International Space Station
Operations Checklist

ISS-2A.2A & 2A.2B

Mission Operations Directorate
Operations Division

Final, Revision B
August 15, 2000

These procedures are available electronically on the SODF Homepage at http://fitproc.jsc.nasa.gov
INTERNATIONAL SPACE STATION
OPERATIONS CHECKLIST
ISS-2A.2A & 2A.2B

FINAL, REVISION B
August 15, 2000

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This document is under the configuration control of the Systems Operations Data File Control Board (SODFCB).
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# INTERNATIONAL SPACE STATION
## OPERATIONS CHECKLIST
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JOINT OPERATIONS PROCEDURES
EXT A/L 1. √ODS Upper Hatch closed
   Equal vlv caps (two) → installed
   Unstrap Centerline Camera Diffuser flex duct from EXT A/L wall. Attach flex duct to camera bracket to direct air flow to window. If required, tape diffuser open.

   AW18A 2. LTG FLOOD 1(3,4) – OFF

   MO13Q 3. AIRLK FAN A(B) – OFF

   EXT A/L 4. Disconnect airlock flex duct from booster fan muffler, rotate into middeck, and secure.

   MO13Q 5. AIRLK FAN A(B) – ON
   6. AIRLK 2 – OFF/ON
   7. TNL ADAPT 1 – OFF/ON
   8. √Airflow at muffler

Middeck 9. Close Inner Hatch per decal.

10. Equal vlv (two) – OFF, install caps
1. Notify MCC, “Beginning initial hatch leak checks.”

MO10W
2. √14.7 CAB REG INLET SYS 1, SYS 2 (two) - CL

   Record EXT A/L PRESS: _____ psia.

4. Record NODE 1 CAB PRESS: _____ psia.

5. Wait 20 minutes.

   ********************************************************************************
   If A/L-VEST ΔP ≤ previously recorded - 0.16 psid,
       Notify MCC-H (possible leakage through hatches).
   If EXT A/L Press ≤ previously recorded - 0.16 psia,
       Notify MCC-H (possible leakage from EXT A/L).
   If NODE PRESS ≤ previously recorded - 0.02 psia,
       Notify MCC-H (possible leakage from NODE 1/PMA 2).
   ********************************************************************************

A6L  1. LT VEST PORT, STBD (two) – OFF
2. LT TRUSS FWD, AFT (two) – OFF
Inner Hatch 3. Equal vlv caps (two) - remove
4. Equal vlv (two) – NORM
5. $\sqrt{}$ Hatch $\Delta P < 0.2$ psid
6. Open Hatch per Decal.
7. Equal vlv (two) – OFF, reinstall caps
MO13Q 8. TNL ADAPT 1 – ON/OFF
9. AIRLK 2 – ON/OFF
10. AIRLK FAN A(B) – OFF
Middeck 11. Remove diffuser cap from floor fitting.
   Stow.
   Mark stowage location; will be reused.
EXT A/L Middeck 12. Unstrap airlock flex duct.
   Connect to middeck floor fitting and to booster fan muffler inlet.
MO13Q 13. AIRLK FAN A(B) – ON
AW18A 14. As required, LTG FLOOD 1(3,4) – ON
15. $\sqrt{}$ Airflow at top of external airlock halo
EXT A/L 16. Unstrap Centerline Camera diffuser flex duct from camera bracket.
   Stow duct along stbd top of EXT A/L wall (in straps).
17. Remove, stow Centerline Camera.
NOTE
Expect possible DP/DT Klaxon, ‘S66 CABIN PRES’ and ‘S66 CABIN PPO2’ alarms during pressurization.

ODS Equal vlv (one) → Remove cap

CAUTION
A total of 10 cycles from OFF to NORM on the equalization valve is required to avoid an excessive negative delta pressure across the APAS Hatch. Opening the equalization valve for more than 15 seconds (before cycles are complete) will cause damage to the Hatch.

NOTE
Pressurization, including valve cycling, will take approximately 15 minutes.

1. ODS Equal vlv (one) → Remove cap

2. ODS Equal vlv (one) → Norm
   Wait 8 seconds.
   ODS Equal vlv (one) → Off
   Wait 30 seconds.
   Repeat step 2 nine times.

3. ODS Equal vlv (one) → Norm

4. When ODS Hatch $\Delta P < 0.2$ psid
   ODS Equal vlv → Off, install cap
   Wait 5 minutes for thermal stabilization.

5. Record A/L-VEST $\Delta P$: _____ psid.
   Wait 30 minutes.

   **************************************************
   If A/L-VEST $\Delta P \geq$ previously recorded + 0.16 psid,
   Notify MCC-H (Vestibule/PMA 2 leak).
   **************************************************


SM 177 EXTERNAL AIRLOCK

CRT 5. Record A/L-VEST $\Delta P$: _____ psid.
   Wait 30 minutes.

31 MAR 00
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TOOLS REQUIRED:
Ingress Equip Bag
General Purpose Tape, 2"
Ratchet 1/4" Drive
7/16" Deep Socket
5/32" Hex Head, 1/4" Drive
10" Adjustable Wrench
1-1/2" Open End Wrench
Grab Sample Containers (two)

EXTERNAL AIRLOCK SETUP FOR ODS AND PMA INGRESS
1. Move Tool Bag and Ingress Equipment Bag to Ext A/L.

ODS Hatch
2. Equal vlv (one) → NORM
   √ODS Hatch ΔP ≤ 0.2 psid

ODS VESTIBULE INGRESS
3. Open ODS Hatch per decal.
   Equal vlv (one) → OFF, install cap

WARNING
Surfaces may be below freezing for a short time after initial ODS Hatch opening. Do not touch vestibule surfaces until VESTIBULE TEMP 1,2 (two) indicate > 40°F (SM 177 EXTERNAL AIRLOCK).

Rotate Centerline Camera Diffuser Duct into vestibule. Wipe any condensate from vestibule volume and report to MCC-H.

4. √MCC-H, “Go for PMA2 Ingress.”

DOCKING EQUIPMENT REMOVAL
ODS Vest
5. For each Docking Light
   Disconnect cables.
   Install caps on outlet.
   Remove the locking pin.
   Remove Docking Light.
   Reinstall locking pin.

6. Mark crosshairs with appropriate identification.

7. Remove crosshairs.
   Stow lights and crosshairs in Jettison/Stowage Bag.
INGRESS OPERATIONS PREPARATION

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Future crews may have trouble docking if the docking target’s delicate surface is scratched or damaged.</td>
</tr>
<tr>
<td>2. Donning of Rubber Gloves is required when handling Docking Target Standoff Cross and Docking Target Base Plate.</td>
</tr>
</tbody>
</table>

PMA2

8. Don Rubber Gloves.
While maintaining a \( \leq \) torque on standoff cross threaded hexagonal cap nut, loosen jam nut on docking target base plate receptacle by applying a \( \geq \) torque (10" Adjustable Wrench and 1-1/2" Open End Wrench). Temporarily stow jam nut by continuing to rotate it \( \geq \) on to smaller, non-threaded diameter of receptacle. Loosen hexagonal cap nut by applying a \( \leq \) torque. Continue to rotate cap nut until threaded off receptacle.


10. Install Docking Target Base Plate Cover.

11. Stow tools.

APAS HATCH OPENING


Insert tool in hatch socket (ensure fully seated) and rotate tool 3 --- 4 turns in direction of ‘OTKP’ (Open) arrow until it clicks.

Remove tool.
Allow hatch seals to relax for 3 minutes.

<table>
<thead>
<tr>
<th>CAUTION</th>
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<tbody>
<tr>
<td>APAS hatch seals require 3 minutes to relax before opening Hatch.</td>
</tr>
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Open Hatch.
Tether APAS Hatch Tool to hatch handle.
Install APAS Hatch Cover.
Secure Hatch in open position to PMA APAS Hatch Standoff.
Temporarily stow Docking Mechanism Accessory Kit in PMA2.

COLLECTING AIR SAMPLE WITH EXTERNAL SAMPLING ADAPTER (ESA)

Node 1

13. \( \sqrt{\text{ESA Handle}} \) – CLOSED
   \( \sqrt{\text{Fwd}} \)
   \( \sqrt{\text{ESA Sample Valve}} \) – CLOSED

12 AUG 00
14. L-Shaped Adapter →|← ESA Sample Port

15. Grab Sample Container #1→|← L-Shaped Adapter

16. ESA Handle → Open
   ESA Sample Valve → Open
   L-Shaped Adapter Valve → Open
   Collect Grab Sample.
   L-Shaped Adapter Valve → Closed
   ESA Sample Valve → Closed
   ESA Handle → Closed
   Label Container, “Node 1 Pre-Scrub #1,” and label MET.

17. Grab Sample Container #1 ←|→ L-Shaped Adapter

18. Grab Sample Container #2→|← L-Shaped Adapter

19. ESA Handle → Open
   ESA Sample Valve → Open
   L-Shaped Adapter Valve → Open
   Collect Grab Sample.
   L-Shaped Adapter Valve → Closed
   ESA Sample Valve → Closed
   ESA Handle → Closed
   Label Container, “Node 1 Pre-Scrub #2,” and label MET.

20. Grab Sample Container #2 ←|→ L-Shaped Adapter

21. L-Shaped Adapter ←|→ ESA Sample Port
    Stow L-Shaped Adapter in Ingress Equipment Bag.

22. √All Equipment Bags and returning items removed from PMA2
    Jettison Stowage Bag
    Tool Bag
    Ingress Equipment Bag
    Docking Mechanism Accessory Kit
    APAS Hatch Tool
    Cleaning Pads

23. Disconnect Hatch from PMA APAS Hatch Standoff and secure Hatch
    Standoff to PMA Handrail.
    Remove APAS Hatch Cover and stow it securely in PMA2.

    Inspect hatch seals and seal surfaces for debris/damage.
    Clean APAS hatch seals and surface with Cleaning Pads.
    Close APAS Hatch.
Select 'РАБОЧЕЕ ПОЛОЖЕНИЕ' (Working Position) torque setting on Hatch Tool.

Insert tool in hatch socket (ensure fully seated). Rotate 3 --- 4 turns in direction of '3ATP' (Close) arrow until tool clicks.

24. √APAS EQUAL VLV – Op

**CAUTION**

Rubber Gloves must be worn when handling the docking target.

25. Don Rubber Gloves.
   Remove Docking Target Base Plate Cover from Target Base Plate.
   Stow Cover in Jettison Stowage Bag.

26. Obtain Docking Target Standoff Cross from Bag.
    Stow Bag in Jettison Stowage Bag.

27. Ensure key on standoff cross shaft is aligned with key-way on mating receptacle.
    Insert Docking Target Standoff Cross into keyed receptacle on Docking Target Base Plate until shaft collar bottoms out.

**NOTE**

When all mating parts are correctly assembled, a groove on docking target standoff cross shaft should be visible above cap nut (not recessed).

28. Ensure jam nut is positioned onto smaller, non-threaded diameter of docking target base plate receptacle.
    Align and mate Docking Target Standoff Cross threaded hexagonal cap nut onto docking target base plate receptacle.
    Continue to rotate hexagonal cap nut , and tighten firmly onto receptacle (10" Adjustable Wrench, 80-100 in-lbs design torque).
    Thread jam nut onto receptacle, rotating , until contact with hexagonal cap nut shoulder occurs.
    While maintaining a torque on hexagonal cap nut, firmly tighten jam nut against hexagonal cap nut shoulder (1-1/2" Open End Wrench, 80-100 in-lbs design torque).
    Doff Rubber Gloves.

29. Stow tools, Docking Target Standoff Cross Bag, and Base Plate Cover.

30. Install Docking Crosshairs per markings.

31. For each Docking Light (two)
    Remove the locking pin.
    Install Docking Light perpendicular to ODS shell.
    Reinstall the locking pin.
    Reconnect cables.
ODS HATCH CLOSURE

32. Close ODS Hatch per decal.

33. √Equal vlv (two) – OFF, capped

Figure 1.- ISS Hatch with ESA, L-shaped Adapter and Grap Sample Container Installed.
1. **UNSTOWING EPCS LAPTOP**
   EPCS Laptop (two)
   DC Power Supply Adapter Cable 10' (two)
   1553 PC Card w/Adapter Cable 22in

   If shuttle AFD
   ORB DC Power Cable 6' (one)
   ORB DC Power Cable 10' (one)
   ORB 1553 Data Cable 8' (two)
   RS/ORB DC Power Supply (two)

   If ISS RS
   RS DC Power and 1553 Cable 8' (one)
   RS/ORB DC Power Supply (one)

2. **VERIFYING POWER OFF**
   If shuttle AFD
   √ PCS1,2 28VDC PWR SPLY – Off

   For DC UTIL PWR outlet availability, refer to UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (DF, REF DATA FS, UTIL PWR).

   A15 √ DC UTIL PWR MNC – OFF (J2)
   L12/A3 √ PDIP DC PWR 2 – OFF

   If in FGB
   √ PCS 28VDC PWR SPLY – Off
   427(227) On panel OUTLET PWR-10/3 AMPS (РБС-10/3)
   √ Switch – Off

   If in SM
   √ PCS 28VDC PWR SPLY – Off

   On panel OUTLET PWR-10/3 AMPS (РБС -10/3)
   √ Switch – Off

3. **MAKING PCS POWER AND DATA CABLE CONNECTIONS**
   Connect the 22-inch Adapter Cable to the 1553 PC Card for both PCSs.
   Insert 1553 PC Card into either PCS PCMCIA slot for both PCSs.

   If shuttle AFD (Figure 1)
   Connect both DC Power Supply Adapter Cable 10' to PCS1,2 and to the 28VDC power supply outlets (J2).

   A15 Connect PCS1 DC Power Supply Adapter Cable 10' to MNC DC UTIL power outlet (J2) and to 28VDC power supply outlet (J1).
L12/A3 Connect PCS2 ORB DC Power Cable 6’ to PDIP DC Power 2 outlet (J3) and to 28VDC power supply outlet (J1).

Connect PCS1 ORB 1553 Data Cable 8’ to the N1-1 (J103) outlet and to the 1553 PC Card w/Adapter Cable 22in.

Connect PCS2 ORB 1553 Data Cable 8’ to the N1-2 (J107) outlet and to 1553 PC Card w/Adapter Cable 22in.

If in FGB (Figure 2)

Connect RS DC Power and 1553 Cable 8’ to
Receptacle on panel GNC 2/RS Bus 8 (GNC 1/RS Bus 7)
28VDC power supply outlet (J1)
1553 PC Card w/Adapter Cable 22in

If in SM

Connect RS DC Power and 1553 Cable 8’ to
Receptacle on panel GNC 2/RS Bus 8 (GNC 1/RS Bus 7)
28VDC power supply outlet (J1)
1553 PC Card w/Adapter Cable 22in

Connect the DC Power Supply Adapter Cable 10’ to the PCS and to the RS/ORB DC power supply outlet (J2).

Connect the cable protruding from the GNC 2/RS Bus 8 (GNC 1/RS Bus 7) panel (cables labeled 77KM-2120-1670 and 77KM-2120-2190 respectively) to the 10A connector on panel OUTLET PWR-10/3 AMPS (PBC-10/3).

4. TURNING ON EPCS LAPTOP

If shuttle AFD

A15 DC UTIL PWR MNC – ON (J2)

Connect RS DC Power and 1553 Cable 8’ to
Receptacle on panel GNC 2/RS Bus 8 (GNC 1/RS Bus 7)
28VDC power supply outlet (J1)
1553 PC Card w/Adapter Cable 22in

Connect the DC Power Supply Adapter Cable 10’ to the EPCS Laptop and to the RS/ORB DC power supply outlet (J2).

If shuttle AFD

Pwr Sply PCS1 28VDC PWR SPLY – On (Lt On)
L12/A3 PDIP DC PWR 2 – On
Pwr Sply PCS2 28VDC PWR SPLY – On (Lt On)
PCS EPCS 1,2 Laptop Power – On
If in FGB
28VDC PWR SPLY → On (Lt On)

427(227)
On panel OUTLET PWR-10/3 AMPS (РБС-10/3)
Switch → On

PCS
EPCS Laptop Power → On

If in SM
Pwr Sply
28VDC PWR SPLY → On (Lt On)

5. **CONNECTING EPCS TO MDM DATA (IF MDMs ARE UP AND RUNNING)**

PCS2
After boot up, when taskbar appears at bottom of display
sel Arrow directly above PCS logo (as required)
sel Start/Restart PCS CDS (as required)

A popup window will appear if the internal positive time is
> 60 seconds different from the RS time.
If this window appears, ‘Use PCS Time’ should be selected per
SPN 635.

A popup window may appear saying that the CW Server failed to start
and it will be retried every 15 seconds.
Select ‘OK’ to remove popup window.

sel Icon to open PCSCDS Main Control Panel Window (as required)
√ Status Box is green and ‘CONNECTED’ is displayed in the PCSCDS
Main Control Panel Window (as required)

**NOTE**
Per SPN 308, when the PCSCDS Main Control Panel is iconified,
an informational popup alerting a Limit Server failure will not be
shown. Loss of the Limit Server leads to the loss of limit sensing.
Restoring the CDS UI icon will provide the popup.

******************************************************************************
If Status Box is not green, select ‘Connect to MDM’
button if the MDMs are on.
******************************************************************************

**NOTE**
1. PCS connection to MDM is indicated by green in the Status Box
   and ‘CONNECTED’ message displayed in the PCSCDS Main
   Control Panel Window only when the associated Node MDM is up
   and running as the Primary MDM.

2. If MDMs are not up and running and step 5 is executed, expect a
   PCS ‘CW SERVER ERROR’ and ‘CDS SIGNON FAIL’ messages.
After connection to the MDMs, if the PCS displays the message ‘THE MDM CONNECTION HAS FAILED’, open the PCSCDS Main Control Panel Window and select ‘Connect to MDM’ button to reconnect.

If no joy, close all displays and anything iconified. Repeat step 5.

NOTE
Per SPN 226, NCS may not be able to process a PCS connect request. If the first PCS or Early Comm connection with NCS is dropped for any reason, NCS will refuse all connection requests until the remaining PCS connections are dropped. At that time, NCS will start processing connect requests.

If still no joy, perform LOSS OF PCS TELEMETRY, all (SODF: ISS MAL: MALFUNCTION: C&DH), then:

6. CONFIGURING PCS FOR DISPLAYS (AS REQUIRED)

NOTE
After PCSCDS has been selected, wait 30 seconds before starting CDDF displays.

sel Arrow above PCS logo
sel Start PCS CDDF display

After approximately 1 minute, √‘INCREMENT 3A HOME PAGE’ is displayed.

********************************************************************
If GMT <static> or telemetry fields in Caution & Warning Tool Bar are cyan, go to PCS RECONNECT (SODF: ISS OPS: C&DH).
********************************************************************

Displays may now be selected as desired.

Inform MCC-H when complete.
Figure 1.- AFD EPCS Configuration.

**NOTE**
The 1553 Data Cable I/Fs with a 22-inch pigtail connector (Ch A and B) connects to the 1553 Card that inserts into the PC Card PCMCIA Upper slot in the EPCS.
Figure 2.- FGB EPCS Configuration.

NOTE
The Russian Power Cable is fixed in place and only needs to be connected to the Russian 10A Power outlet.
If N1-2 is Primary, connect to PCR RS 8 (GNC-2) for data.

If N1-1 is Primary, connect to PCR RS 7 (GNC-1) for data.

**NOTE**

The 1553 Data Cable I/Fs with a 22-inch pigtail connector (Ch A and B) connects to the 1553 Card that inserts into the PC Card PCMCIA Upper slot in the PCS.
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TOOLS REQUIRED:
MD Cel 2A.2B Installation Tool Bag:
Port 3" Common Tip Screwdriver
Bag #1

MATERIALS
Gray Tape

PORTABLE FAN SETUP
SA12 1. Unstow Portable Fan Screens (six).
SA12 2. Unstow Portable Fan Assemblies (four).
   √ Fan power – Off (center position)
   √ Fan Speed select switch position – full CW
5. Open battery compartment using 3" Common Tip Screwdriver.
6. Install Batteries (four).
   Close compartment.
8. Fan power → On
   √ Fan is running
   Fan power → Off
10. Repeat steps 4 --- 9 for three more Fans.
11. Stow Portable Fan Assemblies and Screens in Ingress Equipment Bag for ingress.

CALIBRATING PORTABLE CO2 MONITORS
DAS4 12. Unstow CDMK.
13. For each CDM
   Perform CDM PERSONAL AND AREA MONITORING (ISS OPS: MED OPS) to activate the CDMs.
   Transfer to Orbiter Flight Deck and wait 30 seconds.
   Take readings on Flight Deck.
   Record readings for both monitors and report to MCC.
PREPARING VELOCICALC UNIT

DAS8 14. Unstow Velocicalc unit.
       Install batteries.

TOOLS AND EQUIPMENT PREPARATION FOR INGRESS

15. Unstow, place in Ingress Equipment Bag:

MF28O 10" Adjustable Wrench
MD Ciel 1-1/2" Open End Wrench
Port Bag #1

16. Unstow, place in Ingress Equipment Bag:

MF57C Flashlight or Snakelight (crew preference)
MD Floor Cable Cutter Assembly (three)
Stbd Bag
SA12 IMV Cap O-Ring Replacement Kit (four)
       Bore O-Ring
       Face O-Ring
       Alcohol Wipes
       Braycote Lubricant
MF71M AK-1 Russian Air Sampling Kits (three)
       AM-5 Aspirator (one)
       Portable CO2 Monitors (two)
MF71M US Sampling Bottles (nine)
       L-shaped Adapter
WCS Rubber Gloves (six pairs)
MF28O Gray Tape
WCS Towels
Clothing Locker Ear Plugs (two sets)

MF57K ISS Cue Cards
Port Docking Mechanism Accessory Kit
      APAS Hatch Tool
      Cleaning Pads
      Docking Target Base Plate Cover
      Docking Target Standoff Cross Bag
DAS8 Velocicalc Unit
      Inflight Stowage Bags/Jettison Bags (2 each) (Sampling/PMA2/Fan/
      FGB Subbags)
      Tie Wraps 14" (12 or more, arranged for attaching ducts to mating
      surfaces)
      RSO Ops Books
MD Ciel Individual Tool Kits (prearranged)
Port #1
MF43C Camcorder Batteries
      Extra Ziplock Bags (1 Large for PMA2 Subbag, 1 Large for ESA)
A16 Camcorder Bogan Arm w/Clamp
MA9N Masks and Protective Goggles (four)
NOTE
1. Tables below provide parameter FDA that will be changed prior to Orbiter Depress/Repress.

2. **MCC** will reset software limits via TMBU.

**CONFIGURING C&W**
1. Reset H/W C&W limits per table.

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2. Contact **MCC** to TMBU the following limits to appropriate values for the given activity (depress or repress).

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**RESETTING C&W**

3. Reset H/W C&W

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TOOLS AND EQUIPMENT REQUIRED:

Ingress Equip Bag
Flashlight Towel Earplugs (two sets)
Docking Target Base Plate Cover Rubber Gloves
Docking Target Standoff Cross Bag Docking Mechanism Accessory Kit
APAS Hatch Tool Cleaning Pads
Atmosphere Sampling Bottle (one) AK-1 Russian Sample tubes (two)
AM-5 Aspirator

Tool Bag
General Purpose Tape, 2”
Cable Cutter Assembly
1-1/2” Open End Wrench
10” Adjustable Wrench

MD Ceiling Stbd Port Bag #1

70-ft O2 Hoses (two)

QDMS SETUP FOR INGRESS CONTINGENCY SUPPORT

1. QDMs (two) ←|→ existing LEH O2 lines
   Obtain two HIUs.
   Install HIU and QDM to each of the two 70-ft O2 Hoses.

2. √O2 XOVR SYS 1, SYS 2 (two) – OP

3. √LEH O2 SPLY 1,2 vlv (two) – OP

4. LEH O2 5,6 vlv (two) → CL
   Free end of 70-ft O2 Hoses (two) →|← LEH O2 5, 6 vlv outlet
   LEH O2 5, 6 vlv (two) → OP

5. MIDDECK COMM CCU PWR → OFF
   Comm cables →|← MHA
   CCU PWR → ON (HIU control volume, as required)
   XMIT/ICOM MODE – PTT/PTT (to alleviate comm noise)

6. Don masks.
   Mask O2 Control → EMERGENCY
   Momentarily pull masks away from faces and verify O2 flow.
   Verify comm.

7. Mask O2 Control → NORM

8. Doff masks.
   Route both QDM/70-ft O2 Hoses to External Airlock.
EXTERNAL AIRLOCK SETUP FOR ODS AND PMA INGRESS
9. Move Tool Bag and Ingress Equipment Bag to External Airlock.

10. Collect one US air sample inside the External Airlock and label location and MET on bottle.
    Stow bottle in Ingress Equipment Bag.

ODS Hatch
11. Equal vlv (one) → NORM
    \[\sqrt{\text{ODS Hatch } \Delta P} \leq 0.2 \text{ psid}\]

ODS VESTIBULE INGRESS
12. Open ODS Hatch per decal.
    Equal vlv (one) → OFF, install cap

WARNING
Surfaces may be below freezing for a short time after initial ODS Hatch opening. Do not touch vestibule surfaces until VESTIBULE TEMP 1,2 (two) indicate > 40° F (SM 177 EXTERNAL AIRLOCK).

13. \[\sqrt{\text{MCC-H}}\], "Go for PMA 2 Ingress."

DOCKING EQUIPMENT REMOVAL
14. For each docking light
    Disconnect cables.
    Install caps on outlet.
    Remove the locking pin.
    Remove docking light.
    Reinstall locking pin.

15. Mark crosshairs with appropriate identification.

16. Remove crosshairs.
    Stow lights and crosshairs in Jettison/Stowage Bag.

INGRESS OPERATIONS PREPARATION

CAUTION
1. Future crews may have trouble docking if the docking target’s delicate surface is scratched or damaged.

2. Donning of Rubber Gloves is required when handling Docking Target Standoff Cross and Docking Target Base Plate.
PMA2 INGRESS
(ISS OPS/2A.2B/FIN B) (HC) Page 3 of 4 pages

17. Don Rubber Gloves.
While maintaining \( \Rightarrow \) torque on standoff cross threaded hexagonal cap nut, loosen jam nut on Docking Target Base Plate receptacle by applying a \( \Leftrightarrow \) torque (10” Adjustable Wrench and 1-1/2” Open End Wrench).
Temporarily stow jam nut by continuing to rotate it \( \Leftrightarrow \) on to smaller, non-threaded diameter of receptacle.
Loosen hexagonal cap nut by applying a \( \Rightarrow \) torque.
Continue to rotate cap nut until threaded off receptacle.

18. Insert cross into Docking Target Standoff Cross Bag.
Temporarily stow in Jettison/Stowage Bag (with Docking Lights and crosshairs).

19. Install Docking Target Base Plate Cover.

20. Stow tools.

APAS HATCH OPENING
Insert tool in hatch socket (ensure fully seated) and rotate tool 3 --- 4 turns in direction of ‘OTKR’ (Open) arrow until it clicks.
Remove tool.
Allow hatch seals to relax for 3 minutes.

CAUTION
APAS hatch seals require 3 minutes to relax before opening Hatch.

Open Hatch.
Tether APAS Hatch Tool to hatch handle.
Install APAS Hatch Cover.
Secure Hatch in open position to PMA APAS Hatch Standoff.
Temporarily stow Docking Mechanism Accessory Kit in PMA2.

DETACHING ESA FROM MPEV

Node 1
Fwd
Hatch

22. √ESA Handle – CLOSED
√ESA Sample Valve – CLOSED

Completely loosen ESA captive screws (four).
Remove ESA from MPEV and place it inside Ziplock Bag.
Temporarily stow in PMA2/Node 1 vestibule area.
23. **MCC-H** report to shuttle expected equalization time with Node 1.

**WARNING**

Equalization is loud enough to damage unprotected hearing.

24. Don Earplugs.

MPEV → OPEN

Doff Earplugs when equalization complete.

25. Collect one Russian air sample in orbiter middeck using AK-1 Sampler (one) and AM-5 Aspirator.

26. Stow QDMs, 70-ft hoses in PMA2.

Secure Cable Cutter Assembly (one) to PMA2 Wall near Node 1 Hatch with Gray Tape.

**SHUTTLE/STATION AIR DUCT INSTALLATION**

MO13Q 27. **AIRLK FAN A(B) – OFF**

Reference diagram in NODE 1 INGRESS (SODF: ISS OPS: JOINT OPERATIONS), Figure 1, for ISS Ingress Configuration.

EXT A/L 28. Halo Inlet Flex Duct ←|→ Halo

PMA2 29. Obtain PMA/ODS Interface Duct from PMA2.

PMA/ODS Interface Duct →|← Halo Inlet Flex Duct (using T-handle clamp).

ODS Hatch 30. Stow Centerline Camera Diffuser Duct along starboard top of External Airlock wall (in straps).
TOOLS REQUIRED:

Ingress Digital Multimeter Kit
Equip Multimeter
Bag Temperature Probe
Velocicalc Measurement Kit
ISS Cue Cards
Atmosphere Sampling Bottles (one)
Portable CO2 Monitor (one)
General Purpose Tape, 2"
Axial Port Closeout
Ratchet 1/4" Drive
7/16" Deep Socket
5/32" Hex Head, 1/4" Drive
Driver Handle 1/4" Drive
IMV Fan Outlet Diffuser Covers (two)
AK-1 Russian Sample Tubes (two)
AM-5 Aspirator

NODE 1 FWD HATCH OPENING

CRT SPEC 66 ENVIRONMENT

PMA2 1. When CABIN dP/dT < 0.01, open Node 1 Fwd Hatch per decal.

Notify MCC, “Node 1 Forward Hatch Open.”

NODE 1 CABIN FAN ACTIVATION AND IMV VALVE RECONFIGURATION

PCS 2. Perform NODE 1 CABIN FAN ACTIVATION, all (SODF: ISS OPS: ECLSS), then:

To activate Aft Port, Aft Stbd, Fwd Port, and Fwd Stbd Valves, perform NODE 1 IMV VALVE RECONFIGURATION, steps 1 --- 2 (SODF: ISS OPS: ECLSS), then:

Node 1: ECLSS

√ Aft Port IMV Valve – Closed
√ Aft Stbd IMV Valve – Closed
√ Fwd Port IMV Valve – Closed
√ Fwd Stbd IMV Valve – Closed

NODE 1 INTERNAL LIGHTING POWERUP

3. Node 1: EPS

sel RPCM N13B A

RPCM N13B A
NODE 1 INGRESS
(ISS OPS/2A.2B/FIN B) (HC)

sel RPC [X] where [X] = [13]

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

Repeat

4. Node 1: EPS

sel RPCM N13B B

RPCM N13B B

sel RPC 1

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

5. Node 1: EPS

RPCM N13B C

sel RPC 1

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

6. Node 1: EPS

sel RPCM N14B B

RPCM N14B B

sel RPC 1

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

7. Node 1: EPS

sel RPCM N14B C

RPCM N14B C

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

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

Repeat

\[ \text{CAUTION} \]

It may take 30 minutes for cold lights to come up full bright. Lights must come up to full bright before turning them off.
INITIAL CREW INGRESS
8. Collect one US air sample inside the Node 1, then
   Take one Russian Air Sample using AK-1 Sampler and AM-5 Aspirator.
   Label location and MET on bottle.
   Stow in Ingress Equipment Bag.
   Take three CO2 readings in same location.
   Record readings in log book.
   Report to MCC.

NODE 1 IMV FWD VALVE CYCLING
Node 1 9. Node 1 Fwd Stbd IMV Vlv → Open
   Node 1 Fwd Stbd IMV Vlv → Closed

10. Node 1 Fwd Port IMV Vlv → Open
    Node 1 Fwd Port IMV Vlv → Closed

PMA 2 IMV DUCT ASSEMBLY
PMA2 11. IMV cap ←|→ Node 1 Fwd Stbd IMV Valve Flange (Ratchet 1/4" Drive,
   and 7/16" Deep Socket)
   Leave V-Band Clamp on flange.
   Temporarily stow IMV Cap to IMV Flex Duct with white Velcro Strap.

12. PMA IMV Flex Duct Extension Assy →|← Node 1 Fwd Stbd IMV Valve
    Flange (Ratchet 1/4" Drive, and 7/16" Deep Socket)

[NOTE]
V-Band Clamp should be oriented such that the nut is
vertical to ensure access when CBM CPAs are installed.

13. √Hard Duct Grille Cover – Open

MO13Q 14. AIRLK FAN A(B) → ON

15. Verify airflow at PMA2 Grille.

16. IMV Cap ←|→ Node 1 Fwd Port IMV Valve Flange (Ratchet 1/4" Drive,
    and 7/16" Deep Socket)
    Leave V-Band Clamp on flange.
    Temporarily stow IMV Cap.

17. Retrieve IMV Flange Saver from vestibule, then
    IMV Flange Saver →|← Node 1 Fwd Port IMV Valve Flange (Ratchet 1/4"
    Drive, and 7/16" Deep Socket)

[NOTE]
V-Band Clamp should be oriented such that the nut is
vertical to ensure access when CBM CPAs are installed.

Node 1 18. Node 1 Fwd Stbd IMV Vlv → Open, handle stowed
    Node 1 Fwd Port IMV Vlv → Open, handle stowed
PMA2 19. Close Grille Cover.

20. Move the Tool Bag, the Jettison/Stowage Bag, and the Ingress Equipment Bag to ISS. Set up necessary ISS cue cards.

INSTALLATION OF AXIAL PORT CLOSEOUT
21. Remove Axial Port Closeout from stowage.

Figure 1.- Axial Port Closeout (folded up).
Figure 2.- Axial Port Closeout Installation on Port Side of CBM Vestibule
(Photo from CBM Mockup).

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

22. Unroll Closeout while installing over CBM Vestibule. Begin attaching 1/4-turn fasteners on Port side of Hatch Ring, insert into mounting brackets, tighten 1/4-turn fasteners (sixteen). Refer to Figure 2.

24. Verify all D-Rings are flush with Closeout. Refer to Figure 3.

25. Inform MCC of task completion.

**FINAL CREW INGRESS**

Configure Velocicalc Meter for humidity readings of Node 1.
Report current air temperature and humidity of Node 1 to MCC.

Node 1 27. Unstow PPRV Caps (two) from NOD1D4_D1. Install on Node 1 Port and Starboard Hatches.

28. Yes Node 1 Interior Lights (eight) – Full Bright

29. Configure lighting per crew preference.

**VERIFYING NODE 1 IMV**

NOD1 O1_01 30. Remove, temporarily stow NOD1O1_01 Closeout Panel, fasteners (ten)
(5/32" Hex Head, Driver Handle 1/4" Drive).

31. Yes IMV Orifice Plate – Closed

32. Reinstall panel.

NOD1 OP2_23 33. Remove, temporarily stow NOD1OP2_23 Closeout Panel, fasteners
(5/32" Hex Head, Driver Handle 1/4" Drive).

34. Yes IMV Orifice Plate → Open
35. Reinstall panel.

NOD1 36. Retrieve two IMV Fan Duct Blocks from NOD1O4_A1 and fasten them over Node 1 Aft Port IMV Fan outlet grilles NOD1OP3 and NOD1OP4 using Gray Tape.

Figure 4.- IMV Orifice Plate Handle With Velcro Attachment Removed.

37. Report to MCC, “Node 1 IMV Duct Reconfiguration Complete.”
To orbiter nose
IMV Cap
IMV Flange saver
Closed IMV Valve
Opened IMV Valve
PPRV Capped

ODS
PMA2
To orbiter nose

Fwd Stbd IMV
Fwd Port IMV

ODS

Node 1 Ingress
ISS OPS/2A.2A - 2A.2B/FIN A (HC)

Page 8 of 8 pages

10 AUG 00

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Changes
• Docking Target Standoff Cross removed and bagged, Docking Target covered.
• APAS Hatch open and covered, Hatch secured with Hatch Standoff.
• ESA removed from Node Fwd Hatch and temporarily stowed with Velcro Strap.
• Node Fwd Hatch MPEV opened.
• QDMs/O2 hoses stowed in PMA 2.
• PMA/ODS interface duct segment attached to Halo Inlet Flex Duct.
• Node Fwd Stbd IMV Valve opened and closed (PCS command).
• Node Fwd Stbd IMV Cap removed and temporarily stowed.
• PMA 2 IMV Flex Duct Extension Assembly installed on Node Fwd Stbd IMV Flange.
• Node Fwd Port IMV Cap removed and stowed in vestibule area.
• IMV Flange Saver installed on Node Fwd Port IMV Flange.
• PMA 2 Grille Cover closed.
• Node Forward Hatch open.

Changes (continued)
• Axial CBM Vestibule Closeout installed.
• Node Cabin Fan activated Node Fwd Stbd IMV Valve opened.
• Node lights on.
• Fire Extinguisher and O2 masks transferred.
• Air samples collected and air temperature reading taken.
• PPRV Caps installed on PPRVs.
• Node 1 Duct Covers installed.
• Desiccant shrouds and fans removed from flex brackets.
• FGB Hatches open, lights on, air samples taken.
• PMA 1 Hard Duct Cap removed and stowed on Velcro.
• Node Aft Port IMV Fan and FGB Fans activated.
• PMA 1 Grille Cover closed.

Figure 5.- ISS Ingress Configuration (FD05-FD09).
TOOLS AND EQUIPMENT REQUIRED

Ingress Equip Bag
Flashlight Dry Wipes Ratchet 1/4" Drive
Equip Dry Wipes 10-50 in-lbs Trq Wrench, 1/4" Drive
IMV Caps (two) 7/16" Deep Socket
IMV Cap O-Ring Replacement Kit
Velcro Strap
Rubber Gloves

NODE 1 AFT HATCH OPENING

Node 1 Aft CRT SPEC 66 ENVIRONMENT

1. MPEV → Open

2. When CABIN dP/dT < 0.01, open Node 1 Aft Hatch per decal.
   Notify MCC, “Node 1 Aft Hatch Open.”

NODE 1 AFT IMV CONFIGURATION FOR INGRESS

Node 1 Aft PMA1

3. Node 1 IMV Aft Port Valve → Open

4. Node 1 IMV Aft Stbd Valve → Open

5. √PMA1 Grille Cover – Open

6. Cap ←|→ PMA1 hard duct (Ratchet 1/4" Drive, 7/16" Deep Socket)
   Leave band clamp on duct

7. IMV cap ←|→ Node 1 Aft Port IMV Valve Flange (Ratchet, 1/4" Drive,
   7/16" Deep Socket)
   Stow IMV Cap in PMA1 with Gray Tape.

8. PMA1 IMV Flex Duct →|← Node 1 Aft Port IMV Valve Flange
   (Ratchet 1/4" Drive, 7/16" Deep Socket)

9. IMV Cap ←|→ Node 1 Aft Stbd IMV Valve Flange (Ratchet 1/4" Drive,
   7/16" Deep Socket)
   Stow IMV Cap in PMA1 with Gray Tape.

10. Retrieve IMV Flange Saver from launch restraint, then
    IMV Flange Saver →|← Node 1 Aft Stbd IMV Valve Flange
        (Ratchet 1/4" Drive, 7/16" Deep Socket)

11. Remove Cable Cutter Assembly (one) from Ingress Equipment Bag and
    secure to PMA1 wall with Gray Tape.
PMA1 INGRESS
(ISS OPS/2A.2A - 2A.2B/FIN B) Page 2 of 2 pages

DESICCANT INSTALLATION AND PORTABLE FAN DISASSEMBLY

PMA1/ Node 1
12. Desiccant Bag Assemblies (four) ←|→ used Portable Fans (one in PMA, three in Node)
    Stow used Desiccant Bag Assemblies in Jettison/Stowage Bag.

WARNING
Do not attempt to open battery compartments of used Portable Fans. Doing so could release caustic material from corroded batteries.

13. Portable Fan Assemblies (one in PMA, three in Node) ←|→ flexible brackets
    Put used Portable Fan Assemblies in plastic bags (four) taped to handrail and stow them in Jettison/Stowage Bag.

14. Report to MCC, “PMA1 Ingress complete.”
1. **POWERING DOWN EPCS**

   Close all display windows.
   Disconnect CDS from MDM.
   Close CDS Window.

   At the taskbar on bottom of display,
   sel EXIT

   On ‘Logout Confirmation’ window
   sel OK

   When ‘Type any key to continue’ appears,

   If shuttle AFD
   
   EPCS 1,2 Laptop Power → Off
   
   PCS 1,2 28VDC PWR SPLY → Off (Lt Off)
   
   O19 DC UTIL PWR MNA – OFF
   
   A15 DC UTIL PWR MNC – OFF
   
   L12/A3 PDIP DC PWR 2 CAB PL – OFF

   If in SM
   
   EPCS Laptop Power → Off
   
   PCS 28VDC PWR SPLY → Off (Lt) Off

   If in FGB
   
   EPCS Laptop Power → Off
   
   PCS 28VDC PWR SPLY → Off (Lt. Off)

   P5C-10/3 √RS Power switch → Off

2. **DISCONNECTING EPCS POWER AND DATA CABLE**

   If shuttle AFD
   
   L12/A3 Disconnect both ORB 1553 Data Cable 8’ from N1-1 (J103) and
   N1-2 (J107) and from the1553 PC Card w/Adapter Cable 22in.

   Disconnect both the ORB DC Power Cable 6’ and the ORB DC
   Power Cable 10’ from the RS/ORB DC Power Supply (J1) and the
   ORB DC outlets A15 MNC and O19 MNA.

   Disconnect both the DC Power Supply Adapter Cable 10’ from the
   PCS DC power outlet and the RS/ORB DC Power Supply (J2).
If in FGB

Disconnect the RS DC Power and 1553 Cable 8' to PCR outlet and the RS/ORB DC power supply outlet (J1) and the 1553 PC Card w/Adapter Cable 22in.

Disconnect the DC Power Supply Adapter Cable 10' from the RS/ORB DC power supply outlet (J2) and from the EPCS Laptop.

(P5C-10/3) Disconnect cable protruding from the GNC 2/RS Bus 8 (GNC 1/RS Bus 7) panel (77km-2120-1670 and 77km-2120-2190 respectively) and from the 10A connector on panel OUTLET PWR-10/3 AMPS (P5C-10/3).

If in SM

Disconnect the RS DC Power and 1553 Cable 8' to PCR outlet and the RS/ORB DC power supply outlet (J1) and the 1553 PC Card w/Adapter Cable 22in.

Disconnect the DC Power Supply Adapter Cable 10' from the RS/ORB DC power supply outlet (J2) and from the EPCS Laptop.

3. STOWING EPCS LAPTOP

EPCS Laptop (two)
DC Power Supply Adapter Cable 10' (two)
1553 PC Card w/Adapter Cable 22in (two)

If shuttle AFD

ORB DC Power Cable 6' (one)
ORB DC Power Cable 10' (one)
ORB 1553 Data Cable 8' (two)
RS/ORB DC Power Supply (two)

If ISS FGB

Stow:
RS DC Power and 1553 Cable 8' in the FGB
RS/ORB DC Power Supply (one)
TOOLS AND EQUIPMENT REQUIRED:
Cloth Towel
Velocicalc Measurement Unit

1. **MONITORING ISS ATMOSPHERE**
   Take one humidity reading each from Progress, SM, FGB, and Node 1.
   Report readings to MCC.

2. **INSPECTING PMA1 AND PMA2 FOR CONDENSATION**
   **PMA1**
   2.1 Inspect PMA1 for condensation.
       Report results to MCC.
       Wipe down any damp/wet areas with Cloth Towel.

   **PMA2**
   2.2 Inspect PMA2 for condensation.
       Report results to MCC.
       Wipe down any damp/wet areas with Cloth Towel.

3. **INSPECTING VENTILATION DUCT**
   Inspect all FGB and SM Intermodule Ventilation Ducting.
   Verify that all inlets and outlets are unblocked.
   Verify that all ducting is uncrimped and unbent.
   Verify that no duct segments have come apart.

   Report any problems to MCC.

4. **NODE 1 LIGHTING POWERDOWN**
   **PCS**
   Node 1: EPS
   RPCM N13B A

   sel RPC [X]  where [X] = \(13\)
   cmd RPC Position – Open (Verify – Op)

   Repeat

   Node 1: EPS
   RPCM N13B B

   sel RPC 1
   cmd RPC Position – Open (Verify – Op)

   Node 1: EPS
   RPCM N13B C

   sel RPC 1
   cmd RPC Position – Open (Verify – Op)
Node 1: EPS
RPCM N14B B

sel RPC 1
cmd RPC Position – Open (Verify – Op)

Node 1: EPS
RPCM N14B C

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

    cmd RPC Position – Open (Verify – Op)

Repeat
TOOLS AND EQUIPMENT REQUIRED:
Cloth Towel
Velocicalc Measurement Unit

1. APPLYING POWER TO NODE 1 LIGHTS

PCS

Node 1: EPS

sel RPCM N13B A

RPCM N13B A

sel RPC [X] where [X] = \[5 \ 13\]

\textbf{cmd} RPC Position – Close (Verify – Cl)

Repeat

Node 1: EPS

sel RPCM N13B B

RPCM N13B B

sel RPC 1

\textbf{cmd} RPC Position – Close (Verify – Cl)

Node 1: EPS

sel RPCM N13B C

RPCM N13B C

sel RPC 1

\textbf{cmd} RPC Position – Close (Verify – Cl)

Node 1: EPS

sel RPCM N14B B

RPCM N14B B

sel RPC 1

\textbf{cmd} RPC Position – Close (Verify – Cl)

Node 1: EPS

sel RPCM N14B C

RPCM N14B C
sel RPC [X] where [X] = 2 15 16

\textbf{cmd} RPC Position – Close (Verify – Cl)

Repeat

2. **INSPECTING PMA1 AND PMA2 FOR CONDENSATION**

   PMA2 2.1 Inspect PMA2 for condensation.
   Report results to \textbf{MCC}.
   Wipe down any damp/wet areas with Cloth Towel.

   PMA1 2.2 Inspect PMA1 for condensation.
   Report results to \textbf{MCC}.
   Wipe down any damp/wet areas with Cloth Towel.

3. **ISS MONITORING**

   Take one humidity reading each from Node 1, FGB, SM, and Progress (if Hatch open).
   Report to \textbf{MCC}.

4. **INSPECTING VENTILATION DUCT**

   Inspect all FGB and SM Intermodule Ventilation ducting.

   Verify that all inlets and outlets are unblocked.
   Verify that all ducting is uncrimped and unbent.
   Verify that no duct segments have come apart.

   Report any problems to \textbf{MCC}.
NOTE

1. Purpose is to pressurize stack to 14.96 psia from 14.7 psia using orbiter O2 while maintaining ISS O2 concentration below US Segment limit of 24.1%.

2. O2 repress will be repeated as required to allow adequate mixing and to avoid higher than acceptable O2 concentration in Orbiter cabin.

FDA, C/W LIMITS RESET

NOTE

1. CABIN PRESS H/W C/W upper limit is not changed because it is adequate for the target pressures.

2. PPO2 limits are inhibited to avoid nuisance alarms.

3. O2 is limit-sensed by O2 concentration.

1. Contact MCC-H for uplink of B/U C/W and SM ALERT limit resets via TMBU, if desired.

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<td>44</td>
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</table>

2. √MCC-H for repress Cryo configuration

NODE 1

3. √PPRV caps installed on Port, Stbd Hatches

O2 REPRESS INITIATION

OCAC

4. Perform OCAC filter cleaning
OCAC PWR → OFF

C5

5. DIRECT O2 vlv – OP

6. When ‘S78 O2 CONC’ or ‘S66 CABIN PRESS’ or ‘S210 NODE 1 CAB PRESS’ msg
DIRECT O2 vlv – CL
7. **MCC-H** may ask for another cycle. 
   Wait for O2 to mix and O2 concentration to stabilize.

   On call from **MCC-H**, repeat steps 5 --- 7.

OCAC 8. **OCAC PWR → ON**

9. **MCC-H** for post-repress cryo configuration
TOOLS AND EQUIPMENT REQUIRED

Ingress
Flashlight

Equip
Dry Wipes

Bag
Ratchet Wrench, 1/4" Drive
1/4" Socket, 1/4" Drive

NOTE
Refer to NODE 1 EGRESS, Figure 1, ISS Orbiter Departure Configuration (SODF: ISS OPS: JOINT OPERATIONS).

NODE 1 AFT IMV AND AFT HATCH CONFIGURATION FOR EGRESS

PMA 1
1. √PMA 1 Grille Cover – Open

Node 1 Aft
2. √Node 1 IMV Aft Port Valve – Open, handle stowed
3. √Node 1 IMV Aft Stbd Valve – Open, handle stowed
4. Cap →|← PMA 1 hard duct (using Ratchet Wrench, 1/4" Drive, and 7/16" Deep Socket, leave band clamp on duct).

Node 1 Aft Hatch
5. Inspect Aft Hatch Seals and seal surfaces for condensation, contamination, or damage (nicks, cuts, etc.). If seals are wet, blot (do not wipe) dry using Dry Wipe. Report any condensation or seal damage to MCC.

6. √All Equipment Bags and returning items removed from PMA 1
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TOOLS AND EQUIPMENT REQUIRED:

Ingress Equip Bag
Flashlight Braycote Lubricant (from IMV Cap O-Ring Replacement Kit) Rubber Gloves
Dry Wipes General Purpose Tape, 2”
10” Adjustable Wrench Atmosphere Sampling Bottle (one) Desiccant Bag Assembly (four) Portable Fan Assembly (four) AK-1 Russian Sampler (one) AM-5 Aspirator Velocicalc Unit

EGRESS POSITIVE PRESSURE RELIEF VALVE (PPRV)
CONFIGURATION VERIFICATION

CAUTION

Verification that caps are removed from each PPRV is required in order to provide fault tolerance to an overpressure relief condition of Node 1/PMA1 structure.

Node 1 Port, Stbd Hatch

1. Remove PPRV caps (two).

2. Stow caps in rack NOD1D4_D1.

NODE 1 EGRESS CONFIGURATION

Refer to Figure 1.

3. Remove unused contingency grab sample container from Node 1 wall. Stow in Ingress Equipment Bag.

4. Collect US air sample (one) and Russian Air Sample (one) from inside Node 1 and label location and MET on bottle. Stow bottles (two) in Ingress Equipment Bag. Configure Velocicalc Meter for humidity readings of Node 1. Take three humidity readings of Node 1. Report readings to MCC.

5. Remove covers from Node 1 Aft Port IMV Fan outlet grilles, NODOP3 and NOD1OP4, and stow in location NOD1O4_A1.

NOD1 D4_G1

6. Stow Docking Mechanism Accessory Kit (used during FGB Ingress): APAS Hatch Tool Cleaning Pads
7. \(\sqrt{\text{All equipment bags, ISS cue cards, and returning items removed from Node 1}}\)

\(\text{Ingress Equipment Bag}\)

\(\text{Jettison/Stowage Bag}\)

Remove Cable Cutters from PMA2 wall and fasten them to Node 1 Fwd Hatch using Velcro or Gray Tape.

8. Inspect hatch seals and seal surfaces for condensation, contamination, or damage (nicks, cuts, etc.).

If seals wet, blot (do not wipe) dry using Dry Wipes.

Report any condensation or seal damage to **MCC**.

9. \(\sqrt{\text{MPEV – Closed (not capped)}}\)

10. Open grille cover on PMA2 hard duct.

**NODE 1 FWD IMV VALVE CLOSURE**

**CAUTION**

IMV Valve handles are stiff and must be moved firmly to ensure valve is completely closed.

11. Node 1 Fwd Stbd IMV Vlv → Close

Node 1 Fwd Port IMV Vlv → Close

**EGRESS LIGHTING CONFIGURATION**

12. General Lighting Master Switch pb → On

Ensure all lights are on Full Bright.

**DESICCANT INSTALLATION AND PORTABLE FAN ACTIVATION**

**CAUTION**

Desiccants should be left in plastic bags until crew is ready to close Node 1 Fwd Hatch so as not to waste desiccant absorption capacity.

13. For each of the four Node 1/PMA1 fans, perform **NODE 1 AND PMA1 MOISTURE REMOVAL KIT SETUP**, steps 2 --- 7 (**SODF: ISS OPS: JOINT OPERATIONS**), then:

Once desiccants are deployed, promptly egress Node 1.

**NODE 1 FWD HATCH CLOSURE**

14. \(\sqrt{\text{Axial Port Closeout is removed and stowed}}\)

Close Node 1 Forward Hatch per decal.
ATTACHING ESA TO MPEV
15. Use Rubber Gloves when applying the lubricant. Lubricate External Sampling Adapter (ESA) O-Rings with Braycote Lubricant.

16. ESA handle → Closed

17. Align CLOSE and OPEN words on ESA with words on MPEV.

18. Align arrow on ESA handle with arrow on MPEV.

19. Align ESA captive bolts (four) with holes on hatch panel surrounding MPEV.

20. Manually tighten ESA captive bolts (four) in an “X” pattern until finger tight.

21. ESA Sample Valve → Closed (handle valve perpendicular to flow path)

NODE 1 VENTILATION FAN ACTIVATION FOR DRYOUT
22. To activate Aft Port IMV Fan, perform NODE 1 IMV FAN ACTIVATION/DEACTIVATION, step 1 (SODF: ISS OPS: ECLSS).
Changes:
- PMA 1 hard duct cap installed on hard duct; PMA 1 Grill Cover opened.
- PPRV caps removed and stowed in Node Stowage Rack (NOD1D4_D1).
- Fire Extinguisher, QDM, and Ingress Equipment removed.
- Node air samples taken.
- Node Fwd Stbd IMV Valve closed.
- All Node Lights on (ph).
- Axial Port Closeout stowed in Node.
- Desiccant Bags/Portable Fans installed and activated.
- Node 1 Forward Hatch closed.
- ESA deployed on EVA side of Node 1 Forward MPEV.
- Node 1 lights turned off via RPCM command.

Changes (cont.)
- PMA IMV flex duct extension removed from Node Fwd Stbd IMV Flange and restrained in CBM Vestibule.
- IMV Flange Saver removed from Node Fwd Port IMV Flange and restrained in CBM vestibule.
- IMV cap w/lubricated O-rings installed on Node Fwd Stbd Flange.
- PMA/ODS interface duct removed from ODS Halo and stowed in PMA 2 (restrained to handrail).
- APAS Hatch Standoff disengaged from Hatch and retracted to handrail.
- APAS Hatch closed.
- Docking Target uncovered and Standoff Cross reinstalled.
- Docking Equipment reinstalled.
- ODS Hatch closed.

NOTE
MRK positions are not intended to represent actual positions. The MRKs should be "evenly spaced" throughout the Node.

Figure 1.- ISS Orbiter Departure Configuration.
TOOLS AND EQUIPMENT REQUIRED:

Ingress
10" Adjustable Wrench

Equip
1-1/2" Open End Wrench

Bag
Ratchet 1/4" Drive
10-50 in-lbs Trq Wrench 1/4" Drive
7/16" Deep Socket
IMV Cap O-Ring Replacement Kit (two)
Alcohol Wipes
Bore O-Ring
Face O-Ring
Braycote Lubricant
Rubber Gloves

PMA2 Docking Mechanism Accessory Kit
APAS APAS Hatch Tool
Hatch Cleaning Pads

Jettison
Docking Lights
Stowage
Docking Crosshairs
Bag
Docking Target Standoff Cross (in bag)

AK-1 Russian Air Sampler (one)
AM-5 Aspirator

OXYGEN EQUIPMENT RELOCATION
1. Move QDMs and 70-ft O2 Hoses to shuttle.

MO32M 2. LEH O2 5,6 vlv (two) → CL

3. 70-ft O2 Hoses (two) ←|→ LEH O2 5,6 vlv outlet

Middeck 4. QDM (two) ←|→ 70-ft O2 Hoses and Comm cables
QDM (two) →|← existing LES O2 lines and Comm cables
Stow 70-ft O2 Hoses.

MO32M 5. LEH O2 5,6 vlv (two) → OP

NODE 1 IMV AND HATCH CONFIGURATION FOR EGRESS

MO13Q 6. AIRLK FAN A(B) – OFF

PMA2 7. PMA2 IMV Duct Extension ←|→ Node 1 Fwd Stbd IMV Valve Flange
(Ratchet 1/4" Drive, 7/16" Deep Socket)
Leave V-Band clamp on flange.
8. Don Rubber Gloves. 
Retrieve Fwd Stbd IMV Cap from temporary stow location. 
Remove Bore O-Ring and Face O-Rings from IMV Cap and discard. 
Using Alcohol Wipes, clean IMV Flange and grooves on IMV Cap. 
Inspect cap grooves for nicks or burrs. 
Report any damage to MCC. 
Lubricate new O-Rings with a thin film of Braycote. 
Cap Braycote Tube and stow back in Ziplock Bag. 
Install IMV Cap Bore O-Rings and Face O-Rings.

9. IMV Cap | Node 1 Fwd Stbd IMV Valve Flange |
(Ratchet 1/4” Drive, 7/16” Deep Socket)
Torque V-Band clamp to 35 in-lbf [3.8 to 4.1 N•m] (10-50 in-lbs Trq Wrench 7/16” Deep Socket)

10. IMV Cap (Flange Saver) | Node 1 Fwd Port IMV Valve Flange |
(Ratchet 1/4” Drive, 7/16” Deep Socket)
Leave V-Band clamp on flange.

11. Retrieve Fwd Port IMV Cap from temporary stow location. 
Remove bore and face O-Rings from IMV Cap and discard. 
Using Alcohol Wipes, clean IMV flange and grooves on IMV Cap. 
Inspect cap grooves for nicks or burrs. 
Report any damage to MCC. 
Lubricate new O-Rings with a thin film of Braycote. 
Cap Braycote Tube and stow back in Ziplock Bag. 
Install IMV Cap Bore O-Rings and Face O-Rings. 
Dispose of used gloves in Dry Trash. 
Dispose of used Alcohol Wipes in Ziplock Bags then place in Dry Trash.

12. IMV Cap | Node 1 Fwd Port IMV Valve Flange (using Ratchet and Deep Socket)
Torque V-Band clamp to 35 in-lbf [3.8 to 4.1 N•m] (10-50 in-lbs Trq Wrench 7/16” Deep Socket).

13. PMA/ODS Interface Duct | Halo Inlet Flex Duct (leaving T-handle clamp attached to Halo Inlet Flex Duct)

14. Stow free end of PMA/ODS Interface Duct into PMA2 on port side handrail.

Ext A/L 15. Halo Inlet Flex Duct | Halo (using T-handle clamp)

MO13Q 16. ARLK FAN A(B) → ON
√Airflow at halo
17. √ All Equipment Bags and returning items removed from PMA2
   Jettison Stowage Bag
   Tool Bag
   Ingress Equipment Bag
   Docking Mechanism Accessory Kit
   APAS Hatch Tool
   Cleaning Pads

**APAS HATCH CLOSURE**

ODS Vest

18. Disconnect Hatch from PMA APAS Hatch Standoff and secure Hatch Standoff to PMA Handrail.
   Remove APAS Hatch Cover and stow it securely in PMA2.
   Inspect hatch seals and seal surfaces for debris/damage.
   Clean APAS hatch seals and surface with Cleaning Pads.
   Close APAS Hatch.
   Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on Hatch Tool.
   Insert tool in hatch socket (ensure fully seated).
   Rotate 3 --- 4 turns in direction of ‘ЗАТП’ (Close) arrow until tool clicks.

19. √ APAS EQUAL VLV – Op

   **CAUTION**
   Rubber gloves must be worn when handling the docking target.

20. Don Rubber Gloves.
    Remove Docking Target Base Plate Cover from Target Base Plate.
    Stow Cover in Jettison Stowage Bag.

21. Obtain Docking Target Standoff Cross from Bag.
    Stow Bag in Jettison Stowage Bag.

22. Ensure key on Standoff Cross shaft is aligned with key-way on mating receptacle.
    Insert Docking Target Standoff Cross into keyed receptacle on Docking Target Base Plate until shaft collar bottoms out.

   **NOTE**
   When all mating parts are correctly assembled, a groove on docking target standoff cross shaft should be visible above cap nut (not recessed).

23. Ensure jam nut is positioned onto smaller, non-threaded diameter of docking target base plate receptacle.
    Align and mate Docking Target Standoff Cross threaded hexagonal cap nut onto docking target base plate receptacle.
    Continue to rotate hexagonal cap nut ⤷, and tighten firmly onto receptacle (10" Adjustable Wrench, 80-100 in-lbs design torque).
Thread jam nut onto receptacle, rotating clockwise, until contact with hexagonal cap nut shoulder occurs.
While maintaining a clockwise torque on hexagonal cap nut, firmly tighten jam nut against hexagonal cap nut shoulder (1-1/2" Open End Wrench, 80-100 in-lbs design torque).
Doff Rubber Gloves.

24. Stow tools, Docking Target Standoff Cross Bag, and Base Plate Cover.

25. Install Docking Crosshairs per markings.

26. For each Docking Light (two)
   Remove the locking pin.
   Install docking light perpendicular to ODS shell.
   Reinstall the locking pin.
   Reconnect cables.

27. Take one Russian air sample in the orbiter middeck using AK-1 Sampler (one) and AM-5 Aspirator.
   Label MET and location on bottle.
   Stow in Ingress Equipment Bag.

**ODS HATCH CLOSURE**

28. Close ODS Hatch per decal.

29. √Equal vlv (two) – OFF, capped
TOOLS AND EQUIPMENT REQUIRED

Ingress
Flashlight
Equip
Dry Wipes
Bag
Ratchet, 1/4" Drive
10-50 in-lbs Trq Wrench, 1/4" Drive
7/16" Deep Socket
IMV Caps (two)
IMV Cap O-Ring Replacement Kit
Velcro Strap
Rubber Gloves

NODE 1 EGRESS AND ISOLATION
(1SS OPS/2A.2A - 2A.2B/FIN B) Page 1 of 3 pages

NOTE
Refer to NODE 1 EGRESS, Figure 1, ISS Orbiter Departure
Configuration (SODF: ISS OPS: JOINT OPERATIONS).

NODE 1 AFT IMV AND AFT HATCH CONFIGURATION FOR EGRESS

PMA 1
1. √PMA-1 Grille Cover – Open

Node 1 Aft
2. √Node 1 IMV Aft Port Valve – Closed, handle stowed
3. √Node 1 IMV Aft Stbd Valve – Closed, handle stowed
4. √IMV cap →|← PMA 1 hard duct (Ratchet, 1/4” Drive, 7/16” Deep Socket)
   Leave band clamp on duct.

PMA 1
5. PMA 1 IMV Flex Duct ←|→ Node 1 Aft Port IMV Valve Flange
   (Ratchet, 1/4” Drive, 7/16” Deep Socket)
   Leave V-band clamp on flange.
   Secure duct with Velcro Strap.

6. Don Rubber Gloves.
   Retrieve Aft Port IMV Cap from stowage location.
   Remove bore and face O-Rings from IMV Cap and discard.
   Using Alcohol Wipes, clean IMV Flange and grooves on IMV Cap.
   Inspect cap grooves for nicks or burrs.
   Report any damage to MCC.
   Lubricate new O-Rings with a thin film of Braycote.
   Cap Braycote Tube and stow back in Ziplock Bag.
   Install IMV Cap Bore O-Rings and Face O-Rings.

7. IMV cap →|← Node 1 Aft Port IMV Valve Flange (Ratchet, 1/4” Drive,
   7/16” Deep Socket).
   Torque V-band clamp to 35 in-lbf [3.8 to 4.1 N•m] (10-50 in-lbs Trq Wrench).

8. IMV Flange Saver ←|→ Node 1 Aft Stbd IMV Valve Flange
   (Ratchet, 1/4” Drive, 7/16” Deep Socket)
   Leave V-band clamp on flange.
9. Retrieve Aft Stbd IMV Cap from stowage location. Remove bore and face O-Rings from IMV Cap and discard. Using Alcohol Wipes, clean IMV Flange and grooves on IMV Cap. Inspect cap grooves for nicks or burrs. Report any damage to MCC. Lubricate new O-Rings with a thin film of Braycote. Cap Braycote Tube and stow back in Ziplock Bag. Install IMV Cap Bore O-Rings and Face O-Rings. Dispose of used gloves in dry trash. Dispose of used Alcohol Wipes in Ziplock Bags then place in dry trash.

10. IMV Cap →|← Node 1 Aft Stbd IMV Valve Flange (Ratchet, 1/4" Drive, 7/16" Deep Socket). Torque V-band clamp to 35 in-lbf [3.8 to 4.1 N•m] (10-50 in-lbs Trq Wrench).

11. Inspect Aft Hatch Seals and seal surfaces for condensation, contamination, or damage (nicks, cuts, etc.). If seals wet, blot (do not wipe) dry using Dry Wipe. Report any condensation or seal damage to MCC.

12. √All equipment bags and returning items removed from PMA1

DESSICANT INSTALLATION AND PORTABLE FAN ACTIVATION

CAUTION

Desiccants should be left in plastic bags until crew is ready to close Node-1 Aft Hatch so as not to waste desiccant absorption capacity.

13. For the PMA1 fan, perform NODE 1 AND PMA1 MOISTURE REMOVAL KIT SETUP, steps 2 --- 7 (SODF: ISS OPS: JOINT OPERATIONS), then:
Once desiccants are deployed, promptly egress PMA1.

NODE 1 AFT HATCH CLOSURE AND LEAK CHECK

14. Close Node 1 Aft Hatch per decal.

15. FGB: ECLSS

Record PMA 1 Press 1: ___________ and MET: ___________
Record PMA 1 Press 2: ___________ and MET: ___________


√MCC for target pressure

17. Wait 30 minutes.
PCS 18. **FGB: ECLSS**

Record PMA-1 Press 1: ___________ and MET: ___________
Record PMA-1 Press 2: ___________ and MET: ___________

19. Report results to **MCC**.
   Standby for **MCC GO** to proceed.
TOOLS AND EQUIPMENT REQUIRED:

Ingress Equip Bag
Flashlight Braycote Lubricant (from IMV Cap O-Ring Replacement Kit)
Rubber Gloves Dry Wipes
General Purpose Tape, 2"
Atmosphere Sampling Bottle (one)
Desiccant Bag Assembly (four)
Portable Fan Assembly (four)

EGRESS POSITIVE PRESSURE RELIEF VALVE (PPRV)
CONFIGURATION VERIFICATION

CAUTION
Verification that caps are removed from each PPRV is required in order to provide fault tolerance to an overpressure relief condition of Node 1/PMA1 structure.

Node 1 Port, Stbd Hatch

1. Remove PPRV caps (two).

2. Stow caps in rack NOD1D4_D1.

NODE 1 EGRESS CONFIGURATION

3. Remove unused contingency grab sample container from Node 1 wall. Stow in Ingress Equipment Bag.

4. Collect US air sample (one) and Russian air sample (one) from inside Node 1 and label location and MET on bottles. Stow bottles (two) in Ingress Equipment Bag. Configure Velocicalc Meter for humidity readings of Node 1. Take three humidity readings of Node 1. Report readings to MCC.

5. Remove covers from Node 1 Aft Port IMV Fan outlet grilles, NODOP3 and NOD1OP4, and stow in location NOD104_A1.

6. Stow Docking Mechanism Accessory Kit (used during FGB Ingress):
   APAS Hatch Tool
   Cleaning Pads

7. √ All Equipment Bags, ISS cue cards, and returning items removed from Node 1 Ingress Equipment Bag and Jettison/Stowage Bag. Remove Cable Cutters from PMA2 wall and fasten them to Node 1 wall near Node 1 Fwd hatch using Velcro or Gray Tape.

8. 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.
9. √/MPEV – Closed (not capped)

PMA2 10. Open grille cover on PMA2 hard duct.

**NODE 1 FWD IMV VALVE CLOSURE**

**CAUTION**

IMV Valve handles are stiff and must be moved firmly to ensure valve is completely closed.

Node 1 11. Node 1 Fwd Stbd IMV Vlv → Close (stow handle)
Fwd 11a. Node 1 Fwd Port IMV Vlv → Close (stow handle)

**EGRESS LIGHTING CONFIGURATION**

NOD1 12. General Lighting Master Switch pb → On
P1_01 Make sure all lights are on Full Bright.

**DESICCANT INSTALLATION AND PORTABLE FAN ACTIVATION**

**CAUTION**

Desiccants should be left in plastic bags until crew is ready to close Node 1 Fwd Hatch so as not to waste desiccant absorption capacity.

Node 1 13. For each of the three Node 1 fans, perform NODE 1 AND PMA1 MOISTURE REMOVAL KIT SETUP, steps 2 --- 7 (SODF: ISS OPS: JOINT OPERATIONS), then:
Once desiccants are deployed, promptly egress Node 1.

**NODE 1 FWD HATCH CLOSURE**

14. √/Axial Port Closeout is removed from Node 1/PMA2 vestibule
Close Node 1 Forward Hatch per decal.

**ATTACHING ESA TO MPEV**

15. Use Rubber Gloves when applying the lubricant.
Lubricate External Sampling Adapter (ESA) O-Rings with Braycote Lubricant.

16. ESA handle → Closed

17. Align CLOSE and OPEN words on ESA with words on MPEV.

18. Align arrow on ESA handle with arrow on MPEV.

19. Align ESA captive bolts (four) with holes on hatch panel surrounding MPEV.

20. Manually tighten ESA captive bolts (four) in an “X” pattern until finger tight.

21. ESA Sample Valve → Closed (valve handle perpendicular to flow path)
NODE 1 EXPEDITED INGRESS

TOOLS REQUIRED:
Ingress Portable CO2 Monitor (one)
Equip ISS Cue Cards
Bag General Purpose Tape, 2"
Ratchet 1/4" Drive
7/16" Deep Socket
5/32" Hex Head, 1/4" Drive
Driver Handle 1/4" Drive

WARNING
In order to prevent excessive reverse delta pressure across the PMA2 APAS hatch, PMA2 must be pressurized per ODS VESTIBLE/PMA2 PRESSURIZATION (SODF: ISS OPS: JOINT OPS) prior to opening the ODS equalization valves.

NODE 1 INTERNAL LIGHTING POWERUP
1. Node 1: EPS

   sel RPCM N13B A

   [RPCM N13B A]

   sel RPC [X]  where [X] = [5 13]  

   [cmd] RPC Position – Close (Verify – Cl)

   Repeat

2. Node 1: EPS

   sel RPCM N13B B

   [RPCM N13B B]

   sel RPC 1

   [cmd] RPC Position – Close (Verify – Cl)

3. Node 1: EPS

   sel RPCM N13B C

   [RPCM N13B C]

   sel RPC 1

   [cmd] RPC Position – Close (Verify – Cl)

4. Node 1: EPS

   sel RPCM N14B B
RPCM N14B B

 sel  RPC 1
 cmd  RPC Position – Close (Verify – Cl)

5. Node 1: EPS

 sel  RPCM N14B C

 RPCM N14B C
 sel  RPC [X]  where [X] = 2 15 16

 cmd  RPC Position – Close (Verify – Cl)

 Repeat

**CAUTION**

It may take 30 minutes for cold lights to come up full bright.
Lights must come up to full bright before turning them off.

**EXTERNAL AIRLOCK SETUP FOR ODS AND PMA INGRESS**

6. Move Tool Bag and Ingress Equipment Bag to External Airlock.

7. Equal vlv (one) → NORM

 √ODS Hatch  ΔP ≤ 0.2 psid

**ODS VESTIBULE INGRESS**

8. Open ODS Hatch per decal.

 Equal vlv (one) → OFF, install cap

**WARNING**

Surfaces may be below freezing for a short time after initial ODS Hatch opening. Do not touch vestibule surfaces until VESTIBULE TEMP 1,2 (two) indicate > 40° F (SM 177 EXTERNAL AIRLOCK).

Rotate Centerline Camera Diffuser Duct into vestibule.
Wipe any condensate from vestibule volume and report to MCC-H.

9. √MCC-H, “Go for PMA2 Ingress.”

12 AUG 00  70  9260.doc
DOCKING EQUIPMENT REMOVAL

10. For each Docking Light Vest
   - Disconnect cables.
   - Install caps on outlet.
   - Remove the locking pin.
   - Remove Docking Light.
   - Reinstall locking pin.

11. Mark crosshairs with appropriate identification.

12. Remove crosshairs.
    Stow lights and crosshairs in Jettison/Stowage Bag.

INGRESS OPERATIONS PREPARATION

CAUTION

1. Future crews may have trouble docking if the docking target’s delicate surface is scratched or damaged.

2. Donning of Rubber Gloves is required when handling Docking Target Standoff Cross and Docking Target Base Plate.

PMA2 13. Don Rubber Gloves.
   - While maintaining a \( \pm \) torque on standoff cross threaded hexagonal cap nut, loosen jam nut on docking target base plate receptacle by applying a \( \pm \) torque (10” Adjustable Wrench and 1-1/2” Open End Wrench).
   - Temporarily stow jam nut by continuing to rotate it \( \pm \) on to smaller, non-threaded diameter of receptacle.
   - Loosen hexagonal cap nut by applying a \( \pm \) torque.
   - Continue to rotate cap nut until threaded off receptacle.

    Temporarily stow in Jettison/Stowage Bag (with Docking Lights and crosshairs).

15. Install Docking Target Base Plate Cover.

16. Stow tools.

APAS HATCH OPENING

17. Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on APAS Hatch Tool.
   - Insert tool in hatch socket (ensure fully seated) and rotate tool 3 --- 4 turns in direction of ‘ОТКР’ (Open) arrow until it clicks.
   - Remove tool.
   - Allow hatch seals to relax for 3 minutes.

CAUTION

APAS hatch seals require 3 minutes to relax before opening Hatch.
Open Hatch.
   Tether APAS Hatch Tool to hatch handle.
   Install APAS Hatch Cover.
   Secure Hatch in open position to PMA APAS Hatch Standoff.
   Temporarily stow Docking Mechanism Accessory Kit in PMA2.

**DETACHING ESA FROM MPEV**

| Node 1 | 18. √ESA Handle – CLOSED |
| Fwd   | √ESA Sample Valve – CLOSED |
| Hatch  |                           |

   Completely loosen ESA captive screws (four).
   Remove ESA from MPEV and place it inside Ziplock Bag.
   Temporarily stow in PMA2/Node 1 vestibule area.

19. **MCC-H** report to orbiter expected equalization time with Node 1.

   **WARNING**
   Equalization is loud enough to damage unprotected hearing.


   MPEV → OPEN

   Doff Earplugs when equalization complete.

**NODE 1 FORWARD HATCH OPENING**

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<th>CRT</th>
<th>SPEC 66 ENVIRONMENT</th>
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</thead>
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<tr>
<td>PMA2 21.</td>
<td>When CABIN dP/dT &lt; 0.01, open Node 1 Forward Hatch per decal.</td>
</tr>
</tbody>
</table>

   Notify **MCC**, “Node 1 Forward Hatch Open.”
TOOLS AND EQUIPMENT REQUIRED:

Ingress
10" Adjustable Wrench

Equip
1-1/2" Open End Wrench

Bag
Ratchet 1/4" Drive
10-50 in-lbs Trq Wrench, 1/4" Drive
7/16" Deep Socket
Rubber Gloves

PMA2
Docking Mechanism Accessory Kit

APAS
APAS Hatch Tool

Hatch
Cleaning Pads

Jettison
Docking Lights

Stowage
Docking Crosshairs

Bag
Docking Target Standoff Cross (in bag)

WARNING
In order to prevent excessive reverse delta pressure across the PMA2 APAS Hatch, PMA2 must be pressurized per ODS VESTIBULE/PMA2 PRESSURIZATION (SODF: ISS OPS: JOINT OPS) prior to opening the ODS Equalization Valves.

NODE 1 EGRESS CONFIGURATION

1. √ All Equipment Bags, ISS cue cards, and returning items removed from Node 1
   Ingress Equipment Bag
   Jettison/Stowage Bag

Node 1

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.

3. √ MPEV – Closed (not capped)

EGRESS LIGHTING CONFIGURATION

NOD1

4. General Lighting Master Switch pb → On
P1_01
Ensure all lights are on Full Bright.

DESICCANT INSTALLATION AND PORTABLE FAN ACTIVATION

Node 1

5. Desiccant Bag Assemblies (three) ←|→ used Portable Fans
   Stow used Desiccant Bag Assemblies in Jettison/Stowage Bag.

WARNING
Do not attempt to open battery compartments of used Portable Fans. Doing so could release caustic material from corroded batteries.
6. Portable Fan Assemblies (one in PMA, three in Node) ←|→ flexible brackets
Put used Portable Fan Assemblies in plastic bags (four) taped to handrail and stow them in Jettison/Stowage Bag.

| CAUTION |
| Desiccants should be left in plastic bags until crew is ready to close Node 1 Fwd Hatch so as not to waste desiccant absorption capacity. |

7. For each of the three Node 1 fans, perform NODE 1 AND PMA1 MOISTURE REMOVAL KIT SETUP, steps 2 --- 7 (SODF: ISS OPS: JOINT OPERATIONS), then:
Once desiccants are deployed, promptly egress Node 1.

NODE 1 FORWARD HATCH CLOSURE
8. √ Axial Port Closeout is removed from Node 1/PMA2 vestibule
Close Node 1 Forward Hatch per decal.

ATTACHING ESA TO MPEV
9. Use Rubber Gloves when applying the lubricant.
Lubricate External Sampling Adapter (ESA) O-Rings with Braycote Lubricant.

10. ESA handle → Closed

11. Align CLOSE and OPEN words on ESA with words on MPEV.

12. Align arrow on ESA handle with arrow on MPEV.

13. Align ESA captive bolts (four) with holes on hatch panel surrounding MPEV.

14. Manually tighten ESA captive bolts (four) in an “X” pattern until finger tight.

15. ESA Sample Valve → Closed (valve handle perpendicular to flow path)

16. √ All Equipment Bags and returning items removed from PMA2
   Jettison Stowage Bag
   Tool Bag
   Ingress Equipment Bag
   Docking Mechanism Accessory Kit
   APAS Hatch Tool
   Cleaning Pads
APAS HATCH CLOSURE

ODS Vest

17. Disconnect Hatch from PMA APAS Hatch Standoff and secure Hatch Standoff to PMA Handrail.
   Remove APAS Hatch Cover and stow it securely in PMA2.
   Inspect hatch seals and seal surfaces for debris/damage.
   Clean APAS hatch seals and surface with Cleaning Pads.
   Close APAS Hatch.
   Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on Hatch Tool.
   Insert tool in hatch socket (ensure fully seated).
   Rotate 3 --- 4 turns in direction of ‘ЗАТП’ (Close) arrow until tool clicks.

18. √APAS EQUAL VLV – Op

   CAUTION
   Rubber gloves must be worn when handling the docking target.

19. Don Rubber Gloves.
   Remove Docking Target Base Plate Cover from Target Base Plate.
   Stow Cover in Jettison Stowage Bag.

20. Obtain Docking Target Standoff Cross from Bag.
    Stow Bag in Jettison Stowage Bag.

21. Ensure key on standoff cross shaft is aligned with key-way on mating receptacle.
    Insert Docking Target Standoff Cross into keyed receptacle on Docking Target Base Plate until shaft collar bottoms out.

   NOTE
   When all mating parts are correctly assembled, a groove on docking target standoff cross shaft should be visible above cap nut (not recessed).

22. Ensure jam nut is positioned onto smaller, non-threaded diameter of docking target base plate receptacle.
    Align and mate Docking Target Standoff Cross threaded hexagonal cap nut onto docking target base plate receptacle.
    Continue to rotate hexagonal cap nut , and tighten firmly onto receptacle (10" Adjustable Wrench, 80-100 in-lbs design torque).
    Thread jam nut onto receptacle, rotating , until contact with hexagonal cap nut shoulder occurs.
    While maintaining a torque on hexagonal cap nut, firmly tighten jam nut against hexagonal cap nut shoulder (1-1/2" Open End Wrench, 80-100 in-lbs design torque).
    Doff Rubber Gloves.
23. Stow tools, Docking Target Standoff Cross Bag, and Base Plate Cover.

24. Install Docking Crosshairs per markings.

25. For each Docking Light (two)
   - Remove the locking pin.
   - Install Docking Light perpendicular to ODS shell.
   - Reinstall the locking pin.
   - Reconnect cables.


27. √Equal vlv (two) – OFF, capped
1. ODS Hatch closed
2. ODS Hatch Equal vlv (two) – OFF, caps installed
3. cb ESS 1BC(2CA) SYS PWR CNTL SYS 1(2) – cl
4. SYS PWR MNA(MNB) – ctr (tb-ON)
5. cb ESS 1BC(2CA) DEP SYS 1(2) VENT ISOL – cl
6. cb MNA(B) DEP SYS 1(2) VENT – cl
   MCC-H before proceeding
7. VEST DEP VLV SYS 1(SYS 2) VENT ISOL – OP (tb – OP)
8. VEST DEP VLV SYS 1(SYS 2) VENT – OP (tb – OP)
   Wait 15 minutes.
9. VEST DEP VLV SYS 1(SYS 2) VENT – CL (tb – CL)

NOTE
MCC-H will perform ODS Hatch, Node Fwd Hatch, and IMV leak check overnight.
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NOTE
1. **MCC** will provide MET/EVENT and desired pressure values for use in this procedure.
2. Expect possible dp/dt klaxon alarm during depress.

MO10W 1. √14.7 CAB REG INLET SYS 1, SYS 2 (two) – CL

AW82B 2. AIRLK DEPRESS vlv cap – Vent, remove, stow
   AIRLK DEPRESS vlv – 0

[SM 66 ENVIRONMENT]

CRT 3. If PPO2 < 2.7 (at anytime during depress)
   C5 DIRECT O2 vlv – OP

CRT 4. When CABIN PRESS = desired pressure
   C5 DIRECT O2 vlv – CL
   AW82B AIRLK DEPRESS vlv – CL
   Install AIRLK DEPRESS vlv Cap

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<thead>
<tr>
<th>MET/EVENT</th>
<th>Desired Pressure</th>
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</table>
NOTE
MCC will provide MET/EVENT and desired pressure values for use in this procedure.

WARNING
The WCS should not be used during this procedure because of the high concentration of N2 in the WCS area.

L2
1. O2/N2 CNTLR VLV SYS 1 – OP (N2)
   2 – AUTO

MO10W
2. O2 REG INLET SYS 2 – OP

3. 14.7 CAB REG INLET SYS 1 vlv – OP

4. On MCC GO
   14.7 CAB REG INLET SYS 2 vlv – OP

SM 66 ENVIRONMENT

CRT
5. When CABIN PRESS = desired pressure

MO10W
14.7 CAB REG INLET SYS 1,SYS 2 vlv (two) – CL

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<tr>
<th>MET/EVENT</th>
<th>DESIRED PRESSURE</th>
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6. √MCC to determine if Orbiter Pressure Control System (Orb PCS) is required

If Orb PCS required,
go to PCS 1(2) CONFIG (ORB OPS, ECLSS).

If Orb PCS not required,
L2
   O2/N2 CNTLR VLV SYS 2 – CL (O2)
TOOLS REQUIRED:

Ingress  Flashlight
Equip    Portable Fan Assemblies (four)
Bag      Portable Fan Assemblies (four with batteries)
         D-Cell Batteries (sixteen spares)

NOD1S4  Desiccant Bag Assemblies (four)
        Flexible Brackets (four, already installed)
        Handrail Clamps (two, already installed)
        4" Common Tip Screwdriver

NODE 1 AND PMA1 PORTABLE FAN CONFIGURATION

NOTE
The exact locations of the portable fans in Node 1 and PMA1
are not critical. Do not deploy Desiccant Bag Assemblies
until just prior to hatch closure.

1. Using Handrail Clamps and Flexible Brackets, mount the four Portable
   Fan Assemblies on the flexible brackets already installed in Node 1
   (three) and PMA1 (one).

DESICCANT INSTALLATION AND PORTABLE FAN ACTIVATION (FOUR)

2. √ Fan Pwr – Off
   If required, replace batteries.
   If required, stow used batteries in Jettison/Stowage Bag.

3. Remove Desiccant Bag Assembly from plastic bag and secure bag to
   handrail with tape.

4. Desiccant Bag Assembly – Fan

5. Fan Power → High
   NOTE
   Low power position setting has been disabled.

6. √ Fan RPM control position – Full CW ⬅

7. √ Fan is running
NOTE
ISS steps should be performed by appropriate crew, but may be performed by MCC-H or MCC-M.

1. **VERIFYING ISS NOT IN CONTROL**
   
   **MCS**
   
   **MCS SUMMARY**
   
   ‘MCS Status’
   
   Verify ISS Att Cntl Config – Free Drift

2. **PREPARING ISS TO TAKE CONTROL**
   
   If this step is being performed by ground,
   
   **MCC-H ⇒ MCC-M**, “Perform preparatory Russian steps to mode Indicator to Thrusters.”
   
   If this step is being performed by ISS crew, perform preparatory Russian steps to mode Indicator to Thrusters.

   **ISS(MCC-H) ⇒ Orbiter**, “ISS ready to begin controlling attitude of Mated Stack.”

3. **PLACING ORBITER INTO FREE DRIFT**
   
   **C3(A6)**
   
   **DAP: FREE**
   
   Orbiter ⇒ ISS, **MCC-H**, “Orbiter is in Free Drift.”

4. **ASSUMING CONTROL WITH ISS**
   
   If this step is being performed by ground,
   
   **MCC-H ⇒ MCC-M**, “Perform Russian steps to mode Indicator to Thrusters.”
   
   If this step is being performed by ISS crew, perform Russian steps to mode Indicator to Thrusters.

   **ISS(MCC-H) ⇒ Orbiter**, “ISS has assumed attitude control.”

5. **RETURNING ORBITER TO NOMINAL CONFIGURATION**
   
   If ALT DAP, return to Group B powerdown
   
   **O14, O15,** PRI RJD DRIVER, LOGIC (sixteen) – OFF
   
   **O16:F** RJDA-1A L2/R2 MANF DRIVER – ON
NOTE
ISS steps should be performed by appropriate crew, but may be performed by MCC-H or MCC-M.

1. VERIFYING ORBITER NOT IN CONTROL
   √DAP: A/FREE/VERN(ALT)
   √DAP A12,B12 loaded
   Orbiter ⇒ ISS, MCC-H, “Orbiter ready to begin controlling attitude of Mated Stack.”

2. CONFIGURING ISS TO FREE DRIFT
   ISS(MCC-M) Perform MODE THRUSTERS TO INDICATOR, all (RODF: MCS), then:
   ISS(MCC-M) ⇒ Orbiter, “ISS is in Free Drift.”

3. ASSUMING CONTROL WITH ORBITER
   If ALT DAP required
   O14, O15, O16:F PRI RJD DRIVER, LOGIC (sixteen) – ON
   If required attitude per Flight Plan is LVLH
   DAP – A/LVLH/VERN(ALT)
   If required attitude per Flight Plan is Inertial
   DAP – A/INRTL/VERN(ALT)
   GNC UNIV PTG
   When rates are damped < 0.1 deg/sec/axis
   DAP – A/AUTO/VERN(ALT)
   Orbiter ⇒ ISS, MCC-H, “Orbiter has established attitude control.”
C&DH PROCEDURES
### NOTE

This procedure is used to reconfigure the Node 1 MDMs after an Auto Retry has occurred where the Auto Retry function configures the MDMs back to nominal states of N1-2 Primary and N1-1 Secondary.

If N1-2 recovered – do steps 1, 2, 3.3
If N1-1 recovered – do steps 1, 3

### 1. VERIFYING MDM STATES

#### PCS2

#### 1.1 Node 1: C&DH: MDM N1-2

- **Primary NCS MDM Node 1**
  - Verify Frame Count – <incrementing>
  - Verify MDM ID – N1-2
  - Verify Processing State – Primary

#### Node 1: C&DH: MDM N1-1

- **Secondary NCS MDM Node 1**
  - Verify Frame Count – <incrementing>
  - Verify MDM ID – N1-1
  - Verify Processing State – Secondary

#### 1.2 Verifying RS State

If NCS interface is LM (SM Central Computer)

- **Primary NCS MDM Node 1**
  - ‘Software Control’
  - sel SMCC Control

- **Primary_NCS_SMCC_Control**
  - Verify SMCC Frame Count – <incrementing>

If NCS interface is FGB

- **FGB: C&DH: FGB MDM 2(1)**
  - **FGB_MDM**
  - Verify FGB Frame Count – <incrementing>

### 2. RECONFIGURING THE NODE 1-2 MDM

#### PCS

#### 2.1 Clearing MDM BST Error Latch

- **Node 1: C&DH: MDM N1-2**
  - **Primary NCS MDM Node 1**
  - ‘Software Control’
C&DH RECONFIGURE FOR THE NODE 1 MDMS

2.2 Configuring MDM Heaters Controlled by the N1-2 MDM

Node 1: C&DH: MDM N1-2

RPCM N1RS2 C

√ RPC 4 Position – Cl

If Open

sel RPC 4

RPCM N1RS2_C_RPC_04

cmd RPC Position – Close (√ – Cl)

‘N1-1-Heaters’

Verify Sur – Ena BU

NOTE

The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

Verify Opr – Ena Ops

2.3 Reconfiguring N1-2 MDM EPS Remote Terminals

CRT

SM 200 APCU

√ APCU1 OUT VOLTS RES LOW ≥ 121
If APCU1 OUT VOLTS RES LOW ≥ 121

PCS2

Node 1: C&DH: MDM N1-2

**Primary NCS MDM Node 1**

sel LB SYS LAB 2

**LB_SYS_LAB_2**

sel RT Status

**LB_SYS_LAB_2_RT_Status**

**cmd** 18_RPCM_N13B_C RT Status – Enable **Execute**
**cmd** 19_RPCM_N13B_B RT Status – Enable **Execute**
**cmd** 20_RPCM_N13B_A RT Status – Enable **Execute**

**LB_SYS_LAB_2_RT_Status**

√ RT Status 18, 19, 20 – ENA

**cmd** 18_RPCM_N13B_C RT FDIR Status – Enable FDIR **Execute**
**cmd** 19_RPCM_N13B_B RT FDIR Status – Enable FDIR **Execute**
**cmd** 20_RPCM_N13B_A RT FDIR Status – Enable FDIR **Execute**

**LB_SYS_LAB_2_RT_Status**

√ RT FDIR Status 18, 19, 20 – ENA

2.4 **Resetting NCS Auto Retry Counter**

On MCC GO

PCS2

Node 1: C&DH: MDM N1-1

**Secondary NCS MDM Node 1**

“Software Control”

sel MDM Utilities

**Secondary_NCS_MDM_Utilities**

If Auto Retry Counter – 1

**cmd** Reset **Execute**

√ Auto Retry Counter – 0
2.5 Subsystem Reconfiguration
As required, reactivate the following MDM N1-2 equipment.

√MCC-H for the proper configuration

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<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
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<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION</td>
<td>Activate Node 1 Smoke Detector 2.</td>
</tr>
<tr>
<td>Node 1 Port Fwd IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Port Fwd IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Stbd Aft IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Stbd Aft IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Fwd Port IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Fwd Port IMV Valve only.</td>
</tr>
<tr>
<td>Node 1 Fwd Stbd IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Fwd Stbd IMV Valve only.</td>
</tr>
</tbody>
</table>

2.6 Resetting ACS Moding
If during Docked Ops, go to ACS PRE-DEPARTURE MODING for N1-2, all (SODF: ISS OPS: MCS).

3. RECONFIGURING THE NODE 1-1 MDM

3.1 Clearing MDM BST Error Latch
PCS
Node 1: C&DH: Secondary NCS MDM
[Secondary NCS MDM Node 1]
'Software Control'

sel MDM Utilities
[Secondary NCS_MDM_Utilities]
'Clear Latched Data in BST A'

**cmd** Clear  **Execute**

[Secondary NCS MDM Node 1]

sel MDM BIT Status

Verify BST status – blank (errors cleared)
3.2 Verifying MDM Heaters Controlled by the N1-1 MDM

PCS2

Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1
‘RPCM N1RS1 A’

√RPC 5 Position – Cl

If Open
sel RPC 5

RPCM_N1RS1_A_RPC_05
cmd RPC Position – Close (√ – Cl)

‘N1-1-Heaters

Verify Opr – Ena Ops

‘N1-2-Heaters’

Verify Sur – Ena BU

NOTE
The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

3.3 Reconfiguring N1-1 MDM EPS Remote Terminals

CRT

SM 200 APCU

√APCU2 OUT VOLTS RES LOW ≥ 121

If APCU2 OUT VOLTS RES LOW ≥ 121

PCS2

Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

sel LB SYS LAB 1

LB_SYS_LAB_1
cmd 18_RPCM_N14B_C RT Status – Enable Execute
cmd 19_RPCM_N14B_B RT Status – Enable Execute
cmd 20_RPCM_N14B_A RT Status – Enable Execute
LB_SYS_LAB_1_RT_Status

√RT Status 18, 19, 20 – ENA

**cmd** 18_RPCM_N14B_C RT FDIR Status – Enable FDIR **Execute**
**cmd** 19_RPCM_N14B_B RT FDIR Status – Enable FDIR **Execute**
**cmd** 20_RPCM_N14B_A RT FDIR Status – Enable FDIR **Execute**

LB_SYS_LAB_1_RT_Status

√RT FDIR Status 18, 19, 20 – ENA

3.4 Resetting NCS Auto Retry Counter
**On MCC-H GO**

Node 1: C&DH: MDM N1-2

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Software Control'</td>
</tr>
</tbody>
</table>

sel MDM Utilities

| Primary_NCS_MDM_Utilities |

If Auto Retry Counter – 1

**cmd** Reset **Execute**

√Auto Retry Counter – 0
3.5 As required, reactivate the following MDM N1-1 equipment.

MCC-H for proper configuration

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Cabin Fan</td>
<td>NODE 1 CABIN FAN ACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>This procedure will start up the Cabin Fan and both Node 1 Smoke Detectors.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 1</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION (SODF: ISS OPS: ECLSS).</td>
<td>Execute only if Node 1 Cabin Fan Activation not performed.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION (SODF:ISS OPS: ECLSS).</td>
<td>Execute only if Node 1 Cabin Fan Activation not performed.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS).</td>
<td>Activate Node 1 Aft Port IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS).</td>
<td>Activate Node 1 Aft Port IMV Valve only.</td>
</tr>
<tr>
<td>Node 1 Aft Stbd IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS).</td>
<td>Activate Node 1 Aft Stbd IMV Valve only.</td>
</tr>
</tbody>
</table>

3.6 Resetting ACS Moding
If during orbiter Docked Ops, go to ACS PRE-DEPARTURE MODING for N1-1, all (SODF: ISS OPS: MCS).
NOTE
Commands are not available to silence ISS C&W Tones, so they must be suppressed.

CAUTION
Multiple Suppress or Inhibit commands (or combinations) for a single ‘In Alarm’ event should not be issued as this can cause a Class (E, W, C) Tone and Light state to be shut off erroneously.

1. SILENCING A C&W TONE BY SUPPRESSING EVENT

PCS
C&W Summ
Caution & Warning Summary

Right-click on the text message of the event.

Event Code
sel Suppress
C&W Suppress Event Alarm Window
√Event Message – Text of desired event

cmd Arm
√Status – Arm command was successful

cmd Execute
√Status – Execute command was successful

Close window.
Right-click on the text message of the event.

sel Details
C&W Details
√Annunciation – Suppressed

Close window.
Report event suppressed to MCC-H. >>

2. ENABLING C&W TONES

PCS
C&W Summ
Caution & Warning Summary
‘Event Code Tools’
sel Enable

**Enable An Arbitrary Inactive Event Code**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to NCS C&amp;W EVENT TABLE (SODF: ISS MAL: REFERENCE INFORMATION) to find the Event Code number for the event to be enabled.</td>
</tr>
</tbody>
</table>

input Event Code

**cmd Execute**

√ Status – Execute command was successful

Close window.

‘Event Code Tools’

sel GET STATUS

**Get Status of Arbitrary Event Code**

input Event Code

**cmd Execute**

√ Annunciation – Enabled

Close window.

Report event enabled to **MCC-H**. >>

3. **INHIBITING A C&W EVENT**

PCS C&W Summ

| Caution & Warning Summary |

If the desired event is displayed in the C&W Summary

Right-click on the desired event.

| Event Code |

sel Inhibit

**C&W Inhibit Event Alarm Window**

**cmd Arm**

√ Status – Arm command was successful

**cmd Execute**
√ Status – Execute command was successful
   Close window.

√ Desired Event disappeared from Summary
   Report event inhibited to MCC-H. >>

If the desired event is not displayed in the C&W Summary ‘Event Code Tools’

   sel Inhibit

   Inhibit An Arbitrary Inactive Event Code

   NOTE
   Refer to NCS C&W EVENT TABLE (SODF: ISS MAL: REFERENCE INFORMATION) to find the Event Code number for the event to be inhibited.

   input Event Code – XXXX
   cmd Arm

   √ Status – Arm command was successful
   
   cmd Execute

   √ Status – Execute command was successful
   
   Close window.
   ‘Event Code Tools’
   sel GET STATUS

   Get Status of Arbitrary Event Code

   input Event Code – XXXX
   cmd Execute

   √ Annunciation – Inhibited
   
   Close window.
   Report event inhibited to MCC-H. >>
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY
AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

NOTE
This procedure changes the Primary NCS to ЦВМ (SM
Central Computer) interface from N1-2 to N1-1; therefore,
MCC-M must be notified prior to the execution of this
procedure.

On MCC GO

1. VERIFYING MDM STATES
   PCS2
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1
   
   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-2
   Verify Processing State – Primary

   Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1
   
   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-1
   Verify Processing State – Secondary/Standby

2. CONFIGURING MDM HEATERS
   PCS2
   Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1

   NOTE
   When MDM N1-2 is in Diagnostic/Standby/Off, the N1-2
   Operational Heater is not available and the N1-2 Survival Heater
   is required to maintain the MDM within temperature limits.

   ‘N1-1-Heaters’
   Verify Opr – Ena Ops

   ‘RPCM-N1-RS1-A’

   √RPC 5 Position – Cl

   ‘N1-2-Heaters’
   Verify Sur – Ena BU

   NOTE
   The MDM Survival Heaters default to Ena Ops in NCS R2.
   Ground will configure heaters as desired.
3. **DISABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC**

PCS2 Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node 1

‘Software Control’

sel MDM Utilities

```
Secondary_NCS_MDMUtilities
```

√Auto_Retry_Status – INH

If Auto_Retry_Status – ENA

```
cmd Inhibit Execute
```

√Auto_Retry_Status – INH

Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node 1

sel Processing State

```
Secondary NCS Processing State Transitions
```

‘Secondary MDM State Transitions’

√Auto Transition to Diag State – INH

If Auto Transition to Diag State – ENA

```
cmd Inhibit Execute
```

√Auto Transition to Diag State – INH

4. **SUBSYSTEM RECONFIGURATION**

The following equipment must be shut down as required prior to executing the MDM N1-2 transition.

√MCC-H for the proper configuration
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY
AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Smoke Detector 2 only.</td>
</tr>
<tr>
<td>Node 1 Port Fwd IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Port Fwd IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Stbd Aft IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Stbd Aft IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Fwd Port IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Fwd Port IMV Valve only.</td>
</tr>
<tr>
<td>Node 1 Fwd Stbd IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Fwd Stbd IMV Valve only.</td>
</tr>
</tbody>
</table>

5. COMMANDING N1-2 MDM TO DIAGNOSTIC STATE

**NOTE**

N1-2 MDM must be transitioned to Diagnostic before going to Standby because if it is commanded directly to Standby, it will transition back to Primary before N1-1 can become BC.

PCS2 Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1

sel Processing State

Primary NCS Processing State Transitions
‘Primary MDM Transitions’

√Auto_Transition to Diag State – ENA

If Auto_Transition to Diag State – INH

**cmd** Enable **Execute**

√Auto Transition to Diag State – ENA

√Manual Transition to Diag State – ENA
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

If Manual Transition to Diag State – INH
‘N1-2 MDM Transitions’
‘Manual Transition to Diag State’

**cmd** Arm  **Execute**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sending the following command will cause the loss of PCS2, Early COMM, and OIU telemetry until OIU reconfiguration and PCS1 reconnection are done.</td>
</tr>
<tr>
<td>2. Possible ‘PDI DECOM FAIL’ message.</td>
</tr>
</tbody>
</table>

**cmd** Transition  **Execute**

PCS2
Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1-2 transition to Diagnostic takes 2 minutes. There will be a loss of telemetry on PCS2.</td>
</tr>
</tbody>
</table>

Verify Frame Count static.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. N1-1 transition to Primary will take 1 minute. N1-1 should begin to transition to Primary after 42 seconds of not detecting a BC.</td>
</tr>
<tr>
<td>2. When N1-1 becomes Primary, UB EPS Buses will switch channels and N1-1 MDM will also switch from UB EPS N1-14 to UB EPS N1-23 attempting to communicate with N1-2 MDM.</td>
</tr>
</tbody>
</table>

6. **RECOVERING TELEMETRY ON PCS1**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following procedure is called to power up the PCS, start the CDS, and start the displays. Execute as required.</td>
</tr>
</tbody>
</table>

Perform EPCS SETUP, steps 4 --- 6 (SODF: ISS OPS: JOINT OPS), then:

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;W tone and ‘MDM N1-1 DETECTED RT FAIL MDM N1-2 PMA-1 C&amp;W’ message will be generated as N1-1 becomes Primary and detects N1-2 fail.</td>
</tr>
</tbody>
</table>
7. **TELEMETRY RECOVERY ON OIU**

   **NOTE**

   Possible ‘PDI DECOM FAIL’ message.

   CRT

   SM 212 OIU

   BUS 4 BC – ITEM 15 EXEC
   BUS 3 RT – ITEM 10 EXEC
   Change OIU N1 Physical Device to N1-1 – ITEM 18 +4 EXEC
   Reload OIU FORMAT 2 – ITEM 1 +2 EXEC

   SM 210 NODE

   Verify PHY ID PRI MDM – N1-1
   Verify STATE – PRI
   Verify FAIL – blank
   Verify FRM CTR incrementing

8. **VERIFYING N1-1 MDM STATE**

   PCS1
   Node 1: C&DH: MDM N1-1
   Primary NCS MDM Node 1

   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-1
   Verify Processing State – Primary

9. **VERIFYING RS STATE**

   If NCS interface is LBM (SM Central Computer)
   ‘Software Control’

   sel SMCC Control

   Primary NCS SMCC Control

   Verify SMCC Frame Count – <incrementing>

   If NCS interface is FGB
   FGB: C&DH: FGB MDM 2(1)

   Verify FGB Frame Count – <incrementing>

10. **VERIFYING N1-2 IS IN DIAGNOSTIC**

    PCS1
    Node 1: C&DH: MDM N1-2
    Secondary NCS MDM Node 1
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

Verify Frame Count static.

**NOTE**
Steps below will determine which bus and Bus ID to use in template for Mode Code.

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

sel UB EPS N1-14

**UB_EPS_N1_14**

sel RT Status

**UB_EPS_N1_14_RT_Status**

If 05 MDM N1-2 RT Status – ENA
Use Bus ID 2 in template command.

If 05 MDM N1-2 RT Status – INH

Primary NCS MDM Node 1

sel UB EPS N1-23

**UB_EPS_N1_23**

sel RT Status

**UB_EPS_N1_23_RT_Status**

Verify 05 MDM N1-2 RT Status – ENA
Use Bus ID 3 in template command.

Primary NCS MDM Node 1
‘Software Control’

sel Transmit Mode Code

Primary NCS Transmit Mode Code
‘Transmit Mode Code Commands’

input RT Address – 5
Bus ID – 2 or 3 (as determined above)
Mode Code – 2
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

(cmd) Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

NOTE
If Subsystem Flag Bit is ‘YES’, N1-2 MDM is in Diagnostic and is ready to accept diagnostic commands.

11. VERIFYING MDM AND SHELL HEATERS CONFIGURATIONS

PCS1
Node 1: EPS: RPCM N1RS2 C
RPCM N1RS2 C

√RPC 15 Position – Op

Notify MCC-H to perform NODE 1/PMA1 HEATER RECOVERY (SODF: GND: TCS), then:

12. RECONFIGURING N1-1 MDM EPS REMOTE TERMINALS

CRT
SM 200 APCU

√APCU2 OUT VOLTS RES LOW ≥ 121

If APCU2 OUT VOLTS RES LOW ≥ 121

PCS1
Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

sel LB SYS LAB_1

LAB_SYS_LAB_1

sel RT Status

LB_SYS_LAB_1_RT_Status

(cmd) 18 RPCM N14B C RT Status – Enable Execute
(cmd) 19 RPCM N14B B RT Status – Enable Execute
(cmd) 20 RPCM N14B A RT Status – Enable Execute

√RT 18, 19, 20 - RT Status – ENA

(cmd) 18 RPCM N14B C RT FDIR Status – Enable FDIR Execute
(cmd) 19 RPCM N14B B RT FDIR Status – Enable FDIR Execute
(cmd) 20 RPCM N14B A RT FDIR Status – Enable FDIR Execute

√RT 18, 19, 20 - RT FDIR Status – ENA
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

13. **CLEARING MDM BST ERROR LATCH**
   On MCC GO

   PCS1
   Node 1: C&DH: Primary NCS MDM
   Primary NCS MDM Node 1
   ‘Software Control’

   sel MDM Utilities

   Primary_NCS_MDM_Utilities
   ‘Clear Latched Data in BST A’

   **cmd** Clear  **Execute**

   If transitioning N1-2 to Diagnostic  >>
   If powering off N1-2, go to step 18.

14. **REINITIALIZING MDM FROM EEPROM TO TRANSITION TO STANDBY**

   PCS1
   Node 1: C&DH: MDM N1-1
   Primary NCS MDM Node 1
   ‘Software Control’

   sel MDM Utilities

   Primary_NCS_MDM_Utilities

   **NOTE**
   1. Reinitializing MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current Bus, RT, and application configuration.
   2. All UAS and default Configuration Tables will be loaded from EEPROM.
   3. Normal POST will also be performed.

   ‘N1-2 MDM’

   **NOTE**
   Per PR 13021, the MDM Reinit Cmds are now listed as “constrained” instead of certified since these commands can stop the MDM from operating. Power cycling is the only option for recovery.

   **cmd** Reinitialize EEPROM  **Execute**

   Wait 1 minute for MDM to reinitialize.
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

15. VERIFYING N1-2 IN STANDBY STATE

PCS1
Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-2
Verify Processing State – Standby

16. ENABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

PCS1
Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

[Primary_NCS_MDM_Utilities]

√Auto Retry Status – ENA

If Auto Retry Status – INH
  cmd Enable Execute

√Auto Retry Status – ENA

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

sel Processing State

[Primary_NCS_Processing_State_Transitions]
‘Primary MDM Transitions’

√Auto Transition to Diag State – ENA

If Auto Transition to Diag State – INH
  cmd Enable Execute

√Auto Transition to Diag State – ENA

17. CLEARING MDM BST ERROR LATCH
On MCC GO

PCS 1
Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1
‘Software Control’
A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY OR STANDBY

(sel MDM Utilities)

Secondary_NCS_MDM_Utilities
‘Clear Latched Data in BST A’

**cmd Clear Execute**

If transitioning N1-2 to Standby >>

18. **POWERING OFF N1-2 MDM**

PCS1 Node 1: EPS: RPCM N1RS2 C

RPCM N1RS2_C

sel RPC 13

RPCM_N1RS2_C_RPC_13

Verify RPC Position – Cl
Verify Open Cmd – Ena

‘RPC Position’

**cmd** RPC Position – Open (Verify – Op)
B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY
WHILE N1-1 IS PRIMARY

NOTE
This procedure changes the Primary NCS to (SM Central
Computer) interface from N1-2 to N1-1; therefore, MCC-M
must be notified prior to the execution of this procedure.

On MCC GO

1. VERIFYING MDM STATES

PCS1
Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1
Verify Processing State – Primary

Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1

If Frame Count – <incrementing>, go to step 5.

2. APPLYING POWER TO THE N1-2 MDM IF IT IS OFF

PCS1
Node 1: EPS: N1RS2 C
RPCM_N1RS2_C

sel RPC 13

RPCM_N1RS2_C_RPC_13

√RPC Position – Op

If RPC Position – Cl
Go to step 3.

‘Close Cmd’

cmd Enable

‘RPC Position’

cmd Close Execute

√RPC Position – Cl

Wait 90 seconds.
B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY

NOTE
Requires at least 90 seconds for MDM to start up, finish POST, and go to Standby state.

Go to step 5.

3. VERIFYING N1-2 IS IN DIAGNOSTIC
If required, perform this step to verify N1-2 is in Diagnostic.

PCS1

Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1

Verify Frame Count static

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

NOTE
Steps below will determine which bus and Bus ID to use in template command for Mode Code.

sel UB_EPS_N1_14

UB_EPS_N1_14

sel RT Status

UB_EPS_N1_14_RT_Status

If 05 MDM N1-2 RT Status – ENA
Use Bus ID 2 in template command.

If 05 MDM N1-2 RT Status – INH
Primary_NCS_MDM_Node 1

sel UB_EPS_N1_23

UB_EPS_N1_23

sel RT Status

UB_EPS_N1_23_RT_Status

If 05 MDM N1-2 RT Status – ENA
Use Bus ID 3 in template command.
B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY

Primary NCS MDM Node 1
‘Software Control’

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code
‘Transmit Mode Code Commands’

input T Address − 5
Bus ID − 2 or 3 (as determined above)
Mode Code − 2

*cmd Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

**NOTE**
If Subsystem Flag Bit is YES, N1-2 MDM is in Diagnostic and is ready to accept diagnostic commands.

4. BRINGING N1-2 TO STANDBY FROM DIAGNOSTIC

PCS1 Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

Primary_NCS_MDM_Utilities

**NOTE**
1. Reinitializing MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current bus, RT, and application configurations.

2. All UAS and default Configuration Tables will be loaded from EEPROM.

3. Normal POST will also be performed.

‘N1-2 MDM’

**cmd** Reinitialize EEPROM Execute

Wait 1 minute.

**NOTE**
It will take 60 seconds for MDM to reinitialize.
B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY
WHILE N1-1 IS PRIMARY

(ISS OPS/2A.2/FIN)  Page 4 of 10 Pages

5. VERIFYING N1-2 IS IN STANDBY STATE

PCS1

Secondary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-2
Verify Processing State – Standby

******************************************************************************
If state is not Standby, MDM N1-1 detected
MDM RT N1-2 failure.

√MCC-H
******************************************************************************

6. COMMANDING N1-1 TO SECONDARY

PCS1

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

NOTE
1. 2 should begin transition to Primary in 20 seconds if no BC is
detected after the following command is sent.

2. Sending the following command will cause the loss of PCS1,
   Early COMM, and OIU telemetry until OIU reconfiguration and
   PCS2 reconnection are done.

3. Possible ‘PDI DECOM FAIL’ message.

sel Processing State

Primary_NCS_Processing_State_Transitions
‘N1-1 MDM Transitions’

cmd Transition to Secondary State Execute

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

Verify Frame Count static (loss of PCS1 telemetry)

NOTE
N1-2 should begin to transition to Primary
after 20 seconds of no BC detected.
7. **TELEMETRY RECOVERY ON PCS2**

   **NOTE**
   The following steps power up the PCS, start the CDS, and start the displays. Execute as required.

   Perform EPCS SETUP, steps 4 --- 6 (SODF: ISS OPS: JOINT OPERATIONS), then:

8. **TELEMETRY RECOVERY ON OIU**

   **NOTE**
   Possible ‘**PDI DECOM FAIL**’ message.

   CRT
   
   SM 212 OIU
   
   BUS 3 BC – ITEM 11 EXEC
   BUS 4 RT – ITEM 14 EXEC
   Change OIU N1 Physical Device to N1-2 – ITEM 18 +3 EXEC
   Reload OIU FORMAT 2 – ITEM 1 +2 EXEC
   
   SM 210 NODE
   
   Verify PHY ID PRI MDM – N1-2
   Verify STATE – PRI
   Verify FAIL – blank
   Verify FRM CTR incrementing

9. **VERIFYING MDM STATES**

   PCS2
   
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1
   
   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-2
   Verify Processing State – Primary
   
   Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1
   
   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-1
   Verify Processing State – Secondary

************************************************************
   If states are not correct or no N1-2 TLM, \**MCC-H.**
************************************************************
10. **VERIFYING RS STATE**
   If NCS interface is **LBIM** (SM Central Computer)
   - Primary NCS MDM Node 1
     - ‘Software Control’
     - sel SMCC Control
     - Primary NCS SMCC Control
     - Verify SMCC Frame Count – <incrementing>
   If NCS interface is FGB
   - FGB: C&DH: FGB MDM 2(1)
     - FGB MDM
   - Verify FGB Frame Count – <incrementing>

11. **ENABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC**
    PCS2 Node 1: C&DH: MDM N1-1
    - Secondary NCS MDM Node 1
      - ‘Software Control’
      - sel MDM Utilities
      - Secondary NCS MDM Utilities
      - √ Auto Retry Status – ENA
    If Auto Retry Status – INH
      - cmd Enable Execute
      - √ Auto Retry Status – ENA
    Secondary NCS MDM Node 1
    - sel Processing State
    - Secondary NCS Processing State Transitions
      - ‘Secondary MDM State Transitions’
      - √ Auto Transition to Diag State – ENA
    If Auto Transition to Diag State – INH
      - cmd Enable Execute
      - √ Auto Transition to Diag State – ENA
12. **CLEARING MDM BST ERROR LATCH**

On MCC GO

PCS 1  
Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1
   ‘Software Control’

   sel MDM Utilities

   Primary_NCS_MDM_Utilities
   ‘Clear Latched Data in BST A’

   **cmd** Clear  **Execute**

Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1
   ‘Software Control’

   sel MDM Utilities

   Secondary_NCS_MDM_Utilities
   ‘Clear Latched Data in BST A’

   **cmd** Clear  **Execute**

13. **CONFIGURING MDM HEATERS**

PCS 2  
Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1
   ‘RPCM-N1-RS2-C’

   √RPC 4 Position – Close

   If RPC 4 Position – Open
      sel RPC 4

      RPCM_N1RS2_C_RPC_04
      ‘RPC Position’

      **cmd** Close

      √RPC Position – Cl

      ‘N1-1 Heaters’

      Verify Sur – Ena BU
B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY

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The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

‘N1-2 Heaters’

Verify Opr – Ena Ops
Verify Sur – Ena BU

Notify MCC-H to perform NODE 1/PMA 1 HEATER RECOVERY, all (SODF: GND: TCS), then:

14. RECONFIGURING N1-2 MDM EPS REMOTE TERMINALS

CRT SM 200 APCU

√APCU1 OUT VOLTS RES LOW ≥ 121

If APCU1 OUT VOLTS RES LOW ≥ 121

PCS Node 1: C&DH: MDM N1-2

Primary NCS MDM Node 1

sel LB SYS LAB_2

SEL SYS LAB_2

sel RT Status

LB_SYS_LAB_2_RT_Status

cmd 18 RPCM N13B C RT Status – Enable Execute

cmd 19 RPCM N13B B RT Status – Enable Execute

cmd 20 RPCM N13B A RT Status – Enable Execute

√RT 18, 19, 20 - RT Status – ENA

cmd 18 RPCM N13B C RT FDIR Status – Enable FDIR Execute

cmd 19 RPCM N13B B RT FDIR Status – Enable FDIR Execute

cmd 20 RPCM N13B A RT FDIR Status – Enable FDIR Execute

√RT 18, 19, 20 - RT FDIR Status – ENA

15. RECONFIGURING N1-1 MDM EPS REMOTE TERMINALS

CRT SM 200 APCU

√APCU2 OUT VOLTS RES LOW ≥ 121
B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY

If APCU2 OUT VOLTS RES LOW $\geq 121$

PCS

Node 1: C&DH: MDM_N1-1

Secondary NCS MDM Node 1

sel LB SYS LAB_1

 sel RT Status

 LB_SYS_LAB_1_RT_Status

 cmd 18 RPCM N14B C RT Status – Enable Execute
 cmd 19 RPCM N14B B RT Status – Enable Execute
 cmd 20 RPCM N14B A RT Status – Enable Execute

$\sqrt{RT\ 18,\ 19,\ 20\ -\ RT\ Status\ –\ ENA}$

 cmd 18 RPCM N14B C RT FDIR Status – Enable FDIR Execute
 cmd 19 RPCM N14B B RT FDIR Status – Enable FDIR Execute
 cmd 20 RPCM N14B A RT FDIR Status – Enable FDIR Execute

$\sqrt{RT\ 18,\ 19,\ 20\ -\ RT\ Status\ –\ ENA}$

16. SUBSYSTEM RECONFIGURATION

As required, reactivate the following MDM N1-2 equipment.

$\sqrt{MCC-H}$ for the proper configuration

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Smoke Detector 2.</td>
</tr>
<tr>
<td>Node 1 Port Fwd IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Port Fwd IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Stbd Aft IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Stbd Aft IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Fwd Port IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Fwd Port IMV Valve only.</td>
</tr>
<tr>
<td>Node 1 Fwd Stbd IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Fwd Stbd IMV Valve only.</td>
</tr>
</tbody>
</table>
17. **RESETTING ACS MODING**

If during Docked Ops, go to ACS PRE-DEPARTURE MODING for N1-2, all (SODF: ISS OPS: MCS).
1. **VERIFYING MDM STATES AND MDM IDs**

**PCS1**

Node 1: C&DH: MDM N1-1

- Verify Frame Count – <incrementing>
- Verify MDM ID – N1-1
- Verify Processing State – Primary

Node 1: C&DH: MDM N1-2

- Secondary NCS MDM Node 1

- Verify Frame Count – <incrementing>
- Verify MDM ID – N1-2
- Verify Processing State – Standby

2. **CONFIGURING MDM HEATERS**

**PCS1**

Node 1: C&DH: MDM N1-1

- Primary NCS MDM Node 1

**NOTE**

When MDM N1-2 is in Diagnostic/Standby/Off, the N1-2 Operational Heater is not available and the N1-2 Survival Heater is required to maintain the MDM within temperature limits.

‘RPCM N1RS1 A’

√RPC 5 Position – Cl

If Open

sel RPC 5

<table>
<thead>
<tr>
<th>RPCM_N1RS1_A_RPC_05</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd Close</td>
</tr>
</tbody>
</table>

√Position – Close

‘N1-1-Heaters’

Verify Opr – Ena Ops

‘N1-2-Heaters’

Verify Sur – Ena BU
D. TRANSITIONING N1-2 TO DIAGNOSTIC/OFF FROM STANDBY WHILE N1-1 IS PRIMARY
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NOTE
The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

3. DISABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

PCS1
Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

Primary NCS MDM Utilities

√Auto Retry Status – INH

If Auto Retry Status – ENA
cmd Inhibit Execute

√Auto_Retry_Status – INH

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

sel Processing State

Primary NCS Processing State Transitions
‘Primary MDM Transitions’

√Auto Transition to Diag State – INH

If Auto Transition to Diag State – ENA
cmd Inhibit Execute

√Auto Transition to Diag State – INH

4. COMMANDING N1-2 TO DIAGNOSTIC

PCS1
Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1

sel Processing State

Secondary NCS Processing State Transitions
‘Secondary MDM State Transitions’

√Auto Transition to Diag State – ENA
D. TRANSITIONING N1-2 TO DIAGNOSTIC/OFF FROM STANDBY WHILE N1-1 IS PRIMARY

If Auto Transition to Diag State – INH
    cmd Auto Transition to Diag State – Enable Execute

    √Auto Transition to Diag State – ENA

√Manual Transition to Diag State – ENA

If Manual Transition to Diag State – INH
    ‘N1-2 MDM Transitions’

    ‘Manual Transition to Diag State’

    cmd Arm Execute

    √Manual Transition to Diag State – ENA

Node 1: CDH: MDM N1-1
    Primary NCS MDM Node 1

sel Processing State

    Primary_NCS_Processing_State_Transition
    ‘N1-2 MDM Transitions’

    ‘Manual Transition to Diag State’

    cmd Transition Execute

Wait 1 minute for transition to complete.

5. VERIFYING N1-2 IS IN DIAGNOSTIC

PCS1 Node 1: C&DH: MDM N1-2
    Secondary NCS MDM Node 1

Verify Frame Count static

Node 1: C&DH: MDM N1-1
    Primary NCS MDM Node 1

    NOTE
    It is necessary to identify the EPS bus that the Node 1 MDMs
    are using to communicate with each other to determine the
    Bus ID for the Transmit Mode Code command that will be sent
    to verify the MDM is in Diagnostic.

    sel UB EPS N1 14
D. TRANSITIONING N1-2 TO DIAGNOSTIC/OFF FROM STANDBY WHILE N1-1 IS PRIMARY

If 05 MDM N1-2 - RT Status – ENA
Use Bus ID 2 for template command.

If 05 MDM N1-2 - RT Status – INH

Primary NCS MDM Node 1

sel UB EPS N1 23

UB_EPS_N1_23

sel RT Status

UB_EPS_N1_23_RT_Status

If 05 MDM N1-2 - RT Status – ENA
Use Bus ID 3 for template command.

Primary NCS MDM Node 1
‘Software Control’

sel Transmit Mode Code

Primary NCS Transmit Mode Code
‘Transmit Mode Code Commands’

input RT Address – 5
Bus ID – 2 or 3 (as determined above)
Mode code – 2

cmd Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

NOTE
If Subsystem Flag bit is YES, N1-2 MDM is in Diagnostic state and is ready to accept diagnostic commands.

If transitioning N1-2 to Diagnostic >>
D. TRANSITIONING N1-2 TO DIAGNOSTIC/OFF FROM STANDBY WHILE N1-1 IS PRIMARY

6. **POWERING OFF N1-2 MDM**

PCS1 Node 1: EPS: RPCM N1RS2C

```plaintext
RPCM_N1RS2_C
```

Sel RPC 13

```plaintext
RPCM_N1RS2_C_RPC_13
```

√RPC Position – Cl
√Open Cmd – Ena

If Open Cmd – Inh

  *cmd Enable Execute*

  √Open Cmd – Ena

‘RPC Position’

  *cmd Open Execute*

√RPC Position – Op
This Page Intentionally Blank
E. TRANSITIONING N1-1 TO SECONDARY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

NOTE

This procedure changes the Primary NCS to ЦВМ (SM Central Computer) interface from N1-2 to N1-1; therefore, MCC-M must be notified prior to the execution of this procedure.

On MCC GO

1. VERIFYING MDM STATES AND MDM IDs

PCS1

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1
Verify Processing State – Primary

Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-2
Verify Processing State – Standby

2. COMMANDING N1-1 TO SECONDARY

PCS1

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node 1

sel Processing State

Primary NCS Processing State Transitions
‘N1-1 MDM Transitions’

NOTE

1. N1-2 should begin transition to Primary in 20 seconds if no BC is detected after the following command is sent.

2. Sending the following command will cause the loss of PCS1, Early COMM, and OIU telemetry until OIU reconfiguration and PCS2 reconnection are done.

3. Possible ‘PDI DECOM FAIL’ message.

cmd Transition to Secondary State  Execute

Verify Frame Count static (loss of PCS1 telemetry)
3. **TELEMETRY RECOVERY ON PCS**

   **NOTE**
   The following steps power up the PCS, start the CDS, and start the displays.

   As required, perform EPCS SETUP, steps 4 --- 6 (SODF: ISS OPS: C&DH), then:

4. **TELEMETRY RECOVERY ON OIU**

   **NOTE**
   Possible ‘PDI DECOM FAIL’ message.

   CRT
   SM 212 OIU

   BUS 3 BC – ITEM 11 EXEC
   BUS 4 RT – ITEM 14 EXEC
   Change OIU N1 Physical Device to N1-2 – ITEM 18 +3 EXEC
   Reload OIU FORMAT 2 – ITEM 1 ± 2 EXEC

   SM 210 NODE
   Verify PHY ID PRI MDM – N1-2
   Verify STATE – PRI
   Verify FAIL – blank
   Verify FRM CTR incrementing

5. **VERIFYING MDM STATES**

   PCS2
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1
   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-2
   Verify Processing State – Primary

   Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1
   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-1
   Verify Processing State – Secondary

   ***********************************************************
   If States are not correct or no N1-2 TLM, \(\sqrt{MCC-H}\).
   ***********************************************************
E. TRANSITIONING N1-1 TO SECONDARY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

6. VERIFYING RS STATE

If NCS interface is UBM (SM Central Computer)

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
<th>&quot;Software Control&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>sel SMCC Control</td>
<td></td>
</tr>
<tr>
<td>Primary NCS SMCC Control</td>
<td></td>
</tr>
<tr>
<td>Verify SMCC Frame Count – &lt;incrementing&gt;</td>
<td></td>
</tr>
</tbody>
</table>

If NCS interface is FGB

<table>
<thead>
<tr>
<th>FGB: C&amp;DH: FGB MDM 2(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FGB_MDM</td>
</tr>
<tr>
<td>Verify FGB Frame Count – &lt;incrementing&gt;</td>
</tr>
</tbody>
</table>

7. CLEARING MDM BST ERROR LATCH

On MCC GO

Node 1: C&DH: Primary NCS MDM

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
<th>&quot;Software Control&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>sel MDM Utilities</td>
<td></td>
</tr>
<tr>
<td>Primary NCS MDM Utilities</td>
<td></td>
</tr>
<tr>
<td>‘Clear Latched Data in BST A’</td>
<td></td>
</tr>
</tbody>
</table>

**cmd Clear  Execute**

Node 1: C&DH: Secondary NCS MDM

<table>
<thead>
<tr>
<th>Secondary NCS MDM Node 1</th>
<th>&quot;Software Control&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>sel MDM Utilities</td>
<td></td>
</tr>
<tr>
<td>Secondary NCS MDM Utilities</td>
<td></td>
</tr>
<tr>
<td>‘Clear Latched Data in BST A’</td>
<td></td>
</tr>
</tbody>
</table>

**cmd Clear  Execute**

8. CONFIGURING MDM HEATERS

PCS2

Node 1: C&DH: MDM N1-2

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
<th>&quot;RPCM N1RS2 C’</th>
</tr>
</thead>
</table>

22 DEC 99 131
E. TRANSITIONING N1-1 TO SECONDARY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

√RPC 4 Position – Cl

If RPC 4 Position – Op
   sel RPC 4

   RPCM_N1RS2_C_RPC_04
   ‘RPC Position’

   cmd Close (Verify – Cl)

‘N1-1-Heaters’

Verify Sur – Ena BU

NOTE
The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

‘N1-2 – Heaters’

Verify Opr – Ena Ops
Verify Sur – Ena BU

NOTE
MCC-H will perform NODE 1/PMA 1/HEATER RECOVERY, all (SODF: GND: TCS).

9. RECONFIGURING N1-2 EPS REMOTE TERMINALS

SM 200 APCU

√APCU1 OUT VOLTS RES LOW ≥ 121

If APCU1 OUT VOLTS RES LOW ≥ 121

   PCS

   Node 1: C&DH: MDM_N1-2
   Primary NCS MDM Node1

   sel LB SYS LAB_2

   LB_SYS_LAB_2

   sel RT Status

   LB_SYS_LAB_2_RT_Status
E. TRANSITIONING N1-1 TO SECONDARY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

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- **cmd 18 RPCM N13B C RT Status – Enable Execute**
- **cmd 19 RPCM N13B B RT Status – Enable Execute**
- **cmd 20 RPCM N13B A RT Status – Enable Execute**

√RT 18, 19, 20 - RT Status – ENA

- **cmd 18 RPCM N13B C RT FDIR Status – Enable FDIR Execute**
- **cmd 19 RPCM N13B B RT FDIR Status – Enable FDIR Execute**
- **cmd 20 RPCM N13B A RT FDIR Status – Enable FDIR Execute**

√RT 18, 19, 20 - RT FDIR Status – ENA

10. **RECONFIGURING N1-1 MDM EPS REMOTE TERMINALS**

**CRT**

| SM 200 APCU |

√APCU2 OUT VOLTS RES LOW ≥ 121

If APCU2 OUT VOLTS RES LOW ≥ 121

**PCS**

Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node 1

sel LB SYS LAB 1

| LB_SYS_LAB_1 |

sel RT Status

| LB_SYS_LAB_1_RT_Status |

- **cmd 18 RPCM N14B C RT Status – Enable Execute**
- **cmd 19 RPCM N14B B RT Status – Enable Execute**
- **cmd 20 RPCM N14B A RT Status – Enable Execute**

√RT 18, 19, 20 - RT Status – ENA

- **cmd 18 RPCM N14B C RT FDIR Status – Enable FDIR Execute**
- **cmd 19 RPCM N14B B RT FDIR Status – Enable FDIR Execute**
- **cmd 20 RPCM N14B A RT FDIR Status – Enable FDIR Execute**

√RT 18, 19, 20 - RT FDIR Status – ENA

11. **RECONFIGURING SUBSYSTEMS**

Perform C&DH RECONFIGURE FOR THE NODE 1 MDMs for N1-2, all (SODF: ISS OPS: C&DH), then:
E. TRANSITIONING N1-1 TO SECONDARY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

12. **RESETTING ACS MODING**
   If during Docked Ops, go to ACS PRE-DEPARTURE MODING, all
   (SODF: ISS OPS: MCS).
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

On MCC GO

1. VERIFYING MDM STATES

PCS1

Node 1: C\&DH: MDM N1-1
Primary NCS MDM Node 1

- Verify Frame Count – <incrementing>
- Verify MDM ID – N1-1
- Verify Processing State – Primary

PCS2

Node 1: C\&DH: MDM N1-2
Secondary NCS MDM Node 1

- Verify Frame Count – <incrementing>
- Verify MDM ID – N1-2
- Verify Processing State – Standby

2. VERIFYING MDM HEATER STATUS

PCS1

Node 1: C\&DH: MDM N1-2
Secondary NCS MDM Node 1
‘RPCM N1RS2 C’

\sqrt{RPC} 4 Position – Cl

‘N1-1-Heaters’

Verify Sur – Ena BU

NOTE
The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

‘N1-2-Heaters’

Verify Opr – Ena Ops
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

3. DISABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

PCS2

Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node 1

'Software Control'

sel MDM Utilities

| Secondary_NCS_MDMUtilities |

√Auto Retry Status – INH

If Auto Retry Status – ENA

  cmd Inhibit Execute

  √Auto Retry Status – INH

Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

sel Processing State

| Secondary NCS Processing State Transitions |

‘Secondary MDM State Transitions’

√Auto Transition to Diag State – INH

If Auto Transition to Diag State – ENA

  cmd Inhibit Execute

  √Auto Transition to Diag State – INH
4. **SUBSYSTEM RECONFIGURATION**

The following equipment must be shut down as required prior to executing the MDM N1-1 transition.

√**MCC-H** for the proper configuration

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Cabin Fan</td>
<td>NODE 1 CABIN FAN DEACTIVATION, (SODF: ISS OPS: ECLSS)</td>
<td>This procedure will shut down the Cabin Fan and both Node 1 Smoke Detectors.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 1</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Execute only if Node 1 Cabin Fan deactivation not performed.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Execute only if Node 1 Cabin Fan deactivation not performed.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Aft Port IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Valve</td>
<td>NODE 1 AFT PORT IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Aft Port IMV Valve.</td>
</tr>
<tr>
<td>Node 1 Aft Stbd IMV Valve</td>
<td>NODE 1 AFT STBD IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Aft Stbd IMV Valve.</td>
</tr>
</tbody>
</table>

5. **COMMAN DING N1-1 TO DIAGNOSTIC**

<table>
<thead>
<tr>
<th>NOTE</th>
<th>When MDM N1-1 is commanded to Diagnostic, the following heaters are commanded to their default state, which is off.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PMA 1 Shell Heaters 1A, 3A, 4A, and 5A</td>
</tr>
<tr>
<td></td>
<td>Node 1 Shell Heaters 1A --- 9A</td>
</tr>
<tr>
<td></td>
<td>MDM N1-1 Operational Heater</td>
</tr>
<tr>
<td></td>
<td>MDM N1-2 Survival Heater</td>
</tr>
</tbody>
</table>

PCS1

Node 1: C&DH: MDM N1-1

Primary NCS MDM Node 1

sel Processing State

Primary NCS Processing State Transitions

‘Primary MDM Transitions’

√Auto_Transition_to_Diag_State – ENA
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

If Auto_Transition_to_Diag_State – INH
   cmd Enable Execute

   √Auto_Transition_to_Diag_State – ENA

   √Manual_Transition_to_Diag_State – Arm

If Manual_Transition_to_Diag_State – Disarm
   ‘N1-1 MDM Transitions’
   ‘Manual Transition to Diag State’

   cmd Arm Execute

   √Manual Transition to Diag State – Arm

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sending the following command will cause the loss of PCS1, Early COMM, and OIU telemetry until OIU reconfiguration and PCS2 reconnection are done.</td>
</tr>
<tr>
<td>2. Possible ‘PDI DECOM FAIL’ message.</td>
</tr>
</tbody>
</table>

‘N1-1 MDM Transitions’
‘Manual Transition to Diag State’

   cmd Transition Execute

Wait 2 minutes.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>It takes 2 minutes for N1-1 to transition to Diagnostic. There will be a loss of telemetry on PCS1.</td>
</tr>
</tbody>
</table>

   √Frame Count static (loss of PCS telemetry)

Wait 1 minute.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It takes 1 minute for N1-2 to transition to Primary. (N1-2 begins transition to Primary after detecting no BC for 20 seconds).</td>
</tr>
<tr>
<td>2. When N1-2 becomes Primary, UB EPS buses will switch channels and N1-2 MDM will also switch from UB EPS N1-14 to UB EPS N1-23 in attempting to communicate with N1-1 MDM.</td>
</tr>
</tbody>
</table>
6. **TELEMETRY RECOVERY ON PCS2**

   **NOTE**
   The following steps powerup the PCS, start the CDS, and start the displays. Execute as required.

   Perform EPCS SETUP, steps 4 --- 6 (SODF: ISS OPS: C&DH), then:

   **NOTE**
   C&W tone and ‘MDM N1-2 DETECTED RT FAIL MDM N1-1 PMA-1 C&W’ message will be generated as N1-2 becomes Primary and detects N1-1 fail.

7. **TELEMETRY RECOVERY ON OIU**

   **NOTE**
   Possible ‘PDI DECOM FAIL’ message.

   **CRT**
   SM 212 OIU

   BUS 3 BC – ITEM 11 EXEC
   BUS 4 RT – ITEM 14 EXEC
   Change OIU N1 Physical Device to N1-2 – ITEM 18 +3 EXEC
   Reload OIU FORMAT 2 – ITEM 1 +2 EXEC

   **SM 210 NODE**

   Verify PHY ID PRI MDM – N1-2
   Verify STATE – PRI
   Verify FAIL – blank
   Verify FRM CTR incrementing

8. **VERIFYING MDM STATE**

   **PCS2**
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1

   Verify Frame Count – <incrementing>
   Verify MDM ID – N1-2
   Verify Processing State – Primary
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

9. VERIFYING RS STATE
   If NCS Interface is LBM (SM Central Computer), ‘Software Control’
   sel SMCC Control
      Primary NCS SMCC Control
   Verify SMCC Frame Count – <incrementing>

   If NCS interface is FGB
   FGB: C&DH: FGB MDM 2(1)
      FGB_MDM
   Verify FGB Frame Count – <incrementing>

10. VERIFYING N1-1 IS IN DIAGNOSTIC
    PCS2
    Node 1: C&DH: MDM N1-1
    Secondary NCS MDM Node 1

    Verify Frame Count static

    NOTE
    Steps below will determine which bus and Bus ID to use in template command for Mode Code.

    sel UB EPS N1 14
       UB_EPS_N1_14
    sel RT Status
       UB_EPS_N1_14_RT_Status

    If 06 MDM N1-1 RT Status – ENA
       Use Bus ID 2 in template command.

    If 06 MDM N1-1 RT Status – INH
       Primary_NCS_MDM_Node 1

    sel UB EPS N1 23
       UB_EPS_N1_23
    sel RT Status
       UB_EPS_N1_23_RT_Status
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

If 06 MDM N1-1 - RT Status – ENA
Use Bus ID 3 in template command.

- Primary NCS MDM Node 1
  - Software Control

sel Transmit Mode Code

- Primary_NCS_Transmit_Mode_Code
  - Transmit Mode Code Commands

input RT Address – 6
  - Bus ID – 2 or 3 (as determined above)
  - Mode Code – 2

**cmd** Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

**NOTE**
If Subsystem Flag Bit is YES, N1-2 MDM is in Diagnostic and is ready to accept diagnostic commands.

11. CONFIGURING MDM HEATERS

PCS2

- Node 1: C&DH: MDM N1-2
  - Primary NCS MDM Node 1
    - RPCM N1RS2 C’

√RPC 4 Position – Cl

If RPC 4 Position – Op
  sel RPC 4

- RPCM_N1RS2_C_RPC_04
  - RPC Position

**cmd** Close

√RPC 4 Position – Cl

- Primary NCS MDM Node 1
  - ‘N1-1-Heaters’

Verify Sur – Ena BU
### F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

#### NOTE

1. The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

2. **MCC** will perform NODE 1/PMA 1 HEATER RECOVERY (SODF: GND: TCS).

---

#### 12. RECONFIGURING N1-2 REMOTE TERMINALS

- **CRT**
  - SM 200 APCU Status

  √ APCU1 OUT VOLTS RES LOW ≥ 121

  If APCU1 OUT VOLTS RES LOW ≥ 121

  - **PCS2**
    - Node 1: C&DH: MDM N1-2
    - Primary NCS MDM Node 1

    sel LB SYS LAB 2

    LB SYS LAB 2

    sel RT Status

    LB SYS LAB 2 RT Status

    **cmd** 18 RPCM N13B C RT Status – Enable **Execute**

    **cmd** 19 RPCM N13B B RT Status – Enable **Execute**

    **cmd** 20 RPCM N13B A RT Status – Enable **Execute**

  √ RT 18, 19, 20 - RT Status – ENA

    **cmd** 18 FDIR RPCM N13B C RT FDIR Status – Enable FDIR **Execute**

    **cmd** 19 FDIR RPCM N13B B RT FDIR Status – Enable FDIR **Execute**

    **cmd** 20 FDIR RPCM N13B A RT FDIR Status – Enable FDIR **Execute**

  √ RT 18, 19, 20 - RT FDIR Status – ENA
13. **RECONFIGURATION OF N1-2 MDM EQUIPMENT**

Reactivate the following MDM N1-2 equipment as required.

√ **MCC-H** for the proper configuration

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION</td>
<td>Activate Node 1 Smoke Detector 2.</td>
</tr>
<tr>
<td></td>
<td>(SODF: ISS OPS: ECLSS)</td>
<td></td>
</tr>
<tr>
<td>Node 1 Port Fwd IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Port Fwd IMV Fan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Node 1 Fwd Port IMV Valve</td>
<td>NODE 1 FWD PORT IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Fwd Port IMV Valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. **CLEARING MDM BST ERROR LATCH**

For the N1-2 MDM only, perform NCS MDM BST CLEAR LATCHED DATA - GROUND, all (SODF: GND: C&DH), then:

If transitioning N1-1 to Diagnostic, go to step 20.

If powering off N1-1, go to step 19.

15. **REINITIALIZING MDM FROM EEPROM TO TRANSITION TO STANDBY**

PCS2

Node 1: C&DH: MDM N1-2

Primary NCS MDM Node 1

‘Software Control’

sel MDM Utilities

Primary NCS MDM Utilities

‘N1-1 MDM’

**NOTE**

Per PR 13021, the MDM Reinit Cmnds are now listed as “constrained” instead of certified since these commands can stop the MDM from operating. Power cycling is the only option for recovery.

**cmd** Reinitialize EEPROM  **Execute**

Wait 1 minute.
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

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NOTE
MDM to reinitialize takes 1 minute.

16. VERIFYING N1-1 IN STANDBY STATE

PCS2
Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1
Verify Processing State – Standby

*******************************
If state is not Standby, √MCC-H.
*******************************

17. ENABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

PCS2
Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Auto Retry Status – ENA

If Auto Retry Status – INH
cmd Enable Execute

√Auto Retry Status – ENA

Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1

sel Processing State

Primary_NCS_Processing_State_Transitions
‘Primary MDM Transitions’

√Auto Transition to Diag State – ENA

If Auto Transition to Diag State – INH
cmd Enable Execute

√Auto Transition to Diag State – ENA
F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY AND N1-2 TO PRIMARY FROM STANDBY

18. CLEARING MDM BST ERROR LATCH
   For the N1-1 MDM only, perform NCS MDM BST CLEAR LATCHED DATA - GROUND, all (SODF: GND: C&DH), then:
   
   If transitioning N1-1 to Standby, go to step 20.

19. POWERING OFF N1-1 MDM
   PCS2
   Node 1: EPS: RPCM N1RS1 A
   
   sel RPC 11
   
   RPCM_N1RS1_A_RPC_11
   
   √RPC Position – Cl
   √Open Cmd – Ena
   
   If Open Cmd – Inh
   cmd Enable Execute
   
   √Open Cmd – Ena
   ‘RPC Position’
   
   cmd Open Execute
   
   √RPC Position – Op

20. RESETTING ACS MODING
   If during Docked Ops, go to ACS PRE-DEPARTURE MODING, all (SODF: ISS OPS: MCS).
G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

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1. **VERIFYING MDM STATES**

**PCS1**

Node 1: C&DH: MDM N1-2

Primary NCS MDM Node 1

- Verify Frame Count – <incrementing>
- Verify MDM ID – N1-2
- Verify Processing State – Primary

**PCS2**

Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node 1

- Verify Frame Count – <incrementing>
- Verify MDM ID – N1-1
- Verify Processing State – Secondary

**NOTE**

While MDM N1-1 is in a non-operative state, the Node 1 Cabin Fan and Node 1 Aft Port IMV fans will both be off. If this condition occurs during Node 1/FGB Ingress, the Ingress time must be limited, or portable fans must be set up to compensate for the loss of ventilation.

2. **CONFIGURING MDM HEATERS**

**NOTE**

When MDM N1-1 is in Diagnostic/Standby/Off, the N1-1 Operational Heater is not available and the N1-1 Survival Heater is required to maintain the MDM within temperature limits.

**PCS2**

Node 1: C&DH: MDM N1-2

Primary NCS MDM Node 1

‘RPCM N1RS2 C’

√ RPC 4 Position – Cl

‘N1-1 Heaters’

Verify Sur – Ena BU

**NOTE**

The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

‘N1-2-Heaters’

Verify Opr – Ena Ops
3. **DISABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC**

PCS2

Node 1: C&DH: MDM N1-2

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
</tr>
</thead>
</table>

‘Software Control’

sel MDM Utilities

<table>
<thead>
<tr>
<th>Primary_NCS_MDM_Utilities</th>
</tr>
</thead>
</table>

√ Auto Retry Status – INH

If Auto Retry Status – ENA

<table>
<thead>
<tr>
<th>cmd</th>
<th>Inhibit</th>
<th>Execute</th>
</tr>
</thead>
</table>

√ Auto Retry Status – INH

Node 1: C&DH: MDM N1-2

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
</tr>
</thead>
</table>

sel Processing State

<table>
<thead>
<tr>
<th>Primary_NCS_Processing_State_Transitions</th>
</tr>
</thead>
</table>

‘Primary MDM Transitions’

√ Auto Transition to Diag State – INH

If Auto Transition to Diag State – ENA

<table>
<thead>
<tr>
<th>cmd</th>
<th>Inhibit</th>
<th>Execute</th>
</tr>
</thead>
</table>

√ Auto Transition to Diag State – INH

4. **SUBSYSTEM RECONFIGURATION**

The following equipment must be shut down as required prior to executing the MDM N1-1 transition.

√ MCC-H for the proper configuration
G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Cabin Fan</td>
<td>NODE 1 CABIN FAN DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>This procedure will shut down the Cabin Fan and both Node 1 Smoke Detectors.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 1</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Execute only if Node 1 Cabin Fan deactivation not performed.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Execute only if Node 1 Cabin Fan deactivation not performed.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Aft Port IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Aft Port IMV Valve only.</td>
</tr>
<tr>
<td>Node 1 Aft Stbd IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Deactivate Node 1 Aft Stbd IMV Valve only.</td>
</tr>
</tbody>
</table>

5. TRANSITIONING N1-1 MDM TO DIAGNOSTIC

**NOTE**

When MDM N1-1 is commanded to Diagnostic, the following heaters are commanded to their default state, which is off.
- PMA 1 Shell Heaters 1A, 3A, 4A, and 5A
- Node 1 Shell Heaters 1A --- 9A
- MDM N1-1 Operational Heater
- MDM N1-2 Survival Heater.

PCS2
Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node 1

sel Processing State

```
Secondary_NCS_Processing_State_Transitions
'Secondary MDM State Transitions'

√ Manual Transition to Diag State – ENA
```

If Manual Transition to Diag State – INH

‘N1-1 MDM Transitions’

‘Manual Transition to Diag State’

**cmd Arm Execute**

‘Secondary MDM State Transitions’

√ Manual Transition to Diag State – ENA
G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

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√Auto_Transition to Diag State – ENA

If Auto_Transition to Diag State – INH
   cmd Enable Execute

√Auto_Transition to Diag State – ENA

‘N1-1 MDM Transitions’
‘Manual Transitions to Diag State’

cmd Transition Execute

Wait 2 minutes for N1-1 to transition to Diagnostic.

6. VERIFYING N1-1 IS IN DIAGNOSTIC STATE

PCS2

Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1

√Frame Count static

NOTE
Steps below will determine which bus and Bus ID to use in template command for Mode code.

Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1

sel UB EPS N1 14

UB_EPS_N1_14

sel RT Status

UB_EPS_N1_14_RT_Status

If 06 MDM N1-1 RT Status – ENA
   Use Bus ID 2 in template command.

If 06 MDM N1-1 RT Status – INH

Primary_NCS_MDM_Node 1

sel UB EPS N1-23

UB_EPS_N1_23

sel RT Status

UB_EPS_N1-23_RT_Status
G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

If 06 MDM N1-1 RT Status – ENA
Use Bus ID 3 in template command.

<table>
<thead>
<tr>
<th>Primary NCS MDM Node 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Software Control’</td>
</tr>
</tbody>
</table>

sel Transmit Mode Code

<table>
<thead>
<tr>
<th>Primary_NCS_Transmit_Mode_Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Transmit Mode Code commands’</td>
</tr>
</tbody>
</table>

input RT Address – 6
Bus ID – 2 or 3 (as determined above)
Mode code – 2
cmd Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

NOTE
If Subsystem Flag Bit is YES, N1-1 MDM is in Diagnostic and is ready to accept diagnostic commands.

7. VERIFYING MDM AND SHELL HEATER CONFIGURATIONS

PCS2

Node 1: EPS: RPCM N1RS1 C

RPCM_N1RS1_C

√RPC 2 Position – Op

NOTE
MCC will perform NODE 1/PMA 1 HEATER RECOVERY (SODF: GND: TCS).

If transitioning N1-1 to diagnostic >>
If powering off N1-1, go to step 12.
G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

8. REINITIALIZING MDM FROM EEPROM TO TRANSITION TO STANDBY

PCS2
Node 1: C&DH: MDM N1-2
  Primary NCS MDM Node 1
  ‘Software Control’

sel MDM Utilities

Primary NCS MDM Utilities
  ‘N1-1 MDM’

NOTE
Per PR 13021, the MDM Reinit Cmds are now listed as “constrained” instead of certified since these commands can stop the MDM from operating. Power cycling is the only option for recovery.

**cmd** Reinitialize EEPROM  **Execute**

Wait 1 minute.

**NOTE**
MDM reinitialize takes 1 minute.

9. VERIFYING N1-1 IN STANDBY STATE

PCS2
Node 1: C&DH: MDM N1-1
  Secondary NCS MDM Node 1

Verify Frame Count  – <incrementing>
Verify MDM ID  – N1-1
Verify Processing State – Standby

*******************************************************************************
If state is not Standby, \(^\text{MCC-H}\).
*******************************************************************************

10. ENABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

PCS2
Node 1: C&DH: MDM N1-2
  Primary NCS MDM Node 1
  ‘Software Control’

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Auto Retry Status – ENA

Node 1: C&DH: MDM N1-2
  Primary NCS MDM Node 1

sel Processing State
G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

Primary NCS Processing State Transitions

‘Primary MDM Transitions’

√Auto Transition to Diag State – ENA

If Auto Transition to Diag State – INH

   cmd Enable Execute

   √Auto Transition to Diag State – ENA

11. CLEARING MDM BST ERROR LATCH
On MCC GO

PCS2  Node 1: C&DH: MDM N1-1

   Secondary NCS MDM Node 1

   ‘Software Control’

sel MDM Utilities

   Secondary_NCS_MDM_Utilities

   ‘Clear Latched Data in BST A’

   cmd Clear Execute

   If transitioning N1-1 to Standby >>

12. POWERING OFF N1-1 MDM

PCS2  Node 1: EPS: RPCM N1RS1-A

RPCM_N1RS1_A

sel RPC 11

RPCM_N1RS1_A_RPC_11

√RPC Position – Cl
√Open Cmd – Ena

If Open Cmd – Inh

   cmd Enable Execute

   √Open Cmd – Ena

‘RPC Position’

   cmd Open Execute

√RPC Position – Op
I. TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY

1. **VERIFYING MDM STATE**

   PCS2
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1
   - Verify Frame Count – <incrementing>
   - Verify MDM ID – N1-2
   - Verify Processing State – Primary

   Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1
   
   If frame count incrementing, go to step 5.

2. **APPLYING POWER TO THE N1-1 MDM IF IT IS OFF**

   Node 1: EPS: N1RS1_A
   - RPCM_N1RS1_A
   - sel RPC 11
   - RPCM_N1RS1_A_RPC_11
   - √RPC Position – Op
   
   If RPC Position – Cl
   - Go to step 3.

   ‘Close Cmd’
   
   cmd Enable Execute

   ‘RPC Position’
   
   cmd Close Execute

   √RPC Position – Cl
   
   Wait 90 seconds.

   **NOTE**
   Requires at least 90 seconds for MDM to start up, finish POST, and go to Standby State.

   Go to step 5.
3. **VERIFYING N1-1 IS IN DIAGNOSTIC**
   Perform only if required.

**PCS2**

Node 1: C&DH: MDM N1-1

| Secondary NCS MDM Node 1 |

Verify Frame Count static.

**NOTE**
Steps below will determine which bus and Bus ID to use in template command for Mode Code.

Node 1: C&DH: MDM N1-2

| Primary NCS MDM Node 1 |

sel UB EPS N1 14

| UB_EPS_N1_14 |

sel RT Status

| UB_EPS_N1_14_RT_Status |

If 06 MDM N1-1 RT Status – ENA
   Use Bus ID 2 in template command.

If 06 MDM N1-1 RT Status – INH

| Primary_NCS_MDM_Node_1 |

sel UB EPS N1-23

| UB_EPS_N1_23 |

sel RT Status

| UB_EPS_N1_23_RT_Status |

If 06 MDM N1-1 RT Status – ENA
   Use Bus ID 3 in template command.

| Primary NCS MDM Node 1 |

‘Software Control’

sel Transmit Mode Code

| Primary NCS Transmit Mode Code |

‘Transmit Mode Code Commands’
I. TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY

input RT Address – 6
Bus ID – 2 or 3 (as determined above)
Mode code – 2

cmd Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

NOTE
If Subsystem Flag Bit is YES, N1-1 MDM is in Diagnostic and is ready to accept diagnostic commands.

4. BRINGING N1-1 TO STBY FROM DIAGNOSTIC MODE

PCS2
Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

Primary NCS MDM Utilities

NOTE
1. Reinitialize MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current Bus, RT, and application configuration.
2. All UAS and default Configuration Tables will be loaded from EEPROM.
3. Normal POST will be performed.

‘N1-1 MDM’

NOTE
Per PR 13021, the MDM Reinit Cmds are now listed as “constrained” instead of certified since these commands can stop the MDM from operating. Power cycling is the only option for recovery.

cmd Reinitialize_EEPROM Execute

Wait 60 seconds for MDM re-initialization to complete.

5. VERIFYING N1-1 IS IN STANDBY STATE

PCS2
Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1
Verify Processing State – Standby
I. TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY

6. COMMANDING N1-1 TO SECONDARY

PCS2
Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node 1

sel Processing State

Secondary_NCS_Processing_State_Transitions
‘N1-1 MDM Transitions’

cmd Transition to Secondary State  Execute

Secondary NCS MDM Node 1

Verify Frame Count  – <incrementing>
Verify MDM ID  – N1-1
Verify Processing State – Secondary

7. ENABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

Node 1: C&DH: MDM N1-2
Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Auto Retry Status – ENA

If Auto Retry Status – INH
cmd Enable  Execute

√Auto Retry Status – ENA

Primary NCS MDM Node 1

sel Processing State

Primary_NCS_Processing_State_Transitions
‘Primary MDM Transitions’

√Auto Transition to Diag State – ENA
If Auto Transition to Diag State – INH
   cmd Enable  Execute

√Auto Transition to Diag State – ENA

8. CLEARING MDM ERROR INDICATIONS
   On MCC GO

PCS2

Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node1
   ‘Software Control’

   sel MDM Utilities

   Secondary_NCS_MDM_Utilities
   ‘Clear Latched Data in BST A’

   cmd Clear  Execute

9. CONFIGURING MDM HEATERS
   On MCC GO

PCS2

Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1
   ‘RPCM N1RS1 A’

√RPC 5 Position – Close

If open
   sel RPC 5

RPCM_N1RS1_A_RPC_05

   cmd Close

√Position – Close

Secondary NCS MDM Node 1
   ‘N1-1 Heaters’

Verify Opr – Ena Ops

Secondary NCS MDM Node 1
   ‘N1-1-Heaters’

Verify Sur – Ena BU
I. TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY

NOTE
1. The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.
2. MCC will perform NODE 1/PMA 1 HEATER RECOVERY (SODF: GND: TCS).

10. RECONFIGURING N1-1 EPS REMOTE TERMINALS

CRT

SM 200 APCU Status

√APCU2 OUT VOLTS RES LOW ≥ 121

If APCU1 OUT VOLTS RES LOW ≥ 121

PCS2

Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node1

 sel LB SYS LAB_1

 LAB_SYS_LAB_1

 sel RT Status

 LB_SYS_LAB_1_RT_Status

 cmd 18 RPCM N14B C RT Status – Enable Execute
 cmd 19 RPCM N14B B RT Status – Enable Execute
 cmd 20 RPCM N14B A RT Status – Enable Execute

√RT 18, 19, 20 - RT Status all ENA

 cmd 18 RPCM N14B C RT FDIR Status – Enable FDIR Execute
 cmd 19 RPCM N14B B RT FDIR Status – Enable FDIR Execute
 cmd 20 RPCM N14B A RT FDIR Status – Enable FDIR Execute

√RT 18, 19, 20 - RT FDIR Status all ENA
I. TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY

11. SUBSYSTEM RECONFIGURATION
As required, reactivate the following MDM N1-1 equipment.

✓ MCC-H for proper configuration

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PROCEDURE REFERENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Cabin Fan</td>
<td>NODE 1 CABIN FAN ACTIVATION, (SODF: ISS OPS: ECLSS)</td>
<td>This procedure will start up the Cabin Fan and both Node 1 Smoke Detectors.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 1</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Execute only if Node 1 Cabin Fan Activation not performed.</td>
</tr>
<tr>
<td>Node 1 Smoke Detector 2</td>
<td>NODE 1 SMOKE DETECTOR ACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Execute only if Node 1 Cabin Fan Activation not performed.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Fan</td>
<td>NODE 1 IMV FAN ACTIVATION/DEACTIVATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Aft Port IMV Fan only.</td>
</tr>
<tr>
<td>Node 1 Aft Port IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Aft Port IMV Valve only.</td>
</tr>
<tr>
<td>Node 1 Aft Stbd IMV Valve</td>
<td>NODE 1 IMV VALVE RECONFIGURATION (SODF: ISS OPS: ECLSS)</td>
<td>Activate Node 1 Aft Stbd IMV Valve only.</td>
</tr>
</tbody>
</table>

12. RESETTING ACS MODING
If during Docked Ops, perform ACS PRE-DEPARTURE MODING for N1-1, all (SODF: ISS OPS: MCS).
J. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC FROM STANDBY WHILE N1-2 IS PRIMARY

1. VERIFYING MDM STATES

PCS2

Node 1: C&DH: MDM N1-2

| Primary NCS MDM Node 1 |

Verify Frame Count – <incrementing>
Verify MDM ID – N1-2
Verify Processing State – Primary

Node 1: C&DH: MDM N1-1

| Secondary NCS MDM Node 1 |

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1
Verify Processing State – Standby

2. CONFIGURING MDM HEATERS

NOTE
When MDM N1-1 is in Diagnostic/Standby/Off, the N1-1 Operational Heater is not available and the N1-1 Survival Heater is required to maintain the MDM within temperature limits.

PCS2

Node 1: C&DH: MDM N1-2

| Primary NCS MDM Node 1 |

‘RPCM N1RS2 C’

√RPC 4 Position – Cl

‘N1-1-Heaters’

Verify Sur – Ena BU

NOTE
The MDM Survival Heaters default to Ena Ops in NCS R2. Ground will configure heaters as desired.

‘N1-2-Heaters’

Verify Opr – Ena Ops

3. DISABLING NCS AUTO RETRY AND AUTO TRANSITION TO DIAGNOSTIC

PCS2

Node 1: C&DH: MDM N1-2

| Primary NCS MDM Node 1 |

‘Software Control’

sel MDM Utilities
J. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC FROM STANDBY WHILE N1-2 IS PRIMARY

4. COMMANDING N1-1 TO DIAGNOSTIC

NOTE
When MDM N1-1 is commanded to Diagnostic, the following heaters are commanded to their default state, which is off.
- PMA 1 Shell Heaters 1A, 3A, 4A, and 5A
- Node 1 Shell Heaters 1A --- 9A
- MDM N1-1 Operational Heater
- MDM N1-2 Survival Heater
J. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC FROM STANDBY WHILE N1-2 IS PRIMARY

√ Auto Transition to Diag State – ENA

√ Manual Transition to Diag State – ENA

If Manual Transition to Diag State – INH

‘N1-1 MDM Transitions’

‘Manual Transition to Diag State’

**cmd Arm Execute**

‘Secondary MDM State Transition’

√ Manual Transition to Diag State – ENA

‘N1-1 MDM Transitions’

**cmd Transition Execute**

Wait 2 minutes for N1-1 to transition to Diagnostic.

5. VERIFYING N1-1 MDM IS IN DIAGNOSTIC

PCS2

Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node 1

Verify Frame Count static

**NOTE**

It is necessary to identify the EPS bus that the Node 1 MDMs are using to communicate with each other to determine the Bus ID for the Transmit Mode Code command that will be sent to verify the MDM is in Diagnostic.

Node 1: C&DH: MDM N1-2

sel UB EPS N1-14

UB_EPS_N1_14

sel RT Status

UB_EPS_N1_14_RT_Status
J. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC FROM STANDBY WHILE N1-2 IS PRIMARY

If 06 MDM N1-1 RT Status – ENA
Use Bus ID 2 in template command.

If 06 MDM N1-1 RT Status – INH

Primary_NCS_MDM_Node 1

sel UB EPS N1-23

UB_EPS_N1_23

sel RT Status

UB_EPS_N1_23_RT_Status

If 06 MDM N1-1 RT Status – ENA
Use Bus ID 3 in template command.

Primary_NCS_MDM_Node 1

‘Software Control’

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

‘Transmit Mode Code Commands’

input RT Address – 6
Bus ID – 2 or 3 (as determined above)
Mode Code – 2

cmd Transmit Primary NCS Mode Codes

Verify Subsystem Flag Set – YES

If Subsystem Flag Bit is YES, N1-1 MDM is in Diagnostic and is ready to accept diagnostic commands.

6. VERIFYING MDM AND SHELL HEATER CONFIGURATIONS

PCS2

Node 1: EPS: RPCM N1RS1 C
RPCM_N1RS1_C

√RPC 2 Position – Op

NOTE

MCC will perform NODE 1/PMA 1/HEATER RECOVERY (SODF: GND: TCS).

If transitioning N1-1 to Diagnostic >>
7. **POWERING OFF N1-1 MDM**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>When MDM N1-1 is unpowered, the N1-1 Survival Heater is required to maintain the MDM within temperature limits.</td>
</tr>
</tbody>
</table>

PCS2 Node 1: EPS: RPCM N1RS1-A

RPCM_N1RS1_A

sel RPC 11

RPCM_N1RS1_A_RPC_11

√RPC Position – Cl
√Open Cmd – Ena

If Open Cmd – Inh

**cmd Enable Execute**

√Open Cmd – Ena

‘RPC Position’

**cmd Open Execute**

√RPC Position – Op
# MDM Transition Procedures Cross References

## N1-2 MDM State Changes

<table>
<thead>
<tr>
<th>N1-2 MDM from</th>
<th>N1-2 MDM to</th>
<th>N1-1 MDM from</th>
<th>N1-1 MDM to</th>
<th>Transition Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Standby</td>
<td>Secondary</td>
<td>Primary</td>
<td>A</td>
</tr>
<tr>
<td>Primary</td>
<td>Diagnostics</td>
<td>Secondary</td>
<td>Primary</td>
<td>A</td>
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<tr>
<td>Primary</td>
<td>Off</td>
<td>Secondary</td>
<td>Primary</td>
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<tr>
<td>Standby</td>
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<tr>
<td>Standby</td>
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<td>Diagnostics</td>
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<tr>
<td>Diagnostics</td>
<td>Standby</td>
<td>Primary</td>
<td>Primary</td>
<td>B (steps 1-5)</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Off</td>
<td>Primary</td>
<td>Primary</td>
<td>D (steps 5-6)</td>
</tr>
<tr>
<td>Off</td>
<td>Primary</td>
<td>Primary</td>
<td>Secondary</td>
<td>B</td>
</tr>
<tr>
<td>Off</td>
<td>Standby</td>
<td>Primary</td>
<td>Primary</td>
<td>B (steps 1-5)</td>
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</tbody>
</table>

## N1-1 MDM State Changes

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<td>Primary</td>
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<td>Primary</td>
<td>Diagnostics</td>
<td>Standby</td>
<td>Primary</td>
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<td>Primary</td>
<td>Off</td>
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<td>Secondary</td>
<td>Diagnostics</td>
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<td>Standby</td>
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<td>Standby</td>
<td>I then A</td>
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<td>Standby</td>
<td>Primary</td>
<td>Primary</td>
<td>I (steps 1-5)</td>
</tr>
</tbody>
</table>
PCS 1. CDS LOGS DUMP
   1.1 If PCSCDS Main Control Panel is an icon, double-click the 'cds_ui' icon to restore it.
   1.2 PCSCDS MAIN CONTROL PANEL
   1.3 sel file
   1.4 sel Update Log Files

2. SAVING LOGS
   2.1 sel arrow directly above PCS logo
   2.2 sel Save Logs
      PCS Savelogs
   2.3 Disregard text
      <Enter>

   NOTE
   1. The format to use for naming the directory is:
      [user initials]logs[flight day]
   2. Use a different directory name each time you save the logs. If the logs need to be saved more than once in a flight day, append the directory name with an underscore and a number starting at “1” and incrementing each time that the logs are saved that day. An example directory name would be:
      abclogs07_2
   2.4 input directory name.
      <Enter>
   2.5 Verify message 'Saved logs completed'.
      <Enter>

3. BRINGING UP TERMINAL WINDOW
   3.1 Right-click anywhere on empty desktop space.
   3.2 sel Programs
   3.3 sel Terminal...
4. **VERIFYING THAT THE LOGS HAVE BEEN SAVED**
   4.1 Type `cd <directory_name>`.
   4.2 Type `ls -l`.
   4.3 Verify ‘Runtime_files/and logs/are in the directory’
   4.4 Close termination window.

5. Call **MCC-H** with the directory name.
1. **CDS SHUTDOWN**
   - If PCS does not accept inputs from the keyboard or mouse
     - Go to step 3.
   - If PCS does accept inputs from the keyboard or mouse
     - Close all display windows.
     - Disconnect CDS from MDM.
     - Close CDS Window.

2. **SOLARIS EXIT**
   - On taskbar at bottom of display
     - sel ‘EXIT’
     - sel ‘OK’
     - Wait for ‘type any key to continue.’

3. **TURNING OFF POWER**
   - PCS Thinkpad PWR Switch → Off

4. **TURNING ON POWER**
   - PCS Thinkpad PWR Switch → On

5. **CONNECTING PCS TO MDM DATA**
   - PCS2
     - After bootup, when taskbar appears at bottom of display
       - sel Arrow directly above PCS logo
       - sel Start/Restart PCS CDS
       - sel Icon to open PCSDCS Main Control Panel Window
     - √ Status Box is green and ‘Connected’ is displayed in the PCSCDS Main Control Panel Window
     - Iconify PCSCDS Main Control Panel Window.

   ****************************************************
   If Status Box is not green, select ‘Connect to MDM’ button.
   *****************************************************

6. **CONFIGURING PCS FOR DISPLAYS**

   **NOTE**
   - After PCSCDS has been selected, wait 30 seconds before starting CDDF displays.

   - sel Arrow above PCS logo
   - sel ‘Start PCS CDDF’ display

   After approximately 1 minute, √‘Increment 3A Home Page’ is displayed.
If GMT - <static> or telemetry fields in Caution & Warning Toolbar are cyan, go to PCS RECONNECT (SODF: ISS OPS: C&DH).

Displays may now be selected as desired.
1. **CDDF AND CDS SHUTDOWN**
   
   Close all display windows.
   
   Disconnect CDS from MDM.
   
   Close CDS window.

2. **CONNECTING PCS TO MDM DATA**
   
   seArrow directly above PCS logo
   seStart/Restart PCS CDS

   A popup window will appear if the internal PCS is > 60 seconds different from the RS time.
   If this window appears, ‘Use PCS Time’ should be selected per SPN 635.

   A popup window may appear saying that the CW Server failed to start and it will be retried every 15 seconds.
   Select ‘OK’ to remove popup window.

   seIcon to open PCSCDS Main Control Panel Window

   √Status Box is green and ‘Connected’ is displayed in the PCSCDS Main Control Panel Window

   Iconify PCSCDS Main Control Panel Window.

   **************************************************************************
   If Status Box is not green, select ‘Connect to MDM’ button.
   **************************************************************************

   Configure PCS for displays.

3. **PCS FOR DISPLAYS CONFIGURATION**

   **NOTE**
   
   After PCSCDS has been selected, wait 30 seconds before starting CDDF displays.

   seArrow above PCS logo
   seStart PCS CDDF display

   After approximately 1 minute, √‘Increment 3A Home Page’ is displayed.

   **************************************************************************
   If GMT – <static> or telemetry fields in Caution & Warning Toolbar are cyan, √MCC-H.
   **************************************************************************

   Displays may now be selected as desired.
1. **OPENING SNAPSHOT WINDOW**  
Move the pointer to an open area on the desktop.

Press the right mouse button.

sel ‘Programs’

sel ‘Snapshot…’

2. **TAKING SNAPSHOT**

Snapshots V3.0

sel box next to ‘Hide Window During Capture’

sel ‘Snap’

**NOTE**
When you click on the window, the Snapshot Window will disappear for 8 - 16 seconds.
Once it has reappeared, you may proceed.

Click on the window you want to take a snapshot of.

3. **SAVING SNAPSHOT**

NOTE
The image file will be saved in the /export/home/PCSUser directory.

Snapshots V3.0

sel ‘View…’

Image Tool V3.0 File: Untitled

sel ‘file’

sel ‘save as’

Image Tool: Save As

‘File Format’

sel ‘Sun Raster’

sel ‘JFIF (JPEG)’

‘Save As:’

Type over ‘Untitled1’ with the name that you wish to call the image followed by ‘.jpg’.
NOTE
There will be a popup window with the message ‘Saving to the JFIF(JPEG) file format may result in a loss of data. Do you want to continue?’ The difference is negligible and can be ignored.

sel ‘save’
sel ‘Yes’

4. CLOSING THE IMAGE TOOL AND SNAPSHOT WINDOWS
Double-click the leftmost box on the tile bar of the Image Tool and Snapshot Windows.

5. HOW TO RETRIEVE AND VIEW THE IMAGE
Right-click on any empty space on the desktop.

sel ‘Programs’
sel ‘Image Viewer’
.sel ‘File’
.sel ‘Open…’
.sel the desired file
.sel ‘OK’

Close Image View - Palette window
1. **CHECKING BIOS VERSION AND DATE**

   PCS
   
   F1 pb – Push and hold for powerup
   Wait for Easy Setup program to activate.
   
   √ BIOS version – 97H4601
   √ BIOS date – 3/12/98
   
   If BIOS version and date are correct >>

2. **BIOS UPDATE**

   PCS
   
   Insert floppy disk labeled “ThinkPad 760XD XGA BIOS Update” into floppy disk drive.
   
   sel Restart
   sel OK
   
   Wait 2 minutes.
   
   sel Update system program
   
   Follow onscreen prompts.
   
   **NOTE**
   
   Ensure that the battery is fully charged and that power is being supplied by the UOP. Ensure the laptop is not turned off or suspended until the update is done.
   
   After update is completed, remove the floppy disk.
   Cycle power.
   F1 pb – Push and hold for powerup
   Wait for Easy Setup program to activate.
   
   sel Config
   sel Initialize
   sel OK
   sel Exit
1. **CHECKING BIOS VERSION NUMBER AND DATE**
   F1 – Push and hold for powerup
   Wait for Easy Setup program to activate.

   √ BIOS Version number – 97H4601
   √ BIOS date – 3/12/98

   If BIOS version number and date do not match above
   Go to PCS RESET BIOS (SODF: ISS OPS: C&DH).

2. **VERIFYING PARTITION INFORMATION**
   Insert floppy disk labeled “PCS 2A.2 Utility Diskette.”

   sel Restart
   sel OK

   If laptop does not reboot in 2 minutes, cycle power on laptop.

   After menu appears, press 1.
   At prompt for “Do you wish to enable large disk support (Y/N).............?”
   sel N

   At prompt for “Enter choice:”
   Input: 4

   Verify Pri DOS partition size – between 475 and 525 Mbytes

   sel Esc three times

3. **CHECKING CMOS SETTINGS**
   At prompt, input: 2a2-test

   Wait 3 minutes.

   √ No differences between 2a2.dat file and the current.dat file

   If differences exist
   Insert the “PCS AutoXD Configurator, Version 1.10” diskette.
   Power cycle the laptop.
   Answer “N” to the joystick and cardbus questions.
   Press Enter when prompted to hit any key to continue.
   Press Enter when prompted for date and time.
   Press Enter when prompted for Interrupt and Direct Memory Access assignments.
   Manually eject the “PCS AutoXD Configurator, Version 1.10” diskette.

   Cycle power on laptop.
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NOTES

1. The command to reinitialize the MDM is sent while an MDM is in Diagnostic mode. The other MDM must be in Primary.

2. If reinitializing N1-1, use the parameters in parentheses.

1. VERIFYING MDM STATE AND ID

PCS1(2) Node 1: C&DH: MDM N1-1(2)
Primary NCS MDM Node 1

Verify Frame Count – <incrementing>
Verify MDM ID – N1-1(2)
Verify Processing State – Primary

Node 1: C&DH: MDM N1-2(1)
Secondary NCS MDM Node 1

Verify Frame Count static

2. VERIFYING MDM N1-2(1) IS IN DIAGNOSTIC MODE

If MDM has already been verified as being in Diagnostic, go to step 3.

NOTE

1. It is necessary to identify the EPS bus that the Node 1 MDMs are using to communicate with each other to determine the Bus ID for the Transmit Mode Code command that will be sent to verify the MDM is in Diagnostic.

2. If the MDM has already been verified to be in Diagnostic, skip step 2.

PCS1(2) Node 1: C&DH: MDM N1-1(2)
Primary NCS MDM Node 1

sel UB EPS N1-14
sel RT Status

UB_EPS_N1_14_RT_Status

If 05 MDM N1-2 RT Status – ENA
Use Bus ID 2 in template command.

If 05 MDM N1-2 RT Status – INH

Primary NCS MDM Node 1

sel UB EPS N1-23
sel RT Status

UB_EPS_N1_23_RT_Status

√05 MDM N1-2 RT Status – ENA
Use Bus ID 3 in template command.
Primary NCS MDM Node 1
‘Software Control’

sel Transmit Mode Code

‘Transmit Mode Code Commands’

input RT Address – 5
Bus ID – 2 or 3 (as determined above)
Mode Code – 2

**cmd** Transmit Primary NCS Mode Codes

√Subsystem Flag Set – YES

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Subsystem Flag Bit is set, the MDM is in Diagnostic and is ready to accept diagnostic commands. If not, √MCC.</td>
</tr>
</tbody>
</table>

3. **REINITIALIZING MDM FROM EEPROM**

PCS1(2)

Node 1: C&DH: MDM N1-1(2)

Primary NCS MDM Node 1
‘Software Control’

sel MDM Utilities

**Primary NCS MDM Utilities**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reinitializing MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current Bus, RT, and application configuration.</td>
</tr>
<tr>
<td>2. All UAS and default Configuration Tables will be loaded from EEPROM.</td>
</tr>
<tr>
<td>3. Normal POST will also be performed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per PR 13021, the MDM Reinit Cmds are now listed as “constrained” instead of certified since these commands can stop the MDM from operating. Power cycling is the only option for recovery.</td>
</tr>
</tbody>
</table>

**cmd** N1_2(1)_MDM_Reinitialize_EEPROM **Execute**

Wait 1 minute for MDM to reinitialize.
4. **VERIFYING MDM STATE AFTER REINITIALIZATION**

PCS1(2)  
Node 1: C&DH: MDM N1-2(1)  
[Secondary NCS MDM Node 1]

Verify Frame Count  – <incrementing>
Verify MDM ID  – N1-2(1)
Verify Processing State  – Standby

************************************************
If state is not Standby, √MCC-H.
************************************************
This Page Intentionally Blank
1. **INHIBITING N13B RT AND FDIR**

Node 1: C&DH: MDM N1-2

| Primary NCS MDM Node 1 |

| sel LB Sys Lab – 2 |

| sel RT Status |

- **cmd 18** RPCM N13B C RT FDIR Status – Inhibit FDIR **Execute**
- **cmd 19** RPCM N13B B RT FDIR Status – Inhibit FDIR **Execute**
- **cmd 20** RPCM N13B A RT FDIR Status – Inhibit FDIR **Execute**

√RT FDIR Status Inhibit 18, 19, 20 – Inh

- **cmd 18** RPCM N13B C RT Status – Inhibit **Execute**
- **cmd 19** RPCM N13B B RT Status – Inhibit **Execute**
- **cmd 20** RPCM N13B A RT Status – Inhibit **Execute**

√RT Status 18, 19, 20 – Inh

2. **INHIBITING N14B RT AND FDIR**

Node 1: C&DH: MDM N1-1

| Secondary NCS MDM Node 1 |

| sel LB Sys Lab – 1 |

| sel RT Status |

- **cmd 18** RPCM N14B C RT FDIR Status – Inhibit FDIR **Execute**
- **cmd 19** RPCM N14B B RT FDIR Status – Inhibit FDIR **Execute**
- **cmd 20** RPCM N14B A RT FDIR Status – Inhibit FDIR **Execute**

√RT FDIR Inhibited 18, 19, 20 – Inh

- **cmd 18** RPCM N14B C RT Status – Inhibit **Execute**
- **cmd 19** RPCM N14B B RT Status – Inhibit **Execute**
- **cmd 20** RPCM N14B A RT Status – Inhibit **Execute**

√RT Inhibited 18, 19, 20 – Inh
1. **ENABLING N13B RT AND FDIR**
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node 1

   sel LB SYS LAB 2
   sel RT Status

   **LB_SYS_LAB_RT_Status**

   **cmd** 18_RPCM_N13B_C RT Status – Enable **Execute**
   **cmd** 19_RPCM_N13B_B RT Status – Enable **Execute**
   **cmd** 20_RPCM_N13B_A RT Status – Enable **Execute**

   **LB_SYS_LAB_RT_Status**

   √ RT Inhibited 18, 19, 20 – ENA

   **cmd** 18_RPCM_N13B_C RT FDIR Status – Enable FDIR **Execute**
   **cmd** 19_RPCM_N13B_B RT FDIR Status – Enable FDIR **Execute**
   **cmd** 20_RPCM_N13B_A RT FDIR Status – Enable FDIR **Execute**

   **LB_SYS_LAB_RT_Status**

   √ RT FDIR Inhibited 18, 19, 20 – ENA

2. **ENABLING N14B RT AND FDIR**
   PCS Node 1: C&DH: MDM N1-1
   Secondary NCS MDM Node 1

   sel LB SYS LAB_1
   sel RT Status

   **LB_SYS_LAB_RT_Status**

   **cmd** 18_RPCM_N14B_C RT Status – Enable **Execute**
   **cmd** 19_RPCM_N14B_B RT Status – Enable **Execute**
   **cmd** 20_RPCM_N14B_A RT Status – Enable **Execute**

   **LB_SYS_LAB_RT_Status**

   √ RT Inhibited 18, 19, 20 – ENA

   **cmd** 18_RPCM_N14B_C RT FDIR Status – Enable FDIR **Execute**
   **cmd** 19_RPCM_N14B_B RT FDIR Status – Enable FDIR **Execute**
   **cmd** 20_RPCM_N14B_A RT FDIR Status – Enable FDIR **Execute**

   **LB_SYS_LAB_RT_Status**

   √ RT FDIR Status 18, 19, 20 – ENA
1. Perform PCS LOG FILES SAVE, all (SODF: ISS OPS: C&DH), then:

2. Run copy logs to floppy utility.
   sel Arrow directly above PCS logo
   sel Copy PCS logs to floppy
   Press Enter.

   *********************************************************************************
   If no disk in drive, insert diskette, try again.
   If no floppy drive attached, shutdown, attach floppy drive, and reboot.
   If floppy drive is attached after boot up, shutdown, and reboot.
   If floppy drive not seated properly, shutdown, reseat, and reboot.
   *********************************************************************************

3. Input directory name from list of available directories listed in the
Terminal window.
   sel OK

4. Verify copy logs to floppy complete.
   Press Enter.

5. Manually eject floppy disk.
C&T PROCEDURES
NOTE
This procedure assumes all ECS ORUs are powered on or that ECS RPCs are all closed.

1. **ECS ANTENNA POWER CYCLE**
   Wait 1 minute between all RPC Open and RPC Close commands for the purpose of verifying end item.

PCS

C&T : Early Comm Overview

If power cycling the Port Antenna

- Early Comm Overview
  ```
  ‘RPCM N1RS1C’
  sel RPC 05
  RPCM_N1RS1_C_RPC_05
  cmd RPC Position – Open **Execute** (Verify – Op)
  ```

- Early Comm Overview
  ```
  ‘RPCM N1RS1C’
  sel RPC 05
  RPCM_N1RS1_C_RPC_05
  cmd RPC Position – Close **Execute** (Verify – Cl)
  ```

If power cycling the Starboard Antenna

- Early Comm Overview
  ```
  ‘RPCM N1RS1C’
  sel RPC 12
  RPCM_N1RS1_C_RPC_12
  cmd RPC Position – Open **Execute** (Verify – Op)
  ```

- Early Comm Overview
  ```
  ‘RPCM N1RS1C’
  sel RPC 12
  RPCM_N1RS1_C_RPC_12
  cmd RPC Position – Close **Execute** (Verify – Cl)
2. **TRANSCEIVER POWER CYCLE**

PCS C&T: Early Comm Overview

‘RPCM N1RS2A’

sel RPC 05

RPCM N1RS2_A_RPC_05

cmd RPC Position – Open Execute (Verify – Op)

‘RPCM N1RS2A’

sel RPC 05

RPCM N1RS2_A_RPC_05

cmd RPC Position – Close Execute (Verify – Cl)

3. **CTP POWER CYCLE**

If the CTP has not received any commands from NCS after it was power cycled, the Transceiver will be configured per the position of the CTP Mode switch.

**NOTE**

1. The configuration of ECS after a CTP power cycle with the CTP Mode Switch in:

<table>
<thead>
<tr>
<th>Low Rate</th>
<th>High Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter – OFF</td>
<td>Transmitter – ON</td>
</tr>
<tr>
<td>Decryption – OFF</td>
<td>Decryption – OFF</td>
</tr>
<tr>
<td>Key Sel – 1</td>
<td>Key Sel – 1</td>
</tr>
<tr>
<td>Ant Pointing Mode – AUTO</td>
<td>Ant Pointing Mode – AUTO</td>
</tr>
<tr>
<td>Omni Antenna selected</td>
<td>Omni Antenna selected</td>
</tr>
</tbody>
</table>

2. NCS R1: The CTP and PCS are mutually exclusive in communicating with the MDM on the UB-ORB buses.

3. NCS R2: The CTP and PCS can simultaneously communicate with the MDM on the UB-ORB buses as long as the CTP is the first to connect.
**RPCM N1RS2_A_RPC_10**

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

**RPCM N1RS2_A_RPC_10**

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

If XMTR ON is required,  
Wait until the CTP has established a link with the primary MDM or at least 1 minute before enabling Transmitter.

**RPCM N1RS2_A_RPC_11**

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

**RPCM N1RS2_A_RPC_11**

**cmd** RPC Position – Close  **Execute** (Verify – Cl)
6. **ANTENNA HEATERS POWER CYCLE**

   If required, perform step 6.

   **NOTE**
   Antenna heaters should remain powered in all nominal cases to protect the antenna from breaking lower thermal limits.

   **PCS C&T: Early Comm Overview**

   If power cycling the PORT ANTENNA HEATER
   
   Early Comm Overview
   ‘RPCM N1RS1C’

   sel RPC 06

   RPCM_N1RS1_C_RPC_06

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

   Early Comm Overview
   ‘RPCM N1RS1C’

   sel RPC 06

   RPCM_N1RS1_C_RPC_06

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

   If power cycling the STARBOARD ANTENNA HEATER

   Early Comm Overview
   ‘RPCM N1RS1C’

   sel RPC 13

   RPCM_N1RS1_C_RPC_13

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

   Early Comm Overview
   ‘RPCM N1RS1C’

   sel RPC 13

   RPCM_N1RS1_C_RPC_13

   **cmd** RPC Position – Close (Verify – Cl)
NOTE
All ECS RPC Close Inhibits should be removed for N1RS1C RPC 5,6,12,13 and N1RS2A RPC 5,6,10,11.

1. RF POWER DISTRIBUTION BOX POWERUP

EPCS
C&T: Early Comm Overview
Early Comm Overview
‘RPCM N1RS2A’

sel RPC 11

RPCM_N1RS2_A_RPC_11

cmd RPC Position – Close  Execute (Verify – Cl)

2. ANTENNA HEATERS POWERUP

EPCS
C&T: Early Comm Overview
Early Comm Overview
‘RPCM N1RS1C’

sel RPC 06

RPCM_N1RS1_C_RPC_06

cmd RPC Position – Close (Verify – Cl)

Early Comm Overview
‘RPCM N1RS1C’

sel RPC 13

RPCM_N1RS1_C_RPC_13

cmd RPC Position – Close (Verify – Cl)

NOTE
Post R2 Uplink to the Node MDMs an EPCS may be logged on the UB-ORB buses after Early Comm is activated.

Verify there is no PCS active on the UB-ORB buses (AFT Flight Deck).

3. CTP POWERUP

EPCS
C&T: Early Comm Overview
Early Comm Overview
‘RPCM N1RS2A’

sel RPC 10
EARLY COMM POWERUP
(ISS OPS/2A.2A - 2A.2B/FIN A)  Page 2 of 3 pages

4. TRANSCEIVER POWERUP

EPCS C&T: Early Comm Overview

Early Comm Overview
‘RPCM N1RS2A’

sel RPC 05

RPCM_N1RS2_A_RPC_05

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

Early Comm Overview
‘Command Telemetry Processor’

Verify POST Fail – (blank)
Verify Dcryptr POST Fail – Pass

5. PORT ANTENNA POWERUP

EPCS C&T: Early Comm Overview

Early Comm Overview
‘RPCM N1RS1C’

sel RPC 05

RPCM_N1RS1_C_RPC_05

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

Early Comm Overview
‘Early Comm Health Status’

Verify CTP/xcvr I/F Error – (blank)

6. STARBOARD ANTENNA POWERUP

EPCS C&T: Early Comm Overview

Early Comm Overview
‘RPCM N1RS1C’

sel RPC 12
 RPCM_N1RS1_C_RPC_12

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

**Early Comm Overview**
‘Early Comm Health Status’

Verify CTP/Stbd Ant I/F Error – (blank)

If XMTR ON is required, go to step 7.

**NOTE**
Wait until the CTP has established a link with the primary MDM or at least 1 minute after step 3 and before step 7.

7. **TRANSMITTER ON**

PCS
C&T: Early Comm Overview
‘Early Comm Overview’

sel Transmitter

**Early_Comm_Transmitter**

**cmd**  On

Verify Power – On

**NOTE**
Decryption is OFF.  Ground will perform EARLY COMM DES KEY CHANGE, all (SODF: ISS GEN GND).
1. PORT ANTENNA POWERDOWN

PCS C&T: Early Comm Overview

Early Comm Overview

‘RPCM N1RS1C’

sel RPC 05

RPCM_N1RS1_C_RPC_05

cmd RPC Position – Open Execute (Verify – Op)

2. STARBOARD ANTENNA POWERDOWN

PCS C&T: Early Comm Overview

Early Comm Overview

‘RPCM N1RS1C’

sel RPC 12

RPCM_N1RS1_C_RPC_12

cmd RPC Position – Open Execute (Verify – Op)

3. TRANSCEIVER POWERDOWN

PCS C&T: Early Comm Overview

Early Comm Overview

‘RPCM N1RS2A’

sel RPC 05

RPCM_N1RS2_A_RPC_05

cmd RPC Position – Open Execute (Verify – Op)

4. CTP POWERDOWN

PCS C&T: Early Comm Overview

Early Comm Overview

‘RPCM N1RS2A’

sel RPC 10

RPCM_N1RS2_A_RPC_10

cmd RPC Position – Open Execute (Verify – Op)
5. **RF POWER DISTRIBUTION BOX POWERDOWN**

PCS C&T: Early Comm Overview

*Early Comm Overview*

‘RPCM N1RS2A’

sel RPC 11

[RPCM N1RS2_A_RPC_11]

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

---

**CAUTION**

Antenna heaters should remain powered in all nominal cases to protect the antenna from breaking lower thermal limits.

---

If required, perform step 6.

6. **ANTENNA HEATERS POWERDOWN**

PCS C&T: Early Comm Overview

*Early Comm Overview*

‘RPCM N1RS1C’

sel RPC 06

[RPCM_N1RS1_C_RPC_06]

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

---

‘RPCM N1RS1C’

sel RPC 13

[RPCM_N1RS1_C_RPC_13]

**cmd** RPC Position – Open (Verify – Op)
ECLSS PROCEDURES
1. **APCU AND RPCM STATUS VERIFICATION**
   √**MCC GO** For Cabin Fan activation

2. **SMOKE DETECTOR SD 1 ACTIVATION**

   PCS
   Node 1: ECLSS: SD1
   Node 1 Smoke Detector 1

   2.1 sel RPCM N14B C RPC 03

   **RPCM N14B C RPC 03**

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

   **NOTE**
   If using time tagged commands, allow a minimum 2-second delay between the close RPC command and the monitor enable command to allow the smoke detector voltages to stabilize.

   2.2 [Node 1 Smoke Detector 1]
   ‘Monitoring’

   **cmd** Enable

   ‘Active BIT’

   √Status – In Progress

   Wait 3 seconds.

   √Status – Complete
   √Failure – blank

   ‘Monitoring’

   √Status – Enabled

3. **SMOKE DETECTOR SD 2 ACTIVATION**

   PCS
   Node 1: ECLSS: SD2
   Node 1 Smoke Detector 2

   3.1 sel RPCM N13B A RPC 16

   **RPCM N13B A RPC 16**

   **cmd** RPC Position – Close (Verify – Cl)
NOTE
If using time tagged commands, allow a minimum 2-second delay between the close RPC command and the monitor enable command to allow the smoke detector voltages to stabilize.

3.2 Node 1 Smoke Detector 2
‘Monitoring’

\textbf{cmd} Enable

‘Active BIT’

√Status – In Progress
Wait 3 seconds.

√Status – Complete
√Failure – blank

‘Monitoring’

√Status – Enabled

4. **ENABLING AUTOMATIC FIRE ISOLATION**

\textbf{PCS}
Node 1: ECLSS: FDIR
Node 1 FDIR

4.1 \textbf{cmd} Node 1-1 MDM IMV FDIR – Enable

√Status – Enabled

4.2 \textbf{cmd} Node 1-1 MDM Fire Isolation – Enable

√Status – Enabled

4.3 \textbf{cmd} Node 1-2 MDM IMV FDIR – Enable

√Status – Enabled

4.4 \textbf{cmd} Node 1-2 MDM Fire Isolation – Enable

√Status – Enabled
NOTE

1. For Flight 2A.2B, the APCUs are in parallel configuration; therefore, either APCU 1 or APCU 2 can feed the N13B and N14B buses.

2. If activating the Cabin Fan under a single APCU configuration, the total load on the buses must be less than 2 Amps.

3. If activating under the parallel configuration, the total load on the buses must be less than 16.7 Amps.

5. NODE 1 CABIN FAN ACTIVATION

NOTE

Per SPN 15271, the position of N14B B RPC 17 is incorrect on PCS display for NCS Release 2.

√MCC to confirm RPC position before and after commandng it.

PCS

Node 1: ECLSS: Cab Fan
Node 1 Cabin Fan

5.1 sel RPCM N14B B RPC 17

RPCM N14B B RPC 17

cmd RPC Position – Close (Verify – Cl)

Node 1 Cabin Fan

5.2 cmd State – On

√State – On
√Speed, rpm: 3549 --- 4251
√dP, mmHg: ≤ 5.0

‘Speed Limiting’

√Status – Enabled
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1. **APCU 2 STATUS VERIFICATION**
   ✓ **MCC-H GO** for deactivation

If using NCS R1

2. **NODE 1 CABIN FAN DEACTIVATION**

   **NOTE**
   For Flight 2A.2B, the APCUs are in parallel configuration; therefore, either APCU 1 or APCU 2 can feed the N13B and N14B buses. If deactivating the cabin fan under a single APCU configuration, the total load on the bus must be 1.0 Amp above the cabin fan load. In the dual configuration, there is no constraint to deactivating the cabin fan.

   ✓ **MCC-H** for proper N13B and N14B Bus loads

   **PCS**
   Node 1: ECLSS: Cab Fan
   Node 1 Cabin Fan

   2.1 **cmd** State – Off
      ✓ State – Off
      ✓ Speed, rpm: 2000 ± 100 (2000 rpm denotes Fan Off)
      ‘Speed Limiting’
      ✓ Status – Inhibited

   2.2 sel RPCM N14B B RPC 17
       ![RPCM N14B B RPC 17](RPCM N14B B RPC 17)
       **cmd** RPC Position – Open (Verify – Op)

3. **SMOKE DETECTOR 1 DEACTIVATION**
   Node 1: ECLSS: SD1
   Node 1 Smoke Detector 1
   ‘Monitoring’

   3.1 ✓ Status – Enabled
      **cmd** Inhibit
      ✓ Status – Inhibited

   3.2 sel RPCM N14B C RPC 03
       ![RPCM N14B C RPC 03](RPCM N14B C RPC 03)
       **cmd** RPC Position – Open (Verify – Op)
4. SMOKE DETECTOR 2 DEACTIVATION

Node 1: ECLSS: SD2

Nod1 Smoke Detector 2

‘Monitoring’

4.1 Status – Enabled

`cmd` Inhibit

Status – Inhibited

4.2 sel RPCM N13B A RPC 16

RPCM N13B A RPC 16

`cmd` RPC Position – Open (Verify – Op) »>

If using NCS R2

NOTE

Per SPN 15271, the position of N14B B RPC17 is incorrect on
PCS display for NCS Release 2.

`MCC` to confirm RPC position before and after commanding it

5. NODE 1 CABIN FAN DEACTIVATION

NOTE

For Flight 2A.2B, the APCUs are in parallel configuration;
therefore, either APCU 1 or APCU 2 can feed the N13B and
N14B buses. If deactivating the cabin fan under a single
APCU configuration, the total load on the bus must be 1.0 Amp
above the cabin fan load. In the dual configuration, there is no
constraint to deactivating the cabin fan.

`MCC-H` for proper N13B and N14B Bus loads

PCS

Node 1: ECLSS: Cab Fan

Node 1 Cabin Fan

‘State – Off’

5.1 `cmd` Arm

`cmd` Off

Status – Off

Speed, rpm: 2000 ± 100

5.2 sel RPCM N14B B RPC 17

RPCM N14B B RPC 17

`cmd` RPC Position – Open (Verify – Op)
6. SMOKE DETECTOR 1 DEACTIVATION  
Node 1: ECLSS: SD1  
Node 1 Smoke Detector 1  
‘Monitoring’

6.1 √ Status – Enabled  
   cmd Inhibit  
   √ Status – Inhibited

6.2 sel RPCM N14B C RPC 03  
   cmd RPC Position – Open (Verify – Op)

7. SMOKE DETECTOR 2 DEACTIVATION  
Node 1: ECLSS: SD2  
Node 1 Smoke Detector 2  
‘Monitoring’

7.1 √ Status – Enabled  
   cmd Inhibit  
   √ Status – Inhibited

7.2. sel RPCM N13B A RPC 16  
   cmd RPC Position – Open (Verify – Op)
NODE 1 IMV FAN ACTIVATION/DEACTIVATION

(90x744) NODE 1 IMV FAN ACTIVATION/DEACTIVATION

Page 1 of 2 pages

CAUTION

1. Aft Port - Verify corresponding IMV valve opened prior to activating IMV Fan.

2. Port Fwd, Stbd Aft - Verify ductwork is in the proper configuration prior to activating IMV Fan.

<table>
<thead>
<tr>
<th>X (LOCATION)</th>
<th>Y (RPCM/RPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft Port</td>
<td>RPCM N14B C RPC 12</td>
</tr>
<tr>
<td>Port Fwd</td>
<td>RPCM N13B C RPC 16</td>
</tr>
<tr>
<td>Stbd Aft</td>
<td>RPCM N13B A RPC 04</td>
</tr>
</tbody>
</table>

Table 1. Node 1 IMV Fan Information

Refer to Table 1 above for X and Y references in the following steps.

1. NODE 1 IMV X FAN ACTIVATION

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Fwd and Stbd Aft Fan Status is reversed on PCS display.</td>
</tr>
<tr>
<td>Port Fwd Fan Status is really Stbd Aft Fan Status and vice versa (commanding is unaffected). Reference 2A SPN 12266.</td>
</tr>
</tbody>
</table>

PCS

Node 1: ECLSS: IMV X Fan

Node 1 IMV X Fan

1.1 sel RPCM/RPC Y

<table>
<thead>
<tr>
<th>RPCM/RPC Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd RPC Position – Close (Verify – Cl)</td>
</tr>
</tbody>
</table>

Node 1 IMV X Fan

1.2 cmd On

\( \checkmark \) Status – In Transit

Wait 15 seconds.

\( \checkmark \) Status – On

\( \checkmark \) Speed, rpm: 7745 --- 9278

2. NODE 1 IMV X FAN DEACTIVATION (NCS RELEASE 1)

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDM conversion translates 0 volts (fan off) to 7164 rpm. Reference 2A SPN 8437.</td>
</tr>
</tbody>
</table>

PCS

Node 1: ECLSS: IMV X Fan

Node 1 IMV X Fan

24 MAR 00 215 6092.doc
2.1 **cmd** Off

\[\sqrt{\text{Status}} – \text{Off}\]
\[\sqrt{\text{Speed, rpm}}: \sim 7164 \pm 50 \ (7164 \text{ rpm denotes Fan OFF})\]

![RPCM/RPC Y]

2.2 **sel** RPCM/RPC Y

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

3. **NODE 1 IMV X FAN DEACTIVATION (NCS RELEASE 2)**

**NOTE**

MDM conversion translates 0 volts (fan off) to 7164 rpm. Reference 2A SPN 8437.

**PCS**

Node 1: ECLSS: IMV X Fan

| Node 1 IMV X Fan |

3.1 **cmd** Off – Arm

**cmd** Off

\[\sqrt{\text{Status}} – \text{Off}\]
\[\sqrt{\text{Speed, rpm}}: \sim 7164 \pm 50 \ (7164 \text{ rpm denotes Fan Off})\]

3.2 **sel** RPCM/RPC Y

![RPCM/RPC Y]

**cmd** RPC Position – Open (Verify – Op)
NOTE
This procedure is not necessarily to be executed in its entirety. Execute only those steps required for the desired valve reconfiguration.

Table 1. Node 1 IMV Valve Information

<table>
<thead>
<tr>
<th>X (LOCATION)</th>
<th>Y (RPCM/RPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft Port</td>
<td>RPCM N14B C RPC 05</td>
</tr>
<tr>
<td>Aft Stbd</td>
<td>RPCM N14B C RPC 04</td>
</tr>
<tr>
<td>Fwd Port</td>
<td>RPCM N13B C RPC 14</td>
</tr>
<tr>
<td>Fwd Stbd</td>
<td>RPCM N13B C RPC 13</td>
</tr>
</tbody>
</table>

Refer to Table 1 for X and Y references that follow.

1. **NODE 1 IMV FDIR VERIFICATION**

PCS Node 1: ECLSS: Node 1 FDIR
Node 1 FDIR

1.1 ✓ Node 1–1 MDM IMV FDIR Status – Enabled

   If Node 1-1 MDM IMV FDIR Status – Disabled
   **cmd** Node 1-1 MDM IMV FDIR Enable – Enable

   ✓ Node 1-1 MDM IMV FDIR Status – Enabled

1.2 ✓ Node 1–2 MDM IMV FDIR Status – Enabled

   If Node 1-2 MDM IMV FDIR Status – Disabled
   **cmd** Node 1-2 MDM IMV FDIR Enable – Enable

   ✓ Node 1-2 MDM IMV FDIR Status – Enabled

   **NOTE**
   Per SPN 15271, the indicated position of RPCs N13B C RPC13 and N13B C RPC14 are incorrect on PCS displays for NCS Release 2. Crew should **MCC** for actual position of these RPCs before and after commanding them.

2. **NODE 1 IMV X VALVE ACTIVATION**

Node 1: ECLSS: Node 1 IMV X Vlv

sel RPCM/RPC Y

RPCM/RPC Y

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

Node 1 IMV X Vlv
2.2 \textbf{cmd} Status – Enable

\checkmark Status – Enabled

3. \textbf{NODE 1 IMV X VALVE OPEN}

\textbf{Node 1: ECLSS: IMV X Vlv}

\textbf{Node 1 IMV X Vlv}

If using NCS Release 1

‘Position’

\textbf{cmd} Open

Wait 20 seconds.

\checkmark Position – Open

If using NCS Release 2

‘Position – Open’

\textbf{cmd} Open Arm

\textbf{cmd} Open

Wait 20 seconds.

\checkmark Position – Open

4. \textbf{NODE 1 IMV X VALVE CLOSURE}

\textbf{PCS}

\textbf{Node 1: ECLSS: IMV X Vlv}

\textbf{Node 1 IMV X Vlv}

If using NCS Release 1

‘Position’

\textbf{cmd} Close

Wait 20 seconds.

\checkmark Position – Closed

If using NCS Release 2

‘Position – Close’

\textbf{cmd} Close Arm

\textbf{cmd} Close

Wait 20 seconds.

\checkmark Position – Closed
5. **NODE 1 IMV X VALVE DEACTIVATION**
   Node 1: ECLSS: Node 1 IMV X Vlv

PCS

| Node 1 IMV X Vlv |

- Status – Enabled
  - **cmd** Status – Inhibit
  - Status – Inhibited

sel RPCM/RPC Y

| RPCM/RPC Y |

- **cmd** RPC Position – Open (Verify – Op)
Table 1. Node 1 Smoke Detectors

<table>
<thead>
<tr>
<th>X (Identifier)</th>
<th>Y (RPCM/RPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RPCM N14B C RPC 03</td>
</tr>
<tr>
<td>2</td>
<td>RPCM N13B A RPC 16</td>
</tr>
</tbody>
</table>

Refer to Table 1 above for X and Y references that follow.

1. **AUTOMATIC FIRE ISOLATION VERIFICATION**

   **PCS**
   
   **Node 1: ECLSS: FDIR**
   
   √ Node1-1 MDM Fire Isolation Status – Enabled
   
   √ Node1-1 MDM IMV FDIR Status – Enabled
   
   √ Node1-2 MDM Fire Isolation Status – Enabled
   
   √ Node1-2 MDM IMV FDIR Status – Enabled

2. **SMOKE DETECTOR SD X ACTIVATION**

   **PCS**
   
   **Node 1: ECLSS: SDX**
   
   **Node 1 Smoke Detector X**
   
   2.1 sel RPCM/RPC Y
   
   **RPCM/RPC Y**
   
   **cmd** RPC Position – Close (Verify – Cl)
   
   2.2 **Node 1 Smoke Detector X**
   
   ‘Monitoring’
   
   **cmd** Enable
   
   ‘Active BIT’
   
   √ Status – In Progress
   
   Wait 3 seconds, then
   
   √ Status – Complete
   
   √ Failure – blank
   
   ‘Monitoring’
   
   √ Status – Enabled
3. **SMOKE DETECTOR SD X DEACTIVATION**

PCS Node 1: ECLSS: SDX

Node 1 Smoke Detector X

‘Monitoring’

3.1 √ Status – Enabled

**cmd** Inhibit

√ Status – Inhibited

3.2  sel RPCM/RPC Y

RPCM/RPC Y

**cmd** RPC Position – Open (Verify – Op)
TOOLS REQUIRED
Velocicalc Air Velocity Meter
Ratchet, 1/4" Drive
7/16" Deep Socket
Ziplock Bag

WARNING
To prevent electrical shock, Anemometer should not be used near power rack and probe tip should not be located outside of visual scope.

MEASURING FORWARD PORT IMV OUTLET TO PMA 2
1. IMV Flange Saver ←|→ Node 1 Fwd Port IMV Valve Flange (Ratchet, 1/4" Drive, 7/16" Deep Socket) Temporarily stow Flange Saver.

2. Hold probe tip (small white tip inside the metal housing) perpendicular to airflow direction so that the measurement ruler is visible.

3. Using the ruler, take measurements along a single diameter at the following distances from the outer edge of the duct. Refer to Figure 1.

   M1 at 0.2"   M1__________
   M2 at 0.7"   M2__________
   M3 at 2.3"   M3__________
   M4 at 3.9"   M4__________
   M5 at 4.4"   M5__________
   M6 at 0.2"   M6__________
   M7 at 0.7"   M7__________
   M8 at 3.9"   M8__________
   M9 at 4.4"   M9__________
Figure 1.- Measurement Locations For Fwd Port IMV Flange.

4. Retrieve IMV Flange Saver from temporary stow location.
   IMV Flange Saver →|← Node 1 Fwd Port IMV Valve Flange
   (Ratchet, 1/4" Drive, 7/16" Deep Socket)

MEASURING SHUTTLE TO NODE 1 IMV FLOW
5. PMA 2 Grille Cover → Open

6. Insert probe into duct through mesh, being careful not to break mesh as
   probe is inserted.

7. Hold probe tip (small white tip inside the metal housing) perpendicular to
   airflow direction so that the measurement ruler is visible.

8. Using the ruler, take measurements along a single diameter at the
   following distances from the outer edge of the duct.
   Refer to Figure 2.
   Remove probe when finished.

   M1 at 0.2"
   M2 at 0.6"
   M3 at 2.1"
   M4 at 3.6"
   M5 at 4.1"
9. Remove probe.
   PMA 2 Grille Cover → Close

Figure 2.- Measurement Locations For PMA 2 Air Duct.
**TOOLS REQUIRED:**

- Ingress Portable Fan Assembly
- Equip Sound Suppression Assembly (two)
- Bag
- Seat Track Equipment Anchor
- Articulating Post

<table>
<thead>
<tr>
<th>UOP Location (W)</th>
<th>RPCM (X)</th>
<th>RPC (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UOP N1-1, NOD1SD</td>
<td>RPCM N14B C</td>
<td>RPC 17</td>
</tr>
<tr>
<td>UOP N1-2, NOD1PD</td>
<td>RPCM N13B A</td>
<td>RPC 17</td>
</tr>
</tbody>
</table>

**PFA FAN CONFIGURATION**

1. Install both Sound Suppression Assemblies to each end of the PFA using directional arrow indicators and keyed fasteners.

2. Assemble Seat Track Equipment Anchor and Articulating Post, mount the PFA Fan Assemblies on the Articulating Post.

**POWERUP OF FAN**

- Verify Fan switch is in off position.

PCS

   - sel RPC Y
   - \[RPCM X RPC Y\]
   - √RPC Position – Op
   - √RPC Close Command – Inh

Loc W

4. PFA Power Cord →|← UOP Power Outlet

5. **cmd** RPC X Close Cmd – Enable (Verify – Ena)
   - **cmd** RPC Position – Close (Verify – Cl)

**PFA ACTIVATION**

6. Power Switch → On

7. Speed Control Knob → Desired Flow

8. √Fan is running
NOTE

1. For Flight 2A.2B, the APCUs are in parallel configuration; therefore, either APCU 1 or APCU 2 can feed the N13B and N14B buses. To prevent an APCU trip condition, the N13B and N14B power bus loads must be managed per the APCU Load Management Flight Rule (X9.3.3-1) whenever the Node 1 Cabin Fan speed is increased or decreased.

2. To prevent APCU 2 trip condition, N14B power bus loads must be managed whenever Node 1 Cabin Fan speed is increased or decreased.

1. √MCC-H to verify proper loads on power bus

PCS

2. Node 1: ECLSS: Cab Fan
   Node 1 Cabin Fan

   √State – On

NOTE

1. SPN 2627: If the user enters template command data that is greater than the field width on the command window and then wishes to change the value, the user must backspace until the Execute button is disabled to be sure all previously entered data has been deleted before reentering data.

2. SPN 7629: The Spd Cmd Tmplt pop-up shows an invalid range input for the speed parameter to be ‘0…8500’. The valid range is from 3208 --- 7667 rpm.

‘Speed’

3. Enter valid commandable speed in Set [T], rpm field.

   cmd Set [T]

4. √Speed, rpm: Commanded speed ± 9 %
EPS PROCEDURES
This Page Intentionally Blank
NOTE
If the shuttle is not docked to the ISS, the APCU telemetry will not be valid. Use APCU talkbacks only.

CRT
SM 200 APCU Status

1. **VERIFYING MCC-H READY TO ACTIVATE APCU**
   √MCC-H

2. **VERIFYING ORBITER PAYLOAD BUS CONFIGURATION**
   R1
   √PL PRI MNC tb – ON
   √PL CAB – MNB(MNA)
   √PL AUX – ON

3. **VERIFYING SWITCH POWER**
   SSP1
   √cb APCU 1(2) SW PWR – cl

4. **CLOSING APCU OUTPUT RELAY**
   √APCU 1(2) CONV tb – bp
   
   APCU 1(2) OUTPUT RLY – CL

5. **TURNING APCU CONVERTER ON**
   √APCU 1(2) CONV – ON
   
   √APCU 1(2) CONV tb – gray
   √APCU 1(2) OUTPUT RLY tb – gray

CRT
SM 200 APCU Status

√APCU 1(2) OUT VOLTS RES LOW: 122 --- 126.5
√APCU 1(2) OUT VOLTS RES HIGH: 122 --- 126.5
NOTE
If the shuttle is not docked to the ISS, the APCU telemetry will not be valid. Use APCU talkbacks only.

CRT
SM 200 APCU Status

1. **VERIFYING MCC-H READY TO DEACTIVATE APCU**
   - MCC-H

2. **TURNING APCU CONVERTER OFF**
   - SSP1
     - APCU 1(2) CONV – OFF
     - APCU 1(2) CONV tb – bp
     - APCU 1(2) OUTPUT RLY tb – bp

3. **OPENING APCU OUTPUT RELAY**
   - APCU 1(2) OUTPUT RLY – OP
1. **POWERING OFF LIGHTS ON N14B POWER BUS**

PCS  
Node 1: EPS: RPCM N14B B  
RPCM N14B B  

sel RPC 1  

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

RPCM N14B C  

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

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

2. **POWERING OFF LIGHTS ON N13B POWER BUS**

PCS  
Node 1: EPS: RPCM N13B A  
RPCM N13B A  

sel RPC [X]  where [X] = 5 13  

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

RPCM N13B B  

sel RPC 1  

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

RPCM N13B C  

sel RPC 1  

**cmd** RPC Position – Open (Verify – Op)
1. **POWERING ON LIGHTS ON N14B POWER BUS**

PCS

Node 1: EPS: RPCM N14B B

RPCM N14B B

sel RPC 1

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

RPCM N14B C

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

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

2. **POWERING ON LIGHTS ON N13B POWER BUS**

PCS

Node 1: EPS: RPCM N13B A

RPCM N13B A

sel RPC [X] where [X] = 5 13

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

RPCM N13B B

sel RPC 1

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

RPCM N13B C

sel RPC 1

**cmd** RPC Position – Close (Verify – Cl)
1. Obtain the powerdown target value from **MCC** and continue to work the powerdown in order until the target value is reached.

2. Use the POWERUP column in reverse order to back out of the powerdown.

3. The POWERUP column will also be used to recover from an automatic Loadshed.

4. The loads for the major power users are presented below.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>dc Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 Shell Heaters</td>
<td>0 W predicted</td>
</tr>
<tr>
<td></td>
<td>Total for String B 1284 W</td>
</tr>
<tr>
<td>PMA 1 Shell Heaters</td>
<td>40 W predicted</td>
</tr>
<tr>
<td></td>
<td>Total for String B 272 W</td>
</tr>
<tr>
<td>Early Comm</td>
<td></td>
</tr>
<tr>
<td>Transmitter On</td>
<td>60 W</td>
</tr>
<tr>
<td>N1RS1 C</td>
<td></td>
</tr>
<tr>
<td>Port Antenna Power (5)</td>
<td>Low Rate 19 W</td>
</tr>
<tr>
<td>Port Antenna Heater (6)</td>
<td>High Rate 147 W</td>
</tr>
<tr>
<td>Stbd Antenna Power (12)</td>
<td>Low Rate 70 W</td>
</tr>
<tr>
<td>Stbd Antenna Heater (13)</td>
<td>High Rate 70 W</td>
</tr>
<tr>
<td>N1RS2 A</td>
<td></td>
</tr>
<tr>
<td>XCVR Power (5)</td>
<td>Low Rate 54 W</td>
</tr>
<tr>
<td>CTP Power (10)</td>
<td>High Rate 54 W</td>
</tr>
<tr>
<td>RFPDB Power (11)</td>
<td>Low Rate 12 W</td>
</tr>
<tr>
<td></td>
<td>High Rate 51 W</td>
</tr>
<tr>
<td>MDM N1-1</td>
<td></td>
</tr>
<tr>
<td>Primary Mode</td>
<td>67 W</td>
</tr>
<tr>
<td>Secondary Mode</td>
<td>67 W</td>
</tr>
<tr>
<td>Diagnostic Mode</td>
<td>37 W</td>
</tr>
<tr>
<td>MDM N1-2</td>
<td></td>
</tr>
<tr>
<td>Primary Mode</td>
<td>67 W</td>
</tr>
<tr>
<td>Secondary Mode</td>
<td>67 W</td>
</tr>
<tr>
<td>Diagnostic Mode</td>
<td>37 W</td>
</tr>
</tbody>
</table>

**NOTE**

1. During Node 1 Pre-Ingress Warmup, Ingress, and Post Egress Dryout, the Node 1 and PMA 1 Shell Heater power allocation will vary.

2. All watt values in the table below assume 123 V output from each RACU.
**POWERDOWN**

**NOTE**
Depending on the heater configuration, power usage may not decrease after every step.

1. **POWERDOWN TARGET VALUE**
   Obtain powerdown target value, XX, from
   
   MCC-M _______ kW

   FGB: EPS
   FGB: EPS
   ‘Bottom Right’

   Continue performing steps until
   \[ \sqrt{(RACU5 \text{ Pwr, kW} + RACU6 \text{ Pwr, kW})} \leq XX \text{ kW} \]

2. **INHIBITING NODE 1 A HTRS (1 --- 4)**
   
   **NOTE**
   MCC-H will determine the shell heater recovery steps based on current power allocation and necessary heater configuration.

   PCS
   Node 1: TCS
   Node 1: TCS
   ‘Node 1’

   sel Htr Availability
   Node1Htr16avail

   **cmd** Htr [X]A Availability – Inhibit
   where [X] = 1 2 3 4

   \[ \sqrt{\text{Htr}[X]A \text{ Availability} – \text{Inh}} \]

   Repeat

3. **INHIBITING NODE 1 B HTRS (1 --- 4)**
   Node 1: TCS
   Node 1: TCS
   ‘Node 1’

   sel Htr Availability
   Node1Htr16avail

**POWERUP**
### POWERDOWN

<table>
<thead>
<tr>
<th>cmd Htr [X]B Availability – Inhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td>where [X] = 1 2 3 4</td>
</tr>
<tr>
<td>√Htr[X]B Availability – Inh</td>
</tr>
</tbody>
</table>

Repeat

4. **INHIBITING NODE 1 A HTRS (5 --- 9)**
   - **Node 1: TCS**
   - **Node 1: TCS**
   - ‘Node 1’

   sel Node 1 Htrs 7 --- 9 Availability

   Node1Htr79avail

<table>
<thead>
<tr>
<th>cmd Htr [X]A Availability – Inhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td>where [X] = 5 6 7 8 9</td>
</tr>
<tr>
<td>√Htr[X]A Availability – Inh</td>
</tr>
</tbody>
</table>

Repeat

5. **INHIBITING NODE 1 B HTRS (5 --- 9)**
   - **Node 1: TCS**
   - **Node 1: TCS**
   - ‘Node 1’

   sel Htr Availability

   Node1Htr16avail

   If Inhibiting heater in zone 7,8,or 9, sel Node1 Htrs 7 --- 9 Availability

   Node1Htr79avail

<table>
<thead>
<tr>
<th>cmd Htr [X]B Availability – Inhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td>where [X] = 5 6 7 8 9</td>
</tr>
<tr>
<td>√Htr[X]B Availability – Inh</td>
</tr>
</tbody>
</table>

Repeat
### POWERDOWN

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6. INHIBITING PMA 1 A AND B SHELL HTRS</strong></td>
<td></td>
</tr>
<tr>
<td>Node 1: TCS</td>
<td>Node 1: TCS</td>
</tr>
<tr>
<td>‘PMA 1’</td>
<td></td>
</tr>
<tr>
<td>sel Htr Availability</td>
<td></td>
</tr>
<tr>
<td>PMA1_HtrAvailability</td>
<td></td>
</tr>
<tr>
<td><strong>cmd</strong> Htr [X]A Availability – Inhibit</td>
<td>where [X] = [1 3 4 5]</td>
</tr>
<tr>
<td>√PMA 1 Htr[X]A Availability – Inh</td>
<td></td>
</tr>
<tr>
<td>Repeat</td>
<td></td>
</tr>
<tr>
<td><strong>cmd</strong> Htr [X]B Availability – Inhibit</td>
<td>where [X] = [1 2 3 5]</td>
</tr>
<tr>
<td>√PMA 1 Htr[X]B Availability – Inh</td>
<td></td>
</tr>
<tr>
<td>Repeat</td>
<td></td>
</tr>
<tr>
<td><strong>7. TURNING OFF EARLY COMM ANTENNA HEATERS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>The Early Comm Antennas may experience hardware damage after 10 hours without heater power.</td>
</tr>
<tr>
<td>Node 1: EPS: RPCM N1RS1 C</td>
<td></td>
</tr>
<tr>
<td>RPCM N1RS1 C</td>
<td></td>
</tr>
<tr>
<td>sel RPC [X] where [X] = [6 13]</td>
<td></td>
</tr>
<tr>
<td><strong>cmd</strong> RPC Position – Open (Verify – Op)</td>
<td></td>
</tr>
<tr>
<td>Repeat</td>
<td></td>
</tr>
<tr>
<td>FGB: EPS</td>
<td></td>
</tr>
<tr>
<td>FGB: EPS</td>
<td>‘Bottom Right’</td>
</tr>
<tr>
<td>√(RACU5 Pwr, kW + RACU6 Pwr, kW) ≤ XX kW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWERUP</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 8. DISABLING EARLY COMM TRANSMITTER

**C&T: Early Comm**

- Early S-Band Comm Management
- ‘System Configuration’

<table>
<thead>
<tr>
<th>sel XMTR</th>
<th>cmd ECOMM Xmtr Off</th>
<th>Execute</th>
</tr>
</thead>
</table>

**FGB: EPS**

- ‘Bottom Right’

\[ \sqrt{\text{RACU5 Pwr, kW} + \text{RACU6 Pwr, kW}} \leq XX \text{ kW} \]

### 9. DISABLING INTERNAL EARLY COMM EQUIPMENT

**NOTE**

The Early Comm equipment is powered by the stbd CBM RPCs.

Node 1: EPS: RPCM N1RS2 A

<table>
<thead>
<tr>
<th>RPCM N1RS2 A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>sel RPC [X]</th>
<th>cmd RPC Position – Open (Verify – Op)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ [X] = {5, 6, 10, 11} ]</td>
<td>Repeat</td>
</tr>
</tbody>
</table>

**FGB: EPS**

- ‘Bottom Right’

\[ \sqrt{\text{RACU5 Pwr, kW} + \text{RACU6 Pwr, kW}} \leq XX \text{ kW} \]
### POWERDOWN

10. **TURNING OFF EARLY COMM ANTENNAS**
   - Node 1: EPS: RPCM N1RS1 C
     - RPCM N1RS1 C
   - sel RPC [X] where [X] = \[5\mid 12\]
   - **cmd** RPC Position – Open (Verify – Op)
   - Repeat

   - FGB: EPS
   - FGB: EPS
   - ‘Bottom Right’

   \[ \sqrt{\text{RACU5 Pwr, kW} + \text{RACU6 Pwr, kW}} \leq XX \text{ kW} \]

11. **POWERDOWN OF N1-1 MDM**
   - MCC-H before powerdown of N1-1 MDM
   - Remove power from N1-1 MDM SDO Card.
   - Node 1: EPS: RPCM: N1RS1 A
     - RPCM N1RS1 A
   - sel RPC 5
   - **cmd** RPC Position – Open (Verify – Op)

   Perform G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY, all (SODF: ISS OPS: C&DH), then:
### POWERDOWN

The RPCM Enable/Inhibit telemetry parameters on the RPC detail displays have the following enumerations:

- **Enable = <blank>**
- **Inhibit = Inh**
  
  [ISS SPN 444]

**Verify N1-2 MDM Survival Heater Off**

Node 1: EPS: RPCM: N1RS1 C: RPC 2  
**RPCM N1RS1 C RPC 02**

- **√** RPC Position – Op

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

FGB: EPS  
  
  [FGB: EPS]
  
  ‘Bottom Right’

- **√** (RACU5 Pwr kW + RACU6 Pwr kW) ≤ XX kW

### POWERDOWN OF N1-2 MDM

The RPCM Enable/Inhibit telemetry parameters on the RPC detail displays have the following enumerations:

- **Enable = <blank>**
- **Inhibit = Inh**
  
  [ISS SPN 444]

- **√** MCC-H before powerdown of N1-2 MDM

  Inhibit RPC to N1-1 MDM Survival Heater.

Node 1: EPS: RPCM: N1RS2 C: RPC 15  
**RPCM N1RS2 C RPC 15**

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

### POWERUP

**NOTE**

During recovery, only enable the Close command for the MDM Survival Heater if the power allocation allows.

**cmd** Close Cmd – Enable (Verify – Ena)

**NOTE**

During recovery, only enable the Close command for the MDM Survival Heater if the power allocation allows.
<table>
<thead>
<tr>
<th>POWERDOWN</th>
<th>POWERUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>√MCC-H to determine the ECLSS equipment to powered off prior to powerdown of N1-2 MDM</td>
<td></td>
</tr>
<tr>
<td>RPCM N1RS2 C</td>
<td></td>
</tr>
<tr>
<td>sel RPC[X] where [X] = 4 15 13</td>
<td></td>
</tr>
<tr>
<td>cmd RPC Position – Open (Verify – Op)</td>
<td></td>
</tr>
<tr>
<td>Repeat</td>
<td></td>
</tr>
</tbody>
</table>
1. **VERIFYING POWER IS REMOVED FROM N1-2 MDM**  
   Node 1: EPS: RPCM N1RS2 C  
   
   Verify RPC 13 Position – Open

2. **INHIBITING RT AND RT FDIR FOR RPCMs TO BE POWERED OFF**  
   Node 1: CDH: Primary N1 MDM: UB EPS N1 23: RT Status  
   
   cmd 18 RPCM N1RS2 C Inhibit FDIR **Execute** (Verify RT Status – INH)  
   cmd 19 RPCM N1RS2 B Inhibit FDIR **Execute** (Verify RT Status – INH)  
   cmd 20 RPCM N1RS2 A Inhibit FDIR **Execute** (Verify RT Status – INH)

   ![NOTE]

   Only one of the following steps (3, 4, or 5) should be performed based on the location from which the RACU will be commanded off.

   Upon deactivation of RACU 5, the following messages may be annunciated.

   On Orbiter MCDS:  
   SPEC 204 RACU5 VOLT LMT  
   On PCS:  
   RPCM N1RS2_A Loss of Comm – Nod1  
   RPCM N1RS2_B Loss of Comm – Nod1  
   RPCM N1RS2_C Loss of Comm – Nod1  
   RPCM Z13B_A Loss of Comm – Z1  
   RPCM Z13B_B Loss of Comm – Z1

3. **MCC-M COMMANDING FGB RACU 5 OFF**  
   Crew ↓ **MCC-H**, “Ready for RACU 5 Power Off.”  
   **MCC-H** ⇒ **MCC-M**, “Go for RACU 5 Power Off.”

   Record planned RACU Off Command opportunities based on Russian Ground Site Coverage:

<table>
<thead>
<tr>
<th>RUSSIAN GROUND</th>
<th>AOS</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass 1</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Pass 2</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

   **MCC-M** ⇒ **MCC-H** ↑ crew, “RACU 5 Powered Off at ___/___:___:___ GMT” >>

   PCS  
   FGB: EPS: RACU  
   FGB_RACUs
4. CREW COMMANDING FGB RACU 5 OFF FROM ORBITER MCDS

4.1 Verifying FGB Relay Matrix is Enabled
If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

| CRT          | SM 204 FGB |

√COMMANDING – ENA

If NCS R2 and Telemetry format 2N loaded in Primary MDM

| CRT          | SM 224 FGB - 2N |

√COMMANDING – ENA

4.2 Verifying FGB УПЛУ is Inhibited
MCC-M ⇒ MCC-H: “УПЛУ is Inhibited. Go for RACU 5 Power Off."

4.3 Crew Commanding RACU 5 Off
MCC-H ↑ crew, “Moscow go for RACU 5 Power Off.”

On MCC GO

If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

| CRT          | SM 204 FGB |

If NCS R2 and Telemetry format 2N loaded in Primary MDM

| CRT          | SM 224 FGB - 2N |

RACU 5 PWR OFF VIA NCS – ITEM 6 EXEC

√RACU 5 INPUT AMPS < 2.0 A
√OUTPUT VOLTS ~90 V
√PWR OFF – * »

5. CREW COMMANDING FGB RACU 5 OFF FROM PCS

5.1 Verifying FGB Relay Matrix Is Enabled
FGB: CDH: FGB MDM
   FGB MDM 1(2)

√Direction_Of_Cmd – MU
√Relay_Cmd_Matrix_MU_Inh – <blank>

5.2 Verifying FGB УПЛУ is Inhibited
5.3 Commanding RACU 5 Off

MCC-H ↑ crew, “Moscow GO for RACU 5 Power Off."

**On MCC-H GO**

FGB: EPS: RACU
[FGB RACUs]

**cmd RACU 5 – Off**  **Execute**

√RACU 5 Converter – Off
   √Input Current < 2.0 A
   √Output Voltage ~90 V
**NOTE**

Only one of the following steps (1, 2, or 3) should be performed based on the location from which the RACU will be commanded on. Step 4 should be performed regardless of the commanding location.

1. **MCC-M COMMANDING**


   **MCC-H** ⇒ **MCC-M**, “Go for RACU 5(6) Power On.”

<table>
<thead>
<tr>
<th>RUSSIAN GROUND</th>
<th>AOS</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass 1</td>
<td><em><strong>/</strong></em>:___</td>
<td><em><strong>/</strong></em>:___</td>
</tr>
<tr>
<td>Pass 2</td>
<td><em><strong>/</strong></em>:___</td>
<td><em><strong>/</strong></em>:___</td>
</tr>
</tbody>
</table>

   **MCC-M** ⇒ **MCC-H** ↑ Crew,
   “RACU 5(6) Power On at ___/___:___ GMT.”

   Go to step 4.

2. **CREW COMMANDING FROM MCDS**

   2.1 **Verifying FGB Relay Matrix is Enabled**

   If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

   | SM 204 FGB | √COMMANDING – ENA |

   If NCS R2 and Telemetry format 2N loaded in Primary MDM

   | CRT | SM 224 FGB - 2N |
   |     | √COMMANDING – ENA |


   2.2 **Verifying FGB УППУ is Inhibited**

   **MCC-M** ⇒ **MCC-H**: “УППУ Inhibited. Go for RACU 5(6) Power On.”

   **MCC-H** ↑ crew, “Go for RACU 5(6) Power On.”

   2.3 **Verifying FGB Power System Nominal**

   **On MCC GO**

   If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

   | CRT | SM 204 FGB |

   If NCS R2 and Telemetry format 2N loaded in Primary MDM

   | CRT | SM 224 FGB - 2N |
PARAMETERS:

\[ \sqrt{\text{MAIN BUS V1, V2 (two): 28.0 -- 29.0 V}} \]
\[ \sqrt{\text{BATT VOLTS 1 --- 6 (six) > 25.5 V}} \]

2.4 Commanding RACU On

If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

\[ \text{SM 200 NODE 1} \]

If NCS R2 and Telemetry format 2N loaded in Primary MDM

\[ \text{CRT SM 220 NODE 1 - 2N} \]

Verify PRI MDM FRM CTR incrementing.

If FRM CTR static

If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

\[ \text{SM 204 FGB} \]

If NCS R2 and Telemetry format 2N loaded in Primary MDM

\[ \text{SM 224 FGB - 2N} \]

RACU 5(6) PWR ON VIA FGB – ITEM 1(ITEM 3) EXEC

\[ \sqrt{\text{RACU 5(6) PWR ON -- *}} \]
\[ \sqrt{\text{INP AMPS \geq 2.5 A}} \]
\[ \sqrt{\text{OUT VOLTS: 121 --- 125 V}} \]
\[ \sqrt{\text{OUT AMPS: 0.3 --- 10 A}} \]

NOTE
Amperage should be at 0.5 A at power on. Amperage could be as high as 10 A after MDM initialization (approximately 2.5 minutes), depending on heater usage.

****************************************************************

If RACU 5(6) OUT AMPS > 10

RACU 5(6) PWR OFF VIA FGB – ITEM 5(ITEM 7) EXEC

****************************************************************

If FRM CTR incrementing

If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

\[ \text{SM 204 FGB} \]

If NCS R2 and Telemetry format 2N loaded in Primary MDM

\[ \text{SM 224 FGB -2N} \]

RACU 5(6) PWR ON VIA NCS – ITEM 2(ITEM 4) EXEC
RACU 5(6) ACTIVATION
(ISS OPS/2A.2/FIN B/MULTI) Page 3 of 4 pages

√RACU 5(6) PWR ON – *
√INP AMPS ≥ 2.5 A
√OUT VOLTS: 121 --- 125 V
√OUT AMPS: 0.3 --- 10 A

NOTE
Amperage should be at 0.5 A at power on. Amperage could be as high as 10 A after MDM initialization (approximately 2.5 minutes), depending on heater usage.

***********************************************
If RACU 5(6) OUT AMPS > 10
RACU 5(6) PWR OFF VIA FGB – ITEM 6(ITEM 8) EXEC
***********************************************

Go to step 4.

3. **CREW COMMANDING FROM PCS**

3.1 Verifying FGB Relay Matrix is Enabled

PCS

FGB: CDH: FGB MDM

FGB MDM

√Direction_Of_Cmd – MU
√Relay_Cmd_Matrix_Mu_Inh – <blank>

3.2 Verifying FGB УПЛУ is Inhibited


3.3 Verifying FGB Power System Nominal

PCS

FGB: EPS

FGB: EPS

√Main Bus Voltage 1,2 (two): 28.0 --- 29.0 V
√Battery Voltage 1 --- 6 (six) > 25.5 V

***********************************************
If any FGB Battery Voltage < 25.5 Volts, then notify MCC: “FGB Batteries Low. Wait one orbit for FGB batteries to charge.”
***********************************************

3.4 Commanding RACU On

FGB: EPS: RACU

FGB RACUs

**cmd** RACU 5(6) – On **Execute**
RACU 5(6) ACTIVATION
(ISS OPS/2A.2/FIN B/MULTI) Page 4 of 4 pages

√ RACU 5(6) Converter – On
√ RACU 5(6) Input Current ≥ 2.5 A
  √ Output Current: 0.3 --- 10 A
  √ Voltage: 121 --- 125 V

NOTE
Amperage should be at 0.5 A at power on. Amperage could be as high as 10 A after MDM initialization (approximately 2.5 minutes), depending on heater usage.

********************************************************************
If RACU 5(6) Output Current > 10
  cmd RACU 5(6) – Off Execute
********************************************************************

4. SYSTEM RECOVERY
   Go to EPS SSR-5(6): RACU 5(6) CONTROLLED REPOWER, steps 2 --- all (SODF: ISS MAL: EPS) >>
1. **VERIFYING POWER IS REMOVED FROM N1-1 MDM**
   Node 1: EPS: RPCM N1RS1 A
   RPCM N1RS1 A

   Verify RPC 11 Position – Open

2. **INHIBITING RT AND RT FDIR FOR RPCMs TO BE POWERED OFF**
   Node 1: CDH: Primary N1 MDM: UB EPS N1 14: RT Status
   UB_EPS_N1_14_RT_Status

   **cmd** 18 RPCM N1RS1 C Inhibit FDIR **Execute** (Verify RT Status – INH)
   **cmd** 19 RPCM N1RS1 B Inhibit FDIR **Execute** (Verify RT Status – INH)
   **cmd** 20 RPCM N1RS1 A Inhibit FDIR **Execute** (Verify RT Status – INH)

   **NOTE**
   Only one of the following steps (3, 4, or 5) should be performed based on the location from which the RACU will be commanded off.

   Upon deactivation of RACU 6, the following messages may be annunciated.

   On Orbiter MCDS:
   SPEC 204 RACU6 VOLT LMT
   On PCS:
   RPCM N1RS1_A Loss of Comm – Nod1
   RPCM N1RS1_B Loss of Comm – Nod1
   RPCM N1RS1_C Loss of Comm – Nod1
   RPCM Z13B_A Loss of Comm – Z1
   RPCM Z13B_B Loss of Comm – Z1

3. **MCC-M COMMANDING FGB RACU 6 OFF**
   Crew ↓ **MCC-H**, “Ready for RACU 6 Power Off.”
   **MCC-H** ⇒ **MCC-M**, “Go for RACU 6 Power Off.”

   Record planned RACU Off Command opportunities based on Russian Ground Site Coverage:

<table>
<thead>
<tr>
<th>RUSSIAN GROUND</th>
<th>AOS</th>
<th>LOS</th>
</tr>
</thead>
</table>

   **MCC-M** ⇒ **MCC-H** ↑ crew, “RACU 6 Powered Off at
   __/__/___:___:___ GMT” >>

   **PCS**
   **FGB: EPS: RACU**
   **FGB_RACUs**
RACU 6 DEACTIVATION
(ISS OPS/2A.2B/FIN B/MULTI)   Page 2 of 3 pages

√RACU 6 Converter – Off
√Input Current < 2.0 A
√Output Voltage ~90 V

4. CREW COMMANDING FGB RACU 6 OFF FROM MCDS

4.1 Verifying FGB Relay Matrix is Enabled
If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

CRT

√COMMANDED – ENA

If NCS R2 and Telemetry format 2N loaded in Primary MDM

CRT

√COMMANDED – ENA

4.2 Verifying FGB УПЛУ is Inhibited

4.3 Commanding RACU 6 Off
MCC-H ⇑ crew, “Moscow GO for RACU 6 Power Off.”

On MCC GO

If NCS R1 and Telemetry format 1.1N loaded in Primary MDM

CRT

SM 204 FGB

If NCS R2 and Telemetry format 2N loaded in Primary MDM

CRT

SM 224 FGB - 2N

RACU 6 PWR OFF VIA NCS – ITEM 8 EXEC

√RACU 6 INP AMPS < 2.0 A
√OUT VOLTS: 90 V
√PWR OFF – *

5. CREW COMMANDING FGB RACU 6 OFF FROM PCS

5.1 Verifying FGB Relay Matrix Is Enabled

PCS

FGB: CDH: FGB MDM
[FGB MDM 1(2)]

√Direction_Of_Cmd – MU
√Relay_Cmd_Matrix_MU_Inh – <blank>
5.2 Verifying FGB УПЛУ is Inhibited

Go for RACU 6 Power Off.”

5.3 Commanding RACU 6 Off

MCC-H ↑ crew, “Moscow GO for RACU 6 Power Off.”

On MCC-H GO

FGB: EPS: RACU
[FGY RACUs]

cmd RACU 6 – Off  Execute

√ RACU 6 Converter – Off
  √ Input Current < 2.0 A
  √ Output Voltage ~90 V
1. CLOSING A SINGLE RPC OR MULTIPLE RPCs

PCS

Node 1: EPS: RPCM #### # RPC [X] where [X] = any RPC 1 --- 18

RPCM #### # RPC [X]

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

Repeat if closing(opening) multiple RPCs

2. OPENING A SINGLE RPC OR MULTIPLE RPCs

Node 1: EPS: RPCM #### # RPC [X] where [X] = any RPC 1 --- 18

RPCM #### # RPC [X]

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

Repeat if closing(opening) multiple RPCs
NOTE
The RPCM Enable/Inhibit telemetry parameters on the RPC detail displays have the following enumerations:

- Enable = <blank>
- Inhibit = Inh

[ISS SPN 444]

1. CONFIGURING POWER BUS N1RS1

PCS Node 1: EPS

1.1 Clearing Power On Reset Flag and Inhibiting Input Undervoltage Recovery

\[\text{sel RPCM N1RS1 } [X] \text{ where } [X] = [A][B][C]\]

- \text{RPCM N1RS1 } [X]
- sel Firmware
- ‘Clear Cmds’
- \text{cmd } \text{Common Clear}

\[\text{RPCM N1RS1 } [X]\]

- sel Input Undervoltage
- \text{cmd } \text{Trip Recovery – Inhibit Arm}
- \text{cmd } \text{Trip Recovery – Inhibit (Verify – Inh)}

Repeat

1.2 Inhibiting RPC Close Commands for N1RS1

\[\text{RPCM N1RS1 A}\]

\[\text{sel RPC } [X] \text{ where } [X] = [7][8]\]

- \text{cmd } \text{Close Cmd – Inhibit (Verify – Inh)}

Repeat

\[\text{RPCM N1RS1 B}\]

\[\text{sel RPC } [X] \text{ where } [X] = [1][2][5][6][13][14][15][16]\]

- \text{cmd } \text{Close Cmd – Inhibit (Verify – Inh)}

Repeat
RPCM POWER ON RESET

2. CONFIGURING POWER BUS N1RS2

2.1 Clearing Power On Reset Flag and Inhibiting Input Undervoltage Recovery

RPCM N1RS2 C

sel RPC [X] where [X] = 3 4

cmd Close Cmd – Inhibit (Verify – Inh)

Repeat

2.2 Inhibiting RPC Close Commands for N1RS2

RPCM N1RS2 B

sel RPC [X] where [X] = 1 2 3 4 5

                    12 13 14 15 16

cmd Close Cmd – Inhibit (Verify – Inh)

Repeat

RPCM N1RS2 C
3. **CONFIGURING POWER BUS N13B**

### NODE 1: EPS

#### 3.1 Clearing Power On Reset Flag and Inhibiting Input Undervoltage Recovery

```
0 sel RPCM N13B [X]   where [X] = A B C
RPCM N13B [X]
sel Firmware
‘Clear Cmds’
cmd Common Clear
```

```
RPCM N13B [X]
sel Input Undervoltage
cmd Trip Recovery – Inhibit Arm
cmd Trip Recovery – Inhibit (Verify – Inh)
```

Repeat

#### 3.2 Inhibiting RPC Close Commands for N13B

```
RPCM N13B A
0 sel RPC [X]   where [X] = 1 2 3 14 15 17
   cmd Close Cmd – Inhibit (Verify – Inh)
```

Repeat

```
RPCM N13B B
0 sel RPC [X]   where [X] = 2 3 4 5 6 11 12 13 14
   cmd Close Cmd – Inhibit (Verify – Inh)
```

Repeat

```
RPCM N13B C
```
4. CONFIGURING POWER BUS N14B

**NOTE**
The Power On Reset Bit will not be displayed for N14B RPCMs until NCS Release 2; therefore, the Power On Reset Bit still needs to be cleared. **MCC-H** has access to these parameters via data dump.

**NODE 1: EPS**

4.1 Clearing Power On Reset Flag and Inhibiting Input Undervoltage Recovery

```plaintext
sel RPCM N14B [X]   where [X] = A B C

RPCM N14B [X]

sel Firmware

‘Clear Cmds’

**cmd** Common Clear

RPCM N14B [X]

sel Input Undervoltage
**cmd** Trip Recovery – Inhibit Arm
**cmd** Trip Recovery – Inhibit (Verify – Inh)

Repeat
```

4.2 Inhibiting RPC Close Commands for N14B

```plaintext
RPCM N14B A

sel RPC [X]   where [X] = 1 2 3 14 15

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

Repeat
```

```plaintext
RPCM N14B B
```
**RPCM POWER ON RESET**

 sel RPC [X] where [X] = \[2\ 3\ 4\ 5\ 6\ 11\ 12\ 13\ 14\]

  cmd Close Cmd – Inhibit (Verify – Inh)

  Repeat

  [RPCM N14B C]

 sel RPC [X] where [X] = \[1\ 17\]

  cmd Close Cmd – Inhibit (Verify – Inh)

  Repeat
MCS PROCEDURES
1. **INHIBITING LED INDICATORS**

PCS

MCS: ACS Moding

ACS Moding

‘ACS Configuration’

sel LED Control SW

LED Control SW

‘Primary NCS’

**cmd** Inhibit

Verify LED Control SW – Inh
Verify PMA2,PMA3 LED State – Off

‘Secondary NCS’

**cmd** Inhibit

Verify LED Control SW – Inh
Verify PMA2,PMA3 LED State – Off

2. **DISABLING ARRIVAL RESPONSE SOFTWARE**

ACS Moding

‘Arrival’

sel PMA2(PMA3) Arrival Response SW

PMA2(PMA3) Arrival Response SW

‘Primary NCS’

**cmd** Arm

Verify Arm Status – Arm

**cmd** Inhibit

Verify Arrival Response SW – Inh
Verify Arm Status – Disarm

‘Secondary NCS’

**cmd** Arm

Verify Arm Status – Arm

**cmd** Inhibit

Verify Arrival Response SW – Inh
Verify Arm Status – Disarm
1. **VERIFYING ACS Moding ROLE CONFIGURATION**

   MCS: ACS Moding
   - ACS Moding
   - ‘ACS Configuration’

   √ Moding Role Primary, Secondary NCS – Full

   ***************************************************************
   If Primary(Secondary) NCS Moding Role is not set to Full,
   then the following commands should be sent
   sel Moding Role

   Moding Role

   cmd N1-2(N1-1) – Arm

   Verify Arm Status Primary(Secondary) NCS – Arm

   cmd N1-2(N1-1) – Full

   Verify Moding Role Primary(Secondary) NCS – Full
   Verify Arm Status Primary(Secondary) NCS – Disarm
   ***************************************************************

2. **VERIFYING RUSSIAN SEGMENT MODE STATUS**

   ‘ACS Configuration’

   Verify RS Mode Primary, Secondary NCS – Drift

3. **VERIFYING DEPARTURE EVENT STATUS AND CONFIGURATION**

   ‘Departure’

   Verify PMA2(PMA3) Interface Sealed Primary, Secondary NCS – X
   Verify PMA2(PMA3) Separation Primary, Secondary NCS – blank
   Verify Departure Event Primary, Secondary – blank

4. **PENDING BACK OFF TIMER SET FOR ORBITER DEPARTURE**

   **NOTE**
   Pending Back Off Timer of 250 seconds allows the orbiter to reach
   a safe distance prior to ISS resuming active attitude control.

   MCS: ACS Moding
   - ACS Moding
   - ‘Departure’

  _sel Pending Back Off Time

   Pending Back Off Time
   - ‘Primary NCS’
   input Time: 250 (seconds)
ACS PRE-DEPARTURE MODING

(II.S OPS/2A.2b/FIN) Page 2 of 4 pages

**cmd Accept Time**

Verify Pending Back Off Time: 250 (seconds)
Verify Arm Status – Arm

**cmd Incorporate Pending Back Off Time**

Verify Back Off Time: 250 (seconds)
Verify Arm Status – Arm

**cmd Accept Time**

Verify Pending Back Off Time: 250 (seconds)
Verify Arm Status – Arm

**cmd Incorporate Pending Back Off Time**

Verify Back Off Time: 250 (seconds)
Verify Arm Status – Arm

If, before incorporating this time, the Pending Back Off Time needs to be canceled or configured later, disarm the current Pending Back Off Time as follows:

sel Pending Back Off Time

**Primary NCS** (‘Secondary NCS’)

**cmd Disarm**

Verify Arm Status – Disarm

5. **ENABLING APAS LED LIGHTING**

**NOTE**

Each of the primary and secondary MDMs command one of the LED units (i.e., two units per PMA, four LEDs per unit). LED configurations: On - Active Attitude Control, Flash - Station in Drift, Off - LED Control SW is Inhibited or an MDM loss of comm situation has occurred.

PCS

MCS: ACS Moding

**ACS Moding**

‘ACS Configuration’

sel LED Control SW

01 DEC 99  274
6. CREW VERIFICATION OF LED STATE
Visual verification by orbiter crew that LED indicators are flashing (orbiter overhead windows).

7. ENABLING DEPARTURE EVENT MONITORING FOR ACS MODING
PCS
MCS: ACS Moding
ACS Moding
‘Departure’

sel PMA2(PMA3) Departure Response SW

PMA2(PMA3) Departure Response SW
‘Primary NCS’

cmd Arm
Verify Arm Status – Arm

cmd Enable
Verify Departure Response SW – Ena
Verify Arm Status – Disarm

‘Secondary NCS’

cmd Arm
Verify Arm Status – Arm

cmd Enable
Verify Departure Response SW – Ena
Verify Arm Status – Disarm
8. **VERIFYING DEPARTURE EVENT SOFTWARE STATUS**

**ACS Moding**

‘Departure’

Verify Departure Event Primary,Secondary NCS – blank

<table>
<thead>
<tr>
<th><strong>CAUTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>If the Primary(Secondary) Time Since Separation is observed to be incrementing any time prior to planned departure, ISS may take attitude control.</td>
</tr>
</tbody>
</table>

********************************************************************

If the Primary(Secondary) Time Since Separation is observed to be incrementing any time prior to planned departure, **IMMEDIATE ACTION IS REQUIRED**.

sel Moding Role

<table>
<thead>
<tr>
<th>Moding Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cmd</strong> N1-2(N1-1) – Arm</td>
</tr>
</tbody>
</table>

Verify Arm Status Primary(Secondary) NCS – Arm

**cmd** N1-2(N1-1) – Off

Verify Moding Role Primary(Secondary) NCS – Off

Verify Arm Status Primary(Secondary) NCS – Disarm

********************************************************************
MED OPS PROCEDURES
FGB 217

1. Unstow two Dosimeters (S/Ns 1002 and 1003) from ISS Audio Dosimeter Biobag (ADB) and marking pen.
2. Change batteries in both Dosimeters.
   2.1 Unstow 9V Battery Kit from Audio Dosimeter Biobag.
   2.2 Unstow spare 9V DC Battery from 9V Battery Kit.
   2.3 Slide front panel up on Dosimeter, if not already up.
   2.4 O/I sw → O (off) on Dosimeter.
   2.5 Firmly grasp unit in one hand, and remove grooved battery cover.
   2.6 Remove and replace Battery.
   2.7 Replace Battery cover.
   2.8 Use pen to mark used Battery with “X.”
   2.9 Stow used Battery in 9V Battery Kit.
   2.10 Stow 9V Battery Kit in Audio Dosimeter Biobag.
3. Slide front panel up on both Audio Dosimeters.
4. O/I sw → I (on)
5. After ~10 seconds √'BATT OK' readout appears in top left of display.
   √'0:00 time' appears on display
   
   **NOTE**
   New Battery will operate unit for ~40 hours.

   *******************************************************
   If not, O/I sw → O (off) and perform steps 2.1 --- 2.10.
   *******************************************************
6. Press pb (three times) until ‘Lavg/Leg’ mode appears on display, then slide cover down.

00:00:00 7. Velcro one dosimeter to SM_435 and one to SM_230.
8. Record measurement location and start time in Table 1.
   
   *******************************************************
   If ‘OFL’ (memory overflow) message is seen on the display, ignore and continue taking measurements.
   *******************************************************
24:00:00  9. Retrieve Dosimeters from deployed locations.
   10. Slide front panel up on both Dosimeters.
   11. Record stop time and Lavg/Leg measurements in Table 1.
   12. O/I sw → O (off)
   13. Slide front panel down.

Table 1.

<table>
<thead>
<tr>
<th>Measurement Location</th>
<th>Time and Reading</th>
<th>Comments/Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Location:</td>
<td>Lavg/Leq: ______dBA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start GMT: _________</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop GMT: _________</td>
<td></td>
</tr>
<tr>
<td>Static Location:</td>
<td>Lavg/Leq: ______dBA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start GMT: _________</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop GMT: _________</td>
<td></td>
</tr>
</tbody>
</table>
NOTE
1. The CDM will operate for approximately 18 hours before the battery pack is discharged. The CDM will emit a short beep once every 15 seconds to indicate a low battery condition with approximately 3 --- 5 hours remaining. Battery should be changed out when low battery indicated.

2. The CDM contains a data logger which is activated upon startup. Logged data are time-stamped via an internal clock set to GMT. When a monitoring session (more than a single data point) is conducted, e.g., during an IFM task behind a panel, it is important to record the GMT (watch or CDM clock) at the beginning and end of the activity. Data from the entire session stored in the data logger can then be correlated with log book data and sampling information.

3. In the nominal operating mode, the CDM clock can be accessed by pressing the MODE pushbutton (nine times until 'RT XX:XX' on the top line indicates real time.

1. CDM SETUP

DAS4

Unstow CDM Kit.

Remove from CDM Kit

CDM

Clean Filter Assembly (blue ring next to “CLEAN” Label)

CDM QD →|← Filter

Attach Velcro Tether.

2. CDM ACTIVATION

NOTE
1. Audible beeps occur when the MODE pushbutton is depressed during unit activation.

2. A single beep occurs when the self-check routine is complete.

Press, hold MODE pushbutton until ‘RELEASE’ displayed.

Wait approximately 1 minute while unit runs self-check routine.

Verify display indicates CO2 concentration.
3. **CDM OPERATIONS**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Both area and personal exposure monitoring for CO2 should be conducted during the mission.</td>
</tr>
<tr>
<td>2. Area monitoring is conducted at mid-axis in each module during daily ingress and egress. The CO2 concentration and sampling information should be called down to <strong>MCC-H</strong> if A/G is available. Readings taken during LOS periods should be recorded in the log book and called down at crew convenience.</td>
</tr>
<tr>
<td>3. Personal monitoring is conducted during IFM tasks requiring work in or around open panels. The CDM must be located very close to the crewmember to assess exposure; however, not in the path of exhaled breath.</td>
</tr>
<tr>
<td>4. A Nomex Belt is provided to attach the CDM to the torso or, alternatively, adhesive-backed Velcro patches are provided for surface attachment in the work zone. For these monitoring sessions, the CO2 concentration and sampling information must be recorded at the Logbook at the beginning and end of the session.</td>
</tr>
</tbody>
</table>

If conducting an extended monitoring session during a crew activity

Remove log book, Marker, Nomex Belt, and/or Velcro patch from CDM Kit.

Transfer CDM and items above to monitoring location.

Record the CO2 concentration and sampling information and time activity begins in log book when the activity begins.

Temporarily stow log book and Marker.

Place the Nomex Belt around the torso.

Insert the CDM in the pouch or use the Velcro patch to attach the CDM to a surface in the work zone.

Following completion of the activity, record the current CO2 concentration, time the activity ended, and other sampling information in the log book.

When monitoring is complete and all pertinent data recorded, deactivate CDM.

4. **CDM DEACTIVATION**

Press, hold MODE pushbutton until **RELEASE** displayed.

Verify CDM is off.
5. **CDM STOWAGE**
   Remove Filter Assembly and stow on clean side.

DAS4  Stow CDM Kit.
NOTE
Disabling the CDM alarm function will remove audio and visual (flashing red lights) annunciation if the preset CO2 threshold concentration is exceeded.

1. Notify MCC prior to disabling the alarm function.

2. For activated CDM, press MODE pushbutton (six times) until 'ALM ON' is displayed.

NOTE
1. In the alarm on/off mode, pressing the “E” button will toggle the switch between alarm off and alarm on.

2. The operating mode will revert to the nominal display after 15 seconds.

3. Press “E” button to switch the alarm off.

4. Verify display indicates alarm is off.
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### CARBON DIOXIDE MONITOR (CDM) BATTERY CHANGEOUT

1. **NOTE**
   1. With approximately 3 --- 5 hours of runtime remaining, the CDM will emit a short beep once every 15 seconds to indicate a low battery condition.
   2. When the battery has insufficient charge to operate the CDM, 'BATTERY FAIL' is displayed and a short beep is emitted every second. The battery should be replaced immediately.
   3. When in the normal operation (CO2 concentration displayed), the battery status 'OK' or 'LOW', can be accessed by pressing the MODE pushbutton once. After 15 seconds, the display will revert back to the normal viewing mode.

---

1. **CDM SETUP**
   Unstow Marker and spare Battery Pack from CDM Kit.
   
   Temporarily stow CDM Kit.
   
   If CDM activated, then deactivate.

2. **CDM DEACTIVATION**
   Press, hold MODE pushbutton until 'RELEASE' displayed.
   
   Verify CDM is off.

3. **BATTERY CHANGE OUT**
   3.1 Turn fasteners (two) on back panel 1/4 turn  
   3.2 Temporarily stow Panel.
   3.3 Grasp Battery Pack pull tab, remove pack.
   
   **NOTE**
   Stored data are maintained for a maximum of 30 minutes without battery installed. All data will be lost if battery installation is delayed more than 30 minutes.
   
   3.4 Mark Battery Pack as “DISCHARGED.”
   3.5 Install replacement Battery Pack.
   Press firmly to seat electrodes.
   3.6 Replace Panel, press firmly, turn fasteners (two) 1/4 turn  to lock.
   3.7 Stow Marker and used Battery Pack in CDM Kit.
   3.8 If required, activate CDM.
4. ACTIVATING CDM

**NOTE**

1. Audible beeps occur when the MODE pushbutton is depressed during unit activation.

2. A single beep occurs when the self-check routine is complete.

4.1 Press, hold MODE pushbutton until ‘**RELEASE**’ displayed.

4.2 Wait approximately 1 minute while unit runs self-check routine.

4.3 Verify Display indicates CO2 concentration.

4.4 As required, deploy CDM.

4.5 Notify **MCC** when the battery changeout is completed.
The CDM requires the use of the Filter Assembly for proper operation. The assembly prevents particulate matter from interfering with the infrared sensor and damaging the sampling pump. If the filter becomes clogged, a low flow indication ‘PUMP FLO ALM’ will be displayed and the assembly must be replaced.

If CDM activated, then deactivate.

1. **DEACTIVATING CDM**
   Press, hold MODE pushbutton until ‘RELEASE’ displayed.
   √CDM is off

2. **FILTER ASSEMBLY CHANGEOUT**
   When demating the Filter Assembly from the quick disconnect (QD), grasp the assembly with one hand and the QD with the other.
   CDM QD ←|→ Filter Assembly
   Clean Filter Assemblies will have the blue ring beneath the CLEAN label in kit pouch lid.

   Return used Filter Assembly to pouch lid with blue ring on side with the DIRTY label.

   Remove clean Filter Assembly from CDM Kit.

   CDM QD →|← Clean Filter Assembly

3. **ACTIVATING CDM**
   Audible beeps occur when the MODE pushbutton is depressed during unit activation.
   A single beep occurs when the self-check routine is complete.

   Press, hold MODE pushbutton until ‘RELEASE’ displayed.

   Wait approximately 1 minute while unit runs self-check routine.
   √Display indicates CO2 concentration
NOTE
1. Monitor attachment site must permit air to move freely over monitor surface.
2. Monitors are deployed in duplicate each scheduled day.
3. Execute experiment for 24 hours.

DAS4
1. Unstow FMK from stowage location.
2. Remove six monitors from kit.
3. Record
   Placement location: NOD1P4 G2 on two monitors
   FGB Panel 216 (or 218) on two monitors
   SM Panel 327 (or 330) on two monitors
   Date and time in START space on all six monitors

00:00:00
4. Remove REMOVE TO START labels.
   Dispose into Dry Trash.
5. Remove, adhesive covers on Velcro (on back of monitor).
   Dispose into Dry Trash.
6. Secure two monitors side by side (distance ~5 --- 10 cm) in each designated location.

24:00:00
7. Detach monitors from area location.
8. Seal monitoring surface with APPLY TO STOP label (on back of monitor).
9. Record date and time in STOP space.
10. Stow used monitor in RETURN BAG in FMK.

MF57G
11. Stow FMK.
MF71M 1. Unstow GSC.

2. Record sampling data on GSC label (Date, time, and location of sample).

3. Remove tethered inlet cap.

   **NOTE**
   
   When taking sample, hold GSC far away from body.

4. Open valve for 10 seconds.

   **NOTE**
   
   A click sound occurs when valve has been closed to the proper position.

5. Close valve until it slips and locks.

6. Replace tethered inlet cap.

MF71M 7. Stow GSC.
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**HARDWARE REQUIRED:**
Passive Dosimeter Kit (SEG 46116951-301)

1. **NODE 1 DOSIMETER EXCHANGE**
   1.1 Unstow:
      MF57C Passive Dosimeter Kit
      Camera F5 with flash

      **NOTE**
      Radiation Area Monitor Dosimeters are color-coded.
      For Mission 2A.2B:
      Deploy: White Radiation Area Monitor
      Return: Blue Radiation Area Monitor

   1.2 Remove Ziplock labeled RADIATION AREA SUBPACK ASSY: NODE 1 DOSIMETERS and temporarily stow kit.

   1.3 Transfer Ziplock to Node 1.

   1.4 At each deployment site in Table 1
      Remove Blue Radiation Area Monitor from Node 1.
      Stow Blue Radiation Area Monitor in Ziplock.
      Retrieve White Radiation Area Monitor label from Ziplock and verify label corresponds to location decal.
      Attach White Radiation Area Monitor to corresponding location.

   Table 1. Radiation Area Monitor Dosimeter Locations in Node 1

<table>
<thead>
<tr>
<th>Dosimeter Number</th>
<th>ISS Interior Location Code</th>
<th>Dosimeter Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node 1 #1</td>
<td>NOD1P4_03</td>
<td>Closeout Panel on the port side of Aft Hatch on the Zenith end of the Closeout Panel NOD1P4_03.</td>
</tr>
<tr>
<td>Node 1 #2</td>
<td>NOD1OP2</td>
<td>On the Zenith side of the footbridge across the Port Hatch.</td>
</tr>
<tr>
<td>Node 1 #3</td>
<td>NOD1S1_02</td>
<td>Closeout on Stbd side near the Fwd Hatch Zenith side of the Closeout Panel NOD1S1_02.</td>
</tr>
</tbody>
</table>

   1.5 Return Ziplock containing Blue Radiation Area Monitors to Passive Dosimeter Kit.

2. **SM DOSIMETER INSTALLATION**
   2.1 Remove Ziplock labeled: RADIATION AREA SUBPACK ASSY: SERVICE MODULE DOSIMETERS from temporary stowed Passive Dosimeter Kit.

   2.2 Transfer Ziplock to SM.
2.3 At each deployment site in Figure 1/Table 2
Use Figure 1 to identify a target location.
Select “Radiation Area Monitor” label to match corresponding target location.
Affix the Radiation Area Monitor with its Velcro attachment/tether to panel.
Affix the corresponding decal next to the Radiation Area Monitor.

![Figure 1.- SM Dosimeter Locations.](image)

<table>
<thead>
<tr>
<th>Dosimeter Number</th>
<th>ISS Interior Location Code</th>
<th>Dosimeter Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM #1</td>
<td>SM - P 339</td>
<td>Panel 339 aft section behind treadmill. Upper center part of the panel</td>
</tr>
<tr>
<td>SM #2</td>
<td>SM - P 327</td>
<td>Panel 327, overhead, forward of treadmill</td>
</tr>
<tr>
<td>SM #3</td>
<td>SM - P 307</td>
<td>Panel 307, TsP overhead, near center</td>
</tr>
<tr>
<td>SM #4</td>
<td>SM - W 14</td>
<td>Window #14, Transfer Compartment Adapter section, Stbd Nadir quadrant</td>
</tr>
</tbody>
</table>

2.4 Place all trash in Ziplock and return Ziplock to Passive Dosimeter Kit.

2.5 Photograph SM PDS in deployed locations using F5 with flash.

2.6 Stow:

<table>
<thead>
<tr>
<th>Passive Dosimeter Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera F5 with flash</td>
</tr>
</tbody>
</table>
NOTE
Highlighted items and locations to be used for this procedure.

If crewmembers desire to unstow all bags prior to starting task, Table 1 can be used.

Table 1. Tools Required

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Location</th>
<th>Ops Nom</th>
<th>Item(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS</td>
<td>FGB_104*</td>
<td>Isolator (Orange) - 1,</td>
<td>ISOLATOR</td>
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<tr>
<td></td>
<td></td>
<td>Stabilizer Assy (Orange) - 1</td>
<td>STABILIZER ASSY</td>
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<tr>
<td></td>
<td></td>
<td>(2.0 CTB)</td>
<td></td>
</tr>
<tr>
<td>SHAB</td>
<td>AP03</td>
<td>Isolator (Gray) - 1,</td>
<td>ISOLATOR</td>
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<tr>
<td></td>
<td></td>
<td>Stabilizer Assy (Gray) - 1,</td>
<td>STABILIZER ASSY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVIS Exercise Ops Kit</td>
<td>TVIS EXERCISE OPS KIT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Krikalev) - 1</td>
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<td>(2.0 CTB)</td>
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<tr>
<td>SHAB</td>
<td>AP04</td>
<td>TVIS Assy Kit - 1</td>
<td>TVIS ASSY KIT</td>
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<td>(1.0 CTB)</td>
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<tr>
<td>SHAB</td>
<td>AP06</td>
<td>TVIS ASSEMBLY BAG 1</td>
<td>ZIPLOCK BAG 1:</td>
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<td></td>
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<td>(3.0 CTB)</td>
<td>TURNBUCKLE LOCKING CLIP</td>
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<td></td>
<td>TVIS MALFUNCTION KIT</td>
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<td>WIND SCREEN ASSEMBLY</td>
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<td>ZIPLOCK BAG 2:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>CABLE STRAPS</td>
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<td></td>
<td></td>
<td>CABLE LOOPS</td>
</tr>
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<td></td>
<td></td>
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<td>SUBJECT POSITIONING DEVICE, TOP (2)</td>
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<td></td>
<td></td>
<td>SUBJECT POSITIONING DEVICE, BOTTOM (2)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>ZIPLOCK BAG 3:</td>
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<tr>
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<td>BRACE ROPE ASSEMBLY 1 (LONG) (4)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>BRACE ROPE ASSEMBLY 2 (SHORT) (4)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>BEAM ASSEMBLIES BOLT FLANGE (SHORT) (2)</td>
</tr>
<tr>
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<td></td>
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<td>BEAM ASSEMBLIES SPACER FLANGE (SHORT) (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BEAM ASSEMBLIES BOLT FLANGE (LONG) (2)</td>
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<td>BEAM ASSEMBLIES SPACER (LONG) (2)</td>
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<tr>
<td>SHAB</td>
<td>AP07</td>
<td>TM Elect Box - 1,</td>
<td>ELECTRONICS BOX ASSY,</td>
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<td></td>
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<td>VIS Elect Box - 1</td>
<td>ELECTROMECHANICAL VIS CONTROLLER ASSY</td>
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<td>(1.0 CTB)</td>
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<td>SHAB</td>
<td>AP09</td>
<td>Gyro Assy - 1,</td>
<td>GYROSCOPE</td>
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<td></td>
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<td>Transfer Case - 1</td>
<td>TRANSFER CASE</td>
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<td>(2.0 CTB)</td>
<td></td>
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<tr>
<td>ISS</td>
<td>FGB_104*</td>
<td>Isolator (Blue) - 1,</td>
<td>ISOLATOR</td>
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<tr>
<td></td>
<td></td>
<td>Stabilizer Assy (Blue) - 1,</td>
<td>STABILIZER ASSY</td>
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<tr>
<td></td>
<td></td>
<td>TVIS Exercise Ops Kit</td>
<td>TVIS EXERCISE OPS KIT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Gidzenko) - 1</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(2.0 CTB)</td>
<td></td>
</tr>
</tbody>
</table>
Vehicle | Location | Ops Nom | Item(s)
--- | --- | --- | ---
SHAB | AS03 | TVIS ASSEMBLY BAG 2 (2.0 CTB) | BRACKET ASSY, MULTI USE (2) ZIPLOCK BAG 1: CLAMP ASSY, HEAVY DUTY, MULTI USE BRACKET (2) CABLES: DARK GREEN, LIGHT PURPLE, PINK, WHITE (2), LIGHT GREEN DARK PURPLE, DARK GRAY, ORANGE, LIGHT BLUE TENSIONER ASSEMBLIES (2) MOTOR BOX ASSEMBLY

SHAB | AS04 | Isolator (Purple) - 1; Stabilizer Assy (Purple) - 1; TVIS Exercise Ops Kit (Shepherd) - 1 (2.0 CTB) | ISOLATOR STABILIZER ASSY TVIS EXERCISE OPS KIT

SHAB | AS07 | TVIS ASSEMBLY BAG 3 (2.0 CTB) | CABLES: BROWN, RED, DARK BLUE CONTROL PANEL W/MOUNTING BRACKET FLYWHEEL CASE SLD-L (subject load device) SLD-R (subject load device)

ISS | FGB_104* | TVIS ISS TREADMILL ASSY (FOAM) | ISS TREADMILL ASSY

**NOTE**
Hand Tool may be used in addition to or instead of Power Tool.

AP04

1. Unstow 3/16" Hex Wrench T-handles (two) from TVIS Assy Kit - 1. Temporarily stow kit.

Unstow from orbiter personal tools:
- 3/16" Hex Head, 1/4" Driver
- Makita Drill/Battery
- Hex Shank 1/4" Drive
- 1/4" Adapter

Unstow Photo/TV equipment per P/TV21 ISS INTERNAL OPS item #14 (FDF: PHOTO/TV: SCENES).

2. **UNSTOWING TREADMILL (TM)**

Unstow Treadmill Chassis (SED46113527-304).

3. **POWER TOOL CONFIGURATION AND VIDEO RECORDING INITIALIZATION**

Set Makita Tool to #5 torque setting.

**NOTE**
“Tighten” refers to hand-tighten or with Makita Tool set to #5 torque setting.
For assemblies that require more than one bolt, engage all screws of the assembly first, then tighten.

Perform P/TV21 item #14 Video recording of TVIS assembly activities (FDF: PHOTO/TV: SCENES).

4. **INSTALLING GYRO**

   **AP09**

   4.1 Unstow GYROSCOPE (SEG 46115130-305) from bag labeled Gyro Assy - 1, Transfer Case - 1.

   4.2 Align Gyro T-shaped Brackets with red (left side) tape, dark blue (right side) tape on treadmill side plates. Tighten bolts (six) with corresponding color codes.

   4.3 Inspect Gyro bolts (six) and verify secure.

5. **INSTALLING TRANSFER CASE/MOTOR BOX (MB)**

   **AS03**

   5.1 Unstow Motor Box Assembly (MB) (SEG46116950-303) from TVIS Assembly Bag 2.

   **AP09**

   Unstow Transfer Case (SEG46113530-303) from Gyro Assy - 1, Transfer Case - 1 and remove Viton sleeve (two) from Transfer Case spline shafts.

   **AS07**

   Unstow Flywheel Case (SED46115810-301) from TVIS Assembly Bag 3 and remove Viton sleeve (one) from Flywheel Case spline shaft.

   Install Transfer Case, Flywheel Case, Motor Box as shown in Figure 1 with Motor Box power/data connector facing aft end of TM.

![Figure 1](image-url)
5.2 Align Motor Box in its location underneath forward end of Treadmill Chassis. Manually hold into place.

5.3 On left side of treadmill, align/insert Transfer Case (light blue label) long spline shaft into treadmill drum slot and short spline shaft into Motor Box coupler by rotating treadmill belt slowly until Transfer Case engages.

5.4 Engage bolts (seven) to secure Transfer Case on left side of treadmill (as shown in Figure 2) but do not tighten.

5.5 On right side of treadmill, align/insert Flywheel Case (purple label) long spline shaft into treadmill drum slot by rotating treadmill belt slowly until Flywheel Case engages.

5.6 Engage bolts (seven) to secure Flywheel Case and tighten as shown in Figure 3.
5.7 Tighten Transfer Case bolts (seven) from step 5.4.

5.8 Inspect seven Transfer Case bolts and seven Flywheel Case bolts and verify tightened.

6. **INSTALLING FWD STABILIZERS**

6.1 Unstow left fwd Stabilizer (Light Blue) Assembly (SEG46113870-303) from Isolator (Blue) - 1, Stabilizer Assy (Blue) - 1, TVIS Exercise Ops Kit (Gidzenko) - 1.

6.2 Remove left fwd Stabilizer PIP Pin (one) from side launch slot. Insert into on orbit slot for stowage as shown in Figure 4.

**NOTE**

Force is required on the spring loaded bolts to engage the bolts of the stabilizers.
6.3 Align left fwd Stabilizer keyway slots with treadmill studs (located on front left side of Treadmill Chassis and on Transfer Case) as shown in Figure 5. Slide left fwd Stabilizer forward to secure to treadmill. Tighten bolts (two) on top right and left corners of stabilizer.

Figure 5

6.4 Unstow right fwd Stabilizer (Purple) Assembly (SEG46113870-306) from Isolator (Purple) - 1, Stabilizer Assy (Purple) - 1, TVIS Exercise Ops Kit (Shepherd) - 1.

6.5 Remove right fwd Stabilizer PIP Pin (one) from side launch slots. Insert into on orbit slots for stowage as shown in Figure 4.

6.6 Align right fwd Stabilizer keyway slots with treadmill studs (located on front right side of Treadmill Chassis and on Flywheel Case) as shown in Figure 6. Slide right fwd Stabilizer aft to secure to treadmill. Tighten bolts (two) on top right and left corners of stabilizer.

Figure 6
7. INSTALLING ELECTRONICS BOX (EB) AND VIS CONTROLLER

7.1 Unstow Electronics Box (EB) (SED46113531-303) and VIS Controller Assembly (SEG46113900-303) from TM Elect Box - 1, VIS Elect Box - 1.

7.2 Match Treadmill EB (Orange) to VIS Controller Assembly (Orange) and Treadmill EB (Gray) to VIS Controller Assembly (Gray). Attach and tighten bolts (four) as shown in Figure 7.

7.3 Attach Treadmill EB and VIS Controller Assembly under Treadmill’s aft end (circuit breaker out toward aft end) as shown in Figure 8. Tighten bolts (four).
8. **INSTALLING SUBJECT LOAD DEVICE (SLD)**

8.1 Unstow SLD-R (SED46113528-307) and SLD-L (SED46113528-308) TVIS Assembly Bag 3.

8.2 Align/insert SLD (red) mounting studs into left side chassis keyway slots and slide up. Tighten bolts (four).

8.3 Align/insert SLD (dark blue) mounting studs into right side chassis keyway slots and slide up. Tighten bolts (four).

8.4 Inspect SLD bolts (four per side) and verify secure.

9. **CONNECTING EB/MB/CNTL PNL POWER/DATA CABLE**

9.1 Unstow the following Treadmill cables (three total) from TVIS Assembly Bag 3:

- AS07 P3/P1 brown tagged cable (one)
- P5/P8 red tagged cable (one)
- P6/P9 dark blue tagged cable (one)

Unstow the following Treadmill cables (five total) from TVIS Assembly Bag 2:

- AS03 P4/P7 dark green tagged cable (one)
- P10/P12 light purple tagged cable (one)
- P13/P25 pink tagged cable (one)
- P14 white tagged cable (one)
- P11 white tagged cable (one)

**NOTE**

All right angle connectors interface to EB.

9.2 Remove, secure all connector caps of EB to Velcro on EB or with duct tape.

**CAUTION**

1. No cables should contact Gyro.
2. Connector pins can be damaged if not properly aligned.
3. Do not exceed a 3" bend radius on any cable.

**NOTE**

1. Locate master key on cable connector and bulkhead. Align/Mate connectors and rotate cable connector to lock in place.
2. Slide all Velcro cable ties to middle of cable for later use.
9.3 Connect brown tagged cable to EB
(P3) →|← EB (J3-EB/CONTROL) on EB
Route cable under left SLD, left forward stabilizer, and up the forward face of the left forward stabilizer.
Temporarily stow on chassis.

9.4 Connect dark green tagged cable to EB and Motor Box
(P4) →|← EB (J4-EB/MOTOR)
Route cable around and away from right side of GYRO to Motor Box.
(P7) →|← MB (J7-MOTOR)

9.5 Connect light purple tagged cable to EB and VIS Controller
(P10) →|← EB (J10-EB/VIS POWER)
Route cable underneath EB.
(P12) →|← VIS Controller (J12-VIS/EB POWER)

9.6 Connect pink tagged cable to EB and VIS Controller
(P13) →|← EB (J13-EB/VIS DATA)
(P25) →|← VIS Controller (J25-VIS/EB DATA)

9.7 Connect white tagged cables to EB
(P14) VIS POWER →|← EB (J14-VIS POWER)
Temporarily stow.
(P11) TM POWER →|← EB (J11-TM POWER)
Temporarily stow.

CAUTION
Pins can bend if not properly aligned.

9.8 Connect red tagged cable to EB and left SLD
(P5) →|← EB (J5-EB/SLD LEFT)
(P8) →|← left SLD (J8-SLD LEFT)

9.9 Connect dark blue tagged cable to EB and right SLD
(P6) →|← EB (J6-EB/SLD RIGHT)
(P9) →|← right SLD (J9-SLD RIGHT)

9.10 Inspect cable routing and verify all cables secured.
Verify slack in Gyro Cable to allow Gyro movement.

10. CONNECTING VIS CONTROLLER/STAB/GYRO PWR/DATA CABLE
10.1 Unstow the remaining cables (five total) from TVIS Assembly Bag 2:
AS03
P17/P24 (light green) tag
P19/P23 (dark purple) tag
P16/P21 (dark gray) tag
P18/P22 (orange) tag
P15/P20 (light blue) tag
10.2 Connect light green tagged cable to VIS Controller and Gyroscope
   (P17) →|← VIS Controller (J17-VIS EB/GYRO)
   Route cable and connect (P24) to Gyro (J24-GYROSCOPE).

10.3 Connect light blue tagged cable to VIS Controller and Stabilizer 1
   (P15) →|← VIS Controller (J15 - VIS EB/STAB 1)
   Route cable to forward end of TVIS.
   (P20) →|← Forward Left Stabilizer (J20-STAB FORE LEFT)

10.4 Connect dark purple tagged cable to VIS Controller and Stabilizer 4
   (P19) →|← VIS Controller (J19 - VIS EB/STAB 4)
   Route cable to forward end of TVIS.
   (P23) →|← Forward Right Stabilizer (J23-STAB FORE RIGHT)

10.5 Connect dark gray tagged cable to VIS Controller
   (P16) →|← VIS Controller (J16 - VIS EB/STAB 2)
   Temporarily stow.

10.6 Connect orange tagged cable to VIS Controller
   (P18) →|← VIS Controller (J18 - VIS EB/STAB 3)
   Temporarily stow.

10.7 Inspect cable connections VIS/EB and Treadmill/EB and verify proper connection.

11. INSTALLING AFT STABILIZER

   CAUTION

   √Stabilizers (two) clear the cables before securing to chassis

   FGB_104*

   11.1 Unstow right aft Stabilizer (Orange) Assembly (SEG46113870-305)
       from Isolator (Orange) - 1, Stabilizer Assy (Orange) - 1.

   11.2 Remove right aft Stabilizer PIP Pin (one) from side launch slots.
       Insert into on orbit slots for stowage.

   11.3 Align right aft Stabilizer keyway slots with treadmill studs (two per side on chassis).
       Slide right aft Stabilizer aft to secure to treadmill.
       Tighten bolts (two) on top right and left corners of stabilizer.
11.4 Connect orange tagged cable to aft right Stabilizer (P22) \(\rightarrow\) aft right Stabilizer (J22-STAB AFT RIGHT)

11.5 Unstow left aft Stabilizer (Gray) Assembly (SEG46113870-304) from Isolator (Gray) - 1, Stabilizer Assy (Gray) - 1, TVIS Exercise Ops Kit (Krikalev) - 1.

11.6 Remove left aft Stabilizer PIP Pin (one) from side launch slots. Insert into on orbit slots for stowage.

11.7 Align left aft Stabilizer keyway slots with treadmill studs (two per side on chassis). Slide left aft Stabilizer forward to secure to treadmill. Tighten bolts (two) on top right and left corners of stabilizer.

11.8 Connect dark gray tagged cable to left aft Stabilizer (P21) \(\rightarrow\) left aft Stabilizer (J21-STAB AFT LEFT)

**NOTE**
All cables are to be kept within TVIS envelope (56" x 33" x 20").

**CAUTION**
1. No cables should contact Gyro.
2. Do not exceed a 3" bend radius on any cable.

11.9 Bundle cables and attach to Gyroscope mount with Velcro cable ties or duct tape on both sides of TVIS as shown in Figure 9.
12. **INSTALLING TENSIONER ASSEMBLY**

12.1 Unstow Slot Screw driver (#3 or #4 Common tip screwdriver) from crewmembers personal tools.

AS03 Unstow Stabilizer Tensioner Assembly (two) (SEG46116078-301) from TVIS Assembly Bag 2.

**NOTE**
Tensioner orientation irrelevant for installation.

12.2 Install one Stabilizer Tensioner Assembly between left and right fwd Stabilizer Motor Controllers and tighten. Inspect stabilizer connections and tensioner assembly installation and verify secure.
12.3 Place second tensioner through cable clamps of both P11 and P14 white tagged cables so that cables are routed over tensioner. Tighten clamps on tensioner with slot screw driver. Refer to Figure 10.

12.4 Install Stabilizer Tensioner Assembly between right and left aft Stabilizer Motor Controllers and tighten as shown in Figure 10. Inspect Stabilizer connections and tensioner assembly installation and verify secure.

12.5 Stow slot screw driver.

13. **INSTALLING SUBJECT POSITIONING DEVICE (SPD) BOTTOM ASSEMBLY**

AP06 13.1 Unstow SPD Bottom Assemblies (two) (SEG46116666-303) from TVIS Assembly Bag 1.

13.2 Attach either SPD Bottom Assembly to left SLD with yoke facing top surface of TVIS and tighten bolts (eight), then attach the remaining SPD Bottom Assembly to right SLD and tighten bolts (eight) as shown in Figure 11.
14. INSTALLING SUBJECT POSITIONING DEVICE (SPD) TOP ASSEMBLY

AP06

14.1 Unstow SPD Top Assemblies (two) (SEG46116666-307) from TVIS Assembly Bag 1.

14.2 Unscrew left and right SPD Bottom Assembly knob and remove from SPD Bottom Assembly yoke.

14.3 Insert left and right SPD Top Assembly into respective SPD yoke such that when installed the latch side of the hook faces the treadmill belt.

14.4 Secure by tightening knob.

14.5 Place SPDs in stowed configuration (folded down onto treadmill belt).

15. INSTALLING CLOSEOUT PANEL

15.1 Unstow Closeout Panels (four) and Brackets (four) from TVIS Assy Kit - 1.

Unstow Power Tool/Ratchet with Adapter/3/16" Allen Wrench from crewmembers personal tools.

15.2 Install front right and left brackets to respective stabilizers. Tighten bolts (two) as shown in Figure 12.
15.3 Install rear right and left brackets to respective stabilizers. Tighten bolts (two) as shown in Figure 12.

15.4 Install front right Closeout Panel (two bolts) and front left Closeout Panel (two bolts) and tighten.

15.5 Install rear right Closeout Panel (three bolts) and rear left Closeout Panel (three bolts) and tighten.

15.6 Temporarily stow TVIS Assembly.

15.7 Stow:
   Makita Drill
   3/16" Hex Head T-Bar
   1/4" Drive Handle
   Adapter
   316" Allen Wrench
   3/16" Hex Wrench T-Handle

15.8 Stow per POST TVIS ASSEMBLY PREP, (TRANSFER LISTS, TIMELINED TASK LIST):
   Exercise Ops Kit (Krikalev)
   Exercise Ops Kit (Gidzenko)
   Exercise Ops Kit (Shepherd)
   TVIS Malfunction Kit
15.9 Return empty bags and foam to orbiter per POST TVIS ASSEMBLY PREP, (TRANSFER LISTS, TIMELINED TASK LIST):
   TM Elect Box - 1, VIS Elect Box (came from AP07)
   Gyro Assy - 1, Transfer Case (came from AP09)
NOTE
Video recording of activity should still be taking place per P/TV21 item #14 (FDF: PHOTO/TV: SCENES).

Table 1. Tools Required

<table>
<thead>
<tr>
<th>Vehicle Location</th>
<th>Bag Nomenclature</th>
<th>Item(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHAB AS03</td>
<td>TVIS ASSEMBLY BAG 2 (2.0 CTB)</td>
<td>BRACKET ASSY, MULTI USE (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ZIPLOCK BAG 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLAMP ASSY, HEAVY DUTY, MULTI USE BRACKET (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CABLES: DARK GREEN, LIGHT PURPLE, PINK, WHITE (2), LIGHT GREEN DARK PURPLE, DARK GRAY, ORANGE, LIGHT BLUE</td>
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<tr>
<td></td>
<td></td>
<td>TENSIONER ASSEMBLIES (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOTOR BOX ASSEMBLY</td>
</tr>
<tr>
<td>SHAB AS07</td>
<td>TVIS ASSEMBLY BAG 3 (2.0 CTB)</td>
<td>CABLES: BROWN, RED, DARK BLUE</td>
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<tr>
<td></td>
<td></td>
<td>CONTROL PANEL W/MOUNTING BRACKET</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FLYWHEEL CASE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SLD-L (subject load device)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SLD-R (subject load device)</td>
</tr>
</tbody>
</table>

1. INSTALLING TVIS INTO SERVICE MODULE PIT

1.1 Unstow the following tools from the orbiter personal crew tools:
- #4 Torque Set Apex Bit
- #1 Phillips Screw Driver
- 1/4" Drive Handle

1.2 Using #1 Phillips, unscrew two screws on forward left isolator bracket linear bearing as shown in Figure 1.

1.3 Using #4 Torque Set Apex Bit, loosen torque screw on linear bearing as shown in Figure 1.

1.4 Rotate retaining plate to expose T-bar slots as shown in Figure 1.
1.5 Repeat steps 1.2 --- 1.4 for remaining three isolator bracket linear bearings.

1.6 Stabilizer PIP Pins (four) in on orbit slots

1.7 Tensioner Assembly (two) installed

1.8 Place TVIS Assembly over Isolator/Cage Assembly in aft end of SM pit, aft end down.

1.9 Route TM/VIS Power Cables (two) through Isolator/Cage cable loops and cable straps as shown in Figure 2.

1.10 Connect #5072-P2 end of P11 white tagged cable to SM bulkhead connectors #5074-J1.

1.11 Connect #5073-P2 end of P14 white tagged cable to SM bulkhead connector #5075-J1.

1.12 Perform P/TV21 item #14 (FDF: PHOTO/TV: SCENES).

1.13 Slowly pivot TVIS Assembly and place above Isolator/Cage Assembly in SM pit.

1.14 Align and partially insert all eight Isolator T-bars on TVIS with T-bar receptacles on all four isolator brackets.

1.15 Complete insertion of Isolator T-bars into T-bar receptacles while lowering TVIS into SM pit.
1.16 Remove panel directly forward of TVIS (towards FGB) to try to gain access to the power cables. Pull the slack out of the cables so the cables do not bunch up or hit the gyroscope.

1.17 Perform P/TV21 item #14 (FDF: PHOTO-TV: SCENES).

1.18 Reinstall retainer plate and tighten screws on all four linear bearings.

1.19 Stow:
   - #4 Torque Set Apex Bit
   - #1 Phillips Screw Driver

2. CLOSEOUT SKIRT INSTALLATION
   2.1 Unstow TVIS Closeout Skirt from TVIS Assy Kit - 1. Temporarily stow.

   2.2 Reinstall Service Module floor tile.

   2.3 Perform P/TV21 item #14 (FDF: PHOTO-TV: SCENES).

   2.3 Locate HANDRAIL EAR label on skirt. Align with Treadmill handrail ears on forward end of TVIS. Attach Velcro.

   2.4 Work around TVIS perimeter to align and secure Velcro on skirt to the Velcro on TVIS and also the SM floor.

   2.5 Tuck portion of skirt at cover of SPD Bottom Assembly under and attach Velcro to SPD Velcro location.

   2.6 Perform P/TV21 item #14 (FDF: PHOTO-TV: SCENES).

3. CONTROL PANEL STOWAGE
   AS07 3.1 Unstow Control Panel with Mounting Bracket (one) (SEG46116947-301) from TVIS Assembly Bag 3.

   AS03 3.2 Unstow Bracket Assembly (two) (SED33104076-302) from TVIS Assembly Bag 2.

   3.3 Unstow Clamp Assembly (two) (SED33104844-303) from TVIS Assembly Bag 2.

   3.4 Engage Bracket Assemblies to Clamp Assemblies.

   3.5 Secure Control Panel and Bracket/Clamp Assemblies to the Treadmill surface using Velcro straps or bungees so that the Expedition 1 crew can install them as they desire.
3.6 Perform P/TV21 item #14 (FDF: PHOTO/TV: SCENES).

3.7 Conclude TVIS assembly activities video recording.

4. Stow the temporarily stowed TVIS Assembly Kit per POST TVIS AND CAGE INTEGRATION CLEANUP, (TRANSFER LISTS, TIMELINED TASK LIST).

5. Return the following empty bags and foam per POST TVIS AND CAGE INTEGRATION CLEANUP, (TRANSFER LISTS, TIMELINED TASK LIST)
   - TVIS ASSEMBLY BAG 2 (from AS03)
   - TVIS ASSEMBLY BAG 3 (from AS07)
### TREADMILL WITH VIBRATION ISOLATION AND STABILIZATION (TVIS)

#### ISOLATOR CAGE ASSEMBLY

(Official Document)

**NOTE**

1. The highlighted items can be unstowed all at once to ease in the assembly of the cage.

2. Video recording of session continues.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Location</th>
<th>Bag Nomenclature</th>
<th>Item(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS</td>
<td>FGB_104*</td>
<td>Isolator (Orange) - 1, Stabilizer Assy (Orange) - 1 (2.0CTB)</td>
<td>ISOLATOR STABILIZER ASSY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Isolator (Gray) - 1, Stabilizer Assy (Gray) - 1, TVIS Exercise Ops Kit (Krikalev) - 1 (2.0 CTB)</td>
<td>ISOLATOR STABILIZER ASSY TVIS EXERCISE OPS KIT</td>
</tr>
<tr>
<td>SHAB</td>
<td>AP03</td>
<td>TVIS Assy Kit - 1 (1.0 CTB)</td>
<td>TVIS ASSY KIT</td>
</tr>
<tr>
<td>SHAB</td>
<td>AP04</td>
<td>TVIS ASSEMBLY BAG 1 (3.0 CTB)</td>
<td>ZIPLOCK BAG 1: TURNBUCKEL LOCKING CLIP TVIS MALFUNCTION KIT WIND SCREEN ASSEMBLY ZIPLOCK BAG 2: CABLE STRAPS CABLE LOOPS SUBJECT POSITIONING DEVICE, TOP (2) SUBJECT POSITIONING DEVICE, BOTTOM (2) ZIPLOCK BAG 3: BRACE ROPE ASSEMBLY 1 (LONG) (4) BRACE ROPE ASSEMBLY 2 (SHORT) (4) BEAM ASSEMBLIES BOLT FLANGE (SHORT) (2) BEAM ASSEMBLIES SPACER FLANGE (SHORT) (2) BEAM ASSEMBLIES BOLT FLANGE (LONG) (2) BEAM ASSEMBLIES SPACER FLANGE (LONG) (2)</td>
</tr>
<tr>
<td>ISS</td>
<td>FGB_104*</td>
<td>Isolator (Blue) - 1, Stabilizer Assy (Blue) - 1, TVIS Exercise Ops Kit (Gidzenko) - 1 (2.0 CTB)</td>
<td>ISOLATOR STABILIZER ASSY TVIS EXERCISE OPS KIT</td>
</tr>
<tr>
<td>SHAB</td>
<td>AS04</td>
<td>Isolator (Purple) - 1, Stabilizer Assy (Purple) - 1, TVIS Exercise Ops Kit (Shepherd) - 1 (2.0 CTB)</td>
<td>ISOLATOR STABILIZER ASSY TVIS EXERCISE OPS KIT</td>
</tr>
</tbody>
</table>

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1. Unstow the following tools from the orbiter crews personal tools:
   - Hex Shank 1/4" Drive
   - Large Flat Tip Driver, 3/8" Drive
   - Phillips #3 3/8" Drive 4-1/32"
   - 3/16" L-Wrench
   - 1/8" L-Wrench
   - Tape Measure
   - Power Tool (Makita Drill)
   - Battery for Power Tool
   - 1/4"-3/8" Adapter
   - Driver Handle, 1/4" Drive
   - (10-50 in-lbs) Trq Wrench, 1/4" Drive

2. **SERVICE MODULE POWER CONFIGURATION**
   - SM_435
     - cb 374 – Open
     - cb 375 – Open

3. **POWER TOOL CONFIGURATION**
   - Ensure Battery is fully charged before beginning.
   - Install Battery.
   - Attach Hex Shank 1/4" Driver.

4. **ISOLATOR/CAGE ASSEMBLY**
   - AP06
     - 4.1 Do not connect Long Beam Assembly and Short Beam Assembly together.
       Engage captive screws approximately 1 --- 2 turns.

     - 4.2 Unstow Long Beam Assembly with bolt flange (SEG46117000-303) (two) from TVIS Assembly Bag 1.
       Temporarily stow.

     - Unstow Long Beam Assembly with spacer flange (SEG46117001-303) (two) from TVIS Assembly Bag 1.

     - 4.3 Connect the Long Beam Assemblies together matching the colors and engage captive screws (four) approximately 1 --- 2 turns provided on beam bolt flanges (one at each corner of flange). Refer to Figure 1.

     - 4.4 Temporarily stow Long Beam Assemblies (two).

     - 4.5 Unstow Short Beam Assembly with bolt flange (SEG46117000-301) (two) from TVIS Assembly Bag 1.

     - 4.6 Unstow Short Beam Assembly with spacer flange (SEG46117001-301) (two) from TVIS Assembly Bag 1.
4.7 Connect the Short Beam Assemblies together matching the colors and engage captive screws (four) approximately 1 --- 2 turns, provided on beam bolt flanges (one at each corner of flange). Refer to Figure 1.

4.8 Temporarily stow Short Beam Assemblies (two).

Figure 1.- Beam Assembly.

FGB_104* 4.9 Unstow Isolator Corner Bracket Assembly (SEG46116972-301) (Orange) from Isolator (Orange) - 1, Stabilizer Assy (Orange) - 1. Temporarily stow.

AP03 Unstow Isolator Corner Bracket Assembly (SEG46116972-301) (Gray) from Isolator (Gray) - 1, Stabilizer Assy (Gray) - 1, TVIS Exercise Ops Kit (Krikalev) - 1. Temporarily stow.

FGB_104* Unstow Isolator Corner Bracket Assembly (SEG46116972-301) (Blue) from Isolator (Blue) - 1, Stabilizer Assy (Blue) - 1, TVIS Exercise Ops Kit (Gidzenko) - 1. Temporarily stow.

AS04 Unstow Isolator Corner Bracket Assembly (SEG46116972-301) (Magenta) from Isolator (Purple) - 1, Stabilizer Assy (Purple) - 1, TVIS Exercise Ops Kit (Shepherd) - 1. Temporarily stow.

AP04 Unstow Isolator M8 screws (twenty) from the TVIS Assembly Kit found in bag labeled TVIS Assy Kit - 1. Temporarily stow.

4.10 If required, remove Closeout Panels located between panel SM_130 and SM_137. TVIS will be installed in pit.

4.11 If required, unlatch and open hinged floor panel #130 (immediately forward of TVIS pit).
4.12 If required, remove hinged handrail from Service Module side wall panel #450 (starboard side).

4.13 Remove panel #450.


When securing Isolator corner brackets to corner of SM pit, engage screws but do not fully tighten screws at this point.

Orientation of TVIS with Respect to SM.

4.15 Install Isolator Corner Bracket (Orange) in right aft corner of TVIS pit in SM using M8 flat-head installation screws (OCT 131543-80) (five screws) as shown in Figure 1.
Hand-tighten using Driver Handle, 1/4" Drive, Adapter, and Large Flat Tip Driver, 3/8" Drive.
4.16 Repeat step 4.14 using isolator corner brackets in right forward (Magenta), left forward (Blue), and left aft (Gray) corners and M8 flat-head installation screws (five screws each bracket).

4.17 Lift linear bearings on Isolator corner brackets and place Long Beam Assemblies and Short Beam Assemblies into Isolator Corner Brackets, matching the colors as shown in Figure 3.

4.18 Connect Long and Short Beam Assemblies to Isolator Corner Brackets using captive Phillips head screws (four per beam assembly). Start the screws using a Driver Handle 1/4" Drive with Adapter and Phillips #3 3/8" Drive as shown in Figure 4.
4.19 Using Torque Wrench, torque Phillips head screws to 30 --- 36 in-lbs.

4.20 Set Makita Tool to #5 torque setting and attach Large Flat Tip Driver, 3/8” Drive to 1/4"-3/8" Adapter.

4.21 Tighten corner screw on each corner bracket until the clutch slips first, then proceed outward from corner screw, alternating sides until all five screws are tightened.

4.22 Inspect Isolator attachments and verify all four corners are secure.

4.23 Using 3/16" Allen L-Wrench, turn spacer screw until tip of screw touches opposite flange face.

4.24 Using 1/8" Allen L-Wrench, tighten four corner captive screws on each flange until lock washers flatten as shown in Figure 7.

4.25 Verify gap spacing is consistent throughout width of flange using tape measure.

4.26 Use tape measure to measure the bracket-to-bracket distances (top and bottom on any one of the four sides of the cage) as shown in Figures 5a and 5b.
NOTE
The comparison of the top and bottom dimensions should fall within ± 1/8”.

Figure 5a.- Top Measurement.

Figure 5b.- Bottom Measurement.

If not within tolerance of ± 1/8”

4.27 Unscrew four corner screws on each flange using 1/8” Allen L-Wrench to match the desired top dimension measurement to within ± 1/8” tolerance.

4.28 To set the bottom dimension to match the top dimension, adjust the spacer screw (used to adjust the gap between the flange faces) with the 3/16” L-Wrench, and the captive screws on the flange faces of each beam with the 1/8” L-Wrench as shown in Figure 6.
4.29 Verify gap spacing is consistent throughout width of flange using tape measure.

4.30 Using 1/8” Allen L-Wrench, tighten four corner screws on each flange until lock washer flattens as shown in Figure 7.

4.31 Measure the top and bottom dimensions of the cage again. If measurements are not within tolerance of ± 1/8”, repeat from step 4.26.

4.32 Repeat steps beginning with 4.26 for the remaining three beam assemblies.

AP06 4.33 Unstow four long and four short Brace Rope Assemblies from TVIS Assembly Bag 1. There are two Locking clips attached to each Brace Rope Assembly. Temporarily stow.
NOTE
Brace ropes should be installed in a diagonal pattern from corner to corner with turnbuckles at upper corners of Isolator Cage, as shown in Figure 8.

Figure 8

4.34 Install four long Brace Rope Assemblies to Isolator Bracket Clevis (SEG46116993-301) on right and left (long) sides of the Isolator Cage Assembly as shown in Figure 9. Adjust turnbuckles until each brace rope has approximately ± 1 inch play as shown in Figure 10a.
4.35 Install four short Brace Rope Assemblies (SEG46116994-301) on forward and aft (short) sides of Isolator Cage Assembly as shown in Figure 9.
Adjust the turnbuckles until each brace rope has approximately ± 0.5 inch play as shown in Figure 10b.

4.36 Install turnbuckle clips (P/N MS21256-2) to long and short Brace Rope Assemblies on either side of turnbuckle by aligning marks as shown in Figure 11.
Figure 11

AP06  4.37 Unstow Wind Screen, Nomex cable loops, and cable straps from TVIS Assembly Bag 1. Temporarily stow.

4.38 Install Isolator Cage Wind Screen to right forward/bottom corner of cage to Velcro on cage as shown in Figure 12.

Figure 12

4.39 Install Nomex cable loops (P/N SEG46116658-301) and straps (P/N SEG46116657-301) on the Isolator Cage assembly as shown in Figure 13.
4.40 If required, close and latch panel #130.

4.41 Stow tools from step 1, except the Makita Drill, Hex Shank 1/4” Drive, and Battery.

4.42 If removal of handrail and panel #450 was required
   Reinstall panel #450.
   Reinstall hinged handrail on panel #450.

4.43 Close SM_130 if opened.

4.44 Perform P/TV21 item #14 (FDF: PHOTO/TV: SCENES).

4.45 Notify MCC when task completed.

4.46 Return the following empty bags and foam per POST CAGE ASSEMBLY, (TRANSFER LISTS, TIMELINED TASK LIST):
   Isolator (Orange) - 1
   Isolator (Gray) - 1, Stabilizer
   TVIS Assembly Bag 1
   Isolator (Blue) - 1, Stabilizer Assy (Blue) - 1
   Isolator (Purple) -1, Stabilizer Assy (Purple) - 1, TVIS Exercise Ops Kit (Shepherd) - 1
VTSPC 1. Exit OCA applications.

2. Shut down Windows.

3. VTSPC pwr → Off
   Expansion Chassis pwr → Off

4. **POWER TO VTSPC INHIBIT**
   If in FGB

   FGB 427 (227)
   On panel OUTLET PWR-10/3 AMPS (РБС-10/3),
   Switch → Off

   If in Node 1
   If MCDS required
   CRT
   | SM 203 EARLY COMM
   | N1RS2A RPC 11 OP – ITEM 16 EXEC (*)

   If PCS required
   PCS
   nav C&T
   | Early S-Band Comm Management
   | ‘System Configuration’
   | sel Power Control Display
   | sel N1RS2A RPC 11
   | cmd N1RS2A_RPC_11_OFF **Execute**

   √N1RS2A RPC 11 – Off

VTSPC 5. If in FGB
   Disconnect data cables from rear of VTSPC only; do not disconnect data cables from connectors in FGB ГА. Coil cables and stow in the FGB ГА with Velcro from the IFM KIT.
   If practical, coil cables and stow in the FGB ГА with Velcro from the IFM Kit.
   Apply Velcro to the FGB ГА if necessary.
   Disconnect power cables.

   If in Node 1
   Disconnect power and data cables.

NOD1S4 6. If Node 1 Ops
   Replace Jumper (P18) on the RF PWR DIST BOX ORU.

7. **STOWAGE**
   FGB1D114 Collapsible Transfer Bag
   VTSPC Docking Station (Laptop and Expansion Chassis)
   VTSPC Data cables
   EECOM RFPDB18/VTSPC OCA CABLE SED16103021-301
   VTSPC Power cables
8. **ENABLING POWER TO RF POWER DISTRIBUTION BOX ORU**

If in Node 1

If MCDS required

**CRT**

[SM 203 EARLY COMM]

N1RS2A RPC 11 CL – ITEM 15 EXEC (*)

If PCS required

**PCS**

nav C&T

[Early S-Band Comm Management]

'System Configuration'

sel Power Control Display

sel N1RS2A RPC 11

**cmd** N1RS2A_RPC_11_ON **Execute**

√N1RS2A RPC 11 – On
1. **UNSTOW**

- **FGB1D114** VTSPC Docking Station (Laptop and Expansion Chassis)
  - Collapsible Transfer Bag

- **NOD1** VTSPC Data cables
  - EECOM RFPDB18/VTSPC OCA CBL
  - PDGF/VTSPC OCA CBL

- **D4_D2** EECOM VTS PWR CBL
  - FGB PWR CABLE
  - FGB VTSPC ISO PWR CBL

- Headset
- Mini-cam
- Mini-cam Cable
- Speakers
- DC Power Isolator

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following two cables are pre-routed on STS-88:</td>
</tr>
<tr>
<td>Wire Harness Assy - 1553 Data Bus IF74151-1</td>
</tr>
<tr>
<td>Wire Harness Assy - 1553 Data Bus IF74153-1</td>
</tr>
</tbody>
</table>

VTSPC

2. **Expansion Chassis pwr – Off**

<table>
<thead>
<tr>
<th>3. <strong>INHIBITING POWER TO VTSPC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>If in FGB</td>
</tr>
<tr>
<td><strong>FGB 427</strong> (227) Power from either 427 or 227 may be used for VTSPC.</td>
</tr>
<tr>
<td>On panel OUTLET PWR-10/3 AMPS (РБС-10/3), Switch – Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOD1S4 On RF PWR DIST BOX ORU, verify ECOMM RFPDB18/JUMPER is installed on J18.</th>
</tr>
</thead>
<tbody>
<tr>
<td>If in Node 1</td>
</tr>
<tr>
<td>If MCDS required</td>
</tr>
<tr>
<td><strong>CRT</strong> SM 203 EARLY COMM N1RS2A RPC 11 OP – ITEM 16 EXEC (*)&amp;</td>
</tr>
<tr>
<td>If PCS required</td>
</tr>
<tr>
<td><strong>PCS</strong> nav C&amp;T Early S-Band Comm Management System Configuration sel Power Control Display sel N1RS2A RPC 11 cmd N1RS2A_RPC_11_OFF Execute</td>
</tr>
</tbody>
</table>

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4. **POWER CABLES CONFIGURATION**
   If in FGB, configure cables per Figure 1, ECOMM FGB VTS Power.
   If in Node 1, configure cables per Figure 3, ECOMM NODE VTS Power.

5. Expansion Chassis airflow ports not obstructed

6. **DATA CABLES CONFIGURATION**
   If in FGB, configure cables per Figure 2, ECOMM FGB VTS Data.
   If in Node 1, configure cables per Figure 4, ECOMM NODE VTS Data.
   If Video Telecon required, configure cables per P/TV25 SETUP(ECOMM TELE) (PHOTO/TV, P/TV SCENES).

7. **ENABLING POWER TO VTSPC**
   If in FGB
   FGB 427
   (227)
   DC Pwr Isolator
   On panel OUTLET PWR-10/3 AMPS (РБС-10/3), Switch → On
   √Power Isolator Switch – On
   If in Node 1
   If MCDS required
   CRT
   SM 203 EARLY COMM
   N1RS2A RPC 11 CL – ITEM 15 EXEC (∗)
   If PCS required
   nav C&T
   Early S-Band Comm Management
   ‘System Configuration’
   sel Power Control Display
   sel N1RS2A RPC 11
   cmd N1RS2A_RPC_11_ON Execute
   √N1RS2A RPC 11 – On
   VTSPC
   Expansion Chassis pwr → On
   VTSPC pwr → On

8. At Startup Menu, sel ‘Docked’ configuration

   **NOTE**
   KFX software will be initiated upon bootup for SSCs with OCA card installed.
   √‘KFX’ icon Mini-Window appears
   √TDRSS LINK STATUS display appears, then:
   √OCA-ORBITER SEND: 128 Kbps
If SEND rate out of configuration
sel OPTIONS
sel DOWNLINK RATE 128 Kbps, as required


Figure 1.- ECOMM FGB VTS Power.
NOTE: ATTACH BOTH GROUND STRAPS TO THE CONNECTOR PLATE CLOSEST TO PLANE II VIA THE SCREW IN THE CONNECTOR PLATE

Figure 2.- ECOMM FGB VTS Data.
Figure 3.- ECOMM NODE VTS Power.

Figure 4.- ECOMM NODE VTS Data.

NOTE: After removal from J18, the ECOMM RFPDB18/JUMPER should be capped with the soft cover attached to it. The jumper should then be attached with Velcro to the front of the RF PWR DIST BOX.
S&M PROCEDURES
OBJECTIVE:
Remove two ground straps between Active CBM (ACBM) ring and Passive CBM (PCBM) ring.

LOCATION:
Installed: CBM Vestibule
Stowed: OSO Stowage and Photo Supplement

DURATION:
20 minutes

PARTS:
PCBM Alignment Guides (two), P/N 683-13484

NOTE
PCBM Alignment Guides (two) may be already installed.

MATERIALS:
None

TOOLS REQUIRED:

STATION TOOLS:
Mini Maglite

ISS IVA TOOL KIT:
KIT D:
  3/16" Hex Head, 1/4" Drive
KIT E:
  1/4" Drive Ratchet
KIT F:
  3/8" Socket, 1/4" Drive
KIT G:
  (40-200 in-lbs) Trq Wrench, 1/4" Drive
LID #2:
  Tablecloth

SHUTTLE TOOLS (EQUIVALENT LIST):
Flashlight

IFM TOOL KIT:
DRAWER 1:
  Tool Table Cloth
DRAWER 3:
  3/8" Driver Handle
  1/4" to 3/8" Adaptor
  3/16" Hex Head, 3/8" Drive
  3/8" Socket, 3/8" Drive
  (30-200 in-lbs) Trq Wrench, 1/4" Drive

REFERENCED PROCEDURE(S):
None
Figure 1.- Ground Strap Locations on ACBM (Exterior View).
LOCATING GROUND STRAPS
1. Locate two Ground Straps. (Refer to Figures 1, 2, and 3)
REMOVAL OF ALIGNMENT GUIDES (IF REQUIRED)

NOTE
Removal of PCBM Alignment Guides is only required to allow access to the Ground Strap Fasteners.

Figure 4.- PCBM Alignment Guides.

2. If required, remove PCBM Alignment Guides covering Ground Strap Mounting Brackets.

3. Loosen fasteners (five per Alignment Guide) and temporary stow. (1/4” Drive Ratchet, 3/8” Socket). Refer to Figure 4.

REMOVAL OF GROUND STRAPS

4. Remove ground straps, loosen fasteners (two per strap), and temporary stow (1/4” Drive Ratchet, 3/16” Hex Head). Refer to Figure 2.

INSTALLATION OF ALIGNMENT GUIDES (IF REQUIRED)

5. If required, install Alignment Guides, tighten fasteners (five per Alignment Guide). Torque to 85 in-lbs (1/4” Drive Ratchet, 3/8” Socket, (40-200 in-lbs) Trq Wrench). Refer to Figure 4.
OBJECTIVE:
Install the Axial or Radial Port Closeout in the CBM Vestibule.

LOCATION:
Installed: CBM Vestibule
Stowed: √Transfer List

DURATION:
10 minutes

PARTS:
Axial Port Closeout (one), P/N 683-60461-1
or
Radial Port Closeout (one), P/N 683-60461-2

MATERIALS:
None

TOOLS REQUIRED:
Camera

NOTE
Closeout photograph is required upon completion of installation of the Axial or Radial Port Closeout.

REFERENCED PROCEDURE(S):
None

INSTALLATION OF CLOSEOUT
1. Remove Axial or Radial Port Closeout from stowage.

For the Radial Port Closeout, fastener tabs on the Active CBM side extend toward the center of the Closeout.

Figure 1.- Axial and Radial Port Closeouts (folded up).
NOTE
The flexible bands in the sleeves of the Vestibule Closeout are placed along the curved portion of the hatch opening.

2. Unroll closeout while installing over CBM Vestibule. Attach 1/4 turn fasteners, insert into mounting brackets, tighten 1/4 turn fasteners. Refer to Figure 2.

Figure 3.- Overlapping Ends of Closeout for Final Attachment. (Axial Port Closeout is shown).
3. Overlap ends of Closeout, if necessary, detaching 1/4 turn fasteners at end of Closeout. 
   Reattach 1/4 turn fasteners at end of Closeout by inserting through tabs on other end of Closeout. 
   Press Velcro at Closeout ends together. Refer to Figure 3.

   ![Correct](image1.png) ![Incorrect](image2.png)

   **Figure 4.- D-Rings for Closeout.**

   **CAUTION**
   
   D-Rings for 1/4 turn fasteners should be flush to prevent damage if the Hatch is closed. Refer to Figure 4.

   ![Correct](image3.png) ![Incorrect](image4.png)

4. Take photo of installed Closeout.
OBJECTIVE:
Remove and replace expended Charcoal Filters.

LOCATION:
Installed: Midbay Nadir NOD1D3-01 and NOD1D3-03
Stowed: √MCC-H

DURATION:
30 minutes

PARTS:
Four Charcoal Filters (P/N SV821776)

MATERIALS:
Gray Tape

TOOLS REQUIRED:
Kit D:
  5/32” Hex Head, 1/4” Drive
Kit E:
  Driver Handle 1/4” Drive
  1/4” Drive Ratchet
Kit G:
  (5-35 in-lbs) Trq Driver

SHUTTLE TOOLS:
Drawer 3:
  1/4” Driver Handle
  3/8” to 1/4” Adapter
  4” Ratchet Wrench
  5/32” Hex Head Driver, 3/8” Drive
  1/4” Trq Wrench

REFERENCED PROCEDURES
NODE 1 CABIN FAN DEACTIVATION
NODE 1 CABIN FAN ACTIVATION

SAFE

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

CAUTION
The Area Smoke Detectors (ASD) are mounted on the backside of Closeout Panels NOD1D3-01 and NOD1D3-03. An adequate length of ASD power cable has been provided to open Closeout Panels and allow access to the maintenance areas. Failure to comply may damage ASD, power cable, and/or Closeout Panels.
1. Perform NODE 1 CABIN FAN DEACTIVATION, all (SODF: ISS OPS: ECLSS), then:

![Diagram of Closeout Panels NOD1D3-01 and NOD1D3-03 with fasteners marked (C).]

Figure 1.- Zenith View of Closeout Panels NOD1D3-01 (Left) and NOD1D3-03 (Right) with fasteners marked (C).

2. Remove Closeout Panels NOD1D3-01, fasteners (four) and NOD1D3-03 fasteners (four) (Driver Handle 1/4", 5/32" Hex Head, 1/4" Drive). Refer to Figure 1.

3. Remove, temporary stow Closeout Panels within length of ASD power cables.

![Diagram of Filter Assembly Door with labels for Hinges, Mounting Fasteners, and Filter Element shown through grate.]

Figure 2.- Zenith View of Filter Assembly Door.

**NOTE**
Open plastic containment bag lengthwise when removing replacement filter from bag.

4. Remove, temporary stow new filter from containment bag.

5. Open filter assembly door, position containment bag over expended Charcoal Filter, collapsing it to pull strap in center of filter, pull Charcoal Filter into bag, and close. Temporary stow.

6. Seal containment with expended Charcoal Filter with Gray Tape.
REPLACEMENT
7. Install new filters and close assembly door.

8. Repeat steps 4 --- 6 for remaining filters (three).

CLOSEOUT
9. Install Closeout Panels NOD1D3-01 and NOD1D3-03, fasteners (eight),
torque to 16 in-lbs (1/4" Drive Ratchet, 5/32" Hex Head, (5-35 in-lbs) Trq Driver).

10. Perform NODE 1 CABIN FAN ACTIVATION, all (SODF: ISS OPS: ECLSS), then:

CHECKOUT
11. Stow expended filters and tools.

12. $\sqrt{\text{MCC-H}}$ for stowage location of spent Charcoal Filter
OBJECTIVE:
Install Y-Cable to power N13B power bus by RACU 5.

DESCRIPTION:
Procedure outlines steps to power down RACU 5 and deactivate APCU-1, install the Y-Cable to provide power to N13B, and power up RACU 5.

CREW REQUIRED:
One flight crew

DURATION:
1.5 hours

LOCATION:
NOD1D1

PARTS:
Y-Jumper Wire Harness (P/N 1F89961) (Harness ID W0155)
Deadface Connector (both stowed in bag on STBD hatch)

MATERIALS:
Dry Wipes
Velcro Straps
Gray Tape

TOOLS REQUIRED:
ISS IVA Tool Kit:
Kit D: 5/32" Hex Head, 1/4" Drive
Kit E: Ratchet 1/4" Drive
Kit J: Connector Pliers (if required)
IVA Tool Kit Lid #1: Static Wrist Tether

Equivalent Shuttle Tools:
Drawer 1: Static Wrist Tether
Gray Tape
Drawer 2: Connector Pliers
Drawer 3: 4" Ratchet Wrench
1/4" to 3/8" Adapter
5/32" Allen Head

REFERENCED PROCEDURE(S):
RACU 5(6) ACTIVATION
RACU 5 DEACTIVATION
APCU LOAD POWERDOWN
APCU ACTIVATION
APCU DEACTIVATION
NODE 1/PMA1 SHELL WARMUP AND MAINTENANCE
EARLY COMM POWERDOWN
EARLY COMM POWERUP
TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY
TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY
RPCM POWER ON RESET
WARNING

Failure to remove power can result in electrical shock hazard.


2. Perform APCU DEACTIVATION, step 3 for APCU 1 only, Crew only (SODF: ISS OPS: EPS PROCEDURES).

3. Perform NODE 1/PMA1 SHELL WARMUP AND MAINTENANCE (SODF: ISS OPS: TCS PROCEDURES).

4. Perform EARLY COMM POWERDOWN, all (SODF: GND GEN: C&T).

5. Perform A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY, all (SODF: GND: C&DH).

6. Inhibit FDIR for the N1-2 MDM and N1RS2 RPCMs
   \texttt{cmd 5 N1\_2\_MDM RT\_FDIR - Inhibit}
   \texttt{cmd 18 RPCM\_N1RS2\_C\_RT\_FDIR - Inhibit}
   \texttt{cmd 19 RPCM\_N1RS2\_B\_RT\_FDIR - Inhibit}
   \texttt{cmd 20 RPCM\_N1RS2\_A\_RT\_FDIR - Inhibit}

7. Perform RACU 5 DEACTIVATION, all (SODF: ISS OPS: EPS PROCEDURES).

8. **CLOSEOUT PANEL REMOVAL**

   NOD1  
   Remove Closeout Panel NOD1D1\_01 fasteners (eight)  
   (Ratchet 1/4\" Drive, 5/32\" Hex Head, 1/4\" Drive).

   **MCC-H** † IV, “Go for N13B Y-Cable installation.”
9. **DEMATING CONNECTORS AT NODE 1 CONNECTOR PATCH PANEL (A2)**

   Don Static Wrist Tether.
   Attach to unpainted structure.
   W0104P307 ←|→ J307
   Dummy Connector ←|→ J308
   Temporarily stow.

10. **INSTALLING Y-CABLE (W0155) AT NODE 1 PATCH PANEL (A2)**

    W0155P301 →|← J307
    W0155P302 →|← J308
    W0155J301 →|← W0104P307

    Clean surface of Connector Patch Panel (A2) with Dry Wipes.
    Secure Dummy Connector from J308 to surface of Connector Patch Panel (A2) with Gray Tape.
11. **DEMATING CONNECTOR TO APCU/DDCU**
   W0124P310 ←|→ J310  
   W0124P310 →|← Deadface Connector. Refer to Figure 2.  
   CPP J310 →|← Protective Cap from Y-Cable J301, cut tether if required.

12. Secure harnesses to each other and structure (Velcro Straps).


14. Inhibit RPC Close Commands for all B Heaters (N1RS2A RPC 1, 2, 3, 4, 12, 13, 14, 15, 16; N1RS2C RPC 1, 2, 14, 16).

15. Perform B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY, all (SODF: GND: C&DH: CORRECTIVE).

16. Enable RPC Close commands for all B Heaters (N1RS2A RPC 1, 2, 3, 4, 12, 13, 14, 15, 16; N1RS2C RPC 1, 2, 14, 16).

17. Perform EARLY COMM POWERUP, all (SODF: GND GEN: C&T).


19. Perform APCU ACTIVATION, step 4 for APCU 1 only (SODF: ISS OPS: EPS PROCEDURES).


24. **INSTALLING CLOSEOUT PANEL**
   NOD1 Install Closeout Panel NOD1D1_01, tighten fasteners (eight)  
   D1_01 (Ratchet 1/4" Drive, 5/32" Hex Head, 1/4" Drive).

**POST MAINTENANCE**
25. Inform **MCC-H** of task completion.

OBJECTIVE:
Removal of the Y-Cable from the N13B power bus.

DESCRIPTION:
Verifies powerdown of RACU 5 and APCU 1, removes the Y-Cable that provides power to N13B power bus via the RACU, and powers up RACU 5.

CREW REQUIRED:
One flight crew

DURATION:
1.5 hours

LOCATION:
NOD1D1

PARTS:
Y-Jumper Wire Harness 1F89961 (Harness ID W0155)
Deadface Connector

MATERIALS:
Dry Wipes
Gray Tape

TOOLS REQUIRED:
ISS IVA Tool Kit: Equivalent Shuttle Tools:
Kit D: Drawer 1:
5/32” Hex Head, 1/4” Drive
Static Wrist Tether
Kit E: Drawer 2:
Ratchet 1/4” Drive
Gray Tape
Kit J: Drawer 3:
Connector Pliers
IVA Tool Kit Lid #1: 4” Ratchet Wrench
Static Wrist Tether
1/4” to 3/8” Adapter
5/32” Allen Head

REFERENCED PROCEDURE(S):
RACU 5(6) ACTIVATION
RACU 5 DEACTIVATION
APCU LOAD POWERDOWN
APCU ACTIVATION
APCU DEACTIVATION
NODE 1/PMA1 SHELL WARMUP AND MAINTENANCE
EARLY COMM POWERDOWN
EARLY COMM POWERUP
TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY
TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY
RPCM POWER ON RESET
WARNING
Failure to remove power can result in electrical shock hazard.


2. Perform APCU DEACTIVATION, step 3 for APCU 1 only, Crew only (SODF: ISS OPS: EPS PROCEDURES).

3. Perform NODE 1/PMA1 SHELL WARMUP AND MAINTENANCE (SODF: ISS OPS: TCS PROCEDURES).

4. Perform EARLY COMM POWERDOWN, all (SODF: GND GEN: C&T).

5. Perform A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY AND N1-1 TO PRIMARY FROM SECONDARY, all (SODF: ISS OPS: C&DH).

6. Inhibit FDIR for the N1-2 MDM and N1RS2 RPCMs
   cmd 5 N1_2_MDM RT_FDIR - Inhibit
   cmd 18 RPCM_N1RS2_C_RT_FDIR - Inhibit
   cmd 19 RPCM_N1RS2_B_RT_FDIR - Inhibit
   cmd 20 RPCM_N1RS2_A_RT_FDIR - Inhibit

7. Perform RACU 5 DEACTIVATION, all (SODF: ISS OPS: EPS PROCEDURES).

8. **CLOSEOUT PANEL REMOVAL**
   NOD1 Remove Closeout Panel NOD1D1_01 fasteners (eight)
   D1_01 (Ratchet 1/4” Drive, 5/32” Hex Head, 1/4” Drive).

   MCC-H † IV, “Go for N13B Y-Cable removal.”
9. **DEMATING Y-CABLE CONNECTORS AT NODE 1 CONNECTOR PATCH PANEL (A2)**
   Don Static Wrist Tether.
   Attach to unpainted surface.
   - W0155P301 ←|→ J307
   - W0155P302 ←|→ J308
   - W0155J301 ←|→ W0104P307
   - W0124P310 ←|→ Deadface Connector (Temporarily stow Deadface Connector with Y-Cable).

10. **RECONFIGURING NODE 1 PATCH PANEL (A2) N1RS2 SIDE**
    W0104P307 →|← J307
    Dummy Connector (attached to CPP with Gray Tape) →|← J308
    Temporarily stow Y-Cable.
11. **MATING CONNECTOR TO APCU-1/DDCU**

   W0124P310 ← J310
   W0155P302 (Y-Cable) → Protective Cap from P310
   Y-Cable J301 ← Protective Cap from CPP J310

   Ensure all protective caps are installed on Y-Cable.


13. Inhibit RPC Close commands for all B Heaters (N1RS2A RPC 1, 2, 3, 4, 12, 13, 14, 15, 16; N1RS2C RPC 1, 2, 14, 16).


15. Enable RPC Close commands for all B Heaters (N1RS2A RPC 1, 2, 3, 4, 12, 13, 14, 15, 16; N1RS2C RPC 1, 2, 14, 16).


17. Perform RPCM POWER ON RESET, step 2 (SODF: ISS OPS: EPS PROCEDURES).

18. Perform APCU ACTIVATION, step 4 for APCU 1 only (SODF: ISS OPS: EPS PROCEDURES).


20. Perform NODE 1 INTERNAL LIGHT POWER ON, step 7 (SODF: ISS OPS: EPS PROCEDURES).


23. **CLOSEOUT PANEL INSTALLATION**

   NOD1 Install Closeout Panel NOD1D1_01, tighten fasteners (eight)
   D1_01 (Ratchet 1/4" Drive, 5/32" Hex Head, 1/4" Drive).

   IV MCC-H, “Closeout Panel installation complete.”

**POST MAINTENANCE**

24. Inform MCC-H of task completion.

25. Stow tools, materials.

   Y-Jumper Cable is stowed at NOD1S2 (in bag attached to STBD hatch).
OBJECTIVE:
Install Y-Cable to power N14B power bus by RACU 6.

DESCRIPTION:
Procedure outlines steps to power down RACU 6 and APCU-2, install the Y-Cable to provide power to N14B and power up RACU 6.

CREW REQUIRED:
One flight crew

DURATION:
1.5 hours

LOCATION:
NOD1P1

PARTS:
Y-Jumper Wire Harness (W0155) P/N 1F89961
Deadface Connector (both stowed in bag on STBD hatch)

MATERIALS:
Dry Wipes
Velcro Straps
Gray Tape

TOOLS REQUIRED:
ISS IVA Tool Kit: Equivalent Shuttle Tools:
Kit D: Drawer 1:
  5/32” Hex Head, 1/4” Drive
Kit E: Drawer 2:
  Ratchet 1/4” Drive
Kit J: Drawer 3:
  Connector Pliers (if required)
IVA Tool Kit Lid #1: 4” Ratchet Wrench
  Static Wrist Tether
  Gray Tape
  1/4” to 3/8” Adapter
  5/32” Allen Head

REFERENCED PROCEDURE(S):
RACU 5(6) ACTIVATION
RACU 6 DEACTIVATION
APCU ACTIVATION
APCU DEACTIVATION
APCU LOAD POWERDOWN
NODE 1/PMA1 SHELL WARMUP AND MAINTENANCE
EARLY COMM POWERDOWN
TRANSITIONING N1-1 TO DIAGNOSTIC/STANDBY/OFF FROM SECONDARY WHILE N1-2 IS PRIMARY
TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY
EARLY COMM POWERUP
RPCM POWER ON RESET
APCU CONTROLLED REPOWER
WARNING

Failure to remove power can result in electrical shock hazard.

1. Perform APCU LOAD POWERDOWN, steps 1 (N14-B loads only), 2.1, 3 (SODF: ISS MAL: MALFUNCTION: EPS).

2. Perform APCU DEACTIVATION, step 3 for APCU 2 only, Crew only (SODF: ISS OPS: EPS PROCEDURES).

3. Perform NODE 1/PMA 1 SHELL WARMUP AND MAINTENANCE, only RACU 5 (B Htrs) used during this iteration (SODF: ISS OPS: TCS PROCEDURES).

4. Perform EARLY COMM POWERDOWN, steps 1, 2 (SODF: GND GEN: C&T).

5. Perform G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY, all (SODF: GND: C&DH: CORRECTIVE).

6. Inhibit FDIR for the N1-1 MDM and N1RS RPCMs
   
   cmd 6 N1_1_MDM RT_FDIR - Inhibit
   cmd 18 RPCM_N1RS1_C_RT_FDIR - Inhibit
   cmd 19 RPCM_N1RS1_B_RT_FDIR - Inhibit
   cmd 20 RPCM_N1RS1_A_RT_FDIR - Inhibit


8. REMOVING CLOSEOUT PANEL

   NOD1 Remove Closeout Panel NOD1P1_01 fasteners (twelve)
   P1_01 (5/32" Hex Head, 1/4" Drive, Ratchet 1/4" Drive).

   MCC-H  IV, “Go for N14B Y-Cable installation.”
9. **DEMATING CONNECTORS AT NODE 1 PATCH PANEL (A1)**
   Don Static Wrist Tether.
   Attach to unpainted structure.
   W0103P301 ←|→ J301
   Dummy Connector ←|→ J302
   Temporarily stow.

10. **INSTALLING Y-CABLE (W0155) AT NODE 1 PATCH PANEL (A1)**
    W0155P301 →|← J301
    W0155P302 →|← J302
    W0155J301 →|← W0103P301

   Clean surface of Connector Patch Panel (A1) with Dry Wipes.
   Secure Dummy Connector from J302 to surface of Connector Patch Panel (A1) with Gray Tape.
11. **DEMATING CONNECTOR TO APCU**
   W0123P303 ←|→ J304
   W0123P303 →|← Deadface Connector. Refer to Figure 2.
   CPP J304 →|← Protective Cap from Y-Cable J301, cut tether if required.

12. Secure harnesses to each other and structure (Velcro Straps).


15. Perform EARLY COMM POWERUP, all (SODF: GND GEN: C&T).


17. Perform APCU ACTIVATION, step 4 for APCU 2 only (SODF: ISS OPS: EPS PROCEDURES).


19. **INSTALLING CLOSEOUT PANEL**
   NOD1 P1_01 Install Closeout Panel NOD1P1_01, tighten fasteners (twelve)
   (5/32" Hex Head, 1/4" Drive, Ratchet 1/4" Drive).

19. **POST MAINTENANCE**
   IV ↓ MCC-H, “Closeout Panel installation complete.”

20. Stow tools, materials.
OBJECTIVE:
Removal of the Y-Cable from the N14B power bus.

DESCRIPTION:
Procedure outlines steps to power down the RACU 6 and APCU-2, remove the Y-Cable that provides power to N14B and power up the RACU 6.

CREW REQUIRED:
One flight crew

DURATION:
1.5 hours

LOCATION:
NOD1OP1

PARTS:
Y-Jumper Wire Harness (W0155)
Deadface Connector

MATERIALS:
Dry Wipes
Gray Tape

TOOLS REQUIRED:
ISS IVA Tool Kit:
Kit D:
   5/32" Hex Head, 1/4" Drive
Kit E:
   Ratchet 1/4" Drive
Kit J:
   Connector Pliers (if required)
IVA Tool Kit Lid #1:
   Static Wrist Tether

Equivalent Shuttle Tools:
Drawer 1:
   Static Wrist Tether
Drawer 2:
   Gray Tape
Drawer 3:
   Connector Pliers
   4" Ratchet Wrench
   1/4" to 3/8" Adapter
   5/32" Allen Head

REFERENCED PROCEDURE(S):
RACU 5(6) ACTIVATION
RACU 6 DEACTIVATION
APCU ACTIVATION
APCU DEACTIVATION
APCU LOAD POWERDOWN
NODE 1/PMA1 SHELL WARMUP AND MAINTENANCE
EARLY COMM POWERDOWN
TRANSITIONING N1-1 TO DIAGNOSTIC/STANDBY/OFF FROM SECONDARY WHILE N1-2 IS PRIMARY
TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-2 IS PRIMARY
EARLY COMM POWERUP
RPCM POWER ON RESET
APCU CONTROLLED REPOWER
WARNING
Failure to remove power can result in electrical shock hazard.

1. Perform APCU LOAD POWERDOWN, steps 1 (N14-B loads only), 2.1, 3 (SODF: ISS MAL: MALFUNCTION: EPS).

2. Perform APCU DEACTIVATION, step 3 for APCU 2 only, Crew only (SODF: ISS OPS: EPS PROCEDURES).

3. Perform NODE 1/PMA 1 SHELL WARMUP AND MAINTENANCE, only RACU 5 (B Htrs) used during this iteration (SODF: ISS OPS: TCS PROCEDURES).

4. Perform EARLY COMM POWERDOWN, steps 1, 2 (SODF: GND GEN: C&T).

5. Perform G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY, all (SODF: GND: C&DH: CORRECTIVE).

6. Inhibit FDIR for the N1-1 MDM and N1RS RPCMs
   cmd 6 N1_1_MDM RT_FDIR - Inhibit
   cmd 18 RPCM_N1RS1_C_RT_FDIR - Inhibit
   cmd 19 RPCM_N1RS1_B_RT_FDIR - Inhibit
   cmd 20 RPCM_N1RS1_A_RT_FDIR - Inhibit


8. REMOVING CLOSEOUT PANEL
   NOD1 Remove Closeout Panel NOD1P1_01 fasteners (twelve)
   P1_01 (5/32" Hex Head, 1/4" Drive, Ratchet 1/4" Drive).

MCC-H ↑ IV, “Go for N14B Y-Cable removal.”
9. **DEMATING Y-CABLE CONNECTORS AT NODE 1 PATCH PANEL (A1)**
   - Don Static Wrist Tether.
   - Attach to unpainted structure.
   - W0155P301 ←|→ J301
   - W0155P302 ←|→ J302
   - W0155J301 ←|→ W0103P301
   - W0123P303 ←|→ Deadface connector
   - Stow Deadface connector with Y-Cable.

10. **RECONFIGURING NODE 1 PATCH PANEL (A1) N1RS1 SIDE**
    - W0103P301 →|← J301
    - Dummy Connector (attached to CPP with Gray Tape) →|← J302
    - Temporarily stow Y-Cable.

11. **MATING CONNECTOR TO APCU-2/DDCU AND INSTALLING PROTECTIVE CAPS ON Y-CABLE**
    - W0123P303 ←|→ CPP J304
    - W0155P302 (Y-Cable) ←|→ Protective Cap
    - Y-Cable J301 ←|→ Protective Cap from CPP J304
    - Ensure all protective caps are installed on Y-Cable.


18. INSTALLING CLOSEOUT PANEL
   NOD1 Install Closeout Panel NOD1P1_01, tighten fasteners (twelve) P1_01 (5/32” Hex Head, 1/4” Drive, Ratchet 1/4” Drive).

19. POST MAINTENANCE
   Inform MCC-H of task completion.

20. Stow tools, materials, Y-Jumper Cable at NOD1S2 (in bag attached to STBD Hatch).
OBJECTIVE:
Install four CBM Controller Panel Assemblies (CPAs) onto the Node 1 Forward hatch beam.

LOCATION:
Stowed: NOD1D4_D2, NOD1D4_K2 (CTBs)
Installed: Node 1 Forward Active CBM Hatch Beam

DURATION:
2.5 hour

PARTS:
CTB, Single (two) (P/N SEG33111837-301)

NOTE
The following items are stowed together inside the two Cargo Transfer Bags.

CBM Controller Panel Assy (two) (P/N 2355260-1-1)
CBM Controller Panel Assy (one) (P/N 2355260-2-1)
CBM Controller Panel Assy (one) (P/N 2355260-3-1)
CTB, Divider (two) (P/N SEG33111841-309)
24” x 24” Ziploc Bag (four) (P/N 528-50000-8)
Desiccant Bag Assy (four) (P/N SDG39125390-303)
12” x 12” Ziploc Bag (four) (P/N 528-50000-5)
Protective Cap (four) (P/N NATC-RPC-N-15-0)
Protective Cap (four) (P/N NATC-PPC-N-15-0)
Protective Cap (eight) (P/N NATC-RPC-N-11-0)
Protective Cap (eight) (P/N NATC-PPC-N-11-0)
Protective Cap (twenty-four) (P/N NATC-RPC-N-13-0)
Protective Cap (twenty-four) (P/N NATC-PPC-N-13-0)

MATERIALS:
Towel
Dry Wipe
TOOLS REQUIRED:
F5 Camera

SHUTTLE TOOLS:
DRAWER 1:
- Anti-Static Wrist Tether
- MultiMeter

DRAWER 3:
- 7/16" Socket, 1/4" Drive
- 5/32" Allen Head, 1/4" Drive
- 4" Ratchet Wrench
- Trq Wrench (30-200 in-lbs)
- 4" Ext.

STATION TOOLS (ONLY IF REQUIRED):
IVA Tool Box, Lid #1:
- Static Wrist Tether
Kit F:
- 7/16" Socket, 1/4" Drive

DRAWER 1:
- MultiMeter

Kit D:
- 5/32" Hex Head, 1/4" Drive
- 3/16" Hex Head, 1/4" Drive

Kit E:
- 1/4" Drive Ratchet
- 4" Ext, 1/4" Drive
- 3/8" to 1/4" Adapter

Kit G:
- (30-200 in-lbs) Trq Wrench, 3/8" Drive

Shuttle Tool Locker Drawer 1:
- MultiMeter

REFERENCED PROCEDURES:
None

CPA SAFING

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

1. Verify Primary, Secondary RPCs are Op.
   PCS S&M
   N1 Active CBM Display
   ‘N1_Fwd_CBM_Data’
   ‘RPCM_N13B_C (Primary Power)’
sel RPC [X] Cntr Asy [Y]

where [X] = [3, 4, 5, 6]
[Y] = [1, 2, 3, 4]

RPCM_N13B_C_RPC_[X]
√RPC Position – Op
√RPC Close Cmd – Inh

Repeat

‘RPCM_N14B_A (Secondary Power)’

sel RPC [X] Cntr Asy [Y]

where [X] = [2, 3, 14, 15]
[Y] = [1, 2, 3, 4]

RPCM_N14B_A_RPC_[X]
√RPC Position – Op
√RPC Close Cmd – Inh

Repeat

2. If required, remove Axial Barrier Assy, 1/4 turn fastener (sixteen). Temporarily stow.

**CPA UNSTOW:**

![Image of CPA stowage configuration]

Figure 1.- Typical CPA stowage configuration.
3. Remove one 24" x 24" Ziploc Bag (containing CPA) from CTB. Temporary stow CTB. Refer to Figure 1.

4. Remove, temporary stow the following from 24" x 24" Ziploc bag:
   CPA
   Desiccant Bag
   Empty 12" x 12" Ziploc Bag

   **CAUTION**
   CPAs must be free of moisture before being installed (inspect areas between each controller).

5. Inspect CPA for condensation, dry as required (using towel). Report any condensation to MCC-H.

**CPA INSTALLATION**

![Diagram of CPA installation](image)

Figure 2.- Node 1 Fwd CBM Controller Panel Assembly (CPA) Installation Layout.
6. Mount CPA in its labeled position (CPA 1, 2, 3, 4).
   Snug fasteners (five) by hand.
   Refer to Figures 2, 3, 4, CPA Labels, bulkhead.

7. Torque fasteners (five) to 125 in-lbs (Ratchet 3/8” Drive, 7/16” Socket, (30-200 in-lbs) Trq Wrench).

8. Mate CPA Ground Straps (two) (Ratchet 3/8” Drive, 4” Ext, 5/32” Hex Head).

9. Check for continuity between CPA, CBM Hatch Beam (Multimeter).
10. Don Static Wrist Tether.
   Secure clip end to unpainted, non-anodized metal surface.

   NOTE
   Once protective caps have been removed from CPA and cable interface, mate each pair before stowing.

11. Remove Protective Caps (eighteen), Velcro Straps from cables, CPA.
    Stow Protective Caps, Velcro Straps into one 12" x 12" Ziploc Bag. Temporary stow Ziploc Bag.

   CAUTION
   Inspect each connector pin for damage prior to mating each cable.

Table 1. Node 1 Fwd CPA (X) Power/Data Cables  (X= 1, 2, 3, 4)

<table>
<thead>
<tr>
<th>Cable or Bulkhead Label</th>
<th>Wire Harness No.</th>
<th>Harness Plug No.</th>
<th>Cpa (x) Jack No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Power</td>
<td>W720</td>
<td>P(X)</td>
<td>J1</td>
</tr>
<tr>
<td>1553/485 Bus Data</td>
<td>W721</td>
<td>P(X)</td>
<td>J2</td>
</tr>
<tr>
<td>Secondary Power</td>
<td>W722</td>
<td>P(X)</td>
<td>J3</td>
</tr>
<tr>
<td>485 Bus Data</td>
<td>W723</td>
<td>P(X)</td>
<td>J4</td>
</tr>
<tr>
<td>Capture Latch CL(X)</td>
<td>P1 TO J5 LCH CONT</td>
<td>P1</td>
<td>J5</td>
</tr>
<tr>
<td>Powered Bolt (X)-1</td>
<td>P1 TO J6 BLT CONT</td>
<td>P1</td>
<td>J6</td>
</tr>
<tr>
<td>Powered Bolt (X)-2</td>
<td>P1 TO J7 BLT CONT</td>
<td>P1</td>
<td>J7</td>
</tr>
<tr>
<td>Powered Bolt (X)-3</td>
<td>P1 TO J8 BLT CONT</td>
<td>P1</td>
<td>J8</td>
</tr>
<tr>
<td>Powered Bolt (X)-4</td>
<td>P1 TO J9 BLT CONT</td>
<td>P1</td>
<td>J9</td>
</tr>
</tbody>
</table>

12. Mate Power/data cable connectors (nine) for one CPA.
    Refer to Table 1.

13. If required, remove Static Wrist Tether from bulkhead.

14. Repeat steps 3 --- 13 for remaining CPAs.

**POST MAINTENANCE**
15. Photo document each installed CPA, include all connectors (F5 camera).

16. Stow spent Desiccant Bags (four) in “Return to Houston” Bag.
17. Stow into each CTB:
   12” x 12” Ziploc Bag (two) each filled with Protective Caps (eighteen)
   Empty 24” x 24” Ziploc Bags (two)
   Divider (one)

18. Restow CTBs in NOD1D4_D2 & NOD1D4_K2.

19. Wipe clean Optical Tape on each CPA (four) (Dry wipes).

20. MCC-H for stowage location of Axial Barrier Assembly

21. Stow tools, equipment.

21. Report task completion to MCC-H.
OBJECTIVE:
Attach PMA 2 Centerline Camera Target to existing vestibule closeout with 1/4 turn fastener fittings. Removal steps included, steps 1 – 9 install, steps 11 – 18 remove.

LOCATION:
Installed: PMA 2
Stowed: SpaceHab – PA04B

DURATION:
60 minutes

PARTS:
Target Stowage Box
PMA 2 Centerline Camera Target (P/N 1F92502-1)
Target Protective Cover (P/N SEG3112769-301)

MATERIALS:
Kapton Tape

TOOLS REQUIRED:
Mini Maglite

USOS IVA TOOL KIT:
Kit E: Ratchet 1/4” Drive
4” Ext, 1/4” Drive

Shuttle Tools:
Drawer 1: Kapton Tape

Kit F: 4” Ratchet Wrench
7/16” Socket, 1/4” Drive
4” Extension

Kit G: 7/16”, 1/4” Socket
(5-35 in-lbs)Trq Driver, 1/4” Drive
1/4” Trq Wrench

REFERENCED PROCEDURE (S):
P/TV FS: P/TV 21 ISS INT OPS

WARNING
Target lenses are made of glass. Handle carefully while assembling beam supports. Do not remove Lexan cover until assembly, installation is complete, or if debris is observed.

CAUTION
Target mirror is not to be removed or adjusted. Inform MCC-H of any damage.

ASSEMBLY
1. Remove Target Beam Assembly from Stowage Box.
Verify integrity of beam structures, Target.
Remove Kapton Tape.
Figure 1. Assembled Target Beam.

Match decals A to A, and B to B. Ensure all fasteners align with their respective hole patterns prior to running fasteners in. Refer to Figure 1.

2. Install end beams to center beam, ensure correct orientation. Snug fasteners on each side (four) in X-pattern, torque to 33 in-lbs. (Ratchet 1/4" Drive, 4" Ext, 7/16" Socket, (5–35 in-lbs) Trq Driver). Refer to Figure 1.

3. If installed, remove axial port closeout, 1/4 turn fasteners (sixteen). Temporarily stow.

4. Disconnect 1/4 turn fasteners (four) from temporary stowage on end wings. Refer to Figure 1.

INSTALLATION

Figure 2. Target Assembly Installed on PMA. Looking forward into PMA.
Target mirror must be oriented toward Node with 5th lens oriented toward duct cutout in PMA structure. Refer to Figure 2.

Each End Wing has one Round Fitting, one Oblong Fitting. Refer to Figure 3.

5. Orient assembled beam in PMA. Refer to Figure 2.

6. Install 1/4 turn fasteners (two) through round fittings (two) into PMA structure. Verify by hand 1/4 turn fasteners engaged, locked position. Refer to Figure 3.

7. Install 1/4 turn fasteners (two) through oblong fittings (two) into PMA structure. Verify by hand 1/4 turn fasteners engaged, locked position. Refer to Figure 3.

8. Remove Lexan cover from target mirror (Kapton Tape, Velcro), place in Target Stowage Box.

9. Stow tools, equipment. Report task completion to MCC-H.

REMOVAL

WARNING
Lexan cover must be placed on target mirror before disassembly. Handle carefully while disassembling beam supports.

11. Retrieve Lexan cover from Stowage Box, install on target mirror with arrow on label pointing to fifth lens (velcro straps).

12. Remove Target Assembly from PMA structure, 1/4 turn fasteners (four).

13. Install 1/4 turn fasteners to stowage location.
Refer to Figure 1.

14. Loosen fasteners (eight), remove end beams from center beam. (Ratchet 1/4" Drive, 4" Ext, 7/16" Socket).
Refer to Figure 1.

![Figure 4. Target Beam in Stowage Configuration.](image)

15. Stack three pieces of beam structure in stowage configuration, tape together (Kapton).
Refer to Figure 4.
Place in Target Stowage Box.

16. Reinstall axial port closeout, 1/4 turn fasteners (sixteen).

17. Stow tools, equipment.


19. Inform MCC of task completion.
1. **VERIFYING ALL NODE AND PMA 1 SHELL HEATERS ARE INHIBITED**

   **PCS**
   
   Node 1: TCS
   
<table>
<thead>
<tr>
<th>NODE1: TCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Node 1’</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
   √Node 1 A Htr Availability (nine) – Inh
   √Node 1 B Htr Availability (nine) – Inh
   |
   |
   ‘PMA1’
   |
   √PMA 1 A Htr Availability (four) – Inh
   √PMA 1 B Htr Availability (four) – Inh

2. **DETERMINING IF ANY SHELL HEATER SETPOINTS NEED TO BE CHANGED**

   **NOTE**
   
   1. The Node Htr 7B Setpoints on the Node 1 Htr B Setpoints CDDT and PCS display are incorrect due to an identified mapping problem.
   
   2. The Node 1 Htr 7B Setpoints should be accessed from the Node 1 Htr 7 details page.
   
   3. Heater setpoint values should be within ± 1° C for successful verification of setpoint change.

   Using the values in Table 1, check the upper and lower setpoints, failure upper and lower limits, and cyclic load delta, for all Node 1 and PMA 1 heaters.

   Check both A and B heaters for all zones on the Node 1 and PMA 1.

   For heater with two sensors, check setpoints, limits, and deltas for both sensors.

   Display navigation is specified below.

   **PCS**
   
   Node 1: TCS
   
<table>
<thead>
<tr>
<th>NODE1: TCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Node 1’ or ‘PMA 1’</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
   sel Htr Availability
   |
   NODE1Htr16avail         | I
   |
   or
   |
   PMA1_HtrAvailability    | I
sel Node1 HtrA(B) Setpoints or PMA 1 HtrA(B) Setpoints

**NODE1 HtrA(B) Setpoints**

or

**PMA1 HtrA(B) Setpoints**

If all Node 1 and PMA 1 heater setpoints match the values listed in Table 1, skip steps 3 and 4 and perform step 5.
If Node A(B) heaters do not match Table 1 values, perform step 3.
If PMA 1 A(B) heaters do not match Table 1 values, perform step 4.

### 3. MODIFYING SETPOINTS FOR NODE 1 HEATER TEMP SENSORS

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Node Htr 7B Setpoints on the Node 1 Htr B Setpoints CDDT and PCS display are incorrect due to an identified mapping problem.</td>
</tr>
<tr>
<td>2. The Node 1 Htr 7B Setpoints should be accessed from the Node 1 Htr 7 details page.</td>
</tr>
<tr>
<td>3. Heater setpoint values should be within ± 1° C for successful verification of setpoint change.</td>
</tr>
</tbody>
</table>

Modify Node 1 setpoints to the values in Table 1 per the following example (for Node 1 Htr 1A sensor 1).

PCS

Node 1: TCS

```
NODE1: TCS

'Node 1'
```

sel Htr Availability

```
Node1Htr16avail
```

sel Node 1 HtrA Setpoints

```
Node1_HtrA_Setpoints
```

sel Htr1A Snsr1 – Chng Setpt

```
Node1_Htr1A_SNSR1_Setpoint
```
NOTE
1. Specific values to be entered in the template command below for each temperature sensor are provided in Table 1 - PMA 1/Node 1 Heater Configuration.

2. Values are provided for each of the five items in the template.
   - Failure Upper Limit
   - Upper Setpoint
   - Lower Setpoint
   - Failure Lower Limit
   - Cyclic Load Delta

   input Failure Upper Limit, degC: 40
   Upper Setpoint, degC: 24
   Lower Setpoint, degC: 21
   Failure Lower Limit, degC: -17
   Cyclic Load Delta, degC: 5

   cmd Execute Change

   Node1 HtrA Setpoints

   √ Htr1A Failure Upper Limit, degC: 40
   √ Upper Setpoint, degC: 24
   √ Lower Setpoint, degC: 21
   √ Failure Lower Limit, degC: -17
   √ Cyclic Load Delta, degC: 5

4. MODIFYING SETPOINTS FOR ALL PMA 1 HEATER TEMP SENSORS
   Modify PMA 1 setpoints to the values in Table 1 per the following example (for PMA 1 Htr 1A).

   NOTE
   PMA 1 Heater 2A and 4B are not active and do not appear on the PCS Node 1 TCS display.

   PCS
   Node 1: TCS
   NODE1: TCS
   ‘PMA 1’
   sel Htr Availability
   PMA1_HtrAvailability

   sel PMA 1 HtrA Setpoints
   PMA1_HtrA_Setpoints
sel Htr1A – Change Setpoint

```
PMA1_Htr1A_Setpoint
```

**NOTE**

1. Specific values to be entered in the template command below for each temperature sensor are provided in Table 1 - PMA 1/Node 1 Heater Configuration.

2. Values are provided for each of the five items in the template.
   - Failure Upper Limit
   - Upper Setpoint
   - Lower Setpoint
   - Failure Lower Limit
   - Cyclic Load Delta

3. Heater setpoint values should be within ± 1°C for successful verification of setpoint change.

```
input Failure Upper Limit, degC: 40
  √Upper Setpoint, degC: 24
  √Lower Setpoint, degC: 21
  √Failure Lower Limit, degC: -17
  √Cyclic Load Delta, degC: 5
```

**cmd** Execute Change

```
PMA1_HtrA_Setpoints
```

```
√Htr1A Failure Upper Limit, degC: 40
  √Upper Setpoint, degC: 24
  √Lower Setpoint, degC: 21
  √Failure Lower Limit, degC: -17
  √Cyclic Load Delta, degC: 5
```

---

**5. ENABLING TO OPERATE PMA 1 HEATERS 3B, 4A, AND 5B**

**PCS**

Node 1: TCS

```
NODE1: TCS
‘PMA 1’
```

```
sel Htr Availability
```

```
PMA1_HtrAvailability
```

**cmd** Htr 3B – Ena Operate

```
√Availability – Ena Opr
```
NODE 1/PMA 1 POST EGRESS HEATER RECONFIGURATION

- **cmd** Htr 4A – Ena Operate
  - Availability – Ena Opr

- **cmd** Htr 5B – Ena Operate
  - Availability – Ena Opr
## Node 1 Heaters - All Temperatures in °C(°F)

<table>
<thead>
<tr>
<th>HEATER</th>
<th>AVAILABILITY</th>
<th>FAILURE UPPER LIMIT</th>
<th>UPPER SETPOINT</th>
<th>LOWER SETPOINT</th>
<th>FAILURE LOWER LIMIT</th>
<th>CYCLIC LOAD DELTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A Inh</td>
<td>41 (105.8)</td>
<td>-27 (-16.6)</td>
<td>-30 (-22)</td>
<td>-33 (-27.4)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>1B Inh</td>
<td>41 (105.8)</td>
<td>-27 (-16.6)</td>
<td>-30 (-22)</td>
<td>-33 (-27.4)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>2B Inh</td>
<td>41 (105.8)</td>
<td>-27 (-16.6)</td>
<td>-30 (-22)</td>
<td>-33 (-27.4)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>3A Inh</td>
<td>38 (100.4)</td>
<td>26 (78.8)</td>
<td>23 (73.4)</td>
<td>9 (48.2)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>3B Inh</td>
<td>38 (100.4)</td>
<td>26 (78.8)</td>
<td>23 (73.4)</td>
<td>9 (48.2)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>4A Inh</td>
<td>38 (100.4)</td>
<td>26 (78.8)</td>
<td>23 (73.4)</td>
<td>15 (59)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>5A Inh</td>
<td>38 (100.4)</td>
<td>26 (78.8)</td>
<td>23 (73.4)</td>
<td>20 (68)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>5B Inh</td>
<td>38 (100.4)</td>
<td>26 (78.8)</td>
<td>23 (73.4)</td>
<td>20 (68)</td>
<td>5 (9)</td>
<td></td>
</tr>
</tbody>
</table>

## Node 1 Heaters - All Temperatures in °C(°F)

<table>
<thead>
<tr>
<th>HEATER (SENSOR)</th>
<th>AVAILABILITY</th>
<th>FAILURE UPPER LIMIT</th>
<th>UPPER SETPOINT</th>
<th>LOWER SETPOINT</th>
<th>FAILURE LOWER LIMIT</th>
<th>CYCLIC LOAD DELTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A (Snsr 1) Inh</td>
<td>34 (93.2)</td>
<td>-19 (-2.2)</td>
<td>-23 (-9.4)</td>
<td>-27 (-16.6)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>1A (Snsr 2) Inh</td>
<td>34 (93.2)</td>
<td>-19 (-2.2)</td>
<td>-23 (-9.4)</td>
<td>-27 (-16.6)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>1B (Snsr 1) Inh</td>
<td>34 (93.2)</td>
<td>-19 (-2.2)</td>
<td>-23 (-9.4)</td>
<td>-27 (-16.6)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>1B (Snsr 2) Inh</td>
<td>34 (93.2)</td>
<td>-19 (-2.2)</td>
<td>-23 (-9.4)</td>
<td>-27 (-16.6)</td>
<td>5 (9)</td>
<td></td>
</tr>
<tr>
<td>2A Inh</td>
<td>38 (100.4)</td>
<td>-24 (-11.2)</td>
<td>-28 (-18.4)</td>
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1. **VERIFICATION ALL NODE AND PMA 1 SHELL HEATERS ARE INHIBITED**

PCS

<table>
<thead>
<tr>
<th>PCS Node 1: TCS</th>
<th>NODE1: TCS</th>
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</thead>
<tbody>
<tr>
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<td>'Node 1'</td>
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</tbody>
</table>

√ Node 1 A Htr Availability (nine) – Inh
√ Node 1 B Htr Availability (nine) – Inh

‘PMA1’

√ PMA 1 A Htr Availability (four) – Inh
√ PMA 1 B Htr Availability (four) – Inh

2. **DETERMINING IF ANY SHELL HEATER SETPOINTS NEED TO BE CHANGED**

**NOTE**

1. The Node Htr 7B Setpoints on the Node 1 HtrB Setpoints CDDT and PCS display are incorrect due to an identified mapping problem.

2. The Node 1 Htr 7B Setpoints should be accessed from the Node 1 Htr 7 details page.

3. Heater setpoint values should be within ± 1° C for successful verification of setpoint change.

Using the values in Table 1, check the upper and lower setpoints, failure upper and lower limits, and cyclic load delta, for all Node 1 and PMA 1 heaters.

Check both A and B heaters for all zones on Node 1 and PMA 1.

For a heater with two sensors, check setpoints, limits, and deltas for both sensors.

Display navigation is specified below.

PCS

<table>
<thead>
<tr>
<th>PCS Node 1: TCS</th>
<th>NODE1: TCS</th>
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</thead>
<tbody>
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<td>'Node 1' or 'PMA 1'</td>
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sel Htr Availability

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</table>

or

<table>
<thead>
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</tr>
</thead>
</table>
sel Node 1 HtrA(B) Setpoints or PMA 1 HtrA(B) Setpoints

**NODE1 HtrA(B) Setpoints**

or

**PMA1 HtrA(B) Setpoints**

If all Node 1 and PMA 1 heater setpoints match the values listed in Table 1, skip steps 3 and 4. >> If Node A(B) heaters do not match Table 1 values, perform step 3. If PMA 1 A(B) heaters do not match Table 1 values, perform step 4.

3. **MODIFYING SETPOINTS FOR NODE 1 HEATER TEMP SENSORS**

**NOTE**

1. The Node Htr 7B Setpoints on the Node 1 HtrB Setpoints CDDT and PCS display are incorrect due to an identified mapping problem.

2. The Node 1 Htr 7B Setpoints should be accessed from the Node 1 Htr 7 details page.

3. Heater Setpoint values should be within ±1°C for successful verification of setpoint change.

Modify Node 1 setpoints to the values in Table 1 per the following example (for Node 1 Htr1A sensor 1).

**PCS**

Node 1: TCS

**NODE1: TCS**

'Node 1'

sel Htr Availability

**Node1Htr16avail**

sel Node 1 HtrA Setpoints

**Node1_HtrA_Setpoints**

sel Htr1A Snsr1 – Chng Setpt

**Node1_Htr1A_SNSR1_Setpoint**
NOTE
1. Specific values to be entered in the template command below for each temperature sensor are provided in Table 1 - PMA 1/Node 1 Heater Configuration.

2. Values are provided for each of the five items in the template.
   - Failure Upper Limit
   - Upper Setpoint
   - Lower Setpoint
   - Failure Lower Limit
   - Cyclic Load Delta

3. The setpoints provided in Table 1 are based on a 10°C (50°F) calculated Node 1 dewpoint.

4. If the dewpoint in Node 1 is lower or higher than 10°C, heater setpoints should be lowered or raised accordingly to reduce heater power usage or prevent condensation in the Node.

   input Failure Upper Limit, degC: 40
   Upper Setpoint, degC: 24
   Lower Setpoint, degC: 21
   Failure Lower Limit, degC: -17
   Cyclic Load Delta, degC: 5

   cmd Execute Change

   Node1 HtrA Setpoints

   √Htr1A Failure Upper Limit, degC: 40
   √Upper Setpoint, degC: 24
   √Lower Setpoint, degC: 21
   √Failure Lower Limit, degC: -17
   √Cyclic Load Delta, degC: 5

4. MODIFYING SETPOINTS FOR PMA 1 HEATER TEMP SENSORS
   Modify PMA 1 setpoints to the values in Table 1 per the following example (for PMA 1 Htr1A).

   NOTE
   PMA 1 Heater 2A and 4B are not active and do not appear on the PCS Node 1 TCS display.

   PCS
   Node 1: TCS
   NODE1: TCS
   ‘PMA 1’
NODE 1/PMA 1 PRE-WARMUP HEATER RECONFIGURATION

sel Htr Availability

| PMA1_HtrAvailability |

sel PMA 1 HtrA Setpoints

| PMA1_HtrA_Setpoints |

sel Htr1A – Change Setpoint

| PMA1_Htr1A_Setpoint |

NOTE
1. Specific values to be entered in the template command below for each temperature sensor are provided in Table 1 - PMA 1/Node 1 Heater Configuration.

2. Values are provided for each of the five items in the template. Failure Upper Limit, Upper Setpoint, Lower Setpoint, Failure Lower Limit, Cyclic Load Delta

3. The setpoints provided in Table 1 are based on a 10°C (50°F) calculated Node 1 dewpoint. Heater setpoint values should be within ±1°C for successful verification of setpoint change.

4. If the dewpoint in Node 1 is lower or higher than 10°C, heater setpoints should be lowered or raised accordingly to reduce heater power usage or prevent condensation in the Node.

input Failure Upper Limit, degC: 40
Upper Setpoint, degC: 24
Lower Setpoint, degC: 21
Failure Lower Limit, degC: -17
Cyclic Load Delta, degC: 5

cmd Execute Change

| PMA1_HtrA_Setpoints |

√Htr1A Failure Upper Limit, degC: 40
√Upper Setpoint, degC: 24
√Lower Setpoint, degC: 21
√Failure Lower Limit, degC: -17
√Cyclic Load Delta, degC: 5
### Table 1. PMA 1/Node 1 Heater Configuration

#### PMA 1 Heaters - All Temperatures in °C(°F)

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<tr>
<th>HEATER</th>
<th>AVAILABILITY</th>
<th>FAILURE UPPER LIMIT</th>
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</table>
1. **DOCUMENTING HEATER POWER ALLOCATION FOR WARMUP OR MAINTENANCE**

   **NOTE**
   The heater power allocation recorded in this step is the total power available to the US segment minus the current housekeeping power.

   √MCC for heater power allocation

   Record heater power allocation: _________ W

2. **NODE 1/PMA 1 SHELL HEATER PRIORITIZATION**

   **NOTE**
   1. Node 1 and PMA 1 Heaters are reconfigured at 4-hour intervals based on Shell temperature and heater power allocation. The heaters may be reconfigured more frequently than every 4 hours if the heater power allocation changes.

   2. While MCC-H is executing the procedure, additional margins will be applied to the Shell temperature reading which may affect heater priority. These margins account for MDM errors, sensor errors, and sensor location.

   3. The heater prioritization commands heater availability to “Enable to Operate” and is based on temperature increase necessary to meet ingress criteria noted in Flight Rule B18.5.6-3.

   2.1 Record Node 1 and PMA 1 Shell temperature (use the lowest temperature if there are two temperature sensors) associated with each heater in Table 1 (or Table 2 during maintenance operations).

   2.2 Rank the temperatures from coldest to warmest (i.e., coldest is ranked #1) in Table 1 (or Table 2 during maintenance operations).

   2.3 In the rank order documented in Table 1 (or Table 2 during maintenance operations), select the group of heaters that can be operated within the heater power allocation recorded in step 1.

   2.4 Record total power in Table 1 (or Table 2 during maintenance operations) for selected heaters.

   2.5 If a given heater causes the total heater power to exceed the power allocation documented in step 1, then that heater should be skipped and the next heater in priority order should be compared to the power allocation.
3. **INHIBITING PMA 1 AND NODE 1 HEATERS NOT SELECTED FOR WARMUP OR MAINTENANCE**

   **NOTE**
   
   1. Step 3 inhibits Node 1 and PMA 1 Shell Heaters that were used in the previous 4-hour period but were not selected for the next 4-hour period.
   
   2. When step 3 is executed for the first time, all heaters will already be inhibited.

   If any PMA 1 or Node 1 Heater that did not meet the selection criteria in step 2 is Ena Opr, command the heater availability to inhibit per the following example (for PMA 1 Htr1A).

   **PCS**
   
   Node 1: TCS
   
   NODE1: TCS
   
   ‘PMA 1’
   
   sel Htr Availability
   
   PMA1 HtrAvailability
   
   **cmd Htr1A Availability – Inhibit**
   
   √Availability – Inh

4. **ENABLING PMA 1 AND NODE 1 HEATERS SELECTED FOR WARMUP OR MAINTENANCE**

   **NOTE**
   
   1. Step 4 enables Node 1 and PMA 1 Shell Heaters that were not used in the previous 4-hour period but were selected for the next 4-hour period.
   
   2. When step 4 is executed for the first time, all heaters will already be inhibited.

   If any PMA 1 or Node 1 Heater selected in step 2 is Inh, command the heater availability to Ena Opr per the following example (for PMA 1 Htr1A).

   **PCS**
   
   Node 1: TCS
   
   NODE1: TCS
   
   ‘PMA 1’
   
   sel Htr Availability
   
   PMA1 HtrAvailability
**NODE 1/PMA 1 SHELL WARMUP AND MAINTENANCE**

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**cmd** Htr1A Availability – Ena Operate

√Availability – Ena Opr

Wait 4 hours and repeat steps 2 --- 4 until all Node 1 and PMA 1 Shell temperatures are ≥ the lower setpoints in Table 3.

Proceed to step 5 only after all PMA 1 and Node 1 Shell temperatures are ≥ lower setpoint in Table 3.

5. **SHELL HEATER MAINTENANCE OPERATIONS**

<table>
<thead>
<tr>
<th>NOTE</th>
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<tr>
<td>Step 5 should be executed only after all PMA 1 and Node 1 Shell temperatures are ≥ the lower setpoints in Table 3.</td>
</tr>
</tbody>
</table>

5.1 Repeat step 1 to obtain the heater power allocation for use during maintenance operations.

5.2 Repeat steps 2 --- 4 every 4 hours until the Node 1/PMA 1 Shell Heater powerdown occurs prior to undocking.

<table>
<thead>
<tr>
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<td>1. Table 2 should be used for the prioritization in step 2.</td>
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<tr>
<td>2. Table 2 indicates Node 1 and PMA 1 Shell Heaters, that are utilized during maintenance operations.</td>
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## Table 1. PMA 1/Node 1 Heater Prioritization for Shell Warmup

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<th>RANK</th>
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Table 2. PMA 1/Node 1 Heater Prioritization for Shell Maintenance

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Table 3. PMA 1/Node 1 Heater Configuration

**PMA 1 Heaters - All Temperatures in °C(°F)**

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<th>HEATER</th>
<th>FAILURE UPPER LIMIT</th>
<th>UPPER SETPOINT</th>
<th>LOWER SETPOINT</th>
<th>FAILURE LOWER LIMIT</th>
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**Node 1 Heaters - All Temperatures in °C(°F)**

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<th>UPPER SETPOINT</th>
<th>LOWER SETPOINT</th>
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</table>
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1. Unstow, temporarily stow:
   - FS07F 4" Ratchet Wrench
   - 6” Ext
   - 7/16” Socket, 1/4” Drive
   - 1/4” Trq Wrench

2. Loosen (do not remove) small non-captive Bolts (four) at corners of Top Plate (4" Ratchet Wrench, 6” Ext, 7/16” Socket, 1/4” Drive).

3. Remove one Rod (4" Ratchet Wrench, 6” Ext, 7/16” Socket, 1/4” Drive).

4. Remove Rod located diagonally from first Rod.

5. Remove remaining Rods (two) one at a time.


7. Temporarily stow Tools.

8. Remove Top Plate.
   - Temporarily stow.

9. Remove Battery.

10. Transfer Battery to ISS.

11. Locate Top Plate and place flush against Bottom Plate.

12. Remove (one at a time) small Bolts (four) on Top Plate.
    - Place in Rod holes.

13. Hand tighten small Bolts (four).

14. Snug Bolts (four) down (4" Ratchet Wrench, 6” Ext, 7/16” Socket, 1/4” Drive).

15. Adjust Wrench to final torque value (85 to 95 in-lbs).
    - Torque Bolts (four) (1/4” Trq Wrench, 6” Ext, 7/16” Socket, 1/4” Drive).

16. Repeat steps 2 --- 15 until all Battery transfers are complete.

17. Stow:
   - FS07F 4" Ratchet Wrench
   - 6” Ext
   - 7/16” Socket, 1/4” Drive
   - 1/4” Trq Wrench
1. Verify Battery Terminal Lugs are covered with Insulating Caps.

****************************************************
If Battery Terminal Lugs not covered, √MCC.
****************************************************

2. Unstow:
   FS07F
     4" Ratchet Wrench
     6" Ext
     7/16" Socket, 1/4" Drive
   FC03
     Dial Trq Wrench, temporarily stow

   A17/
   AC20
   3. Loosen (do not remove) small non-captive Bolts (four) on corners
      of Top Plate (4" Ratchet Wrench, 6" Ext, 7/16" Socket, 1/4" Drive).

   4. Remove (one at a time) small Bolts (four).
      Replace in small threaded holes at corners of Top Plate.

   5. Hand tighten small Bolts (four).

   6. Remove Top Plate, temporarily stow.

   7. Place Battery flush against Bottom Plate (connectors toward floor).

   8. Relocate Top Plate.

   9. Place Top Plate flush against Battery so that Battery fits into recessed
      area on bottom of Top Plate.

10. Unstow Rods (four) from FDF VW Bag.

11. Place Rod (one) in hole at corner of Top Plate.
    Hand turn until Rod is captured.

12. Place Rod (one) in hole located diagonally from first Rod.
    Hand turn Rod until Rod is captured.

13. Insert remaining Rods (two) in remaining holes at corners of Top Plate.
    Hand turn Rod until Rod is captured.

14. Determine running torque for each Rod.
    Log values on torque values logsheet (Dial Trq Wrench, 6" Ext, 7/16"
    Socket, 1/4" Drive.

15. Determine Final torque values (10 to 12 in-lbs above running torque
    values)  
    Record on torque values logsheet.  
    Refer to Table 1.
### Table 1. Torque Values Logsheet

<table>
<thead>
<tr>
<th>BOLT #</th>
<th>UL</th>
<th>UR</th>
<th>LL</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running torque</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final torque</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### CAUTION

Over-tightening may damage battery.

---

- **AC16/AC19**
  - 16. Snug Rods (four) down (4" Ratchet Wrench, 6" Ext, 7/16" Socket, 1/4" Drive).
  - 17. Torque Rods (four) to final torque value (Dial Trq Wrench, 6" Ext, 7/16" Socket, 1/4" Drive).
  - 18. Tighten small Bolts (four) (4" Ratchet Wrench, 6" Ext, 7/16" Socket, 1/4" Drive).

- **FS07F**
  - 19. Stow:
    - 4" Ratchet Wrench
    - 6" Ext
    - 7/16" Socket, 1/4" Drive

- **FC03**
  - Dial Trq Wrench
1. Loosen and unbuckle Straps (seven).

2. Remove front Foam.
   Temporarily stow.

3. Remove Foam piece marked “TORU CONTAINER 1 I-BEAM”.
   Temporarily stow.

4. Remove Foam pieces (five) marked “REMOVE & STOW”.
   Stow Foam pieces (five) in empty Rack Bayliner.

5. Remove Foam piece marked “TORU CONTAINER 2 I-BEAMS”.

6. Stow TORU Container 2 I-Beams (two) in Foam piece marked “TORU CONTAINER 2 I-BEAMS”.

7. Replace Foam piece marked “TORU CONTAINER 2 I-BEAMS” in btm cavity (right side of rack).

8. Stow TORU Container 2 (frame attached) in btm cavity, base toward Foam piece marked “TORU CONTAINER 2 I-BEAMS”.

9. Stow TORU Container 1 I-Beam in Foam piece marked “TORU CONTAINER 1 I-BEAM”.

10. Replace Foam piece marked “TORU CONTAINER 1 I-BEAM” in btm cavity.

11. Replace front Foam.

12. Rebuckle and tighten Straps (seven).
PA01 1. Unbuckle top seven Straps.

2. Remove front Foam
   Temporarily stow.

3. Remove Desiccant Bags.

4. Bundle Desiccant Bags appropriately using Velcro per Transfer List.

5. Transfer all Desiccant Bags to ISS per Transfer List.

6. Replace descent Desiccant Bags in top cavity.

   Desiccant Bags are stabilized

7. Replace Foam.

8. Rebuckle and tighten Straps.

   **WARNING**

   MESS Rack (PA04) contains Ku-Band Power Supply and IRED Heel Block. Both are penetrators and must be transferred one at a time.

PA04 9. Unbuckle top four Straps.


11. Rebuckle one of the top four Straps.

12. Transfer PA04A PMA 2 Target Assy-1/Target Protective Cover-1 Bag and PA04B Ku-Band Power Supply Assy-1/VIU Assy-2 Bag to ISS.

13. Unbuckle bottom three Straps and other top Strap.

14. Remove front Foam.
   Temporarily stow.

15. Remove PA04C IRED Assy Bag (Heel Block).

16. Transfer PA04C IRED Assy Bag to ISS.

17. Replace front Foam.

18. Rebuckle and tighten Straps.
1. Loosen and unbuckle Straps (seven).
2. Remove front Foam.
   Temporarily stow.

3. Remove Desiccant Bags (four).
4. Bundle Desiccant Bags using attached Velcro.
5. Transfer Desiccant Bags to ISS.
6. Remove Foam pieces (two) marked “REMOVE & STOW”.
   Stow Foam pieces (two) in empty Rack Bayliner.

7. Stow descent Desiccant Bags in top cavity.
8. Remove Foam piece marked “REMOVE & REPLACE”.
   Temporarily stow.
9. Remove EDV Kit (triple CTB).
10. Transfer EDV Kit to ISS.
11. Stow Subfloor Pallet Foam pieces (six) marked “REMOVE & STOW TO PA02” in middle cavity.
12. Replace Foam piece marked “REMOVE & REPLACE”.
13. Replace front Foam.
14. Rebuckle and tighten Straps (seven).
1. Unbuckle Straps.

2. Remove transfer item from Foam. Transfer to ISS.

3. Remove Foam from Tray. Temporary stow.

4. Remove PIP Pins (four) from latched position on Tray.

5. Rotate levers (four) to disengaged position.

6. While lifting both ends of tray simultaneously, Pin Levers (four) into disengaged position.

7. While lifting Tray slightly away from seat track, slide Tray half a position up(down) so posts are in circular areas of seat track.

8. Lift and remove Tray.

9. Position levers (four) into engaged position.


Figure 1.- Lever Positions.
1. Retrieve temporarily stowed Tray.

2. Pin levers (four) into disengaged position before placing Tray on rack front.

3. Place Tray into seat track, aligning top Tray marks on both sides half a position up(down) from required number on seat track. Slide Tray to locked position. Refer to Table 2.

<table>
<thead>
<tr>
<th>RACK LOCATION</th>
<th>FIRST TRAY</th>
<th>SECOND TRAY</th>
<th>THIRD TRAY</th>
<th>FOURTH TRAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fwd Stbd</td>
<td>3</td>
<td>23</td>
<td>43</td>
<td>N/A</td>
</tr>
<tr>
<td>Fwd Port</td>
<td>3</td>
<td>23</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Aft Port</td>
<td>3</td>
<td>23</td>
<td>41</td>
<td>N/A</td>
</tr>
<tr>
<td>Aft Stbd</td>
<td>3</td>
<td>20</td>
<td>37</td>
<td>N/A</td>
</tr>
</tbody>
</table>

4. Tray engaged with seat track

5. While lifting Tray slightly, remove PIP Pins (four).

6. While holding Tray in place, rotate levers (one side at a time) into engaged position.

7. Replace PIP Pins (four) to lock levers into engaged position.

8. Retrieve temporarily stowed Foam.

9. Replace Foam on trays.

10. Rebuckle and tighten straps.
1. Remove Straps from bulkheads and subfloor.

2. Stow Straps in empty Rack Bayliners per Table 1.

Table 1. Strap Stowage Locations

<table>
<thead>
<tr>
<th>STRAPS (#)</th>
<th>STOWAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fwd Stbd Bulkhead (8)</td>
<td>FC07</td>
</tr>
<tr>
<td>Aft Port Bulkhead (8)</td>
<td>FC07</td>
</tr>
<tr>
<td>Aft Stbd Bulkhead (8)</td>
<td>FC07</td>
</tr>
<tr>
<td>Subfloor (8)</td>
<td>FC07</td>
</tr>
<tr>
<td>Aft Center Bulkhead (8)</td>
<td>FC07</td>
</tr>
<tr>
<td>Port Fwd (PF13/PF15)</td>
<td>FC07</td>
</tr>
<tr>
<td>Rack Front (16)</td>
<td>FC07</td>
</tr>
<tr>
<td>Port Aft (PA13) Rack Front (10)</td>
<td>PA15</td>
</tr>
</tbody>
</table>
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DAC1 1. Loosen and unbuckle Straps.

2. Remove top Foam Cover from Subfloor Pallet.
   Temporarily stow.

3. Remove middle Foam Cover pieces (four) marked “REMOVE & STOW TO PA02”.

4. Remove Cable Trays from middle Foam Cover.
   Transfer to ISS.
   Temporarily stow middle Foam Cover.

5. Remove SSU Cover from Foam.
   Transfer to ISS.

6. Remove Foam Base pieces (two) marked “REMOVE & STOW TO PA02”.
   Temporarily stow.

7. Reconfigure latitudinal Strap sets (four sets, two straps per set) on Subfloor Pallet to positions 5 and 7.

DAC1 8. Place TORU #1 container (beams attached) into subfloor Foam.

9. Replace top Foam Cover.

10. Cross and rebuckle two longitudinal Strap sets, tighten.

11. Rebuckle and tighten four latitudinal Strap sets.
1. Loosen and unbuckle Straps.

2. Remove top Foam Cover with End Caps (two) from Subfloor Pallet.

3. Stow End Caps (two).

4. Remove Foam Blocks (two) from underside of Top Foam Cover.

5. Place Foam Blocks (two) in bottom Foam, matching Velcro color.

6. Reconfigure Strap sets (four sets, two straps per set) on Subfloor Pallet to positions 5 and 7.

7. Place TORU #1 container (beams attached) into subfloor Foam.

8. Replace top Foam Cover.

9. Cross and rebuckle two longitudinal Strap sets, tighten.

10. Rebuckle and tighten four latitudinal Strap sets.
DAC1  1. Loosen and unbuckle Straps.

2. Remove top Foam Cover with End Caps (two).  
Temporary stow.

3. Remove TVIS Treadmill Assembly.  
Transfer to ISS.

4. Relocate top Foam Cover with End Caps (two) and place on Subfloor  
Pallet.

DAC1  5. Buckle and tighten Straps.
STOWAGE OPERATIONS
LOCATION:
Stowed: ____________________
Installed: NOD104
NOD1P4

MATERIALS:
Decal Package – ZSR 1
Decal Package – ZSR 2
Decal Package – ZSR Spare

NOTE
All three decal packages contain identical decals.

1. REMOVING OLD DECALS
Remove and discard previously applied decals from both ZSRs.

NOTE
Decals should not be applied at identical location of old decals. Residual adhesive from the old decals may hinder the bonding effectiveness of the new decals.

2. APPLYING DECALS
Apply decals onto both ZSRs according to Figure 1.

3. RESTOWING
Restow spare decals to _____________________.

Figure 1.- ZSR Decal Installation for Node 1.
TOP OF “SSC FS CUE CARD”

SSC FS
ISS OPS - 1a/A

TOP OF “PCS CUE CARD”

PCS
ISS OPS - 2a/A
TOP BACK OF “SSC FS CUE CARD”

Hook

Velcro

ISS OPS - 1b/A

TOP BACK OF “PCS CUE CARD”

Hook

Velcro

ISS OPS - 2b/A
INTERNATIONAL SPACE STATION

OPERATIONS CHECKLIST

ISS-2A.2B / STS-106