugs (two) in ITCS Caps and Plugs Ziplock Bag.

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

Page 1 of 16 pages

OBJECTIVE:

Prepare Node 2 closeout panels for nominal on-orbit ops by removing Launch Restraint Bolts. To help the crew keep track of the removed bolts/washers, a 6X6 Ziplock Bag has been provided and labeled for each closeout panel. Each bag has also been labeled with the expected number of bolts to be removed. As the bolts from each panel are removed they will be placed in the corresponding Ziplock Bag.

LOCATION

Installed: Node 2

Stowed: √Inventory Management System

DURATION

Fwd Cone (Bay 0): 25 minutes

Alcove (Bay 1): 60 minutes

Radial Beams (Bay 2): 55 minutes

Midbay (Bay 3): 60 minutes

Avionics Rack (Bay 4): 30 minutes

Aft Cone (Bay 6): 50 minutes

CREW

One

PARTS

None

MATERIALS

6X6 Ziplock Bags labeled for each closeout panel

TOOLS:

DCS 760 Camera

Driver Drill

ISS IVA Toolbox:

Drawer 2:

Hex Shank, 1/4" Drive

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

3/16" Hex Head, 1/4" Drive [Midbay]

1/2" Socket, 1/4" Drive [Fwd and Aft End Cone]

Driver Handle, 1/4" Drive [Fwd and Aft End Cone]

REFERENCED PROCEDURE(S)

None

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

Page 2 of 16 pages

NOTE

1. Fasteners covered with Kapton tape will not be removed (i.e. captive fasteners and structural bolts).
2. There are some areas where Kapton tape could not be placed over protruding fasteners, but fasteners in those areas will also not be removed. Extra pictures are included in this procedure to specify these fasteners.
3. Standoffs have no Launch Restraint Bolts.

1. REMOVING LAUNCH RESTRAINT BOLTS FROM FWD CONE (BAY 0)

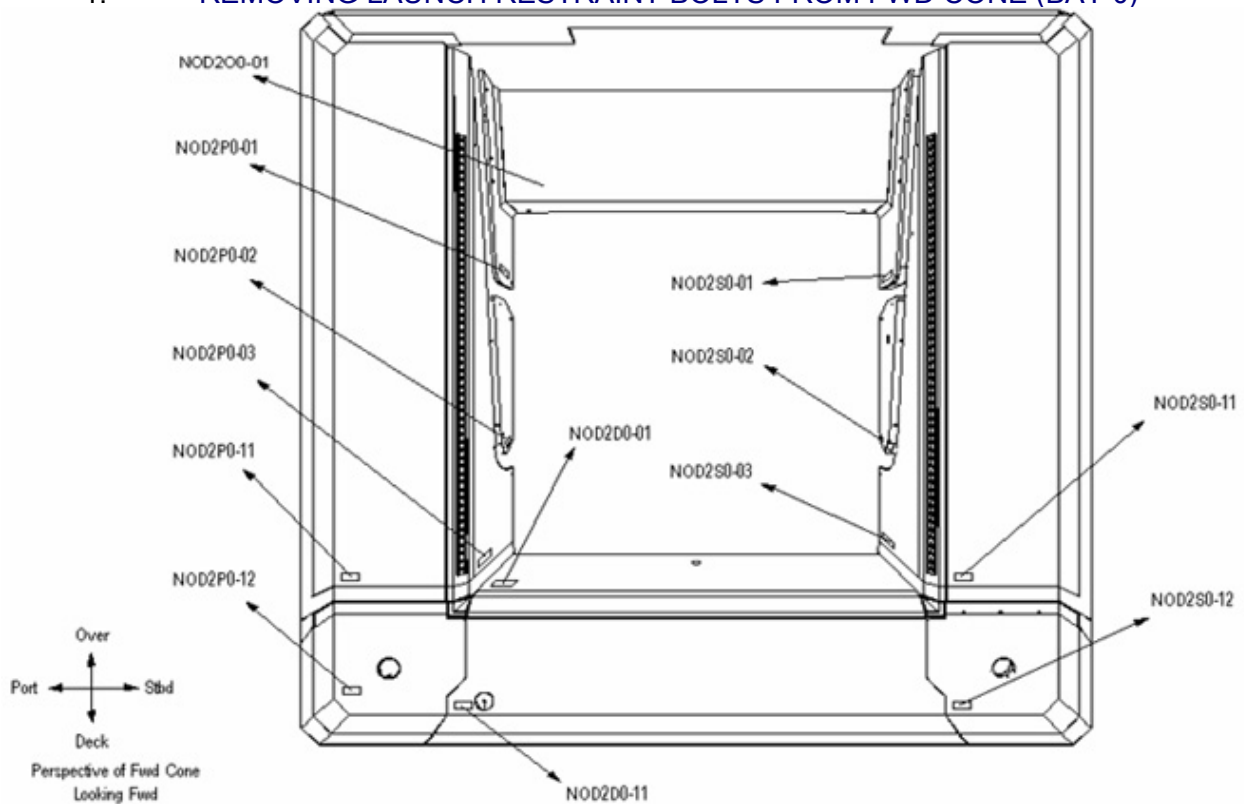


Figure 1. Node 2 Forward Cone (Looking Forward).

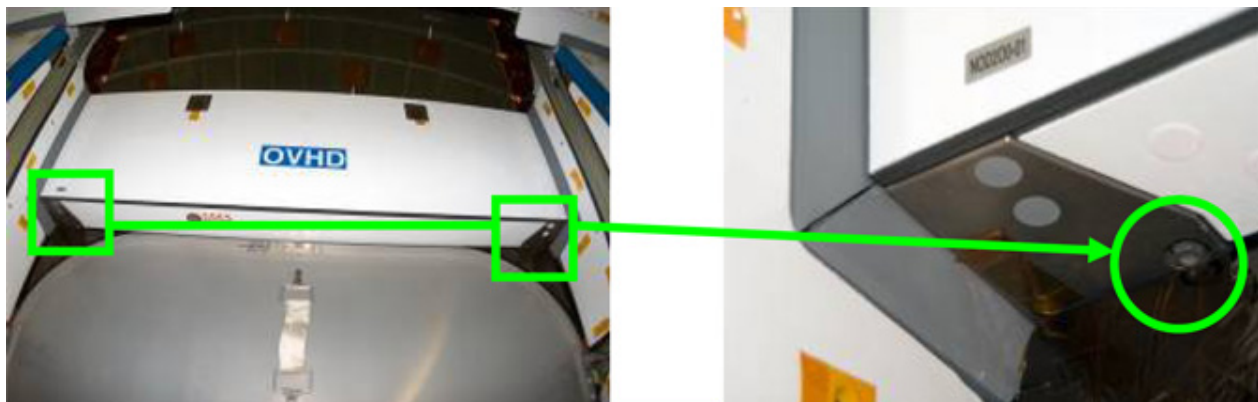


Figure 2. Node 2 Forward Cone 1/2" Socket Launch Restraint Bolt Location

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

Page 3 of 16 pages

Table 1. Node 2 Forward Cone Launch Restraint Bolt Locations (5/32" Hex Head interface)

Location	Closeout Panel	Launch Bolts
Fwd Cone Deck	NOD2D0-01	0
"	NOD2D0-11	0
"	NOD2P0-12	0
"	NOD2S0-12	0
Fwd Cone Port	NOD2P0-01	2
"	NOD2P0-02	2
"	NOD2P0-03	4
"	NOD2P0-11	3
Fwd Cone Starboard	NOD2S0-01	2
"	NOD2S0-02	2
"	NOD2S0-03	4
"	NOD2S0-11	3
	TOTAL	22

Table 2. Node 2 Forward Cone Launch Restraint Bolt Location (5/32" Hex Head, 1/4 Drive and 1/2" Socket)

Location	Closeout Panel	Launch bolts
Fwd Cone Overhead	NOD2O0-01	6

- 1.1 Remove Launch Restraint Bolts (twenty-two) from Node 2 Fwd Cone Closeout Panels (Driver Drill; Hex Shank, 1/4" Drive; 5/32 Hex Head, 1/4 Drive).
Refer to Figure 1, Table 1.
- 1.2 Remove Launch Restraint Bolts (six) from NOD2O0-01 (Driver Drill; Hex Shank, 1/4" Drive; 5/32 Hex Head, 1/4 Drive; 1/4" Driver Handle, 1/4 Drive; 1/2" Socket, 1/4 Drive).
Stow Bolts and Washers in labeled 6X6 Ziplock Bag.
Photo document final configuration (DCS 760 Camera).
Refer to Figure 1 and 2, Table 2.

2. REMOVING LAUNCH RESTRAINT BOLTS FROM ALCOVE (BAY 1)

NOTE

There is Kapton tape placed on bolts that will not be removed (i.e. captive fasteners and structural bolts).

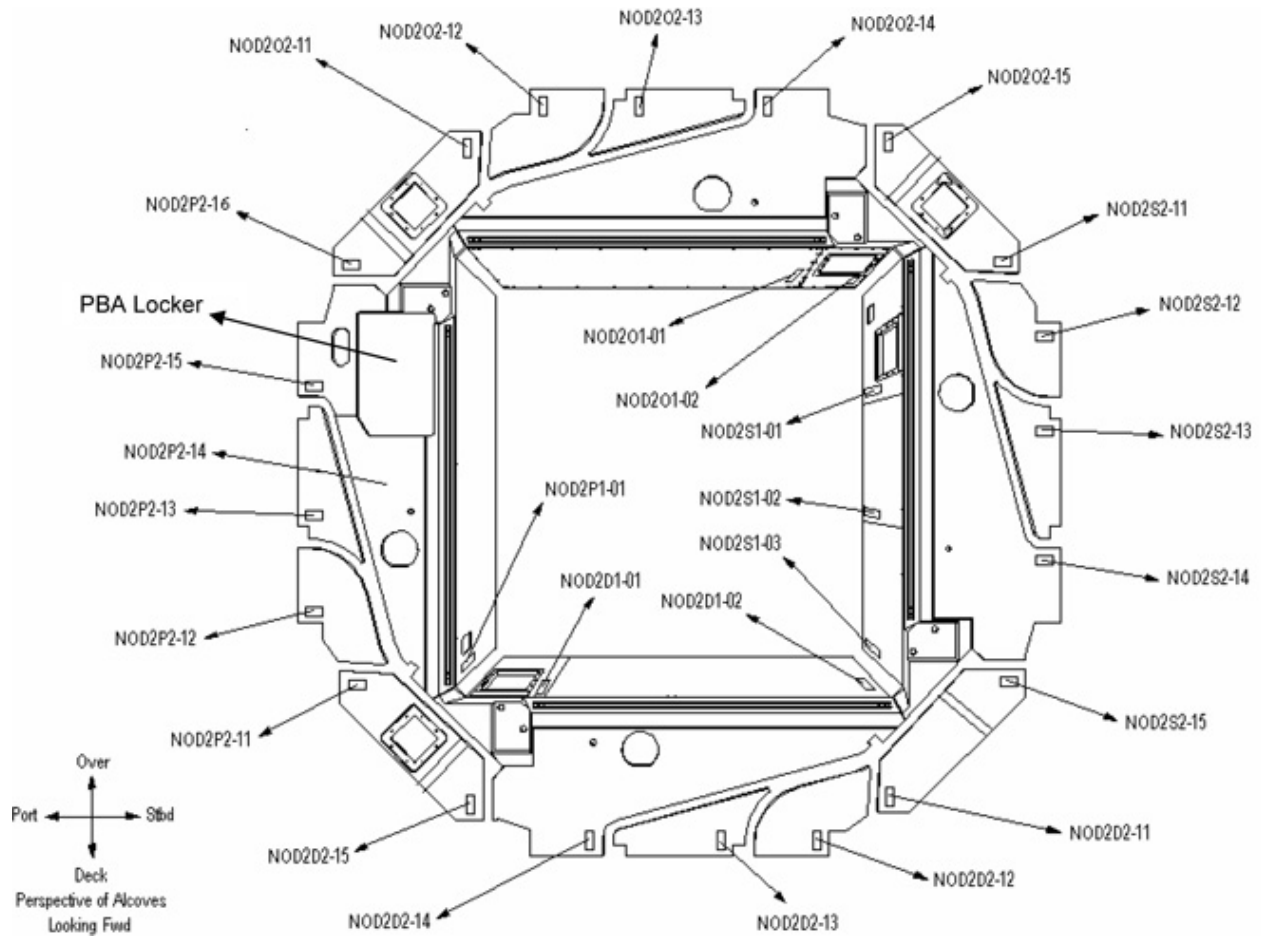


Figure 3. Node 2 Alcove (Looking Forward).

Launch Restraint Bolts under cloth closeouts on closeout panel. May also be true for overhead starboard and port.

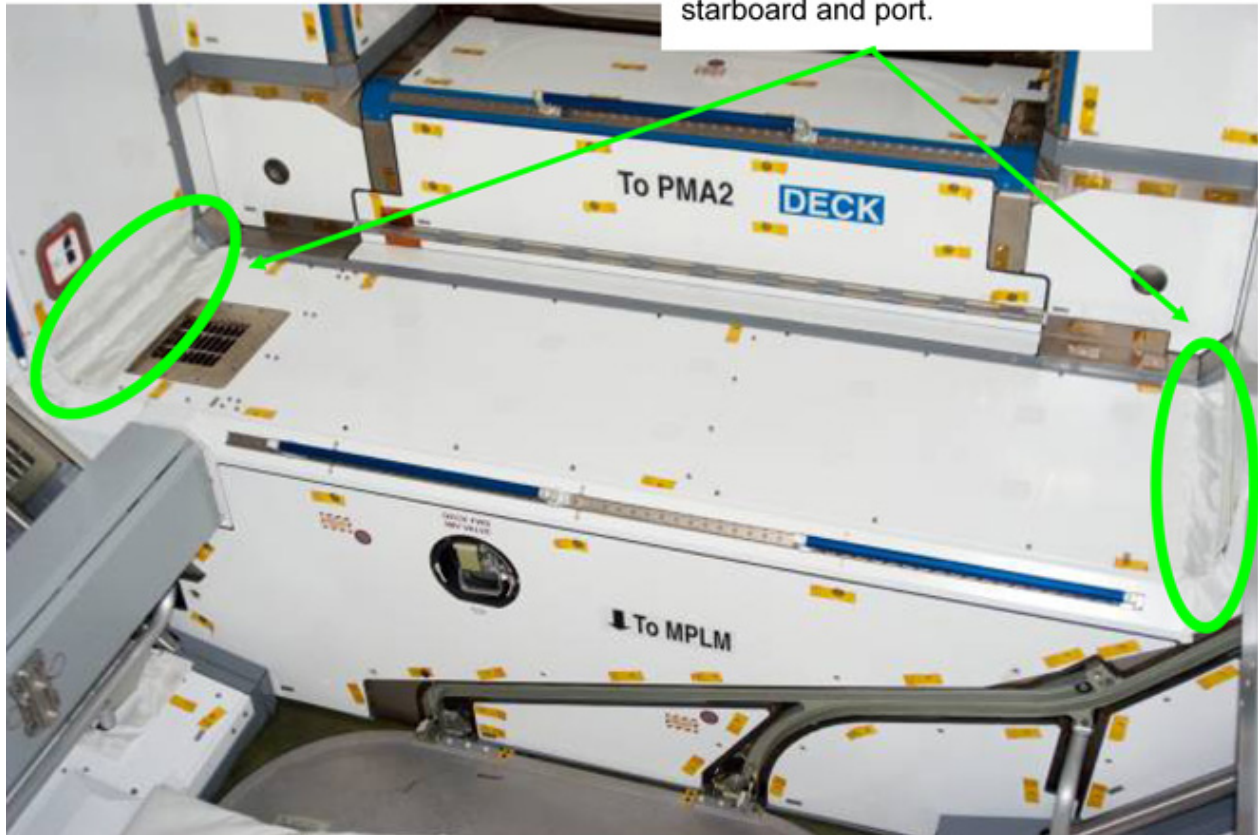


Figure 4. Node 2 Alcove (Looking Forward) pointing out other locations of Launch Restraint Bolts.

Table 3. Node 2 Alcove Launch Restraint Bolt Locations (5/32" Hex Head Interface)

Location	Closeout Panel	Launch Bolts
Alcove Deck	NOD2D1-01	16
"	NOD2D1-02	29
"	NOD2D2-11	2
"	NOD2D2-12	2
"	NOD2D2-13	1
"	NOD2D2-14	5
"	NOD2D2-15	1
Alcove Overhead	NOD2O1-01	27
"	NOD2O1-02	16
"	NOD2O2-11	1
"	NOD2O2-12	2
"	NOD2O2-13	1
"	NOD2O2-14	5
"	NOD2O2-15	1
Alcove Port	NOD2P1-01	32
"	NOD2P2-11	2

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

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Continuation of Table ...

"	NOD2P2-12	2
"	NOD2P2-13	1
"	NOD2P2-14	3
"	NOD2P2-15	1
"	PBA Locker	5
"	NOD2P2-16	2
Alcove Starboard	NOD2S1-01	9
"	NOD2S1-02	4
"	NOD2S1-03	22
"	NOD2S2-11	2
"	NOD2S2-12	2
"	NOD2S2-13	1
"	NOD2S2-14	5
"	NOD2S2-15	2
	TOTAL	204

- 2.1 Remove Launch Restraint Bolts (two hundred four) from Node 2 Alcove (Driver Drill; Hex Shank; 5/32" Hex Head, 1/4" Drive).
Stow Bolts and Washers in labeled 6X6 Ziplock Bag.
Photo document final configuration (DCS 760 Camera).
Refer to Figure 3, 4, Table 3.

3. REMOVING LAUNCH RESTRAINT BOLTS FROM RADIAL BEAMS (BAY 2)

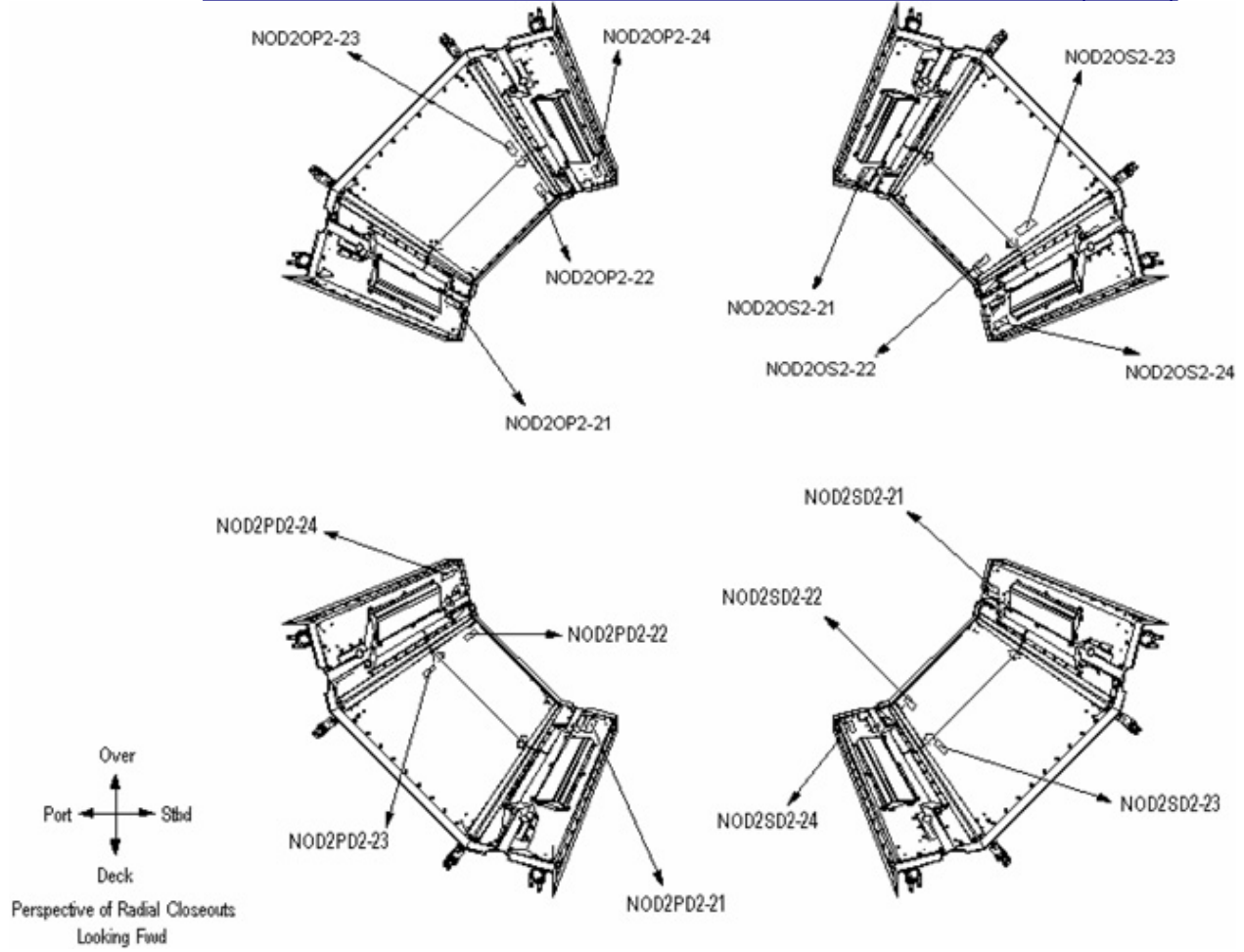


Figure 5. Node 2 Radial Bays (Looking Forward).

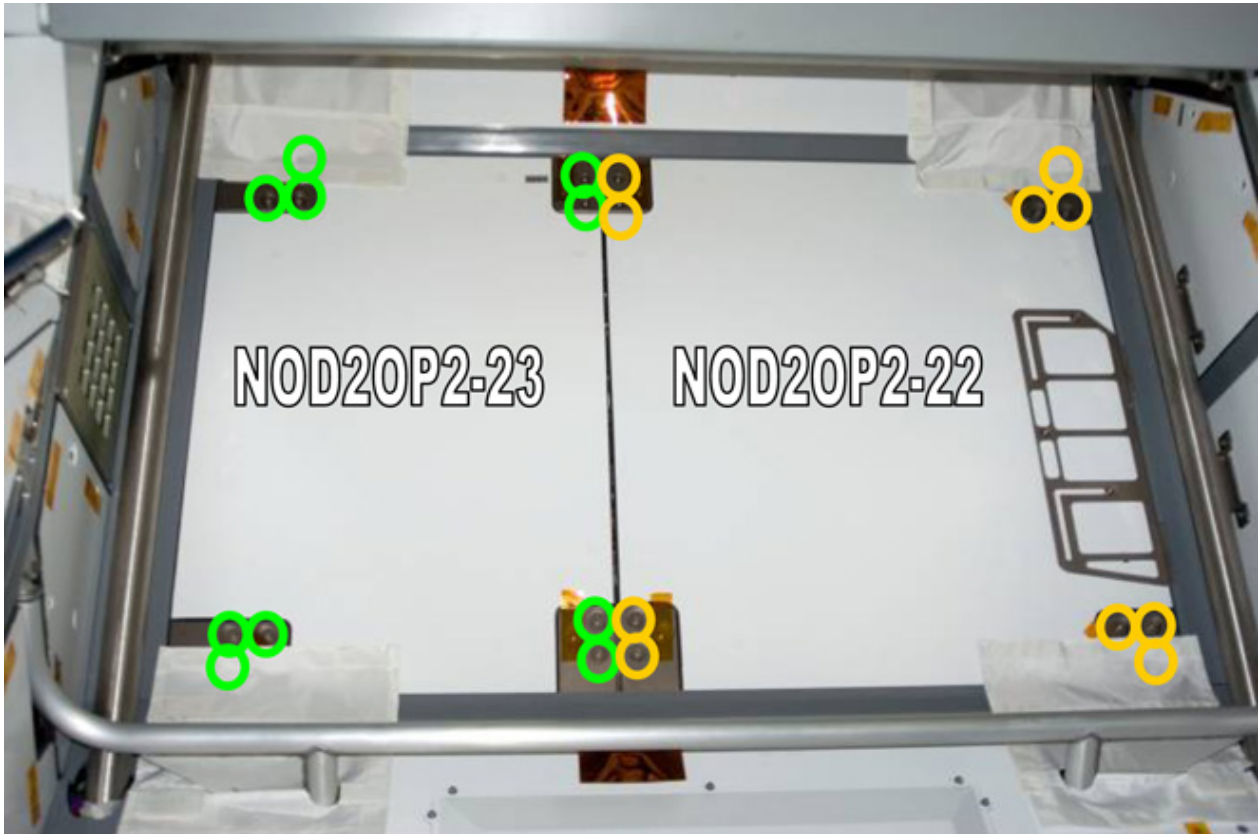


Figure 6. Radial bay looking Overhead-port. Locations of bolts apply to all other appropriate areas in Radial bay.



Figure 7. Radial Bay looking Overhead-port. Locations of bolts apply to all other appropriate areas in Radial Bay.

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

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Table 4. Node 2 Alcove Radial Bays Launch Bolt Locations (5/32" Hex Head Interface)

Location	Closeout Panel	Launch Bolts
Radial Port Deck	NOD2PD2-21	10
"	NOD2PD2-22	10
"	NOD2PD2-23	10
"	NOD2PD2-24	10
"	Footbridge	0
Radial Port Overhead	NOD2OP2-21	10
"	NOD2OP2-22	10
"	NOD2OP2-23	10
"	NOD2OP2-24	10
"	Footbridge	0
Radial Starboard Overhead	NOD2OS2-21	10
"	NOD2OS2-22	10
"	NOD2OS2-23	10
"	NOD2OS2-24	10
"	Footbridge	0
Radial Starboard Deck	NOD2SD2-21	10
"	NOD2SD2-22	10
"	NOD2SD2-23	10
"	NOD2SD2-24	10
"	Footbridge	0
	TOTAL	160

- 3.1 Remove Launch Restraint Bolts (one hundred sixty) from Node 2 Radial Beams (Driver Drill; Hex Shank, 1/4" Drive; 5/32 Hex Head, 1/4" Drive) Stow Bolts and Washers in labeled 6X6 Ziplock Bag.
Photo document final configuration (DCS 760 Camera).
Refer to Figures 5, 6, 7, and Table 4.

4. REMOVING LAUNCH RESTRAINT BOLTS FROM MIDBAY (BAY 3)

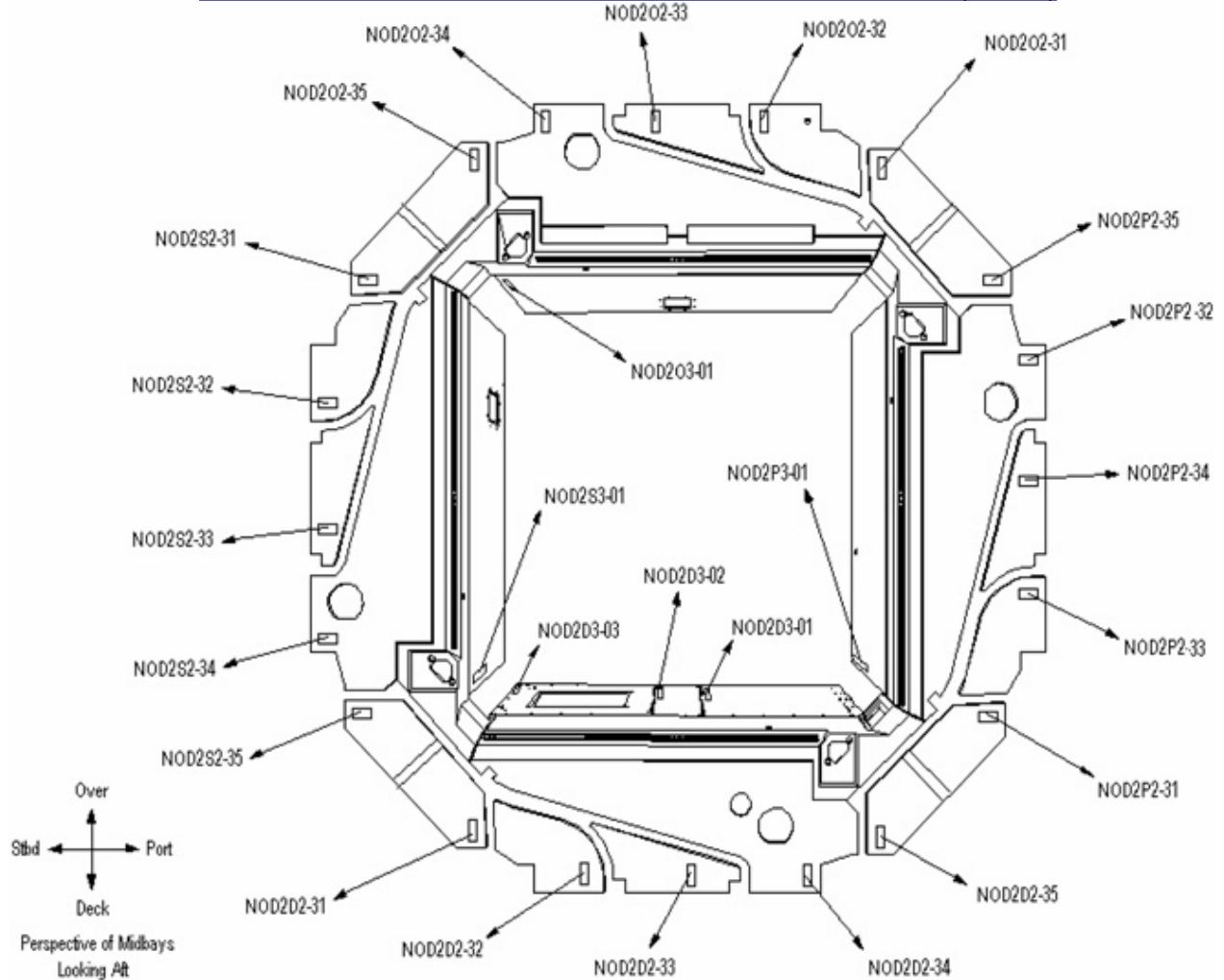


Figure 8. Node 2 Midbay Looking Aft

NOTE
 Must remove Brown Tape before removing the Launch Restraint Bolts.

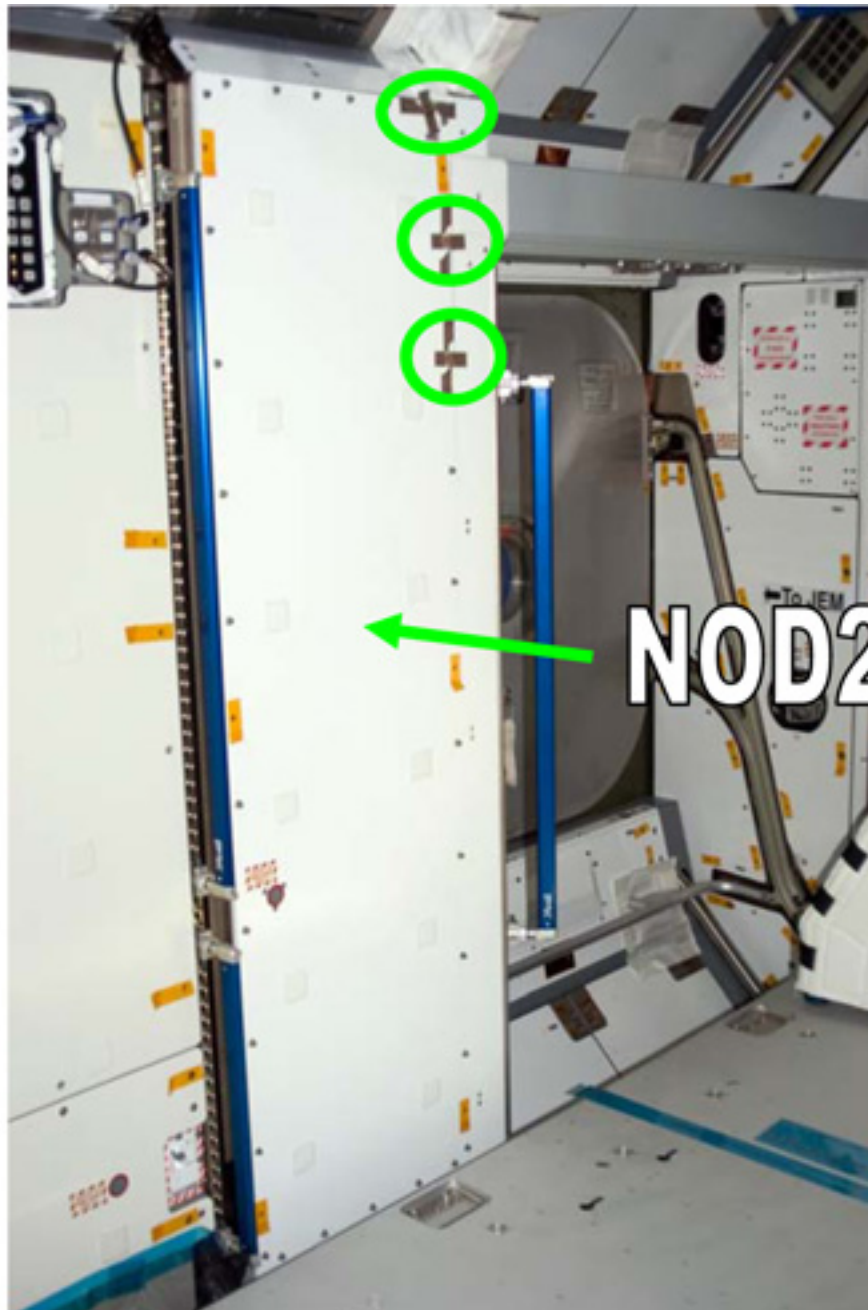


Figure 9. Node 2 Midbay Closeout Panel NOD2P3-01, Identifying three locations of Launch Restraint Bolts behind brown Tape.

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

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Table 5. Node 2 Midbay Launch Restraint Bolts Locations (3/16" Hex Head Interface)

Location	Closeout Panel	Launch Bolts
Midbay Deck	NOD2D2-31	2
"	NOD2D2-32	3
"	NOD2D2-33	2
"	NOD2D2-34	8
"	NOD2D2-35	2
"	NOD2D3-01	22
"	NOD2D3-02	20
"	NOD2D3-03	22
Midbay Overhead	NOD2O2-31	2
"	NOD2O2-32	3
"	NOD2O2-33	2
"	NOD2O2-34	6
"	NOD2O2-35	2
"	NOD2O3-01	31
Midbay Port	NOD2P2-31	1
"	NOD2P2-32	3
"	NOD2P2-33	0
"	NOD2P2-34	2
"	NOD2P2-35	2
"	NOD2P3-01	31
Midbay Starboard	NOD2S2-31	2
"	NOD2S2-32	3
"	NOD2S2-33	2
"	NOD2S2-34	6
"	NOD2S2-35	2
"	NOD2S3-01	30
	TOTAL	211

- 4.1 Remove launch restraint bolts (two hundred eleven) from Node 2 Midbay (Driver Drill; Hex Shank, 1/4" Drive; 3/16" Hex Head, 1/4" Drive) Stow Bolts and Washers in labeled 6X6 Ziplock Bag.
 Photo document final configuration (DCS 760 Camera).
 Refer to Figure 8, 9, and Table 5

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

5. REMOVING LAUNCH RESTRAINT BOLTS FROM AVIONICS RACK (BAY 4)

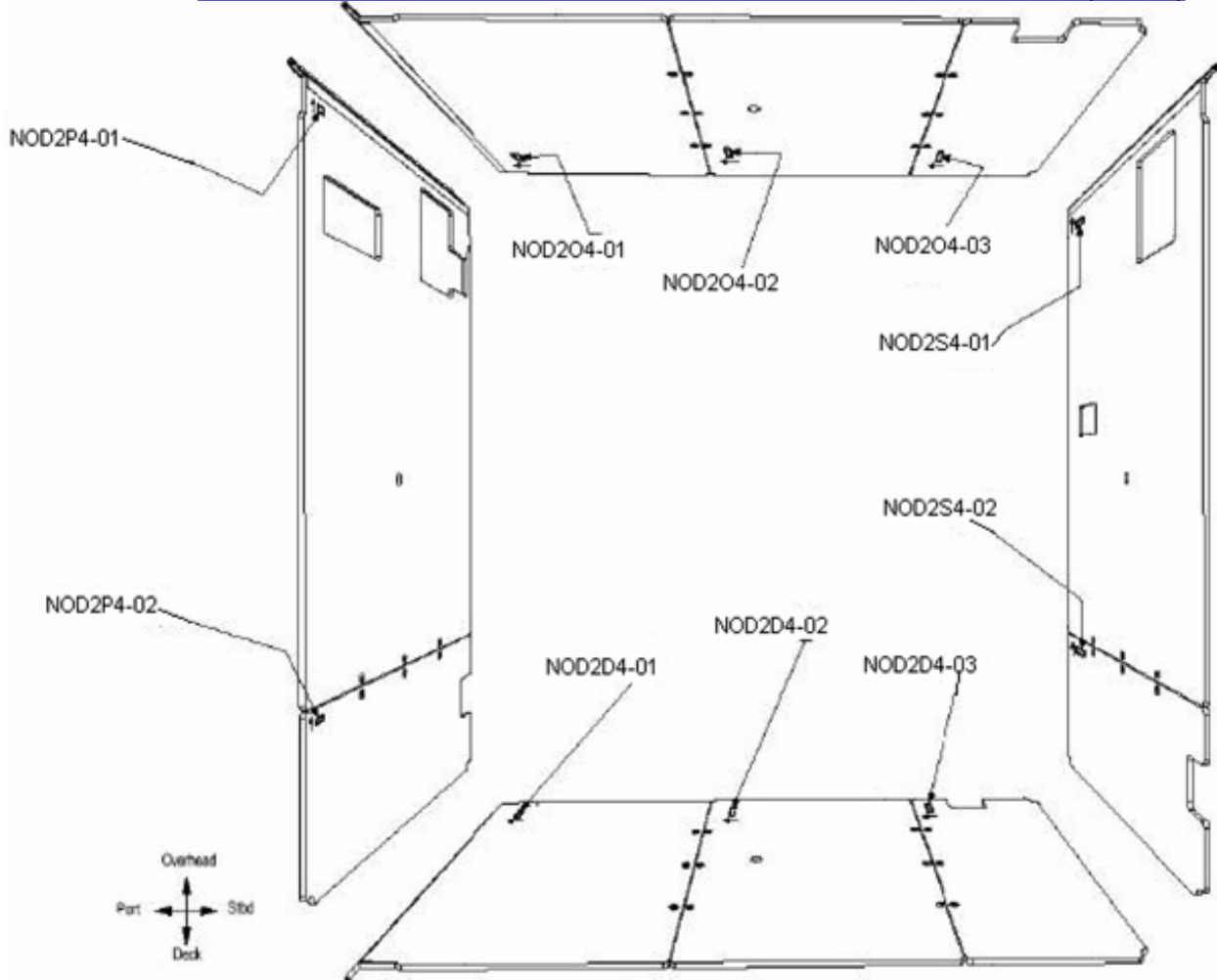


Figure 10. Node 2 Avionics Rack Looking Forward.

Table 6. Node 2 Avionics Rack Launch Bolt Locations (5/32" Hex Head interface)

Location	Closeout Panel	Launch Bolts
Deck Rack	NOD2D4-01	5
"	NOD2D4-02	8
"	NOD2D4-03	7
Overhead Rack	NOD2O4-01	5
"	NOD2O4-02	8
"	NOD2O4-03	7
Port Rack	NOD2P4-01	8
"	NOD2P4-02	7
Starboard Rack	NOD2S4-01	12
"	NOD2S4-02	7
	TOTAL	74

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

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- 5.1 Remove Launch Restraint Bolts (seventy-four) from Node 2 Avionics Rack (Driver Drill; Hex Shank, 1/4" Drive; 5/32 Hex Head, 1/4" Drive) Stow Bolts and Washers in labeled 6 x 6 Ziplock Bag. Photo document final configuration (DCS 760 Camera). Refer to Figure 10, Table 6.

6. REMOVING LAUNCH RESTRAINT BOLTS FROM AFT CONE (BAY 6)

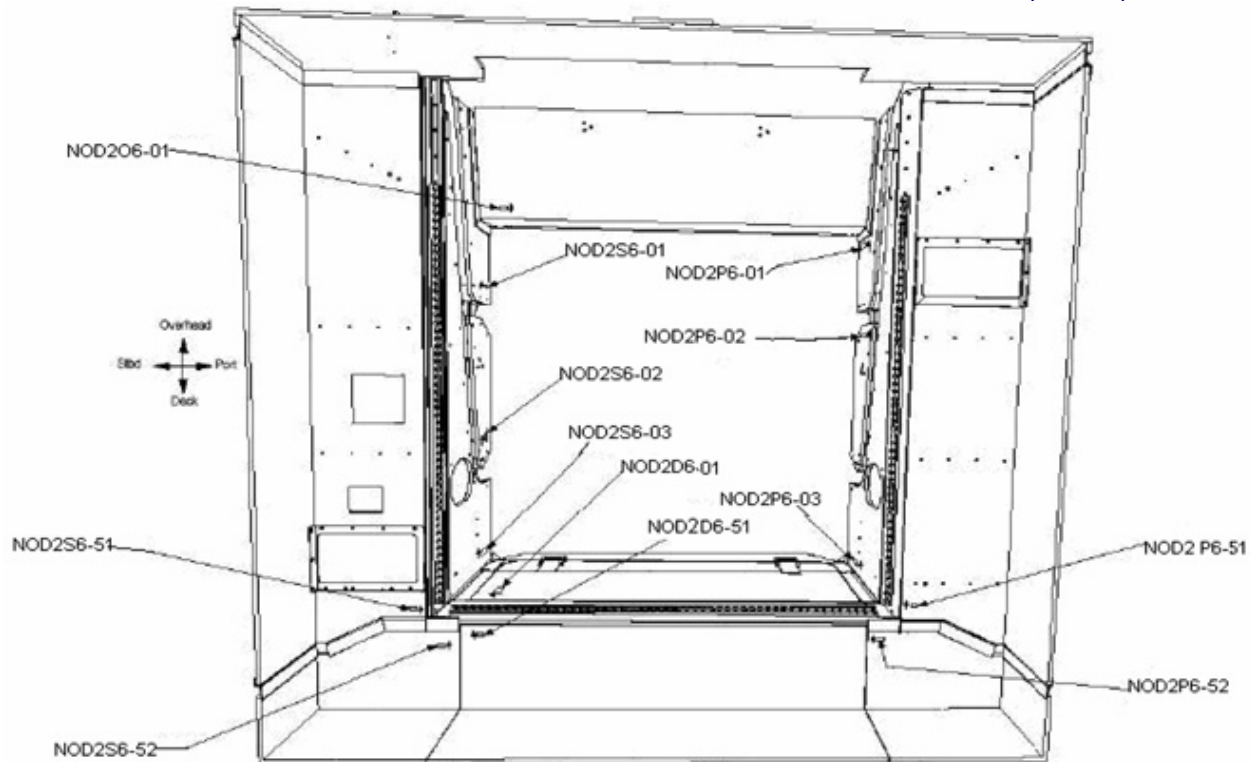


Figure 11. Node 2 Aft Cone Looking Aft.

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

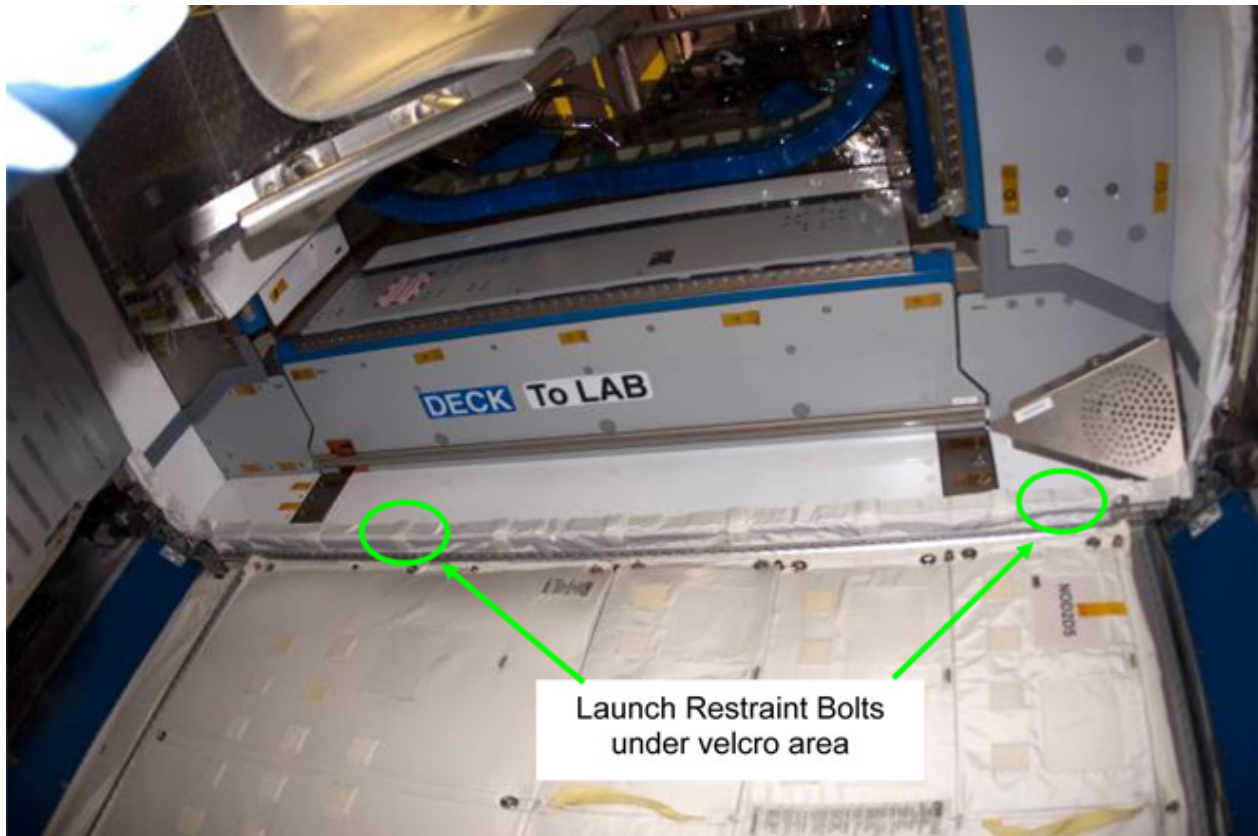


Figure 12. Node 2 Aft Cone Looking Aft - Deck.

Table 7. Node 2 Aft Cone Launch Restraint Bolt Locations (5/32" Hex Head interface)

Location	Closeout Panel	Launch Bolts
Aft Cone Deck	NOD2D6-01	4
"	NOD2D6-51	8
"	NOD2D6-52	0
"	NOD2S6-52	6
Aft Cone Port	NOD2P6-01	3
"	NOD2P6-02	2
"	NOD2P6-03	6
"	NOD2P6-51	8
Aft Cone Starboard	NOD2S6-01	3
"	NOD2S6-02	2
"	NOD2S6-03	6
"	NOD2S6-51	8
	TOTAL	56

Table 8. Node 2 Aft Cone Launch Restraint Bolt Location (5/32" Hex Head and 1/2" Socket interface)

Location	Closeout Panel	Launch bolts
Aft Cone Overhead	NOD2O6-01	6

NODE 2 LAUNCH RESTRAINT BOLTS REMOVAL

(ASSY OPS/10A/FIN)

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- 6.1 Remove Launch Restraint Bolts (fifty-six) from Node 2 Aft Cone (Driver Drill; Hex Shank, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Refer to Figures 11, 12, and Table 7
- 6.2 Remove Launch Restraint Bolts (six) from NOD206-01 (Driver Drill; Hex Shank, 1/4" Drive; 5/32" Hex Head; 1/2" Socket, 1/4" Drive; Driver Handle, 1/4" Drive).
Stow Bolts and Washers in labeled 6X6 Ziplock Bag
Photo document final configuration (DCS 760 Camera).
Refer to Figures 2, 11, and Table 8

7. POST MAINTENANCE

- 7.1 Remove all Kapton Tape from remaining bolts.
- 7.2 Stow tools.
- 7.3 Notify **MCC-H** of task completion

NODE 2 LTL PUMP PACKAGE ASSEMBLY (PPA) LAUNCH BRACKET REMOVAL (ASSY OPS/10A/FIN)

Page 1 of 5 pages

OBJECTIVE:

Enable the Node 2 Low Temperature Loop (LTL) Pump Package Assembly (PPA) Anti-Vibration Mountings (AVMs), by removing launch brackets that will not be reinstalled.

LOCATION

Installed: NOD2D1

Stowed: √Inventory Management System

DURATION

1 hour 30 minutes

CREW

One

PARTS

None

MATERIALS

None

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 1:

5/16" Combination Wrench

Drawer 2:

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

5/16" Socket, 1/4" Drive

1/2" Socket, 1/4" Drive

2" Ext, 1/4" Drive

4" Ext, 1/4" Drive

6" Ext, 1/4" Drive

10" Ext, 1/4" Drive

Ratchet, 1/4" Drive

Driver Handle, 1/4" Drive

Drawer 3:

Inspection Mirror

REFERENCED PROCEDURE(S)

None

1. [ACCESSING LTL PPA LAUNCH BRACKETS](#)
 - 1.1 Remove Closeout Panels NOD2D1-02 Fasteners (six), NOD2D2-12 Fasteners (four) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow.

2. REMOVING DECK ALCOVE SHEAR FRAME

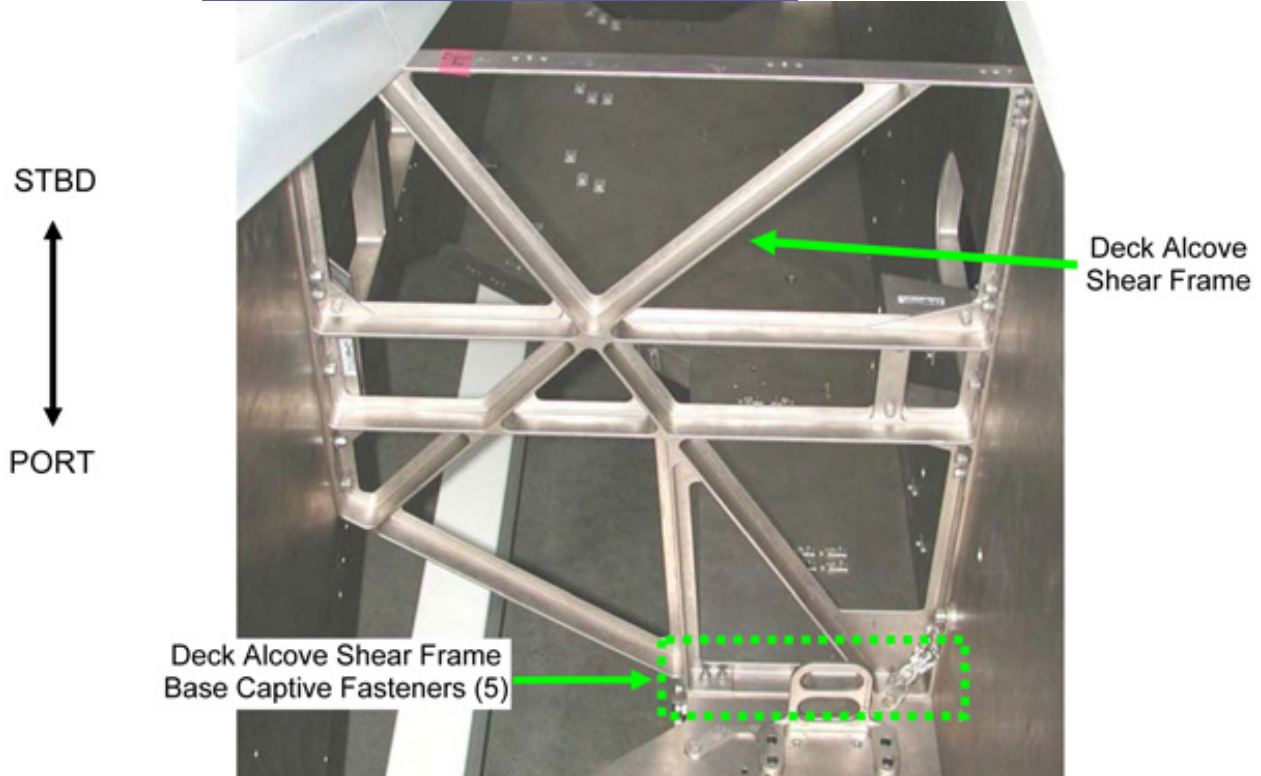


Figure 1. View of Deck Alcove Shear Frame.

- 2.1 Unfasten Deck Alcove Shear Frame Base captive fasteners (five) (Ratchet, 1/4" Drive; 6" Ext, 1/4" Drive and 10" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 1.

Deck Alcove Shear Frame NIA captive fasteners (six) circled in green. (Note NIA is not installed).

Same view with NIA installed. Only two (of six) fasteners can be seen (circled in green.)

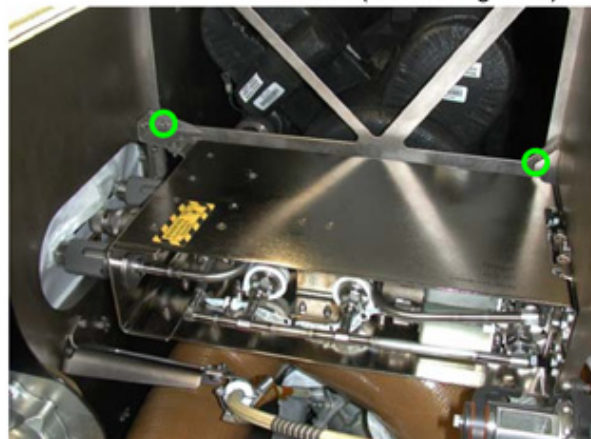
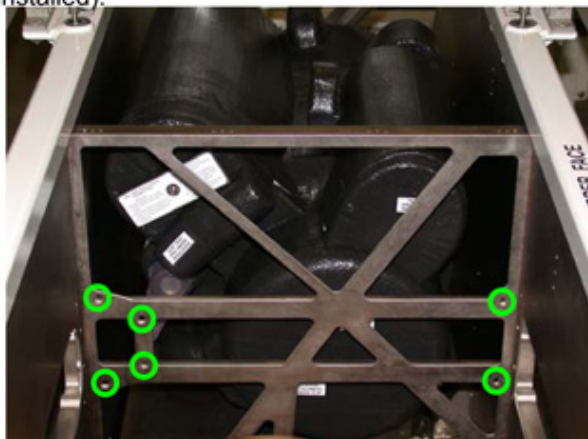


Figure 2. View of Deck Alcove Shear Frame.

- 2.2 Remove Deck Alcove Shear Frame NIA captive fasteners (six) (Ratchet, 1/4" Drive; 5/16" Socket, 1/4" Drive).

Refer to Figure 2.

NOTE

Some of the Shear frame fasteners may require a 2" Ext or 5/16" Combination Wrench for access to break torque on fasteners.

- 2.3 Remove Deck Alcove Shear Frame, remaining captive fasteners (twenty-three) (Ratchet, 1/4" Drive; 5/16" Socket, 1/4" Drive).
If required: (2" Ext, 1/4" Drive or 5/16" Combination Wrench, 1/4" Drive).
Refer to Figure 1.
Temporarily stow Shear Frame.

3. REMOVING THE LTL PPA LAUNCH BRACKETS

NOTE

PPA is installed inside Deck Alcove via a dedicated plate on four Anti-vibration mounts.

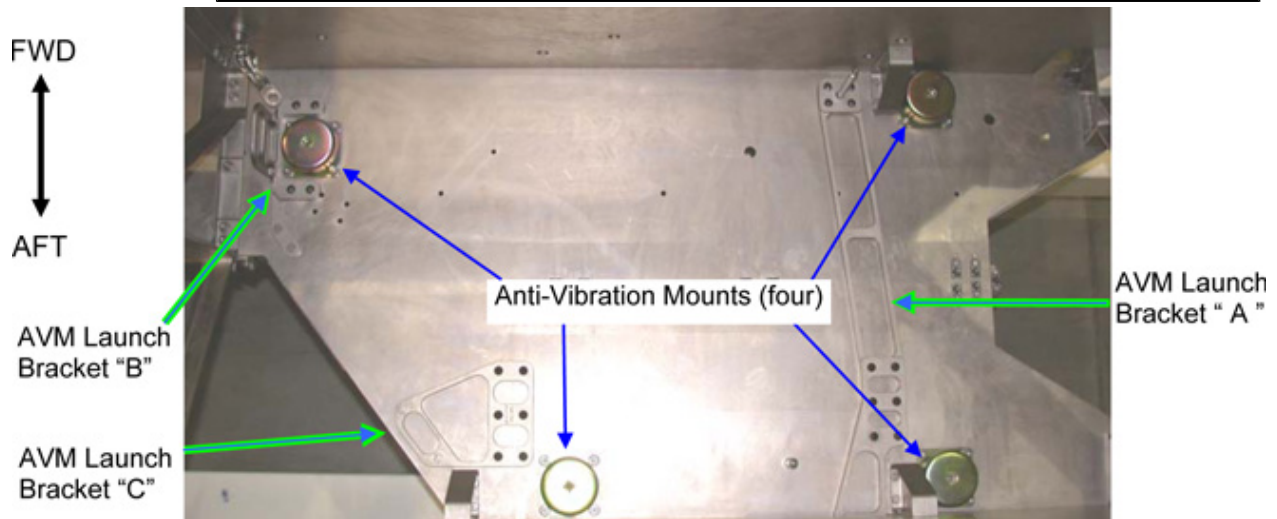


Figure 3. View inside Deck Alcove showing PPA AVM, (PPA and mounting plate removed for clarity).

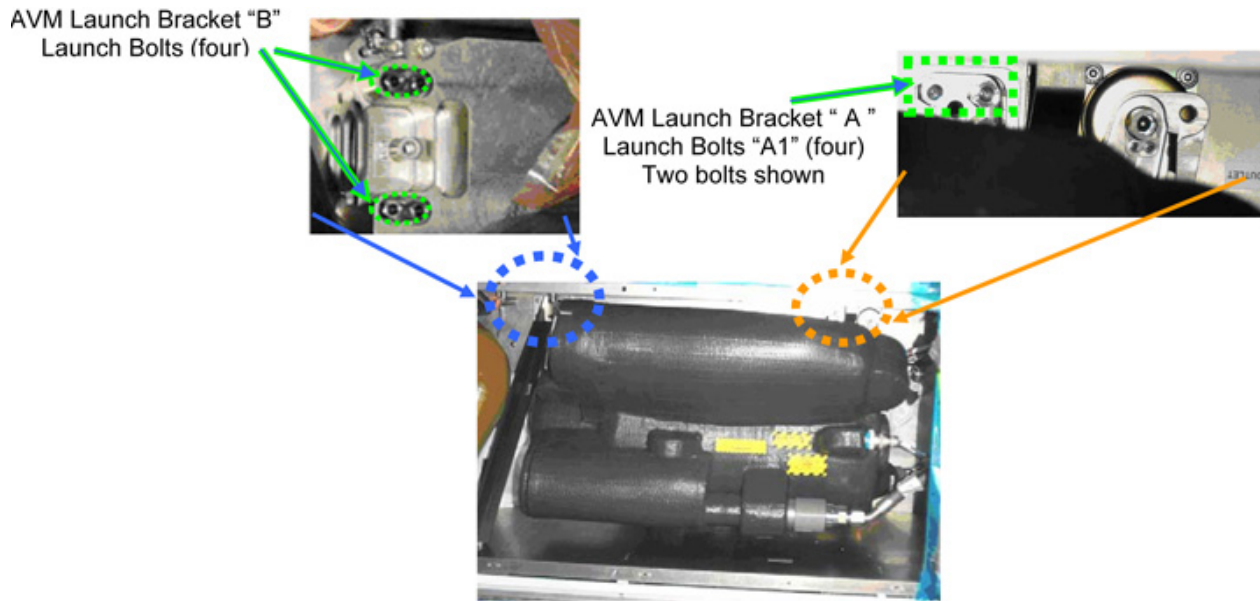


Figure 4. LTL PPA and Approximate Locations of Launch Bolts.

NOTE

The AVM Launch Bracket "A" Launch Bolts "A1" (four) and the AVM Launch Bracket "B" Launch Bolts (four) can only be accessed from inside the Deck Alcove structure.

- 3.1 Remove LTL PPA AVM Launch Bracket "A" launch bolts "A1" (four) (Ratchet, 1/4" Drive; 10" Ext, 1/4" Drive, 6" Ext, 1/4" Drive, and 4" Ext, 1/4" Drive; 1/2" Socket, 1/4" Drive).
Refer to Figures 3, 4.
- 3.2 Remove LTL PPA AVM Launch Bracket "B" launch bolts (four) (Ratchet, 1/4" Drive; 10" Ext, 1/4" Drive, 6" Ext, 1/4" Drive, and 4" Ext, 1/4" Drive; 1/2" Socket, 1/4" Drive) .
Remove LTL PPA AVM Launch Bracket "B", temporarily stow.
Refer to Figures 3, 4.

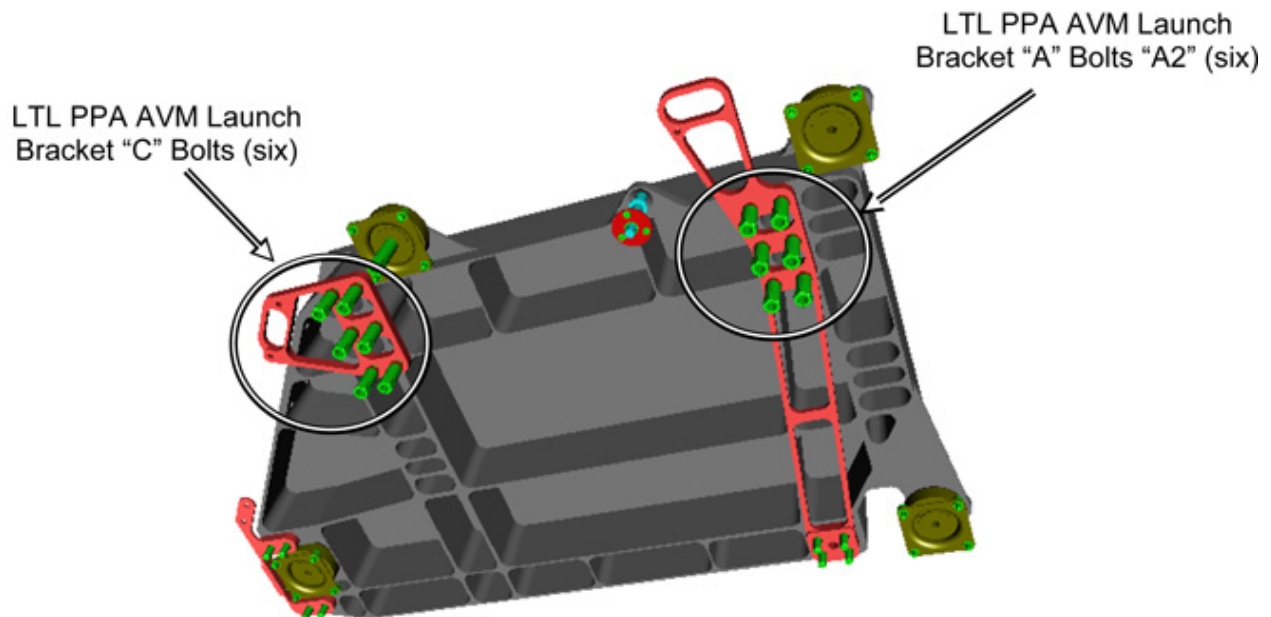


Figure 5. View under PPA Mounting Plate showing AVM Launch Bracket A and C Launch Bolts.

NOTE

The AVM Launch Bracket "A" Launch Bolts "A2" (six) and the AVM Launch Bracket "C" Launch Bolts (six) can only be accessed from under the Deck Alcove structure by removing NOD2D2-12 closeout panel.

- 3.3 Remove LTL PPA AVM Launch Bracket "C" launch bolts (six) (Ratchet, 1/4" Drive; 1/2" Socket, 1/4" Drive; Inspection Mirror).
Remove LTL PPA AVM Launch Bracket "C", temporarily stow.
Refer to Figures 3, 5.
- 3.4 Remove LTL PPA AVM Launch Bracket "A2" launch bolts (six) (Ratchet, 1/4" Drive; 1/2" Socket, 1/4" Drive; Inspection Mirror) .
Remove LTL PPA AVM Launch Bracket "A", temporarily stow.
Refer to Figures 3, 5.

4. CLOSEOUT

- 4.1 Check for FOD within 3' radius.
- 4.2 Photo document final configuration prior to closeout (DCS 760 Camera)
- 4.3 Install Closeout Panels NOD2D1-02 Fasteners (six), NOD2D2-12 Fasteners (four) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 4.4 ISS ↓ **MCC-H** of task completion.
Stow tools, launch brackets, bolts (twenty), shear frame and diagonal frame.
Update IMS.

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NODE 2 MTL PUMP PACKAGE ASSEMBLY (PPA) LAUNCH BRACKET REMOVAL (ASSY OPS/10A/FIN)

Page 1 of 5 pages

OBJECTIVE:

Enable the Node 2 Moderate Temperature Loop (MTL) Pump Package Assembly (PPA) Anti-Vibration Mountings (AVMs) by removing the launch bracket.

LOCATION

Installed: NOD2O1

Stowed: √Inventory Management System

DURATION

1 hour 30 minutes

CREW

One

PARTS

None

MATERIALS

None

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 1:

5/16" Combination Wrench

Drawer 2:

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

3/16" Hex Head, 1/4" Drive

1/2" Socket, 1/4" Drive

5/16" Socket, 1/4" Drive

2" Ext, 1/4" Drive

4" Ext, 1/4" Drive

6" Ext, 1/4" Drive

10" Ext, 1/4" Drive

Ratchet, 1/4" Drive

Driver Handle, 1/4" Drive

Drawer 3:

Inspection Mirror

REFERENCED PROCEDURE(S)

None

1. [ACCESSING MTL PPA LAUNCH BRACKETS](#)

- 1.1 Remove Closeout Panels NOD2O1-01 Fasteners (six), NOD2O2-12 fasteners (four) (Driver Handle, 1/4" Drive; 5/32" Hex Head).

Temporarily stow.

2. REMOVING OVERHEAD ALCOVE DIAGONAL & SHEAR FRAME

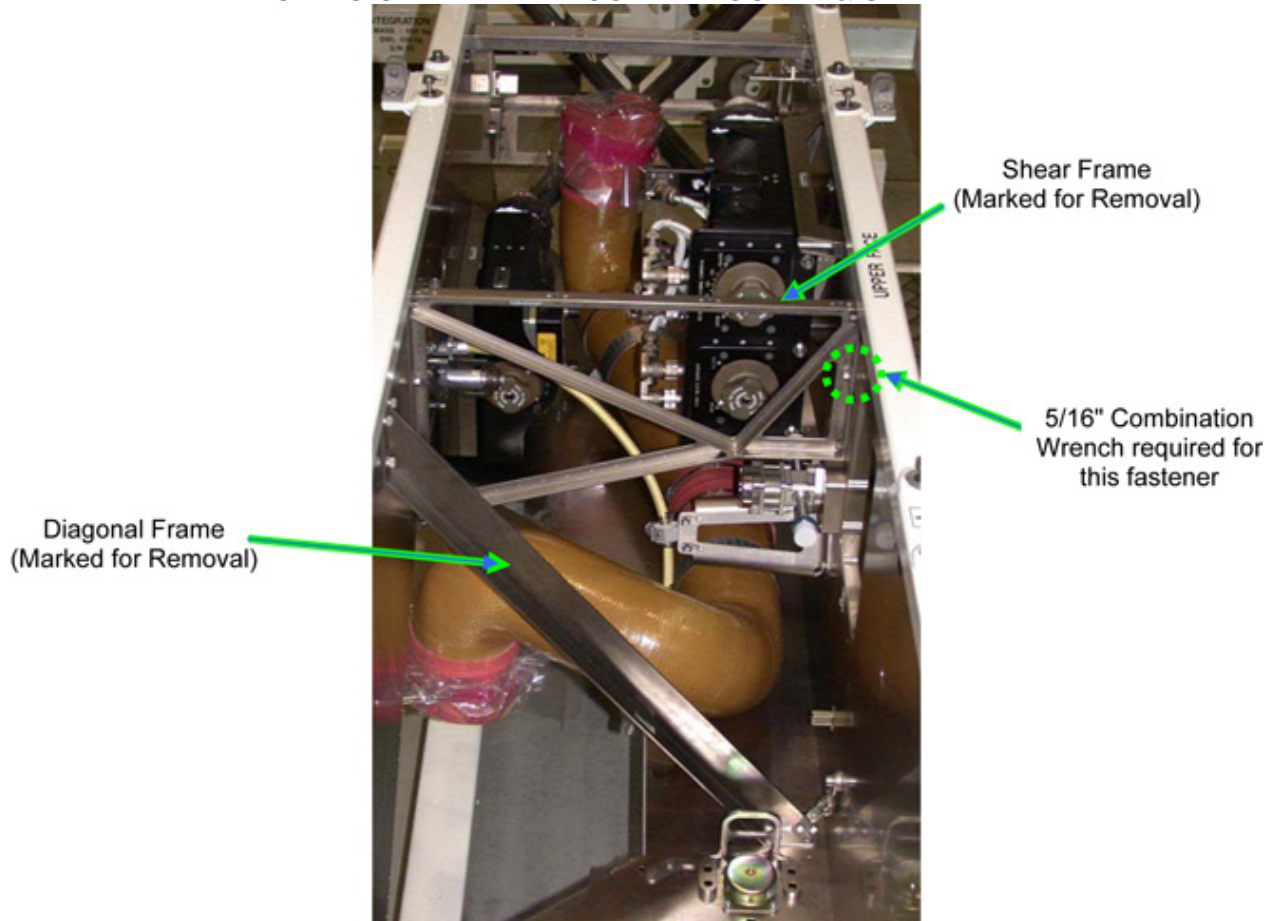


Figure 1. View of Overhead Alcove Diagonal and Shear Frame

- 2.1 Remove Overhead Alcove Diagonal Frame, fasteners (eight) (Ratchet, 1/4" Drive; 4" Ext; 10" Ext; 3/16" Hex Head). Refer to Figure 1. Temporarily stow Diagonal Frame.

NOTE

Some of the Shear frame fasteners may require a 2" Ext or 5/16" Combination Wrench for access to break torque on fasteners.

- 2.2 Remove Overhead Alcove Shear Frame, fasteners (seven) (Ratchet, 1/4" Drive; 5/16" Socket). If required: (2" Ext or 5/16" Combination Wrench) Refer to Figure 1. Temporarily stow Shear Frame.

3. REMOVING OF THE MTL PPA LAUNCH BRACKETS

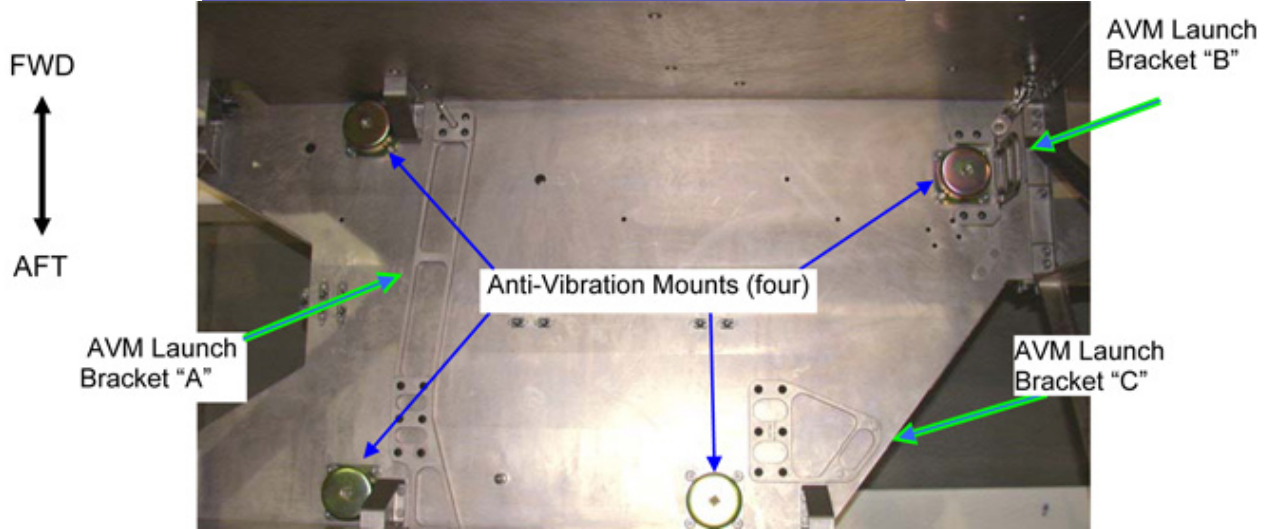


Figure 2. View Inside Overhead Alcove showing PPA AVMs. PPA removed for clarity.

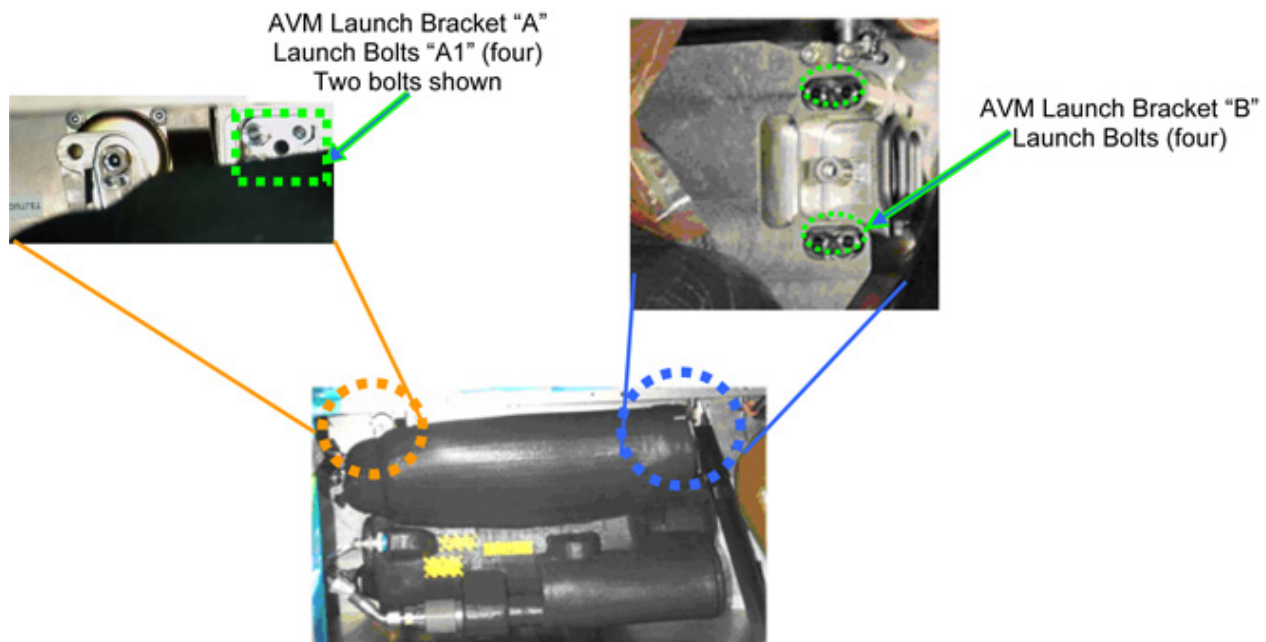


Figure 3. MTL PPA and Approximate Locations of Launch Bolts.

NOTE

The AVM Launch Bracket "A" Launch Bolts "A1" (four) and the AVM Launch Bracket "B" Launch Bolts (four) can only be accessed from inside the Overhead Alcove structure.

- 3.1 Remove MTL PPA AVM Launch Bracket "A" launch bolts "A1" (four) (Ratchet, 1/4" Drive; 10" Ext, 6" Ext, and 4" Ext; 1/2" Socket). Refer to Figures 2, 3.
- 3.2 Remove MTL PPA AVM Launch Bracket "B" launch bolts (four) (Ratchet, 1/4" Drive; 10" Ext, 6" Ext, and 4" Ext; 1/2" Socket).

Remove MTL PPA AVM Launch Bracket "B", temporarily stow.
Refer to Figures 2, 3.

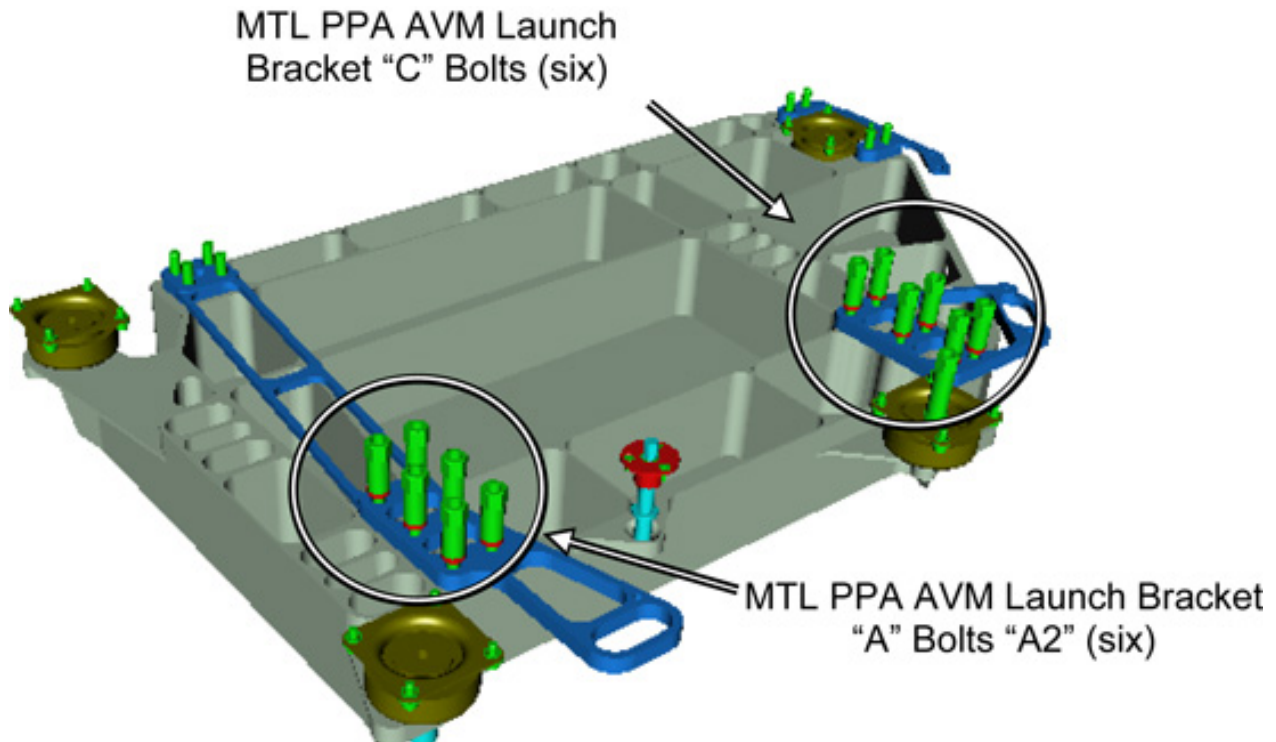


Figure 4. View under PPA Mounting Plate showing AVM Launch Bracket A and C Launch Bolts.

NOTE

The AVM Launch Bracket "A" Launch Bolts "A2" (six) and the AVM Launch Bracket "C" Launch Bolts (six) can only be accessed from above the Overhead Alcove structure by removing NOD2O2-12 closeout panel.

- 3.3 Remove MTL PPA AVM Launch Bracket "C" launch bolts (six) (Ratchet, 1/4" Drive; 1/2" Socket; Inspection Mirror).
Remove LTL PPA AVM Launch Bracket "C", temporarily stow.
Refer to Figures 2, 4.
- 3.4 Remove MTL PPA AVM Launch Bracket "A2" launch bolts (six) (Ratchet, 1/4" Drive; 1/2" Socket; Inspection Mirror).
Remove LTL PPA AVM Launch Bracket "A", temporarily stow.
Refer to Figures 2, 4.

4. CLOSEOUT

- 4.1 Check for FOD within 3' radius.
- 4.2 Photo document final configuration prior to closeout (DCS 760 Camera)
- 4.3 Install Closeout Panels NOD2O1-01 fasteners (six), NOD2O2-12 fasteners (four) (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

- 4.4 Notify **MCC-H** of task completion.
Stow tools, launch brackets, bolts (twenty), shear frame and diagonal frame.
Update IMS.

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NODE 2 POSITIVE PRESSURE RELIEF VALVE (PPRV) CAP INSTALL
(ASSY OPS/10A/FIN)

Page 1 of 4 pages

OBJECTIVE:

The procedure installs a PPRV Cap onto the Starboard and Port Hatch PPRVs.

LOCATION:

Node 2, Starboard Hatch and Port Hatch

DURATION:

10 minutes

CREW:

One

PARTS:

PPRV Cap P/N PPRV-1-915

MATERIALS:

None

TOOLS:

None

REFERENCED PROCEDURE(S):

None

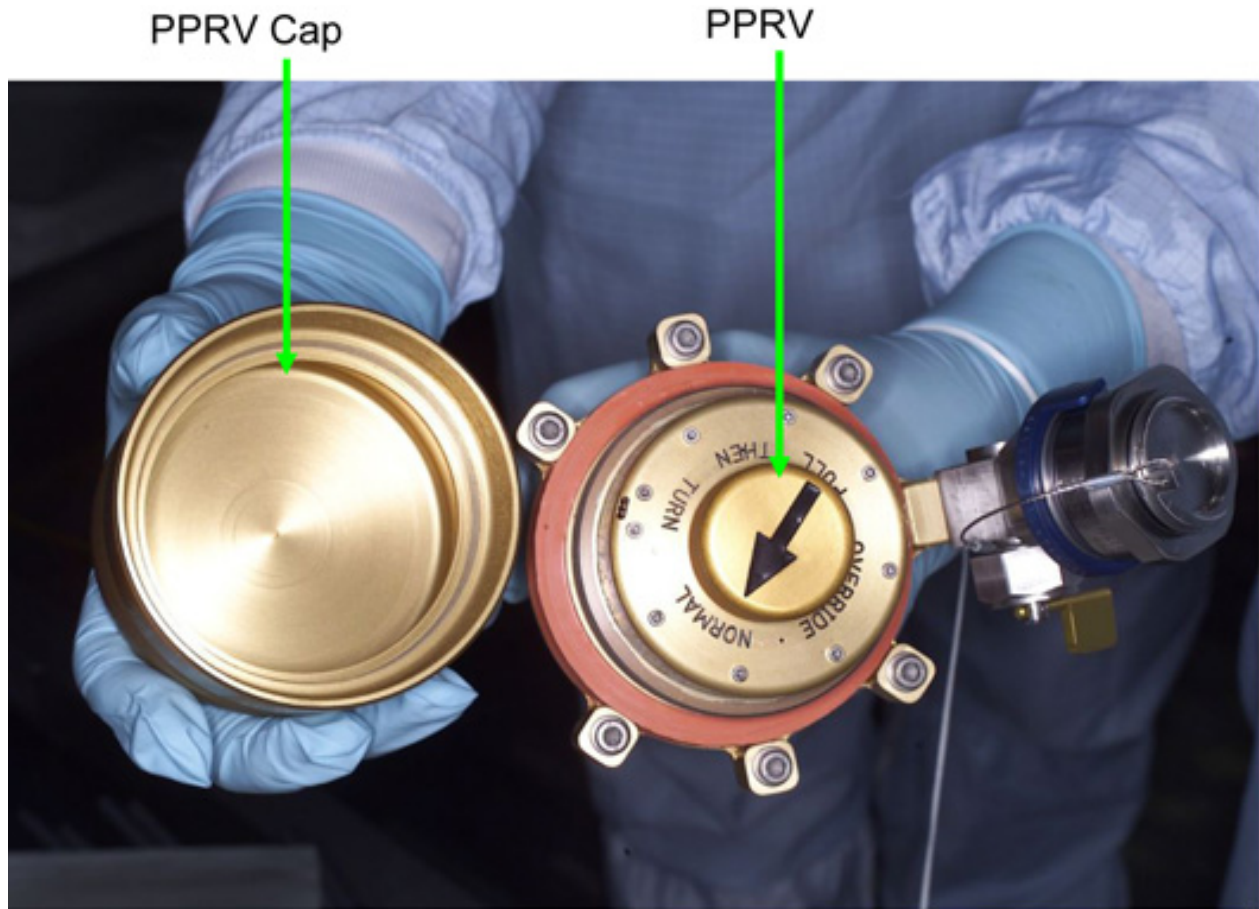


Figure 1. PPRV Uninstalled and Cap to be Installed.



Cap will engage
threads on
PPRV

Figure 2. PPRV Showing Threads for Cap.

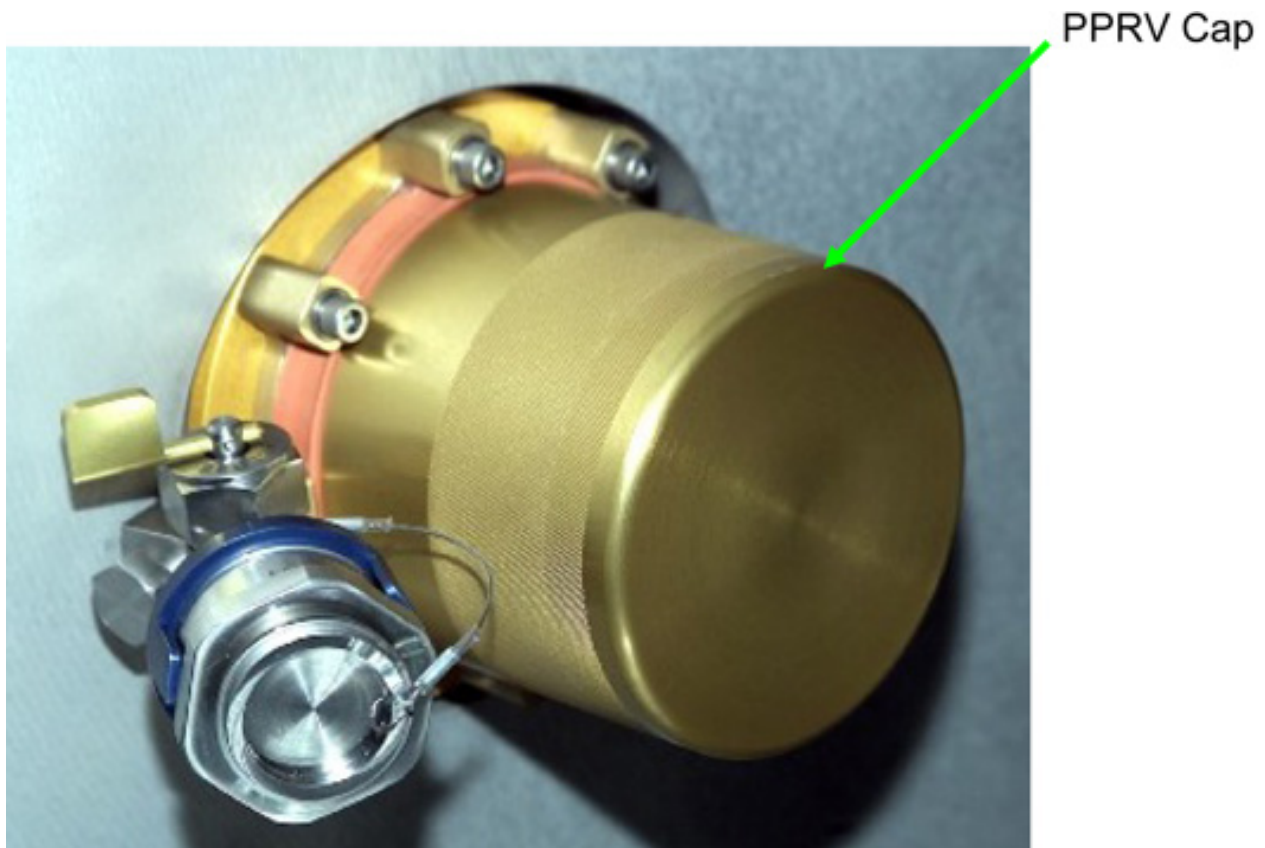


Figure 3. Cap Installed on PPRV.

1. [INSTALLING CAPS ON PORT PPRV AND STARBOARD PPRV](#)
 - 1.1 Screw Cap onto PPRV on Port Hatch.
Refer to Figures 1 to 3.
 - 1.2 Hand tighten Cap on PPRV.
 - 1.3 Perform steps 1.1 and 1.2 for Starboard PPRV and Cap.
2. [POST MAINTENANCE](#)
 - 2.1 Update IMS with stowage locations.

REMOVAL OF NODE 2 AFT PPRV AND INSTALL MPEV

(ASSY OPS/10A/FIN)

Page 1 of 5 pages

OBJECTIVE:

Remove the Aft PPRV from Node 2 and install a Manual Pressure Equalization Valve (MPEV).

LOCATIONS:

Stowed: Node 2 Midbay Starboard

Installed: Node 2 Aft Hatch

DURATION:

30 minutes

CREW:

One

PARTS:

MPEV P/N 2353028-2-1

MATERIALS:

Dry Wipes

Braycote Lubricant

Gray Tape

Latex Gloves

Sharpie

TOOLS:

ISS IVA Toolbox:

Drawer 2:

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

Ratchet, 1/4" Drive

4" Ext, 1/4" Drive

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

REFERENCED PROCEDURE(S):

None

NOTE

1. Removal/installation both occur on cabin (dome) side of Hatch.
2. Hatch should remain open, stowed throughout procedure.

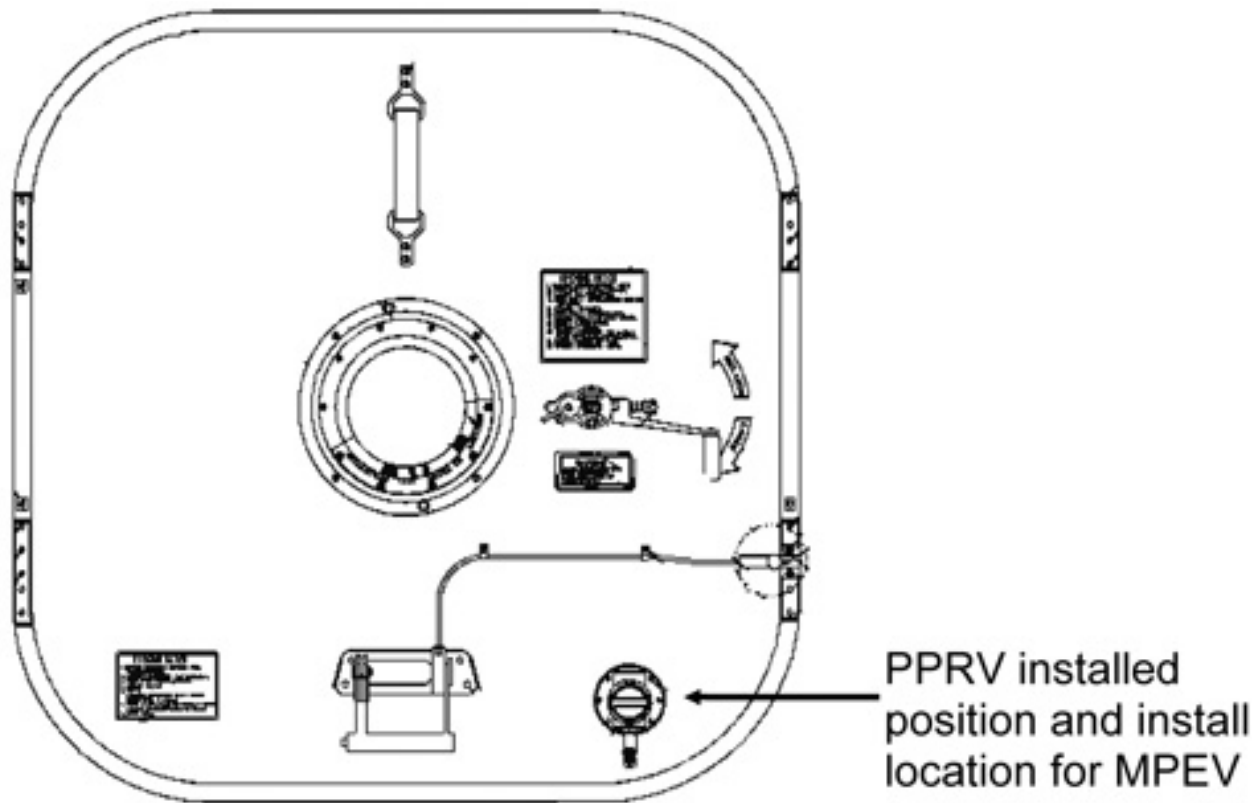


Figure 1. Hatch (Dome Side).

WARNING

Pressure between elements must be equalized. Failure to equalize pressure could injure crew.

1. PPRV REMOVAL

- 1.1 Remove PPRV, Fasteners (six) (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Label, temporary stow (Gray Tape, Sharpie).
Record part number of PPRV: _____
Record serial number of PPRV: _____
Refer to Figure 1.
- 1.2 Remove PPRV Spacer.
- 1.3 Clean Hatch at PPRV removal location (Dry Wipes).
- 1.4 Temporarily stow PPRV.

2. UNSTOW MPEV FROM NODE 2 STARBOARD MIDBAY

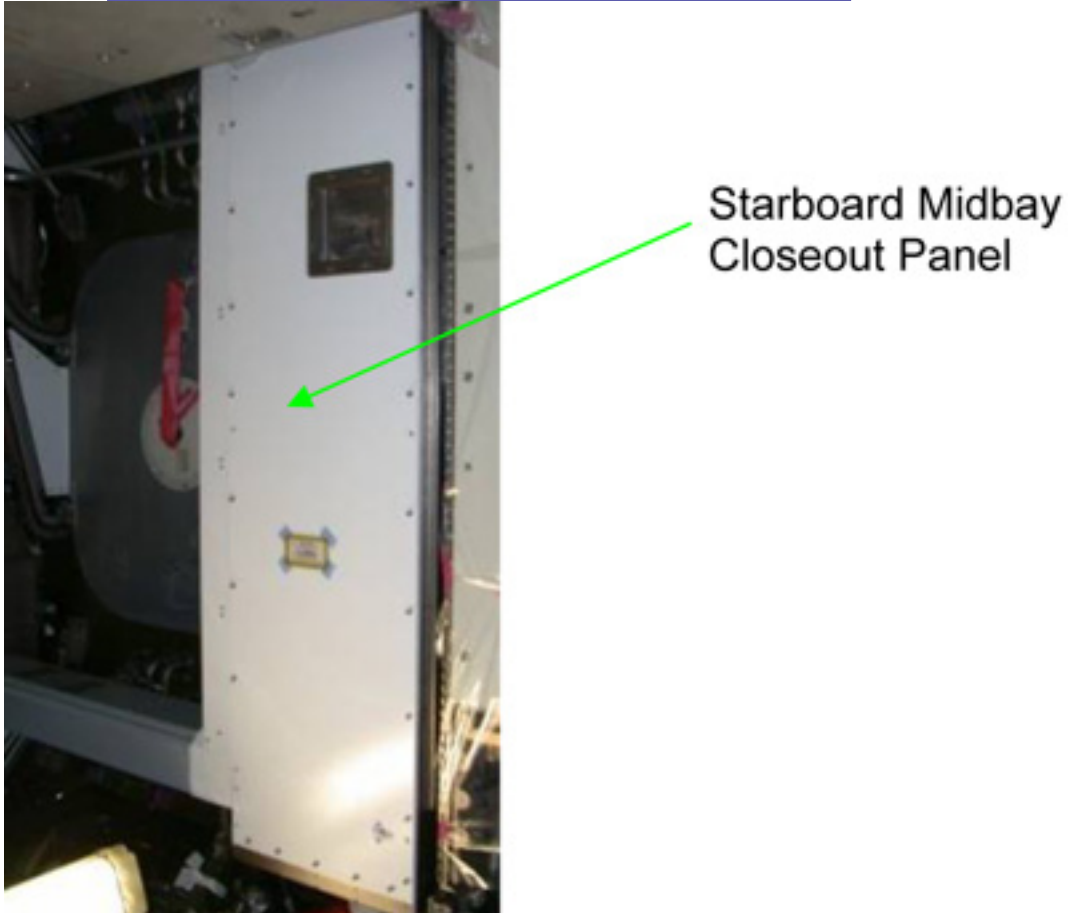


Figure 2. Starboard Midbay with Closeout.

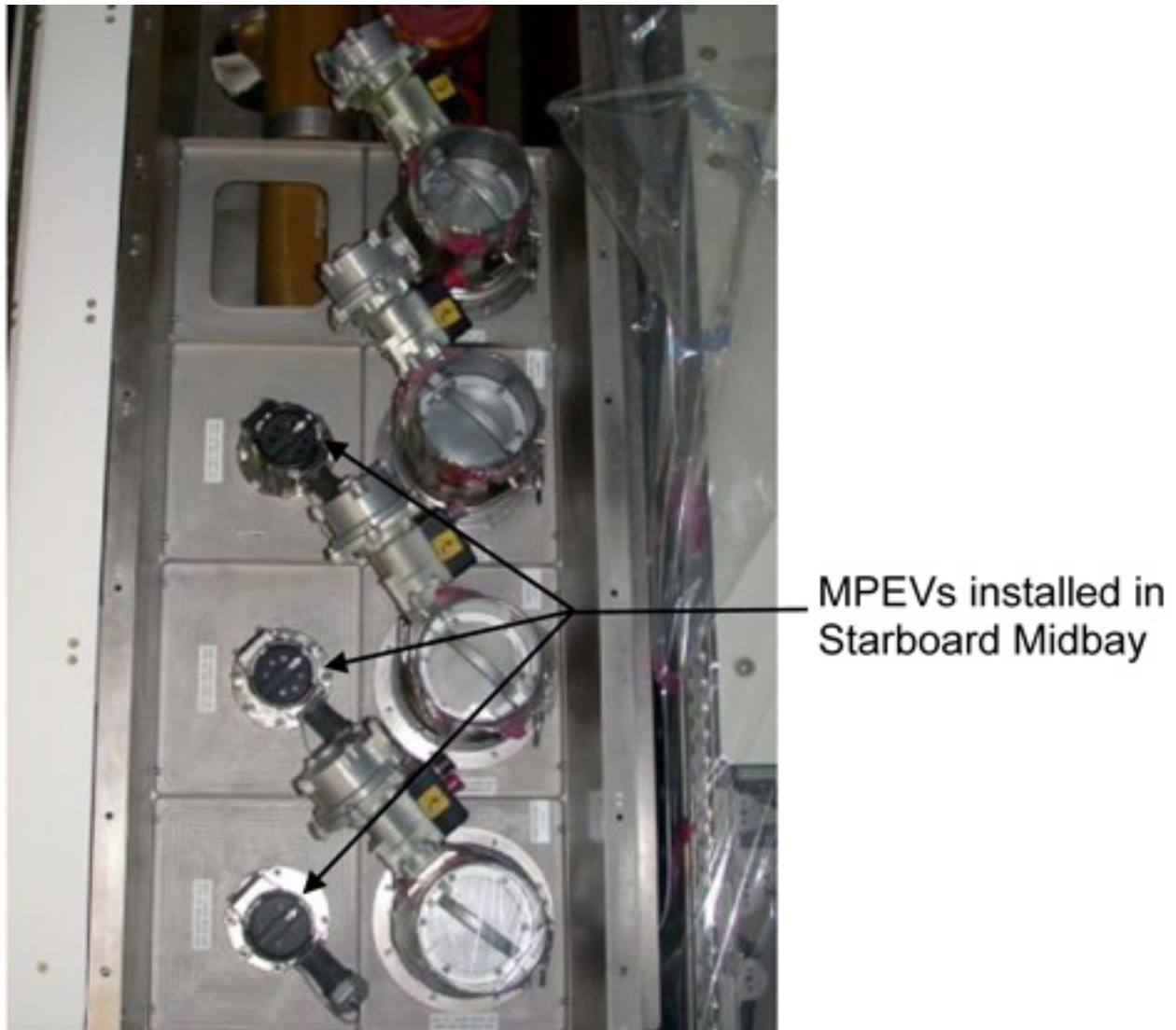


Figure 3. Starboard Midbay with Closeout Removed.

- 2.1 Remove Starboard Midbay Closeout Panel NOD2S3-01, Fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head Driver, 1/4" Drive).
- 2.2 Remove MPEV from stowed location at NOD2S3-01, Fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head Driver, 1/4" Drive). Refer to Figure 3.
- 2.3 Record part number of MPEV: _____
Record serial number of MPEV: _____
- 2.4 Remove shipping closures (two) from MPEV, place on PPRV. Temporarily stow PPRV.
- 2.5 Stow PPRV.
- 2.6 Replace Starboard Midbay Closeout Panel NOD2S3-01, Fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head Driver, 1/4" Drive).

3. MPEV INSTALLATION

3.1 √Replacement MPEV – OPEN, cap removed

NOTE

Equalization valve must be oriented correctly. Refer to Figure 1 for proper installation orientation (nozzle toward bottom).



Figure 4. MPEV Shown in Closed Position.

3.2 Apply a small amount of Braycote to MPEV seals and position MPEV in proper installation orientation (Latex Gloves, Braycote Lubricant). Refer to Figures 1, 4.

3.3 Tighten, torque Fasteners (six) in star pattern, to 66 in-lbs [Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; 4" Ext, 1/4" Drive; (40-200 in-lbs) Trq Wrench, 1/4" Drive].

WARNING

MPEV must be closed for module pressure, equalization to be prepared for emergency Hatch closing.

3.4 MPEV → CLOSED, capped.

3.5 Check for FOD around work area within 3' radius.

3.6 Photo document final configuration (DCS 760 Camera).

4. POST MAINTENANCE

4.1 Notify **MCC-H** of task completion, part numbers, serial numbers

4.2 Update IMS with stowage locations.
Stow tools, equipment.

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NODE 2 RSR OUTFITTING

(ASSY OPS/10A/FIN)

Page 1 of 7 pages

OBJECTIVE:

Configure Node 2 Resupply Stowage Racks (RSR) for on-orbit operations. Includes installation of left and right Pivot Pins, K-BARs and removal of Knee Braces for each RSR in Bay 5.

LOCATION:

Node 2 Rack Bay 5

DURATION:

45 min per Rack

CREW:

One

PARTS:

ARIS - Pivot Fitting Bottom Left (two) P/N 683-61711-31

ARIS - Pivot Fitting Bottom Right (two) P/N 683-61711-32

K-BAR Assy, Left (two) P/N 683-62201-33

K-BAR Assy, Right (two) P/N 683-62201-34

TOOLS:

DCS 760 Camera

ISS IVA Toolbox:

Drawer 2:

Ratchet, 3/8" Drive

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

5/32" Hex Head, 3/8" Drive

Drawer 3:

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

5" Long, 3/8" Ball Tip Hex Head, 3/8" Drive

NOTE

This procedure can be run as a stand-alone procedure for each individual Rack.

1. LOWER LAUNCH RESTRAINT DISENGAGEMENT

- 1.1 Select one of the two Node 2 Resupply Stowage Racks to outfit (NOD2P5, NOD2D5).

CAUTION

Disengagement sequence must be followed exactly to allow any induced loads to be released safely back into structure. Start on either left or right side of rack.

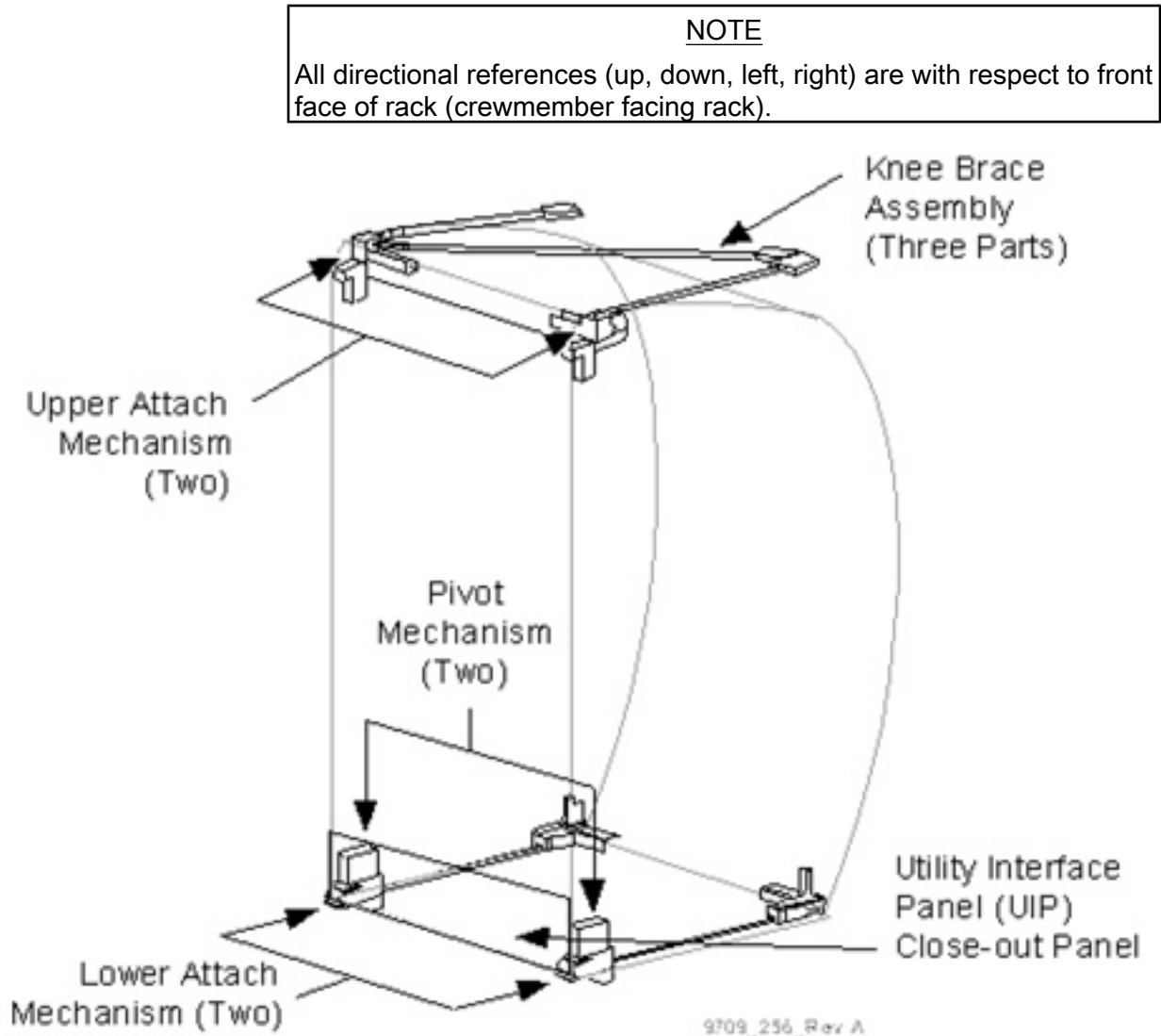


Figure 1. Location of Rack Attachment Mechanisms.

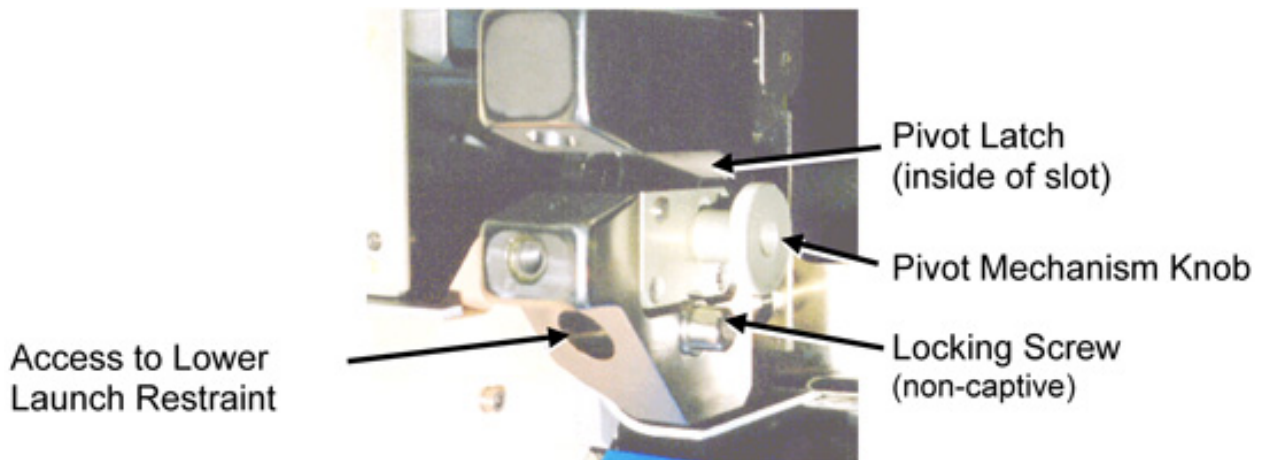


Figure 2. Lower Launch Restraint (Left Side).

NOTE

A loud pop may occur during release of first Lower Launch Restraint.

- 1.2 Remove noncaptive Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
Refer to Figures 1, 2.
- 1.3 Disengage Lower Launch Restraint 10 to 12 turns until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head).
- 1.4 Reinstall, snug Locking Screw (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive).
- 1.5 Repeat steps 1.2 to 1.4 for opposite side.

2. PIVOT FITTING INSTALLATION

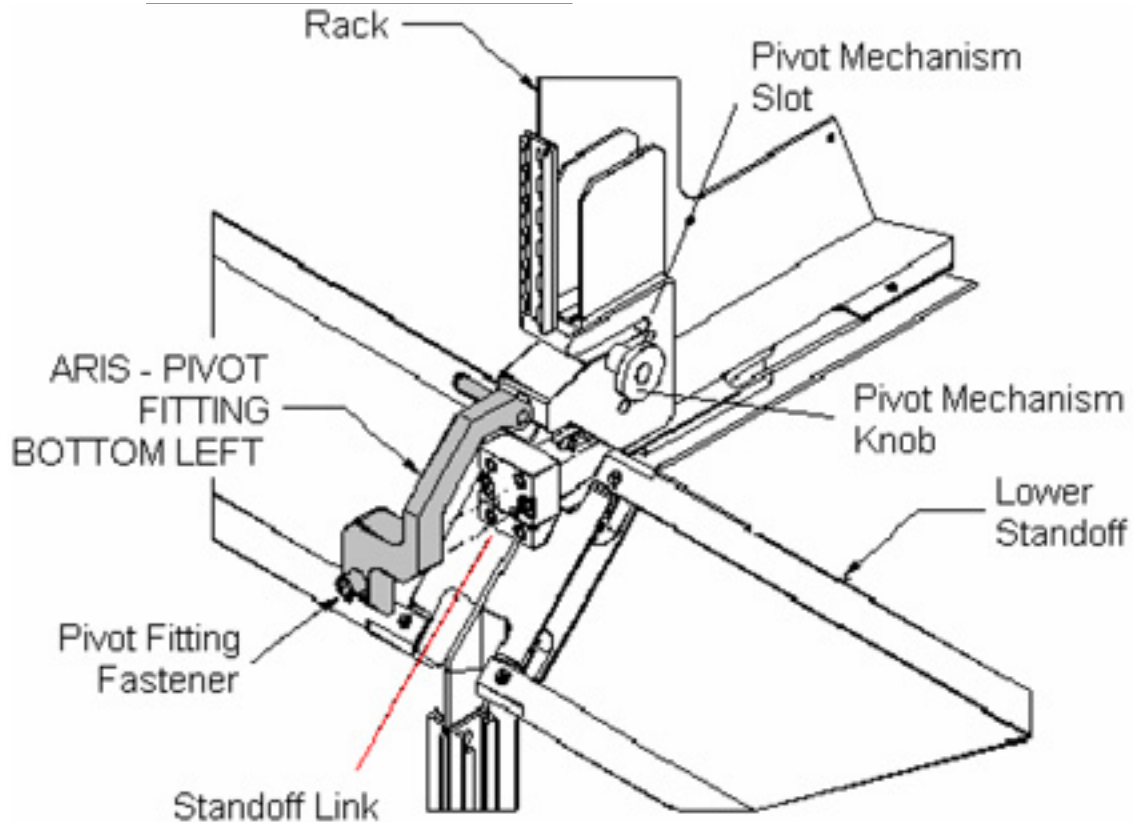


Figure 3. Installation of Pivot Fitting, Left Side.

- 2.1 Loosen both left and right Pivot Mechanism Knobs one turn then snug in the unlatched, down position.
Refer to Figure 3.
- 2.2 Install Pivot Fitting Bottom Left (P/N 683-61711-31) onto Standoff Link located on lower left Standoff.
- 2.3 Tighten, torque fastener to 150 in-lbs [Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive; (40-200 in-lbs) Trq Wrench, 3/8" Drive].

- 2.4 Install Pivot Fitting Bottom Right (P/N 683-61711-32) onto Standoff Link located on lower right Standoff.
- 2.5 Tighten, torque fastener to 150 in-lbs [Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive; (40-200 in-lbs) Trq Wrench, 3/8" Drive].
- 2.6 Loosen both left and right Pivot Mechanism Knobs one turn, then snug in latched, up position.

3. **UPPER ATTACH MECHANISM DISENGAGEMENT**

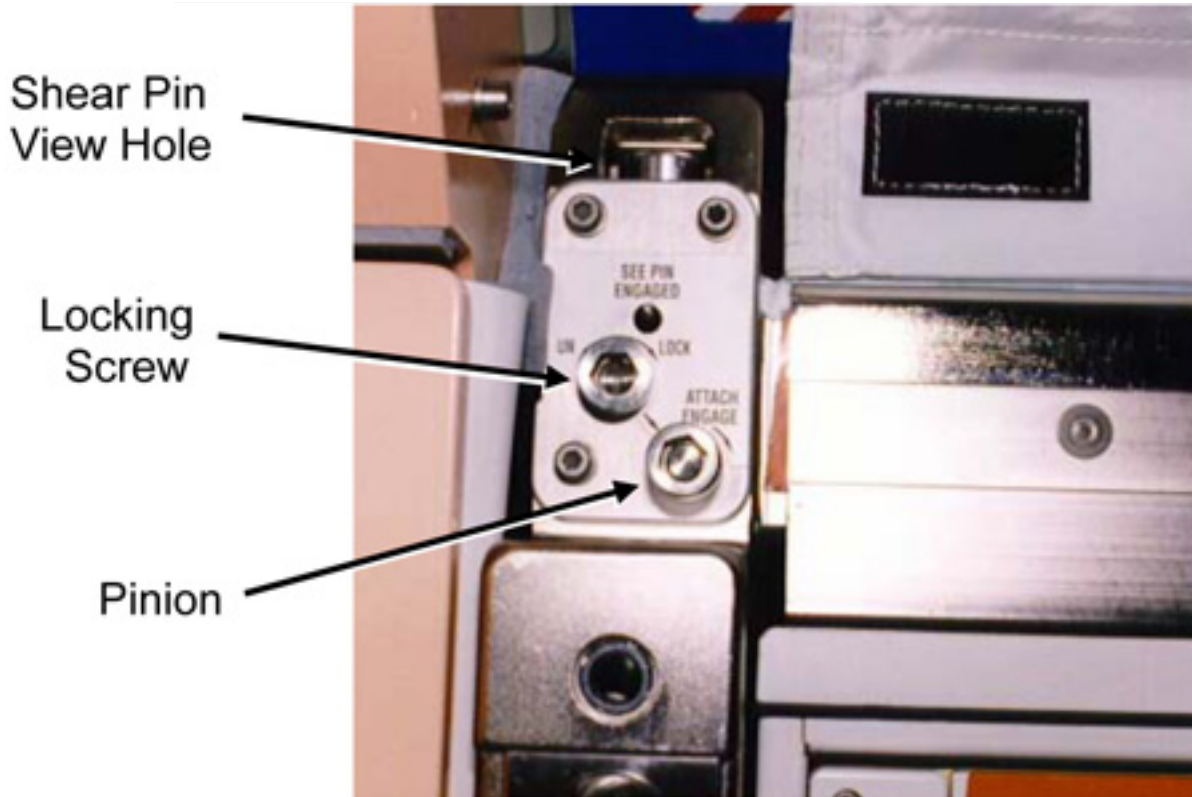


Figure 4. Upper Attach Mechanism, Left Side, Typical.

- 3.1 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 4.

NOTE

To disengage left Pinion, turn ↺.
To disengage right Pinion, turn ↻.

- 3.2 Disengage left Pinion one full turn until hard stop (Ratchet, 3/8" Drive; 6" Long, 3/8" Hex Head, 3/8" Drive). Refer to Figure 4.
- 3.3 Repeat for opposite side.

4. K-BAR INSTALLATION

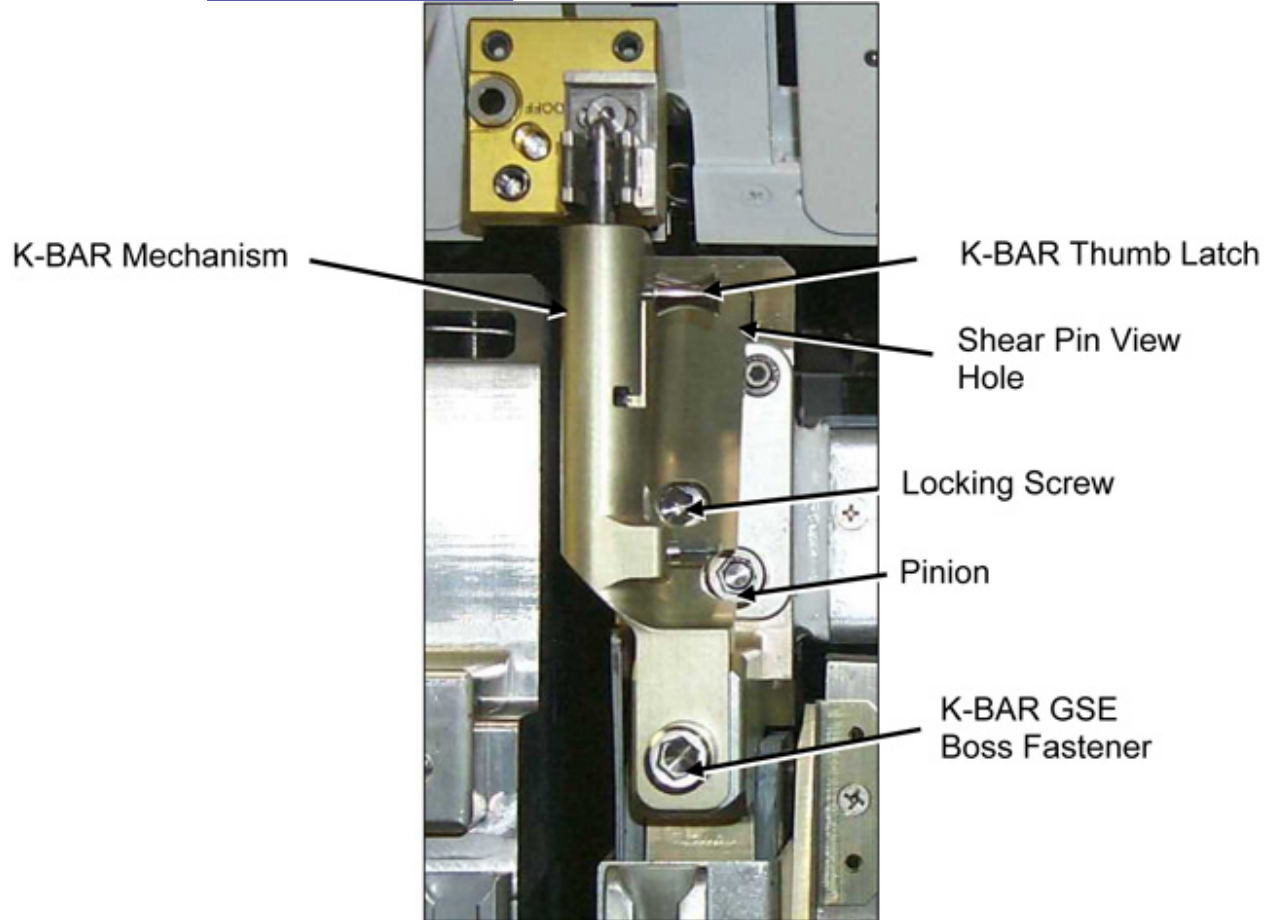


Figure 5. K-BAR Assembly Installed (Rack Upper Left).

- 4.1 Rotate Rack down ~15 cm (~5 in).

CAUTION

Do not force Upper Attach Mechanism Pinions. Mechanism should easily engage K-BAR.

NOTE

To engage left Pinion, turn ↺.
To engage right Pinion, turn ↻.

- 4.2 Place K-BAR Assy, Left (P/N 683-62201-33), into left Upper Attach Mechanism Shear Pin View Hole. Refer to Figure 5.
- 4.3 Verify Locking Screw fully unlocked. Refer to Figure 5.
- 4.4 Engage Pinion, one full turn, into K-BAR (Ratchet, 3/8" Drive; 5" Long, 3/8" Ball Tip Hex Head, 3/8" Drive).

Refer to Figure 5.

- 4.5 Snug Locking Screw and K-BAR GSE Boss Fastener (Ratchet, 3/8" Drive; 5" Long, 3/8" Ball Tip Hex Head, 3/8" Drive). Refer to Figure 5.
- 4.6 K-BAR Thumb Latch → down
Refer to Figure 5.
- 4.7 Repeat steps 4.2 to 4.6 for K-BAR Assy, Right (P/N 683-62201-34).

5. KNEE-BRACE REMOVAL

- 5.1 Check Rack rotation path unobstructed.
- 5.2 Slowly rotate Rack down to a controlled stop.

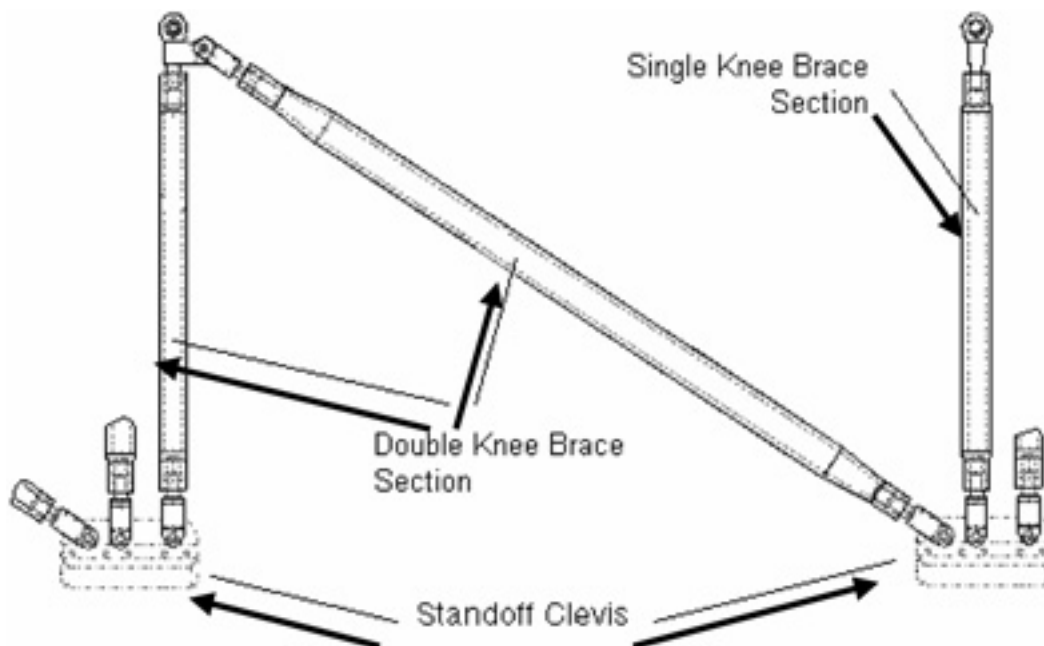


Figure 6. Rack Knee Brace Assembly.

- 5.3 Remove Knee-Brace Assembly sections (P/N 683-50249-3) by pulling captive PIP Pins (three) from Standoff Clevis. Refer to Figure 6.
 - 5.4 Temporarily stow Knee-Brace Assembly.
6. ROTATING RACK UP
- 6.1 K-BAR Thumb Latches (two) → up
 - 6.2 Check Rack Rotation path unobstructed.
 - 6.3 Slowly rotate Rack up to a controlled stop.

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NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN)

Page 1 of 13 pages

OBJECTIVE:

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

LOCATION:

Installed: Node 2 Aft-Starboard End Cone

DURATION:

Installation: 1 hour

Removal: 1 hour

CREW:

One

PARTS:

PMA IMV Flex Duct Extension P/N 1F94509-1

Flexible Ventilation Duct (13 ft) P/N 683-51988-1

V-Band Clamp P/N AS5355/2-21R

MATERIALS:

Gray Tape

Dry Wipes

6" x 6" Ziplock Bag labeled "NOD2S6-02"

6" x 6" Ziplock Bag labeled "NOD2S6-51"

6" x 6" Ziplock Bag labeled "NOD2S3-01"

TOOLS:

DCS 760 Camera

Static Wrist Tether

ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive

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

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

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

1/4" Socket, 1/4" Drive

Driver Handle, 1/4" Drive

4" Ext, 1/4" Drive

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

Drawer 5:

2" Cut Scissors

REFERENCED PROCEDURE(S):

None

1. ACCESSING

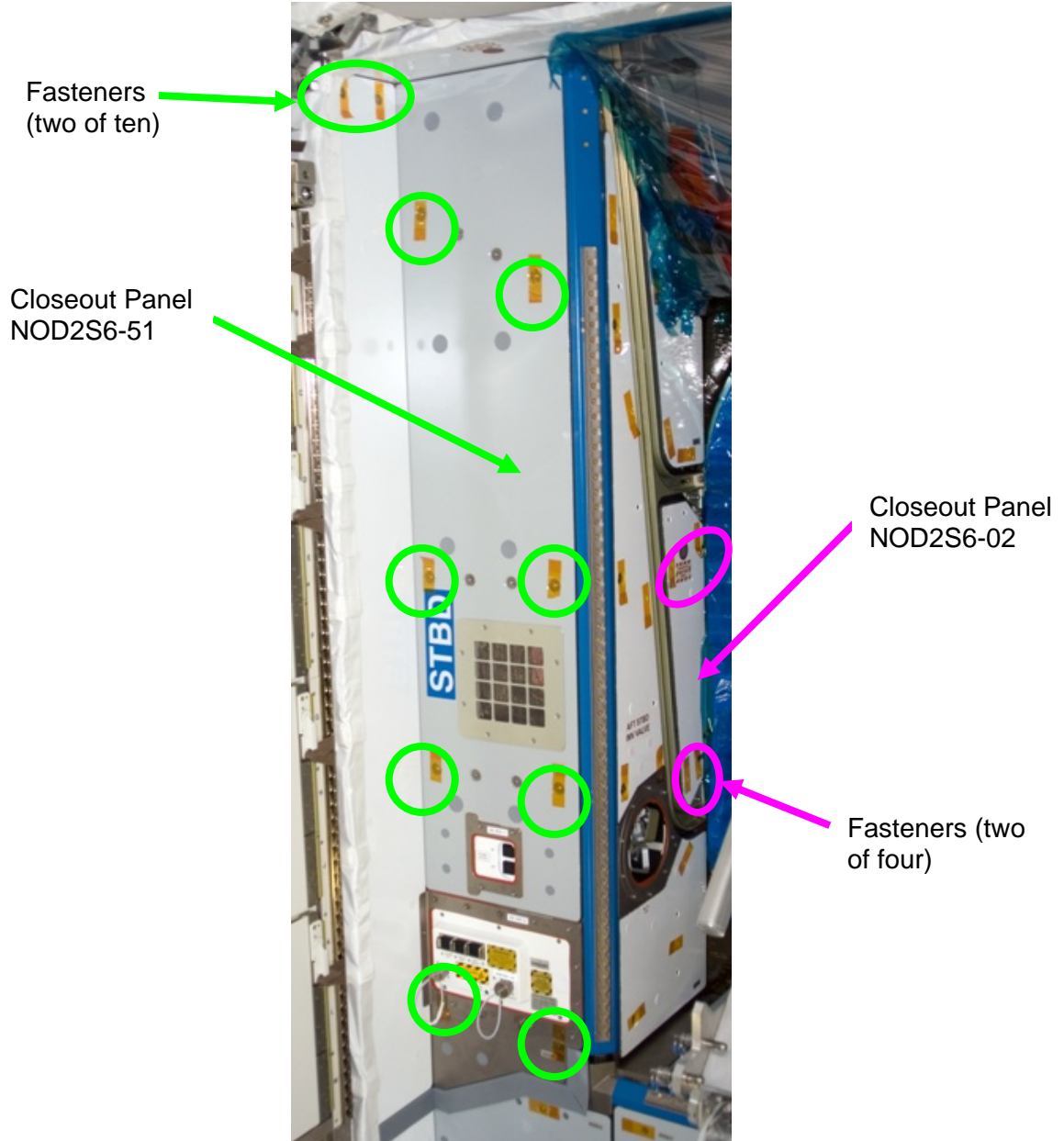


Figure 1.- Node 2 Aft Closeout Panels.

NOTE
There is a gray dot beside each non-captive Launch Restraint Bolt.

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

NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN)

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- 1.2 Remove Closeout Panel NOD2S6-02, Fasteners (four) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow.
Refer to Figure 1.
- 1.3 Remove launch restraint bolts (eight) from Closeout Panel NOD2S6-51 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Stow Bolts and Washers in labled 6" x 6" Ziplock Bag.
- 1.4 Remove Closeout Panel NOD2S6-51, Beta Cloth and Fasteners (ten) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow.
Refer to Figure 1.

2. INSPECTING NEGATIVE PRESSURE RELIEF VALVE (NPRV)



Figure 2.- Deployed NPRV.



Figure 3.- Fully Seated NPRV.

- 2.1 Verify NPRV fully seated.
Notify **MCC-H**.
Refer to Figures 2, 3.
- 2.2 If NPRV deployed, press external cover toward bulkhead until cover snaps into place against base assembly.

3. REMOVING NPRV

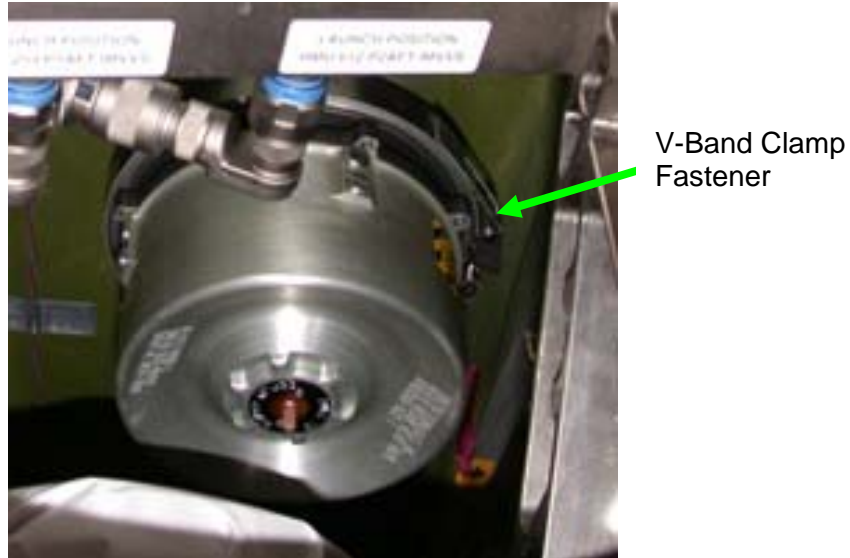


Figure 4.- Aft-Starboard Bulkhead IMV Location with NPRV Installed (looking aft).



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

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

4. INSTALLING VENTILATION DUCTING

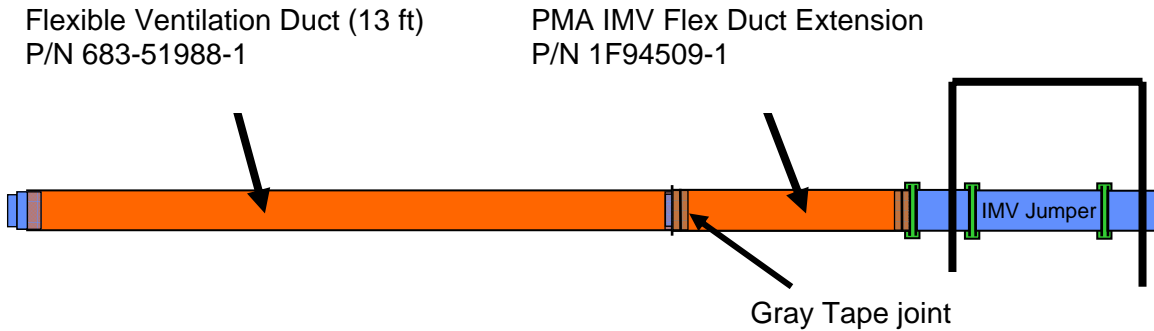


Figure 6.- Ventilation Ducting Installed Configuration.

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

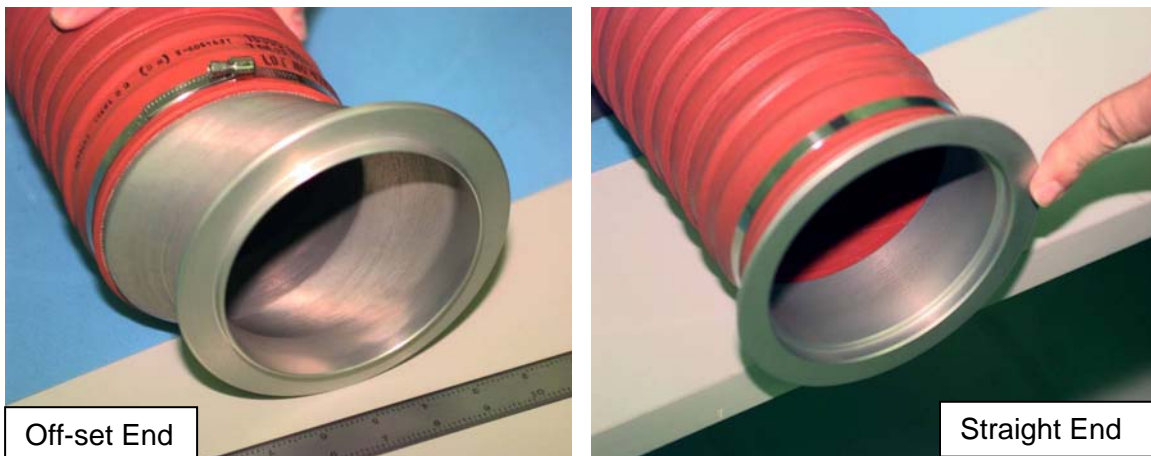


Figure 7.- Flanged ends of PMA IMV Flex Duct Extension.

- 4.1 Align Off-set end of PMA IMV Flex Duct Extension to Aft-Starboard bulkhead IMV location.
Install V-Band Clamp, Fastener (one) (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
Refer to Figures 6, 7.



Figure 8.- Flexible Ventilation Duct (13 ft) stowed in Node 2 (launch configuration).

- 4.2 Remove Flexible Ventilation Duct (13 ft) from stowed location in NOD2P4 (2" Cut Scissors).
Refer to Figure 8.
- 4.3 Secure Non-Velcro end of Flexible Ventilation Duct (13 ft) inside straight-flanged end of PMA IMV Flex Duct Extension (Gray Tape).
Refer to Figure 6,7.
- 4.4 Secure free end of Flexible Ventilation Duct (13 ft) to structure (Velcro).

5. REMOVING VENTILATION DUCTING

- 5.1 Remove Gray Tape securing Flexible Ventilation Duct (13 ft) to PMA IMV Flex Duct Extension (2" Cut Scissors).
Temporarily stow.
- 5.2 Inspect PMA IMV Flex Duct Extension straight flange sealing surface for tape residue.
If necessary, clean flange.

NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN)

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- 5.3 Remove Off-set end of PMA IMV Flex Duct Extension from Aft-Starboard bulkhead IMV location.
V-Band Clamp, Fastener (one) (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).
Temporarily stow.

6. INSTALLING IMV VALVE



Figure 9.- NOD2S3 Closeout.

NOTE

There is a gray dot beside each non-captive Launch Restraint Bolt.

NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN)

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- 6.1 Remove launch restraint bolts (thirty) from Closeout Panel NOD2S3-01 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Stow Bolts and Washers in labled 6" x 6" Ziplock Bag. Refer to Figure 9.
- 6.2 Remove Closeout Panel NOD2S3-01, Fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow. Refer to Figure 9.
- 6.3 Don Static Wrist Tether. Secure to unpainted, unanodized metal surface.

Table 1. IMV Valve Identification

IMV Valve Stowage Label	P/N	S/N
IMV VLV STBD AFT CONE	P/N 2353024-2-1	D0006

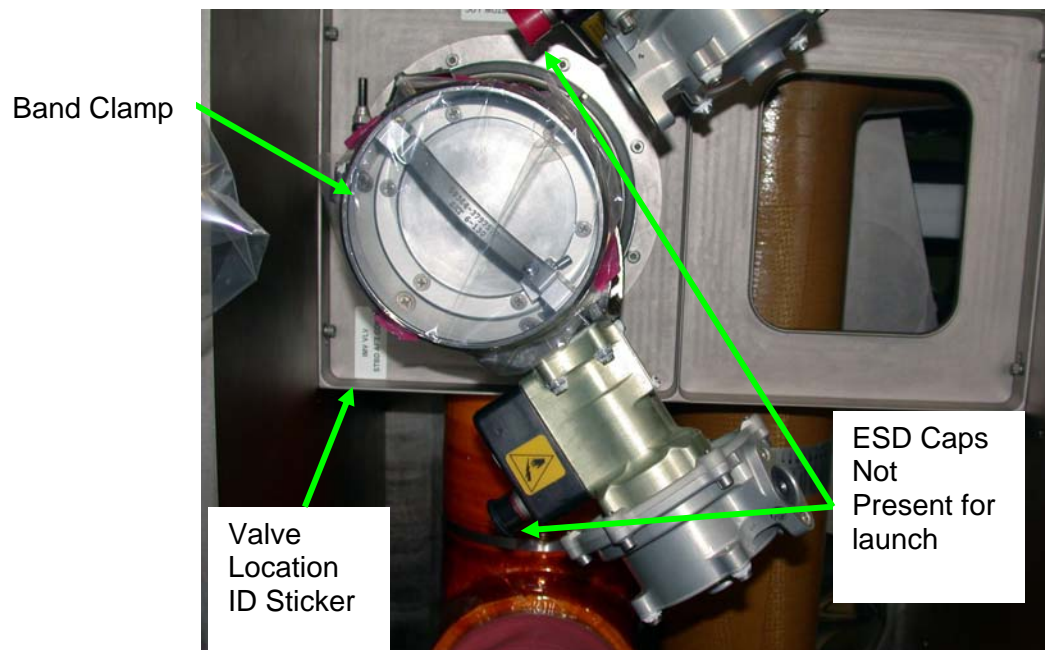


Figure 10.- IMV Valve Starboard Aft Cone Stowed Location (NOD2S3-01).

- 6.4 Remove IMV Valve and V-Band Clamp from stowed location NOD2S3-01 (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive). Refer to Table 1. Refer to Figure 10.



Figure 11.- IMV Valve.

6.5 ✓ Teflon Seals (two) on mating surface of IMV Valve Flange are present

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

CAUTION

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

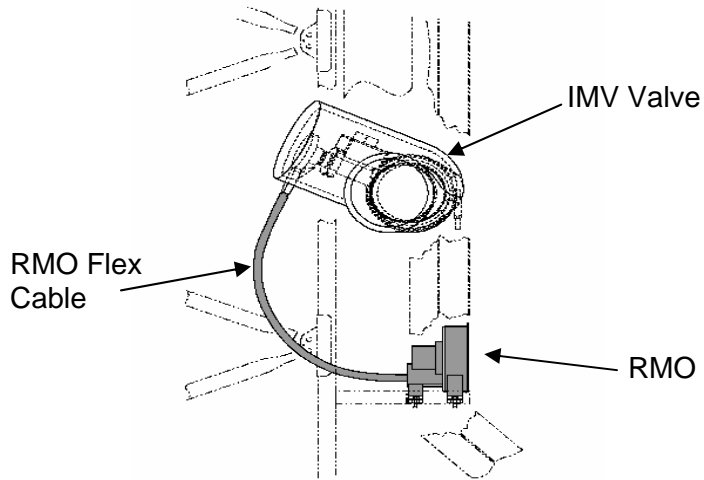


Figure 12. Aft Stbd IMV Valve with RMO Installed.

- 6.6 Verify RMO cable has optimum bend radius.
Refer to Figure 12.

If optimum bend radius, proceed to step 6.9.

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

NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN)

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Figure 14.- Typical IMV Valve Reference Marks in Node 2.

- 6.10 Using reference marks, align IMV Valve to bulkhead and install V-Band Clamp, torque to 35 in-lbs [Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive]. Refer to Figure 14.
- 6.11 Remove Tethered Cap from end of RMO flex shaft (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 6.12 Remove RMO flex cable from launch configuration (2" Cut Scissors).
- 6.13 Install RMO flex cable. Verify acceptable bend radius, Fasteners (two) (Driver Handle, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 12.
- 6.14 P1AFT_IMVVS HMU253 →|← J1
P2AFT_IMVVS HMU612 →|← J2



Figure 15.- Flexible Coupling Launch Configuration.

NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN)

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- 6.15 Remove protective cloth from flexible coupling (2" Cut Scissors).
Refer to Figure 15.
 - 6.16 Slide IMV Valve Band Clamp over flexible coupling, tighten (Ratchet,
1/4" Drive; 4" Ext, 1/4" Drive; 1/4" Socket, 1/4" Drive).
 - 6.17 Doff Static Wrist Tether.
7. [POST MAINTENANCE](#)
- 7.1 Photo document final configuration (DCS 760 Camera).
 - 7.2 Notify **MCC-H** of task completion.
 - 7.3 Stow tools, materials, equipment.
Update IMS with stowage locations.

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PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

(ASSY OPS/10A/FIN)

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OBJECTIVE:

Inspect, install Portable Breathing Apparatuses (PBAs) (each consists of Quick Don Mask Assembly (QDMA) and Oxygen Bottle) and Portable Fire Extinguisher.

LOCATION:

NOD2P2-14 (Port Alcove)

NOD2D6-61 (Aft Deck)

DURATION:

35 minutes

PARTS:

Extension Hose Tee Kits (EHTK) (two)

PBAs (two)

PFE

MATERIALS:

None

TOOLS:

ISS IVA Toolbox:

Drawer 2:

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

Driver Handle, 1/4" Drive

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

(ASSY OPS/10A/FIN)

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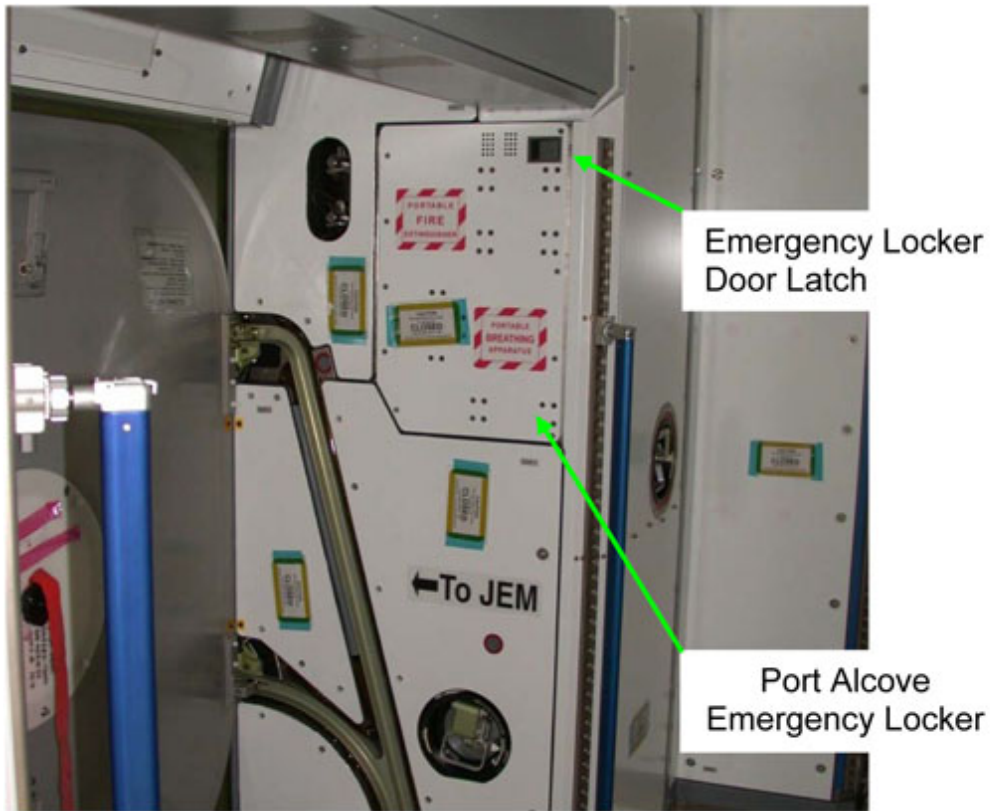


Figure 1. Alcove Port Emergency Locker.

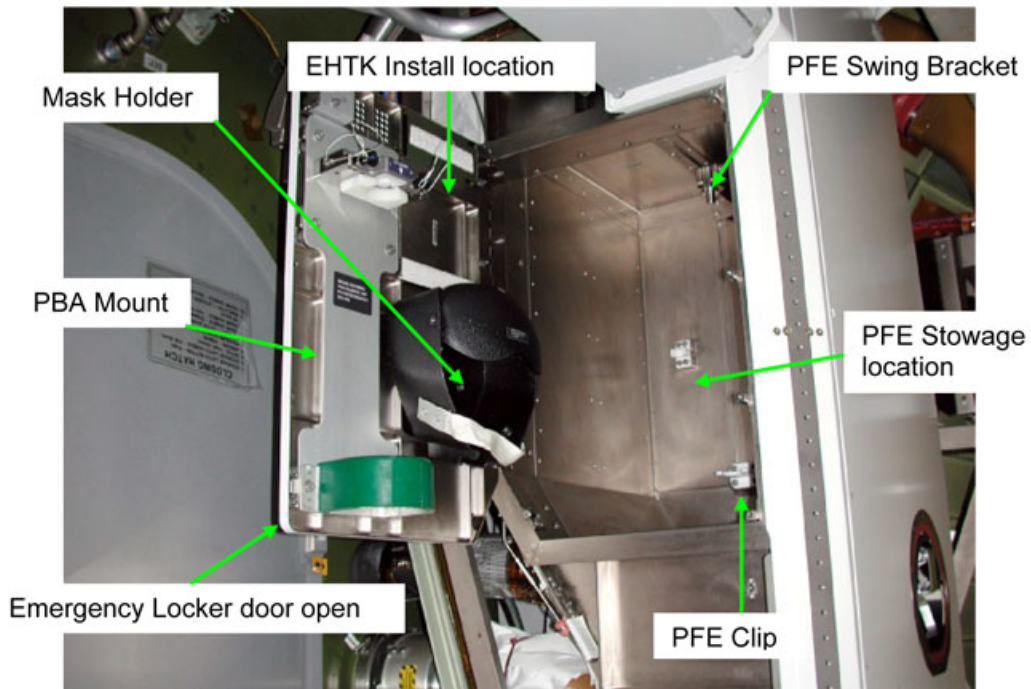


Figure 2. Alcove Port Emergency Locker.

1. [PORT ALCOVE EMERGENCY LOCKER PFE INSTALLATION](#)

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

(ASSY OPS/10A/FIN)

Page 3 of 11 pages

- 1.1 If required, unfasten, remove launch bolts (five) from Alcove Port Emergency Locker panel (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

Stow launch bolts.

Open Emergency Locker Door using Door Latch.

Refer to Figure 1.

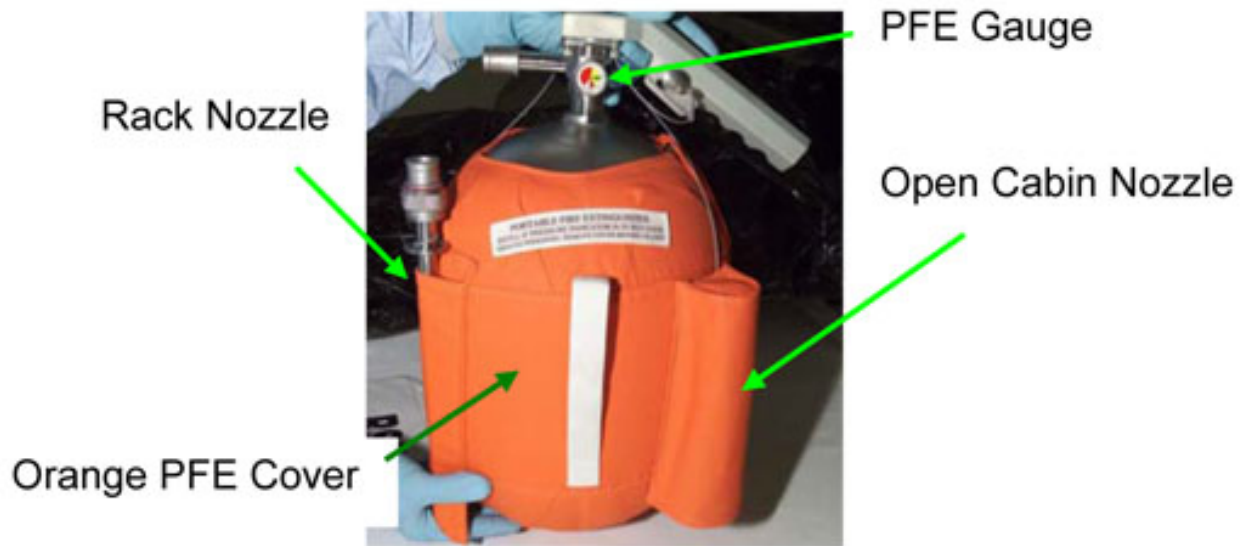


Figure 3. PFE with Nozzles.

- 1.2 Retrieve PFE from stowage location.
Verify both nozzles stowed, tethered on PFE.
Verify Orange PFE Cover on PFE.
Verify gauge needle in green.
Refer to Figure 3.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

(ASSY OPS/10A/FIN)

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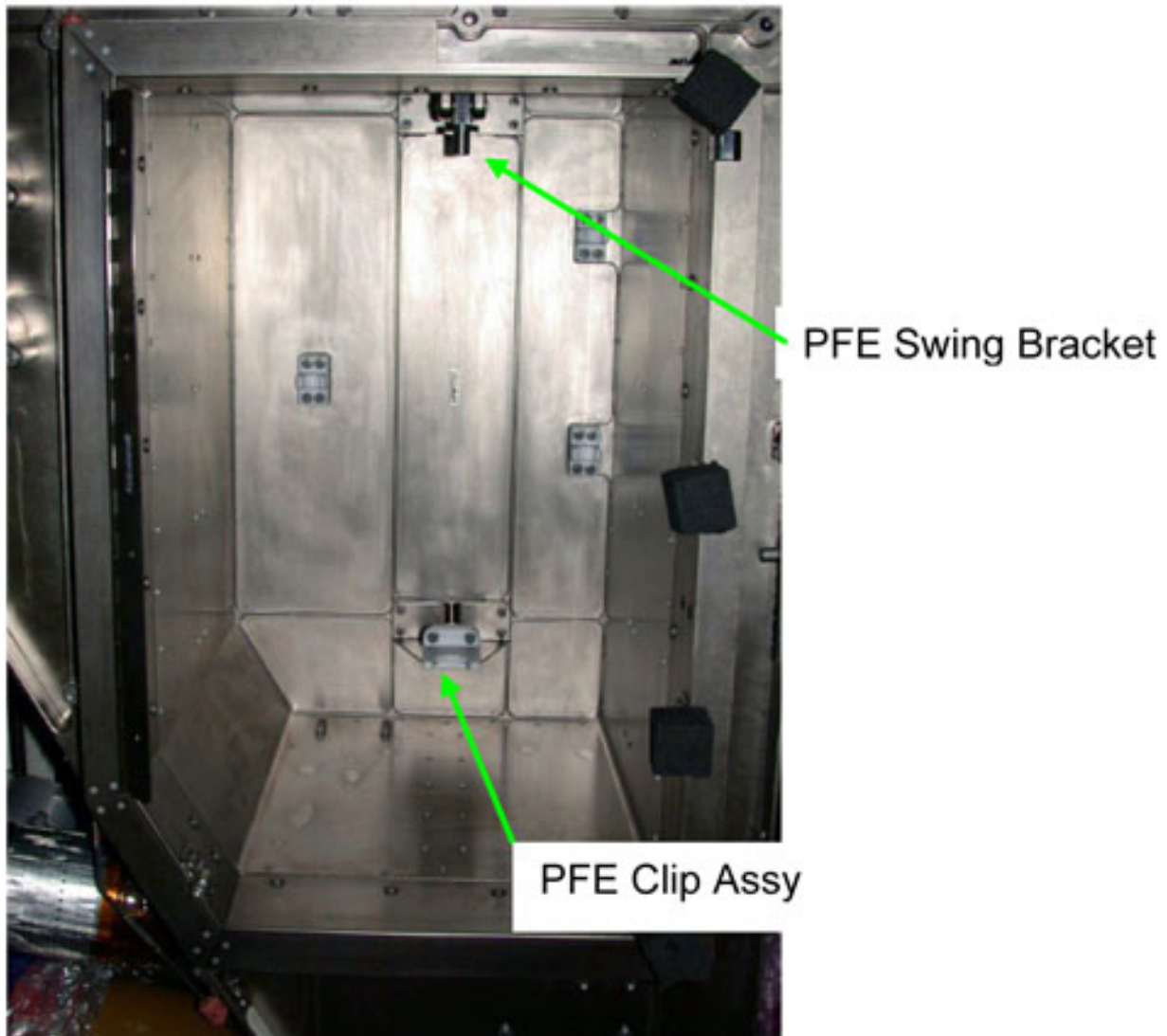


Figure 4. PFE Install Location.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

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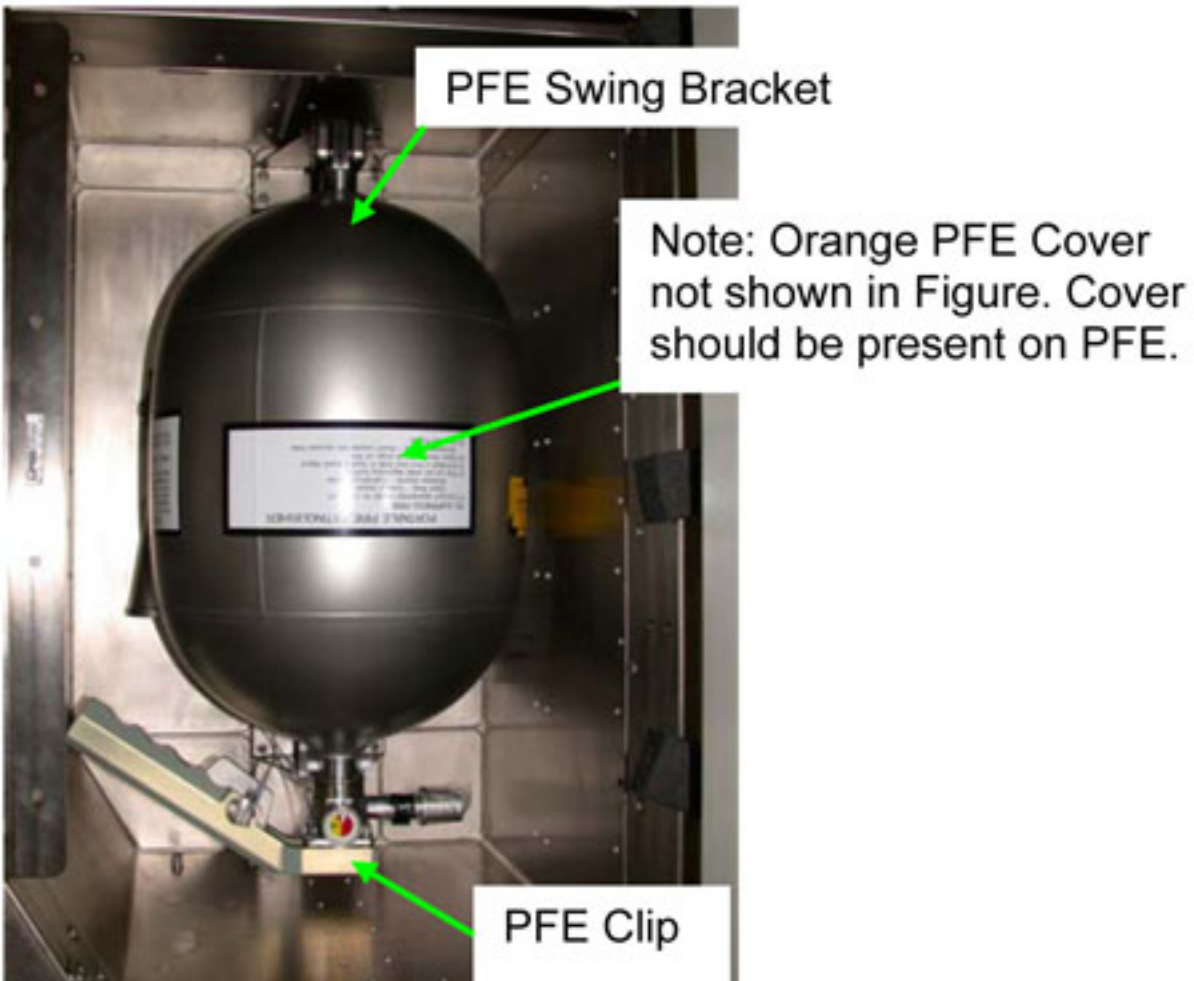


Figure 5. PFE Installed.

- 1.3 Engage Swing Bracket Assembly with bottom of PFE.
Refer to Figures 4, 5.
- 1.4 Slide neck of PFE into Clip Assembly.
Refer to Figures 4, 5.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

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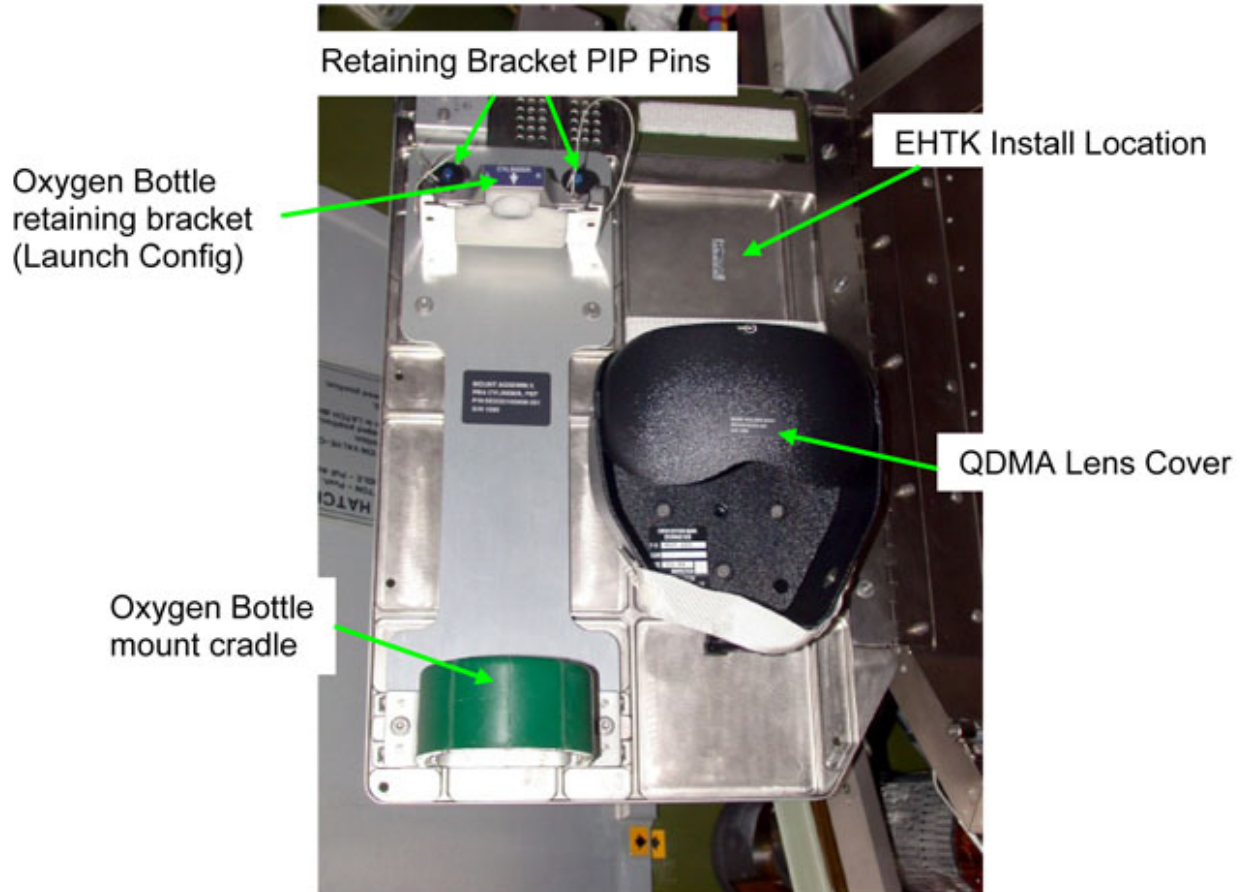


Figure 6. PBA Install Location.

2. PORT ALCOVE EMERGENCY LOCKER PBA INSTALL

- 2.1 Unstow and install, Extension Hose Tee Kit (EHTK) using Velcro, on Emergency Box Door. Refer to Figure 6.

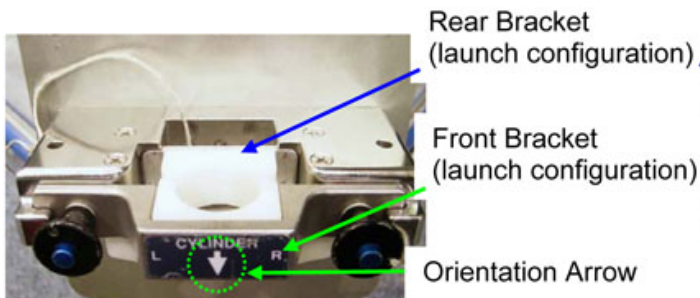


Figure 7.- Oxygen Bottle Retaining Bracket.

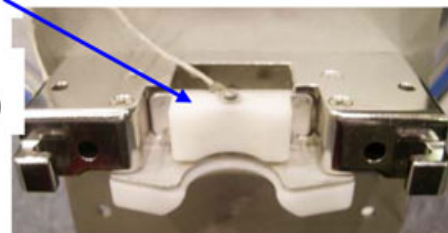


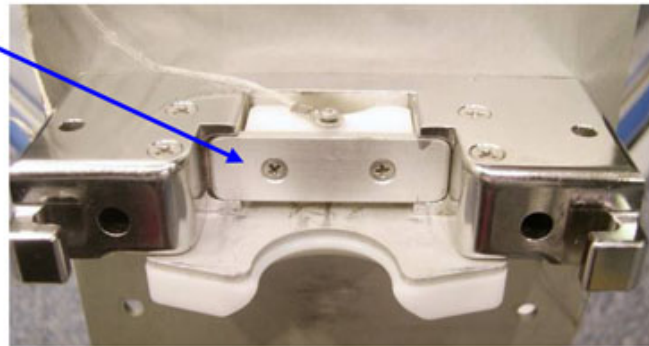
Figure 8.- Oxygen Bottle Rear Bracket.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

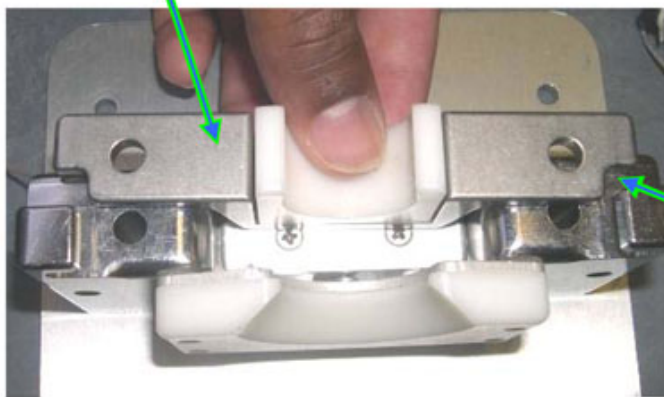
(ASSY OPS/10A/FIN)

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Rear Bracket rotated and
installed in recessed slot



Front Bracket rotated horizontally
and positioned for installation



One of two cut outs that must face
down, in addition to the downward
pointing orientation arrow, which is
on the reverse side.

Figure 9. Front and Rear Brackets in On-orbit Configuration.

- 2.2 Remove tethered PIP Pins (two) to release front and rear brackets.
Refer to Figures 6, 7, 8, 9.
- 2.3 Rotate and install rear bracket in recessed slot.
Refer to Figures 7, 8, 9.
- 2.4 Horizontally rotate front bracket and install with two cutouts and
orientation arrow pointing down.
Reinstall PIP Pins.
Refer to Figures 6, 7, 9.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

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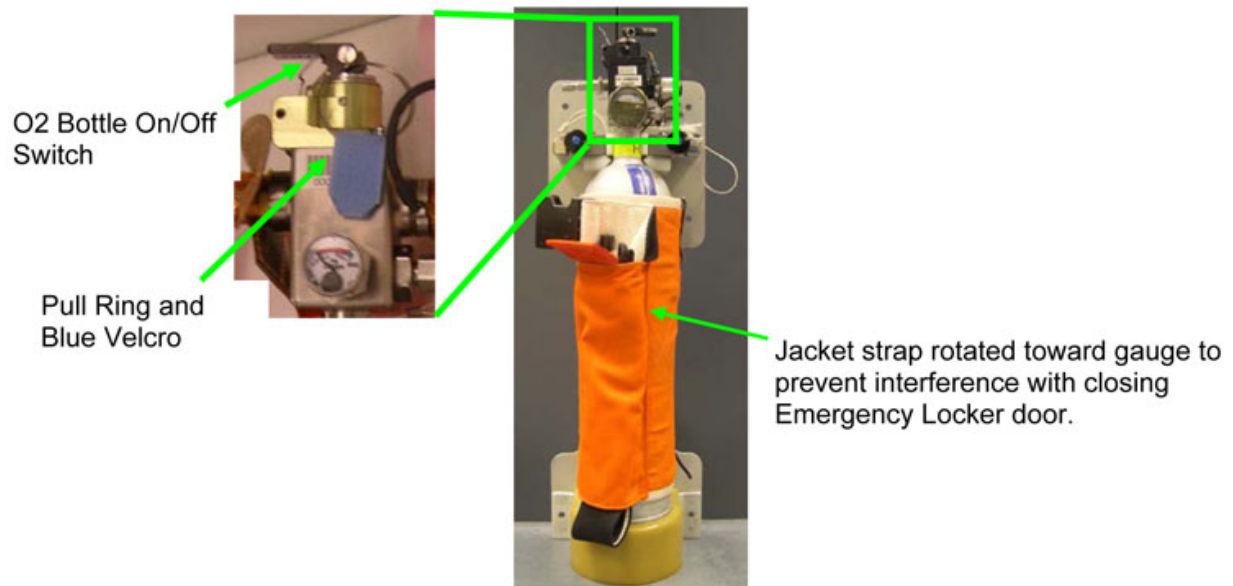


Figure 10. PBA Installed in Bracket with Jacket Rotated.

- 2.5 Rotate PBA Oxygen Bottle Jacket so that it is in line with the gauge and will not interfere with installing bottle on bracket or closing Emergency Locker door.
Refer to Figure 10.
- 2.6 Lower Oxygen Bottle of PBA onto mount cradle.
- 2.7 Push top of Oxygen Bottle into retaining bracket.
- 2.8 Insert QDMA into Lens Cover.
- 2.9 If installed
| Pull launch restraint pin from O2 Bottle On/Off switch (Blue velcro, Pull Ring).

Stow Pin or Ring for trash.
Refer to Figure 10.
- 2.10 Verify hoses are cleared from pinch points, close Emergency Locker Door.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

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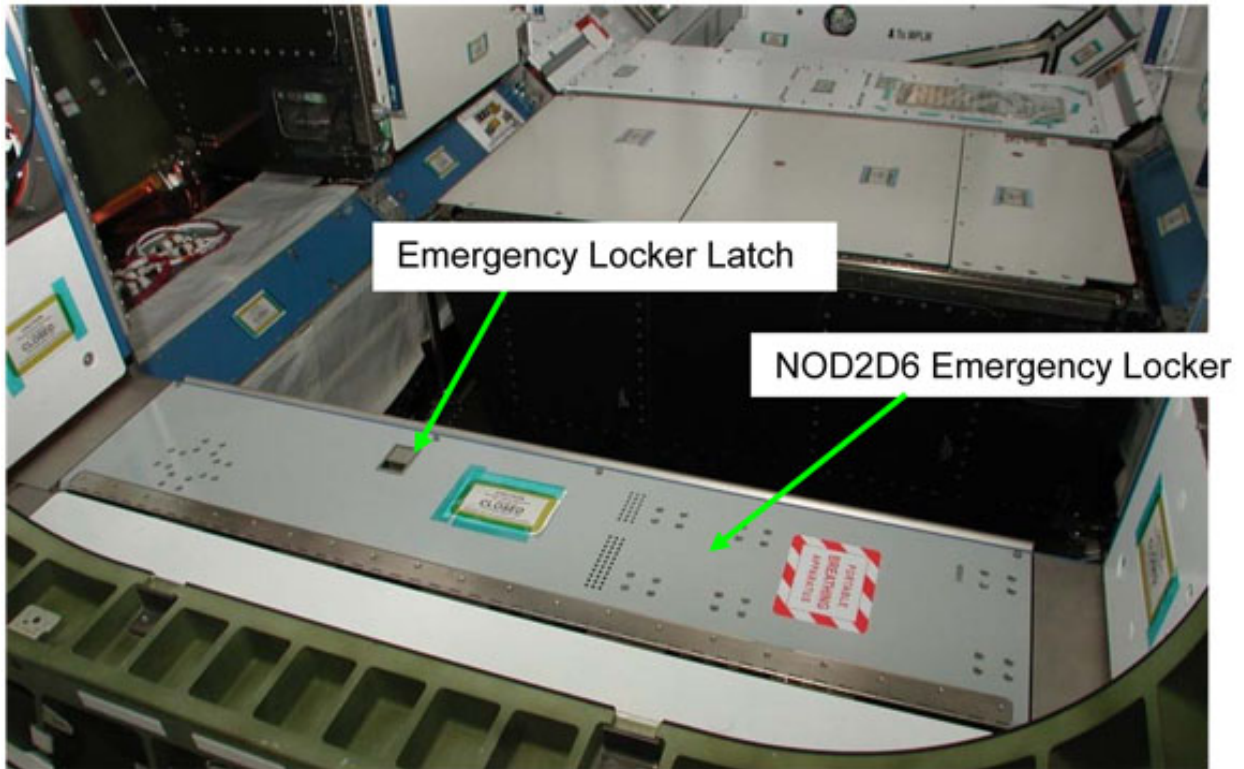


Figure 11. NOD2D6 Emergency Locker.

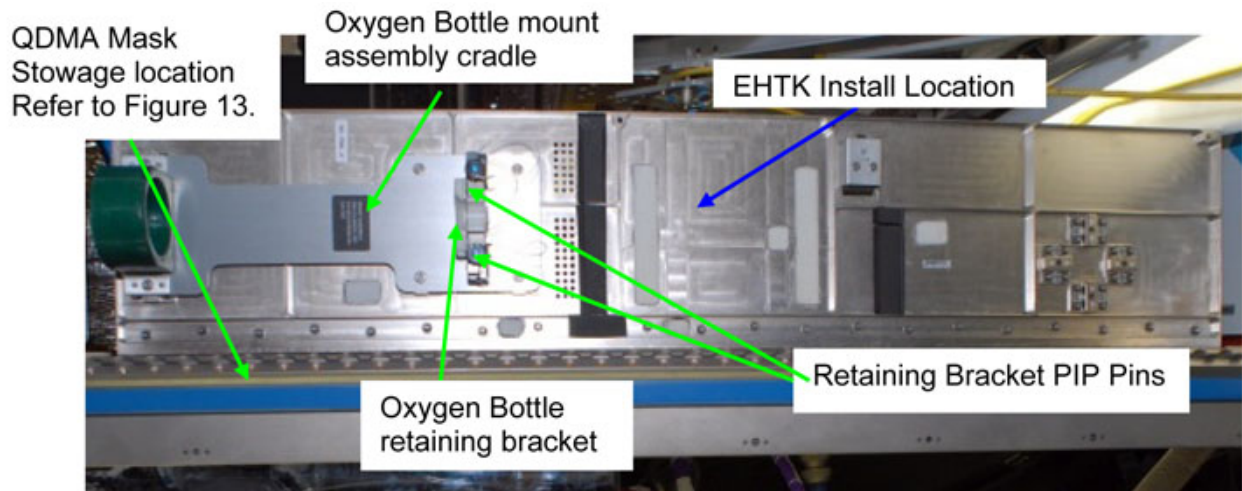


Figure 12. NOD2D6 Emergency Locker Open.

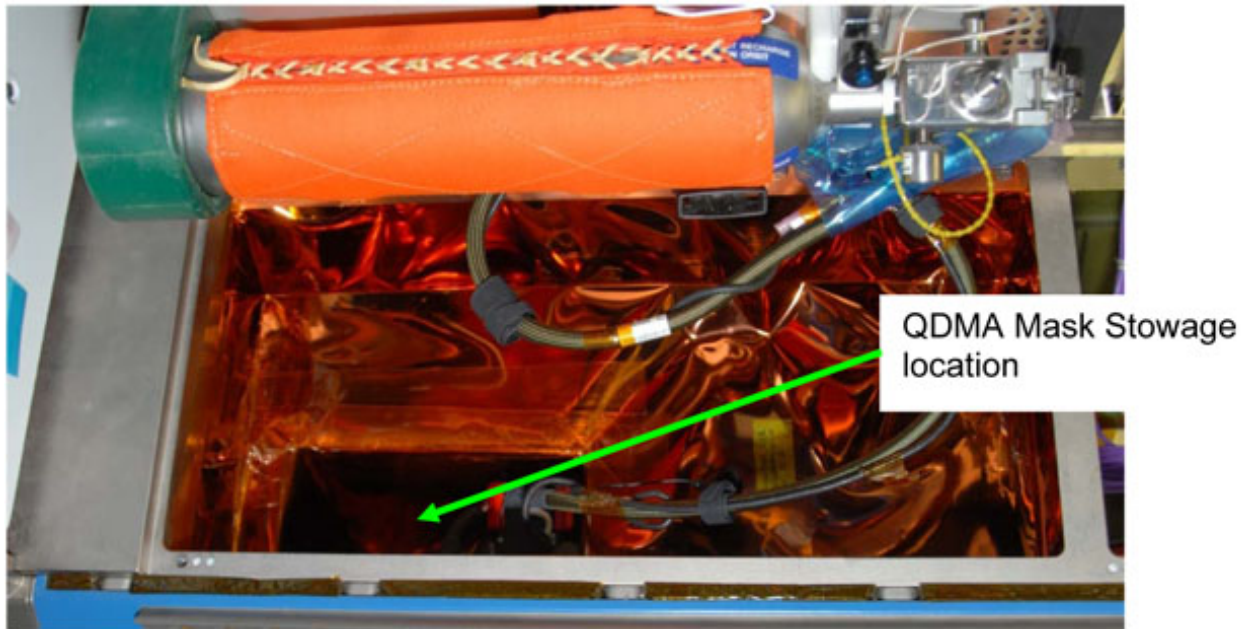


Figure 13. NOD2D6 QDMA Mask Stowage Location.

3. NODE2D6 EMERGENCY LOCKER PBA INSTALLATION
 - 3.1 If required, unfasten, remove launch bolts (four) from panel NOD2D6 Emergency Locker (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
 - Stow launch bolts.
 - Disengage Latch and open locker by pulling the latch with finger.
 - Refer to Figures 11, 12.
 - 3.2 Unstow and install, Extension Hose Tee Kit (EHTK) using Velcro, on Emergency Box Door.
 - 3.3 Remove tethered PIP Pins (two) to release front and rear brackets. Refer to Figures 6, 7, 8, 9.
 - 3.4 Rotate and install rear bracket in recessed slot. Refer to Figures 7, 8, 9.
 - 3.5 Horizontally rotate front bracket and install with two cutouts, and orientation arrow pointing down. Reinstall PIP Pins. Refer to Figures 6, 7, 9.
 - 3.6 Rotate PBA Oxygen Bottle Jacket so that it is in line with the gauge and will not interfere with installing bottle on bracket or closing Emergency Locker door. Refer to Figure 10.

PORTABLE FIRE EXTINGUISHER AND PORTABLE BREATHING APPARATUS INSTALLATION

(ASSY OPS/10A/FIN)

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- 3.7 Lower Oxygen Bottle of PBA onto mount cradle.
- 3.8 Push top of Oxygen Bottle into retaining bracket.
- 3.9 Insert QDMA into Mask Stowage Location.
Refer to Figure 13.
- 3.10 Verify hoses are cleared from pinch points, then close Emergency Locker Door.

4. POST MAINTENANCE

- 4.1 Notify **MCC-H** of task completion.
- 4.2 Update IMS with stowage locations.

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OBJECTIVE:

Safe connectors for RPCM S04B-C R&R.

INITIAL CONDITIONS:

LAB RWS Active and Cupola RWS in Backup, MSS LB Channel A selected.
 MT at Worksite 4 with 3A and 4B heaters powered.
 MBS and SSRMS Operational on Redundant (3A) string, MBS Keep-Alive on Prime (4B) string, MBS VDUs powered from redundant (3A) string.

1. CONFIGURING VIDEO FOR DDCU S14B POWERDOWN

MCC-H 1.1 Coordinating with ISS Crew
MCC-H notifies ISS crew that MSS video will be lost temporarily, and directs ISS crew to halt all MSS video routing.

Wait for **MCC-H GO** before resuming routing.

1.2 VDS Auto Route - Deroute
 To deroute all MSS camera views, perform {2.601 VDS AUTO ROUTE - DEROUTE}, steps 5 and 6 (SODF: C&T: NOMINAL: VIDEO), then:

1.3 VDS Trunkline Configuration

NOTE

VDS Trunkline Configuration, VDS Activation, and VDS Deactivation (steps 1.3 and 1.4) can be performed in parallel to reduce execution time.

Perform {4.602 VDS TRUNKLINE CONFIGURATION}, steps 1 to 3 for USOS TLs 19, 20, 21 and 22, and steps 5 to 7 for MSS TLs 1, 8 and 9 (SODF: C&T: NOMINAL: VIDEO), then:

1.4 MBS VDU 2 Sync 2 Selection
 MSS: Video: VSU1: MSS Sync Config
MSS Sync Config

sel 'Sync Source' – MSS Sync Line 2
 sel 'MBS VDU 2' – Enable
 sel all others – Inhibit

cmd Set (Verify VDU Sync Status – as commanded)

Table 1.

Ops Name	CIPUI
MSS_Video_Sync_Route_VDU2_Sync2	CMRM96IM0158K:001

Verify Sync selection – Sync 2
 Verify sync output to MBS Mast Camera.

1.5 SSRMS VDU Sync 2 Selection
 MSS: Video: VSU1: MSS Sync Config

MSS Sync Config

- sel 'Sync Source' – MSS Sync Line 2
- sel 'Base Elbow' – Enable
- sel 'Base LEE' – Enable
- sel 'Tip Elbow' – Enable
- sel 'Tip LEE' – Enable
- sel all others – Inhibit

cmd Set (Verify VDU Sync Status – as commanded)

Table 2.

Ops Name	CIPUI
MSS_Video_Sync_Route_SSRMS_Sync2	CMRM96IM0158K:002

Verify Sync selection – Sync 2
 Verify sync output to SSRMS Cameras.

1.6 EVSU 3 Power Reconfiguration
 C&T: Video: EVSU 3: RPCM S02B E RPC 3
RPCM S02B E RPC 3

√RPC Position – CI

NOTE

To reduce execution time, the RT Inhibit portion of {1.603 VDS DEACTIVATION}, step 9 (SODF: C&T: ACTIVATION AND CHECKOUT: VIDEO) can be omitted with ODIN concurrence as long as RT FDIR is inhibited.

For EVSU 3 Ops Pwr only
 Perform {1.603 VDS DEACTIVATION}, steps 9 and 12 (SODF: C&T: ACTIVATION AND CHECKOUT: VIDEO), then:

2. CONFIGURING MSS FOR DDCU S14B POWERDOWN

2.1 Configuring MSS LB to Channel B
 MSS: LAS5(LAP5) Bus Config
LAS5(LAP5) CEU Bus Configuration

cmd 'Local Bus' 'MSS' B (Verify – B)

Table 3.

OPS Name	CIPUI
CUP_RWS_Bus_Ch_Select_MSS_LB_Ch_B	CMRM96IM0170K
LAB_RWS_Bus_Ch_Select_MSS_LB_Ch_B	CMRM96IM0067K

2.2 Powering Prime MBS String to Off

- | <u>NOTE</u> | |
|--|----------------------------------|
| 1. Expect 'R1E - MSS Active | OCS MBS Prime MCU SRT Comm Fail' |
| Robotics Advisory messages (SCR 17730). | |
| 2. Expect 'R2O - MBS CRPCM 1P(2P, 3P) Cat-2 Transmit | (Receive) Msg Err' |
| Robotics Advisory messages (SCR 21744). | |

CDDT

MSS: MBS: MCU
MCU

cmd 'Prime' Off (Verify – Off)

Table 4.

Ops Name	CIPUI
MBS_Power_Off_Prime_Pre_SPDM	CMRM96IM0205K

2.3 Powering Up TUS 1 IMCA 2

MSS: MT: Power: 'RPCM S03A F' 1
RPCM S03A F RPC 01

cmd 'RPC Position' Close (Verify – Cl)

Table 5.

Ops Name	CIPUI
RPCM_S03A_F_RPC_01_MSS_MT_TUS_1_IMCA_2_CI	S0PR96IM0258K

3. CONFIGURING DDCU S14B POWERED UTILITY RAIL HEATERS
 3.1 Configuring Prime Utility Rail Heaters

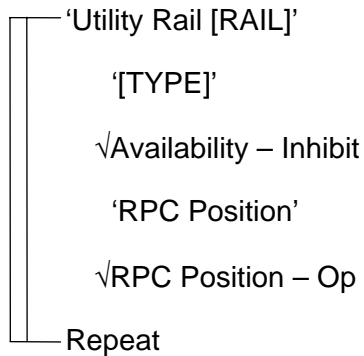
Table 6. DDCU S14B Powered Utility Rail Heaters

Truss [XX]	Display [DISPLAY]	Utility Rail [RAIL]	Heater Type [TYPE]
P1	Pwr Busses P12B P13A Rail Htrs	P12B	Survival
P1	Pwr Busses P12B P13A Rail Htrs	P13A	Survival
P1	Pwr Busses P11A P14B Rail Htrs	P14B	Operational
P3	P3 Rail Heaters	P32B	Survival
P3	P3 Rail Heaters	P33A	Survival
P3	P3 Rail Heaters	P34B	Operational
S0	Pwr Bus S02B Rail Heaters	S02B	Survival
S0	Pwr Bus S03A Rail Heaters	S03A	Survival
S0	Pwr Bus S04B Rail Heaters	S04B	Operational
S1	Pwr Busses S12B S13A Rail Htrs	S12B	Survival
S1	Pwr Busses S12B S13A Rail Htrs	S13A	Survival
S1	Pwr Busses S11A S14B Rail Htrs	S14B	Operational
S3	S3 Rail Heaters	S32B	Survival
S3	S3 Rail Heaters	S33A	Survival
S3	S3 Rail Heaters	S34B	Operational

Refer to Table 6 for [XX], [DISPLAY], [RAIL], and [TYPE] references that follow.

[XX]: [DISPLAY]

[DISPLAY]



3.2 Configuring Redundant Utility Rail Heaters

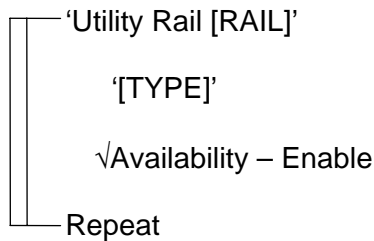
Table 7. Redundant Utility Rail Heaters (powered by DDCUs other than S14B)

Truss [XX]	Display [DISPLAY]	Utility Rail [RAIL]	Heater Type [TYPE]
P1	Pwr Busses P12B P13A Rail Htrs	P12B	Operational
P1	Pwr Busses P12B P13A Rail Htrs	P13A	Operational
P1	Pwr Busses P11A P14B Rail Htrs	P14B	Survival
P3	P3 Rail Heaters	P32B	Operational
P3	P3 Rail Heaters	P33A	Operational
P3	P3 Rail Heaters	P34B	Survival
S0	Pwr Bus S02B Rail Heaters	S02B	Operational
S0	Pwr Bus S03A Rail Heaters	S03A	Operational
S0	Pwr Bus S04B Rail Heaters	S04B	Survival
S1	Pwr Busses S12B S13A Rail Htrs	S12B	Operational
S1	Pwr Busses S12B S13A Rail Htrs	S13A	Operational
S1	Pwr Busses S11A S14B Rail Htrs	S14B	Survival
S3	S3 Rail Heaters	S32B	Operational
S3	S3 Rail Heaters	S33A	Operational
S3	S3 Rail Heaters	S34B	Survival

Refer to Table 7 for [XX], [DISPLAY], [RAIL], and [TYPE] references that follow.

[XX]: [DISPLAY]

[DISPLAY]



4. DEACTIVATING DDCU S14B

NOTE

Prior to removing Channel 4B power, it is necessary to ensure that the downstream EPS ORUs do not have ORU health flags set (i.e., EEPROM Bit Flips). If the health flag is set due to an ORU flip bit, failure to check the ORU health prior to powering it down may result in loss of ORU function upon powering it back. If repowered, these ORUs will boot from unhealthy EEPROM Firmware.

4.1 Inhibiting RT FDIR on ORUs and DDCU S14B

NOTE

1. Inhibit RT FDIR to RTs that will lose power, but will still be monitored during the powerdown (i.e., RPCMs).
2. Expect multiple loss of comm and observed vs last commanded states messages when DDCU S14B converter powered off.
3. ODIN to perform via command script.

CDH Summary: Primary EXT MDM

Primary EXT MDM

sel LB MT 1
sel RT Status
sel RT Status Cont. RT#16-25

LB MT 1 RT Status Cont.

cmd '25 RPCM MT 4B A' RT FDIR Status – Inhibit FDIR **Execute**
(Verify – Inh)

CDH Summary: S1 1 MDM

S1 1 MDM

sel UB SEPS S1 14
sel RT Status

S1 1 UB SEPS S1 14 RT Status

cmd RPCM S14B [X] RT FDIR Status – Inhibit FDIR **Execute**
(Verify – Inh) where [X] = [E] [F] [G]

CDH Summary: S0 1 MDM

S0 1 MDM

sel UB SEPS S0 14
sel RT Status

S0 1 UB SEPS S0 14 RT Status

cmd RPCM S04B [X] RT FDIR Status – Inhibit FDIR **Execute**
(Verify – Inh) where [X] = [A] [B] [C] [D] [E] [F]

CDH Summary: P1 1 MDM

P1 1 MDM

sel UB SEPS P1 14
sel RT Status

P1 1 UB SEPS P1 14 RT Status

cmd RPCM P14B [X] RT FDIR Status – Inhibit FDIR **Execute**
(Verify – Inh) where [X] = [E] [F] [G]

CDH Summary: P3 1 MDM

P3 1 MDM

sel UB SEPS P3 14
sel RT Status

P3 1 UB SEPS P3 14 RT Status

cmd RPCM P34B [X] RT FDIR Status – Inhibit FDIR **Execute**
(Verify – Inh) where [X] = [C] [E] [F]

CDH Summary: S3 1 MDM

S3 1 MDM

sel UB SEPS S3 14
sel RT Status

S3 1 UB SEPS S3 14 RT Status

cmd RPCM S34B [X] RT FDIR Status – Inhibit FDIR **Execute**
(Verify – Inh) where [X] = [C] [E] [F]

4.2 Deactivating DDCU S14B

EPS Summary: S1: DDCU S14B

DDCU S14B

sel Converter

DDCU S14B Converter

'Converter'

cmd Off (1-step command, arm not required)

√Output Voltage < 12.8 V

MCC-H ↑ ISS, "GO for RPCM S04B-C R&R."

4.3 Receiving GO for DDCU S14B Powerup

NOTE

Crew will give GO for powerup after RPCM S04B-C R&R is completed

ISS ↓ **MCC-H**, "GO for DDCU S14B Powerup."

5. ACTIVATING DDCU S14B

EPS Summary: S1: DDCU S14B

DDCU S14B

sel Converter

DDCU S14B Converter

'Converter'

cmd Converter On – Arm

cmd Converter On – On

DDCU S14B

√Input Current: -4 to 4 A

√Input Voltage: 146 to 165 V

√Out Current: -4 to 4 A

√Out Voltage: 120.2 to 128.8 V

√Converter Temp: -37.3 to 43.8° C

√Power Supply Temp: -37.3 to 49.5° C

√Baseplate Temp: -37.3 to 40.3° C

6. REENABLING FDIR ON ORUs AND DDCUs

Enabling RT FDIR on ORUs and DDCU S14B

NOTE

1. Enable RT FDIR to RTs from step 4.3.
2. ODIN to perform via command script.

CDH Summary: S1 1 MDM

S1 1 MDM

sel UB SEPS S1 14

sel RT Status

S1 1 UB SEPS S1 14 RT Status

RPCM S04B-C REMOVE AND REPLACE (R&R) POWERDOWN/POWERUP

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cmd RPCM S14B [X] RT FDIR Status – Enable FDIR **Execute**
(Verify – Ena) where [X] = [E] [F] [G]

CDH Summary: S0 1 MDM

S0 1 MDM

sel UB SEPS S0 14
sel RT Status

S0 1 UB SEPS S0 14 RT Status

cmd RPCM S04B [X] RT FDIR Status – Enable FDIR **Execute**
(Verify – Ena) where [X] = [A] [B] [C] [D] [E] [F]

CDH Summary: P1 1 MDM

P1 1 MDM

sel UB SEPS P1 14
sel RT Status

P1 1 UB SEPS P1 14 RT Status

cmd RPCM P14B [X] RT FDIR Status – Enable FDIR **Execute**
(Verify – Ena) where [X] = [E] [F] [G]

CDH Summary: P3 1 MDM

P3 1 MDM

sel UB SEPS P3 14
sel RT Status

P3 1 UB SEPS P3 14 RT Status

cmd RPCM P34B [X] RT FDIR Status – Enable FDIR **Execute**
(Verify – Ena) where [X] = [C] [E] [F]

CDH Summary: S3 1 MDM

S3 1 MDM

sel UB SEPS S3 14
sel RT Status

S3 1 UB SEPS S3 14 RT Status

cmd RPCM S34B [X] RT FDIR Status – Enable FDIR **Execute**
(Verify – Ena) where [X] = [C] [E] [F]

7. CONFIGURING MBS/MT FOR NOMINAL OPERATIONS

7.1 Powering MBS Prime to Keep-Alive

MSS: MBS: MCU

MCU

cmd 'Prime' Keep-Alive (Verify – Keep-Alive)

Table 8.

Ops Name	CIPUI
MBS_Power_Keep_Alive_Prime	CMRM96IM0201K

7.2 Verifying TUS 1 Gearbox Heater Activation

MSS: MT: Thermal: 'RPCM S04B F' Heater 3

MT TUS 1 Gearbox Heater

√'Htr Availability' – ENA

Table 9.

Ops Name	CIPUI
PTCS_MSS_MT_TUS_1_Htr_Ena	S0TH96IM0011K

√'Control Mode State' – Closed Loop

Table 10.

Ops Name	CIPUI
PTCS_MSS_MT_TUS_1_Htr_Closed_Loop	S0TH96IM0188K

7.3 RPCM MT4B Powerup

MSS: MT: RPCM MT-4B: RPCM S04B F

RPCM S04B F RPC 17

Verify 'Integration Counter' – incrementing

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

Table 11.

Ops Name	CIPUI
RPCM_S04B_F_RPC_17_MSS_MT_4B_CI	S0PR96IM0320K

MSS: MT: RPCM MT-4B

RPCM_MT4B_A

Verify 'Integration Counter' – incrementing

CDH Summary: Primary EXT MDM

Primary EXT MDM

sel LB MT 1
 sel RT Status
 sel RT Status Cont. RT#16-25

LB MT 1 RT Status Cont.

cmd '25 RPCM MT 4B A' RT FDIR Status – Enable FDIR **Execute**
 (Verify – Ena)

7.4 MT-4B Heater and Amp Power Activation

MSS: MT: Thermal: RPCM-MT-4B

RPCM MT4B A Details

sel RPC [X] where [X] = **8** **12** **13** **14** **16**

RPCM MT4B A RPC [X]

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

Repeat

Table 12.

RPC	Ops Name	CIPUI
8	RPCM_MT4B_A_RPC_08_MSS_MT_IUA_Htr_1_UMA_Htr_2_Cl	S0PR96IM0329K
12	RPCM_MT4B_A_RPC_12_MSS_MT_LTU_Htr_1_Cl	S0PR96IM0333K
13	RPCM_MT4B_A_RPC_13_MSS_MT_AMP_1_Htr_1_and_Operational_Pwr_Cl	S0PR96IM0334K
14	RPCM_MT4B_A_RPC_14_MSS_MT_AMP_2_Htr_1_and_Operational_Pwr_Cl	S0PR96IM0335K
16	RPCM_MT4B_A_RPC_16_MSS_MT_ED_Htr_2_RSU_Htr_1_Cl	S0PR96IM0337K

7.5 Activating TUS-2 Video Signal Converter Heater 2

MSS: MT: Thermal: RPCM-S0-4B-E: RPC 4

RPCM S04B E RPC 04

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

Table 13.

Ops Name	CIPUI
RPCM_S04B_E_RPC_04_MSS_MT_TUS_2_VSC_Htr_2_Cl	S0PR96IM0289K

7.6 Activating TUS-2 Video Signal Converter Power 2

MSS: MT: Thermal: RPCM-S0-4B-E: RPC 2

RPCM S04B E RPC 02

cmd 'RPC Position' – Close (Verify – CI)

Table 14.

Ops Name	CIPUI
RPCM_S04B_E_RPC_02_MSS_ MT_TUS_2_VSC_Pwr_1_CI	S0PR96IM0287K

7.7 Activating TUS-1 Video Signal Converter Heater 1

MSS: MT: Thermal: RPCM-S0-4B-F: RPC 4

RPCM S04B F RPC 04

cmd 'RPC Position' – Close (Verify – CI)

Table 15.

Ops Name	CIPUI
RPCM_S04B_F_RPC_04_MSS_ MT_TUS_1_VSC_Htr_1_CI	S0PR96IM0307K

7.8 Activating TUS-1 Video Signal Converter Power 1

MSS: MT: Thermal: RPCM-S0-4B-F: RPC 2

RPCM S04B F RPC 02

cmd 'RPC Position' – Close (Verify – CI)

Table 16.

Ops Name	CIPUI
RPCM_S04B_F_RPC_02_MSS_ MT_TUS_1_VSC_Pwr_1_CI	S0PR96IM0305K

7.9 RPCM MT-4B Closed Loop Heater Activation

MSS: MT: Thermal: 'RPCM-MT-4B' RPC 15

RPCM MT 4B Bracket Heater

√'Htr Availability' Ena – ENA

Table 17.

Ops Name	CIPUI
PTCS_RPCM_Brkt_Htr1_Ena	S0TH96IM0000K

cmd 'Control Mode State' Closed Loop (Verify – Closed Loop)

Table 18.

Ops Name	CIPUI
PTCS_RPCM_Brkt_Htr1_Closed_Loop	S0TH96IM0006K

- 7.10 Powering Down TUS 1 IMCA 2
 MSS: MT: Power: 'RPCM S03A F' 1
RPCM S03A F RPC 01

cmd 'RPC Position' Open (Verify – Op)

Table 19.

Ops Name	CIPUI
RPCM_S03A_F_RPC_01_MSS_MT _TUS_1_IMCA_2_Op	S0PR96IM0638K

8. CONFIGURING VIDEO FOR NOMINAL OPERATIONS

8.1 VDS Trunkline Configuration

NOTE

VDS Trunkline Configuration and VDS Activation (steps 8.1 and 8.2) can be performed in parallel to reduce execution time.

Perform {4.602 VDS TRUNKLINE CONFIGURATION}, step 4 for USOS TLs 19, 20, 21 and 22; step 8 for MSS TLs 1, 8 and 9 (SODF: C&T: NOMINAL: VIDEO), then:

Confirm all other TLs are available.

8.2 VDS Activation

For EVSU 3 Ops Pwr only

Perform {1.601 VDS ACTIVATION}, steps 21 to 23 (SODF: C&T: ACTIVATION AND CHECKOUT: VIDEO), then:

8.3 Coordinating with ISS Crew

MCC-H notifies ISS crew that full video routing capability has been restored.

9. CONFIGURING HEATERS FOR NOMINAL OPERATIONS

9.1 Configuring PTR MDM Survival Heaters

CDH Summary: PTR MDM: PTR Surv Htr:

PTR Survival Heater

sel RPCM P14B G RPC 11

RPCM P14B G RPC 11

'RPC Position'

√RPC Position – CI

9.2 ESP-2 Heater Repower

S0: EPS: RPCM S04B-F

RPCM _S04B_F

sel RPC [X] where [X] =

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

Repeat

CAUTION

The Operational and Survival Rail Heaters for a single power bus should never be powered at the same time. The following commands could place some heaters at risk of damage (SCAN-44 heaters). Reconfiguration of the redundant heater strings may be necessary.

9.3 Recovering Redundant Utility Rail Heaters

Table 20. Redundant Utility Rail Heaters

Truss [XX]	Display [DISPLAY]	Utility Rail [RAIL]	Heater Type [TYPE]
P1	Pwr Busses P12B P13A Rail Htrs	P12B	Survival
S0	Pwr Bus S02B Rail Heaters	S02B	Survival
S0	Pwr Bus S03A Rail Heaters	S03A	Survival
S0	Pwr Bus S04B Rail Heaters	S04B	Operational
S1	Pwr Busses S12B S13A Rail Htrs	S13A	Survival
S1	Pwr Busses S11A S14B Rail Htrs	S14B	Operational

Refer to Table 20 for [XX], [DISPLAY], [RAIL], and [TYPE] references that follow.

[XX]: [DISPLAY]

'Utility Rail [RAIL]'

'[TYPE]'

√Availability – Enable

Repeat

9.4 Recovering P1 1/4 Rail Heaters

P1: EPS: Pwr Busses P11A and P14B Rail Heaters

 'Utility Rail P14B'
 'Survival Htr'

√Availability – Inhibit

‘RPC Position’

√RPC Position – Op

‘Operational Htr’

√Availability – Enable

If Temp, deg C < -23

√RPC Position – Cl

Wait until Temp, deg C > -23

‘Survival Htr’

√Availability – Enable

9.5 Recovering P1 2/3 Rail Heaters

P1: EPS: Pwr Busses P12B and P13A Rail Heaters

Pwr Busses P12B P13A Rail Htrs

‘Utility Rail P13A’

‘Operational Htr’

√Availability – Inhibit

‘RPC Position’

√RPC Position – Op

‘Survival Htr’

√Availability – Enable

If Temp, deg C < -23

√RPC Position – Cl

Wait until Temp, deg C > -23

‘Operational Htr’

√Availability – Enable

9.6 Recovering P3 1/4 Rail Heaters

P3: EPS: P3 Rail Heaters

P3 Rail Heaters

‘Utility Rail P34B’

‘Survival (Htr1)’

√Availability – Inhibit

‘RPC Position’

√RPC Position – Op

‘Operational (Htr2)’

√Availability – Enable

9.7 Recovering S1 2/3 Rail Heaters

S1: EPS: Pwr Busses S12B and S13A Rail Heaters

Pwr Busses S12B S13A Rail Htrs

‘Utility Rail S12B’

‘Operational Htr’

√Availability – Inhibit

‘RPC Position’

√RPC Position – Op

‘Survival Htr’

√Availability – Enable

If Temp, deg C < -23

√RPC Position – Cl

Wait until Temp, deg C > -23

‘Operational Htr’

√Availability – Enable

9.8 Recovering S3 1/4 Rail Heaters

S3: EPS: S3 Rail Heaters

S3 Rail Heaters

‘Utility Rail S34B’

‘Survival (Htr1)’

√Availability – Inhibit

‘RPC Position’

√RPC Position – Op

‘Operational (Htr2)’

√Availability – Enable

10. PERFORMING POWER ON RESET

For RPCMs [XX] where [XX] = the following

S04B_A – F
S14B_E – G
P14B_E – G
S34B_C, E, F
P34B_C, E, F
MT4B_A

Perform {5.420 RPCM POWER ON RESET}, all (SODF: GND
SYSTEMS: EPS: CORRECTIVE: SECONDARY POWER SYSTEM),
then:

11. C&W CONFIGURATIONS

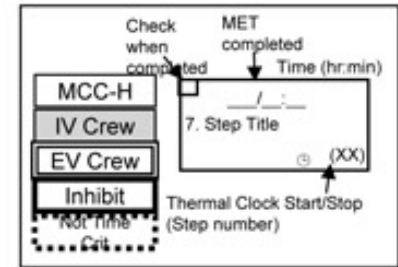
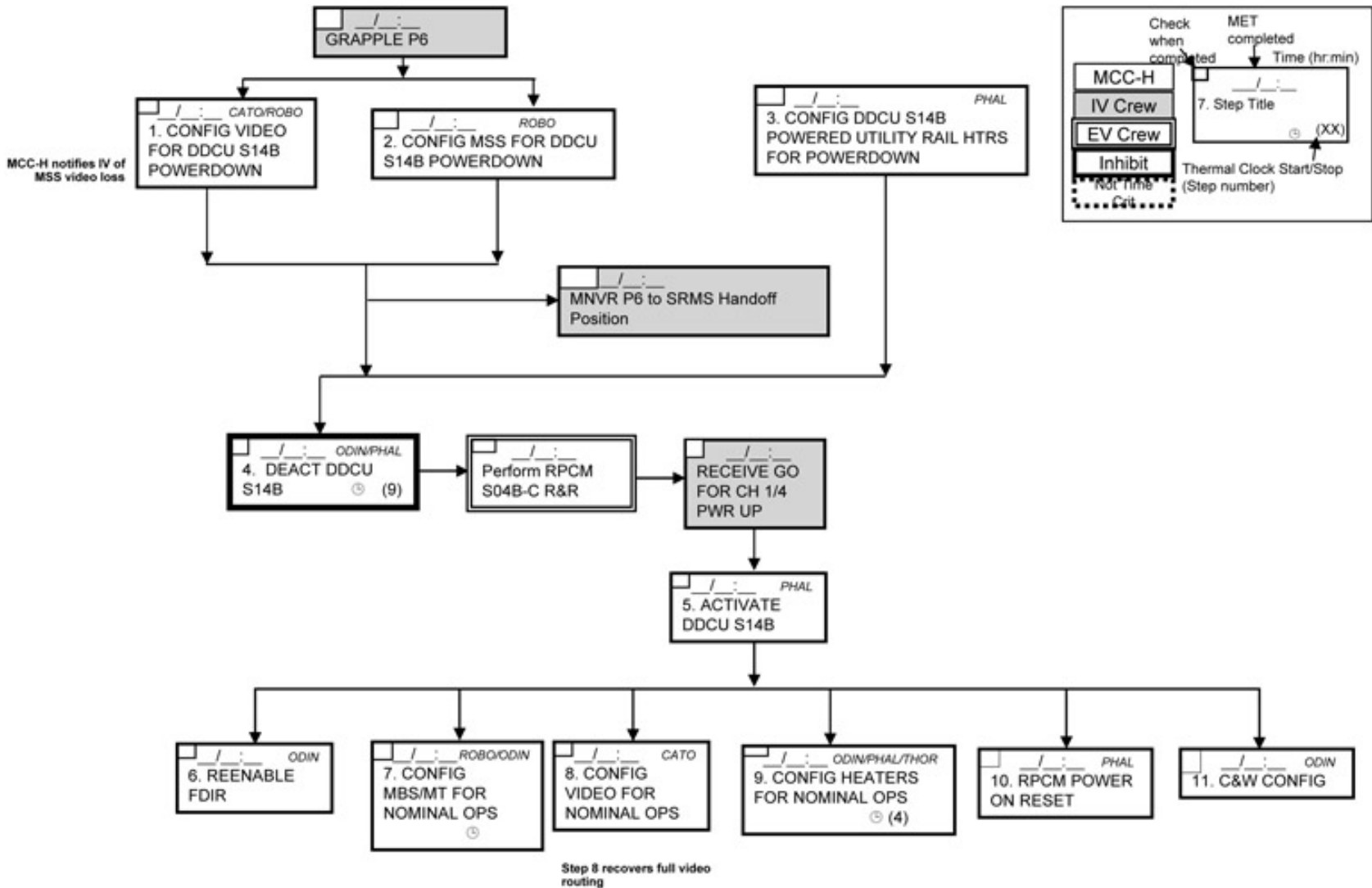
NOTE

ODIN will enable the applicable Caution and Warning events in the
C&C MDM.

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RPCM S04B-C REMOVE AND REPLACE FLOWCHART

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P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

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OBJECTIVE:

This procedure will completely powerdown the P6 Channels 2B and 4B primary power system equipment. This procedure assumes that all downstream loads have been transferred to other power channels via Seamless Power Channel Handover procedures and that Channel 2B and 4B are being back fed by other channels.

Verify **MCC-H GO** for P6 Powerdown.

1. SUPPRESSING P6 CAUTIONS AND WARNINGS

The following Caution and Warning messages in Table 1 should be suppressed or inhibited during P6 relocation to prevent nuisance tones.

Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
174	C	Primary Node 1 MDM Detected Loss of Sync with PVCU-4B MDM-P6	SUPP
175	C	Primary Node 1 MDM Detected Loss of Sync with PVCU-2B MDM-P6	SUPP
214	C	MDM PVCU 2B Loss of Comm-P6	SUPP
215	C	MDM PVCU 4B Loss of Comm-P6	SUPP
712	C	BCDU 4B1 Observed vs Last Commanded State Discrepancy-P6	SUPP
713	C	BCDU 4B3 Observed vs Last Commanded State Discrepancy-P6	SUPP
714	C	BCDU 2B1 Observed vs Last Commanded State Discrepancy-P6	SUPP
715	C	BCDU 2B2 Observed vs Last Commanded State Discrepancy-P6	SUPP
716	C	BCDU 2B3 Observed vs Last Commanded State Discrepancy-P6	SUPP
723	C	BCDU 4B1 1553/FWC Errors-P6	SUPP
724	C	BCDU 4B2 1553/FWC Errors-P6	SUPP
725	C	BCDU 4B3 1553/FWC Errors-P6	SUPP
726	C	BCDU 2B1 1553/FWC Errors-P6	SUPP
727	C	BCDU 2B2 1553/FWC Errors-P6	SUPP
728	C	BCDU 2B3 1553/FWC Errors-P6	SUPP
739	C	DCSU 4B Observed vs Last Commanded State Discrepancy-P6	SUPP
740	C	DCSU 2B Observed vs Last Commanded State Discrepancy-P6	SUPP
757	C	BGA 4B Observed vs Last Commanded State Discrepancy-P6	INH
758	C	BGA 2B Observed vs Last Commanded State Discrepancy-P6	INH
761	C	BGA 4B 1553/FWC Errors-P6	SUPP
762	C	BGA 2B 1553/FWC Errors-P6	SUPP
765	C	PVTCS 2B Observed vs Last Commanded State Discrepancy-P6	SUPP
770	C	PVTCS PFCS 4B 1553/FWC Errors-P6	SUPP
771	W	EEATCS Loop A PFCS ORU Failure-P6	SUPP
772	C	PVTCS PFCS 2B 1553/FWC Errors-P6	SUPP
773	W	EEATCS Loop B PFCS ORU Failure-P6	SUPP
780	C	SSU 4B 1553/FWC Errors-P6	SUPP
781	C	SSU 2B 1553/FWC Errors-P6	SUPP
785	W	PVTCS PFCS 4B Fluid Leak-P6	SUPP
786	C	EEATCS Loop A PFCS Fluid Leak Condition-P6	SUPP
787	W	PVTCS PFCS 2B Fluid Leak-P6	SUPP
788	C	EEATCS Loop B PFCS 2B Fluid Leak-P6	SUPP
789	C	BCDU 4B2 Observed vs Last Commanded State Discrepancy-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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Continuation of Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
793	C	BCDU 4B1 Loss of Comm-P6	SUPP
794	C	BCDU 4B2 Loss of Comm-P6	SUPP
795	C	BCDU 4B3 Loss of Comm-P6	SUPP
796	C	BCDU 2B1 Loss of Comm-P6	SUPP
797	C	BCDU 2B2 Loss of Comm-P6	SUPP
798	C	BCDU 2B3 Loss of Comm-P6	SUPP
799	C	BCDU 4B1 Trip-P6	SUPP
800	C	BCDU 4B2 Trip-P6	SUPP
801	C	BCDU 4B3 Trip-P6	SUPP
802	C	BCDU 2B1 Trip-P6	SUPP
803	C	BCDU 2B2 Trip-P6	SUPP
804	C	BCDU 2B3 Trip-P6	SUPP
805	C	Battery 4B11 Trip-P6	SUPP
806	C	Battery 4B21 Trip-P6	SUPP
807	C	Battery 4B31 Trip-P6	SUPP
808	C	Battery 2B11 Trip-P6	SUPP
809	C	Battery 2B21 Trip-P6	SUPP
810	C	Battery 2B31 Trip-P6	SUPP
811	C	Battery 4B22 Trip-P6	SUPP
812	C	Battery 4B32 Trip-P6	SUPP
813	C	Battery 2B12 Trip-P6	SUPP
814	C	Battery 2B22 Trip-P6	SUPP
815	C	Battery 2B32 Trip-P6	SUPP
816	C	RPCM 4B_A Loss of Comm-P6	SUPP
817	C	RPCM 4B_B Loss of Comm-P6	SUPP
818	C	RPCM 2B_A Loss of Comm-P6	SUPP
819	C	RPCM 2B_B Loss of Comm-P6	SUPP
820	C	RPCM 4B_A Trip-P6	SUPP
821	C	RPCM 4B_B Trip-P6	SUPP
822	C	RPCM 2B_A Trip-P6	SUPP
823	C	RPCM 2B_B Trip-P6	SUPP
824	C	DCSU 4B Loss of Comm-P6	SUPP
825	C	DCSU 2B Loss of Comm-P6	SUPP
826	W	DCSU 4B Trip-P6	SUPP
827	W	DCSU 2B Trip-P6	SUPP
828	C	DDCU 4B Loss of Comm-P6	SUPP
829	C	DDCU 2B Loss of Comm-P6	SUPP
830	C	DDCU 4B Trip-P6	SUPP
831	C	DDCU 2B Trip-P6	SUPP
832	C	BGA 4B Loss of Comm-P6	SUPP
833	C	BGA 2B Loss of Comm-P6	SUPP
836	C	BGA 4B Motor Trip-P6	SUPP
837	C	BGA 2B Motor Trip-P6	SUPP
838	W	PVTCS PFCS 4B Loss of Comm-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

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Continuation of Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
839	W	EEATCS Loop A PFCS Loss of Comm-P6	INH
840	W	PVTCS PFCS 2B Loss of Comm-P6	SUPP
841	W	EEATCS Loop B PFCS Loss of Comm-P6	INH
844	C	SSU 4B Loss of Comm-P6	SUPP
845	C	SSU 2B Loss of Comm-P6	SUPP
846	W	SSU 4B Trip-P6	SUPP
847	W	SSU 2B Trip-P6	SUPP
884	C	Primary PVCU 2B/4B MDM Det Loss of Sync with Prim Node 1 MDM-P6	SUPP
891	C	BCDU 4B1 Overtemp Condition-P6	SUPP
892	C	BCDU 4B2 Overtemp Condition-P6	SUPP
893	C	BCDU 2B1 Overtemp Condition-P6	SUPP
894	C	BCDU 2B2 Overtemp Condition-P6	SUPP
895	C	BCDU 2B3 Overtemp Condition-P6	SUPP
902	C	BCDU 4B1 Battery SOC Low Failure-P6	SUPP
903	C	BCDU 4B2 Battery SOC Low Failure-P6	SUPP
904	C	BCDU 4B3 Battery SOC Low Failure-P6	SUPP
905	C	BCDU 2B1 Battery SOC Low Failure-P6	SUPP
906	C	BCDU 2B2 Battery SOC Low Failure-P6	SUPP
907	C	BCDU 2B3 Battery SOC Low Failure-P6	SUPP
938	C	Batt 4B11 Temp Out Of Range-P6	SUPP
939	C	Batt 4B12 Temp Out Of Range-P6	SUPP
940	C	Batt 4B21 Temp Out Of Range-P6	SUPP
941	C	Batt 4B22 Temp Out Of Range-P6	SUPP
942	C	Batt 4B31 Temp Out Of Range-P6	SUPP
943	C	Batt 4B32 Temp Out Of Range-P6	SUPP
944	C	Batt 2B11 Temp Out Of Range-P6	SUPP
945	C	Batt 2B12 Temp Out Of Range-P6	SUPP
946	C	Batt 2B21 Temp Out Of Range-P6	SUPP
947	C	Batt 2B22 Temp Out Of Range-P6	SUPP
948	C	Batt 2B31 Temp Out Of Range-P6	SUPP
949	C	Batt 2B32 Temp Out Of Range-P6	SUPP
950	C	Batt 4B11 Undervoltage Condition-P6	SUPP
951	C	Batt 4B12 Undervoltage Condition-P6	SUPP
952	C	Batt 4B21 Undervoltage Condition-P6	SUPP
953	C	Batt 4B22 Undervoltage Condition-P6	SUPP
954	C	Batt 4B31 Undervoltage Condition-P6	SUPP
955	C	Batt 4B32 Undervoltage Condition-P6	SUPP
956	C	Batt 2B11 Undervoltage Condition-P6	SUPP
957	C	Batt 2B12 Undervoltage Condition-P6	SUPP
958	C	Batt 2B21 Undervoltage Condition-P6	SUPP
959	C	Batt 2B22 Undervoltage Condition-P6	SUPP
960	C	Batt 2B31 Undervoltage Condition-P6	SUPP
961	C	Batt 2B32 Undervoltage Condition-P6	SUPP
988	C	DCSU 4B RBI 6 Overcurrent Condition-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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Continuation of Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
989	C	DCSU 2B RBI 6 Overcurrent Condition-P6	SUPP
996	W	DDCU 4B Overtemp Condition-P6	SUPP
997	W	DDCU 2B Overtemp Condition-P6	SUPP
998	W	DDCU 4B Overvoltage Condition-P6	SUPP
999	W	DDCU 2B Overvoltage Condition-P6	SUPP
1004	W	BGA 4B Overtemp Condition-P6	SUPP
1005	W	BGA 2B Overtemp Condition-P6	SUPP
1012	C	BGA 4B Motor Current Limit Exceeded-P6	SUPP
1013	C	BGA 2B Motor Current Limit Exceeded-P6	SUPP
1014	C	BGA 4B Motor Stall Condition-P6	SUPP
1015	C	BGA 2B Motor Stall Condition-P6	SUPP
1016	C	BGA 4B Motor Velocity Limit Exceeded-P6	SUPP
1017	C	BGA 2B Motor Velocity Limit Exceeded-P6	SUPP
1022	C	PVTCS PFCS 4B Pump A Failure-P6	SUPP
1023	C	EEATCS Loop A PFCS Pump A Failure-P6	SUPP
1024	C	PVTCS PFCS 2B Pump A Failure-P6	SUPP
1025	C	EEATCS Loop B PFCS Pump A Failure-P6	SUPP
1026	C	PVTCS PFCS 4B Pump B Failure-P6	SUPP
1027	C	EEATCS Loop A PFCS Pump B Failure-P6	SUPP
1028	C	PVTCS PFCS 2B Pump B Failure-P6	SUPP
1029	C	EEATCS Loop B PFCS Pump B Failure-P6	SUPP
1032	C	BCDU 4B3 Overtemp Condition-P6	SUPP
1036	W	SSU 4B Overtemp Condition-P6	SUPP
1037	W	SSU 2B Overtemp Condition-P6	SUPP
1050	C	EEATCS Loop A PFCS Too Warm Auto FCV Recal Condition-P6	SUPP
1051	W	PVTCS PFCS 2B Flow Control Valve Failure-Temp High-P6	INH
1056	C	EEATCS Loop B PFCS Too Warm Auto FCV Recal Condition-P6	SUPP
1058	C	PVTCS PFCS 2B Warm Flow Control Valve Recalibration In Prog-P6	SUPP
1059	C	PVTCS PFCS 4B Warm Flow Control Valve Recalibration In Prog-P6	SUPP
1060	W	PVTCS PFCS 4B Flow Control Valve Failure-Temp High-P6	INH
1086	W	PVTCS PFCS 4B Minimum Inlet Temp Violation-P6	SUPP
1087	W	PVTCS PFCS 2B Minimum Inlet Temp Violation-P6	SUPP
1088	W	PVTCS PFCS 4B Maximum Outlet Temp Violation-P6	SUPP
1089	W	PVTCS PFCS 2B Maximum Outlet Temp Violation-P6	SUPP
1098	C	EEATCS Loop A PFCS Maximum Outlet Temp Violation Condition-P6	INH
1099	C	EEATCS Loop B PFCS Maximum Outlet Temp Violation Condition-P6	INH
1102	C	BCDU 4B1 Loss of Comm Time Limit Expired-P6	SUPP
1103	C	BCDU 4B2 Loss of Comm Time Limit Expired-P6	SUPP
1104	C	BCDU 4B3 Loss of Comm Time Limit Expired-P6	SUPP
1105	C	BCDU 2B1 Loss of Comm Time Limit Expired-P6	SUPP
1106	C	BCDU 2B2 Loss of Comm Time Limit Expired -P6	SUPP
1107	C	BCDU 2B3 Loss of Comm Time Limit Expired-P6	SUPP
1114	C	EEATCS Loop A PFCS Invalid Data Condition-P6	SUPP
1115	C	EEATCS Loop B PFCS Invalid Data Condition-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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Continuation of Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
1140	C	Battery 4B12 Trip-P6	SUPP
1141	C	Backup PVCU 2B/4B MDM Failed to Shutdown Primary PVCU MDM-P6	SUPP
1142	C	BCDU 4B1 Batter Current Setpt Command Response Failed-P6	SUPP
1143	C	BCDU 4B2 Batter Current Setpt Command Response Failed-P6	SUPP
1144	C	BCDU 4B3 Batter Current Setpt Command Response Failed-P6	SUPP
1145	C	BCDU 2B1 Batter Current Setpt Command Response Failed-P6	SUPP
1146	C	BCDU 2B2 Batter Current Setpt Command Response Failed-P6	SUPP
1147	C	BCDU 2B3 Batter Current Setpt Command Response Failed-P6	SUPP
1148	C	BCDU 4B1 Batter Current Setpt Command Invalid-P6	SUPP
1149	C	BCDU 4B2 Batter Current Setpt Command Invalid-P6	SUPP
1150	C	BCDU 4B3 Batter Current Setpt Command Invalid-P6	SUPP
1151	C	BCDU 2B1 Batter Current Setpt Command Invalid-P6	SUPP
1152	C	BCDU 2B2 Batter Current Setpt Command Invalid-P6	SUPP
1153	C	BCDU 2B3 Batter Current Setpt Command Invalid-P6	SUPP
1154	C	Primary PVCU 2B/4B MDM Failed to Shutdown Backup PVCU MDM-P6	SUPP
1155	W	PVTCS 4B FCV Overtemp Safing Failed-P6	SUPP
1158	W	PVTCS 2B FCV Overtemp Safing Failed-P6	SUPP
1161	C	BCDU 4B1 Discharge Control Command Response Failed-P6	SUPP
1162	C	BCDU 4B2 Discharge Control Command Response Failed-P6	SUPP
1163	C	BCDU 4B3 Discharge Control Command Response Failed-P6	SUPP
1164	C	BCDU 4B1 Heater Control Command Response Failed-P6	SUPP
1165	C	BCDU 4B2 Heater Control Command Response Failed-P6	SUPP
1166	C	BCDU 4B3 Heater Control Command Response Failed-P6	SUPP
1168	C	BCDU 2B1 Discharge Control Command Response Failed-P6	SUPP
1169	C	BCDU 2B2 Discharge Control Command Response Failed-P6	SUPP
1170	C	BCDU 2B3 Discharge Control Command Response Failed-P6	SUPP
1171	C	BCDU 2B1 Heater Control Command Response Failed-P6	SUPP
1172	C	BCDU 2B2 Heater Control Command Response Failed-P6	SUPP
1173	C	BCDU 2B3 Heater Control Command Response Failed-P6	SUPP
1179	W	PVTCS PFCS 4B FCV Recalibration Safing Failed-P6	INH
1181	W	PVTCS PFCS 2B FCV Recalibration Safing Failed-P6	INH
1184	C	BGA 4B Pointing Control Command Response Failed-P6	SUPP
1185	C	BGA 4B Pointing Control Command Invalid-P6	SUPP
1187	C	BGA 2B Pointing Control Command Response Failed-P6	SUPP
1188	C	BGA 2B Pointing Control Command Invalid-P6	SUPP
1209	W	BCDU 4B1 Overtemp Safing Failed-P6	SUPP
1210	W	BCDU 4B2 Overtemp Safing Failed-P6	SUPP
1211	W	BCDU 4B3 Overtemp Safing Failed-P6	SUPP
1212	W	BCDU 2B1 Overtemp Safing Failed-P6	SUPP
1213	W	BCDU 2B2 Overtemp Safing Failed-P6	SUPP
1214	W	BCDU 2B3 Overtemp Safing Failed-P6	SUPP
1215	W	Batt 4B11 Temp Out Of Range Safing Failed-P6	SUPP
1216	W	Batt 4B12 Temp Out Of Range Safing Failed-P6	SUPP
1217	W	Batt 4B21 Temp Out Of Range Safing Failed-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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Continuation of Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
1218	W	Batt 4B22 Temp Out Of Range Safing Failed-P6	SUPP
1219	W	Batt 4B31 Temp Out Of Range Safing Failed-P6	SUPP
1220	W	Batt 4B32 Temp Out Of Range Safing Failed-P6	SUPP
1221	W	Batt 2B11 Temp Out Of Range Safing Failed-P6	SUPP
1222	W	Batt 2B12 Temp Out Of Range Safing Failed-P6	SUPP
1223	W	Batt 2B21 Temp Out Of Range Safing Failed-P6	SUPP
1224	W	Batt 2B22 Temp Out Of Range Safing Failed-P6	SUPP
1225	W	Batt 2B31 Temp Out Of Range Safing Failed-P6	SUPP
1226	W	Batt 2B32 Temp Out Of Range Safing Failed-P6	SUPP
1227	W	Batt 4B11 Undervoltage Safing Failed-P6	SUPP
1228	W	Batt 4B12 Undervoltage Safing Failed-P6	SUPP
1229	W	Batt 4B21 Undervoltage Safing Failed-P6	SUPP
1230	W	Batt 4B22 Undervoltage Safing Failed-P6	SUPP
1231	W	Batt 4B31 Undervoltage Safing Failed-P6	SUPP
1232	W	Batt 4B32 Undervoltage Safing Failed-P6	SUPP
1233	W	Batt 2B11 Undervoltage Safing Failed-P6	SUPP
1234	W	Batt 2B12 Undervoltage Safing Failed-P6	SUPP
1235	W	Batt 2B21 Undervoltage Safing Failed-P6	SUPP
1236	W	Batt 2B22 Undervoltage Safing Failed-P6	SUPP
1237	W	Batt 2B31 Undervoltage Safing Failed-P6	SUPP
1238	W	Batt 2B32 Undervoltage Safing Failed-P6	SUPP
1239	W	BCDU 4B1 Loss of Comm Safing Failed-P6	SUPP
1240	W	BCDU 4B2 Loss of Comm Safing Failed-P6	SUPP
1241	W	BCDU 4B3 Loss of Comm Safing Failed-P6	SUPP
1242	W	BCDU 2B1 Loss of Comm Safing Failed-P6	SUPP
1243	W	BCDU 2B2 Loss of Comm Safing Failed-P6	SUPP
1244	W	BCDU 2B3 Loss of Comm Safing Failed-P6	SUPP
1245	W	BGA 4B Motor Persistent Current Safing Failed-P6	SUPP
1246	W	BGA 2B Motor Persistent Current Safing Failed-P6	SUPP
1247	W	BGA 4B Motor Velocity Limit Safing Failed-P6	SUPP
1248	W	BGA 2B Motor Velocity Limit Safing Failed-P6	SUPP
1249	W	BGA 4B Motor Stall Safing Failed-P6	INH
1250	W	BGA 2B Motor Stall Safing Failed-P6	INH
1251	W	DCSU 4B RBI 6 Overcurrent Safing Failed-P6	SUPP
1252	W	DCSU 2B RBI 6 Overcurrent Safing Failed-P6	SUPP
1253	W	DDCU 4B Overtemp Safing Failed-P6	SUPP
1254	W	DDCU 2B Overtemp Safing Failed-P6	SUPP
1255	W	DDCU 4B Overvoltage Safing Failed-P6	SUPP
1256	W	DDCU 2B Overvoltage Safing Failed-P6	SUPP
1257	W	PVTCS PFCS 4B Pump Switchover Failed-P6	SUPP
1258	W	EEATCS Loop A Pump Switchover Failed-P6	SUPP
1259	W	PVTCS PFCS 2B Pump Switchover Failed-P6	SUPP
1260	W	EEATCS Loop B Pump Switchover Failed-P6	SUPP
1261	W	PVTCS PFCS 4B Minimum Inlet Temp Safing Failed-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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Continuation of Table 1. P6 Caution and Warning to be Suppressed or Inhibited

Event Code	Class	Message Text	State
1262	C	EEATCS Loop A PFCS Minimum Inlet Temp Safing Failed-P6	SUPP
1263	W	PVTCS PFCS 2B Minimum Inlet Temp Safing Failed-P6	SUPP
1264	C	EEATCS Loop B PFCS Minimum Inlet Temp Safing Failed-P6	SUPP
1265	W	PVTCS PFCS 4B Maximum Outlet Temp Safing Failed-P6	SUPP
1266	W	EEATCS Loop A PFCS Maximum Outlet Temp Safing Failed-P6	SUPP
1267	W	PVTCS PFCS 2B Maximum Outlet Temp Safing Failed-P6	SUPP
1268	W	EEATCS Loop B PFCS Maximum Outlet Temp Safing Failed-P6	SUPP
1269	W	EEATCS Loop A PFCS Invalid Data Safing Failed-P6	SUPP
1270	W	EEATCS Loop B PFCS Invalid Data Safing Failed-P6	SUPP
1271	W	EEATCS Loop A PFCS Outlet Temp Low Safing Failed-P6	INH
1272	W	EEATCS Loop B PFCS Outlet Temp Low Safing Failed-P6	INH
1273	W	ECU 4B Overtemp Safing Failed-P6	SUPP
1274	W	ECU 2B Overtemp Safing Failed-P6	SUPP
1275	W	SSU 4B Overtemp Safing Failed-P6	SUPP
1276	W	SSU 2B Overtemp Safing Failed-P6	SUPP
1303	C	EEATCS Loop A Outlet Temp Low Violation-P6	INH
1304	C	EEATCS Loop B Outlet Temp Low Violation-P6	INH
1310	W	EEATCS Loop A PFCS Outlet Line Max Temp/Inv Data Safing Fail-P6	SUPP
1311	C	EEATCS Loop A PFCS Outlet Line Max Temp/Inv Data Violation-P6	SUPP
1312	W	EEATCS Loop B PFCS Outlet Line Max Temp/Inv Data Safing Fail-P6	SUPP
1313	C	EEATCS Loop B PFCS Outlet Line Max Temp/Inv Data Violation-P6	SUPP
1316	W	PVTCS PFCS 4B Deadhead Safing Failure-P6	SUPP
1317	W	PVTCS PFCS 2B Deadhead Safing Failure-P6	SUPP
1318	W	EEATCS Loop A PFCS Pump Deadhead Safing Failure-P6	SUPP
1319	W	EEATCS Loop B PFCS Pump Deadhead Safing Failure-P6	SUPP
1320	W	PVTCS PFCS 4B Deadhead Trip-P6	SUPP
1321	W	PVTCS PFCS 4B Deadhead Failure Condition-P6	INH
1322	C	EEATCS Loop A PFCS Pump Deadhead Safing Complete-P6	SUPP
1323	C	EEATCS Loop A PFCS Pump Deadhead Failure Condition-P6	INH
1324	W	PVTCS PFCS 2B Deadhead Trip-P6	SUPP
1325	W	PVTCS PFCS 2B Deadhead Failure Condition-P6	INH
1326	C	EEATCS Loop B PFCS Pump Deadhead Safing Complete-P6	INH
1327	C	EEATCS Loop B PFCS Pump Deadhead Failure Condition-P6	SUPP
5066	W	Ch 2B Power Utilization Violation - Load Shed Initiated-P6	SUPP
5070	W	Ch 4B Power Utilization Violation - Load Shed Initiated-P6	SUPP
5628	C	Primary PMCU Detected Loss of Sync with PVCU 2B MDM-P6	INH
5644	C	Primary PMCU Detected Loss of Sync with PVCU 4B MDM-P6	INH
5717	C	Primary PMCU Detected Failed PVCU 2B/4B Switchover-P6	INH
11308	C	SSU 4B LFD Trip-P6	SUPP
11309	C	SSU 2B LFD Trip-P6	SUPP

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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2. INHIBITING P6 MDM RT FDIR

CDH: Primary N1 MDM: UB EPS N1 14: RT Status

UB EPS N1 14 RT Status

cmd 23 MDM PVCU 4B RT FDIR Status – Inhibit FDIR **Execute**
(√ – Inh)

CDH: Primary N1 MDM: UB EPS N1 23: RT Status

UB EPS N1 23 RT Status

cmd 23 MDM PVCU 2B RT FDIR Status – Inhibit FDIR **Execute**
(√ – Inh)

3. POWERING DOWN EETCS LOOP A AND B PFCS

P6: TCS: Loop A PFCS

LoopA PFCS Nominal Commands

'EETCS LoopA PFCS'

If PumpA – On or PumpB – On then

 For Loop A, perform {2.105 EETCS LOOP A(B) PFCS SHUTDOWN},
 steps 2, 3, 6 (SODF: TCS: NOMINAL: EETCS), then:

P6: TCS: Loop B PFCS

LoopB PFCS Nominal Commands

'EETCS LoopB PFCS'

If PumpA – On or PumpB – On then

 For Loop B, perform {2.105 EETCS LOOP A(B) PFCS SHUTDOWN},
 steps 2, 3, 6 (SODF: TCS: NOMINAL: EETCS), then:

4. INHIBITING P6 PVCU BUS RT FDIR

CDH

CDH Summary

'P6 on Z1 Truss'

sel P6 PVCU Primary

Primary P6 PVCU MDM on Z1 Truss

sel UB PVB 24 1

UB PVB 24 1

sel RT Status

UB PVB 24 1 RT Status

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'RT [X]' where [X] =

00	01	02	03	04	05	06	07	08	12	25
----	----	----	----	----	----	----	----	----	----	----

cmd Inhibit FDIR Execute

Verify RT FDIR Status – Inh

Repeat

Primary P6 PVCU MDM on Z1 Truss

sel UB PVB 24 2

UB PVB 24 2

sel RT Status

UB PVB 24 2 RT Status

'RT [X]' where [X] =

00	01	02	03	04	05	06	07	08	12	25
----	----	----	----	----	----	----	----	----	----	----

cmd Inhibit FDIR Execute

Verify RT FDIR Status – Inh

Repeat

5. CONFIGURING BGA 2B FOR P6 RELOCATION

For P6 BGA 2B

Perform {2.108 PVM BGA XX OPEN LOOP CONTROL}, step 12
(SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

For P6 BGA 2B and a position of 222.1875 deg

Perform {2.101 PVM BGA XX ENGAGE ANTIROTATION LATCH}, all
(SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

6. CONFIGURING BGA 4B FOR P6 RELOCATION

For P6 BGA 4B

Perform {2.108 PVM BGA XX OPEN LOOP CONTROL}, step 12
(SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

For P6 BGA 4B and a position of 219.375 deg

Perform {2.101 PVM BGA XX ENGAGE ANTIROTATION LATCH}, all
(SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

7. OPENING BCDU CP RBIs

P6: EPS

P6: EPS

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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sel Energy Storage 2B

Energy Storage 2B

'2B1'

sel CP RBI

BCDU 2B CP RBIs

'2B1 CP RBI'

√Posn – Op

'2B2 CP RBI'

'Open'

cmd Arm

cmd Open (Verify – Op)

'2B3 CP RBI'

√Posn – Op

P6: EPS

sel Energy Storage 4B

Energy Storage 4B

'4B1'

sel CP RBI

BCDU 4B CP RBIs

'4B1 CP RBI'

√Posn – Op

'4B2 CP RBI'

'Open'

cmd Arm

cmd Open (Verify – Op)

'4B3 CP RBI'

√Posn – Op

8. [POWERING DOWN BCDU 2B1](#)

P6: EPS: Energy Storage 2B

Energy Storage 2B

'2B1'

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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sel Conv

BCDU 2B1 ConverterFI

'Converter'

√State – Off

'Fault Isolator'

√Posn – Op

Energy Storage 2B

sel DCSU 2B RBI 2

DCSU 2B RBI 2

'Cmded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8

Verify Voltage: -4.0 to 4.0

9. POWERING DOWN BCDU 2B2

P6: EPS: Energy Storage 2B

Energy Storage 2B

'2B2'

sel Conv

BCDU 2B2 ConverterFI

'Converter'

√State – Off

'Fault Isolator'

√Posn – Op

Energy Storage 2B

sel DCSU 2B RBI 3

DCSU 2B RBI 3

'Cmded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8

Verify Voltage: -4.0 to 4.0

10. POWERING DOWN BCDU 2B3

P6: EPS: Energy Storage 2B

'2B3'

sel Conv

'Converter'

√State – Off

'Fault Isolator'

√Posn – Op

sel DCSU 2B RBI 4

'Cmded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8

Verify Voltage: -4.0 to 4.0

11. OPENING DCSU 2B RBI 1

P6: EPS: DCSU 2B: RBI 1

'Cmded Position'

cmd Open (√ – Op)

Verify Voltage: -4.2 to 4.2 V

Verify Current: -7.5 to 7.5 A

12. DISABLING P6 CHANNEL 2B SECONDARY POWER OUTPUTS

P6: EPS: RPCM 2B A

sel RPC 07

cmd RPC Position Open (√ – Op)

sel RPC 08

RPCM 2B A RPC 08

cmd RPC Position Open (\surd – Op)

13. REMOVING POWER INPUT TO ECU 2B

CAUTION

Do not perform this step until BGA 2B has reached commanded angle and latched.

NOTE

ECU 2B may experience a Power On Reset when the first RPC is opened.

P6: EPS: BGA 2B

BGA 2B

sel RPCM 4B A RPC 2

RPCM 4B A RPC 02

cmd RPC Position – Open (\surd – Op)

BGA 2B

sel RPCM 2B A RPC 1

RPCM 2B A RPC 01

cmd RPC Position – Open (\surd – Op)

14. REMOVING POWER INPUT TO ECU 4B

Verify BGA4B has reached commanded angle and latched.

NOTE

ECU 4B may experience a Power On Reset when the first RPC is opened.

P6: EPS: BGA 4B

BGA 4B

sel RPCM 2B A RPC 2

RPCM 2B A RPC 02

cmd RPC Position – Open (\surd – Op)

BGA 4B

sel RPCM 4B A RPC 1

RPCM 4B A RPC 01

cmd RPC Position – Open ($\sqrt{\quad}$ – Op)

15. POWERING DOWN PFCS 2B

15.1 Configuring PVTCS 2B Algorithms for Deactivation

P6: EPS: PVTCS 2B

PVTCS 2B

'PFCS 2B'

sel FCV

PVTCS PFCS 2B FCV

'Primary PVCU' (column)

'FCV Control'

cmd Inhibit Arm

cmd Inhibit ($\sqrt{\quad}$ – Inh)

'Backup PVCU' (column)

'FCV Control'

cmd Inhibit Arm

cmd Inhibit ($\sqrt{\quad}$ – Inh)

15.2 Powering Off PFCS Pump

PVTCS 2B

'PFCS 2B'

sel Active Pump (A or B)

PVTCS PFCS 2B Pump

cmd Active Pump – Off

$\sqrt{\quad}$ Pump X Speed: -975 to 975 rpm

15.3 Positioning FCV to 45 Degrees

PVTCS PFCS 2B FCV

'Manual Recal'

input FCV Position: 0.5 (0.5 = 45 degrees)

cmd Set

'FCV Position'

√FCV Position: 39.7 to 50.3 deg

15.4 Removing Power from PFCS

sel RPCM 2B A RPC 03

cmd Open Cmd – Enable (√ – Ena)

cmd RPC Position Open (√ – Op)

16. TURNING DDCU 2B CONVERTER OFF

P6: EPS: DDCU 2B

sel Converter

cmd Off

'Output'

Verify Current: -3.8 to 3.8 A

Verify Voltage: -2.8 to 2.8 V

√Status: Off

17. REMOVING POWER FROM DDCU 2B

P6: EPS: DDCU 2B: RBI 5

'Cmded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8 A

Verify Voltage: -4.0 to 4.0 V

18. OPENING 2B RBI 6

P6: EPS: DDCU 2B: RBI 6

'Cmded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8 A

DCSU 2B

Verify Bus Voltage: -4.0 to 4.0 V

19. POWERING DOWN BCDU 4B1

P6: EPS: Energy Storage 4B

Energy Storage 4B

'4B1'

sel Conv

BCDU 4B1 ConverterFI

'Converter'

√State – Off

'Fault Isolator'

√Posn – Op

Energy Storage 4B

sel DCSU 4B RBI 2

DCSU 2B RBI 2

'Cmdded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8

Verify Voltage: -4.0 to 4.0

20. POWERING DOWN BCDU 4B2

P6: EPS: Energy Storage 4B

Energy Storage 4B

'4B2'

sel Conv

BCDU 4B2 ConverterFI

'Converter'

√State – Off

'Fault Isolator'

√Posn – Op

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

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Energy Storage 4B

sel DCSU 4B RBI 3

DCSU 4B RBI 3

'Cmdded Position'

cmd Open ($\sqrt{\quad}$ – Op)

Verify Current: -3.8 to 3.8

Verify Voltage: -4.0 to 4.0

21. POWERING DOWN BCDU 4B3

P6: EPS: Energy Storage 4B

Energy Storage 4B

'4B3'

sel Conv

BCDU 4B3 ConverterFI

'Converter'

$\sqrt{\text{State}}$ – Off

'Fault Isolator'

$\sqrt{\text{Posn}}$ – Op

Energy Storage 4B

sel DCSU 4B RBI 4

DCSU 4B RBI 4

'Cmdded Position'

cmd Open ($\sqrt{\quad}$ – Op)

Verify Current: -3.8 to 3.8

Verify Voltage: -4.0 to 4.0

22. OPENING DCSU 4B RBI 1

P6: EPS: DCSU 4B: RBI 1

DCSU 4B RBI 1

'Cmdded Position'

cmd Open ($\sqrt{\quad}$ – Op)

Verify Voltage: -4.2 to 4.2 V

Verify Current: -7.5 to 7.5 A

23. DISABLING P6 CHANNEL 4B SECONDARY POWER OUTPUTS

P6: EPS: RPCM 4B A

RPCM 4B A

sel RPC 07

RPCM 4B A RPC 07

cmd RPC Position Open ($\sqrt{\text{Op}}$)

RPCM 4B A

sel RPC 08

RPCM 4B A RPC 08

cmd RPC Position Open ($\sqrt{\text{Op}}$)

24. POWERING DOWN PFCS 4B

24.1 Configuring PVTCS 4B Algorithms for Deactivation

P6: EPS: PVTCS 4B

PVTCS 4B

'PFCS 4B'

sel FCV

PVTCS PFCS 4B FCV

'Primary PVCU' (column)

'FCV Control'

cmd Inhibit Arm

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

'Backup PVCU' (column)

'FCV Control'

cmd Inhibit Arm

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

24.2 Positioning FCV to 45 Degrees

PVTCS PFCS 4B FCV

'Manual Recal'

input FCV Position: 0.5 (0.5 = 45 degrees)

cmd Set

'FCV Position'

$\sqrt{\text{FCV}}$ Position: 39.7 to 50.3 deg

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

Page 19 of 23 pages

24.3 Powering Off PFCS Pump

'PFCS 4B'

sel Active Pump (A or B)

cmd Active Pump – Off

√Pump X Speed: -975 to 975 rpm

24.4 Removing Power from PFCS

sel RPCM 4B A RPC 03

cmd Open Cmd – Enable (√ – Ena)

cmd RPC Position Open (√ – Op)

25. TURNING DDCU 4B CONVERTER OFF

P6: EPS: DDCU 4B

sel Converter

cmd Off

'Output'

Verify Current: -3.8 to 3.8 A

Verify Voltage: -2.8 to 2.8 V

√Status: Off

26. REMOVING POWER FROM DDCU 4B

P6: EPS: DDCU 4B: RBI 5

'Cmded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8 A

Verify Voltage: -4.0 to 4.0 V

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

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27. OPENING 4B RBI 6

P6: EPS: DCSU 4B: RBI 6

DCSU 4B RBI 6

'Cmdded Position'

cmd Open (√ – Op)

Verify Current: -3.8 to 3.8 A

DCSU 4B

Verify Bus Voltage: -4.0 to 4.0 V

28. LOADING P6 ACTIVATION PPLs TO PVCUs 2B AND 4B EEPROM

If required to load PPLs listed in Table 2 to PVCUs 2B and 4B EEPROM

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

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

Table 2. P6 Activation PPLs

PPL	Version	Description
7	803	Channel 4B Battery Current Setpoints
8	803	Channel 2B Battery Current Setpoints
9	803	Channel 4B Battery Current Loss Of Comm Setpoints
10	803	Channel 2B Battery Current Loss Of Comm Setpoints
12	802	SSU/BCDU Bus Voltage Setpoints
14	801	PVTCS Setpoints

29. PVCU 2B AND 4B POWERDOWN

29.1 Inhibiting PVCU 4B/2B Switchover

CDH Summary: Primary N1 MDM

Primary N1 MDM

'Software Control'

sel PVCU Recovery

PVCU Recovery

sel P6 PVCU 2B/4B Recovery

PVCU 2B 4B Recovery

'PVCU 2B/4B Recovery Inhibit'

cmd Arm **Execute**

cmd Inhibit **Execute**

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

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Verify PVCU 2B/4B Recovery Inh/Ena Status – Inh

NOTE

Expect possible '**MDM PVCU 2B(4B) Loss of Comm - P6**' message after the following command. No action required.

29.2 Inhibiting PVCU MDM 2B RT On Primary NCS MDM

CDH: Primary N1-1(2)

Primary Node1 MDM

Verify Frame Count – incrementing

Verify Processing State – Primary

sel UB EPS N1 23

sel RT Status

UB EPS N1 23 RT Status

cmd 23 MDM PVCU 2B RT Status – Inhibit **Execute** (√ – Inh)

29.3 Powering Off PVCU MDM 2B

P6: EPS: PVCU 2B(4B): EPS P6 PVCU Software: PVCU 2B(4B)
Pwr Cmds

P6 PVCU 2B Power

cmd PVCU 2B Power Off – Arm

cmd PVCU 2B Power Off – Power Off

√PVCU 2B(4B) On/Off Stat – Off

Verify DCSU MDM Voltage: 0.0

29.4 Powering Off PVCU MDM 4B

P6: EPS: PVCU 2B(4B): EPS P6 PVCU Software: PVCU 2B(4B)
Pwr Cmds

P6 PVCU 4B Power

cmd PVCU 4B Power Off – Arm

cmd PVCU 4B Power Off – Power Off

29.5 Inhibiting PVCU MDM 4B RT On Primary NCS MDM

CDH: Primary N1-1(2)

Primary Node1 MDM

Verify Frame Count – incrementing

Verify Processing State – Primary

sel UB EPS N1 14

sel RT Status

UB EPS N1 14 RT Status

cmd 14 MDM PVCU 4B RT Status – Inhibit **Execute** (√ – Inh)

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

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30. [OPENING MBSU 2 RBI 8](#)

S0: EPS: MBSU 2: RBI 8

MBSU 2 RBI 8

'Cmded Position'

cmd Open (√ – Op)

√Close Cmd – Inh

31. [OPENING MBSU 4 RBI 8](#)

S0: EPS: MBSU 4: RBI 8

MBSU 4 RBI 8

'Cmded Position'

cmd Open (√ – Op)

√Close Cmd – Inh

32. [NCS PPL LOAD](#)

Table 3. Node 1 MDM PPLs

PPL Filename	Purpose
ncs_ppl_0009_4_a_00001.lif	Updates NCS PVCU Control Parameters.
ncs_ppl_0014_4_a_00005.lif	Updates default NCS Station Config for Post P6 move.
ncs_ppl_0016_4_a_00002.lif	Defines the default enabled RTs for all three NCS states. Updated for Post P6 move.

Load PPLs to Primary and Backup N1 MDMs.

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

Destination Device – N1-2(N1-1)

Storage Type – EEPROM and DRAM

File to Load – Refer to Table 3 above

Perform {1.236 [CCS DATA LOAD MANAGEMENT](#)}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

33. [NCS MODE TO CONFIG 7](#)

CDH: Primary N1-2

Primary Node1 MDM

Verify Frame Count – incrementing

Verify Processing State – Primary

P6 CHANNELS 2B AND 4B GRACEFUL POWERDOWN

(ASSY OPS/10A/FIN)

Page 23 of 23 pages

'Software Control'

sel Configuration

Primary NCS Configuration

'Current Configuration'

input Select Configuration – 6

cmd Select Configuration **Execute**

Verify Current Configuration – Config 7

CDH: Primary N1-1

Secondary Node1 MDM

Verify Frame Count – incrementing

Verify Processing State – Secondary

'Software Control'

sel Configuration

Secondary NCS Configuration

'Current Configuration'

input Select Configuration – 6

cmd Select Configuration **Execute**

Verify Current Configuration – Config 7

34. INHIBITING NCS RTs

CDH: Primary N1 MDM: UB ORB N1 2: RT Status

UB ORB N1 2 RT Status

cmd 08 OIU RT FDIR Status – Inhibit RT FDIR **Execute** (Verify – Inh)

cmd 08 OIU RT Status – Inhibit RT **Execute** (Verify – Inh)

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PAYLOAD DEACTIVATION

(ASSY OPS/10A/FIN)

Page 1 of 1 page

OBJECTIVE:

Deactivate payload power.

- | | | |
|-----------------|----|---|
| (SSP1)
L12U | 1. | cb SW PWR 1 - op
cb PDIP 1 PWR 2/KuBAND RLY - op
cb PDIP 1 PWR 1 - op |
| (SSP2)
L12L | 2. | cb PDIP 2 PWR 2 - op
cb PDIP 2 PWR 1 - op |
| (PDIP1)
L12L | 3. | Ku BAND RATE - OFF
DC PWR 1 CAB P/L - OFF
DC PWR 2 CAB P/L - OFF |
| (PDIP2)
L11U | | DC PWR 1 CAB P/L - OFF
DC PWR 2 CAB P/L - OFF |
| R1 | 4. | PL CAB - OFF |

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PAYLOAD ENTRY SWITCH LIST/VERIFICATION

(ASSY OPS/10A/FIN)

Page 1 of 1 page

- | | | |
|--------------|----|---|
| TIG-1:55 | | PAYLOAD PWR CONFIG |
| R1 | 1. | √PL CAB – OFF
√PL PRI MNC – ctr (tb-OFF)
√PL PRI MNB – ctr (tb-OFF)
√PL PRI FC3 – ctr (tb-OFF)
√PL AUX – ON
√PL AFT MNB – OFF
√PL AFT MNC – OFF |
| L12U (SSP1) | 2. | √cb SW PWR 1 – op
√cb PDIP 1 PWR 2/KuBAND RLY – op
√tb OIU PWR – bp
√TCS PWR – OFF (tb-bp)
√cb SW PWR2
√cb PDIP1 PWR1 – op

√OIU PWR – OFF |
| L12L (SSP2) | 3. | √cb PDIP 2 PWR 2 – op
√C/L CAM PWR – OFF
√cb PDIP 2 PWR 1 – op |
| L12L (PDIP1) | 4. | √Ku BAND RATE – OFF
√DC PWR 1 CAB P/L – OFF

√DC PWR 2 CAB P/L – OFF |
| ML86B:E | 5. | √cb MNB MAR 1 – op

√cb MNB MAR 2 – cl |
| ML85E | 6. | √DC 10 AMP MNB S3 – OFF
√DC 10 AMP MNB S2 – OFF
√DC 10 AMP MNB S4 – ON
√DC 10 AMP MNB S5 – OFF |
| | 7. | √cb DC 10 AMP MNB CB3 – op
√cb DC 10 AMP MNB CB2 – op
√cb DC 10 AMP MNB CB4 – cl
√cb DC 10 AMP MNB CB5 – op |
| L11U (PDIP2) | 8. | √DC PWR 1 CAB P/L – OFF
√DC PWR 2 CAB P/L – OFF |

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N/A

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PRE-EVA PAYLOAD CONFIGURATION

(ASSY OPS/10A/FIN)

Page 1 of 1 page

N/A

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POST EVA PAYLOAD CONFIGURATION

(ASSY OPS/10A/FIN)

Page 1 of 1 page

N/A

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10A REMOVAL OF CHAB AND CELL CULTURE HAB FROM CGBA-5

(ASSY OPS/10A/FIN)

Page 1 of 7 pages

OBJECTIVE:

This procedure will direct the crew on how to access the Commercial Generic Bioprocessing Apparatus-5 (CGBA-5) internal volume and perform the steps required for the removal of the CHab and Cell Culture Hab from the CGBA Science Insert-02. Upon the removal of the CHab and Cell Culture Hab CGBA-5 will be recabled and powered up. The remainder of CGBA Science Insert-02 will remain onboard.

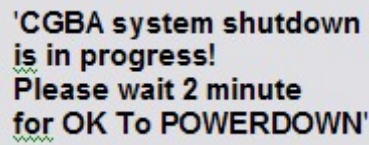
NOTE

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 will reactivate display.

1. CGBA-5 POWER OFF

CGBA-5

- 1.1 On Keypad
 - pb MENU → Press
 - pb 7 Shutdown → Press
 - pb ENTER → Press
- 1.2 On Shutdown CGBA-5 screen
 - pb 1 Shutdown system → Press
 - pb ENTER → Press
- 1.3 Verify CGBA-5 display indicates



'CGBA system shutdown
is in progress!
Please wait 2 minute
for OK To POWERDOWN'

- 1.4 While waiting for CGBA-5 to shut down, remove mufflers (as shown in Figure 1) and temporarily stow.



Figure 1.- CGBA-5 Mufflers.

1.5 Check CGBA-5 display indicates

**'OK TO POWERDOWN
It is now safe to turn off power to CGBA!'**

* If CGBA-5 Computer display does not indicate above information
* | Notify **POIC** and continue.

1.6 cb MAIN POWER → Open
√LED-MAIN POWER – Off

LAB1P2_A2 1.7 sw LOCKER-5 POWER → OFF
√LOCKER-5 POWER Lt – Off

2. LOADING EXPRESS RACK APPLICATION

NOTE

The EXPRESS Rack Application takes approximately thirty seconds to load.

ELC 2.1 Double click EXPRESS Laptop Application icon.

2.2 Check message '**EXPRESS RACK APPLICATION LOADING**' is displayed.

2.3 Check EXpedite the PProcessing of Experiments for Space Station
(EXPRESS) is displayed.

2.4 Check Health and Status is displayed.

```
*****
* If displays do not appear
* |   Perform {3.001 EXPRESS RACK APPLICATION FAILS
* |   TO LOAD OR LOCKS UP} all, then:
*****
```

2.5 EXpedite the PProcessing of Experiments for Space Station (EXPRESS)

√Laptop Comm – Ethernet

```
*****
* If Laptop Comm – RS-232 or Off (purple)
* |   Perform {3.002 EXPRESS ELC FAILS TO COMMUNICATE
* |   WITH RIC} all, then:
*****
```

3. CGBA-5 EXPRESS CONNECTION POWER OFF

3.1 EXpedite the PProcessing of Experiments for Space Station
(EXPRESS)

EXPRESS EPS: Locker/Drawer Power
Locker/ Drawer Power
'Commanded Connector Power'

cmd CGBA-5 – Off Execute

3.2 EXPRESS EPS
(P/L Power Tab)

Check CGBA-5 unpowered (black corners).

```
*****
* If CGBA-5 powered (green corners)
* |   Locker/Drawer Power
* |   'Commanded Connector Power'
*
*   cmd CGBA-5 – On Execute
*   cmd CGBA-5 – Off Execute
*
*   If still no joy
*   |   Notify POIC (for possible SSPC failure).
*****
```

4. DISABLING CGBA-5 COMM

4.1 EXPRESS the PProcessing of Experiments for Space Station
(EXPRESS)

EXPRESS Comm: Locker/Drawer Comm
Locker/Drawer Comm
 'Commanded Comm Configuration'

cmd CGBA-5 – Disable Execute

4.2 EXPRESS Comm
 'CGBA-5'
 (P/L Comm Tab)

√Cmd – Disabled
 √Cnct – Inactive

```

*****
* If Cmd – Enabled or Cnct – Active
* | Locker/Drawer Comm
* | 'Commanded Comm Configuration'
* |
* | cmd CGBA-5 – Enable Execute
* | cmd CGBA-5 – Disable Execute
* |
* | If still no joy
* | | Notify POIC (for possible RIC software failure).
*****
  
```

5. REMOVING CGBA-5 FROM EXPRESS RACK

CGBA-5

- 5.1 Disconnect EXPRESS Rack cables.
 EXPRESS Rack Power Cable (38") ←|→ POWER-IN 28 VDC J1
 EXPRESS Rack Data Cable (38") ←|→ EXPRESS DATA J4
- 5.2 Unlatch, open CGBA-5 locker door.
- 5.3 Pull Velcro tabs to deploy CGBA-5 recessed handles.
 Grasp CGBA-5, pull unit out of locker (push recessed handles back in place when done).
- 5.4 Temporarily stow CGBA-5 in a secure location for access operations.
- 5.5 Open CGBA-5 lid by lifting Velcro tabs on each side of Nomex cover.

10A REMOVAL OF CHAB AND CELL CULTURE HAB FROM CGBA-5

(ASSY OPS/10A/FIN)

Page 5 of 7 pages

6. REMOVING CHAB AND CELL CULTURE HAB

- CHab
- 6.1 Demate CHab power/data connector J2 from P2.
 - 6.2 Using handle, pull up on CHab to release habitat from foam restraint.
 - 6.3 Temporarily stow CHab.
- Cell Culture Hab
- 6.4 Demate Cell Culture Hab power/data connector J3 from P3.
 - 6.5 Repeat steps 6.2 and 6.3 for Cell Culture Hab removal.
 - 6.6 Retrieve and transfer CHab and Cell Culture Hab per Transfer List.

7. INSERTING CGBA-5 IN EXPRESS RACK

- CGBA-5
- 7.1 Close CGBA-5 lid, attach Velcro tabs.
 - 7.2 Open CGBA-5 locker door, slide CGBA-5 into locker, close locker door, and latch.

8. CONNECTING CGBA-5 TO EXPRESS RACK

- 8.1 √cb MAIN POWER – Open
√LED-MAIN POWER – Off
- LAB1P2_A2
- 8.2 √sw LOCKER-5 – OFF
√LOCKER-5 POWER Lt – Off
- CGBA-5
- 8.3 Connect EXPRESS Rack cables.
EXPRESS Rack Power Cable (38") →|← POWER-IN 28 VDC J1
EXPRESS Rack Data Cable (38") →|← EXPRESS DATA J4
 - 8.4 Replace CGBA-5 Mufflers.

9. CGBA-5 POWER ON

- ELC
- 9.1 EXpedite the PProcessing of Experiments for Space Station
(EXPRESS)

EXPRESS EPS: Locker/Drawer Power
Locker/ Drawer Power
'Commanded Connector Power'

cmd CGBA-5 – On Execute
 - 9.2 EXPRESS EPS
(P/L Power Tab)

Check CGBA-5 powered (green corners).

```
*****
* If CGBA-5 unpowered (black corners)
* | Locker/Drawer Power
* | 'Commanded Connector Power'
*
* | cmd CGBA-5 – Off Execute
* | cmd CGBA-5 – On Execute
*
* | If still no joy
* | | Notify POIC (for possible SSPC failure).
*****
```

LAB1P2_A2 9.3 sw LOCKER-5 POWER → ON
 √LOCKER-5 POWER Lt – On

CGBA-5 9.4 cb MAIN POWER → Close
 √LED-MAIN POWER – On

```
*****
* If no LED
* | Perform {3.002 CGBA INCORRECT (NO) DISPLAY} all, then:
*****
```

10. ENABLING CGBA-5 COMM

ELC 10.1 Express the PProcessing of Experiments for Space Station
(EXPRESS)

EXPRESS Comm: Locker/Drawer Comm
Locker/Drawer Comm
 'Commanded Comm Configuration'

cmd CGBA-5 – Enable Execute

10.2 EXPRESS Comm
 'CGBA-5'
 (P/L Comm Tab)

√Cmd – Enabled
 √Cnct – Active

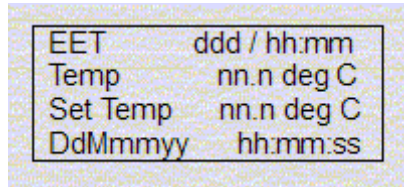
```
*****
* If Cmd – Disabled or Cnct – Inactive
* | Locker/Drawer Comm
* | 'Commanded Comm Configuration'
*
* | cmd CGBA-5 – Disable Execute
* | cmd CGBA-5 – Enable Execute
*
* | If still no joy
* | | Notify POIC (for possible RIC software failure).
*****
```

11. CGBA-5 CHECK OUT

CGBA-5 11.1 Check CGBA-5 fan running (sound, feel airflow).

* If CGBA-5 fan not running
* | Notify **POIC**.

11.2 Check CGBA-5 display indicates.



* If display incorrect or no display
* | Notify **POIC**.

12. CLOSING EXPRESS RACK APPLICATION

ELC 12.1

sel Exit

12.2 Check message 'This will cause comm between payload applications and payloads to be lost. Are you sure you want to exit EXPRESS?' displayed.

sel Yes

13. UPDATING IMS

Ground should update IMS for the following parts:
CHab P/N CSI-A204 to Transfer List (step 6.6)
Cell Culture Hab P/N CSI-A440 to Transfer List (step 6.6)

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CGBA SCIENCE INSERT REMOVE

(ASSY OPS/10A/FIN)

Page 1 of 5 pages

OBJECTIVE:

To remove the Commercial Generic Bioprocessing Apparatus (CGBA) Science Insert-02 (CSI-02). Crew will power off CGBA, open CGBA, remove CSI-02, and close CGBA. CSI-02 will be packed for return.

LOCATION:

Installed: CSI-02 (EXPRESS-4 RACK - LAB1P2_G1)

Stowed: CSI-02 (ref Transfer List)

DURATION:

About 30 minutes with one crewmember.

PARTS:

Return: CSI-02

LAB1P2_G 1.
1

POWERDOWN CGBA

NOTE

If CGBA computer screen blank, press [ENTER] to disable screen saver.

- 1.1 On keypad
pb MENU → Press
pb 7 Shutdown → Press
pb ENTER → Press
- 1.2 Verify Shutdown CGBA screen
On keypad
pb 1 Shutdown system → Press
pb ENTER → Press
- 1.3 √CGBA Computer Display indicates.

**'CGBA system shutdown
is in progress!
Please wait 2 minute
For OK to POWERDOWN'**

- 1.4 While waiting for CGBA to shut down (approximately 2 minutes), remove mufflers (two) and temporarily stow.
√CGBA Computer Display indicates:

**'OK TO POWERDOWN
It is now safe to turn off
power to CGBA!'**

CGBA SCIENCE INSERT REMOVE

(ASSY OPS/10A/FIN)

Page 2 of 5 pages

- 1.5 cb MAIN POWER → Open
 √LED-MAIN POWER – Off
- LAB1P2_F1 1.6 sw LOCKER-3 POWER → OFF
 √LOCKER-3 POWER Lt – Off
- LAB1P2_G
1 1.7 Disconnect EXPRESS Rack cables from CGBA:
 EXPRESS Rack Power Cable (24") ←|→ POWER-IN 28 VDC J1
 EXPRESS Rack Data Cable (38") ←|→ EXPRESS DATA J4

2. REMOVING CSI-02

- 2.1 Unlatch and open CGBA locker door.
- 2.2 Grasp CGBA and pull unit out of locker using side handles.
 If needed, pull Velcro tabs (Figure 1) to deploy CGBA recessed handles.
 Push recessed handles back into place when done.



Figure 1. CGBA Locker Insert.

- 2.3 Open CGBA lid by lifting Velcro tabs on each side of top of Nomex Cover.
 Refer to Figure 2.



Figure 2. CGBA 4 Locker Insert Nomex Cover.



Figure 3. CGBA 4 Locker Insert with Lid Open.

- 2.4 Remove CSI-02 Stow Bag from inside CGBA lid (Figure 3).
Open CSI-02 Stow Bag by removing tape and unfolding bag.
Temporarily stow.
- 2.5 Disconnect CSI-02 cables from CGBA along right side panel of CGBA:
CSI-02 ←|→ POWER / DATA J6
CSI-02 ←|→ VIDEO J7
- 2.6 Reach inside CGBA and turn thumbscrews B1, B2, and B3 (↺) to release CSI-02 from CGBA.
Place CSI-02 inside CSI-02 Stow Bag.
Close CSI-02 Stow Bag and stow for return home.

CGBA SCIENCE INSERT REMOVE

(ASSY OPS/10A/FIN)

Page 5 of 5 pages

3. CLOSING AND CONNECTING CGBA

- | | | |
|---------------|-----|--|
| CGBA | 3.1 | Close CGBA lid, and attach Velcro tabs. |
| LAB1P2_G
1 | 3.2 | Slide CGBA into locker, close locker door, and latch. |
| | 3.3 | √cb MAIN POWER – Open
√LED-MAIN POWER – Off |
| LAB1P2_F1 | 3.4 | √sw LOCKER-3 POWER – OFF
√LOCKER-3 POWER Lt – Off |
| CGBA | 3.5 | Connect EXPRESS Rack cables:
EXPRESS Rack Power Cable (24") → ← POWER-IN 28 VDC J1
EXPRESS Rack Data Cable (38") → ← EXPRESS DATA J4 |

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FRTL5 HARDWARE ROTATE

(ASSY OPS/10A/FIN)

Page 1 of 1 page

OBJECTIVE:

The crew will rotate the FRTL5 Pouch into the correct orientation for landing.

LOCATION:

MF57G

DURATION:

10 minutes

- MF57G
1. Pull out locker Bag.
 2. Open Bag.
 3. Locate FRTL5 Pouch.
 4. Remove Foam piece from rear of cut-out and save for restow.
 5. Pull out FRTL5 Pouch and look at Caution label.
 6. Rotate the pouch until the arrow indicated on the Caution label is inline with the landing gravity vector (point arrow towards Deck) and return to stowage location.
Refer to Figure 1.

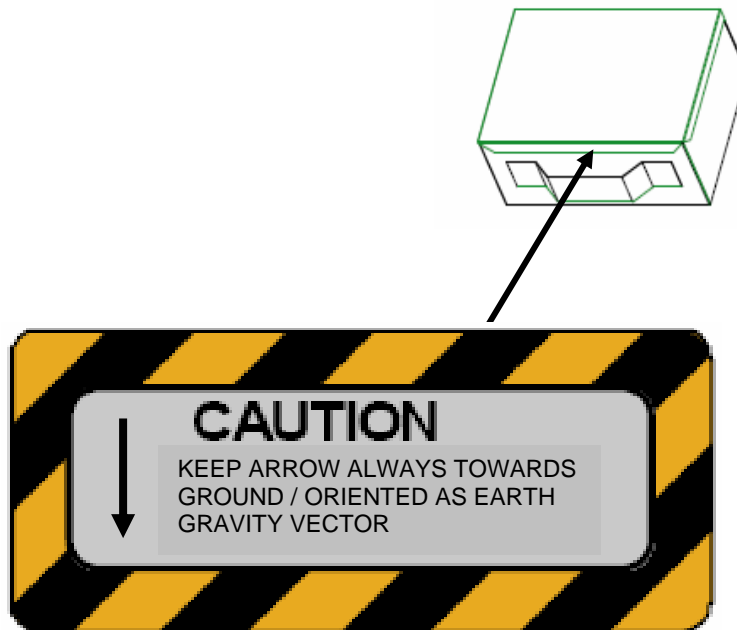


Figure 1,- Label Placement .

7. Place Foam removed in step 4 on top of the FRTL5 Pouch.
8. Close locker Bag and return to MF57G.

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STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 1 of 10 pages

OBJECTIVE:

Procedure deactivates shuttle and ISS printers, transfers the printers with attached input and output paper trays, installs them in their new locations, then configures them for use on their new networks.

NOTE

The procedure may be performed by one or two crewmembers. If one: crew member performs as written. If two: ISS crew performs parts A, E, and F, and shuttle crew performs parts B, C, and D in parallel.

STATION PARTS:

Printer Epson P/N SEZ39134666-306, S/N 6006- LAB1S6

Printer Input Tray P/N SEZ39134666-701 - Installed in ISS Printer

Printer Output Tray P/N SEZ39134666-702 - Installed in ISS Printer

SHUTTLE PARTS:

Printer Epson P/N SEZ39134666-307, S/N 6005 - Shuttle Middeck, Port Wall

Printer Input Tray P/N SEZ39134666-701 - Installed in Shuttle Printer

Printer Output Tray P/N SEZ39134666-702 - Installed in Shuttle Printer

DURATION:

70 minutes for one CM including transfer or

35 minutes each for one STS and one ISS CM, including transfer

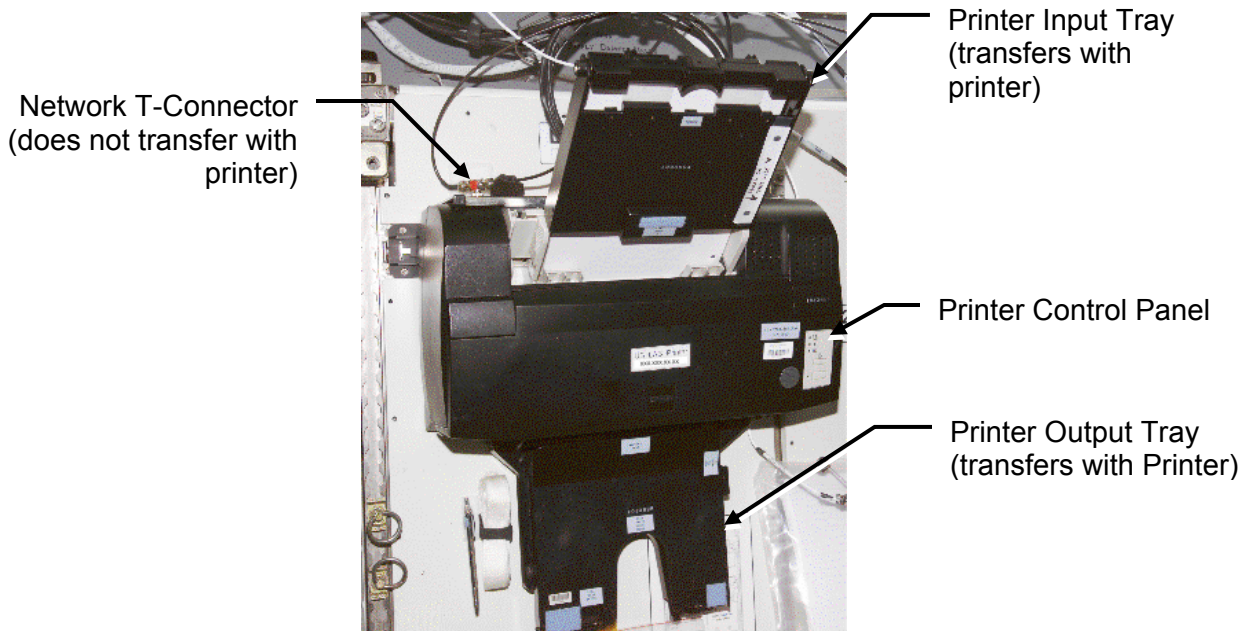


Figure 1.- Printer 2 Installed at LAB1S6.

STATION AND SHUTTLE PRINTER EXCHANGE

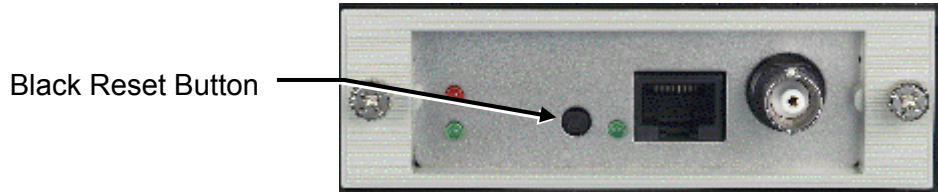


Figure 2.- Rear View of Printer Showing Network Card.

PART A: DEACTIVATING ISS LAB PRINTER **On MCC-H GO**

- LAB1S6 1. ✓Printer 2 pwr – ON (LED – Green)
2. ✓Paper loaded in Printer Input Tray
- Printer 2 3. Press black reset button on back of printer to print a Network Configuration Page for Printer 2. Refer to Figure 2.
4. Circle IP address on Network Configuration Page. Refer to Figure 3.
- LAB1S6 5. Label Network Configuration Page as “ISS - Initial.” Temporarily stow near Printer 2 location.

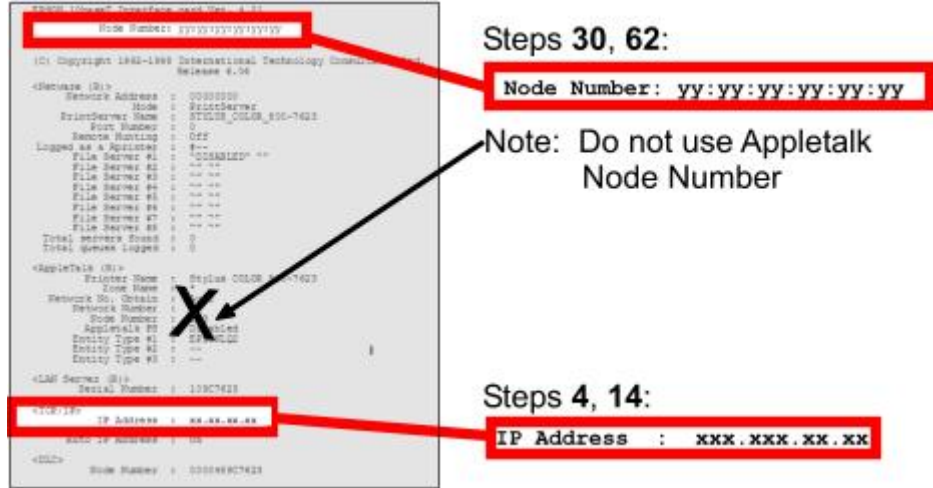


Figure 3.- Network Configuration Page (Example).

NOTE

1. The Printer power switch is not turned off so that it will be in the correct position for the IP reset upon reactivation.
2. Only the printer and attached input/output trays transfer. Power cable and network connections stay in place.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 3 of 10 pages

LAB
UOP2

6. PS-120 Junction Box 120 VDC SW 2 → Off
7. Printer Epson ←|→ US DC Power Cable, 10 ft
8. Printer Epson ←|→ Ethernet Connector
9. Remove paper from input tray and temp stow near Printer 2 location
10. Transfer Printer 2 (with attached input and output paper trays) to shuttle middeck.
Refer to Transfer List for details.

PART B: DEACTIVATING STS PRINTER

Middeck Port Wall

11. ✓Printer Epson pwr – ON (LED – Green)
12. ✓Paper loaded in Printer Input Tray
13. Press black reset button on back of printer to print a Network Configuration Page for shuttle Printer.
Refer to Figure 2.

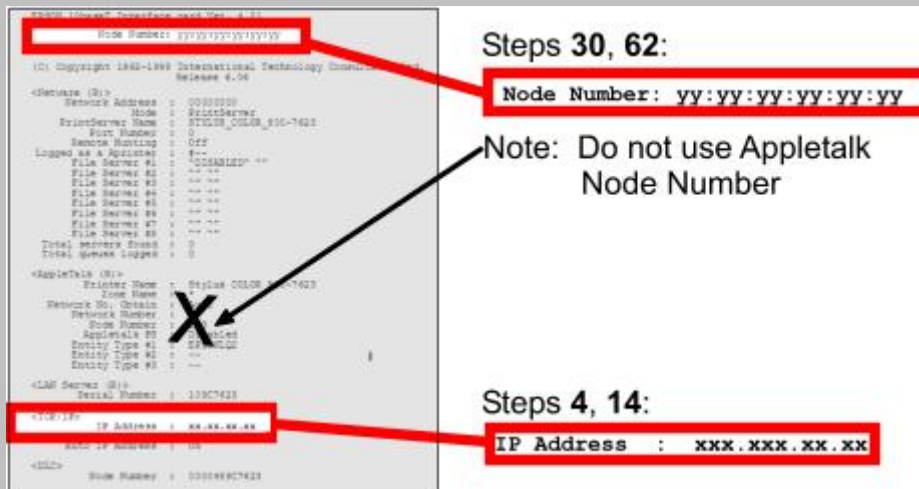


Figure 3.- Network Configuration Page (Example).

14. Circle IP address on Network Configuration Page.
Refer to Figure 3.
15. Label Network Configuration Page as “Shuttle - Initial.”

NOTE

1. The printer power switch is not turned off so that it will be in the correct position for the IP address reset upon reactivation.
2. Only the printer and attached input/output trays transfer. Power cable and network connections stay in place.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 4 of 10 pages

- ML85E 16. AC S1 → OFF
17. Printer Epson ←|→ 20' AC Extension Cable
18. Printer Epson ←|→ Ethernet T-Connector
19. Remove paper from input tray and temp stow near Printer location
20. Transfer Printer (with attached input and output paper trays) to ISS LAB1S6.
Refer to Transfer List for details.

PART C: CONNECTING ISS PRINTER ON PGSC NETWORK

Once ISS Printer (S/N 6006) has been transferred to shuttle middeck:

- Middeck 21. Printer Epson →|← Ethernet T-Connector
Port
Wall
22. Printer Epson →|← 20' AC Extension Cable
23. Load shuttle printer paper into Printer Input Tray, adjust Printer Input Tray to fit paper.

PART D: RECONFIGURING ISS PRINTER WITH PGSC NETWORK IP ADDRESS

NOTE

1. The printer IP address reset sets the printer IP address to the default value of 11.22.33.44.
2. Printer IP Address reset requires depressing the black reset button on the printer network card while printer power is applied. The reset button must continue to be depressed while power is applied via the ML85E switch until after the printer power LED begins flashing.

24. √Printer Epson power button – depressed
- Printer 25. Press and hold black reset button on back of Printer.
Hold button until step 27.
- ML85E 26. AC S1 → ON
- Printer 27. √Green Power LED – flashing
Release black reset button.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 5 of 10 pages

- ML85E
- If no LED activity
- √Printer Epson power button – depressed (√LED – ON)
 - AC S1 → OFF
 - Repeat steps 25 to 27 once.
 - If no joy, √**MCC-H**.
28. √Printer head stops moving
- √Green Power LED stops flashing and remains steady (~20 to 60 seconds)
29. Press black reset button once to print Network Configuration Page.
30. Circle Node Number on Network Configuration Page.
Refer to Figure 3.
31. Label Network Configuration Page as “Shuttle - Post Transfer.”
32. Verify IP address is 11.22.33.44 from bottom of “Shuttle - Post Transfer”
Network Configuration Page.
Refer to Figure 3.
- Printer
- ML85E
- If IP Address is not 11.22.33.44
- √Green Power LED – illuminated
 - AC S1 → OFF
 - Repeat steps 24 to 32 once.
 - If no joy, √**MCC-H**.
- PGSC (A31p) 33. From an active PGSC A31p Client on the network
sel Start ► Program ► Accessories ► Command Prompt
- NOTE

The following command prompt entry maps the node number of the new printer with its new IP Address.
- Command Prompt
34. input – A R P -S [xxx.xxx.xx.xx] [yy-yy-yy-yy-yy-yy]
where [xxx.xxx.xx.xx] is: IP address from “Shuttle - Initial” Network
Configuration Page
Numbers must be separated with periods.
- and
- where [yy-yy-yy-yy-yy-yy] is: Node Number from “Shuttle - Post Transfer”
Network Configuration Page
Numbers must be separated with dashes instead of colons.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 6 of 10 pages

35. sel [Enter]
36. Verify no error messages.
 - If error messages
 - Repeat steps 34 to 36; press up arrow to display last entered command.
37. Wait ~20 seconds for network settings to take effect.
38. To verify successful IP address mapping
 - input – P I N G [xxx.xxx.xx.xx]
 - where [xxx.xxx.xx.xx] is the IP address from “Shuttle - Initial” Network Configuration Page
39. sel [Enter]
40. Verify PING results contained ‘**Reply from [xxx.xxx.xx.xx]**’ four times.

If PING did not contain ‘**Reply from [xxx.xxx.xx.xx]**’

Verify Printer network connections.

ML85E

AC S1 → OFF

Repeat steps 24 to 40 once.

If no joy, √**MCC-H** for additional troubleshooting.

Command Prompt

PGSC
(A31p)

41. Close Command Prompt window.
42. sel Start ► Settings ► Printers and Faxes
 - Printers and Faxes
43. Right click on “Network Epson Stylus COLOR 800 ESC/P2.”
44. sel Properties
 - Network Epson Stylus COLOR 800 ESC/P2 Properties
45. sel Print Test Page
46. Verify test page prints.
 - Network Epson Stylus COLOR 800 ESC/P2
47. sel OK

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 7 of 10 pages

Network Epson Stylus COLOR 800 ESC/P2 Properties

48. sel OK

Printers and Faxes

49. Close Printers window.

50. Notify **MCC-H**, "Shuttle Printer setup complete."

PART E: CONNECTING STS PRINTER ON ISS OPS LAN

Once STS Printer (S/N 6005) has been transferred to LAB1S6:

- LAB1S6 51. Transferred Printer Epson →|← Ethernet Connector
52. Transferred Printer Epson →|← US DC Power Cable, 10 ft
53. Load ISS printer paper into Printer Input Tray, adjust Printer Input Tray to fit paper.

PART F: RECONFIGURING STS PRINTER WITH OPS LAN IP ADDRESS

NOTE

1. The printer IP address reset sets the printer IP address to the default value of 11.22.33.44.
2. Printer IP Address reset requires depressing the black reset button on the printer network card while printer power is applied. The reset button must continue to be depressed while power is applied via the PS-120 switch until after the printer power LED begins flashing.

54. Verify able to reach Printer Epson reset button and PS-120 Junction Box simultaneously from installed printer location.
55. If unable to reach both simultaneously
Printer Epson ←|→ Ethernet Connector
Remove Printer Epson from LAB1P6 with US DC Power Cable, 10 ft attached and relocate adjacent to PS-120 Junction Box.
56. √Printer Epson power button – depressed
57. Press and hold black reset button on back of Printer.
Hold button until step 59.
- LAB UOP2 58. PS-120 Junction Box 120 VDC SW 2 → On (green led)
- Printer 59. √Green Power LED – flashing
Release black reset button.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 8 of 10 pages

LAB UOP2

If no LED activity

- √Printer Epson power button – depressed (√LED – ON)
- PS-120 Junction Box 120 VDC SW 2 → Off
- Repeat steps 56 to 59 once.
- If no joy, √**MCC-H** for additional troubleshooting steps.

60. √Printer head stops moving
 - √Green Power LED stops flashing and remains steady (~20 to 60 seconds)
61. Press black reset button once to print Network Configuration Page.

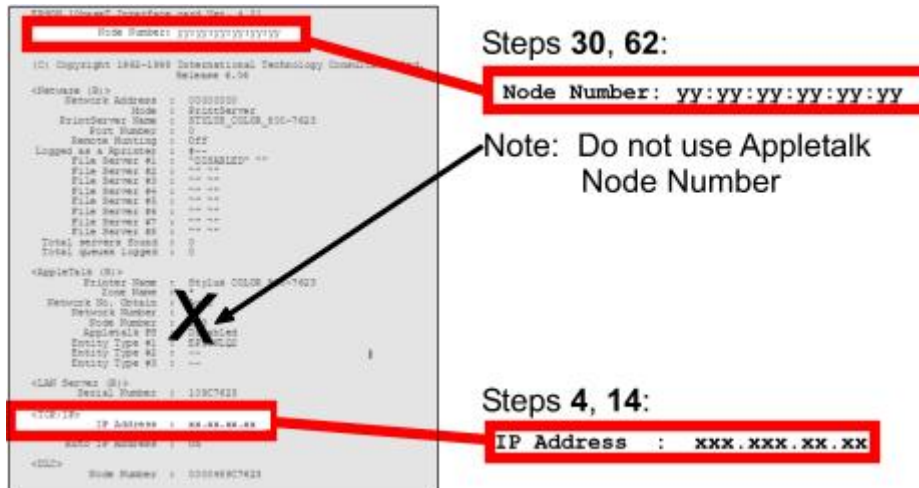


Figure 3.- Network Configuration Page (Example).

62. Circle Node Number on Network Configuration Page. Refer to Figure 3.
- LAB1S6 63. Label Network Configuration Page as "ISS - Post Transfer."
64. Verify IP address is 11.22.33.44 from bottom of "ISS - Post Transfer" Network Configuration Page. Refer to Figure 3.

Printer

If IP Address is not 11.22.33.44

- √Green Power LED – illuminated

LAB UOP2

- PS-120 Junction Box 120 VDC SW 2 → Off
- Repeat steps 56 to 64 once.
- If no joy, √**MCC-H**.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 9 of 10 pages

65. If Printer relocated adjacent to PS-120 Junction Box
Relocate to final location.
Transferred Printer Epson →|← Ethernet Connector

- SSC
66. From an active SSC Client on the network:
sel Start ► Programs ► Command Prompt

NOTE

The following command prompt entry maps the node number of the new printer with its new IP address.

Command Prompt

67. input – A R P – S [xxx.xxx.xx.xx] [yy-yy-yy-yy-yy-yy]
where [xxx.xxx.xx.xx] is: IP address from “ISS - Initial” Network Configuration Page
Numbers must be separated with periods.

and

where [yy-yy-yy-yy-yy-yy] is: Node Number from “ISS - Post Transfer” Network Configuration Page
Numbers must separated with dashes instead of colons.

68. sel [Enter]
69. Verify no error messages.
If any error messages exist
Repeat steps 67 to 69; press up arrow to display last entered command.
70. Wait ~20 seconds for network settings to take effect.
71. To verify successful IP address mapping
input – P I N G [xxx.xxx.xx.xx]
where [xxx.xxx.xx.xx] is the IP address from “ISS - Initial” Network Configuration Page
72. sel [Enter]
73. Verify PING results contained ‘**Reply from [xxx.xxx.xx.xx]**’ four times.

If PING did not contain ‘**Reply from [xxx.xxx.xx.xx]**’
Verify Printer network connections.

- LAB UOP2
- PS-120 Junction Box 120 VDC SW 2 → OFF
 - Repeat steps 56 to 73 once.
 - If no joy, √**MCC-H**.

STATION AND SHUTTLE PRINTER EXCHANGE

(ASSY OPS/10A/FIN)

Page 10 of 10 pages

SSC 74. Close Command Prompt window.

75. sel Start ► Settings ► Printers

76. Right Click on "Network EPSON 2 on fserver."

77. sel Properties

78. sel Print Test Page

79. Verify test page prints.

80. sel OK

81. sel OK

82. Close Printers window.

83. Notify **MCC-H**, "ISS Printer setup complete."

PART G: CONTINGENCY - RESTORING STS PRINTER TO ISS **On MCC-H GO**

84. Go to Part B (steps 16 to 20), Part E (all), and Part F (all).

PART H: CONTINGENCY - RESTORING ISS PRINTER TO STS **On MCC-H GO**

85. Go to Part A (steps 6 to 10), Part C (all), and Part D (all).

MALFUNCTION

MALFUNCTION

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COMM

OIU FAIL TO COMMAND

(ASSY OPS/10A/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 Requesting PSP
Dummy CMDs

- MCC will uplink PSP
Dummy CMDs and verify
telemetry.
- √PSP Dummy CMD 2(1)
- √PSP CONFIG ID 2(1)
- √UMB #4(1)
- √No SM/PSP LOAD errors
- √PSP I/F to OIU OFF(ON)

MCC CMD successful?

2 Power Cycling PSP 1(2)

(A1L)

- √S-BD PL CNTL – CMD
- S-BD PL PWR SYS – OFF
- S-BD PL CNTL – PNL
- S-BD PL PWR SYS – 1(2)
- S-BD PL CNTL – CMD
- S-BD PL PWR SYS – OFF

- Expect 'S62 BCE BYP PSP 1(2)'
message.

[SM 62 PCMMU/PL COMM]

- I/O RESET PSP 1(2) – ITEM 6(7) EXEC

3

- √OIU CMD
- [SM 212 OIU]
- √BUS 2 A – ITEM 8 (*)
- √BUS 2 B – ITEM 9 EXEC (*)

CMD successful?

4 Transient PSP 1(2)
failure.

5 Determining Current
OIU FMT

[SM 212 OIU]

- √FMT (ITEM 1), and
log: ____

6 Returning BUS 2 to
Nominal Configuration

[SM 212 OIU]

- BUS 2 A – ITEM 8 EXEC (*)

7 Power Cycling OIU
1(2)

On MCC GO
(SSP1)

- OIU PWR – ctr, then
- OIU PWR – OIU 1(2): ON
- √OIU tb – UP(DN)

OIU FMT block 5 = 255?

8

- Continue nominal
operations.

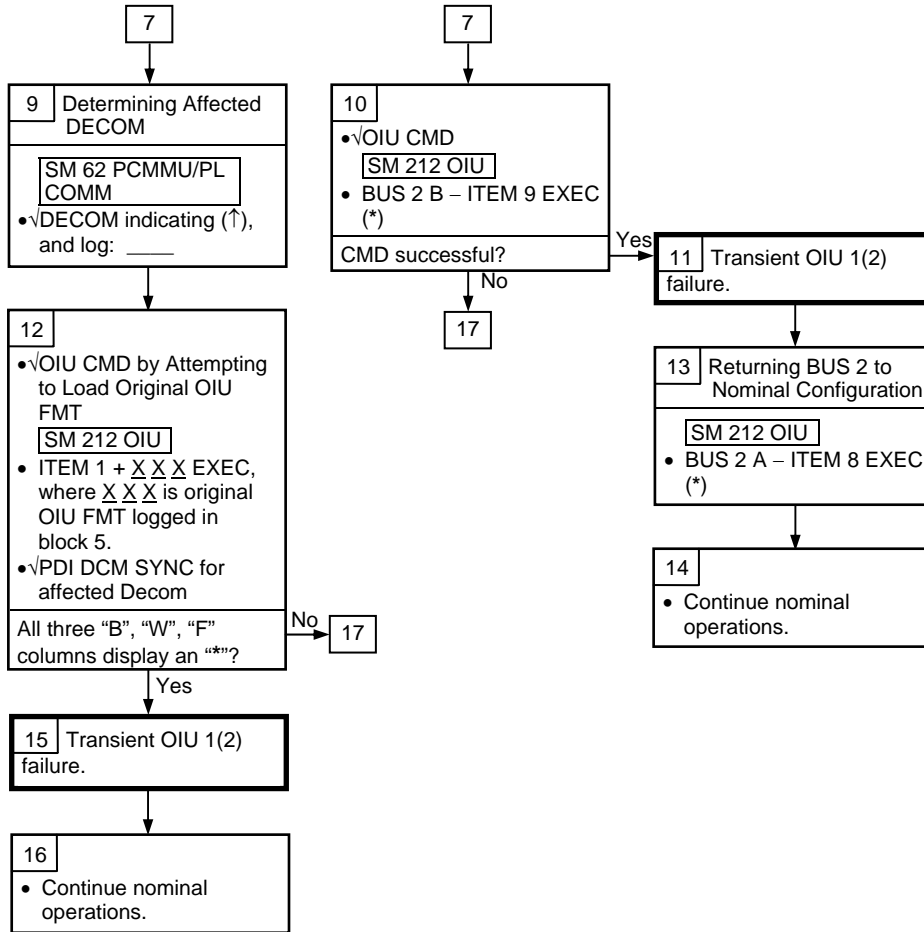
10

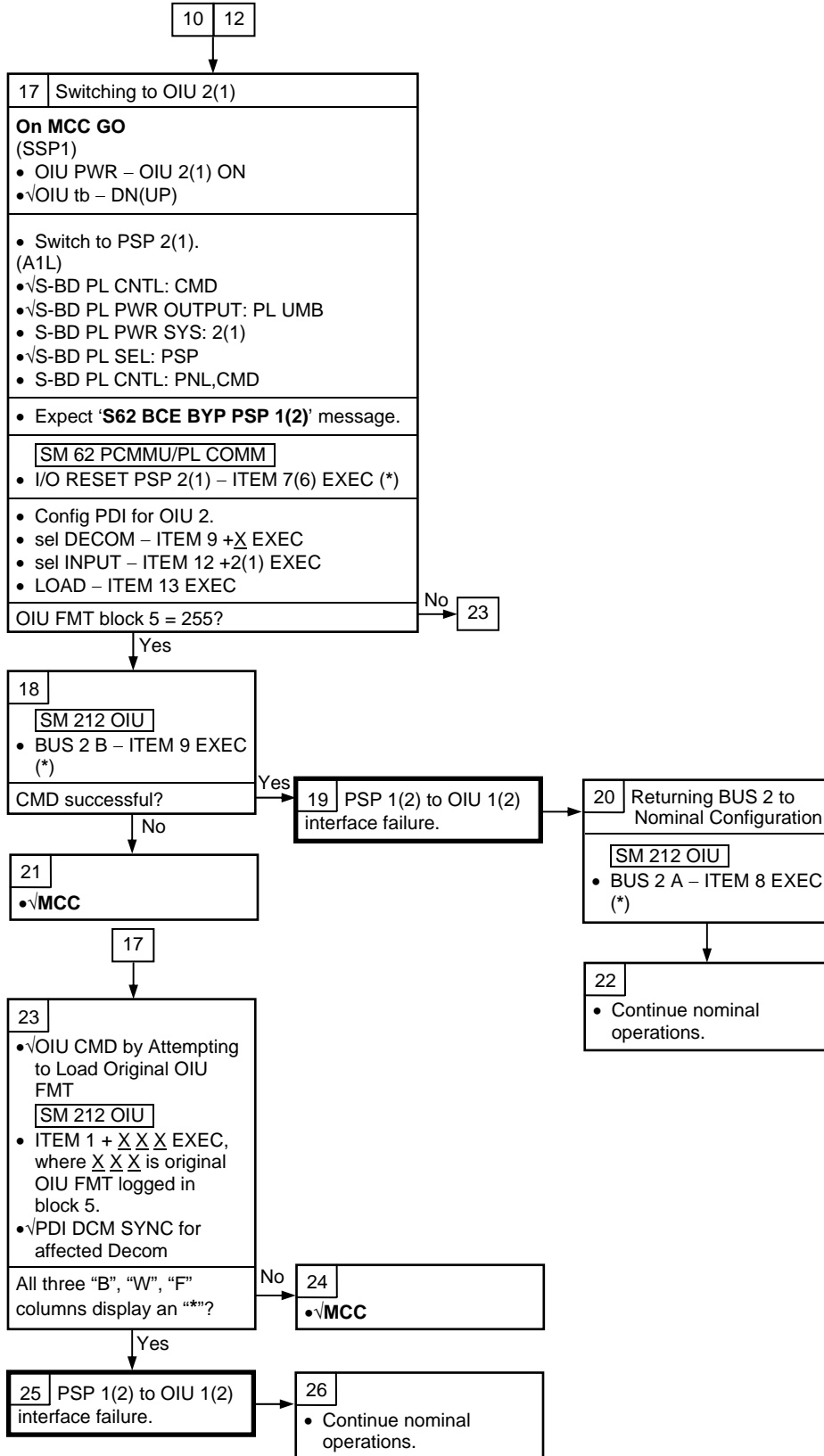
9

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

(ASSY OPS/10A/FIN)





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ASSY OPS

OIU TEMP HIGH MALFUNCTION

(ASSY OPS/10A/FIN)

Page 1 of 2 pages

SM 212 OIU TEMP

OIU message:
OIU TEMP > 212

Nominal Config:
(R1)

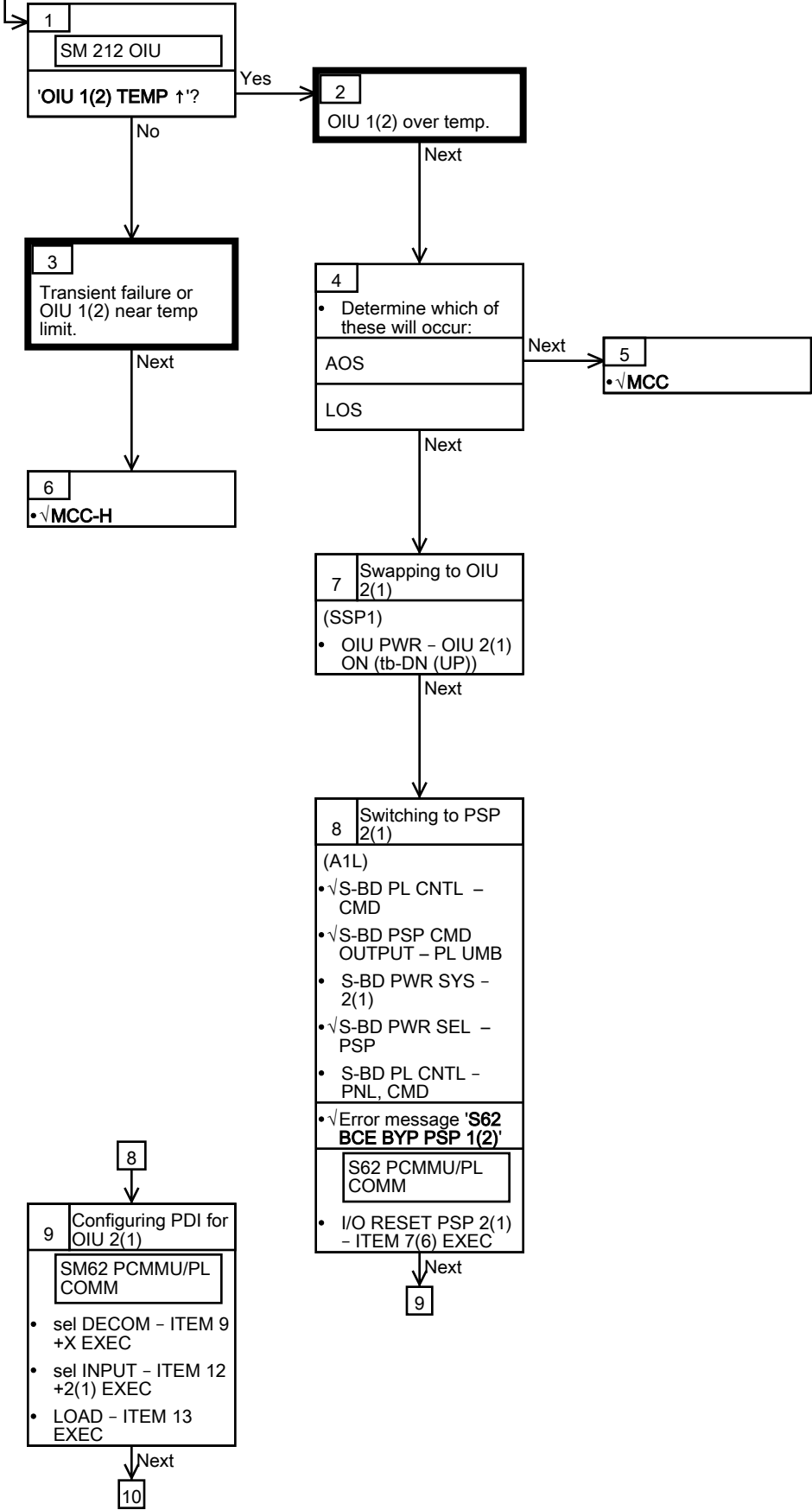
PL CAB - MNA(MNB)

PL AUX - ON

(SSP 1)

OIU PWR - OIU 1(2) ON

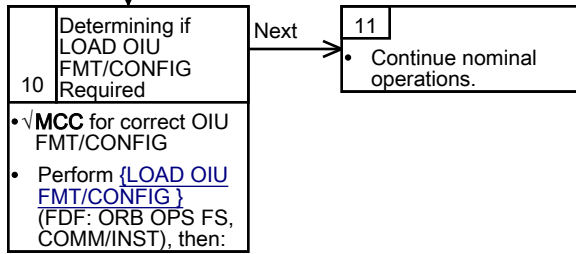
tb OIU - UP(DN)



OIU TEMP HIGH MALFUNCTION

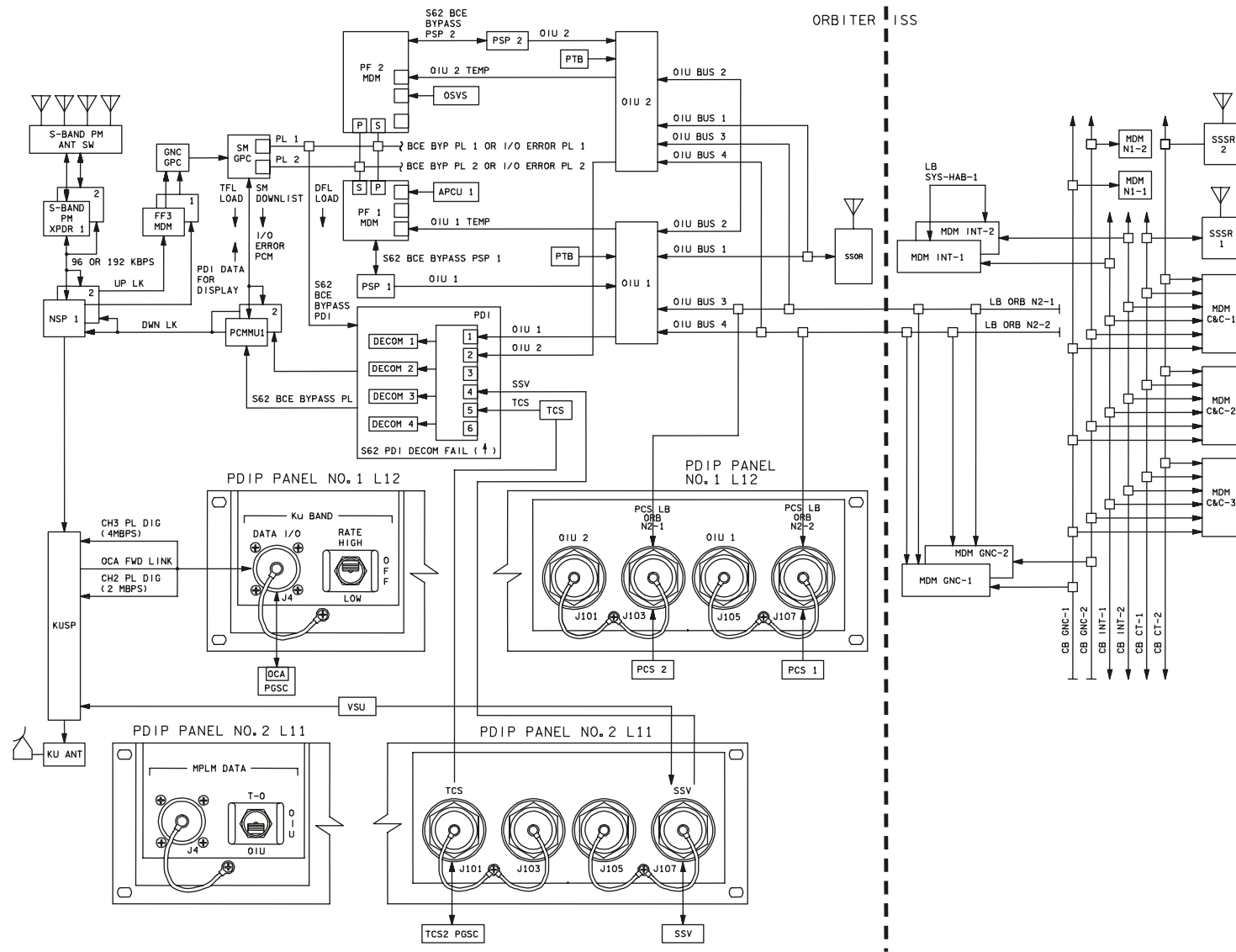
(ASSY OPS/10A/FIN)

9



COMM MALFUNCTION POINTS (ASSY OPS/10A/FIN) Page 1 of 1 page

365



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Procedure	Secure Action	Recovery Action	Info
PL 1(2) MDM I/O ERROR; PL 1(2) MDM OUTPUT (FDF, ORB PKT, DPS)	N/A	N/A	A
5.3c I/O ERROR PL 1(2); MDM OUTPUT PL 1(2) (FDF, MAL, DPS)	N/A*	N/A	A
PASS SM GPC FAIL (FDF, ORB PKT, DPS)	N/A	D	B
GNC RECOVERY VIA G2FD (FDF, ORB PKT, DPS)	N/A	C,D	B
5.1a CS SPLIT(FDF, MAL, DPS)	N/A	C,D,E **	B
5.3g BCE BYP PL1(2) (FDF, MAL, DPS)	N/A*	N/A	A
GPC FRP-4 PASS RECOVERY AFTER BFS ENGAGE (ASCENT/ORBIT/ ENTRY) (FDF, MAL, DPS)	N/A*	C,D	B
GPC FRP-7 DPS RECONFIG FOR LOSS OF AV BAY COOLING (FDF, MAL, DPS)	N/A*	C,D	B
DPS SSR-3 GNC REASSIGNMENT (FDF, MAL, DPS)	N/A*	N/A	B
DPS SSR-4 SM REASSIGNMENT (FDF, MAL, DPS)	N/A	C,D	B
ECLSS SSR-10 H2O PUMP OPS VIA GPC (FDF, MAL, ECLSS)	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.

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 FS, COMM/INST).

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COMM

S212 OIU AD 1 NOLK/LOSS OF ISS OR SSOR TELEMETRY

(ASSY OPS/10A/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:

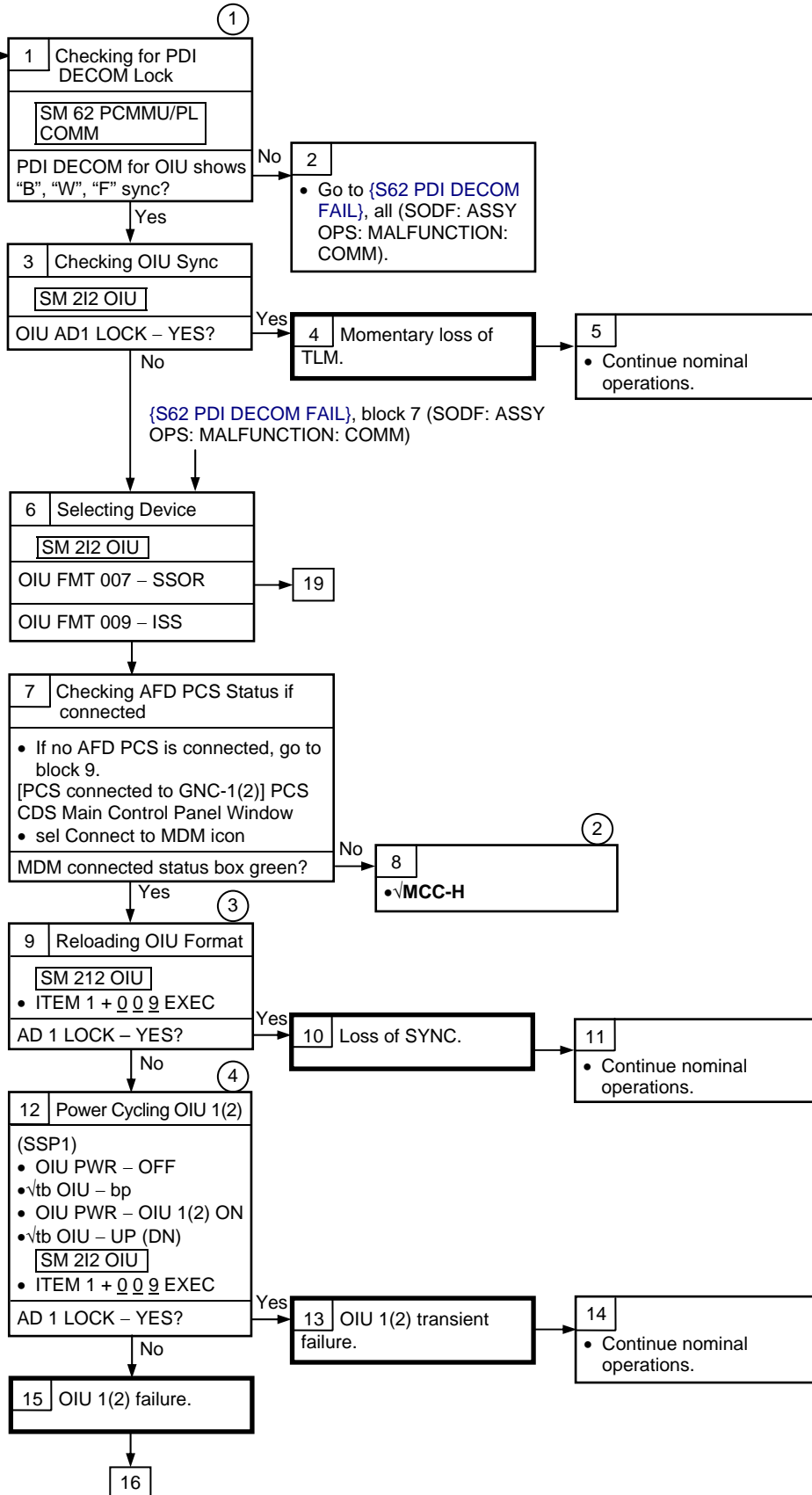
(R1)
 PL CAB
 - MNB(MNA)
 PL AUX - ON

 (SSP1)
 OIU PWR - OIU 1(2)
 ON
 tb OIU - UP(DN)

For ISS:
 If AFD PCS manifested, then one PCS connected to GNC-1(2) 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

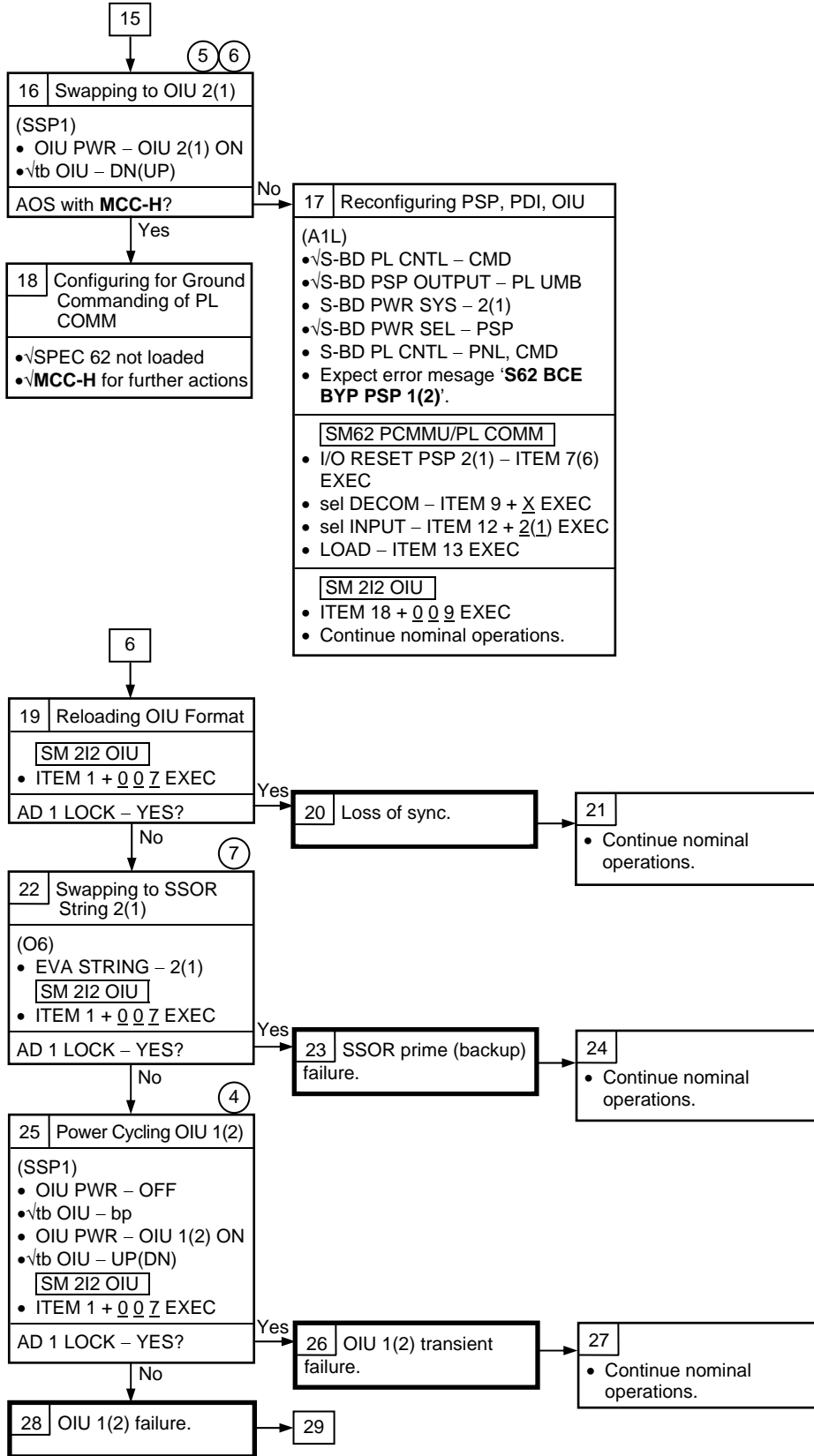


① OIU to PDI problems would annunciate a 'S62 PDI DECOM FAIL' message if FDA enabled.

② If AFD PCS connected, then MCC-H will likely direct STS or ISS crew to reconnect the AFD PCS after MCC-H has completed any required reconfigurations.

③ Reloading the OIU format forces a resync with the GNC MDM or SSOR.

④ OIU active device mapping occurs with format load.

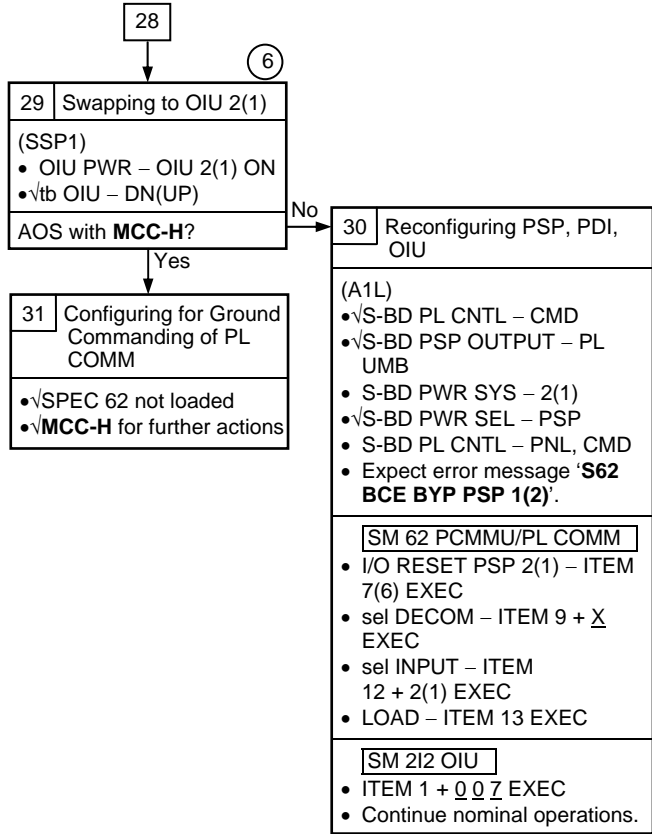


4 OIU active device mapping occurs with format load.

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.

7 Reloading the OIU format forces a resync with the SSOR.



⑥ OIU powerup config on OIU BUS 3 is RT on ch A.

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COMM

SM
ALERT

S62 PDI DECOM FAIL
(ASSY OPS/10A/FIN) Page 1 of 2 pages

{S212 OIU AD 1 NOLK/LOSS OF ISS or SSOR TELEMETRY}, block 2 (SODF: ASSY OPS: MALFUNCTION: COMM) or 2.4g S62 PDI DECOM FAIL (FDF, MAL, COMM)

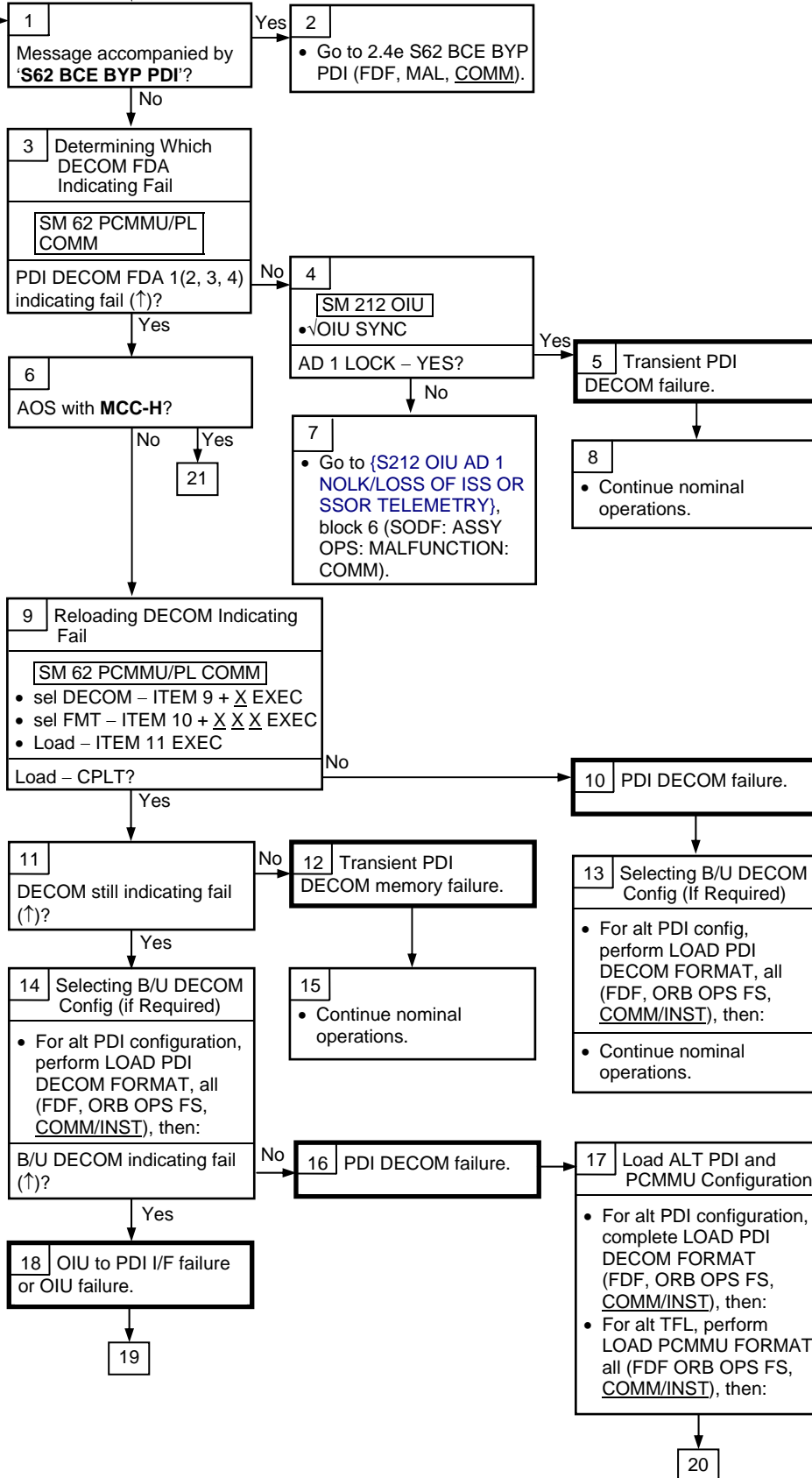
S62 PDI DECOM FAIL

①

Nominal Config:
(A1L)
PL DATA INTLVR
PWR – ON

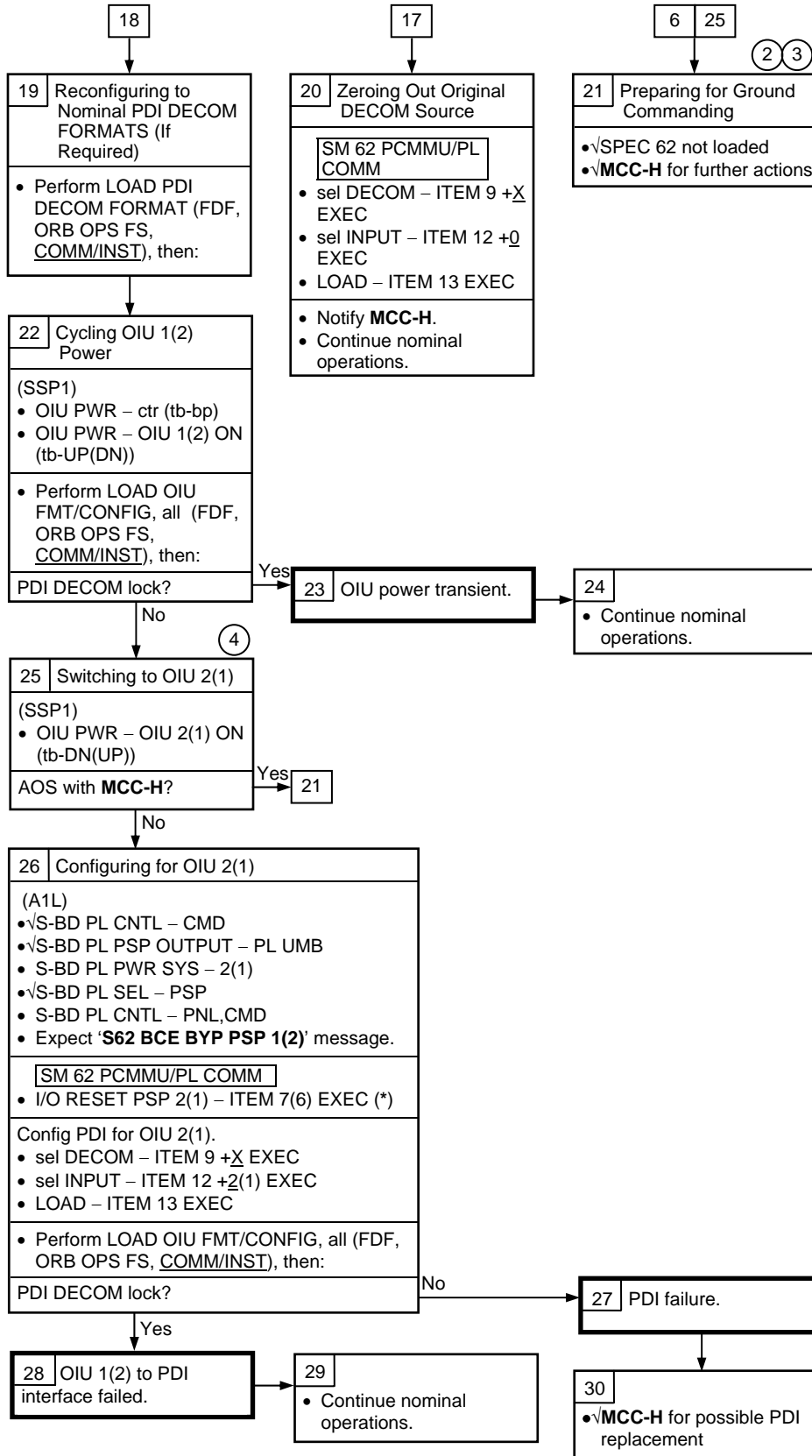
(R1)
PL CAB
– MNA(MNB)
PL AUX – ON

(SSP1)
OIU PWR – OIU 1(2)
ON
tb-UP(DN)



①

TCS and SSV not addressed in MAL; FDA not nominally enabled.



② For ground commanding of PL COMM system, SPEC 62 must not be loaded.

③ **MCC-H** can perform all PL COMM reconfig, except OIU PWR cycle and swap steps.

④ Alternate (OIU 1) requires PSP 1.

ORBITER ELECTRICAL BUS LOSS MATRIX
(ASSY OPS/10A/FIN) Page 1 of 2 pages

Table 1. Orbiter Electrical Bus Loss Matrix

ORBITER ELECTRICAL BUSES →	FC1				FC2		FC3		MNA DA1						MNB DA2								FC3		MNC DA3			MNC FPC3		
	ESS 1BC	CNTL AB2	CNTL CA1	CNTL AB3	CNTL CA2	ESS 2CA	ESS 3AB	R14	O14	A6&A14	MPC1		MPC2		A6&A14	APC5	FPC2	O15	R14	MAR1*	MAR2*	(R)	(R)	P	O16	R14	APC6	AC3		
	O13&R14					O13&R14					AUX PLA	P	(R)	AUX PLB		APC2	AC2						PRI PL			APC3	A15			
												CABIN PL				AFT PLB	φA										AFT PLC	ACφC		
ORBITER EQUIPMENT AND CARGO																														
PTU1	XRC																													
APCU 1 Conv (Node2 Htrs)		XC							P																					
PTU2						XRC																				XRC				
APCU 2 Conv (Node2 Htrs/LCS/IDC)			XC												P															
OIU 1												X																		
OIU 2													X																	
ODS X1 Connector Mate Tlm/Pwr		R		R																										
ODS X2 Connector Mate Tlm/Pwr			R		R																									
TCS													X																	
Pri C/L Camera													X																	
Sec C/L Camera											X																			
PDIP #1												X																		
PDIP #2												X																		
Video Processing Unit																				X										
Payload Timing Buffer													X																	
RSC Illuminator										X																				
PRIME PCS (Orbiter)													X																	
RSC Cam / SPEE													X																	
SSOR								R																			R			
DTV											X							X												
SSV												X																		
ISS EQUIPMENT																														
PMA 2/3 Hooks -SYS A	XRC									R	R																			
PMA 2/3 Hooks -SYS B						XRC									R	R										XRC				
PAYLOAD BUS CNTL PWR																														
CABIN PL MNA		XC	XC																											
CABIN PL MNB						XC																								
AUX PLA		XC	XC																											
AUX PLB						XC																								
PL PRI MNB						XRC																					XRC			
PL PRI MNC							XRC		XRC																					
PL PRI FC3							XRC		XRC																					
AFT PLB						XRC																				XRC				
AFT PLC							XRC		XRC																					

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

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ORBITER ELECTRICAL BUS LOSS MATRIX

(ASSY OPS/10A/FIN)

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Table 2. Orbiter Electrical Bus Loss Matrix (PRLA)

ORBITER ELECTRICAL BUSES->	MNA DA1		CNTL BUS*						MNB DA2	
	FPC1	PNL A6&A14							FPC2	PNL A6&A14
	AC1		AB1	AB2	BC1	BC2	CA1	CA2	AC2	
PRLA-PAYLOAD RETENTION LATCHES										
PRLA PL 1, 2, & 3- Latch 1/Sys A, 2/A, 3/A, 4/A, 5/A DC Logic Pwr		X								
PRLA PL 1, 2, & 3- Latch 1/Sys A, 2/A, 3/A, 4/A, 5/A Cntl Bus			XC							
PRLA PL 1, 2, & 3- Latch 1/Sys A, 2/A, 3/A, 4/A, 5/A AC Mech Pwr	X									
PRLA PL 1, 2, & 3- Latch 1/Sys B, 2/B, 3/B, 4/B, 5/B DC Logic Pwr										X
PRLA PL 1, 2, & 3- Latch 1/Sys B, 2/B, 3/B, 4/B, 5/B Cntl Bus					XC					
PRLA PL 1, 2, & 3- Latch 1/Sys B, 2/B, 3/B, 4/B, 5/B AC Mech Pwr									X	
Logic Pwr Sys 1		X								
Logic Pwr Sys 2										X
PL Bay Mech Pwr Sys 1	X		XRC	XRC			XRC	XRC		
PL Bay Mech Pwr Sys 2					XRC	XRC			X	

X = Total loss of operational power

P = Loss of primary power source

R = Loss of redundant power source

(R) = Requires action to use redundant source

XC = Total loss of CNTL power

XPC = Loss of primary CNTL power

XRC = Loss of redundant CNTL power

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

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Table 3. Payload Retention Usage

Payload	Latch	PL SEL	Latch Use	Latch Location
Node 2	1	1	LATCH / RELEASE	LATCH 1
	2	1	LATCH / RELEASE	LATCH 2
	3	1	LATCH / RELEASE	LATCH 3
	4	1	LATCH / RELEASE	LATCH 4
	5	1	LATCH / RELEASE	KEEL LATCH 2

ORBITER MDM LOSS IMPACTS

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FF1	Uplink through NSP 1 (secondary)
FF3	Uplink through NSP 2 (primary)
PF1	ISS Primary command path (via PSP 1 - UMB 1/OIU 1) KU-band Auto Search OIU 1 telemetry (PDI TELEMETRY 1) input DIH ODS X2/PMA2 X1 connector mate telemetry - <u>1 4</u> input DIH ODS X1/PMA2 X2 connector mate telemetry - <u>1 5</u>
PF2	ISS Redundant command path (via PSP 2 - UMB 1/OIU 2) OIU 2 telemetry (PDI TELEMETRY 2) input DIH ODS X1/PMA2 X2 connector mate telemetry - <u>0 8</u> input DIH ODS X2/PMA2 X1 connector mate telemetry - <u>0 9</u>
OF1	PCMMU 1 - mode select telemetry PCMMU 1 / 2 - ON/OFF power telemetry PCMMU 1 / 2 - RPC A telemetry PL AUX A - RPC ON/OFF telemetry MID MCA 1 OP STATUS (1, 2, 3, 4) telemetry MID MCA 3 OP STATUS (1, 2, 3, 4) telemetry PL BAY MECH PWR SYS 1, 2 telemetry PL RETEN LOGIC PWR SYS 1, 2 telemetry
OF2	PSP 1 / 2 - bit and frame sync PCMMU 2 - mode select telemetry PCMMU 2 RPC B telemetry PL AUX B - RPC ON/OFF telemetry MID MCA 1 OP STATUS (5, 6) telemetry MID MCA 3 OP STATUS (5, 6, 7, 8) telemetry PRLA PL SEL 1 / SYSTEM B: Latch (1, 2, 3, 4, 5) R-F-L, LAT, REL telemetry
OF3	Orbiter Comm system telemetry (refer to OI MDM/DSC Failure Impacts) PL PRI MNC, MNB, FC3 - ON/OFF telemetry PCMMU 1 RPC B telemetry
OF4	Ku-Band - RADAR mode and output power S-Band, Ku-Band - PNL/CMD switch position PSP, GCIL - ON/OFF telemetry ORBITER Comm system telemetry (refer to OI MDM/DSC Failure Impacts) CAB PL (MNA, MNB), PL AUX - ON/OFF telemetry APCU 1 and 2 Converters/Outputs switch position telemetry PTU1 and 2 OPCU Converter switch position telemetry

ORBITER MDM LOSS IMPACTS

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OA1	ODS X4/PMA X3 connector mate telemetry PTU1 voltage/trip status/temperature telemetry PMA 2/3 GRP 1 passive hooks (1, 3, 5, 7, 9, 11) Close telemetry
DSC OA1	ODS X4/PMA X3 connector mate telemetry PMA 2/3 GRP 1 passive hooks (1, 3, 5, 7, 9, 11) Close telemetry
OA2	AFT PL MNB PWR ON telemetry PTU2 voltage/trip status/temperature telemetry AFT PL MNB amps ODS X3/PMA X4 connector mate telemetry PMA 2/3 GRP 2 passive hooks (2, 4, 6, 8, 10, 12) Close telemetry
DSC OA2	ODS X3/PMA X4 connector mate telemetry PMA 2/3 GRP 2 passive hooks (2, 4, 6, 8, 10, 12) Close telemetry
OA3	AFT PL MNC PWR ON telemetry AFT PL MNC amps PRLA PL SEL 1 / SYSTEM A: PRLA Latch (1, 2, 3, 4, 5) R-F-L, LAT, REL telemetry

REFERENCE

REFERENCE

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CARGO MCDS DISPLAY DESCRIPTIONS

(ASSY OPS/10A/FIN)

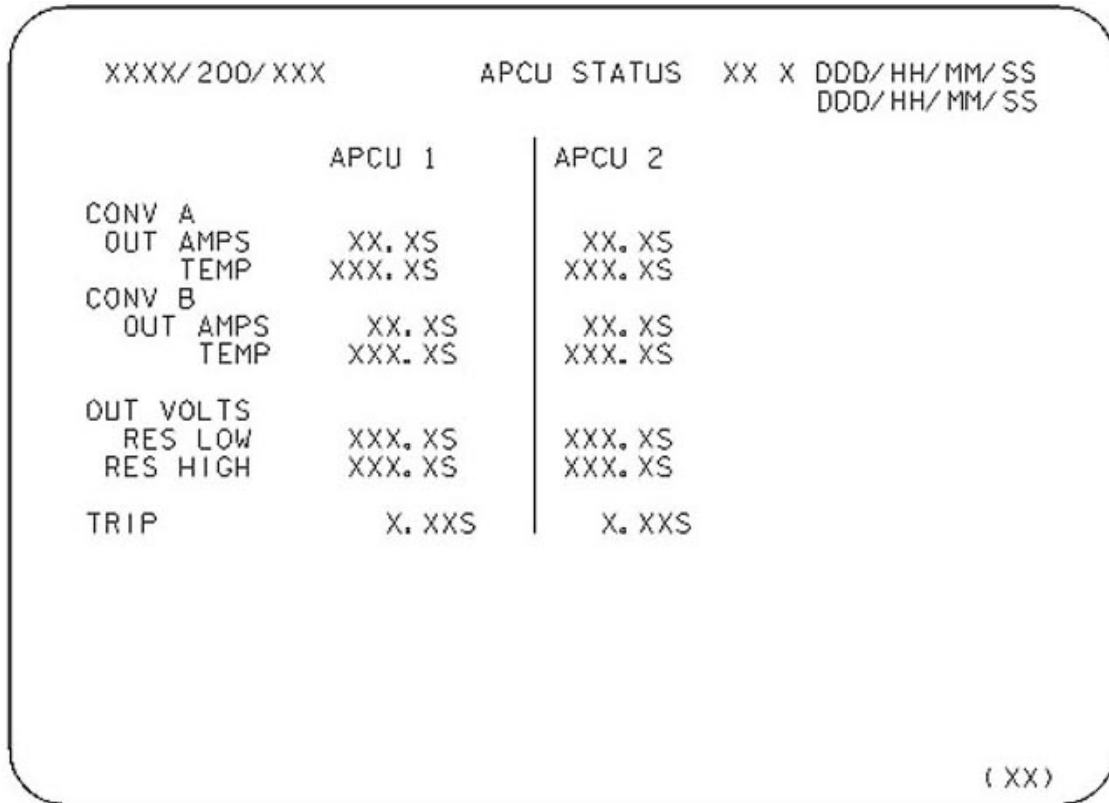
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1. MULTIFUNCTION CRT DISPLAY SYSTEM

MCDS or SPEC displays are used by the orbiter crew to aid in Mission 10A.

1.1 SPEC 200 - APCU Status. This display is not used for 10A mission because it is a SSPTS flight.

This display monitors health and status of the two APCUs and is available in SM OPS 2. The display is generic and has been used on several missions. Figure 1 is a view of this display.



3649007_117.CRT: 1

Figure 1.- APCU Status - MCDS Display.

TITLE: APCU STATUS

TYPE: SPEC 200

CARGO MCDS DISPLAY DESCRIPTIONS

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Table 1. SPEC 200 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

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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.

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.

CARGO MCDS DISPLAY DESCRIPTIONS

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1.2 SPEC 205 - ISS MCS Moding. For 12A thru 10A, there is no planned use of this display. For all flights after 10A, the purpose of this display is to allow the orbiter crew to command the ISS at dock and undock, and provide the capability to execute the attitude control handover procedures. Specifically, the orbiter crew can command the ISS to Free Drift upon contact or to activate attitude control upon separation. The orbiter crew could command at dock and undock from this display starting at 12A, however, there is full redundancy in the ISS MCS moding system at that point until the redundancy is removed when PMA 2 utilities are disconnected during STS-120 EVA 5. Stage 10A places Node 2 between the LAB and PMA2, and Node 2 does not contain any automatic ACS Moding wiring for undocking and only one string for docking, as opposed to two strings for each prior to Node 2. For the capability of executing the attitude control handover procedures, the communication link will nominally be through the OIU / GNC Hardline. Therefore, all the commands on Spec 205 have a routing code for the OIU / GNC Hardline. For commanding the ISS at dock and undock, the communication link will nominally be through the SSOR. Since all the Spec 205 commands have a routing code through the OIU / GNC Hardline, the orbiter crew will send a reroute command that reroutes all Hardline commands to the SSOR. Figure 2 shows the display.

XXXX/205/XXX		ISS MCS MODING		XX X	DDD/HH:MM:SS	DDD/HH:MM:SS
STATUS				CONTINGENCY DOCKING		
US GNC MODE	XXXXXXXX			DOCK SOFTWARE ENA		10
RS GNC MODE	XXXXXXXX			SEQUENCE INIT		11X
US/RS GNC COMM	XXXX			CONTINGENCY UNDOCKING		
GNC MDM FRAME COUNT	XX			POST DEP CNTL MODE	XXXXXXXX	
US PRI GNC MDM	XXXXS			UNDOCK SOFTWARE ENA		12
CMG ATT CNTL	XXXXS			SEQUENCE INIT		13X
REROUTE TO SSOR		1		TIME SINCE SEP		XXX
ROUTE NORM HARDLINE		2		OFF NOMINAL COMMANDS		
NO OP COMMAND		3	XXX	INCORP MASS PROP		14
15INHIBITS		ENA	INH	DOCKED IND		15X
MODE XTION	4	8	XXX	UNDOCKED IND		16X
ATT MNVR	5		XXX	HOLD CURRENT ATTITUDE		17
DESAT REQ	6		XXX	RS TAKE LVLH ATT CNTL		18
ATT CNTL SHDN	7		XXX	HANDOVER CNTL TO ORB		
HANDOVER CNTL TO ORB				RS PREP FOR CMG DESAT		19
US DRIFT AVAIL		XXX		THRSTR AVAIL FOR DESAT		XXX
MODE TO DRIFT		9		MODE TO CMG TA		20
						(XX)

Figure 2.- ISS MCS MODING - MCDS Display.

TITLE: ISS MCS MODING

TYPE: SPEC 205

CARGO MCDS DISPLAY DESCRIPTIONS

(ASSY OPS/10A/FIN)

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Table 3. SPEC 205 Parameter Characteristics

CRT NAME	MSID	UNITS	DISPLAY RANGE	STATUS IND					FDA LIMITS	
				M	H	L	↑	↓	LO	HI
STATUS [1]										
US GNC MODE [2]	P79X0845E P79X0846E P79X0847E	text	Refer to remarks							
RS GNC MODE [3]	P79X0842E P79X0843E P79X0844E	text	Refer to remarks							
US/RS GNC COMM [4]	P79X0857E	text	0 = 'GOOD' 1 = overbright 'FAIL'							
GNC MDM FRAME COUNT [5]	P79U0856D		Refer to remarks							
US PRI GNC MDM [6]	P79X0854E	text	0 = 'GOOD' 1 = overbright 'FAIL'					↓	1	
CMG ATT CNTL [7]	P79X0853E	text	0 = 'GOOD' 1 = overbright 'LOST'					↓	1	
NO OP COMMAND	P79U0855D	Hex								
INHIBITS										
MODE XTION	P79X0807E	text	0 = 'ENA' 1 = 'INH'							
ATT MNVR	P79X0812E	text	0 = 'ENA' 1 = 'INH'							
DESAT REQ	P79X0813E	text	0 = 'ENA' 1 = 'INH'							
ATT CNTL SHDN	P79X0806E	text	0 = 'ENA' 1 = 'INH'							
HANDOVER CNTL TO ORB										
US DRIFT AVAIL [8]	P79X0814E	text	0 = 'NO' 1 = 'YES'							

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Continuation of Table 3. SPEC 205 Parameter Characteristics

CRT NAME	MSID	UNITS	DISPLAY RANGE	STATUS IND					FDA LIMITS	
				M	H	L	↑	↓	LO	HI
CONTINGENCY DOCKING [9]										
DOCK SEQUENCE INIT [10]	P79X0858E	text	0 = blank 1 = " * "							
CONTINGENCY UNDOCKING [11]										
POST DEP CNTL MODE [12]	P79X0818E P79X0819E	text	Refer to remarks							
UNDOCK SEQUENCE INIT	P79X0859E	text	0 = blank 1 = " * "							
TIME SINCE SEP [13]	P79W0860D	s								
OFF NOMINAL COMMANDS [14]										
DOCKED IND	P79X0811E	text	0 = blank 1 = " * "							
UNDOCKED IND	P79X0811E	text	0 = " * " 1 = blank							
HANDOVER CONTL TO ISS										
THRSTR AVAIL FOR DESAT [15]	P79X0805E	text	0 = 'NO' 1 = 'YES'							

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CARGO MCDS DISPLAY DESCRIPTIONS

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REMARKS

[1] The US (United States) GNC MODE and the RS (Russian Segment) GNC MODE allow the orbiter crew to know how the station is controlling attitude. For nominal ISS attitude control, the US GNC Mode = CMG TA, and the RS GNC Mode = CMG TA. If the RS was controlling, the US GNC Mode = Drift (although depending on the failure scenario, it could be any one of the modes), and the RS GNC Mode = Thruster. If the orbiter was controlling, the US GNC Mode = Drift (although depending on the failure scenario, it could be any one of the modes), and the RS GNC Mode = CMG TA or Indicator.

[2] The US GNC MODE allows the orbiter crew to know how the US station is controlling attitude.

Table 4.

MSID									
P79X0845E	0	0	0	0	1	1	1	1	
P79X0846E	0	0	1	1	0	0	1	1	
P79X0847E	0	1	0	1	0	1	0	1	
Displayed Text:	DEFAULT	WAIT	RESERVED	STANDBY	CMG ONLY	CMG TA	UDG	DRIFT	

[3] The RS GNC MODE allows the orbiter crew to know how the RS station is controlling attitude.

Table 5.

MSID									
P79X0842E	0	0	0	0	1	1	1	1	
P79X0843E	0	0	1	1	0	0	1	1	
P79X0844E	0	1	0	1	0	1	0	1	
Displayed Text:	RESERVED	THRUSTER	GY ONLY	GY+T H/US	GY+T H/RS	REBOOST	CMG TA	INDICATOR	

[4] The US/RS GNC LOSS COMM: This Caution and Warning (C&W) is used in the handover of attitude control from orbiter to CMG TA procedure, and if it is in alarm, the handover will not work. This C&W is coded on this Spec as conditional, which utilizes the overbright and flash functionality.

[5] GNC MDM FRAME COUNT: This parameter is used to determine if the entire Spec in general is getting updated data from the ISS. This parameter is normally displayed in decimal form resulting in an increment counter. But due to flight software constraints, this parameter will be displayed in hex form. Hex is sufficient because this parameter just needs to update.

[6] US PRI GNC MDM FAIL: This Caution and Warning (C&W) is used in the handover of attitude control from orbiter to CMG TA procedure, and if it is in alarm, the handover will not work. This C&W is FDA'd as a Class 3 Alert, which when TMBU enabled, will have an onboard audible alarm, a light indication, an Onboard Fault Summary message, and a down arrow on the Spec parameter

CARGO MCDS DISPLAY DESCRIPTIONS

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status field. This C&W is coded on this Spec as conditional, which utilizes the overbright and flash functionality.

- [7] LOSS CMG ATT CNTL: This Caution and Warning (C&W) is used in the handover of attitude control from orbiter to CMG TA procedure, and if it is in alarm, the handover will not work. This C&W is FDA'd as a Class 3 Alert, which when TMBU enabled, will have an onboard audible alarm, a light indication, an Onboard Fault Summary message, and a down arrow on the Spec parameter status field. This C&W is coded on this Spec as conditional, which utilizes the overbright and flash functionality.
- [8] US DRIFT AVAIL: If this parameter, US Drift Available = Yes, then the command Item 9 MODE TO DRIFT will be accepted by the ISS US GNC MDM.
- [9] CONTINGENCY DOCKING: These commands do not have any nominally planned use, but if there is a loss of redundancy to mode the ISS to Free Drift at docking, then **MCC** may decide to use this section.
- [10] DOCK SEQUENCE INIT: This parameter is set high if item 11 was commanded to start the manual ACS Moding software to execute and mode the ISS to Free Drift.
- [11] CONTINGENCY UNDOCKING: These commands do not have any nominally planned use, but if there is a loss of redundancy to mode the ISS to attitude control after undocking, then **MCC** may decide to use this section.
- [12] POST DEP CNTL MODE: The Post Departure Control Mode can be set to CMG TA, CMG Only, or RS CNTL. If this parameter reads RS CNTL, then after undocking, if the ACS Moding software properly executes, the ISS will resume control on Russian thruster control.

Table 6.

MSID			
P79X0818E	0	0	1
P79X0819E	0	1	0
Displayed Text:	CMG TA	CMG ONLY	RS CNTL

- [13] TIME SINCE SEP: When the manual software is initiated or when the automatic software is initiated by the sensors, this time since separation parameter begins to count up from zero to a commanded value (typically 100 seconds) at which time the ISS will resume attitude control using the control method defined by the Post Departure Control Mode parameter.
- [14] OFF NOMINAL COMMANDS: These commands do not have any nominally planned use, but may be used in **MCC** determined contingencies.
- [15] THRSTR AVAIL FOR DESAT: telemetry feedback for Item 19 RS PREP FOR CMG DESAT. If that command is successful, then this parameter will show 'YES', and the RS is prepared to enter CMG TA mode.

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ITEM ENTRY CHARACTERISTICS

- Item 1: REROUTE TO SSOR: All the commands on this Spec are hardcoded with a routing code = 1, which is for the OIU / GNC Hardline. If the commands are to be sent through the SSOR, then this reroute command will tell the OIU that for any command with a routing code of 1, to change it to 2, which is the routing code for SSOR.
- Item 2: ROUTE TO NORMAL HARDLINE: If there was an activity that required commanding from Spec 205 through the SSOR and that commanding activity is complete, then this route to normal command should be sent. All the commands on this Spec are hardcoded with a routing code = 1, which is for the OIU / GNC Hardline. But, for commanding through the SSOR, the OIU can be configured to take all routing codes of 1 and change it to 2, which is SSOR. So, to return the OIU to a nominal configuration, this command will tell the OIU that for all commands with routing code of 1, to assign it a routing code of 1.
- Item 3: NO OP COMMAND: The commands to reroute to SSOR and route to normal hardline do not have any telemetry feedback. As a form of feedback, this no op command is sent and the command accept counter telemetry will increment, thus verifying the routing commands success.
- Item 4: MODE XTION ENA is used to command the Mode Transition Inhibit to a status of either enabled. The telemetry feedback is ENA.
- Item 5: ATT MNVR ENA is used to command the Attitude Maneuver Inhibit to a status of enabled. The telemetry feedback is ENA or INH.
- Item 6: DESAT REQ ENA is used to command the Desat Request Inhibit to a status of enabled. The telemetry feedback is ENA or INH.
- Item 7: ATT CNTL SHDN ENA is used to command the Attitude Control Shutdown Inhibit to a status of enabled. The telemetry feedback is ENA or INH.
- Item 8: MODE XTION INH is used to command the Mode Transition Inhibit to a status of either inhibited. The telemetry feedback is INH.
- Item 9: MODE TO DRIFT commands the ISS US GNC Mode to Drift.
- Item 10: DOCK SOFTWARE ENA commands the manual dock software within the ACS Moding software to be enabled.
- Item 11: DOCK SEQUENCE INIT commands the manual dock software within the ACS Moding software to execute, if the manual dock software is enabled per Item 10. The software that executes is the same software that the automatic ACS Moding software executes if the Capture Long sensors worked.

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- Item 12: UNDOCK SOFTWARE ENA commands the manual undock software within the ACS Moding software to be enabled.
- Item 13: UNDOCK SEQUENCE INIT commands the manual undock software within the ACS Moding software to execute, if the manual undock software is enabled per Item 12. The software that executes is the same software that the automatic ACS Moding software executes if the Interface Sealed sensors and Separation sensors worked.
- Item 14: INCORP MASS PROP is a command that incorporates the US GNC mass properties from a buffer location to active use.
- Item 15 & 16: DOCKED IND and UNDOCKED IND are manual commands that toggle a bit in the Primary C&C MDM automatic ACS Moding software. This bit is used by the Russian Segment to update their mass properties.
- Item 17: HOLD CURRENT ATTITUDE is a command to the US GNC MDM that performs a snap and hold at the current attitude, assuming the US GNC Mode is already in CMG TA and controlling attitude.
- Item 18: RS TAKE LVLH ATT CNTL is an ISS Tier 1 command that tells the Russian Segment to take attitude control in Thrusters in the LVLH reference frame. This command is an off nominal command without handshake between the US GNC MDM and the RS TBM. The nominal command to have the Russian Segment take control 6-17 is with handshake, which means there is some Tier 2 communication between the US GNC MDM and the RS TBM.
- Item 19: RS PREP FOR CMG DESAT is a Tier 1 command that prepares the Russian Segment for CMG TA mode.
- Item 20: MODE TO CMG TA is a command that changes the US GNC Mode to CMG TA using CCDB slot number 1, and also will change the RS GNC Mode to CMG TA if it is not already so.

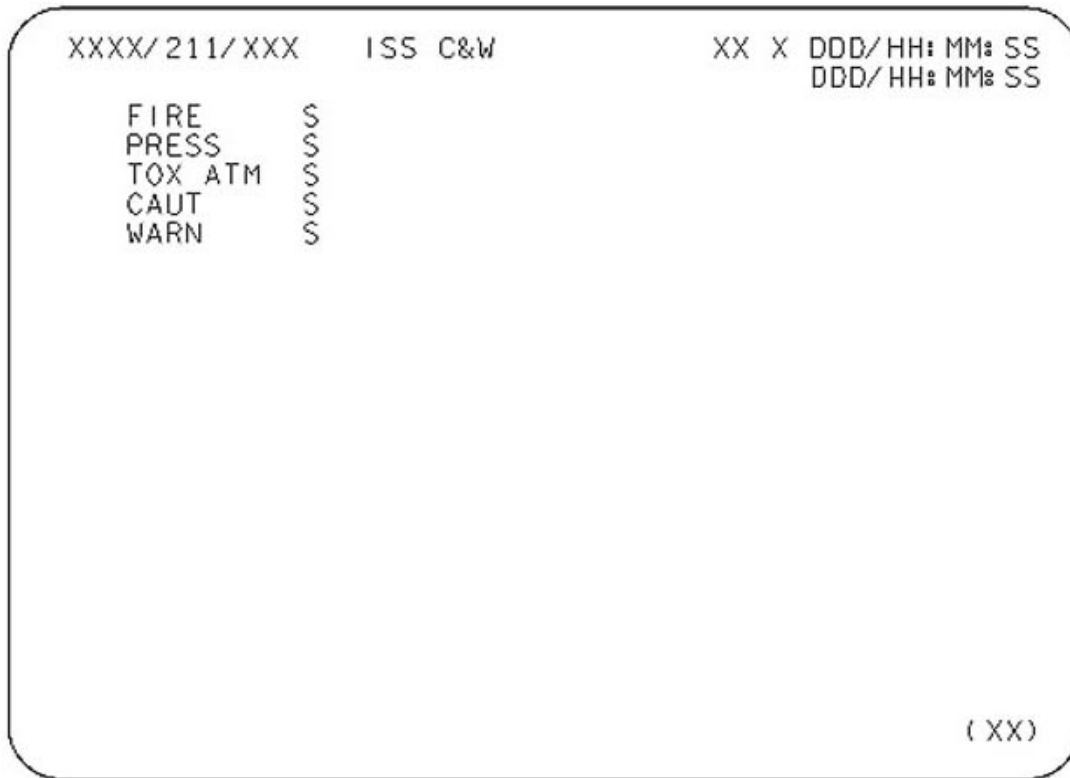
CARGO MCDS DISPLAY DESCRIPTIONS

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1.3 SPEC 211 - ISS C&W

The SM 211 ISS C&W display is available in SM OPS 2, and is used for monitoring pertinent ISS C&W telemetry. Because the PCS does not have the capacity to annunciate alarm tones, the tone status flag from the ISS will be used to trigger the orbiter C&W system. Refer to Figure 3.



3648066_114. CRT# 1

Figure 3.- ISS C&W - MCDS Display.

TITLE: ISS C&W

TYPE: SPEC 211

Table 7. SPEC 211 Parameter Characteristics

CRT Name	MSID	Units	Display Range	Status IND [1]					FDA Limits	
				M	H	L	↑	↓	LO	HI
FIRE	P79X0803E			M					1	
PRESS	P79X0801E			M					1	
TOX ATM	P79X0802E			M					1	
CAUT	P79X0830E			M					1	
WARN	P79X0831E			M					1	

CARGO MCDS DISPLAY DESCRIPTIONS

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REMARKS

- [1] The parameter status field for all parameters will be blank for normal operation or will display an "M" for missing data. For analog parameters, this field will also display an "H" or "L" for offscale data. Some parameters displayed will be limit-sensed for SM alerts or C&W alarms. For discretes that are limit-sensed, the undesirable state is defined in the FDA low-limit field and the FDA high-limit field is left blank. Satisfaction of the undesirable state triggers a "↓" indication. For analogs that are limit-sensed, an "↑" or "↓" 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.
- [2] When the tone status flag is set for any FIRE, pressure PRESS, toxic atmosphere TOX ATM, caution CAUT, or warning WARN event, a "↓" will be displayed in the appropriate status field. The FIRE, PRESS, and TOX ATM events will initiate a master alarm light and tone, B/U C&W light on panel F7, and a fault message. WARN and CAUT events will initiate an alert light, tone, and fault message. The PCS can be referenced for additional details on the fault condition.

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	1	2	3	4	5
1	XXXX/212/XXX	OIU	XX X	DDD/HH:MM:SS	
2				DDD/HH:MM:SS	
3	OIU 1 TEMP ±XXX.XS			OIU STATUS CTR	XX
4	OIU 2 TEMP ±XXX.XS	ISS BC TIME	XX-XX-XX/XX:XX:XX		
5					
6	STATUS			1 FORMAT XXX	
7	ACTIVE DEVICES			PDI	
8	AD	PD	BUS LOCK	DCM	SYNC
9				B	W F
10	1	XXXX	X XXXXS	1	XSXSXS
11	2	XXXX	X XXXXS	2	XSXSXS
12	3	XXXX	X XXXXS	3	XSXSXS
13	4	XXXX	X XXXXS	4	XSXSXS
14					
15	OIU CMD CTR	XXX			
16	PSP I/F	XXX			
17	FLOAT POINT	XXXS		LAST CMD	
18				PSP XXX	
19				OIU XXX	
20	SSOR				
21	PRI FRM SYNC	XXXS			
22	PRI STATUS	XXXS		18 SPARE CMD	
23	B/U FRM SYNC	XXXS		XXX	
24	B/U STATUS	XXXS			
25					(XX)
26					

Figure 4.- OIU Display - SPEC 212.

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The SM 212 OIU display (shown in Figure 4) is available in SM OPS 2 and is used to configure the OIU for cargo element operations, monitor OIU status, and monitor relevant PDI, PSP, and SSOR statuses.

Table 8. SPEC 212 Parameter Characteristics

CRT Name	MSID	Units	Display Range	Status IND [9]					FDA Limits	
				M	H	L	↑	↓	LO	HI
OIU 1 TEMP [1]	P50T4000V	deg F	-23.4 to +304.3	M	H	L	↑			212
OIU 2 TEMP [1]	P50T4001V	deg F	-23.4 to +304.3	M	H	L	↑			212
OIU STATUS CTR [2]	P50U4106D	s	00 to 59							
ISS BC TIME [2]	P50U4112D, P50U4113D, P50U4111D, P50U4114D, P50U4115D, P50U4116D	time	Refer to remarks							
AD 1 PD [3]	P50X4401E, P50X4402E, P50X4403E, P50X4404E, P50X4405E, P50X4406E	text	Refer to remarks							
AD 2 PD [3]	P50X4411E, P50X4412E, P50X4413E, P50X4414E, P50X4415E, P50X4416E	text	Refer to remarks							

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Continuation of Table 8. SPEC 212 Parameter Characteristics

CRT Name	MSID	Units	Display Range	Status IND [9]					FDA Limits		
				M	H	L	↑	↓	LO	HI	
AD 3 PD [3]	P50X4421E, P50X4422E, P50X4423E, P50X4424E, P50X4425E, P50X4426E	text	Refer to remarks								
AD 4 PD [3]	P50X4431E, P50X4432E, P50X4433E, P50X4434E, P50X4435E, P50X4436E	text	Refer to remarks								
AD 1 BUS [4]	P50U4055D	n/a	0 to 7								
AD 2 BUS [4]	P50U4065D	n/a	0 to 7								
AD 3 BUS [4]	P50U4075D	n/a	0 to 7								
AD 4 BUS [4]	P50U4085D	n/a	0 to 7								
AD 1 LOCK [5]	P50X4440E, P50X4441E	text	0,0 = 'NONE' 0,1 = 'YES' 1,0 = 'NO' 1,1 = 'N/A'	M				↓	1,0		
AD 2 LOCK [5]	P50X4450E, P50X4451E	text	0,0 = 'NONE' 0,1 = 'YES' 1,0 = 'NO' 1,1 = 'N/A'	M				↓	1,0		
AD 3 LOCK [5]	P50X4460E, P50X4461E	text	0,0 = 'NONE' 0,1 = 'YES' 1,0 = 'NO' 1,1 = 'N/A'	M				↓	1,0		

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Continuation of Table 8. SPEC 212 Parameter Characteristics

CRT Name	MSID	Units	Display Range	Status IND [9]					FDA Limits	
				M	H	L	↑	↓	LO	HI
AD 4 LOCK [5]	P50X4470E, P50X4471E	text	0,0 = 'NONE' 0,1 = 'YES' 1,0 = 'NO' 1,1 = 'N/A'	M				↓	1,0	
PDI DCM 1 B,W,F SYNC [13]	V75X6403D, V75X6402D, V75X6401D	text	0 = blank, 1 = '*' 0 = blank, 1 = '*' 0 = blank, 1 = '*'	M				↓	0	
				M				↓	0	
				M				↓	0	
PDI DCM 2 B,W,F SYNC [13]	V75X6407D, V75X6406D, V75X6405D	text	0 = blank, 1 = '*' 0 = blank, 1 = '*' 0 = blank, 1 = '*'	M				↓	0	
				M				↓	0	
				M				↓	0	
PDI DCM 3 B,W,F SYNC [13]	V75X6411D, V75X6410D, V75X6409D	text	0 = blank, 1 = '*' 0 = blank, 1 = '*' 0 = blank, 1 = '*'	M				↓	0	
				M				↓	0	
				M				↓	0	
PDI DCM 4 B,W,F SYNC [13]	V75X6415D, V75X6414D, V75X6413D	text	0 = blank, 1 = '*' 0 = blank, 1 = '*' 0 = blank, 1 = '*'	M				↓	0	
				M				↓	0	
				M				↓	0	
OIU CMD CTR [6]	P50U4132A	n/a	0 to 255							
OIU PSP I/F [7]	P50X4283E	text	0 = 'OK', 1 = 'ERR'							
FLOAT POINT [8]	P50X4288E	text	0 = 'OK', 1 = 'ERR'	M				↓	1	
PSP LAST CMD [10]	V92X1102X, V92X1116X, V92X1129X	text	1,0,1 = 'REJ' 0,1,1 = 'INC' else = 'OK'							
OIU LAST CMD [11]	P50X4281E, P50X4303E, P50X4287E	text	1,0,0 or 0,1,0 or 1,1,0 or 0,0,1 or 1,0,1 or 0,1,1 or 1,1,1 = 'REJ' else = 'OK'							
SSOR PRI FRM SYNC [12]	V74X2050E	text	0 = 'NO', 1 = 'YES'	M				↓	0	
SSOR PRI STATUS [12]	V74X2051E	text	0 = 'BAD', 1 = 'OK'	M				↓	0	

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Continuation of Table 8. SPEC 212 Parameter Characteristics

CRT Name	MSID	Units	Display Range	Status IND [9]					FDA Limits	
				M	H	L	↑	↓	LO	HI
SSOR B/U FRM SYNC [12]	V74X2053E	text	0 = 'NO', 1 = 'YES'	M				↓	0	
SSOR B/U STATUS [12]	V74X2052E	text	0 = 'BAD', 1 = 'OK'	M				↓	0	
FORMAT [14]	P50U4010A	n/a	0 to 255							
BUS 1 RT [15]	P50X4021E	text	0 = '*', 1 = blank							
BUS 1 BC [15]	P50X4021E	text	0 = blank, 1 = '*'							
BUS 1 A [15]	P50X4041E	text	0 = '*', 1 = blank							
BUS 1 B [15]	P50X4041E	text	0 = blank, 1 = '*'							
BUS 2 RT [15]	P50X4022E	text	0 = '*', 1 = blank							
BUS 2 BC [15]	P50X4022E	text	0 = blank, 1 = '*'							
BUS 2 A [15]	P50X4042E	text	0 = '*', 1 = blank							
BUS 2 B [15]	P50X4042E	text	0 = blank, 1 = '*'							
BUS 3 RT [15]	P50X4023E	text	0 = '*', 1 = blank							
BUS 3 BC [15]	P50X4023E	text	0 = blank, 1 = '*'							
BUS 3 A [15]	P50X4043E	text	0 = '*', 1 = blank							
BUS 3 B [15]	P50X4043E	text	0 = blank, 1 = '*'							
BUS 4 RT [15]	P50X4024E	text	0 = '*', 1 = blank							
BUS 4 BC [15]	P50X4024E	text	0 = blank, 1 = '*'							
BUS 4 A [15]	P50X4044E	text	0 = '*', 1 = blank							
BUS 4 B [15]	P50X4044E	text	0 = blank, 1 = '*'							
SPARE CMD [16]	P93J0101C	n/a	1 to 25							

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CARGO MCDS DISPLAY DESCRIPTIONS

REMARKS

- [1] The OIU TEMP parameters will read 140° F when the OIU associated with that measurement is OFF. Note that this is the only sure method to determine which OIU is powered up from this display alone. Additional insight is available via the panel L12 OIU PWR tb.
- [2] OIU STATUS CTR displays the OIU time parameter for seconds, reading from 00 to 59 and resetting to 00 again. This indicates OIU health by constantly counting from 00 to 59 and recycling when the OIU telemetry is being processed by the PDI. ISS BC TIME follows the format MM-DD-YY/HH:MM:SS and comes from whichever device is BC to the OIU. This parameter will read all zeros at powerup, will show the correct BC time at the time the BC comes up and starts sending telemetry to the OIU, and will remain static at the last good sample when the incoming telemetry from that BC goes away.
- [3] ACTIVE DEVICES: The OIU active device (AD) status section provides insight for OIU processing on the external telemetry sources with which the OIU can interface. Status shown for each AD (1 to 4) includes the physical device (PD) assigned to that AD, the BUS being used to acquire that device's telemetry, and a 'LOCK' status indication. The computation used to drive the PD field is defined in Table 10:

Table 9.

MSID											
Argument 1	0	0	0	0	0	0	0	0	0	0	0
Argument 2	0	0	0	0	0	0	0	0	0	0	0
Argument 3	0	0	0	0	0	0	0	0	1	1	1
Argument 4	0	0	0	0	1	1	1	1	0	0	0
Argument 5	0	0	1	1	0	0	1	1	0	0	1
Argument 6	0	1	0	1	0	1	0	1	0	1	0
Displayed Text:	OIU	GNC1	GNC2	SR-1	SR-2	MP-1	MP-2	N1-1	N1-2	FGB1	FGB2

If none of the above conditions are met, the default text displayed is 'ERR'. Note that PD = OIU when no active device is assigned and is also displayed when OIU format supports an OIU error log dump, GNC1 and GNC2 are the ISS Tier 2 Guidance, Navigation and Control MDMs, SR-1 and SR-2 are the Space to Space Orbiter Radios (SSOR), MP-1 and MP-2 are the MPLM MDMs, N1-1 and N1-2 are the Node MDMs, and FGB1 and FGB2 are the ISS FGB MDMs.

- [4] BUS: Indicates the OIU bus 1 to 7, 0 indicates OIU bus 8. Note that the OIU hardware currently supports only buses 1 to 4.

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- [5] LOCK: **'NONE'** if the current OIU format does not have an AD for this display location.
'YES' if the OIU is RT and in sync with the AD (ISS BC or SSOR).
'YES' if the AD is OIU in error log dump format (OIU must be in sync with itself).
'NO' if the OIU is RT and was in sync with the AD but has lost lock on the AD (ISS BC or SSOR).
N/A if the OIU is BC to the AD, except if the AD is SSOR.
Note that if LOCK goes from **'YES'** to **'NO'**, the OIU stops attempting to acquire sync with that AD. To force the OIU to attempt to resync with an AD, the OIU format must be reloaded.
- [6] OIU CMD CTR will start at "000" at powerup, and will increment by one whenever the OIU receives a valid command from the PSP. The counter reads in decimal, and will count from 000 to 255 and roll over to 000. All commands, whether from the **MCC** or the MCDS, will cause the counter to increment if received and processed by the OIU.
- [7] PSP I/F indicates **'OK'** if the OIU is receiving the 16 Khz command carrier from either PSP1 or PSP2. **'ERR'** is displayed if no command carrier is being received.
- [8] The OIU can convert one ISS floating point parameter value per PDI minor frame (maximum of 100 per major frame) into a shuttle PDI-compatible parameter value. If an ISS floating point value is invalid or results in an invalid floating point value/operation during the conversion process, the OIU annunciates an error. The FLOAT POINT display parameter will read **'ERR'** for this condition, or **'OK'** if no floating point error/operation is detected.
- [9] The parameter status field for all parameters will be blank for normal operation or will display an "M" for missing data. For analog parameters, this field will also display an "H" or "L" for offscale data. Some parameters displayed will be limit-sensed for SM alerts or C&W alarms. For discretes that are limit-sensed, the undesirable state is defined in the FDA low limit field and the FDA high limit field is left blank. Satisfaction of the undesirable state triggers a "↓" indication. For analogs that are limit-sensed, an "↑" or a "↓" will be displayed when the parameter exceeds either an upper or lower limit. The symbols driven in the parameter status field have the following display priority from highest to lowest: "M", "H", "L", "↑", "↓". All symbols driven in the parameter status column will be displayed four times normal intensity.
- [10] PSP LAST CMD indicates the command acceptance for crew originated command: **'OK'** if the PSP has not rejected a crew command, **'REJ'** if the PSP rejected the last crew command, or **'INC'** if the PSP was not able to complete the transfer of the last crew command. The **'REJ'** and **'INC'** indications are cleared by the next successfully processed PSP command from either crew or ground.
- [11] OIU LAST CMD indicates the command acceptance by the OIU. **'REJ'** is displayed if the OIU has detected either a parity error or an incorrect byte count in a command received from the PSP. Otherwise, **'OK'** is displayed.

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- [12] For both the primary (PRI) and a backup (B/U) Space to Space Orbiter Radio (SSOR), the FRM SYNC indication gives the status of the frame synchronizer. 'YES' indicates SSOR frame sync with the ISS Space to Space Station Radio (SSSR), 'NO' indicates no SSOR frame sync, or the SSOR is off, or the SSOR is not present. The 'STATUS' indication yields 'OK' if the SSOR is operating normally, or indicates 'BAD' if the SSOR BITE has sensed a failure.
- [13] PDI DCM SYNC gives indication of the Bit ("B"), Word ("W"), and Frame ("F") synchronizer statuses for all four PDI decommutators. For each DCM, the B, W, and F columns will be blank if the decom is not in bit, word, or frame sync, respectively. An asterisk will be displayed in each of the B, W, or F columns if the sync conditions do exist. Note that the decom actually processing OIU telemetry is dependent on orbiter PDI/PCMMU config.
- [14] FORMAT: Indicates the currently loaded OIU format.
- [15] BUS 1 to 4: The OIU bus processing state [Bus Controller (BC) or Remote Terminal (RT)] and channelization (A or B) is indicated by asterisks for each of buses 1 to 4.
- [16] SPARE CMD: Displays the item entry index associated with the last Item 18.

ITEM ENTRY CHARACTERISTICS

- Item 1: FORMAT: indexed command item entry used for changing the OIU format (ITEM 1 + XXX EXEC). The valid decimal format numbers for entry via MCDS on STS-120 are 001 to 020, 250, 251, 252, 254, and 255.
- Item 2 to 17: BUS 1 to BUS 4: This section allows changing the OIUs current bus processing state [Bus Controller (BC) or Remote Terminal (RT)] and bus channel (A or B) for any of the currently implemented four OIU buses. For example, if Bus 3 is BC, and using Channel A, there will be an asterisk next to Items 11 and 12. To change Bus 3 to RT, an ITEM 10 EXEC is performed. In the case of the bus channelization (A or B), the displayed telemetry indicates which channel is prime for command and telemetry transactions on that bus if the OIU is BC on that bus. If the OIU is BC on a bus, it will try to send a command for an AD using the prime channel. If the OIU receives no status message from that AD, it tries again on the prime channel, then it tries on the alternate channel, and if the AD has not responded it declares failure and stops trying to send a command to that AD. When the OIU is RT on a bus, it will respond on either channel, depending on which channel received a transaction from the BC; therefore, the channel indication has no meaning when the OIU is RT on a bus.

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Item 18: SPARE CMD: an indexed command that allows performing the following internal OIU function mapping:

- Item 18 + 1: Change FGB MDM active device to FGB-2 MDM physical device.
- Item 18 + 2: Change FGB MDM active device to FGB-1 MDM physical device.
- Item 18 + 3: Change Node 1 MDM active device to N1-2 MDM physical device.
- Item 18 + 4: Change Node 1 MDM active device to N1-1 MDM physical device.
- Item 18 + 5: Move FGB -2 MDM physical device to OIU Bus 4.
- Item 18 + 6: Move FGB -2 MDM physical device to OIU Bus 3.
- Item 18 + 7: Move FGB -1 MDM physical device to OIU Bus 4.
- Item 18 + 8: Move FGB -1 MDM physical device to OIU Bus 3.
- Item 18 + 9: Move N1-1 MDM physical device to OIU Bus 4.
- Item 18 + 10: Move N1-1 MDM physical device to OIU Bus 3.
- Item 18 + 11: Move N1-2 MDM physical device to OIU Bus 4.
- Item 18 + 12: Move N1-2 MDM physical device to OIU Bus 3.
- Item 18 + 13: Change GNC MDM active device to GNC-2 MDM physical device.
- Item 18 + 14: Change GNC MDM active device to GNC-1 MDM physical device.
- Item 18 + 15: Move GNC-1 MDM physical device to OIU Bus 4 (LB ORB N2-2).
- Item 18 + 16: Move GNC-1 MDM physical device to OIU Bus 3 (LB ORB N2-1).
- Item 18 + 17: Move GNC-2 MDM physical device to OIU Bus 4 (LB ORB N2-2).
- Item 18 + 18: Move GNC-2 MDM physical device to OIU Bus 3 (LB ORB N2-1).
- Item 18 + 19: Set OIU logic device MDMX to FGB-1 MDM.
- Item 18 + 20: Set OIU logic device MDMX to FGB-2 MDM.
- Item 18 + 21: Set OIU logic device MDMX to N1-1 MDM.
- Item 18 + 22: Set OIU logic device MDMX to N1-2 MDM.
- Item 18 + 23: Set OIU logic device MDMX to MPLM MDM.
- Item 18 + 24: Set OIU logic device MDMX to GNC-1 MDM.
- Item 18 + 25: Set OIU logic device MDMX to GNC-2 MDM.

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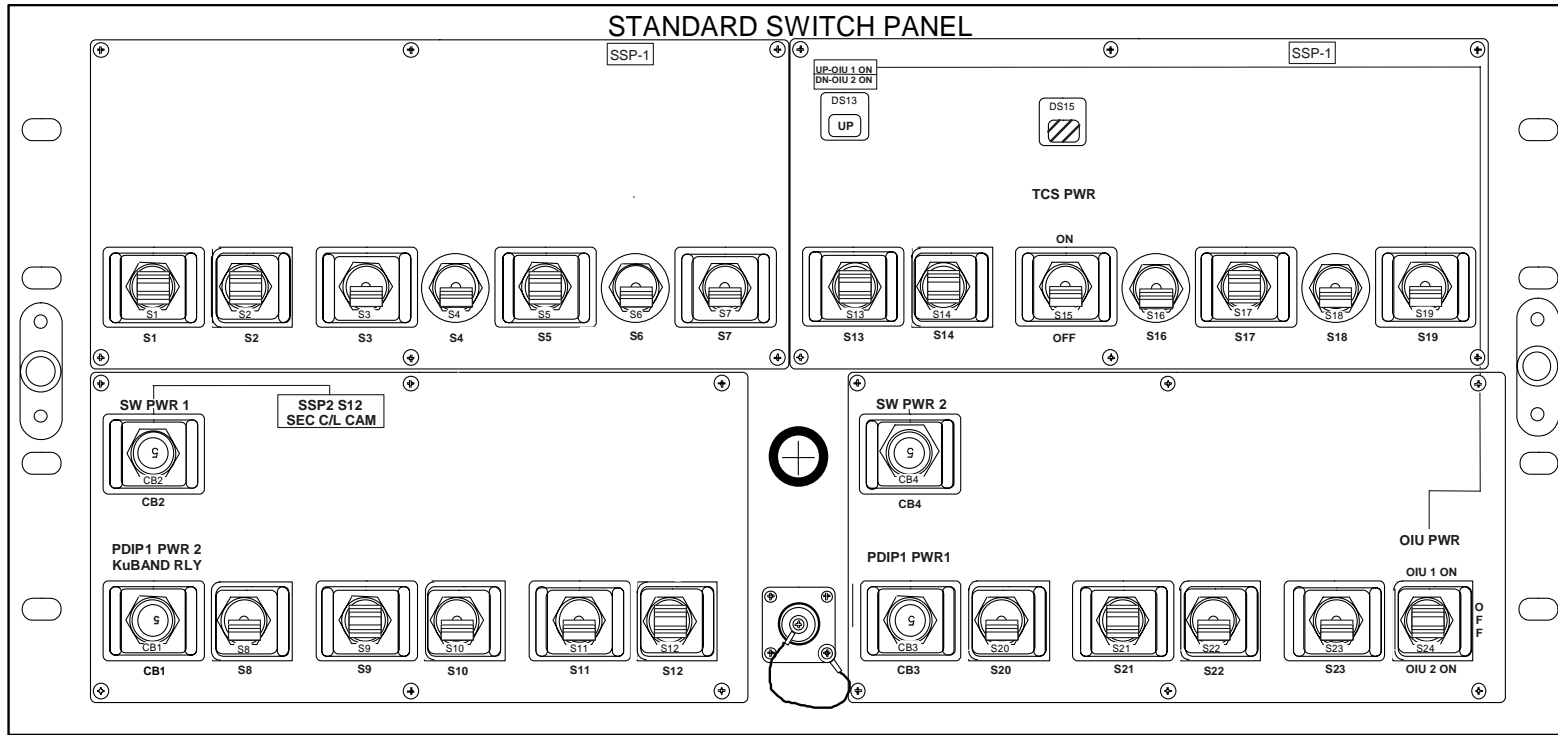


Figure 1.- Standard Switch Panel 1.

STANDARD SWITCH PANEL 1

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ITEM	DEVICE TYPE	FUNCTION
CB2 SW PWR 1	Circuit breaker, 5 amp	closed (in) - Applies orbiter CAB PL1 power to SSP2 S12. open (out) - Removes power from SSP2 S12.
CB1 PDIP 1 PWR 2/ KuBAND RLY	Circuit breaker, 5 amp	closed (in) - Applies orbiter CAB PL2 power to the PDIP1 DC PWR 2 outlet and KuBAND RATE switch. open (out) - Removes power from PDIP DC PWR 2 outlet and KuBAND RATE switch.
DS13	Event indicator, three - position	UP - Indicates that CAB PL3 power is being supplied to OIU 1. bp - Indicates power is removed from OIU 1 and OIU 2. DN - Indicates that AUX PLB power is being supplied to OIU 2.
S15 TCS PWR	Toggle switch, two - position (Maintained - Maintained)	ON (up) - Applies power to TCS. OFF (dn) - Removes power from TCS.
DS15 TCS PWR	Event indicator, two - position	gray - Indicates TCS powered. bp - Indicates TCS not powered.
CB4 SW PWR 2	Circuit breaker, 5 amp	Not Wired
CB3 PDIP1 PWR 1	Circuit breaker, 5 amp	closed (in) - Applies orbiter CAB PL2 to PDIP1 DC PWR 1 outlet. open (out) - Removes power from PDIP DC PWR 1 outlet.
S24 OIU PWR	Toggle switch, three - position (Maintained - Maintained - Maintained)	OIU 1 ON (up) - Provides CAB PL3 power to OIU 1. OFF (ctr) - Removes power from OIU 1 and OIU 2. OIU 2 ON (dn) - Provides AUX PLB power to OIU 2.

STANDARD SWITCH PANEL 2

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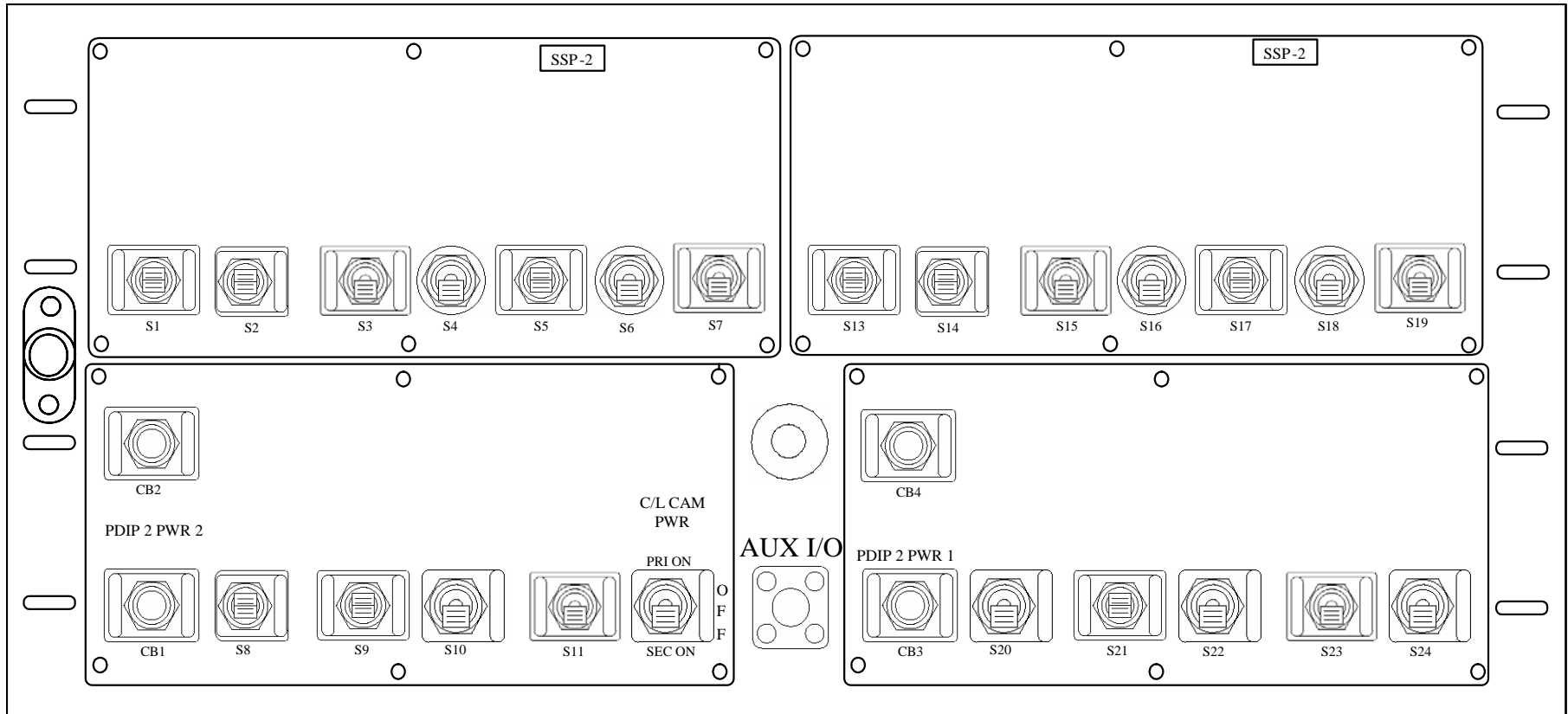


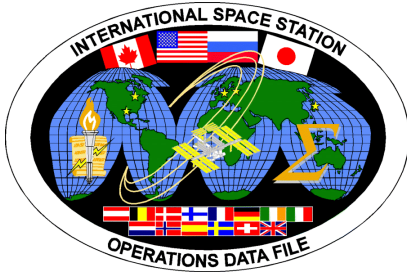
Figure 1.- Standard Switch Panel 2.

STANDARD SWITCH PANEL 2

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Item	Device Type	Function
CB1 PDIP 2 PWR 2	Circuit breaker, 5 amp	closed (in) - Applies orbiter CAB PL2 power to PDIP2 DC PWR 1 outlet. open (out) - Removes power from PDIP2 DC PWR 1 outlet.
S12 C/L CAM PWR	Momentary switch	PRI - Applies CAB PL3 power to PRI C/L CAM. SEC - Applies CAB PL 1 power to SEC C/L CAM.
CB3 PDIP 2 PWR1	Circuit breaker, 5 amp	closed (in) - Applies orbiter CAB PL2 power to PDIP2 DC PWR 1 outlet. open (out) - Removes power from PDIP2 DC PWR 1 outlet.



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