INTERNATIONAL SPACE STATION
ISS/SHUTTLE JOINT OPERATIONS BOOK

28 JUN 05

APPROVED BY:

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ACCEPTED BY:

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Incorporates the following:

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

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1. Use the POWERUP column in reverse order to back out of the powerdown.

2. The loads for the major power users are presented below.

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<td>Z1 Dome Heater</td>
<td>180 W</td>
</tr>
<tr>
<td>CheCS Equipment</td>
<td>43 W</td>
</tr>
</tbody>
</table>

Total (actual decrease in power draw 3052 Watts may be less than max values indicated here due to duty cycling)
### POWERDOWN  

**NOTE**  
Depending on the load configuration, power usage may not decrease after every step.

1. **RS LOAD POWERDOWN**  
ARCU deactivation is requested by MCC-H and performed after MCC-M concurrence.

2. **INHIBITING NODE 1 B HTRS (1 to 6)**  

Node 1: TCS  
‘Node 1’

 sel Htr Availability

<table>
<thead>
<tr>
<th>Node1Htr16avail</th>
</tr>
</thead>
</table>

‘Htr [X]B’ where [X] = 1 2 3 4 5 6

‘Availability’

**cmd** Inhibit

√Availability – Inh

Repeat

3. **INHIBITING NODE 1 B HTRS (7 to 9)**  

Node 1: TCS  
‘Node 1’

 sel Htr Availability

<table>
<thead>
<tr>
<th>Node1Htr16avail</th>
</tr>
</thead>
</table>

 sel Node1 Htr 7 – 9 availability

<table>
<thead>
<tr>
<th>Node1Htr79avail</th>
</tr>
</thead>
</table>

‘Htr [X]B’ where [X] = 7 8 9

‘Availability’

**cmd** Inhibit

√Availability – Inh

Repeat

### POWERUP

As required

**cmd** Ena Operate

√Availability – Ena Opr

**cmd** Ena Operate

√Availability – Ena Opr
### POWERDOWN

<table>
<thead>
<tr>
<th>PCS</th>
<th></th>
<th>POWERUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. <strong>INHIBITING PMA1 B SHELL HTRS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Node 1: TCS</td>
<td>‘PMA1’</td>
<td></td>
</tr>
<tr>
<td>sel Htr Availability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMA1 Htr Availability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Htr [X]B’ where [X] = 1 2 3 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Availability’</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cmd</strong> Inhibit</td>
<td></td>
<td><strong>cmd</strong> Ena Operate</td>
</tr>
<tr>
<td>√Availability – Inh</td>
<td></td>
<td>√Availability – Ena Opr</td>
</tr>
<tr>
<td>Repeat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 5. **DISABLING Z1 RAIL HEATERS** |          |         |
| Z1: EPS: Pwr Bus Z13B Rail Heaters |          |         |
| Pwr Bus Z13B Rail Htrs |          |         |
| **cmd** Htr B – Inhibit (√Availability – Inh) |          |         |

| 6. **INHIBITING LAB SHELL HTRS** |          |         |
| PCS |          |         |
| LAB: TCS: IATCS Details: LAB Shell Heater Control |          |         |
| LAB Shell Heater Control |          |         |
| sel LAB Shell Htr X where X = 1 2 3 |          |         |
| LAB Shell Htr X |          |         |
| ‘Heater X Cmd Status’ |          |         |
| **cmd** Override Off – Arm (√ - √) |          | **cmd** Override On – Ovrd On |
| **cmd** Override Off – Ovrd Off |          | √Heater X Cmd Status – Ovrd On |
| √Heater X Cmd Status – Ovrd Off |          |         |
| Verify RPC Posn – Op |          |         |
| Repeat |          |         |
### POWERDOWN

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| 7.     | **DISABLING Z1 DDCU HEATERS** | Z1: EPS: RPCM Z13B B  
RPCM Z13B B  

sel RPC X  

where [X] = 6 11  

**cmd** RPC Position – Open (Verify – Op)  
Repeat |
| 8.     | **POWERDOWN ECLSS EQUIPMENT** | LAB: ECLSS: AR Rack  
LAB AR Rack Overview  
‘TCCS’  
‘Shutdown’  

**cmd** Shutdown Arm (√ – Armed)  
**cmd** Shutdown – Shutdown  

When TCCS Status – Shutdown Complete  

sel RPCM LAD62B A RPC 05  

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

‘Rack Location: LAB1D6 – (Entire Rack)’  
√RPC Position – Closed  
To activate TCCS, perform \{1.301 ATMOSPHERE REVITALIZATION RACK ACTIVATION\}, step 8 (SODF: ECLSS: ACTIVATION AND CHECKOUT: ARS) |
| 9.     | **POWERDOWN Z1 DOME HEATERS** | Node1: EPS: RPCM N13B B  
RPCM N13B B  

sel RPC 11  

**cmd** RPC Position – Open (Verify – Op) |
| 10.    | **POWERDOWN CHECS EQUIPMENT** | Go directly to the CHECS Rack and turn  
Defibrillator S1 switch to OFF.  

Go directly to the CHECS TEPC plugged into the UOPs and turn the ON switch to OFF.  

Go directly to the CHECS IVCPDS plugged into the UOPs and turn the ON switch to OFF.  

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

### POWERUP
1. Use the POWERUP column in reverse order to back out of the powerdown.

2. 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>Russian Load Powerdown</td>
<td>Check MCC-H</td>
</tr>
<tr>
<td>Power Bus Z14B Rail Heater B</td>
<td>56 W</td>
</tr>
<tr>
<td>PMA2 Shell Heaters String A</td>
<td>304 W</td>
</tr>
<tr>
<td>PMA2 Shell Heaters String B</td>
<td>302 W</td>
</tr>
<tr>
<td>LAB Shell Heaters 4 to 6</td>
<td>685 W</td>
</tr>
<tr>
<td>Airlock Shell Heaters</td>
<td>1232 W</td>
</tr>
<tr>
<td>Z1 DDCU Heaters</td>
<td>200 W</td>
</tr>
<tr>
<td>Z1 Dome Heater</td>
<td>180 W</td>
</tr>
<tr>
<td>LAB Window Heater</td>
<td>53 W</td>
</tr>
<tr>
<td>Node 1 Lights (3 lights)</td>
<td>84 W</td>
</tr>
<tr>
<td>LAB Lights (5 lights)</td>
<td>140 W</td>
</tr>
</tbody>
</table>

Total (actual decrease in power draw 3239 Watts may be less than max values indicated here due to duty cycling)
### POWERDOWN

**NOTE**

Depending on the load configuration, power usage may not decrease after every step.

1. **RS LOAD POWERDOWN**
   - ARCU deactivation is requested by MCC-H and performed after MCC-M concurrence.

2. **DISABLING Z1 RAIL HEATERS**
   - **Z1 EPS**
   - sel Pwr Bus Z14B Rail Heaters
   - Pwr Bus Z14B Rail Htrs
   - **cmd** Htr B – Inhibit (√Availability – Inh)

3. **INHIBITING PMA2 A AND B SHELL HTRS**
   - **PCS**
   - **PMA2: TCS: PMA2 Heater Control**
   - **cmd** PMA2 Htr CLC Inhibit – Arm (√ – X)
   - **cmd** PMA2 Htr CLC Inhibit – Inh
   - Verify PMA2 Htr CLC - Inh
   - **LAB: EPS: DDCU LA1B Distribution:**
   - RPCM LA1B C
   - **RPCM LA1B C**
   - sel RPC X where [X] = 5 6 7 8 9 10 11 12 13 14
   - Verify RPC Position – Op

### POWERUP

- As required
  - **cmd** Htr B – Ena Operate (√Availability – Ena Opr)

- **PMA2 Heater Control**
  - ‘CLC’
  - **cmd** CLC – Ena Verify CLC – Ena

  If no shuttle present,
  - sel PMA2 Htr X where [X] = 4 5

- **PMA2 Htr X**
  - For both heaters,
  - **cmd** Override Off – Arm (√ - √)
  - **cmd** Override Off – Ovrd Off

- √PMA2 HtrXA
  - Cmd Status – Ovrd Off

- √PMA2 HtrXB
  - Cmd Status – Ovrd Off

- Repeat
### POWERDOWN

<table>
<thead>
<tr>
<th>PCS</th>
<th>LAB: TCS: IATCS Details: LAB Shell Heater Control</th>
</tr>
</thead>
</table>

#### 4. INHIBITING LAB SHELL HTRS

**LAB Shell Heater Control**

- `sel LAB Shell HtrX where X = [4 5 6]`

  - **LAB Shell Htr X**
    - ‘Heater X Cmd Status’

    - **cmd** Override Off – Arm (√ – √)
    - **cmd** Override Off – Ovrd Off

    - √Heater X Cmd Status – Ovrd Off

    - Verify RPC Posn – Op

  Repeat

#### 5. DEACTIVATING SHELL HEATER CONTROL

**Airlock: TCS : AL SHELL HEATER CONTROL**

- **AL Shell Heater Control**
  - ‘AL Shell Heater’
  - ‘Software’

  - **cmd** Shutdown – Arm (√ – √)
  - **cmd** Shutdown – Shutdown

- `sel AL Shell Htr X where X = [1 2 3 4 5]`

  - **AL Shell Htr X**
    - √Cmd Status – Ovrd Off
    - Verify RPC Posn – Op

  Repeat

### POWERUP

- (For Hrs 4 to 6)
  - **cmd** Override On – Ovrd On
    - √Heater X Cmd Status – Ovrd Off

- ‘AL Shell Heater’
  - ‘Software’

  - **cmd** Startup – Startup
    - √Software – Started
    - √CLC – Ena

---

08 OCT 03  9  12616.doc
<table>
<thead>
<tr>
<th>POWERDOWN</th>
<th>POWERUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>sel RPC X  where [X] = 11, 16</td>
<td><strong>cmd</strong> RPC Position – Close (Verify – Cl)</td>
</tr>
<tr>
<td>Repeat</td>
<td><strong>cmd</strong> RPC Position – Close (Verify – Cl)</td>
</tr>
<tr>
<td><strong>7. POWERDOWN Z1 DOME HEATERS</strong>&lt;br&gt; Node1: EPS: RPCM N14B B&lt;br&gt; RPCM N14B B</td>
<td><strong>cmd</strong> RPC Position – Open (Verify – Op)</td>
</tr>
<tr>
<td>sel RPC 3</td>
<td><strong>cmd</strong> RPC Position – Close (Verify – Cl)</td>
</tr>
<tr>
<td><strong>8. DEACTIVATING LAB WINDOW HEATER</strong>&lt;br&gt; PCS&lt;br&gt; Lab: TCS: IATCS Details: LAB Window Heater Commands&lt;br&gt; LAB Window Heater Commands&lt;br&gt; ‘LAB Window Heater’</td>
<td><strong>cmd</strong> CLC – Inh (√ – Inh)</td>
</tr>
<tr>
<td><strong>cmd</strong> CLC – Ena (√ – Ena)</td>
<td><strong>cmd</strong> CLC – Ena (√ – Ena)</td>
</tr>
<tr>
<td>Verify Heater Status – Ovrd Off</td>
<td>Verify Heater Status – Ovrd Off</td>
</tr>
<tr>
<td><strong>9. POWERDOWN NODE LIGHTS</strong></td>
<td>As required</td>
</tr>
<tr>
<td><strong>NOTE</strong>&lt;br&gt; Lights should be turned off via the crew. If lights are commanded off at the RPC level, the crew will not have insight should an unknown EPS bus failure occur.</td>
<td>As required</td>
</tr>
<tr>
<td>Have crew turn off three of the Node 1 lights on channel 4B via the GLA switch.</td>
<td></td>
</tr>
<tr>
<td><strong>10. POWERDOWN LAB LIGHTS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>NOTE</strong>&lt;br&gt; Lights should be turned off via the crew. If lights are commanded off at the RPC level, the crew will not have insight should an unknown EPS bus failure occur.</td>
<td>As required</td>
</tr>
<tr>
<td>Have crew turn off five of the LAB lights on channel 4B via the GLA switch.</td>
<td></td>
</tr>
</tbody>
</table>
Ext A/L 1. 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

A6L 3. √SYS PWR SYS 1,SYS 2 (two) – ON
   √cb DOCK LT (four) – cl

4. LT TRUSS FWD,AFT (two) – ON

5. LT VEST PORT,STBD (two) – ON

MO13Q 6. AIRLK FAN A(B) – OFF

EXT A/L 7. Disconnect airlock flex duct from booster fan muffler, rotate into middeck,
   and secure.

MO13Q 8. AIRLK FAN A(B) – ON

9. AIRLK 2 – OFF/ON

10. TNL ADAPT 1 – OFF/ON

11. √Airflow at muffler

Middeck 12. Close Inner Hatch per decal.

13. Equal vlv (two) – OFF, install caps

MO10W 14. 14.7 CAB REG INLET SYS 1, SYS 2 (two) – CL
This Page Intentionally Blank
OBJECTIVE:
Perform procedure about 1 to 2 hours before the arrival of the orbiter. Configure the CCS Attitude Control System (ACS) Moding software and ensure the correct control parameters are loaded onboard.

1. **GNC COMMAND RESPONSE COUNTERS RESET**

PCS

MCG: GNC Command Response Counters

GNC Command Response Counters

sel Reset

Verify the Since Reset column values are all blank.

Do not close this window until the procedure is complete.

If while executing a command, the Command Accept counter on that display does not increment

Reselect GNC Command Response Counters to determine if a command was rejected.

MCC-H
2. **VERIFYING FLIGHT SPECIFIC PAD**

MCC-H

If the following information is not recorded elsewhere, record it here.

<table>
<thead>
<tr>
<th>Required for Pre-Arrival</th>
<th>ADO</th>
<th>Pri</th>
<th>B/U</th>
<th>Ver ID</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MASS PROPERTIES</td>
<td>PS21</td>
<td></td>
<td></td>
<td></td>
<td>Post Docking Mass Properties</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 CCDB SLOT 1</td>
<td>CA11</td>
<td></td>
<td></td>
<td></td>
<td>Failed Docking Attitude:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 CCDB SLOT 2</td>
<td>CA12</td>
<td></td>
<td></td>
<td></td>
<td>Post Docking Attitude:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Desat Target Momentum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Components</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Version ID for CCS PPL</td>
<td></td>
<td></td>
<td></td>
<td>4003</td>
<td>Must be built as File Uplink and uplinked to the Backup and Standby C&amp;C.</td>
</tr>
<tr>
<td>180 (ACS FDIR Adaptation Data) with RS_ACS_Safing_Status set to &quot;0&quot; (off) to be loaded to the Backup and Standby C&amp;C MDM.</td>
<td></td>
<td></td>
<td></td>
<td>4002</td>
<td>If GNC RM with checkpointing is to be inhibited for docking, uplink PPL to all C&amp;C MDMs. Must be built as File Uplink.</td>
</tr>
</tbody>
</table>

3. **VERIFYING INITIAL CONDITIONS**

PCS

MCG

MCG Summary

'MCG Status'
Verify US Station Mode – Prox Ops
Verify RS Station Mode – Prox Ops
Verify US GNC Mode – CMG TA
Verify RS SUDN Mode – CMG TA

‘Primary GNC MDM’

Verify Frame Count – incrementing

‘Backup GNC MDM’

Verify Frame Count – incrementing

4. **LOADING REQUIRED PPLs TO THE PRIMARY GNC MDM**
   
   **MCC-H**
   
   For all PPLs designated in step 2 to be loaded to the Primary GNC MDM, coordinate with ODIN.

5. **LOADING REQUIRED PPLs TO THE BACKUP GNC MDM**
   
   For all PPLs designated in step 2 to be loaded to the Backup GNC MDM, coordinate with ODIN.

6. **LOADING REQUIRED PPLs TO THE C&C MDM**
   
   For all PPLs designated in step 2 to be loaded to the C&C MDMs, coordinate with ODIN.

7. **CONFIGURING RUSSIAN SEGMENT FOR DOCKING**

   **NOTE**
   
   These commands can be sent by RS any time prior to orbiter docking.

   **MCC-M**
   
   УВЦ F8_10 (inf0=9, inf1=1) Inhibit the RS takeover due to Tier 1 Loss of Comm
   
   УВЦ F1_44 Update the unmated Mass Properties into the TBM buffer for Joint Expedited Undocking and Separation (JEUS)

   **MCC-M** will uplink the cyclogram contents to channel 34 for JEUS.

   **MCC-M ⇒ MCC-H**, “Step 7 complete.”
8. **UPDATING CCDB COMMANDED ATTITUDE**

MCG: MCS Configuration

MCS Configuration

‘CCDB Slots’

For CCDB Slots 1 and 2

sel Cmd Att [X]

![Cmd Att [X]]

If slot [X] Yaw, Pitch, Roll does not match Yaw, Pitch, Roll in step 2

If in step 2, CCDB Slot [X] Yaw, Pitch, Roll is (0,0,0)

   **cmd** YPR 0,0,0

If in step 2, CCDB Slot [X] Yaw, Pitch, Roll is not (0,0,0)

   Input Yaw – (from step 2)
   Pitch – (from step 2)
   Roll – (from step 2)

   **cmd** Set

Verify Slot [X] Yaw – (as commanded)
Pitch – (as commanded)
Roll – (as commanded)

9. **SETTING MOMENTUM SERVO REFERENCE FRAME AND GNC INHIBITS**

MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock

Pre Node 2 PMA 2 Dock

‘System Configuration’

If Cmd’d Drift Ref Frame – LVLH(Body)

   **cmd** Inertial

   Verify Cmd’d Drift Ref Frame – Inertial

If Attitude Maneuver – Inh

   **cmd** Enable (Verify – Ena)

If Att Cntl Shutdown – Inh

   **cmd** Enable (Verify – Ena)

If Mode Transition – Inh

   **cmd** Enable (Verify – Ena)

If Desat Request – Inh

   **cmd** Enable (Verify – Ena)
10. **VERIFYING STATUS OF ACS MODING SIGNALS**

PCS

Pre Node 2 PMA 2 Dock

‘Final Approach’

- Verify Manual Dock Sequence Init – Not Init
- Verify LA-1/LA-2 Capture – No/No
- Verify Arrival Flag – No
- Verify Docked Indication – NOT Docked

11. **INHIBITING GNC CHECKPOINTING**

If GNC Checkpointing is to be inhibited for docking, perform \(2.702\) **DISABLE GNC CHECKPOINTING**, all (SODF: MCS: NOMINAL: CHECKPOINTING), then:

12. **ENABLING ARRIVAL SOFTWARE**

Pre Node 2 PMA 2 Dock

‘Pre Arrival’

Sel PMA 2 Manual Arrival SW

Manual Arrival SW

‘PMA 2’

Cmd Manual Arrival SW Enable

Verify PMA 2 Docking Vehicle – Shuttle
Verify PMA 2 Manual Arrival SW – Ena

Pre Node 2 PMA 2 Dock

‘Pre Arrival’

Sel PMA 2 Automatic Arrival SW

Automatic Arrival SW

‘PMA 2’

Cmd Enable

Verify PMA 2 Docking Vehicle – Shuttle
Verify PMA 2 Automatic Arrival SW – Ena

13. **ENABLING APAS LEDS**

Pre Node 2 PMA 2 Dock

‘Pre-Arrival’

Sel LED Control SW

LED Control SW
14. **INHIBITING AUTO ATTITUDE CONTROL HANDOVER TO RS**

   *MCC-H*

   This step should be performed at Dock - 10 minutes (this should correspond to approximately 40 ft distance).

   **Pre Node 2 PMA 2 Dock**

   ‘Pre Arrival’

   If Auto Att Control Handover to RS – Ena

   **cmd** Arm

   **cmd** Inhibit

   Verify Auto Att Control Handover to RS – Inh

15. **PERFORMING MANUAL DESATURATION**

   At orbiter call, “Initiating Final Approach” or Dock - 5 minutes (this corresponds to 30 ft distance)

   **Pre Node 2 PMA 2 Dock**

   ‘Pre Arrival’

   Verify Thrstr Avail for CMG Desat – Yes
1.106 PMA2 PRE-ARRIVAL CONFIGURATION

If Desat Target Momentum Components in step 2 are 100 % and 0,0,0
When Desat In Progress – No

    cmd Desat CMGs 100 % 0,0,0

If Desat Target Momentum Components in step 2 are not 100 % and 0,0,0
When CMG Desat In Progress – No

MCC-H
If ground is performing this step

    cmd <Cmd Inv: USGNC_CA_CMD_Manual_CMG_Desat_Tmplt –
    (LAGU96IM0137K)> using values from step 2.

PCS
If crew is performing this step on PCS

    ['Pre Node 2 PMA 2 Dock'
    'Related Displays'
    'Manual CMG Desat'
    'Desaturation Commands'

        input Percent as recorded in step 2
        X: as recorded in step 2
        Y: as recorded in step 2
        Z: as recorded in step 2

    cmd Set

Pre Node 2 PMA 2 Dock
'Pre-Arrival'

NOTE
The desaturation will drive the On-line momentum toward
the target momentum. This should happen quickly and
may not be visible to the operator.

Monitor for desat complete, as follows

    Verify CMG Desat In Progress – No
    Verify Desat Complete – 100 %

MCC-H ⇒ orbiter, ISS, “Manual desaturation complete.”
At Rendezvous 10 meters (30 ft): Blue/White FCR Flights will call “All Quiet”. All controllers will monitor Shuttle FD and A/G loops.

1. **CAPTURE PHASE**

<table>
<thead>
<tr>
<th>Controller</th>
<th>Expected Call</th>
<th>Loop</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNC</td>
<td>PCT ARMED</td>
<td>Shuttle FD</td>
<td>SSP GC – Start 65 second wall clock in WFCR and BFCR.</td>
</tr>
<tr>
<td>MMACS</td>
<td>CONTACT</td>
<td>Shuttle FD</td>
<td>ISS Crew – After 20 seconds, if software has not moded ISS to Free Drift, ISS crew will command to Free Drift.</td>
</tr>
<tr>
<td>Shuttle Crew</td>
<td>CAPTURE CONFIRMED</td>
<td>A/G</td>
<td>MMACS CAPTURE CONFIRMED Shuttle FD ADCO – Confirm Capture Long and Arrival Event on ISS FD.</td>
</tr>
<tr>
<td>MMACS</td>
<td>CAPTURE CONFIRMED</td>
<td>Shuttle FD</td>
<td>GNC SHUTTLE FREE DRIFT Shuttle FD</td>
</tr>
</tbody>
</table>

2. **ISS FREE DRIFT**

<table>
<thead>
<tr>
<th>Controller</th>
<th>Expected Call</th>
<th>Loop</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS Crew, or Orbiter Crew, or ADCO</td>
<td>ISS IS FREE DRIFT</td>
<td>A/G</td>
<td>ADCO – Confirm Free Drift on ISS FD ADCO – Confirm Free Drift on ISS FD</td>
</tr>
<tr>
<td>ISS FD</td>
<td>STATION FLIGHT CONFIRMS FREE DRIFT</td>
<td>Shuttle FD</td>
<td>ISS FD CAPCOM – table 4 block 1</td>
</tr>
</tbody>
</table>

3. **ISS ACTIVE CONTROL - NO CHANGE AT CONTACT + 55 seconds**

<table>
<thead>
<tr>
<th>Controller</th>
<th>Expected Call</th>
<th>Loop</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADCO</td>
<td>ADCO CONFIRMS ACTIVE CONTROL</td>
<td>ISS FD</td>
<td>ISS FD STATION FLIGHT CONFIRMS ACTIVE CONTROL Shuttle FD CAPCOM – Table 4, block 2</td>
</tr>
</tbody>
</table>

4. **FINAL CALLS TO SHUTTLE CREW - NLT CONTACT + 65 seconds**

<table>
<thead>
<tr>
<th>Controller</th>
<th>Expected Call</th>
<th>Loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ISS FD</td>
<td>STATION FLIGHT CONFIRMS FREE DRIFT</td>
<td>Shuttle FD</td>
</tr>
<tr>
<td>2 CAPCOM</td>
<td>STATION FREE DRIFT CONFIRMED</td>
<td>A/G</td>
</tr>
<tr>
<td>1 ISS FD</td>
<td>STATION FLIGHT CONFIRMS ACTIVE CONTROL</td>
<td>Shuttle FD</td>
</tr>
<tr>
<td>2 CAPCOM</td>
<td>STATION IN ACTIVE CONTROL, PERFORM FAILED CAPTURE TO UNDOCK</td>
<td>A/G</td>
</tr>
</tbody>
</table>
**OBJECTIVE:**
Monitor orbiter arrival and mode ISS to Free Drift. ISS MCS is configured to allow for automatic moding to Free Drift, and then orbiter arrival is monitored. Crew will command ISS to Free Drift manually only if automatic software does not complete mode transition within 20 seconds of Capture confirmed.

**NOTE**
1. Perform step 1 after orbiter has begun approach (dock -15 minutes).
2. Start step 2 when orbiter starts final approach (from 30 feet). US GNC must mode to Drift within 65 seconds of orbiter call of Capture Confirmed or orbiter will perform corridor backout. ISS Crew commands Manual Dock Sequence to mode to drift after 20 seconds ONLY if automatic software is not successful.

1. **VERIFYING INITIAL CONFIGURATION**

PCS

<table>
<thead>
<tr>
<th>Pre Node 2 PMA 2 Dock</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Configuration</strong></td>
</tr>
</tbody>
</table>

- Verify US Station Mode – Prox Ops
- Verify RS Station Mode – Prox Ops
- Verify US GNC Mode – CMG TA
- Verify RS SUDN Mode – CMG TA
- Verify Attitude Maneuver – Ena
- Verify Att Cntl Shutdown – Ena
- Verify Mode Transition – Ena
- Verify Desat Request – Ena
- Verify US Drift Available – Yes

- **Pre Arrival**

- Verify PMA 2 Manual Arrival SW – Ena
- Verify PMA 2 Automatic Arrival SW – Ena

- **Final Approach**

- Verify LA-1/LA-2 Capture – No/No
- Verify Arrival Flag – No
- Verify Docked Indication – NOT Docked

2. **FINAL APPROACH AND CAPTURE**

Orbiter ⇒ ISS, “Initiating final approach.”

Pre Node 2 PMA 2 Dock

‘Final Approach’
Orbiter ⇒ ISS, “Capture Confirmed.”

Wait up to 20 seconds for the following indication.

Verify US GNC Mode – Drift

**********************************************************

* When time since capture confirmed > 20 seconds
* If US GNC Mode – CMG TA
* ‘Final Approach’
* √Manual SW Enable (Verify – Ena)
* cmd Manual Dock Sequence Init (Verify – Init)
* Verify US GNC Mode – Drift
* ISS ⇒ orbiter, “ISS is Free Drift.”
* ‘Pre Arrival’
* sel PMA2 Manual Arrival SW
* Manual Arrival SW
* ‘PMA 2’
* cmd Manual Arrival SW Inhibit
* Verify PMA 2 Docking Vehicle – None
* Verify PMA 2 Manual Arrival SW – Inhibit
* Pre Node 2 PMA 2 Dock
* ‘Final Approach’
* Verify Manual Dock Sequence Init – Not Init

**********************************************************

ISS ⇒ orbiter, “ISS is Free Drift.”
If at any time orbiter calls Failed Dock and proceeds to separation

√ MCC (if LOS, proceed)

Pre Node 2 PMA 2 Dock

‘System Configuration’

√ Attitude Maneuver  — Ena
√ Mode Transition  — Ena
√ Desat Request  — Ena

Verify US GNC Mode – Drift

‘Final Approach’

If Manual Dock Sequence Init – Init

‘Pre Arrival’

sel PMA2 Manual Arrival SW

Manual Arrival SW

‘PMA 2’

cmd Manual Arrival SW Inhibit

Verify PMA 2 Docking Vehicle – None
Verify PMA 2 Manual Arrival SW – Inhibit

Pre Node 2 PMA 2 Dock

‘Final Approach’

Verify Manual Dock Sequence Init – Not Init

Pre Node 2 PMA 2 Dock

‘Final Approach’

If LA1/LA2 Capture – Yes/Yes

‘Pre Arrival’

sel PMA 2 Automatic Arrival SW

Automatic Arrival SW

‘PMA 2’

cmd Arm

cmd Inhibit

Verify State – Disarm
Verify PMA 2 Docking Vehicle – None
Verify PMA 2 Automatic Arrival SW – Inhibit
1.108 PMA2 ARRIVAL
(JNT OPS/LF1 - ALL/FIN 5/MULTI/HC) Page 4 of 4 pages

* | Pre Node 2 PMA 2 Dock
  | ‘Failed Capture’
  | If Abort in Progress – Yes
  |   cmd Clear Desat Abort
  |   Verify Abort in Progress – No
  | If Thrstr Avail for CMG Desat – No
  |   cmd RS Prep Thrusters for CMG Desat
  |   Verify Thrstr Avail for CMG Desat – Yes
  | cmd CMG TA Slot 1
  | Verify Active CCDB Source Slot – 1
  | cmd Hold Current Attitude
  | ‘System Configuration’
  | Verify US GNC Mode – CMG TA
  | Verify RS SUDN Mode – CMG TA
  | ISS ⇒ orbiter, “ISS in Attitude Control.”

* If Failed Dock star block was performed, MCC-M will incorporate
  * unmated Mass Properties.

MCC-M
* YBT F1_42 (Incorporate unmated Mass Properties)

3. MODING TO FREE DRIFT - HOUSTON GROUND STEP

MCC-H
If time since Capture Confirmed > 30 seconds and US GNC Mode is
not Drift
  MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock
  | Pre Node 2 PMA 2 Dock
  | ‘Final Approach’

\ Manual SW Enable (Verify – Ena)

| cmd Manual Dock Sequence Init (Verify – Init)
  | Verify US GNC Mode – Drift
  | MCC-H ⇒ orbiter, ISS, “ISS is Free Drift.”
OBJECTIVE:
Operational sequence used to disable Arrival software.

NOTE
This procedure should be complete prior to US GNC attitude control and prior to SM attitude control if SM is using US mass properties.

1. GNC COMMAND RESPONSE COUNTERS RESET

PCS

MCC-H

Verify the Since Reset column values are all blank.

Do not close this window until the procedure is complete.

If while executing a command, the Command Accept counter on that display does not increment
Reselect GNC Command Response Counters to determine if a command was rejected.

√MCC-H

2. VERIFYING FLIGHT SPECIFIC PAD

MCC-H

If the following information is not recorded elsewhere, record it here.

Table 1.- Post Arrival Requirements

<table>
<thead>
<tr>
<th>Required for Post Arrival</th>
<th>ADO</th>
<th>Pri</th>
<th>B/U</th>
<th>Ver ID</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version ID for CCS PPL 181 - CCS RM PPL For GNC RM with or without Checkpointing to be loaded to all C&amp;C MDMs.</td>
<td></td>
<td></td>
<td></td>
<td>4003</td>
<td>If GNC RM with Checkpointing was inhibited for docking and is now enabled, uplink PPL to all C&amp;C MDMs. Must be built as File Uplink.</td>
</tr>
</tbody>
</table>

3. VERIFYING CORRECT CONFIGURATION

PCS

MCC-H

Verify US Station Mode – Prox Ops
Verify RS Station Mode – Prox Ops
Verify US GNC Mode – Drift
Verify RS SUDN Mode – Indicator
4. **LOADING REQUIRED PPLs TO THE C&C MDMs**
   For all PPLs designated in step 2 to be loaded to C&C MDMs, to load PPL to C&C MDMs, coordinate with ODIN.

5. **ENABLING GNC CHECKPOINTING**
   If GNC Checkpointing is to be enabled after docking, perform {2.701 ENABLE GNC CHECKPOINTING}, all (SODF: MCS: NOMINAL: CHECKPOINTING), then:

6. **DISABLING ARRIVAL SOFTWARE**

   **NOTE**
   If the Manual Dock Sequence Init command was sent, the software automatically inhibits the manual software. However, to configure the Man Dock Seq Init telemetry to Not Init, the Manual Software must be commanded Inh even though its telemetry already reads Inh. After docking, if ISS attitude control is resumed while the telemetry reads Init, the ACS Moding software will automatically mode the ISS to Free Drift.

   Pre Node 2 PMA 2 Dock
   'Final Approach'

   If Manual SW Enable – Ena, or Manual Dock Sequence Init – Init
   Pre Node 2 PMA 2 Dock
   'Pre Arrival'

   sel PMA 2 Manual Arrival SW

   Manual Arrival SW
   'PMA 2'

   **cmd** Manual Arrival SW Inhibit
   Verify PMA 2 docking Vehicle – None
   Verify PMA 2 Manual Arrival SW – Inh

   Pre Node 2 PMA 2 Dock
   'Final Approach'

   Verify Manual Dock Sequence Init – Not Init

   Pre Node 2 PMA 2 Dock
   'Pre Arrival'

   sel PMA 2 Automatic Arrival SW

   Automatic Arrival SW
   'PMA 2'
7. **DISABLING LED CONTROL SOFTWARE**

   Pre Node 2 PMA 2 Dock
   ‘Pre Arrival’

   sel LED Control SW
   LED Control SW
   cmd Inhibit

   Verify LED Control SW – Inh
   Verify LED State – Off

8. **VERIFYING APAS INDICATION OF HARD DOCK**

   **NOTE**
   Perform this step after Hard Dock complete, which may take up to 17 minutes.

   Pre Node 2 PMA 2 Dock
   ‘Final Approach’

   Verify LA-1/LA-2 Capture – No/No

   If Docked Indication – NOT Docked
   cmd Docked
   Verify Docked Indication – Docked

9. **CONFIGURING US GNC MDM**

   Pre Node 2 PMA 2 Dock
   ‘System Configuration’

   cmd Attitude Maneuver – Inhibit (Verify – Inh)
   cmd Att Cntl Shutdown – Inhibit (Verify – Inh)
   cmd Mode Transition – Inhibit (Verify – Inh)
   cmd Desat Request – Inhibit (Verify – Inh)
   cmd Mass

   Verify Active Mass Properties PPL Version ID as expected per PMA2 Pre-Arrival Configuration.
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2.101 POST DOCKING HATCH LEAK CHECK

NOTE
ISS will concurrently perform a leak check of the PMA2 volume.

1. Notify MCC and ISS, “Beginning initial Hatch leak checks.”

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

SM 177 EXTERNAL AIRLOCK

   Record EXT A/L PRESS: _____ psia.

4. 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).
   ******************************************************************************

OBJECTIVE:
Utilize Internal Sampling Adapter (ISA), Vacuum Access Jumper (VAJ), Scopemeter, Scopemeter Pressure Probe to verify integrity of pressure in PMA2, post shuttle docking.

LOCATION:
LAB Forward Hatch

DURATION:
30 minutes

CREW:
One

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

TOOLS:
Internal Sampling Adapter (ISA)  P/N 97M55830-1
VAJ-78-1  P/N 683-17111-1
Scopemeter and Accessories Kit:  P/N SJG33115340-301
  Scopemeter  P/N SEG39129678-303
Scopemeter Pressure Probe Kit:  P/N SEG39130251-301
  Scopemeter Pressure Probe  P/N SEG39130244-301
ISS IVA Toolbox:
  Drawer 3
    #0 Phillips Screwdriver (if Battery changeout required)
NOTE
This procedure is performed in parallel with shuttle
{2.101 POST DOCKING HATCH LEAK CHECK}
(SODF: JNT OPS: INGRESS STATION).

1. SETTING UP SCOPEMETER AND VAJ

1.1 Cap ←|→ VAJ-78-1 (both ends)
Inspect seals for any visible damage.

✓ MCC-H if any damage noted to seals

Refer to Figure 1.

Figure 1.- Scopemeter Pressure Probe Connected to Scopemeter.

LAB Fwd Hatch

1.2 VAJ-78-1 (bent end) →|← MPEV, hand tighten.

NOTE
ISA consists of two ISA VAJ Ports. VAJ-78-1 may be connected to either ISA VAJ Port. To ensure proper leak check, remaining ISA VAJ Port must be capped.

1.3 Cap ←|→ ISA-VAJ Port
VAJ-78-1 (straight end) →|← ISA VAJ Port, hand tighten

1.4 √ Cap →|← ISA VAJ Port (remaining), hand tighten
1.5 √ISA Sample Port Valve – CLOSED
   √ISA Sample Port Capped
   Refer to Figure 2.

![Figure 2.- ISA Sample Port Valve.](image)

1.6 √Scopemeter Pressure Probe →|← ISA

   **NOTE**
   Plug marked "COM" must be inserted in COM jack on Scopemeter; plug marked “V” must be inserted in EXT mV jack. Scopemeter Pressure Probe slide switch will be facing away from user.

1.7 Scopemeter Pressure Probe COM plug →|← COM jack (black) on top of Scopemeter.
   V plug of Scopemeter Pressure Probe →|← EXT mV jack of Scopemeter.
   Refer to Figure 1.

1.8 √Scopemeter Pressure Probe – OFF (using slide switch)

1.9 While holding down [F5], press and release ON/OFF. Listen for two beeps, release [F5].

1.10 Setup Scopemeter for pressure measurement.
   Press [F5] (to select EXT.mV).
   Press [F1] (to select CLOSE).

1.11 Verify voltage reading > 80mV DC (good Scopemeter Pressure Probe Battery indication).
   If voltage reading < 80 mV DC, Scopemeter Pressure Probe Battery must be replaced.
   9V Battery replaced by removing non-captive screw on back of probe (#0 Phillips Screwdriver).
1.12 Select mmHg on Scopemeter Current Probe using slide switch.

2. **PMA2 LEAK CHECK**
   2.1 MPEV → OPEN

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scopemeter Pressure Probe displays 1 mV of output per pressure unit. Ex. 0.760 V = 760 mV = 760 mmHgA</td>
</tr>
</tbody>
</table>

   2.2 Record Scopemeter Pressure Probe P: ________ mmHg
       Record GMT ____/____:____:____ GMT

       Report values to MCC-H.

   2.3 Wait 5 minutes.

   2.4 Record Scopemeter Pressure Probe P: ________ mmHg
       Record GMT ____/____:____:____ GMT

       Report values to MCC-H.

   2.5 MPEV → CLOSED

       *************************************************************************************
       * If ∆P > 5 mmHg during monitoring period
       * Notify MCC-H.
       * ISS report to shuttle, “Abnormal leakage is being observed from the PMA.”
       *************************************************************************************

3. **DISASSEMBLE AND STOWING EQUIPMENT**
   3.1 Press ON/OFF (to power down Scopemeter).

   3.2 Scopemeter Pressure Probe – OFF (using slide switch)

   3.3 Scopemeter ←|→ Scopemeter Pressure Probe on ISA

   3.4 VAJ-78-1 (bent end) ←|→ MPEV
       VAJ-78-1 (straight end) ←|→ ISA VAJ Port
       Cap →|← VAJ-78-1 (both ends)
       Cap →|← ISA-VAJ Port

   3.5 ISA Sample Port Valve → OPEN (for stowage).

   3.6 Stow hardware
       Check FOD within a 3’ radius of worksite.

       Inform MCC-H of task completion.
4. **INGRESSING PMA**
   4.1 Remove Hatch Stowage Area Closeout.
      Temporarily stow.

   4.2 **On MCC-H GO**, open LAB Fwd Hatch per decal.
2.103 ODS VOLUME PREPARATION FOR INGRESS
(JNT OPS/7A - ALL/FIN 5) Page 1 of 1 page

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. √Hatch ΔP < 0.2 psid

6. Open Hatch per dekal.

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/
Ext A/L
11. Rotate airlock flex duct into tunnel extension and connect to booster fan muffler inlet.

MO13Q
12. AIRLK FAN A(B) – ON

AW18A
13. As required, LTG FLOOD 1(3,4) – ON

14. √Airflow at top of external airlock halo

EXT A/L
15. Unstrap centerline camera diffuser flex duct from camera bracket. Stow duct along Stbd top of EXT A/L wall (in straps).

R12
16. √Green Jumper – PRI C/L

√PRI C/L Cap installed

√VPU PWR – ON

A7
VID OUT pb – MON 1

√IN pb – PL2

IRIS – CLOSE

L12
C/L CAM PWR – OFF

( SSP2) Remove, stow Centerline Camera and bridge.
2.104 HATCH OPENING AND SHUTTLE/ISS DUCT INSTALLATION
(JNT OPS/X2R4 - ALL/FIN 9)  Page 1 of 9 pages

OBJECTIVE:
This procedure is used to equalize pressures between ISS and shuttle post docking, as well as setting up proper IMV flow between the two vehicles.

SHUTTLE TOOLS AND EQUIPMENT REQUIRED
Towel

ISS TOOLS AND EQUIPMENT REQUIRED
Rubber Gloves
Deerskin Gloves

(NOD1 D4_G2)
10" Adjustable Wrench

(PMA)
Docking Mechanism Accessory Kit
   APAS Hatch Tool
   Cleaning Pads

APAS Hatch Cover
Docking Target Standoff Cross Bag
Docking Target Base Plate Cover
1-1/2" Open End Wrench

ISS IVA Tool Kit
Drawer 2:
   Ratchet, 1/4" Drive
   7/16" Deep Socket, 1/4" Drive
   1/2" Deep Socket, 1/4" Drive
Drawer 3:
   4" Common Tip Screwdriver

WARNING
PMA is unventilated at this time. Limit amount of time spent in PMA to minimum required to complete ingress tasks.

NOTE
This procedure is performed after shuttle crew performs (2.101 POST DOCKING HATCH LEAK CHECK) (SODF: JNT OPS: INGRESS STATION) and ISS crew performs (2.102 POST DOCKING HATCH LEAK CHECK - ISS) (SODF: JNT OPS: INGRESS STATION). Both procedures should be completed successfully prior to beginning this procedure.
1. **INHIBITING ISS RAPID DEPRESS SOFTWARE RESPONSE**

1.1 Inhibiting Internal Systems MDM Response

PCS

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

‘INT MDM Rapid Depress Response’

‘Inhibit’

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√Status – Inhibited)

‘Airlock Depress Response – INT MDM’

‘Inhibit’

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√Status – Inhibited)

1.2 Inhibiting C&C MDM Response

‘CC MDM Rapid Depress Response’

‘Inhibit’

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√Status – Inhibited)

1.3 Inhibiting CCS Low Pressure Safing Response

‘CCS MDM Low Cabin P Response’

‘Inhibit’

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√Status – Inhibited)

1.4 Inhibiting Lab & Airlock Rapid Depress C&W Messages

C&W Summ

[Caution & Warning Summary]

‘Event Code Tools’

**sel** Inhibit

[Inhibit an Event]

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

**cmd** Arm

**cmd** Execute

input Event Code – 6 5 7 6 (RAPID DEPRESS – A/L)

**cmd** Arm

**cmd** Execute

1.5 √**MCC** to verify Russian Segment Rapid Depress Response inhibited
2. **EQUALIZING WITH ODS VESTIBULE**

PMA

2.1 APAS EQUAL VLV → OP

US Lab: ECLSS

Lab: ECLSS

2.2 When dP/dT ~0 or On MCC GO, proceed.

2.3 APAS EQUAL VLV → CL

2.4 ISS report to shuttle: “ODS Vestibule pressurized. GO to begin leak check.”

3. **LEAK CHECKING ODS/PMA DOCKING SEAL**

3.1 Wait 10 minutes for thermal stabilization.

CRT

SM 177 EXTERNAL AIRLOCK

3.2 Record A/L-VEST ∆P: _____ psid.

Wait 15 minutes.

**************************************************************

* If A/L-VEST ∆P ≥ previously recorded + 0.16 psid,
  * notify MCC-H (Vestibule leak).

**************************************************************

4. Shuttle report to ISS: “ODS Vestibule leak check complete. GO for APAS Hatch opening.”

5. **OPENING APAS HATCH**

APAS EQUAL VLV → OP

Wipe any condensate from vestibule volume using towel.

Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on APAS Hatch Tool.
Insert tool in Hatch socket (ensure fully seated).
Rotate tool 3 to 4 turns in direction of ‘ОТКР’ (Open) arrow until it clicks.

**************************************************************

* If tool prematurely slips or does not engage
  * √MCC-H before proceeding.
  *]

**************************************************************

* Select ‘АВАРийНОЕ ПОЛОЖЕНИЕ’ (Emergency Position) setting on APAS Hatch Tool.
  * Reattempt to open Hatch.

**************************************************************
Remove tool.
Allow hatch seals to relax for 5 minutes.

**WARNING**
Surfaces may be below freezing for a short time after initial APAS Hatch opening. Don deerskin gloves prior to touching hatch external or vestibule surfaces.

**CAUTION**
APAS hatch seals require 5 minutes to relax before opening Hatch.

Open Hatch.
APAS EQUAL VLV → CL

6. **EQUALIZING WITH SHUTTLE**
6.1 ISS report to shuttle: “PMA Hatch is opened. GO for shuttle equalization with ISS.”

**ODS**
Hatch

6.2 Equal vlv (one) → NORM

7. **REMOVING DOCKING EQUIPMENT**

**CAUTION**
1. Docking Target Base Plate Cover should be put on the Docking Target Base Plate any time the Docking Target Standoff Cross Bag is not mounted in order to prevent scratches, surface damage.

2. Docking Target Standoff Cross should be put in its bag to protect the Docking Target Standoff Cross when not mounted to the Docking Target Base Plate. The surfaces of these items are very easily scratched.

3. When handling the Docking Target Standoff Cross or the Docking Target Base Plate, rubber gloves should be worn.

**PMA**
Hatch

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

7.2 Remove and insert Cross into Docking Target Standoff Cross Bag. Temporarily stow.
2.104 HATCH OPENING AND SHUTTLE/ISS DUCT INSTALLATION
(JNT OPS/X2R4 - ALL/FIN 9) Page 5 of 9 pages

7.3 Install Docking Target Base Plate Cover.
 Install APAS Hatch Cover.
 Secure Hatch in open position with PMA APAS Hatch Standoff.

7.4 Stow 10” Adjustable Wrench in NOD1D4_G2.
 Stow 1-1/2” Open End Wrench in PMA.

8. OPENING ODS HATCH

CRT SPEC 66 ENVIRONMENT

8.1 When Cabin dP/dT < ± 0.01, proceed.

CRT SPEC 177 EXTERNAL AIRLOCK

8.2 √A/L – VEST ΔP ≤ 0.5 psid

Open ODS Hatch per decal.
Equal vlv (one) → OFF, cap installed

9. REMOVING DOCKING EQUIPMENT

WARNING
Surfaces may be below freezing for a short time after initial ODS Hatch opening. Avoid direct contact with vestibule surfaces until SHUTTLE VESTIBULE TEMP 1,2 (two) indicate > 40° F (SM 177 EXTERNAL AIRLOCK).

ODS Vestibule

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

9.2 Remove crosshairs.
 As required, stow lights and crosshairs .

9.3 Wipe any condensate from vestibule volume using towel.

10. INSTALLING PMA/LAB DUCTING

10.1 Cycle Lab IMV Fwd Stbd Valve
 US Lab: ECLSS: IMV Fwd Stbd Valve
 LAB IMV Fwd Stbd Vlv

10.1.1 sel RPCM LA1B B RPC 16

RPCM LA1B B RPC 16

cmd Close (√RPC Position – Cl)

LAB IMV Fwd Stbd Vlv
2.104 HATCH OPENING AND SHUTTLE/ISS DUCT INSTALLATION

10.1.2 ‘Enable’

**cmd** Arm (√Arm Status – Armed)

**cmd** Enable (√State – Enabled)

10.1.3 ‘Open’

**cmd** Arm (√Arm Status – Armed)

**cmd** Open

Wait 25 seconds, then:

√Position – Open

10.1.4 ‘Close’

**cmd** Arm (√Arm Status – Armed)

**cmd** Close

Wait 25 seconds, then:

√Position – Closed

PMA2 10.2 PMA2 air duct jumper ←|→ launch restraint bracket (Use Ratchet and 7/16” Deep Socket, leave V-Band clamp on flange)

Open Velcro straps securing rest of flex duct to Closeout From (two places).

10.3 IMV cap ←|→ Lab Fwd Stbd IMV flange (Use Ratchet and 7/16” Deep Socket, leave V-Band on flange.)

Using hands and optional FDF/SODF Cover, pry the IMV cap (if required, use screwdriver).

Remove face and bore O-Rings from IMV cap.

Label both O-rings as “Used O-Rings. Return to Houston.”

Stow in “Return to Houston” Bag.

10.4 PMA2 air duct jumper →|← Lab Fwd Stbd IMV flange (Use V-Band clamp, Ratchet, and 7/16” Deep Socket.)

10.5 IMV cap →|← PMA2 launch restraint (Use V-Band clamp, Ratchet, and 7/16” Deep Socket.)

11. INSTALLING PMA/ODS DUCTING

MO13Q 11.1 AIRLK FAN A(B) → OFF

Ext A/L 11.2 Disconnect air inlet flex duct from external A/L duct from halo cross air duct.

PMA 11.3 Unstow PMA/ODS Interface Duct Segment from PMA.
### 2.104 HATCH OPENING AND SHUTTLE/ISS DUCT INSTALLATION

**Ext A/L** 11.4 Connect PMA/ODS Interface Duct Segment to air inlet flex duct with T-handle clamp.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per SPN 26180, before Node 2 is in place at the forward end of the LAB, <strong>MCC-H</strong> must load patch: intr2_pat_imvn2_4_d_00001.lif; and send the enable commands for the appropriate Node 2 IMV valve. The valves (Stbd vs Port) which the INTSYS checks are switched in INTSYS R2. This means the Node 2 IMV Aft Port Valve must be open prior to commanding the Lab IMV Fwd Stbd Fan to On, and the Node 2 IMV Aft Stbd Valve open prior to commanding the Lab IMV Fwd Port Fan to On.</td>
</tr>
</tbody>
</table>

#### 12. ENABLING NODE 2 IMV AFT PORT VALVE

**PCS**

Node 2: ECLSS: IMV Aft Port Valve

<table>
<thead>
<tr>
<th>Node 2 IMV Aft Port Vlv</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Enable’</td>
</tr>
<tr>
<td>cmd Arm (√Arm Status – Armed)</td>
</tr>
<tr>
<td>cmd Enable (√State – Enable)</td>
</tr>
<tr>
<td>Verify Position - Open</td>
</tr>
</tbody>
</table>

#### 13. OPENING LAB IMV FWD STBD VALVE

**US Lab**: ECLSS: IMV Fwd Stbd Valve

<table>
<thead>
<tr>
<th>LAB IMV Fwd Stbd Vlv</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Open’</td>
</tr>
<tr>
<td>cmd Arm (√Arm Status – Armed)</td>
</tr>
<tr>
<td>cmd Open</td>
</tr>
<tr>
<td>Wait 25 seconds, then:</td>
</tr>
<tr>
<td>√Position – Open</td>
</tr>
</tbody>
</table>

#### 14. ACTIVATING LAB IMV FWD STBD FAN

**US Lab**: ECLSS: IMV Fwd Stbd Fan

<table>
<thead>
<tr>
<th>LAB IMV Fwd Stbd Fan</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1 sel RPCM LA2B B RPC 09</td>
</tr>
<tr>
<td>RPCM LA2B B RPC 09</td>
</tr>
<tr>
<td>cmd Close (√RPC Position – Cl)</td>
</tr>
<tr>
<td>Lab IMV Fwd Stbd Fan</td>
</tr>
<tr>
<td>14.2 ‘On’</td>
</tr>
<tr>
<td>cmd On</td>
</tr>
<tr>
<td>Wait 15 seconds.</td>
</tr>
</tbody>
</table>
2.104 HATCH OPENING AND SHUTTLE/ISS DUCT INSTALLATION

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15. **INHIBIT NODE 2 IMV AFT PORT VALVE**
   - Node 2: ECLSS: IMV Aft Port Valve
   - Node 2 IMV Aft Port Vlv
   - Inhibit

   **cmd** Arm (√Arm Status – Armed)
   **cmd** Inhibit (√State – Inhibit)

MO13Q 16. **AIRLK FAN A(B) → ON**

PMA2 17. **PMA2 Grille Cover – Closed**

18. **ENABLING ISS RAPID DEPRESS RESPONSE SOFTWARE**

   18.1 Enabling Internal Systems MDM Response
   - Rapid Depress: Rapid Depress Response Software Control
   - ‘INT MDM Rapid Depress Response’
   - ‘Enable’

      **cmd** Enable (√Status – Enabled)

   - ‘Airlock Depress Response – INT MDM’
   - ‘Enable’

      **cmd** Enable (√Status – Enabled)

   18.2 Enabling C&C MDM Response
   - ‘CC MDM Rapid Depress Response’
   - ‘Enable’

      **cmd** Enable (√Status – Enabled)

   18.3 Enabling CCS Low Pressure Safing Response
   - ‘CC MDM Low Cabin P Response’
   - ‘Enable’

      **cmd** Enable (√Status – Enabled)
18.4 Enabling Lab & Airlock Rapid Depress C&W Messages

If Rapid Depress C&W Messages were previously inhibited:

- C&W Summ
- Caution & Warning Summary
- ‘Event Code Tools’

1. sel ENABLE

2. [Enable an Event]

   - input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)
   - cmd Execute

   - input for Event Code – 6 5 7 6 (RAPID DEPRESS – A/L)
   - cmd Execute

18.5 MCC-M to reenable Russian Segment Rapid Depress Response
2.105 ISS INTERIM INGRESS

SHUTTLE TOOLS AND EQUIPMENT REQUIRED
- Towel

ISS TOOLS AND EQUIPMENT REQUIRED
- CSA-CP Rubber Gloves
- NOD1 10" Adjustable Wrench
- D4_G2 Docking Mechanism Accessory Kit
  - APAS Hatch Tool
  - Cleaning Pads
  - APAS Hatch Cover
  - Docking Target Standoff Cross Bag
  - Docking Target Base Plate Cover
  - 1-1/2" Open End Wrench

1. INGRESSING PMA
   Lab Fwd
   - Open Lab Fwd Hatch per decal.

2. EQUALIZING ISS AND ODS VESTIBULE
   PMA
   2.1 APAS EQUAL VLV → OP
   LAB: ECLSS
   LAB: ECLSS
   2.2 When dP/dT ~0 or **On MCC GO**, proceed.

3. OPENING APAS HATCH
   PMA
   3.1 Open APAS Hatch.
   Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting
   on APAS Hatch Tool.
   Insert tool in hatch socket (ensure fully seated).
   Rotate tool 3 --- 4 turns in direction of ‘ОТКП’ (Open) arrow until it
   clicks.
   Remove tool.
   Allow Hatch Seals to relax for 5 minutes.

   **CAUTION**
   APAS Hatch Seals require 5 minutes to relax before opening Hatch.

   3.2 Open Hatch.
   APAS EQUAL VLV → CL
   Tether hatch tool to hatch handle.

   ISS report to shuttle: “PMA Hatch is opened. Go for shuttle equalization
   with ISS.”
EQUALIZING SHUTTLE AND ISS

MO10W 4. √14.7 CAB REG INLET SYS 1 vlv – CL

ODS Hatch 5. Equal vlv (one) → NORM

6. REMOVING DOCKING EQUIPMENT

**CAUTION**

1. The Docking Target Base Plate Cover should be put on the Docking Target Base Plate any time the Docking Target Standoff Cross Bag is not mounted in order to prevent scratches, surface damage.

2. The Docking Target Standoff Cross should be put in its bag to protect the Docking Target Standoff Cross when not mounted to the Docking Target Base Plate. The surface of these items are very easily scratched.

3. Donning of Rubber Gloves required in handling of Docking Target Standoff Cross and Docking Target Base Plate.

6.1 Don Rubber Gloves.

6.2 While maintaining a √−−−−−− torque on standoff cross threaded hexagonal capnut, loosen jamnut on Docking Target Base Plate receptacle by applying a √−−−−−− torque (10" Adjustable Wrench and 1-1/2" Open End Wrench).

Temporarily stow jamnut by continuing to rotate it √−−−−−− onto smaller, non-threaded diameter of receptacle.

Loosen hexagonal capnut by applying √−−−−−− torque.

Continue to rotate capnut until threaded off of receptacle.

6.3 Remove and insert cross into Docking Target Standoff Cross Bag. Temporarily stow.


6.5 Stow 10" Adjustable Wrench in NOD1D4 G2.

Stow 1-1/2" Open End Wrench in PMA.

OPENING ODS HATCH

ODS 7. √ODS Hatch ΔP ≤ 0.2 psid

Open ODS Hatch per decal.

Equal vlv (one) → OFF, cap installed

8. Wipe any condensate from vestibule volume using towel.
CONFIGURING IMV DUCTING

MO13Q 9. AIRLK FAN A(B) – OFF

Ext A/L 10. Disconnect air inlet flex duct from external A/L duct from halo cross air duct.

PMA 11. Unstow PMA/ODS Interface Duct Segment from PMA.

Ext A/L 12. Connect PMA/ODS Interface Duct Segment to air inlet flex duct with T-handle clamp.

13. ACTIVATING LAB IMV FWD STBD VALVE

PCS

13.1 sel RPCM LA1B B RPC 16

‘RPC Position’

**cmd** Close (√RPC Position – Cl)

13.2 ‘Enable’

**cmd** Arm (√Arm Status – Armed)

**cmd** Enable (√State – Enabled)

14. OPENING LAB IMV FWD STBD VALVE OPENING

‘Open’

**cmd** Arm (√Arm Status – Armed)

**cmd** Open

√Position – In Transit

Wait 25 seconds, then:

√Position – Open

15. ACTIVATING LAB IMV FWD STBD FAN

PCS

15.1 sel RPCM LA2B B RPC 09

‘RPC Position’

**cmd** Close (√RPC Position – Cl)
15.2 LAB IMV Fwd Stbd Fan

- **On**

- **cmd** On

- √ State – In Transit

- Wait 15 seconds.

- √ State – On
- √ Speed, rpm: 7745 --- 9278


MO13Q 17. ARLK FAN A(B) – ON

**14.7 PSI REPRESSURIZATION**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expect possible ‘S66 CAB O2(N2) FLO 1’ message in next step.</td>
</tr>
</tbody>
</table>

MO10W 18. 14.7 CAB REG INLET SYS 1 vlv – OP
OBJECTIVE:
This procedure is required to configure the orbiter and ISS for the booster fan bypass. This will allow deactivation of the booster fan to save Cryo O2.

SHUTTLE TOOLS AND EQUIPMENT REQUIRED
Towel

ISS TOOLS AND EQUIPMENT REQUIRED
Rubber Gloves
Deerskin Gloves

(NOD1D4_G2)
10" Adjustable Wrench

(PMA)
Docking Mechanism Accessory Kit
  APAS Hatch Tool
  Cleaning Pads
  APAS Hatch Cover
Docking Target Standoff Cross Bag
Docking Target Base Plate Cover
1-1/2" Open End Wrench
Kapton tape

ISS IVA Tool Kit
Drawer 2:
  Ratchet, 1/4" Drive
  7/16" Deep Socket, 1/4" Drive
  1/2" Deep Socket, 1/4" Drive
Drawer 3:
  4" Common Tip Screwdriver

WARNING
The PMA is unventilated at this time. Limit the amount of time spent in the PMA to the minimum required to complete the ingress tasks.

NOTE
This procedure is performed after the shuttle crew performs (FDF: RNDZ: POST DOCKING HATCH LEAK CHECK and AIRLOCK PREP FOR INGRESS - BYPASS CONFIG) and ISS crew performs (2.102 POST DOCKING HATCH LEAK CHECK - ISS) (SODF: JNT OPS: INGRESS STATION). These procedures should be completed successfully prior to beginning this procedure.
1. **INHIBITING ISS RAPID DEPRESS SOFTWARE RESPONSE**

1.1 Inhibiting Internal Systems MDM Response

PCS

<table>
<thead>
<tr>
<th>RAPID DEPRESS</th>
<th>ISS DEPRESS</th>
</tr>
</thead>
</table>

sel Rapid Depress Response Software Control

<table>
<thead>
<tr>
<th>US Rapid Depress Response Software Control</th>
<th>INT MDM Rapid Depress Response</th>
<th>'Inhibit'</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd Arm (√Arm Status – Armed)</td>
<td>cmd Inhibit (√Status – Inhibited)</td>
<td></td>
</tr>
</tbody>
</table>

'Airlock Depress Response – INT MDM'

<table>
<thead>
<tr>
<th>'Inhibit'</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd Arm (√Arm Status – Armed)</td>
</tr>
<tr>
<td>cmd Inhibit (√Status – Inhibited)</td>
</tr>
</tbody>
</table>

1.2 Inhibiting C&C MDM Response

<table>
<thead>
<tr>
<th>CC MDM RAPID DEPRESS RESPONSE</th>
<th>'Inhibit'</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd Arm (√Arm Status – Armed)</td>
<td>cmd Inhibit (√Status – Inhibited)</td>
</tr>
</tbody>
</table>

1.3 Inhibiting CCS Low Pressure Safing Response

<table>
<thead>
<tr>
<th>CC MDM LOW CABIN P RESPONSE</th>
<th>'Inhibit'</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmd Arm (√Arm Status – Armed)</td>
<td>cmd Inhibit (√Status – Inhibited)</td>
</tr>
</tbody>
</table>

1.4 Inhibiting Lab and Airlock Rapid Depress C&W Messages

<table>
<thead>
<tr>
<th>Caution &amp; Warning Summary</th>
<th>Event Code Tools</th>
</tr>
</thead>
</table>

sel Inhibit

<table>
<thead>
<tr>
<th>Inhibit an Event</th>
</tr>
</thead>
</table>

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

| cmd Arm |
| cmd Execute |

input Event Code – 6 5 7 6 (RAPID DEPRESS – A/L)

| cmd Arm |
| cmd Execute |
2. **HATCH OPEN AND DUCT INSTALL (BYPASS CONFIG)**

2.1 **MCC** to verify Russian Segment Rapid Depress Response inhibited

**PMA**

2. **EQUALIZING WITH ODS VESTIBULE**

2.1 APAS EQUAL VLV → OP

US Lab: ECLSS

Lab: ECLSS

2.2 When dP/dT ~0 or **On MCC GO**, proceed.

2.3 APAS EQUAL VLV → CL

2.4 ISS report to shuttle: “ODS Vestibule pressurized. GO to begin leak check.”

3. **LEAK CHECKING ODS/PMA DOCKING SEAL**

3.1 Wait 10 minutes for thermal stabilization.

**CRT**

SM 177 EXTERNAL AIRLOCK

3.2 Record A/L-VEST ΔP: _____ psid.

Wait 15 minutes.

****************************************************************************************************************************
* If A/L-VEST ΔP ≥ previously recorded + 0.16 psid,
* notify **MCC-H** (Vestibule leak).
****************************************************************************************************************************

4. Shuttle report to ISS: “ODS Vestibule leak check complete. GO for APAS Hatch opening.”

5. **OPENING APAS HATCH**

APAS EQUAL VLV → OP

Wipe any condensate from vestibule volume using towel.

Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on APAS Hatch Tool.

Insert tool in hatch socket (ensure fully seated).

Rotate tool 3 to 4 turns in direction of ‘ОТКР’ (Open) arrow until it clicks.

****************************************************************************************************************************
* If tool prematurely slips or does not engage
* \**MCC-H** before proceeding
* Select ‘АВАРИЙНОЕ ПОЛОЖНИЕ’ (Emergency Position)
* setting on APAS Hatch Tool.
* Reattempt to open Hatch.
****************************************************************************************************************************

Remove tool.

Allow hatch seals to relax for 5 minutes.
2.106 HATCH OPEN AND DUCT INSTALL (BYPASS CONFIG)

WARNING
Surfaces may be below freezing for a short time after initial APAS Hatch opening. Don deerskin gloves prior to touching hatch external or vestibule surfaces.

CAUTION
APAS hatch seals require 5 minutes to relax before opening Hatch.

Open Hatch.

APAS EQUAL VLV → CL

6. EQUALIZING WITH SHUTTLE

6.1 ISS report to shuttle: “PMA Hatch is opened. GO for shuttle equalization with ISS.”

Upper Hatch

6.2 ODS Upper Hatch Equal vlv cap (one) → vent, remove

6.3 ODS Upper Hatch Equal vlv (one) → NORM

7. REMOVING DOCKING EQUIPMENT

CAUTION

1. The Docking Target Base Plate Cover should be put on the Docking Target Base Plate any time the Docking Target Standoff Cross Bag is not mounted in order to prevent scratches, surface damage.

2. The Docking Target Standoff Cross should be put in its bag to protect the Docking Target Standoff Cross when not mounted to the Docking Target Base Plate. The surfaces of these items are very easily scratched.

3. When handling the Docking Target Standoff Cross or the Docking Target Base Plate, rubber gloves should be worn.

PMA Hatch

7.1 While maintaining a torque on standoff cross threaded hexagonal cap nut, loosen jam nut on docking target base plate receptacle by applying a torque (10” Adjustable Wrench and 1-1/2” Open End Wrench).

Temporarily stow jam nut by continuing to rotate it onto smaller, non-threaded diameter of receptacle.

Loosen hexagonal cap nut by applying torque.

Continue to rotate cap nut until threaded off of receptacle.

7.2 Remove and insert Cross into Docking Target Standoff Cross Bag. Temporarily stow.
2.106 HATCH OPEN AND DUCT INSTALL (BYPASS CONFIG)
(JNT OPS/LF1 - ALL/FIN/SPN) Page 5 of 10 pages

7.3 Install Docking Target Base Plate Cover.
    Install APAS Hatch Cover.
    Secure Hatch in open position with PMA APAS Hatch Standoff.

7.4 Stow 10" Adjustable Wrench in NOD1D4_G2.
    Stow 1-1/2" Open End Wrench in PMA.

8. OPENING ODS HATCH

8.1 When Cabin dP/dT < ± 0.01, proceed.

8.2 √A/L – VEST ΔP ≤ 0.5 psid
    Open ODS Upper Hatch per decal.
    Equal vlv (one) → OFF, cap installed

9. REMOVING DOCKING EQUIPMENT

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

9.2 Remove crosshairs.
    Stow lights and crosshairs as required.

9.3 Wipe any condensate from vestibule volume using towel.

10. INSTALLING PMA/LAB DUCTING

10.1 Cycle Lab IMV Fwd Stbd Valve
    US Lab: ECLSS: IMV Fwd Stbd Valve
    LAB IMV Fwd Stbd Vlv

10.1.1 sel RPCM LA1B B RPC 16
    RPCM LA1B B RPC 16
    cmd Close (√RPC Position – Cl)
    LAB IMV Fwd Stbd Vlv
2.106 HATCH OPEN AND DUCT INSTALL (BYPASS CONFIG)
(JNT OPS/LF1 - ALL/FIN/SPN)  Page 6 of 10 pages

10.1.2 ‘Enable’

cmd Arm (√Arm Status – Armed)
cmd Enable (√State – Enabled)

10.1.3 ‘Open’

cmd Arm (√Arm Status – Armed)
cmd Open

Wait 25 seconds.

√Position – Open

10.1.4 ‘Close’

cmd Arm (√Arm Status – Armed)
cmd Close

Wait 25 seconds.

√Position – Closed

PMA2 10.2 PMA2 air duct jumper ←|→ launch restraint bracket (Use Ratchet and 7/16” Deep Socket, leave V-Band clamp on flange)
Open Velcro straps securing rest of flex duct to Closeout From (two places).

10.3 IMV cap ←|→ Lab Fwd Stbd IMV flange (Use Ratchet and 7/16” Deep Socket, leave V-Band on flange.)
Using hands and optional FDF/SODF Cover, pry the IMV cap (if required, use screwdriver).
Remove face and bore O-Rings from IMV cap.
Label both O-Rings as “Used O-Rings. Return to Houston.”
Stow in “Return to Houston” Bag.

10.4 IMV cap →|← PMA2 launch restraint (Use V-Band clamp, Ratchet, and 7/16” Deep Socket.)

10.5 PMA2 air duct jumper →|← Lab Fwd Stbd IMV flange (Use V-Band clamp, Ratchet, and 7/16” Deep Socket.)
11. INSTALLING PMA/ODS DUCTING

Ext A/L 11.1 Release T-handle clamp to disconnect halo inlet flex duct from halo inlet.

PMA 11.2 Unstow PMA/ODS Interface Duct Segment from PMA.

Ext A/L 11.3 Connect PMA/ODS Interface Duct Segment to halo inlet flex duct using T-handle clamp.

11.4 Disconnect bypass duct from Airlock Fan outlet.
   Remove air diffuser cap from middeck floor and install on Airlock Fan outlet.
   Connect bypass duct to middeck floor diffuser.

PMA2 11.5 PMA2 Grille Cover → Partially Open (six rows of holes, using Kapton Tape per Figure 1)
   Secure Velcro cover to back of duct.

Figure 1.- Grille Cover.

NOTE
Per SPN 26180, before Node 2 is in place at the forward end of the LAB, **MCC-H** must load patch: intr2_pat_imvn2_4_d_00001.lif; and send the enable commands for the appropriate Node 2 IMV valve. The valves (Stbd vs Port) which the INTSYS checks are switched in INTSYS R2. This means the Node 2 IMV Aft Port Valve must be open prior to commanding the LAB IMV Fwd Stbd Fan to On, and the Node 2 IMV Aft Stbd Valve open prior to commanding the LAB IMV Fwd Port Fan to On.
12. **ENABLING NODE 2 AFT PORT IMV VALVE**

PCS

Node 2: ECLSS: IMV Aft Port Valve

- **Node 2 IMV Aft Port Vlv**
- ‘Enable’

- **cmd** Arm (√Arm Status – Armed)
- **cmd** Enable (√State – Enabled)

Verify Position – Open

13. **OPENING LAB IMV FWD STBD VALVE**

US Lab: ECLSS: IMV Fwd Stbd Valve

- **LAB IMV Fwd Stbd Vlv**
- ‘Open’

- **cmd** Arm (√Arm Status – Armed)
- **cmd** Open

Wait 25 seconds.

√Position – Open

14. **ACTIVATING LAB IMV FWD STBD FAN**

US Lab: ECLSS: IMV Fwd Stbd Fan

- **LAB IMV Fwd Stbd Fan**

14.1 sel RPCM LA2B B RPC 09

- **RPCM LA2B B RPC 09**

- **cmd** Close (√RPC Position – Cl)

- **Lab IMV Fwd Stbd Fan**

14.2 ‘On’

- **cmd** On

Wait 15 seconds.

√State – On

√Speed, rpm: 7745 to 9278
15. **INHIBIT NODE 2 AFT PORT IMV VALVE**

Node 2: ECLSS: IMV Aft Port Valve

- Node 2 IMV Aft Port Vlv
- ‘Inhibit’

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√State – Inhibited)

16. **ENABLING ISS RAPID DEPRESS RESPONSE SOFTWARE**

16.1 Enabling Internal Systems MDM Response

- PCS Rapid Depress
- ISS Depress sel Rapid Depress Response Software Control

- [US Rapid Depress Response Software Control]
- ‘INT MDM Rapid Depress Response’
- ‘Enable’

**cmd** Enable (√Status – Enabled)

- ‘Airlock Depress Response – INT MDM’
- ‘Enable’

**cmd** Enable (√Status – Enabled)

16.2 Enabling C&C MDM Response

- ‘CC MDM Rapid Depress Response’
- ‘Enable’

**cmd** Enable (√Status – Enabled)

16.3 Enabling CCS Low Pressure Safing Response

- ‘CC MDM Low Cabin P Response’
- ‘Enable’

**cmd** Enable (√Status – Enabled)
16.4 Enabling Lab and Airlock Rapid Depress C&W Messages
If Rapid Depress C&W Messages were previously inhibited:

C&W Summ

Caution & Warning Summary

‘Event Code Tools’

sel ENABLE

Enable an Event

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

**cmd** Execute

input for Event Code – 6 5 7 6 (RAPID DEPRESS – A/L)

**cmd** Execute

16.5 \**MCC-M** to reenable Russian Segment Rapid Depress Response
OBJECTIVE:
Procedure is used if shuttle Airlock/Tunnel Fan ("booster fan") is to be activated when starting from the "bypass duct" configuration.

PMA2
1. Check PMA/ODS Interface Duct Segment connected between shuttle External Airlock and station PMA2
2. PMA2 Grille Cover – Closed

WARNING
The PMA is unventilated at this time. Limit the amount of time spent in the PMA to the minimum required.

PCS
3. DEACTIVATING LAB IMV FWD STBD FAN
   LAB: ECLSS: IMV Fwd Stbd Fan
   [Lab IMV Fwd Stbd Fan]

   NOTE
   Upon IMV Fan deactivation, rpm sensor register 0 volts. MDM conversion translates 0 volts (0 counts) to 7164 ± 50 rpm. Reference 2A SPN 8437.

   3.1 ‘Off’
      - cmd Arm (√Status – Armed)
      - cmd Off (√State – Off)
      - √Speed, rpm: 7164 ± 50

   3.2 sel RPCM LA2B B RPC 09
      - cmd Open (√RPC Position – Op)

MDDK
4. Disconnect bypass duct from middeck floor fitting.

EXT A/L
5. Attach bypass duct to Airlock Fan outlet.
   6. Unstow inlet duct from tunnel extension wall. Attach one end to Airlock fan muffler inlet.

MDDK
7. Attach free-end inlet duct to cabin MDDK floor fitting.
   8. Remove mylar sleeve/tape from outer screen of Fwd Middeck Diffuser.

MO13Q
9. ARLK FAN A(B) – ON
10. **VERIFYING LAB FWD STBD IMV VALVE POSITION**

PCS US Lab: ECLSS: IMV Fwd Stbd Valve
LAB IMV Fwd Stbd Vlv

√ Position – Open

11. **OPENING NODE 2 IMV VALVE**

**NOTE**
Per SPN 26180, before Node 2 is in place at the forward end of the LAB, MCC-H must load patch intr2_pat_imvn2_4_d_00001.lif and send the enable commands for the appropriate Node 2 IMV valve. The valves (Stbd vs. Port) which the INTSYS checks are switched in INTSYS R2. This means the Node 2 IMV Aft Port Valve must be open prior to commanding the LAB IMV Fwd Stbd Fan to On, and the Node 2 IMV Aft Stbd Valve open prior to commanding the LAB IMV Fwd Port Fan to On.

PCS Node 2: ECLSS: IMV Aft Port Valve
Node 2 IMV Aft Port Vlv
‘Enable’

**cmd** Arm (√Arm Status – Armed)
**cmd** Enable (√State – Enabled)

Verify Position – Open

12. **ACTIVATING LAB IMV FWD STBD FAN**

PCS US Lab: ECLSS: IMV Fwd Stbd Fan
LAB IMV Fwd Stbd Fan

12.1 *sel RPCM LA2B B RPC 09*

RPCM LA2B B RPC 09

**cmd** Close (√RPC Position – Cl)

Lab IMV Fwd Stbd Fan

12.2 ‘On’

**cmd** On

Wait 15 seconds.

√ State – On
√ Speed, rpm: 7745 to 9278
### 13. INHIBITING NODE 2 IMV VALVE

Node 2: ECLSS: IMV Aft Port Valve

| PCS | Node 2 IMV Aft Port Valv | ‘Inhibit’ |

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√State – Inhibited)
OBJECTIVE:
Procedure is used if shuttle Airlock/Tunnel Fan (“booster fan”) is to be deactivated to return to the “bypass duct” configuration.

WARNING
The PMA is unventilated at this time. Limit the amount of time spent in the PMA to the minimum required.

PMA2
1. Check PMA/ODS Interface Duct Segment connected between shuttle External Airlock and station PMA2,

2. DEACTIVATING LAB IMV FWD STBD FAN

PCS
LAB: ECLSS: IMV Fwd Stbd Fan
Lab IMV Fwd Stbd Fan

NOTE
Upon IMV Fan deactivation, rpm sensor register 0 volts. MDM conversion translates 0 volts (0 counts) to 7164 ± 50 rpm. Reference 2A SPN 8437.

2.1 ‘Off’

   cmd Arm (√Status – Armed)
   cmd Off (√State – Off)

√Speed, rpm: 7164 ± 50

2.2 sel RPCM LA2B B RPC 09

RPCM LA2B B RPC 09

NOTE
A “?” may temporarily appear in the RPC data field. This is due to Shuttle ODS Booster Fan generating flow through the IMV duct and causing IMV Fan rotation and back EMF.

   cmd Open (√RPC Position – Op)

PMA2
3. PMA2 Grille Cover – Open

MO13Q
4. ARLK FAN A(B) – OFF

MDDK
5. Disconnect inlet duct from cabin MDDK floor fitting.

6. Disconnect other end inlet duct from Airlock Fan muffler inlet. Stow fwd flex duct on tunnel extension wall.

EXT A/L
7. Disconnect bypass duct from Airlock Fan outlet.
MDDK 8. Attach bypass duct to cabin MDDK floor fitting.

9. Replace mylar sleeve/tape onto outer screen of Fwd Middeck Diffuser.

10. **VERIFYING LAB FWD STBD IMV VALVE POSITION**

    PCS US Lab: ECLSS: IMV Fwd Stbd Valve
    Lab IMV Fwd Stbd Vlv
    √ POSITION – Open

11. **OPENING NODE 2 IMV VALVE**

    **NOTE**
    Per SPN 26180, before Node 2 is in place at the forward end of the LAB, **MCC-H** must load patch intr2_pat_imvn2_4_d_00001.lif and send the enable commands for the appropriate Node 2 IMV valve. The valves (Stbd vs. Port) which the INTSYS checks are switched in INTSYS R2. This means the Node 2 IMV Aft Port Valve must be open prior to commanding the LAB IMV Fwd Stbd Fan to On, and the Node 2 IMV Aft Stbd Valve open prior to commanding the LAB IMV Fwd Port Fan to On.

    PCS Node 2: ECLSS: IMV Aft Port Valve
    Node 2 IMV Aft Port Vlv
    ‘Enable’
    cmd Arm (√Arm Status – Armed)
    cmd Enable (√State – Enabled)
    Verify Position – Open

12. **ACTIVATING LAB IMV FWD STBD FAN**

    PCS US Lab: ECLSS: IMV Fwd Stbd Fan
    LAB IMV Fwd Stbd Fan
    
    12.1 sel RPCM LA2B B RPC 09
    
    RPCM LA2B B RPC 09
    cmd Close (√RPC Position – Cl)
    
    Lab IMV Fwd Stbd Fan
    
    12.2 ‘On’
    cmd On
    Wait 15 seconds.
2.108 SHUTTLE AIRLOCK/TUNNEL FAN DEACTIVATION (BYPASS DUCT INSTALLED)

13. INHIBITING NODE 2 IMV VALVE

Node 2: ECLSS: IMV Aft Port Valve

Node 2 IMV Aft Port Vlv

‘Inhibit’

| cmd Arm (√Arm Status – Armed) |
| cmd inhibit (√State – Inhibited) |
MATED OPERATIONS
OBJECTIVE:
Resupply two new CSA-CP units, ten new Battery Packs, one new Zero Filter, and two spare Pump Filters. The resupplied CSA-CP sensors (CO and HCL) may give elevated readings as a result of stowage during launch and transfer. The units should be deployed in an open environment for two to four weeks for the elevated readings to decrease to nominal levels.

NOTE
The Exp 7 primary CSA-CP (S/N 1008) should remain on board. The Exp 5 and backup Exp 7 CSA-CPs (S/N(s) 1001 and 1007) should be stowed in Resupply Kit for return.

Reference
1. Unstow CSA-CP Resupply Kit.

Transfer List
2. Unstow Marking Pen
3. Retrieve prime CSA-CP (1008) from deployed location.

LAB01D4
5. Remove the two Exp 7 CSA-CPs (1003, 1004) from the Resupply Kit. Temporarily stow.
6. Demate (if necessary) the Exp 7 backup CSA-CP (1007) from Sampling Pump.
   Unstow Exp 5 CSA-CP (1001) from NOD1D2.
   Stow both in the Resupply Kit.

NOTE
1. The old and new Battery Packs have part number SED46115802-304.
2. The following Battery Pack serial numbers have been resupplied:
   1012, 1027, 1076, 1077, 1078, 1079, 1080, 1082, 1084, 1085.
3. Any unused Battery Packs should remain in the Stowage Kit.
4. The new Zero Filter serial number is 1004.

7. Transfer new Battery Packs (10) from Resupply Kit to Stowage Kit.
   Transfer used Battery Packs (7) from Stowage Kit to Resupply Kit.
   Leave unused Battery Packs (1) in Stowage Kit.
8. Remove, exchange the following items from CSA-CP Resupply Kit with like items from CSA-CP Stowage Kit: Packet with 2 spare Pump Filters (SED46115799-601), Zero Filter (1)

9. CSA-CP Resupply Kit contains the following Exp 5 and 7 items
   Exp 5 CSA-CP (1001) with Battery
   Backup Exp 7 CSA-CP (1007) with Battery
   Used Battery Packs (8)
   Zero Filter (1)
   Packet with two sampling Pump Filters (1)

Reference
10. Stow CSA-CP Resupply Kit for return.

Transfer List

NOTE
Audible beeps occur when the MODE pushbutton is depressed during unit activation.

11. Activate all three CSA-CPs.
   pb MODE – press, hold (until ‘RELEASE’ displayed)

NOTE
Wait approximately 1 minute while unit runs self-check routine. A single beep occurs when the self-check routine is complete.

12. Wait 1 minute.

Verify display indicates readings for OXYGEN, HCN, HCL, and CO.

NOTE
1. The resupplied CSA-CP sensors (CO and HCL) may be elevated as a result of stowage for launch and transfer. The elevated readings should decrease to nominal levels after being deployed in an open environment for several days.

2. The old Exp 7 primary unit (1008) should be used until the resupplied units are operating nominally.

3. Upon activation, the new Exp 7 CSA-CPs (1003, 1004) may be in the alarm range. Readings may be required every four to seven days to determine status of elevated CO and HCL levels.
13. Record sensor readings and Battery status for the old Exp 7 and new Exp 7 CSA-CPs.
   After each reading recorded proceed to step 14.

<table>
<thead>
<tr>
<th>Date</th>
<th>CSA-CP S/N</th>
<th>CO</th>
<th>HCN</th>
<th>HCL</th>
<th>O2</th>
<th>Batt Ticks</th>
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<tbody>
<tr>
<td>____</td>
<td>1003</td>
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</tr>
</tbody>
</table>

14. Deactivate all three Exp 7 CSA-CPs.
   pb MODE – press, hold (until ‘RELEASE’ displayed)
   √CSA-CPs – OFF

15. Deploy new Exp 7 CSA-CPs outside of the Stowage Kit in the open environment.

16. Deploy the old primary Exp 7 CSA-CP in the desired location or per MCC-H instruction.

17. Report sensor readings to MCC-H after each data logging.


19. Stow Marker
OBJECTIVE:
Transfer nitrogen from the shuttle nitrogen tanks to the ISS Airlock nitrogen tanks via equalization.

TOOLS AND EQUIPMENT REQUIRED:
(NOD1P4_D)
GN2 Transfer Flex Hose Assy   P/N V857-643003-008
Flashlight
Ear Plugs
(NOD1D4_G2)
ISS IVA Toolbox
Drawer 3:
   Inspection Mirror

1. CONFIGURING ISS N2 SYSTEM
   1.1 Check MCC-H for ISS payload nitrogen configuration.

   A/L1OA2  1.2 VL013 (N2) → CLOSED

   PCS  1.3 Airlock: ECLSS: Nitrogen System
       [AL Nitrogen System]
       ‘N2 Supply Valve’

       √Actual Position – Open

2. REDUCING ISS N2 SYSTEM PRESSURE TO AMBIENT

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

   2. As the N2 system pressure bleeds down and N2 is introduced into the cabin, the following messages may be received:
       ‘N2 Supply Pressure Low – A/L’,
       ‘PCA N2 Line Pressure Low – A/L’,
       ‘PCA N2 Line Pressure Low – LAB’

   3. The messages will return to normal as the N2 system is repressurized (step 4).

   Airlock: ECLSS: Nitrogen System
   [AL Nitrogen System]
   ‘AL PCA N2 Intro Valve’

   cmd Open (√Actual Position – Open)

   Wait 5 minutes or On MCC-H GO, proceed.
3. CONFIGURING PMA/ODS FOR N2 TRANSFER

3.1 FLOW – CLOSED

**WARNING**
Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don ear plugs.

Inspect GN2 Transfer Flex Hose Assy for any cracks or anomalies. If so, contact **MCC-H**.

3.2 Don ear plugs

3.3 VENT → OPEN

3.4 √GN2 Xfer Panel Pressure Gauge reading ~0 psi, doff ear plugs

**CAUTION**
Minimize the amount of time open fluid connectors are exposed to cabin air to prevent contamination. If debris is found during inspections, contact **MCC-H**.

**NOTE**
QDs must be closed to remove caps. As needed, refer to Figure 2 at the end of this procedure for reference information on the high pressure quick disconnects.

3.5 Inspect GN2 Transfer Flex Hose Assy for any cracks or anomalies.
If so, contact **MCC-H**.

3.6 Uncap GN2 Xfer Panel QD.

3.7 Close GN2 Transfer Flex Hose Assy bent-end QD.
Remove plug.
Inspect both QDs for debris.

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

GN2 Transfer Flex Hose Assy bent-end →|← GN2 Xfer Panel QD
Hard mate/open QD.
3.102 NITROGEN TRANSFER INITIATION
(JNT OPS/X2R4 - ALL/FIN 9/HC)  Page 3 of 4 pages

PMA
3.9 Uncap Nitrogen Recharge QD.
3.10 Close GN2 Transfer Flex Hose Assy straight-end QD.
    Remove plug.
    Inspect both QDs for debris.
3.11 GN2 Transfer Flex Hose Assy straight-end →|← Nitrogen Recharge QD
    Hard mate/open QD.

PMA/ODS
3.12 Secure GN2 Transfer Flex Hose Assy to PMA/ODS Extension Duct
    and ODS Flange with Velcro straps.

ODS Vest
3.13 VENT → CLOSED

4. VERIFYING N2 TRANSFER SYSTEM PRESSURE INTEGRITY
ML86B:D
4.1 cb MN A MMU GN2 SPLY ISOL VLV A → cl
R13L
4.2 MMU GN2 SPLY ISOL VLV A → OP (tb-OP)

ODS Vest
4.3 FLOW → OPEN

4.4 Wait 5 minutes.

PCS
4.5 Airlock: ECLSS: Nitrogen System
   AL Nitrogen System

   Report Supply Press to MCC-H.
3.102 NITROGEN TRANSFER INITIATION
(JNT OPS/X2R4 - ALL/FIN 9/HC) Page 4 of 4 pages

AL ECLSS
'Equipment Lock'

Verify \( \frac{dP}{dt} < 0.05 \text{ mmHg/min} \)

5. INITIATING N2 TRANSFER
A/L1OA2 5.1 On MCC-H GO, VL013 (N2) \( \rightarrow \) OPEN

5.2 On MCC-H GO, go to [3.103 NITROGEN TRANSFER TERMINATION] (SDF: JNT OPS: MATED OPERATIONS).

**Figure 2:** Two-Stage High Pressure QDs.

**VIEW A**

In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To “soft-latch,” the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

**VIEW B**

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

**VIEW C**

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

**VIEW D**

To unlatch the coupling halves, the release ring is retracted from the mating end of the coupler and the coupler is pulled away from the nipple.
3.103 NITROGEN TRANSFER TERMINATION
(JNT OPS/X2R4 - ALL/FIN 10) Page 1 of 3 pages

OBJECTIVE:
Terminate the transfer of nitrogen from the shuttle nitrogen tanks to the ISS Airlock nitrogen tanks and return both nitrogen systems to their nominal configurations.

TOOLS AND EQUIPMENT REQUIRED:
Flashlight
Ear Plugs

(NOD1D4_G2)
ISS IVA Toolbox
Drawer 3:
   Inspection Mirror

1. TERMINATING N2 TRANSFER
A/L1OA2 1.1 VL013 (N2) → CLOSED

PCS 1.2 Airlock: ECLSS: Nitrogen System
   AL Nitrogen System
   'N2 Supply Valve'  cmd Close (√Actual Position – Closed)

R13L 1.3 MMU GN2 SPLY ISOL VLV A → CL (tb-CL)

ML86B:D 1.4 cb MN A MMU GN2 SPLY ISOL VLV A → op

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

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

3. The messages will return to normal as the N2 system is repressurized (step 3).

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

1.5 Don ear plugs

ODS Vest GN2 Xfer 1.6 VENT → OPEN
Panel

04 APR 05  85
1.7 Check GN2 Xfer Panel Pressure Gauge reading ~0 psi. Doff ear plugs.

1.8 Wait 15 minutes or On MCC-H GO, proceed.

ODS Vest GN2 Xfer Panel

1.9 VENT → CLOSED

1.10 FLOW → CLOSED

2. CONFIGURING PMA/ODS FOR NOMINAL OPERATIONS

NOTE
QDs must be closed to disconnect lines.

2.1 GN2 Transfer Flex Hose Assy ←|→ GN2 Xfer Panel QD
Inspect both QDs for debris.
Install cap on GN2 Xfer Panel QD.
Install plug on GN2 Transfer Flex Hose Assy.

PMA 2.2 GN2 Transfer Flex Hose Assy ←|→ Nitrogen Recharge QD
Inspect both QDs for debris.
Install cap on Nitrogen Recharge QD.
Install plug on GN2 Transfer Flex Hose Assy.

PMA/ODS 2.3 Remove GN2 Transfer Flex Hose Assy from PMA/ODS Extension Duct and ODS Flange.
Stow GN2 Transfer Flex Hose Assy in NOD1P4_D.

3. RETURNING ISS NITROGEN SYSTEM TO NOMINAL OPERATIONS

A/L1OA2 3.1 On MCC-H GO, VL013 (N2) → OPEN

NOTE
The PCA Intro Valve is opened in order to avoid tripping the pressure switch in the VOA due to a regulator lockup. This trip can occur even if the VOA has been deactivated.

PCS 3.2 Airlock: ECLSS: Nitrogen System

AL Nitrogen System

'AL N2 Intro Valve'

cmd Open (√Position – Open)

'N2 Supply Valve'

cmd Open (√Actual Position – Open)

Wait 2 minutes, then:
‘AL PCA N2 Intro Valve’

cmd Close (√Position – Closed)
3.103 NITROGEN TRANSFER TERMINATION

Report Supply Press to MCC-H.

[AL ECLSS]
‘Equipment Lock’

Verify dP/dt < 0.05 mmHg/min

3.3 Notify MCC-H, “Nitrogen Transfer Termination complete.”
OBJECTIVE:
Remove and Install Lab Forward Hatch Thermal Cover

LOCATION:
Installed: US Lab Forward Hatch Bulkhead

DURATION:
Removal: 30 minutes
Installation: 30 minutes

PARTS:
Only required when cover not installed
Hatch Thermal Cover   P/N 683-80441

TOOLS REQUIRED:
ISS IVA Toolbox:
Drawer 2:
  Ratchet, 1/4” Drive
  4” Ext, 1/4” Drive
  3/8” Socket, 1/4” Drive

REFERENCED PROCEDURE(S):
None

NOTE
1. Hatch Thermal Cover has decal with removal steps. Decal instructions are incomplete; refer to procedure as required.

2. Hatch Thermal Cover is attached to four Corner Struts. Corner Struts are attached to Lab Fwd Hatchway. Cover Attach fasteners (four each corner) are accessed from IVA-side of Hatch. Corner Strut fasteners (two each strut) are accessed from EVA-side of Hatch. Refer to Figures 1, 2.

* If beginning Cover removal on IVA-side of Hatch, perform steps 1 to 12; else perform steps 5 to 12.

* If installing Cover, go to step 13.
REMOVING COVER FROM IVA-SIDE OF HATCH

Figure 1.- IVA Side of Hatch Thermal Cover.

NOTE
There are eight IVA-side Cover Attach Point fasteners labeled "Cover Attach Point" located on deck-port, deck-starboard corners of Cover.

1. Remove deck IVA-side Cover Attach Point fasteners (eight) (Ratchet; 1/4" Drive; 4" Ext; 3/8" Socket).
Refer to Figure 1, Cover decals labeled "Cover Attach Point."

**NOTE**
1. Static jumpers are press-fit, no tool required.
2. There are total of four static jumpers on Cover. Only disconnect deck-port, deck-starboard static jumpers.

2. Disconnect static jumpers (two).
3. Fold blanket in half, secure with provided Velcro tabs.
4. Translate through opening to EVA-side of Hatch, continue with next section of procedure.
REMOWING COVER FROM EVA-SIDE OF HATCH

Figure 2.- EVA Side of Hatch Thermal Cover (CBM CPAs shown installed).

5. Remove EVA-Side Corner Bracket fasteners (eight) (Ratchet, 1/4 Drive; 4" Ext; 3/8" Socket).
   Refer to Figure 2, Cover decals labeled "Cover Attach Point."

   **NOTE**
   Only perform steps 6 and 7 if Cover removal began on IVA-side of Hatch.

6. Reinstall deck-port, deck-starboard Corner Struts (two) onto Cover, fasteners (eight) (Ratchet, 1/4 Drive; 4" Ext; 3/8" Socket).

7. Reconnect static jumpers (two).

8. Fold four struts toward center of cover.


10. Fold blanket diagonally.

11. Inform **MCC-H** of task completion.

12. Stow tools, equipment.
HATCH THERMAL COVER INSTALLATION
13. Unfold blanket, detach center Velcro tabs, continue unfolding until blanket folded in half.
Orient Cover such that Corner Brackets visible on EVA-side of Hatch, removal decal right-side up with respect to lab.
Refer to Figure 2.

**********************************************************
* If crewmember needs to be on EVA-side of Hatch
* after cover installation, only perform step 16.
* 
* If crewmember needs to be on IVA-side of Hatch
* after cover installation, perform all steps.
**********************************************************

14. Remove deck-port, deck-starboard Corner Struts (two) from Hatch Thermal Cover, fasteners (eight) (Ratchet, 1/4 Drive; 4" Ext; 3/8" Socket).
These two Corner Struts will be reattached to lab hatchway in step 16.
Refer to Figure 2.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Static jumpers are press-fit, no tool required.</td>
</tr>
<tr>
<td>2. There are total of four static jumpers on cover. Only disconnect deck-port, deck-starboard static jumpers.</td>
</tr>
</tbody>
</table>

15. Disconnect static jumpers (two).

16. Snug EVA-Side Corner Bracket fasteners (eight) (Ratchet, 1/4 Drive; 4" Ext; 3/8" Socket).
Refer to Figure 2, Cover decals labeled "Cover Attach Point."

17. Translate through Cover opening to IVA-side of Hatch.

18. Reconnect static jumpers (two).

19. Snug IVA-side Cover Attach Point fasteners (eight) (Ratchet, 1/4 Drive; 4" Ext; 3/8" Socket).
Refer to Figure 1, Cover decals labeled "Cover Attach Point."

20. Inform MCC-H of task completion.

21. Stow tools, equipment.
3.105 O2 REPRESS
(JNT OPS/7A - ALL/FIN 2) Page 1 of 2 pages

NOTE
1. Purpose is to pressurize stack to 14.90 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.

<table>
<thead>
<tr>
<th>SM ALERT</th>
<th>PARAM ID</th>
<th>LO EU</th>
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</thead>
<tbody>
<tr>
<td>H2O LOOP ICH OUT</td>
<td>0612744</td>
<td>33.0</td>
</tr>
<tr>
<td>2</td>
<td>0612724</td>
<td>33.0</td>
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<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>ENA/INH</th>
<th>HI EU</th>
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<tbody>
<tr>
<td>CABIN PRESS</td>
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<td>14.90</td>
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<tr>
<td>PPO2 A</td>
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<table>
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<tr>
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<th>ENA/INH</th>
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<tbody>
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<tr>
<td>PPO2 B</td>
<td>44</td>
<td>INH</td>
</tr>
</tbody>
</table>

2. √MCC-H for repress Cryo configuration

Node 1 3. √PPRV caps installed on port, stbd Hatches

MO13Q 4. ARLK FAN B → ON

O2 REPRESS INITIATION

OCAC 5. Perform OCAC filter cleaning. OCAC PWR → OFF

C5 6. DIRECT O2 vlv → OP

7. When ‘S78 O2 CONC’ or ‘S66 CABIN PRESS’ message, DIRECT O2 vlv → CL

05 FEB 02
8. **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 9. OCAC PWR → ON

10. √**MCC-H** for post-repress cryo configuration

11. **On MCC GO**,  
   MO13Q ARLK FAN B → OFF

12. Contact **MCC-H** for uplink of SM ALERT limit resets via TMBU, if desired.

<table>
<thead>
<tr>
<th>SM ALERT</th>
<th>PARAM ID</th>
<th>LO EU</th>
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<tbody>
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<td>2</td>
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</table>
NOTE

1. Purpose is to pressurize the stack to 14.9 psia from 14.7 using orbiter N2.

2. Nitrogen will be introduced from the ODS Vestibule GN2 Transfer Panel at approximately 6 CFM, and will mix with air returning from station at over 100 CFM.

3. Avoid prolonged exposure in the ODS/Vestibule area during repress.

1. **MCC-H** will TMBU the following to the appropriate value for this vehicle (approximately 14.90 psia):

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>HI EU</th>
<th>CABIN P</th>
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<td>M013Q</td>
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<td>0612405</td>
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2. ARLK FAN B – ON

ODS Vest
3. FLOW → OPEN
   GN2 Xfer Pnl
   VENT → OPEN

ML86B:D R13L
4. cb MNA MMU GN2 SPLY ISOL VLV A – cl
   MMU GN2 SPLY ISOL VLV A – OP (tb-OP)

5. When ‘**S66 CABIN PRESS**’ message or **MCC** call
   R13L ML86B:D
   MMU GN2 SPLY ISOL VLV A – CL (tb-CL)
   cb MNA MMU GN2 SPLY ISOL VLV A – op

ODS Vest

GN2 Xfer Pnl
6. FLOW → CLOSED
   VENT → CLOSED

7. **On MCC GO**

M013Q
ARLK FAN B – OFF
3.107 GENERIC DEPRESS

(JNT OPS/7A - ALL/FIN 2)  Page 1 of 1 page

**NOTE**

**MCC** will provide MET/EVENT and desired pressure values for use in this procedure. Expect possible dP/dT Klaxon alarm during depress.

MO10W 1. $\sqrt{14.7}$ CABIN REG INLET SYS 1, SYS 2 vlv (two) – CL

AW82B 2. AIRLK DEPRESS vlv cap – Vent, remove
      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 ARLK DEPRESS vlv – CL
      Install ARLK DEPRESS vlv cap

<table>
<thead>
<tr>
<th>MET/EVENT</th>
<th>DESIRED PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This Page Intentionally Blank
WARNING
Terminate all WCS activity during repress.

NOTE
MCC will provide MET/EVENT and desired pressure values for use in this procedure

1. Reset H/W C&W limits per Table 1.

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C&amp;W CHL</th>
<th>ENA/INH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN O2 FLOW 1</td>
<td>14</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN O2 FLOW 2</td>
<td>24</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>54</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>64</td>
<td>INH</td>
</tr>
</tbody>
</table>

2. Contact MCC-H for uplink of SM ALERT limit resets via TMBU, if desired.

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN O2 FLOW 1</td>
<td>0612105</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN O2 FLOW 2</td>
<td>0612205</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>0612553</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>0612554</td>
<td>INH</td>
</tr>
<tr>
<td>SM ALERT</td>
<td></td>
<td>LO EU</td>
</tr>
<tr>
<td>H2O LOOP ICH OUT T 1</td>
<td>0612744</td>
<td>33.0</td>
</tr>
<tr>
<td>2</td>
<td>0612724</td>
<td>33.0</td>
</tr>
</tbody>
</table>

L2 3. O2/N2 CNTLR VLV SYS 1 – OP (N2) 2 – AUTO

MO10W 4. O2 REG INLET SYS 2 vlv – OP

5. 14.7 CAB REG INLET SYS 1 vlv – OP

6. On MCC GO
   14.7 CABIN REG INLET SYS 2 vlv – OP

7. SM 66 ENVIRONMENT
   CRT When CABIN PRESS = desired pressure
   MO10W 14.7 CAB REG INLET SYS 1,SYS 2 vlv (two) – CL

<table>
<thead>
<tr>
<th>MET/Event</th>
<th>Desired Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. If required
   Go to PCS 1(2) CONFIG (FDF: ORB OPS, ECLS).

   If not required
   MO10W O2 REG INLET SYS 2 vlv – CL
   L2 O2/N2 CNTLR VLV SYS 2 – CL (O2)

9. Reset H/W C&W limits per Table 4.

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C&amp;W CHL</th>
<th>ENA/INH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN O2 FLOW 1</td>
<td>14</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN O2 FLOW 2</td>
<td>24</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>54</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>64</td>
<td>ENA</td>
</tr>
</tbody>
</table>

10. Contact **MCC-H** for uplink of SM ALERT limit resets via TMBU, if desired.

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN O2 FLOW 1</td>
<td>0612105</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN O2 FLOW 2</td>
<td>0612205</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>0612553</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>0612554</td>
<td>ENA</td>
</tr>
<tr>
<td>SM ALERT</td>
<td></td>
<td>LO EU</td>
</tr>
<tr>
<td>H2O LOOP ICH OUT T 1</td>
<td>0612744</td>
<td>35.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0612724</td>
</tr>
</tbody>
</table>
NOTE
1. Tables below provide parameter FDA that will be changed prior to Orbiter Depress/Repress.
2. MCC will reset software limits via TMBU.

C&W CONFIGURATION
1. Reset H/W C&W limits per table.

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C&amp;W CHL</th>
<th>ENA/INH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN PRESS</td>
<td>4</td>
<td>INH</td>
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<tr>
<td>CABIN O2 FLOW 1</td>
<td>14</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN O2 FLOW 2</td>
<td>24</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN PPO2 A</td>
<td>34</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN PPO2 B</td>
<td>44</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>54</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>64</td>
<td>INH</td>
</tr>
<tr>
<td>CABIN FAN Δ P</td>
<td>74</td>
<td>INH</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN PRESS</td>
<td>0612405</td>
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</tr>
<tr>
<td>CABIN O2 FLOW 1</td>
<td>0612105</td>
<td></td>
</tr>
<tr>
<td>CABIN O2 FLOW 2</td>
<td>0612205</td>
<td></td>
</tr>
<tr>
<td>CABIN PPO2 A</td>
<td>0612511</td>
<td></td>
</tr>
<tr>
<td>CABIN PPO2 B</td>
<td>0612513</td>
<td></td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>0612553</td>
<td></td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>0612554</td>
<td></td>
</tr>
<tr>
<td>CABIN FAN Δ P</td>
<td>0612556</td>
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</tr>
<tr>
<td>SM ALERT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV BAY FAN Δ P 1</td>
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<td></td>
</tr>
<tr>
<td>AV BAY FAN Δ P 2</td>
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<td></td>
</tr>
<tr>
<td>AV BAY FAN Δ P 3</td>
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</tr>
<tr>
<td>IMU FAN Δ P</td>
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<td></td>
</tr>
<tr>
<td>CABIN Airlk P</td>
<td>0640101</td>
<td></td>
</tr>
<tr>
<td>EXT Airlk P</td>
<td>0640126</td>
<td></td>
</tr>
<tr>
<td>CABIN O2 CONC</td>
<td>0922104</td>
<td></td>
</tr>
</tbody>
</table>

If Spacehab present

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH CAB PRESS</td>
<td>0472008</td>
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</tr>
<tr>
<td>SH CAB PPO2 - 1</td>
<td>0472012</td>
<td></td>
</tr>
<tr>
<td>SH CAB PPO2 - 2</td>
<td>0472113</td>
<td></td>
</tr>
</tbody>
</table>
3.109 CONFIGURE C&W FOR INGRESS/DEPRESS/REPRESS

3. Reset H/W C&W.

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C&amp;W CHL</th>
<th>ENA/INH</th>
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<tbody>
<tr>
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<td>CABIN PPO2 B</td>
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<td>ENA</td>
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</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>64</td>
<td>ENA</td>
</tr>
<tr>
<td>CABIN FAN ∆ P</td>
<td>74</td>
<td>ENA</td>
</tr>
</tbody>
</table>

4. Contact MCC to TMBU the following parameters to the appropriate values.

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN PRESS</td>
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<td></td>
</tr>
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<td></td>
</tr>
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<td>0612205</td>
<td></td>
</tr>
<tr>
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<td>0612511</td>
<td></td>
</tr>
<tr>
<td>CABIN PPO2 B</td>
<td>0612513</td>
<td></td>
</tr>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>0612553</td>
<td></td>
</tr>
<tr>
<td>CABIN N2 FLOW 2</td>
<td>0612554</td>
<td></td>
</tr>
<tr>
<td>CABIN FAN ∆ P</td>
<td>0612556</td>
<td></td>
</tr>
<tr>
<td>SM ALERT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV BAY FAN ∆ P 1</td>
<td>0612642</td>
<td></td>
</tr>
<tr>
<td>AV BAY FAN ∆ P 2</td>
<td>0612647</td>
<td></td>
</tr>
<tr>
<td>AV BAY FAN ∆ P 3</td>
<td>0612658</td>
<td></td>
</tr>
<tr>
<td>IMU FAN ∆ P</td>
<td>0612869</td>
<td></td>
</tr>
<tr>
<td>CABIN AIRLK P</td>
<td>0640101</td>
<td></td>
</tr>
<tr>
<td>EXT AIRLK P</td>
<td>0640126</td>
<td></td>
</tr>
<tr>
<td>CABIN O2 CONC</td>
<td>0922104</td>
<td></td>
</tr>
</tbody>
</table>

If Spacehab present

<table>
<thead>
<tr>
<th>B/U C&amp;W</th>
<th>PARAM ID</th>
<th>VALVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH CAB PRESS</td>
<td>0472008</td>
<td></td>
</tr>
<tr>
<td>SH CAB PPO2 - 1</td>
<td>0472012</td>
<td></td>
</tr>
<tr>
<td>SH CAB PPO2 - 2</td>
<td>0472113</td>
<td></td>
</tr>
</tbody>
</table>
OBJECTIVE:
Transfer mated stack attitude control from ISS to orbiter. Verify orbiter is in Free Drift, configure ISS to Free Drift, then assume mated stack control with orbiter.

1. **VERIFYING ORBITER NOT IN CONTROL**
   - C3(A6) \(\checkmark\) DAP configured per DOCKED CONFIGURATION DAP REFERENCE (FDF: ORB OPS, REBOOST/DAP)
   - If ALT DAP required
     - \(\checkmark\) MCC
     - \(\checkmark\) DAP: FREE
   - O14:F RJDA 1A L2/R2 MANF DRIVER – OFF
   - O16:F Pri RJD LOGIC (eight) – ON
   - \(\checkmark\) MCC FOR GO TO POWER UP Pri DRIVERS
     - Pri RJD DRIVER (eight) – ON
   - RJD MANF L5/F5/R5 DRIVER – ON

   Orbiter \(\Rightarrow\) ISS, MCC-H, “Shuttle ready to begin controlling attitude of Mated Stack.”

2. **GNC COMMAND RESPONSE COUNTERS RESET**
   - PCS MCG: GNC Command Response Counters
   - GNC Command Response Counters
   - sel Reset
   - Verify the Since Reset column values are all blank.

   Do not close this window until the procedure is complete.

   If while executing a command, the Command Accept counter on that display does not increment
   - Reselect GNC Command Response Counters to determine if a command was rejected.

   \(\checkmark\) MCC-H

3. **DETERMINING DESIRED MOMENTUM CONFIGURATION**
   - The following information will be determined via ground call or OSTP.
     - Drift Reference Frame
     - Drift Momentum Vector X
     - Drift Momentum Vector Y
     - Drift Momentum Vector Z
**NOTE**

1. CMG 2 IG/OG angles have a known bias of -1.3/24.7 deg, respectively.

2. The PCS displays show a Software (S/W) and Firmware (F/W) value for the Current Angle. The S/W value is the angle with the calculated bias for CMG 2.

3. The S/W value is calculated by subtracting the bias from the Commanded Angle. If the Calculated Angle is greater than a magnitude of 180, then 360 is subtracted to obtain Current Angle.

CMG 1 IG/OG Angles, deg: ____/_____
CMG 2 IG/OG Angles, deg: ____/_____
CMG 3 IG/OG Angles, deg: ____/_____
CMG 4 IG/OG Angles, deg: ____/_____ 

**4. VERIFYING INITIAL ATTITUDE CONTROL CONFIGURATION AND REMOVING INHIBITS**

PCS

MCS Configuration

MCS Moding

Verify US GNC Mode – CMG TA
Verify RS SUDN Mode – CMG TA
Verify RS Control – Slave

‘Attitude’

Verify Att Mnvr In Prog – No

‘MCS Moding’

sel Drift

Drift

**5. MODING US GNC FROM CMG TA TO DRIFT**

Drift

‘Momentum Servo’

**NOTE**

The purpose of this command is to change the Momentum Servo Reference Frame. Ignore the momentum vector components.
If Drift Reference Frame from step 3 is Inertial

\[
\text{cmd Inertial } 0,0,0
\]

Verify Commanded Drift Reference Frame – Inertial

If Drift Reference Frame from step 3 is Body

\[
\text{cmd Body } 0,0,0
\]

Verify Commanded Drift Reference Frame - Body

If Drift Reference Frame from step 3 is LVLH

\[
\text{cmd LVLH } 0,0,0
\]

Verify Commanded Drift Reference Frame - LVLH

‘Moding’

Verify US Drift Available – Yes

\[
\text{cmd Mode to Drift}
\]

Verify US GNC Mode – Drift

ISS(MCC-H) ⇒ orbiter, “ISS is in Free Drift.”

6. ASSUMING CONTROL WITH ORBITER

If orbiter airlock pressure ≥ 2.44 psi

\[
\text{C3(A6) DAP: LVLH}
\]

If attitude is to be held in Inertial or XPOP

\[
\text{DAP: INRTL}
\]

\[
\text{GNC UNIV PTG}
\]

When rates are < 0.1 degrees/second/axis

\[
\text{DAP: AUTO}
\]

C3(A6)

If orbiter airlock pressure < 2.44 psi, perform RATE DAMPING FROM FREE DRIFT, (FDF: ORB OPS, REBOOST/DAP), then:

Orbiter ⇒ ISS, MCC-H, “Shuttle has established attitude control.”
7. CONFIGURING US GNC AFTER HANDOVER

7.1 Moding US GNC to UDG and Positioning the CMG Gimbals

If CMG gimbal angles are to be updated, per step 3
MCG: MCS Configuration: UDG

**UDG**

**cmd** Mode to UDG

Verify US GNC Mode - UDG

MCG: CMG Configuration: Gimbal Angles

**CMG Gimbal Angles**

input CMG 1 Angles
  IG deg: (as recorded in step 3)
  OG deg: (as recorded in step 3)

**cmd** Set

Verify IG, OG Cmd Angle, deg – as commanded
Verify IG, OG Current Angle S/W, deg – moving to commanded targets

input CMG 2 Angles
  IG deg: (as recorded in step 3)
  OG deg: (as recorded in step 3)

**cmd** Set

Verify IG, OG Cmd Angle, deg – as commanded
Verify IG, OG Current Angle S/W, deg – moving to commanded targets

input CMG 3 Angles
  IG deg: (as recorded in step 3)
  OG deg: (as recorded in step 3)

**cmd** Set

Verify IG, OG Cmd Angle, deg – as commanded
Verify IG, OG Current Angle S/W, deg – moving to commanded targets

input CMG 4 Angles
  IG deg: (as recorded in step 3)
  OG deg: (as recorded in step 3)
3.110 HANDOVER ATTITUDE CONTROL CMG TA TO ORBITER

cmd Set
- Verify IG, OG Cmd Angle, deg – as commanded
- Verify IG, OG Current Angle S/W, deg – moving to commanded targets

* If the gimbals stop moving before the commanded angles are reached, repeat Set Angles command.

Verify CMG 1(2,3,4) IG, OG Current Angle S/W, deg – as commanded
Verify CMG 1(2,3,4) Gimbals in Position – Yes
Verify CMG 1(2,3,4) IG, OG Rate, deg/s – 0.0,0.0

7.2 Updating US Momentum Servo Reference Frame and Momentum Vector

NOTE
If only two CMGs are available in drift mode, (0,0,0) momentum vector cannot be commanded per IFI-01143.

If a momentum bias is required
MCG: MCS Configuration: Drift 'Momentum Servo'
- input Drift Reference Frame – (from step 3)
- input Drift Momentum Vector X – (from step 3)
  Y – (from step 3)
  Z – (from step 3)

cmd Set
- Verify Commanded Drift Reference Frame – as commanded
- Verify Commanded Drift Momentum Vector X – as commanded
  Y – as commanded
  Z – as commanded

8. REPLACING INHIBITS TO PREVENT MODING

PCS
MCG: MCS Configuration: MCS Inhibits

cmd Mode Transition Inhibit (Verify – Inh)
cmd Attitude Maneuver Inhibit (Verify – Inh)
cmd Desat Request Inhibit (Verify – Inh)
cmd Att Cntl Shutdown Inhibit (Verify – Inh)
OBJECTIVE:
To switch mated stack attitude control responsibility from orbiter to ISS.

1. **GNC COMMAND RESPONSE COUNTERS RESET**
   PCS
   MCG: GNC Command Response Counters
   GNC Command Response Counters
   sel Reset
   Verify the Since Reset column values are all blank.
   Do not close this window until the procedure is complete.
   If while executing a command, the Command Accept counter on that
display does not increment
   Reselect GNC Command Response Counters to determine if a
command was rejected.

2. **VERIFYING INITIAL ATTITUDE CONTROL CONFIGURATION – FREE DRIFT**
   PCS
   MCG: MCS Configuration
   MCS Configuration
   ‘MCS Moding’
   Verify US GNC Mode – Drift (UDG)
   Verify RS SUDN Mode – CMG TA (Indicator)
   ‘MCS ORU Status’
   Verify Min ORUs Avail – Yes
   ‘Data Source and Quality’
   Verify the following information
   
   **US Quality**
   Attitude Valid (Valid RS) (Degraded)
   Rate Valid (Valid RS) (Degraded)
   State Vector Valid (Valid RS) (Degraded)

3. **VERIFYING DESAT ABORT STATUS**
   ‘Desat Information’
   sel Manual CMG Desat
   Manual CMG Desat
   ‘Desaturation Commands’
If Abort In Progress – Yes

**cmd** Clear Desat Abort

Verify Abort in Progress – No

4. **DETERMINING REQUIRED CCDB INFORMATION**

Determine from OSTP or from **MCC-H** the CCDB information required for moding.

If this information is not recorded elsewhere, record it below

| Version ID | __________ |
| Cntl Type  | __________ |
| Ref Frame  | __________ |
| Cmd Att Y  | __________ |
| P          | __________ |
| R          | __________ |
| Slot #     | __________ |

5. **RS PREPARING FOR CMG TA**

If RS Control – Master

**MCC-M**

**YBT F1_45** Remove inhibit for change of Master

**MCC-M** ⇒ **MCC-H**, “Inhibit has been removed.”

6. **PREPARING THRUSTERS FOR CMG DESAT**

**PCS**

MCG: MCS Configuration

|MCS Configuration|

‘MCS Moding’

**sel CMG TA**

**CMG TA**

If Thrusters Available for CMG Desat – No

**cmd** RS Prepare Thrusters for CMG Desat

**NOTE**

The following signal may take up to 5 minutes to occur.

Verify Thrusters Available for CMG Desat – Yes

7. **REMOVING INHIBITS TO ENABLE MODING**

**cmd** Mode Transition Enable (Verify – Ena)

**cmd** Attitude Maneuver Enable (Verify – Ena)

**cmd** Desat Request Enable (Verify – Ena)

**ISS(MCC-H)** ⇒ orbiter, “ISS ready to begin controlling attitude of Mated Stack.”
8. PLACING ORBITER INTO FREE DRIFT
   DAP: FREE
   Orbiter ⇒ ISS, MCC-H, “Shuttle is in Free Drift.”

9. MODING FROM FREE DRIFT TO CMG TA
   PCS
   ‘Mode to CMGTA using’
   For CCDB Slot # [X] identified in step 4
   cmd CCDB Slot [X]
   Verify Active CCDB Source Slot – as commanded
   Verify US GNC Mode – CMG TA
   Verify RS GNC Mode – CMG TA
   ISS (MCC-H) ⇒ orbiter, “ISS has assumed attitude control.”

10. REPLACING RS SUDN INHIBITS TO PREVENT MODING
    If MCC-M commanding was performed in step 5
    MCC-M
    YBT F1_46 Inhibit for change of Master – as needed
    YBT F1_82 Remove Indicator flag RS Mode – as needed
    MCC-M ⇒ MCC-H, “Inhibit for change of master has been set.”

11. REPLACING US INHIBITS TO PREVENT MODING
    NOTE
    Desat Request remains enabled to permit automatic desaturation of the CMGs.

12. RETURNING ORBITER TO NOMINAL CONFIGURATION
    If ALT DAP, return to Group B powerdown
    O14, PRI RJD DRIVER, LOGIC (sixteen) OFF
    O15, RJDA-1A L2/R2 MANF DRIVER – ON
OBJECTIVE:
This procedure defines the steps needed to Auto Route/Deroute the orbiter video signal to/from the station.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The user will need to coordinate with the shuttle team before starting this procedure. Each section can be performed separately. Steps 1 to 10 Auto Route Steps 11 to 13 Deroute Steps 14 to 15 Reconnecting VTR cables</td>
</tr>
</tbody>
</table>

1. CHECKING VIDEO ROUTING SOFTWARE

PCS

C&T: Video

Video Overview

Verify Video Software – Enable (Green)

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If the user is not planning to use Orbiter Video Channel 1 (DCP 92), then skip to step 7.</td>
</tr>
<tr>
<td>2. Due to the wiring problem discovered on flight 5A.1, a jumper cable has been installed to cable W322P1 in order to get video to and from the orbiter.</td>
</tr>
</tbody>
</table>

2. CONNECTING ORBITER VIDEO LINE CHANNEL1 (DCP 92)

CM1

LAS5 Rack Interface Panel

If the VTR bypass cables are to be used

Perform \{15.160 VTR BYPASS CABLE - NOMINAL DOCKED OPERATIONS (LAB1S5/CUP RWS)\}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:

If VTR bypass cables are not used

2.1 Cable W1190P1 \(\leftrightarrow\) Connector J37 (on the left)/(VTR2 to CVIU 6)  

2.2 Orbiter Video Cable W0400P1 \(\rightarrow\) J37 Connector (Orbiter Video Channel1/CVIU6)

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>When the user does an auto route, select VTR2 in order to receive the orbiter video signal.</td>
</tr>
</tbody>
</table>

3. AUTO ROUTING VIDEO SIGNAL FROM ORBITER CH1

PCS

C&T: Video

Video Overview

‘Video Routing Status’
3.112 VDS SHUTTLE AUTO ROUTE - DEROUTE
(JNT OPS/LF1 - ALL/FIN/SPN)  Page 2 of 5 pages

sel (Destination Button)

(Destination Button)
‘Full Screen Routing’

pick Source ID – 2 4 (VTR 2)
cmd Set

Video Overview
‘Last Attempted Route’

NOTE
Depending on the type of route requested, the user may have to
wait up to one minute before seeing In Progress go to done.

Verify Progress – Done
Verify Status – Valid Path

4. AUTO ROUTING VIDEO SIGNAL TO THE ORBITER
C&T: Video: VTR2
‘VTR 2 Routing Status’

sel VTR2/Orbiter Ch 1

VTR 2
‘Full Screen Routing’

pick Source ID – [XX] where [XX] is the source ID
cmd Set

Video Overview
‘Last Attempted Route’

NOTE
Depending on the type of route requested, the user may have to
wait up to one minute before seeing In Progress go to done.

Verify Progress – Done
Verify Status – Valid Path

5. POWERING ON COMMON VIDEO INTERFACE UNIT 6
PCS
C&T: Video: CVIU
‘VSU 2’

sel CVIU 6

RPCM_LAS52A3B_A_RPC_06
6. **COORDINATING VIDEO SIGNAL**

**CM1**

6.1 Check that orbiter team has completed routing the video signal.

6.2 Check that (VTR2) Orbiter Channel 1 has been routed.

**NOTE**

If the user is not planning to use Orbiter Video Channel 2 (DCP 91), then skip to step 11.

7. **CONNECTING ORBITER VIDEO LINE CHANNEL 2 (DCP 91)**

**CM1**

If the VTR bypass cables are to be used

Perform {15.170 VTR BYPASS CABLE - NOMINAL DOCKED OPERATIONS (LAB1P5/LAB RWS) STS VIEW}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:

If VTR bypass cables are not used

7.1 Cable Connector W1290P1 ←|→ J37 (on the left)/(VTR1 to CVIU 3)

7.2 Orbiter Video Cable W3356P1 →|← J37 Connector (Orbiter Video Channel2/CVIU3)

8. **AUTO ROUTING VIDEO SIGNAL FROM ORBITER CH2**

**PCS**

C&T: Video

Video Overview

‘Video Routing Status’

sel (Destination Button)

(Destination Button)

‘Full Screen Routing’

pick Source ID – 2 3 (VTR 1)

**cmd** Set

Video Overview

‘Last Attempted Route’

**NOTE**

Depending on the type of route requested, the user may have to wait up to one minute before seeing In Progress go to done.

Verify Progress – Done
Verify Status – Valid Path
9. **POWERING ON COMMON VIDEO INTERFACE UNIT 3**

PCS

C&T: Video

<table>
<thead>
<tr>
<th>Video CVIU</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘VSU 1’</td>
</tr>
</tbody>
</table>

sel CVIU 3

RPCM LAP51A4A A RPC 06

**cmd**

RPC Position – Close (Verify – Cl)

10. **COORDINATING VIDEO SIGNAL**

CM1

10.1 Check that orbiter team has completed routing the video signal.

10.2 Check that (VTR1) Orbiter Channel 2 has been routed.

11. **CHECKING DESTINATION**

PCS

C&T: Video

<table>
<thead>
<tr>
<th>Video Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Video Routing Status’</td>
</tr>
</tbody>
</table>

Verify (Destination: Source) – Not blank

12. **DEROUTING VIDEO SIGNAL**

PCS

C&T: Video

<table>
<thead>
<tr>
<th>Video Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Video Routing Status’</td>
</tr>
</tbody>
</table>

sel (Destination Button)

<table>
<thead>
<tr>
<th>(Destination Button)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Deroute Video Signal’</td>
</tr>
</tbody>
</table>

**cmd** Deroute

<table>
<thead>
<tr>
<th>Video Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Last attempted Route’</td>
</tr>
</tbody>
</table>

Verify Progress – Done

‘Video Routing Status’

Verify (Destination: Source) – blank
13. **POWERING OFF COMMON VIDEO INTERFACE UNIT**
   
   If Orbiter Channel 2 was used
   
   **PCS**
   
   C&T: Video: CVIU
   
   Video CVIU
   
   ‘VSU 1’
   
   sel CVIU 3
   
   **RPCM LAP51A4A A RPC 06**
   
   **cmd** RPC Position – Open (Verify – Op)
   
   If Orbiter Channel 1 was used
   
   **PCS**
   
   C&T: Video: CVIU
   
   Video CVIU
   
   ‘VSU 2’
   
   sel CVIU 6
   
   **RPCM_LAS52A3B_A_RPC_06**
   
   **cmd** RPC Position – Open (Verify – Op)

14. **RECONNECTING VTR1**
   
   LAP5 Rack Interface Panel
   
   If the VTR bypass cables were used
   
   Perform {15.150 VTR BYPASS CABLE - UNDOCKED OPERATIONS (LAB1P5/LAB RWS)}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:
   
   If VTR bypass cables were not used
   
   14.1 Orbiter Video Cable W3356P1 ←|→ J37 Connector (Orbiter Video Channel2/CVIU3)
   
   14.2 VTR Cable Connector W1290P1 →|← J37 (on the left)/(VTR1 to CVIU 3)

15. **RECONNECTING VTR2**
   
   LAS5 Rack Interface Panel
   
   If the VTR bypass cables were used
   
   Perform {15.140 VTR BYPASS CABLE - UNDOCKED OPERATIONS (LAB1S5/CUP RWS)}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:
   
   If VTR bypass cables were not used
   
   15.1 Orbiter Video Cable W0400P1 ←|→ J37 Connector (Orbiter Video Channel1/CVIU6)
   
   15.2 VTR Cable Connector W1190P1 →|← J37 (on the left)/(VTR2 to CVIU 6)
OBJECTIVE:
This procedure defines the steps needed to manually route/deroute the orbiter video signal to the station.

NOTE
1. The user will need to coordinate with the Shuttle Team before starting this procedure. Each section can be completed separately.
   Steps 1 to 8 Manual Route
   Steps 9 to 11 Manual Deroute
   Steps 12 to 13 Reconnecting VTR Cables

2. If the user is not planning to use Orbiter Channel 1, then go to step 5.

1. CONNECTING ORBITER VIDEO LINE CHANNEL 1

   CM1
   LAS5 Rack Interface Panel

   If the VTR bypass cables are to be used
   Perform {15.160 VTR BYPASS CABLE - NOMINAL DOCKED OPERATIONS (LAB1S5/CUP RWS)}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:

   If VTR bypass cables are not used
   1.1 VTR2 Cable W1190P1 ←|→ J37 Connector (VTR2 to CVIU 6)
   1.2 Orbiter Video Cable W0400P1 →|← J37 Connector (Orbiter Video Channel1/CVIU6)

   NOTE
   When the user does a manual route, select VTR 2 to receive the orbiter video signal.

2. ROUTING VIDEO SIGNAL

   Refer to {2.603 VDS MANUAL ROUTE - DEROUTE}, all (SODF: C&T: NOMINAL: VIDEO), then:

3. POWERING ON COMMON VIDEO INTERFACE UNIT 6

   PCS
   C&T: Video: CVIU
   Video CVIU
   ‘VSU 2’
   sel CVIU 6

   RPCM_LAS52A3B_A_RPC_06

   cmd RPC Position – Close (Verify – Cl)
4. **COORDINATING VIDEO SIGNAL**
   CM1
   4.1 Check that Orbiter Team has completed routing the video signal.

   4.2 Check that (VTR2) Orbiter Channel 1 has been routed.

   **NOTE**
   If the user is not planning to use Orbiter Channel 2, then skip to step 9.

5. **CONNECTING ORBITER VIDEO LINE CHANNEL2**
   CM1
   LAP5 Rack Interface Panel
   If the VTR bypass cables are to be used
   Perform {15.170 VTR BYPASS CABLE - NOMINAL DOCKED OPERATIONS (LAB1P5/LAB RWS) STS VIEW}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:

   If VTR bypass cables are not used
   5.1 VTR1 Cable Connector W1290P1 ←|→ J37 Connector (VTR1 to CVIU 3)

   5.2 Orbiter Video Cable Connector W3356P1 →|← J37 Connector (Orbiter Video Channel2/CVIU3)

   **NOTE**
   When the user does a manual route, select VTR 1 to receive the shuttle video signal.

6. **ROUTING VIDEO SIGNAL**
   Refer to {2.603 VDS MANUAL ROUTE - DEROUTE}, all (SODF: C&T: NOMINAL: VIDEO), then:

7. **POWERING ON COMMON VIDEO INTERFACE UNIT 3**
   PCS
   C&T: Video: CVIU
   Video CVIU
   `VSU 1`
   sel CVIU 3
   
   **RPCM LAP51A4A A RPC06**
   cmd RPC Position – Close (Verify – Cl)

8. **COORDINATING VIDEO SIGNAL**
   CM1
   8.1 Check that Orbiter Team has completed routing the video signal.

   8.2 Check that (VTR1) Orbiter Channel 2 has been routed.
9. CHECKING DESTINATION

PCS

C&T: Video

  Video Overview
  ‘Video Routing Status’
  ‘Destination’

Verify (Destination: Source) – (not blank)

NOTE
When the user does a manual deroute, select either VTR 1 or VTR 2 to remove the shuttle video signal.

10. DEROUTING VIDEO SIGNAL

Refer to {2.603 VDS MANUAL ROUTE - DEROUTE} (SODF: C&T: NOMINAL: VIDEO), then:

11. POWERING OFF COMMON VIDEO INTERFACE UNIT

If Orbiter Ch 2 was used

PCS

C&T: Video: CVIU

  Video CVIU
  ‘VSU 1’

  sel CVIU 3

  RPCM LAP51A4A A RPC06

    cmd RPC Position – Open (Verify – Op)

If Shuttle Ch 1 was used

C&T: Video: CVIU

  Video CVIU
  ‘VSU 2’

  sel CVIU 6

  RPCM_LAS52A3B_A_RPC_06

    cmd RPC Position – Open (Verify – Op)
12. **RECONNECTING VTR1**

LAP5 Rack Interface Panel

If the VTR bypass cables were used

Perform {15.150 VTR BYPASS CABLE - UNDOCKED OPERATIONS (LAB1P5/LAB RWS)}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:

If VTR bypass cables were not used

12.1 Orbiter Video Cable Connector W3356P1 ←|→ J37 Connector (Orbiter Video Channel2/CVIU3)

12.2 VTR Cable Connector W1290P1 →|← J37 (VTR1 to CVIU 3)

13. **RECONNECTING VTR2**

LAS5 Rack Interface Panel

If the VTR bypass cables were used

Perform {15.140 VTR BYPASS CABLE - UNDOCKED OPERATIONS (LAB1S5/CUP RWS)}, all (SODF: P/TV GEN: VIDEO CONFIGURATIONS: VTR BYPASS), then:

If VTR bypass cables were not used

13.1 Orbiter Video Cable Connector W0400P1 ←|→ J37 Connector (Orbiter Video Channel1/CVIU6)

13.2 VTR Cable Connector W1190P1 →|← J37 (VTR2 to CVIU 6)
OBJECTIVE:
Equipment setup and reconfigure oxygen system in preparation for performing oxygen transfer from the shuttle cryo oxygen system to the ISS Airlock oxygen tanks using the Oxygen Recharge Compressor Assembly (ORCA).

TOOLS AND EQUIPMENT REQUIRED:
(NOD1P4_D)
GO2 Transfer Flex Hose Assy  P/N V857-643003-002
ORCA O2 Outlet Line   P/N 683-51901-19

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

(NOD1D4_G2)
ISS IVA Toolbox
Drawer 2:
  5/32" Hex Head, 1/4" Drive
  Driver Handle, 1/4" Drive
Drawer 3:
  Inspection Mirror

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

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

          If required, remove panel A/L1A2.

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

A/L1A2  1.3 Unfasten blue ESSS cover fasteners.
          Cover is located ovhd aft of IV Hatch (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
          Temporarily stow ESSS cover panel.

          1.4 Unfasten A/L1A2 closeout panel fasteners (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
          Temporarily stow A/L1A2 Closeout Panel.
3.115 OXYGEN TRANSFER SETUP
(JNT OPS/X2R4 - ALL/FIN 7/SPN/HC) Page 2 of 7 pages

2. CONFIGURING ISS O2 SYSTEM

A/L1OA2

2.1 VL009 (O2 Lo P) → CLOSED

A/L1A2

2.2 √VL011 (O2 Xover Vlv) – CLOSED

PCS

2.3 Airlock: ECLSS: Oxygen System

   AL Oxygen System

   ‘O2 Low Pressure Supply Valve’

   √Actual Position – Open

   ‘O2 Hi Pressure Supply Valve’

   √Actual Position – Closed

3. REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT

NOTE

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

2. As the O2 system pressure bleeds down and O2 is introduced into the cabin, the following messages may be received:

   ‘O2 Lo P Supply Pressure Low – A/L’
   ‘PCA O2 Line Pressure Low – A/L’
   ‘PCA O2 Line Pressure Low – LAB’

3. The messages will return to normal as the O2 system is repressurized (step 6).

PCS

Airlock: ECLSS: Oxygen System

   AL Oxygen System

   ‘AL PCA O2 Intro Valve’

   cmd Open (√Position – Open)

   ‘Low Pressure’

   When PCA O2 Line Press < 160 kPa (23 psi) or On MCC-H GO, proceed.

   ‘AL PCA O2 Intro Valve’

   cmd Close (√Position – Closed)
4. CONFIGURING PMA/ODS FOR O2 TRANSFER

4.1 FLOW – CLOSED

4.2 Don ear plugs

4.3 VENT → OPEN

4.4 Check GO2 Xfer Panel Pressure Gauge reading ~0 psi.
   Doff ear plugs

---

### WARNING
Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don ear plugs.

---

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

4.6 Don Powder-Free Gloves.

---

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

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

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

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

---

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

    Install hose so that it can be routed along the ODS Flange as shown in Figure 1.
3.115 OXYGEN TRANSFER SETUP
(JNT OPS/X2R4 - ALL/FIN 7/SPN/HC)  Page 4 of 7 pages

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

Cover caps and plugs.

PMA 4.8 Uncap Oxygen Recharge QD.
Close GO2 Transfer Flex Hose Assy straight-end QD.
Remove plug.
Inspect both QDs for debris.

GO2 Transfer Flex Hose Assy straight-end →|← Oxygen Recharge QD
Hard mate/open QD.

Cover caps and plugs.

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

ODS Vest GO2 Xfer Panel 4.10 VENT → CLOSED

4.11 Doff Gloves.

Figure 1.- ODS Vestibule Xfer Panel Hose Routing.

5. CONFIGURING ORCA FOR O2 TRANSFER

PCS 5.1 Airlock: ECLSS: ORCA
RPCM AL1A4A B RPC 18
√RPC Position – Op
√Close Cmd – Inh
5.2 Don new pair of Powder-Free Gloves.

A/L1OA2 5.3 Close O2 Recharge Line QD.
O2 Recharge Line ← SPARE QD

Cover SPARE QD temporarily (Cap from QD011 will be used as a permanent cover in step 5.6.)

ORCA 5.4 Uncap O2 IN
Inspect both QDs for debris.

O2 Recharge Line → O2 IN
Hard mate/open QD.

Cover caps.

CAUTION
ORCA O2 Outlet Line QDs are keyed differently on each end. The hose has arrows near the QDs that indicate O2 flow direction. The flow direction through the hose is out of the ORCA and into QD011. Failure to install the hose correctly may result in damage to the QDs and hose.

5.5 Uncap O2 OUT.
Close ORCA O2 Outlet Line (MW ORCA OUT) QD.
Remove plug.
Inspect both QDs for debris.

ORCA O2 Outlet Line (MW ORCA OUT) ← O2 OUT
Hard mate/open QD.

Cover caps and plugs.

A/L1OA2 5.6 Uncap QD011.
Close ORCA O2 Outlet Line (MW QD011) QD.
Remove plug.
Inspect both QDs for debris.

ORCA O2 Outlet Line (MW QD011) ← QD011
Hard mate/open QD.

Cover caps and plugs.
Use cap from QD011 to cover SPARE QD.

5.7 Doff Gloves.

A/L1OA2 5.8 Unstow ORCA Power Cable and remove cap.
3.115 OXYGEN TRANSFER SETUP
(JNT OPS/X2R4 - ALL/FIN 7/SPN/HC)

ORCA 5.9 ORCA Power Cable →|← MAIN POWER

A/L1OA1 5.10 √Flexible Ventilation Duct (TO IMV AIR RETURN/CONDITIONED AIR
SUPPLY) →|← Conditioned Air Supply connection

ORCA 5.11 Disengage spring-loaded locking pin to remove the cap, then:

Flexible Ventilation Duct (TO ORCA/OPEN CABIN) →|← ORCA
Flexible Ventilation Duct (TO ORCA/OPEN CABIN) →|← Locked

6. VERIFYING O2 TRANSFER SYSTEM PRESSURE INTEGRITY
6.1 √MCC-H to verify proper cryo configuration

ODS Vest 6.2 FLOW → OPEN
GO2 Xfer Panel

Middeck 6.3 Verify EMU O2 ISOL VLV – OPEN
Floor

6.4 Wait 5 minutes.

PCS 6.5 Airlock: ECLSS: Oxygen System

AL Oxygen System

‘Low Pressure’

Verify Supply Press > 4482 kPa (650 psi)

AL ECLSS

‘Equipment Lock’

Verify dP/dt < 0.05 mmHg/min

6.6 Notify MCC-H, “Oxygen Transfer Setup complete.”

6.7 √MCC-H to determine which oxygen tank to recharge

If transferring to the High Pressure Tank, go to {3.116 HIGH
PRESSURE TANK O2 TRANSFER} (SODF: JNT OPS:
MATED OPERATIONS).

If transferring to the Low Pressure Tank, go to {3.117 LOW
PRESSURE TANK O2 TRANSFER} (SODF: JNT OPS:
MATED OPERATIONS).
**3.115 OXYGEN TRANSFER SETUP**

In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To "soft-latch," the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

**VIEW B**

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

**VIEW C**

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

**VIEW D**

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

---

**Figure 2.** Two-Stage High-Pressure QDs.

**Figure 3.** High-Pressure QDs.
OBJECTIVE:
Transfer oxygen from the shuttle cryo oxygen system to the ISS Airlock high pressure oxygen tank using the Oxygen Recharge Compressor Assembly (ORCA).

NOTE
MCC-H will nominally perform step 1 from the ground.

1. CONFIGURING AL CCAA FOR ORCA OPS
MCC-H
1.1 To raise the AL CCAA Fan speed to 5950 rpm and to set the Cabin temperature to 18°C in step 1.5, perform [2.503 CCAA FAN SPEED CHANGE] (SODF: ECLSS: NOMINAL: THC), then:

PCS
1.2 C&W Summ
[Caution & Warning Summary]
‘Event Code Tools’

sel Enable

[Enable an Event]

input Event Code – 6 7 0 3 (AL1A1 CCAA Inoperative-A/L)

cmd Execute

2. INITIATING O2 TRANSFER
2.1 Verify with MCC-H that step 1 is complete, then:

ML86B:C
2.2 \( cb \) MNB EXT AIRT HTR LN ZN 1,2 (two) – cl
\( \sqrt{ } \) STRUC Z1/2/3 – cl
\( \sqrt{ } \) VEST Z1/2/3 – cl
\( \sqrt{ } \) MNA EXT AIRT HTR LN ZN 1,2 (two) – op
\( \sqrt{ } \) STRUC Z1/2/3 – op
\( \sqrt{ } \) VEST Z1/2/3 – op

If ‘S88 H2O LOOP 1(2) TEMP’ message is received at any time during oxygen transfer, immediately perform the following

L1
H2O PUMP LOOP 1 – ON

Contact MCC-H.

If comm is not available, perform step 3 to terminate O2 transfer.

A/L1OA2
2.3 \( \sqrt{ } \) VL009 (O2 Lo P) – CLOSED

A/L1A2
2.4 VL011 (O2 Xover Vlv) → OPEN

A/L1OA2
2.5 \( \sqrt{ } \) VL010 (O2 Hi P) – OPEN
3.116 HIGH PRESSURE TANK O2 TRANSFER
(JNT OPS/X2R4 - ALL/FIN 8/HC)  Page 2 of 3 pages

ORCA Status Panel

2.6 Verify RPCM ON LED – ■
sw PUMP CONTROL → RUN

2.7 Report Cycle Counter reading to MCC-H.

PCS

2.8 Airlock: ECLSS: ORCA
RPCM AL1A4A B RPC 18
‘Close Cmd’

**cmd** Enable (√Close Cmd – Ena)
‘RPC Position’

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

2.9 Airlock: ECLSS: Oxygen System
AL Oxygen System
‘High Pressure’

*On MCC-H GO* or when Supply Press ~16548 kPa (2400 psi),
proceed to step 3.

3. TERMINATING O2 TRANSFER

PCS

3.1 Airlock: ECLSS: ORCA
RPCM AL1A4A B RPC 18
‘RPC Position’

**cmd** Open (√RPC Position – Op)
‘Close Cmd’

**cmd** Inhibit (√Close Cmd – Inh)

A/L1A2

3.2 VL011 (O2 Xover Vlv) → CLOSED

PCS

3.3 C&W Summ

[Caution & Warning Summary]
‘Event Code Tools’

sel Supress

[Suppress Annunciation of an Event]

input Event Code – 6 7 0 3 (AL1A1 CCAA Inoperative-A/L)

**cmd** Arm

**cmd** Execute

15 FEB 05 132
3.4 Report to MCC-H, “High Pressure Tank O2 Transfer complete.”

On MCC-H GO, perform 3.118 OXYGEN TRANSFER TEARDOWN or perform 3.121 PREBREATHE USING SHUTTLE O2 SETUP (POST O2 TRANSFER) (SODF: JNT OPS: MATED OPERATIONS), then:

If LOS, and AOS not expected within 10 minutes, go to 3.118 OXYGEN TRANSFER TEARDOWN, steps 1 and 2 only (SODF: JNT OPS: MATED OPERATIONS).
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OBJECTIVE:
Transfer oxygen from the shuttle cryo oxygen system to the ISS Airlock low pressure oxygen tank using the Oxygen Recharge Compressor Assembly (ORCA).

NOTE
MCC-H will nominally perform step 1 from the ground.

1. CONFIGURING AL CCAA FOR ORCA OPS
MCC-H
1.1 To raise the AL CCAA Fan speed to 5950 RPM and to set the Cabin temperature to 18° C in step 1.5, perform {2.503 CCAA FAN SPEED CHANGE} (SODF: ECLSS: NOMINAL: THC), then:

PCS
1.2 C&W Summ

2. INITIATING O2 TRANSFER
2.1 Verify with MCC-H that step 1 is complete, then:

ML86B:C 2.2 √cb MNB EXT AIRLK HTR LN ZN 1,2 (two) – cl
√STRUC Z1/2/3 – cl
√VEST Z1/2/3 – cl
√cb MNA EXT AIRLK HTR LN ZN 1,2 (two) – op
√STRUC Z1/2/3 – op
√VEST Z1/2/3 – op

If ‘S88 H2O LOOP 1(2) TEMP’ message is received at any time during oxygen transfer, immediately perform the following:

L1 H2O PUMP LOOP 1 – ON
Contact MCC-H.

If comm is not available, perform step 3 to terminate O2 transfer.

A/L1A2 2.3 √VL011 (O2 Xover Vlv) – CLOSED

A/L1OA2 2.4 VL009 (O2 Lo P) → OPEN

ORCA Status Panel
2.5 Verify RPCM ON LED –

sw PUMP CONTROL → RUN

10 JAN 05 135
3.117 LOW PRESSURE TANK O2 TRANSFER
(JNT OPS/X2R4 - ALL/FIN 6/HC)  Page 2 of 3 pages

2.6 Report Cycle Counter reading to MCC-H.

PCS 2.7 Airlock: ECLSS: ORCA
RPCM AL1A4A B RPC 18
‘Close Cmd’

**cmd** Enable (√Close Cmd – Ena)

‘RPC Position’

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

2.8 Airlock: ECLSS: Oxygen System
AL Oxygen System
‘Low Pressure’

When Supply Press ~16548 kPa (2400 psi) or
On MCC-H GO, proceed to step 3.

3. TERMINATING O2 TRANSFER

PCS 3.1 Airlock: ECLSS: ORCA
RPCM AL1A4A B RPC 18
‘RPC Position’

**cmd** Open (√RPC Position – Op)

‘Close Cmd’

**cmd** Inhibit (√Close Cmd – Inh)

A/L1OA2 3.2 VL009 (O2 Lo P) → CLOSED

3.3 C&W Summ
[Caution & Warning Summary]
‘Event Code Tools’

sel Suppress

[Suppress Annunciation of an Event]

input Event Code – 6 7 0 3 (AL1A1 CCAA Inoperative-A/L)

**cmd** Arm
**cmd** Execute
3.4 Report to **MCC-H**, “Low Pressure Tank O2 Transfer complete.”

**On MCC-H GO**, perform **3.118 OXYGEN TRANSFER TEARDOWN** or perform **3.121 PREBREATHE USING SHUTTLE O2 SETUP (POST O2 TRANSFER)** (SODF: JNT OPS: MATED OPERATIONS), then:

If LOS, and AOS not expected within 10 minutes, go to

- **3.118 OXYGEN TRANSFER TEARDOWN**, steps 1 and 2 only
  (SODF: JNT OPS: MATED OPERATIONS).
OBJECTIVE:
Return the shuttle and ISS Airlock oxygen systems to their nominal configurations following oxygen transfer using the Oxygen Recharge Compressor Assembly (ORCA).

TOOLS AND EQUIPMENT REQUIRED
(A/L1O1)
- Powder-Free Gloves
- Teflon Bags P/N 300045-08
- Clean Room Tape P/N 3M/1251
- Flashlight
- Ear Plugs

(NOD1D4_G2)
- ISS IVA Toolbox
  - Drawer 2: 5/32" Hex Head, 1/4" Drive
  - Driver Handle, 1/4" Drive
  - Drawer 3: Inspection Mirror

1. RECONFIGURING ISS O2 SYSTEM
   A/L1OA2 1.1 √VL009 (O2 Lo P) – CLOSED
   A/L1A2 1.2 √VL011 (O2 Xover Vlv) – CLOSED
   ORCA 1.3 Verify RPCM ON LED – ■
   1.4 sw PUMP CONTROL → STOP/RESET
   1.5 Report Cycle Counter reading to MCC-H.

2. REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT
   NOTE
   1. When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.
   2. As the O2 system pressure bleeds down and O2 is introduced into the cabin, the following messages may be received:
      ‘O2 Lo P Supply Pressure Low – A/L’
      ‘PCA O2 Line Pressure Low – A/L’
      ‘PCA O2 Line Pressure Low – LAB’
   3. These messages will return to normal as the O2 system is repressurized (step 4).
3.118 OXYGEN TRANSFER TEARDOWN

3.118 OXYGEN TRANSFER TEARDOWN

Middeck Floor

2.1 EMU O2 ISOL VLV → CLOSED

**WARNING**
Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don ear plugs.

2.2 Don ear plugs.

ODS Vest GO2 Xfer Panel

2.3 VENT → OPEN

2.4 Check GO2 Xfer Panel Pressure Gauge reading ~0 psi. Doff ear plugs.

PCS

2.5 Airlock: ECLSS: Oxygen System

[AL Oxygen System]
‘O2 Low Pressure Supply Valve’

√Actual Position – Open

‘AL PCA O2 Intro Valve’

_cmd Open (√Position – Open)

‘Low Pressure’

When PCA O2 Line Press < 160 kPa (23 psi) or On MCC-H GO, proceed.

‘AL PCA O2 Intro Valve’

_cmd Close (√Position – Closed)

ODS Vest GO2 Xfer Panel

2.6 VENT → CLOSED

2.7 FLOW → CLOSED

3. RECONFIGURING ORCA

ORCA

3.1 Disengage spring-loaded locking pin, then:
Flexible Ventilation Duct (TO ORCA/OPEN CABIN) ← Unlocked
Flexible Ventilation Duct (TO ORCA/OPEN CABIN) ←|→ ORCA Cap ORCA connection.

3.2 Place free-end of Flexible Ventilation Duct (TO ORCA/OPEN CABIN) in Crew Lock.

3.3 ORCA Power Cable ←|→ MAIN POWER
3.4 Install cap on ORCA Power Cable.
Stow behind panel A/L1OA2

**WARNING**

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

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

3. All fitting should be inspected for contaminants before mating. If debris is found, \(\text{MCC-H}\).

3.5 Don Powder-Free Gloves.

**NOTE**

QDs must be closed to disconnect lines. As needed, refer to Figure 1 at the end of this procedure for information on the high-pressure quick disconnects.

**ORCA**

3.6 Close O2 Recharge Line QD
O2 Recharge Line \(\leftarrow\) ORCA O2 IN
Inspect for debris.
Install cap on O2 IN.

**NOTE**

To ensure that all seals are engaged, female high pressure QDs should be reopened after the plugs are installed.

**A/L1OA2**

3.7 Remove cap from SPARE QD.
Inspect both QDs for debris.

O2 Recharge Line \(\rightarrow\) SPARE QD
Hard mate/open O2 Recharge Line QD.

3.8 Close ORCA O2 Outlet Line (MW QD011) QD.
ORCA O2 Outlet Line (MW QD011) \(\leftarrow\) QD011
Inspect both QDs for debris.
Install cap on QD011.
Install plug on ORCA O2 Outlet Line (MW QD011).
Open ORCA O2 Outlet Line QD.
3.118 OXYGEN TRANSFER TEARDOWN

3.10 Doff Gloves.

4. VERIFYING ISS O2 SYSTEM PRESSURE INTEGRITY

A/L1A2 4.1 √VL011 (O2 Xover Vlv) – CLOSED
A/L1OA2 4.2 VL009 (O2 Lo P) → OPEN
4.3 √VL010 (O2 Hi P) – OPEN

PCS 4.4 Airlock: ECLSS: Oxygen System
[AL Oxygen System]
‘Low Pressure’

Report Supply Press to MCC-H.

‘High Pressure’
Report Supply Press to MCC-H.

[AL ECLSS]
‘Equipment Lock’

Verify dP/dt < 0.05 mmHg/min

5. CONFIGURING PMA/ODS FOR NOMINAL OPERATIONS

5.1 Don new pair of Powder-Free Gloves.

PMA 5.2 Close GO2 Transfer Flex Hose Assy straight end QD.
GO2 Transfer Flex Hose Assy ←|→ Oxygen Recharge QD

Inspect both QDs for debris.
Install cap on Oxygen Recharge QD.
Install plug on GO2 Transfer Flex Hose Assy.

ODS Vest 5.3 Close GO2 Transfer Flex Hose Assy bent-end QD
GO2 Transfer Flex Hose Assy ←|→ GO2 Xfer Panel QD

Inspect both QDs for debris.
Install cap on GO2 Xfer Panel QD.
Install plug on GO2 Transfer Flex Hose Assy.
5.4 Doff Gloves.

PMA/ODS 5.5 Remove GO2 Transfer Flex Hose Assy from PMA/ODS Extension Duct and ODS Flange.

6. **INSTALLING CLOSEOUT PANELS**

If required

A/L1A2 6.1 Install A/L1A2 Closeout Panel, snug fasteners (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

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

A/L1OA2 6.3 Install A/L1OA2 Closeout Panel, snug fasteners
   (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

6.4 Stow tools and equipment.
   Stow GO2 Transfer Flex Hose Assy and ORCA O2 Outlet Line in NOD1P4_D.
   Stow both hoses as straight as possible.

6.5 Notify **MCC-H**, “Oxygen Teardown complete.”

7. **CONFIGURING AL CCAA FOR NOMINAL OPERATIONS**

| NOTE | MCC-H will nominally perform step 7 from the ground. |

**MCC-H**

To lower the AL CCAA Fan speed to 3400 rpm and to set Cabin Temperature to 22° C in step 1.5, go to **2.503 CCAA FAN SPEED CHANGE** (SODF: ECLSS: NOMINAL: THC).
3.118 OXYGEN TRANSFER TEARDOWN
(JNT OPS/X2R4 - ALL/FIN 8/SPN/HC)  Page 6 of 6 pages

VIEW A
In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To “soft-latch,” the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

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

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

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

Figure 1.- Two-Stage High-Pressure QDs.
OBJECTIVE:
To provide instructions and locations for deploying the Radiation Area Monitors (RAM) throughout ISS and for photographing each newly deployed RAM for ground verification purposes.

PARTS REQUIRED:
Radiation Area Monitors (17)   P/N SEZ 33111519-303   S/N 1298-1314

1. UNSTOW RADIATION AREA MONITORS
Unstow Radiation Area Monitors using the 10Soyuz Resupply List in Unpack List as a reference.

2. EXCHANGE RADIATION AREA MONITORS
2.1 At each deployment site in Table 1 (SM), Table 2 (Node), Table 3 (A/L), or Table 4 (LAB)
   2.1.1 Remove white Radiation Area Monitor from deployed location, but leave the tether at the location.
   Stow white Radiation Area Monitor in Ziplock.
   2.1.2 Retrieve blue Radiation Area Monitor from Ziplock. Verify label corresponds to location decal.
   2.1.3 Attach blue Radiation Area Monitor to corresponding location.
   Attach tether to Radiation Area Monitor
   2.1.4 Take two pictures of the deployed RAM: one close-up picture where the F.O.V. is the RAM and the panel on which its deployed, and one picture where the F.O.V. is further away where the RAM is identifiable in the approximate center of the frame to see the relation to the other panels.
   2.2 Stow Ziplock with white Radiation Area Monitors for return using the 9Soyuz Return List in Unpack List as reference.
2.3 Notify **MCC-H** when Radiation Area Monitor swapout is complete.

### Table 1. Radiation Area Monitor Dosimeter Locations in Service Module

<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 242</td>
<td>Inside Port SM Crew Quarters, Outboard wall aft upper corner</td>
</tr>
<tr>
<td>SM#2</td>
<td>SM - P 442</td>
<td>Inside Starboard SM Crew Quarters, Outboard wall aft upper corner</td>
</tr>
<tr>
<td>SM#3</td>
<td>SM - P 339</td>
<td>Panel 339 aft section behind Treadmill, Upper center part of the panel</td>
</tr>
<tr>
<td>SM#4</td>
<td>SM - P 327</td>
<td>Panel 327, overhead, forward of Treadmill</td>
</tr>
<tr>
<td>SM#5</td>
<td>SM - P 307</td>
<td>Panel 307, TsP overhead, near center</td>
</tr>
<tr>
<td>SM#6</td>
<td>SM - W 14</td>
<td>Window #14, Transfer Compartment Adapter section, Stbd Nadir quadrant</td>
</tr>
<tr>
<td>10S/TEPC</td>
<td>TEPC</td>
<td>Directly on the surface of TEPC Detector</td>
</tr>
</tbody>
</table>

### Table 2. 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>

### Table 3. Radiation Area Monitor Dosimeter locations in Air Lock

<table>
<thead>
<tr>
<th>Dosimeter Number</th>
<th>ISS Interior Location Code</th>
<th>Dosimeter Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>A/L1 AD3</td>
<td>Aft wall low outboard in large section</td>
</tr>
<tr>
<td>#2</td>
<td>A/L1 OF3</td>
<td>Forward wall High outboard in large section</td>
</tr>
</tbody>
</table>

### Table 4. Radiation Area Monitor Dosimeter Locations in LAB

<table>
<thead>
<tr>
<th>Dosimeter Number</th>
<th>ISS Interior Location Code</th>
<th>Dosimeter Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab#1</td>
<td>LAB1 OS6</td>
<td>Starboard side standoff between starboard and ceiling</td>
</tr>
<tr>
<td>Lab#2</td>
<td>LAB1 D3</td>
<td>In the vicinity of the Lab window.</td>
</tr>
<tr>
<td>Lab#3</td>
<td>LAB1 PD2</td>
<td>Port side standoff between Deck and Port Rack</td>
</tr>
<tr>
<td>Lab#4</td>
<td>LAB1 OS0</td>
<td>Forward Closeout Panel starboard upper corner</td>
</tr>
<tr>
<td>Lab#5</td>
<td>LAB1 TESS</td>
<td>Ventilation grille in Temporary Sleep Station (TESS)</td>
</tr>
</tbody>
</table>
Figure 1.- Dosimeter SM#1 and SM#2.
Figure 2.- Dosimeter SM#3 and SM#4.
Figure 3.- Dosimeter SM#5 and SM#6.
Figure 4. - TEPC Detector and RAM.
3.119 RADIATION AREA MONITOR DOSIMETERS - INSTALLATION OF DOSIMETERS ON ISS

Page 7 of 11 pages

Figure 5.- Dosimeter Node 1 #1 and #2.

24 MAR 05
Figure 6.- Dosimeter Node 1 #3 and Airlock #1.
Figure 7.- Airlock Dosimeter and Lab#1.
Figure 8.- Dosimeter Lab#2 and Lab#3.
Figure 9.- Dosimeter Lab#4 and Lab#5.
OBJECTIVE:
Reconfigure equipment setup and oxygen system in preparation for performing EVA prebreathe using shuttle oxygen.

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

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

(NOD1D4_G2)
ISS IVA Toolbox
Drawer 2:
  5/32" Hex Head, 1/4" Drive
  Driver Handle, 1/4" Drive
Drawer 3:
  Inspection Mirror

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

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL011 (O2 Xover Vlv) is behind panel A/L1A2; however, once A/L1OA2 is removed, VL011 can be reached from above. Removal of panel A/L1A2 is at the crew's discretion.</td>
</tr>
</tbody>
</table>

If required, remove panel A/L1A2.

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

A/L1A2  1.3 Unfasten blue ESSS cover fasteners. Cover is located ovhd aft of IV Hatch (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow ESSS cover panel.

1.4 Unfasten A/L1A2 closeout panel fasteners (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow A/L1A2 Closeout Panel.
3.120 PREBREATHE USING SHUTTLE O2 SETUP
(JNT OPS/X2R4 - ALL/FIN 4)  Page 2 of 7 pages

2. CONFIGURING ISS O2 SYSTEM

A/L1OA2  2.1 VL009 (O2 Lo P) → CLOSED

A/L1A2  2.2 √VL011 (O2 Xover Vlv) – CLOSED

PCS  2.3 Airlock: ECLSS: Oxygen System

      AL Oxygen System

      ‘O2 Low Pressure Supply Valve’

      √Actual Position – Open

3. REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT

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

PCS  Airlock: ECLSS: Oxygen System

      AL Oxygen System

      ‘AL PCA O2 Intro Valve’

cmd Open (√Position – Open)

‘Low Pressure’

When PCA O2 Line Press <160 kPa (23 psi) or On MCC-H GO, proceed.

‘AL PCA O2 Intro Valve’

cmd Close (√Position – Closed)

4. CONFIGURING PMA/ODS O2 SYSTEM

ODS Vest  4.1 √FLOW – CLOSED

GO2 Xfer Panel

WARNING

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

4.2 Don ear plugs.
4.3 VENT → OPEN

4.4 Check GO2 Xfer Panel Pressure Gauge reading ~0 psi.
Doff ear plugs.

**WARNING**

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

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

All fittings should be inspected for contaminants before mating. If debris is found, \[\checkmark\text{MCC-H}\].

Inspect GO2 Transfer Flex Hose Assy for any cracks or anomalies. If found, \[\checkmark\text{MCC-H}\].

4.5 Inspect GO2 Transfer Flex Hose Assy for any cracks or anomalies. If found, \[\checkmark\text{MCC-H}\].

4.6 Don powder-free Gloves.

**NOTE**

QDs must be closed to remove plugs and disconnect lines. As needed, refer to Figures 2 and 3 at the end of this procedure for information on the high-pressure quick disconnects.

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

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

GO2 Transfer Flex Hose Assy bent-end →|← GO2 Xfer Panel QD
Hard mate/open QD.
Cover caps and plugs.
3.120 PREBREATHE USING SHUTTLE O2 SETUP
(JNT OPS/X2R4 - ALL/FIN 4) Page 4 of 7 pages

![ODS Vestibule Xfer Panel Hose Routing](image)

Figure 1.- ODS Vestibule Xfer Panel Hose Routing.

PMA 4.8 Uncap Oxygen Recharge QD.
Close GO2 Transfer Flex Hose Assy straight-end QD.
Remove plug.
Inspect both QDs for debris.

GO2 Transfer Flex Hose Assy straight-end →|← Oxygen Recharge QD
Hard mate/open QD.
Cover caps and plugs.

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

ODS Vest 4.10 VENT → CLOSED

GO2 Xfer Panel 4.11 Doff gloves.

5. CONFIGURING THE O2 RECHARGE LINE
5.1 Don new pair of powder-free Gloves.

A/L1OA2 5.2 Close O2 Recharge Line QD.
O2 Recharge Line ←|→ SPARE QD
Cover SPARE QD temporarily (the cap from QD011 will be used as a permanent cover in step 5.3).

5.3 Uncap QD011.
Inspect both QDs for debris.
O2 Recharge Line →|← QD011
Hard mate/open QD.
Use cap from QD011 to cover SPARE QD.
5.4 Doff Gloves.

6. **VERIFYING O2 SYSTEM PRESSURE INTEGRITY**

6.1 √**MCC-H** to verify proper cryo configuration

- **ODS Vest**
  - 6.2 FLOW → OPEN

- **GO2 Xfer Panel**
  - 6.2 FLOW → OPEN

- **Middeck Floor**
  - 6.3 Verify EMU O2 ISOL VLV – OPEN
  - 6.4 Wait 5 minutes.

- **PCS**
  - 6.5 Airlock: ECLSS: Oxygen System
    - AL Oxygen System
    - ‘Low Pressure’
    - Verify Supply Press > 5515 kPa (800 psia).
    - Verify PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia).

  - AL ECLSS
    - ‘Equipment Lock’
    - Verify dP/dt < 0.05 mmHg/min.

- **C-Lk A/L1A0**
  - 6.6 Unstow 60-ft PHA Bag #1.
    - Remove cap from Relief Valve, A/L PBA port.
    - Inspect for debris.
    - Relief Valve of 60-ft PHA Bag #1 →|← A/L PBA port

  - 6.7 Don Mask.

- **PHA mask**
  - 6.8 Mask O2 control → EMERGENCY
    - Momentarily pull Mask away from face.
      - √O2 flow
  - 6.10 Mask O2 control → NORMAL
  - 6.11 Doff Mask.

  - 6.12 Relief Valve of 60-ft PHA Bag #1 ←|→ A/L PBA port
    - Depress Mask O2 control to bleed down line.
    - Install cap on Relief Valve, A/L PBA port.
    - Stow 60-ft PHA Bag #1 in C-Lk.
3.120 PREBREATHE USING SHUTTLE O2 SETUP

7. INSTALLING CLOSEOUT PANELS
   If required

A/L1A2  7.1 Install A/L1A2 Closeout Panel, snug fasteners
         (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

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

A/L1OA2 7.3 Install A/L1OA2 Closeout Panel, snug fasteners
         (Driver Handle 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

    7.4 Stow tools and equipment.

    7.5 Notify MCC-H, “Prebreathe Using Shuttle O2 Setup complete.”
3.120 PREBREATHE USING SHUTTLE O2 SETUP
(JNT OPS/X2R4 - ALL/FIN 4) Page 7 of 7 pages

VIEW A
In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To "soft-latch," the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

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

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

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

Figure 2.- Two-Stage High-Pressure QDs.

Figure 3.- High-Pressure QD.
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OBJECTIVE:
Equipment setup and reconfigure oxygen system in preparation for performing EVA prebreathe using shuttle oxygen. The O2 Transfer Setup is the starting configuration.

TOOLS AND EQUIPMENT REQUIRED
(A/L1O1)
Powder-Free Gloves
Teflon Bags P/N 300045-08
Clean Room Tape P/N 3M/1251
Flashlight
Ear Plugs

(NOD1D4_G2)
ISS IVA Toolbox
Drawer 2:
  5/32" Hex Head, 1/4" Drive
  Driver Handle, 1/4" Drive
Drawer 3:
  Inspection Mirror

1. RECONFIGURING ISS O2 SYSTEM
A/L1OA2  1.1 √VL009 (O2 Lo P) – CLOSED
A/L1A2  1.2 √VL011 (O2 Xover Vlv) – CLOSED
ORCA Status Panel  1.3 Verify RPCM ON LED – ■
1.4 sw PUMP CONTROL → STOP/RESET
1.5 Report Cycle Counter reading to MCC-H.

2. REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT

NOTE
1. When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.
2. As the O2 system pressure bleeds down and O2 is introduced into the cabin, the following messages may be received:
   ‘O2 Lo P Supply Pressure Low - A/L’
   ‘PCA O2 Line Pressure Low - A/L’
   ‘PCA O2 Line Pressure Low - LAB’
3. These messages will return to normal as the O2 system is repressurized (step 4).

14 APR 05
3.121 PREBREATHE USING SHUTTLE O2 SETUP (POST O2 TRANSFER)
(JNT OPS/X2R4 - ALL/FIN 4)  Page 2 of 6 pages

ODS Vest
GO2 Xfer
Panel

2.1 FLOW → CLOSED

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

2.2 Don ear plugs.

2.3 VENT → OPEN

2.4 Check GO2 Xfer Panel Pressure Gauge reading ~0 psi. Doff ear plugs.

PCS

2.5 Airlock: ECLSS: Oxygen System

[AL Oxygen System]
‘O2 Low Pressure Supply Valve’

√Actual Position – Open

‘AL PCA O2 Intro Valve’

cmd Open (✓Position – Open)

‘Low Pressure’

When PCA O2 Line Press < 160 kPa (23 psi) or On MCC-H GO, proceed.

‘AL PCA O2 Intro Valve’

cmd Close (✓Position – Closed)

ODS Vest
GO2 Xfer
Panel

2.6 VENT → CLOSED

3. RECONFIGURING ORCA

ORCA

3.1 Disengage spring-loaded locking pin, then:
Flexible Ventilation Duct (TO ORCA/OPEN CABIN) ↔ Unlocked Flexible Ventilation Duct (TO ORCA/OPEN CABIN) ←|→ ORCA Cap ORCA connection.

3.2 Place free-end of Flexible Ventilation Duct (TO ORCA/OPEN CABIN) in Crewlock.

ORCA

3.3 ORCA Power Cable ←|→ MAIN POWER

3.4 Install cap on ORCA Power Cable and stow behind panel A/L1OA2.
3.121 PREBREATHE USING SHUTTLE O2 SETUP (POST O2 TRANSFER)
(JNT OPS/X2R4 - ALL/FIN 4) Page 3 of 6 pages

WARNING

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

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

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

3.5 Don Powder-Free Gloves.

NOTE
QDs must be closed to disconnect lines. As needed, refer to Figures 1 and 2 at the end of this procedure for information on the high-pressure quick disconnects.

ORCA 3.6 Close O2 Recharge Line QD.

O2 Recharge Line ← | → ORCA O2 IN

Inspect for debris.
Install cap on O2 IN.
Cover O2 Recharge Line QD temporarily.

NOTE
To ensure that all seals are engaged, female high pressure QDs should be reopened after the plugs are installed.

A/L1OA2 3.7 Close ORCA O2 Outlet Line (MW QD011) QD

ORCA O2 Outlet Line (MW QD011) ← | → QD011

Inspect both QDs for debris.
Cover QD011 temporarily.
Install plug on ORCA O2 Outlet Line (MW QD011).
Open ORCA O2 Outlet Line QD.

3.8 Uncover QD011.
Uncover O2 Recharge Line QD.
Inspect for debris.

O2 Recharge Line →|← QD011.
Hard mate/open QD.
3.121 PREBREATHE USING SHUTTLE O2 SETUP (POST O2 TRANSFER)

ORCA  3.9 Close ORCA O2 Outlet Line (MW ORCA OUT) QD
ORCA O2 Outlet Line (MW ORCA OUT) ←→ O2 OUT

- Inspect for debris.
- Install cap on O2 OUT.
- Install plug on ORCA O2 Outlet Line (MW ORCA OUT).
- Open ORCA O2 Outlet Line QD.

3.10 Doff Gloves.

4. VERIFYING ISS O2 SYSTEM PRESSURE INTEGRITY

4.1 √MCC-H to verify proper cryo configuration

ODS Vest GO2 Xfer Panel
4.2 FLOW → OPEN

Middeck Floor
4.3 Verify EMU O2 ISOL VLV – OPEN
4.4 Wait 5 minutes.

PCS
4.5 Airlock: ECLSS: Oxygen System

- AL Oxygen System
  ‘Low Pressure’
  - Verify Supply Press > 5515 kPa (800 psia).
  - Verify PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia).
- AL ECLSS
  ‘Equipment Lock’
  - Verify dP/dt < 0.05 mmHg/min.

C-Lk A/L1A0
4.6 Unstow 60-ft PHA Bag #1.
Remove cap from Relief Valve, A/L PBA port.
Inspect for debris.
Relief Valve of 60-ft PHA Bag #1 PHA →|← A/L PBA port
4.7 Don Mask.

PHA Mask
4.8 Mask O2 control → EMERGENCY
4.9 Momentarily pull Mask away from face.

√O2 flow
4.10 Mask O2 control → NORMAL
4.11 Doff Mask.
4.12 Relief Valve of 60-ft PHA Bag #1 ← A/L PBA port
Depress Mask O2 control to bleed down line.
Install cap on Relief Valve, A/L PBA port.
Stow 60-ft PHA Bag #1 in C-Lk.

5. INSTALLING CLOSEOUT PANELS
If required

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

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

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

5.4 Stow tools and equipment.
   Stow ORCA O2 Outlet Line in NOD1P4_D.
   Stow hose as straight as possible.

5.5 Notify MCC-H, “Prebreathe Using Shuttle O2 Setup (Post O2 Transfer) complete.

6. CONFIGURING AL CCAA FOR NOMINAL OPERATIONS

MCC-H
To lower the AL CCAA Fan speed to 3400 rpm and to set Cabin Temperature to 22° C in step 1.5, go to {2.503 CCAA FAN SPEED CHANGE} (SODF: ECLSS: NOMINAL: THC).
3.121 PREBREATHE USING SHUTTLE O2 SETUP (POST O2 TRANSFER)
(JNT OPS/X2R4 - ALL/FIN 4)  Page 6 of 6 pages

VIEW A
In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To "soft-latch," the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

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

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

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

Figure 1.- Two-Stage High-Pressure QDs.

Figure 2.- High-Pressure QDs.
OBJECTIVE:
Return the shuttle and ISS Airlock oxygen systems to their nominal configurations following EVA prebreathe using shuttle oxygen.

TOOLS AND EQUIPMENT REQUIRED
(A/L1O1)
Powder-Free Gloves
Teflon Bags  P/N 300045-08
Clean Room Tape  P/N 3M/1251
Flashlight
Ear Plugs

(NOD1D4_G2)
ISS IVA Toolbox
Drawer 2:
  5/32" Hex Head, 1/4" Drive
  Driver Handle 1/4" Drive
Drawer 3:
  Inspection Mirror

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

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

If required, remove panel A/L1A2.

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

A/L1A2  1.3 Unfasten blue ESSS cover fasteners.
Cover is located ovhd aft of IV Hatch (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
Temporarily stow ESSS cover panel.

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

2. VERIFYING ISS O2 SYSTEM CONFIGURATION
A/L1OA2  2.1 √VL009 (O2 Lo P) – CLOSED

A/L1A2  2.2 √VL011 (O2 Xover Vlv) – CLOSED
3.122 PREBREATHE USING SHUTTLE O2 TEARDOWN

(JNT OPS/X2R4 - ALL/FIN 4) Page 2 of 5 pages

PCS 2.3 Airlock: ECLSS: Oxygen System

- AL Oxygen System
- 'O2 Low Pressure Supply Valve'

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

### 3. REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.</td>
</tr>
<tr>
<td>2. As the O2 system pressure bleeds down and O2 is introduced into the cabin, expect the following message: ‘O2 Lo P Supply Pressure Low - A/L’</td>
</tr>
<tr>
<td>3. This message will return to normal as the O2 system is repressurized (step 5).</td>
</tr>
</tbody>
</table>

### ODS Vest

3.1 FLOW → CLOSED

**WARNING**

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

3.2 Don ear plugs.

3.3 VENT → OPEN

3.4 √GO2 Xfer Panel Pressure Gauge reading ~0 psi

Doff ear plugs.

3.5 VENT → CLOSED

### 4. DISCONNECTING O2 RECHARGE LINE

**WARNING**

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

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

3. All fittings should be inspected for contaminants before mating. If debris is found, contact MCC-H.
4.1 Don Powder-Free Gloves.

**NOTE**

QDs must be closed to disconnect lines. As needed, refer to Figure 1 at the end of this procedure for information on the high pressure quick disconnects.

4.2 Close O2 Recharge Line QD.

O2 Recharge Line ← QD011 →

4.3 Remove cap from SPARE QD.

Inspect both QDs for debris.

O2 Recharge Line → SPARE QD

Hard mate/open O2 Recharge Line QD.

Cover QD011 with cap from SPARE QD.

4.4 Doff Gloves.

5. **VERIFYING ISS O2 SYSTEM PRESSURE INTEGRITY**

A/L1A2 5.1 √VL011 (O2 Xover Vlv) – CLOSED

A/L1OA2 5.2 VL009 (O2 Lo P) → OPEN

5.3 √VL010 (O2 Hi P) – OPEN

PCS 5.4 Airlock: ECLSS: Oxygen System

AL Oxygen System

‘O2 Low Pressure Supply Valve’

**cmd** Open (√Actual Position – Open)

‘Low Pressure’

Report Supply Press to MCC-H.

‘High Pressure’

Report Supply Press to MCC-H.

AL ECLSS

‘Equipment Lock’

Verify dP/dt < 0.05 mmHg/min.
6. CONFIGURING PMA/ODS FOR NOMINAL OPERATIONS

6.1 Don new pair of Powder-Free Gloves.

6.2 Close GO2 Transfer Flex Hose Assy straight end QD.

   GO2 Transfer Flex Hose Assy ←|→ Oxygen Recharge QD
   
   Inspect both QDs for debris.
   Install cap on Oxygen Recharge QD.
   Install plug on GO2 Transfer Flex Hose Assy.

6.3 Close GO2 Transfer Flex Hose Assy bent-end QD.

   GO2 Transfer Flex Hose Assy ←|→ GO2 Xfer Panel QD
   
   Inspect both QDs for debris.
   Install cap on GO2 Xfer Panel QD.
   Install plug on GO2 Transfer Flex Hose Assy.

6.4 Doff Gloves.

6.5 Remove GO2 Transfer Flex Hose Assy from PMA/ODS Extension Duct and ODS Flange.

7. INSTALLING CLOSEOUT PANELS

If required

A/L1A2

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

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

A/L1OA2

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

7.4 Stow tools and equipment.
   Stow GO2 Transfer Flex Hose Assy in NOD1P4_D.
   Stow hose as straight as possible.

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

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

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

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

Figure 1.- Two-Stage High-Pressure QDs.
OBJECTIVE:
Equipment setup and reconfigure oxygen system in preparation for performing oxygen transfer from the shuttle cryo oxygen system to the ISS Airlock oxygen tanks using the Oxygen Recharge Compressor Assembly (ORCA). The Prebreathe Using Shuttle O2 Setup is the starting configuration.

TOOLS AND EQUIPMENT REQUIRED
(NOD1P4_D)
ORCA O2 Outlet Line  P/N 683-51901-19

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

(NOD1D_G2)
ISS IVA Toolbox
Drawer 2:
  5/32" Hex Head, 1/4" Drive
  Driver Handle 1/4" Drive
Drawer 3:
  Inspection Mirror

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

   NOTE
   To transfer O2 to the High P Tank, access to VL011 (O2 Xover Vlv) is required. VL011 is behind panel A/L1A2; however, once A/L1OA2 is removed, VL011 can be reached from above. Removal of panel A/L1A2 is at the crew's discretion.

   If required, remove panel A/L1A2.

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

   A/L1A2  1.3 Unfasten blue ESSS cover fasteners.
   Cover is located ovhd aft of IV Hatch (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
   Temporarily stow ESSS cover panel.

   1.4 Unfasten A/L1A2 closeout panel fasteners (Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
   Temporarily stow A/L1A2 Closeout Panel.
2. **VERIFYING ISS O2 SYSTEM CONFIGURATION**

   A/L1OA2  2.1 √VL009 (O2 Lo P) – CLOSED

   A/L1A2  2.2 √VL011 (O2 Xover Vlv) – CLOSED

   PCS  2.3 Airlock: ECLSS: Oxygen System

   'O2 Low Pressure Supply Valve'

   cmd Close (√Actual Position – Closed)

3. **REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT**

   **NOTE**
   1. When possible, connection and disconnection of QDs requires adjoining lines to be at approximately ambient pressure on both sides of the QD.
   2. As the O2 system pressure bleeds down and O2 is introduced into the cabin, expect the following message:
      ‘O2 Lo P Supply Pressure Low - A/L’
   3. This message will return to normal as the O2 system is repressurized (step 5).

   ODS Vest  3.1 FLOW → CLOSED

   GO2 Xfer Panel

   **WARNING**
   Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don ear plugs.

   3.2 Don ear plugs.

   3.3 VENT → OPEN

   3.4 Check GO2 Xfer Panel Pressure Gauge reading ~0 psi.
   Doff ear plugs

   3.5 VENT → CLOSED

4. **CONFIGURING ORCA FOR O2 TRANSFER**

   PCS  4.1 Airlock: ECLSS: ORCA

   RPCM AL1A4A B RPC 18

   √RPC Position – Op
   √Close Cmd – Inh
WARNING

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

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

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

4.2 Don Powder-Free Gloves.

NOTE
QDs must be closed to remove plugs and disconnect lines. As needed, refer to Figure 1 and 2 at the end of this procedure for information on the high pressure quick disconnects.

A/L1OA2 4.3 Close O2 Recharge Line QD.

O2 Recharge Line ←|→ QD011
Inspect for debris.
Cover QD011 temporarily.

ORCA 4.4 Uncap O2 IN.
Inspect both QDs for debris.

O2 Recharge Line →|← O2 IN
Hard mate/open QD.
Cover caps.

CAUTION
ORCA O2 Outlet Line QDs are keyed differently on each end. The hose has arrows near the QDs that indicate O2 flow direction. The flow direction through the hose is out of the ORCA and into QD011. Failure to install the hose correctly may result in damage to the QDs and hose.

ORCA 4.5 Uncap O2 OUT.
Close ORCA O2 Outlet Line (MW ORCA OUT) QD.
Remove plug.
Inspect both QDs for debris.

ORCA O2 Outlet Line (MW ORCA OUT) →|← O2 OUT
3.123 O2 TRANSFER SETUP (POST PREBREATHE USING SHUTTLE O2)
(JNT OPS/X2R4 - ALL/FIN 4) Page 4 of 6 pages

Hard mate/open QD.
Cover caps and plugs.

A/L1OA2 4.6 Close ORCA O2 Outlet Line (MW QD011) QD.
Remove plug.
Uncover QD011.
Inspect both QDs for debris.
ORCA O2 Outlet Line (MW QD011) →|← QD011
Hard mate/open QD.
Cover caps and plugs.

4.7 Doff Gloves.

A/L1OA2 4.8 Unstow ORCA Power Cable and remove cap.

ORCA 4.9 ORCA Power Cable →|← MAIN POWER

A/L1OA1 4.10 √Flexible Ventilation Duct (TO IMV AIR RETURN/CONDITIONED AIR SUPPLY) →|← Conditioned Air Supply connection

ORCA 4.11 Disengage spring-loaded locking pin to remove the cap, then:
Flexible Ventilation Duct (TO ORCA/OPEN CABIN) →|← ORCA
Flexible Ventilation Duct (TO ORCA/OPEN CABIN) ∨ Locked

5. VERIFYING O2 TRANSFER SYSTEM PRESSURE INTEGRITY
5.1 √MCC-H to verify proper cryo configuration

ODS Vest 5.2 FLOW → OPEN

GO2 Xfer Panel
Middeck Floor 5.3 Verify EMU O2 ISOL VLV – OPEN

5.4 Wait 5 minutes.

PCS 5.5 Airlock: ECLSS: Oxygen System
[AL Oxygen System]
‘O2 Low Pressure Supply Valve’

cmd Open (√Actual Position – Open)
‘Low Pressure’

Verify Supply Press > 4482 kPa (650 psi).
Verify $dP/dt < 0.05$ mmHg/min.

5.6 Notify MCC-H, “O2 Transfer Setup(Post Prebreathe Using Shuttle O2) complete.”

5.7 $\sqrt{\text{MCC-H}}$ to determine which oxygen tank to recharge

If transferring to the High Pressure Tank, go to [3.116 HIGH PRESSURE TANK O2 TRANSFER], all (SODF: JNT OPS: MATED OPERATIONS).

If transferring to the Low Pressure Tank, go to [3.117 LOW PRESSURE TANK O2 TRANSFER], all (SODF: JNT OPS: MATED OPERATIONS).
3.123 O2 TRANSFER SETUP (POST PREBREATHE USING SHUTTLE O2)
(JNT OPS/X2R4 - ALL/FIN 4)  Page 6 of 6 pages

VIEW A
In the uncoupled position, the release ring is retracted from the mating end of the coupler half. To "soft-latch," the coupler is pushed on to the nipple half. When the soft-latch motion is complete, release ring automatically snaps forward, locking the coupling halves together.

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

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

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

Figure 1.- Two-Stage High-Pressure QDs.

Figure 2.- High-Pressure QDs.
OBJECTIVE:
Provides criteria and support data for use during inspection of a Passive Common Berthing Mechanism (PCBM). This includes elaborating on the criteria and providing examples of debris/damage that has been seen in the past.

**NOTE**
1. If using Camera(s) to perform inspection, use highest zoom possible.

2. If FOD found on MPLM PCBM, refer to Figure 4 for location description and corresponding ACBM bolt number.

3. Even with best available views some small percentage of CBM ring may be hidden behind an alignment guide (this lack of 100% coverage is acceptable risk if no other view is available)

1. Verify Mating corridor clear of obstructions and in expected configuration. Refer to Figure 1.

2. Verify seals and surfaces clear of FOD (debris or damage). The PCBM must be clear of debris or damage/irregularities outside of conditions consistent with historical acceptance. Refer to Figures 2 and 3.

3. Verify the ability for CBM Seals to seal; refer to Figure 2. There must be a very high degree of confidence in the ability of at least one PCBM seal to completely seal against the ACBM interface.

4. If steps 1 to 3 cannot be definitively verified, delay mate for ground assessment.
   
   If steps 1 to 3 are verified, ISS ↓ **MCC-H**, “PCBM Inspection complete.”
CBM Mating Corridor
The Mating Corridor is the area that the ACBM and PCBM move through when the two halves are mated. Note that the two halves may be misaligned up to 5 degrees or so in combined pitch/yaw and also have significant lateral or roll misalignments.

There should be no loose items near the sealing surface or the alignment features since these are contact surfaces. During a mating MLI should be restrained and back below the seals/sealing surfaces.

The image below provides a good indication of a “clean” PCBM in the nominal expected configuration for a mating event.

The entire 360° of PCBM ring should be inspected, however if viewing at an angle (as in photo below) small portions of the ring may be obstructed (by CBM Alignment guides, etc). This is considered acceptable.

MPLM being moved in for mating with Node 1 (Flight 5A.1)

PMA3 being moved in for mating with Node 1 (Flight 3A)

Figure 1.- CBM Mating Corridor Examples
Seals and FOD
(Debris or Damage)
In general there should be no debris on the seals or seal interface and no damage (dings into metal, etc.).

Any FOD must be photo documented for ground assessment.

In some cases Flight rules may allow to press with mating if “soft” or stringy type FOD goes across one of the three seal beads (accept loss of pressure redundancy for one flight, especially if an MPLM and not permanent module).

Metallic or “hard” FOD can cause damage to the ACBM which will jeopardize not only this specific mating, but all future mates to that port.

Each seal has a thin coat of Braycote-601 lubricant which may look white when light is reflected on it. This lubricant is a nominal feature.

“Interlock Joint” between the four sections of the CBM Gasko-Seal

Gasko Seal Beads are shaped into a groove (not an O-Ring)

CBM Nut: Gap around Nut allows motion to accommodate Powered Bolt and Nut misalignments

Two Inner Silicon Seal Beads - (~0.044” tall)

Outer Silicon Seal Bead (~0.05” tall)

Thermal Plunger

Alignment Cone (Alignment Pin from ACBM mates into this slot)

Typical type MLI Velcro’d and butts right up to seal surface

In some cases Flight rules may allow to press with mating if “soft” or stringy type FOD goes across one of the three seal beads (accept loss of pressure redundancy for one flight, especially if an MPLM and not permanent module).

Metallic or “hard” FOD can cause damage to the ACBM which will jeopardize not only this specific mating, but all future mates to that port.

Each seal has a thin coat of Braycote-601 lubricant which may look white when light is reflected on it. This lubricant is a nominal feature.

“Interlock Joint” between the four sections of the CBM Gasko-Seal

Gasko Seal Beads are shaped into a groove (not an O-Ring)
### History

Only one FOD event recorded for PCBM:

This case does not fall under the judgment of acceptable FOD per the procedure. No pre-mate inspection was performed.

FOD was compressed between the ACBM and PCBM during UF-2 and possibly previous mates. Ground inspection of MPLM after UF-2 revealed hard metallic FOD on seals and substrate. Material was confirmed to be Starblast (sandblasting residue from the Pad at KSC). While not clear when and how, it got onto the passive CBM prior to launch (some CBCS and other imagery support fact that FOD arrived with UF-2 MPLM, but cannot be determined conclusively).

Images below show the FOD and the resulting damage to metal substrate.

From image below on left, one can see FOD particles also on the side of the seal facing the CBM vestibule (vestibule on right side of this image). During the demate some small (< 5mmHg) pressure is still in the CBM vestibule and can blow FOD out across the seals and ring surface.

<table>
<thead>
<tr>
<th>FOD during post UF-2 MPLM PCBM ground inspection [size ~.2&quot; (5mm) across]</th>
<th>Image once FOD removed shows pitting on metal substrate.</th>
</tr>
</thead>
</table>

Figure 3.- History of PCBM FOD
NOTE

PCBM nut numbers shown in red (based on KSC nut numbering system). Blue numbers show the corresponding Active CBM Bolt Numbers. MPLM coordinate frame are for ground reference.

Figure 4.- MPLM Passive CBM as Viewed from the Shuttle Aft Flight Deck.
### SHUTTLE TOOLS AND EQUIPMENT REQUIRED

None

### ISS TOOLS AND EQUIPMENT REQUIRED

- Dry Wipes
- Kapton Tape (P/N 7648A32)
- Rubber Gloves
- 10" Adjustable Wrench
- Docking Mechanism Accessory Kit
- APAS Hatch Tool
- Cleaning Pads
- APAS Hatch Cover
- Docking Target Standoff Cross Bag
- Docking Target Base Plate Cover
- 1-1/2" Open End Wrench

### TERMINATING IMV FLOW

1. **PMA2**
   - Open grille cover.

2. **MO13Q**
   - ARLK FAN A(B) – OFF

3. **PCS**
   - **DEACTIVATING LAB IMV FWD STBD FAN**

   | US Lab: ECLSS: IMV Fwd Stbd Fan | LAB IMV Fwd Stbd Fan |

   **NOTE**
   
   Upon IMV Fan deactivation, rpm sensor registers 0 volts. MDM conversion translates 0 volts (0 counts) to $7164 \pm 50$ rpm. Reference 2A SPN 8437.

3.1 **‘Off’**

- **cmd** Arm (√Arm Status – Armed)
- **cmd** Off (√State – Off)

3.2 **sel** RPCM LA2B B RPC 09

   ‘RPC Position’

   **NOTE**
   
   A ‘?’ may temporarily appear in the RPC data field. This is due to Shuttle ODS Booster Fan generating flow through the IMV duct and causing IMV fan rotation and back EMF.

   - **cmd** Open (√RPC Postion – Op)
4. CLOSING LAB IMV FWD STBD VALVE

   US Lab: ECLSS: IMV Fwd Stbd Vlv
   LAB IMV Fwd Stbd Valve
   ‘Close’

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

   √Position – In Transit

   Wait 25 seconds, then:

   √Position – Closed

5. DEACTIVATING LAB IMV FWD STBD VALVE

   5.1 ‘Inhibit’

   **cmd** Arm (√Arm Status – Armed)
   **cmd** Inhibit (√State – Inhibited)

   5.2 sel RPCM LA1B B RPC 16

   ‘RPC Position’

   **cmd** Open (√RPC Position – Op)

CONFIGURING IMV DUCTING

Ext A/L 6. Disconnect PMA/ODS Interface Duct Segment from halo inlet flex duct.

PMA2 7. Stow free-end of PMA/ODS Interface Duct Segment on PMA2 Handrail.

Ext A/L 8. Connect external A/L halo inlet flex duct to halo cross duct with T-handle clamp.

MO13Q 9. AIRLK FAN A(B) – ON

   √Airflow at halo

10. INSTALLING DOCKING TARGET

   **CAUTION**
   Donning of rubber gloves required in handling of Docking Target Standoff Cross and Docking Target Base Plate.

   10.1 Release Hatch from PMA APAS Hatch Standoff.

   10.2 Secure Hatch Standoff to PMA handrail.
10.3 Remove APAS Hatch Cover.  
Stow cover securely in PMA.

10.4 Remove Docking Target Base Plate Cover from Target Base Plate.  
Stow cover in PMA2.

10.5 Remove Docking Target Standoff Cross from Standoff Cross Bag.  
Stow Standoff Cross Bag in PMA2.

**NOTE**
Ensure key on Standoff Cross shaft is aligned with key-way on mating receptacle, and insert shaft until collar bottoms out on receptacle surface.

10.6 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 capnut (not recessed).

10.7 Ensure jamnut is positioned onto smaller, non-threaded diameter of Docking Target Base Plate receptacle.

Rotate capnut and tighten very firmly onto receptacle (10" Adjustable Wrench, 80-100 in-lbs design torque)

Thread jamnut onto receptacle, rotating until contact with capnut occurs.

While maintaining a torque on capnut, firmly tighten jamnut against capnut (1-1/2" Open End Wrench, 80-100 in-lbs design torque).

10.8 Stow 10" Adjustable Wrench in NOD1D4 G2.  
Stow Docking Mechanism Accessory Kit in PMA.

**CLOSING ODS HATCH**

11. Close ODS Hatch per decal.

12. √ EQUAL VLV (two) – OFF, capped

**PMA2**

13. **CLOSING APAS HATCH**

13.1 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 tool 3 to 4 turns in direction of ‘3ATP’ (Close) arrow until tool clicks.

PMA2 13.2 APAS EQUAL VLV – CL

14. **EGRESSING PMA**

**WARNING**

PMA remains unventilated and should not be considered a habitable module. Restrict activity in PMA to stowage only.

Lab Fwd 14.1 Perform {1.1.521 U.S. HATCH SEAL INSEPECTION} (SODF: ISS IFM: COMMON: PREVENTIVE/S&M), then Close Lab Fwd Hatch per decal.

14.2 Report to MCC-H, “ISS Interim Egress complete.”
4.102 SHUTTLE/ISS DUCT REMOVAL AND HATCH CLOSING
(JNT OPS/7A - ALL/FIN 6) Page 1 of 4 pages

SHUTTLE TOOLS AND EQUIPMENT REQUIRED
None

ISS TOOLS AND EQUIPMENT REQUIRED
Rubber Gloves
Hatch Assembly P/N 683-60425

PMA2
Docking Mechanism Accessory Kit
   APAS Hatch Tool
   Cleaning Pads
APAS Hatch Cover
Docking Target Standoff Cross Bag
Docking Target Base Plate Cover
1-1/2" Open End Wrench

Braycote
Face O-Ring
Bore O-Ring
Kapton Tape P/N 7648A32
Dry Wipe

ISS IVA Toolbox
Drawer 1:
   10" Long Adjustable Wrench
Drawer 2:
   Ratchet, 1/4" Drive
   7/16" Deep Socket, 1/4" Drive
   (10-50 in-lbs) Trq Wrench, 1/4" Drive

TERMINATING IMV
MO13Q
1. Airlk Fan A(B) – Off

PCS
2. Deactivating Lab IMV Fwd Stbd Fan
   LAB: ECLSS: IMV Fwd Stbd Fan
   Lab IMV Fwd Stbd Fan

   NOTE
   Upon IMV Fan deactivation, rpm sensor register 0 volts.
   MDM conversion translates 0 volts (0 counts) to 7164 ± 50 rpm. Reference 2A SPN 8437.

2.1 ‘Off’
   cmd Arm (√Status – Armed)
   cmd Off (√State – Off)
   √Speed, rpm: 7164 ± 50

2.2 sel RPCM LA2B B RPC 09

RPCM LA2B B RPC 09
NOTE
A “?” may temporarily appear in the RPC data field. This is due to Shuttle ODS Booster Fan generating flow through the IMV duct and causing IMV fan rotation and back EMF.

CMD Open (√RPC Position – Op)

3. Closing Lab IMV Fwd Stbd Valve

Lab IMV Fwd Stbd Valve

3.1 ‘Close’

CMD Arm (√Status – Armed)

CMD Close

Wait 25 seconds, then:

√Position – Closed

3.2 ‘Inhibit’

CMD Arm (√Status – Armed)

CMD Inhibit (√State – Inhibited)

3.3 sel RPCM LA1B B RPC 16

RPCM LA1B B RPC 16

CMD Open (√RPC Position – Op)

WARNING
The PMA is unventilated at this time. Limit the amount of time spent in the PMA to the minimum required to complete the egress tasks.

REMOVING PMA/ODS DUCTING

Ex A/L 4. Disconnect PMA/ODS Interface Duct Segment from halo inlet flex duct.

PMA2 5. Stow free-end of PMA/ODS Interface Duct Segment on PMA2 handrail.

Ex A/L 6. Connect external A/L halo inlet flex duct to halo cross duct with T-handle clamp.

MO13Q 7. AIRLK FAN A(B) – ON

√Airflow at halo
8. Install crosshair per numbered position

9. For each docking light
   - Remove locking pin.
   - Install docking light.
   - Install locking pin.
   - Remove outlet cap.
   - Connect cable.

10. INSTALLING DOCKING TARGET

    CAUTION
    When handling the Docking Target Standoff Cross or the Docking Target Base Plate, rubber gloves should be worn.

    PMA2 10.1 Release Hatch from PMA APAS Hatch Standoff.
         Secure Hatch Standoff to PMA handrail.
         Remove APAS Hatch Cover.
         Stow cover securely in PMA.

    10.2 Remove Docking Target Base Plate Cover from Target Base Plate.
        Stow cover in PMA2.
        Remove Docking Target Standoff Cross from Standoff Cross Bag.
        Stow Standoff Cross Bag in PMA2.

        NOTE
        Ensure key on Standoff Cross shaft is aligned with key-way on mating receptacle, and insert shaft until collar bottoms out on receptacle surface.

    10.3 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).

    10.4 Ensure jam nut is positioned onto smaller, non-threaded diameter of Docking Target Base Plate receptacle.

        Rotate cap nut and tighten very firmly onto receptacle (10" Adjustable Wrench, 80-100 in-lbs design torque).

        Thread jam nut onto receptacle, rotating until contact with cap nut occurs.

        While maintaining a torque on cap nut, firmly tighten jam nut against cap nut (1-1/2" Open End Wrench, 80-100 in-lbs design torque).

    10.5 Stow 10" Adjustable Wrench in NOD1 D4_G2.
        Stow Docking Mechanism Accessory Kit in PMA.
11. **CLOSING ODS HATCH**

ODS Hatch

Close ODS Hatch per decal.

12. (√) EQUAL VLV (two) – OFF, capped

13. **PERFORM CO2 ABSORBER REPLACEMENT (CUE CARD)**

14. **CLOSING APAS HATCH**

PMA2


Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on Hatch Tool. Insert tool in hatch socket (ensure fully seated). Rotate tool 3 to 4 turns in direction of ‘ЗАТР’ (Close) arrow until tool clicks.

PMA2

14.2 APAS EQUAL VLV → CL

15. **REMOVING PMA/LAB DUCTING**

15.1 PMA2 air duct jumper ←|→ Lab Fwd Stbd IMV flange, leaving V-band clamp on flange (Ratchet, 7/16" Deep Socket.)

15.2 IMV cap ←|→ PMA2 launch restraint, leaving V-band clamp on flange (Ratchet, 7/16" Deep Socket.)

15.3 PMA2 air duct jumper →|← PMA2 launch restraint. Secure with V-band clamp (Ratchet, 7/16" Deep Socket.) Secure rest of flex duct to Closeout with Velcro Straps (two places).

15.4 Remove face and bore O-Rings on IMV Cap. Clean cap (Dry Wipe) Don rubber gloves. Lubricate new O-Rings with Braycote. Install O-Rings on IMV Cap.

15.5 IMV cap →|← Lab Fwd Stbd IMV flange, torque V-Band clamp to 35 in-lb (Ratchet, 7/16" Deep Socket, (10-50 in-lbs) Trq Wrench).

15.6 Doff rubber gloves.

16. **CLOSING LAB FWD HATCH**

Lab Fwd

16.1 (√) All loose equipment removed from PMA2

16.2 Perform {1.1.521 U.S. HATCH SEAL INSPECTION}, all (SODF: ISS IFM: COMMON: PREVENTIE/S&M), then: Close LAB Fwd Hatch per decal. (√) MPEV – CLOSED, capped

16.3 Report to MCC-H, “LAB Forward Hatch closed.”

16.4 Install Hatch Enclosure Assembly (Velcro at 10 places)
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

7. Check with ISS crew to verify that PMA2 APAS Hatch and Equalization Valve are closed before proceeding.

8. √MCC-H for a go to depress

   VEST DEP VLV SYS 1(SYS 2) VENT ISOL → OP (tb–OP)
   VENT → OP (tb–OP)

   If depressurizing the Vest only
   Wait 5 minutes.

   If depressurizing the Vest and PMA
   Wait 15 minutes.

   ************************************************************
   * If orbiter dP/dT or O2(N2) Flow Hi alarm during depress
   * VEST DEP VLV SYS 1(SYS 2)
   * VENT, VENT ISOL (two) → CL (tb-CL)
   ************************************************************

9. VEST DEP VLV SYS 1(SYS 2) VENT → CL (tb–CL)

   **NOTE**
   Following a 10-minute thermal stabilization period, MCC-H will perform a 20-minute ODS Hatch and PMA APAS Hatch leak check (for Vest only depress), or a 30-minute ODS Hatch and Lab Fwd Hatch leak check (if depressurizing the Vest and PMA).

10. On MCC-H GO
    VEST DEP VLV SYS 1(SYS 2) VENT → OP (tb-OP)
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OBJECTIVE:
This procedure is required to configure the orbiter and ISS for the booster fan bypass. This will allow deactivation of the booster fan to save cryo O2.

SHUTTLE TOOLS AND EQUIPMENT REQUIRED
None

ISS TOOLS AND EQUIPMENT REQUIRED
Rubber Gloves
Hatch Enclosure Assembly  P/N 683-60425

PMA2
Docking Mechanism Accessory Kit
  APAS Hatch Tool
  Cleaning Pads
APAS Hatch Cover
Docking Target Standoff Cross Bag
Docking Target Base Plate Cover
1-1/2” Open End Wrench
Braycote
Face O-Ring
Bore O-Ring
Kapton Tape  P/N 7648A32
Dry Wipe

ISS IVA Toolbox
Drawer 1:
  10” Long Adjustable Wrench
Drawer 2:
  Ratchet, 1/4” Drive
  7/16” Deep Socket, 1/4” Drive
  (10-50 in-lbs) Trq Wrench, 1/4” Drive

1. TERMINATING IMV
  1.1 Deactivating Lab IMV Fwd Stbd Fan

NOTE
Upon IMV Fan deactivation, rpm sensor register 0 volts. MDM conversion translates 0 volts (0 counts) to 7164 ± 50 rpm. Reference 2A SPN 8437.

1.1.1 ‘Off’

  cmd Arm (√Status – Armed)
  cmd Off (√State – Off)

�Speed, rpm:  7164 ± 50
1.1.2 sel RPCM LA2B B RPC 09

RPCM LA2B B RPC 09

NOTE
A “?” may temporarily appear in the RPC data field. This is due to Shuttle ODS Booster Fan generating flow through the IMV duct and causing IMV fan rotation and back EMF.

**cmd** Open (\sqrt{RPC Position – Op})

2. CLOSING LAB IMV FWD STBD VALVE

PCS

US Lab: ECLSS: IMV Fwd Stbd Vlv
Lab IMV Fwd Stbd Valve

2.1 ‘Close’

**cmd** Arm (\sqrt{Status – Armed})
**cmd** Close
Wait 25 seconds.
\sqrt{Position – Closed}

2.2 ‘Inhibit’

**cmd** Arm (\sqrt{Status – Armed})
**cmd** Inhibit (\sqrt{State – Inhibited})

2.3 sel RPCM LA1B B RPC 16

RPCM LA1B B RPC 16

**cmd** Open (\sqrt{RPC Position – Op})

**WARNING**
The PMA is unventilated at this time. Limit the amount of time spent in the PMA to the minimum required to complete the egress tasks.

3. REMOVING PMA/ODS DUCTING

Ext A/L

3.1 Disconnect PMA/ODS Interface Duct Segment from halo inlet flex duct.

PMA2

3.2 Stow free-end of PMA/ODS Interface Duct Segment on PMA2 handrail.

Ext A/L

3.3 Connect external A/L halo inlet flex duct to halo inlet with T-handle clamp.

\sqrt{Airflow at halo}
3.4 Install crosshair per numbered position.

ODS Vestibule

3.5 For each docking light
   Remove locking pin.
   Install docking light.
   Install locking pin.
   Remove outlet cap.
   Connect cable.

4. INSTALLING DOCKING TARGET

CAUTION
When handling the Docking Target Standoff Cross or the Docking Target Base Plate, rubber gloves should be worn.

PMA2

4.1 Release Hatch from PMA APAS Hatch Standoff.
   Secure Hatch Standoff to PMA handrail.
   Remove APAS Hatch Cover.
   Stow cover securely in PMA.

4.2 Remove Docking Target Base Plate Cover from Target Base Plate.
   Stow cover in PMA2.
   Remove Docking Target Standoff Cross from Standoff Cross Bag.
   Stow Standoff Cross Bag in PMA2.

NOTE
Ensure key on Standoff Cross shaft is aligned with key-way on mating receptacle, and insert shaft until collar bottoms out on receptacle surface.

4.3 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).

4.4 Ensure jam nut is positioned onto smaller, non-threaded diameter of Docking Target Base Plate receptacle.

   Rotate cap nut \( \rightarrow \) and tighten very firmly onto receptacle
   (10" Adjustable Wrench, 80-100 in-lbs design torque).

   Thread jam nut onto receptacle, rotating \( \leftarrow \) until contact with cap nut occurs.

   While maintaining a \( \rightarrow \) torque on cap nut, firmly tighten jam nut \( \leftarrow \)
   against cap nut (1-1/2" Open End Wrench, 80-100 in-lbs design torque).

4.5 Stow 10" Adjustable Wrench in NOD1 D4_G2.
   Stow Docking Mechanism Accessory Kit in PMA.
5. **CLOSING ODS HATCH**

   Close ODS Hatch per decal.

6. √EQUAL VLV (two) – OFF, capped

7. **PERFORM CO2 ABSORBER REPLACEMENT (CUE CARD)**

8. **CLOSING APAS HATCH**

   8.1 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 tool three to four turns in direction of ‘ЗАКР’ (Close) arrow until tool clicks.

   8.2 APAS EQUAL VLV → CL

9. **REMOVING PMA/LAB DUCTING**

   9.1 PMA2 air duct jumper ←|→ Lab Fwd Stbd IMV flange, leaving V-Band clamp on flange (Ratchet, 7/16” Deep Socket.)

   9.2 IMV cap ←|→ PMA2 launch restraint, leaving V-Band clamp on flange (Ratchet, 7/16” Deep Socket.)


   9.4 IMV cap →|← Lab Fwd Stbd IMV flange, torque V-Band clamp to 35 in-lbs [Ratchet, 7/16” Deep Socket, (10-50 in-lbs) Trq Wrench].

   9.5 PMA2 air duct jumper →|← PMA2 launch restraint. Secure with V-Band clamp (Ratchet, 7/16” Deep Socket.) Secure rest of flex duct to Closeout with Velcro Straps (two places).

   9.6 Doff rubber gloves.

10. **CLOSING LAB FW D HATCH**

    10.1 Check all loose equipment removed from PMA2.

    10.2 Perform **{1.1.521 U.S. HATCH SEAL INSPECTION}**, all (SODF: ISS IFM: COMMON: PREVENTIVE/S&M), then: Close LAB Fwd Hatch per decal.

        √MPEV – CLOSED, capped

    10.3 Report to **MCC-H**, “LAB Forward Hatch closed.”

    10.4 Install Hatch Enclosure Assembly (Velcro at 10 places).
OBJECTIVE:
Configure CCS Departure software and load controllers and PPLs for unmated configuration.

1. **GNC COMMAND RESPONSE COUNTERS RESET**
   **PCS**
   MCG: GNC Command Response Counters
   [GNC Command Response Counters]
   sel Reset
   Verify the Since Reset column values are all blank.
   Do not close this window until the procedure is complete.
   If while executing a command, the Command Accept counter on that display does not increment
   Reselect GNC Command Response Counters to determine if a command was rejected.

2. **VERIFYING FLIGHT SPECIFIC PAD**
   **MCC-H**
   If the following information is not recorded elsewhere, record it here.

<table>
<thead>
<tr>
<th>Table 1. Post Departure Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADO</td>
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</tbody>
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3. **VERIFYING INITIAL CONDITIONS**
   **PCS**
   MCG: MCS Configuration
   [MCS Configuration]
   ‘MCS Moding’
   Verify US Station Mode – Prox Ops
   Verify RS Station Mode – Prox Ops
   Verify US GNC Mode – CMG TA (Drift)
   Verify RS SUDN Mode – CMG TA (Indicator)

4. **LOADING REQUIRED PPLs TO THE PRIMARY GNC MDM**
   **MCC-H**
   For all PPLs designated in step 2 to be loaded to Primary GNC MDM, coordinate with ODIN.
5.101 PMA2 PRE-DEPARTURE CONFIGURATION
(JNT OPS/LF1 - ALL/FIN 5/MULTI)  Page 2 of 4 pages

5. **LOADING REQUIRED PPLs TO THE BACKUP GNC MDM**
   MCC-H
   For all PPLs designated in step 2 to be loaded to Backup GNC MDM, coordinate with ODIN.

6. **LOADING REQUIRED PPLS TO THE C&C MDMS**
   For all PPLs designated in step 2 to be loaded to C&C MDMs, coordinate with ODIN.

7. **UPDATING UNDOCKING CCDB COMMANDED ATTITUDE**
   PCS
   MCS Configuration
   ‘CCDB Slots’
   sel Cmd Att 1
   Cmd Att 1
   If Slot 1 Cmd Att Yaw, Pitch, Roll DOES NOT MATCH Yaw, Pitch, Roll in step 2
     If in step 2, Yaw, Pitch, Roll is (0,0,0)
       cmd YPR 0,0,0
     If in step 2, Yaw, Pitch, Roll is not (0,0,0)
       input Yaw – (from step 2)
       Pitch – (from step 2)
       Roll – (from step 2)
     cmd Set
     Verify Slot 1 Yaw – (as commanded)
     Pitch – (as commanded)
     Roll – (as commanded)

8. **SETTING MOMENTUM SERVO REFERENCE FRAME AND GNC INHIBITS**
   MCG: Dock and Undock: Pre Node 2 PMA 2 Undock
   Pre Node 2 PMA 2 Undock
   ‘System Configuration’
   If Cmd’d Drift Ref Frame – LVLH(Body)
     cmd Inertial
     Verify Cmd’d Drift Ref Frame – Inertial
   If Attitude Maneuver – Inh
     cmd Enable (Verify – Ena)
   If Att Cntl Shutdown – Inh
     cmd Enable (Verify – Ena)
   If Mode Transition – Inh
     cmd Enable (Verify – Ena)
5.101 PMA2 PRE-DEPARTURE CONFIGURATION
(JNT OPS/LF1 - ALL/FIN 5/MULTI)  Page 3 of 4 pages

If Desat Request – Inh
    cmd Enable (Verify – Ena)

9. **VERIFYING STATUS OF ACS MODING SIGNALS**

   Pre Node 2 PMA 2 Undock
   ‘Undocking’
   
   Verify Manual Undock Sequence Init – Not Init
   Verify LA-1/LA-2 Interface Sealed – Yes/Yes
   Verify LA-1/LA-2 Separation – No/No
   Verify Docked Indication – Docked
   Verify Departure Flag – No

10. **INHIBITING GNC CHECKPOITING**
    If GNC Checkpointing is to be inhibited for undocking, perform {2.702
        DISABLE GNC CHECKPOITING}, all (SODF: MCS: NOMINAL:
        CHECKPOITING), then:

11. **SETTING BACK OFF TIME**

    Pre Node 2 PMA 2 Undock
    ‘Pre Departure’

    sel Back Off Time
    
    Back Off Time
    
    cmd 100 Seconds
    
    Verify Pending Back Off Time: 100 (sec)
    Verify Arm State – Arm
    
    cmd Incorporate Pending Back Off Time
    
    Verify Back Off Time: 100 (sec)
    Verify Arm State – Disarm

12. **SETTING POST DEPARTURE CONTROL MODE**

    Pre Node 2 PMA 2 Undock
    ‘Pre Departure’

    If Post Departure Control Mode – RS Control (CMG Only)
    sel Post Departure Control Mode
    
    Post Dprtr Cntl Mode
    
    cmd CMG TA
    
    Verify Post Departure Control Mode – CMG TA
13. **ENABLING DEPARTURE SOFTWARE**

 sel PMA2 Automatic Departure SW

 Automatic Departure SW

 ‘PMA 2’

 **cmd** Arm

 Verify State – Arm

 **cmd** Enable

 Verify PMA 2 Undocking Vehicle – Shuttle
 Verify PMA 2 Automatic Departure SW – Ena
 Verify State – Disarm

 14. **VERIFYING TIME SINCE SEPARATION TELEMETRY**

 Verify Time Since Separation: 0 (sec)

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the Time Since Separation is observed to be incrementing any time prior to planned departure, ISS may take attitude control after 100 seconds. <strong>IMMEDIATE ACTION IS REQUIRED.</strong></td>
</tr>
</tbody>
</table>

* If the Time Since Separation is observed to be incrementing any time prior to planned departure, send all of the following commands to inhibit both the manual and automatic SW, even if either is already inhibited, to ensure the timer stops.

* sel PMA 2 Manual Departure SW

 Manual Departure SW

 ‘PMA 2’

 **cmd** Manual Departure SW Inhibit

 Verify PMA 2 Undocking Vehicle – None
 Verify PMA 2 Manual Dprtr SW – Inh

 **cmd** Automatic Departure SW Inhibit

 Verify PMA 2 Automatic Dprtr SW – Inh
OBJECTIVE:
Confirm CCS Software is in the correct configuration, monitor departure and ensure proper functioning of the USOS software following separation. Manually incorporate post departure mass properties in US GNC. Confirm correct post departure control configuration.

NOTE
1. This procedure should be started about 25 minutes prior to orbiter departure.

2. Step 3 (Incorporating Post Departure PPLs) should be completed as soon as confirmation of the US GNC Mode - Drift.

3. In step 4, orbiter separation occurs and resumption of attitude control should occur at separation + 100 seconds. Otherwise, the crew will manually command to resume control.

1. GNC COMMAND RESPONSE COUNTERS RESET
PCS
MCG: GNC Command Response Counters
GNC Command Response Counters

Sel Reset
Verify the Since Reset column values are all blank.

Do not close this window until the procedure is complete.

If while executing a command, the Command Accept counter on that display does not increment
Reselect GNC Command Response Counters to determine if a command was rejected.

\MCC-H

2. VERIFYING CORRECT CONFIGURATION
PCS
MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock

Pre Node 2 PMA 2 Undock
‘System Configuration’

Verify US Station Mode – Prox Ops
Verify RS Station Mode – Prox Ops
Verify US GNC Mode – CMG TA (Drift)
Verify RS SUDN Mode – CMG TA (Indicator)

Verify Attitude Maneuver – Ena
Verify Att Cntl Shutdown – Ena
Verify Mode Transition – Ena
Verify Desat Request – Ena
5.102 PMA2 DEPARTURE
(JNT OPS/LF1 - ALL/FIN 6/SPN/MULTI/HC) Page 2 of 4 pages

‘Pre Departure’

Verify Back Off Time: 100 (sec)
Verify Post Departure Control Mode – CMG TA
Verify PMA2 Automatic Departure SW – Ena
Verify Thrstr Avail for CMG Desat – Yes

‘Undocking’

Verify LA-1/LA-2 Interface Sealed – Yes/Yes
Verify LA-1/LA-2 Separation – No/No
Verify Time Since Separation: 0
Verify Docked Indication – Docked
Verify Departure Flag – No

ISS ⇒ orbiter, “Station ready for undocking”

3. INCORPORATING POST DEPARTURE PPLs

NOTE
The orbiter crew will mode the mated stack to Free Drift at undock - 3 minutes.

This step must be completed after US GNC Mode – Drift is confirmed.

Pre Node 2 PMA 2 Undock
‘System Configuration’

Verify US GNC Mode – Drift

If Active Mass Properties does not match Buffer Mass Properties
 cmd Mass

Verify Active Mass Properties PPL Version ID matches Buffer Mass Properties PPL Version ID.
4. ORBITER SEPARATION

NOTE

1. The driving of the APAS Hooks open takes approximately 2 minutes.

2. The Docked Indication will remain Docked until the Time Since Separation of 100 seconds is reached.

Orbiter ⇒ ISS, “Physical Separation; executing SEP Burn”

Start manual timer.

Pre Node 2 PMA 2 Undock
‘Undocking’

Wait up to 120 seconds for the following indication.

US GNC Mode – CMG TA
RS SUDN Mode – CMG TA

ISS ⇒ orbiter, “Station is in Attitude Control.”

***********************************************************************
* If US GNC Mode is not “Drift” and time since physical separation > 120 seconds
* [Pre Node 2 PMA 2 Undock]
* ‘Undocking’
* cmd Not Docked
* Verify Docked Indication – NOT Docked
* ‘Other Commands’
* cmd CMG TA Slot 1
* Verify Active CCDB Source Slot – 1
* cmd Hold Current Attitude
* ‘System Configuration’
* Verify US GNC Mode – CMG TA
* Verify RS SUDN Mode – CMG TA
* ISS ⇒ orbiter, “Station is in Attitude Control.”
***********************************************************************
5. RESUMING ATTITUDE CONTROL (GROUND STEPS)

MCC-H

If time since physical separation > 140 seconds and US GNC Mode is not Drift

Pre Node 2 PMA 2 Undock

‘Undocking’

cmd Not Docked

Verify Docked Indication – NOT Docked

‘Other Commands’

cmd CMG TA Slot 1

Verify Active CCDB Source Slot: 1

cmd Hold Current Attitude

‘System Configuration’

Verify US GNC Mode – CMG TA
Verify RS SUDN Mode – CMG TA

MCC-H ⇒ orbiter, ISS, “Station is in Attitude Control.”
5.103 PMA2 POST DEPARTURE CONFIGURATION
(JNT OPS/LF1 - ALL/FIN 5/MULTI)  Page 1 of 4 pages

OBJECTIVE:
Disable CCS Departure Software after orbiter departure. Verify appropriate MCS inhibits are set for stage operations.

1. GNC COMMAND RESPONSE COUNTERS RESET

PCS
MCG: GNC Command Response Counters
GNC Command Response Counters

sel Reset

Verify the Since Reset column values are all blank.

Do not close this window until the procedure is complete.

If while executing a command, the Command Accept counter on that display does not increment
Reselect GNC Command Response Counters to determine if a command was rejected.

√MCC-H

2. VERIFYING FLIGHT SPECIFIC PAD

MCC-H
If the following information is not recorded elsewhere, record it here.

Table 1. Version ID

<table>
<thead>
<tr>
<th>Version ID</th>
<th>Version ID for CCS PPL 180 (ACS FDIR Adaptation Data) with RS ACS_Safing_Status set to &quot;0&quot; (off) to be loaded to Backup and Standby C&amp;C MDM.</th>
<th>4002</th>
<th>Must be built as File Uplink and uplinked to the backup and standby C&amp;C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Version ID for CCS PPL 181 - CCS RM PPL For GNC RM with or without Checkpointing to be loaded to all C&amp;C MDMs.</td>
<td>4003</td>
<td>If GNC RM with Checkpointing was inhibited for undocking and is now to be enabled uplink PPL to all C&amp;C MDMs. Must be built as file uplink.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. VERIFYING CONFIGURATION

PCS
MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock
Pre Node 2 PMA 2 Undock
‘System Configuration’

Verify US Station Mode – Prox Ops
Verify RS Station Mode – Prox Ops
Verify US GNC Mode – CMG TA
Verify RS SUDN Mode – CMG TA
5.103 PMA2 POST DEPARTURE CONFIGURATION

‘Undocking’

Verify LA-1/LA-2 Interface Sealed – No/No
Verify LA-1/LA-2 Separation – Yes/No
Verify Time Since Separation > 100 and incrementing
Verify Docked Indication – NOT Docked

4. ENABLING GNC CHECKPOINTING

If GNC Checkpointing is to be enabled after undocking, perform

[2.701 ENABLE GNC CHECKPOINTING], all (SODF: MCS: NOMINAL: CHECKPOINTING), then:

5. INHIBITING THE DEPARTURE SOFTWARE

NOTE

1. The Time Since Separation gets reset to zero by commanding the automatic departure software inhibit, but it does not get reset by commanding the manual departure software inhibit. There could be times when the automatic software was not used or already is inhibited, and it should still be commanded inhibited in this step to reset the timer.

2. If the Manual Undock Sequence Init command was sent, the software automatically inhibits the manual software. However, to configure the Manual Undock Seq Init telemetry to Not Init, the Manual Software must be commanded Inh even though its telemetry already reads Inh.

Pre Node 2 PMA 2 Undock
‘Undocking’

If Manual SW Enable – Ena or Manual Undock Sequence Init – Init

Pre Node 2 PMA 2 Undock
‘Pre Departure’

sel PMA2 Manual Departure SW

Manual Departure SW
‘PMA 2’

cmd Manual Departure SW Inhibit

Verify PMA2 Undocking Vehicle – None
Verify PMA2 Manual Departure SW – Inh

Pre Node 2 PMA 2 Undock
‘Undocking’

Verify Manual Undock Sequence Init – Not Init
5.103 PMA2 POST DEPARTURE CONFIGURATION

Pre Node 2 PMA 2 Undock
‘Pre Departure’

If PMA2 Automatic Departure SW – Ena
sel PMA 2 Automatic Departure SW

Automatic Departure SW
‘PMA 2’
cmd Inhibit

Verify PMA 2 Undocking Vehicle – None
Verify PMA 2 Automatic Departure SW – Inh

Pre Node 2 PMA 2 Undock
‘Undocking’

Verify Time Since Separation: 0

6. ENABLING AUTO ATTITUDE CONTROL HANDOVER TO RS

Pre Node 2 PMA 2 Undock
‘Pre Departure’

sel Auto Att Control Handover to RS

Auto Att Control Handover to RS
‘Enable’
cmd Enable

Verify Auto Att Control Handover – Ena

7. REPLACING US GNC SOFTWARE INHIBITS

Pre Node 2 PMA 2 Undock
‘System Configuration’
cmd Attitude Maneuver Inhibit (Verify – Inh)
cmd Att Cntl Shutdown Inhibit (Verify – Inh)
cmd Mode Transition Inhibit (Verify – Inh)
8. **LOADING REQUIRED PPLs TO THE C&C MDMs**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The purpose of CCS PPL 180 is to enable the auto attitude control handover to RS in the Backup and Standby C&amp;C MDMs, which is inhibited during docked operations.</td>
</tr>
</tbody>
</table>

For all PPLs designated in step 2 to be loaded to the C&C MDMs, to load PPL to the C&C MDMs, coordinate with ODIN.

9. **CONFIGURING RS INHIBIT FOR STAGE OPERATIONS**

**MCC-M**

УБЦ F8_10 (inf0=9, inf1=0) Enable RS automatic takeover due to Tier 1 Loss of Comm.
6.101 AUDIO LOSS OF DOCKED VOICE

All displays in this procedure are on the PCS.

A filter located in the Russian Segment prevents voice from coming thru the RSA Channels when a Russian C&W tone is in alarm. If a Russian C&W tone is in alarm, voice from Russian Segment to the Orbiter should NOT be expected until all RS tones are acknowledged.

Performing an ABIT will remove the docked channels from their Public Calls and mode the DAIU to Standby after 2 minutes.

During troubleshooting of Hardline Docked Audio, crew should utilize alternate ship to ship communications via the BPSMU as a workaround.
A filter located in the Russian Segment prevents voice from coming thru the RSA Channels when a Russian C&W tone is in alarm.

If a Russian C&W tone is in alarm, voice from Russian Segment to the Orbiter should NOT be expected until all RS tones are acknowledged.

DAIU will go into Standby mode 2 minutes after being commanded active. DAIU has to be in the active mode in order to place Docked Audio Channels into a public calls.

**Voice Check on Docked Channels**
- Perform voice check on the following channels:
  - Page Loop
  - DAG1 Loop
  - DIA1 Loop
- Discuss results with MCC-H in order to develop workarounds and further troubleshooting if needed.
1. **ADD UHF1 VOICE LOOP**

   PCS C&T: Audio: Audio Subsystem
   
   Audio Subsystem
   
   Determine which IAC is Active, IAC(X).
   
   √IAC(X) – On and Active
   
   ‘Audio ORUs’
   
   sel AUA11P
   sel RPCM LAD22B A RPC 04
   cmd Close

   Verify Position – Close

   ‘AUAI1P Bus IO’

   cmd Enable

   Verify AUAI1P Audio Bus IO – Enable

   ‘AUAI1P State’

   cmd Active

   Verify AUAI1P State – Active

   ‘Audio Displays Menu’

   sel IAC(X) Call Select

   √IAC(X) – On and Active

   sel IAC(X) Call Select

   ‘Public1’

   sel Select
   cmd UHF1

2. **VERIFYING VOICE LOOP WAS ESTABLISHED**

   IAC(X) Call Select

   √UH1 in Public1 T
NOTE
1. This procedure will be performed to establish the hardline communications path between ISS and the orbiter while docked. This configuration will link shuttle and station to ground, and station to shuttle by a single button push using any ATU in the lab as shown below.

2. Summary of Docked Audio Configuration
Big loop consist of: A/G1+DAG1+S/G1+RSA1
ISS only loop consist of: S/G2
STS only loop consist of: A/G2

ISS crew in the LAB may

Press 1 for:
“Big loop” station, shuttle, SSP MCC and ISS MCC on one loop.
Contains: Any ATU, GND1(S/G1), DAG1, RSA1 (SM Comm Panel (CP) 3)

Press 2 for:
ISS MCC to station only
Contains: Any ATU, RSA2, GND2(S/G2)

Press 3 for:
ICOM between ISS and orbiter
Contains: Any ATU, DIA1 (SM CP2)
This is NOT tied to the Russian Segment.

3. If CP2 and CP3 in Service Module are tied together, S/G 2 and/or ICOM A will be heard on the “big loop.”

1. POWERING OFF SSOR
Inform ISS that shuttle SSOR will be disabled and the next voice will be via hardline.

O6 UHF MODE sel – OFF
A1R AUD CTR UHF A/G 1(2) – OFF

MCC will uplink PCMMU/PDI/OIU configuration.
2. **CONFIGURING SHUTTLE AUDIO**
   ISS will not be configured for voice until after step 5 is complete. 
   MCC-H or ISS crew perform steps 3 to 5.

   A1R
   - AUD CTR SL PAGE – ON
   - A/G 1 – ON
   - √AUD CTR SL A/A – OFF
   - AUD CTR SL ICOM A – ON

3. **POWERING ON DAIU**

   ISS Crew C&T: Audio
   PCS Audio Overview

   sel DAIU1
   sel RPCM LA1B E RPC 05
   cmd RPC Position – Close (Verify – CL)

   Verify which IAC is active and powered on, and use the commands for the active and powered IAC.

   **DAIU1**
   - ‘IAC [X]’ where [X] = Active and Powered IAC 1 or 2
   - ‘DAIU1 Bus I/O’

   cmd DAIU1 Bus I/O – Enable (Verify – Ena)

   **NOTE**
   DAIU will go into Standby mode 2 minutes after being commanded Active if not placed into a call. DAIU has to be in Active mode to place DAG1, DAA1 or DIA1 into a public call.

   ‘DAIU1 State’

   cmd DAIU1 State – Active (Verify – Active)

4. **CONFIGURING ISS AUDIO SUBSYSTEM FOR DOCKED VOICE**

   ISS Crew Audio Overview

   sel IAC (X) Call Select
   **IAC(X) Call Select**
   - ‘Public 1’

   sel Call Setup
   cmd GND1
   cmd RSA1
   cmd DAG1
6.103 HARDLINE AUDIO CONFIGURATION (ISS)

5. CREW CONFIGURING LAB ATU 1 AND LAB ATU 2 INTO PUBLIC CALLS

اري العدد من المجموعة 1 و 2

<table>
<thead>
<tr>
<th>ISS Crew</th>
<th>ATU Lab1 pb → PTT 3,2,1</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWD ATU Lab2</td>
<td>ATU Lab2 pb → PTT 3,2,1</td>
</tr>
</tbody>
</table>

Verify ATU Display: 3 2G 1TG

ISS audio configuration must be complete prior to next step.
When complete, the configuration will be A/G1 and S/G1 in the “big loop,” A/G 2 (STS only), S/G2 (ISS only), and ICOM between ISS and Lab.

6. ESTABLISHING VOICE CONTACT WITH ISS

As required, adjust volume.
Perform voice checks between STS crew and ISS crew in the LAB.

<table>
<thead>
<tr>
<th>STS Loop</th>
<th>ISS Crew Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICOM A</td>
<td>From ISS ATU Lab1 or Lab2 by selecting pb 3</td>
</tr>
<tr>
<td>A/G 1</td>
<td>From ISS ATU Lab1 or Lab2 by selecting pb 1</td>
</tr>
</tbody>
</table>
7. **RECONFIGURING ATU(S)**
   When comm checks complete, reconfigure FD/MD/CDR-BPSMU speakers for A/G as desired.
   Ensure BPSMU ATU is configured to avoid feedback.

8. **DECONFIGURING FROM UHF OPS**
   ISS Crew Perform {2.210 AUDIO SUBSYSTEM DECONFIGURATION FROM UHF OPS} (SODF: C&T: NOMINAL: AUDIO), then:

   Perform {2.702 UHF 1 ORU DEACTIVATION} (SODF: C&T: NOMINAL: UHF), then:

   Go to {2.704 UHF 2 ORU DEACTIVATION} (SODF: C&T: NOMINAL: UHF).
NOTE
1. This procedure will be performed to configure the SSOR and SSSR communications path between ISS and STS in preparation for undock. This configuration will link shuttle and station to ground, station to ground, and ISS US segment to Russian segment by a single button push using any ATU in the lab as shown below.

2. Summary of Undocked Audio Configuration
   Big loop consist of: A/G1+UHF1(3)+S/G1+RSA1
   ISS only loop consist of: S/G2
   STS only loop consist of: A/G2

   ISS crew in the LAB may
   Press 1 for:
   
   Ground (Station & Shuttle Joint Ops) and shuttle crew
   
   Contains: Any ATU, GND1(S/G1), UHF1(3), RSA1
   (SM Comm Panel 3)

   Press 2 for:
   
   Ground (Station only Ops)
   
   Contains: Any ATU, RSA2, GND2(S/G2)

3. If CP 2 and CP 3 in Service Module are tied together, S/G 2 and/or ICOM A will be heard on the “big loop.”

1. PREPARING STS SSOR FOR BACKOUT

STS Crew: Inform ISS that shuttle SSOR will be activated and the next voice will be via UHF.

    ISS audio will not be configured until after step 3 is complete.

R14:C

\ncb MNA UHF EVA – cl
\ncb MNC UHF EVA – cl

O6

\cUHF SPLX/EVA PWR AMP – OFF
\cMODE sel – EVA

\cUHF SPLX/EVA XMIT FREQ: 259.7/414.2
\cSPLX SQUELCH – ON
\cEVA STRING: 1

UHF ENCRYPT – ON

MCC will uplink encryption key and configure the PCMMU/PDI/OIU configuration as required.
2. PREPARING ISS FOR BACKOUT

ISS Crew or MMC-H

As required

2.1 Powering On UHF 1
Perform [2.701  UHF 1 ORU ACTIVATION] {SODF: C&T: NOMINAL: UHF}, then:

2.2 Configuring AUAI1P for UHF Voice
Verify which IAC is active and powered on, and use the commands for the active and powered IAC.

PCS C&T: Audio: Audio Overview

sel IAC[X] Call Select where [X] = Active and Powered IAC 1 or 2

IAC[X] Call Select
‘Public 1’

sel Call Setup
cmd UHF1

IAC[X] Call Select
‘Public 1’

Verify – UHF1 TL

2.3 Powering On AUAI2S for Redundant UHF Voice Path
PCS C&T: Audio: Audio Overview: AUAI2S

sel RPCM LAD11B A RPC 02
cmd RPC Position – Close (Verify – Cl)

2.4 Enabling F/O Bus I/O for AUAI2S
Verify which IAC is active and powered on, and use the commands for the active and powered IAC.

AUAI2S
‘IAC [X]’ where [X] = Active and Powered IAC 1 or 2
‘AUAI2S Bus I/O’

cmd AUAI2S Bus I/O – Enable (Verify – Ena)
2.5 Activating and Configuring AUAI2S for Redundant UHF Voice

**NOTE**

1. AUAI2S will go into standby mode 2 minutes after being commanded active if it is not placed into a call.

2. AUAI2S has to be in active mode to place UHF3 into a call.

Verify which IAC is active and powered on, and use the commands for the active and powered IAC.

```
AUAI2S
'IAC [X]' where [X] = Active and Powered IAC 1 or 2
'AUAI2S State'
```

**cmd** AUAI2S State – Active (Verify – Active)

```
Audio Overview
```

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

'IAC[X] Call Select
'Public 1'
```

```
IAC[X] Call Selec
sel Call Setup
```

**cmd** UHF3

```
'IAC[X] Call Select
'Public 1'
```

Verify – UHF3 TL

3. CONFIGURING SHUTTLE FOR SSOR AUDIO AND DISABLE HARDLINE AUDIO

STS Crew Verify SSOR and SSSR(UHF) are communicating.

```
SM 76 COMMUNICATIONS

√SSOR FRM SYNC 1 – YES
```

A1R AUD CTR SL A/G 1 – OFF
UHF A/G 1(2) – T/R
4. **ESTABLISHING UHF VOICE CONTACT BETWEEN ISS AND STS**

Perform UHF voice checks with ISS crew.

<table>
<thead>
<tr>
<th>STS Loop</th>
<th>ISS Crew Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any ATU – A/G1</td>
<td>From ISS ATU Lab1 or Lab2 by selecting pb 1</td>
</tr>
</tbody>
</table>

If comm checks successful

- A1R AUD CTR SL PAGE – OFF
- √/A/A – OFF
- ICOM A – ON

Continue with step 5.

5. **ISS DOCKED AUDIO DECONFIGURATION**

5.1 **Hangup of DAG1 from Public Loop**

ISS Crew or MCC-H

PCS

C&T: AUDIO: AUDIO OVERVIEW

Audio Overview

sel IAC[X] Call Select  where [X] = Active and Powered IAC

[ICAC] Call Select
‘Public 1’

sel Hangup

cmd DAG1

[ICAC] Call Select
‘Public 1’

Verify DAG1 TL removed from Public1.

5.2 **Hangup of DIA1 from Public Loop**

PCS

C&T: AUDIO: AUDIO OVERVIEW

Audio Overview

sel IAC[X] Call Select  where [X] = Active and Powered IAC

[ICAC] Call Select
‘Public 3’

sel Hangup

cmd DIA1

[ICAC] Call Select
‘Public 3’

Verify DIA1 TL removed from Public3.
5.3 Deactivating DAIU1

Verify which IAC is active and powered on, and use the commands for the active and powered IAC.

DAIU1

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

'DAIU1 State'

cmd DAIU1 State – Standby (Verify – Standby)

5.4 Inhibiting F/O Bus I/O for DAIU1

Verify which IAC is active and powered on, and use the commands for the active and powered IAC.

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

'DAIU1 Bus I/O'

cmd DAIU1 Bus I/O – Inhibit (Verify – Inh)

5.5 Powering Off DAIU1

sel RPCM LA1B E RPC 05

cmd RPC Position – Open (Verify – Op)
6.105 SSOR ACTIVATION

R14:C 1. cb MNA UHF EVA – cl
      MNC UHF EVA – cl

O6  2. UHF SPLX/EVA PWR AMP – OFF
      SPLX/EVA XMIT FREQ: 259.7/414.2
      EVA STRING: 1
      UHF ENCRYPT – ON
      MODE – EVA

A1R  3. AUD CTR UHF A/G 1 (2) – T/R

4. Perform voice checks as required after SSSR(UHF) and SSOR are within communicating range (about 10,000 feet).

SM 76 COMMUNICATIONS

SSOR FRM SYNC 1 – YES

5. MCC uplinks encryption key # and PCMMU/PDI/OIU configurations as required.
O6 1. UHF MODE – OFF

A1R 2. AUD CTR UHF A/G 1(2) – OFF

3. If required, MCC performs TFL/DFL configuration.
1. **UNSTOWING PCS**

   MA16N
   Thinkpad (one) P/N SDZ39129262-303 S/N 6070 with B/C POC20617J
   ORB Power Supply Adapter Cable 10’ (one)
   KIT, IBM THINKPAD (one 1553 Card and 22-inch Adapter Cable in each
   Kit) (one)
   ORB DC Power Cable 6’ (one)
   ORB DC Power Cable 10’ (one)
   ORB 1553 Data Cable 8’ (one)
   RS/ORB DC Power Supply (one)

2. **POWER OFF VERIFICATION**

   Pwr Sply
   √PCS 28V DC PWR SPLY switch – Off
   
   For DC UTIL PWR outlet availability, refer to UTILITY OUTLET PLUG-IN
   PLAN ORBIT CONFIGURATION (FDF, REF DATA FS, UTIL PWR).

3. **PCS POWER AND DATA CABLE CONNECTIONS**

   (See Figure 1)
   Connect 22” Adapter Cable to the 1553 PC Card for the PCS.
   Insert 1553 PC Card into either PCS PCMCIA slot for the PCS.
   Connect both Power Supply Adapter Cable 10’ to PCS and to 28V DC
   power supply outlets (J2).
   L12
   Connect PCS Power Supply Adapter Cable 10’ to DC Power 1 Cabin P/L
   power outlet (J2) and to 28V DC power supply outlet (J1).
   Connect PCS ORB 1553 Data Cable 8’ to (J103) outlet and to 1553 PC
   Card Adapter Cable.

4. **TURNING ON PCS**

   L12
   DC Power 1 – ON
   
   Pwr Sply
   PCS 28V DC PWR SPLY switch → On (Lt On)
   
   PCS
   PCS Thinkpad PWR switch → On
   Do not iconify PCSCDS Main Control Panel Window.

   *******************************************************
   * 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.

2. If MDM is not up and running and step 4 is executed, expect a PCS ‘CW Server Error Msg’ and a ‘CDS Signon Fail’.

3. After connected to the MDM, if the PCS displays ‘The MDM Connection has failed’, open the PCSCDS Main Control Panel Window and select CONNECT TO MDM button to reconnect. If no joy, perform (3.301 LOSS OF PCS TELEMETRY), all (SODF: POC: MALFUNCTION: PCS E8 ALL).

Configure displays as desired.
Figure 1.- AFD L12 PDIP Panel PCS Configuration.

NOTE
The 1553 Data Cable I/Fs with a 22-inch pigtail connector (Ch A & B) connects to the 1553 Card that inserts into the PC Card PCMCIA Upper slot in the PCS.
NOTE
This procedure is not necessary if ICOM A through the DAIU is functional. Once complete, the CDR ATU can only be used to transmit on A/A, which will be used as the ICOM loop between shuttle and ISS. To transmit, use the XMIT button on the BPSMU.

SHUTTLE CREW
L5
1. √LEFT COMM POWER – ON
   BPSMU connected

06
2. LEFT AUDIO A/A – T/R
   A/G 1 – RCV
   A/G 2 – RCV
   ICOM A – RCV
   ICOM B – RCV

ISS CREW OR MCC-H
3. CONFIGURING ISS FOR DAA CHANNEL IN PUBLIC 3

PCS
C&T: Audio Subsystem
   Audio Subsystem
   ‘Audio ORUs’
   √DAIU1 – Powered
   √DAIU1 F/O Bus I/O – Enabled
   √DAIU1 – Active

NOTE
Verify which IAC is active and powered on, and use the commands for the Active and Powered IAC.

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

IAC [X] Call Select
   ‘Public3’

sel Call Setup

Public 3 Call Select
   ‘Talk/Listen (T/L)’

cmd DAA1 TL

IAC [X] Call Select
   ‘Public3’

Verify DAA1 TL

4. Perform Shuttle to ISS DAA voice check
2.302 ONBOARD FILE TRANSFER

1. OPENING FILE TRANSFER WINDOW

PCS PCSCDS Main Control Panel

sel Commands
sel File Transfer

File and Memory Transfer

NOTE
The maximum size for one file transfer is 8 Megabytes (MB).

At this point, decide which file transfer to perform. The options include:
1. **Get a File Function** - initiate a direct file or directory listing transfer from the C&C MDM or Payload MDM to PCS.
2. **Put a File Function** - initiate a direct file transfer from PCS to the C&C MDM or Payload MDM.
3. **Indirect File Transfer Function** - initiate an indirect file transfer between the C&C MDM and the Payload or JEM MDMs, between prime and backup C&C MDMs, or between prime and backup Payload MDMs.
4. **Indirect Data Load Function** - initiate an indirect transfer of a file from the C&C MDM to the memory of the GN&C MDMs, LAB CEU, or Cupola CEU.

To perform the Get a File Function, go to step 2.
To perform the Put a File Function, go to step 3.
To perform the Indirect File Transfer Function, go to step 4.
To perform the Indirect Data Load Function, go to step 5.

2. GETTING A FILE FUNCTION

PCS File and Memory Transfer

sel Commands
sel Get a File

Get Remote File

sel Source Node (MDM that PCS is connected to)

‘Abort on MSD Read Error’

sel True
NOTE
On the Source is Directory radio button, select True when transferring a directory and select False when transferring a file.

‘Source is Directory’

sel True or False as appropriate
   True - for directory listing transfer
   False - for file transfer

NOTE
1. Direct file transfers to and from the C&C MDM to PCS are only available if the PCS is connected on a control bus (i.e., not available in pass-through mode).

2. Due to limitations on the MDM, the source and target directory paths specified during transfers are limited to a total of 96 characters each. In addition, each directory and file name is limited to 32 characters.

Input Source Directory by keyboard or by File Select button (i.e., /fmt).
Input Source File by keyboard or by File Select button.

Input Target Directory by keyboard or by File Select button (i.e., /export/home/PCSUser).
Input Target File by keyboard or by File Select button.

sel Apply

Go to step 6.

3. PUT A FILE FUNCTION

PCS
    File and Memory Transfer

sel Commands
sel Put a File

Put Remote File

NOTE
1. Direct file transfers to and from the C&C MDM to PCS are only available if PCS is connected on a control bus (i.e., not available in pass-through mode).

2. Due to limitations on the MDM, the source and target directory paths specified during transfers are limited to a total of 96 characters each. In addition, each directory and file name is limited to 32 characters.
Input Source Directory by keyboard or by File Select button 
(i.e., /export/home/PCSUser).
Input Source File by keyboard or by File Select button.

sel Target Node (MDM that PCS is connected to)

Input Target Directory by keyboard or by File select button (i.e., /fmt).
Input Target File by keyboard or by File select button.

sel Apply
Go to step 6.

4. INDIRECT FILE TRANSFER FUNCTION

PCS

File and Memory Transfer

sel Commands
sel Indirect File Transfer

Indirect File Transfer

NOTE
Only certain combinations of source and target
nodes are available for indirect transfers.

sel Source Node (Device to transfer from)
sel Target Node (Device to transfer to)

NOTE
1. Due to limitations on the MDM, the source and target
directory paths specified during transfers are limited to a
total of 96 characters each. In addition, each directory
and file name is limited to 32 characters.

2. PCS must be connected to the MDM that the user wants
to transfer files to or the MDM that the user wants to
transfer files from.

Input Source Directory by keyboard (i.e., /fmt).
Input Source File by keyboard.
Input Target Directory by keyboard (i.e., /fmt).
Input Target File by keyboard.

sel Apply
Go to step 6.
5. INDIRECT DATA LOAD FUNCTION

**NOTE**
Due to limitations on the MDM, the source and target directory paths specified during transfers are limited to a total of 96 characters each. In addition, each directory and file name is limited to 32 characters.

PCS

File and Memory Transfer

sel Commands
sel Indirect Data Load

**Indirect Data Load**

**NOTE**
This function is not available when PCS is connected to the Payload MDM.

sel Source Node – C&C Prime
sel Target Node (Platform to transfer to)

Input the Source Directory (i.e., /cdh).
Input the Source File (i.e., gnc3_3.b).
Input the Starting Address for the memory location on the Target Node to hold the transferred file.
Input the File Length, in decimal, of the file being transferred.

sel Apply

6. MONITORING THE FILE AND MEMORY TRANSFER

PCS

File and Memory Transfer

‘Active Transfers’

Verify Transfer status – OK

Wait 4 minutes per megabyte of file size to be transferred.

‘Completed Transfers’

Verify Transfer Status – COMPLETED

To perform another file transfer, go to step 1.

sel Commands
sel Close

**Verify Shutdown**

sel Yes
POWERING DOWN EPCS/PCS

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

Wait for ‘Type any key to continue’ message to appear.

If message does not appear within 90 seconds, then proceed.

If shuttle AFD

<table>
<thead>
<tr>
<th>PCS</th>
<th>PCS 1,2 Laptop pwr sw → Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pwr Sply</td>
<td>PCS1 28VDC Pwr Sply sw → Off (Lt Off)</td>
</tr>
<tr>
<td></td>
<td>PCS2 28VDC Pwr Sply sw → Off (Lt Off)</td>
</tr>
<tr>
<td>A15</td>
<td>MNC DC UTIL PWR (J2) → Off</td>
</tr>
<tr>
<td>PDIP</td>
<td>PDIP DC POWER 2 → Off</td>
</tr>
</tbody>
</table>

If in USOS

<table>
<thead>
<tr>
<th>PCS</th>
<th>PCS Laptop pwr sw → Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>UOP</td>
<td>Push Power Button → On (Lt Off)</td>
</tr>
</tbody>
</table>

If in SM

<table>
<thead>
<tr>
<th>PCS</th>
<th>PCS Laptop pwr sw → Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pwr Sply</td>
<td>PCS 28VDC Pwr Sply sw → Off (Lt Off)</td>
</tr>
</tbody>
</table>

If in FGB

<table>
<thead>
<tr>
<th>PCS</th>
<th>PCS Laptop Pwr sw → Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pwr Sply</td>
<td>PCS 28VDC Pwr Sply sw → Off (Lt Off)</td>
</tr>
<tr>
<td>P5C-10/3</td>
<td>On Panel OUTLET PWR 10/3 AMPS (P5C-10/3) sw → OFF</td>
</tr>
</tbody>
</table>
2. **DISCONNECTING EPCS/PCS POWER AND DATA CABLE**

If shuttle AFD

L12/A3

- Disconnect both ORB 1553 Data Cables 8' from N1-1 (J103) and N1-2 (J107) and from the 22-inch Adapter Cable.
- Disconnect both the ORB DC Power Cable 6' and ORB DC Power Cable 10' from the RS/ORB DC power supply (J1) and the ORB DC outlets.
- Disconnect both the ORB Power Supply Adapter Cable 10' from the PCS DC power outlet and the RS/ORB DC power supply (J2).

If in USOS

- Disconnect the DC Power Supply Adapter Cable 10' from the PCS and from the US DC Power Supply (120V) outlet (J2)
- Disconnect US DC Power and 1553 Cable (UOP to Power Supply and 760), 8 feet from the UOP, the US DC Power Supply (120V) outlet (J1), and 22-inch Adapter Cable

If in SM

- Disconnect RS DC Power and 1553 Cable 8' to PCR outlet and the RS/ORB DC power supply outlet (J1) and the 22-inch Adapter Cable.
- Disconnect the ORB Power Supply Adapter Cable 10' from the RS/ORB DC power supply outlet (J2) and from the PCS.

If in FGB

- Disconnect RS DC Power and 1553 Cable 8' to PCR outlet and the RS/ORB DC power supply outlet (J1) and the 22-inch Adapter Cable.
- Disconnect the ORB Power Supply Adapter Cable 10' from the RS/ORB DC power supply outlet (J2) and from the PCS.

Pwr Sply

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

3. **STOWING EPCS/PCS**

PCS Laptops

- 20V DC Power Cables 10'
- 1553 Card and 22-inch Adapter Cable

If shuttle AFD

- Stow ORB DC Power Cable 6'
- ORB DC Power Cable 10'
- ORB 1553 Data Cables 8'
- RS/ORB DC Power Supply

If ISS RS

- Stow RS DC Power and 1553 Cable 8' in the FGB.
- RS/ORB DC Power Supply
PCSDS MAIN CONTROL PANEL

sel Commands
sel Update Log Files

Wait until Hard Drive Active indicator clears from LCD status bar.

2. SAVE LOGS
sel Arrow directly above PCS logo on CDE front panel
sel Save Logs

PCS save logs

Disregard text.
Press enter.

NOTE
1. The format to use for naming the directory <directory name> is: [user initials] logs [GMT 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 day, append a number starting at “1” for the first log and increment it each time that the logs are saved that day. For example: abclogs230_2.

Enter directory name and press enter.
Verify message –挽救 logs completed

Press enter.
Right-click anywhere on empty desktop space.

Workspace Menu

sel Programs
sel Terminal

Type ‘cd <directory name>’
2.304 PCS LOG FILE SAVE
(POC/4A - ALL/FIN C) Page 2 of 2 pages

NOTE
Ensure the period is included in the following lines

Type 'cp -p /var/adm/messages* .'
Type 'cp -p /var/log/syslog* .'

PCS 3. VERIFYING THE LOGS HAVE BEEN SAVED
Type ‘ls -l’
Verify Runtime_files/ and logs/ are in the directory.
Close the terminal window.
Inform MCC-H of the directory name used.
1. **CDDF AND CDS SHUTDOWN**
   - Close all display windows.
   - Disconnect CDS from MDM.
   - Close CDS window.

2. **CONNECTING PCS TO MDM DATA**
   - sel Arrow directly above PCS logo
   - sel Start/Restart PCS CDS

   If popup window appears asking what time source to use
   - On EPCS
     - sel RS Time
   - On PCS
     - sel MDM Time

   **NOTE**
   A pop-up window may appear saying that the CW Server failed to start and it will be retried every 15 seconds.

   - sel Icon 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.

3. **PCS FOR DISPLAYS CONFIGURATION**
   - sel Arrow above PCS logo
   - sel Start PCS CDDF display

   After approximately 1 minute, √‘Increment xA Home Page’ is displayed.

   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**

   **NOTE**
   You must have the window that you wish to snapshot open and uncovered.

   Snapshot V3.X

   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.

   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.

   Snapshot V3.X

   sel View…

   Image Tool V3.X File: Untitled

   sel File
   sel Save As…

   Image Tool: Save As
   ‘File Format’

   sel Sun Raster
   sel GIF

   Save As…

   Type over ‘Untitled1’ with the name that you wish to call the image followed by ‘.gif’. 
NOTE
There will be a pop-up window with the message
‘Saving to the GIF 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

Close the display and Snapshot application.

4. RETRIEVING AND VIEWING 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. **PERFORMING PCS LOG FILES SAVE**
   Perform [2.304 PCS LOG FILE SAVE], all (SODF: POC: NOMINAL: PCS) as needed, then:

2. **RUNNING COPY LOGS TO FLOPPY UTILITY**
   sel Arrow directly above PCS logo
   sel Copy PCS logs to floppy

   Press Enter.

   **NOTE**
   If action fails, the following will be displayed:
   - 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, re-seat, and reboot.

   Input directory name from list of available directories listed in the Terminal Window.

   sel OK

   Verify Copy logs to floppy complete.

   Press Enter.

   Manually Eject Floppy Disk.
Hatch Does Not Function Properly

1. **WARNING**
   If at any time a crewmember may become isolated from his or her return vehicle, he or she must have a Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; and a 1/2" Socket, 1/4" Drive (mini-maglight is suggested). Also, a hardcopy of this procedure [1.3.501 HATCH MECHANISM MALFUNCTION] (SODF: ISS IFM: COMMON: CORRECTIVE/ S&M) is required with the isolated crewmember.

2. **IVA side** refers to smooth domed side. **EVA side** is ribbed mechanism side.

3. No clear workaround. If Airlock, will remove IMV Valve for inspection/recovery. Other locations may remove MPEV/IMV (provides ~3" hole for inspection mirror/flashlight assessment of at least a portion of hatch). Other more destructive alternatives (window removal/breakage) may be required to get hatch open.

4. Need to balance crew risk vs. configuration/repair. Additional guidance expected to be:
   a. Leave 25" opening for egress if possible.
   b. If not 25" gap, place nonsharp hard object in Hatch opening to ensure it cannot close.
   c. If fully closed Hatch, follow warning at top of page (tools & procedure), verify comm where will isolate crew, and open all IMV/MPEV valves

5. **Likely remove damaged component** [1.2.507 Hatch Tension Rod/Latch R&R] (SODF: ISS IFM: COMMON: CORRECTIVE/ S&M) MCC will request imagery and scavenge spare component from another hatch.

6. Is full Hatch closure possible without isolating crew from return vehicle?
   - No
   - Yes

7. Is the crew isolated from the Earth Return Vehicle?
   - Yes
   - No

8. **Visually check Hatch for debris or damage which may prevent actuation (flashlight optional).**
   - Latches
   - Tension rods
   - PIP Pins
   - Sliders
   - Drive mechanism
   - Pinion gear & Crank Mechanism
   - Refer to Figure 3.
   - Yes
   - No

9. **If the crew is isolated from return vehicle, crew should proceed to block 8 for troubleshooting (can pull PIP Pins and/or remove latches (1/2" Socket) as required to gain access.)**

10. **Damaged component.**

11. **MCC-H**

12. **MCC**
12. Attempt to actuate hatch mechanism and open/close.

Does Hatch mechanism fully actuate and hatch move up and down tracks freely?

Yes → 13. Hatch operational.

No → 15. Determine which condition exists.

Hatch not rolling smoothly to the fully stowed (up) or fully closed (down) position.
Hatch mechanism not latching/unlatching.

16. No FOD in/ across hatch track (clear FOD if present)

- Hatch crank handle on IVA side of hatch is stowed (flush against Hatch and engaged on lock)
- Stowage pin on side of Hatch retracted out of way (this pin is driven by IVA side handle)
- Hatch crank handle on EVA side of hatch is stowed and engaged on lock
- Hatch latches in fully unlatched position (not being fully unlatched would cause contact between tension rods and module pressure shell)

17. Block uses access to both IVA and EVA side of hatch.

14. Continue nominal ops.
   Report damage/repair to MCC when possible.
Some type of adjustment problem needs more detailed assessment. Crew may compare this Hatch to others to look for any differences which might explain these binding phenomena. For a hatch mechanism that fails to operate, may tape/rerelease tension rods per block 28 and leave Hatch open temporarily or do detailed troubleshooting right away.

MCC will likely have crew execute (1.2.523 US COMMON HATCH ROLLER ADJUSTMENT) (SODF: ISS IFM: COMMON: CORRECTIVE/ S&M) to relieve binding.
Some type of adjustment problem needs more detailed assessment. Crew may compare this Hatch to others to look for any differences which might explain these binding phenomena. For a hatch mechanism that fails to operate, may tape/rerelease tension rods per block 28 and leave Hatch open temporarily or do detailed troubleshooting right away.

The Hand Crank and Drive Assemblies cannot be R&R’ed on-orbit due noncaptive pieces inside the Hatch and adjustments. If this Hatch is critical (such as the Hatch to the PMA/shuttle or Node/Airlock, will likely direct crew to R&R Hatch (using a scavenge Hatch as the spare). This will likely take at least 3 hours (though 2 or more additional hours may be required for hatch adjustment). See 1.2.503 HATCH R&R (SCDF: ISS IFM: COMMON: CORRECTIVE/ S&M)
1. **POWERING DOWN EPCS/PCS**
   Close all display windows.

   If PCS does not accept inputs from the keyboard or mouse, go to step 2.

   Disconnect CDS from MDM.

   Close CDS window.

   At the taskbar on bottom of display
   sel EXIT

   On Logout Confirmation window
   sel OK

   Wait for ‘**Type any key to continue**’ message to appear.

   If message does not appear within 90 seconds, then proceed to step 2.

2. **TURNING OFF POWER**
   PCS Thinkpad pwr sw → Off

   Wait 10 seconds.

3. **TURNING ON POWER**
   PCS Thinkpad pwr sw → On

   Perform steps 4 and 5 for e5A PCS only. PCS 5A and subsequent releases auto load PCS CDS and CDDF display.

4. **CONNECTING EPCS/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

   \(\sqrt{\text{Status Box is green and ‘Connected’ is displayed in the PCSCDS Main Control Panel Window}}\)

   Iconify PCSCDS Main Control Panel Window.

5. **CONFIGURING PCS FOR DISPLAYS**
   sel Arrow above PCS logo
   sel Start PCS CDDF display

   After approximately 1 minute, ‘**Increment xA Home Page**’ is displayed.

   Displays may now be selected as desired.
If GMT - static or telemetry fields in Caution & Warning toolbar are cyan, go to 2.306 PCS RECONNECT, all (SODF: POC: NOMINAL: PCS).

Displays may now be selected as desired.
All displays in this procedure are on the PCS.

If prompted to use PCS time without a use MDM time prompt (see figure), this means a significant C&C MDM time change to 1992 has occurred and likely that all three C&Cs have transitioned.

Expect several C&W messages after a Primary C&C MDM failure with possible Backup C&C MDM failure.

1. Determine condition that applies to loss of telemetry

2. Reconnect to MDM

   - PCS CDS Main Control Panel Window
   - sel Connect to MDM

   Is MDM connected status box green?

   Yes

   No

3. C&W Check

   Was the PCS disconnect associated with any C&W tones?

   Yes

   No


5. Time Check

   Was the following prompt (without MDM time option) received?

   - MDM Connection Failed Message Box
   - MDM Connection Box status - Purple
   - MDM Connection Box status - Green But All Telemetry Fields Cyan

6. Shut Down CDS

   - PCS CDS Main Control Panel Window
   - sel Commands
   - sel Shutdown
   - sel Yes

   The PCSCDS main control panel will terminate.

   After PCS CDS Main Control Panel has terminated, then
   - Start PCS CDS Main Control Panel Window
   - 'CDS Front Panel'
   - Click PCS button.

   Is MDM connected status box green?

   Yes

   No

7. Primary C&C MDM has failed with possible Backup C&C failure.

8. Select Use PCS Time.

9. Inform MCC-H if comm is available.

10. Go to (4.201 CC MDM RECONFIGURATION), steps 1 & 3 (SODF: C&DH: CORRECTIVE: MDM RECONFIGURATION).
If in AFD, orbiter crew will need to contact station crew to determine if PCS is connected.

Probable CCS failure. Expect loss of communication with the ground. Connection should be periodically attempted during redundancy management operations to allow for good communication. Attempt should be made once every 5 minutes for 30 minutes. This can be attempted on any core/control bus PCS.

On the RS Laptop expect to see 'КС:Обнаружена потеря связи с C&C MDM' when the Node is trying to recover the C&C MDMs. If recovery is unsuccessful, expect the following RS C&Ws:

'Вкл трансп."OTHER" WARN''
'Вкл трансп."OTHER" CAUT.'
'КС:Обнаружена MDM Node1 как BC'.

NCS is now in control and in a pre-5A configuration. NCS has minimal insight into LAB functionality.
The Node 1 MDMs in Config 8 are Bus Controller (BC) on CB GNC (Node 1-2 is BC on CB GNC 2 and Node 1-1 is BC on CB GNC 1) and Remote Terminal (RT) on both LB SYS LAB 1,2.

This step is time critical. Without a C&C MDM there is a risk that the KU antenna will point at structure and damage itself with reflected energy.

Since there is no insight into the INT MDM, the Secondary Node MDM is commanded to Config 5. If the Node MDM remains in Config 8, that confirms that the INT MDM is in Min Ops and still BC on the LB SYS LAB 1,2. If the Node MDM changes to Config 5 after commanding it to Config 5 then that confirms that the INT MDM is not operational and no longer BC on the LB SYS LAB 1,2.
This step is time critical. Without a C&C MDM there is a risk that the KU antenna will point at structure and damage itself with reflected energy.

If the Node 1 MDMs are still in Config 6, then they are still RT on both CB GNC 1,2 and LB Sys LAB 1,2. The EPCS cannot connect on CB GNC 2(1) if the Node 1 MDM is in Config 6. The only option would be to connect the EPCS to UB ORB Bus, which requires building a PCR for the UB ORB Bus.

Since there is no insight into the INT MDM the Primary Node MDM is commanded to Config 5. If the Node MDM remains in Config 8 that confirms that the INT MDM is in Min Ops and still BC on the LB SYS LAB 1,2. If the Node MDM changes to Config 5 after commanding it to Config 5 then that confirms that the INT MDM is not operational and no longer BC on the LB SYS LAB 1,2.
3.301 LOSS OF PCS TELEMETRY

(POC/EPCSR2 - ALL/FIN 3/Paper on ISS) Page 5 of 7 pages

44 Verify Node MDM Status and Cmd Node MDMs to Config 8

Task: CCS Restart
CCS Restart

- Verify Prim NCS MDM ID – N1-2
- Verify Prim NCS Frame Count – Incr
- Verify Prim NCS Operational Status – Primary
- Verify Prim NCS Current Config – Config 6
- Verify Sec NCS MDM ID – N1-1
- Verify Sec NCS Frame Count – Incr
- Verify Sec NCS Operational Status – Secondary
- Verify Sec NCS Current Config – Config 6
- Command Sec NCS Config 8
- Verify Sec NCS Current Config – Config 8
- Expect EPCS disconnect after commanding Primary Node 1 MDM to Config 8
- Command Prim NCS Config 8
- After 2 minutes connect EPCS.
- Prim NCS Current Config – Config 8

45 Connect EPCS on UB ORB N1-1 Bus

- Connect EPCS on UB ORB N1-1
- Perform (1.401 NODE 1 PCS/SSC INSTALLATION SETUP) (SODF: STRUC & MECH: NOMINAL: PCS/SSC/CBCS), then:

46 Verify EPCS Connection on UB ORB N1-1 Bus

Was EPCS connection successful on the UB N1-1 Bus?

No

- No Joy connecting the EPCS on either the CB GNC Buses or the ORB N1 Buses.
- Notify MCC-H via Russian Comm which blocks were executed.

Yes

47 Verify Node MDM Status and Cmd Primary Node 1 to Config 8

Task: CCS Restart
CCS Restart

- Verify Prim NCS MDM ID – N1-1
- Verify Prim NCS Frame Count – Incr
- Verify Prim NCS Operational Status – Primary
- Verify Prim NCS Current Config – Config 6
- Verify Sec NCS MDM ID – N1-2
- Verify Sec NCS Frame Count – Incr
- Verify Sec NCS Operational Status – Standby
- Expect EPCS disconnect after commanding Primary Node 1 MDM to Config 8.
- Command Prim NCS Config 8
- After 2 minutes connect EPCS.
- Prim NCS Current Config – Config 8
Note that C&W event times may be mixed between current time for those in alarm before the C&C failure and new ones in the 1992 epoch. This is just a symptom of the CCS transition and cannot be corrected yet.
No telemetry verification for GNC pass thru N2-1(2) is available. Select bus opposite of C&W indicated in block 49.

55 Station Crew Enable Pass thru

CDH: Primary C&C
Primary CCS MDM
'Software Control'
• sel Data Path
Primary CCS Data Path
OIU
• cmd Inh OIU Path GNC Execute
• Verify CCS OIU Data Path – GNC_Inh 'PCS'
• cmd Inh PCS Path GNC Execute
• Verify CCS PCS Data Path – None 'OIU'
• cmd Ena OIU Path GNC Execute
• Verify CCS OIU Data Path – GNC_Ena 'PCS'
• cmd Ena PCS Path GNC Execute
• Verify CCS PCS Data Path – GNC_Ena 'GNC'
• cmd Ena GNC Pass thru N2-1(2) Execute

56 Station Crew Swap Bus

CDH: Primary C&C
Primary CCS MDM
'Software Control'
• sel Data Path
Primary CCS Data Path
'GNC'
• cmd Inh GNC Pass thru Execute
• cmd Ena GNC Pass thru N2-X Execute, where X is the bus opposite of C&W indicated in block 46.

57 Orbiter Crew Reconnect to N2-X Bus

• Connect PDIP to N2-X bus, where X is the bus opposite of C&W indicated in block 46.

58 Orbiter Crew Reconnect PCS

• sel Connect to MDM
Is MDM connected status box green?

59 Yes

MCC-H

Comm reestablished with Primary GNC MDM and PCS telemetry regained.

60

61

• Inform MCC-H.
• Continue nominal operations.
**OBJECTIVE:**
Switch mated stack attitude control responsibility from orbiter to ISS. Verify ISS is in Free Drift and verify orbiter is Free Drift, assuming mated stack control for RS.

1. **VERIFYING INITIAL ATTITUDE CONTROL CONFIGURATION**
   
   PCS
   
   **MCG Summary**
   'MCG Status'
   
   Verify US GNC Mode – Drift(UDG, Standby, Wait)
   Verify RS SUDN Mode – Indicator (CMGTA)
   Verify ISS Attitude – Free Drift (No Control)

2. **PREPARING RS СУДН FOR ATTITUDE CONTROL HANOVER**
   
   MCC-M
   MCC-M will prepare the RS for handover by issuing the following commands per verified ground procedure
   
   УВТ F1_45 Remove inhibit for change of Master as needed
   УВТ F1_17 Set BRO (Attitude control prop consumption limit; requires BRO value)
   УВТ F1_40 Manifolds and ДО for Attitude Control, select (requires some initial data for thruster configuration) as needed
   [УВ] for selection of proper RS Attitude Mode as needed
   УВТ F1_198 for preparation of thrusters for attitude control
   
   MCC-M ⇒ ISS, MCC-H, “Russian Segment ready for handover.”

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

4. **ASSUMING CONTROL WITH ISS (VIA ISS CREW OR MCC-M)**
   
   RS Laptop
   СМ: TBM PROC
   СМ: TBM: Procedures
   
   sel F1_16 “Mode СУДН to active control using ДО”
   cmd Execute
   
   СМ: СУДН: Main
   СМ: СУДН: Main
   
   Verify RS GNC mode – Thruster (ДО) Only
   
   MCC-M
   УВТ F1_46 Inhibit change of Master as needed
   
   ISS ⇒ MCC-H, MCC-M, “Russian Segment has assumed attitude control.”
5. **RETURNING ORBITER TO NOMINAL CONFIGURATION**

If ALT DAP, return to Group B powerdown.

O14, PRI RJD DRIVER, LOGIC (sixteen) – OFF
O15, RJDA-1A L2/R2 MANF DRIVER – ON
O16:F
OBJECTIVE:
Switch mated stack attitude control responsibility from ISS to orbiter. Verify orbiter is in Free Drift, configure ISS to Free Drift, and then assume mated stack control with orbiter.

1. VERIFYING INITIAL RS ATTITUDE CONTROL CONFIGURATION
RS Laptop

Verify RS GNC Mode – Thrusters (ДО) Only

2. VERIFYING ORBITER CONFIGURATION
C3

GNC 20 DAP CONFIG

If ALT DAP required

MCC

DAP: FREE

O14:F
RJDA 1A L2/R2 MANF DRIVER – OFF
O15:F,
RJD MANF L5/F5/R5 DRIVER – OFF
O16:F
Pri RJD LOGIC (eight) – ON

MCC FOR GO TO POWER UP Pri DRIVERS
Pri RJD DRIVER (eight) – ON
RJD MANF L5/F5/R5 DRIVER – ON

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

3. CONFIGURING ISS TO FREE DRIFT (VIA ISS CREW OR MCC-M)
RS Laptop

CM: TBM PROC

sel F1_37 “Mode СУДН to Indicator, (ИР) with ОДУ OFF”

cmd Execute

CM: СУДН: Main

Verify RS GNC Mode – Indicator: Master

ISS ⇒ MCC-H, MCC-M: “Russian Segment has moded to Indicator. ISS is Free Drift.”

4. ASSUMING CONTROL WITH ORBITER
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)

When rates are damped < 0.1 deg/sec/axis
DAP – A/AUTO/VERN(ALT)

Orbiter ⇒ ISS, MCC-H, “Orbiter has established Attitude Control.”
OBJECTIVE:
Operational sequence used to configure the CCS Attitude Control System Moding software for docking on RS control.

1. **GNC COMMAND RESPONSE COUNTERS RESET**

   PCS
   GNC Command Response Counters
   GNC Command Response Counters

   sel Reset
   Verify the Since Reset column values are all blank.
   Do not close this window until the procedure is complete.
   If while executing a command, the Command Accept counter on the display does not increment
   Reselect GNC Command Response Counters to determine if a command was rejected.

   \(\n\)

2. **VERIFYING FLIGHT SPECIFIC PAD**

   If the following information is not recorded elsewhere, record it here.
   Is Checkpointing normally enabled or inhibited? _______
   Is Checkpointing to be enabled or inhibited for docking? _______
### Table 1. Pre-Arrival Requirements

<table>
<thead>
<tr>
<th>Req’d for Pre-Arrival</th>
<th>ADO</th>
<th>Pri</th>
<th>B/U</th>
<th>Ver ID</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mass Properties</td>
<td>ps21</td>
<td></td>
<td></td>
<td>______</td>
<td>Post Dock Mass Properties</td>
</tr>
<tr>
<td>2 CCDB SLOT X</td>
<td>ca1X</td>
<td></td>
<td>B/U</td>
<td>______</td>
<td>Post Docking attitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Version ID for CCS PPL 180 (ACS FDIR Adaptation Data) with RS_ACS_Safing_Status set to “0” (off) to be loaded to the backup and standby C&amp;C MDM.</td>
<td></td>
<td></td>
<td></td>
<td>______</td>
<td>Must be built as File Uplink.</td>
</tr>
<tr>
<td>4 Version ID for CCS PPL 181 - CCS RM PPL for GNC RM with or without Checkpointing to be loaded on all C&amp;C MDMs.</td>
<td></td>
<td></td>
<td></td>
<td>______</td>
<td>If GNC RM with Checkpointing is to be inhibited for docking, uplink PPL to all C&amp;C MDMs. Must be built as File Uplink.</td>
</tr>
<tr>
<td>5 Version ID for CCS PPL 216 - CCS PPL containing the commands to snap/hold US attitude control in CCDB slot 1 which execute if there is a TBM restart without context data.</td>
<td></td>
<td></td>
<td></td>
<td>______</td>
<td>This PPL will be nulled out, thus not containing any commands, to prevent this snap/hold from occurring during mated ops and prevent a potential force fight.</td>
</tr>
</tbody>
</table>

### 3. VERIFYING INITIAL CONDITIONS

**PCS**

**MCG**

**MCG Summary**

‘MCG Status’

- Verify US Station Mode – Prox Ops
- Verify RS Station Mode – Prox Ops
- Verify RS SUDN Mode – Thrusters Only

‘Primary GNC MDM’

- Verify Frame Count – incrementing

‘Backup GNC MDM’

- Verify Frame Count – incrementing
4. LOADING PPLs TO THE PRIMARY GNC MDM

CAUTION

Since a PPL load error that corrupts memory in the Primary GNC would be checkpointed to the Backup GNC, checkpointing should be stopped until the Primary GNC is successfully loaded. Failure to do this may result in corrupted memory in both the Primary and Backup GNC MDMs.

PCS 4.1 Disabling Checkpointing in Primary GNC MDM
MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock

`Pre Node 2 PMA 2 Dock`

‘Pre Arrival’

If Pri GNC Checkpoint – Ena
sel Pri

Primary GNC Checkpointing Status
‘Checkpoint Inhibit Status’

**cmd** Inh **Execute** (Verify – Inhibited)

`Pre Node 2 PMA 2 Dock`

sel Bkup

Backup GNC Checkpoint Status

Verify Idle Read/Start counter – incrementing

MCC-H 4.2 Loading the PPLs
For all PPLs designated in step 2 to be loaded to the Primary GNC MDM, coordinate with ODIN.

PCS 4.3 Enabling Checkpointing in Primary GNC MDM
If Checkpointing is normally enabled per step 2
MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock: Pri

Primary GNC Checkpoint Status
‘Checkpoint Inhibit Status’

**cmd** Ena **Execute** (Verify – Enabled)

`Pre Node 2 PMA 2 Dock`

sel Bkup

Backup GNC Checkpoint Status

Verify Idle Read/Start counter: 0
5. **LOADING PPLS TO THE BACKUP GNC MDM**
   
   If Checkpointing is normally inhibited per step 2, or if loading PPLs that are not checkpointed in R4, which are GC, SD, and RG PPLs.
   
   For all PPLs designated in step 2 to be loaded to the Backup GNC MDM, coordinate with ODIN.

6. **LOADING REQUIRED PPLs TO THE BACKUP/STANDBY C&C MDM**
   
   For all PPLs designated in step 2 to be loaded to the Backup and Standby C&C MDM, coordinate with ODIN.

7. **CONFIGURING RUSSIAN SEGMENT FOR DOCKING**

   **NOTE**
   
   MCC-M can send these commands any time prior to orbiter docking.

   **MCC-M**
   
   УВЦ F8_10 (inf0=9, inf1=1) Inhibit RS takeover due to Tier 1 Loss of Comm
   
   УВЦ F1_44 Update unmated Mass Properties into TBM buffer for Joint Expedited Undocking and Separation (JEUS).
   
   MCC-M will uplink cyclogram contents to channel 34 for JEOS.
   
   MCC-M ⇒ MCC-H, “Step 7 complete.”

8. **UPDATING POST DOCKING CCDB COMMANDED ATTITUDE**

   **PCS**
   
   MCG: MCS Configuration
   
   MCS Configuration
   
   ‘CCDB Slots’
For CCDB Slot X (from step 2)

`sel Cmd Att X`

`Cmd Att X`

If Slot X Yaw, Pitch, Roll does not match Yaw, Pitch, Roll in step 2

If in step 2, CCDB Slot X Yaw, Pitch, Roll is (0,0,0)

`cmd YPR 0,0,0`

If in step 2, CCDB Slot X Yaw, Pitch, Roll is not (0,0,0)

‘Command Input’

input Yaw – (from step 2)
Pitch – (from step 2)
Roll – (from step 2)

`cmd Set`

Verify Slot X Yaw – (as commanded)
Pitch – (as commanded)
Roll – (as commanded)

9. VERIFYING STATUS OF ACS MODIFYING SIGNALS

MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock

‘Final Approach’

Verify Manual Dock Sequence Init – Not Init
Verify LA-1, LA-2 Capture – No/No
Verify Arrival Flag – No
Verify Docked Indication – NOT Docked

10. INHIBITING GNC CHECKPOINTING

If GNC Checkpointing is to be inhibited for docking per step 2, perform

[2.702 DISABLE GNC CHECKPOINTING], all (SODF: MCS: NOMINAL: CHECKPOINTING), then:

11. ENABLING ARRIVAL SOFTWARE

MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock

‘Pre Arrival’

`sel PMA2 Manual Arrival SW`

`Manual Arrival SW`

‘PMA 2’

`cmd Manual Arrival SW Enable`
Verify PMA2 Docking Vehicle – Shuttle
Verify PMA2 Manual Arrival SW – Ena

Pre Node 2 PMA 2 Dock
‘Pre Arrival’

sel PMA 2 Arrival Automatic Arrival SW

Automatic Arrival SW
‘PMA 2’

cmd Enable

Verify PMA2 Docking Vehicle – Shuttle
Verify PMA2 Automatic Arrival SW – Ena

12. **ENABLING APAS LEDs**

Pre Node 2 PMA 2 Dock
‘Pre Arrival’

sel LED Control SW

LED Control SW

cmd Enable

Verify LED Control SW – Ena
Verify LED State – On

13. **VERIFYING STATUS OF AUTO HANDOVER**

Pre Node 2 PMA 2 Dock
‘Pre Arrival’

If Auto Att Control Handover to RS – Ena
   cmd Arm
   cmd Inhibit (Verify – Inh)
OBJECTIVE:
Operational sequence used to monitor orbiter arrival on RS Thrusters and then mode RS SUDN to Indicator. ISS MCS is configured to allow for automatic moding to Free Drift and then orbiter arrival is monitored. The crew will command the ISS to Free Drift manually only if the automatic software does not complete the mode transition within 20 seconds of Capture Confirmed.

NOTE
1. Perform step 1 after orbiter has begun approach (Dock - 15 minutes).
2. Start step 2 when orbiter starts final approach (from 30 feet). RS GNC must mode to Indicator – Master within 65 seconds of the orbiter call of Capture Confirmed or the orbiter will execute a corridor backout. ISS crew commands RS GNC to Indicator – Master after 20 seconds ONLY if automatic software is not successful.
3. Steps 3 and 4 provide manual commanding by the ground if the automatic, or crew, moding is unsuccessful.

1. VERIFYING INITIAL CONFIGURATION

   PCS
   MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock
   Pre Node 2 PMA 2 Dock
   'System Configuration'
   Verify US Station Mode – Prox Ops
   Verify RS Station Mode – Prox Ops
   Verify RS SUDN Mode – Thrusters Only
   'Pre Arrival'
   Verify PMA 2 Manual Arrival SW – Ena
   Verify PMA 2 Automatic Arrival SW – Ena
   'Final Approach'
   Verify LA-1/LA-2 Capture – No/No
   Verify Arrival Flag – No
   Verify Docked Indication – NOT Docked

2. FINAL APPROACH AND CAPTURE

   Orbiter ⇒ ISS, “Initiating final approach.”
   Pre Node 2 PMA 2 Dock
   'Final Approach'
   Orbiter ⇒ ISS, “Capture confirmed.”
   Start manual timer.
   Wait up to 20 seconds for the following indication.
   Verify RS SUDN Mode – Indicator
When time since capture confirmed > 20 seconds
* If RS SUDN Mode – Thrusters Only
* ‘Final Approach’
* √Manual SW Enable – Ena
* **cmd** Manual Dock Sequence Init (Verify – Init)
* **Verify RS SUDN Mode – Indicator

### 3. MODING TO FREE DRIFT - HOUSTON GROUND STEP

MCC-H
If time since Capture Confirmed > 30 seconds and RS SUDN Mode is not Indicator

MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock

[Pre Node 2 PMA 2 Dock]

‘Final Approach’

√Manual SW Enable – Ena

**cmd** Manual Dock Sequence Init (Verify – Init)

Verify RS SUDN Mode – Indicator

MCC-H ⇒ orbiter, ISS, “ISS is Free Drift.”

### 4. MODING TO FREE DRIFT - MOSCOW GROUND STEP

MCC-H
If time since Capture Confirmed > 40 seconds and RS SUDN Mode is not Indicator

MCC-H ⇒ MCC-M “Execute Step 4”

MCC-M
УВЦ F8_4 Manual entry of Capture discrete with shuttle

MCC-H
MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock

[Pre Node 2 PMA 2 Dock]

‘Final Approach’

Verify RS SUDN Mode – Indicator

MCC-H ⇒ orbiter, ISS, “ISS is Free Drift.”
OBJECTIVE:
Operational sequence used to disable the Arrival SW.

1. **GNC COMMAND RESPONSE COUNTERS RESET**
   - PCS
   - MCG: GNC Command Response Counters
   - sel Reset
   - Verify the Since Reset column values are all blank.
   - Do not close this window until the procedure is complete.
   - If while executing a command, the Command Accept counter on that display does not increment:
     - Reselect GNC Command Response Counters to determine if a command was rejected.

2. **VERIFYING FLIGHT SPECIFIC PAD**
   - Is Checkpointing to be enabled or inhibited? _______

Table 1.- Post Arrival Requirement

<table>
<thead>
<tr>
<th>Req'd for Post Arrival</th>
<th>ADO</th>
<th>Pri</th>
<th>B/U</th>
<th>Ver ID</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version ID for CCS PPL 181 - CCS RM PPL FOR GNC RM with or without Checkpointing to be loaded to all C&amp;C MDMS.</td>
<td></td>
<td></td>
<td></td>
<td>______</td>
<td>If GNC RM with Checkpointing was inhibited for docking and is now to be enabled, uplink PPL to all C&amp;C MDMs. Must be built as File Uplink.</td>
</tr>
</tbody>
</table>

3. **VERIFYING CORRECT CONFIGURATION**
   - PCS
   - MCG: Dock and Undock: Pre-Node 2 PMA 2 Dock
   - Pre Node 2 PMA 2 Dock
   - ‘System Configuration”
   - Verify US Station Mode – Prox Ops
   - Verify RS Station Mode – Prox Ops
   - Verify RS SUDN Mode – Indicator

4. **LOADING REQUIRED PPLS TO THE C&C MDMS**
   - MCC-H
   - For all PPLs designated in step 2 to be loaded to the C&C MDMs, to load PPL to the C&C MDMs, coordinate with ODIN.
5. **ENABLING GNC CHECKPOINTING**

If GNC Checkpointing is to be enabled per step 2, perform (2.701 [ENABLE GNC CHECKPOINTING], (SODF: MCS: NOMINAL: CHECKPOINTING), then:

6. **DISABLING ARRIVAL SOFTWARE**

   **NOTE**
   If the Manual Dock Sequence Init command was sent, the software automatically inhibits the manual software. However, to configure the Man Dock Seq Init telemetry to Not Init, the Manual Software must be commanded Inh even though its telemetry already reads Inh. After docking, if ISS attitude control is resumed while the telemetry reads Init, the ACS Moding software will automatically mode the ISS to Free Drift.

   Pre Node 2 PMA 2 Dock
   ‘Final Approach’

   If Manual SW Enable – Ena, or Manual Dock Sequence Init – Init
   ‘Pre Arrival’

   sel PMA 2 Manual Arrival SW

   Manual Arrival SW
   ‘PMA 2’

   cmd Manual Arrival SW Inhibit

   Verify PMA 2 Docking Vehicle – None
   Verify PMA 2 Manual Arrival SW – Inh

   Pre Node 2 PMA 2 Dock
   ‘Final Approach’

   Verify Manual Dock Sequence Init – Not Init

   Pre Node 2 PMA 2 Dock
   ‘Pre Arrival’

   sel PMA 2 Automatic Arrival SW

   Automatic Arrival SW
   ‘PMA 2’

   cmd Arm (Verify – Arm)
   cmd Inhibit

   Verify PMA 2 Docking Vehicle – None
   Verify PMA 2 Automatic Arrival SW – Inh
7. **DISABLING LED CONTROL SOFTWARE**

   **Pre Node 2 PMA 2 Dock**

   ‘Pre Arrival’

   sel LED Control SW

   **LED Control SW**

   **cmd** Inhibit

   Verify LED Control SW – Inh
   Verify LED State – Off

8. **VERIFYING APAS INDICATION OF HARD DOCK**

   **NOTE**
   Perform this step after Hard Dock complete, which may take up to 17 minutes.

   **Pre Node 2 PMA 2 Dock**

   ‘Final Approach’

   Verify LA-1,LA-2 Capture – No/No

   If Docked Indication – NOT Docked

   **cmd** Docked

   Verify Docked Indication – Docked

9. **INCORPORATING POST-ARRIVAL PPLS**

   **PCS**

   **Pre Node 2 PMA 2 Dock**

   ‘System Configuration’

   **cmd** Mass

   Verify Active Mass Properties PPL Version ID as expected per 8.103 PMA2 Pre-Arrival Configuration (Thrusters).
OBJECTIVE:
Operational sequence used to configure CCS Attitude Control System (ACS) Moding software to allow for RS GNC control after departure of orbiter.

1. **VERIFYING FLIGHT-SPECIFIC PAD**
   If the following information is not recorded elsewhere, record it here.
   - Is Checkpointing normally enabled or inhibited? _____
   - Is Checkpointing to be enabled or inhibited for undocking? _____

<table>
<thead>
<tr>
<th>Table 1. Post Arrivals Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reg'd for Post Departure</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>1 Mass Properties</td>
</tr>
<tr>
<td>2 Version ID for CCS PPL</td>
</tr>
<tr>
<td>181 - CCS RM PPL For GNC</td>
</tr>
<tr>
<td>RM with or without Checkpointing to be loaded to all C&amp;C MDMs.</td>
</tr>
</tbody>
</table>

2. **VERIFYING INITIAL CONDITIONS**

PCS
- MCG Summary
  - 'MCG Status'
  - Verify US Station Mode – Prox Ops
  - Verify RS Station Mode – Prox Ops
  - Verify US GNC Mode – CMG TA (Drift, UDG)
  - Verify RS SUDN Mode – CMG TA (Indicator)
  - Verify RS Control – Slave (Master)

3. **LOADING PPLS TO THE PRIMARY GNC MDM**

   **CAUTION**
   Since a PPL load error that corrupts memory in the Primary GNC would be checkpointed to the Backup GNC, checkpointing should be stopped until the Primary GNC is successfully loaded. Failure to do this may result in corrupted memory in both the Primary and Backup GNC MDMs.

PCS
- 3.1 Disabling Checkpointing in Primary GNC MDM
  - MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock
  - Pre-Node 2 PMA 2 Undock
  - 'Pre Departure'
8.106 PMA2 PRE-DEPARTURE CONFIGURATION (THRUSTERS)

If Pri GNC Checkpoint – Ena

* sel Pri

**Primary GNC Checkpoint Status**
‘Checkpoint Inhibit Status’

**cmd Inh Execute** (Verify – Inhibited)

Pre Node 2 PMA 2 Undock

* sel Bkup

**Backup GNC Checkpoint Status**

Verify Idle Read/Start Counter – incrementing

**MCC-H** 3.2 Loading the PPLs

For all PPLs designated in step 1 to be loaded to the Primary GNC MDM, coordinate with ODIN.

**PCS** 3.3 Enabling Checkpointing in Primary GNC MDM

If Checkpointing is normally enabled per step 1

* MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock: Pri

**Primary GNC Checkpoint Status**
‘Checkpoint Inhibit Status’

**cmd Ena Execute** (Verify – Enabled)

Pre Node 2 PMA 2 Undock

* sel Bkup

**Backup GNC Checkpoint Status**

Verify Idle Read/Start Counter: 0

**MCC-H** 4. LOADING PPLS TO THE BACKUP GNC MDM

If Checkpointing is normally inhibited per step 1, or if loading PPLs that are not checkpointed in R4, which are GC, SD, and RG PPLs

For all PPLs designated in step 1 to be loaded to Backup GNC MDM, coordinate with ODIN.

5. LOADING REQUIRED PPLS TO THE BACKUP/STANDBY C&C MDM

For all PPLs designated in step 1 to be loaded to Backup and Standby C&C MDMs, coordinate with ODIN.

**PCS** 6. VERIFYING STATUS OF ACS MODING SIGNALS

MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock

Pre Node 2 PMA 2 Undock
‘Pre Departure’
Verify Auto Att Control Handover to RS – Inh 
‘Undocking’

Verify Manual Undock Sequence Init – Not Init
Verify LA-1/LA-2 Interface Sealed – Yes/Yes
Verify LA-1/LA-2 Separation – No/No
Verify Docked Indication – Docked
Verify Departure Flag – No

7. INHIBITING GNC CHECKPOINTING
If GNC Checkpointing is to be inhibited for undocking per step 1, perform
(2.702 DISABLE GNC CHECKPOINTING), all (SODF: MCS: NOMINAL: CHECKPOINTING), then:

8. SETTING BACK OFF TIME
Pre Node 2 PMA 2 Undock
‘Pre Departure’

sel Back Off Time

Back Off Time
‘Pending Time’

cmd 100 Seconds

Verify Pending Back Off Time: 100 sec
Verify Arm State – Arm

cmd Incorporate Pending Back Off Time

Verify Back Off Time: 100 sec
Verify Arm State – Disarm

9. SETTING POST DEPARTURE CONTROL MODE
Pre Node 2 PMA 2 Undock
‘Pre Departure’

If Post Departure Control Mode – CMG TA (CMG Only)

sel Post Departure Control Mode

Post Dprtr Cntl Mode

cmd RS Control

Verify Post Departure Control Mode – RS Control
10. **ENABLING DEPARTURE SOFTWARE**

**NOTE**
Due to SPN 3366, which is only applicable to CCS R4, the manual dock ACS Moding software will remain inhibited, and the ISS crew will command from the Russian Segment in the Departure procedure.

Pre Node 2 PMA 2 Undock
‘Pre Departure’

sel PMA 2 Automatic Departure SW

Automatic Departure SW
‘PMA 2’

**cmd** Arm

Verify State – Arm

**cmd** Enable

Verify PMA 2 Undocking Vehicle – Shuttle
Verify PMA 2 Automatic Departure SW – Ena
Verify State – Disarm

11. **VERIFYING TIME SINCE SEPARATION TELEMETRY**

Pre Node 2 PMA 2 Undock
‘Undocking’

Verify Time Since Separation: 0

**CAUTION**
If the Time Since Separation is observed to be incrementing any time prior to planned departure, ISS will take attitude control after 100 seconds, which could result in a force fight or collision with the orbiter. IMMEDIATE ACTION IS REQUIRED to prevent ISS from taking attitude control.
8.106 PMA2 PRE-DEPARTURE CONFIGURATION (THRUSTERS)
(JNT OPS/LF1 - ALL/FIN 8/SPN/MULTI)  Page 5 of 6 pages

* If Time Since Separation is observed to be incrementing any time
  prior to planned departure, send all of the following commands
  to inhibit both manual and automatic SW, even if either is
  already inhibited, to ensure timer stops.

  Pre Node 2 PMA 2 Undock
  ‘Pre Departure’

  sel PMA2 Manual Departure SW

  Manual Departure SW
  ‘PMA 2’

  cmd Manual Departure SW Inhibit

  Verify PMA 2 Undocking Vehicle – None
  Verify PMA 2 Manual Dprtr SW – Inh

  cmd Automatic Departure SW Inhibit

  Verify PMA 2 Automatic Dprtr SW – Inh

12. HANDOVER ATTITUDE CONTROL TO ORBITER
MCG: MCS Configuration
  ‘MCS Moding’

If US GNC Mode – CMG TA
Perform {3.110 HANDOVER ATTITUDE CONTROL CMG TA TO
ORBITER}, all (SODF: JNT OPS: MATED OPERATIONS), then:

MCG: MCS Configuration
  ‘MCS Moding’

MCC-H
  Verify RS SUDN Mode – CMG TA

13. PREPARING RUSSIAN SEGMENT FOR DEPARTURE

  NOTE
  RS Control must be Master for the ACS
  moding software to mode RS to thruster
  control after undocking.
If handover to orbiter occurred in step 12

**MCC-M**
- YBT F14_20 Take Master Flag from US and Mode RS to Indicator

**MCC-H**
- MCS Configuration
  - ‘MCS Moding’
  - Verify RS SUDN Mode – Indicator
  - Verify RS Control – Master

**MCC-M**
- Verify GTUBM_B13.B.14 = 1 Inhibit dynamic checking flag bit set

**MCC-M** will prepare thrusters for attitude control approximately 3 minutes prior to undocking.

YBT F1_198 Prepare thrusters for attitude control.

<table>
<thead>
<tr>
<th><strong>NOTE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>MCC-M</strong> will also verify that Russian Segment is not using USOS calculated mass properties.</td>
</tr>
<tr>
<td>2. <strong>MCC-M</strong> mass properties will have been updated once station is in attitude control.</td>
</tr>
</tbody>
</table>

**MCC-M ⇒ MCC-H**, “Russian Segment is prepared for departure.”
8.107 PMA 2 DEPARTURE (THRUSTERS)
(JNT OPS/LF1 - ALL/FIN 5/MULTI)  Page 1 of 3 pages

OBJECTIVE:
Operational sequence used to monitor departure and to ensure proper functioning of the USOS software after orbiter departure on RS Thrusters. The crew will command the ISS to attitude control manually only if the automatic software does not complete the transition within 120 seconds of Physical Separation.

NOTE
1. Step 2 in this procedure should be started about 25 minutes prior to orbiter departure.

2. Orbiter separation occurs in step 3 including crew steps to regain attitude control in contingency scenario.

3. Step 4 provides manual command by MCC-M if the automatic, or crew, moding is unsuccessful.

1. CONFIGURING FGB COMM PANEL
Setup headset on FGB Comm Panel for use during this procedure when using RS Laptop.

2. VERIFYING CORRECT CONFIGURATION

   NOTE
   The RS Control must be Master for the ACS Moding software to mode RS to thruster control after undocking.

PCS

MCG
MCG Summary
'MCG Status'

Verify US Station Mode – Prox Ops
Verify RS Station Mode – Prox Ops
Verify RS SUDN Mode – Indicator
Verify RS Control – Master

MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock
   Pre Node 2 PMA 2 Undock
   'Pre Departure'

   Verify Back Off Time: 100
   Verify Post Departure Control Mode – RS Control
   Verify PMA 2 Automatic Departure SW – Ena

   'Undocking'

   Verify LA-1 / LA-2 Interface Sealed – Yes/Yes
   Verify LA-1 / LA-2 Separation – No/No
   Verify Time Since Separation: 0
   Verify Docked Indication – Docked
   Verify Departure Flag – No
3. ORBITER SEPARATION

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Driving the APAS Hooks open takes approximately 2 minutes.</td>
</tr>
<tr>
<td>2. Approximately 100 seconds after physical separation, the automatic departure software should execute resulting in resumption of ISS attitude control. Also at this time, the Docked Indication will change to “Not Docked.”</td>
</tr>
<tr>
<td>3. If the ISS is still in Free Drift after 120 seconds since physical separation, the crew will execute the star block to resume attitude control.</td>
</tr>
<tr>
<td>4. If the ISS is still in Free Drift after 140 seconds since physical separation, MCC-M will execute commands in step 4.</td>
</tr>
</tbody>
</table>

Orbiter ⇒ ISS, “Physical Separation.”

Start manual timer.

Wait up to 120 seconds for the following indication.

RS Laptop

| СМ: СУДН: Main |
| СМ: СУДН: Main |

Verify RS GNC mode – Thruster (ДО) Only

******************************************************************************

* If RS GNC mode is not “Thruster (ДО) Only” and time since physical separation > 120 seconds.

RS Laptop

| СМ: ЦВМ PROC |
| СМ: ЦВМ: Procedures |
| УВЦ F8_5 Manual entry of Undock discrete with shuttle |

**cmd Execute**

| СМ: СУДН: Main |
| СМ: СУДН: Main |

* Verify RS GNC mode – Thruster (ДО) Only

* ISS ⇒ orbiter, “Station is in Attitude Control.”

******************************************************************************

ISS ⇒ orbiter, “Station is in Attitude Control.”
4. RESUMING ATTITUDE CONTROL – GROUND STEPS

NOTE
The Russian command, УВЦ F22_1, uses the JEUS cyclogram located in channel 34 to resume control. This cyclogram has a built in 100 second pause to allow the orbiter to back away, so attitude control should be resumed approximately 240 seconds after physical separation. There should not be an additional pause in the cyclogram to prepare thrusters.

MCC-H
If time since physical separation > 140 seconds and RS SUDN Mode is not Thrusters Only
\[ MCC-H \Rightarrow MCC-M, \text{ “Execute step 4.”} \]

MCC-M
УВЦ F22_1

MCC-H
MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock
Pre Node 2 PMA 2 Undock
‘Undocking’

Verify RS SUDN Mode – Thrusters Only

MCC-H \Rightarrow orbiter, ISS, “Station is in Attitude Control.”
OBJECTIVE:
Operational sequence used to reconfigure the departure software on RS Thrusters.

1. **GNC COMMAND RESPONSE COUNTERS RESET**

   PCS
   MCG: GNC Command Response Counters
   GNC Command Response Counters

   sel Reset

   Verify the Since Reset column values are all blank.

   Do not close this window until the procedure is complete.

   If while executing a command, the Command Accept counter on that display does not increment
   Reselect GNC Command Response Counters to determine if a command was rejected.

   √MCC-H

2. **VERIFYING FLIGHT SPECIFIC PAD**

   If the following information is not recorded elsewhere, record it here.

   Is Checkpointing to be enabled or inhibited? _____

<table>
<thead>
<tr>
<th>Table 1. Version ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version ID</td>
</tr>
<tr>
<td>Version ID for CCS PPL 180 (ACS FDIR Adaptation Data) with RS ACS_Safing_Status set to “0” (off) to be loaded to Backup and Standby C&amp;C MDM.</td>
</tr>
<tr>
<td>_________</td>
</tr>
<tr>
<td>Must be built as File Uplink and uplinked to the backup and standby C&amp;C.</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Version ID for CCS PPL 181 - CCS RM PPL For GNC RM with or without Checkpointing to be loaded to all C&amp;C MDMs.</td>
</tr>
<tr>
<td>_________</td>
</tr>
<tr>
<td>If GNC RM with Checkpointing was inhibited for undocking, and is to be enabled now, uplink PPL to all C&amp;C MDMs. Must be built as File Uplink.</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Version ID for CCS PPL 216 - CCS PPL containing the cmds to snap/hold US attitude control in CCDB slot 1 which execute if there is a TBM restart without context data</td>
</tr>
<tr>
<td>_________</td>
</tr>
<tr>
<td>This PPL will be nulled out, thus not containing any commands, to prevent this snap/hold from occurring during mated ops and prevent a potential force fight.</td>
</tr>
</tbody>
</table>
3. **VERIFYING CORRECT CONFIGURATION**

   PCS MCG: Dock and Undock: Pre-Node 2 PMA 2 Undock
   
   Pre Node 2 PMA 2 Undock
   
   'System Configuration'

   Verify US Station Mode – Prox Ops
   Verify RS Station Mode – Prox Ops
   Verify RS SUDN Mode – Thrusters Only

   'Undocking'

   Verify LA-1/LA-2 Interface Sealed – No/No
   Verify LA-1/LA-2 Separation – Yes/Yes
   Verify Time Since Separation > 100

   If Docked Indication – Docked
   
   **cmd** Not Docked

   Verify Docked Indication – NOT Docked

4. **ENABLING GNC CHECKPOINTING**

   If GNC Checkpointing is to be enabled per step 2
   
   Perform [2.701 ENABLE GNC CHECKPOINTING], all (SODF: MCS: NOMINAL: CHECKPOINTING), then:

5. **INHIBITING THE DEPARTURE SOFTWARE**

   **NOTE**
   
   1. The Time Since Separation gets reset to zero by commanding the automatic departure software inhibit, but it does not get reset by commanding the manual departure software inhibit. So there could be times when the automatic software was not used or already is inhibited, and it should still be commanded inhibited in this step to reset the timer.

   2. If the Manual Undock Sequence Init command was sent, the software automatically inhibits the manual software. However, to configure the Manual Undock Seq Init telemetry to Not Init, the Manual Software must be commanded Inh even though its telemetry already reads Inh.

   Pre Node 2 PMA 2 Undock
   
   'Undocking'
8.108 PMA2 POST DEPARTURE CONFIGURATION (THRUSTERS)
(JNT OPS/LF1 - ALL/FIN 8/MULTI)  Page 3 of 4 pages

If Manual SW Enable – Ena, or Manual Undock Sequence Init – Init

Pre Node 2 PMA 2 Undock

‘Pre Departure’

sel PMA 2 Manual Departure SW

Pre Node 2 PMA 2 Undock

‘PMA 2’

cmd Manual Departure SW Inhibit

Verify PMA 2 Undocking Vehicle – None
Verify PMA 2 Manual Dprtr SW – Inh

Pre Node 2 PMA 2 Undock

‘Undocking’

Verify Manual Undock Sequence Init – Not Init

Pre Node 2 PMA 2 Undock

‘Pre Departure’

If PMA 2 Automatic Departure SW – Ena
or
‘Undocking’

If Time Since Separation is increasing

‘Pre Departure’

sel PMA 2 Automatic Departure SW

Automatic Departure SW

‘PMA 2’

cmd Inhibit

Verify PMA 2 Undocking Vehicle – None
Verify PMA 2 Automatic Departure SW – Inh

Pre Node 2 PMA 2 Undock

‘Undocking’

Verify Time Since Separation:  0

6. INCORPORATING MASS PROPERTIES

Pre Node 2 PMA 2 Undock

‘System Configuration’

cmd Mass

Verify Active Mass Properties PPL Version ID as expected per step 1 of 8.106 PMA2 Pre-Departure Configuration (Thrusters).
7. **LOADING REQUIRED PPLs TO BACKUP/STANDBY C&C MDM**
   Coordinate with ODIN prior to loading CCS PPLs designated in step 2

8. **CONFIGURING RS INHIBIT FOR STAGE OPERATIONS**
   УВЦ F8_10 (inf0=9, inf1=0) Enable the RS automatic takeover due to Tier 1 Loss of Comm
OBJECTIVE:
Quickly safe the Oxygen Recharge Compressor Assembly (ORCA) in the event of an ORCA failure.

1. **RECONFIGURING ISS O2 SYSTEM**
   If ORCA is still running
   ORCA Status Panel
   1.1 PUMP Control sw → STOP/RESET
   1.2 Report any illuminated LEDs to **MCC-H**.

2. **REDUCING ISS O2 SYSTEM PRESSURE TO AMBIENT**

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

   2. As the O2 system pressure bleeds down and O2 is introduced into the cabin, the following messages may be received:
      ‘O2 Lo P Supply Low - A/L’
      ‘PCA O2 Line Pressure Low - A/L’
      ‘PCA O2 Line Pressure Low - LAB’

   3. The messages will return to normal as the O2 system is repressurized (Step 4).

   ODS Vest GO2 Xfer Panel
   2.1 FLOW → CLOSED

   **WARNING**
   Opening the ODS Vestibule Transfer Panel Vent may cause a loud hissing noise. Crew in the vicinity should don ear plugs.

   2.2 Don ear plugs.

   2.3 VENT → OPEN

   2.4 Check GO2 Xfer Panel Pressure Gauge reading 0 psi.
   Doff ear plugs.
PCS 2.5 Airlock: ECLSS: Oxygen System

- **AL Oxygen System**
  - 'O2 Low Pressure Supply Valve'
    - √ Actual Position – Open

- 'AL PCA O2 Intro Valve'
  - cmd Open (√ Position – Open)
  - 'Low Pressure'

When PCA O2 Line Press < 160 kPa (23 psia) or **On MCC-H GO**, proceed.

- 'AL PCA O2 Intro Valve'
  - cmd Close (√ Position – Closed)

ODS Vest 2.6 VENT → CLOSED

3. **RECONFIGURING ORCA**
   3.1 If time available, don powder-free Gloves.

   **NOTE**
   QDs must be closed to disconnect lines.

A/L1OA2 3.2 ORCA O2 Outlet Line (MW QD011) ←|→ QD011

- 3.3 Remove cap from SPARE QD.
  - ORCA O2 Outlet Line (MW QD011) →|← SPARE QD

- 3.4 Install cap on QD011.

- 3.5 Doff gloves.

4. **RETURNING ISS O2 SYSTEM TO NOMINAL CONFIGURATION**
   4.1 **On MCC-H GO**, proceed.

A/L1OA2 4.2 VL009 (O2 Lo P) → Open

- 4.3 VL010 (O2 Hi P) → Open
**NOTE**

1. This Expedited undocking should be used for the following shuttle failures
   - Cabin leak
   - Loss of cooling (2 water coolant loops or 2 Freon coolant loops)

2. This Expedited undocking may be used for the following shuttle failures on MCC call
   - Non-isolatable prop leak
   - Loss of cooling (2 cabin fans)
   - Loss of 2 fuel cells

3. Entrance to this procedure based on Cabin Leak or Loss of Cooling scenario assumes that this
   procedure will be worked concurrently with the associated FDF ORB PKT and ENTRY PKT powerdown.

4. At least 20 minutes is required to perform mandatory activities (not including ISS SAFING actions)
   through physical separation (10 minutes for JOINT EMERGENCY EGRESS + 10 minutes for undocking).

   An additional 45 minutes is required for ANY ATTITUDE SEPARATION (from physical separation
   to OMS TIG burn).

   An additional 20 minutes is required for SHUTTLE EMERGENCY SEPARATION (from physical
   separation to OMS TIG burn).

5. If ISS SAFING results in jettison of hardware, jettison will be performed in step 10b of the JEUS just prior to undock.
### 9.101 JOINT EXPEDITED UNDOCKING AND SEPARATION
(JNT OPS/8A - ALL/FIN 6/MULTI/HC) Page 2 of 9 pages

<table>
<thead>
<tr>
<th>ISS CREW</th>
<th>SHUTTLE MS</th>
<th>SHUTTLE CDR/PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOTE</strong> If ISS crew available, steps 2a to 4a should be performed in parallel.</td>
<td><strong>NOTE</strong> If shuttle crew available, steps 2b to 4b should be performed in parallel.</td>
<td><strong>NOTE</strong> Shuttle CDR will give final “GO” for Hatch closure (steps 14 to 18 of JOINT EMERGENCY EGRESS).</td>
</tr>
</tbody>
</table>
| 2a. ISS SAFING
As required, perform **9.102 ISS SAFING**, all (SODF: JNT OPS: EMERGENCY RESPONSE), then:
Report to shuttle CDR, “ISS SAFING complete.” | 2b. ISS SAFING
As required, perform **9.102 ISS SAFING**, all (SODF: JNT OPS: EMERGENCY RESPONSE), then:
Report to shuttle CDR, “ISS SAFING complete.” | 2c. JOINT EMERGENCY EGRESS
All crew return to home vehicle. If required, unstow and don masks.
√ Only shuttle crew onboard shuttle
CDR reports to MS, “GO for Hatch closure.”
√ EVA crew not tethered to ISS |
| 3a. JOINT EMERGENCY EGRESS
All crew return to home vehicle.
If required, unstow and don masks.
√ Only ISS crew onboard ISS
Perform **10.102 JOINT EMERGENCY EGRESS**, steps 3 to 4 (SODF: JNT OPS: CUE CARD), then:
If ISS crew available
Perform **10.102 JOINT EMERGENCY EGRESS**, steps 8 to 13 (SODF: JNT OPS: CUE CARD), then: | 3b. JOINT EMERGENCY EGRESS
In coordination with ISS crew (if crew available), perform **10.102 JOINT EMERGENCY EGRESS**, all (SODF: JNT OPS: CUE CARD), then: | 3c. UNDOCKING PREP (GET-AHEAD)
√ MCC for separation maneuver required
If no comm available
If time to OMS TIG burn ≤ 1:10, or ISS SAFING actions required, assume Shuttle Emergency Separation. If not, assume Any Attitude Separation.
O14, Pri RJD DRIVER, LOGIC
O15, (sixteen) – ON
O16:F
O15, O16:E |
| 4a. FEATHER P6 SOLAR ARRAYS FOR DEPARTURE
L12U **APCU 1,2 CONV** – OFF
 **CONV tb** – bp
 **OUTPUT RLY tb** – bp
 **OUTPUT RLY** – OPEN |
| PCS P6: EPS: BGA 2B
sel Channel Targeted Modes
BGA 2B Ch Targeted Modes
‘Column = Non-Solar Tracking’
‘Row = Directed Position’ |
| 4b. VERIFYING APCU DEACT
L12U **APCU 1,2 CONV** – OFF
 **CONV tb** – bp
 **OUTPUT RLY tb** – bp
 **OUTPUT RLY** – OPEN |
| 5b. Hold for shuttle CDR call, “Go for vestibule depress.” |

08 JUN 04
## ISS CREW

<table>
<thead>
<tr>
<th>ISS CREW</th>
<th>SHUTTLE MS</th>
<th>SHUTTLE CDR/PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>input Cmded Angle – 150 deg</td>
<td>6b. <strong>DEPRESSURIZING SHUTTLE VESTIBULE</strong></td>
<td>5c. Hold for shuttle MS call, “UNDOCKING PREP complete.”</td>
</tr>
<tr>
<td><strong>cmd</strong> Set</td>
<td>On shuttle CDR “GO for vestibule depress”</td>
<td></td>
</tr>
<tr>
<td>P6: EPS: BGA 4B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sel Channel Targeted Modes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BGA 4B Ch Targeted Modes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Column = Non-Solar Tracking’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Row = Directed Position’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>input Cmded Angle – 210 deg</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cmd</strong> Set</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5a. Hold for shuttle CDR call, “GO for ISS to Free Drift.”

### 6b. DEPRESSURIZING SHUTTLE VESTIBULE

On shuttle CDR “GO for vestibule depress”

<table>
<thead>
<tr>
<th><strong>A6L</strong></th>
<th>cb ESS 1BC SYS PWR CNTL SYS – cl</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cb ESS 2CA SYS PWR CNTL SYS 2 – cl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cb ESS 1BC DEP SYS 1 VENT ISOL – cl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cb ESS 2CA DEP SYS 2 VENT ISOL – cl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cb ESS MNA DEP SYS 1 VENT – cl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cb ESS MNB DEP SYS 2 VENT – cl</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SYS PWR SYS 1, SYS 2 tb (two) – ON VEST DEP VLV SYS 1,2 VENT ISOL (two) – OP (tb-OP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VEST DEP VLV SYS 1,2 VENT (two) – OP (tb-OP)</td>
<td></td>
</tr>
</tbody>
</table>

### 7b. ODS PREPARATION FOR UNDOCKING

If required, perform PMA-2 HOOKS OPEN (FDF: RNDZ, APDS), then:
Perform DOCKING MECHANISM PWRUP (FDF: RNDZ, APDS), then:

<table>
<thead>
<tr>
<th><strong>NOTE</strong></th>
<th>If Airlock Pressure &lt; 8.0 psia, expect hooks motor drive to fail during operation.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perform UNDOCKING PREP (FDF: RNDZ, APDS), then:</td>
</tr>
<tr>
<td></td>
<td>Report to shuttle CDR, “UNDOCKING PREP complete.”</td>
</tr>
</tbody>
</table>

### 5c. Hold for shuttle MS call, “UNDOCKING PREP complete.”

### 6c. When UNDOCKING PREP complete,

<table>
<thead>
<tr>
<th><strong>A1R</strong></th>
<th>Spacelab A/G 1 – ON</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CDR reports to ISS crew, “GO for ISS to Free Drift.”</td>
<td></td>
</tr>
</tbody>
</table>
### 6a. **MODING ISS TO FREE DRIFT**
- On shuttle CDR "GO for ISS to Free Drift"

#### PCS
- MCG: MCS Configuration
  - MCS Configuration
  - ‘MCS Moding’
- If ISS Att Cntl Config is CMG TA
  - sel Drift
    - Drift
  - √ Mode Transition – Ena
  - √ Attitude Maneuver – Ena
  - √ Att Cntl Shutdown – Ena
  - ‘Moding’
  - **cmd** Mode to Drift
- Verify US GNC Mode – Drift
- If ISS Att Cntl Config is Free Drift and
- RS Control is Slave
  - Report to shuttle CDR, “ISS in Free Drift.”

### 8b. **Hold for shuttle CDR call,**
- "GO for undocking."

### 7c. **CONFIGURING RCS FOR UNDOCKING**
- **GNC_23_RCS**
  - Reselect manually deselected jets.
  - CRT
    - If performing Any Attitude Sep,
      - configure for single – X jet
      - JET DES F1F – ITEM 31
        - EXEC (*)
      - JET DES F2F – ITEM 35
        - EXEC (*)
  - NOTE
    - Do not perform steps 8c to 9c until ready for undock.

### 8c. **FLT CNTLR PWRUP**
- **GNC_25_RM_ORBIT**
  - SW RM INH – ITEM 16 (*)
  - A6U FLT CNTLR PWR – ON
  - SW RM INH – ITEM 16 (no *)

### 9c. **CONFIGURING DAP FOR UNDOCKING**
- **GNC_UNIV_PTG**
  - √ Rates < 0.12°/sec
  - A6U DAP: FREE
  - **GNC_20_DAP_CONFIG**
  - CRT
    - X JETS ROT ENA, ITEM 7 EXEC
      - (no*)
    - If performing Any Attitude Sep,
      - Config DAP A, B to A9, B9.
    - If performing Shuttle Emergency Sep,
      - Config DAP A, B to A7, B7.
### 9.101 JOINT EXPEDITED UNDOCKING AND SEPARATION

#### (JNT OPS/8A - ALL/FIN 6/MULTI/HC)  Page 5 of 9 pages

<table>
<thead>
<tr>
<th>ISS CREW</th>
<th>SHUTTLE MS</th>
<th>SHUTTLE CDR/PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOTE</strong></td>
<td><strong>COMMAND UNDOCKING</strong></td>
<td>10c. CDR report to <strong>MCC</strong>, “ISS SAFING complete, ISS in Free Drift, and DAP configured for undock” (if no comm, then proceed).</td>
</tr>
<tr>
<td><strong>ISS CREW</strong></td>
<td><strong>SHUTTLE MS</strong></td>
<td><strong>MCC</strong> for “GO” for undocking (if time permits and comm available), then:</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>7a. Proceed to step 8a.</td>
</tr>
<tr>
<td>7a.</td>
<td>Proceed to step 8a.</td>
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### 9.101 JOINT EXPEDITED UNDOCKING AND SEPARATION
(JNT OPS/8A - ALL/FIN 6/MULTI/HC) Page 6 of 9 pages

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Report to shuttle CDR,
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## Joint Expedited Undocking and Separation

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<td><strong>8a.</strong> Moding ISS Back to Attitude Control</td>
<td><strong>POST-PHYSICAL SEPARATION</strong></td>
<td><strong>POST-PHYSICAL SEPARATION</strong></td>
</tr>
<tr>
<td>PCS: Docking Configuration</td>
<td><strong>POST-PHYSICAL SEPARATION</strong></td>
<td><strong>POST-PHYSICAL SEPARATION</strong></td>
</tr>
<tr>
<td>Docking Configuration ‘Orbiter Departure’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When PMA2 Separation LA-1 or LA-2 = “Yes”, or if shuttle separation is confirmed, wait 100 seconds then continue.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### RS Laptop

- CM: ЦВМ PROC
- CM: ЦВМ: Procedures
- sel F22_1
  - input param 1 – 3 4
  - input param 2 – 0
  - cmd Execute

#### Post-Physical Separation

- **9a.** Verifying Solar Arrays in Commanded Position
- PCS: P6: EPS: BGA: 2B
- sel Channel Targeted Modes
  - BGA 2B Ch Targeted Modes
  - Verify Ch 2B Mode – Non-Solar Tracking
  - Verify BGA Mode – Directed Position
  - BGA 2B
  - Verify Actual Angle: 150 deg

- **12b.** Disabling APDS Control Commands
  - A7L
  - PWR OFF pb – push
  - √STATUS It (eighteen) – off

#### SHUTTLE MS

- **13b.** Performing Separation Burn Maneuvers
  - On shuttle MS call, “Separation confirmed”
  - If performing Emergency Separation Go to SHUTTLE EMERGENCY SEPARATION (FDF: RNDZ, CONTINGENCY OPS)
  - If performing Any Attitude Separation Unstow HHL with Nightscope.
  - Go to ANY ATTITUDE SEPARATION (FDF: RNDZ, CONTINGENCY OPS)

- **12c.** Performing Separation
  - Reserved

08 JUN 04
<table>
<thead>
<tr>
<th>ISS CREW</th>
<th>SHUTTLE MS</th>
<th>SHUTTLE CDR/PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>sel Channel Targeted Modes</td>
<td>15b. Perform DOCKING MECHANISM PWRDN (FDF: RNDZ, APDS), then:</td>
<td></td>
</tr>
<tr>
<td>BGA 4B Ch Targeted Modes</td>
<td>16b. Go to PL SAFING (FDF: ORB PKT, PL PWRDN).</td>
<td></td>
</tr>
</tbody>
</table>
| Verify Ch 4B Mode – Non-Solar Tracking | | NOTE
<p>| Verify BGA Mode – Directed Position | The following steps will only be performed in the event that the EVA crew ingress was delayed until post separation. |
| BGA 4B | | |
| Verify Actual Angle: 210 deg | | |
| | | |
| R14 17b. cb MNA UHF EVA – cl | |
| :C MNC UHF EVA – cl | |
| O6 18b. UHF SPLX/EVA XMIT FREQ | |
| -259.7/414.2 | |
| \UHF SPLX/EVA PWR AMP – OFF | |
| \EVA STRING – 1 | |
| MODE – EVA | |
| 19b. AUD CTR UHF A/G 1 – TR | |
| A/G 2 – OFF | |
| A/A – OFF | |
| IVA \AUD A/G1 – TR | |
| | |
| ATU | 20b. Remove hardware from external airlock for EV crew ingress | |
| | 21b. Ext A/L Aft Hatch EQ VLV caps (two) – vent, remove | |
| | 22b. Close Inner A/L Hatch per decal. | |
| | 23b. Inner Hatch Equal vlv (two) – OFF, caps installed. | |
| | 24b. EVA crew: remove Ext A/L Aft Hatch thermal cover. | |
| | 25b. EVA crew: Ext A/L Aft Hatch EQ VLVs (two) – EMER | |</p>
<table>
<thead>
<tr>
<th>ISS CREW</th>
<th>SHUTTLE MS</th>
<th>SHUTTLE CDR/PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>* If cabin dP/dT or O2(N2) Flow Hi alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* during airlock depress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* EVA crew: Ext A/L Aft Hatch EQ VLVs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* (two) – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* IV crew: verify Inner Hatch closed and Inner Hatch EQ VLVs (two) – OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

26b. EVA crew monitor Hatch $\Delta P$ gauge. When $\Delta P < 0.5$ psi (~10 min), perform AIRLOCK INGRESS (Cuff C/L). Close Hatch. Engage latches.

27b. Ext A/L Aft EQ VLVs (two) – OFF, install caps

28b. Go to PRE-REPRESS/REPRESS (FDF: EVA C/L, DEPRESS/REPRESS).
**9.103 UTILIZE ISS ATMOSPHERE**

(JNT OPS/7A - ALL/FIN 1) Page 1 of 1 page

<table>
<thead>
<tr>
<th>Lab Fwd</th>
<th>Utilizing Atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Shuttle CDR request to use ISS atmosphere</td>
<td></td>
</tr>
<tr>
<td>1. Lab Fwd MPEV → OP</td>
<td></td>
</tr>
<tr>
<td>2. Open Lab Fwd Hatch per decal.</td>
<td></td>
</tr>
<tr>
<td>PMA2</td>
<td></td>
</tr>
<tr>
<td>3. APAS Hatch MPEV → OP</td>
<td></td>
</tr>
<tr>
<td>Report to STS, <strong>MCC</strong>, “APAS MPEV open.”</td>
<td></td>
</tr>
<tr>
<td>ODS Hatch</td>
<td></td>
</tr>
<tr>
<td>4. ODS HATCH Equal vlv (two) – EMER</td>
<td></td>
</tr>
</tbody>
</table>

**CAUTION**

Minimum allowable ISS Pressure is 490 mmHg (9.5 psia).

<table>
<thead>
<tr>
<th>PCS [PO]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NODE 1: ECLSS Lab ECLSS</td>
<td></td>
</tr>
<tr>
<td>or Russian Manometer [MB]</td>
<td></td>
</tr>
<tr>
<td>When ISS total pressure &lt; 495 mmHg (9.57 psia), terminate flow to shuttle.</td>
<td></td>
</tr>
<tr>
<td>PMA2</td>
<td></td>
</tr>
<tr>
<td>6. APAS Hatch MPEV → CL</td>
<td></td>
</tr>
<tr>
<td>Report to STS, <strong>MCC</strong>, “APAS MPEV closed.”</td>
<td></td>
</tr>
<tr>
<td>ODS Hatch</td>
<td></td>
</tr>
<tr>
<td>7. ODS HATCH Equal vlv (two) → OFF, caps installed</td>
<td></td>
</tr>
<tr>
<td>Report to ISS, <strong>MCC</strong>, “ODS Hatch Equalization vlvs closed.”</td>
<td></td>
</tr>
<tr>
<td>Lab Fwd</td>
<td></td>
</tr>
<tr>
<td>8. Close Lab Fwd Hatch per decal.</td>
<td></td>
</tr>
<tr>
<td>Lab Fwd MPEV → CL</td>
<td></td>
</tr>
<tr>
<td>9. Lab Fwd IMV vlvs (two) → CL</td>
<td></td>
</tr>
</tbody>
</table>
TMAX DETERMINATION

ORBITER + ISS ATMOSPHERE TO 9.5 PSIA NOMOGRAPH

Orbiter + ISS (7A.1 stage - all compartments, no MPLM)

Initial Cabin Press, psia

Hatches to ISS OP 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5
Hatches to ISS CL 0.26 0.53 0.79 1.05 1.31 1.58 1.84 2.10 2.37 2.63

\( \frac{dP}{dT} \) - EQ (psi/min)

BASIS:
O2 Flow: on/off at 50 lb/hr after 10 min, with ppO2 > 2.2 psi, % O2
Total Volume = 15255.4 ft^3
10.101 BIG LOOP REACTIVATION
(JNT OPS/7A - ALL/FIN 1) Page 1 of 2 pages

1. CONFIGURING DAIU1 FOR DOCKED VOICE

PCS

C&T: Audio: DAIU 1

‘IAC [X]’ where [X] = Active and Powered IAC 1 or 2

‘DAIU 1 Bus I/O’

**cmd** DAIU 1 Bus I/O – Enable (Verify – Enabled)

**NOTE**

DAIU 1 will go into Standby mode 2 minutes after being commanded Active if it is not placed into a call. DAIU 1 has to be in Active mode to place DIA1 or DAG 1 into a call.

‘DAIU 1 State’

**cmd** DAIU 1 State – Active (Verify – Active)

Audio Overview

sel IAC[X] Call Select where [X] = Active and Powered IAC 1 or 2

‘Public 1’

sel Call Setup

**cmd** DAG1 (Verify – DAG1 in Public 1)

‘Public 3’

sel Call Setup

**cmd** DIA1 (Verify – DIA1 in Public 3)
10.102 JOINT EMERGENCY EGRESS
(JNT OPS/7A - ALL/FIN 6) Page 1 of 2 pages

This cue card is executed to perform basic safing and return crews to their home vehicle in an emergency. Appropriate emergency procedures should then be executed.

EGRESSING TO HOME VEHICLE
1. If EV crew isolated in Joint Airlock
   1.1 Open Node 1 Stbd Fwd (Aft) IMV Valve
   1.2 Node Stbd Hatch MPEV → OPEN
      Open Hatch per decal.
   If EV crew isolated in Crewlock with EV Hatch closed
   1.3 IV Hatch equalization vlv → NORM
      Open Hatch.

2. If EV crew suited
   2.1 Perform \{4.115 EXPEDITED SUIT DOFFING\}, all applicable
      Safer Doffing and Suit Doffing steps (SODF: ISS EVA SYS: EMERGENCY), then:
   2.2 √ Two EMUs on shuttle for return

3. If SSAS latching/bolting ops in progress
   Skip to step 4

   If SSRMS Ops in progress (no SSAS latching/bolting ops)
   Apply SSRMS safing
   DCP SAFING → SAFE (Verify – Safed)

4. All crew return to home vehicle.
   If required, unstow and don Masks.

5. If O2 transfer in progress

   ORCA Status Pnl
   A/L1OA2 sw PUMP Control → STOP/RESET
   VL009 (O2 Lo P) → CLOSED
   VL010 (O2 Hi P) → CLOSED
   A/L1A2 VL011 (O2 Xover Vlv) → CLOSED
   A/L1OA2 QD011 → Disconnected, capped
   VL009 (O2 Lo P) → OPEN

   VERIFYING IMV VALVE CLOSURE
   LAB 7. √LAB Fwd Stbd IMV valve – CLOSED
   Fwd 8. √LAB Fwd Hatch MPEV – CLOSED and uncapped
   MO13Q 9. √AILLK FAN A(B) – OFF

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10.102 JOINT EMERGENCY EGRESS
(JNT OPS/7A - ALL/FIN 6) Page 2 of 2 pages

ODS Vest
10. FLOW → CL
   GN2 Xfer √VENT – CL
   Pnl

GO2 Xfer
11. FLOW → CL
   Pnl √VENT – CL

HATCH CLOSURE PREP
ODS Vest
12. Demate GO2/GN2 hoses from ODS Xfer Pnl.
   Clear Hatch pathway of cables, ducts, hoses.
   Stow PMA/ODS duct and GO2/GN2 hoses in PMA.

APAS
13. Disconnect Hatch from Standoff.

14. Remove and stow covers for Hatch, Docking Target Baseplate.

15. Retrieve Standoff Cross and stow in ODS vestibule.

HATCH CLOSURES
On shuttle CDR call, “Go for Hatch closure.”
16. Close LAB Fwd Hatch per decal.

APAS

   Select ‘РАБОЧЕЕ ПОЛОЖЕНИЕ’ (Working Position) torque setting on
   Hatch Tool.
   Insert tool in Hatch socket (ensure fully seated).
   Rotate tool 3 to 4 turns in direction of ‘ЗАКР’ (Close) arrow until tool
   clicks.
   Secure tool in PMA.

   √APAS EQUAL VLV → CL

18. Install Standoff Cross by hand.

ODS
19. Close ODS Hatch per decal.

   √EQUAL VLVS (two) – OFF, caps installed

11.103 O2 AND N2 TRANSFER SCHEMATIC
(JNT OPS/UF1 - ALL/FIN 2)  Page 1 of 2 pages

Notes for Oxygen Distribution:
1. ISS tank design max P 3000 psi. Nominal Ops. max P 2400 psi.
   Each tank is 15.1 cu. ft.
2. All ISS pressure relief valves vent into the cabin.
3. Connections between modules are not shown. A flexible hose with Garnet
   fittings on each end is used to connect between modules.
4. The Hi P Supply Pressure sensor has a -572 kPa (-83psi) bias. (SPN 1401)
5. Configuration for oxygen transfer from orbiter to ISS tanks is shown, insert appropriate configuration when necessary.
   Slide blue dashed line designates the area affected.
Notes for Nitrogen Distribution:

1. ISS tank design max P 3400 psi. Nominal Ops. max P 2400 psi.
   Each tank is 15.1 cu. ft.
2. All ISS pressure relief valves vent into the cabin.
3. Connections between modules are not shown. A flexible hose with Gamah fittings on each end is used to connect between modules.
4. Per flight rule C-17-16, Nitrogen Transfer to ISS may only be performed if Shuttle N2 tank pressures are at least 100 psi (689 kPa) greater than ISS N2 tank pressures.
5. Each Orbiter tank is 8181 cu. in (4.73 cu. ft.). The number of tanks can vary from flight to flight.
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