Orbit Operations Checklist

Mission Operations Directorate
Operations Division

Generic, Rev M
October 29, 2008

NOTE
For STS-126 and subsequent flights.
List of Implemented Change Requests (482s):
ORB OPS-02326

Incorporate the following:
1. Replace iii and iv
2. Replace 5-35 and 5-36, 5-41 thru 5-44

NOTE
For STS-127 and subsequent flights

Prepared by: Lisa A. Giles  
Publication Manager

Approved by:  
Manager, Flight Procedures

Accepted by:  
FDF Manager

Encl: 8 pages

File this PCN immediately behind the front cover as a permanent record
ORBIT OPERATIONS | GENERIC, REV M (Oct 29, 2008)

PCN-2 (Jan 16, 2009) Sheet 1 of 1

List of Implemented Change Requests (482s):
ORB OPS-2325  MULTI-1833
       MULTI-1834

Incorporate the following:
1. Replace iii thru viii
2. Replace 2-9 and 2-10
3. Replace 6-11 and 6-12
4. Replace 11-1 thru 11-4
5. Replace 12-39 thru 12-42

NOTE
For STS-119 and subsequent flights

Prepared by: [Signature]
Publication Manager

Approved by: [Signature]
Manager, Shuttle Procedures Management

Accepted by: [Signature]
FDF Manager

Encl: 18 pages

File this PCN immediately behind the front cover as a permanent record
List of Implemented Change Requests (482s):

ORB OPS-2320
ORB OPS-2322A
ORB OPS-2324

Incorporate the following:
1. Replace iii thru viii
2. Replace 5-33 and 5-34
3. Replace 7-31 and 7-32
4. Replace 12-65 and 12-66

NOTES
For STS-119 and subsequent flights

Prepared by: ____________________________
Publication Manager

Approved by: ____________________________
Manager, Shuttle Procedures Management

Accepted by: ____________________________
FDF Manager

Encl: 12 pages

File this PCN immediately behind the front cover as a permanent record
MISSION OPERATIONS DIRECTORATE

ORBIT OPERATIONS CHECKLIST

GENERIC, REVISION M
October 29, 2008

PREPARED BY:

Lisa A. Giles
Publication Manager

APPROVED BY:

Kimberly A. Johnson
Manager, Shuttle
Procedures Management

Michael T. Hurt
FDF Manager

This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted via FDF Workflow Crew Procedure Change Request (CR) to DO3/FDF Manager.

Additional distribution of this book, for official use only, may be requested in writing to DO3/PMO Administrator. The request must include justification and requester's name, organization, position, and phone number. Contractor requests are made through the NASA or DOD organization supported. Deletions, reduction in quantity, or change of address may be submitted to DO3/FDF Management Office, 281-244-1184.
Incorporates the following:

<table>
<thead>
<tr>
<th>#</th>
<th>Document 1</th>
<th>Document 2</th>
<th>Document 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>482#</td>
<td>ORB OPS-2313</td>
<td>ORB OPS-2320</td>
<td>MULTI-1825</td>
</tr>
<tr>
<td></td>
<td>ORB OPS-2317</td>
<td>ORB OPS-2321</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ORB OPS-2318</td>
<td>ORB OPS-2322A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ORB OPS-2319</td>
<td>ORB OPS-2323</td>
<td></td>
</tr>
</tbody>
</table>

**AREAS OF TECHNICAL RESPONSIBILITY**

<table>
<thead>
<tr>
<th>Role</th>
<th>Name/Title</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication Manager</td>
<td>DO3/L. Giles</td>
<td>281-244-9068</td>
</tr>
<tr>
<td>Alternate Publication Manager</td>
<td>DO3/T. Zulauf</td>
<td>281-244-0922</td>
</tr>
</tbody>
</table>
## ORBIT OPERATIONS CHECKLIST

### LIST OF EFFECTIVE PAGES

<table>
<thead>
<tr>
<th>GENERIC 10/30/87</th>
<th>REV M 10/29/08</th>
<th>PCN-1 12/17/08</th>
<th>PCN-2 01/16/09</th>
<th>PCN-3 05/20/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign Off</td>
<td>ALL/GEN M</td>
<td>2-13</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>ALL/GEN M</td>
<td>2-14</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>ALL/GEN M,3</td>
<td>2-15</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>iv</td>
<td>ALL/GEN M,3</td>
<td>2-16</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>v</td>
<td>ALL/GEN M,2</td>
<td>2-17</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>vi</td>
<td>ALL/GEN M,2</td>
<td>2-18</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>vii</td>
<td>ALL/GEN M,2</td>
<td>2-19</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>viii</td>
<td>ALL/GEN M</td>
<td>2-20</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>ix</td>
<td>ALL/GEN M</td>
<td>3-1</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>ALL/GEN M</td>
<td>3-2</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>xi</td>
<td>ALL/GEN M</td>
<td>3-3</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>xii</td>
<td>ALL/GEN M</td>
<td>3-4</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>xiii</td>
<td>ALL/GEN M</td>
<td>3-5</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>xiv</td>
<td>ALL/GEN M</td>
<td>3-6</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>xv</td>
<td>ALL/GEN M</td>
<td>3-7</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>xvi</td>
<td>ALL/GEN M</td>
<td>3-8</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>1-1</td>
<td>ALL/GEN M</td>
<td>3-9</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>ALL/GEN M</td>
<td>3-10</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>ALL/GEN M</td>
<td>3-11</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>ALL/GEN M</td>
<td>3-12</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>ALL/GEN M</td>
<td>3-13</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-2</td>
<td>ALL/GEN M</td>
<td>3-14</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>ALL/GEN M</td>
<td>3-15</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>ALL/GEN M</td>
<td>3-16</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-5</td>
<td>ALL/GEN M</td>
<td>3-17</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-6</td>
<td>ALL/GEN M</td>
<td>3-18</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>ALL/GEN M</td>
<td>3-19</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-8</td>
<td>ALL/GEN M</td>
<td>3-20</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-9</td>
<td>ALL/GEN M,2</td>
<td>3-21</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-10</td>
<td>ALL/GEN M,2</td>
<td>3-22</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-11</td>
<td>ALL/GEN M</td>
<td>3-23</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
<tr>
<td>2-12</td>
<td>ALL/GEN M</td>
<td>3-24</td>
<td>ALL/GEN M</td>
<td></td>
</tr>
</tbody>
</table>

* – Omit from flight book
<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
<th>Page</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-25</td>
<td>ALL/GEN M</td>
<td>5-21</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-26</td>
<td>ALL/GEN M</td>
<td>5-22</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-27</td>
<td>ALL/GEN M</td>
<td>5-23</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-28</td>
<td>ALL/GEN M</td>
<td>5-24</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-29</td>
<td>ALL/GEN M</td>
<td>5-25</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-30</td>
<td>ALL/GEN M</td>
<td>5-26</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-31</td>
<td>ALL/GEN M</td>
<td>5-27</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-32</td>
<td>ALL/GEN M</td>
<td>5-28</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-33</td>
<td>ALL/GEN M</td>
<td>5-29</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-34</td>
<td>ALL/GEN M</td>
<td>5-30</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-35</td>
<td>ALL/GEN M</td>
<td>5-31</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-36</td>
<td>ALL/GEN M</td>
<td>5-32</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>3-37</td>
<td>ALL/GEN M</td>
<td>5-33</td>
<td>ALL/GEN M,1</td>
</tr>
<tr>
<td>3-38</td>
<td>ALL/GEN M</td>
<td>5-34</td>
<td>ALL/GEN M,1</td>
</tr>
<tr>
<td>4-1</td>
<td>ALL/GEN M</td>
<td>5-35</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>4-2</td>
<td>ALL/GEN M</td>
<td>5-36</td>
<td>ALL/GEN M,3</td>
</tr>
<tr>
<td>4-3</td>
<td>ALL/GEN M</td>
<td>5-37</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>4-4</td>
<td>ALL/GEN M</td>
<td>5-38</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>4-5</td>
<td>ALL/GEN M</td>
<td>5-39</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>4-6</td>
<td>ALL/GEN M</td>
<td>5-40</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>4-7</td>
<td>ALL/GEN M</td>
<td>5-41</td>
<td>ALL/GEN M,3</td>
</tr>
<tr>
<td>4-8</td>
<td>ALL/GEN M</td>
<td>5-42</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-1</td>
<td>ALL/GEN M</td>
<td>5-43</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-2</td>
<td>ALL/GEN M</td>
<td>5-44</td>
<td>ALL/GEN M,3</td>
</tr>
<tr>
<td>5-3</td>
<td>ALL/GEN M</td>
<td>5-45</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-4</td>
<td>ALL/GEN M</td>
<td>5-46</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-5</td>
<td>ALL/GEN M</td>
<td>5-47</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-6</td>
<td>ALL/GEN M</td>
<td>5-48</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-7</td>
<td>ALL/GEN M</td>
<td>5-49</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-8</td>
<td>ALL/GEN M</td>
<td>5-50</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-9</td>
<td>ALL/GEN M</td>
<td>5-51</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-10</td>
<td>ALL/GEN M</td>
<td>5-52</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-11</td>
<td>ALL/GEN M</td>
<td>5-53</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-12</td>
<td>ALL/GEN M</td>
<td>5-54</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-13</td>
<td>ALL/GEN M</td>
<td>5-55</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-14</td>
<td>ALL/GEN M</td>
<td>5-56</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-15</td>
<td>ALL/GEN M</td>
<td>5-57</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-16</td>
<td>ALL/GEN M</td>
<td>5-58</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-17</td>
<td>ALL/GEN M</td>
<td>5-59</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-18</td>
<td>ALL/GEN M</td>
<td>5-60</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-19</td>
<td>ALL/GEN M</td>
<td>5-61</td>
<td>ALL/GEN M</td>
</tr>
<tr>
<td>5-20</td>
<td>ALL/GEN M</td>
<td>5-62</td>
<td>ALL/GEN M</td>
</tr>
</tbody>
</table>

iv ORB OPS/ALL/GEN M,3
<p>| 6-1 | ALL/GEN M | 7-27 | ALL/GEN M |
| 6-2 | ALL/GEN M | 7-28 | ALL/GEN M |
| 6-3 | ALL/GEN M | 7-29 | ALL/GEN M |
| 6-4 | ALL/GEN M | 7-30 | ALL/GEN M |
| 6-5 | ALL/GEN M | 7-31 | ALL/GEN M,1 |
| 6-6 | ALL/GEN M | 7-32 | ALL/GEN M |
| 6-7 | ALL/GEN M | 7-33 | ALL/GEN M |
| 6-8 | ALL/GEN M | 7-34 | ALL/GEN M |
| 6-9 | ALL/GEN M | 7-35 | ALL/GEN M |
| 6-10 | ALL/GEN M | 7-36 | ALL/GEN M |
| 6-11 | ALL/GEN M,2 | 7-37 | ALL/GEN M |
| 6-12 | ALL/GEN M | 7-38 | ALL/GEN M |
| 6-13 | ALL/GEN M | 7-39 | ALL/GEN M |
| 6-14 | ALL/GEN M | 7-40 | ALL/GEN M |
| 6-15 | ALL/GEN M | 8-1 | ALL/GEN M |
| 6-16 | ALL/GEN M | 8-2 | ALL/GEN M |
| 7-1 | ALL/GEN M | 9-1 | ALL/GEN M |
| 7-2 | ALL/GEN M | 9-2 | ALL/GEN M |
| 7-3 | ALL/GEN M | 9-3 | ALL/GEN M |
| 7-4 | ALL/GEN M | 9-4 | ALL/GEN M |
| 7-5 | ALL/GEN M | 9-5 (3 pgs) | ALL/GEN M |
| 7-6 | ALL/GEN M | 9-6 (3 pgs) | ALL/GEN M |
| 7-7 | ALL/GEN M | 10-1 | ALL/GEN M |
| 7-8 | ALL/GEN M | 10-2 | ALL/GEN M |
| 7-9 | ALL/GEN M | 10-3 | ALL/GEN M |
| 7-10 | ALL/GEN M | 10-4 | ALL/GEN M |
| 7-11 | ALL/GEN M | 10-5 | ALL/GEN M |
| 7-12 | ALL/GEN M | 10-6 | ALL/GEN M |
| 7-13 | ALL/GEN M | 10-7 | ALL/GEN M |
| 7-14 | ALL/GEN M | 10-8 | ALL/GEN M |
| 7-15 | ALL/GEN M | 10-9 | ALL/GEN M |
| 7-16 | ALL/GEN M | 10-10 | ALL/GEN M |
| 7-17 | ALL/GEN M | 10-11 | ALL/GEN M |
| 7-18 | ALL/GEN M | 10-12 | ALL/GEN M |
| 7-19 | ALL/GEN M | 10-13 | ALL/GEN M |
| 7-20 | ALL/GEN M | 10-14 | ALL/GEN M |
| 7-21 | ALL/GEN M | 10-15 | ALL/GEN M |
| 7-22 | ALL/GEN M | 10-16 | ALL/GEN M |
| 7-23 | ALL/GEN M | 10-17 | ALL/GEN M |
| 7-24 | ALL/GEN M | 10-18 | ALL/GEN M |
| 7-25 | ALL/GEN M | 10-19 (4 pgs) | ALL/GEN M |
| 7-26 | ALL/GEN M | 10-20 (4 pgs) | ALL/GEN M |</p>
<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
<th>Page</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-1</td>
<td>ALL GEN M</td>
<td>12-39</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>11-2</td>
<td>ALL GEN M</td>
<td>12-40</td>
<td>ALL GEN M,2</td>
</tr>
<tr>
<td>11-3</td>
<td>ALL GEN M</td>
<td>12-41</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>11-4</td>
<td>ALL GEN M</td>
<td>12-42</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-1</td>
<td>ALL GEN M</td>
<td>12-43</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-2</td>
<td>ALL GEN M</td>
<td>12-44</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-3</td>
<td>ALL GEN M</td>
<td>12-45</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-4</td>
<td>ALL GEN M</td>
<td>12-46</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-5</td>
<td>ALL GEN M</td>
<td>12-47</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-6</td>
<td>ALL GEN M</td>
<td>12-48</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-7</td>
<td>ALL GEN M</td>
<td>12-49</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-8</td>
<td>ALL GEN M</td>
<td>12-50</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-9</td>
<td>ALL GEN M</td>
<td>12-51</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-10</td>
<td>ALL GEN M</td>
<td>12-52</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-11</td>
<td>ALL GEN M</td>
<td>12-53</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-12</td>
<td>ALL GEN M</td>
<td>12-54</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-13</td>
<td>ALL GEN M</td>
<td>12-55</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-14</td>
<td>ALL GEN M</td>
<td>12-56</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-15</td>
<td>ALL GEN M</td>
<td>12-57</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-16</td>
<td>ALL GEN M</td>
<td>12-58</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-17</td>
<td>ALL GEN M</td>
<td>12-59</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-18</td>
<td>ALL GEN M</td>
<td>12-60</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-19</td>
<td>ALL GEN M</td>
<td>12-61</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-20</td>
<td>ALL GEN M</td>
<td>12-62</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-21</td>
<td>ALL GEN M</td>
<td>12-63</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-22</td>
<td>ALL GEN M</td>
<td>12-64</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-23</td>
<td>ALL GEN M</td>
<td>12-65</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-24</td>
<td>ALL GEN M</td>
<td>12-66</td>
<td>ALL GEN M,1</td>
</tr>
<tr>
<td>12-25</td>
<td>ALL GEN M</td>
<td>12-67</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-26</td>
<td>ALL GEN M</td>
<td>12-68</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-27</td>
<td>ALL GEN M</td>
<td>12-69</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-28</td>
<td>ALL GEN M</td>
<td>12-70</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-29</td>
<td>ALL GEN M</td>
<td>12-71</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-30</td>
<td>ALL GEN M</td>
<td>12-72</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-31</td>
<td>ALL GEN M</td>
<td>12-73</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-32</td>
<td>ALL GEN M</td>
<td>12-74</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-33</td>
<td>ALL GEN M</td>
<td>12-75</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-34</td>
<td>ALL GEN M</td>
<td>12-76</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-35</td>
<td>ALL GEN M</td>
<td>12-77</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-36</td>
<td>ALL GEN M</td>
<td>12-78</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-37</td>
<td>ALL GEN M</td>
<td>12-79</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td>12-38</td>
<td>ALL GEN M</td>
<td>12-80</td>
<td>ALL GEN M</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>12-81</td>
<td>ALL/GEN M</td>
<td>CC 15-3</td>
<td>*</td>
</tr>
<tr>
<td>12-82</td>
<td>ALL/GEN M</td>
<td>CC 15-4</td>
<td>*</td>
</tr>
<tr>
<td>12-83</td>
<td>ALL/GEN M</td>
<td>CC 15-5</td>
<td>*</td>
</tr>
<tr>
<td>12-84</td>
<td>ALL/GEN M</td>
<td>CC 15-6</td>
<td>*</td>
</tr>
<tr>
<td>12-85</td>
<td>ALL/GEN M</td>
<td>CC 15-7</td>
<td>*</td>
</tr>
<tr>
<td>12-86</td>
<td>ALL/GEN M</td>
<td>CC 15-8</td>
<td>*</td>
</tr>
<tr>
<td>12-87</td>
<td>ALL/GEN M</td>
<td>CC 15-9</td>
<td>*</td>
</tr>
<tr>
<td>12-88</td>
<td>ALL/GEN M</td>
<td>15-10</td>
<td>*</td>
</tr>
<tr>
<td>12-89</td>
<td>ALL/GEN M</td>
<td>15-11</td>
<td>*</td>
</tr>
<tr>
<td>12-90</td>
<td>ALL/GEN M</td>
<td>CC 15-12</td>
<td>*</td>
</tr>
<tr>
<td>12-91</td>
<td>ALL/GEN M</td>
<td>CC 15-13</td>
<td>*</td>
</tr>
<tr>
<td>12-92</td>
<td>ALL/GEN M</td>
<td>CC 15-14</td>
<td>*</td>
</tr>
<tr>
<td>12-93</td>
<td>ALL/GEN M</td>
<td>CC 15-15</td>
<td>*</td>
</tr>
<tr>
<td>12-94</td>
<td>ALL/GEN M</td>
<td>CC 15-16</td>
<td>*</td>
</tr>
<tr>
<td>12-95</td>
<td>ALL/GEN M</td>
<td>CC 15-17</td>
<td>*</td>
</tr>
<tr>
<td>12-96</td>
<td>ALL/GEN M</td>
<td>CC 15-18</td>
<td>*</td>
</tr>
<tr>
<td>12-97</td>
<td>ALL/GEN M</td>
<td>CC 15-19</td>
<td>*</td>
</tr>
<tr>
<td>12-98</td>
<td>ALL/GEN M</td>
<td>CC 15-20</td>
<td>*</td>
</tr>
<tr>
<td>12-99</td>
<td>ALL/GEN M</td>
<td>15-21</td>
<td>*</td>
</tr>
<tr>
<td>12-100</td>
<td>ALL/GEN M</td>
<td>15-22</td>
<td>*</td>
</tr>
<tr>
<td>13-1</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-2</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-3</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-4</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-5</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-6</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-7</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-8</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-9</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-10</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-11</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-12</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-13</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-14</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-15</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-16</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-1</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-2</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-3</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-4</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-1</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-2</td>
<td>ALL/GEN M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* – Omit from flight book
<table>
<thead>
<tr>
<th>Title</th>
<th>Ref. Page</th>
<th>Card No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCCS COMM PLAN</td>
<td>CC 15-3</td>
<td>ORB OPS-1a/O/B</td>
</tr>
<tr>
<td>(Front).......................................</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Back).........................................</td>
<td>CC 15-4</td>
<td>ORB OPS-1b/O/B</td>
</tr>
<tr>
<td>ORBIT SPEC (R11) (Front)</td>
<td>CC 15-5</td>
<td>ORB OPS-2a/O/K</td>
</tr>
<tr>
<td>PRIMARY C/W PARAMETER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATRIX (Back of ORBIT SPEC (R11)).........</td>
<td>CC 15-6</td>
<td>ORB OPS-2b/O/E</td>
</tr>
<tr>
<td>KU ANTENNA OVERLAY</td>
<td>CC 15-7</td>
<td>ORB OPS-4a/O/B</td>
</tr>
<tr>
<td>(COLOR MONITOR)............................</td>
<td></td>
<td></td>
</tr>
<tr>
<td>URINE COLLECTION</td>
<td>CC 15-8</td>
<td>ORB OPS-5a/O/I</td>
</tr>
<tr>
<td>(Front).......................................</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONT WASTE COLLECTION –</td>
<td>CC 15-9</td>
<td>ORB OPS-5b/O/H</td>
</tr>
<tr>
<td>UCD/APOLLO BAG (Back of URINE COLLECTION)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHOTO GRID OVERLAY.............</td>
<td>CC 15-12</td>
<td>ORB OPS-9a/O/B</td>
</tr>
<tr>
<td>URINE PRETREAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHANGEOUT (Front).........................</td>
<td>CC 15-13</td>
<td>ORB OPS-23a/O/F</td>
</tr>
<tr>
<td>URINE PRETREAT SETUP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Back of URINE PRETREAT CHANGEOUT)........</td>
<td>CC 15-14</td>
<td>ORB OPS-23b/O/E</td>
</tr>
<tr>
<td>ERGOMETER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Front).......................................</td>
<td>CC 15-15</td>
<td>ORB OPS-24a/O/A</td>
</tr>
<tr>
<td>(Back).........................................</td>
<td>CC 15-16</td>
<td>ORB OPS-24b/O/A</td>
</tr>
<tr>
<td>GALLEY IODINE REMOVAL ASSEMBLY (GIRA)</td>
<td>CC 15-17</td>
<td>ORB OPS-44a/O/A</td>
</tr>
<tr>
<td>INSTALLATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Front).......................................</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CWC (CONTINGENCY WATER CONTAINER) FILL</td>
<td>CC 15-18</td>
<td>ORB OPS-44b/O/A</td>
</tr>
<tr>
<td>(Back of GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RECUMBENT SEAT KIT (RSK) INSTALLATION
(Front) ....................................... CC 15-19 ORB OPS-43a/O/A
(Back) ................................. CC 15-20 ORB OPS-43b/O/A
# CONTENTS

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>APU/HYDRAULICS</td>
<td>1-1</td>
</tr>
<tr>
<td>APU HEATER RECONFIG</td>
<td>1-2</td>
</tr>
<tr>
<td>HYD ISOL VALVE REPOSITIONING</td>
<td>1-3</td>
</tr>
<tr>
<td>MANUAL CIRC PUMP 2 OPS</td>
<td>1-4</td>
</tr>
<tr>
<td>3 OPS</td>
<td>1-4</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM/INST</td>
<td>2-1</td>
</tr>
<tr>
<td>KU-BD ANT DEPLOY</td>
<td>2-2</td>
</tr>
<tr>
<td>ACTIVATION</td>
<td>2-3</td>
</tr>
<tr>
<td>ANT STOW (CIL)</td>
<td>2-5</td>
</tr>
<tr>
<td>MANUAL ACQUISITION (COMM)</td>
<td>2-7</td>
</tr>
<tr>
<td>ANT JETTISON</td>
<td>2-8</td>
</tr>
<tr>
<td>PRE-SLEEP AUD CONFIG (DOCKED)</td>
<td>2-11</td>
</tr>
<tr>
<td>(UNDOCKED)</td>
<td>2-12</td>
</tr>
<tr>
<td>POST-SLEEP AUD CONFIG (DOCKED)</td>
<td>2-13</td>
</tr>
<tr>
<td>(UNDOCKED)</td>
<td>2-14</td>
</tr>
<tr>
<td>STD S-BD/KU-BD PNL Config</td>
<td>2-15</td>
</tr>
<tr>
<td>LANDING-1 COMM C/O</td>
<td>2-16</td>
</tr>
<tr>
<td>COMM STRING 1 C/O</td>
<td></td>
</tr>
<tr>
<td>(PART A: COMMAND TO STRING 1)</td>
<td>2-18</td>
</tr>
<tr>
<td>COMM STRING 1 C/O</td>
<td></td>
</tr>
<tr>
<td>(PART B: RETURN TO STRING 2)</td>
<td>2-19</td>
</tr>
<tr>
<td>CREW SYSTEMS</td>
<td>3-1</td>
</tr>
<tr>
<td>PRE-SLEEP ACTIVITY</td>
<td>3-2</td>
</tr>
<tr>
<td>POST-SLEEP ACTIVITY</td>
<td>3-7</td>
</tr>
<tr>
<td>OCAC SETUP</td>
<td>3-11</td>
</tr>
<tr>
<td>STOWAGE</td>
<td>3-12</td>
</tr>
<tr>
<td>MAL</td>
<td>3-13</td>
</tr>
<tr>
<td>LIOH VOLUME INFIGHT RECONFIG</td>
<td>3-14</td>
</tr>
<tr>
<td>TISSUE EQUIVALENT PROPORTIONAL COUNTER (TEPC)</td>
<td>3-16</td>
</tr>
<tr>
<td>TEPC DISPLAY LOGSHEET</td>
<td>3-22</td>
</tr>
<tr>
<td>CYCLE ERGOMETER OPS</td>
<td>3-23</td>
</tr>
<tr>
<td>FORMALDEHYDE MONITORING KIT: FMK – OPERATIONS</td>
<td>3-31</td>
</tr>
<tr>
<td>CARBON DIOXIDE MONITOR: OPERATIONS FOR</td>
<td>3-32</td>
</tr>
<tr>
<td>CARBON DIOXIDE MONITORING</td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE MONITOR: BATTERY</td>
<td></td>
</tr>
<tr>
<td>CHANGEOUT</td>
<td>3-35</td>
</tr>
<tr>
<td>CARBON DIOXIDE MONITOR: FILTER ASSEMBLY</td>
<td></td>
</tr>
<tr>
<td>CHANGEOUT</td>
<td>3-37</td>
</tr>
</tbody>
</table>
DPS ................................................................. 4-1
  G2 SET CONTRACTION ........................................ 4-2
  EXPANSION .................................................. 4-4
  TO G8 TRANSITION ......................................... 4-6
  G8 TO G2 TRANSITION .................................... 4-7
  SM CHECKPOINT INITIATE ................................. 4-8

ECLS .................................................................. 5-1
  SUPPLY/WASTE WATER DUMP ......................... 5-2
  SUPPLY WATER DUMP USING FES .................... 5-9
  CABIN TEMP CONTROL ..................................... 5-10
  RAD BYPASS/FES C/O .................................... 5-12
  MODIFIED RAD BYP/FES C/O AND TOPPING
    CORE FLUSH ................................................. 5-13
    RAD DEPLOY ................................................ 5-15
    STOW ....................................................... 5-17
    PCS 1(2) CONFIG ......................................... 5-19
    TOPPING FES DEACTIVATION STARTUP ............ 5-20
  SMOKE DETN CKT TEST ................................... 5-22
  SHUTTLE/ISS H2O CONTAINER FILL (HC) ............ 5-25
  CWC-I FILL .................................................. 5-32
  CWC OVERBOARD DUMP .................................... 5-36
  CABIN TEMP CONTROLLER
    RECONFIG – 2(1) .......................................... 5-39
  SHUTTLE CONDENSATE COLLECTION .................. 5-40
  PWR DUMP-WASTE LINE .................................. 5-41
    DUMP-SUPPLY LINE ..................................... 5-44
    FILL ....................................................... 5-47
  GALLEY IODINE REMOVAL ASSEMBLY (GIRA)
    INSTALLATION ............................................. 5-50
    GALLEY OVERNIGHT CONFIG ............................ 5-52
      MORNING CONFIG ...................................... 5-52
      WATER SAMPLE ........................................ 5-53
    GIRA STOWAGE .......................................... 5-54
    NOMINAL H2O CONFIG ................................... 5-55
    CWC VENTING ............................................. 5-56
    O2 REPRESS USING PAYLOAD O2 VALVES ............ 5-59
    N2 REPRESS USING PAYLOAD N2 VALVES ............ 5-60

EPS .................................................................. 6-1
  LAMP TEST .................................................. 6-2
  HEATER RECONFIG – CONFIG B(CONFIG A) ......... 6-5
  FUEL CELL PURGE – AUTO, SM 2(4) ................. 6-6
    – MANUAL ............................................... 6-7
  VI PERFORMANCE PLOT .................................. 6-8
CRYO O2 TK HTR SNSR CK ................................................. 6-9
FC MONITORING SYS (FCMS) OPS ........................................ 6-10
SSPTS OPCU ACTIVATION ........................................ 6-12
DEACTIVATION ..................................................... 6-13
APCU ACTIVATION ........................................ 6-14
DEACTIVATION ..................................................... 6-14
DIAGRAM ......................................................... 6-15

GNC ............................................................................. 7-1
IMU ALIGN – S TRK, GNC 201,202,301 .......................... 7-2
ALIGNMENT – IMU/IMU .............................................. 7-4
S TRK SELF-TEST, GNC 201,202,301 .......................... 7-5
IMU STAR OF OPPORTUNITY ALIGN .......................... 7-6
COAS CALIBRATION, GNC 201 ................................ ......... 7-7
HUD CALIBRATION, GNC 201 ................................ ......... 7-9
BORESIGHT DESIGNATION ........................................... 7-12
FCS CHECKOUT ......................................................... 7-13
AFT CONTROLLER C/O .............................................. 7-32
OMICRON SPECIFICATION ........................................... 7-33
ELEVON PARK, GNC 201 .............................................. 7-34
GPS PWRUP ............................................................ 7-35
PWRDN ................................................................. 7-35
SELF-TEST, GNC 201,202,301,801 .......................... 7-36
INCORPORATION ....................................................... 7-37
ELEVON POSITIONING FOR INSPECTION ................. 7-38

MPS ............................................................................. 8-1
MPS VACUUM INERT ................................................... 8-2

OMS ............................................................................. 9-1
ON-ORBIT OMS BURN ................................................... 9-2

RCS .......................................................................... 10-1
RCS HOT FIRE TEST ..................................................... 10-2
GG FREE DRIFT ....................................................... 10-6
PRCS PTC ............................................................... 10-8
VRCS PTC ............................................................... 10-9
ON-ORBIT +X RCS BURN, MM202 ............................ 10-10
-X RCS BURN, MM202 ........................................... 10-12
MULTI-AXIS RCS BURN, MM202 ............................ 10-14
LOSS OF VERNIERS .................................................. 10-16
RECOVERY OF VERNIERS ...................................... 10-17
RCS REGULATOR RECONFIG .................................... 10-18
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEP MANEUVER</td>
<td>11-1</td>
</tr>
<tr>
<td>SEP MANEUVER</td>
<td>11-2</td>
</tr>
<tr>
<td>PGSC</td>
<td>12-1</td>
</tr>
<tr>
<td>PGSC ACT</td>
<td>12-3</td>
</tr>
<tr>
<td>OCA AND PCMMU DOCKING STATION CARDS</td>
<td>12-6</td>
</tr>
<tr>
<td>PGSC HARD DISK LATE UPDATE</td>
<td>12-7</td>
</tr>
<tr>
<td>OCA SETUP</td>
<td>12-8</td>
</tr>
<tr>
<td>DOWNLINK VIA GROUND CMD</td>
<td>12-11</td>
</tr>
<tr>
<td>DIRECTORY STRUCTURE</td>
<td>12-12</td>
</tr>
<tr>
<td>FILENAMES</td>
<td>12-13</td>
</tr>
<tr>
<td>KU-BAND (KFX) MANUAL DOWNLINK</td>
<td>12-14</td>
</tr>
<tr>
<td>S-BAND MODEM (MFX) ACTIVATION (760XD ONLY)</td>
<td>12-16</td>
</tr>
<tr>
<td>SSR-1 REGAIN 2 GREEN LIGHTS</td>
<td>12-18</td>
</tr>
<tr>
<td>RECONFIGURE OCA DOWNLINK RATE</td>
<td>12-19</td>
</tr>
<tr>
<td>OCA LOOPBACK TEST</td>
<td>12-21</td>
</tr>
<tr>
<td>PGSC NETWORK</td>
<td>12-25</td>
</tr>
<tr>
<td>COLOR PRINTER UNSTOW AND ASSEMBLE</td>
<td>12-29</td>
</tr>
<tr>
<td>WARMUP AND SELF-TEST</td>
<td>12-32</td>
</tr>
<tr>
<td>STOW</td>
<td>12-33</td>
</tr>
<tr>
<td>CHECK COLOR PRINTER SETTINGS</td>
<td>12-34</td>
</tr>
<tr>
<td>COLOR PRINTER PAPER JAM</td>
<td>12-34</td>
</tr>
<tr>
<td>INK CARTRIDGE CHANGEOUT</td>
<td>12-35</td>
</tr>
<tr>
<td>CLEANING PRINTER HEADS</td>
<td>12-37</td>
</tr>
<tr>
<td>PRINTER HEAD ALIGNMENT</td>
<td>12-38</td>
</tr>
<tr>
<td>UMBILICAL WELL TPS CAMERA IMAGERY</td>
<td>12-39</td>
</tr>
<tr>
<td>DOWNLOADING</td>
<td>12-39</td>
</tr>
<tr>
<td>WINDECOM OPS</td>
<td>12-42</td>
</tr>
<tr>
<td>RSAD SETUP INSTRUCTIONS</td>
<td>12-47</td>
</tr>
<tr>
<td>FUNCTION KEYS SUMMARY</td>
<td>12-49</td>
</tr>
<tr>
<td>TROUBLESHOOTING</td>
<td>12-50</td>
</tr>
<tr>
<td>DOUG SETUP INSTRUCTIONS</td>
<td>12-54</td>
</tr>
<tr>
<td>FUNCTION KEYS SUMMARY</td>
<td>12-62</td>
</tr>
<tr>
<td>TROUBLESHOOTING</td>
<td>12-63</td>
</tr>
<tr>
<td>WORLDMAP INITIALIZATION</td>
<td>12-64</td>
</tr>
<tr>
<td>DEORBIT MANAGER INITIALIZATION</td>
<td>12-65</td>
</tr>
<tr>
<td>NETMEETING VIDEO CONFERENCING</td>
<td>12-67</td>
</tr>
<tr>
<td>PILOT WITH RHC (FOR A31p PGSC)</td>
<td>12-71</td>
</tr>
<tr>
<td>WITHOUT RHC (FOR A31p PGSC)</td>
<td>12-76</td>
</tr>
<tr>
<td>PGSC STATE VECTOR UPDATE WITHOUT PCMMU DATA</td>
<td>12-78</td>
</tr>
<tr>
<td>BOOTING FROM A31p ULTRABAY HARD DISK</td>
<td>12-79</td>
</tr>
</tbody>
</table>
RELOAD A31p PGSC ......................................................... 12-80
A31p HARD DRIVE CHANGEOUT............................. 12-82
DEVICE CHANGEOUT.............................................. 12-85
RELOAD 760XD PGSC ................................................... 12-89
WINDOWS KEYBOARD REF ....................................... 12-90
WORLDMAP KEYBOARD REF ..................................... 12-94
FILE SNEAKERNET BETWEEN ISS SSC AND
SHUTTLE PGSC .......................................................... 12-95
DOCKING/UNDOCKING A31p PGSC ........................... 12-96

COMPOUND SPECIFIC ANALYZER – COMBUSTION
PRODUCTS (CSA-CP) .................................................. 13-1
COMPOUND SPECIFIC ANALYZER –
COMBUSTION PRODUCTS CHECKOUT AND
ZERO CALIBRATION OPS ........................................... 13-2
PASSIVE SAMPLING WITH DATA LOGGING ............ 13-5
ACTIVE SAMPLING WITH PUMP AND DATA
LOGGING ........................................................................ 13-7
CSA-CP BATTERY CHANGEOUT ................................. 13-9
SAMPLING PUMP BATTERY CHANGEOUT ............... 13-10
ZERO CALIBRATION ..................................................... 13-11
DATA LOGGER ACTIVATION/DEACTIVATION ............ 13-13
ALARM DISABLE/ENABLE ........................................... 13-14
DATA RECORDING TABLE ........................................... 13-15

SHUTTLE AUDIO DOSIMETER .................................. 14-1
ACTIVATION ................................................................. 14-2
SOUND LEVEL METER (SLM) MODE .......................... 14-2
Lavg/Leq MODE ............................................................ 14-3
DEACTIVATION ............................................................ 14-4

CUE CARD CONFIGURATION .................................... 15-1
CREW SYSTEMS REFERENCE .................................... 15-21
APU/ HYDRAULICS

APU HEATER RECONFIG .................................................. 1-2
HYD ISOL VALVE REPOSITIONING .................................. 1-3
MANUAL CIRC PUMP 2 OPS ............................................. 1-4
3 OPS ................................................................. 1-4

1-1 ORB OPS/ALL/GEN M
<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>A12 APU HTR GAS GEN/FUEL PUMP (three) LUBE OIL LN (three) APU HTR TK/FU LN/H2O SYS 1B,2B,3B (three)</td>
<td>– B AUTO</td>
<td>– B AUTO</td>
</tr>
<tr>
<td></td>
<td>APU HTR TK/FU LN/H2O SYS 1A,2A,3A (three)</td>
<td>– AUTO</td>
</tr>
</tbody>
</table>
HYD ISOL VALVE REPOSITIONING

**CAUTION**

LG EXTEND ISOL VLV should not be opened on orbit

If CIRC PUMP P (HYD PRESS) < 100 psia
30 sec after pump on, CIRC PUMP – OFF

1. If bus tied, √MCC for possible bus tie reconfiguration:

   R1
   MN BUS TIE __ – ON
   __ – OFF

2. HYD CIRC PUMP X – ON
   Wait 10 sec, then:

   3. If repositioning brake isolation valve:

      R4
      HYD BK ISOL VLV X – CL(OP)
      (hold 5 sec, tb – CL(OP))

4. If repositioning MPS/TVC isolation valve:

   HYD MPS/TVC ISOL VLV SYS X – CL(OP)
   (hold 5 sec, tb – CL(OP))

5. HYD CIRC PUMP X – GPC

6. If bus tie reconfigured in step 1:
   Return bus tie to original configuration:

   R1
   MN BUS TIE __ – ON
   __ – OFF
**MANUAL CIRC PUMP 2 OPS**

R1  MN BUS TIE A – ON  
    B – OFF  
R2  HYD CIRC PUMP 2 – ON  
    Wait 30 min  
    HYD CIRC PUMP 2 – GPC  
R1  MN BUS TIE B – ON  
    A – OFF

**MANUAL CIRC PUMP 3 OPS**

R1  MN BUS TIE B – ON  
    A – OFF  
R2  HYD CIRC PUMP 3 – ON  
    Wait 30 min  
    HYD CIRC PUMP 3 – GPC  
R1  MN BUS TIE A – ON  
    B – OFF
## COMM/INST

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>KU-BD ANT DEPLOY</td>
<td>2-2</td>
</tr>
<tr>
<td>ACTIVATION</td>
<td>2-3</td>
</tr>
<tr>
<td>ANT STOW (CIL)</td>
<td>2-5</td>
</tr>
<tr>
<td>MANUAL ACQUISITION (COMM)</td>
<td>2-7</td>
</tr>
<tr>
<td>ANT JETTISON</td>
<td>2-8</td>
</tr>
<tr>
<td>PRE-SLEEP AUD CONFIG (DOCKED)</td>
<td>2-11</td>
</tr>
<tr>
<td>(UNDOCKED)</td>
<td>2-12</td>
</tr>
<tr>
<td>POST-SLEEP AUD CONFIG (DOCKED)</td>
<td>2-13</td>
</tr>
<tr>
<td>(UNDOCKED)</td>
<td>2-14</td>
</tr>
<tr>
<td>STD S-BD/KU-BD PNL CONFIG</td>
<td>2-15</td>
</tr>
<tr>
<td>LANDING-1 COMM C/O</td>
<td>2-16</td>
</tr>
<tr>
<td>COMM STRING 1 C/O</td>
<td>2-18</td>
</tr>
<tr>
<td>(PART A: COMMAND TO STRING 1)</td>
<td></td>
</tr>
<tr>
<td>COMM STRING 1 C/O</td>
<td>2-19</td>
</tr>
<tr>
<td>(PART B: RETURN TO STRING 2)</td>
<td></td>
</tr>
</tbody>
</table>
KU-BD ANT DEPLOY

CAUTION
If OBSS cradled, OBSS MPMs must be stowed prior to Ku-band antenna deploy to prevent antenna/OBSS contact

COMM/INST

A1U
KU BD PWR – OFF
CNTL – PNL

R13L
KU ANT DIRECT STO – OFF

PL BAY MECH PWR SYS 1,2 (two) – ON
KU ANT – DPY

* If tb not DPY after 46 sec, *
* KU ANT – GND *
* Perform MAL, MECH, 9.3a *

When KU ANT tb – DPY (~23 to 46 sec),
KU ANT – GND

PL BAY MECH PWR SYS 1,2 (two) – OFF
KU-BD ACTIVATION

R14:C cb MNB KU ELEC – cl
√ ANT HTR – cl
√ CABLE HTR – op
MNC KU SIG PROC – cl

A1U SIG STR – KU
√ SLEW RATE – SLOW
√ KU BD SCAN WARN tb – bp
√ TRACK tb – bp
√ SEARCH tb – bp
√ sel – MAN SLEW
√ RDR OUTPUT – HI
√ SIG PROC HDR sel – TV
√ LDR sel – MMU 1
√ KU BD MODE – RDR PASSIVE
PWR – ON
√ CNTL – PNL

[SM ANTENNA]

CRT I/O RESET KU – ITEM 8 EXEC (*)

NOTE
System warmup takes ~4 min

[SM 76 COMMUNICATIONS]
When KU-BAND PWR OUT > 15 (watts), proceed

A2 DIGI DIS SEL – EL/AZ
√ R/EL ind: +000.0
√ RR/AZM ind: +000.0
DIGI DIS SEL – R/Ř

[SM ANTENNA]

CRT SELF TEST – ITEM 7 EXEC (*)
When SELF TEST complete (~3 min):

A1U √ KU BD SCAN WARN tb – gray
√ TRACK tb – gray
√ SEARCH tb – gray

A2 √ R/EL ind: +888.8
If R/EL ind: +333.3, √ MCC

Cont next page

2-3 ORB OPS/ALL/GEN M
CRT  SELF TEST – ITEM 7 EXEC (no *)

A1U  KU BD MODE – COMM
        sel – GPC DESIG
        CNTL – CMD
KU-BD ANT STOW

**CAUTION**
If OBSS cradled, OBSS MPMs must be stowed prior to Ku-band antenna stow to prevent antenna/OBSS contact.

- R13L
  - \( \sqrt{\text{PL BAY MECH PWR SYS 1,2 (two) – OFF}} \)
- A1U
  - \( \sqrt{\text{CNTL – CMD}} \)
  - \( \sqrt{\text{RADAR OUTPUT – LOW}} \)

**NOTE**
If docked to ISS \( \sqrt{\text{MCC for Traveling Wave Tube inhibit prior to next step}} \)

- KU BD PWR – ON
- MODE – RDR PASSIVE
- CNTL – PNL
- KU BD sel – MAN SLEW
- A2
  - \( \sqrt{\text{DIGI DIS SEL – EL/AZ}} \)
- A1U
  - SLEW RATE – as reqd
  - SLEW ELEV – as reqd
- A2
  - \( \sqrt{\text{R/EL ind: -27.0 (± 1°)}} \)
- A1U
  - SLEW AZM – as reqd
- A2
  - \( \sqrt{\text{RR/AZM ind: -123.0 (± 1°)}} \)

**LOCK GIMBALS**

**NOTE**
KU ANT sw must remain in STOW until STOW DEPLOYED ASSEMBLY complete

- DAP: VERN(FREE)
- R13L
  - \( \sqrt{\text{KU ANT – STO}} \)
- A2
  - \( \sqrt{\text{R/EL ind: -29.0 (± 1°)}} \)
  - \( \sqrt{\text{RR/AZM ind: -125.0 (± 1°)}} \)

Cont next page
00:00  Start Event Timer
A2  Monitor KU ANT gimbal angles for 50 sec (gimbal lock test), then:
   * If KU ANT gimbal movement occurs
   * within 50 sec, and/or if gimbal angles incorrect after 50 sec,
   * perform MAL, MECH, 9.3c

DAP: as reqd

STOW DEPLOYED ASSEMBLY

If OBSS cradled:

MA73C:A  MCA LOGIC MNB MID 2 – OFF
:B  MNA MID 3 – OFF
R13L  PL BAY MECH PWR SYS 1,2 (two) – ON
\KU ANT tb – STO (~23 to 46 sec)
   * If tb not STO after 46 sec,  *
   * perform MAL, MECH, 9.3b

A1U  KU BD PWR – OFF (Expect 'BCE BYP KU' msg)
R14:C  cb MNB KU ELEC – op
       MNC KU SIG PROC – op
R13L  PL BAY MECH PWR SYS 1,2 (two) – OFF
       KU ANT – GND

If MCA LOGIC switches previously taken OFF:

MA73C:A  MCA LOGIC MNB MID 2 – ON
:B  MNA MID 3 – ON

2-6  ORB OPS/ALL/GEN M
KU-BD MANUAL ACQUISITION (COMM)

1. SETUP

A2  √DIGI DIS SEL – EL/AZ
A1U  KU BD sel – AUTO TRACK
     √PWR – ON
     MODE – COMM
     √SIG PROC HDR sel – TV
     √LDR sel – MMU 1
     CNTL – PNL
     √SIG STR – KU
     SLEW RATE – as reqd
     √KU BD SCAN WARN tb – bp
     √TRACK tb – bp
     √SEARCH tb – bp

2. ANTENNA STEERING

NOTE
ANT will not LOCK/TRACK when slewing in FAST RATE

SM ANTENNA
A1U,CRT, Use SLEW AZ and SLEW ELEV sw as reqd to
A2  position antenna, until ANT EL,AZ angles on pnl A2
   are within 5° of ANT EL,AZ CMD angles on CRT

A1U  KU BD SEARCH – SEARCH
     √tb – gray
When SIG STR > 1.0 and
KU BD TRACK tb – gray (< 3 min):
     √KU BD SCAN WARN tb – bp
     √SEARCH tb – bp

* If no track in 3 min,  *
* repeat step 2 once  *
* If still no track, \MCC *

CNTL – CMD
KU-BD ANT JETTISON

NOTE
Jettison between sunrise and noon if possible

AUTO MNVR TO -XLV

GNC UNIV PTG

START TIME at least 15 min prior to sunrise

TGT ID: +2

BODY VECT: +2

OM: +0

START TRK – ITEM 19 EXEC (CUR-*)

DAP: A/AUTO/VERN

CONFIGURE KU FOR JETTISON

A1U

KU BD PWR – OFF

CNTL – PNL

R14:C

cb MNB KU ELEC – op

ANT HTR – op

CABLE HTR – op

MNC KU SIG PROC – op

A14

PYRO KU ANT (two) – SAFE

MA73C:A

MCA LOGIC MNC MID 2 – OFF

MB MID 4 – OFF

: B

ML86B:D

cb MNA PYRO JETT SYS A KU ANT – cl

MNC PYRO JETT SYS B KU ANT – cl

SET UP PLB CAMRS, RECORDING DEVICES

Perform ACTIVATION, OPERATIONS (Cue Card, TV) for Camrs A, B

Perform ILLUMINATOR OPS (Cue Card, TV) as reqd

A7

VID OUT MON 1 pb – push

IN A pb – push

PAN, TILT – as reqd

VID OUT MON 2 pb – push

IN B pb – push

PAN, TILT, FOCUS, ZOOM – as reqd

Cont next page

2-8 ORB OPS/ALL/GEN M
PL BAY FLOOD – as reqd

L10
(MUX) \(\sqrt{VTR/CC\ PWR}\) – on (LED on)
(VTR) ON/STANDBY – press (green LED on)
Tape – install

O14:E, O16:E \(\sqrt{\text{cb DDU AFT (two)} – \text{cl}}\)

A6U FLT CNTLR PWR – ON

In jettison att
DAP TRANS: PULSE/PULSE/PULSE

If VERN jets avail:
DAP: A1/INRTL/VERN
If VERN jets not avail:
DAP: B1/INRTL/PRI

Wait until rates damped, then:
DAP: A1/FREE/PRI
\(\sqrt{\text{SENSE}}\) – as reqd

A7 VID OUT PAYLOAD(DTV) pb – push
IN A(B) pb – push

L10 (VTR) REC pb – press, hold
PLAY pb – press (red REC dot on)

NOTE
After JETT, initiate opening rate ASAP.
Minimize other THC/RHC inputs

A14 PYRO KU ANT – ARM

Wait 1 sec, then:
PYRO KU ANT – JETT

INITIAL SEP MNVR (IMMEDIATELY AFTER JETT)
DAP: A/INRTL/PRI

Cont next page

2-9 ORB OPS/ALL/GEN M,2
THC: +Z, 12 pulses (~1 fps)
(-X sense: THC dn)
(-Z sense: THC out)

SECOND SEP BURN (JETT +2:00 MIN)
SENSE – as reqd

THC: +Z, 12 pulses (~1 fps)
(-X sense: THC dn)
(-Z sense: THC out)

Maintain visual contact with KU ANT in OVHD window using RHC
When KU ANT no longer visible, then:

CLEANUP

L10
(VTR) STOP pb – press

[GNC UNIV PTG]
\[ TGT ID: +2 \]
\[ BODY VECT: +3 \]
\[ OM: +0 \]
START TRK – ITEM 19 EXEC (CUR-*)

DAP: A1/AUTO/VERN

A6U FLT CNTLR PWR – OFF
O14:E, cb DDU AFT (two) – as reqd
O16:E

Perform DEACTIVATION (Cue Card, TV) as reqd

A7 PL BAY FLOOD – as reqd

A14 PYRO KU ANT (two) – SAFE

ML86B:D cb MNA PYRO JETT SYS A KU ANT – op
MNC PYRO JETT SYS B KU ANT – op
MA73C:A MCA LOGIC MNC MID 2 – ON
:B MNB MID 4 – ON

2-10 ORB OPS/ALL/GEN M,2
PRE-SLEEP AUD CONFIG (DOCKED)

MIDDECK/FLIGHT DECK SPEAKER AUD CONFIG

a. MIDDECK SPEAKER CONFIG (reqd)

MO42F MIDDECK SPKR AUD PWR – AUD/TONE
   A/G 1 – RCV, tw – R
   2 – T/R, tw – R
   ICOM A – OFF
   B – RCV
   √ XMIT/ICOM MODE sel – PTT/PTT
   √ SPKR AUD TONES – ACCU/BYPASS
   √ SPKR PWR – SPKR (reqd for ACCU tones)
   MSTR SPKR VOL sel – R

MO39M MIDDECK COMM CCU PWR – ON

NOTE
For ATUs connected to BPSMUs:
CDR ATU: Power – AUD
   A/G2 – OFF
A/L ATUs: Power – AUD
   A/G2 – OFF

b. FLIGHT DECK CONFIG (optional)

R10 MS AUD PWR – AUD/TONE
   A/G 1 – RCV, tw – R
   2 – T/R, tw – R
   ICOM A,B (two) – OFF
   √ XMIT/ICOM MODE sel – PTT/PTT

A13 √ OS AUD SPKR PWR – SPKR
    MSTR SPKR VOL sel – R

A11 √ MS COMM CCU PWR – ON
**PRE-SLEEP AUD CONFIG (UNDOCKED)**

O6

√ UHF MODE sel – OFF

**FLIGHT DECK/MIDDECK AUD CONFIG**

a. **MIDDECK CONFIG (reqd)**

<table>
<thead>
<tr>
<th>MO42F</th>
<th>MIDDECK SPKR AUD PWR</th>
<th>– AUD/TONE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A/G 1</td>
<td>– T/R, tw – R</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>– RCV, tw – R</td>
</tr>
<tr>
<td></td>
<td>ICOM A,B (two)</td>
<td>– OFF</td>
</tr>
<tr>
<td></td>
<td>√ XMIT/ICOM MODE sel</td>
<td>– PTT/PTT</td>
</tr>
<tr>
<td></td>
<td>√ SPKR AUD TONES</td>
<td>– ACCU/BYPASS</td>
</tr>
<tr>
<td></td>
<td>√ SPKR PWR</td>
<td>– SPKR (reqd for ACCU tones)</td>
</tr>
<tr>
<td></td>
<td>MSTR SPKR VOL sel</td>
<td>– R</td>
</tr>
</tbody>
</table>

| MO39M | √MIDDECK COMM CCU PWR | – ON |

b. **FLIGHT DECK CONFIG (optional)**

**NOTE**

If FD ATUs connected to BPSMUs:

BPSMU ATU: A/G 2 – OFF

<table>
<thead>
<tr>
<th>R10</th>
<th>MS AUD PWR</th>
<th>– AUD/TONE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A/G 1</td>
<td>– T/R, tw – R</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>– RCV, tw – R</td>
</tr>
<tr>
<td></td>
<td>ICOM A,B (two)</td>
<td>– OFF</td>
</tr>
<tr>
<td></td>
<td>√ XMIT/ICOM MODE</td>
<td>– PTT/PTT</td>
</tr>
</tbody>
</table>

| A13   | √OS AUD SPKR PWR | – SPKR |
|       | MSTR SPKR VOL sel | – R |
|       | √MS COMM CCU PWR | – ON |
### POST-SLEEP AUD CONFIG (DOCKED)

#### MIDDECK/FLIGHT DECK SPEAKER AUD CONFIG

**a. MIDDECK SPEAKER CONFIG (reqd)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO42F</td>
<td>MIDDECK SPKR AUD PWR</td>
<td>AUD/TONE</td>
</tr>
<tr>
<td></td>
<td>A/G 1</td>
<td>T/R, tw – R</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>RCV, tw – R</td>
</tr>
<tr>
<td></td>
<td>ICOM A</td>
<td>RCV</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>T/R</td>
</tr>
<tr>
<td></td>
<td>✚ XMIT/ICOM MODE sel</td>
<td>PTT/PTT</td>
</tr>
<tr>
<td></td>
<td>✚ SPKR AUD SPKR PWR</td>
<td>SPKR</td>
</tr>
<tr>
<td></td>
<td>MSTR SPKR VOL sel</td>
<td>R</td>
</tr>
<tr>
<td>MO39M</td>
<td>MIDDECK COMM CCU PWR</td>
<td>ON</td>
</tr>
</tbody>
</table>

**NOTE**

For ATUs connected to BPSMUs:
- **CDR ATU:** Power – AUD/TONE
  - A/G2 – T/R
- **A/L ATUs:** Power – AUD/TONE
  - A/G2 – T/R

**b. FLIGHT DECK CONFIG (optional)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>R10</td>
<td>MS AUD PWR</td>
<td>AUD/TONE</td>
</tr>
<tr>
<td></td>
<td>A/G 1</td>
<td>T/R, tw – R</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>A/A</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>ICOM A</td>
<td>T/R</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>✚ XMIT/ICOM MODE sel</td>
<td>PTT/PTT</td>
</tr>
<tr>
<td>A13</td>
<td>✚ OS AUD SPKR PWR</td>
<td>SPKR</td>
</tr>
<tr>
<td></td>
<td>MSTR SPKR VOL sel</td>
<td>R</td>
</tr>
<tr>
<td>A11</td>
<td>✚ MS COMM CCU PWR</td>
<td>ON</td>
</tr>
</tbody>
</table>
POST-SLEEP AUD CONFIG (UNDOCKED)

O6  √UHF MODE sel – OFF

FLIGHT DECK/MIDDECK AUD CONFIG

a. MIDDECK CONFIG (reqd)

MO42F
   MIDDECK SPKR AUD PWR – AUD/TONE
   A/G 1 – T/R, tw – R
   2 – RCV, tw – R
   ICOM A – T/R
   B – RCV
   √XMIT/ICOM MODE sel – PTT/PTT
   √SPKR AUD SPKR PWR – SPKR
   MSTR SPKR VOL sel – R

MO39M  √MIDDECK COMM CCU PWR – ON

b. FLIGHT DECK CONFIG (optional)

   NOTE
   If FD ATUs connected to BPSMUs:
   BPSMU ATU: A/G 2 – T/R
   MS ATU: A/G 2 – OFF, ICOM B – OFF
   (disregard A/G 2, ICOM B action below)

R10
   MS AUD PWR – AUD/TONE
   A/G 1 – T/R, tw – R
   2 – RCV, tw – R
   ICOM A – T/R
   B – RCV
   √XMIT/ICOM MODE – PTT/PTT

A13  √OS AUD SPKR PWR – SPKR
     MSTR SPKR VOL sel – R

A11  √MS COMM CCU PWR – ON
### STD S-BD/KU-BD PNL CONFIG

If configuring for TDRS KU-BD:
Prior to configuring A1L/C3:
If KU in radar:

√ KU PWR – ON
Perform KU OPS, step 4 (Cue Card, RNDZ), then:
KU CNTL – PNL,CMD

**NOTE**
KU-BD may take up to 3 min to complete search and acquire TDRS

If KU TRACK tb – bp
Perform KU-BD MANUAL ACQUISITION, 2-7, then:

| IF STDN(SGLS) IF TDRS TDRS |
|--------------------------|---------------------|---------------------|
| S-BD | S-BD | KU-BD |
| A1L  | NSP DATA RATE XMIT – HI HI HI |
|      | RCV  – HI HI HI |
|      | UPLK DATA – S-BD S-BD KU |
|      | CODING XMIT – OFF ON ON |
|      | RCV  – OFF ON OFF |
|      | S-BD PM MODE sel – STDN LO (SGLS) TDRS DATA -- |
| C3   | S-BD PM CNTL – PNL, CMD PNL, CMD PNL, CMD |

**NOTE**
If S-BD mode TDRS or STDN HI, xmit may be delayed 3 min for PA warmup. Receive not affected
LANDING-1 COMM C/O

NOTE
Performed to verify good CMD/TLM/voice/video and UHF with entry sites. MCC config COMM system to STDN and back to TDRS via SPC. East and west coast sites checked on different revs. Expect A/G, UHF voice calls for each site. MCC will *good TLM, CMD, voice, video, and UHF. Expect poor S-BD COMM during H/Os and if site problem. TDRS COMM available with C3 S-BD PM PNL/CMD.
Perform step 1 prior to AOS of site

1. UHF C/O CONFIG

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>O6</td>
<td>UHF SPLX/EVA XMIT FREQ – 259.7/414.2</td>
</tr>
<tr>
<td></td>
<td>PWR AMPL – ON</td>
</tr>
<tr>
<td></td>
<td>SPLX SQUELCH – ON (OFF if heads down)</td>
</tr>
<tr>
<td></td>
<td>MODE sel – SPLX</td>
</tr>
<tr>
<td>ATUxx</td>
<td>AUD A/G1 or A/G2 – T/R</td>
</tr>
<tr>
<td></td>
<td>A/A – T/R</td>
</tr>
</tbody>
</table>

2. ENTRY VIDEO C/O CONFIG

If ENTRY VIDEO SETUP (PHOTO/TV FS, REF PROC) configured:
- Connect Mini-Cam cables to HUD Mini-Cam Extension Cable
- TV PWR – ON
- VTR/CC PWR – on (LED on)
- ON/STANDBY – push (green LED on)
- Entry Mini-Cam AVIU J1 output to VTR IN
- V10 connected to VTR MONITOR
- V10 PWR – ON
- R HUD PWR – ON
- MODE – TEST
- BRT – MAN DAY
- BRT sel – as reqd (VTR mon)

Cont next page
NOTE
Once good link established at site, MCC will call crew on A/Gs, then A/A. Crew responds on all loops for each comm check performed. Once MCC finished comm checks, complete remaining steps.

3. NORMAL UHF CONFIG

O6
\UHF SPLX SQUELCH – ON
MODE sel – OFF

ATUxx
AUD A/A – RCV

4. VIDEO RECONFIG

F8U
R HUD MODE – NORM
F3
PWR – OFF
V10
PWR – OFF
O19
TV PWR – OFF

Connect Mini-Cam cable to Handheld Mini-Cam

H/O TIMES (supplied by MCC at crew request)

TDRS → STDN
_____/____:____:____

WEST COAST
STDN → TDRS
_____/____:____:____
TDRS → STDN
_____/____:____:____

EAST COAST
SITE → SITE (STDN)_____/____:____:____
STDN → TDRS
_____/____:____:____
COMM STRING 1 C/O (PART A: COMMAND TO STRING 1)

1. VERIFY PANEL A1L CONFIG

   A1L
   \(\sqrt{\text{S-BD PM ANT SW ELEC}}\) – 1
   \(\sqrt{\text{PRE AMP}}\) – 1
   \(\sqrt{\text{PWR AMPL STBY}}\) – 1
   \(\sqrt{\text{OPER}}\) – 1
   \(\sqrt{\text{MODE sel}}\) – TDRS DATA
   \(\sqrt{\text{XPNDR}}\) – 1
   \(\sqrt{\text{NSP DATA RATE (two)}}\) – HI
   \(\sqrt{\text{UPLK DATA}}\) – S-BD
   \(\sqrt{\text{CODING XMIT,RCV (two)}}\) – ON
   \(\sqrt{\text{PWR}}\) – 1

2. RECONFIG COMM STRINGS

   MCC ready for reconfig
   Expect ‘BCE STRG 3 NSP’ msg

   C3
   S-BD PM_CNTL – PNL, CMD

   Wait 1 min, then perform comm checks with MCC-H

   NOTE
   S-Band, NSP now configured to String 1.
   Alternate sw callouts used on all malfunction procedures. This config maintained for ~24 hr

3. RECONFIG PANEL A1L

   A1L
   S-BD PM ANT SW ELEC – 2
   PRE AMP – 2
   PWR AMPL STBY – 2
   OPER – 2
   XPNDR – 2
   NSP PWR – 2

2-18 ORB OPS/ALL/GEN M
COMM STRING 1 C/O (PART B: RETURN TO STRING 2)

1. **VERIFY PANEL A1L CONFIG**
   - S-BD PM ANT SW ELEC – 2
   - PRE AMP – 2
   - PWR AMPL STBY – 2
   - OPER – 2
   - MODE sel – TDRS DATA
   - XPNDR – 2
   - NSP DATA RATE (two) – HI
   - UPLK DATA – S-BD
   - CODING XMIT, RCV (two) – ON
   - PWR – 2

2. **RECONFIG COMM STRINGS**
   - MCC ready for reconfig
   - Expect ‘BCE STRG 1 NSP’ msg

   C3  S-BD PM CNTL – PNL, CMD

   Wait 1 min, then perform comm checks with MCC-H

   **NOTE**
   - S-Band, NSP now configured to String 2.
   - Nominal sw callouts should be used on all malfunction procedures

3. **RECONFIG PANEL A1L**
   - S-BD PM ANT SW ELEC – 1
   - PRE AMP – 1
   - PWR AMPL STBY – 1
   - OPER – 1
   - XPNDR – 1
   - NSP PWR – 1
CREW SYSTEMS

PRE-SLEEP ACTIVITY .......................................................... 3-2
POST-SLEEP ACTIVITY .......................................................... 3-7
OCAC SETUP ........................................................................ 3-11
STOWAGE ............................................................................ 3-12
MAL .................................................................................... 3-13
LIOH VOLUME INFIGHT RECONFIG ........................................ 3-14
TISSUE EQUIVALENT PROPORTIONAL COUNTER (TEPC) ........................................ 3-16
TEPC DISPLAY LOGSHEET ..................................................... 3-22
CYCLE ERGOMETER OPS .................................................... 3-23
FORMALDEHYDE MONITORING KIT: FMK – OPERATIONS ........................................ 3-31
CARBON DIOXIDE MONITOR: OPERATIONS FOR CARBON DIOXIDE MONITORING .......... 3-32
CARBON DIOXIDE MONITOR: BATTERY CHANGEOUT ...................................................... 3-35
CARBON DIOXIDE MONITOR: FILTER ASSEMBLY CHANGEOUT ....................................... 3-37

TABLE

3-1 TEPC NORMAL OPS DISPLAY KEY ................................. 3-17

FIGURES

3-1 TEPC location (middeck avionics bay 3A) ..................... 3-18
3-2 Ergometer .................................................................. 3-24
3-3 Ergometer middeck launch/landing config (ergo assy) ............................................. 3-27
3-4 Alternate exercise bungee attachments – front view (facing stdb) ............................. 3-29
3-5 Alternate exercise bungee attachments – side view (facing stdb) ............................... 3-30
3-6 Carbon Dioxide Monitor .............................................. 3-33
PRE-SLEEP ACTIVITY

NOTE
Keep one CRT active through completion of pre-sleep activities to acknowledge C&W lights

FLIGHT DECK ACTIVITY LIST

R1(A11) 1. CRYO HEATER/MANF VLV config per MCC
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

2. SM CHECKPOINT INITIATE (DPS)
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

L1 3. CAB TEMP – adj rotary as desired (suggest 5 o’clock posn)
   If night before Entry:
      Suggest 10 o’clock posn for Entry cooling
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

4. Expect possible ‘S66 CAB N2 FLO 1(2)’
   L2 O2/N2 CNTLR VLV SYS 1(2) – OP
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

Cont next page
5. **DPS/MEDS SLEEP CONFIG**

- **R11**
  - √IDP/CRT4 PWR – ON
  - IDP/CRT4 MAJ FUNC – SM
  - SM ANTENNA (CRT is driven by SM GPC)

- **CRT4**
  - All AFT MDUs PWR – OFF
  - IDP/CRT4 PWR sw – OFF

- **C2**
  - √IDP/CRT1 PWR sw – ON
  - √IDP/CRT2 PWR sw – ON
  - IDP/CRT2 MAJ FUNC – GNC
  - GNC UNIV PTG (CRT is driven by GNC GPC)

- **C2**
  - All FWD MDUs except CRT 1, MDU PWR – OFF
  - IDP/CRT2 PWR sw – OFF

Set CRT Wake-up Time/Alert Tone Duration:

- **CRT1**
  - GNC(SM) 2 TIME
  - TONE MSN T – ITEM 3 +hh +mm +ss EXEC
  - DURATION – ITEM 23 +XX EXEC

Perform ERR LOG resets:

- GNC 0 GPC MEMORY
  - ITEM 48 EXEC
- SM 0 GPC MEMORY
  - ITEM 48 EXEC

- **C3**
  - BFC CRT SEL – 1+2
  - DISP – ON

- **F7**
  - CRT1 – OFF

- **C2**
  - IDP/CRT1 PWR sw – OFF

Cont next page
6. √PWR OFF:
   A3     TV MON
   A7    CAMERAS
   O19   PWR
   Recording Devices/Camcorders
   L10 (VTR)  ON/STANDBY pb – push (LED red)
       (VIP)  PWR – off (LED off)
       (MUX)  MUX/VTR/CC PWR – off (LED off)
   VTR/CC PWR – off (LED off)
   PLB LIGHTS
   DDUs
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

7. WINDOW SHADES
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

MIDDECK ACTIVITY LIST
1. LiOH CHANGEOUT (Cue Card)

   WARNING
   If using ISS stockpile canisters, don PPE to reduce possible exposure to LiOH dust

   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16

Cont next page

3-4 ORB OPS/ALL/GEN M
2. WCS CLEANING (Cue Card, URINE COLLECTION)

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. PWR OFF:

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. PGSC OVERNIGHT CONFIG

- COLOR PRINTER – ON
- PAPER IN COLOR PRINTER
- OCA ROUTER – ON
- OUTLOOK APPLICATION CLOSED ON ALL PGSCs

- KFX PGSC (Prime and Backup) – On
  - KFX App LAUNCHED ON KFX PGSCs (Prime and Backup)
    - Prime KFX ________  Backup KFX ________

- WLES PGSC (Prime and Backup) – On
  - WLES App LAUNCHED ON WLES PGSCs (Prime and Backup)
    - Prime WLES ________  Backup WLES ________
5. PRE-SLEEP AUD CONFIG (COMM/INST)
   1  2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

6. GALLEY OVERNIGHT CONFIG (ECLS)
   1  2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

7. AIRFLOW CONFIG
   √WCS Upper Privacy Curtain is open (stowed)
   √Shade not installed in Port Interdeck accessway
   √OCAC Airflow path not obstructed
   √Duffy Ducts are fully extended and Airflow path not obstructed
   1  2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16
POST-SLEEP ACTIVITY

NOTE
Activate one CRT prior to initiating post-sleep activities to acknowledge C&W lights

MIDDECK ACTIVITY LIST
1. GALLEY MORNING CONFIG (ECLS)

2. LiOH CHANGEOUT (Cue Card)

WARNING
If using ISS stockpile canisters, don PPE to reduce possible exposure to LiOH dust

3. MESSAGE REVIEW

4. POST-SLEEP AUD CONFIG (COMM/INST)

Cont next page
5. **URINE PRETREAT CHANGEOUT** (Cue Card)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

6. If Entry day, perform **URINE PRETREAT ENTRY PREP** (Cue Card, **URINE PRETREAT CHANGEOUT**) (if flown)
<table>
<thead>
<tr>
<th>FLIGHT DECK ACTIVITY LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. WINDOW SHADES</strong></td>
</tr>
<tr>
<td>1 2 3 4 5 6 7 8 9 1 0</td>
</tr>
<tr>
<td>11 12 13 14 15 16</td>
</tr>
</tbody>
</table>

| **2. IDPs/MDUs – ON as desired (use only one IDP with three MDUs max if in GROUP B(C) PWRDN)** |
| 1 2 3 4 5 6 7 8 9 1 0    |
| 11 12 13 14 15 16        |

| **C3 3. BFC CRT DISP – OFF** |
| 1 2 3 4 5 6 7 8 9 1 0    |
| 11 12 13 14 15 16        |

| **4. ALERT TONE DURATION** |
| 1 2 3 4 5 6 7 8 9 1 0    |
| 11 12 13 14 15 16        |

| **L1 5. CAB TEMP – adj rotary as reqd** |
| If Entry day: |
| CAB TEMP – full COOL |
| Wait 20 min |
| CAB TEMP CNTLR – OFF |
| 1 2 3 4 5 6 7 8 9 1 0    |
| 11 12 13 14 15 16        |

| **L2 6. O2/N2 CNTLR VLV SYS 1(2) – AUTO** |
| 1 2 3 4 5 6 7 8 9 1 0    |
| 11 12 13 14 15 16        |

Cont next page
R1(A11)  7. CRYO HEATER/MANF VLV config per MCC

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. If EVA day:

A7  WIRELESS VID HTR – ON

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**OCAC SETUP**

1. √OCAC PWR – OFF
   Attach DC Pwr cable to OCAC

2. Loosen fabric shroud via Velcro attach points

3. Loosen knurled collar on port arm until arm can be rotated down and locked
   Fully extend arm by rotating collar

4. Depress handles on stbd arm
   Rotate arm down until locked

5. Center OCAC in stbd interdeck accessway

6. Place port arm pad in upper groove

7. While depressing stbd arm handles, pivot OCAC into position, then release handles

   **NOTE**
   Port arm may need adjustment to accommodate OCAC fit

8. √OCAC fit secure

9. Secure fabric shroud to surrounding accessway

10. √DC UTIL PWR – OFF
    Attach DC Pwr cable to predetermined orbiter DC UTIL PWR outlet

    **NOTE**
    DC UTIL PWR – ON

11. Remove filter cover
    OCAC PWR – ON
    Adjust CFM to 300 cfm (or desired level)
OCAC STOWAGE

OCAC

1. √Filter for debris. If reqd, clean using Gray Tape or vacuum
   Place filter cover over filter

2. OCAC PWR – OFF
   \RPM – 0

3. DC UTIL PWR – OFF
   Disconnect DC Pwr cable from orbiter/OCAC

4. Pivot stbd/port arms into stowed posn via pivot release buttons
   Adjust arms to fit within OCAC

5. Secure fabric shroud to OCAC

6. Stow OCAC
# OCAC MAL

<table>
<thead>
<tr>
<th>ERROR INDICATOR</th>
<th>PROBLEM RESOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECK FILTER (LED illuminated)</td>
<td>Filter not properly attached to OCAC; reattach filter</td>
</tr>
<tr>
<td>CHECK BREAKER (LED illuminated)</td>
<td>√cb sw – off</td>
</tr>
<tr>
<td></td>
<td>√MCC</td>
</tr>
<tr>
<td>MOTOR OVERHEAT (LED illuminated)</td>
<td>√OCAC PWR – OFF</td>
</tr>
<tr>
<td></td>
<td>Filter clean (If reqd, clean filter, allow motor to cool down before turning)</td>
</tr>
<tr>
<td></td>
<td>OCAC PWR – ON</td>
</tr>
<tr>
<td></td>
<td>Motor not restricted (If reqd, remove object, allow motor to cool down before turning OCAC PWR – ON)</td>
</tr>
<tr>
<td>LED on top of OCAC (not illuminated)</td>
<td>√DC UTIL PWR – ON</td>
</tr>
<tr>
<td></td>
<td>√OCAC PWR – ON</td>
</tr>
<tr>
<td></td>
<td>√cb sw – on</td>
</tr>
<tr>
<td></td>
<td>Ensure proper cable connection</td>
</tr>
</tbody>
</table>
LiOH VOLUME INFLIGHT RECONFIG

1. Open LiOH Door

2. Unfasten wing fasteners (two) on beam assembly
   Remove beam

3. Unfasten strap from buckle

4. Remove Clothing Bags (seven)

5. Unfold Trash Bag Liner and position in container,
   matching bottom Velcro on liner with Velcro on
   preinstalled Nomex Bag (verify vent opening
   positioned aft of beam)

6. Place collar on Trash Bag Liner under beam
   assembly and align with wing fasteners (four) on
   beam assembly. Hand tighten

7. Mate vent line from orbiter to collar assembly
   (ensure proper connection by gently pulling on
   hose)

8. Reinstall beam

9. Place hand inside liner and mate Velcro on outside
   of liner to Velcro on Nomex Bag
   Spread bag out while mating Velcro
TISSUE EQUIVALENT PROPORTIONAL COUNTER (TEPC)

A. POWER ON

NOTE
PDB (P1) needs to be connected after launch

MO52J
TEPC
Av Bay 3A

1. √DC UTIL PWR MNA – ON

2. PWR sw 1 – ON

3. Verify green LED – ON
   If not, perform C. MALFUNCTION, step 1, 3-19

4. After 1 min, verify display backlit and startup displays cycling
   If not, perform C. MALFUNCTION, step 3, 3-20
   If no joy, notify MCC

   NOTE
   During instrument startup routine, TEPC cycles thru 12 startup displays (initializations). After 8 min, TEPC startup complete

5. Record initialization MET ____/____:____:____

   NOTE
   When startup complete, TEPC cycles thru four operational displays. See table 3-1 for displays

   When time permits:

6. √TEPC Window Display
   If display not cycling, (e.g., if time not incrementing), perform
   C. MALFUNCTION, step 4, 3-20
   If dose not incrementing, perform
   C. MALFUNCTION, step 5, 3-20

7. Notify MCC of MET

Cont next page
TABLE 3-1.- TEPC NORMAL OPS DISPLAY KEY

Verification of normal operation:
Cyclic displays of operating parameters from the Window Display are shown below. Each left-hand box represents the layout of each display. The right-hand boxes are the noun names of the indicated values for the corresponding Window Display. Dose rate should change with each screen. Elapsed time (m) will change with each min.

### NOTE

Units for Dose Rate may be pGy/h, nGy/h, μGy/h, or mGy/h. Units for Total Dose may be pGy, nGy, μGy, or mGy. 1 Gy = 100 rad:
- pGy – picogray
- nGy – nanogray
- μGy – microgray
- mGy – milligray

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Dose</th>
<th>Elapsed Time</th>
<th>Dose Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>μG</td>
<td>m</td>
<td>μG/h</td>
</tr>
<tr>
<td>Display 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Dose</th>
<th>Date</th>
<th>Dose Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>μG</td>
<td>DD.MM.YY</td>
<td></td>
</tr>
<tr>
<td>Display 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Dose</th>
<th>Memory Errors</th>
<th>Dose Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>μG</td>
<td>%</td>
<td>E</td>
</tr>
<tr>
<td>Display 3</td>
<td></td>
<td></td>
<td>μG/h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Dose</th>
<th>Flags</th>
<th>Dose Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>μG</td>
<td>&gt;</td>
<td>μG/h</td>
</tr>
<tr>
<td>Display 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B. POWERDOWN

TEPC

1. PWR sw 1 – OFF

NOTE
Following step 2 will terminate pwr to other loads on that utility outlet

MO52J

2. DC UTIL PWR MNA – OFF

3. Record TEPC deactivation MET

Figure 3-1.- TEPC location (middeck avionics bay 3A).
C. MALFUNCTION

1. Green LED not ON (no display)

<table>
<thead>
<tr>
<th>Component</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEPC</td>
<td>PWR sw 1 – OFF</td>
</tr>
<tr>
<td>MO52J</td>
<td>DC UTIL PWR MNA – OFF</td>
</tr>
<tr>
<td></td>
<td>√External connections properly mated per PLUG-IN-PLAN (REF DATA FS)</td>
</tr>
<tr>
<td>MO52J</td>
<td>DC UTIL PWR MNA – ON</td>
</tr>
<tr>
<td>TEPC</td>
<td>PWR sw 1 – ON</td>
</tr>
<tr>
<td></td>
<td>√Green LED – ON</td>
</tr>
<tr>
<td></td>
<td>If green LED ON, go to A. <strong>POWER ON</strong>, step 3, 3-16</td>
</tr>
<tr>
<td></td>
<td>If no green LED:</td>
</tr>
<tr>
<td></td>
<td>√MCC regarding fuse replacement and perform step 2</td>
</tr>
</tbody>
</table>

2. Fuse Replacement

<table>
<thead>
<tr>
<th>Component</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEPC</td>
<td>PWR sw 1 – OFF</td>
</tr>
<tr>
<td>MO52J</td>
<td>DC UTIL PWR MNA – OFF</td>
</tr>
<tr>
<td>TEPC</td>
<td>√Fuse (F1/F2)</td>
</tr>
<tr>
<td>switchbox</td>
<td>If necessary:</td>
</tr>
<tr>
<td>Top of TEPC</td>
<td>Replace with spare fuse</td>
</tr>
<tr>
<td></td>
<td>Stow blown fuse in spare fuse holder</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
</tr>
<tr>
<td></td>
<td>There are two spare fuses available, one on top of TEPC pouch and one in TEPC switchbox. Fuse on top of pouch is easier to access so it should be tried first</td>
</tr>
<tr>
<td>MO52J</td>
<td>DC UTIL PWR MNA – ON</td>
</tr>
<tr>
<td>TEPC</td>
<td>PWR sw 1 – ON</td>
</tr>
<tr>
<td></td>
<td>√Green LED – ON</td>
</tr>
<tr>
<td></td>
<td>If green LED, perform A. <strong>POWER ON</strong>, step 4, 3-16</td>
</tr>
<tr>
<td></td>
<td>If no green LED, notify MCC</td>
</tr>
</tbody>
</table>

Cont next page
3. Green LED – ON but no display after 60 sec

TEPC PWR sw 1 – OFF

MO52J DC UTIL PWR MNA – OFF

√Internal connections properly mated:
  Unfasten straps and unzip TEPC case
  Check three internal connections
  Zip up TEPC case and fasten straps

DC UTIL PWR MNA – ON

TEPC PWR sw 1 – ON

Go to A. POWER ON, step 4, 3-16

4. Display ON but not cycling (or no time updates)

TEPC PWR sw 1 – OFF

Wait 30 sec

PWR sw 1 – ON

NOTE
During instrument startup routine,
TEPC cycles through 12 startup
displays (initializations). After
8 min, TEPC startup complete

√For proper display:
  If proper display, go to A. POWER ON,
  step 4, 3-16
  If no joy, notify MCC

5. Display ON but no dose rate or incrementing dose

TEPC PWR sw 1 – OFF

MO52J DC UTIL PWR MNA – OFF

√Detector cable connection to spectrometer
Zip up TEPC case and fasten straps

MO52J DC UTIL PWR MNA – ON

TEPC PWR sw 1 – ON

Cont next page
NOTE
During instrument startup routine, TEPC cycles through 12 startup displays (initializations). After 8 min, TEPC startup complete.

√ For proper display:
   If proper display, go to A. POWER ON, step 4, 3-16
   If no joy, notify MCC

D. CALL DOWN DATA

   NOTE
   This procedure only reqd at direction of MCC

   1. Record data per MCC instruction. Note appropriate scientific units on dose and dose rate. Refer to TEPC DISPLAY LOGSHEET, 3-22

   2. Call down recorded data to MCC

   NOTE
   TEPC operational sequence consists of continuous cycling through four operational displays. See table 3-1, 3-17, for displays
**TEPC DISPLAY LOGSHEET**

**NOTE**
Report units as well as values

<table>
<thead>
<tr>
<th>Date</th>
<th>GMT</th>
<th>Dose Rate (___Gy/h)</th>
<th>Total Dose (___Gy)</th>
<th>Elapsed Time (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CYCLE ERGOMETER OPS

ERGOMETER SETUP

1. Remove Ergometer Assy from middeck floor, transport Ergometer to desired exercise location

2. Unstow:
   - Ergo Assy
   - Ergometer Accessories (Ergo Acc) Bag
   - Ergo Acc Sound Mounts w/ Knurled Kbs (4)
   - Bag Adjustable Quick Disconnects (AQDs) (4)
   - Spacers (4)

3. Attach AQDs (four) to seat floor studs
   - Install spacers and then sound mounts on ADQs
   - Secure loosely with knurled knobs

Disassemble Ergo Assy:

4. Remove seat stem pip pin, seat stem foot, restraining belt, temp stow
5. Remove seat assy, temp stow
6. Remove Ergometer pip pins (four), ergometer assy straps (four); release Ergometer from frame; temp stow

7. Mount both frame sections loosely to AQDs on seat floor studs (fig 3-2) using Knurled Kbs (four)

8. Install seat assy on seat stem; insert seat stem foot into stem
   - Move seat assy pip pin (one) from green to yellow hole, secure with seat stem pip pin, slide blocks together, secure with Velcro

9. √Ergometer ON/OFF – OFF

NOTE
Following steps will interrupt pwr to other loads on that utility outlet

Cont next page
10. ✓ DC UTIL PWR MNC – OFF

11. Connect prerouted Ergometer Pwr cable to Ergometer Pwr Jack
    Connect Ergometer Display Panel cable to Ergometer Display Jack; temp stow

12. Unstow: Threaded fasteners (four)

    NOTE
    Ergometer ON/OFF, MANUAL/REMOTE switches should face subject

Cont next page
3-24   ORB OPS/ALL/GEN M
13. √Ergometer for proper orientation
   Mount Ergometer to frame assy with Threaded
   Fasteners (four)
   Tighten with Wrench
   Hand-tighten Knurled Kbs to secure Ergometer
   frame assy to Middeck floor
   Tighten seat stem foot against orbiter floor

14. Unstow:
   Ergo Acc Bag
   Ergometer Pedals
   Ergometer Cranks

15. Install pedals on cranks using Wrench from Ergo
    Acc Bag, attach cranks with pedals to Ergometer,
    tighten with Wrench (see fig 3-2)

    NOTE
    Install RED on RIGHT,
    BLUE on LEFT

16. DC UTIL PWR MNC – ON

   As reqd, if exercise session follows immediately,
   perform muscle stretch:
   17. Hold each stretch 1 min
   18. While stretching, relax involved muscle

19. Adjust seat assy for subject comfort

20. Mount Ergometer
    Secure shoes into pedals
    Secure body with restraining belt

21. Ergometer ON/OFF – ON
    √DATA – MANUAL

22. Perform exercise

23. Ergometer ON/OFF – OFF

   Cont next page
RECONFIG/STOW

NOTE
Following steps will interrupt power to other loads on that utility outlet

1. DC UTIL PWR MNC – OFF

2. Disconnect prerouted Ergometer Pwr cable, secure

3. If other loads on utility outlet (verify per Plug-In Plan), DC UTIL PWR – ON

4. Detach Ergometer Display Panel cable, Ergometer pedals, cranks, stow

5. Remove Threaded Fasteners, stow

6. Remove Ergometer from frame, temp stow

7. Remove seat stem pip pin, seat stem foot; temp stow

8. Remove seat assy, reconfigure for launch/landing (pip pin moves from yellow to green hole)

9. Unscrew Knurled Kbs (four)

10. Release both frame sections from AQDs on seat studs; remove spacers (four), AQDs with Knurled Kbs/sound mounts (four), stow

11. Slide frame half, without seat stem, onto stem in launch/landing config (fig 3-3)

12. Unstow: Ergo Assy Straps (two pair), slide onto frame

13. Unstow: Pip pins

Cont next page
Figure 3-3.- Ergometer middeck launch/landing config (ergo assy).

14. Attach Ergometer horizontally to frame with pip pins (fig 3-3)
\(\checkmark\) Arrow on decal, seat stem face same direction
Verify pip pins (four) fully seated/secured

15. Slide seat assy onto seat stem, reinstall seat stem foot, secure with seat stem pip pin

16. Tighten Knurled Kbs (two) on seat assy

17. Secure restraining belt around seat assy, seat stem
Verify pip pin fully seated/secured

18. Mount frame to launch/landing position in middeck using frame/AQDs (four), with seat stem facing forward (fig 3-3)
Verify AQD collars (four) locked

19. Using Ergo Assy Straps attach Ergo Acc Bag to Ergometer (fig 3-3)

20. Pull straps tight; secure loose ends

Cont next page
**CYCLE ERGOMETER MANUAL OPS**

Ergo Acc Bag

1. Unstow: Manual Control Kb

2. Screw Manual Control Kb into bushing on Ergometer (fig 3-3)

**NOTE**
To increase workload, turn Manual Control Kb cw. To decrease workload, turn Manual Control Kb ccw

If workload/pedal speed desired, pwr available:

3. √Ergometer ON/OFF – ON
   Set desired pedal speed, workload on display panel
   Perform exercise
   Adjust Manual Control Kb until ONLY center LED on workload illuminated; repeat for any change in workload

If workload/pedal speed feedback not desired or pwr not available:

4. Perform exercise, adjusting Manual Control Kb cw or ccw as desired

**ALTERNATE ERGOMETER EXERCISE**

Ergo Acc Bag

1. Unstow: Bungee Cords

2. Connect two sets of four Bungee Cords in series in the following order:
   - Set 1: #1, #5, #6, #2
   - Set 2: #3, #7, #8, #4

3. Attach Bungees to opposite corners of Ergometer frame, crossing Bungees over shoulders (see figs 3-4, 3-5)

4. Stand topside of Ergometer with feet approx shoulder width apart

5. Adjust Bungee length for comfort

Cont next page
NOTE
Use towels, socks for shoulder padding if desired

6. Perform exercise

7. Stow: Bungee Cords

Figure 3-4.- Alternate exercise bungee attachments – front view (facing stbd).

Cont next page
Figure 3-5.- Alternate exercise bungee attachments – side view (facing stbd).
FORMALDEHYDE MONITORING KIT: FMK – OPERATIONS

NOTE
1. Monitor attachment site must permit air to move freely over monitor surface

2. Execute experiment for 40-48 hr

1. Unstow: Formaldehyde Monitor Kit (FMK)
2. Remove two monitors from FMK
3. Record (on both monitors):
   Placement location
   If OCAC operating, R14
   If OCAC not operating, R9
   Date and time in START space

00:00:00 4. Remove and dispose of REMOVE TO START labels in FMK

5. Remove and dispose of adhesive covers on Velcro (on back of monitor) in FMK

6. Secure monitors side by side (distance $\approx$ 5 to 10 cm) in sampling location

$\sim$48:00:00 7. Detach monitors from area location

8. Seal monitoring surfaces with APPLY TO STOP labels (on back of monitors)
9. Record date and time in STOP spaces
10. Stow used monitors in RETURN BAG in FMK
11. Stow FMK
CARBON DIOXIDE MONITOR: OPERATIONS FOR CARBON DIOXIDE MONITORING

PARTS:
CDM
Clean Filter Assy (2)
Batt Pack Assy (5)

NOTE
CDM will operate for approx 10 hr before Batt Pack is discharged. CDM will emit a short beep once every 15 sec to indicate a low battery condition with approx 3 to 8 hr remaining

SETTING UP CDM
1. Mate CDM QD and Filter Assy
2. Attach Velcro tether

ACTIVATING CDM

NOTE
Audible beeps occur when MODE pb is pressed during unit activation

3. Press, hold MODE pb until ‘RELEASE’ displayed

NOTE
Unit will run self-check routine for 1 min. A single beep occurs when self-check routine is complete.

Battery status should be taken after self-check routine, when pump has started and CDM begins displaying CO2 concentrations

4. Wait 1 min
5. Verify display indicates readings for CO2

Cont next page
TAKING CDM SPOT CHECK MEASUREMENTS

NOTE
Spot check is conducted at mid-axis in each module or in specific locations where CO2 pockets may be present.

When in normal operation (CO2 concentration displayed), battery status OK or LOW can be accessed by pressing MODE pb once. Operating mode will revert to nominal display after 15 sec.

CDM battery level indicator displays a graphical representation of remaining operating time. Battery status is indicated by 0 to 8 tick marks (or “spider legs”) on LCD display. As battery life is used, tick marks will disappear in counts of two. Only possible battery tick readings are 0, 2, 4, 6, or 8.
6. Record the following:
   MET ______
   Sampling Location ______
   CO2 Concentration ______
   Batt ticks [Press MODE pb once] ______

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

DEACTIVATING CDM
8. Press, hold MODE pb until ‘RELEASE’ displayed

9. √CDM OFF

   NOTE
   When demating Filter Assy from Quick Disconnect (QD), grasp assy with one hand and QD with other

10. Demate CDM QD and Filter Assy

11. Stow equipment
CARBON DIOXIDE MONITOR: BATTERY CHANGEOUT

NOTE
CDM will operate for approx 10 hr before Batt Pack is discharged. CDM will emit a short beep once every 15 sec to indicate a low battery condition with 3 to 8 hr remaining. Battery installed in CDM for launch may annunciate low battery alarm earlier than expected if instrument has not been used for several weeks. Batt Pack should be changed out when low battery is indicated.

When battery has insufficient charge to operate CDM, ‘BATTERY FAIL’ is displayed and a short beep is emitted every second. Battery should be replaced immediately.

When in normal operation (CO2 concentration displayed), battery status OK or LOW can be accessed by pressing MODE pb once. After 15 sec, display will revert back to normal viewing mode

1. Unstow:
   CDM
   Marker
   Spare Batt Pack

2. If CDM activated, deactivate:
   Press, hold MODE pb until ‘RELEASE’ displayed
   $\sqrt{\text{CDM OFF}}$
   If CDM not activated, go to step 3

3. Turn both fasteners on back panel ¼ turn ccw

4. Temp stow panel

5. Grasp Batt Pack pull tab, remove pack

Cont next page
NOTE
Stored data is maintained for a max of 30 min without battery installed. All data will be lost if battery installation is delayed more than 30 min.

6. Mark Batt Pack as “DISCHARGED”

7. Install replacement Batt Pack, press firmly to seat electrodes

8. Replace panel, press firmly, turn fasteners (two) ¼ turn cw to lock

9. Stow:
   Used Batt Pack
   Marker

   NOTE
   Audible beeps occur when MODE pb is pressed during unit activation.

   A single beep occurs when self-check routine is complete

10. If reqd, activate CDM:

    Press, hold MODE pb until ‘RELEASE’ displayed
    Wait approx 1 min while unit runs self-check routine
    Verify display indicates CO2 concentration
    Deploy CDM as reqd
    If not reqd, stow CDM

11. Notify MCC when battery changeout is complete
CARBON DIOXIDE MONITOR: FILTER ASSEMBLY
CHANGEOUT

NOTE
CDM requires use of Filter Assy for proper operation. Assy prevents particulate matter from interfering with infrared sensor and damaging sampling pump. If filter becomes clogged, a low flow indication ‘PUMP FLO ALM’ will be displayed and assy must be replaced.

1. If CDM activated, deactivate:
   - Press, hold MODE pb until ‘RELEASE’ displayed
   - √CDM – Off
   - If CDM not activated, go to step 2

NOTE
When demating Filter Assy from Quick Disconnect (QD), grasp assy with one hand and QD with other.

2. Demate CDM QD and Filter Assy

3. Return used Filter Assy to pouch lid

4. Remove clean Filter Assy from middeck stowage

5. Mate CDM QD and Clean Filter Assy

6. Attach Velcro tether

Cont next page
NOTE
Audible beeps occur when MODE pb is pressed during unit activation.

A single beep occurs when self-check routine is complete

7. Activate CDM:
   Press, hold MODE pb until ‘RELEASE displayed
   Wait 1 min
   Verify display indicates CO2 concentration
DPS

G2 SET CONTRACTION .................................................. 4-2
EXPANSION ............................................................... 4-4
TO G8 TRANSITION ..................................................... 4-6
G8 TO G2 TRANSITION .................................................. 4-7
SM CHECKPOINT INITIATE ............................................. 4-8
G2 SET CONTRACTION

**NOTE**
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

1. If RNDZ NAV enabled: Go to step 7

2. **CONFIG FOR SET CONTRACTION**
   If MM202: GNC, OPS 201 PRO
   | GNC 0 GPC MEMORY |
   | CONFIG – ITEM 1 +2 EXEC |
   | Assign MC 2 |
   | C3(A6U) |
   | DAP: FREE |
   | VERN(ALT) |

3. **OPS MODE RECALL**
   If MM202: GNC, OPS 201 PRO
   | Pause ~30 sec (DAP settling) |
   | C3(A6U) |
   | DAP: as reqd |

4. **FREEZE DRY GPC 2(3) (G2FD)**
   If MM202: GNC, OPS 201 PRO
   | MAJ FUNC – PL |
   | GPC/CRT2(3)/X EXEC [X: PL GPC MEMORY] |
   | CONFIG – ITEM 45 +2 EXEC |
   | GPC – ITEM 46 +2(3) EXEC |
   | STORE – ITEM 47 EXEC |
   | Store complete when MC = 02 (~15 sec) |
   | √All IDPs(CRTs) deassigned from FD GPC |

O6  GPC MODE 2(3) – STBY (tb-bp)
   – HALT (tb-bp)
   – STBY (tb-RUN)
   – HALT (tb-bp)

Cont next page
5. **CONFIG CLEANUP**

- [GNC 22 S TRK/COAS CNTL]
- S TRK -Y,-Z: STAR TRK – ITEM 3,4 EXEC (*)
- [GNC 21 IMU ALIGN]

**RESUME**

6. **CLEAR SOFTWARE FAIL VOTES**

On MCC GO:

- [GNC 0 GPC MEMORY]
- ITEM 48 EXEC
- [SM 0 GPC MEMORY]
- ITEM 48 EXEC >>

7. **SET CONTRACTION “if RNDZ NAV ENA”**

**NOTE**

The following steps do not take PASS redundant set through OPS 0

a. Remove GPC From Redundant Set:

- CRT If MM202: GNC, OPS 201 PRO
- [GNC 0 GPC MEMORY]
- CONFIG – ITEM 1 +2 EXEC
- Assign MC 2 without modifying target set

<table>
<thead>
<tr>
<th>Current: Dual G2</th>
<th>Triple G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>getConfig GPC</td>
<td>12000</td>
</tr>
<tr>
<td>STR 1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>PL 1/2</td>
<td>0</td>
</tr>
</tbody>
</table>

b. Create G2FD GPC

- Perform step 4 if GPC not currently reqd

c. **Clear Software Fail Votes**: Go to step 6
G2 SET EXPANSION

NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

1. If RNDZ NAV enabled:
   C3(A6U) DAP: LVLH
   GNC UNIV PTG
   CNCL – ITEM 21 EXEC

2. CONFIG G2FD GPC(s) FOR SET EXPANSION
   √AV BAY 2(3) FAN A(B) – ON
   O6 √GPC MODE 2(3) – HALT
       √OUTPUT 2(3) – NORM
       √PWR 2(3) – ON
       MODE 2 – STBY(tb-RUN)
       – RUN (OUTPUT tb-gray)

   If triple G2 reqd:
   GPC MODE 3 – STBY (tb-RUN)
   – RUN (OUTPUT tb-gray)

3. CONFIG FOR SET EXPANSION
   CRT
   If MM202:  GNC, OPS 201 PRO
   [GNC 0 GPC MEMORY]
   CONFIG – ITEM 1 +2 EXEC
   Assign MC 2

   CRT
   4. OPS MODE RECALL
   C3(A6U) DAP: FREE
   CRT GNC, OPS 201 PRO
   Pause ~30 sec (DAP settling)
   C3(A6U) DAP: as reqd

   NOTE
   Downlist reverts to lowest GPC (MCC may request Item 44+X)

Cont next page

ORB OPS/ALL/GEN M
5. **CONFIG CLEANUP**
   
   **GNC 22 S TRK/COAS CTL**
   
   S TRK - Y,Z: STAR TRK – ITEM 3,4 EXEC (*)
   
   **GNC 21 IMU ALIGN**
   
   RESUME

6. If resuming RNDZ NAV TRACKING:
   
   Go to RNDZ NAV RECOVERY (RNDZ, CONTINGENCY OPS)
G2 TO G8 TRANSITION

NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

1. If KU BD in RDR:
   A1U KU BD sel – AUTO TRACK

2. If RNDZ NAV enabled:
   C3(A6U)
   DAP: LVLH
   GNC UNIV PTG
   CNCL – ITEM 21 EXEC

3. CONFIG TFL FOR G8 TRANSITION
   If Elevon Park: TFL change not reqd
   If FCS Checkout (load FMT ID 103/161):
   SM 62 PCMMU/PL COMM
   Perform LOAD PCMMU FORMAT
   (ORB OPS FS, COMM/INST)

4. CONFIG FOR G8 OPS TRANSITION
   O8 √ MLS (three) – ON
   O14,O15,O16:E √ cb ADTA (four) – cl
   O14,O15:F √ MMU (two) – ON

5. G8 OPS TRANSITION
   CRT
   If MM202: GNC, OPS 201 PRO
   
   GNC 0 GPC MEMORY
   CONFIG – ITEM 1 +8 EXEC
   Assign MC8 – ITEM 1 +8 EXEC

<table>
<thead>
<tr>
<th>If:</th>
<th>Single</th>
<th>Dual</th>
<th>Triple</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G2 10000</td>
<td>G2 12000</td>
<td>G2 12300</td>
</tr>
<tr>
<td>CONFIG</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>GPC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   C3(A6U)
   DAP: FREE
   
   CRT
   GNC, OPS 801 PRO
   
   | STR       | 1       | 1       | 1       |
   | 2         | 1       | 2       | 2       |
   | 3         | 1       | 1       | 3       |
   | 4         | 1       | 2       | 3       |
   | PL 1/2    | 0       | 0       | 0       |

   NOTE
   Downlist reverts to lowest GPC (MCC may request Item 44+X)

   C3(A6U)
   DAP: as reqd
   
   CRT
   | 1         | 1       | 1       |
   | 2         | 1       | 2       |
   | 3         | 0       | 0       |
   | 4         | 1       | 2       |
   | L 1/2     | 0       | 0       | 0       |
   | MM 1/2    | 1       | 1       | 1       |
   | 2         | 1       | 2       |

   O15:F
   MMU 2 – OFF

6. If reqd for PWRDN:

4-6 ORB OPS/ALL/GEN M
G8 TO G2 TRANSITION

NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

1. **SM 62 PCMMU/PL COMM**
   If reqd, perform LOAD PCMMU FORMAT
   (ORB OPS FS, COMM/INST)

2. **G2 OPS TRANSITION**
   O14,O15:F MMU (two) – ON
   **GNC 0 GPC MEMORY**
   CONFIG – ITEM 1+2 EXEC
   Assign MC2
<table>
<thead>
<tr>
<th>If:</th>
<th>Single G8</th>
<th>Dual G8</th>
<th>Triple G8</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG GPC</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>STR</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>PL</td>
<td>1/2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CRT</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>DAP: as reqd</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   **NOTE**
   Downlist reverts to
   lowest GPC (MCC may
   request Item 44+X)

3. **CONFIG CLEANUP**
   **GNC 22 S TRK/COAS CNTL**
   S TRK -Y,-Z: STAR TRK – ITEM 3,4 EXEC (*)
   **GNC 21 IMU ALIGN**
   RESUME
   O15:F If reqd for PWRDN: MMU 2 – OFF

Cont next page
4-7 ORB OPS/ALL/GEN M
If not currently performing FCS Checkout, then:

- MLS (three) – OFF
- cb ADTA (four) – op

4. If resuming RNDZ NAV TRACKING:
   Go to RNDZ NAV RECOVERY (RNDZ, CONTINGENCY OPS)

5. If resuming KU BD RDR:
   - MCC for KU BD RDR OUTPUT
   - KU BD sel – GPC

**SM CHECKPOINT INITIATE**

1. MMU 2 – ON

2. SELECT MMU 2(1) FOR CKPT
   - SM 60 TABLE MAINT
   - MMU 2(1) ASSIGN – ITEM 22(21) EXEC (*)
   - MMU STATUS 2(1) – RDY
   - SM COM BUFF – ‘RDY’
   - CHECKPT INITIATE – ITEM 18 EXEC
     - Time updated
     - STATUS – ‘GOOD’

3. Repeat step 2 for MMU 1

4. After completion of SM CKPTs:
   - CKPT RETRVL ENA – ITEM 23 EXEC (*)

5. If reqd for PWRDN: MMU 2 – OFF
ECLS

SUPPLY/WASTE WATER DUMP........................................ 5-2
SUPPLY WATER DUMP USING FES................................... 5-9
CABIN TEMP CONTROL............................................... 5-10
RAD BYPASS/FES C/O............................................... 5-12
MODIFIED RAD BYP/FES C/O AND TOPPING
CORE FLUSH.................................................................. 5-13
RAD DEPLOY............................................................... 5-15
STOW............................................................................. 5-17
PCS 1(2) CONFIG .......................................................... 5-19
TOPPING FES DEACTIVATION ....................................... 5-20
STARTUP......................................................................... 5-21
SMOKE DETN CKT TEST............................................... 5-22
SHUTTLE/ISS H2O CONTAINER FILL (HC)............................ 5-25
CWC-I FILL...................................................................... 5-32
CWC OVERBOARD DUMP.............................................. 5-36
CABIN TEMP CONTROLLER RECONFIG – 2(1)...................... 5-39
SHUTTLE CONDENSATE COLLECTION............................... 5-40
PWR DUMP-WASTE LINE............................................... 5-41
DUMP-SUPPLY LINE...................................................... 5-44
FILL............................................................................... 5-47
GALLEY IODINE REMOVAL ASSEMBLY (GIRA)
INSTALLATION............................................................... 5-50
GALLEY OVERNIGHT CONFIG........................................ 5-52
MORNING CONFIG.......................................................... 5-52
WATER SAMPLE.............................................................. 5-53
GIRA STOWAGE............................................................. 5-54
NOMINAL H2O CONFIG.................................................. 5-55
CWC VENTING................................................................. 5-56
O2 REPRESS USING PAYLOAD O2 VALVES......................... 5-59
N2 REPRESS USING PAYLOAD N2 VALVES........................... 5-60

FIGURES

5-1 Initial purge setup; water transfer hose coming from GIRA ........................................ 5-26
5-2 CWC or EDV fill setup................................................ 5-27
5-3 Quantity measuring strap and CWC details.................. 5-28
5-5 CWC sample setup.................................................... 5-33
5-6 CWC-I sample setup.................................................. 5-35
5-7 GIRA config (connections and routing)......................... 5-51

5-1 ORB OPS/ALL/GEN M
SUPPLY/WASTE WATER DUMP

For SPLY H2O Dump, perform steps in sections A,B,D,F,H,K
For WST H2O Dump, perform steps in sections B,E,G,I,K
For simo SPLY/WST H2O Dump, perform all steps

NOTE
If PASS SM avail, monitor temps and qty; otherwise, dump only when MCC avail to monitor.

Dump in current SPLY H2O tank config (panels R11L, ML31C), unless directed otherwise by MCC.

If no comm: Dump H2O tanks to provide 100% total ullage in any single or combination of TKs A,B,C,D. 100% ullage reqd for FC-produced water for 12 hr.

Qty of approx 200% among TKs A,B,C,D reqd for deorbit/entry FES usage.

If part of TKA and all of TKB to be dumped:
Set TKB QTY LL to -10 to preclude nuisance alarm
Do not reset LL or dump TKA QTY less than 80

A. SUPPLY/SIMO DUMP PREP

WCS Outbd Wall
For SPLY H2O or simo SPLY/WST H2O DUMP, unstow and install SPLY H2O Dumpline Purge Device into CONT H2O X-TIE POT QD (lower QD with blue Velcro and “POTABLE” label)

NOTE
Have towel ready for possible release of water when mating/demating any connections

Cont next page
B. PRE-DUMP FDA

If comm, MCC will TMBU nozzle temp, tank qty limits, and provide dump duration as reqd

If no comm, change limits via table A for SPLY H2O Dump, table B for WST H2O Dump, or both for simo SPLY/WST H2O Dump

### TABLE A

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
<th>LOW</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY H2O QTY A</td>
<td>0620410</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0620420</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0620548</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>0620544</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOZ T A</td>
<td>0620440</td>
<td>90</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0620439</td>
<td>90</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>

*Limits TMBU’d on orbit to provide leak and overfill detection

### TABLE B

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
<th>LOW</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE H2O QTY 1</td>
<td>0620540</td>
<td>*</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>NOZ T A</td>
<td>0620520</td>
<td>50</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0620519</td>
<td>50</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>

*Limits TMBU’d on orbit to provide leak and overfill detection

Cont next page
C. SIMO DUMP H2O TK N2 REG CONFIG

MO10W

If performing simo SPLY/WST H2O Dump:
H2O TK N2 REG INLET SYS 1, SYS 2 vlv (two) – OP

D. SUPPLY H2O DUMP NOZZLE HTR ACTIVATION

[SM 66 ENVIRONMENT]

CRT
1. √SUPPLY H2O DMP LN T ≥ 65
   * If DMP LN T < 65, enable second heater:
   * cb MNB(MNA) H2O LINE HTR
   * B(A) – cl

R11L
2. √SPLY H2O DUMP ISOL VLV – OP (tb-OP)
3. VLV ENA/NOZ HTR – ON
4. √VLV – CL (tb-CL)

E. WASTE H2O DUMP NOZZLE HTR ACTIVATION

[SM 66 ENVIRONMENT]

CRT
1. √WASTE H2O DMP LN T > 50
   * If WASTE H2O DMP LN T ≤ 50, enable second heater:
   * cb MNB(MNA) H2O LINE HTR
   * B(A) – cl

ML31C
2. √WASTE H2O DUMP ISOL VLV – OP (tb-OP)
3. VLV ENA/NOZ HTR – ON
4. √VLV – CL (tb-CL)
F. SUPPLY H2O DUMP INITIATION

SM 66 ENVIRONMENT

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

CRT 1. When SUPPLY H2O NOZ T A,B (two) exceed 100 (~5 min warmup time), continue

R11L 2. SPLY H2O DUMP VLV – OP (tb-OP)

CRT 3. √SUPPLY H2O QTY A(B,C,D) decr (~1 to 2% per min)

   If ‘S66 SPLY H2O TEMP’ msg, SUPPLY H2O NOZ T A,B (two) < 90, terminate dump immediately per H. SUPPLY H2O DUMP TERMINATION, 5-6

NOTE
If dump terminated for SUPPLY H2O NOZ T < 90, √MCC about dumping supply water thru FES, thru waste water nozzle, or into CWC to make ullage for fuel cell product water

G. WASTE H2O DUMP INITIATION

SM 66 ENVIRONMENT

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

CRT 1. When ‘S66 WASTE H2O TEMP’ msg, WASTE H2O NOZ T A,B (two) exceed 250 (~10 min warmup time), continue

   CAUTION
   Dumping WASTE H2O TK1 QTY below 5% can cause bellows damage

Cont next page

5-5 ORB OPS/ALL/GEN M
ML31C 2. WASTE H2O TK1 VLV – OP (tb-OP)
3. DUMP VLV – OP (tb-OP)
4. WASTE H2O QTY 1 – decr (~1 to 2% per min)
5. √NOZ T A,B (two) – not incr

If ‘S66 WASTE H2O TEMP’ msg, WASTE H2O NOZ T A(B) ↓ then:
ML31C 6. WASTE H2O DUMP VLV – CL (tb-CL)
CRT 7. When ‘S66 WASTE H2O TEMP’ msg
WASTE H2O NOZ T A,B (two) exceed 250 (~8 min reheat time), continue
ML31C 8. WASTE H2O DUMP VLV – OP (tb-OP)

H. SUPPLY H2O DUMP TERMINATION
R11L 1. SPLY H2O DUMP ISOL VLV – CL (tb-CL)
CRT 2. SUPPLY H2O QTY A(B,C,D) not decr
	* If SUPPLY H2O QTY A(B,C,D) decr, *
	* cycle SPLY H2O DUMP ISOL VLV *
	* If not successful, *
	* SPLY H2O DUMP VLV – CL (tb-CL) *

CRT 3. When ‘S66 SPLY H2O TEMP’ msg,
SUPPLY H2O NOZ T A,B (two) exceed 250 (~10-12 min bakeout time), continue
R11L 4. SPLY H2O DUMP VLV – CL (tb-CL), wait 60 sec
5. – OP (tb-OP), wait 60 sec
6. – CL (tb-CL)
7. ISOL VLV – OP (tb-OP)
8. VLV ENA/NOZ HTR – OFF
9. √VLV tb – bp

Cont next page
CRT 10. $\sqrt{\text{SUPPLY H2O NOZ T A,B (two)}}$ – not incr

* If SPLY H2O NOZ T A,B (two) incr: *

ML86B:A
* cb MNC SPLY H2O DUMP
* VLV/NOZ HTR – op

WCS
11. Remove, stow SPLY H2O Dumpline Purge Device from CONT H2O X-TIE POT QD Wall

I. WASTE H2O DUMP TERMINATION

ML31C 1. WASTE H2O DUMP VLV – CL (tb-CL)

CRT 2. $\sqrt{\text{QTY 1 not decr}}$

* If WASTE H2O QTY 1 decr: *
* Cycle WASTE H2O DUMP VLV *
* If not successful, *

ML31C
* WASTE H2O DUMP ISOL VLV – *
* CL (tb-CL)

3. When 'S66 WASTE H2O TEMP’ msg,
WASTE H2O NOZ T A,B (two) exceed 250 (~8 min bakeout time), continue

ML31C 4. WASTE H2O DUMP VLV ENA/NOZ HTR – OFF

5. $\sqrt{tb – bp}$

* If WASTE H2O NOZ T A,B (two) incr: *
* cb MNA WASTE H2O DUMP *
* VLV/NOZ HTR – op *

J. SIMO DUMP H2O TK N2 REG RECONFIG
If simo SPLY/WASTE H2O DUMP performed, execute following after both dumps complete:

If Cab P < 14.7 psia or PCS1 active:

MO10W 1. H2O TK N2 REG INLET SYS 2 vlv – CL

If PCS2 active:
2. H2O TK N2 REG INLET SYS 1 vlv – CL

Cont next page
K. POST-DUMP FDA CLEANUP
If comm, MCC will reset SM limits via TMBU
If no comm, reset SM limits via table C for SPLY
H2O DUMP, table D for WST H2O Dump, or both
for simo SPLY/WST H2O Dump

TABLE C

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY H2O NOZ T A B</td>
<td>0620440 0620439</td>
<td>-82 -82 250 250</td>
</tr>
</tbody>
</table>

TABLE D

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE H2O NOZ T A B</td>
<td>0620520 0620519</td>
<td>-82 -82 250 250</td>
</tr>
</tbody>
</table>

NOTE
If WASTE H2O and SUPPLY QTY limits
were reset to annunciate end of dump,
leave limits at annunciation value
SUPPLY WATER DUMP USING FES  
(Approx 8%/hr net supply water used by this method)

NOTE  
If PASS SM avail, monitor tank qty;  
otherwise, monitor dump time provided  
by MCC

1. DUMP INITIATION  
L1  
FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF  
RAD CNTLR OUT TEMP – HI  
O1  
When FREON EVAP OUT TEMP ind > 50 degF,  
L1  
FLASH EVAP CNTLR PRI A(B) – ON  
O1  
After 1 min, √FREON EVAP OUT TEMP ~39 degF

2. DUMP TERMINATION  
L1  
RAD CNTLR OUT TEMP – NORM  
FLASH EVAP CNTLR PRI A(B) – OFF  
If FES reqd, wait 1 min, then:  
O1  
When FREON EVAP OUT TEMP ind < 40 degF,  
L1  
FLASH EVAP CNTLR PRI A(B) – ON
## CABIN TEMP CONTROL

<table>
<thead>
<tr>
<th>CREW ACTION</th>
<th>Δ TEMP EXPECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>( √ ) MCC</td>
<td>( 1 \text{ to } 9 \text{ degF} )</td>
</tr>
<tr>
<td>Implement ECLS SSR-6 CABIN</td>
<td></td>
</tr>
<tr>
<td>EQUIP PWRDN</td>
<td>( 8 \text{ degF} )</td>
</tr>
<tr>
<td>( √ ) H2O LOOP 2(1) ICH FLOW 950</td>
<td>( 6 \text{ degF} )</td>
</tr>
<tr>
<td>L1 FLOW PROP VLV LOOP 2 – ICH</td>
<td>( 1 \text{ degF} )</td>
</tr>
<tr>
<td>(( √ ) MCC for payload impact)</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>FLOW PROP VLV LOOP 1 – ICH</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>(( √ ) MCC for payload impact)</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>MD44F Pin CAB TEMP CNTLR vlv – FULL COOL</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>– 2/3 COOL</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>– 1/3 COOL</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>– FULL HEAT</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>L1 FLOW PROP VLV LOOP 1 – PL</td>
<td>( 4 \text{ degF} )</td>
</tr>
<tr>
<td>2 – PL</td>
<td>( 8 \text{ degF} )</td>
</tr>
<tr>
<td>H2O LOOP 2 BYP MAN – DECR until</td>
<td>( 5 \text{ degF} )</td>
</tr>
<tr>
<td>H2O LOOP 2 ICH FLOW MAX</td>
<td></td>
</tr>
<tr>
<td>H2O PUMP LOOP 1 – ON,B</td>
<td></td>
</tr>
<tr>
<td>H2O LOOP 1,2 BYP MAN – DECR until</td>
<td></td>
</tr>
<tr>
<td>H2O LOOP 1,2 ICH FLOW MAX</td>
<td></td>
</tr>
<tr>
<td>FLASH EVAP CNTLR PRI A,B – OFF</td>
<td></td>
</tr>
<tr>
<td>SEC – OFF</td>
<td></td>
</tr>
<tr>
<td>( √ ) MCC</td>
<td></td>
</tr>
</tbody>
</table>
RAD BYPASS/FES C/O

NOTE
Procedure bypasses radiators and performs checkout of Secondary (Topper and Hi-Load) and PRI B (Full Up) FES controllers. Expect ‘S88 EVAP OUT T 1(2)’ msgs.

1. √DAP: A/AUTO/ALT(PRI)
   R11L
2. √SPLY H2O XOVR VLV – OP (tb-OP)
   L1
3. FLASH EVAP CNTLR PRI A,B – OFF
   SEC (two) – A SPLY,ON
   HI LOAD DUCT HTR sel – B
   EVAP – ENA
4. RAD BYP VLV MODE 1,2 (two) – MAN
   MAN SEL 1,2 (two) – BYP
   (tb-BYP ~3 sec)
   RAD CNTLR LOOP 1,2 (two) – OFF
   After 2.5 min,
   O1
   √FREON EVAP OUT TEMP ind: 62 ± 2 degF
   L1
5. HI LOAD EVAP – OFF
   After 2.5 min,
   O1
   √FREON EVAP OUT TEMP ind: 62 ± 2 degF
   L1
6. HI LOAD EVAP – ENA
7. FLASH EVAP CNTLR SEC (two) – A SPLY,OFF
   PRI B – ON
   After 2.5 min,
   O1
   √FREON EVAP OUT TEMP ind: 39 ± 1 degF
   L1
8. √FLOW PROP VLV LOOP 1,2 (two) tb – ICH
9. RAD CNTLR OUT TEMP – NORM
MODIFIED RAD BYP/FES C/O AND TOPPING
CORE FLUSH

NOTE
Procedure should be used if icing is suspect
cause of FES shutdown. Use on MCC call.
Expect ‘S88 EVAP OUT T 1(2)’ msgs

1. √DAP: A/AUTO/ALT(PRI)
R11L
2. √SPLY H2O XOVR VLV − OP (tb-OP)
L1
3. FLASH EVAP CNTLR PRI A,B − OFF
   SEC (two) − A SPLY, ON
   √HI LOAD DUCT HTR sel − B
   EVAP − ENA
   TOP EVAP HTR DUCT sel − A/B
4. RAD BYP VLV MODE 1,2 (two) − MAN
   MAN SEL 1,2 (two) − BYP
   (tb-BYP ~3 sec)
   RAD CNTLR LOOP 1,2 (two) − OFF
   After 2.5 min,
   O1
   √FREON EVAP OUT TEMP ind: 62 ± 2 degF
L1
5. FLASH EVAP CNTLR SEC − OFF
   HI LOAD EVAP − OFF
   Wait 2 min
6. FLASH EVAP CNTLR SEC − ON
   Wait 30 sec
   FLASH EVAP CNTLR SEC − OFF
   Wait 30 sec
7. Repeat step 6 two additional times (three total),
then:
   FLASH EVAP CNTLR SEC − ON

Cont next page
8. Proceed on MCC call (if no comm, wait minimum 7 min, then proceed when EVAP OUTs stable at 62 and TOP FWD(AFT) DUCT temps > 120 degF)

   * While waiting, if TOP FWD(AFT) *
   * DUCT temps < 40 degF (flush not *
   * successful), proceed to step 9 *

L1  9. FLASH EVAP CNTLR SEC – OFF
    HI LOAD EVAP – ENA
    If successful flush:
    FLASH EVAP CNTLR PRI B – ON
    If not successful flush:
    FLASH EVAP CNTLR SEC – ON

10. √FLOW PROP VLV LOOP 1,2 tb (two) – ICH

11. RAD CNTLR OUT TEMP – NORM
RAD DEPLOY

**NOTE**
If RMS uncradled, √MCC for priority of RAD deploy/RMS ops. If MCC not available and RADs must be deployed immediately, continue ops. Expect PORT RAD, LAT 7-12, STBD LAT 1-6 to operate single motor

**WARNING**
To preclude inadvertent MPM cycling:
- cb MCA PWR AC2 3Φ MID 2
- cb MCA PWR AC3 3Φ MID 4
must remain open if RMS uncradled

1. **CONFIG CBS**
   If deploying single RAD and opposite RAD stowed, config cbs:

   **DESIRED ACTION** | **cb CONFIG**
   ----------------- | -----------------
   Deploy PORT RAD    | cb MCA PWR AC1 3Φ MID 3 – op
                      | AC2 3Φ MID 2 – op
                      | AC3 3Φ MID 2 – op
   Deploy STBD RAD    | cb MCA PWR AC1 3Φ MID 1 – op
                      | AC2 3Φ MID 4 – op
                      | AC3 3Φ MID 4 – op

2. **UNLATCH PANELS**
   R13L √RAD LAT CNTL SYS A,B (two) – OFF
   √CNTL SYS A,B (two) – OFF
   √RAD,LAT PORT,STBD tb (four) match current RAD config
   PL BAY MECH PWR SYS 1,2 (two) – ON
   RAD LAT CNTL SYS A,B (two) – REL
   (√Deploying RAD LAT tb(s)-bp, ~30 sec REL)
   RAD LAT CNTL SYS A,B (two) – OFF

Cont next page
* If deploying RAD LAT tb not REL in 30 sec: *
* RAD LAT CNTL SYS A,B (two) – OFF *
* Perform MAL, MECH, 9.2a *

3. DEPLOY PANELS
RAD CNTL SYS A,B (two) – DPY
( Deploying RAD tb(s)-bp, ~50 sec DPY)

RAD CNTL SYS A,B (two) – OFF

* If deploying RAD tb(s) not bp after 10 sec and no motion, or *
* If RAD panel(s) in transit and no motion, or *
* If deploying RAD tb not DPY within 50 sec: *
* RAD CNTL SYS A,B (two) – OFF *
* Perform MAL, MECH, 9.2b *

PL BAY MECH PWR SYS 1,2 (two) – OFF

4. RECONFIG CBS
If cbs were opened for single RAD deploy,
MA73C: config cbs:

<table>
<thead>
<tr>
<th>COMPLETED ACTION</th>
<th>cb CONFIG</th>
</tr>
</thead>
</table>
| PORT RAD Deployed      | cb MCA PWR  
|                        | AC1 3Φ MID 3 – cl                              |
|                        | AC2 3Φ MID 2 – cl                              |
|                        | (unless RMS uncradled)                         |
|                        | AC3 3Φ MID 2 – cl                              |
| STBD RAD Deployed      | cb MCA PWR  
|                        | AC1 3Φ MID 1 – cl                              |
|                        | AC2 3Φ MID 4 – cl                              |
|                        | AC3 3Φ MID 4 – cl                              |
|                        | (unless RMS uncradled)                         |

5-16 ORB OPS/ALL/GEN M
**RAD STOW**

**NOTE**
If RMS uncradled, PORT RAD, LAT 7-12, and STBD LAT 1-6 will operate single motor (cbs are pulled to safe MPMs)

**WARNING**
To preclude inadvertent MPM cycling:
- cb MCA PWR AC2 3φ MID 2
- cb MCA PWR AC3 3φ MID 4
must remain open if RMS uncradled

1. **CONFIG CBS**

   If stowing single RAD and opposite RAD deployed,
   **MA73C:**
   config cbs:
   **C,D**

<table>
<thead>
<tr>
<th>DESIRED ACTION</th>
<th>cb CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stow PORT RAD</td>
<td>cb MCA PWR AC1 3φ MID 3 – op</td>
</tr>
<tr>
<td></td>
<td>AC2 3φ MID 2 – op</td>
</tr>
<tr>
<td></td>
<td>AC3 3φ MID 2 – op</td>
</tr>
<tr>
<td>Stow STBD RAD</td>
<td>cb MCA PWR AC1 3φ MID 1 – op</td>
</tr>
<tr>
<td></td>
<td>AC2 3φ MID 4 – op</td>
</tr>
<tr>
<td></td>
<td>AC3 3φ MID 4 – op</td>
</tr>
</tbody>
</table>

2. **STOW PANELS**

   **R13L**
   - √ RAD LAT CNTL SYS A,B (two) – OFF
   - √ CNTL SYS A,B (two) – OFF
   - √ RAD,LAT PORT,STBD tb (four) match current RAD config

   **PL BAY MECH PWR SYS 1,2 (two) – ON**

   RAD CNTL SYS A,B (two) – STO
   - √ Stowing RAD tb-bp, ~50 sec STO
   RAD CNTL SYS A,B (two) – OFF

   Cont next page
If stowing RAD tb(s) not bp after 10 sec and no motion, or
* If RAD panel(s) in transit and no motion, or
* If stowing RAD tb(s) not STO within 100 sec and no motion:
  * RAD CNTL SYS A,B (two) – OFF
  * Perform MAL, MECH, 9.2b

3. LATCH PANELS
RAD LAT CNTL SYS A,B (two) – LAT
Stowing RAD LAT tb-bp, ~30 sec, LAT
RAD LAT CNTL SYS A,B (two) – OFF
* If stowing RAD LAT tb not LAT in 60 sec:
  * RAD LAT CNTL SYS A,B (two) – OFF
  * Perform MAL, MECH, 9.2a

PL BAY MECH PWR SYS 1,2 (two) – OFF

4. RECONFIG cbs
If cbs were pulled for single RAD stow, config
MA73C:
C,D

<table>
<thead>
<tr>
<th>COMPLETED ACTION</th>
<th>cb CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORT RAD stowed</td>
<td>cb MCA PWR AC1 3φ MID 3 – cl</td>
</tr>
<tr>
<td></td>
<td>AC2 3φ MID 2 – cl (unless RMS uncradled)</td>
</tr>
<tr>
<td></td>
<td>AC3 3φ MID 2 – cl</td>
</tr>
</tbody>
</table>

STBD RAD stowed cb MCA PWR
AC1 3φ MID 1 – cl
AC2 3φ MID 4 – cl
AC3 3φ MID 4 – cl (unless RMS uncradled)
PCS 1(2) CONFIG

If FD1:

- SM 66 ENVIRONMENT
- Report cabin pressure (two) to MCC

Expect possible ‘S66 CAB O2(N2) FLO 1(2)’ msg

MO10W

- 14.7 CAB REG INLET SYS 1(2) vlv – OP
- 2(1) vlv – CL

- O2 REG INLET SYS 1(2) vlv – OP
- 2(1) vlv – CL
- H2O TK N2 REG INLET SYS 1(2) vlv – OP
- 2(1) vlv – CL
- √ISOL SYS 1,2 vlv (two) – OP
- √PPO2 CNTLR SYS 1,2 (two) – NORM
- √N2 XOVER vlv – CL
- √PL O2 SYS 1,2 vlv – CL
- √N2 SYS 1,2 vlv – CL

Middeck

- √EMU O2 ISOL VLV – CL

Floor

- √O2 SYS 1,2 SPLY (two) – ctr (tb-OP)
- √XOVR SYS 1,2 (two) – OP
- √N2 SYS 1,2 SPLY (two) – ctr (tb-OP)
- √REG INLET (two) – ctr (tb-OP)
- √O2/N2 CNTLR VLV SYS 1(2) – AUTO
- √2(1) – CL

O1

- √O2/N2 FLOW sel – SYS 1(2) O2
- √PPO2 – SNSR A(B)

VENT SAFING

O14:D

- √cb MNA ATM PRESS CNTL CAB VENT – op
- √VENT ISOL – op
Topping FES Deactivation

1. FES Deactivation

L1 Flash EVAP CNTLR PRI A,B – OFF
SEC – OFF
Wait 30 min, or on MCC GO, proceed

2. FDA Reset

If comm, MCC will TMBU limits as reqd
If no comm, change limits via table

SM 60 Table MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP TEMP TOPPING AFT</td>
<td>0631802</td>
<td>-10</td>
</tr>
<tr>
<td>FWD</td>
<td>0631801</td>
<td>-10</td>
</tr>
<tr>
<td>L DUCT</td>
<td>0631800</td>
<td>-10</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631878</td>
<td>-10</td>
</tr>
<tr>
<td>R DUCT</td>
<td>0631810</td>
<td>-10</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631879</td>
<td>-10</td>
</tr>
</tbody>
</table>

3. Heater Deactivation

L1 TOP EVAP HTR DUCT sel – OFF
NOZ L,R (two) – OFF
Topping FES Startup

1. HEATER ACTIVATION
   L1 √ TOP EVAP HTR DUCT sel – A(B,C)
   √ NOZ L,R – A(B) AUTO

   If htrs were off, wait 90 min or on MCC GO, proceed

2. FDA RESET
   If comm, MCC will TMBU limits as reqd
   If no comm, change limits via Table

   **SM 60 TABLE MAINT**

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP TEMP TOPPING AFT</td>
<td>0631802</td>
<td>[100]</td>
</tr>
<tr>
<td>L DUCT</td>
<td>0631800</td>
<td>[50]</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631878</td>
<td>[40]</td>
</tr>
<tr>
<td>EVAP TEMP TOPPING FWD</td>
<td>0631801</td>
<td>[100]</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631879</td>
<td>[40]</td>
</tr>
</tbody>
</table>

3. FES STARTUP
   **SM SYS SUMM 2**

   CRT If FREON EVAP OUT TEMP > 41 and ≤ 47 degF:
   L1 RAD CNTLR OUT TEMP – HI
   CRT When FREON EVAP OUT TEMP > 50 degF,
   L1 RAD CNTLR OUT TEMP – NORM, then
   immediately:
   | FLASH EVAP CNTLR PRI A(B) – ON |
   CRT If FREON EVAP OUT TEMP ≤ 41 or > 47 degF:
   L1 FLASH EVAP CNTLR PRI A(B) – ON
SMOKE DETN CKT TEST

NOTE
If any SMOKE DETN lt fails to illum (except PAYLOAD), open and close associated cb (pnl O14/O15/O16) and repeat test. For PART 2 TESTS only, allow 60 sec to take SMOKE DETN CKT TEST – OFF

CKT TEST A PART 1
L1
SMOKE DETN CKT TEST – A
√FIRE SUPPR AV BAY 1,2,3 pb (three) – lt on
   Wait at least 5 sec (no more than 10 sec)
   SMOKE DETN CKT TEST – OFF
√FIRE SUPPR AV BAY 1,2,3 pb (three) – lt off
√SMOKE DETN A lt (five) – on
√Siren – on
F2
√MSTR ALARM pb – MSTR ALM lt on
   – push (lt off)
L1
SMOKE DETN SNSR – RESET
√Above lights and siren – off

Cont next page
CKT TEST A PART 2
SMOKE DETN CKT TEST – A
√FIRE SUPPR AV BAY pb (three) – Lt on
In 15-25 sec:
√SMOKE DETN A lt (five) – on
√Siren – on
F2
√MSTR ALARM pb – MSTR ALM lt on
MSTR ALARM pb – push (lt off)
L1
SMOKE DETN CKT TEST – OFF
SNSR – RESET
√Above lights and siren – off

CKT TEST B PART 1
SMOKE DETN CKT TEST – B
√FIRE SUPPR AV BAY pb (three) – Lt on
Wait at least 5 sec (no more than 10 sec)
SMOKE DETN CKT TEST – OFF
√FIRE SUPPR AV BAY pb (three) – Lt off
√SMOKE DETN B lt (four) – on (PL lt off)
√Siren – on
F2
√MSTR ALARM pb – MSTR ALM lt on
– push (lt off)
L1
SMOKE DETN SNSR – RESET
√Above lights and siren – off

CKT TEST B PART 2
SMOKE DETN CKT TEST – B
√FIRE SUPPR AV BAY pb (three) – Lt on
In 15-25 sec:
√SMOKE DETN B lt (four) – on (PL lt off)
√Siren – on
F2
√MSTR ALARM pb – MSTR ALM lt on
MSTR ALARM pb – push (lt off)
L1
SMOKE DETN CKT TEST – OFF
SNSR – RESET
√Above lights and siren – off

Cont next page
<table>
<thead>
<tr>
<th>CRT Verify:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SMOKE</strong></td>
<td>1/A</td>
<td>2/B</td>
</tr>
<tr>
<td><strong>CABIN</strong></td>
<td>-0.5 to +0.5</td>
<td></td>
</tr>
<tr>
<td><strong>L/R FD</strong></td>
<td>-0.5 to +0.5</td>
<td>-0.5 to +0.5</td>
</tr>
<tr>
<td><strong>AV BAY 1</strong></td>
<td>-0.5 to +0.5</td>
<td>-0.5 to +0.5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>AV BAY 2</strong></td>
<td>-0.5 to +0.5</td>
<td>-0.5 to +0.5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>AV BAY 3</strong></td>
<td>-0.5 to +0.5</td>
<td></td>
</tr>
</tbody>
</table>

If limits exceeded, \(\sqrt{\text{MCC}}\)
SHUTTLE/ISS H2O CONTAINER FILL (HC)

NOTE
For CWC or RSA EDV Tank fill. Assumes galley iodine removal hardware (GIRA) already installed. To minimize contamination possibility, avoid touching any internal parts of QDs or connections

EQUIPMENT PREPARATION
Unstow from designated stowage when needed:

______ Towel(s), CWCs, Sample/Purge Kit (contains Sample Bags (mylar), Purge Bags (clear), Needle Adapter, Sampling Adapter), mineral and silver biocide syringe kits. Retrieve “-2” adapter (EDV QD Adapter) if filling EDVs

WATER TRANSFER HOSE PURGE (see fig 5-1)

NOTE
WATER TRANSFER HOSE PURGE reqd only if prior to first fill or three or more days since last fill

ML90N 1. Retrieve Needle Adapter from Sample/Purge Kit. Attach to injection port on tee at end of CWC Hose coming from tee of previously installed ACTEX

2. Remove cap on Needle Adapter and attach Purge Bag. Open valve on injection port and fill bag to capacity (about 12 ounces). Close valve when capacity reached

3. Disconnect Purge Bag from Needle Adapter. Stow Purge Bag in Ziplock Bag and place in crew-designated location (Dry Trash). Replace cap on Needle Adapter and temp stow adapter until further use

Cont next page
Figure 5-1.- Initial purge setup; water transfer hose coming from GIRA.

CWC FILL (see fig 5-2)

**NOTE**
Potable water has both silver biocide and minerals added. Technical water has only silver biocide added

**CAUTION**
Do not squeeze CWC while filling. This may cause water backflow into connecting equipment and galley. Do not detach or move quantity measurement strap (if flown)

1. Retrieve desired number of CWCs. Report condition to MCC-H

**NOTE**
For Potable CWCs, ALWAYS add minerals first.

CWC will begin filling as soon as connected to free end of ACTEX or Water Transfer Hose

Cont next page

5-26 ORB OPS/ALL/GEN M
ML90N

2. Attach CWC to Water Transfer Hose

3. Remove cap from syringe. At injection port nearest to CWC, remove cap and install syringe. Open valve on injection port and inject solution. Slowly withdraw syringe plunger fully, filling syringe with water, then reinject. Close valve on injection port when final injection complete.

4. Remove syringe and stow in empty syringe location.

![Diagram of CWC or EDV fill setup.](image)

**Figure 5-2.-** CWC or EDV fill setup.

**FILL TERMINATION**

1. If quantity indicator flown:
   - If no comm, terminate fill if quantity indicator shows yellow/white transition (see fig 5-3)
   - If comm, terminate fill on MCC call or when quantity indicator shows yellow/white transition, whichever occurs first

2. To terminate fill, disconnect CWC from Water Transfer Hose. Flow to CWC will stop when this action performed.
3. If no samples reqd, fill out CWC label and temp stow CWC until transferred to ISS. If samples reqd, fill out CWC label, then go to CWC SAMPLING PROCEDURE and/or CARTRIDGE ASSEMBLY SAMPLING PROCEDURE.

4. Report barcode and serial number (located on CWC label) to MCC-H.

Figure 5-3.- Quantity measuring strap and CWC details.
CWC SAMPLING PROCEDURE (if reqd) (see fig 5-4)

NOTE
If filling Technical CWCs, use ONLY sampling hardware with green valve handle. Sampling hardware with blue handle is for Potable CWCs only.

1. Retrieve Sample/Purge Kit and obtain Sampling Adapter. Connect Luer-lock end to Sample Bag. Connect QD end of Sampling Adapter to CWC. Ensure manual valve set to open posn. Fill bag (estimate visually) by squeezing CWC. When complete, close manual valve and remove Sample Bag. Fill out Sample Bag label, stow in Ziplock Bag, and place in crew-designated sample stowage location.

2. Disconnect Sampling Adapter from CWC and stow in Sample/Purge Kit. Temp stow CWC until transferred to ISS.

Figure 5-4.- CWC sample setup.
ACTEX CARTRIDGE SAMPLING PROCEDURE
(if reqd)

ML90N 1. At injection port on ACTEX cartridge, remove cap, connect Needle Adapter

2. Connect clear Purge Bag to Needle Adapter. Open valve on injection port and fill bag to ~4 oz (estimate visually)

3. When complete, close valve on injection port and remove bag. Fill out label. Stow Sample Bag in Ziplock Bag and place in crew-designated sample stowage location

4. Remove and temp stow Needle Adapter. Replace cap on injection port

EDV TANK FILL PROCEDURE (see fig 5-2)

NOTE
Procedure assumes WATER TRANSFER HOSE PURGE already completed

1. Retrieve desired number of EDV tanks (usually preassembled with lids), fill indicator, “-2” adapter, EDV tank hose (US-PB or US/RSA-B)

ML90N 2. Install “-2” adapter to Water Transfer Hose

3. Attach free end of “-2” adapter to EDV tank hose, and free end of hose to EDV tank hose fitting (remove cap if present)
NOTE
EDV will begin filling as soon as it is connected to "-2" adapter

4. On EDV tank lid, remove plug from fitting designated “Supply Pressure” (ПОДАЧА ДАБЛЕНИЯ). Remove plug from opposite fitting and install fill indicator (no filter screen present)

NOTE
For Potable EDVs, ALWAYS add minerals first

5. Remove cap from syringe. At injection port nearest to EDV, remove cap and install syringe. Open valve on injection port and inject only HALF of syringe contents. When complete, remove syringe and replace syringe cap. Restow syringe

6. Retrieve empty syringe from syringe kit and remove cap. Verify syringe plunger fully depressed. At injection port nearest to EDV, install empty syringe. Slowly withdraw syringe plunger fully, filling syringe with water, then reinject. Repeat once. After last reinjection, remove empty syringe and replace cap on syringe and injection port

7. On MCC-H call, check that EDV fill indicator shows red band. If red band shows, disconnect EDV from tank hose

8. Remove fill indicator from fitting and replace plug. Install other plug on "Supply Pressure" (ПОДАЧА ДАБЛЕНИЯ) fitting. Reinstall cap on tank hose fitting on lid (if cap present). Label EDV as reqd using spare labels from kit, then temp stow EDV until transferred to ISS
NOTE
This procedure is to be used when filling a CWC-I containing a purple card (for iodinated water). To minimize contamination possibility, avoid touching any internal parts of QDs or connections.

EQUIPMENT PREPARATION
Unstow from designated stowage when needed:

____ Towel(s) from Shuttle, CWC-Is, Water Transfer Accessory Kit (contains R/Y QD Adapter, 3/8" Male Hose Adapter ("-2" adapter), Y/Y QD Hose, and Sample/Purge Kit) from ISS

CWC-I FILL SET UP (see fig 5-5) AND FILL INIT

If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):

R11L 1. SPLY H2O TKA OUTLET – CL (tb-CL)

CRT 2. Use SUPPLY H2O QTY A:

3. Log bag barcode/serial number and TKA % value before fill. Report bag barcode and serial number (located on CWC-I label) to MCC-H

<table>
<thead>
<tr>
<th>Bag Serial Number/Barcode</th>
<th>H2O TKA %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAUTION
Do not overfill CWC-I as damage to bag may occur

Galley 4. MV2 vlv → Max AMB

Cont next page
NOTE
Have towels ready to absorb any liquid released when mating or demating QDs

5. Y/Y QD Hose $\rightarrow|\leftarrow$ CWC-I

6. “-2” adapter $\rightarrow|\leftarrow$ Y/Y QD Hose

7. R/Y QD Adapter $\rightarrow|\leftarrow$ “-2” adapter

Figure 5-5.- CWC-I fill setup.

NOTE
CWC-I will begin filling as soon as free end of R/Y QD Adapter connected to Galley AUX PORT

8. R/Y QD Adapter $\rightarrow|\leftarrow$ Galley AUX PORT

NOTE
Do not perform Galley ops while CWC-I is connected to Galley AUX PORT

CAUTION
Do not detach CWC-I QD restraint during fill

9. Set timer for 60 min
   Attach timer to Velcro square on CWC-I

FILL TERMINATION AND TEARDOWN
After 60 min:

Galley 10. CWC-I $\leftarrow|\rightarrow$ Y/Y QD Hose
CRT

11. Use SUPPLY H2O QTY A:

12. Log bag serial number/barcode and TKA % value after fill

<table>
<thead>
<tr>
<th>Bag Serial Number/Barcode</th>
<th>H2O TKA %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

Full fill = 21% change in TKA quantity

13. Fill out CWC-I label and insert purple card (for iodinated water):
   - If samples reqd, go to CWC-I SAMPLING PROCEDURE
   - If no samples reqd, temp stow CWC-I for transfer to ISS

For remaining bag(s):

14. Y/Y QD Hose →|← CWC-I and repeat steps 9-13

After last bag filled:

Galley

15. MV2 vlv – as reqd

16. Y/Y QD Hose ←|→ “-2” adapter

17. “-2” adapter ←|→ R/Y QD Adapter

18. R/Y QD Adapter ←|→ Galley AUX PORT

If additional CWC-I fill(s) to be performed later:

19. Temp stow R/Y QD Adapter, “-2” adapter, and Y/Y QD Hose (place equipment in Ziplock Bags)

If final CWC-I fill of flight:

20. Stow R/Y QD Adapter, “-2” adapter, and Y/Y QD Hose (place equipment in Ziplock Bags) in Water Transfer Accessory Kit and return to ISS

R11L

If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):

21. SPLY H2O TKA OUTLET – OP (tb-OP)

22. Transfer bag(s) to ISS

Cont next page
CWC-I SAMPLING PROCEDURE (if reqd) (see fig 5-6)

NOTE
Use ONLY sampling adapter labeled for iodinated water sampling

1. Retrieve Sample/Purge Kit and obtain Sampling Adapter designated for iodinated water sampling. Connect Luer-lock end to Sample Bag. Connect QD end of Sampling Adapter to CWC-I. Ensure manual valve set to open posn. Fill sample bag full (estimate visually) by squeezing CWC-I. When complete, close manual valve and remove Sample Bag. Fill out Sample Bag label, stow in Ziplock Bag, and place in crew-designated sample stowage location

2. Disconnect Sampling Adapter from CWC-I and stow in ____________. Temp stow CWC-I until transferred to ISS

Figure 5-6.- CWC-I sample setup.
CWC OVERBOARD DUMP

NOTE
Procedure is used to dump CWC(s) containing waste, supply, or condensate water. Choose either “8 ft Y-Y” or “20 ft Y-Y” hose from CHCK. If either hose previously used to dump waste or condensate, do not use that hose to dump CWC containing supply water.

If PASS SM available, monitor waste dumpline and nozzle temps; otherwise, dump only when MCC available to monitor.

Have towels ready to absorb any liquid released when mating or demating QDs

A. DUMP PREP

CAUTION
Waste Dump Isol Vlv must be closed before WWD filter and hose/CWC are connected to Cont H2O X-tie Waste QD

ML31C
1. WASTE H2O DUMP ISOL VLV – CL (tb-CL)
\√VLV – CL (tb-CL)

2. Obtain CWCs to be dumped
   BOB
   Unstow WWD filter
   CHCK
   Unstow Y-Y hose

WCS
3. Connect female end of WWD filter to Cont H2O X-tie Waste QD (upper QD with yellow Velcro and “WASTE” label)
   Connect Y-Y hose to male end of WWD filter
   Connect free end of Y-Y hose to CWC

Cont next page
B. PRE-DUMP FDA

**NOTE**
Change limits via table or request MCC TMBU.

If entering CWC OVERBOARD DUMP after performing waste-only or simo supply/waste dump, these limits already in place:

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
<th>LOW</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE H2O NOZ T A</td>
<td>0620520</td>
<td>50</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>WASTE H2O NOZ T B</td>
<td>0620519</td>
<td>50</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>

On MCC GO, proceed to step C

C. HEATER ACTIVATION

**CAUTION**
Tile debonding may occur if nozzle temps exceed 350 deg F

<table>
<thead>
<tr>
<th>SM 66 ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. √ WASTE H2O DMP LN T &gt; 50</td>
</tr>
</tbody>
</table>

* If WASTE H2O DMP LN T ≤ 50, *
* enable 2nd htr: *

ML86B:A
* cb MNB(MNA) H2O LINE *
* HTR B(A) – cl *

ML31C
2. WASTE H2O DUMP VLV ENA/NOZ HTR – ON
3. √ VLV – CL (tb-CL)
4. √ ISOL VLV – CL (tb-CL)

D. DUMP INITIATION

<table>
<thead>
<tr>
<th>SM 60 SM TABLE MAINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRT</td>
</tr>
</tbody>
</table>

1. When WASTE H2O NOZ T A,B (two) > 250 (~8-10 min), continue

ML31C
2. WASTE H2O DUMP VLV – OP (tb-OP)

CRT
3. √ NOZ T A,B (two) – not incr

Cont next page
4. If dumping multiple CWCs sequentially:
   When CWC empty,
   ML31C 5. WASTE H2O DUMP VLV – CL (tb-CL)
   Disconnect empty CWC and temp stow
   Connect next CWC
   CRT 6. When WASTE H2O NOZ T A,B (two)
   > 150,
   ML31C 7. WASTE H2O DUMP VLV – OP
   (tb-OP)
   CRT If ‘S66 WASTE H2O TEMP’, WASTE H2O NOZ
   T A(B) ‘↓’, then:
   ML31C 8. WASTE H2O DUMP VLV – CL (tb-CL)
   CRT 9. When WASTE H2O NOZ T A,B (two)
   > 150 (~4 min),
   ML31C 10. WASTE H2O DUMP VLV – OP (tb-OP)

   NOTE
   Periodically monitor CWC and hose. Ensure
   no hose kinks or signs of CWC collapse

E. DUMP TERMINATION
   Terminate on MCC call, or if no comm, upon any
   signs of CWC collapse
   ML31C 1. WASTE H2O DUMP VLV – CL (tb-CL)
   Disconnect CWC from Y-Y hose, and temp stow
   empty CWC
   CRT 2. When WASTE H2O NOZ T A,B (two) > 250
   (~8 min),
   ML31C 3. WASTE H2O DUMP VLV ENA/NOZ
   HTR – OFF
   4. \WASTE H2O DUMP VLV tb – bp

* If WASTE H2O NOZ T A,B (two) incr: *
ML86B:A * cb MNA WASTE H2O DUMP *
* VLV/NOZ HTR – op *

Cont next page
5-38 ORB OPS/ALL/GEN M
F. POST-DUMP RECONFIG

WCS
Outbd Wall
1. Disconnect WWD filter from Cont H2O X-tie Waste QD and Y-Y hose from filter

ML31C
2. WASTE H2O DUMP ISOL VLV – OP (tb-OP)

G. STOW CWC HARDWARE

If additional CWC dump(s) to be performed later:
1. Temp stow WWD filter (unless dumping PWR immediately following) (place filter in Ziplock Bag) and Y-Y hose

If final CWC/PWR dump of flight:

CHCK
2. Stow Y-Y hose
BOB
3. Stow WWD filter (place filter in Ziplock Bag)

H. POST-DUMP FDA CLEANUP

Change limits via table or request MCC TMBU:

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE H2O NOZ T A</td>
<td>0620520</td>
<td>-82 250</td>
</tr>
<tr>
<td>WASTE H2O NOZ T B</td>
<td>0620519</td>
<td>-82 250</td>
</tr>
</tbody>
</table>

CABIN TEMP CONTROLLER RECONFIG – 2(1)

L1 CAB TEMP sel – WARM (COOL)
Wait until linkage can connect to the SEC(PRI) ACT (avg time ≈ 5 min), then:
CAB TEMP CNTLR – OFF

MD44F Pin CAB TEMP CNTL act link – SEC(PRI) ACT
L1 CAB TEMP CNTLR – 2(1) sel – as reqd
SHUTTLE CONDENSATE COLLECTION

SETUP
1. Unstow:
   - 8 ft Y-Y Condensate Hose
   - Contingency Water Container (CWC), report barcode and serial number to MCC
   - Towel
   - Gray Tape
2. Attach CWC to Y-Y Hose
3. Label CWC with Gray Tape marked “CONDENSATE, DO NOT TRANSFER TO ISS”

   NOTE
   Catch any water droplets with towel. Waste Tank Drain config (step 5) should be performed ASAP after attaching Y-Y Hose to Condensate QD to prevent possible backflow of waste tank contents into condensate CWC

ML31C
4. Attach Y-Y Hose to Condensate QD
5. WASTE H2O TK1 DRAIN VLV – CL (tb-CL)
6. Position, secure all hardware
7. Mark start MET on CWC label
8. Notify MCC, “CONDENSATE FILL INITIATED”
9. CWC fill progress every 24 hr

CHANGEOUT

   NOTE
   Catch any water droplets with towel

ML31C
1. Obtain empty CWC
2. Verify S/N with MCC
3. Disconnect Condensate CWC from Y-Y Hose
4. Connect empty CWC to free end of Y-Y Hose
5. Notify MCC, “CONDENSATE FILL INITIATED”
6. Temp stow full CWC

TEARDOWN

   NOTE
   Catch any water droplets with towel

ML31C
1. WASTE H2O TK1 DRAIN VLV – OP (tb-OP)

   NOTE
   Catch any water droplets with towel

2. Remove, stow all hardware
PWR DUMP-WASTE LINE

NOTE
If PASS SM available, monitor waste dumpline and nozzle temps, otherwise dump only when MCC available to monitor. Have towels ready to absorb any liquid released when mating or demating QDs.

CAUTION
Waste Dump Isol Vlv must be closed before WWD filter and hose/PWR are connected to Cont H2O X-tie Waste QD.

1. DUMP PREP
Obtain Payload Water Reservoirs (PWRs) to be dumped.

CAUTION
Do not detach PWR QD restraint during dump.

BOB Unstow Waste Water Dump (WWD) filter

NOTE
B-B hose, R-Y QD adapter referenced in steps below are stowed in ziplock bag labeled "PWR VENTING HARDWARE ONLY", and are to be obtained from ISS stowage if not already transferred.

Unstow B-B hose
Unstow R-Y QD adapter

ML31C WASTE H2O DUMP ISOL VLV – CL (tb-CL)

WCS Connect female end of WWD filter to Cont H2O Outbd Wall X-tie Waste QD (upper QD with yellow Velcro and "WASTE" label).
Connect yellow end of R-Y QD adapter to free end of WWD filter
Connect B-B hose to free end of R-Y QD adapter
Connect free end of B-B hose to PWR

Cont next page
2. Change limits via table, or request MCC TMBU:

```
<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE H2O NOZ T A</td>
<td>0620520</td>
<td>[50] 250</td>
</tr>
<tr>
<td>B</td>
<td>0620519</td>
<td>[50] 250</td>
</tr>
</tbody>
</table>
```

3. HEATER ACTIVATION

```
SM 66 ENVIRONMENT

\check{WASTE H2O DMP LN T > 50}

* If WASTE H2O DMP LN T ≤ 50, * 
* enable second heater: * 
ML86B:A * cb MNB(MNA) H2O LINE HTR B(A) – cl *

ML31C WASTE H2O DUMP VLV ENA/NOZ HTR – ON

\check{VLV – CL (tb-CL)}
\check{ISOL VLV – CL (tb-CL)}

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

4. DUMP INITIATION

```
CRT When WASTE H2O NOZ T A,B (two) > 250 (8-10 min):
ML31C WASTE H2O DUMP VLV – OP (tb-OP)
CRT \check{NOZ T A,B (two) – not incr}
```

If dumping multiple PWRs sequentially:
When PWR empty:
```
ML31C WASTE H2O DUMP VLV – CL (tb-CL)
Disconnect empty PWR and temp stow
Connect next PWR
CRT When WASTE H2O NOZ T A,B (two) > 150,
ML31C WASTE H2O DUMP VLV – OP (tb-OP)
```

If ‘S66 WASTE H2O TEMP’, WASTE H2O NOZ T A(B) ↓ msgs:
```
ML31C * WASTE H2O DUMP VLV – CL (tb-CL) *
CRT * When WASTE H2O NOZ T A,B (two) > 250 *
* (~8 min), *
ML31C * WASTE H2O DUMP VLV – OP (tb-OP) *
Cont next page

5-42 ORB OPS/ALL/GEN M
NOTE
Periodically monitor PWR and B-B hose. Ensure no hose kinks or signs of PWR collapse

5. DUMP TERMINATION
When PWR empty:
ML31C WASTE H2O DUMP VLV – CL (tb-CL)
    Disconnect PWR from B-B hose and temp stow
CRT When WASTE H2O NOZ T A,B (two) > 250
    (~8 min):
ML31C WASTE H2O DUMP VLV ENA/NOZ HTR – OFF
   \(tb – bp\)
CRT * If WASTE H2O NOZ T A,B (two) still incr: *
ML86B:A * cb MNA WASTE H2O DUMP *
   * VLV/NOZ HTR – op *

6. POST-DUMP RECONFIG
WCS Disconnect WWD filter from Cont H2O X-tie
Outbd Waste QD, R-Y QD adapter from filter, and
Wall B-B hose from adapter
ML31C WASTE H2O DUMP ISOL VLV – OP (tb-OP)
    Stow empty PWR(s)
    If additional PWR dump(s) to be performed later:
        Temp stow WWD filter, B-B hose, and R-Y QD adapter (place equipment in Ziplock Bags)
    If final PWR dump of flight:
        Stow B-B hose (place in Ziplock Bag)
        Stow R-Y QD adapter (place in Ziplock Bag)
        Stow WWD filter (place in Ziplock Bag)

7. POST-DUMP FDA CLEANUP
Change limits via table, or request MCC TMBU:

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE H2O NOZ T A B</td>
<td>0620520</td>
<td>-82 250</td>
</tr>
<tr>
<td></td>
<td>0620519</td>
<td>-82 250</td>
</tr>
</tbody>
</table>

5-43 ORB OPS/ALL/GEN M
PWR DUMP-SUPPLY LINE

NOTE
If PASS SM available, monitor supply dumpline and nozzle temps, otherwise dump only when MCC available to monitor. Have towels ready to absob any liquid released when mating or demating QDs

CAUTION
Supply Dump Isol Vlv must be closed before PWR is connected to Cont H2O X-tie Potable QD

1. DUMP PREP
Obtain Payload Water Reservoirs (PWRs) to be dumped and SPLY H2O Dumpline Purge Device to be used after all dumps are complete

CAUTION
Do not detach PWR QD restraint during dump

CHCK
Unstow B-B hose and R-Y QD adapter

R11L
SPLY H2O DUMP ISOL VLV – CL (tb-CL)
√VLV – CL (tb-CL)

WCS
Connect yellow end of R-Y QD adapter to Cont H2O X-tie Potable QD (lower QD with blue Velcro and “POTABLE” label)
Connect B-B hose to free end of R-Y QD adapter
Connect free end of B-B hose to PWR

2. PRE-DUMP FDA
Change limits via table, or request MCC TMBU:

SM 60 TABLE MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY H2O NOZ T</td>
<td>0620440</td>
<td>90  250</td>
</tr>
<tr>
<td>A B</td>
<td>0620439</td>
<td>90  250</td>
</tr>
</tbody>
</table>

Proceed to step 3
Cont next page
3. HEATER ACTIVATION

**SM 66 ENVIRONMENT**

\[\text{SUPPLY H2O DMP LN T} > 65\]

* If SUPPLY H2O DMP LN T < 65,
* enable second heater:

ML86B:A

* cb MNB(MNA) H2O LINE HTR B(A) – cl *

R11L SPLY H2O DUMP VLV ENA/NOZ HTR – ON

\[\sqrt{VLV} – CL \ (tb-CL)\]

\[\sqrt{ISOL VLV} – CL \ (tb-CL)\]

4. DUMP INITIATION

CRT When SUPPLY H2O NOZ T A,B (two) > 250

(8-10 min):

R11L SPLY H2O DUMP VLV – OP (tb-OP)

CRT \[\sqrt{NOZ T A,B} \ (two) – not incr\]

**CAUTION**

Tile debonding may occur if nozzle temps exceed 350 degF

If dumping multiple PWRs sequentially:

When PWR empty:

R11L SPLY H2O DUMP VLV – CL (tb-CL)

Disconnect empty PWR and temp stow

Connect next PWR

CRT When SUPPLY H2O NOZ T A,B (two) > 150,

R11L SPLY H2O DUMP VLV – OP (tb-OP)

CRT If ‘S66 SPLY H2O TEMP’, SPLY H2O NOZ T A(B)

\[\downarrow\] msgs:

R11L * SPLY H2O DUMP VLV – CL (tb-CL) *

CRT * When SUPPLY H2O NOZ T A,B (two) > 250 *

* (~8 min), *

R11L * SPLY H2O DUMP VLV – OP (tb-OP) *

**NOTE**

Periodically monitor PWR and B-B hose. Ensure no hose kinks or signs of PWR collapse

Cont next page
5. DUMP TERMINATION

R11L SPLY H2O DUMP VLV – CL (tb-CL)
WCS Disconnect R-Y QD adapter from Cont H2O X-TIE POT QD
Outbd Wall

Install SPLY H2O Dumpline Purge Device into CONT H2O X-TIE POT QD (lower QD with blue Velcro and "POTABLE" label)

R11L SPLY H2O DUMP VLV – OP (tb-OP)
CRT When 'S66 SPLY H2O TEMP' msg, SUPPLY H2O NOZ T A,B (two) > 250 continue:

R11L SPLY H2O DUMP VLV – CL (tb-CL), wait 60 sec
– OP (tb-OP), wait 60 sec
– CL (tb-CL)
ISOL VLV – OP (tb-OP)
VLV ENA/NOZ HTR – OFF
√VLV tb – bp

CRT * If SUPPLY H2O NOZ T A,B (two) still incr: *
ML86B:A * cb MNC SPLY H2O DUMP VLV/NOZ *
* HTR – op *

WCS Remove, stow SPLY H2O Dumpline Purge Device Outbd Wall from CONT H2O X-TIE POT QD

6. POST-DUMP RECONFIG

Disconnect B-B hose from PWR and R-Y QD adapter

Stow empty PWR(s)

If additional PWR dump(s) to be performed later:
Temp stow B-B hose and R-Y QD adapter (place equipment in Ziplock Bags)

If final PWR dump of flight:
_______ Stow B-B hose (place in Ziplock Bag)
_______ Stow R-Y QD adapter (place in Ziplock Bag)

7. POST-DUMP FDA CLEANUP

Change limits via table, or request MCC TMBU:

SM 60 TABLE MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY H2O NOZ T A</td>
<td>0620440</td>
<td>-82 250</td>
</tr>
<tr>
<td>B</td>
<td>0620439</td>
<td>-82 250</td>
</tr>
</tbody>
</table>

5-46 ORB OPS/ALL/GEN M
PWR FILL

NOTE
This procedure is to be used when filling a PWR containing either a white card (for EMU H2O Recharge) or a purple card (for filling the ISS OGS)

E-Lk 1. Unstow EMU Water Recharge Bag(s) (Payload Water Reservoir) from E-Lk floor bin, as reqd

CAUTION
Do not use water bags containing orange cards. These bags not certified for EMU use

2. Transfer bag(s) to orbiter galley

WATER FILL (On MCC-H Call)

If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):

R11L 3. SPLY H2O TKA OUTLET – CL (tb-CL)

CRT 4. Use SUPPLY H2O QTY A:

5. Log bag serial number/barcode and TKA % value before recharge. Report bag serial number/barcode to MCC-H

<table>
<thead>
<tr>
<th>Bag Serial Number/Barcode</th>
<th>H2O TKA %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAUTION
Do not overfill EMU Water Recharge Bag as damage to bag may occur

Cont next page

5-47 ORB OPS/ALL/GEN M
6. MV2 vlv → Max AMB

7. EMU Water Recharge Bag QD →← Orbiter Galley Aux Port

NOTE
Do not perform Galley ops while EMU Water Recharge Bag is connected to Galley Aux Port

CAUTION
Do not detach EMU H2O Recharge Bag QD restraint during fill

8. Set timer for 30 min
   Attach timer to Velcro square on EMU Water Recharge Bag

CRT 9. √H2O TKA quantity decr

VERIFYING WATER FILL
After ~30 min:

10. Use SUPPLY H2O QTY A:

11. Log bag serial number/barcode and TKA % value after recharge

<table>
<thead>
<tr>
<th>Bag Serial Number/Barcode</th>
<th>H2O TKA %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE
Full charge = 10% change in TKA quantity

Cont next page
To terminate fill:

Galley 12. EMU Water Recharge Bag \(\rightarrow\) Orbiter Galley Aux Port

13. Temp stow EMU Water Recharge Bag for transfer to ISS

14. Repeat steps 4-13 for remaining bag(s)

After last bag filled:

15. MV2 vlv – as reqd

If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):


17. Record fill date and quantity for bag(s) on card.
   Report bag(s) serial number, fill date, and quantity of bags to MCC-H as comm permits

18. Transfer bag(s) to ISS

E-Lk 19. Stow bag(s) in floor bins as reqd
GALLEY IODINE REMOVAL ASSEMBLY (GIRA)
INSTALLATION
(Time: 1 hr)

EQUIPMENT PREPARATION

MCV (short metal cartridge)
ACTEX hose (labeled #3,4,5)
ACTEX (large insulated cartridge labeled #2,3)
Hose/Microbe filter (wrapped in washcloth)
assembly (labeled #1,2)

NOTE
Have towel ready for possible release of water when mating/demating connections.
Numbered figure labels are indicated in ()

ML90N
1. Remove tie-wrap (if present) connecting Galley Ambient and Chilled hoses
   Detach Galley Ambient and Chilled hoses from QD bracket

2. Install MCV on Ambient (uninsulated) supply line by
   connecting MCV to Ambient QD at QD bracket and
   connecting Galley Ambient supply hose to other
   end of MCV (see fig 5-7)

3. Connect Hose (#1) assembly to Galley Chilled (insulated) hose

4. Attach ACTEX (#2) to Hose/Microbe filter assembly (#2)

5. Attach ACTEX hose (#3) to ACTEX assembly (#3)

6. Connect ACTEX hose (#4) to Chilled QD at QD bracket

7. Secure ACTEX assembly as reqd (see fig 5-7)
   Ensure access to locker MF14O

8. Circulate water through galley:
   Galley OVEN/RHS – OFF,ON

5-50 ORB OPS/ALL/GEN M
NOTE
Water Transfer Hose only present for water transfer

Figure 5-7.- GIRA config (connections and routing).

5-51 ORB OPS/ALL/GEN M
GALLEY OVERNIGHT CONFIG  
(Time: 5 min)

NOTE
Have towel ready for possible release of water when mating/demating connections

ML90N
1. Disconnect Galley Chilled hose from GIRA hose (#1)
2. Connect Galley Chilled hose to free end (#5) of Tee attached to Chilled QD at QD bracket
3. Circulate water through galley:
   Galley
   OVEN/RHS – OFF,ON

NOTE
FOLLOWING step 3, to avoid noise from recirc pump cycling overnight, OVEN/RHS sw can be taken to OFF. Take sw to ON as needed for dispenses overnight

GALLEY MORNING CONFIG  
(Time: 5 min)

NOTE
Have towel ready for possible release of water when mating/demating connections

ML90N
1. Disconnect Galley Chilled hose from Tee (#5) attached to Chilled QD at QD bracket
2. Connect Galley Chilled hose to GIRA hose (#1)
3. Circulate water through galley:
   Galley
   If sw OFF:
   OVEN/RHS – ON
   If sw ON:
   OVEN/RHS – OFF,ON
GALLEY WATER SAMPLE  
(Time: 5 min)

NOTE
Each Galley Water Sample Kit consists of a Ziplock bag containing a Sample Bag and Teflon Luer adapter. Luer adapter is inside a sterile pouch.

Retrieve Galley Water Sample Kits from ____________:

1. Unpackage Luer adapter and Sample Bag from one kit
2. Remove tethered cap from bag sample port
3. Affix Luer adapter to Sample Bag
4. Wipe RHS needle with Wet Wipe
5. Fill one Sample Bag with 8 oz hot water
6. Detach Luer adapter from Sample Bag
7. Replace cap on bag sample port
8. Fill out label (circle hot or cold, record MET)
9. Return Sample Bag and Luer adapter to Galley Water Sample Kit
10. Repeat steps 1 thru 9 EXCEPT, in step 5, fill Sample Bag with 8 oz chilled water
11. Stow Sample Kits in an empty fresh food locker
**GIRA STOWAGE**

(Time: 15 min)

**NOTE**

Have towel ready for possible release of water when mating/demating connections

**MAR/Galley**

1. Remove all black Velcro/Gray Tape from Chilled line assembly and hoses
   Leave insulation covers in place

2. Detach Galley Chilled hose (insulated) from Hose/Microbe filter (#1)
   Disconnect ACTEX hose from QD bracket

3. Detach Galley Ambient hose (uninsulated) from MCV
   Remove MCV from QD bracket
   Reconnect Galley Ambient and Chilled hoses to QD bracket

4. Break down assembly formerly installed on Chilled line into subassemblies as follows:
   - Between ACTEX hose and ACTEX cartridge (#3)
   - Between ACTEX cartridge and Hose/Microbe filter assembly (#2)

5. Resecure Galley Ambient and Chilled hoses with tie-wrap (if present)

6. Return hardware to launch stowage location
NOMINAL H2O CONFIG

ML86B:A  cb MNB SPLY H2O TKB INLET – cl
          MNC SPLY H2O XOVR VLV – cl
R11L     SPLY H2O TKA OUTLET – CL (tb-CL)
          TKB INLET – OP (tb-OP)
          XOVR VLV – OP (tb-OP)
L1       FLASH EVAP CNTLR PRI B – OFF

If FES reqd, go to TOPPING FES STARTUP, 5-21,
using FLASH EVAP CNTLR PRI A
CWC VENTING

OBJECTIVE: Provide method for venting Contingency Water Containers (CWCs) to vacuum to remove residual air and water

A. PRE-DUMP FDA
If comm, MCC will TMBU nozzle limits and provide duration as reqd
If no comm, change limits via table:

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY H2O NOZ T A</td>
<td>0620440</td>
<td>LOW 90 HIGH 250</td>
</tr>
<tr>
<td>SUPPLY H2O NOZ T B</td>
<td>0620439</td>
<td>LOW 90 HIGH 250</td>
</tr>
</tbody>
</table>

B. CWC VENTING

CAUTION
Supply Dump Isol Vlv must be closed before CWC hose connected to CONT H2O X-TIE POTABLE QD

R11L 1. SPLY H2O DUMP ISOL VLV – CL (tb-CL)
2. VLV ENA/NOZ HTR – ON
   √VLV – CL (tb-CL)

SM 66 ENVIRONMENT

* If SUPPLY H2O DMP LN T < 65, enable *
* second htr *

ML86B:A * cb MNB(MNA) H2O LINE HTR B(A) – cl *

NOTE
If Supply H2O Dump Line Purge Device installed, remove before step 3 and temp stow. Device may be reinstalled prior to next supply water nozzle dump

Cont next page
WCS
3. Obtain CWC hose from CHCK and attach to CWC. If not complete, attach free end of hose Wall to CONT H2O X-TIE POT QD (lower QD with blue Velcro and “POTABLE” label)

CRT
4. When SUPPLY H2O NOZ T A,B (two) exceed 150 (~5 min warmup time), continue

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

NOTE
Next step initiates venting of CWC. Estimated time of completion is ~5 min per CWC vented.

During venting, have one crew hold CWC flat on flat surface while another crew works air/water pockets towards CWC outlet

R11L
5. SPLY H2O DUMP VLV – OP (tb-OP)

WCS
6. When venting complete, or if CWC begins to crumple, disconnect CWC from CWC hose

Outbd Wall
7. Repeat steps 3,4, and 6 for all desired CWCs. When ALL CWCs have been evacuated, disconnect all hardware from CONT H2O X-TIE POT QD and stow

R11L
8. SPLY H2O DUMP VLV – CL (tb-CL)

CRT
9. When SUPPLY H2O NOZ T A,B (two) exceed 250, continue

R11L
SPLY H2O DUMP VLV ENA/NOZ HTR – OFF
√SPLY H2O DUMP VLV tb – bp

CRT
10. √SUPPLY H2O NOZ T A,B (two) – not incr

Cont next page

5-57 ORB OPS/APL/GEN M
* If SUPPLY H2O NOZ T A,B (two) incr: *  
ML86B:A  * cb MNC SPLY H2O DUMP VLV/NOZ *  
* HTR – op *  

R11L 11. SPLY H2O DUMP ISOL VLV – OP (tb-OP)

C. POST-DUMP FDA
If comm, MCC will TMBU nozzle limits
If no comm, change limits via table:

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPLY H2O NOZ T A</td>
<td>0620440</td>
<td>-82</td>
<td>0620439</td>
<td>-82</td>
</tr>
<tr>
<td>SUPPLY H2O NOZ T B</td>
<td>0620440</td>
<td>250</td>
<td>0620439</td>
<td>250</td>
</tr>
</tbody>
</table>
O2 REPRESS USING PAYLOAD O2 VALVES

REPRESS SETUP
1. Reset C/W,FDA limits per table
   √MCC for uplink of SM ALERT TMBU. Changes enclosed in [ ]

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W CHL</th>
<th>H/W C/W</th>
<th>H/W &amp; B/U</th>
<th>PARA ID</th>
<th>B/U C/W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN O2 FLOW 1,2</td>
<td>14/24</td>
<td>4.90/4.90</td>
<td>INH/INH</td>
<td>0612105/0612205</td>
<td>4.9/4.9</td>
</tr>
</tbody>
</table>

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

MO10W 3. O2 REG INLET SYS 1(2) vlv – CL
        2(1) vlv – OP

        4. PL O2 SYS 1,2 vlv (two) – OP

START REPRESS
MO10W 5. 14.7 CAB REG INLET SYS 1(2) vlv – OP

TERMINATE REPRESS
MO10W 6. 14.7 CAB REG INLET SYS 1(2) vlv – CL

L2 7. O2 REG INLET SYS 1(2) vlv – OP
        2(1) vlv – CL

    8. PL O2 SYS 1,2 vlv (two) – CL

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

L2 10. Reset C/W,FDA limits per table
       √MCC for uplink of SM ALERT TMBU. Changes enclosed in [ ]

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W CHL</th>
<th>H/W C/W</th>
<th>H/W &amp; B/U</th>
<th>PARA ID</th>
<th>B/U C/W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN O2 FLOW 1,2</td>
<td>14/24</td>
<td>4.90/4.90</td>
<td>ENA/ENA</td>
<td>0612105/0612205</td>
<td>4.9/4.9</td>
</tr>
</tbody>
</table>

5-59 ORB OPS/ALL/GEN M
N2 REPRESS USING PAYLOAD N2 VALVES

REPRESS SETUP AND INIT

R13U 1. Reset C/W,FDA limits per table

\[\sqrt{\text{MCC for uplink of SM ALERT TMBU. Changes enclosed in }}\]

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W CH</th>
<th>H/W C/W LO V</th>
<th>HI V</th>
<th>H/W &amp; B/U ENA/INH</th>
<th>PARA ID</th>
<th>B/U C/W LO EU</th>
<th>HI EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>54</td>
<td>4.90</td>
<td>INH</td>
<td>0612553</td>
<td>0612554</td>
<td>4.9</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>4.90</td>
<td>INH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>ENA/ INH</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAB N2 REG P1</td>
<td>ENA</td>
<td>0612310</td>
<td>OSL</td>
</tr>
<tr>
<td>CAB N2 REG P2</td>
<td>ENA</td>
<td>0612410</td>
<td>260</td>
</tr>
</tbody>
</table>

R13L If MMU GN2 SPLY ISOL VLV A tb – OP

2. MMU GN2 SPLY ISOL VLV A – CL (tb-CL)

L2 3. N2 SYS 1(2) REG INLET – CL (tb-CL)

\[\sqrt{2(1) \text{ REG INLET – OP (tb-OP)}}\]

4. O2/N2 CNTLR VLV SYS 1(2) – OP

MO10W 5. PL N2 SYS 1,2 vlv (two) – OP

6. O2 REG INLET SYS 1,2 vlv (two) – CL

7. 14.7 CAB REG INLET SYS 1(2) vlv – OP

\[2(1) \text{ vlv – CL}\]

REPRESS TERM AND RECONFIG

MO10W 8. 14.7 CAB REG INLET SYS 1,2 vlv (two) – CL

9. O2 REG INLET SYS 1(2) vlv – OP

\[\sqrt{2(1) \text{ vlv – CL}}\]

10. PL N2 SYS 1,2 vlv (two) – CL

L2 11. N2 SYS 1,2 REG INLET (two) – OP (tb-OP)

Cont next page

5-60 ORB OPS/ALL/GEN M
12. O2/N2 CNTLR VLV SYS 1(2) – AUTO
   2(1) – CL

R13U 13. Reset C/W,FDA limits per table
   √MCC for uplink of SM ALERT TMBU. Changes
   enclosed in ____________

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W CH</th>
<th>H/W C/W</th>
<th>H/W &amp; B/U</th>
<th>PARA</th>
<th>B/U C/W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN N2 FLOW 1</td>
<td>54 64</td>
<td>4.90 4.90</td>
<td>ENA ENA</td>
<td>0612553</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0612554</td>
<td>4.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>ENA/ INH</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAB N2 REG P1</td>
<td>ENA</td>
<td>0612310</td>
<td>LOW 150</td>
</tr>
<tr>
<td>P2</td>
<td>ENA</td>
<td>0612410</td>
<td>HIGH 260</td>
</tr>
</tbody>
</table>

√MCC for N2 Transfer

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAMP TEST</td>
<td>6-2</td>
</tr>
<tr>
<td>HEATER RECONFIG – CONFIG B(CONFIG A)</td>
<td>6-5</td>
</tr>
<tr>
<td>FUEL CELL PURGE – AUTO, SM 2(4)</td>
<td>6-6</td>
</tr>
<tr>
<td>– MANUAL</td>
<td>6-7</td>
</tr>
<tr>
<td>VI PERFORMANCE PLOT</td>
<td>6-8</td>
</tr>
<tr>
<td>CRYO O2 TK HTR SNSR CK</td>
<td>6-9</td>
</tr>
<tr>
<td>FC MONITORING SYS (FCMS) OPS</td>
<td>6-10</td>
</tr>
<tr>
<td>SSPTS OPCU ACTIVATION</td>
<td>6-12</td>
</tr>
<tr>
<td>DEACTIVATION</td>
<td>6-13</td>
</tr>
<tr>
<td>APCU ACTIVATION</td>
<td>6-14</td>
</tr>
<tr>
<td>DEACTIVATION</td>
<td>6-14</td>
</tr>
<tr>
<td>DIAGRAM</td>
<td>6-15</td>
</tr>
</tbody>
</table>
FORWARD STATION

**O6/O8 ANNUN LAMP TEST – L, hold**

√78 lights – illuminated:

- O1 CAM lts (25)
- F2 MSTR ALARM (1)
  - Aerodynamic controls (7)
  - DRAG CHUTE (2)
- F3 NWS FAIL (1)
  - DRAG CHUTE (1)
- L1 FIRE SUPPR AV BAY (3)
  - SMOKE DETN (10)
- F6 LDG GEAR (2)
  - ABORT (1)
  - RCS CMD (3)
  - RANGE SAFE ARM (1)
- F7 SM ALERT (1)
  - C/W panel – partial (20)

**O6/O8 ANNUN LAMP TEST – R, hold**

√61 lights – illuminated:

- F4 MSTR ALARM (1)
  - Aerodynamic controls (7)
  - DRAG CHUTE (1)
- F3 ANTISKID FAIL (1)
  - DRAG CHUTE (2)
- F8 LDG GEAR (2)
- F7 MN ENG STAT (3)
  - C/W panel – partial (20)
- C3 DAP PANEL (24)

**MIDDECK (Verified by second crewmember)**

**O6/O8 ANNUN LAMP TEST – L, hold**

MO29J √MIC KEY light – illuminated

**O6/O8 ANNUN LAMP TEST – R, hold**

√5 lights – illuminated:

- MO52J MSTR ALARM light (1)
- MO51F RCRS CNTLR 1 (2)
  - RCRS CNTLR 2 (2)

Cont next page
AFT STATION

A6U
ANNUN LAMP TEST – L, hold
25 lights – illuminated:
   DAP PANEL (24)
A2
MIC KEY (1)

A6U
ANNUN LAMP TEST – R, hold
28 lights – illuminated:
A7U
   MSTR ALARM (1)
   VID IN (13)
   OUT (8)
   CAMR CMD ALC (3)
   GAMMA (3)

C/W STATUS

R13U
C/W LAMP TEST – L, hold
STATUS lights – illuminated (60)
C/W LAMP TEST – R, hold
STATUS lights – illuminated (60)
HEATER RECONFIG – CONFIG B(CONFIG A)

L1  TOP EVAP HTR NOZ (two) – B AUTO(A AUTO)
    DUCT – B(A)

L2  FLASH EVAP FDLN HTR A,B SPLY (two) – 2(1)

A12 Perform APU HEATER RECONFIG (APU/HYD), then:

A14 RCS/OMS HTR FWD RCS – B AUTO(A AUTO)
    L POD – A OFF (A AUTO)
    – B AUTO (B OFF)
    R POD – A OFF(A AUTO)
    – B AUTO(B OFF)

RCS/OMS HTR
    OMS CRSFD LINES – A OFF(A AUTO)
    – B AUTO(B OFF)

R11U FC H2O LINE HTR – B AUTO(A AUTO)
    RELIEF HTR – B AUTO(A AUTO)

ML86B:A cb MNA H2O LINE HTR A – op(cl)
    MNB H2O LINE HTR B – cl(op)

ML86B:C cb MNA EXT ARLK HTR
    LINE ZN 1,2 (two) – op(cl)
    STRUC Z1/2/3 – op(cl)

    cb MNB EXT ARLK HTR
    LINE ZN 1,2 (two) – cl(op)
    STRUC Z1/2/3 – cl(op)

If both RMS htrs active >>

A8L PORT RMS HTR A – OFF(AUTO)
    B – AUTO(OFF)
FUEL CELL PURGE – AUTO, SM 2(4)

CAUTION
Do not purge FC if:
- FC AMPS > 350
- FC is shut down
- ‘PH’ indication
Do not init auto purge within 1 hr of any
SM OPS transition or 3 hr of deorbit burn

R11U FC PURGE VLV (three) – GPC
   HTR – GPC
   GPC PURGE SEQ – START
   (After tb-gray, hold 3 sec)

* If any flow ‘↑’ alarm, *
* (aff) FC PURGE VLV – CL *
FUEL CELL PURGE – MANUAL

CAUTION
Do not purge FC if:
- FC AMPS > 350
- FC is shut down
- ‘PH’ indication
- Within 3 hr of deorbit burn

1. TURN ON PURGE HEATERS
   R11U FC PURGE HTR – ON
   SM 69 FUEL CELLS
   CRT √PURGE LN O2 T > 69
        √H2 T1 > 79
        √T2 > 40

2. MANUAL PURGE SEQUENCE
   NOTE
   Fuel cells must be purged separately
   CRT FC 1(2,3) FLOW O2 – note
       H2 – note
   R11U FC PURGE VLV 1(2,3) – OP
   CRT √FC 1(2,3) FLOW O2 – incr ~3.3 (max)
        √H2 – incr ~0.6 (max)
    * If any flow ‘↑’ alarm, *
    R11U * (aff) FC PURGE VLV – CL *
    Wait 2 min
    FC PURGE VLV 1(2,3) – GPC
   CRT √FC 1(2,3) FLOW O2 – decr ~3.3 (max)
        √H2 – decr ~0.6 (max)
    Repeat step 2 for FCs 2 and 3
    Wait at least 30 min, then continue

3. TURN OFF PURGE HEATERS
   R11U FC PURGE HTR – GPC

6-7 ORB OPS/ALL/GEN M
FUEL CELL VI PERFORMANCE PLOT

Note
Record FC performance. Select a curve for each FC. A drop of 0.5 volts below a selected curve during subsequent check indicates a degraded FC.

0 = FC1
X = FC2
Δ = FC3
CRYO O2 TK HTR SNSR CK

NOTE
Expect ‘S68 O2 HTR TRP’ msg
when htr sensor taken to test

SM 68 CRYO SYSTEM

R1 1. Note O2 TK1 HTR sw posns
O2 TK1 HTRS A,B (two) – ON, pause 5 sec

CRT 2. √HTR CUR SNSR 1A, 1B, 2A, 2B (four) not ↓

* If any HTR CUR SNSR 1A, 1B, 2A, 2B – ↓
* or 2B – ‘↓’
* O2 TK1 HTRS A,B (two) – OFF, then:
  * Go to step 7

R1 3. O2 TK1 HTRS – TEST (1 sec)

CRT 4. √HTR CUR SNSR 1A,1B,2A,2B (four) – ‘↓’

* If HTR CUR SNSR 1A(1B) or 2A(2B) not ‘↓’
* O2 TK1 HTRS A,B (two) – OFF, then:
  * If HTRS A(B) was in AUTO:
  * O2 TK1 HTRS B(A) – AUTO, then:
    * Go to step 6

R1 5. O2 TK1 HTRS A,B (two) – previous posn

6. O2 TK1 HTRS – RESET

7. Repeat steps 1-6 for following:
   O2 TK2 HTRS
   TK3 HTRS
   A11 O2 TK4 HTRS (if 4th tk flown)
   A15 O2 TK5 HTRS (if 5th tk flown)

8. Report results to MCC

6-9 ORB OPS/ALL/GEN M
FC MONITORING SYS (FCMS) OPS

NOTE
Recorded data file names will have the format fcDDDDHHMM.fcv and be compressed as fcDDDDHHMM.zip where ‘DDDDHHMM’ refers to the GMT of the first data point. Recorded data files will contain single cell voltages from all three fuel cells.

WinDecom-FCMS can be run on either the WinDecom PGSC or another PGSC with a PCMMU expansion unit. The FCMS application can be run on a PGSC running WinDecom-FCMS or a PGSC connected (via network or serial) to a PGSC running WinDecom-FCMS.

The FCMS cable pin out is different from a standard PCMMU data cable and panel O5 PCMMU 2 outlet is the only outlet specially modified to accommodate the cable.

ACTIVATION
1. On PGSC with PCMMU Expansion Unit to be used for FCMS operations, terminate all applications using Telemetry Server, and verify Telemetry Server not active (no green “GO”, yellow “TFL”, or red “STOP” sign in lower right corner of PGSC display).

   If using WinDecom PGSC:
   2. Double-click ‘Shuttle Apps’>‘WinDecom’>‘WinDecom shutdown’
   3. Sel ‘OK’ to shutdown Telemetry System
   4. Disconnect PCMMU cable from PCMMU expansion card port on WinDecom PGSC

Data Cable Setup
5. If PCMMU 2 outlet in use, disconnect cable from PCMMU 2 outlet

Cont next page
6. Connect FCMS cable from PCMMU 2 outlet to PCMMU expansion card port on PGSC that will run WinDecom-FCMS

ML86B:E 7. cb MNA FC PCM – cl

Starting WinDecom-FCMS
8. Double-click ‘Shuttle Apps’>‘WinDecom’> ‘WinDecom-FCMS’
9. Expect TLM Monitor, TLM Pkt-net, and TLM Pkt-com windows to appear (possibly minimized). Data should be incrementing in TLM Pkt-net window

FCMS Application
11. Verify data being received (data updating and GMT incrementing on FCMS display, green “GO” sign in lower right corner of PGSC display)
12. Press record button, select full rate recording option, then select OK
13. When recording complete (~12 min), notify MCC. The zip data file is in the C:\SPOCAPPS\FCMS directory

DEACTIVATION
ML86B:E 1. cb MNA FC PCM – op
2. Close FCMS application
3. Double-click ‘Shuttle Apps’>‘WinDecom’> ‘WinDecom Shutdown’
4. Disconnect and stow FCMS cable
5. Reconfigure WinDecom PGSC as reqd per WINDECOM OPS (PGSC), 12-46
**SSPTS OPCU ACTIVATION** (OV103,105)

OPCUs require 120 V input pwr provided by ISS RPCs

Prior to OPCU activation, ISS RPCs will be enabled

OPCU telemetry is OSL when ISS RPCs are not activated

---

**CRT SM 179 POWER TRANSFER**

1. **VERIFY PTU MAIN BUS CONNECTIONS**

   A15  √PTU 1(2) tb – ON

2. **ACTIVATE OPCU CONVERTER POWER**

   **NOTE**

   Expect possible ‘SPEC 179 OPCU CH A(B) VOLTS’ msg

   A15  OPCU 1(2) CONV – ON

3. **ENABLE CREW MANUAL VOLTAGE ADJUST**

   **NOTE**

   OPCU voltage adjustment range is from 29.28 to 31.80 volts. There are 64 incremental steps of 0.04 volts.
   OPCU voltage is initialized at 31.12 volts (incremental step 46)

   A15  OPCU 1(2) V-ADJ – PNL

   Repeat below action for ____ increments

   OPCU 1(2) V-ADJ – UP(DOWN), release

   CRT  √PTU 1(2) OPCU OUT VOLTS incr (decr)

4. **ENABLE MCC COMMANDED VOLTAGE ADJUST**

   A15  OPCU 1(2) V-ADJ – CMD

   6-12  ORB OPS/ALL/GEN M
SSPTS OPCU DEACTIVATION (OV103,105)

OPCU telemetry is OSL when ISS RPCs are not activated

1. **DEACTIVATE OPCU CONVERTER POWER**

   A15 OPCU 1(2) CONV – OFF
SSPTS APCU ACTIVATION (OV103,105)

1. **VERIFY PTU MAIN BUS CONNECTIONS**

   A15 \( \sqrt{\text{PTU 1(2) tb – ON}} \)

2. **ENABLE APCU OUTPUT POWER**

   A15 \( \text{APCU 1(2) OUTPUT – ON} \)

3. **ACTIVATE APCU CONVERTER POWER**

   A15 \( \text{APCU 1(2) CONV – ON} \)

   CRT \( \text{SM 179 POWER TRANSFER} \)

   \( \sqrt{\text{PTU 1(2) APCU OUT VOLTS: 123 to 126 V OUTPUT – ON}} \)

SSPTS APCU DEACTIVATION (OV103,105)

1. **DEACTIVATE APCU CONVERTER POWER**

   A15 \( \text{APCU 1(2) CONV – OFF} \)

   CRT \( \text{SM 179 POWER TRANSFER} \)

   \( \sqrt{\text{PTU 1(2) APCU OUT VOLTS: < 10 V}} \)

2. **DISABLE APCU OUTPUT POWER**

   A15 \( \text{APCU 1(2) OUTPUT – OFF} \)
SSPTS DIAGRAM (OV103,105)

* 120V output for OBSS and ISS PL PWR
GNC

IMU ALIGN – S TRK, GNC 201,202,301 .............................. 7-2
ALIGNMENT – IMU/IMU ................................................... 7-4
S TRK SELF-TEST, GNC 201,202,301 .............................. 7-5
IMU STAR OF OPPORTUNITY ALIGN ............................ 7-6
COAS CALIBRATION, GNC 201 ........................................ 7-7
HUD CALIBRATION, GNC 201 ....................................... 7-9
BORESIGHT DESIGNATION ......................................... 7-12
FCS CHECKOUT ............................................................ 7-13
AFT CONTROLLER C/O ............................................... 7-32
OMICRON SPECIFICATION ....................................... 7-33
ELEVON PARK, GNC 201 ............................................ 7-34
GPS PWRUP ............................................................... 7-35
PWRDN ................................................................. 7-35
SELF-TEST, GNC 201,202,301,801 ............................ 7-36
INCORPORATION ...................................................... 7-37
ELEVON POSITIONING FOR INSPECTION ................. 7-38
IMU ALIGN – S TRK, GNC 201,202,301

1. COLLECT STAR DATA
   √ In attitude
   [GNC 22 S TRK/COAS CNTL]
   S TABLE CLR – ITEM 20 EXEC
   √ STAR TRK – ITEM 3,4 (*)
   √ S TRK -Y,-Z: STATUS – (no BITE)
   SHUTTER – OP

   * If SHUTTER – CL:
   * √ Attitude,MET correct
   * Visually verify no bright object in FOV
   * After data collected and before changing attitude, return shutter to AUTO
   * To open shutter:
     * MAN OP – ITEM 15(16) EXEC (*)
   * To return shutter to AUTO:
     * MAN OP – ITEM 15(16) EXEC (no *)

2. VERIFY STAR DATA
   √ S TABLE: TRK ID 1,2 correct #s
   ANG ERR 1 ≤ 0.08
   SEL, ITEM 17,18 – (*)
   Wait ~1 min for new IMU ΔANGs

   * If no data after 3 min or bad data:
     * Repeat step 1
   * √ Attitude,start,MET correct
   * √ S TRK -Y,-Z: TRK ID: correct #s
   * ∆ANG: < 1.0
   * If still no data or bad data:
     * Perform S TRK SELF-TEST, then:
     * If both STATUS – ST FAIL:
       * Inform MCC before proceeding
     * If both STATUS – ST PASS:
       * Repeat step 1 at new att, stars
     * If one STATUS – ST PASS:
       * Perform single tracker steps

Cont next page
* Single tracker procedure *
* \text{TERM/IDLE, ITEM 9(10) – (*)} *
* Good S TRK, STAR TRK – ITEM 3(4)*
* EXEC (*) *
* S TABLE CLR – ITEM 20 EXEC *
* \text{S TABLE: TRK ID 1 correct #} *
* Good S TRK, TERM/IDLE – ITEM *
* 9(10) EXEC (*) *
* Mnvr to second attitude, star *
* Good S TRK, STAR TRK – ITEM 3(4)*
* EXEC (*) *
* Repeat step 2 with good S TRK only *

3. **CHECK IMU ΔANGs**

\text{GNC 21 IMU ALIGN}

\begin{itemize}
\item IMU 1,2,3: STAT – blank
\item \text{REF STAR, ITEM 13 – (*)}
\item \text{TYPE, ITEM 15 – TORQUE}
\item \text{ANG 1,2,3:} ΔX,ΔY,ΔZ \leq 0.50
\end{itemize}

If no comm, record ΔANGs
* If ΔX,ΔY,ΔZ > 0.50 for two or more IMUs, repeat steps 1,2,3 *

\text{CAUTION}

If ANG ΔX,ΔY,ΔZ still > 0.50 for two or more IMUs, **DO NOT TORQUE PLATFORMS** EXCEPT UNDER MCC INSTRUCTIONS

4. **ALIGN IMUs**

ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*)
\text{EXEC, ITEM 16} – (no *)
\text{ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (no *)}
If not deorbit align >>

5. **D/O ALIGN VERIFICATION**

When D/O align complete, mnvr to VERIF ATT
(FLIGHT PLAN, Detailed Timeline), perform steps 1,2 using verif stars

\text{IMU 1,2,3 ANG ΔX,ΔY,ΔZ < 0.1}

* If ΔX,ΔY,ΔZ ≥ 0.1, \text{MCC} *
* If no comm, repeat steps 1-5 *

7-3 ORB OPS/ALL/GEN M
IMU ALIGNMENT – IMU/IMU

NOTE
Procedure must be accomplished in GNC OPS 2 or 3

GNC 21 IMU ALIGN
REF IMU – ITEM 14 + (REF IMU) EXEC
√TYPE, ITEM 15 – TORQUE

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔX( )</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>ΔY( )</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>ΔZ( )</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*),
Rcd MET ___ ___/___ ___:___ ___
     ___ ___/___ ___:___ ___
     ___ ___/___ ___:___ ___

NOTE
Align will require 3-6 min

Report IMU align results

VERIFY GOOD IMU/IMU ALIGNMENT
√EXEC, ITEM 16 – (no *)
REF IMU – ITEM 14 +(SAME REF IMU) EXEC
√IMU 1,2,3 ANG ΔX,ΔY,ΔZ < 0.13

* If ANG ΔX,ΔY,ΔZ ≥ 0.13, report to MCC *

If in GNC OPS 2 or MM 301,
REF STAR – ITEM 13 EXEC (*)

ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (no *)
S TRK SELF-TEST, GNC 201,202,301

Mnvr to avoid bright objects in both BOSs

GNC 22 S TRK/COAS CNTL

CRT   √S TRK -Y,-Z: STATUS – (no BITE)
     SHUTTER – OP

* If SHUTTER – CL:
  * ITEM 15(16) – EXEC (*)
  * ITEM 15(16) – EXEC (no *)

SELF-TEST – ITEM 1,2 EXEC (*)
√S TRK -Y,-Z: SHUTTER – CL
  S PRES – (*)
  STATUS – BITE (mom)
  SHUTTER – OP
  STATUS – ST PASS

* If STATUS – ST FAIL, repeat *
* SELF-TEST *
* If still FAIL, use only if directed *
* by MCC *

STAR TRK – ITEM 3,4 EXEC (*)
IMU STAR OF OPPORTUNITY ALIGN

1. VERIFY STAR DATA

- GNC 22 S TRK/COAS CNTL
  - √S TABLE: TRK ID 1,2,3 for correct #s
  - ANG ERR 1,2,3: ≤ 0.08 for correct #s
  - SEL, ITEM 17,18,19 – (*) for correct #s

2. CHECK IMU ΔANGs

- GNC 21 IMU ALIGN
  - IMU 1,2,3: STAT – blank
  - √REF STAR, ITEM 13 – (*)
  - √TYPE, ITEM 15 – TORQUE
  - √ANG 1,2,3: ΔX,ΔY,ΔZ ≤ 0.50

  **CAUTION**
  If ANG ΔX,ΔY,ΔZ > 0.50 for any IMU, DO NOT TORQUE PLATFORMS EXCEPT UNDER MCC INSTRUCTIONS

3. ALIGN IMUs

  - ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
  - EXEC – ITEM 16 EXEC (*)
  - √EXEC, ITEM 16 – (no *)

  ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (no *)
COAS CALIBRATION, GNC 201

1. COAS CALIBRATION PREP

O1(O19) COAS – ON

COAS \sqrt{Barrel Index – FW(OW)}

\sqrt{\text{DAP: A/AUTO/VERN}}

If -Z COAS CAL, SENSE: -Z

Change DAP A,B to A1,B5

GNC 22 S TRK/COAS CNTL

COAS: REQD ID – ITEM 21 +_ _ EXEC

POS +X(-Z) – ITEM 26(27) EXEC (*)

CAL MODE – ITEM 24 EXEC (*)

O14:E, \sqrt{cb DDU L(AFT) (two) – cl}

O15:E,

O16:E

F6/F8 FLT CNTLR PWR – ON

(A6U)

2. MARK ON STAR

DAP: A1/INRTL(FREE)/VERN (for COARSE CNTL)

Mnvr to locate star

DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)

B5/FREE/PRI (loss of VERNs)

Mnvr to center star in COAS:

F6 ATT REF pb – push

(A6U)

NOTE

Take minimum three verif marks
to ensure \Delta BIAs consistency

DAP: A1/AUTO/VERN

Cont next page

7-7 ORB OPS/ALL/GEN M
3. **CALIBRATE COAS**
   CRT
   Rcd CAL +X(−Z) ΔBIAS: ______
   UPDATE – ITEM 28(29) EXEC, Rcd
   MET ___/___ ___:____
   √ΔBIAS goes to zero

4. **VERIFICATION**
   DAP: A1/INRTL(FREE)/VERN (for COARSE CNTL)
   Mnvr to locate star
   DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)
   B5/FREE/PRI (loss of VERNS)
   Mnvr to center star in COAS:
   F6 ATT REF pb – push
   (A6U)
   **NOTE**
   Take minimum three verif marks
to ensure ΔBIAS consistency

   √ΔBIAS < 0.12
   * If majority of ΔBIASs > 0.12, repeat *
   * steps 3 and 4. If ΔBIAS still > 0.12, *
   * √MCC

5. **CLEAN UP**
   COAS: DES – ITEM 25 EXEC (*)
   O1(O19) COAS – OFF
   F6/F8 FLT CNTLR PWR – OFF
   (A6U)
   O14,O15, cb DDU L(AFT) (two) – as reqd

   √Data transcribed into FLIGHT PLAN
   CRT
   If S TRK(S) to be left in auto star-select mode:
   S TRK(S) -Y(-Z) – ITEM 3(4) EXEC (*)
   Reconfig to FLIGHT PLAN DAP
   7-8 ORB OPS/ALL/GEN M

HUD CALIBRATION, GNC 201

1. HUD PREP
   Remove L(R) HUD Cover

   F3  L(R) HUD PWR – ON
   F6U(F8U)  MODE – TEST

   Wait ~15 sec for final symbology of test mode display (see HUD BORESIGHT DESIGNATION, 7-12)
   √Final test mode display symbology
   * If final test mode symbology not in agreement with diagram, notify MCC *

   L(R) HUD BRT – MAN NIGHT
   MAN BRT – as reqd

   C3  √DAP:  A/AUTO/VERN
       B/AUTO/PRI (loss of VERNS)
       Change DAP A,B to A1,B5

   GNC 22 S TRK/COAS CNTL
   CRT  COAS:  REQD ID – ITEM 21 + _ _ EXEC
           POS +X – ITEM 26 EXEC (*)
           CAL MODE – ITEM 24 EXEC (*)

   O14,O15, O16:E  √cb DDU L(R) (two) – cl

   F6/F8  FLT CNTLR PWR – ON

2. MARK ON STAR

   NOTE
   DAP in INRTL or FREE as desired for taking marks. For loss of VERNS, use B5/FREE/PRI

   DAP:  A1/INRTL(FREE)/VERN (for COARSE CNTL)
   Mnvr to locate star
   DAP:  B5/INRTL(FREE)/VERN (for FINE CNTL)

   Cont next page
Mnvr to center star in HUD boresight:
(Center of ‘P’ in ‘COMPLETE’, see HUD
BORESIGHT DESIGNATION, 7-12)
F6/F8 ATT REF pb – push

Note ΔBIAS value

NOTE
Take minimum three verif marks
to ensure ΔBIAS consistency

If ΔBIAS < 0.12 for at least three marks, go to step 5

DAP: A1/AUTO/VERN
B5/AUTO/PRI (loss of VERNS)

3. CALIBRATE HUD
CRT
Rcd CAL +X ΔBIAS: ___.___ ___
UPDATE – ITEM 28 EXEC,
Rcd MET ___/___ ___:
√ΔBIAS goes to zero

4. CONFIRMATION OF CALIBRATION

NOTE
DAP in INRTL or FREE as desired for taking
marks. For loss of VERNS, use B5/FREE/PRI

DAP: A1/INRTL(FREE)/VERN (for COARSE CNTL)

Mnvr to locate star

DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)

Mnvr to center star in HUD boresight:
F6/F8 ATT REF pb – push

Cont next page
NOTE
Take minimum three verif marks
to ensure $\Delta$BIAS consistency

$\sqrt{\Delta}$BIAS < 0.12

* If majority of $\Delta$BIAS > 0.12, repeat *
* steps 3 and 4. If $\Delta$BIAS still > 0.12, *
* $\sqrt{\mathrm{MCC}}$
*

5. CLEAN UP
COAS: DES – ITEM 25 EXEC (*)
F6U/F8U HUD MODE – NORM
F3 PWR – OFF
F6/F8 FLT CNTLR PWR – OFF
O14,O15, cb DDU L(R) (two) – as reqd
O16:E CRT If S TRK(s) to be left in auto star-select mode:
S TRK(s) -Y(-Z) – ITEM 3(4) EXEC (*)

Install L(R) HUD Cover

Reconfig to FLIGHT PLAN DAP

7-11 ORB OPS/ALL/GEN M
HUD BORESIGHT DESIGNATION

Final symbology of HUD test mode display

HUD boresight designation
FCS CHECKOUT

DISPLAY/DPS CONFIG

O14,
RGA (four) – ON

O15,
cb MNA,B,C ADTA (four) – cl

O16
MNA,B ACCEL 1,2 (two) – cl
   DDU L (two) – cl
   MNB,C DDU R (two) – cl

If APU will be used:
   ASA (four) – ON

If circ pump will be used:
   √ASA (four) – OFF
   ACCEL 3,4 (two) – ON
   BRAKES (three) – ON

L2
ANTISKID – ON

O17
ATVC (four) – ON

If OV103,4:

O7
TACAN 1,2,3 MODE sel (three) – GPC

O8
RA (two) – ON
   MLS (three) – ON

F3
L,R TRIM PNL (two) – ON
   HUD PWR (two) – ON

C3
√FCS CH (four) – AUTO

√DAP: A1/AUTO/VERN

If OV105:
   Perform GPS PWRUP, 7-35, for GPS 1,3 if reqd

Perform G2 TO G8 TRANSITION (DPS), then:

If using circ pump for part 1:
   FCS CH 2,3 – OFF

O14, O15, O16:F
ASA (four) – ON

Go to step 7b, 7-18

Cont next page

7-13 ORB OPS/ALL/GEN M
ON-ORBIT FCS CHECKOUT, PART 1

NOTE
Only one APU used for FCS C/O. Circ pump used if APU does not start or MCC advises abbreviated actuator check. APU or circ pump selection made real time by MCC.

If APU shuts down, ‘S86 APU GBX T’, ‘S86 APU TEMP’, ‘S86 APU GBX P’ msgs, APU shifts to HI speed (SPEED % > 111), [APU OVERSPEED] or [APU UNDERSPEED], then go to step 6, APU SHUTDOWN, 7-17.

NOTE
Any previously failed actuator channel should be bypassed via ITEM 21 on FCS/DED DIS C/O display prior to APU start.
1. **FCS C/O PREP**
   
   Set EVENT TIMER to 00:00, count UP

2. **APU PRESTART**
   
   1: GNC, FCS/DED DIS C/O  
   2: SM 86 APU/HYD
   
   CRT2
   
   √APU, HYD, W/B status no ‘↑’ or ‘↓’ (except HYD B/U)

   If SYS 1:
   
   R4
   
   √LG EXTD ISO VLV tb – CL

   √HYD BK ISOL VLV X tb – CL
   
   R2
   
   CIRC PUMP (three) – OFF

   BLR N2 SPL Y X – ON
   
   √PWR (three) – ON
   
   √CINTL/R HTR (three) – B
   
   √cb APU FU TK VLV ENA (six) – CL
   
   √APU FU TK VLV (three) – CL
   
   √AUTO SHTDN (three) – ENA
   
   √SPEED SEL (three) – NORM
   
   √OPER (three) – OFF

   HYD MN PUMP PRESS X – LO
   
   APU CNTLR PWR X – ON

   Notify MCC: READY FOR APU START

   Wait for MCC GO

Cont next page
3. APU START

R2 APU FU TK VLV X – OP
√APU/HYD RDY X tb – gray

* If tb – bp, √MCC *

00:00 Start EVENT TIMER
R2 APU OPER X – START/RUN
HYD/APU √HYD PRESS ind X – LOW green
R2 √APU/HYD RDY X tb – bp

* If APU did not start, go to step 6 *

HYD MN PUMP PRESS X – NORM
HYD/APU √HYD PRESS ind X – HI green

[SM 87 HYD THERMAL]
√SW VLV ELEV (four) per table
√RUD/SPDBK per table

<table>
<thead>
<tr>
<th>If HYD SYS 1</th>
<th>If HYD SYS 2</th>
<th>If HYD SYS 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(*)</td>
<td>2(*)</td>
<td>3(*)</td>
</tr>
<tr>
<td>1(*)</td>
<td>2(*)</td>
<td>3(*)</td>
</tr>
</tbody>
</table>

4. AEROSURFACE DRIVE

CRT1 SURF DR START – ITEM 10 EXEC (*)
Verify all surfaces cycling for 30 sec

NOTE
POS ‘↓’ may be indicated
until HYD SYS is warm

* If FCS CH failure (‘↓’ port status), *
* reset affected FCS CH: *
* FCS CH – ORIDE,AUTO *

After 30 sec of aerosurface drive,
SURF DR STOP – ITEM 11 EXEC (*)
Surfaces not moving

Cont next page
5. **SECONDARY ACTUATOR CHECK (APU)**

   **NOTE**
   If a port does not bypass during check, bypass affected port after APU shutdn:
   
   SEC ACT BYPASS – ITEM 21 +X X EXEC
   
   If affected port still does not bypass:
   SEC ACT RESET – ITEM 22 +X X EXEC

**CRT1**

a. √POS STIM ENA, ITEM 20 – (*)

**C3**

b. √FCS CH 1,2,3,4 – AUTO

**CRT1**

c. SEC ACT CK, CH 1 – ITEM 15 EXEC (*)

d. √All CH 1 ports bypass (↓)
   STOP – ITEM 19 EXEC (*)

**C3**

e. FCS CH 1 – ORIDE

**CRT1**

   √All CH 1 ports reset (no ↓)

**C3**

   FCS CH 1 – AUTO

f. Repeat steps c thru e for CH 2,3,4

**CRT1**

   g. NEG STIM – ITEM 20 EXEC (no *)

h. Repeat steps b thru f

6. **APU SHUTDOWN**

On MCC GO for APU SHUTDN:

**R2**

   BLR N2 SPLY X – OFF
   PWR (three) – OFF
   APU OPER X – OFF
   FU TK VLV X – CL
   √Shutdn (hyd press < 200)
   CNTLR PWR X – OFF
   HYD CIRC PUMP (three) – GPC

Proceed to part 2, 7-20
7. CIRC PUMP ACTIVATION

1: GNC, FCS/DED DIS C/O 2: SM 86 APU/HYD

NOTE
OPS 2/8 trans must be performed with ASAs off to avoid AERO DRIVE fault msgs during actuator checks

a. Perform G8 TO G2 TRANSITION (DPS), then:
O14, O15, ASA (four) – OFF
O16: F
C3 √
FCS CH 1, 4 – AUTO
2, 3 – OFF
O14, O15, ASA (four) – ON
O16: F

b. HYD CIRC PUMP X – ON

8. ABBREVIATED SECONDARY ACTUATOR CHECK (CIRC PUMP)

NOTE
If an elevon does not move to commanded posn, bypass affected port after check of all channels:
SEC ACT BYPASS – ITEM
21 + X X EXEC

CRT1 a. √POS STIM ENA, ITEM 20 – (*)

C3 b. √FCS CH 1, 4 – AUTO
√2, 3 – OFF

CRT2 c. GNC 42 SWITCH/SURF
√All elevons move to U7.5° ± 0.8°

CRT1 d. SEC ACT CK, CH1 – ITEM 15 EXEC (*)
Wait 5 sec
Cont next page
7-18 ORB OPS/ALL/GEN M
e. T

Turn off FCS CH not being checked:

C3 FCS CH (three) – OFF

CRT2 √ All elevons move to U1.5° ± 0.8°

* If any elevon drives past 0°, turn on all *
* FCS CHs to stop movement *
* FCS CH (four) – AUTO *
* Expect AERO DRIVE msg. Continue *
* procedure and report to MCC *

CRT1 f. STOP – ITEM 19 EXEC (*)

√ All elevons move to U7.5° ± 0.8°

C3 g. Configure FCS CHs for check of next CH:

(Config switches in sequence shown)

<table>
<thead>
<tr>
<th>NEXT CH</th>
<th>FCS CH SWITCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>AUTO</td>
</tr>
<tr>
<td>1</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>AUTO</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>AUTO</td>
</tr>
<tr>
<td>2</td>
<td>AUTO</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>AUTO</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>AUTO</td>
</tr>
<tr>
<td>4</td>
<td>OFF</td>
</tr>
</tbody>
</table>

h. Repeat steps d thru g for CHs 2,3,4

9. HYDRAULIC SYSTEM RECONFIG

R2 HYD CIRC PUMP (three) – GPC

10. FCS CH RECONFIG

a. Perform G8 TO G2 TRANSITION (DPS), then:

C3 FCS CH 1,2,3 – AUTO

√4 – AUTO

b. Perform G2 TO G8 TRANSITION (DPS), then:

Continue with part 2, 7-20

Cont next page

7-19 ORB OPS/ALL/GEN M
ON-ORBIT FCS CHECKOUT, PART 2

1. Sensor Test – MLS,TAC,RA,AA

   NOTE
   TAC test not available for OV105.
   During MLS/TAC/RA/AA test, deselect
   LRU for failure indicated:
   MLS,TAC,RA,AA – ‘↑’ or ‘↓’
   or AA – BIAS/NULL limits exceeded
   Record values of failures defined

   2: GNC 40 SENSOR TEST

   CRT2
   √DES: (no *)
   √STAT: blank
   √RNG,AZ,EL: no M

   CONFIG FOR FREE DRIFT

   F6
   ADI RATE – MED
   DAP: A1/INRTL\VERN
   √R,P,Y rates 0 ± 0.1°/sec, then:
   DAP: FREE

   AA Bias/Null Shift Test

   CRT2
   √Y,Z within limits: Y -0.5 to +0.5
   Z -1.3 to +1.3

   MLS,TAC,RA,AA Test
   START – ITEM 13 EXEC (*)

   NOTE
   ‘*’ blanks when test complete (√no ‘↑’ or
   ‘↓’). See LIMIT VALUES TABLE, 7-21

Cont next page
### LIMIT VALUES TABLE

<table>
<thead>
<tr>
<th>MLS</th>
<th>RNG</th>
<th>AZ</th>
<th>EL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>-2.9</td>
<td>+,-3.1</td>
<td>5.9 to</td>
</tr>
<tr>
<td>15.4</td>
<td>to +,-3.1</td>
<td></td>
<td>6.1</td>
</tr>
</tbody>
</table>

**NOTE**
Values from 182.1 to 182.5 will be displayed as 2.1 to 2.5

<table>
<thead>
<tr>
<th>TAC</th>
<th>ALT</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>900 to</td>
<td>+14.40 to</td>
<td>+57.70 to</td>
</tr>
<tr>
<td>0.5</td>
<td>1100</td>
<td>17.80</td>
<td>71.10</td>
</tr>
</tbody>
</table>

**NOTE**
During RGA, ADTA test, deselect LRU for failure indicated:
- RGA – bias null limits exceeded,
- ↑ or ↓, or SMRD
- ADTA – any ↑ or ↓, except temp (‘T’)

If RGA does not respond to HIGH or LOW TEST or displays ‘SMRD’ indication in STAT column:
- √/MCC, confirm that payload config can support PRCS firings
- Null vehicle rates
- Mnvr at 0.5°/sec about appropriate axis; monitor RGA data
- If RGA responds, self-test circuitry or SMRD circuitry failed
- If no RGA response, deselect sensor

STOP – ITEM 14 EXEC (*)
If OV103,4:
O7 TACAN 1,2,3 MODE sel (three) – OFF

2. **Sensor Test – RGA, ADTA**

**NOTE**
During RGA, ADTA test, deselect LRU for failure indicated:
- RGA – bias null limits exceeded,
- ↑ or ↓, or SMRD
- ADTA – any ↑ or ↓, except temp (‘T’)

If RGA does not respond to HIGH or LOW TEST or displays ‘SMRD’ indication in STAT column:
- √/MCC, confirm that payload config can support PRCS firings
- Null vehicle rates
- Mnvr at 0.5°/sec about appropriate axis; monitor RGA data
- If RGA responds, self-test circuitry or SMRD circuitry failed
- If no RGA response, deselect sensor

Cont next page
2: GNC 41 RGA/ADTA/RCS

CRT2

√DES: (no *)
√STAT: blank
√PS, PαC, PαU, PαL, T – no M

Config For Free Drift
√R, P, Y rates 0 ± 0.1°/sec
√DAP: FREE

RGA Bias/Null Shift Test
√R, P, Y within limits: R -0.4 to +0.4
P/Y -0.2 to +0.2
Refer to LIMIT VALUES TABLE, 7-23

High Test
TEST HI – ITEM 9 EXEC (*)
(after 10 sec, no *)
√No ‘↑’ or ‘↓’
If ADTA BITE, √MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)

Low Test
TEST LOW – ITEM 10 EXEC (*) (after 10 sec, no *)
√No ‘↑’ or ‘↓’
If ADTA BITE, √MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)
DAP: A1/AUTO/VERN

Cont next page
### LIMIT VALUES TABLE

#### HIGH TEST LIMITS

<table>
<thead>
<tr>
<th>RGA</th>
<th>P</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>+9.4 to +10.6</td>
<td>+9.4 to +10.6</td>
</tr>
<tr>
<td>ADTA</td>
<td>PαC</td>
<td>PαU</td>
</tr>
<tr>
<td>PS</td>
<td>5.473 to 5.477</td>
<td>2.740 to 2.744</td>
</tr>
</tbody>
</table>

#### LOW TEST LIMITS

<table>
<thead>
<tr>
<th>RGA</th>
<th>P</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>-9.4 to -10.6</td>
<td>-9.4 to -10.6</td>
</tr>
<tr>
<td>ADTA</td>
<td>PαC</td>
<td>PαU</td>
</tr>
<tr>
<td>PS</td>
<td>29.527 to 29.531</td>
<td>21.708 to 21.712</td>
</tr>
</tbody>
</table>

3. SENSOR TEST – GPS (if reqd)

A13/O7 GPS 1(2,3) PRE AMPL (two) – OFF

NOTE

\[^\text{MCC}\] if deselect of LRU for failure indicated by ‘↓’ is reqd at end of GPS S/TEST. GPS self-test takes ~2 min to complete. ‘BIT’ in STAT field on SPEC 55 indicates hardware feedback and clears when test complete

Cont next page
2: GNC 55 GPS STATUS
\sqrt{NAV} – ITEM 17(18,19) (*)
If ‘RPF’ in STAT field, \sqrt{MCC} (if LOS, proceed with test)
S/TEST – ITEM 11(12,13) EXEC (*)
\sqrt{‘BIT’} in STAT field after ~6 sec,
‘BIT’ will clear after ~2 min, FCS Checkout may be continued without waiting for completion of GPS self-test

4. FCS MODE/CH SWITCH AND SURF TEST

NOTE
During tests, FCS CH:
  Fail op or fail cl – deselect failed contacts
  FCS CH OVERRIDE function of a CH with failed contacts may be made operable if at least one good contact available
  Proceed: \sqrt{MCC} when possible

FCS MODE:
  Fail op – 2 op or 1 op/1 cl contacts preclude use of sw
  Fail cl – 1st failure, deselect failed contact
  – 2nd failure L(R), deselect all L(R) contacts

2: GNC 42 SWITCH/SURF

CRT2

NOTE
During following tests, verify ‘*’ appears except as noted. If ‘*’ remains after releasing pb, contact failed closed

F6/F8
FLT CNTLR PWR (two) – ON
C3
FCS CH (four) – ORIDE (wait 5 sec)
  – AUTO (no *)

Cont next page
F2/F4  
PITCH pb  – AUTO
         – CSS
ROLL/YAW pb – AUTO
         – CSS
SPDBK/THROT pb  – AUTO
BODY FLAP pb  – AUTO
L2/C3  
SBTC TAKEOVER pb – push

Notify MCC if any single surf feedback exceeds average of other three feedbacks by greater than:

- Elevons  \( (\Delta 1.3\degree) \)
- Rudder  \( (\Delta 1.2\degree) \)
- SPD BK  \( (\Delta 2.2\%) \)
- BDY FLP  \( (\Delta 3\%) \)

5. ENTRY MODE SW TEST

NOTE
ENTRY MODE:
Fail op or cl – 1st,2nd failure, deselect contact
         – 3rd failure, when in OPS 3,
         [GNC 51 OVERRIDE]
         – AUTO SEL – ITEM 42 EXEC (*)

2: GNC 44 SWITCHES

CRT2  
NOTE
During following tests, verify "*" appears except as noted. If "*" remains after releasing pb, contact failed closed

L2  
ENTRY MODE – LO GAIN
         – NO Y JET
         – AUTO (no *)

Cont next page

7-25  ORB OPS/ALL/GEN M
6. NWS CHECK

NOTE
During following tests, verify POSITION A,B,C (three) values remain ~0.00°

√POSITION A,B,C (three): 0.00° ± 0.75°

a. NWS1
L2
NWS – 1

CRT2
√/NWS1 SYS SEL (*)
√HYD PRESS HIGH (no *)
√CURRENT: 1.00 to 3.15 ma

ENABLE – ITEM 1 EXEC (*)
√/NWS1 ENABLE A,B (two) (*)

F3
√/NWS FAIL lt – NWS FAIL lt on

CRT2
RIGHT TURN – ITEM 2 EXEC (*)
√/NWS1 CURRENT: 3.75 to 6.25 ma

LEFT TURN – ITEM 3 EXEC (*)
√/NWS1 CURRENT: -4.25 to -1.75 ma

STOP – ITEM 4 EXEC (*)
√/NWS1 CURRENT: 1.00 to 3.15 ma

b. NWS2
L2
NWS – 2

CRT2
√/NWS2 SYS SEL (*)
√HYD PRESS HIGH (no *)
√CURRENT: 1.00 to 3.15 ma

ENABLE – ITEM 1 EXEC (*)
√/NWS2 ENABLE A,B (two) (*)

F3
√/NWS FAIL lt – NWS FAIL lt on

Cont next page
CRT2

RIGHT TURN – ITEM 2 EXEC (*)
√NWS2 CURRENT:  3.75 to 6.25 ma

LEFT TURN – ITEM 3 EXEC (*)
√NWS2 CURRENT:  -4.25 to -1.75 ma

STOP – ITEM 4 EXEC (*)
√NWS2 CURRENT:  1.00 to 3.15 ma

L2

NWS – OFF

7. CONTROLLER AND SWITCH TEST

NOTE
During cntlr/sw test,
THC: One TX(TY,TZ) failed CLOSED –
    reselect all contacts (failed
    contact last)
One TX(TY,TZ) failed OPEN –
    reselect good contacts only
Multi +TX,-TX,+TY,-TY,+TZ,-TZ
    failures – reselect good
    contacts only

SPDBK L(R): Deselect failed xdcrs
    After 2nd L(R) failure,
    use other side

RUD PED L(R): One failure – deselect
    failed xdcr
    Multi L(R) failures –
    deselect all L(R) xdcrs

RHC L(R): One xdcr failure – reselect
    good xdcrs only
    Multi L(R) failures – reselect
    good xdcrs L(R) and F7(F8)
    FLT CNTLR PWR – OFF

BDY FLP L(R): Fail close, deselect all
    L(R) contacts

Cont next page
RHC or PNL TRIM L(R): If contact failed, deselect failed contact row

2: GNC 43 CONTROLLERS

a. THC
   Deselect L THC:
   CRT2
   THCLDES – ITEMS 1,2,3 EXEC (*)
   F5
   L THC – deflect in each axis
   CRT2
   √THC: ‘+’ and ‘-’
   Reselect THC contacts:
   THCLITEM 1,2,3 EXEC (no *)

b. L SBTC
   L SBTC – full aft; √ > 95%
   – full fwd; √ < 15%

c. Rudder/Brake
   RUD PED – full L; √ > 87% and ch Δ < 9%
   – full R; √ > 80% and ch Δ < 9%
   – null; between L 14% and R 4%
   BK PED – depress to verify unrestricted movement (~20 to 25°)

d. L Body Flap Switch
   L2
   BDY FLP – UP,DN
   CRT2
   √BDY FLP UP,DN – ‘*’

e. L RHC
   Deselect L RHC:
   RHC L DES – ITEM 23,24,25 EXEC (*)
   L RHC – deflect to hardstop in each axis
   √RHC L: R,P – > 92%
   Y – > 88%
   Reselect RHC CHs:
   RHC L DES – ITEM 23,24,25 EXEC (no *)

f. L RHC Trim Switch
   L RHC Trim – deflect sw in each axis
   √RHC TRIM L: R – R/L
   P – U/D

Cont next page
g. **L Panel Trim Switches**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2</td>
<td>TRIM R – R,L</td>
</tr>
<tr>
<td></td>
<td>P – UP,DN</td>
</tr>
<tr>
<td></td>
<td>Y – R,L</td>
</tr>
<tr>
<td>CRT2</td>
<td>√PNL TRIM L: R,Y – R/L</td>
</tr>
<tr>
<td></td>
<td>P – U/D</td>
</tr>
<tr>
<td>F3</td>
<td>L,R TRIM RHC/PNL – ENA</td>
</tr>
<tr>
<td></td>
<td>(Wait 5 sec; no crew insight)</td>
</tr>
<tr>
<td></td>
<td>L,R TRIM RHC/PNL – INH</td>
</tr>
</tbody>
</table>

h. Repeat steps b and d thru g for R cntlr/sws:

- **RHC R DES – ITEM 26,27,28**

i. **DDUs**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>O14:E</td>
<td>cb MNA DDU L – op</td>
</tr>
<tr>
<td>O16:E</td>
<td>MNC DDU R – op</td>
</tr>
<tr>
<td></td>
<td>(Wait 5 sec)</td>
</tr>
<tr>
<td>O14:E</td>
<td>cb MNA DDU L – cl</td>
</tr>
<tr>
<td>O16:E</td>
<td>MNC DDU R – cl</td>
</tr>
<tr>
<td>O15:E</td>
<td>MNB DDU L,R (two) – op</td>
</tr>
<tr>
<td></td>
<td>(Wait 5 sec)</td>
</tr>
<tr>
<td></td>
<td>cb MNB DDU L,R (two) – cl</td>
</tr>
</tbody>
</table>

8. **MEDS CHECKOUT**

**MDU Checkout**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6/F7</td>
<td>Power ON all forward MDUs (9) and IDPs (3)</td>
</tr>
<tr>
<td>F8/C2</td>
<td>Verify appropriate display appears (expect big ‘X’ for any DPS Display whose IDP is deassigned)</td>
</tr>
</tbody>
</table>

**Flight Critical/IDP Interface Checkout**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6/F8</td>
<td>On CDR 1, CDR 2, and PLT 1 MDUs:</td>
</tr>
<tr>
<td></td>
<td>Ensure on primary ports</td>
</tr>
<tr>
<td></td>
<td>Sel FLT INST: A/E: ADI displays</td>
</tr>
<tr>
<td></td>
<td>Verify no OFF flags in following configs:</td>
</tr>
<tr>
<td></td>
<td>On CDR 1 and CDR 2, √FC BUS 4,1,2,3</td>
</tr>
<tr>
<td></td>
<td>On PLT 1, √FC BUS 1,2,3,4</td>
</tr>
<tr>
<td>F6/F7</td>
<td>Reconfig MDUs as desired (use only one IDP with three MDUs max if in GROUP B(C) PWRDN)</td>
</tr>
</tbody>
</table>

Cont next page
9. HUD CHECK
   √ HUD BRT (two) – as reqd
   MODE (two) – TEST
   √ Brightness
   √ Format ‘COMPLETE’ msg
   HUD MODE (two) – NORM

CRT1 DED DIS FWD – ITEM 1 EXEC (*)
LOW – ITEM 4 EXEC (*)

√ HUD using HUD low value test diagram

F6/F8 √ Readouts for L(R) HUD DATA BUS 1,2(3,4)

CRT1 DED DIS OFF – ITEM 6 EXEC (*)

HUD LOW VALUE TEST

NOTE
No HUD high value test exists

Cont next page
7-30 ORB OPS/ALL/GEN M
10. **MODE LAMP TEST**

**Test Start**

**CRT1**

- **MODE LT ON – ITEM 7 EXEC (**)**
- **F2/F4**
  - \( \sqrt{\text{PITCH AUTO,CSS lt (two)}} \) – on
  - \( \sqrt{\text{ROLL/YAW AUTO,CSS lt (two)}} \) – on
  - \( \sqrt{\text{SPDBK/THROT AUTO,MAN lt (two)}} \) – on
  - \( \sqrt{\text{BDY FLP AUTO,MAN lt (two)}} \) – on

**Test Terminate**

**CRT1**

- **MODE LT OFF – ITEM 8 EXEC (**)**
- **F6/F8**
  - **FLT CNTLR PWR (two) – OFF**

**Display/DPS Reconfig**

Perform G8 TO G2 TRANSITION (DPS), then:

**F3**

- L,R TRIM PNL (two) – OFF
- HUD PWR (two) – OFF

**C3**

- FCS CH (four) – AUTO

**O8**

- MLS (three) – OFF
- RA (two) – OFF

**O14, O15, O16**

- RGA (four) – OFF
- cb MNA,B,C ADTA (four) – op
- MNA,B ACCEL 1,2 (two) – op
- DDU L (two) – as reqd
- MNB,C DDU R (two) – op
- ASA (four) – OFF
- ACCEL 3,4 (two) – OFF
- BRAKES (three) – OFF
- ANTISKID – OFF
- ATVC (four) – OFF

If GPS self-test performed:

If OV103:

**A13**

- GPS PRE AMPL (two) – MNC

If OV104:

**A13**

- GPS PRE AMPL (two) – ON

If OV105:

**O7**

- GPS 1(2,3) PRE AMPL (two) – ON

**2: GNC 55 GPS STATUS**

- \( \sqrt{\text{S/TEST }} \) †; if ↓\( \sqrt{\text{MCC (if LOS, deselect GPS)}} \)
- INIT – ITEM 14(15,16) EXEC (*)
- MODE – INIT
- NAV – ITEM 17(18,19) EXEC (*)
- MODE – INS

If reqd, go to GPS PWRDN, 7-35
AFT CONTROLLER C/O

1. POWER UP

GNC 25 RM ORBIT
Deselect A THC:
THC A DES – ITEM 4,5,6 EXEC (*)

O14:E √ cb MNA DDU AFT – cl
O16:E √ MNC DDU AFT – cl
A6U FLT CNTLR PWR – ON

2. AFT DDU

O16:E cb MNC DDU AFT – op
(Wait 5 sec)
cb MNC DDU AFT – cl

O14:E cb MNA DDU AFT – op
(Wait 5 sec)
cb MNA DDU AFT – cl

3. AFT THC

A THC – deflect in each axis
√ THC: ‘+’ and ‘-’

<table>
<thead>
<tr>
<th>AFT CONTROLLER C/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC</td>
</tr>
<tr>
<td>DISP</td>
</tr>
</tbody>
</table>

* During THC test, *
* One TX(TY,TZ) failed CLOSED – reselect *
* all contacts (failed contact last) *
* One TX(TY,TZ) failed OPEN – reselect *
* good contacts only *
* Multi +TX,-TX,+TY,-TY,+TZ,-TZ *
* failures – reselect good contacts only *

Reselect A THC contacts:
THC A DES – ITEM 4,5,6 EXEC (no *)

Cont next page
4. **AFT RHC**
   
   Deselect A RHC:
   
   CRT
   
   RHC A DES – ITEM 13,14,15 EXEC (*)
   
   A RHC – deflect to hardstop in each axis
   
   √RHC A: R,P > 92%
   
   Y > 88%
   
   * During RHC test,            *
   
   * One xdcr failure – reselect good xdcrs    *
   
   * only           *
   
   * Multi RHC failures – reselect good xdcr, *
   
   A6U
   
   * FLT CNTRL PWR – OFF      *
   
   Reselect RHC CHs:
   
   CRT
   
   RHC A DES – ITEM 13,14,15 EXEC (no *)
   
5. **RECONFIG TO NOMINAL**
   
   A6U
   
   FLT CNTRL PWR – OFF
   
   O14:E, AFT DDU PWR – as reqd
   
   O16:E
   
6. **AFT DAP SPARE pbi**
   
   A6U
   
   SPARE pbi – push (hold 5 sec)
   
**OMICRON SPECIFICATION**

1. **DETERMINE REFERENCE ATTITUDE**
   
   Designated body axis pointed toward target (P)
   
   Y body axis in same plane as negative angular momentum vector (-h) and P
   
2. **DETERMINE DESIRED ATTITUDE**
   
   Rotate cw around P (right-hand rule) to desired attitude
   
   Omicron = angle of rotation around P from reference attitude to desired attitude
   
   **NOTE**
   
   If P = ±Y body axis, use -Z body axis for reference attitude

7-33 ORB OPS/ALL/GEN M
ELEVON PARK, GNC 201

1. Perform G2 TO G8 TRANSITION (DPS)

2. ASA 4 – ON

3. Perform G8 TO G2 TRANSITION (DPS)

4. HYD CIRC PUMP 1 – ON

NOTE
Elevons will be positioned within 3 min

On MCC GO,
HYD CIRC PUMP 1 – GPC
GPS PWRUP

1. CHECK GPS ANTENNA PRE-AMP CONFIG
   If OV103:
   A13  GPS PRE AMPL (two) – MNC
   If OV104:
   A13  GPS PRE AMPL (two) – ON
   If OV105:
   O7   GPS 1(2,3) PRE AMPL (two) – ON

2. PWR UP GPS RECEIVER
   * If GPS just PWRed off, wait *
   * at least 30 sec *

   A13/O7  GPS 1(2,3) PWR – ON
   ENCRYPT – NORMAL
   Wait at least 30 sec
   GNC I/O RESET

3. INITIALIZE GPS RECEIVER
   GNC 55 GPS STATUS
   NAV – ITEM 17(18,19) (*)
   INIT – ITEM 14(15,16) EXEC (*)
   MODE – INIT
   NAV – ITEM 17(18,19) EXEC (*)
   MODE – INS

GPS PWRDN

1. CHECK GPS RECEIVER MODE
   SPEC 55 GPS STATUS
   NAV – ITEM 17(18,19) (*)

2. PWR OFF GPS RECEIVER
   A13/O7  GPS 1(2,3) PWR – OFF

3. PWR OFF GPS ANTENNA PRE-AMPS
   GPS 1(2,3) PRE AMPL (two) – OFF

7-35  ORB OPS/ALL/GEN M
GPS SELF-TEST, GNC 201,202,301,801

1. GPS ANTENNA PRE-AMP CONFIG
   A13/O7 GPS 1(2,3) PRE AMPL (two) – OFF

2. PWR UP GPS RECEIVER (if reqd)
   * If GPS just PWRD off, wait *
   * at least 30 sec *
   A13/O7 GPS 1(2,3) PWR – ON
   Wait at least 30 sec
   GNC I/O RESET

3. GPS SELF-TEST
   2: GNC 55 GPS STATUS
   √NAV – ITEM 17(18,19) (*)
   If “RPF” in STAT field, √MCC (if LOS, proceed with test)
   S/TEST – ITEM 11(12,13) EXEC
   √“BIT” in STAT field after ~6 sec
   Wait for “BIT” to clear after ~2 min
   √S/TEST ‘↑’; if ‘↓’ deselect GPS

4. PWR ON GPS ANTENNA PRE-AMPS
   If OV103:
   A13 GPS PRE AMPL (two) – MNC

   If OV104:
   A13 GPS PRE AMPL (two) – ON

   If OV105:
   O7 GPS 1(2,3) PRE AMPL (two) – ON

5. INITIALIZE GPS RECEIVER
   GNC 55 GPS STATUS
   INIT – ITEM 14(15,16) EXEC (*)
   √MODE – INIT
   NAV – ITEM 17(18,19) EXEC (*)
   √MODE – INS
GPS INCORPORATION

1. GPS functioning properly:
   CRT [GNC SPEC 55 GPS STATUS]
   √STAT = BLANK or BATT
   √MODE = INS
   √DG FAIL = BLANK
   √QA1 P1 $\leq$ 175 (can be > 175 for no more than 5 min)
   √LAST SEL FIL UPDATE < 30 min
   *
   If GPS not functioning properly for 5 min, *
   * perform GPS TROUBLESHOOTING *
   * (ORB PKT, GNC) *

2. If QA2 ratio > 1.0, GPS TO NAV FOR – ITEM 37 EXEC (*)
   Expect toggle to FOR then back to previous state (AUT or INH)

3. GPS TO NAV AUT – ITEM 35 EXEC (*)

   NOTE
   Due to timing of OPS transition and GPS to Auto, it could take up to 90 min before first Auto GPS incorporation

   √GPS MINUS NAV POS ($\Delta H, \Delta DR, \Delta CR$) < 100

4. Repeat step 1 every 90 min while awake to √GPS still functioning properly
ELEVON POSITIONING FOR INSPECTION

1. Config Check
   O14, O15, ASA (four) – OFF
   O16
   C3 √FCS CH (four) – Auto
   R2 HYD CIRC PUMP (three) – OFF

2. Initial Elevon Positioning
   Perform G2 TO G8 TRANSITION, steps 1-5 (DPS)
   C3 FCS CH 1,2,3 – OFF
   O14, O15, ASA (four) – ON
   O16
   R2 HYD CIRC PUMP X – ON
   CRT2 √All CH 4 Elevon Positions move to U7.5 ± 0.8

3. Increment Elevon Command
   CRT1 √GNC FCS/DED DIS C/O

   NOTE
   Display will initialize with POS STIM ENA (*)
   IF UP Elevon Desired:
   NEG STIM – ITEM 20 EXEC (no *)
   C3 √FCS CH 1,2,3 – OFF
   R2 √HYD CIRC PUMP X – ON
   SEC ACT CK, CH 4 – ITEM 18 EXEC (*)
   CRT2 √All CH 4 Elevon Positions increment additional 6 deg
   from previous position
   R2 HYD CIRC PUMP X – OFF
   CRT1 STOP – ITEM 19 EXEC (*)

4. Freeze Elevon Command at current position
   Perform G8 TO G2 TRANSITION, step 2 (DPS),
   then:
   C3 FCS CH 1,2,3 – AUTO
   Perform G2 TO G8 TRANSITION, step 5 (DPS),
   then:
   √Elevon positions
   Cont next page

   ORB OPS/ALL/GEN M
Repeat steps 3-4 as needed for desired Elevon Position

**NOTE**
Disregard any "AERO DRIVE" msg

5. **Clean Up**
   Perform G8 TO G2 TRANSITION (DPS), then:
   - C3  √ FCS CH 1,2,3 – Auto
   - O14,O15, √ ASA 4 – ON
   - O16    ASA 1,2,3 – OFF
   - R2   HYD CIRC PUMP (three) – GPC
MPS

MPS VACUUM INERT ............................................................... 8-2

ORB OPS/ALL/GEN M
MPS VACUUM INERT

ACTIVATION
R2  1. MPS PNEU He ISOL – OP
R4  2. MPS FILL/DRAIN LH2 OUTBD – CL
      Wait 15 sec
3. MPS FILL/DRAIN LH2 OUTBD – OP

TERMINATION

NOTE
After 1 min or on MCC Call

1. MPS FILL/DRAIN LH2 OUTBD – CL
   Wait 15 sec
2. MPS FILL/DRAIN LH2 OUTBD – GND
R2  3. MPS PNEU He ISOL – GPC
ON-ORBIT OMS BURN

1. OMS BURN PREP
   C2 Wedge
   Install OMS-2/ORBIT OMS BURNS
   Cue Cards (two) and ORBIT BURN MONITOR Cue Cards (two) (F6,F8)

   GNC 55 GPS STATUS
   √GPS TO NAV – INH (*)

   CRT
   If OPS 2:
   1: GNC 20 DAP CONFIG
      √DAP Config A1,B1
   1: GNC UNIV PTG
      CNCL – ITEM 21 EXEC
      GNC, OPS 202 PRO
   1: GNC ORBIT MNVR EXEC
   2: GNC SYS SUMM 2

   If OPS 3:
   GNC, OPS 302 PRO
   1: GNC DEORB MNVR EXEC
   3: BFS, GNC SYS SUMM 2

2. OMS/MPS
   √OMS PRESS He TK L,R > 1500 psia
   √N2 TK L(R) > 564 psia

   WARNING
   If OMS PRESS not within limits,
do not execute on-orbit burn

   O14:F, √Pri RJD LOGIC,DRIVER (sixteen) – ON
   O15:F,
   O16:F

   O14:E, √cb DDU (six) – cl
   O15:E,
   O16:E

Cont next page

9-2 ORB OPS/ALL/GEN M
2. **LOAD TGT DATA**
   Load TGT DATA per Burn Pad
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC
   \BURN DATA per Burn Pad
   C3 DAP:  If OPS 2, B/AUTO/VERN
   \If OPS 3, AUTO
   CRT1 MNVR – ITEM 27 EXEC (*)

3. **PERFORM OMS BURN**
   TIG-4 If xfeed Burn:
   O8 √L(R) OMS TK ISOL (two) – OP (tb-OP)
   O8 √R(L) OMS TK ISOL (two) – CL (tb-CL)
   O8 √L,R OMS XFEED B (two) – OP (tb-OP)
   If straight feed:
   O8 √L,R OMS TK ISOL (four) – OP (tb-OP)
   F6/F8 ADI RATE (two) – MED (1 deg/sec)
   F6/F8 FLT CNTLR PWR (two) – ON

   Perform OMS-2/ORBIT OMS BURNS
   (Cue Card), then:

4. **OMS POST BURN RECONFIGURATION**
   CRT1 Perform OMS TVC GMBL CK, as reqd
   * If down arrow(s) or M(s), *
   * select good GMBL *
   F6/F8 FLT CNTLR PWR (two) – OFF
   O14:E, cb DDU (six) – as reqd
   O15:E, O16:E
   O8 L,R OMS He PRESS/VAP ISOL (four) – CL

Cont next page
If feeding ICNCT:
\[\sqrt{L(R)}\text{ OMS XFEED A} \quad CL\text{ (tb-CL)}\]
\[\sqrt{B}\quad OP\text{ (tb-OP)}\]
\[\sqrt{R(L)}\text{ OMS XFEED (two)} \quad CL\text{ (tb-CL)}\]
\[\sqrt{L,R}\text{ OMS TK ISOL (four)} \quad OP\text{ (tb-OP)}\]

Otherwise:
\[L,R\text{ OMS XFEED (four)} \quad CL\text{ (tb-CL)}\]
\[TK\text{ ISOL (four)} \quad OP\text{ (tb-OP)}\]

5. **RECONFIG FOR GROUP B(C)**

If Group B(C) PWRDN:
\[O14:F,\quad Pri\text{ RJD LOGIC,DRIVER (sixteen)} \quad OFF\]
\[O15:F,\quad RJDA 1A L2/R2 MANF DRIVER \quad ON\]
\[O16:F\]
<table>
<thead>
<tr>
<th>OMS BOTH 1</th>
<th>L 2</th>
<th>R 3</th>
<th>RCS SEL 4</th>
<th>TV ROLL 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+X</td>
<td>-X</td>
<td>MULTI-AXIS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRIM LOAD</th>
<th>P 6</th>
<th>LY 7</th>
<th>RY 8</th>
<th>WT 9</th>
<th>TIG 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(   )</td>
<td>(   )</td>
<td>(   )</td>
<td>(   )</td>
<td>/ : : : : : :</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TGT PEG 7</th>
<th>∆VX 19</th>
<th>∆VY 20</th>
<th>∆VZ 21</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(   )</td>
<td>(   )</td>
<td>(   )</td>
</tr>
</tbody>
</table>

- **NOTES**

- **ORBIT MANEUVER PAD FOR**

- **OMS GMBL CK:**
  - PRE
  - POST-BURN

- **OMS HE REG TEST:**
  - NONE

- **X-RCS BURNS:**
  - BURN ATT
  - LVLH ATT

- **ORBIT BURN MONITOR**
  - GPC FILL-INS ___ ( ___ )
  - GPC FILL-INS ___ ( ___ )

- **MAX TIG SLIP ____ MIN.**
- **DO NOT UPDATE TIG**
- **UPDATE TIG AFTER ____ MIN.**
### Orbit Maneuver Pad for __________

<table>
<thead>
<tr>
<th>OMS BOTH</th>
<th>1</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCS SEL</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV ROLL</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM LOAD</td>
<td></td>
<td>P 6</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LY 7</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RY 8</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>WT 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIG 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TGT PEG 7</td>
<td></td>
<td>VX 19</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VY 20</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VZ 21</td>
<td>( )</td>
<td></td>
</tr>
</tbody>
</table>

### Burn Attitude

<table>
<thead>
<tr>
<th>ΔVTOT</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TGO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGO X</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGO Y</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGO Z</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TGT</td>
<td></td>
<td>HA</td>
<td>( )</td>
<td>HP</td>
</tr>
</tbody>
</table>

### Trim Load

<table>
<thead>
<tr>
<th>ΔVTOT</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TGO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGO X</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGO Y</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGO Z</td>
<td>( )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

- Do not update TIG after ___ min.
- Update TIG after ___ min.

### Down Mode Options

- RCS I/CNCT:
  - L OMS → RCS
  - R OMS → RCS
  - NONE

### Orbit Burn Monitor

- GPC FILL-INS: __ (___)
- CRIT BURN
- NON-CRIT BURN

### Max TIG Slip

- ___ Min.

---

### Notes

- Trim Load
  - L PRI L SEC R PRI R SEC
  - NONE
- Notes
  - OMS GMBL CK:
  - PRE POST-BURN
  - OMS HE REG TEST:
  - NONE
- X RCS BURNS:
  - BURN ATT
  - LVLH ATT
  - GPC FILL-INS: __ (___)
  - CRIT BURN
  - NON-CRIT BURN
  - MAX TIG SLIP ___ Min.
  - DO NOT UPDATE TIG
  - UPDATE TIG AFTER ___ MIN.
# RCS

RCS HOT FIRE TEST .......................................................... 10-2
GG FREE DRIFT ............................................................... 10-6
PRCS PTC ....................................................................... 10-8
VRCS PTC ....................................................................... 10-9
ON-ORBIT +X RCS BURN, MM202 .................................... 10-10
- X RCS BURN, MM202 .................................................. 10-12
MULTI-AXIS RCS BURN, MM202 .................................... 10-14
LOSS OF VERNIERS ....................................................... 10-16
RECOVERY OF VERNIERS ............................................... 10-17
RCS REGULATOR RECONFIG .......................................... 10-18
RCS HOT FIRE TEST

NOTE
If RMS not cradled, verify RMS not in jet impingement zone (\$MCC if desired)

1. CONFIGURE FOR JET TEST
   DAP: A1/INRTL/VERN

2. PERFORM RCS JET TEST
   Wait 3 sec between pulses
   Monitor CRT for JET FAIL msgs
   Monitor ADI rates to verify jet on or jet fail

   NOTE
   If failed RCS JET detected, wait 30 sec before next pulse, deselect any failed RCS JET not auto deselected, complete TEST, then go to MAL, RCS, 10.1a (MAL, RCS)

O14, Pri RJD LOGIC, DRIVER (sixteen) – ON
O15, \$cb MNA, B DDU L (two) – cl
O16
DAP TRANS: PULSE/PULSE/PULSE
DAP: A/FREE/PRI
F6 ADI RATE – MED
F6/F8 FLT CNTLR PWR – ON

GNC 23 RCS
CRT
RCS FWD – ITEM 1 EXEC (*)
MANF VLVS STAT OVRD
\_1 OP – ITEM 40
\_2 OP – ITEM 41
3 CL – ITEM 42 EXEC
4 CL – ITEM 43 EXEC
JET DES F2U – ITEM 21 EXEC (*)

Cont next page
10-2 ORB OPS/ALL/GEN M
Perform following pulse sequence twice:

F5
THC: +X, 1 PULSE (fires jets R1A,L1A)
-\textcolor{red}{X}, 1 PULSE (fires jets F1F,F2F)
+\textcolor{green}{Z}, 1 PULSE (fires jets F1U,R1U,L1U)

F6
+\textcolor{green}{Y}, 1 PULSE (fires jets F1L,L1L)
-\textcolor{red}{Y}, 1 PULSE (fires jets F2R,R1R)

Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F2U,L2U,R2U)
-\textcolor{red}{Z}, 1 PULSE (fires jets F1D,F2D,L2D,R2D)
+\textcolor{green}{Y}, 1 PULSE (fires jets F1L,L2L)
-\textcolor{red}{Y}, 1 PULSE (fires jets F2R,R2R)
Perform following pulse sequence twice:

THC:  
+X, 1 PULSE (fires jets L3A,R3A)
-X, 1 PULSE (fires jet F3F)
-Z, 1 PULSE (fires jets F3D,F4D,L3D,R3D)
+Y, 1 PULSE (fires jets F3L,L3L)
-Y, 1 PULSE (fires jets F4R,R3R)
Perform following pulse sequence twice:

**THC:**
- +Z, 1 PULSE (fires jets F3U,L4U,R4U)
- -Z, 1 PULSE (fires jets F3D,F4D,L4D,R4D)
+Y, 1 PULSE (fires jets F3L,L4L)
- Y, 1 PULSE (fires jets F4R,R4R)

**DAP:** A/INRTL/VERN

F6/F8
FLT CNTLR PWR – OFF

3. **RECONFIGURE JET SELECT**

   **CRT**
   √ RCS L, ITEM 2 – (*)
   MANF VLVS STAT OVRD
   - 1 OP – ITEM 40 EXEC
   - 2 OP – ITEM 41 EXEC
   - 3 OP – ITEM 42 EXEC
   - √ 4 OP – ITEM 43

   RCS R – ITEM 3 EXEC (*)
   MANF VLVS STAT OVRD
   - 1 OP – ITEM 40 EXEC
   - 2 OP – ITEM 41 EXEC
   - 3 OP – ITEM 42 EXEC
   - √ 4 OP – ITEM 43

   RCS F – ITEM 1 EXEC (*)
   MANF VLVS STAT OVRD
   - 1 OP – ITEM 40 EXEC
   - 2 OP – ITEM 41 EXEC
   - √ 3 OP – ITEM 42
   - √ 4 OP – ITEM 43

4. **CONFIG FOR VERN MANIFOLD VLV TEST**

   R14:C
   cb MNC MANF ISOL L5,R5,F5 ENA (three) – op

5. **PERFORM TEST**

   **NOTE**
   If any vernier manifold closes, ignore DAP RECONFIG msg, reopen affected manifold, complete TEST, and notify MCC

   O7,O8
   L,R,F RCS MANF ISOL 5 (three) – CL (tb-OP)

6. **CLEANUP**

   R14:C
   cb MNC MANF ISOL L5,R5,F5 ENA (three) – cl
   O14,O15,
   Pri RJD LOGIC,DRIVER (sixteen) – as reqd
   O16
   cb MNA,B DDU L (two) – as reqd
   Reconfig to FLIGHT PLAN DAP

10-5 ORB OPS/ALL/GEN M
GG FREE DRIFT

1. AUTO MNVR TO ATTITUDE
   Change DAP A,B to A3,B3
   DAP:  B3/AUTO/VERN(ALT)

   GNC UNIV PTG
   √TGT ID, ITEM 8 – 2
   BODY VECT – ITEM 14 +5 EXEC
   Load Body Vector P,Y,OM (per table, 10-7)

   TRK – ITEM 19 EXEC (CUR-*)
   √ERR TOT, ITEM 23 – (*)

2. ESTABLISH FREE DRIFT
   F6,F8  √Att mnvr complete
   ADI ATT – LVLH
   L1  FLASH EVAP CNTLR PRI A,B (two) – OFF
       √SEC – OFF
   √HI LOAD DUCT HTR – OFF

   If VERN jets available:
   DAP:  A3/AUTO/VERN
       Wait 3 min
   DAP:  FREE

   If VERN jets not available:
   DAP:  A3/AUTO/ALT
       Wait 30 sec
   When -0.01 < Roll Rate < 0.01, then:
   DAP:  FREE
   Rcd MET _____/_____ _____:_____ _____:_____ 

   NOTE
   If FREON EVAP OUT TEMP > 60, execute
   PRIORITY PWRDN GROUP A and
   subsequent (ORB PKT, PRIOR PWRDN) to
   maintain FREON EVAP OUT TEMP ≤ 55

Cont next page
10-6  ORB OPS/ALL/GEN M
3. **VEHICLE RECOVERY AND FES RESTART**

   DAP: A3/FREE/VERN(ALT)

   If VERN jets available:
   
   O14:F, O15:F, O16:F
   \(\sqrt{\text{All RJD LOGIC, DRIVER (seventeen) – ON}}\)

   If VERN jets not available:
   \(\sqrt{\text{Pri RJD LOGIC, DRIVER (sixteen) – ON}}\)

   F6,F8
   ADI ATT – as reqd
   
   Reconfig to FLIGHT PLAN DAP
   DAP: INRTL

   If FES reqd:

   CRT(O1) If FREON EVAP OUT TEMP > 41
   and \(\leq\) 47 degF:
   
   L1 RAD CNTLR OUT TEMP – HI
   
   CRT(O1) When FREON EVAP OUT TEMP > 50 degF, then
   immediately:
   
   FLASH EVAP CNTLR PRI A(B) – ON
   
   CRT(O1) If FREON EVAP OUT TEMP \(\leq\) 41 or > 47 degF:
   
   L1 FLASH EVAP CNTLR PRI A(B) – ON

---

**GRAVITY GRADIENT BODY VECTORS**

<table>
<thead>
<tr>
<th>ATT ID</th>
<th>EXEC DATA</th>
<th>BODY RATES (±0.002)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATT ID</td>
<td>P</td>
</tr>
<tr>
<td>+</td>
<td>X NORTH</td>
<td>A 357.51</td>
</tr>
<tr>
<td></td>
<td>X SOUTH</td>
<td>B 357.51</td>
</tr>
<tr>
<td>-</td>
<td>X NORTH</td>
<td>C 177.51</td>
</tr>
<tr>
<td></td>
<td>X SOUTH</td>
<td>D 177.51</td>
</tr>
</tbody>
</table>
PRCS PTC

1. MNVR TO PTC ATTITUDE

   **NOTE**
   If crew sleep, use Tail-only control for all DAPs

   DAP: A1/AUTO/ALT

   CRT
   GNC UNIV PTG
   TGT ID – ITEM 8 +4 EXEC
   BODY VECT – ITEM 14 +5 EXEC
   P – ITEM 15 +2 7 0 EXEC
   Y – ITEM 16 +0 EXEC
   OM – ITEM 17 +2 7 0 EXEC
   TRK – ITEM 19 EXEC (CUR-*

2. INITIATE PTC ROTATION

   GNC 20 DAP CONFIG
   Change DAP A to A2

   CRT
   GNC UNIV PTG
   BODY VECT – ITEM 14 +1 EXEC
   ROT – ITEM 20 EXEC (CUR-*

3. TERMINATE PTC ROTATION

   GNC UNIV PTG
   CNCL – ITEM 21 EXEC
   Reconfig to FLIGHT PLAN DAP

10-8 ORB OPS/ALL/GEN M
VRCS PTC

1. MNVR TO PTC ATTITUDE
   DAP: A1/AUTO/VERN
   
   CRT
   TGT ID – ITEM 8 +4 EXEC
   BODY VECT – ITEM 14 +5 EXEC
   P – ITEM 15 +2 7 0 EXEC
   Y – ITEM 16 +0 EXEC
   OM – ITEM 17 +2 7 0 EXEC
   TRK – ITEM 19 EXEC (CUR-*)

2. INITIATE PTC ROTATION
   When in attitude:
   
   CRT
   BODY VECT – ITEM 14 +1 EXEC
   ROT – ITEM 20 EXEC (CUR-*)
   
   When rates have stabilized (~60 sec):
   
   CRT
   Change DAP A to A2

3. TERMINATE PTC ROTATION
   
   CRT
   Change DAP A to A1
   
   When rates have stabilized (~60 sec):
   
   CRT
   CNCL – ITEM 21 EXEC
   
   When rates have damped:
   
   CRT
   Reconfig to FLIGHT PLAN DAP
ON-ORBIT +X RCS BURN, MM202

1. RCS BURN PREP
   O14:F, \Pri RJD LOGIC, DRIVER (sixteen) – ON
   O15:F,
   O16:F
   O14:E, \cb DDU (six) – cl
   O15:E,
   O16:E

   \GNC 55 GPS STATUS
   \GPS TO NAV – INH (*)

2. LOAD TGT DATA AND MNVR TO BURN
   ATT
   C3
   DAP: B1/AUTO/VERN(PRI)

   \GNC UNIV PTG
   CNCL – ITEM 21 EXEC
   GNC, OPS 202 PRO

   1: GNC ORBIT MNVR EXEC
   2: GNC SYS SUMM

   Enter or verify TGT DATA per ORB MNVR PAD
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC

   \BURN DATA per PAD
   MNVR – ITEM 27 EXEC (*)

3. BURN EXEC
   TIG-3:00
   F6(F8) ADI ERR – MED
   RATE – HI
   ATT – INRTL
   \ADI ATT, then:
   ATT – REF
   REF pb – push
   F6(F8) FLT CNTLR PWR – ON
   C3 DAP TRANS: NORM/PULSE/PULSE
   TIG-0:30 DAP: B1/INRTL/PRI
   TIG THC Trim VGOs < 0.2 fps

   Cont next page

   10-10 ORB OPS/ALL/GEN M
4. POST BURN RECONFIG
F6(F8) FLT CNTLR PWR – OFF
CRT GNC, OPS 201 PRO
C3 DAP TRANS: PULSE/PULSE/PULSE
   DAP: as reqd

O14:E, cb DDU (six) – as reqd
O15:E,
O16:E

5. RECONFIG FOR GROUP B(C)
   If Group B(C) PWRDN:
O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F
ON-ORBIT -X RCS BURN, MM202

1. RCS BURN PREP
O14:F, √Pri RJD LOGIC, DRIVER (sixteen) – ON
O15:F,
O16:F
O14:E, √cb DDU (six) – cl
O15:E,
O16:E

GNC 55 GPS STATUS
√GPS TO NAV – INH (*)

2. MNVR TO BURN ATT AND LOAD TGT DATA
C3
DAP: B1/AUTO/VERN(PRI)
GNC UNIV PTG
Perform Auto Mnvr to Burn Att,
TGT ID – ITEM 8 +2 EXEC
BODY VECTOR – ITEM 14 +5 EXEC
Posigrade Retrograde Burn Att from
Heads Up Heads Up MNVR PAD
P – ITEM 15 +276.0 280.0
Y – ITEM 16 +0.0 +0.0
OM – ITEM 17 180.0 +0.0
Init TRK – ITEM 19 EXEC (CUR-*)

GNC, OPS 202 PRO
1: GNC ORBIT MNVR EXEC
2: GNC SYS SUMM
Enter or verify TGT DATA per
ORB MNVR PAD
LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC
√BURN DATA per PAD

Cont next page
3. **BURN EXEC**

TIG-3:00

- ADI ERR – MED
- RATE – HI
- ATT – LVLH

\sqrt{ADI ATT}

<table>
<thead>
<tr>
<th>Posigrade Heads Up</th>
<th>Retrograde Heads Up</th>
<th>Burn Att from MNVR PAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>+180.0</td>
<td>+0.0</td>
</tr>
<tr>
<td>P</td>
<td>+186.0</td>
<td>+350.0</td>
</tr>
<tr>
<td>Y</td>
<td>+0.0</td>
<td>+0.0</td>
</tr>
</tbody>
</table>

F6/F8

- FLT CNTLR PWR – ON
- DAP TRANS: NORM/PULSE/PULSE

TIG-0:30>

- DAP: B1/INRTL/PRI
- ADI ATT – REF
- REF pb – push

TIG

- THC: Trim VGOs < 0.2 fps

4. **POST BURN RECONFIG**

F6/F8

- FLT CNTLR PWR – OFF
- GNC, OPS 201 PRO
- DAP TRANS: PULSE/PULSE/PULSE

C3

- DAP: as reqd

O14:E, O15:E, O16:E

- cb DDU (six) – as reqd

5. **RECONFIG FOR GROUP B(C)**

If Group B(C) PWRDN:

O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F

10-13 ORB OPS/ALL/GEN M
ON-ORBIT MULTI-AXIS RCS BURN, MM202

1. RCS BURN PREP
   - O14:F, \(\sqrt{}\) Pri RJD LOGIC, DRIVER (sixteen) – ON
   - O15:F,
   - O16:F
   - O14:E, \(\sqrt{}\) cb DDU (six) – cl
   - O15:E,
   - O16:E

   [GNC 55 GPS STATUS]
   \(\sqrt{}\) GPS TO NAV – INH (*)

2. EXECUTE MULTI-AXIS BURN
   - C3 DAP: B1/AUTO/VERN (PRI)
   - GNC, OPS 202 PRO
   - 1: GNC ORBIT MNVR EXEC
   - 2: GNC SYS SUMM

   Enter or verify TGT DATA per ORB MNVR PAD
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC
   \(\sqrt{}\) BURN DATA per PAD

   NOTE
   Ignore computed attitude,
   perform burn in current attitude

   TIG-3:00
   - FLT CNTRL PWR – ON
   - DAP TRANS: as reqd

   TIG-0:30
   - DAP: B1/AUTO/PRI

   TIG
   - If VGO Z neg:
     - Z, X, Y THC sequence
   - If VGO Z not neg:
     - X, Y, Z THC sequence

   THC: Trim VGOs < 0.2 fps

Cont next page
3. POST BURN RECONFIG
   FLT CNTLR PWR – OFF
   GNC, OPS 201 PRO
   DAP: VERN
   DAP: A/AUTO

O14:E, cb DDU (six) – as reqd
O15:E,
O16:E

4. RECONFIG FOR GROUP B(C)
   If Group B(C) PWRDN:
O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F
LOSS OF VERNIERS

NOTE
DAPs called out in this procedure should only be used if flight-specific loss of VERN DAPs not specified in flight-specific checklists (Deploy, RNDZ, PDRS, EVA). Use Tail-only for crew sleep; Nose and Tail for all other times.

1. CONFIG DAP
   √DAP: FREE
   
   If Tail-only control desired:
   | Change DAP A,B to A6,B2
   If Nose and Tail control desired:
   Change DAP A,B to A5,B3

2. ESTABLISH CONTROL
   O14:F, √Pri RJD LOGIC, DRIVER (sixteen) – ON
   O15:F, O16:F
   O16:F √RJD L5/F5/R5 DRIVER – OFF
   DAP: A/FREE/ALT
   A/AUTO/ALT
RECOVERY OF VERNIERS

DAP: FREE

1. CONFIG DAP
   Reconfig to FLIGHT PLAN DAP

2. CONFIG FOR VERNIER(PRIMARY) CONTROL
   O16:F
   RJD L5/F5/R5 DRIVER – ON
   Wait 5 sec
   DAP: A/AUTO/VERN(PRI)
RCS REGULATOR RECONFIG

O7/O8

He PRESS A (three) – OP (tb-OP)
B (three) – OP (tb-OP)
A (three) – CL (tb-CL)
B (three) – GPC (tb-OP)
### ORBIT MANEUVER PAD FOR

<table>
<thead>
<tr>
<th>OMS BOTH</th>
<th>L 2</th>
<th>R 3</th>
<th>RCS SEL</th>
<th>TV ROLL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BURN ATT

<table>
<thead>
<tr>
<th>R 24</th>
<th>P 25</th>
<th>Y 26</th>
</tr>
</thead>
</table>

### Notes

- VGO X
- VGO Y
- VGO Z

### Down Mode Options

- RCS I’CNECT:
  - L OMS → RCS
  - R OMS → RCS
  - NONE

- RCS SEL:
  - 1 OMS

- TRIM LOAD:
  - P 6
  - LY 7
  - RY 8

### TGT

<table>
<thead>
<tr>
<th>HA</th>
<th>HP</th>
</tr>
</thead>
</table>

### GPC Fill-Ins

| GPC Fill-INS | ( ) |

### Orbit Burn Monitor

<table>
<thead>
<tr>
<th>CRIT BURN</th>
<th>NON-CRIT BURN</th>
</tr>
</thead>
</table>

### Max TIG Slip

- Do not update TIG
- Update TIG after ___ min.

### Notes

- BURN ATT
- ΔVTOT
- TGO
- TGT
- ΔV Y
- ΔV X
- ΔV Z
- BURN ATT
- ΔV TOT
- TGO
- ΔV TOT
- TGO

---

**ORBIT OPS/ALL/GEN M**
### ORBIT MANEUVER PAD

#### OMS BOTH
- L 2
- R 3
- RCS SEL 4
- TV ROLL 5

#### TRIM LOAD
- P 6
- LY 7
- RY 8
- WT 9
- TIG 10

#### TGT PEG
- \( \Delta V_X \) 19
- \( \Delta V_Y \) 20
- \( \Delta V_Z \) 21

#### BURN ATT
- R 24
- P 25
- Y 26

#### \( \Delta V_{TOT} \)
- VGO X
- VGO Y
- VGO Z
- TGT HA
- TGT HP

#### ORBIT BURN MONITOR

#### ORBIT BURN MONITOR

#### NOTES

---

**ORBIT MANEUVER PAD FOR _________**

---

**NOTES**

---
SEP MANEUVER

SEP MANEUVER.................................................................................. 11-2
SEP MANEUVER

1. SET UP AFT STATION
   A6U
   √SENSE -Z
   DAP: A1/INRTL/PRI
   DAP TRANS: as reqd
   O14:E, O16:E
   √cb DDU AFT (two) – cl
   FLT CNTLR PWR – ON

2. OBTAIN VISUAL CONTACT THRU OVHD WINDOW
   DAP ROT: as reqd
   RHC: as reqd

   When adequate visual contact obtained,
   DAP ROT: DISC/DISC/DISC

3. NULL CLOSING RATE
   THC: +Z (out)
   As reqd to null closing rate

4. PERFORM RR ACQ (if desired)
   A1U
   KU MODE – RDR PASSIVE
   RADAR OUTPUT – LO
   sel – AUTO TRK
   CNTL – PNL

   Slew antenna to target

   KU SEARCH – SEARCH (tb-gray)

   If no lock-on within 1 min,
   repeat SEARCH as convenient

Cont next page

11-2 ORB OPS/ALL/GEN M,2
5. **OBTAIN ~1 FPS OPENING RATE**

DAP TRANS: NORM/NORM/NORM

* If Norm Z sep desired: *
  * DAP: no LO Z *
  * THC: +Z (out) for 3 sec *
* If LO Z sep desired (MCC call): *
  * DAP: LO Z *
  * THC: +Z (out) for 25 sec *

6. **PERFORM OUT-OF-PLANE MNVR**

**GNC UNIV PTG**

**CRT**

CNCL – ITEM 21 EXEC
GNC, OPS 202 PRO

**GNC ORBIT MNVR EXEC**

RCS SEL – ITEM 4 EXEC (*)

* If time critical, *
  * Set TIG to current time +2.00 *
* If not time critical, *
  * Set TIG to current time +22.00 *

TGT PEG 7 \(\Delta V_x\) – ITEM 19 +0 EXEC
\(\Delta V_y\) – ITEM 20 +2 EXEC
\(\Delta V_z\) – ITEM 21 +0 EXEC
LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

\(\sqrt{VGO Z} \geq 0; \text{if } VGO Z < 0\)

* TGT PEG 7 \(\Delta V_y\) – ITEM 20 -2 EXEC *
* LOAD – ITEM 22 EXEC *
* TIMER – ITEM 23 EXEC *
* \(\sqrt{VGO Z} \geq 0\)

Do **NOT** MNVR to BURN ATT

**A6U**

\(\sqrt{DAP}: \text{no LO Z}\)

At TIG, deflect THC to null VGOs

Cont next page
7. **PERFORM FINAL SEP**

   **GNC ORBIT MNVR EXEC**

CRT √RCS SEL – ITEM 4 (*)

   If \( \Delta \text{VY} \) (block 6) +2:
   
   TV ROLL – ITEM 5 +2 7 0 EXEC

   If \( \Delta \text{VY} \) (block 6) -2:
   
   TV ROLL – ITEM 5 +0 9 0 EXEC

Set TIG to TIG from step 6 +15:00

TGT PEG 7 \( \Delta \text{Vx} \) – ITEM 19 +3 EXEC

\( \Delta \text{Vy} \) – ITEM 20 +0 EXEC

\( \Delta \text{Vz} \) – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

DAP: B1/AUTO/PRI

At TIG-8:00, MNVR – ITEM 27 EXEC (*)

A6U At TIG, deflect THC to null VGOs

FLT CNTLR PWR – OFF

O14:E, cb DDU AFT (two) – as reqd

O16:E

8. **MNVR TO MINIMUM DRAG ATTITUDE**

   (-ZLV/-XVV)

A6U DAP: A/AUTO/VERN

CRT GNC, OPS 201 PRO

   **GNC UNIV PTG**

   √TGT ID: 2

   BODY VECT: 3

   OM: 0

   START TRK – ITEM 19 EXEC (CUR-*)

11-4 ORB OPS/ALL/GEN M,2
PGSC

PGSC ACT ................................................................. 12-3
OCA AND PCMMU DOCKING STATION CARDS ............. 12-6
PGSC HARD DISK LATE UPDATE ............................... 12-7
OCA SETUP .................................................................. 12-8
  DIRECTORY STRUCTURE ........................................ 12-12
  FILENAMES ......................................................... 12-13
  KU-BAND (KFX) MANUAL DOWNLINGK ...................... 12-14
  S-BAND MODEM (MFX) ACTIVATION (760XD ONLY) . 12-16
SSR-1 REGAIN 2 GREEN LIGHTS .................................. 12-18
RECONFIGURE OCA DOWNLINGK RATE ....................... 12-19
OCA LOOPBACK TEST .............................................. 12-21
PGSC NETWORK ..................................................... 12-25
COLOR PRINTER UNSTOW AND ASSEMBLE ................. 12-29
  WARMUP AND SELF-TEST ..................................... 12-32
  STOW ............................................................... 12-33
CHECK COLOR PRINTER SETTINGS ............................ 12-34
COLOR PRINTER PAPER JAM ..................................... 12-34
INK CARTRIDGE CHANGEOUT .................................... 12-35
CLEANING PRINTER HEADS ...................................... 12-37
PRINTER HEAD ALIGNMENT ...................................... 12-38
UMBILICAL WELL TPS CAMERA IMAGERY
  DOWNLOADING .................................................... 12-39
WINDECOM OPS ..................................................... 12-42
RSAD SETUP INSTRUCTIONS ..................................... 12-47
  FUNCTION KEYS SUMMARY ................................ 12-49
  TROUBLESHOOTING ............................................ 12-50
DOUG SETUP INSTRUCTIONS ..................................... 12-54
  FUNCTION KEYS SUMMARY ................................ 12-62
  TROUBLESHOOTING ............................................ 12-63
WORLDMAP INITIALIZATION ...................................... 12-64
DEORBIT MANAGER INITIALIZATION ......................... 12-65
NETMEETING VIDEO CONFERENCING ......................... 12-67
PILOT WITH RHC (FOR A31p PGSC) ......................... 12-71
  WITHOUT RHC (FOR A31p PGSC) ....................... 12-76
PGSC STATE VECTOR UPDATE WITHOUT PCMMU DATA .... 12-78
BOOTING FROM A31p ULTRABAY HARD DISK ............. 12-79
RELOAD A31p PGSC .................................................. 12-80
A31p HARD DRIVE CHANGEOUT ........................................ 12-82
DEVICE CHANGEOUT ................................................. 12-85
RELOAD 760XD PGSC ..................................................... 12-89
WINDOWS KEYBOARD REF .......................................... 12-90
WORLDMAP KEYBOARD REF ......................................... 12-94
FILE SNEAKER NET BETWEEN ISS SSC AND SHUTTLE PGSC ................................................................ 12-95
DOCKING/UNDOCKING A31p PGSC ........................................ 12-96

FIGURES

12-1 PGSC without Docking Station .................................... 12-5
12-2 Back of Docking Station ........................................... 12-5
12-3 OCA Docking Station card ......................................... 12-6
12-4 PCMMU Docking Station card ..................................... 12-6
12-5 OCA Cable Diagram – Loopback ............................... 12-24
12-6 WAP configuration .................................................. 12-26
12-7 Side view of printer and trays, ready for assembly .... 12-30
12-8 Printer (top view/back view), PGSC 
(parallel port) ............................................................... 12-31
12-9 Hardware configuration ............................................ 12-39
12-10 Ultraport Camera position ....................................... 12-67
12-11 Ultraport Camera .................................................... 12-68
12-12 Headset configuration ............................................. 12-69
12-13 A31p PILOT setup diagram with RHC ..................... 12-75
12-14 A31p Hard Drive location ....................................... 12-83
12-15 A31p Hard Drive removal ........................................ 12-83
12-16 A31p Hard Drive cover removal ............................... 12-84
12-17 Ultrapay location in A31p Laptop ............................ 12-85
12-18 A31p Ultrapay Adapter ............................................ 12-86
12-19 Inserting device into A31p Ultrapay Adapter .......... 12-87
12-20 A31p Ultrapay Adapter and A31p Hard Drive final configuration .................................................. 12-87
12-21 A31p Docking Station ............................................. 12-99
12-22 Docking Station Eject button and Power button .... 12-99
12-23 Alt Eject lever and blue Lock/Unlock knob ............. 12-100
PGSC ACT

1. If activating OCA Router PGSC, go to OCA SETUP, 12-8

2. Unstow (if not pre-routed):
   - PGSCs
   - PCMMU Docking Station
   - DC Pwr cables
   - DC Pwr Sply cables (for laptops)
   - Dock DC Pwr Sply cable (for Docking Station)
   - DC Pwr Supplies, 28VDC (emerald)

   If WinDecom to be run, unstow:
   - PCMMU data cable (if not prerouted)
   - RS-232 Y data cable (if reqd)
   - RS-422 Y data cable (if reqd)
   - RS-422 PCMCIA cards, adapter boxes (if reqd)

3. √ DC PWR SPLY PWR sw1 – OFF

4. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use

5. √ DC UTIL PWR – OFF

   NOTE
   If needed, reference PGSC figures 12-1 thru 12-4 to identify PGSC ports, connectors

6. Connect PGSC DC PWR cable from DC Util Pwr outlet to DC Pwr Sply input (J1)
   Connect DC PWR SPLY cable from DC Pwr Sply output (J2) to PGSC pwr port (align red dot on pwr cable with red dot on PGSC/Docking Station pwr port)

Cont next page
7. \CHECKPGSC fan (on left side of PGSC) not obstructed

8. DC UTIL PWR – ON

9. DC PWR SPLY PWR sw – ON

10. Verify DC PWR SPLY output pwr LED is lit

11. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7, then:

12. Windows shut down

13. Repeat steps 3 thru 11 for each PGSC to be activated

14. If PGSC to be networked, perform PGSC NETWORK, A. SETUP, 12-25 >>

15. PGSC pwr – on
Figure 12-1.- PGSC without Docking Station.

Figure 12-2.- Back of Docking Station.
OCA AND PCMMU DOCKING STATION CARDS

Figure 12-3.- OCA Docking Station card.

Figure 12-4.- PCMMU Docking Station card.
PGSC HARD DISK LATE UPDATE

NOTE
Late Update disk is intended for STS PGSC load only (i.e., not OCA Router)
Procedure assumes PGSCs already connected for pwr

PGSC
1. √PGSC pwr – on
2. Insert disk containing late PGSC updates and verify Windows recognizes disk (e.g., listen for short tone played by Windows or verify disk can be viewed in My Computer)
   Double-click ‘Shuttle Apps’>‘Late PGSC Update’ to run Late Update program
3. If referred to this procedure from OCA SETUP or PGSC ACT, follow instructions on PGSC monitor but shut down PGSC (versus restart) >>
4. Follow instructions on PGSC monitor
OCA SETUP

1. Unstow:
   - OCA Router PGSC
   - OCA Docking Station
   - KFX PGSC
   - DC Pwr cables (if not prerouted)
   - PGSC DC Pwr Sply cable (if not prerouted)
   - Dock DC Pwr Sply cable (if not prerouted)
   - A31p DC Pwr Supplies (2)
   - OCA I/F cable (if not prerouted)

2. Blue knob (located on side of Docking Station) in Unlock position (i.e., most counterclockwise position)

   NOTE
   Docking of PGSC to Docking Station should be performed over firm/flat surface

3. Place PGSC over blue interface plate of Docking Station ensuring bottom corners of PGSC are against two corners of blue interface plate. Move Velcro tab that is attached to PGSC's hard drive so that it does not get caught between underside of PGSC and Docking Station

4. Push down on lid to lock PGSC to Docking Station (listen for 'click' sound). Docking Station cover will slide towards PGSC

5. Verify PGSC does not separate from Docking Station
   - If separation occurs:
     - a. Place PGSC/Docking Station assy on its side
     - b. Press simo on PGSC lid and on back of Docking Station near area of locking mechanism (listen for 'click' sound)
     - c. Verify PGSC does not separate from Docking Station

Cont next page
Docking Station

6. Turn blue knob clockwise to Lock position

7. Config switches for Ku-band file xfer:
   √MCC for:
   Ku-band rate _______
   Pnl location of:
   PDIP Pwr cb
   KuBand Rate sw
   ______
   cb PDIP PWR 2 KU BAND RLY – cl
   ______
   Ku BAND RATE – LO(HI)

8. Connect OCA I/F cable to OCA card (in OCA Router Docking Station) and Orbiter interfaces as follows:
   P1 → OCA card 44-pin connector
   P2 → L12 PDIP 1 Ku/J4
   P3 → L10 DTV MUX, BYPFR CLOCK
   P4 → L10 DTV MUX, BYPFR DATA

9. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use for OCA Router pwr

10. √DC UTIL PWR – OFF

11. Per PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)
   a. Connect DC PWR cable from DC Util Pwr outlet to DC Pwr Sply input J1
   b. Connect Docking Station DC Pwr Sply Cable from DC Pwr Sply output J2 to Docking Station pwr port J1 (align red dot on pwr cable connector to red dot on Docking Station pwr port)

12. DC UTIL PWR – ON

PWR SPLY

13. DC PWR SPLY PWR sw – ON

14. Verify Pwr Sply’s output pwr LED is lit

Cont next page
Docking 15. Verify Docking Station’s pwr LED (next to pwr port) is lit

NOTE
PGSC with Docking Station can be pwrd on/off from either PGSC pwr button or Docking Station pwr button

PGSC 16. PGSC pwr – on

Docking 17. Verify Docking Station light “ ” (located near Docking Station pwr button) is lit

18. Verify data rate:
   Sel Start > ‘OCA Control Panel Applet’
   √‘OCA Control Panel App’ display on desktop
   In ‘OCA-FLIGHT VC-2E’ section of ‘OCA Control Panel App’ display:
   √SEND – 2(4)M

* If send rate out of config: *
* Sel ’OCA Port Select’>’OCA’ *
* Transmit Port and Rate’>’RS-422’ *
OCA DOWNLINK VIA GROUND CMD

1. MOVE FILE(S) TO DOWNLINK DIRECTORIES

   NOTE
   Files downlinked via ground cmd
   unless MCC instructs otherwise

   See OCA DIRECTORY STRUCTURE, 12-12
   See OCA FILENAMES, 12-13, for file naming
   convention

   PGSC Copy(Move) desired files to appropriate subfolder in
   c:\oca-down\
   Notify MCC when complete

2. MONITOR KFX DOWNLINK (if desired)
   When link established:
   From ‘KFX’ window:
   \REMOTE KFX – green
   \Uplink arrow (‘↑’ next to send rate) – green
   \Dnlink arrow (‘↓’ next to send rate) – green

   √KFX application activated
   √File Transfer Status dialog (displayed during file xfer)

3. MONITOR MFX DOWNLINK (760XD only)
   (if desired)
   If MFX application not activated:
   Perform OCA S-BAND MODEM (MFX)
   ACTIVATION, 12-16, then:

   If minimized:
   √Icon Title displaying File Name, Send/Receive
   Status

   NOTE
   For detailed file xfer information, following
   steps must be completed prior to file xfer
   initiation

   Sel ‘File’ on menu bar of MFX application
   √Show Status During File Xfers – (√)
   √Z MODEM(1K-X MODEM) display appears
   √Displaying File Name, Send/Receive Status
**OCA DIRECTORY STRUCTURE**

C:\

- OCA-DOWN
  - IMAGERY
    - ET HAND-HELD
    - OMS POD
    - UMBILICAL
    - UMBILICAL 2
    - MAIL
    - PAYLOADS *

- OCA--SW (ground use only)

- OCA-UP
  - FP
  - MAIL
  - MESSAGES
  - NEWS
  - OTHER
  - PAYLOADS
  - SpOC **
  - WEB

* PAYLOADS Directory: Directory may contain flight-specific subdirectory

** SpOC Directory: Directory will contain latest file updates for SpOC applications
## OCA FILENAMES

### UPLINKED FILES
- **SpOC updates:** c:\oca-up\spoc\n- **Ops notes:** c:\oca-up\other\opsxxxxx.doc
- **Graphics files:** c:\oca-up\other\othrxxxx.bmp
- **Uplinked personal mail:** c:\oca-up\mail\n- **Uplinked Payload files:** c:\oca-up\payloads\n
### DOWNLINKED FILES
- **Camera images:** c:\oca-down\imagery\n- **Personal mail, other:** c:\oca-down\mail\n- **Payload files:** c:\oca-down\payloads\n
### STD FILENAMES
- `filename.doc`: WORD documents only
- `filename.txt`: ASCII text file (NOTEPAD or WORD)
- `filename.bmp`: Graphics file (Paint)
- `filename.pcx`: Graphics file (Paint)
- `famcdr01.doc*`: family mail: CDR → family on FD01
- `cdrfam02.doc*`: family mail: family → CDR on FD02
- `fltcdr02.doc*`: message: CDR → FLT Director on FD02

*Outlook OST files are nominally used for personal mail. If Outlook is not working properly, the above file locations and nomenclature will be used.

**NOTE**
Do not downlink medical data. Downlink directories will be cleared of all files at end of each OCA session. To retain archive copy of downlink msgs, save in personal directory.
OCA KU-BAND (KFX) MANUAL DOWNLINK

1. CONFIGURE S/W FOR FILE DOWNLINK
   PGSC If reqd, enlarge ‘KFX’ window
   From ‘KFX’ window:
   ✓ REMOTE KFX – green
   ✓ Uplink arrow (‘↑’ next to send rate) – green
   ✓ Dnlink arrow (‘↓’ next to send rate) – green

2. SELECT FILE(S) TO DOWNLINK
   Use WINDOWS EXPLORER to sel files/directories to transfer
   Drag files over KFX window
   Rel mouse button
   ✓ ‘KFX File Transfer Preview’ display appears with selected file(s) listed

3. ADD ADDITIONAL FILE FOR DOWNLINK (if reqd)
   ✓ ‘KFX File Transfer Preview’ display active
   Sel ‘add to list’ button (button with documents, ‘+’ symbols)
   ✓ ‘Select Files for Transfer’ display appears
   Sel desired file from file listbox
   Sel ‘Select’ button
   Repeat for each additional file as reqd
   Sel ‘Done’ button

4. REMOVE FILE FROM DOWNLINK (if reqd)
   ✓ ‘KFX File Transfer Preview’ display active
   Sel desired file(s) in listbox
   Sel ‘delete’ button (button with ‘X’)

5. START FILE DOWNLINK
   NOTE
   User may halt transfer while in progress by sel ‘Abort’ button

Cont next page
\checkmark KFX File Transfer Preview’ display active
Sel ‘downlink’ button (button with ‘↓’)
\checkmark File Transfer Status’ display appears
\checkmark Displaying xfer status

* If error displayed, repeat step 5 *
1. **ESTABLISH LINK**
   On MCC Go:
   - A15 PS COMM CCU PWR – OFF
   - L9 PS AUD PWR – AUD
   - A/G 1 – OFF
   - A/G 2 – T/R
   - A/A – OFF
   - ICOM (two) – OFF
   - VOL A/G 2 tw – 0
   - XMIT/ICOM MODE – PTT/PTT

   **CAUTION**
   Loss of A/A (UHF) will occur if OCA PGSC Modem cable connected to COMM OUTLET and A/A in T/R on ATU

   - O9 R AUD A/G 2 – OFF
   - O5 L AUD A/G 2 – OFF
   - R10 MS AUD A/G 2 – OFF
   - MO42F MIDDECK SPKR AUD A/G 2 – OFF

   A15 √ PGSC Modem cable connected to PS COMM outlet

2. **ACTIVATE FILE XFER S/W**
   **OCA**
   - If PGSC not running Windows 98:
     - Router Restart (or pwr on) PGSC
     - PGSC Within 15 sec, click on ‘STS PGSC’ at ‘Boot Magic’ bootup menu
     - Sel ‘Docked (OCA Card)’ config at Startup Menu, then press [ENTER]

   - Double-click ‘Shuttle Apps’>‘OCA-KFX-MFX’>‘MFX-Modem File Transfer’
   - √‘MFX’ display appears
   - √WINDOW – OFFLINE
   - Arrange ‘MFX’ window as reqd

Cont next page
3. VERIFY PRINTER SETTINGS
MFX PGSC

Click ‘Start’>‘Settings’>‘Printers’
In “Printers” window, right-click “NETWORK EPSON1” printer
On popup menu:
   Verify “Set as Default” checked
   Verify “Use Printer Offline” NOT checked
Close “Printers” window
OCA SSR-1 REGAIN 2 GREEN LIGHTS

OCA Router 1. Rcd UPLK/DNLK colors in STATUS box of OCA Control Panel window:
   Uplink (green circle/red circle/yellow “?”): _______
   Downlink (green circle/red circle/yellow “?”): _______

2. If AOS Ku, check Status of OCA link (via OCA Control Panel window on OCA Router) after each step below. Exit SSR and notify MCC of actions taken when 2 green lights are displayed on router

SSP 3. √ cb PDIP 1 PWR 2 KU BAND RLY – cl

PDIP 4. √ KU BAND RATE in correct posn
   If OCA 2 Mbps, KU BAND RATE – LO
   If OCA 4 Mbps, KU BAND RATE – HI

OCA Router 5. √ OCA Router set to correct transmit rate:
   If KU BAND RATE – LO:
      ‘OCA Port Select’>‘OCA Transmit Port and Rate’>‘RS-422’>‘0-…2,000,000 bps’
   If KU BAND RATE – HI:
      ‘OCA Port Select’>‘OCA Transmit Port and Rate’>‘RS-422’>‘1-…4,000,000 bps’

6. Verify that OCA Interface Cable is well seated to both PDIP panel and OCA card in Router

7. Perform OCA LOOPBACK TEST, 12-21
   If 2 green lights observed during loopback test:
      Cable and card are good
      Reconnect OCA Interface Cable to PDIP panel
      Problem downstream of OCA Interface Cable
      √MCC
   If 2 green lights not observed during loopback test:
      Possible problem with OCA card or OCA Interface Cable
      √MCC

12-18 ORB OPS/ALL/GEN M
RECONFIGURE OCA DOWNLINK RATE

A. CONFIGURE FOR KU CH 2
PDIP
1. Ku BAND RATE – LO

OCA
2. If ‘OCA Control Panel App’ not running, sel ‘Start’ > ‘OCA Control Panel Applet’

Router
3. On ‘OCA Control Panel App’ menu bar:
   Sel ‘OCA Port Select’>‘OCA Transmit Port and Rate’ >
   ‘RS-422’ > ‘0 – Crystal Clock @ 2,000,000 bps’

4. If reqd, config router boot up rate:
   Open ‘Change Boot Up Rate’ folder on desktop
   Double click ‘Boot Up 2 Mbps’ file
   Acknowledge message dialogs (2)

B. CONFIGURE FOR KU CH 3
PDIP
1. Ku BAND RATE – HI

OCA
2. If ‘OCA Control Panel App’ not running, sel ‘Start’ > ‘OCA Control Panel Applet’

Router
3. On ‘OCA Control Panel App’ menu bar:
   Sel ‘OCA Port Select’>‘OCA Transmit Port and Rate’ >
   ‘RS-422’ > ‘1 – Crystal Clock @ 4,000,000 bps’

4. If reqd, config router boot up rate:
   Open ‘Change Boot Up Rate’ folder on desktop
   Double click ‘Boot Up 4 Mbps’ file
   Acknowledge message dialogs (2)
C. CONFIGURE FOR KU PL MAX - 48(36) Mbps

NOTE
\MCC prior to configuring OCA for PL MAX. This will disable DTV downlink

L10
1. Configure DTV MUX:
   1.1 OCA cable P3 (‘OCA2A Shuttle Cable to Shuttle Dnlk Data Mux CLK’) connected to BYPFR CLOCK connector
   1.2 OCA cable P4 (‘OCA2A Shuttle Cable to Shuttle Dnlk Data Mux DATA’) connected to BYPFR DATA connector
   1.3 MUX BYPASS – BYPFR
   1.4 \MUX/VTR/CC – ON

OCA
2. If ‘OCA Control Panel App’ not running,
   sel ‘Start’ > ‘OCA Control Panel Applet’

Router
3. On ‘OCA Control Panel App’ menu bar:
   Sel ‘OCA Port Select’>‘OCA Transmit Port and Rate’ >
   ‘Fiber (ISS) or PMAX (Shuttle)’ >
   ‘6 – Crystal Aux2 Clock @ 48,000,000 bps’
   (‘5 – Crystal Aux1 Clock @ 36,000,000 bps’)  

4. If reqd, config router bootup rate:
   Open ‘Change Boot Up Rate’ folder on desktop
   Double click ‘Boot Up 48(36) Mbps’ file
   Acknowledge message dialogs (2)

D. DE-CONFIGURE FROM KU PL MAX

L10
1. MUX BYPASS – ACT (or as reqd)

2. Perform step A or B as reqd
OCA LOOPBACK TEST

NOTE
Perform on OCA Router PGSC

1. OPEN OCA CONTROL PANEL APPLET

OCA Router Log into OCA Router
PGSC Sel ‘Start’ > ‘OCA Control Panel Applet’
√ OCA Control Panel App’ display on desktop

2. INTERNAL LOOPBACK TEST

2.1 Initiate Test

From ‘OCA Control Panel App’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘Internal Loopback’

√ OCA Control Panel App’ display:
Successful Test – Animated signal moving inside PC icon and ‘SUCCESS’ displayed
Unsuccessful Test – ‘Frowny face’ displayed inside PC icon and ‘FAILURE’ displayed
Inform MCC of results

2.2 Terminate Test

From ‘OCA Control Panel App’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘Stop Loopback Testing’

3. EXTERNAL LOOPBACK TEST 1 (PDIP I/F)

3.1 Initiate Test

√ OCA I/F cable P1 connected to OCA PC board
44-pin connector
Disconnect OCA I/F cable P2 from PDIP panel
On OCA I/F cable, connect P2 to J1

From ‘OCA Control Panel App’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘External Loopback #1’
Sel ‘OK’ to acknowledge msg about connecting the loopback cable
Cont next page
OCA Control Panel App’ display:
Successful Test – ‘Happy face’ displayed inside PC icon and animated signal moving outside PC icon and ‘SUCCESS’ displayed
Unsuccessful Test – ‘Frowny face’ displayed inside PC icon and no animation outside PC icon and ‘FAILURE’ displayed
Inform MCC of results

3.2 Terminate Test
From ‘OCA Control Panel App’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘Stop Loopback Testing’
Disconnect OCA I/F cable P2 from J1
Reconnect OCA I/F cable P2 to PDIP Ku/J4 (as reqd)
4. EXTERNAL LOOPBACK TEST 2 (DTV MUX I/F)

4.1 Initiate Test

√ OCA I/F cable P1 connected to OCA PC board

44-pin connector

Disconnect OCA I/F cable P3, P4 (two) from DTV MUX

On OCA I/F cable, connect

P3 to J3 (PL MAX clock)
P4 to J4 (PL MAX data)

From ‘OCA Control Panel App’ display:

Sel ‘OCA Self Tests’ on menu bar

Sel ‘External Loopback #2’

Sel ‘OK’ to acknowledge the message about connecting the loopback cable

√ ‘OCA Control Panel App’ display:

Successful Test – ‘Happy face’ displayed inside PC icon and animated signal moving outside PC icon and ‘SUCCESS’ displayed

Unsuccessful Test – ‘Frowny face’ displayed inside PC icon and no animation outside PC icon and ‘FAILURE’ displayed

Inform MCC of results

4.2 Terminate Test

From ‘OCA Control Panel App’ display:

Sel ‘OCA Self Tests’ on menu bar

Sel ‘Stop Loopback Testing’

Disconnect OCA I/F cable P3,P4 from J3,J4 (two)

Reconnect OCA I/F cable P3,P4 (two) to DTV MUX (as reqd)
Figure 12-5.- OCA Cable Diagram – Loopback.

P1 remains connected to OCA card for all loopback tests.
PGSC NETWORK

A. SETUP

NOTE
Procedure assumes PGSC ACT, 12-3, performed for each PGSC to be networked

1. Unstow (if not pre-routed):
   Wireless Access Point (WAP)
   WAP DC Pwr Sply (white)
   WAP Pwr Sply cable
   WAP Pwr cable
   DC Pwr cable
   Wireless Network cards
   RJ-45 Network cables

NOTE
At a minimum, network equipment should be configured for OCA Router PGSC, KFX PGSC, Wireless Access Point, and Printer

WIRELESS ACCESS POINT SETUP

2. Configure network equipment per:
   PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)

3. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use for Wireless Access Point pwr

4. √ DC UTIL PWR – OFF

Cont next page

12-25 ORB OPS/ALL/GEN M
5. Per Figure 12-6, PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR):
   a. Connect DC PWR cable from DC Util Pwr outlet to Access Point DC Pwr Sply input
   b. Connect WAP Pwr Sply Cable to WAP Pwr Cable (see fig 12-6)
   c. Connect other end of WAP Pwr Sply Cable to DC Pwr Sply output (see fig 12-6)
   d. Connect WAP Pwr Cable to Access Point pwr port (see fig 12-6)

6. DC UTIL PWR – ON
7. DC PWR SPLY PWR sw – ON
8. Connect RJ-45 Network cables:
   a. From hub of Wireless Access Point to OCA Router’s RJ-45 port (on Docking Station)
   b. From hub of Wireless Access Point to KFX PGSC’s RJ-45 port
   c. From hub of Wireless Access Point to Printer’s RJ-45 port
   d. From hub of Wireless Access Point to any other PGSC planned to be on wired network (as reqd)

9. Access Point PWR sw – ON
10. Verify Access Point’s pwr LED is lit

Figure 12-6.- WAP configuration.
NOTE
Use top PCMCIA card slot for wireless network card to avoid blocking accessibility to bottom PCMCIA card slot

PGSC
11. For all PGSCs planned to be on wireless network, insert Wireless Network card into top PCMCIA card slot of PGSCs
12. If not already done, pwr on PGSCs
13. Verify network connectivity using PingMaster:
   - Double-click ‘Shuttle Apps’>‘Network Configuration’>‘PingMaster’
   - √ ‘Status’ column of ‘Network Primary’ and ‘Network Nodes’ sections for networked PGSCs, Printer (if setup) and Access Point
   - If status is ‘Good Response’ for networked PGSCs, Printer (if setup) and Access Point, press [CTRL]/[x] to exit PingMaster (if desired)

   * If status is ‘Not Responding’:
   *   1. Verify proper network cable
   *          connections: For RJ-45 ports with connected network cables, verify Access Point LAN LEDs are lit and PGSC/Docking Station’s RJ-45 port LEDs are green
   *   2. For wireless network, verify network cards are properly seated PCMCIA card slots and PGSCs recognize cards
   *   3. Recheck status in PingMaster
   *   4. If still no joy, reboot PGSCs and recheck status in PingMaster

KFX
   - Arrange ‘KFX’ window as desired

Cont next page
B. TEARDOWN

1. For PGSCs on wireless network, depress release button to eject wireless network card from PCMCIA card slot and remove wireless network card

2. For PGSCs on wired network, disconnect RJ-45 network cables from RJ-45 port on PGSC or Docking Station

3. Stow network equipment

C. PGSC NAMING

1. MCC for new PGSC name

2. Double-click ‘Shuttle Apps’>‘Network Configuration’>‘Rename PGSC’

3. Sel ‘Yes’ to run ‘Unique Client Config’ program

4. At ‘Network Client Config’ dialog box, sel appropriate computer name assigned by MCC

5. Sel ‘Update’ button

6. Sel ‘OK’ at ‘Verification’ and ‘Update’ dialog boxes

7. Sel ‘Yes’ to restart PGSC
COLOR PRINTER UNSTOW AND ASSEMBLE

NOTE
Power off Printer when not in use

1. UNSTOW
   Printer
   AC PWR Cable (if reqd)
   Printer Data Cable (one of the following):
      - 6-ft parallel data cable
      - 25-ft parallel data cable
      - 16-ft or 32-ft RJ-45 network cable
   Printer paper
   Printer Paper Feeder Tray
   Paper Output Tray

2. ASSEMBLE PRINTER
   Printer
   Align arrows on Paper Feeder Tray and back of Printer
   Insert white tabs on Paper Feeder Tray (near arrows) into black outlined slots on Printer
   (see figure 12-7)
   Slide tray downward
   Attach Paper Feeder Tray to Printer (secure via thumbscrews)
   Attach Paper Output Tray to Printer (secure via thumbscrews)

3. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use

4. √AC UTIL PWR – OFF
   Printer
   √AC PWR cable connected to AC Util Pwr panel
   Connect AC PWR cable to Printer Power Port
   (see figure 12-8)

Cont next page
If Printer to be set up as Network Printer:
Connect RJ-45 network cable to Printer Network RJ-45 Port (see figure 12-8)
Connect other end of RJ-45 network cable to LAN port of Wireless Access Point

If Printer to be set up as Local Printer:
Connect parallel cable between Printer Parallel Port and KFX PGSC Parallel Port (see figure 12-8)

Insert 8.5 x 11” paper into Paper Feeder Tray (~50 sheets)

Attach Printer to wall of desired area (example: AFD or Airlock ditch) using Velcro

Figure 12-7.- Side view of printer and trays, ready for assembly.
Figure 12-8.- Printer (top view/back view), PGSC (parallel port).
COLOR PRINTER WARMUP AND SELF-TEST

WARMUP
1. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use

2. AC UTIL PWR – ON

Printer

3. Printer pwr – on (see figure 12-8)
   √ Flashing green pwr light (~5 min)

4. √ Printer ready
   Ready when pwr light is steady green

SELF-TEST

NOTE
After successful test print, terminate SELF-TEST by powering printer OFF

Printer

1. Printer pwr – off

2. Press and hold Load/Eject button, then press pwr button
   Hold Load/Eject button for 3 sec after depressing pwr button, then release

3. Observe printing of one black text page and one color text page

4. √ Print quality
   Look for missing sections in Nozzle Check section

5. If print quality not acceptable, go to CLEANING PRINTER HEADS, 12-37

6. If paper jam, go to COLOR PRINTER PAPER JAM, 12-34

7. If printer quality acceptable, Printer pwr – off
   (to terminate SELF-TEST)

8. Notify MCC: Status of SELF-TEST results
COLOR PRINTER STOW

1. Printer pwr – off (press pwr button once)
   Printer lt – off
   Wait for unit to stop moving. Printer head should be
   at right side and locked into place

2. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT
   CONFIG (REF DATA FS, UTIL PWR) or PGSC
   Usage Chart (if available) for appropriate AC Util
   Pwr outlet/sw to use

3. AC UTIL PWR – OFF

4. Disconnect AC PWR cable from AC Util Pwr outlet,
   if reqd

5. Remove paper from Paper Feeder Tray and stow it

6. Remove Paper Feeder Tray from Printer (disconnect
   via thumbscrews)

7. Remove Paper Output Tray from Printer (disconnect
   via thumbscrews)

8. Disconnect AC PWR cable from Printer

9. If Printer set up as Network Printer:
   Disconnect RJ-45 network cable from Printer
   Network RJ-45 Port (see figure 12-8)
   If Printer set up as Local Printer:
   Disconnect parallel cable between Printer
   Parallel Port and KFX PGSC Parallel Port
   (see figure 12-8)

10. Stow:
    Printer
    AC PWR cable (if reqd)
    Printer Data cable(s)
    Printer paper
    Printer Paper Feeder Tray
    Paper Output Tray
CHECK COLOR PRINTER SETTINGS

NOTE
Perform following procedure to verify Printer settings on PGSC from which printing executed (i.e., settings are not on Printer)

PGSC
1. Sel ‘Start’>‘Settings’>‘Printers and Faxes’ from Windows taskbar
2. Right-click appropriate printer icon:
   Parallel: Local Color Printer
   Network: Network Color Printer
3. Verify ‘Set as default’ selected (√)

COLOR PRINTER PAPER JAM

Printer
1. Printer pwr – off (press pwr button once)
2. √Printer lt – off
3. √Paper Feeder Tray clear of obstruction
   √Paper Output Tray clear of obstruction
4. Raise Printer cover (see figure 12-7)
   √Inside of Printer clear from obstruction
5. If paper jam cleared, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-32, then:
6. If paper jam continues, notify MCC
7. If reqd, go to COLOR PRINTER STOW, 12-33
INK CARTRIDGE CHANGEOUT

NOTE
Perform if color(black) ink cartridge light illuminated. Changeout of color and black cartridges takes ~5 min.

If color(black) ink cartridge light flashing, ink is low.

If color(black) ink cartridge light solid, ink is out

1. Printer ready (notice steady green pwr light)

2. Raise Printer cover (see figure 12-7)

NOTE
Printer will reset if step 4 not performed within 1 min after step 3. If reset experienced, repeat step 3

3. Press and hold “color(black) ink cartridge advance button” (~3 sec) and release. Color(black) ink cartridge will move and become accessible

CAUTION
Do NOT squeeze ink cartridges

4. Lift tab on purple cover
Remove color(black) ink cartridge

5. Cover opening on used cartridge with Gray Tape
Stow old cartridge in Ziplock Bag
Place Ziplock Bag in Printer Locker

6. Unstow new cartridge from sealed pack
Remove small yellow plastic tab on top (Do not remove white tab; reference instructions on cartridge)

Cont next page
7. Insert new cartridge (arrow should be pointing toward back of Printer)

8. Lower and latch tab on purple cover
   (Do not reopen)
   If also changing other cartridge, go to step 3

9. Lower and close Printer cover

10. Press Load/Eject button; Printer will perform a cleaning that will last ~3 min

11. Go to COLOR PRINTER WARMUP AND SELF-TEST, SELF-TEST, 12-32, to ensure proper operation
CLEANING PRINTER HEADS (Black and/or Color)

NOTE
Printer must be on, not printing, and appropriate ink cartridge light must not illuminate red

Printer 1. √Printer pwr – on

2. √Ink cartridge lt – OFF
   If ink cartridge lt flashing or solid, go to INK CARTRIDGE CHANGEOUT, 12-35

NOTE
Perform following steps from PGSC connected to Printer via parallel cable or networked to Printer

PGSC 3. Sel ‘Start’>‘Settings’>‘Printers and Faxes’ from Windows taskbar

4. Right-click appropriate printer icon:
   Parallel: Local Color Printer
   Network: Network Color Printer

5. Verify ‘Set as default’ selected (√)

6. Sel ‘Properties’

7. Sel ‘Utilities’ tab

8. Sel ‘Head Cleaning’
   Sel ‘Next’

9. Sel ‘Black’, ‘Color’, or ‘Both’
   Sel ‘Next’

10. When cleaning complete (~5 min), sel ‘Nozzle Check’
    If test still missing sections, repeat steps 8 and 9

11. If nozzle test nominal, click ‘OK’ to exit

   12-37 ORB OPS/ALL/GEN M
PRINTER HEAD ALIGNMENT

NOTE
Printer must be on, not printing, and appropriate ink cartridge light must not illuminate red

Printer
1. √Printer pwr – on
2. √Ink cartridge lt – off
   If ink cartridge lt flashing or solid, go to INK CARTRIDGE CHANGEOUT, 12-35
3. Verify Paper Feeder Tray has at least ten sheets of paper

NOTE
Perform following steps from PGSC connected to Printer via parallel cable or networked to Printer

PGSC
4. Sel ‘Start’>‘Settings’>‘Printers and Faxes’ from Windows taskbar
5. Right-click appropriate printer icon:
   Parallel: Local Color Printer
   Network: Network Color Printer
6. Verify ‘Set as default’ selected (√)
   Sel ‘Properties’
7. Sel ‘Utilities’ tab
   Sel ‘Print Head Alignment’ button
   At ‘Printer Head Alignment’ dialog box, sel ‘Next’ button
8. At second ‘Printer Head Alignment’ dialog box, sel ‘Next’ button
9. Examine printed sheet “A”
   If alignment satisfactory, sel ‘Cancel’ twice to exit
   If alignment not satisfactory, follow directions on screen
10. When alignment complete (~5 min), sel ‘OK’ to exit
NOTE
This procedure assumes A31p laptop is configured for pwr, running, and networked. Two downloads will be performed to assure uncorrupted images are downloaded.

1. MCC that camera is powered and ready

2. Unstow:
   - A17 1394 Converter (SED33117251-301)
   - DTV bag
   - IEEE 1394 Crew Cabin cable (SED33113436-303)
   - IEEE 1394 cable assy (firewire) (SEZ33112995-303)

3. PWR sw – ON (lt on)
   If no lt, Replace batts (batt life – 4 hr)

4. Configure hardware per figure 12-9 below making Firewire cable connection to laptop last:

---

Cont next page
5. √PGSC pwr – on
   If ‘Found New Hardware Wizard’ appears:
   Sel ‘No, not this time’
   Sel ‘Next’
   Sel ‘Install the software automatically
   (Recommended)’
   Sel ‘Next’
   Sel ‘Finish’

6. Double-click ‘Shuttle Apps’>‘Image Processing’>
   ‘KODAK DCS Camera Manager’ (“KODAK
   Professional DCS Camera Manager” box
   displayed)
   If ‘DCS Camera Manager’ window with ‘Please wait
   while Camera Manager searches for connected
   cameras’ message appears for > 30 sec:
   Sel ‘Cancel’
   √MCC

7. √Camera Folders’ tab selected

8. √CARD1/FOLDER01’ selected (red), note image qty
   shown in “( )”, expect approx 23

9. First download:
   a. Under ‘Copy to Computer’:
      √No boxes selected (DO NOT delete files)
      Sel ‘Copy...’
   b. Under ‘Copy To’:
      Sel ‘c:\OCA-down\Imagery\UMBILICAL’ in
      ‘Save in:’ text box
      √As Is’ selected in ‘Format:’ text box
      √No ‘√’ for ‘Rename Image File(s)’
      Sel ‘Save Files in “UMBILICAL”’
      (“Saving Files” box displayed, est 6 min to
      download)
   c. When “Saving Files” completed, go to “My
      Computer: c:\OCA-down\Imagery\UMBILICAL”,
      √ object qty matches “CARD1\FOLDER01” qty
      If not, √MCC

Cont next page

12-40 ORB OPS/ALL/GEN M,2
10. Second download:
   a. Under 'Copy to Computer':
      \No boxes selected (DO NOT delete files)
      Sel 'Copy…'
   b. Under 'Copy To':
      Sel 'c:\OCA-down\Imagery\UMBILICAL 2' in 'Save in:' text box
      \As Is’ selected in ‘Format:’ text box
      \No ‘\’ for ‘Rename Image File(s)’
      Sel ‘Save Files in “UMBILICAL 2”’
      (“Saving Files” box displayed, est 6 min to download)
   c. When “Saving Files” completed, go to “My Computer: c:\OCA-down\Imagery\UMBILICAL 2”,”
      \ object qty matches “CARD1\FOLDER01” qty
      If not, \MCC

11. Sel ‘X(Close)’ to return to desktop

CONV 12. PWR sw – OFF (lt off)

13. Stow Converter box,cables

   \NOTE
   MCC will downlink images as soon as practical
WINDECOM OPS

A. ACT

1. Unstow data cables, cards, adapters:
   - PCMMU data cable (if not prerouted)
   - RS-232 Y data cable (if reqd)
   - RS-422 Y data cable (if reqd)
   - RS-422 PCMCIA cards, adapter boxes (if reqd)

2. √OI PCMMU PWR – 1(2)
   - C3 MO30F If using pnl O5 to receive PCMMU feed, verify jumper plug connected to PCMMU 1(2) outlet
   - If using pnl MO30F to receive PCMMU feed, disconnect jumper plug from PCMMU 1(2) outlet

3. Connect PCMMU data cable from PCMMU 1(2) outlet to PGSC PCMMU expansion card port

4. If sending WinDecom data via serial connection(s):
   - See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate data cable/card connections from WinDecom PGSC to end user PGSC(s)

5. If sending WinDecom data via network:
   - See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate network cable connections from WinDecom PGSC to end user PGSC(s)
   - If not already done, perform PGSC NETWORK, 12-25
6. Double-click ‘Shuttle Apps’>‘WinDecom’>
appropriate WinDecom application

7. √Software application(s) on end user PGSC(s)
receiving WinDecom data

   * If Software application(s) on end user *
   * PGSC(s) not receiving WinDecom *
   * data, go to C. TROUBLE- *
   * SHOOTING, below *

B. DEACT

Win 1. Double-click ‘Shuttle Apps’>‘WinDecom’>
Decom ‘WinDecom Shutdown’
PGSC Sel ‘OK’ to shut down telemetry system >>

C. TROUBLESHOOTING

1. On Telemetry Monitor display, sel
   ‘Mode’>‘Newman’ menu option and sel ‘Yes’
to Tlm Monitor dialog

   NOTE
   The following individual steps may fix
   the problem. Exit procedure as needed

PGSC If dynamic data not displayed on WinDecom
   ‘Tlm Pkt-Net’ and/or ‘Tlm Pkt-Com’ displays:

   2. √PGSC PCMMU card receiving data from
      orbiter PCMMU stream:
      From WinDecom ‘Tlm Pkt-Net’ and/or
      ‘Tlm Pkt-Com’ displays, sel ‘Packets’ tab
      and verify ‘send at’ GMT times are
      dynamic

      If no joy, verify PCMMU data cable
      properly connected at orbiter PCMMU
      port and PGSC Expansion Unit PCMMU
      port, repeat step 2, above

      √End user PGSC(s) receiving WinDecom
      data

Cont next page
3. Repeat A. **ACT**, step 2, 12-42

4. Disconnect PCMMU cable at both ends, connect backup PCMMU cable between orbiter PCMMU port and PGSC Expansion Unit PCMMU port

5. Replace WinDecom PGSC with backup PGSC with PCMMU Expansion Unit

If end user PGSC(s) not receiving WinDecom data:

6. Data being sent out from network and/or com ports on WinDecom PGSC:
   - From WinDecom ‘Tlm Pkt-Net’ and/or ‘Tlm Pkt-Com’ displays, sel ‘Ports’ tab and verify ‘Bytes’ indicator is dynamic

7. Network, RS-232 Y, and/or RS-422 Y data cables properly connected on WinDecom and end user PGSC(s)
   - If applicable, verify RS-422 PCMCIA card(s) properly inserted and RS-422 adapters properly connected

8. If sending WinDecom data via network, check network status using PingMaster:
   - Double-click ‘Shuttle Apps’> ‘Network Config’>‘PingMaster’ on any networked PGSC
   - √‘Status’ column of ‘Network Nodes’ section for WinDecom PGSC and end user PGSC(s)
   - If status is ‘Good Response’ for networked PGSCs, press [CTRL]/[x] to exit PingMaster (if desired)
   - If status is not ‘Good Response’:
     - √Proper network cable and card connections, then recheck status in PingMaster
     - If end user application supports Telemetry Server, double-click ‘Telemetry Server’ icon (i.e., red stop sign or yellow circle) in system tray of each end user PGSC not receiving data
   - Sel ‘File’ on menu bar, then sel ‘Reset Server’

Cont next page
9. If end user application supports Telemetry Server and PGSC set up to receive serial data, verify port and baud rate selections:  
   Double-click ‘Telemetry Server’ icon (i.e., red stop sign or yellow circle) in system tray of each end user PGSC not receiving data  
   Sel ‘Source’ on menu bar of Telemetry Server  
   √‘Serial’ selected (✓)  
   Sel ‘Port’ on menu bar  
   √Com port selected (✓) same as com port receiving WinDecom data  
   √Correct baud rate selected for com port:  
      Open ‘Packet & TFL Info’ table (from ‘Shuttle Apps’>’WinDecom’)  
      √Footnotes of table to determine proper baud rate for each com port, then minimize file  
      Sel ‘Baud’ on menu bar of Telemetry Server  
      √Baud rate selected (✓) matches rate shown in footnote of table for particular com port

10. √Current TFL and WinDecom data output config can support end user application(s):  
    Open ‘Packet & TFL Info’ table (from ‘Shuttle Apps’>’WinDecom’)  
    Reference table to verify current loaded TFL supports particular end user application(s)  
    √‘Output’ column of table for packet output from WinDecom (com ports and network), compare info to cabling on WinDecom PGSC

Cont next page
11. If end user application supports Telemetry Server, from ’Help’ on menu bar of Telemetry Server of each end user PGSC not receiving data:
   Sel ’Trouble-shooting’ for more troubleshooting info
RSAD SETUP INSTRUCTIONS

NOTE
To prevent additional setup and troubleshooting steps, setup and start RSAD before starting DOUG. Multicast must be enabled on RSAD for DOUG to get SRMS data via packet 42. For docked ops, joint angle information is sent via packet 44 from SSRMS thru OIU to RSAD and then to DOUG. Data from SSRMS can also be received by DOUG serially via PCSDAS server application.

A. GENERAL OPERATIONS

PGSC

1. Select RSAD shortcut from ‘Shuttle Apps’

2. SRMS joint angles (displayed on A8 or Spec 169) agree with those displayed by RSAD
   If all angles do not agree (to the nearest tenth of a degree):
   Perform RSAD TROUBLESHOOTING,
   A. RSAD JOINT ANGLES DIFFERENT THAN SRMS ANGLES, 12-50
   If only WR angle does not agree (to the nearest tenth of a degree):
   Perform RSAD TROUBLESHOOTING,
   B. INVALID MCIU WRR MESSAGE, 12-50

Cont next page
B.  **OBSS OPERATIONS**

**NOTE**
The Boom display prompts you to select a waypoints group if none is selected.

Waypoint targets should automatically update. If target does not update, use ‘↓’ on keybd to move to next target

1. Bring up Boom display screen: Press [B] or ‘Views’>‘Boom’

2. Bring up target selection window: Press [F8] or ‘Data’>‘Select Target’. Choose group of waypoint targets from bottom half of target selection window, then click ‘OK’

3. If desired, bring up Combo display screen:
   Press [C] or ‘Views’>‘Combo’
RSAD FUNCTION KEYS SUMMARY

GENERAL FUNCTION KEYS

[F7] SELECT DATA SOURCE
[F8] SELECT TARGET
[B] BOOM VIEW
[C] COMBO VIEW
[CTRL][H] HIDE HCD
[CTRL][J] HIDE JID
[CTRL][P] HIDE POR
RSAD TROUBLESHOOTING

Notify MCC of problem. Then perform each step from appropriate procedure, one at a time, in order, until functionality restored

A. RSAD JOINT ANGLES DIFFERENT THAN SRMS ANGLES

1. If WR joint angle is the only one different, go to

B. INVALID MCIU WRR MESSAGE

PGSC

2. √MCC for Arm ID

3. ‘Data’>‘Select Arm ID (Joint Biases)’>‘Arm ID’
   (in ‘Arm Selection’ window)

4. Select ‘Arm ID’ as suggested by MCC, then ‘OK’

B. INVALID MCIU WRR MESSAGE

1. ‘MCIU’>‘Select WR Range’

2. Select WR range that matches WR angle displayed on A8 or Spec 169
3. If MCIU WRR message does not go away or continually reappears, \( \sqrt{\text{MCC}} \)

C. A YELLOW X ACROSS RSAD DISPLAY APPEARS OR SPINNER IN LOWER RIGHT-HAND CORNER OF RSAD APPLICATION NOT ROTATING

**NOTE**

Appearance of yellow X means RSAD is not receiving any data

1. If spinner not rotating, go to step 6

2. √Network Cable properly connected or network card seated properly for both RSAD PGSC and WinDecom PGSC

O5 (MO30F) 3. √PCMMU Cable is properly connected between correct PCMMU port and WinDecom’s PCMMU board

PGSC 4. Reset Telemetry Server by double-clicking on Stop Sign in icon tray. Select ‘File’>‘Reset Server’. Once complete, minimize Telemetry Server window

Cont next page
5. Restart RSAD application

6. Shutdown PGSC, reseat network card or network cable, boot PGSC, and start RSAD

7. √MCC, and upon their GO, go to D. **TELEMETRY SERVER DATA REMAINS UNAVAILABLE BUT MCIU DATA IS STILL AVAILABLE**

D. **TELEMETRY SERVER DATA REMAINS UNAVAILABLE BUT MCIU DATA IS STILL AVAILABLE**

**NOTE**
Without Telemetry Server, Spec 94 target from RSAD is unavailable

1. Select ‘Data’>‘Manual Input’

2. Configure ‘Robotic Arm Specific Parameters’ in right column as desired and click ‘OK’

3. If Control Mode, Payload ID, or Payload Capture status is changed, return to these parameters to make appropriate updates

Cont next page

12-52 ORB OPS/ALL/GEN M
If Telemetry Server data is recovered,
4. Open ‘Data Source Selection’ window via menu ‘Data’>‘Select Data Source’ or [F7] function key
5. Select ‘Telemetry Server’, then click ‘OK’ to make change

E. MCIU ERROR [VALUE] …MESSAGE OCCURS
1. √Card and cable as suggested by error message

NOTE
Without MCIU data, RSAD data will be delayed approx 4 sec

If MCIU data cannot be recovered:
2. Open ‘Data Source Selection’ window via [F7] function key
3. De-select ‘Enable MCIU’ checkbox
4. Click ‘OK’ to make change
DOUG SETUP INSTRUCTIONS

NOTE
To prevent additional setup and troubleshooting steps, setup and start RSAD before starting DOUG. Multicast must be enabled on RSAD for DOUG to get SRMS data via packet 42. For docked ops, joint angle information is sent via packet 44 from SSRMS thru OIU to RSAD and then to DOUG. Data from SSRMS can also be received by DOUG serially via PCSDAS server application.

A. GENERAL OPERATIONS
1. Select appropriate DOUG setup from ‘Shuttle Apps’>‘DOUG’
   a. For EVA preparation, select ‘EVA’
   b. For undocked operations, select ‘RMS – Data from RSAD’
   c. For docked operations using OIU, select ‘RMS_&_SSRMS - Data from RSAD with OIU’
   d. For docked operations using PCSDAS data, perform D. DOCKED OPERATIONS PCSDAS SETUP, then:
      Select ‘RMS_&_SSRMS 2 - Data from RSAD & PCSDAS’

2. Adjust volume to hear proximity alarm. It is recommended that alarm be enabled. To check proximity settings: select ‘Options’>‘RMS Proximity’

3. SRMS joint angles (displayed on A8 or Spec 169) agree with those displayed by DOUG. If they do not agree (to the nearest tenth of a degree), perform DOUG TROUBLESHOOTING, A. DOUG DOES NOT MATCH RSAD JOINT ANGLES, 12-63


Cont next page
CAUTION
In low detail many structural items will not appear in scene and therefore will not be tracked by proximity alarm

5. To change the scene level of detail: Right click anywhere on DOUG display then ‘Scene Detail’>‘High’ or ‘Low’

NOTE
Press [b] to toggle color of target RMS

6. Display target RMS position: ‘Display’>‘Show RMS Target’

NOTE
RMS Proximity must be enabled for VPP to display information. To check proximity settings: ‘Options’>‘RMS Proximity’

7. To call up SRMS VPP display (boom distance to structure): Press [Shift]-[v]

B. OBSS OPERATIONS

NOTE
Press [b] to toggle color of target RMS

1. Display target RMS position: ‘Display’>‘Show RMS target’

NOTE
Restarting DOUG will make ISS stack visible

2. Bring up orbiter with no ISS stack: ‘Reconfig’>‘ORBITER_INSPECTION’> ‘FLIGHT_DAY_2 Configuration’
3. Put OBSS on SRMS:
   ‘Reconfig’>‘ORBITER_INSPECTION’>
   ‘OBSS_GF1_to_SRMS’

4. (If desired) Put OBSS on SSRMS:
   ‘Reconfig’>‘ORBITER_INSPECTION’>
   ‘OBSS_GF2_to_SSRMS’

5. Turn on Orbiter tiles: ‘Reconfig’>‘ORBITER_TILES’>[make selection]

   NOTE
   Pan/tilt values are sent to DOUG from RSAD based upon pre-planned autosequence data.
   Real-time pan/tilt values would have to be entered manually.

6. (If desired) Change LDRI pan/tilt values:
   ‘JntSystems’>‘LDRI-ITVC’>[enter values]

C. FOCUSED INSPECTION OPERATIONS
1. If MCC has uplinked DOUG targets, restart DOUG

   NOTE
   If reviewing in RMS – Data from RSAD mode, Multicast must be disabled on RSAD to allow RMS to be moved in DOUG using DOUG Targets features.

   After reviewing DOUG targets, remember to re-select the ‘Enable Multicast’ checkbox to allow DOUG to receive updates from RSAD.

   If reviewing in RMS – Data from RSAD mode:
   2. On RSAD, open ‘Data Source Selection’ window via [F7] function key
   3. Deselect ‘Enable Multicast’ checkbox
   4. Click ‘OK’ to make change
5. Turn on Orbiter tiles: ‘Reconfig’
   >'ORBITER_TILES'>[make selection]

   **NOTE**
   Damaged RCC sites will have circles
   “painted” on RCC around area of interest.
   Damaged tile sites will be painted yellow.

6. To access an MCC uplinked tile state file:
   ‘File’>'Load Tile State'>[locate file]>'Open’

   **NOTE**
   Enabling SRMS VPP display (Press [Shift]-[v])
   will help identify positions with possible
   clearance concerns.

   Using a multiple window view (‘Display’> ‘One
   View’, ‘Two Views’, or ‘Three Views’) may help
   identify the best cameras for clearance
   monitoring.

   If using ‘Targ RMS’, VPP info will be
   unavailable.

   If using ‘Targ RMS’, press [b] to toggle color of
   target RMS.

Cont next page
If MCC has uplinked DOUG targets:

7. Access targets: Options > RMS Targets

8. √RMS’ checkbox is selected

9. Select target from list

10. Press [HOME] keybd key until ‘RMS TARGETS SELECTED’ appears in lower left corner of DOUG window

11. Scroll thru list using [PAGE UP] and [PAGE DOWN] keybd keys

Cont next page
D. **DOCKED OPERATIONS PCSDAS SETUP**

**NOTE**
Use this procedure only to start and configure PCS laptop and PGSC DOUG application to receive and display real-time SSRMS joint angle telemetry.

**CAUTION**
Do not connect anything to J2 end of Y cable when connecting J3 end of RS232 Y cable (P/N SED39124826-307) to the 9-pin port labeled “COM 1” on back of DOUG PGSC and J1 end to PCS. Deviations from this configuration may cause PCS to fail to halt or application to terminate.
PCS/DOUG 1. Connect RS232 Y Cable between PCS and DOUG. Use 6.107 PCS SETUP - SHUTTLE (SODF: JOINT OPS, COMM/DATA) to power up PCS

If PCS already running, go to step 3

PCS 2. Power up PCS machine

When prompted click ‘Use MDM time’

3. In upper left hand corner of PCS screen, click on the icon ‘PCSCDS main’

PCSCDS Main Control Panel

✓ ‘Connected’ and square is GREEN

Under ‘PCS Connection Status’:

✓ ‘Serial Transfer On’ appears

* If Serial Transfer not On:

* Commands menu ► Serial Transfer

* PCSDS Main Control Panel

* ✓ ‘Serial Transfer On’

4. Open MSS: SSRMS page

NOTE
It may take a few mins for PCS to transfer necessary files to open Robotics displays

If [PCS Home Page] does not appear automatically, click on Home Icon in upper right hand part of screen

[PCS Home Page] ► Robotics Icon

Wait for ‘Transfer Succeeded’, then minimize transfer window and proceed

[RWS page] ► SSRMS Icon

Wait for ‘Transfer Succeeded’, then minimize transfer window and proceed
NOTE
The SSRMS page must be open on PCS and PCS-DAS Server must be active on PGSC in order to supply realtime SSRMS joint angle data to DOUG. None of data fields can be purple or Ms, as that data will not be supplied to DOUG.

DOUG 5. Start PCS-DAS server from Shuttle Apps ➤
PCSDAS
DOUG FUNCTION KEYS SUMMARY

GENERAL FUNCTION KEYS

[b] TOGGLE TARGET ARM GHOST COLOR

[q] KEY CUE CARD

[SHIFT] [v] TOGGLE VPP DISPLAY

CAMERA FUNCTION KEYS

[F1] CAMERA A [SHIFT] [F1] CP 3 (S1 CAMERA)

[F2] CAMERA B [SHIFT] [F2] CP 9 (P1 CAMERA)

[F3] CAMERA C [SHIFT] [F3] CP 13 (LAB CAMERA)

[F4] CAMERA D [SHIFT] [F4] LEE CAMERA

[F5] RMS ELBOW CAMERA [SHIFT] [F5] TIP ELBOW CAMERA

[F6] END EFFECTOR CAMERA [SHIFT] [F6] BASE ELBOW CAMERA

[F7] RSC [SHIFT] [F7] CLPTU MBS

[F8] LDRI ITVC [SHIFT] [F8] STBD

[F9] LDRI SENSOR [SHIFT] [F9] FWD

[F10] IDC [SHIFT] [F10] AFT

[F11] JIMBO CAMERA RMS [SHIFT] [F11] TOP

[F12] JIMBO CAMERA [SHIFT] [F12] BOTTOM
DOUG TROUBLESHOOTING

Notify MCC of problem. Then perform each step from appropriate procedure, one at a time, in order, until functionality restored.

A. DOUG DOES NOT MATCH RSAD JOINT ANGLES
   1. √Cables
   2. Refer to RSAD TROUBLESHOOTING,
   C. A YELLOW X ACROSS RSAD DISPLAY APPEARS OR SPINNER IN LOWER RIGHT-HAND CORNER OF RSAD APPLICATION NOT ROTATING, 12-51
   3. On RSAD, open ‘Data Source Selection’ window via [F7] function key
      √‘Telemetry Server’, ‘Enable MCIU’, and ‘Enable Multicast’ are selected
      If changes are necessary, make changes, and click ‘OK’

4. Restart DOUG

5. √MCC
WORLDMAP INITIALIZATION

PGSC

1. Double-click ‘Shuttle Apps’>‘WorldMap’

2. If no shuttle ground track displayed:
   
   If PGSC configured to receive WinDecom data:
   Sel ‘Tools’>‘Update Satellite Data’ menu option
   √ ‘Receiving Windecom data’ is displayed

   * If ‘Not receiving Windecom data’ displayed:
   * Sel ‘Exit’ to close ‘Satellite Data’ display
   * Perform WINDECOM OPS,
   * C. TROUBLESHOOTING, 12-43
   * Go to step 2

   Sel ‘Set GMT’ button
   √ ‘Receiving Windecom data’ is displayed
   Sel ‘Exit’ to close ‘System Time’ display
   Sel ‘Orbit’ tab
   √ ‘Receiving Windecom data’ is displayed
   Sel ‘Exit’ to close ‘Satellite Data’ display

   If PGSC not configured to receive WinDecom data:
   Sel ‘Tools’>‘Update Satellite Data’ menu option
   If reqd, update MET
   Sel ‘Set GMT’ button
   If reqd, update GMT
   Sel ‘Exit’ to close ‘System Time’ display
   Sel ‘Orbit’ tab

   Update state vector info using data from SPEC 34 display
   Sel ‘Apply’
   Sel ‘Exit’ to close ‘Satellite Data’ display
DEORBIT MANAGER INITIALIZATION

PGSC

1. Double-click ‘Shuttle Apps’>‘Deorbit Manager’

NOTE
Step 2 may be performed as part of Deorbit Manager Initialization if prompted at initialization (without using menu options)

2. Sel ‘Update’>‘Time or State Vector’ menu option
   If PGSC configured to receive WinDecom data:
   - Sel ‘Time’ tab
   - Sel ‘Set GMT’
   - Verify ‘Use Telemetry Time Synchronization’ checked (✓) on
   - ✓‘Receiving WinDecom data’ is displayed (Green)
   - Sel ‘Apply’
   - Sel ‘Exit’ at ‘TVA Server Input Dialog – View/Modify System Time’ dialog
   - Verify ‘Use Telemetry Time Data For This Vehicle’ checked (✓) on
   - ✓‘Receiving WinDecom data’ is displayed (Green)
   - Sel ‘Apply’
   - Sel ‘Orbit’ tab
   - Verify ‘Use Telemetry Orbit Data’ checked (✓) on
   - ✓‘Receiving WinDecom data’ is displayed (Green)
   - Sel ‘Apply’
   - Sel ‘Exit’ at ‘TVA Server Input Dialog – View/Modify Satellite Data’ dialog
   If PGSC not configured to receive WinDecom data:
   - Sel ‘Time’ tab
   - Sel ‘Set GMT’
   - Set GMT value as reqd
   - Sel ‘Apply’
   - Sel ‘Exit’ at ‘TVA Server Input Dialog – View/Modify System Time’ dialog
   - Set MET and/or launch values as reqd
   - Sel ‘Apply’
   - Sel ‘Orbit’ tab

Cont next page
If reqd, update state vector information using data from SPEC 34 display
Sel ‘Apply’
Sel ‘Exit’ at ‘TVA Server Input Dialog – View/Modify Satellite Data’ dialog

3. Sel ‘Mass Properties’>‘CG Manager Data’ menu option
If reqd, update OMS quantity values on ‘Propellant Consumables’ tab
Sel ‘OK’ at ‘CG Manager Data’ display

4. Sel ‘Mass Properties’>‘Cargo Status’ menu option
If reqd, update cargo status
Sel ‘OK’ at ‘Cargo Status’ display

5. If cabin leak:
   * Sel ‘Cabin Leak Filter’ checkbox
   * When Cabin Leak application displayed,
   * update cabin leak data as reqd
   * Minimize Cabin Leak application

6. In Deorbit Opportunities Table, sel desired landing site and sel ‘Target’ button or double-click desired landing site

7. Sel ‘Mnvr PAD’ button to view/copy Deorbit Maneuver PAD for selected landing site

8. When finished viewing Mnvr PAD, sel ‘Close’ at ‘Deorbit Maneuver PAD’ display

9. Repeat steps 6 thru 8 to view Mnvr PAD for other landing site as needed

10. Exit application as needed
NETMEETING VIDEO CONFERENCING

OBJECTIVE:
This procedure is used to configure for, initiate and terminate a NetMeeting session.

Steps 1.1 and 2 set up the camera on the PGSC.
Steps 1.2 and 3 set up the VLHS, if the audio will be through NetMeeting and not A/G.
Steps 4 through 6 are used to start and end a NetMeeting session.

1. UNSTOW
   1.1 Ultraport Camera
   1.2 If audio will be through NetMeeting (vice A/G), VLHS
       VLHS To VTS Interface Cable

2. ULTRAPORT CAMERA SETUP (if reqd)
   If Ultraport Camera is not installed,
   PGSC
   2.1 Exit all applications
   2.2 Perform shut down:
       Sel ▶ Start ▶ Shut Down… ▶ Shut down ▶ OK
   2.3 Open small cover above Interposer (refer to figure 12-10)

Figure 12-10.- Ultraport Camera position.

Cont next page
Camera  2.4 Move and hold release latch towards angled side of Ultraport Camera Align metal legs below Ultraport Camera with holes inside Interposer Refer to figures 12-10 and 12-11

2.5 Release latch to properly secure Ultraport Camera (refer to figure 12-11)

2.6 Ultraport Camera properly secured and does not disconnect

2.7 Rotate lens so that lens is directed towards user (refer to figure 12-11)

3. AUDIO CONFIG THROUGH NETMEETING (if reqd) If audio will be through NetMeeting (vice A/G), Headset, PGSC 3.1 Configure VLHS To VTS Interface Cable and VLHS (refer to figure 12-12)

3.2 Connect cable’s headphone and mic jacks to PGSC (refer to figure 12-12)
Figure 12-12.- Headset configuration.

4. LAUNCHING NETMEETING
   4.1 PGSC connected to network
   4.2 PGSC pwr – on
      
      **CAUTION**
      NetMeeting may not operate properly if KFX is running on the PGSC at the same time
      
   4.3 If running KFX on PGSC, exit KFX
   4.4 Sel Shuttle Apps ▶ NetMeeting
      
      **NetMeeting – Not in a Call**
      
   4.5 Sel Start Video button 📺
   4.6 Verify video image from Ultraport Camera
      Adjust lens position and focus (using focus dial on top of lens assembly) as required
   4.7 Inform MCC (a) ready for call and (b) which PGSC to call
      
      **NOTE**
      MCC will initiate call
      
      **NetMeeting – Incoming call**
      
Cont next page
4.8 Sel Accept button to receive incoming call

4.9 If desired, resize window:
   Right-click on window with incoming video
   Sel 'Window Size'
   Sel value for desired window size

   **NOTE**
   Do not disconnect the Ultraport Camera
   while the PGSC is powered on

5. **ENDING NETMEETING SESSION**

5.1 To end session, sel End Call button

5.2 Sel Call ➤ Exit

5.3 If last NetMeeting session of flight:
   Disconnect VLHS To VTS Interface Cable
   from PGSC (if used)
   Move and hold release latch towards angled
   side of Ultraport Camera and remove
   Ultraport Camera from PGSC (refer to
   figure 12-11)
   Stow VLHS, VLHS To VTS Interface Cable,
   Ultraport Camera (as needed)

6. **RESTART KFX (if reqd)**

6.1 Startup KFX on PGSC as needed
PILOT WITH RHC (FOR A31p PGSC)

NOTE
It is assumed PGSC (A31p) set up without Expansion Unit

A. EQUIPMENT SETUP
1. Unstow:
   PILOT HC
   PILOT Y-Cable
   Elastic Strap (1)
   Tie-wraps (2)
   PILOT CD
   DC PWR SPLY (760XD type, ‘white brick’)
   DC PWR SPLY Cable (760XD type)
   PGSC DC PWR Cable (28 Vdc)

Towel Rack/Handhold
2. Secure elastic strap to Towel Rack and Window Handhold (right or left, to match seat used) with tie-wraps

CAUTION
Once secure, pushing buckle will allow it to release, freeing RHC. When pushing buckle lever to release, keep thumb clear from underneath (pinch hazard)

PILOT HC
3. Extend (pull) PILOT HC straps and position HC on aft portion of orbiter RHC pedestal. Secure lower strap over pedestal, pull strap taut and pull out firmly on buckle; repeat with upper strap

4. PILOT HC pwr – OFF (down posn)

PWR SPLY
5. DC PWR SPLY PWR sw1 – OFF

6. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart for appropriate DC Util Pwr outlet/sw to use for PILOT HC pwr

Cont next page
Pwr outlet 7. DC UTIL PWR – OFF (utility outlet for HC)

DC PWR Cable 8. Connect DC PWR Cable from DC Util Pwr outlet to DC PWR SPLY (white brick) outlet (J1)

DC PWR SPLY Cable 9. Connect DC PWR SPLY Cable from DC PWR SPLY (white brick) outlet (J2) to PILOT HC (see figure 12-13)

PGSC 10. Shut down A31p PGSC

11. If present, disconnect any cable from PGSC RS-232 port and secure

NOTE
PILOT Y-Cable Power Leg to PGSC remains terminated

PILOT Y-Cable 12. Connect PILOT Y-Cable RS-232 Leg to RS-232 port
Connect PILOT Y-Cable Hand Controller Leg to PILOT HC (see figure 12-13)

PGSC 13. Position and secure PGSC in front of HUD and behind elastic strap (top of display touching bottom of eyebrow panel). Duct tape can be used as needed to secure PGSC

Pwr outlet 14. DC UTIL PWR – ON (utility outlet for HC)

PWR SPLY 15. DC PWR SPLY PWR sw1 – ON

B. PILOT OPERATION WITH RHC
PILOT HC 1. PILOT HC pwr – ON (up posn)

PGSC 2. Press and hold down [F12] WHILE powering up A31p


4. Confirm Boot Menu appears

Cont next page
5. Insert PILOT CD into DVD/CD-ROM drive

6. Select ‘CD ROM Drive’ from ‘Boot Menu’

7. Select ‘Start PILOT in RHC Mode’ from ‘Windows Startup Menu’

8. Follow instructions for HC calibration (after ~30 sec)

9. Menu Selection Values:
   Modify as desired
   ‘Enter’ twice to run sim

10. Simulation Begins (~15 sec)
    ‘z’ – toggles between instruments and out-the-window displays
    [space bar] – HUD declutter or if WOW, drag chute deploy
    ‘a’ – switch to auto
    ‘c’ – switch to CSS (same as HC breakout)
    ‘p’ – pause sim, ‘p’ again resumes

11. Post Simulation
    [space bar] – cycles through data to main menu
    ‘b’ – cycles back through post run data

12. Terminate PILOT
    Enter ‘q’ to quit (returns to DOS prompt)

13. Remove PILOT CD

14. Shut down A31p PGSC, then use as desired

PILOT HC 15. PILOT HC pwr – OFF (down posn)

Cont next page
C. PILOT DISCONNECT and STOWAGE

PILOT HC  1. Confirm PILOT HC pwr – OFF (down posn)

PGSC  2. Confirm PGSC pwr – OFF

PWR SPLY  3. DC PWR SPLY PWR sw1 – OFF

Pwr outlet  4. DC UTIL PWR – OFF (utility outlet for HC)

PILOT  5. Disconnect Y-Cables from PGSC and HC

Y-Cable  (remove PGSC from behind elastic if necessary)

Pwr Cables  6. Disconnect DC PWR Cable and DC PWR SPLY

Cable from DC Util Pwr outlet, DC PWR SPLY, and PILOT HC

CAUTION
When pushing buckle lever to release, keep thumb clear from underneath
(pinch hazard)

PILOT HC  7. Unsecure HC, press buckle on top strap, loosen strap, repeat for bottom strap

8. Stow PILOT HC, Y-Cable, Boot CDs, Pwr Cables and DC PWR SPLY in original locker

Towel Rack/ Handhold  9. Cut loose tie-wraps and elastic strap from window and secure after final on-orbit PILOT session

D. TROUBLESHOOTING

1. If HC appears to have bias, calibrate HC at main menu – enter ‘c’, follow onscreen instructions

2. If DOS prompt appears or program hangs, cycle PGSC pwr and repeat B. PILOT OPERATION WITH RHC, steps 1 thru 10 above

3. If Boot from CD fails or PILOT fails to begin (B. PILOT OPERATION WITH RHC, steps 6 thru 10), boot with spare CD
Figure 12-13.- A31p PILOT setup diagram with RHC.
PILOT WITHOUT RHC (FOR A31p PGSC)

NOTE
Only PILOT CD reqd

A. PILOT OPERATION WITHOUT RHC
1. Unstow PILOT CD

PGSC
2. Shut down A31p PGSC

3. Press and hold down [F12] WHILE powering up A31p


5. Confirm Boot Menu appears

6. Insert PILOT CD into DVD/CD-ROM drive

7. Select ‘CD ROM Drive’ from ‘Boot Menu’

8. Select ‘Start PILOT in KBD Mode’ from ‘Windows Startup Menu’

9. Menu Selection Values:

   NOTE
   Sim must be in ‘auto’ to keep from crashing:
   Sel ‘Auto’ at startup (item 7)
   Otherwise, modify as desired
   ‘Enter’ twice to run simulation

10. Simulation Begins (~15 sec)
   ‘z’ – toggles between instruments and out-the-window displays
   [space bar] – HUD declutter or if WOW, drag chute deploy
   ‘p’ – pause sim, ‘p’ again resumes

Cont next page
11. Post Simulation
   [space bar] – cycles thru data to
   main menu
   ‘b’ – cycles back thru post
   run data

12. Terminate PILOT
   Enter ‘q’ to quit (returns to DOS prompt)

13. Remove and stow PILOT CD

14. Shut down A31p PGSC, then use as desired

B. TROUBLESHOOTING
   1. If DOS prompt appears or program hangs, cycle
      PGSC pwr and repeat A. PILOT OPERATION
      WITHOUT RHC, steps 2 thru 9 above

   2. If Boot from CD fails or PILOT fails to begin
      (A. PILOT OPERATION WITHOUT RHC,
      steps 7 thru 10), boot with spare CD
PGSC STATE VECTOR UPDATE WITHOUT PCMMU DATA

L/O  __  __  __  __  YEAR  __  __  __  __  DAY  __  __  __  __  HOUR  __  __  __  __  MIN  __  __  __  __  SEC

NOTE
If no PCMMU feed available to PGSCs, current orbiter state vector can be obtained via GPC displays in OPS 2 or OPS 3.

Press ‘SPEC’ on keypad to freeze data. Press ‘CLEAR’ to resume display changes.

SET STATE VECTOR

1. If OPS 2:
   SPEC 34
   X( ) __ __ __ __ __ __ __ __
   Y( ) __ __ __ __ __ __ __ __
   Z( ) __ __ __ __ __ __ __ __
   VX( ) __ __ __ __ __ __ __ __
   VY( ) __ __ __ __ __ __ __ __
   VZ( ) __ __ __ __ __ __ __ __

2. If OPS 3:
   GNC 0 GPC MEMORY
   ITEM 26 +2 1 0 EXEC

   X  B9D6  VX  B9E2
   Y  B9DA  VY  B9E6
   Z  B9DE  VZ  B9EA

NOTE
Default for PGSC SpOC applications is set to accept state vector data in kft (position) and kft/sec (velocity). When entering GPC display data into SpOC application, ensure SpOC application is configured to accept default units of kft and kft/sec.

S/V __ __ __ / __ : __ : __ : __
DAY HR MIN SEC

S/V __ __ __ / __ : __ : __ : __
DAY HR MIN SEC

X( ) __ __ __ __ __ __ __ __
Y( ) __ __ __ __ __ __ __ __
Z( ) __ __ __ __ __ __ __ __
VX( ) __ __ __ __ __ __ __ __
VY( ) __ __ __ __ __ __ __ __
VZ( ) __ __ __ __ __ __ __ __

12-78  ORB OPS/ALL/GEN M
BOOTING FROM A31p ULTRABAY HARD DISK

NOTE
Internal hard disk is referred to as PM in BIOS and Ultrabay hard disk is PS. Hard disk that appears at top of BIOS boot list is disk that boots at PGSC startup

A31p PGSC

1. Shutdown PGSC
2. PGSC pwr – on (press [F1] when “Press F1 for IBM BIOS Setup Utility” message appears)
3. √ “IBM BIOS Setup Utility” display appears
4. Using arrow keys, sel ‘Startup’ and press [ENTER]
5. Sel ‘Boot’ and press [ENTER]
6. Sel ‘+Hard Drive’ and press [ENTER]
7. If ‘…(PS)’ hard disk does not appear at top of hard drive list, sel ‘…(PM)’ and press [F5] to bring ‘…(PS)’ hard disk to top of hard drive list
8. √ ‘…(PS)’ appears at top of hard drive list
9. Press [F10]
10. Sel ‘Yes’ and press [ENTER] to save changes
11. √PGSC boots up
RELOAD A31p PGSC

OBJECTIVE:
This contingency procedure is used to reload the primary hard drive in the A31p PGSC using A31p Reload DVD located in FDF CD Kit

A31p
PGSC

1. Shut down PGSC
2. PGSC shutdown complete
3. Remove any network card or network cable from PGSC
4. Press and hold down [F12] WHILE powering up A31p
6. Boot Menu appears
7. Insert A31p Reload DVD into DVD/CD-ROM drive
8. Using arrow keys, sel ‘CD-ROM drive’ from boot menu and press [ENTER]
9. When prompted to overwrite hard drive, press [Y] to start reload software
10. After completion of loading, follow instructions on screen to remove Reload DVD and reboot PGSC
11. For STS PGSC load only (i.e., not OCA Router): Allow computer to proceed through post-loading setup (PGSC will automatically reboot three times during this stage)
12. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7

13. If PGSC intended for use on STS network:

    **NOTE**
    Do not install the network card or network cable until PGSC NAMING is complete

    a. For PGSC NAMING, go to PGSC NETWORK, C. PGSC NAMING, 12-28

    b. Insert/connect network card or network cable
A31p HARD DRIVE CHANGEOUT

On MCC GO:

CAUTION
A31p Hard Drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data

1. Exit all applications
2. Perform shut down:
   • Sel ► Start ► Turn Off Computer… ► Turn Off
3. ¥PGSC shut down complete
4. Remove all PCMCIA cards
5. Close A31p Laptop cover
6. Turn A31p Laptop over so that bottom side faces up

NOTE
For location of A31p Hard Drive refer to figure 12-14. A31p Hard Drive is attached to Hard Drive cover
7. Refer to figure 12-15 for removing A31p Hard Drive. Gently pull cover and A31p Hard Drive out from the A31p Laptop to remove from slot.
8. Remove cover from A31p Hard Drive (refer to figure 12-16)

Figure 12-16.- A31p Hard Drive cover removal.

9. Attach cover to new A31p Hard Drive

10. Inspect pins on the hard drive for damage
    If damaged, report to MCC
    Insert A31p Hard Drive into Hard Drive slot

11. Flip A31p Laptop over to original position
    Reinsert PCMCIA cards

12. PGSC pwr – on

13. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7

14. If PGSC is intended for use on STS network, go to PGSC NETWORK, C. PGSC NAMING, 12-28

15. Report procedure complete to MCC
A31p DEVICE CHANGEOUT

OBJECTIVE:
This procedure is used to safely remove and/or install A31p Laptop Ultrabay devices. The procedure applies to Ultrabay slots on both sides of A31p Laptop. The A31p DVD/CDRW Drive and A31p Ultrabay Adapter can be inserted into Ultrabay slots on either side.

On MCC GO:
1. Unstow required Ultrabay device(s)
A31p 2. Exit all applications
3. Perform shut down:
   Sel ➤ Start ➤ Turn Off Computer… ➤ Turn Off
4. ✓ PGSC shut down complete

NOTE
Refer to figure 12-17 for switch and lever locations

Figure 12-17.- Ultrabay location in A31p Laptop.
5. To discharge Ultrabay lever, pull Ultrabay switch toward front of laptop

6. To release device from bay, pull Ultrabay lever

7. Remove device from Ultrabay

8. If changeout is for spare A31p Hard Drive:

   **CAUTION**

   A31p Hard Drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data

   Ultrabay Adapter
   a. Raise black security latch (refer to figure 12-18)
   b. Separate A31p Hard Drive from A31p Ultrabay Adapter pin connector and remove A31p Hard Drive from Ultrabay Adapter
   c. Insert spare A31p Hard Drive (label side face up) while aligning hard drive pins to A31p Ultrabay Adapter pin connector (refer to figure 12-18)

   Figure 12-18.- A31p Ultrabay Adapter.
d. Slide hard drive pins gently into Ultrabay Adapter pin connector until firmly in place

e. Close down black security latch until locked in place (refer to figure 12-20)

f. Black security latch does not protrude from A31p Ultrabay Adapter

Cont next page

Figure 12-19.- Inserting device into A31p Ultrabay Adapter.

Figure 12-20.- A31p Ultrabay Adapter and A31p Hard Drive final configuration.
9. Insert new A31p Ultrabay device into Ultrabay
10. Push Ultrabay lever until firmly in place
11. PGSC pwr – on
12. If changeout was for A31p Hard Drive:
   - If reqd, perform BOOTING FROM A31p ULTRABAY HARD DISK, 12-79
   - If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7
   - If PGSC is intended for use on STS network, go to PGSC NETWORK, C. PGSC NAMING, 12-28
13. Report procedure complete to MCC
RELOAD 760XD PGSC

PGSC 1. PGSC pwr – on (while holding [F1] key down)
    2. Sel ‘Config’ at Easy-Setup main menu
    3. Sel ‘Initialize’
    4. Sel ‘OK’ to initialize system settings
    5. Sel ‘Exit’
    6. Insert bootable PGSC Reload Diskette into floppy drive
    7. Sel ‘Restart’ at Easy-Setup main menu
    8. Sel ‘OK’
    9. When prompted, press [Y] to overwrite hard drive
    10. Insert PGSC Reload CD when prompted
    11. When CD-ROM light stops blinking, press any key to continue (software recovery program now loading)
    12. After hard drive updated, remove PGSC Reload Diskette and remove CD
    13. Press ‘Ctrl-Alt-Del’ to reboot PGSC
    14. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7
    15. If PGSC intended for use on STS network:

    NOTE
    Do not install the RF LAN card or Ethernet card until PGSC NAMING is complete

For PGSC NAMING, go to PGSC NETWORK, C. PGSC NAMING, 12-28
WINDOWS KEYBOARD REF

NOTE
Simo key combinations linked by slash marks.
Sequential key combinations linked by commas

WINDOWS DESKTOP

Shut down Windows [CTRL]/[ESC], [↑], [ENTER]

Sel and open desktop icon [CTRL]/[ESC], [ESC], [TAB], [TAB], [Arrow keys], [ENTER]

Program item icons contained in folder:

Sel program item icon [Arrow keys]

Start program Sel program item, [ENTER]

WINDOWS EXPLORER

Sel previous/next directory or subdirectory [↑] or [↓]

Page forward/backward [PG DN] or [PG UP]

Sel root directory [HOME]

Sel last directory [END]

Expand current selection (if in left pane and not expanded) [→]

Collapse current selection (if in left pane and expanded) [←]

Toggle between panes [TAB] or [F6]

Refresh screen [F5]
FILE MANIPULATION IN WINDOWS EXPLORER
Sel adjacent files [SHIFT]/[Up or down arrow keys]
Sel nonadjacent files [CTRL]/[Up or down arrow keys to move to desired file], [spacebar], repeat as needed
Sel all items [CTRL]/[A]
Move sel files or dir [CTRL]/[X], sel drive/dir to move files/dir to, [CTRL]/[V]
Copy sel files or dir [CTRL]/[C], sel drive/dir to copy files/dir to, [CTRL]/[V]

OPERATING PROGRAMS IN WINDOWS: STARTING, QUITTING, AND SWITCHING BETWEEN PROGRAMS
Start Windows or DOS program Sel icon on Windows desktop, [ENTER]
Cycle between open applications [ALT]/[TAB] or [ALT]/[ESC] (sel applications in forward direction) or [SHIFT]/[ALT]/[ESC] (sel applications in reverse direction)
Display Task List Dialog Box [CTRL]/[ALT]/[DELETE]
Cycle between selections in Dialog Box [TAB] (forward dir) or [SHIFT]/[TAB] (reverse dir)
Cancel menu currently displayed [ESC]
Quit active application [ALT]/[F4] or [ALT], [spacebar], [C] or [ALT], [F], [X]
SIZING, CLOSING, AND MOVING WINDOWS

NOTE
Maximized window cannot be resized; use Restore to config window for resizing

Restore window from maximized config [ALT], [spacebar], [R]

Resize active program window [ALT], [spacebar], [S], [press arrow keys to adjust window size], [ENTER]

NOTE
Document window is working area window inside applications main window

Resize document window [ALT], [S], [press arrow keys to adjust window size], [ENTER]

Close window [ALT], [spacebar], [C]

Close document window [ALT], [C]

Move window [ALT], [spacebar], [M], [use arrow keys to move window to desired location], [ENTER]

Move document window [ALT], [M], [use arrow keys to move window to desired location], [ENTER]

Minimize program or document window to icon [ALT], [spacebar], [N]

Maximize program or document window to full screen [ALT], [spacebar], [X]
PROGRAM CURRENTLY RUNNING
Sel menu and perform task [ALT], [underlined menu letter], [underlined task letter]

Move between areas (lists, buttons, etc) in Dialog Box [TAB] or [SHIFT]/[TAB] or [ALT]/[underlined letter]

Sel pulldown list within Dialog Box [ALT]/[underlined letter]

Cancel pulldown list [ESC]

Cancel menu sel [ESC]

CLIPBOARD FUNCTIONS
Copy displayed image to Clipboard [CTRL]/[C]

Cut image to Clipboard [CTRL]/[X]

Paste object from Clipboard to document, spreadsheet, etc [CTRL]/[V]

GETTING HELP
Get Help [F1] or [ALT], [H]
WORLDMAP KEYBOARD REF

NOTE
Simo key combinations linked by slash marks

Help Index [F1]
Layer Description Index [Shift]/[F1]
Zoom in [CTRL]/[I]
Zoom out [CTRL]/[O]
Zoom – Back (to prior zoom level) [CTRL]/[B]
Display full map view [CTRL]/[F]
Center map on primary vehicle [CTRL]/[C]
Find EOS, city, etc. in map [F3]
Display settings for the currently selected view [F11]
Display menu in a view [SHIFT]/[F10] or right mouse click
Toggle panning mode on/off [CTRL]/[P]
Toggle menu on/off [CTRL]/[M]
Toggle toolbar on/off [CTRL]/[T]
Toggle caption on/off [CTRL]/[A]
Turn on all window decorations [CTRL]/[W]
Refresh all views [F5]
Save WorldMap configuration [CTRL]/[S]
Exit application [ALT]/[F4]

12-94 ORB OPS/ALL/GEN M
FILE SNEAKERNET BETWEEN ISS SSC AND SHUTTLE PGSC

A. FROM ISS SSC TO SHUTTLE PGSC
   1. Insert a Shuttle “Late Update” PCMCIA card into an ISS SSC
   2. √KFX running on SSC
   3. Notify MCC of SSC number used
   4. Wait for MCC to uplink files to the “To Shuttle” folder on PCMCIA card in the ISS SSC
   5. Remove the “Late Update” PCMCIA card from the ISS SSC
   6. Insert the “Late Update” PCMCIA card into the KFX PGSC in the Shuttle
   7. On KFX PGSC desktop, double click “DistributeShuttleUplink.bat” (to copy files from the PCMCIA card to the KFX PGSC hard drive)
   8. If reqd, when step 7 complete, on the KFX PGSC desktop, double click “Ex Pkg Batch #X” (to initiate printing of uplinked messages)

B. FROM SHUTTLE PGSC TO ISS SSC
   1. Insert a Shuttle “Late Update” PCMCIA card into a Shuttle PGSC
   2. Copy desired files from PGSC hard drive to “From Shuttle” folder on the PCMCIA card
   3. Remove PCMCIA card and insert into an ISS SSC
   4. √KFX running on ISS SSC
   5. Notify MCC which SSC contains the PCMCIA card
   6. Wait for MCC to downlink all files in “From Shuttle” folder on PCMCIA card

12-95 ORB OPS/ALL/GEN M
DOCKING/UNDOCKING A31p PGSC

NOTE
If needed, reference PGSC figures 12-21 thru 12-23 to identify various parts of A31p Docking Station

A. DOCKING PGSC TO DOCKING STATION

PGSC 1. √PGSC is shutdown

2. √PGSC lid is closed

3. If DC Pwr Sply Cable connected to PGSC pwr port:
   PWR SPLY a. √DC PWR SPLY PWR sw – OFF
   Pwr outlet b. √DC UTIL PWR – OFF (for pwr to PGSC)
   PGSC c. Disconnect DC Pwr Sply Cable from PGSC pwr port and DC Pwr Sply output J2
   d. Stow DC Pwr Sply Cable as needed

Docking Station 4. √Blue knob (located on side of Docking Station) in Unlock position (i.e., most counterclockwise position)

NOTE
Docking of PGSC to Docking Station should be performed over firm/flat surface

PGSC 5. Place PGSC over blue interface plate of Docking Station ensuring bottom corners of PGSC are against two corners of blue interface plate
   Move Velcro tab that is attached to PGSC’s hard drive so that it does not get caught between underside of PGSC and Docking Station

6. Push down on lid to lock PGSC to Docking Station (listen for ‘click’ sound). Docking Station cover will slide towards PGSC

Cont next page

12-96 ORB OPS/ALL/GEN M
7. Verify PGSC does not separate from Docking Station
   * If separation occurs:
   *  a. Place PGSC/Docking Station assy on its side
   *  b. Press simo on PGSC lid and on back of Docking Station near area of locking mechanism (listen for ‘click’ sound)
   *  c. Verify PGSC does not separate from Docking Station

Docking Station
8. Turn blue knob clockwise to Lock position

Pwr outlet
9. √DC UTIL PWR – OFF (for pwr to Docking Station)

PWR SPLY
10. √PGSC DC Pwr Cable connected from DC Util Pwr outlet to DC Pwr Sply input J1
    Connect Docking Station DC Pwr Sply Cable from DC Pwr Sply output J2 to Docking Station pwr port J1 (align red dot on pwr cable connector to red dot on Docking Station pwr port)

Pwr outlet
11. DC UTIL PWR – ON

PWR SPLY
12. DC PWR SPLY PWR sw – ON
    13. √Pwr Sply’s output pwr LED is lit

Docking Station
14. √Docking Station’s pwr LED (next to pwr port) is lit

NOTE
PGSC with Docking Station can be pwrd on/off from either PGSC pwr button or Docking Station pwr button

PGSC
15. PGSC pwr – on

Docking Station
16. Verify Docking Station light “” (located near Docking Station pwr button) is lit
B. UNDOCKING PGSC FROM DOCKING STATION

CAUTION
In event of PCMMU or OCA card failure, or Docking Station Fan failure, overheating can occur

1. If undocking PGSC as a result of a failure of PCMMU or OCA card, wait 30 min before replacing card (contact MCC)

2. In event of Docking Station Fan failure, wait 50 min before replacing or removing hardware after power down (contact MCC)

PGSC
3. Shut down PGSC

4. Close PGSC lid

Docking Station
5. Turn blue knob (located on side of Docking Station) counterclockwise to Unlock position

6. If Docking Station has external pwr applied to it, press rectangular Eject button once (Eject button will lift up). Reference figure 12-22

   If Docking Station does not have external pwr applied to it, push Alt Eject lever (located near blue knob) towards laptop (Eject button will lift up). Reference figures 12-22 and 12-23

7. Firmly push down on rectangular Eject button to unlock and separate PGSC from Docking Station

PGSC
8. Remove PGSC from Docking Station

Cont next page
Figure 12-21.- A31p Docking Station.

Figure 12-22.- Docking Station Eject button and Power button.

Cont next page
12-99 ORB OPS/ALL/GEN M
Figure 12-23.- Alt Eject lever and blue Lock/Unlock knob.
COMPUND SPECIFIC ANALYZER – COMBUSTION PRODUCTS (CSA-CP)

COMPOUND SPECIFIC ANALYZER – COMBUSTION PRODUCTS CHECKOUT AND ZERO CALIBRATION OPS ............................................................. 13-2
PASSIVE SAMPLING WITH DATA LOGGING ........................................ 13-5
ACTIVE SAMPLING WITH PUMP AND DATA LOGGING .......................... 13-7
CSA-CP BATTERY CHANGEOUT ....................................................... 13-9
SAMPLING PUMP BATTERY CHANGEOUT ...................................... 13-10
ZERO CALIBRATION ...................................................................... 13-11
DATA LOGGER ACTIVATION/DEACTIVATION .................................. 13-13
ALARM DISABLE/ENABLE ............................................................... 13-14
DATA RECORDING TABLE .............................................................. 13-15
COMPOUND SPECIFIC ANALYZER – COMBUSTION PRODUCTS CHECKOUT AND ZERO CALIBRATION OPS

NOTE
Function of Zero Calibration Filter is to remove all target gases (if present) in air stream so sensors can be rezeroed. Capacity to remove target gases severely reduced if tethered filter caps not immediately replaced and tightened after use.

1. Unstow:
   CSA-CP Sampling Pump Zero Filter

   NOTE
   MODE pb (black) located between two red alarm lights.

   Audible beeps occur when MODE pb depressed during unit activation

2. Activate CSA-CP
   Press, hold MODE pb until ‘RELEASE’ displayed

   NOTE
   Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete.

   No O2 sensor is installed in the Shuttle CSA-CP monitor

3. √Display indicates readings for CO, HCN, HCL and record values in DATA RECORDING TABLE, 13-15

Cont next page
4. If any reading higher than listed values below, proceed to step 5 for sensor rezeroing:
   - CO ≤ 4 ppm
   - HCL ≤ 0.4 ppm
   - HCN ≤ 0.4 ppm
   If readings less than or equal to listed values, go to step 22

5. Mate CSA-CP to Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps

6. Unscrew, remove Sampling Pump Inlet (blue) Filter; temp stow

7. Unscrew tethered end caps on Zero Filter

   **NOTE**
   Pump inlet fitting has outside and inside threads

8. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug (arrow on Zero Filter should point toward Sampling Pump)

9. Sampling Pump sw – ON

10. After 2 min, press MODE pb (11 times) until ‘GO CAL’ displayed at top

11. Press “E” button
   √’SET SPAN’ displayed at top
   If “E” button not pressed before 10 sec elapsed, screen will revert back to nominal screen
   Repeat step 10

12. Press “+” button
   √’ZERO’ displayed at top

13. Press “E” button, verify ‘ZEROING’ displayed
   Wait 15 sec
   √’ZERO’ displayed at top
   Cont next page
14. Press MODE pb once
   After 15 sec, verify nominal display
   (gas concentrations)

15. Display readings for CO, HCN, HCL less than
   or equal to values below
   If readings higher than values below, notify MCC:
   \[ CO \leq 4 \text{ ppm} \]
   \[ HCL \leq 0.4 \text{ ppm} \]
   \[ HCN \leq 0.4 \text{ ppm} \]

16. Sampling Pump sw – OFF

17. Remove Zero Filter from Sampling Pump inlet
   Replace tethered endcaps and tighten finger tight

18. Stow Zero Filter

   **NOTE**
   Damage to O-ring can occur if overtightened

19. Replace Sampling Pump Inlet Filter and tighten
    until snug

   **NOTE**
   CSA-CP can be used in active sampling
   mode using pump or in passive mode
   without pump. Use of pump provides faster
   response times for some contaminants.

   Audible beeps occur when MODE pb
   depressed during unit activation or
   deactivation

20. Demate CSA-CP/Sampling Pump

21. Stow:
   Sampling Pump

22. Deactivate CSA-CP
   Press, hold ‘MODE’ pb until ‘RELEASE’ displayed

23. Temp stow:
   CSA-CP at crew-selected location. Call MCC
   with location
PASSIVE SAMPLING WITH DATA LOGGING

1. Unstow from temp:
   CSA-CP

   **NOTE**
   Audible beeps occur when MODE pb depressed during unit activation

2. Press, hold MODE pb until ‘RELEASE’ displayed

   **NOTE**
   Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

3. ✓ Display indicates readings for CO, HCN, HCL

   **NOTE**
   When activated, there is an audible beep, fault LED illuminates momentarily, and pwr LED stays illuminated

4. Transfer CSA-CP to desired location

   **NOTE**
   After activating/deactivating logger, nominal display (gas concentrations) returns in ~10 sec

5. Press MODE pb (9 times) until ‘LOG OFF’ or ‘LOG ON’ displayed
   If reqd, press “+” button to reset data logger to ‘LOG ON’ displayed
   ✓‘LOG ON’ displayed
   Notify MCC to discuss sampling plan

6. Conduct sampling session
7. Record value
   Notify MCC of results

8. Press, hold MODE pb until ‘RELEASE’ displayed
   \Unit off

9. Temp stow:
   CSA-CP
ACTIVE SAMPLING WITH PUMP AND DATA LOGGING

1. Unstow from temp:
   CSA-CP

2. Unstow:
   Sampling Pump

   **NOTE**
   CSA-CP should be oriented with display visible when facing front panel of sampling pump

3. Mate CSA-CP to Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps

   **NOTE**
   Audible beeps occur when MODE pb depressed during unit activation

4. Press, hold MODE pb until ‘RELEASE’ displayed

   **NOTE**
   Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

5. √Display indicates readings for CO, HCN, HCL

   **NOTE**
   When activated, there is an audible beep, fault LED illuminates momentarily, and pwr LED stays illuminated.
   
   After activating/deactivating logger, nominal display (gas concentrations) returns in ~10 sec

6. Sampling Pump sw – ON

Cont next page
7. Transfer active sampling assembly to desired location

8. Press MODE pb (9 times) until ‘LOG OFF’ or ‘LOG ON’ displayed
   If reqd, press “+” button to reset data logger to ‘LOG ON’
   √‘LOG ON’ displayed
   Notify MCC to discuss sampling plan

9. Conduct active sampling session
   Record values
   Notify MCC of results

10. At end of active sampling, press, hold MODE pb until ‘RELEASE’ displayed
    √‘RELEAS’ displayed
    Unit off

11. Sampling Pump sw – OFF

12. Demate Sampling Pump and CSA-CP

13. Temp stow:
    CSA-CP

14. Stow:
    Sampling Pump
CSA-CP BATTERY CHANGEOUT

1. If CSA-CP active:
   Sampling Pump sw – OFF
   Press, hold MODE pb until ‘RELEASE’ displayed
   CSA-CP off
   If not active, go to step 2

2. Unstow Batt Pack
   IFM Kit

3. Unstow Marker

4. Replace battery, turn fasteners (two) on back panel
   1/4 turn ccw; temp stow panel
   NOTE
   Stored data maintained for max of 30 min
   without battery installed. All data lost if
   battery installation delayed more than
   30 min

5. Grasp Batt Pack pull tab, remove pack

6. Mark Batt Pack DISCHARGED “YES” with marker

7. Stow Used Batt Pack
   IFM Kit

8. Stow Marker

9. Install replacement Batt Pack, press firmly to seat
   contacts

10. Replace panel, press firmly, turn fasteners (two) 1/4
    turn cw to lock

11. If contingency, activate CSA-CP:
    Press, hold MODE pb until ‘RELEASE’
    displayed
    CSA-CP on
    If not contingency, temp stow CSA-CP
SAMPLING PUMP BATTERY CHANGEOUT

IFM Kit 1. Unstow:
   Small Flathead Screwdriver
   Marker

2. Unstow Spare Batt Pack

3. Turn screw on back panel ccw 3 to 4 turns

4. Remove panel
   Temp stow

5. Grasp Batt Pack pull tab, remove Batt Pack

6. Mark Batt Pack DISCHARGED “YES” with marker

7. Install replacement Batt Pack, press firmly to seat contacts

8. Replace cover plate, turn screw cw until tight

IFM Kit 9. Stow:
   Screwdriver
   Marker

10. Stow Used Batt Pack
ZERO CALIBRATION

NOTE
Function of Zero Calibration Filter is to remove all target gases (if present) in air stream so sensors can be rezeroed. Capacity to remove target gases severely reduced if tethered filter caps not immediately replaced and tightened after use.

1. Unstow from temp:
   CSA-CP
Unstow:
   Zero Filter
   Sampling Pump

   NOTE
   Audible beeps occur when MODE pb depressed during unit activation

2. Press, hold MODE pb until ‘RELEASE’ displayed

   NOTE
   Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

3. √Display indicates readings for CO, HCN, HCL

4. Mate CSA-CP to Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps

5. Unscrew, remove Sampling Pump Inlet (blue) Filter Temp stow

6. Unscrew tethered end caps on Zero Filter

   NOTE
   Pump inlet fitting has outside and inside threads

Cont next page
7. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug
   Arrow on Zero Filter should point toward Sampling Pump

8. Sampling Pump sw – ON

9. After 2 min, press MODE pb (11 times) until ‘GO CAL’ is displayed at top

10. Press “E” button
    √‘SET SPAN’ displayed at top

11. Press “+” button
    √‘ZERO’ displayed at top

12. Press “E” button, verify ‘ZEROING’ displayed
    Wait 15 sec
    √‘ZERO’ displayed at top

13. Press MODE pb once
    After 15 sec, verify nominal display (gas concentrations)

14. Sampling Pump sw – OFF

15. Remove Zero Filter from Sampling Pump inlet
    Replace tethered endcaps and tighten finger tight

   **NOTE**
   Damage to O-ring can occur if overtightened

16. Replace Sampling Pump Inlet Filter and tighten until snug

   **NOTE**
   CSA-CP can be used in active sampling mode using pump or in passive mode without pump.
   Use of pump provides faster response times for some contaminants

Cont next page
17. If active sampling desired:
   Use as configured
   If passive operation of CSA-CP desired, then:
   Demate CSA-CP from Sampling Pump

18. Stow Zero Filter
   Stow Sampling Pump (for passive operation)
   Notify MCC

19. Transfer CSA-CP to desired location for sampling session

DATA LOGGER ACTIVATION/DEACTIVATION

NOTE
After activating/deactivating Data Logger, nominal display (gas concentrations)
returns in ~10 sec

CSA-CP
1. Press MODE pb (9 times) until ‘LOG ON’
   (for activation) or ‘LOG OFF’ (for deactivation)
   displayed

2. Press “+” button to activate or deactivate Data Logger
   √’LOG ON’ or ‘LOG OFF’ displayed, as desired
ALARM DISABLE/ENABLE

NOTE
Disabling CSA-CP alarm function
removes audio and visual annunciation
(flashing red lights) if target gas
thresholds exceeded. However, any
target gas concentration(s) above preset
threshold(s) continue to be indicated by
blinking display

1. Notify MCC prior to disabling alarm function

NOTE
Audible beeps occur when MODE pb
depressed during unit activation

2. Press, hold MODE pb until ‘RELEASE’ displayed

NOTE
Wait ~1 min while unit runs self-check
routine. A single beep occurs when
self-check routine complete

3. Display indicates readings for CO, HCN, HCL

NOTE
Operating mode reverts to nominal display
after 10 sec

4. Press MODE pb (10 times) until ‘MUTE’ or
‘UNMUTE’ is displayed

5. Press “+” button to disable/enable alarms, as
desired
Display indicates alarm enabled/disabled
## DATA RECORDING TABLE

<table>
<thead>
<tr>
<th>MET</th>
<th>LOCATION</th>
<th>DATA READINGS</th>
<th>REMARKS</th>
</tr>
</thead>
</table>
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
| ___/___:___ | 1. CO _________  
2. HCN _________  
3. HCL _________ | | |
SHUTTLE AUDIO DOSIMETER

ACTIVATION........................................................................ 14-2
SOUND LEVEL METER (SLM) MODE................................. 14-2
Lavg/Leq MODE................................................................. 14-3
DEACTIVATION................................................................. 14-4
ACTIVATION

VOL 3B 1. Unstow:
   Audio Dosimeter

2. Slide front panel up ~1 inch on audio Dosimeter

3. O/I sw → I (on)

   **NOTE**
   Front panel LED will light for ~10 sec while circuits test battery, then flash at intervals of ~2 sec to show circuits functioning

4. √ ‘BATT OK’ appears in top left of display and does not blink after ~10 sec
   √ ‘0:00 time’ appears on display

SOUND LEVEL METER (SLM) MODE

1. Depress and release front black pb until ‘SLM dB’ appears on display

   **NOTE**
   Do not read SLM dB data when talking. This may interfere with real-time decibel measurement.

   An ‘OFL’ (memory overflow) msg may appear momentarily on display if Dosimeter measures sound ≥ 99 dB. Ignore msg and continue measurements

2. Hold mic in front of desired location for ~10 sec to take measurement

3. Record:
   SLM dB _____________dB
   Location _______________
   MET Time ____/:____:____

4. Call down recorded data to MCC

---

14-2       ORB OPS/ALL/GEN M
Lavg/Leq MODE

1. Depress and release front black pb until ‘Lavg/Leq’ appears on display

2. For Crew Worn:
   Attach Dosimeter to belt
   Run mic underneath shirt
   Attach mic to collar as close to ear as possible

   For Static Deployment:
   Place Dosimeter in specified location
   Slide front panel down to cover display
   Attach mic ~60 cm (2 ft) away from Dosimeter

3. Record:
   Deployed Location: _________________
   MET Start Time ____/____:____:____

   NOTE
   An ‘OFL’ (memory overflow) msg may appear momentarily on display if Dosimeter measures sound ≥ 99 dB or if Dosimeter has been on ≥ 20 hr. Ignore msg and continue measurements

4. Retrieve Dosimeter from location or crewmember after specified deployment time (~24 hr) expired

5. Record:
   MET Stop Time ____/____:____:____
   Lavg/Leq ________________________dBA

6. Call down recorded location, MET Start and Stop Time, and Lavg/Leq dBA to MCC
DEACTIVATION

1. Slide front panel up, if reqd
2. O/I sw → O (off)
3. Slide front panel down

Vol 3B 4. Stow Dosimeter
### WCCS COMM PLAN

<table>
<thead>
<tr>
<th>CREW/CHNL WALL UNIT</th>
<th>A/G1</th>
<th>A/G2</th>
<th>A/A</th>
<th>ICOM A</th>
<th>ICOM B</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______/A1 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/A2 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/B1 B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/B2 B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/C1 C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/C2 C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/D1 D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/D2 D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/E1 E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_______/E2 E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>GNC SPEC</td>
<td>OPS</td>
<td>SM OPS 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>-----</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>CONTROLLERS</td>
<td>X</td>
<td>88</td>
<td>APU/ENVIRON THERM</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>DAP CONFIG</td>
<td>X</td>
<td>86</td>
<td>APU/HYD</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>DPS UTILITY</td>
<td>X</td>
<td>76</td>
<td>COMMUNICATIONS</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>GPC/BUS STATUS</td>
<td>X</td>
<td>68</td>
<td>CRYO SYSTEM</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>GPC MEMORY</td>
<td>X</td>
<td>168</td>
<td>CARGO LOOP</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>IMU ALIGN</td>
<td>X</td>
<td>1</td>
<td>DPS UTILITY</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>NWS</td>
<td>X</td>
<td>67</td>
<td>ELECTRIC</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>ORBIT TGT</td>
<td>X</td>
<td>66</td>
<td>ENVIRONMENT</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>RCS</td>
<td>X</td>
<td>77</td>
<td>EVA - MMU/FSS</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>RGA/ADTA/RCS</td>
<td>X</td>
<td>69</td>
<td>FUEL CELLS</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>RM ORBIT</td>
<td>X</td>
<td>6</td>
<td>GPC/BUS STATUS</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>SENSOR TEST</td>
<td>X</td>
<td>87</td>
<td>HYD THERMAL</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>S TRK/COAS CNTL</td>
<td>X</td>
<td>85</td>
<td>MASS MEMORY R/W</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>SWITCHES</td>
<td>X</td>
<td>62</td>
<td>PCMMU/PL COMM</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>SWITCH/SURF</td>
<td>X</td>
<td>94</td>
<td>PDRS CONTROL</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TIME</td>
<td>X</td>
<td>95</td>
<td>PDRS OVERRIDE</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>GPS STATUS</td>
<td>X</td>
<td>96</td>
<td>PDRS STATUS</td>
<td></td>
</tr>
</tbody>
</table>

| ORBIT SPEC (R11) | 900-902 | TEXT SPEC INDEX |

PL RETENTION 89 | PRPLT THERMAL 60 | SM TABLE MAINT 2 | TIME
KU ANTENNA OVERLAY
(COLOR MONITOR)

CAM C
ZOOM-IN FULL
MONITOR SCAN - UNDER
MOUNT OVERLAY: ALIGN CROSS HAIR
PAN/TILT TO ALIGN BULKHEAD ROLLERS

BULKHEAD ROLLER
GO FOR PLBD CLOSURE
DOOR SEAL
KU BAND ANT STOWED
URINE COLLECTION
- FAN SEP same as HOSE BLOCK
- MODE – AUTO
- CRADLE – AUTO
- Unstow hose and install urinal funnel
- Airflow
- WCS ON it – on
- Urinate
- Remove, clean, stow urinal funnel
- FAN SEP will run for ~30 sec after hose stowage

URINE/FECES COLLECTION
- FAN SEP same as HOSE BLOCK
- New bag in WCS Coffee Can
- MODE – COMMODE/MANUAL/EMU
- CRADLE sw disabled when MODE sw in COMMODE/MANUAL/EMU position
- Unstow hose and install urinal funnel
- Airflow
- WCS ON it – on
- COMMODE CNTL – UP (wait 15 sec)
- FWD
- Ensure proper seal, restrain body
- Urinate/defecate
- Transport tube – clean if reqd
- FAN SEP will run for ~30 sec after mode – AUTO

WCS COMPACTOR OPS (DUAL-VANE)

Tools reqd: 1/4-in Torque Wrench
6-in Extension
1/4-in to 3/8-in Adapter
Set Torque Wrench to 50 in-lb (1st or 2nd compaction)
- MODE – AUTO

FIRST COMPACTION
- Rotate Compactor crank – cw. Stop when torque limit obtained
- At completion of compaction, net clear of transport tube. If torque limit reached while gauge in yellow region, MCC before proceeding to CONTINGENCY OPS

SECOND COMPACTION
- Rotate compactor crank – cw. Stop when torque limit obtained
- At completion of compaction, net clear of transport tube. If torque limit reached while gauge in yellow region, MCC before proceeding to CONTINGENCY OPS

- CONTINGENCY OPS: (Vanes will not rotate or jammed)
  - Vane
  - MODE – COMMODE/MANUAL/EMU (airflow)
  - COMMODE CNTL – UP (wait 20 sec)
  - WCS ON it – on
  - FWD
  - Allow 5 min for compod contents to soften, then
  - Retain comp. If no joy, attempt comp. once more after 5 min if still no joy, inspect vanes for
  - Attached debris. If debris present, remove/redistribute
  - Using scraper tool (wear gloves). Re-attempt
  - Compaction. If still no joy, MCC
  - If compactor net blocking transport tube, use scissors to
  - Cut elastic net to clear tube
  - When complete:
    - COMMODE CNTL – OFF (BACK/DN)
    - MODE – AUTO
    - WCS ON it – off
  - Slow tools

Stow tools
CONT WASTE COLLECTION – UCD/APOLLO BAG

NOTE
WCS Compactor Ops must be performed before stowing Apollo Bags in commode

Unstow Bags
Complete urination in UCD
Remove Apollo Bag Seal Cover
Seal to buttocks and defecate
Force gas out and seal
Stow Apollo Bag in commode or wet trash
Stow UCD in wet trash

FAN SEP SWITCHING

\*MODE – AUTO
\*CRADLE – AUTO
\*Hose stowed in cradle
\*WCS ON it – off
FAN SEP SEL sw – OFF
HOSE BLOCK – SEP 2(1)

NOTE
In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete
FAN SEP SEL sw – 2(1)
If airflow still low or if no airflow, \*MCC

NOTE
Hose must be stowed in cradle to take switch to AUTO INHIBIT

CRADLE – AUTO INHIBIT
Inspect/replace prefilter (once/day or as reqd)
Discard old prefilter in WCS dry trash
Inspect/clean urinal Hose Screen (disconnect Hose from Hose Block)
CRADLE – AUTO

Commode:
Use Sanitation Agent/Dry Wipes to clean seat and transport tube above gate vlv
Discard in WCS trash module
Fabricate as a Transparency

PHOTO GRID OVERLAY

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10| 11| 12| 13| 14| 15| 16| 17| 18| 19| 20| 21| 22| 23| 24| 25| 26| 27| 28| 29| 30| 31|

ORB OPS-9a/O/B

(reduced copy)
URINE PRETREAT CHANGEOUT

NOTE
Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia.

Retrieve new OHS from large Ziplock Bag
Remove Combitherm Bag from OHS
Record H/N from OHS label and 'installed' MET on Cue Card for new OHS
Remove caps from new OHS; temp stow
Detach used OHS from prefilter housing and hose block extension
Place caps on used OHS
Place used OHS in Ziplock Bag labeled 'Trash'; stow in large Ziplock Bag
Attach new OHS to prefilter housing and hose block extension
Ensure locking collars on new OHS are rotated to the locked position

<table>
<thead>
<tr>
<th>FD</th>
<th>OHS H/N</th>
<th>MET INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**URINE PRETREAT SETUP**

**NOTE**
Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia.

Retrieve OHS kit, temp stow large Ziplock Bag
Retrieve new OHS from large Ziplock Bag
Remove Combitherm Bag from OHS
Record H/N from OHS label and ‘installed’ MET on Cue Card for new OHS
Remove caps from new OHS; temp stow
Detach empty urinal hose section from prefilter housing and hose block extension
Place caps on empty hose section
Fasten empty hose section to WCS via Velcro strap
Attach new OHS to prefilter housing and hose block extension
Ensure locking collars on new OHS are rotated to the locked position

**URINE PRETREAT ENTRY PREP**

**NOTE**
Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia.

Unfasten empty hose section from WCS
Remove caps from empty hose section; temp stow
Detach used OHS from prefilter housing and hose block extension
Place caps on used OHS
Place used OHS in Ziplock Bag labeled ‘Trash’; stow in large Ziplock Bag
Attach empty hose section to prefilter housing and hose block extension
Record H/N from OHS label and ‘installed’ MET on Cue Card for empty hose section
Stow OHS kit for Entry
Ergometer setup locations:
Seat 3 - facing stbd
Seat 4 - facing port
Seat 5 - facing port
Seat 6 - facing port
Seat 7 - facing stbd

1. Temp slow accessory bag at setup location. Note display panel is under pedal cranks
2. Secure / latch AQDs onto deck studs
3. Install spacers then sound mounts. Secure loosely with knurled knobs
4. Remove pip pin, seat stem foot and seat, temp stow all
5. Remove pip pins (4) securing ergometer to frame and temp stow ergometer
6. Release frame from seat 8 deck studs via AQDs (4); push button and lift collar. Disassemble frame by sliding seat stem and forward sections apart
7. Loosely secure frame onto AQDs, with knurled knobs
8. Loosely secure frame with seat stem onto AQDs with knurled knobs
9. Install seat onto seat stem
CAUTION: Ensure ergometer and power panel are OFF before making connections. Note: Steps will interrupt power to other loads on utility panel. Connect display panel to ergometer and connect Pre-routed power cable.

When ready to exercise:
- DC UTIL PWR – ON
- ERGOMETER ON/OFF – ON
- DATA - MANUAL

10 Reconfigure seat pip pin and seat assembly from green to yellow. Secure blocks together using Velcro tab. Tighten knob.

11 Secure ergometer to frame using threaded fasteners (4) and hexagonal wrench. (Note: cables will be on bottom and ON/OFF and MANUAL/REMOTE switches toward seated user). Tighten knurled knobs.

12 Install seat stem foot. Secure with pip pin and tighten by turning (CW).

13 Secure pedal cranks onto ergometer using hexagonal wrench.

14 Tighten pedals into pedal cranks using wrench if necessary (red = right / blue = left). Note: blue is reverse threaded.

FAB USE ONLY CC 15-16 ORB OPS/ALL/GEN M
5) Detach Galley Ambient hose (uninsulated) from ML90N QD bracket. Connect Galley Ambient hose to MCV, then MCV to Ambient QD at ML90N bracket.

6) OVEN/RHS-OFF, then ON to circulate water through Galley.

3) Connect ACTEX (#3) to ACTEX hose (#3). Secure ACTEX hose as reqd.

4) Connect ACTEX hose Tee (#4) to Chilled QD at ML90N bracket.

2) Attach ACTEX (#2) to Microbe Filter assembly (#2). Secure ACTEX/Microbe Filter assembly as reqd.

1) Detach Galley Chilled hose (#1) from ML90N QD bracket. Then Connect Galley Chilled hose (#1) to Microbe Filter assembly hose (#1).

NOTE
Have towel ready for possible release of water when mating/demating connections.

If present, remove tie-wrap connecting Galley Ambient and Chilled hoses. Unstow GIRA hardware and temp stow near Galley.

Water Transfer Hose only present for flights where water transfer is scheduled.

(3 reduced copy)
WATER TRANSFER HOSE PURGE

1. Secure Needle Adapter and Pump Bag from Sample/Bottle Kit. Position Pump from Needle Adapter, attach to Infection port and then attach inlet and outlet adapters.

2. Open valve on Injection Port. Fill Purge Bag to capacity. Secure Purge Bag to O-rings of O-ring and close in Dry Tank. Reinstall adapter on Needle Adapter, remove and temp slow until needed.

CWC FILL

1. Fill Portable CWC Fill Kit, fill Sample Container. Open Side Valve to fill CWC fill to MOD H. Open CWC Fill Kit to Water Transfer Hose QD. Start 90 seconds counterclockwise.

2. Attach syringe to Injection Port. Open valve on injection Port and connect CWC fill to MOD H. Insert plunger, then adjust residual solution. Close valve on Injection Port then remove syringe and close plunger. Repeat injection protocol, as needed.

3. Terminate CWC Fill on MOD H port or as indicated by counterclockwise, if no connector. Fill out CWC label. Note M.E.T. Insert green (IAA) label to CWC window. Apply bottle to CWC, mark CWC fill on the end fillers.

CWC SAMPLING

1. Sample rear, retrieve Sample Adapter, and Sample Bags from Sample/Bottle Kit. Connect Sample Bag to appropriate adapter (either Portable or Technical). Connect adapter & Sample Bag in CWC QD then OPEN valve on sample adapter. Square CWC andIPHs up at least 12 inches. Close valve, remove Sample Bag from adapter and fit our Quarter Bag label. Place in CWC Bottle and store in crew designated location. Detach/Remove all Sample Adapter.

(reduced copy)
RECOMMENDED SEAT KIT (RSK) INSTALLATION

This procedure may be used to install RSK 6 or 7 (Time: 1 hr)

1. Unstow headrest, bushing, blue RSK ICU brackets (2) and extension strap
2. Install bushing into port side of seat back. Secure with spring pin
3. Replace black ICU brackets (2) on stbd seat pan (pull spring pin, slide out bracket) with blue RSK ICU brackets (2)
4. Install extension strap (loop strap through D-rings)
5. Install ICU onto blue RSK ICU brackets. Pull strap and install bottom of ICU onto bracket on top of seat leg. See next photo for config with ICU installed. Seat legs will still be folded
6. Restrain ICU and seat legs using extension strap
CREW SYSTEMS REFERENCE (OOPS CD-1/ALL/B)

The Crew System Reference CD contains two Computer Based Training (CBT) lessons. This CD is authorized to be flown on every Shuttle flight for crew refresher while on orbit. It will be manifested as part of the FDF subassembly unless a crew specifically requests that it be omitted.

The CBT lessons are contained in two directories. The lessons and directories are described below for configuration control purposes.

Crew Escape Systems Review (March 29, 2005 Version LF-1)
  Directory content: 297 files/14 folders
  Directory size: 230 MB
  File dates: 2/24/2005

Crew Worn Equipment Review (March 29, 2005 Version LF-1)
  Directory content: 337 files/15 folders
  Directory size: 149 MB
  File dates: 2/9/2005

NOTE
The content of this CD is a duplicate of COSS Reference CD 5, Version Generic, 2/24/2005