

# Orbit Operations Checklist

**Mission Operations Directorate  
Operations Division**

**Generic, Rev K  
November 22, 2004**

**NOTE**  
**For STS-114 and subsequent flights**

National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
Houston, Texas



***United Space Alliance***

**Verify this is the correct version for the pending operation (training, simulation or flight).**  
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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-10 (Aug 10, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2181      MULTI-1762  
ORB OPS-2185  
ORB OPS-2192  
ORB OPS-2194  
ORB OPS-2196  
ORB OPS-2199  
ORB OPS-2202  
ORB OPS-2203  
ORB OPS-2204A  
ORB OPS-2207

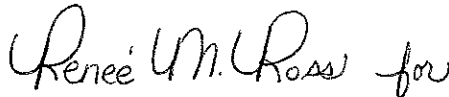
**NOTE**

For STS-115 and subsequent flights

Incorporate the following:

1. Replace iii thru xii
2. Replace TEMP 2-1 thru 2-4 (4 pgs), TEMP 2-5 & TEMP 2-6
3. Replace 4-5 thru 4-8
4. Replace 5-1 & 5-2, 5-31 thru 5-36, 5-55 thru 5-58
5. Replace 6-11 & 6-12
6. Replace 7-25 & 7-26
7. Replace 9-5 & 9-6
8. Replace 10-21 & 10-22
9. Replace 13-1 & 13-2, 13-5 thru 13-8, 13-11 & 13-12, 13-15 & 13-16
10. Delete 15-45 & 15-46  
After CC 15-44, add CC 15-45 thru 15-48 (4 pgs)

Prepared by:



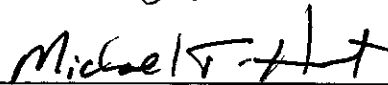
Publication Manager

Approved by:



Manager, Shuttle Procedures Management

Accepted by:



FDF Manager

Encl: 54 pages

**File this PCN immediately behind the front cover as a permanent record**



ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-9 (June 5, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2186  
ORB OPS-2189  
ORB OPS-2190  
ORB OPS-2191

**NOTE**

For STS-121 and subsequent flights

Incorporate the following:

1. Replace iii thru viii, xv & xvi
2. Replace 12-1 & 12-2, 12-43 thru 12-46, 12-71 & 12-72, 12-75 thru 12-78  
After 12-88, add 12-89 & 12-90

Prepared by:

  
Publication Manager

Approved by:

  
Manager, Shuttle Procedures Management

Accepted by:

  
FDF Manager

Encl: 22 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-8 (June 1, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2172      MULTI-1741C  
ORB OPS-2177**NOTE**

For STS-121 and subsequent flights

Incorporate the following:

1. Replace iii thru viii
2. Replace 5-55 & 5-56
3. Replace 7-31 & 7-32

Prepared by:

  
Publication Manager

Approved by:

  
Manager, Shuttle Procedures Management

Accepted by:

  
FDF Manager

Encl: 10 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-7 (Apr 14, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2171      MULTI-1741B  
ORB OPS-2175**NOTE**

For STS-121 and subsequent flights

Incorporate the following:

1. Replace iii thru viii
2. Replace 7-13 thru 7-38
3. Replace 12-75 thru 12-78

Prepared by:

  
Publication Manager

Approved by:

  
Manager, Shuttle Procedures Management

Accepted by:

  
FDF Manager

Encl: 36 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-6 (Jan 31, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2155(R)    ORB OPS-2169  
ORB OPS-2163      ORB OPS-2170  
ORB OPS-2166  
ORB OPS-2168

**NOTE**

For STS-121 and subsequent flights

Incorporate the following:

1. Replace iii thru viii, xiii thru xvi
2. Replace pages TEMP 2-1 and TEMP 2-2
3. Replace pages 3-5 thru 3-8
4. Replace section 12 (88 pages)

Prepared by:

  
Publication Manager

Approved by:

  
Manager, Shuttle Procedures Management

Accepted by:

  
FDF Manager

Encl: 104 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-5 (Dec 6, 2005) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2155    ORB OPS-2162  
ORB OPS-2156    ORB OPS-2164(S)  
ORB OPS-2157    ORB OPS-2165  
ORB OPS-2158    ORB OPS-2167  
ORB OPS-2160

**NOTE**

For STS-121 and subsequent flights

Incorporate the following:

1. Replace iii thru xii
2. Replace pages 2-1 and 2-2, 2-11 thru 2-22  
After page 2-22, add pages 2-23 and 2-24
3. Replace pages 3-3 and 3-4
4. Replace section 4 (8 pages)
5. Replace pages 5-19 thru 5-22, 5-39 and 5-40
6. Replace pages CC 15-5 and CC 15-6

Prepared by:

*April Smit for CJ Gilson*  
Publication Manager

Approved by:

*Kimberly Johnson*  
Manager, Shuttle Procedures Management

Accepted by:

*Michael T. ...*  
FDF Manager

Encl: 44 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-4 (Jul 25, 2005) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2123    MULTI-1713  
ORB OPS-2135  
ORB OPS-2140  
ORB OPS-2148  
ORB OPS-2152  
ORB OPS-2154

**NOTE**

For STS-121 and subsequent flights

Incorporate the following:

1. Replace iii thru vi
2. Replace pages 1-3 and 1-4
3. Replace pages 3-27 and 3-28, 3-31 and 3-32
4. Replace 7-3 and 7-4, 7-7 thru 7-10
5. Replace pages 11-1 and 11-2

Prepared by:

  
\_\_\_\_\_  
Publication Manager

Approved by:

  
\_\_\_\_\_  
Manager, Shuttle Procedures Management

Accepted by:

  
\_\_\_\_\_  
FDF Manager

Encl: 18 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-3 (Jun 24, 2005) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-2144

Incorporate the following:

1. Replace iii thru viii
2. After page 2-2, add TEMP 2-1 & TEMP 2-2  
After page 2-6, add TEMP 2-5 & TEMP 2-6

**NOTE**

For STS-114 and subsequent flights

Prepared by:

*Thomas Zulauf*  
\_\_\_\_\_  
Publication Manager

Approved by:

*Dorothy Johnson*  
\_\_\_\_\_  
Manager, Shuttle Procedures Management

Accepted by:

*Michael E. Shaw*  
\_\_\_\_\_  
FDF Manager

Encl: 10 pages

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ORBIT OPERATIONS

GENERIC, REV K (Nov 22, 2004)

## PCN-2 (Jun 10, 2005) Sheet 1 of 1

List of Implemented Change Requests (482s):


ORB OPS-2103	ORB OPS-2132	MULTI-1701
ORB OPS-2107	ORB OPS-2141	
ORB OPS-2110B	ORB OPS-2142	
ORB OPS-2122	ORB OPS-2145	

**NOTE**

For STS-114 and subsequent flights

Incorporate the following:

1. Replace iii thru xvi
2. Replace section 4
3. Replace 6-1 and 6-2, 6-9 thru 6-12  
Delete 6-13 and 6-14
4. Replace 7-7 thru 7-18  
Remove TEMP 7-23 and TEMP 7-24 from hardcopy  
Replace 7-25 and 7-26
5. Replace 9-3 and 9-4
6. Replace 11-1 and 11-2
7. Replace 12-1 thru 12-4  
Replace 12-73 thru 12-82 with 12-73 thru 12-86 (14 pages)

Prepared by:   
Publication ManagerApproved by:   
Manager, Shuttle Procedures ManagementAccepted by:   
FDF Manager

Encl: 64 pages

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**ORBIT OPERATIONS****REV K (Nov 22, 2004)****PCN-1 (Apr 29, 2005) Sheet 1 of 1**

List of Implemented Change Requests (482s):

MULTI-1671	ORB OPS-2098	ORB OPS-2115	ORB OPS-2124
MULTI-1687	ORB OPS-2099	ORB OPS-2117	ORB OPS-2126
	ORB OPS-2108	ORB OPS-2118	ORB OPS-2130
	ORB OPS-2109	ORB OPS-2102A	ORB OPS-2133
	ORB OPS-2111	ORB OPS-2104A	ORB OPS-2134
	ORB OPS-2112	ORB OPS-2120A	
	ORB OPS-2113	ORB OPS-2121A	

Incorporate the following:

1. Replace iii thru xvi
2. Replace 2-3 and 2-4, 2-7 and 2-8, 2-17 thru 2-22
3. Replace 3-23 thru 3-30
4. Replace 5-1 and 5-2, 5-19 and 5-20, 5-35 and 5-36  
After 5-54, add 5-55 and 5-56
5. Replace 6-5 thru 6-14
6. Replace 9-1 and 9-2
7. Replace 10-1 and 10-2, 10-5 and 10-6, 10-9 thru 10-16
8. Replace section 12
9. Replace 13-3 and 13-4
10. Replace 15-43 and 15-44 with CC 15-43 thru 15-46 (4 pages)

**NOTE**

For STS-114 and subsequent flights

**Prepared by:** \_\_\_\_\_  
Publication Manager

**Approved by:** \_\_\_\_\_  
Manager, Shuttle Procedures Management

**Accepted by:** \_\_\_\_\_  
FDF Manager

Encl: 152 pages

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MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST**

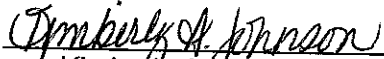
GENERIC, REVISION K  
November 22, 2004

PREPARED BY:



\_\_\_\_\_  
CJ Gilson  
Publication Manager

APPROVED BY:



\_\_\_\_\_  
Kimberly A. Johnson  
Manager, Shuttle  
Procedures Management



\_\_\_\_\_  
Michael T. Hurt  
FDF Manager

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ORB OPS/ALL/GEN K

Incorporates the following:			
482#:	ORB OPS-2063A	ORB OPS-2079	ORB OPS-2088
	ORB OPS-2067C	ORB OPS-2080	ORB OPS-2089
	ORB OPS-2068A	ORB OPS-2081	ORB OPS-2090
	ORB OPS-2069	ORB OPS-2082	ORB OPS-2091
	ORB OPS-2070A	ORB OPS-2083	ORB OPS-2092
	ORB OPS-2071	ORB OPS-2084	ORB OPS-2093
	ORB OPS-2077	ORB OPS-2086	MUTLI-1668A
	ORB OPS-2078A	ORB OPS-2087	

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Alt Book Manager              DO3/H. Scott                      281-483-0670



ORBIT OPERATIONS CHECKLIST

**LIST OF EFFECTIVE PAGES**

GENERIC 10/30/87	PCN-3 06/24/05	PCN-7 04/14/06
REV K 11/22/04	PCN-4 07/25/05	PCN-8 06/01/06
PCN-1 04/29/05	PCN-5 12/06/05	PCN-9 06/05/06
PCN-2 06/10/05	PCN-6 01/31/06	PCN-10 08/10/06

Sign Off .....	* ALL/GEN K	2-11 .....	ALL/GEN K,5
ii .....	* ALL/GEN K	2-12 .....	ALL/GEN K,5
iii .....	* ALL/GEN K,10	2-13 .....	ALL/GEN K,5
iv .....	* ALL/GEN K,10	2-14 .....	ALL/GEN K,5
v .....	* ALL/GEN K,10	2-15 .....	ALL/GEN K,5
vi .....	* ALL/GEN K,10	2-16 .....	ALL/GEN K,5
vii .....	* ALL/GEN K,10	2-17 .....	ALL/GEN K,5
viii .....	* ALL/GEN K	2-18 .....	ALL/GEN K,5
ix .....	* ALL/GEN K,5	2-19 .....	ALL/GEN K,5
x .....	* ALL/GEN K,10	2-20 .....	ALL/GEN K,5
xi .....	ALL/GEN K,5	2-21 .....	ALL/GEN K,5
xii .....	ALL/GEN K,10	2-22 .....	ALL/GEN K,5
xiii .....	ALL/GEN K,2	2-23 .....	ALL/GEN K,5
xiv .....	ALL/GEN K,6	2-24 .....	ALL/GEN K,5
xv .....	ALL/GEN K,9	3-1 .....	ALL/GEN K
xvi .....	ALL/GEN K	3-2 .....	ALL/GEN K
1-1 .....	ALL/GEN K	3-3 .....	ALL/GEN K,5
1-2 .....	ALL/GEN K	3-4 .....	ALL/GEN K
1-3 .....	ALL/GEN K,4	3-5 .....	ALL/GEN K
1-4 .....	ALL/GEN K	3-6 .....	ALL/GEN K,6
2-1 .....	ALL/GEN K,5	3-7 .....	ALL/GEN K,6
2-2 .....	ALL/GEN K	3-8 .....	ALL/GEN K,6
TEMP 2-1 .....	115/GEN K,10	3-9 .....	ALL/GEN K
TEMP 2-2 .....	115/GEN K,10	3-10 .....	ALL/GEN K
2-3 .....	ALL/GEN K,10	3-11 .....	ALL/GEN K
2-4 .....	ALL/GEN K	3-12 .....	ALL/GEN K
2-5 .....	ALL/GEN K	3-13 .....	ALL/GEN K
2-6 .....	ALL/GEN K	3-14 .....	ALL/GEN K
TEMP 2-5 .....	115/GEN K,10	3-15 .....	ALL/GEN K
TEMP 2-6 .....	115/GEN K,10	3-16 .....	ALL/GEN K
2-7 .....	ALL/GEN K,1	3-17 .....	ALL/GEN K
2-8 .....	ALL/GEN K,1	3-18 .....	ALL/GEN K
2-9 .....	ALL/GEN K	3-19 .....	ALL/GEN K
2-10 .....	ALL/GEN K	3-20 .....	ALL/GEN K

\* – Omit from flight book

3-21.....	ALL/GEN K	5-25.....	<input checked="" type="checkbox"/> ALL/GEN K
3-22.....	ALL/GEN K	5-26.....	ALL/GEN K
3-23.....	ALL/GEN K,1	5-27.....	ALL/GEN K
3-24.....	ALL/GEN K,1	5-28.....	ALL/GEN K
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3-26.....	ALL/GEN K,1	5-30.....	ALL/GEN K
3-27.....	ALL/GEN K,4	5-31.....	ALL/GEN K
3-28.....	ALL/GEN K,1	5-32.....	ALL/GEN K,10
3-29.....	ALL/GEN K,1	5-33.....	ALL/GEN K
3-30.....	ALL/GEN K	5-34.....	ALL/GEN K,10
3-31.....	ALL/GEN K,4	5-35.....	ALL/GEN K,10
3-32.....	ALL/GEN K	5-36.....	ALL/GEN K,10
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4-2.....	ALL/GEN K,5	5-38.....	ALL/GEN K
4-3.....	ALL/GEN K	5-39.....	<input checked="" type="checkbox"/> ALL/GEN K
4-4.....	ALL/GEN K,5	5-40.....	ALL/GEN K,5
4-5.....	ALL/GEN K	5-41.....	ALL/GEN K
4-6.....	ALL/GEN K,10	5-42.....	<input checked="" type="checkbox"/> ALL/GEN K
4-7.....	ALL/GEN K,5	5-43.....	ALL/GEN K
4-8.....	ALL/GEN K,10	5-44.....	ALL/GEN K
5-1.....	ALL/GEN K,10	5-45.....	ALL/GEN K
5-2.....	ALL/GEN K	5-46.....	<input checked="" type="checkbox"/> ALL/GEN K
5-3.....	ALL/GEN K	5-47.....	ALL/GEN K
5-4.....	ALL/GEN K	5-48.....	ALL/GEN K
5-5.....	ALL/GEN K	5-49.....	ALL/GEN K
5-6.....	ALL/GEN K	5-50.....	ALL/GEN K
5-7.....	ALL/GEN K	5-51.....	ALL/GEN K
5-8.....	ALL/GEN K	5-52.....	ALL/GEN K
5-9.....	ALL/GEN K	5-53.....	ALL/GEN K
5-10.....	ALL/GEN K	5-54.....	ALL/GEN K
5-11.....	104,105/GEN K	5-55.....	ALL/GEN K,8
5-12.....	ALL/GEN K	5-56.....	ALL/GEN K,10
5-13.....	ALL/GEN K	5-57.....	ALL/GEN K,10
5-14.....	ALL/GEN K	5-58.....	ALL/GEN K,10
5-15.....	ALL/GEN K	6-1.....	ALL/GEN K,2
5-16.....	ALL/GEN K	6-2.....	ALL/GEN K
5-17.....	ALL/GEN K	6-3.....	ALL/GEN K
5-18.....	ALL/GEN K	6-4.....	ALL/GEN K
5-19.....	ALL/GEN K,1	6-5.....	ALL/GEN K,1
5-20.....	ALL/GEN K,5	6-6.....	ALL/GEN K,1
5-21.....	ALL/GEN K,5	6-7.....	ALL/GEN K,1
5-22.....	ALL/GEN K	6-8.....	ALL/GEN K
5-23.....	ALL/GEN K	6-9.....	ALL/GEN K,2
5-24.....	ALL/GEN K	6-10.....	ALL/GEN K,2

– Prelift-off information required

6-11.....	ALL/GEN K,10	9-1.....	ALL/GEN K
6-12.....	ALL/GEN K,2	9-2.....	ALL/GEN K,1
7-1.....	ALL/GEN K	9-3.....	ALL/GEN K,2
7-2.....	ALL/GEN K	9-4.....	ALL/GEN K
7-3.....	ALL/GEN K	9-5 (3 pgs)..... †	ALL/GEN K,10
7-4.....	ALL/GEN K,4	9-6 (3 pgs)..... †	ALL/GEN K,10
7-5.....	ALL/GEN K	10-1.....	ALL/GEN K
7-6.....	ALL/GEN K	10-2.....	ALL/GEN K,1
7-7.....	ALL/GEN K,4	10-3.....	ALL/GEN K
7-8.....	ALL/GEN K,2	10-4.....	ALL/GEN K
7-9.....	ALL/GEN K,4	10-5.....	ALL/GEN K,1
7-10.....	ALL/GEN K	10-6.....	ALL/GEN K
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7-12.....	ALL/GEN K	10-8.....	ALL/GEN K
7-13.....	ALL/GEN K,7	10-9.....	ALL/GEN K
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7-15.....	ALL/GEN K,2	10-11.....	ALL/GEN K,1
7-16.....	ALL/GEN K,2	10-12.....	ALL/GEN K,1
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7-18.....	ALL/GEN K,7	10-14.....	ALL/GEN K,1
7-19.....	ALL/GEN K	10-15.....	ALL/GEN K,1
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7-21.....	ALL/GEN K,7	10-17.....	ALL/GEN K
7-22.....	ALL/GEN K	10-18.....	ALL/GEN K
7-23.....	ALL/GEN K,7	10-19.....	ALL/GEN K
7-24.....	ALL/GEN K,7	10-20.....	ALL/GEN K
7-25.....	ALL/GEN K,10	10-21 (4 pgs).... †	ALL/GEN K,10
7-26.....	ALL/GEN K,2	10-22 (4 pgs).... †	ALL/GEN K,10
7-27.....	ALL/GEN K	11-1.....	ALL/GEN K
7-28.....	ALL/GEN K	11-2.....	ALL/GEN K,4
7-29.....	ALL/GEN K,7	11-3.....	ALL/GEN K
7-30.....	ALL/GEN K,7	11-4.....	ALL/GEN K
7-31.....	ALL/GEN K,8	12-1.....	ALL/GEN K,6
7-32.....	ALL/GEN K	12-2.....	ALL/GEN K,9
7-33.....	ALL/GEN K	12-3.....	ALL/GEN K,6
7-34.....	ALL/GEN K	12-4.....	ALL/GEN K,6
7-35.....	ALL/GEN K,7	12-5.....	ALL/GEN K,6
7-36.....	ALL/GEN K,7	12-6.....	ALL/GEN K,6
7-37.....	ALL/GEN K,7	12-7.....	ALL/GEN K,6
7-38.....	ALL/GEN K	12-8.....	ALL/GEN K,6
7-39.....	ALL/GEN K	12-9.....	ALL/GEN K,6
7-40.....	ALL/GEN K	12-10.....	ALL/GEN K,6
8-1.....	ALL/GEN K	12-11.....	ALL/GEN K,6
8-2.....	ALL/GEN K	12-12..... ☒	ALL/GEN K,6

† – Extra pages in crew copy only

☒ – Prelift-off information required

12-13.....	ALL/GEN K,6	12-57.....	ALL/GEN K,6
12-14.....	ALL/GEN K,6	12-58.....	ALL/GEN K,6
12-15.....	ALL/GEN K,6	12-59.....	ALL/GEN K,6
12-16.....	ALL/GEN K,6	12-60.....	ALL/GEN K,6
12-17.....	ALL/GEN K,6	12-61.....	ALL/GEN K,6
12-18.....	ALL/GEN K,6	12-62.....	ALL/GEN K,6
12-19.....	ALL/GEN K,6	12-63.....	ALL/GEN K,6
12-20.....	ALL/GEN K,6	12-64.....	ALL/GEN K,6
12-21.....	ALL/GEN K,6	12-65.....	ALL/GEN K,6
12-22.....	ALL/GEN K,6	12-66.....	ALL/GEN K,6
12-23.....	ALL/GEN K,6	12-67.....	ALL/GEN K,6
12-24.....	ALL/GEN K,6	12-68.....	ALL/GEN K,6
12-25.....	ALL/GEN K,6	12-69.....	ALL/GEN K,6
12-26.....	ALL/GEN K,6	12-70.....	ALL/GEN K,6
12-27.....	ALL/GEN K,6	12-71.....	ALL/GEN K,6
12-28.....	ALL/GEN K,6	12-72.....	ALL/GEN K,9
12-29.....	ALL/GEN K,6	12-73.....	ALL/GEN K,6
12-30.....	ALL/GEN K,6	12-74.....	ALL/GEN K,6
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12-32.....	ALL/GEN K,6	12-76.....	ALL/GEN K,9
12-33.....	ALL/GEN K,6	12-77.....	ALL/GEN K,9
12-34.....	ALL/GEN K,6	12-78.....	ALL/GEN K,9
12-35.....	ALL/GEN K,6	12-79.....	ALL/GEN K,6
12-36.....	ALL/GEN K,6	12-80.....	ALL/GEN K,6
12-37.....	ALL/GEN K,6	12-81.....	ALL/GEN K,6
12-38.....	ALL/GEN K,6	12-82.....	ALL/GEN K,6
12-39.....	ALL/GEN K,6	12-83.....	ALL/GEN K,6
12-40.....	ALL/GEN K,6	12-84.....	ALL/GEN K,6
12-41.....	ALL/GEN K,6	12-85.....	ALL/GEN K,6
12-42.....	ALL/GEN K,6	12-86.....	ALL/GEN K,6
12-43.....	ALL/GEN K,6	12-87.....	ALL/GEN K,6
12-44.....	ALL/GEN K,9	12-88.....	ALL/GEN K,6
12-45.....	ALL/GEN K,9	12-89.....	ALL/GEN K,9
12-46.....	<input checked="" type="checkbox"/> ALL/GEN K,6	12-90.....	ALL/GEN K,9
12-47.....	ALL/GEN K,6	13-1.....	ALL/GEN K
12-48.....	ALL/GEN K,6	13-2.....	<input checked="" type="checkbox"/> ALL/GEN K,10
12-49.....	ALL/GEN K,6	13-3.....	ALL/GEN K,1
12-50.....	ALL/GEN K,6	13-4.....	<input checked="" type="checkbox"/> ALL/GEN K
12-51.....	ALL/GEN K,6	13-5.....	ALL/GEN K,10
12-52.....	ALL/GEN K,6	13-6.....	ALL/GEN K
12-53.....	ALL/GEN K,6	13-7.....	ALL/GEN K,10
12-54.....	ALL/GEN K,6	13-8.....	ALL/GEN K
12-55.....	ALL/GEN K,6	13-9.....	ALL/GEN K
12-56.....	ALL/GEN K,6	13-10.....	<input checked="" type="checkbox"/> ALL/GEN K

– Prelift-off information required

13-11.....	ALL/GEN K	CC 15-35.....	* ALL/GEN K
13-12.....	<input checked="" type="checkbox"/> ALL/GEN K,10	CC 15-36.....	* ALL/GEN K
13-13.....	ALL/GEN K	CC 15-37.....	* ALL/GEN K
13-14.....	ALL/GEN K	CC 15-38.....	* ALL/GEN K
13-15.....	ALL/GEN K,10	CC 15-39.....	* ALL/GEN K
13-16.....	ALL/GEN K,10	CC 15-40.....	* ALL/GEN K
14-1.....	ALL/GEN K	CC 15-41.....	* ALL/GEN K
14-2.....	ALL/GEN K	CC 15-42.....	* ALL/GEN K
14-3.....	ALL/GEN K	CC 15-43.....	* ALL/GEN K,1
14-4.....	ALL/GEN K	CC 15-44.....	* ALL/GEN K,1
15-1.....	* ALL/GEN K	15-45.....	* deleted
15-2.....	* ALL/GEN K	15-46.....	* deleted
CC 15-3.....	* ALL/GEN K	CC 15-45.....	* ALL/GEN K,10
CC 15-4.....	* ALL/GEN K	CC 15-46.....	* ALL/GEN K,10
CC 15-5.....	* ALL/GEN K,5	15-47.....	* ALL/GEN K,10
CC 15-6.....	* ALL/GEN K	15-48.....	* ALL/GEN K,10
CC 15-7.....	* ALL/GEN K		
CC 15-8.....	* ALL/GEN K		
CC 15-9.....	* ALL/GEN K		
CC 15-10.....	* ALL/GEN K		
CC 15-11.....	* ALL/GEN K		
CC 15-12.....	* ALL/GEN K		
CC 15-13.....	* ALL/GEN K		
CC 15-14.....	* ALL/GEN K		
CC 15-15.....	* ALL/GEN K		
CC 15-16.....	* ALL/GEN K		
CC 15-17.....	* ALL/GEN K		
CC 15-18.....	* ALL/GEN K		
CC 15-19.....	* ALL/GEN K		
CC 15-20.....	* ALL/GEN K		
CC 15-21.....	* ALL/GEN K		
CC 15-22.....	* ALL/GEN K		
CC 15-23.....	* ALL/GEN K		
CC 15-24.....	* ALL/GEN K		
CC 15-25.....	* ALL/GEN K		
CC 15-26.....	* ALL/GEN K		
CC 15-27.....	* ALL/GEN K		
CC 15-28.....	* ALL/GEN K		
CC 15-29.....	* ALL/GEN K		
CC 15-30.....	* ALL/GEN K		
CC 15-31.....	* ALL/GEN K		
CC 15-32.....	* ALL/GEN K		
CC 15-33.....	* ALL/GEN K		
CC 15-34.....	* ALL/GEN K		

\* – Omit from flight book

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ORBIT OPS CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
WCCS COMM PLAN		
(Front).....	CC 15-3	ORB OPS-1a/O/B
(Back).....	CC 15-4	ORB OPS-1b/O/B
ORBIT SPEC (R11) (Front).....	CC 15-5	ORB OPS-2a/O/J
PRIMARY C/W PARAMETER MATRIX (Back of ORBIT SPEC (R11)).....	CC 15-6	ORB OPS-2b/O/E
KU ANTENNA OVERLAY (COLOR MONITOR).....	CC 15-7	ORB OPS-4a/O/B
URINE COLLECTION (w/o UMS) (Front).....	CC 15-8	ORB OPS-5a/O/H
CONT WASTE COLLECTION – UCD/APOLLO BAG (Back of URINE COLLECTION (w/o UMS)).....	CC 15-9	ORB OPS-5b/O/G
URINE COLLECTION (w/UMS) (Front).....	CC 15-10	ORB OPS-6a/O/I
UMS CONT WASTE COLLECTION – UCD/APOLLO BAG (Back of URINE COLLECTION (w/UMS)).....	CC 15-11	ORB OPS-6b/O/H
EDO WCS URINE COLLECTION (Front).....	CC 15-12	ORB OPS-7a/O/D
EDO FECAL CANISTER CHANGEOUT (Back of EDO WCS URINE COLLECTION)....	CC 15-13	ORB OPS-7b/O/D
EDO WCS MANUAL COMPACTION (Front).....	CC 15-14	ORB OPS-8a/O/B
(Back).....	CC 15-15	ORB OPS-8b/O/B
PHOTO GRID OVERLAY .....	CC 15-16	ORB OPS-9a/O/B

## ORBIT OPS CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
DUAL SHIFT ORBITER CO2		
ABSORBER REPLACEMENT		
(Front) .....	CC 15-17	ORB OPS-11a/nonRCRS/B
(Back) .....	CC 15-18	ORB OPS-11b/nonRCRS/B
(Front) .....	CC 15-19	ORB OPS-12a/nonRCRS/B
(Back) .....	CC 15-20	ORB OPS-12b/nonRCRS/B
(Front) .....	CC 15-21	ORB OPS-13a/nonRCRS/B
(Back) .....	CC 15-22	ORB OPS-13b/nonRCRS/B
(Front) .....	CC 15-23	ORB OPS-14a/nonRCRS/B
(Back) .....	CC 15-24	ORB OPS-14b/nonRCRS/B
(Front) .....	CC 15-25	ORB OPS-15a/nonRCRS/B
(Back) .....	CC 15-26	ORB OPS-15b/nonRCRS/B
(Front) .....	CC 15-27	ORB OPS-16a/nonRCRS/B
(Back) .....	CC 15-28	ORB OPS-16b/nonRCRS/B
(Front) .....	CC 15-29	ORB OPS-17a/nonRCRS/B
(Back) .....	CC 15-30	ORB OPS-17b/nonRCRS/B
(Front) .....	CC 15-31	ORB OPS-18a/nonRCRS/B
(Back) .....	CC 15-32	ORB OPS-18b/nonRCRS/B
SINGLE SHIFT ORBITER CO2		
ABSORBER REPLACEMENT		
(Front) .....	CC 15-33	ORB OPS-19a/nonRCRS/B
(Back) .....	CC 15-34	ORB OPS-19b/nonRCRS/B
(Front) .....	CC 15-35	ORB OPS-20a/nonRCRS/B
(Back) .....	CC 15-36	ORB OPS-20b/nonRCRS/B
(Front) .....	CC 15-37	ORB OPS-21a/nonRCRS/B
(Back) .....	CC 15-38	ORB OPS-21b/nonRCRS/B
(Front) .....	CC 15-39	ORB OPS-22a/nonRCRS/B
(Back) .....	CC 15-40	ORB OPS-22b/nonRCRS/B
URINE PRETREAT		
CHANGEOUT (Front) ..	CC 15-41	ORB OPS-23a/O/D
URINE PRETREAT SETUP		
(Back of URINE PRETREAT		
CHANGEOUT).....	CC 15-42	ORB OPS-23b/O/D
ERGOMETER		
(Front) .....	CC 15-43	ORB OPS-24a/O/A
(Back) .....	CC 15-44	ORB OPS-24b/O/A
GALLEY IODINE REMOVAL		
ASSEMBLY (GIRA)		
INSTALLATION		
(Front) .....	CC 15-45	ORB OPS-44a/O/A
CWC (CONTINGENCY		
WATER CONTAINER)		
FILL(Back of GALLEY		
IODINE REMOVAL		
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INSTALLATION) .....	CC 15-46	ORB OPS-44b/O/A
x		ORB OPS/ALL/GEN K,10



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APU/HYDRAULICS

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APU/  
HYD

APU/  
HYD

### APU HEATER RECONFIG

A12	APU HTR GAS GEN/FUEL PUMP (three)	- B AUTO
	LUBE OIL LN (three)	- B AUTO
	APU HTR TK/FU LN/H2O SYS 1B,2B,3B (three)	- AUTO
	APU HTR TK/FU LN/H2O SYS 1A,2A,3A (three)	- OFF



## HYD ISOL VALVE REPOSITIONING

### SM 87 HYD THERMAL

#### 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

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COMM/  
INST

COMM/  
INST

## KU-BD ANT DEPLOY

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

COMM/INST

KU-BD ANT DEPLOY .....	TEMP 2-2
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COMM/  
INST

## 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

**115 |**

TEMP 2-2      ORB OPS/115/GEN K,10

## 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/ $\bar{R}$

### 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

CRT SELF TEST – ITEM 7 EXEC (no \*)

A1U KU BD MODE – COMM  
sel – GPC DESIG  
CNTL – CMD



## KU-BD ANT STOW

R13L	√PL BAY MECH PWR SYS 1,2 (two) – OFF
A1U	√CNTL – CMD
	KU BD PWR – ON
	MODE – RDR PASSIVE
	CNTL – PNL
	KU BD sel – MAN SLEW
A2	√DIGI DIS SEL – EL/AZ
A1U	SLEW RATE – as reqd
	SLEW ELEV – as reqd
A2	R/EL ind: -27.0 (± 1°)
A1U	SLEW AZM – as reqd
A2	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	KU ANT – STO
A2	√R/EL ind: -29.0 (± 1°)
	√RR/AZM ind: -125.0 (± 1°)
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, <u>MECH</u> , 9.3c *

DAP: as reqd

Cont next page

STOW DEPLOYED ASSEMBLY

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

OCA If not in D/O Prep,  
go to OCA S-BAND MODEM (MFX)  
ACTIVATION (PGSC)

## 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    √PL BAY MECH PWR SYS 1,2 (two) – OFF  
A1U    √CNTL            – CMD  
          KU BD PWR    – ON  
                      MODE – RDR PASSIVE  
          CNTL            – PNL  
          KU BD sel    – MAN SLEW  
A2        √DIGI DIS SEL – EL/AZ  
A1U        SLEW RATE – as reqd  
  
          SLEW ELEV – as reqd  
A2            R/EL ind: -27.0 (± 1°)  
  
A1U        SLEW AZM – as reqd  
A2            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    KU ANT – STO  
  
A2        √R/EL ind:    -29.0 (± 1°)  
          √RR/AZM ind: -125.0 (± 1°)

Cont next page

# 115 |

TEMP 2-5    ORB OPS/115/GEN K,10

00:00

A2

Start Event Timer  
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

R13L

STOW DEPLOYED ASSEMBLY  
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

OCA

If not in D/O Prep,  
go to OCA S-BAND MODEM (MFX)  
ACTIVATION (PGSC)

**115 |**

TEMP 2-6 ORB OPS/115/GEN K,10

## 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,  
A2 Use SLEW AZ and SLEW ELEV sw as reqd to  
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-\*)

A6U 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

:B MNB MID 4 – OFF

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

	PL BAY FLOOD – as reqd	
L10 (MUX) (VTR)	√VTR/CC PWR – on (LED on) ON/STANDBY – press (green LED on) Tape – install	
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	
	√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)	
	<u>NOTE</u> After JETT, initiate opening rate ASAP. Minimize other THC/RHC inputs	
A14	PYRO KU ANT – ARM	
	Wait 1 sec, then: PYRO KU ANT – JETT	
	<u>INITIAL SEP MNVR (IMMEDIATELY AFTER JETT)</u> DAP: A/INRTL/PRI	

Cont next page

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  
FLT CNTLR PWR – OFF

A7 Perform DEACTIVATION (Cue Card, TV) as reqd  
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



**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 – 2  
(as reqd)  
2 – T/R, tw – 2  
MIDDECK SPKR AUD A/A – OFF  
ICOM A – OFF  
ICOM B – RCV  
XMIT/ICOM MODE sel – PTT/PTT  
TONES – ACCU/BYPASS  
MIDDECK SPKR AUD SPKR PWR – SPKR (reqd  
for ACCU tones)  
MIDDECK SPKR AUD MSTR SPKR VOL sel – as  
reqd
- MO39M MIDDECK COMM CCU PWR – ON  
All WCCS leg units – off

**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 – 2  
(as reqd)  
2 – T/R, tw – 2  
MS AUD A/A – OFF  
ICOM A,B (two) – OFF  
XMIT/ICOM MODE – PTT/PTT
- A13 OS AUD SPKR PWR – SPKR  
MSTR SPKR VOL sel – R
- A11 MS COMM CCU PWR – ON  
All WCCS leg units – off

Cont next page

- MO42F c. TONE CHECKS (optional)  
√MIDDECK SPKR AUD PWR – AUD/TONE  
Set off alert tone and adjust speaker volume as reqd

NOTE

If IDP not initially on, wait ~30 sec after IDP/CRT pwr-on before turning off unit

If desired, alert tone duration may be adjusted via a SPEC 2, Item 23 entry

IDP/CRT PWR – OFF,ON

NOTE

If during sleep period, SM ALERT annunciated with no fault msg, MCC has no cmd capability. √MCC. If no joy, go to COMM LOST (ORB PKT, COMM)

## PRE-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 – 2                |
|       | 2                                  | – RCV, tw – 2                |
|       | MIDDECK SPKR AUD A/A               | – OFF                        |
|       | ICOM A,B (two)                     | – OFF                        |
|       | XMIT/ICOM MODE sel                 | – PTT/PTT                    |
|       | TONES                              | – ACCU/BYPASS                |
|       | MIDDECK SPKR AUD PWR               | – SPKR (reqd for ACCU tones) |
|       | MIDDECK SPKR AUD MSTR SPKR VOL sel | – as reqd                    |
- MO39M
- |                      |       |
|----------------------|-------|
| MIDDECK COMM CCU PWR | – ON  |
| All WCCS leg units   | – off |
- b. FLIGHT DECK CONFIG (optional)
- |     |                |               |
|-----|----------------|---------------|
| R10 | MS AUD PWR     | – AUD/TONE    |
|     | A/G 1          | – T/R, tw – 2 |
|     | 2              | – RCV, tw – 2 |
|     | MS AUD A/A     | – OFF         |
|     | ICOM A,B (two) | – OFF         |
|     | XMIT/ICOM MODE | – PTT/PTT     |
- A13
- |                   |        |
|-------------------|--------|
| OS AUD SPKR PWR   | – SPKR |
| MSTR SPKR VOL sel | – R    |
- A11
- |                    |       |
|--------------------|-------|
| MS COMM CCU PWR    | – ON  |
| All WCCS leg units | – off |
- c. TONE CHECKS (optional)
- |       |  |            |
|-------|--|------------|
| MO42F | <input checked="" type="checkbox"/> MIDDECK SPKR AUD PWR | – AUD/TONE |
|-------|--|------------|
- Set off alert tone and adjust speaker volume as reqd

Cont next page

NOTE

If IDP not initially on, wait ~30 sec after IDP/CRT pwr-on before turning off unit

If desired, alert tone duration may be adjusted via a SPEC 2, Item 23 entry

IDP/CRT PWR – OFF,ON

NOTE

If during sleep period, SM ALERT annunciated with no fault msg, MCC has no cmd capability. √MCC. If no joy, go to COMM LOST (ORB PKT, COMM)

## POST-SLEEP AUD CONFIG

If handheld mic/speaker operation:  
Perform STD HANDHELD MIC/SPEAKER  
CONFIG, 2-17

If VLHS/HIU operation:  
Perform STD VLHS/HIU CONFIG  
(NO SPEAKER)

If WCCS operation:

### NOTE

More than one crewmember per WCCS  
channel will cause intermittent loss of  
comm. Turn unused WCCS leg units OFF

Perform STD VLHS/HIU CONFIG  
(NO SPEAKER)

## STD VLHS/HIU CONFIG (NO SPEAKER)

XX	XX AUD PWR	– AUD/TONE
	A/G 1	– T/R, tw – 2
	A/G 2	– RCV, tw – 2
	A/A	– RCV, tw – 2
	ICOM A,B (two)	– T/R, tw – 2
	XMIT/ICOM MODE	– PTT/PTT
XX	XX CCU PWR	– ON
A13	OS AUD SPKR PWR	– OFF
	MSTR SPKR VOL sel	– MIN
MO42F	MIDDECK SPKR AUD TONES	– ACCU/BYPASS
	SPKR PWR	– OFF
	MSTR SPKR VOL sel	– MIN

### NOTE

Unused audio loops either RCV or OFF.  
Unused VLHS comm systems either  
disconnected or CCU PWR – OFF and  
HIU VOL – 0

## 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) <u>S-BD</u>	IF TDRS <u>S-BD</u>	IF TDRS <u>KU-BD</u>
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

## STD HANDHELD MIC/SPEAKER CONFIG

### NOTE

For PRE-SLEEP AUD CONFIG,  
MS A/G 2 and MIDDECK SPKR  
AUD A/G 2 sws should remain off

### FLIGHT DECK CONFIG

R10	MS AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - 2
	2	- RCV, tw - 2
	A/A	- RCV, tw - 2
	ICOM A,B (two)	- RCV, tw - 2
	XMIT/ICOM MODE	- PTT/PTT
A13	OS AUD SPKR PWR	- SPKR
	MSTR SPKR VOL sel	- 8
A11	MS COMM CCU PWR	- ON
	All WCCS leg units	- off

### MIDDECK CONFIG

MO42F	MIDDECK SPKR AUD	
	A/G 1	- T/R, tw - 2
	2	- RCV, tw - 2
	A/A	- RCV, tw - 2
	ICOM A,B (two)	- RCV, tw - 2
	XMIT/ICOM MODE sel	- PTT/PTT
	SPKR PWR	- SPKR
	MSTR SPKR VOL sel	- 8
MO39M	MIDDECK COMM CCU PWR	- ON
	All WCCS leg units	- off

## STD WCCS CONFIG

### ACTIVATION

Unstow and assemble WCCS leg units

XX	XX AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - 5
	A/G 2	- RCV, tw - 2
	A/A	- RCV, tw - 5
	ICOM A	- T/R, tw - 5
	B	- OFF, tw - 5
	XX AUD XMIT/ICOM MODE	- PTT/PTT
A13	OS AUD SPKR PWR	- OFF
	MSTR SPKR VOL sel	- MIN
MO42F	MIDDECK SPKR AUD SPKR PWR	- OFF
	VOL sel	- MIN
XX	XX CCU PWR	- OFF
	Connect AIU cables to CCU outlets	
	XX CCU PWR - ON	
AIU	MODE SEL	- as reqd
	Green pwr lt	- ON
CRU	CHNL	- Designated chnl (see Cue Card, <u>WCCS COMM PLAN</u> )
	VOLUME	- as reqd

### NOTE

If WCCS used in config with Spkr Units, adjust spkr volume as reqd to prevent squeals

### DEACTIVATION

AIU	MODE SEL	- OFF
	Green pwr lt	- OFF
CRU	VOLUME	- OFF
XX	XX CCU PWR	- OFF
	Disconnect AIU cables from CCU outlets	
	Disassemble, stow WCCS leg units	



## ICOM RECORDER OPS

1. RECORD (Entry Config)
  - A11 MS COMM CCU PWR – OFF
  - √MHA connected to CCU
  - ICOM RCDR CABLE Connect to MHA at A11
  - Plug P3/RCDR into Rcdr MIC Port
  - Plug P2/RCDR Headphone into Rcdr Headphones port
  - Plug mic into cable MIC connector
  - Tape all connections to Rcdr
  - A11 MS COMM CCU PWR – ON
  - RCDR Install tape
  - MIC ATT sw – 0 dB
  - SPEED TUNE – OFF
  - HEADPHONE VOLUME – 0 (taped)
  - DOLBY NR – OFF
  - TAPE – NORM
  - PEAK/BATT – BATT
  - MIC MIC PWR – 120
  - √LED flash for good BATT
  - ATU Desired Audio Loop(s) – T/R
  - RCDR PAUSE and RECORD – depress, √no motion
  - √BATT LED
  - PEAK/BATT – PEAK
  - REC LEVEL – 4
  - PAUSE – release, √tape motion
  - When complete – STOP, Mic – OFF
  - To test setup – PLAYBACK
2. PLAYBACK
  - RCDR √Tape rewind
  - HEADPHONE VOL – 7
  - ATU XMIT/ICOM MODE – PTT/VOX
  - VOX SENS – MAX
  - ICOM A(B) – T/R
  - RCDR PLAY – depress
  - √Tape motion, voice quality
  - When complete, STOP – depress

## 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
  - O6 √UHF SPLX/EVA XMIT FREQ – 259.7/414.2
    - √PWR AMPL – ON
    - √SPLX SQUELCH – ON (OFF if heads down)
    - MODE sel – SPLX
  - ATUxx √AUD A/G1 or A/G2 – T/R
    - A/A – T/R
2. ENTRY VIDEO C/O CONFIG

If ENTRY VIDEO SETUP (PHOTO/TV, MINI-CAM) configured:

  - Connect Mini-Cam cables to HUD Mini-Cam Extension Cable
  - O19 TV PWR – ON
  - L10(MUX) √VTR/CC PWR – on (LED on)
  - (VTR) √ON/STANDBY – push (green LED on)
  - √Entry Mini-Cam AVIU J1 output to VTR IN
  - √V10 connected to VTR MONITOR
  - V10 PWR – ON
  - F3 R HUD PWR – ON
  - F8U 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      √S-BD PM ANT SW ELEC    - 1  
              √PRE AMP                - 1  
              √PWR AMPL STBY - 1  
                                  √OPER - 1  
              √MODE sel            - TDRS DATA  
              √XPNDR               - 1  
              √NSP DATA RATE (two)    - HI  
                  √UPLK DATA               - S-BD  
                  √CODING XMIT,RCV (two) - ON  
                  √PWR                       - 1

2. RECONFIG COMM STRINGS
- √MCC ready for reconfig  
Expect 'BCE STRG 3 NSP' msg

- C3            S-BD PM CNTL – PNL,CMD
- Perform comm check 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

**COMM STRING 1 C/O (PART B: RETURN TO STRING 2)**

1. VERIFY PANEL A1L CONFIG
- |     |                        |             |
|-----|------------------------|-------------|
| A1L | √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
- Perform comm check 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
- |     |                     |     |
|-----|---------------------|-----|
| A1L | S-BD PM ANT SW ELEC | - 1 |
|     | PRE AMP             | - 1 |
|     | PWR AMPL STBY       | - 1 |
|     | OPER                | - 1 |
|     | XPNDR               | - 1 |
|     | NSP PWR             | - 1 |

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**CREW  
SYS**

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CREW  
SYS

**PRE-SLEEP ACTIVITY**

FLIGHT DECK ACTIVITY LIST

- R1(A11) 1. If reqd, SUPPLY WATER DUMP (ECLS) (√MCC)  
CRYO HEATER/MANF VLV config per MCC  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16
- MO69M 2. If FD1 and PPO2 < 3.20:  
√LEH O2 8 vlv – CL  
Insert O2 Bleed Orifice Assembly into LEH O2 8  
QD  
LEH O2 8 vlv – OP
- C7 √SPLY 1,2 vlv – OP  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16
3. SM CHECKPOINT INITIATE (DPS)  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16
- L1 4. 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
- MO10W 5. If 14.7 CAB REG INLET SYS 1(2) VLV – OP  
(PCS active):  
Expect possible 'S66 CAB N2 FLO 1(2)'  
O2/N2 CNTLR VLV SYS 1(2) – OP
- L2 1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16

Cont next page



6. DPS/MEDS SLEEP CONFIG

NOTE

Reminder: complete middeck speaker volume adjust prior to IDP powerdown, PRE-SLEEP AUD CONFIG (COMM/INST); see MIDDECK ACTIVITY LIST, step 10, 3-6

- R11      √IDP/CRT4 PWR      – ON  
          IDP/CRT4 MAJ FUNC – SM
- CRT4       SM ANTENNA (√CRT is driven by SM GPC)
- 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
- CRT2       GNC UNIV PTG (√CRT is driven by GNC GPC)
- All FWD MDUs except CRT 1,  
          MDU PWR – OFF  
          IDP/CRT2 PWR sw – OFF
- CRT1      Set CRT Wake-up Time/Alert Tone Duration:  
           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
- 1  2  3  4  5  6  7  8  9  10   
          11  12  13  14  15  16

Cont next page

A3 7. ✓PWR OFF:  
 A7 TV MON  
 CAMERAS  
 PWR CONTR UNIT  
 O19 PWR  
 Recording Devices/Camcorders  
 PLB LIGHTS  
 DDUs

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

8. WINDOW SHADES/FILTERS

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

9. LIGHTING

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

O14,O15,O16:F 10. Pri RJDF DRIVER,LOGIC (eight) – OFF

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

O14,O15,O16:F 11. Pri RJDA DRIVER,LOGIC (eight) – OFF  
 RJDA 1A L2/R2 MANF DRIVER – ON

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

MIDDECK ACTIVITY LIST

1. FOOD PREP/POST

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

2. CO2 ABSORBER REPLACEMENT (Cue Card)

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

Cont next page

3. HOUSEKEEPING

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

4. WCS CLEANING (Cue Card, URINE COLLECTION)

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

5. SET UP EQUIPMENT FOR NEXT DAY'S ACTIVITIES

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

MO58F

6.  PWR OFF:

TV PWR

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

7. MISSION NOTES

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

8. TYPE PERSONAL MESSAGES, if desired

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

9. PGSC OVERNIGHT CONFIG

COLOR PRINTER – ON

PAPER IN COLOR PRINTER

OCA ROUTER – ON

KFX PGSC (Prime and Backup) – On

KFX LAUNCHED ON KFX PGSCs (Prime and Backup)

OUTLOOK APPLICATION CLOSED ON ALL PGSC's

Prime KFX \_\_\_\_\_ Backup KFX \_\_\_\_\_

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

Cont next page

10. PRE-SLEEP AUD CONFIG (COMM/INST)

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

11. LIGHTING

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

12. GALLEY OVERNIGHT CONFIG (ECLS)

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

## POST-SLEEP ACTIVITY

### MIDDECK ACTIVITY LIST

#### 1. GALLEY MORNING CONFIG (ECLS)

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

#### 2. LIGHTING (minimize if in GROUP B(C) PWRDN)

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

#### 3. CO2 ABSORBER REPLACEMENT (Cue Card)

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

#### 4. MESSAGE REVIEW

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

#### 5. POST-SLEEP AUD CONFIG (COMM/INST)

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

#### 6. If FD2 and Bleed Orifice not installed:

MO69M

√LEH O2 8 vlv – CL

Insert O2 Bleed Orifice Assembly into LEH O2 8  
QD

LEH O2 8 vlv – OP

C7

√SPLY 1,2 vlv – OP

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

#### 7. FOOD PREP/POST

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

Cont next page

3-7

ORB OPS/ALL/GEN K,6

8. HOUSEKEEPING

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

9. WCS OHS REPLACEMENT

a. If FD2, perform URINE PRETREAT SETUP  
(Cue Card, URINE PRETREAT CHANGEOUT)

b. URINE PRETREAT CHANGEOUT (Cue Card)

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

10. If Entry day, perform URINE PRETREAT ENTRY  
PREP (Cue Card, URINE PRETREAT  
CHANGEOUT) (if flown)

Cont next page

3-8

ORB OPS/ALL/GEN K,6

FLIGHT DECK ACTIVITY LIST

1. LIGHTING (minimize if in GROUP B(C) PWRDN)

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

2. WINDOW SHADES/FILTERS

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

3. 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  10   
11  12  13  14  15  16

C3

4. BFC CRT DISP – OFF

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

5. ALERT TONE DURATION

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

L1

6. 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  10   
11  12  13  14  15  16

MO10W

7. If 14.7 CAB REG INLET SYS 1(2) vlv – OP (PCS active):

L2

O2/N2 CNTLR VLV SYS 1(2) – AUTO

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

Cont next page

8. If planned, perform I'CNCT: L(R) OMS to RCS (ORB PKT, RCS), then:

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

9. If not GROUP B(C) PWRDN:

O14:F,  
O15:F,  
O16:F

Pri RJDF DRIVER,LOGIC (eight) – ON

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

10. If not GROUP B(C) PWRDN:

O14:F,  
O15:F,  
O16:F

Pri RJDA DRIVER,LOGIC (eight) – ON

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

11. If reqd, SUPPLY WATER DUMP (ECLS) (√MCC)  
CRYO HEATER/MANF VLV config per MCC

R1(A11)

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



## OCAC SETUP

- OCAC
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  
  
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

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

## **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

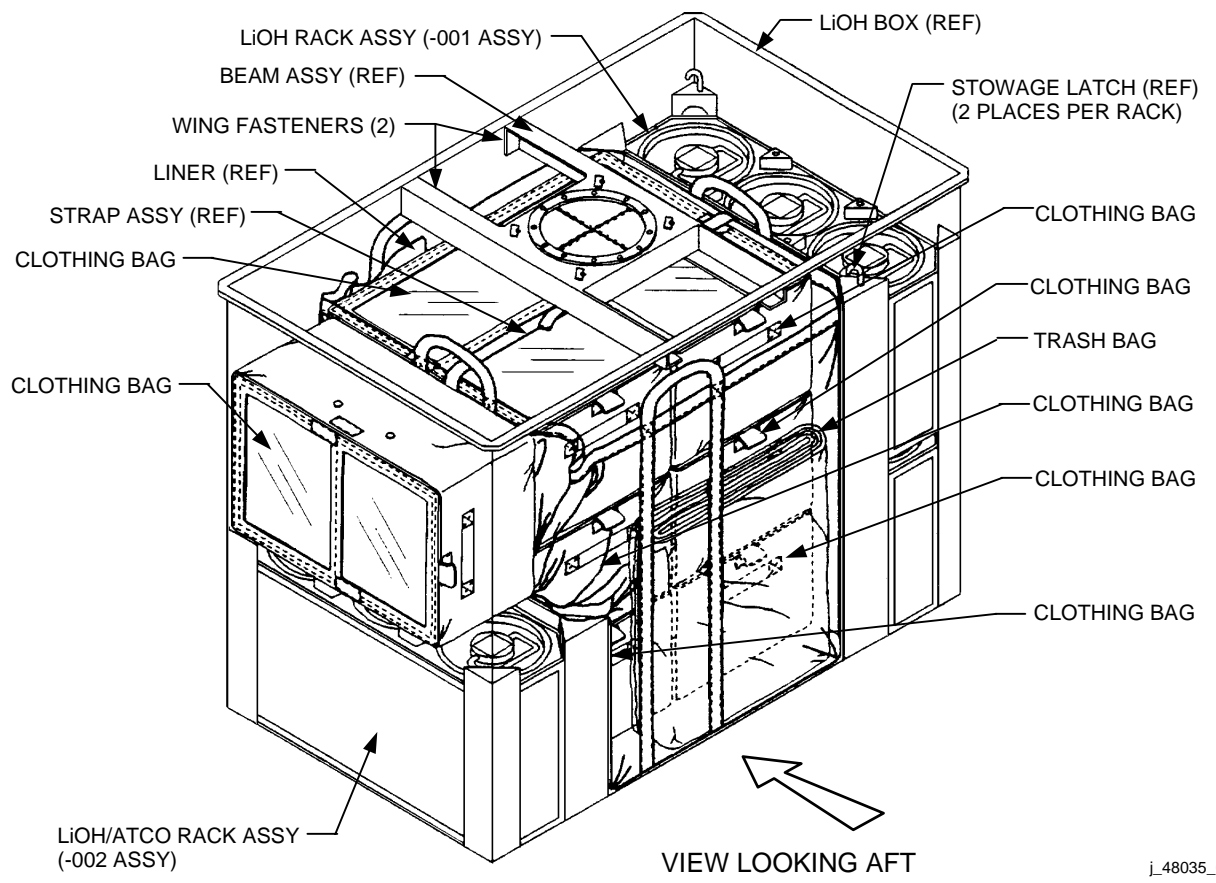
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3-14

ORB OPS/ALL/GEN K

3-15

ORB OPS/ALL/GEN K



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## 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,  $\mu$ Gy/h, or mGy/h. Units for Total Dose may be pGy, nGy,  $\mu$ Gy, or mGy. 1 Gy = 100 rad:  
 pGy – picogray  
 nGy – nanogray  
 $\mu$ Gy – microgray  
 mGy – milligray

::00 Display 1	hh:mm:ss _____ $\mu$ G _____m _____ $\mu$ G/h	→	Time Elapsed Time	Total Dose Dose Rate
::15 Display 2	hh:mm:ss _____ $\mu$ G DD.MM.YY _____ $\mu$ G/h	→	Time Date	Total Dose Dose Rate
::30 Display 3	hh:mm:ss _____ $\mu$ G ___% ___E _____ $\mu$ G/h	→	Time Memory Errors	Total Dose Dose Rate
::45 Display 4	hh:mm:ss _____ $\mu$ G > _____ $\mu$ G/h	→	Time Flags	Total Dose Dose Rate

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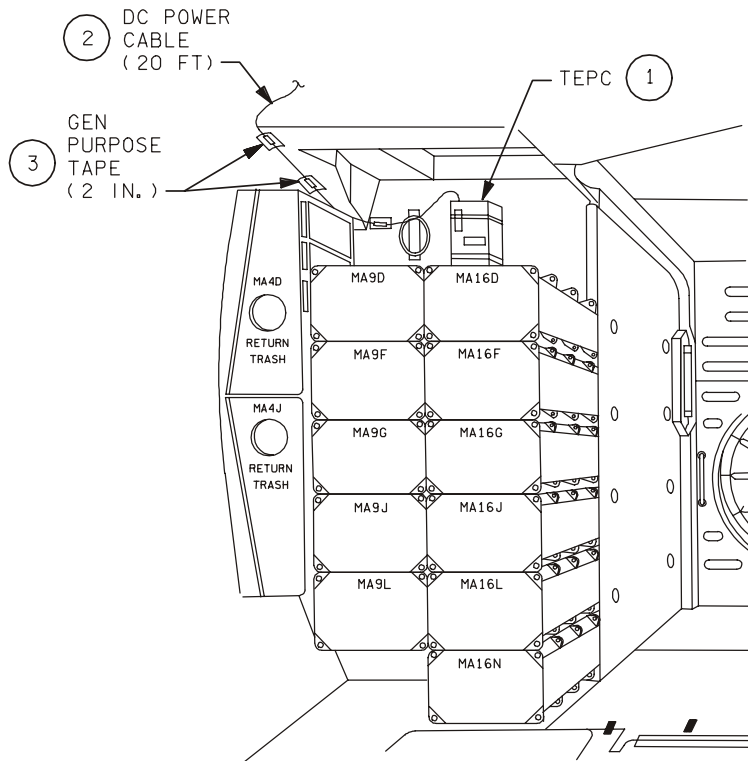
- TEPC      B. POWERDOWN  
 1. PWR sw 1 – OFF

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

\_\_\_\_/\_\_\_\_:\_\_\_\_:\_\_\_\_



480350318\_114. ART 1

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



C. MALFUNCTION

1. Green LED not ON (no display)

TEPC PWR sw 1 – OFF

MO52J DC UTIL PWR MNA – OFF

√External connections properly mated per  
PLUG-IN-PLAN (REF DATA FS)

MO52J DC UTIL PWR MNA – ON

TEPC PWR sw 1 – ON

√Green LED – ON  
If green LED ON, go to A. POWER ON, step 3,  
3-16

If no green LED:

√MCC regarding fuse replacement and  
perform step 2

2. Fuse Replacement

TEPC PWR sw 1 – OFF

MO52J DC UTIL PWR MNA – OFF

TEPC √Fuse (F1/F2)

switchbox

If necessary:

Top of TEPC

Replace with spare fuse

Stow blown fuse in spare fuse holder

NOTE

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

MO52J DC UTIL PWR MNA – ON

TEPC PWR sw 1 – ON

√Green LED – ON  
If green LED, perform A. POWER ON, step 4,  
3-16

If no green LED, notify MCC

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

Unfasten straps and unzip TEPC case

√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

Cont next page

3-21

ORB OPS/ALL/GEN K

### TEPC DISPLAY LOGSHEET

NOTE

Report units as well as values

Date	GMT	Dose Rate (__Gy/h)	Total Dose (__Gy)	Elapsed Time (m)

## 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

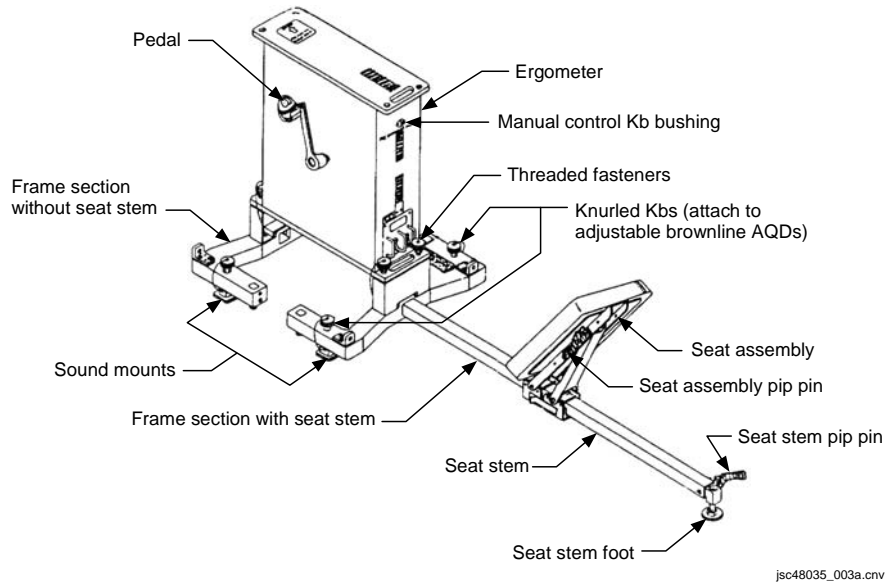


Figure 3-2.- Ergometer.

12. Unstow: Threaded fasteners (four)

**NOTE**

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

Cont next page

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 Ergometer Pedals  
Bag 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
- Ergo Acc 4. Detach Ergometer Display Panel cable,  
Bag 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

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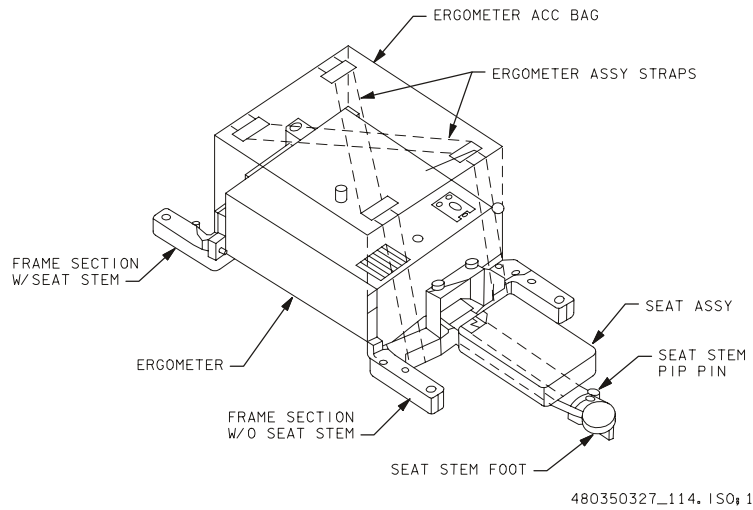


Figure 3-3.- Ergometer middeck launch/landing config (ergo assy).

14. Attach Ergometer horizontally to frame with pip pins (fig 3-3)  
 ✓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

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NOTE

Use towels, socks for shoulder padding if desired

6. Perform exercise

7. Stow: Bungee Cords

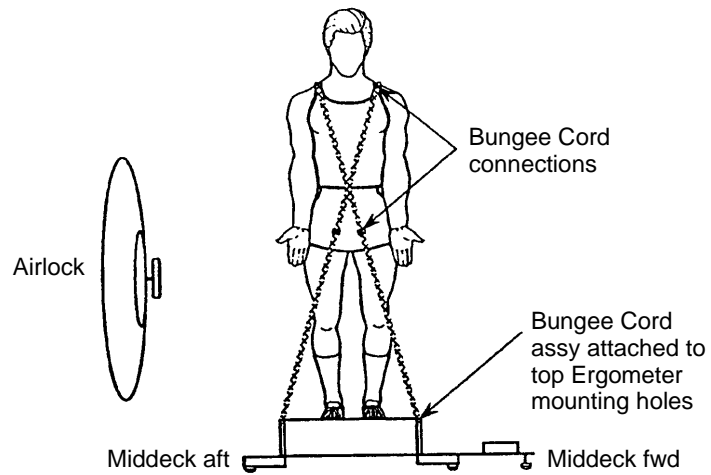


Figure 3-4.- Alternate exercise bungee attachments – front view (facing stbd).

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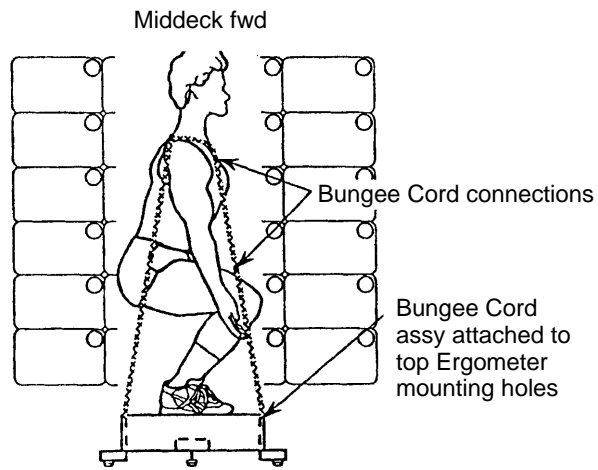


Figure 3-5.- Alternate exercise bungee attachments – side view (facing stbd).

**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

~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



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DPS

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DPS

## 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

CRT

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

CRT

GNC, OPS 201 PRO

Pause ~30 sec (DAP settling)

C3(A6U)

DAP: as reqd

If:	Single G2	Dual G2
CONFIG GPC	2 10000	2 12000
STR 1	1	1
2	1	2
3	1	1
4	1	2
PL 1/2	0	0
CRT 1	1	1
2	1	2
3	0	0
4	1	2
L 1	0	0
2	0	0
MM 1	1	1
2	1	2

### NOTE

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

4. FREEZE DRY GPC 2(3) (G2FD)

CRTX

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

DPS



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:

If MM202: GNC, OPS 201 PRO

GNC 0 GPC MEMORY

CONFIG – ITEM 1 +2 EXEC

Assign MC 2 without modifying target set →

CRT

C3(A6U)

CRT

O6

C3(A6U)

DAP: FREE  
VERN(ALT)

GNC, OPS 201 PRO

GPC MODE – STBY  
(tb-bp)  
– RUN  
(tb-RUN)

	Current:	Dual G2	Triple G2
CONFIG	2	2	2
GPC	12000	12300	
STR	1	1	1
	2	1	2
	3	1	1
	4	1	2
PL	1/2	0	0
CRT	1	1	1
	2	1	2
	3	0	0
	4	1	2
L	1	0	0
	2	0	0
MM	1	1	1
	2	1	2

DAP: as reqd

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

- C3(A6U) 1. If RNDZ NAV enabled:  
 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)

- CRT 3. CONFIG FOR SET EXPANSION  
 If MM202: GNC, OPS 201 PRO

GNC 0 GPC MEMORY  
 CONFIG – ITEM 1 +2 EXEC  
 Assign MC 2 →

If:	Dual G2	Triple G2
CONFIG GPC	2 12000	2 12300
STR 1	1	1
2	2	2
3	1	3
4	2	3
PL 1/2	0	0
CRT 1	1	1
2	2	2
3	0	0
4	2	3
L 1	0	0
2	0	0
MM 1	1	1
2	2	2

- C3(A6U) 4. OPS MODE RECALL  
 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

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. 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

		lf:	Single G2	Dual G2	Triple G2	
C3(A6U) CRT	DAP: FREE	CONFIG	8	8	8	
	GNC, OPS 801 PRO	GPC	10000	12000	12300	
	Pause ~30 sec (DAP settling)	STR	1	1	1	1
		2	1	2	2	
3		1	1	3		
4		1	2	3		
C3(A6U) CRT	DAP: as reqd	PL 1/2	0	0	0	
	<u>NOTE</u> Downlist reverts to lowest GPC (MCC may request Item 44+X)	CRT	1	1	1	1
		2	1	2	2	
		3	0	0	0	
4		1	2	3		
O15:F	6. If reqd for PWRDN: MMU 2 – OFF	L	1	0	0	
		2	0	0	0	
		MM	1	1	1	
		2	1	2	2	

## 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  $\sqrt$ MMU (two) – ON

#### GNC 0 GPC MEMORY

CONFIG – ITEM 1 +2 EXEC

Assign MC2 →

C3(A6U)

DAP: FREE

CRT

GNC, OPS 201 PRO

Pause ~30 sec  
 (DAP settling)

C3(A6U)

DAP: as reqd

lf:	Single G8	Dual G8	Triple G8
CONFIG	2	2	2
GPC	10000	12000	12300
STR 1	1	1	1
2	1	2	2
3	1	1	3
4	1	2	3
PL 1/2	0	0	0
CRT 1	1	1	1
2	1	2	2
3	0	0	0
4	1	2	3
L 1	0	0	0
2	0	0	0
MM 1	1	1	1
2	1	2	2

### 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

If not currently performing FCS Checkout, then:  
O8                   √MLS (three) – OFF  
O14,O15,O16:E   √cb ADTA (four) – op

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

A1U               5. If resuming KU BD RDR:  
                  √MCC for KU BD RDR OUTPUT  
                  KU BD sel – GPC

### **SM CHECKPOINT INITIATE**

O15:F   1. √MMU 2 – ON

2. SELECT MMU 2(1) FOR CKPT  
SM 1 DPS UTILITY  
MMU 2(1) ASSIGN – ITEM 4(3) EXEC (\*)

√MMU STATUS 2(1) – RDY

SM 60 TABLE MAINT  
√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:  
SM 1 DPS UTILITY  
√CKPT RETRV ENA – ITEM 12 EXEC (\*)

O15:F   5. If reqd for PWRDN: MMU 2 – OFF

ECLS

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ECLS

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## 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

ECLS

WCS  
Outbd  
Wall

### A. SUPPLY/SIMO DUMP PREP

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

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O QTY A	0620410	*	
B	0620420	*	
C	0620548	*	*
D	0620544		
NOZ T A	0620440	90	250
B	0620439	90	250

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

TABLE B

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O QTY 1	0620540	*	99
NOZ T A	0620520	50	250
B	0620519	50	250

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

Cont next page

- MO10W C. SIMO DUMP H2O TK N2 REG CONFIG  
 If performing simo SPLY/WST H2O Dump:  
 H2O TK N2 REG INLET SYS 1, SYS 2 vlv  
 (two) – OP
- CRT D. SUPPLY H2O DUMP NOZZLE HTR ACTIVATION  
SM 66 ENVIRONMENT  
 1. √SUPPLY H2O DMP LN T ≥ 65
- ML86B:A \* 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)
- CRT E. WASTE H2O DUMP NOZZLE HTR ACTIVATION  
SM 66 ENVIRONMENT  
 1. √WASTE H2O DMP LN T > 50
- ML86B:A \* 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)

Cont next page

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

- ML31C 2. √WASTE H2O TK1 VLV – OP (tb-OP)  
 3. DUMP VLV – OP (tb-OP)  
 CRT 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
- R11L \* 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. √SUPPLY H2O NOZ T A,B (two) – not incr

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

WCS 11. Remove, stow SPLY H2O Dumpline Purge  
Outbd 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. √QTY 1 not decr

ML31C \* If WASTE H2O QTY 1 decr: \*  
\* Cycle WASTE H2O DUMP VLV \*  
\* If not successful, \*  
\* WASTE H2O DUMP ISOL VLV – \*  
\* CL (tb-CL) \*

CRT 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. √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:

MO10W If Cab P < 14.7 psia or PCS1 active:  
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

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O NOZ T A	0620440	-82	250
B	0620439	-82	250

TABLE D

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	-82	250
B	0620519	-82	250

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**

**SM 88 APU/ENVIRON THERM**

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



**CO2 RMVL SYS CNTLR CONFIG:  
ACT 1/DEACT 2 (ACT 2/DEACT 1)**

ML86B:E    √cb MNA,C CO2 SYS 1,2 CNTLR (two) – cl

MO51F        CNTLR 2(1) MODE – STBY (hold 3 sec)  
              Wait 6 sec

√CNTLR 2(1) OPER It – It off

              √FAIL It – FAIL It on

              MNC(MNA) – OFF

√CNTLR 2(1) FAIL It – It off

              AC3(AC1) – OFF (hold 3 sec)

              cb AC3(AC1) ΦA(ΦC) (three) – op

                  AC1(AC3) ΦA(ΦC) (three) – cl

              AC1(AC3) – ON (hold 3 sec)

              MNA(MNC) – ON

              CNTLR 1(2) MODE – OPER (hold 3 sec)

              Wait 6 sec

√CNTLR 1(2) OPER It – OPER It on

√COM INSTR – ON

**CHARCOAL CANISTER REPLACEMENT**

Perform if CO2 RMVL SYS CNTLR CONFIG  
accomplished as part of midflight reconfig:

- MD54G        a. Remove and replace charcoal canister  
                  (if flown)
- b. Reseal used charcoal canister with wrapper  
                  and Gray Tape, stow

**OV104,105**

5-11    ORB OPS/104,105/GEN K

## 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:  $62 \pm 2$  degF
- L1 5. HI LOAD EVAP – OFF  
After 2.5 min,
- O1 √FREON EVAP OUT TEMP ind:  $62 \pm 2$  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:  $39 \pm 1$  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:  $62 \pm 2$  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

MA73C:  
C,D

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,  
 config cbs:

MA73C:  
 C,D

COMPLETED ACTION	cb CONFIG
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)

## 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

MA73C:  
C,D

If stowing single RAD and opposite RAD deployed,  
config cbs:

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

### 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 cbs:

MA73C:  
C,D

COMPLETED ACTION	cb CONFIG
PORT RAD stowed	cb MCA PWR AC1 3Φ MID 3 – cl AC2 3Φ MID 2 – cl (unless RMS uncradled) AC3 3Φ MID 2 – cl
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  
CRT,O1 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 XOVR vlv – CL  
√PL O2 SYS 1,2 vlv – CL  
√N2 SYS 1,2 vlv – CL

Middeck Floor √EMU O2 ISOL VLV – CL

L2 √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

L1      1. FES DEACTIVATION  
 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
-------------------

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
EVAP TEMP TOPPING AFT	0631802	-10	
FWD	0631801	-10	
L DUCT	0631800	-10	
NOZ	0631878	-10	
R DUCT	0631810	-10	
NOZ	0631879	-10	

L1      3. HEATER DEACTIVATION  
 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**

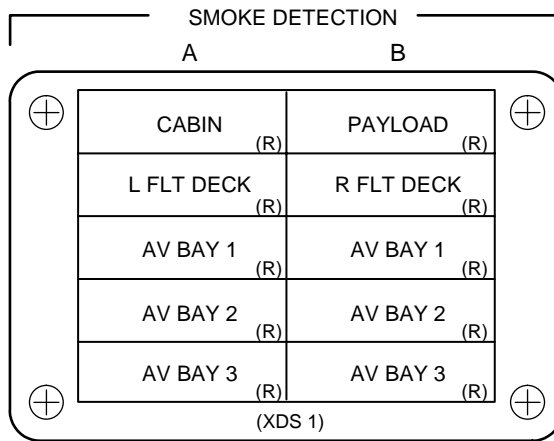
PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
EVAP TEMP TOPPING AFT	0631802	100	
FWD	0631801	100	
L DUCT	0631800	50	
NOZ	0631878	40	
R DUCT	0631810	50	
NOZ	0631879	40	

### 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 It 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

**SM SYS SUMM 1**

CRT

Verify:

	1/A	2/B
SMOKE		
CABIN	-0.5 to +0.5	
L/R FD	-0.5 to +0.5	-0.5 to +0.5
AV BAY 1	-0.5 to +0.5	-0.5 to +0.5
2	-0.5 to +0.5	-0.5 to +0.5
3	-0.5 to +0.5	-0.5 to +0.5

If limits exceeded, √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

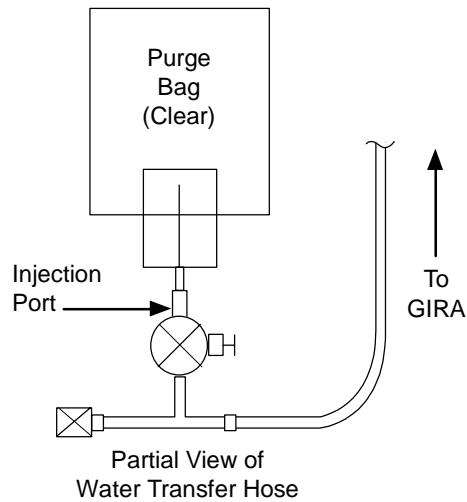
### WATER TRANSFER HOSE PURGE (see fig 5-1)

### 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



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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

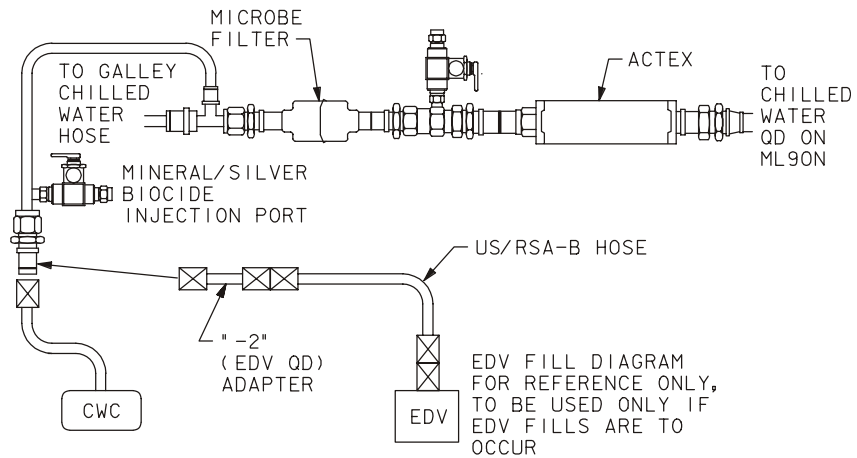
For Potable CWCs, ALWAYS add minerals first.

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

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- 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



480350527\_112. ART 1

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

Cont next page

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

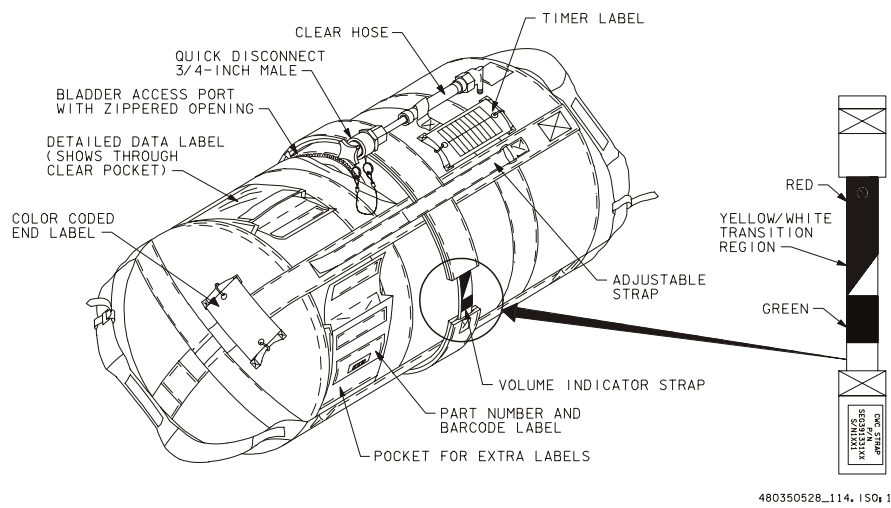


Figure 5-3.- Quantity measuring strap and CWC details.

Cont next page

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

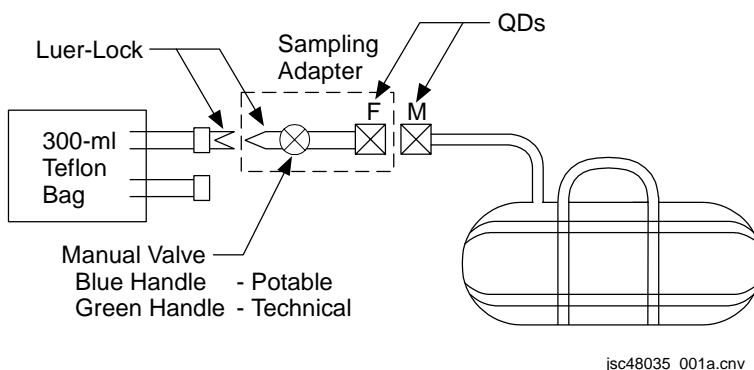


Figure 5-4.- CWC sample setup.

Cont next page

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-P5 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)

Cont next page

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

## 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)  |
|       | 2. Obtain CWCs to be dumped  |
| BOB   | Unstow WWD filter  |
| CHCK  | Unstow Y-Y hose  |
|       | 3. Connect female end of WWD filter to Cont H2O X-tie Waste QD (upper QD with yellow Velcro and "WASTE" label) |
| WCS   | Connect Y-Y hose to male end of WWD filter   |
| Outbd | Connect free end of Y-Y hose to CWC  |
| Wall  |  |

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:

CRT

SM 60 SM TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	50	250
B	0620519	50	250

On MCC GO, proceed to step C

C. HEATER ACTIVATION

CAUTION

Tile debonding may occur if nozzle temps exceed 350 deg F

CRT

SM 66 ENVIRONMENT

1.  $\sqrt{\text{WASTE H2O DMP LN T}} > 50$

- \* If WASTE H2O DMP LN T  $\leq$  50, \*
- \* enable 2nd htr: \*
- \* cb MNB(MNA) H2O LINE \*
- \* HTR B(A) – cl \*

ML86B:A

ML31C

2. WASTE H2O DUMP VLV ENA/NOZ HTR – ON
3.  $\sqrt{\text{VLV – CL (tb-CL)}}$
4.  $\sqrt{\text{ISOL VLV – CL (tb-CL)}}$

D. DUMP INITIATION

CRT

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.  $\sqrt{\text{NOZ T A,B (two) – not incr}}$

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

Cont next page



WCS  
Outbd  
Wall

F. POST-DUMP RECONFIG  
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  
BOB
2. Stow Y-Y hose
  3. Stow WWD filter (place filter in Ziplock Bag)

H. POST-DUMP FDA CLEANUP

Change limits via table or request MCC TMBU:

SM 60 SM TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	-82	250
B	0620519	-82	250

**CABIN TEMP CONTROLLER RECONFIG – 2(1)**

L1 CAB TEMP sel – WARM  
Wait 10 sec, 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

Middeck  
Flr  
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

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

- 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

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  
Outbd  
Wall

Connect female end of WWD filter to Cont H2O 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

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

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	50	250
B	0620519	50	250

Cont next page

3. HEATER ACTIVATION

SM 66 ENVIRONMENT

√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
- √VLV – CL (tb-CL)
- √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      √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) \*

NOTE

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

Cont next page

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)
- BOB Stow WWD filter (place in Ziplock Bag)

7. POST-DUMP FDA CLEANUP

Change limits via table, or request MCC TMBU:

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A B	0620520	-82	250
	0620519	-82	250

## 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 absorb 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

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

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

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

#### 2. Change limits via table, or request MCC TMBU:

### SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O NOZ T A B	0620440	90	250
	0620439	90	250

Proceed to step 3

Cont next page

3. HEATER ACTIVATION

SM 66 ENVIRONMENT

√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
- √VLV – CL (tb-CL)
- √ISOL VLV – CL (tb-CL)

4. DUMP INITIATION

- CRT When SUPPLY H2O NOZ T A,B (two) > 150
- (8-10 min):
- R11L SPLY H2O DUMP VLV – OP (tb-OP)
- CRT √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)
- '↓' 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)
- CRT Disconnect PWR from B-B hose and temp stow
- CRT When SUPPLY H2O NOZ T A,B (two) > 250
- continue:
- R11L SPLY H2O DUMP VLV ENA/NOZ HTR – OFF
- √VIV tb – bp
- CRT \* If SUPPLY H2O NOZ T A,B (two) still incr: \*
- ML86B:A \* cb MNC SPLY H2O DUMP VLV/NOZ \*
- \* HTR – op \*

6. POST-DUMP RECONFIG

- WCS Disconnect R-Y QD adapter from Cont H2O X-tie
- Outbd Potable QD, and B-B hose from adapter
- Wall
- R11L SPLY H2O DUMP ISOL VLV – OP (tb-OP)
- 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

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O NOZ T A	0620440	-82	250
B	0620439	-82	250



**PWR FILL**

- 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)

NOTE  
Do not perform galley ops or CWC fills while filling EMU Water Recharge Bags

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

- R11L 3. SPLY H2O TKA OUTLET – CL (tb-CL)  
SM 60 TABLE MAINT
4. Use TKA quantity:  
PARAM ID – ITEM 1 +0 6 2 0 4 1 0 EXEC
5. Log bag serial number/barcode and TKA % value before recharge. Report bag serial number/barcode to MCC-H

Bag Serial Number/Barcode	H2O TKA %

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

Cont next page

NOTE

Full charge = 12% change in TKA quantity and requires ~30 min

- Galley
6. MV2 vlv → Max AMB
  7. EMU Water Recharge Bag QD →|← Orbiter Galley Aux Port
  8. Set timer for 30 min  
Attach timer to Velcro square on EMU Water Recharge Bag
  9. √H2O TKA quantity decr

VERIFYING WATER FILL

After ~30 min:

SM 60 TABLE MAINT

10. Use TKA quantity:  
PARAM ID – ITEM 1 +0 6 2 0 4 1 0 EXEC
11. Log bag serial number/barcode and TKA % value after recharge

Bag Serial Number/Barcode	H2O TKA %

NOTE

Full charge = 12% change in TKA quantity

To terminate fill:

12. EMU Water Recharge Bag ←|→ Orbiter Galley Aux Port
13. Temp stow EMU Water Recharge Bag for transfer to ISS

Cont next page

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

After last bag filled:

Galley 15. MV2 vlv – as reqd

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

R11L 16. SPLY H2O TKA OUTLET – OP (tb-OP)

17. Record fill date and quantity for bag(s) on white 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

**GALLEY IODINE REMOVAL ASSEMBLY (GIRA)  
INSTALLATION**

(Time: 1 hr)

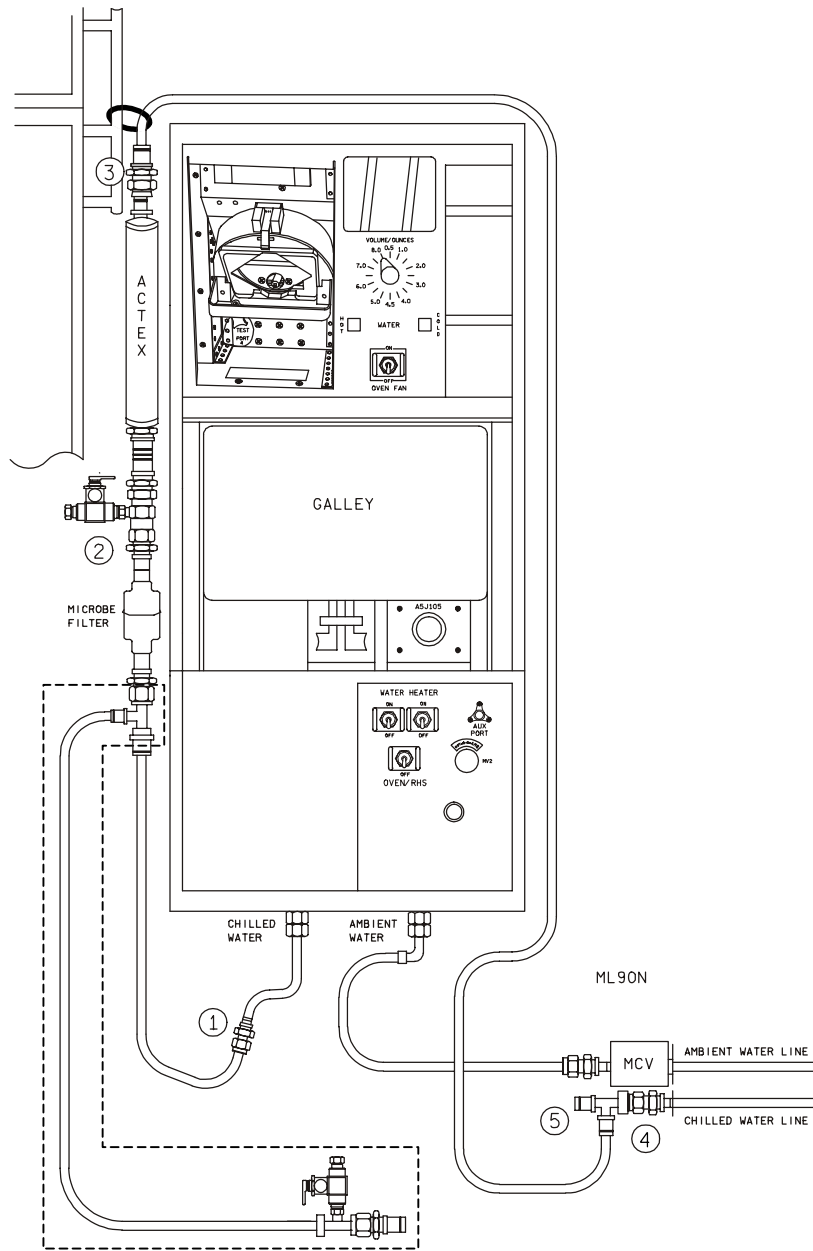
EQUIPMENT PREPARATION

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 5-5)
  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 5-5)  
Ensure access to locker MF14O
  8. Circulate water through galley:  
Galley OVEN/RHS – OFF,ON



**NOTE**

Water Transfer Hose only present for water transfer

480350528\_112\_PNL42

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

**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:  
OVEN/RHS – OFF,ON
- Galley

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  
If sw OFF:  
| OVEN/RHS – ON  
If sw ON:  
OVEN/RHS – OFF,ON
- Galley

## **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/<br>Galley | 1. Remove all black Velcro/Gray Tape from Chilled line assembly and hoses<br>Leave insulation covers in place  |
| ML90N          | 2. Detach Galley Chilled hose (insulated) from Hose/Microbe filter (#1)<br>Disconnect ACTEX hose from QD bracket   |
|                | 3. Detach Galley Ambient hose (uninsulated) from MCV<br>Remove MCV from QD bracket<br>Reconnect Galley Ambient and Chilled hoses to QD bracket   |
|                | 4. Break down assembly formerly installed on Chilled line into subassemblies as follows:<br>Between ACTEX hose and ACTEX cartridge (#3)<br>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:

#### SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O NOZ T A	0620440	90	250
B	0620439	90	250

### 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  
Outbd

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  
Outbd  
Wall

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

ML86B:A \* If SUPPLY H2O NOZ T A,B (two) incr: \*  
 \* 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:

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O NOZ T A	0620440	-82	250
B	0620439	-82	250

## 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

PARAMETER NAME	C/W CHL	H/W C/W		H/W & B/U ENA/INH	PARA ID	B/U C/W	
		LO V	HI V			LO EU	HI EU
CABIN O2 FLOW 1	14		4.90	INH	0612105		4.9
2	24		4.90	INH	0612205		4.9

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

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

                 8. PL O2 SYS 1,2 vlv (two) – CL

L2          9. O2/N2 CNTLR VLV SYS 1(2) – AUTO

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

PARAMETER NAME	C/W CHL	H/W C/W		H/W & B/U ENA/INH	PARA ID	B/U C/W	
		LO V	HI V			LO EU	HI EU
CABIN O2 FLOW 1	14		4.90	ENA	0612105		4.9
2	24		4.90	ENA	0612205		4.9

## N2 REPRESS USING PAYLOAD N2 VALVES

### REPRESS SETUP

- R13U 1. Reset C/W,FDA limits per table  
 √MCC for uplink of SM ALERT TMBU. Changes enclosed in

PARAMETER NAME	C/W CHL	H/W C/W		H/W & B/U ENA/INH	PARA ID	B/U C/W	
		LO V	HI V			LO EU	HI EU
CABIN N2 FLOW 1	54		4.90	<input type="checkbox"/> INH	0612553		4.9
2	64		4.90	<input type="checkbox"/> INH	0612554		4.9

PARAMETER NAME	ENA / INH	PARA ID	SM ALERT	
			LOW	HIGH
CAB N2 REG P1	ENA	0612310	<input type="checkbox"/> OSL	260
P2	ENA	0612410	<input type="checkbox"/> OSL	260

- L2 2. N2 SYS 1(2) REG INLET – CL (tb-CL)  
 √2(1) REG INLET – OP (tb-OP)
3. O2/N2 CNTLR VLV SYS 1(2) – OP (N2)
- MO10W 4. PL N2 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
7. PL N2 SYS 1,2 vlv (two) – CL
- L2 8. N2 SYS 1(2) REG INLET – OP (tb-OP)  
 √2(1) REG INLET – OP (tb-OP)
9. O2/N2 CNTLR VLV SYS 1(2) – AUTO

Cont next page

R13U 10. Reset C/W,FDA limits per table  
 ✓MCC for uplink of SM ALERT TMBU. Changes enclosed in

PARAMETER NAME	C/W CHL	H/W C/W		H/W & B/U ENA/INH	PARA ID	B/U C/W	
		LO V	HI V			LO EU	HI EU
CABIN N2 FLOW 1	54		4.90	<input type="checkbox"/> ENA	0612553		4.9
2	64		4.90	<input type="checkbox"/> ENA	0612554		4.9

PARAMETER NAME	ENA/INH	PARA ID	SM ALERT	
			LOW	HIGH
CAB N2 REG P1	ENA	0612310	<input type="checkbox"/> 150	260
P2	ENA	0612410	<input type="checkbox"/> 150	260

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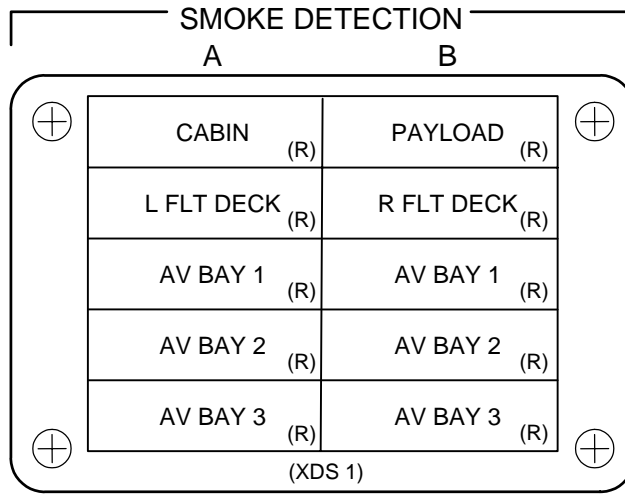


EPS

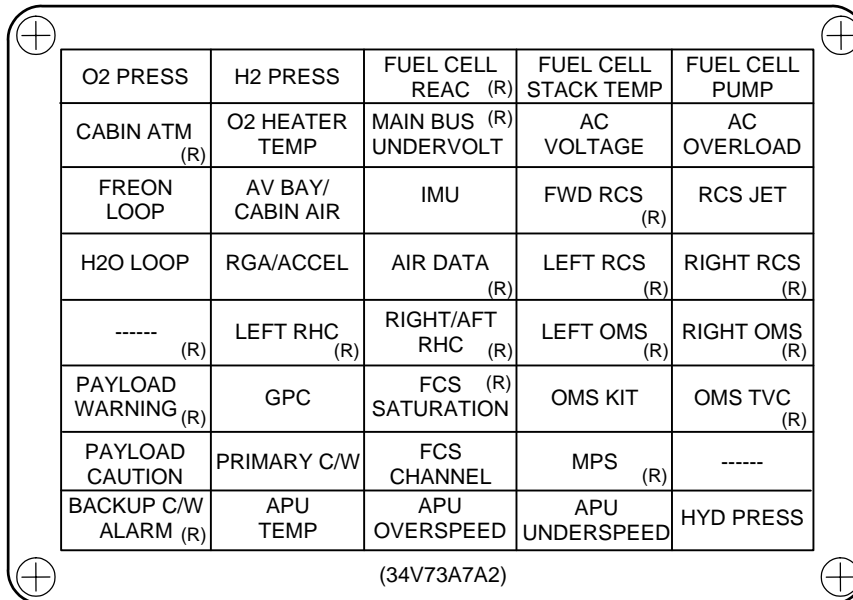
LAMP TEST ..... 6-2  
HEATER RECONFIG – CONFIG B(CONFIG A) ..... 6-5  
FUEL CELL PURGE – AUTO, SM 2(4) ..... 6-6  
    – MANUAL ..... 6-7  
    VI PERFORMANCE PLOT ..... 6-8  
CRYO O2 TK HTR SNSR CK ..... 6-9  
FC MONITORING SYS (FCMS) OPS..... 6-10

EPS

## LAMP TEST



## C/W PANEL



EPS

Cont next page

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 docked:

cb MNA EXT ARLK HTR VEST Z1/2/3 – op(cl)  
MNB EXT ARLK HTR VEST 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

- R11U 1. TURN ON PURGE HEATERS  
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)

- R11U \* If any flow '↑' alarm, \*  
\* (aff) FC PURGE VLV – CL \*

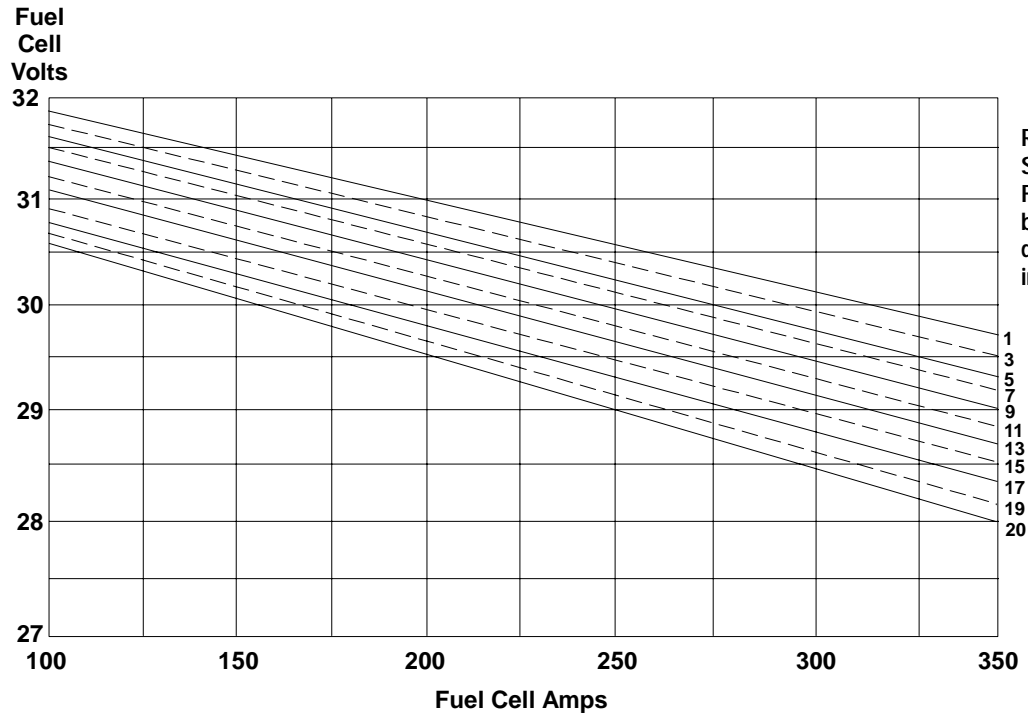
Wait 2 min  
FC PURGE VLV 1(2,3) – GPC

- 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

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

## 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

6-8 ORB OPS/ALL/GEN K



## 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, \*
  - \* 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) – 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

## 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:

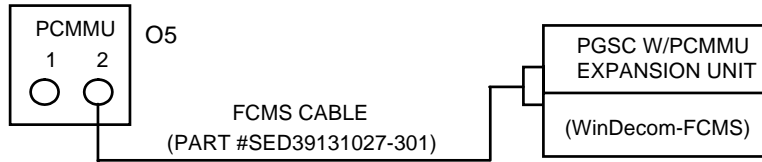
2. Double-click 'Shuttle Apps' > 'WinDecom' > 'WinDecom shutdown'
3. Sel 'OK' to shutdown Telemetry System
4. Disconnect PCMMU cable from PCMMU expansion card port on WinDecom PGSC

Data Cable Setup

- O5
5. If PCMMU 2 outlet in use, disconnect cable from PCMMU 2 outlet

Cont next page

6. Connect FCMS cable (part #SED39131027-301) 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'>'Fuel Cell Monitoring'>'WinDecom-FCMS'
9. After 30-45 sec, 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

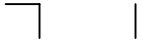
10. Double-click 'Shuttle Apps'>'Fuel Cell Monitoring'>'Fuel Cell Monitoring System'
11. Verify data being received (data updating and GMT incrementing on FCMS display, green "GO" sign in lower right corner of PGSC display)
12. Press record button, select full rate recording option, then select OK
13. When recording complete (~12 min), select YES in the popup window to copy zip data file (fcDDDHHMM.zip) from C:\SPOCAPPS\FCMS directory to KFX PGSC \*:\OCA\_DOWN directory. Notify MCC

#### DEACTIVATION

- ML86B:E
1. cb MNA FC PCM – op
  2. Close FCMS application
  3. Double-click 'Shuttle Apps'>'Fuel Cell Monitoring'>'WinDecom Shutdown'
  4. Disconnect and stow FCMS cable
  5. Reconfigure WinDecom PGSC as reqd per WINDECOM OPS (PGSC), 12-37



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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  
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**GNC**

## 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 \*
- \* ΔANG: < 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 \*

GNC

Cont next page

- \* Single tracker procedure \*
- \*  $\sqrt{\text{TERM/IDLE, ITEM 9(10) - (*)}$  \*
- \* Good S TRK, STAR TRK – ITEM 3(4)\*
- \* EXEC (\*) \*
- \* S TABLE CLR – ITEM 20 EXEC \*
- \*  $\sqrt{\text{S TABLE: TRK ID 1 correct \#}}$  \*
- \* 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  $\Delta$ ANGs

CRT

**GNC 21 IMU ALIGN**

IMU 1,2,3: STAT – blank

$\sqrt{\text{STAR ALIGN, ITEM 13 - (*)}$

$\sqrt{\text{ANG 1,2,3: } \Delta X, \Delta Y, \Delta Z \leq 0.50}$

If no comm, record  $\Delta$ ANGs

- \* If ANG  $\Delta X, \Delta Y, \Delta Z > 0.50$  for two or \*
- \* more IMUs, repeat steps 1,2,3 \*

**CAUTION**

If ANG  $\Delta X, \Delta Y, \Delta Z$  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 (\*)

$\sqrt{\text{EXEC, ITEM 16 - (no *)}$

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

$\sqrt{\text{IMU 1,2,3 ANG } \Delta X, \Delta Y, \Delta Z < 0.1}$

- \* If ANG  $\Delta X, \Delta Y, \Delta Z \geq 0.1$ ,  $\sqrt{\text{MCC}}$  \*
- \* If no comm, repeat steps 1-5 \*

**IMU ALIGNMENT – IMU/IMU**

NOTE

Procedure must be accomplished  
in GNC OPS 2 or 3

**GNC 21 IMU ALIGN**

IMU/IMU – ITEM 14 + (REF IMU) EXEC

	1	2	3
$\Delta X$ ( )	____.____	( ) ____.	( ) ____.
$\Delta Y$ ( )	____.____	( ) ____.	( ) ____.
$\Delta Z$ ( )	____.____	( ) ____.	( ) ____.

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 \*)  
 IMU/IMU – ITEM 14 +(SAME REF IMU) EXEC  
 √IMU 1,2,3 ANG  $\Delta X, \Delta Y, \Delta Z < 0.13$

\* If ANG  $\Delta X, \Delta Y, \Delta Z \geq 0.13$ , report to MCC \*

If in GNC OPS 2 or MM 301,  
STAR ALIGN – 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

- √S TABLE: TRK ID 1,2,3 for correct #s  
ANG ERR 1,2,3:  $\leq 0.08$  for correct #s  
SEL, ITEM 17,18,19 – (\*) for correct #s

### 2. CHECK IMU $\Delta$ ANGs

#### GNC 21 IMU ALIGN

- IMU 1,2,3: STAT – blank
- √STAR ALIGN, ITEM 13 – (\*)
- √ANG 1,2,3:  $\Delta X, \Delta Y, \Delta Z \leq 0.50$

#### CAUTION

If ANG  $\Delta X, \Delta Y, \Delta Z > 0.50$  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 \*)

## COAS CALIBRATION, GNC 201

1. COAS CALIBRATION PREP  
O1(O19) COAS – ON  
COAS √Barrel Index – FW(OW)  
√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, √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

- CRT
3. CALIBRATE COAS  
 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:  
 ATT REF pb – push
- F6  
 (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 (\*)  
 COAS – OFF  
 FLT CNTLR PWR – OFF
- O1(O19)  
 F6/F8  
 (A6U)

O14,O15,  
 O16:E      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

## 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  
Change DAP A,B to A1,B5

CRT                    GNC 22 S TRK/COAS CNTL  
COAS: REQD ID    – ITEM 21 +\_ \_ EXEC  
                  POS +X        – ITEM 26 EXEC (\*)  
                  CAL MODE – ITEM 24 EXEC (\*)

O14,O15,            √cb DDU L(R) (two) – cl  
O16:E

F6/F8                    FLT CNTLR PWR – ON

### 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 VERN)

Cont next page

F6/F8 Mnv to center star in HUD boresight:  
(‘P’ in ‘COMPLETE’, see HUD BORESIGHT  
DESIGNATION, 7-12)  
ATT REF pb – push

Note  $\Delta$ BIAS value

NOTE

Take minimum three verif marks  
to ensure  $\Delta$ BIAS consistency

If  $\Delta$ BIAS < 0.12 for at least three marks, go to step 5

DAP: A1/AUTO/VERN

CRT 3. CALIBRATE HUD  
Rcd CAL +X  $\Delta$ BIAS: \_\_\_\_ . \_\_\_\_ \_\_\_\_  
UPDATE – ITEM 28 EXEC,  
Rcd MET \_\_\_\_ / \_\_\_\_ \_\_\_\_ : \_\_\_\_  
 $\sqrt{\Delta}$ BIAS goes to zero

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

Mnv to locate star

DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)  
B5/FREE/PRI (loss of VERNs)

F6/F8 Mnv to center star in HUD boresight:  
ATT REF pb – push

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, \*
- \*  $\sqrt{MCC}$  \*

Cont next page

5. CLEAN UP

	COAS: DES	– ITEM 25 EXEC (*)
F6U/F8U	HUD MODE	– NORM
F3	PWR	– OFF
F6/F8	FLT CNTLR PWR	– OFF

O14,O15,  
O16:E      cb DDU L(R) (two) – as reqd

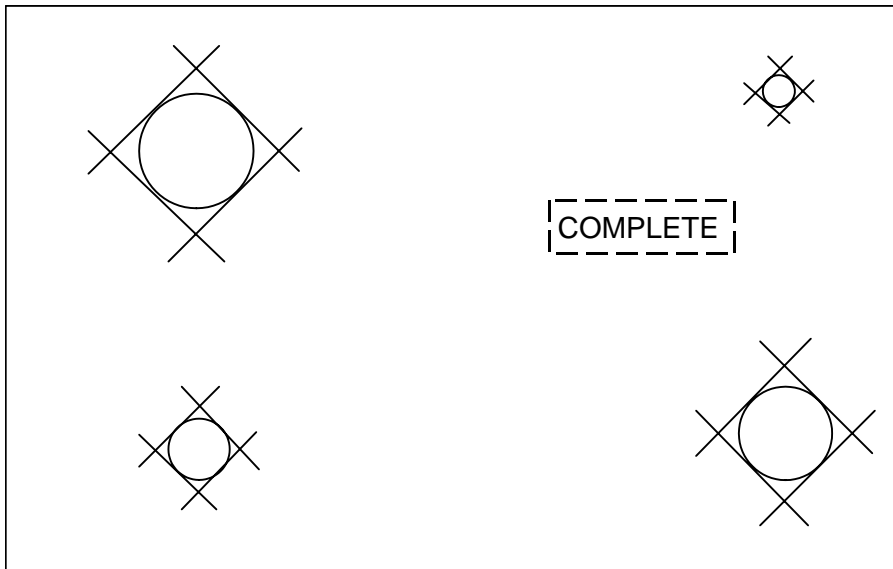
√Data transcribed into FLIGHT PLAN

CRT      If S TRK(s) to be left in auto star-select mode:  
          S TRK(s) -Y(-Z) – ITEM 3(4) EXEC (\*)

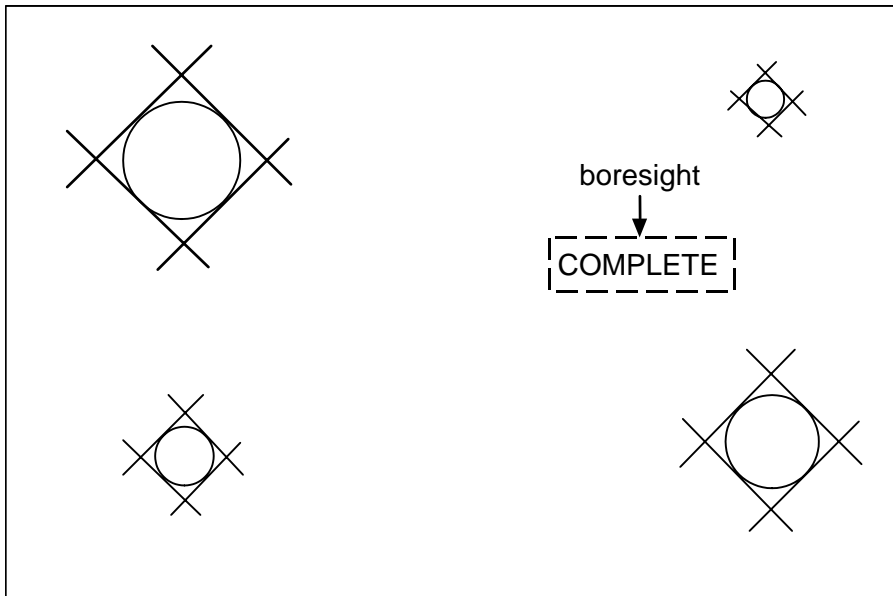
Install L(R) HUD Cover

Reconfig to FLIGHT PLAN DAP

# 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  
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

Perform GPS PWRUP if reqd  
Perform G2 TO G8 TRANSITION (DPS), then:

If using circ pump for part 1:  
FCS CH 2,3 – OFF  
O14,O15, ASA (four) – ON  
O16:F

Go to step 7b, 7-18

Cont next page

7-13 ORB OPS/ALL/GEN K,7

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

Cont next page

7-14

ORB OPS/ALL/GEN K,2

C2 1. FCS C/O PREP  
Set EVENT TIMER to 00:00, count UP

2. APU PRESTART

CRT2 

1: GNC, FCS/DED DIS C/O	2: SM 86 APU/HYD
-------------------------	------------------

  
√APU, HYD, W/B status no '↑' or '↓' (except HYD B/U) |

R4 If SYS 1:  
√LG EXTD ISO VLV tb – CL |

R2 √HYD BK ISOL VLV X tb – CL  
CIRC PUMP (three) – OFF |

BLR N2 SPLY X – ON  
√PWR (three) – ON  
√CNTLR/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/APU 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

If HYD SYS 1	If HYD SYS 2	If HYD SYS 3
1(*)	2(*)	3(*)
1(*)	2(*)	3(*)

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)
- CNTRLR PWR X – OFF
- HYD CIRC PUMP (three) – GPC

Proceed to part 2, 7-20

Cont next page

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

- O14,O15,  
O16:F
- a. Perform G8 TO G2 TRANSITION (DPS), then:  
ASA (four) – OFF
- C3
- Perform G2 TO G8 TRANSITION (DPS), then:  
√FCS CH 1,4 – AUTO  
2,3 – OFF
- O14,O15,  
O16:F
- ASA (four) – ON
- R4
- √HYD BK ISOL VLV X tb – CL
- R2
- √CIRC PUMP (three) – OFF
- 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  $U7.5^\circ \pm 0.8^\circ$
- CRT1
- d. SEC ACT CK, CH1 – ITEM 15 EXEC (\*)  
Wait 5 sec

Cont next page

C3  
CRT2

- e. Turn off FCS CH not being checked:  
FCS CH (three) – OFF

√All elevons move to  $U1.5^\circ \pm 0.8^\circ$

- \* If any elevon drives past  $0^\circ$ , 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  $U7.5^\circ \pm 0.8^\circ$

C3

- g. Config FCS CHs for check of next CH:  
(Config switches in sequence shown)

NEXT CH	FCS CH SWITCHES			
	4	1	2	3
2	AUTO	OFF	AUTO	OFF
3	AUTO	OFF	OFF	AUTO
4	AUTO	OFF	OFF	AUTO

- h. Repeat steps d thru g for CHs 2,3,4

R2

9. HYDRAULIC SYSTEM RECONFIG

HYD CIRC PUMP (three) – GPC

C3

10. FCS CH RECONFIG

- a. Perform G8 TO G2 TRANSITION (DPS), then:  
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

ON-ORBIT FCS CHECKOUT, PART 2

1. Sensor Test – MLS,TAC,RA,AA

NOTE

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 – LO  
DAP: A1/INRTL/VERN  
√R,P,Y rates  $0 \pm 0.1^\circ/\text{sec}$ , 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

	RNG	AZ	EL
MLS	15.0 to 15.4	+, -2.9 to +, -3.1 (+ for 3 sec, then -)	5.9 to 6.1
TAC	0 to 0.5	177.5 to 182.5  <u>NOTE</u> Values from 182.1 to 182.5 will be displayed as 2.1 to 2.5	
RA	ALT		
	900 to 1100		
AA		Y	Z
		+14.40 to 17.80	+57.70 to 71.10

O7 STOP – ITEM 14 EXEC (\*)  
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

CRT2

2: GNC 41 RGA/ADTA/RCS

- √DES: (no \*)
- √STAT: blank
- √PS,PαC,PαU,PαL,T – no M

Config For Free Drift

- √DAP: A1/INRTL/VERN
- √R,P,Y rates  $0 \pm 0.1^\circ/\text{sec}$ , then:  
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

<u>HIGH TEST LIMITS</u>				
<u>RGA</u>				
R	P	Y		
+18.8 to +21.2	+9.4 to +10.6	+9.4 to +10.6		
<u>ADTA</u>				
PS	P $\alpha$ C	P $\alpha$ U	P $\alpha$ L	T
.813 to .815	5.473 to 5.477	2.740 to 2.744	1.708 to 1.712	173.56 to 173.60
<u>LOW TEST LIMITS</u>				
<u>RGA</u>				
R	P	Y		
-18.8 to -21.2	-9.4 to -10.6	-9.4 to -10.6		
<u>ADTA</u>				
PS	P $\alpha$ C	P $\alpha$ U	P $\alpha$ L	T
24.887 to 24.889	29.527 to 29.531	21.708 to 21.712	14.713 to 14.717	18.50 to 18.54

3. SENSOR TEST – GPS  
 √MCC if GPS S/TEST desired

A13 GPS PRE AMPL UC – OFF  
 LC – OFF

NOTE

After GPS S/TEST, √MCC if deselect LRU for failure indicated by ‘↓’ reqd. 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**

√NAV – ITEM 18 (\*)

If 'RPF' in STAT field, √MCC (if LOS, proceed with test)

S/TEST – ITEM (12) EXEC (\*)

√'BIT' in STAT field after ~6 sec,

Wait for 'BIT' to clear after ~2 min

√S/TEST '↑'; if '↓' √MCC (if LOS, deselect GPS)

A13 If OV103:  
√GPS PRE AMPL UC – MNC  
√LC – MNC

A13 If OV104:  
√GPS PRE AMPL UC – ON  
√LC – ON

**2: GNC 55 GPS STATUS**

NAV – ITEM 18 EXEC (\*)

√MODE – INS

**4. FCS MODE/CH SWITCH 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: √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

Cont next page

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 43 CONTROLLERS

Deselect L THC:

CRT2            THC L DES – ITEMS 1,2,3 EXEC (\*)

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  
C3

FLT CNTLR PWR (two) – ON  
FCS CH (four) – ORIDE (wait 5 sec)  
– AUTO (no \*)

F2/F4

PITCH pb        – AUTO  
                    – CSS  
ROLL/YAW pb – AUTO  
                    – CSS

L2/C3

SPDBK/THROT pb – AUTO  
BODY FLAP pb    – AUTO  
SBTC TAKEOVER pb – push

5. SURF TEST

Notify MCC if any single surf feedback exceeds average of other three feedbacks by greater than:

- Elevons    ( $\Delta 1.3^\circ$ )
- Rudder     ( $\Delta 1.2^\circ$ )
- SPD BK    ( $\Delta 2.2\%$ )
- BDY FLP   ( $\Delta 3\%$ )

2: GNC 44 SWITCHES

During following sw test, verify '\*' appears

Cont next page

L2 ENTRY MODE – LO GAIN  
– NO Y JET  
– AUTO (no \*)

6. NWS CHECK

2: GNC 45 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°

L2 a. NWS1  
NWS – 1

CRT2 √NWS1 SYS SEL (\*)  
√HYD PRESS HIGH (no \*)  
√CURRENT: 1.00 to 3.15 ma

F3 ENABLE – ITEM 1 EXEC (\*)  
√NWS1 ENABLE A,B (two) (\*)  
√NWS FAIL It – NWS FAIL It 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

L2 b. NWS2  
NWS – 2

CRT2 √NWS2 SYS SEL (\*)  
√HYD PRESS HIGH (no \*)  
√CURRENT: 1.00 to 3.15 ma

F3 ENABLE – ITEM 1 EXEC (\*)  
√NWS2 ENABLE A,B (two) (\*)  
√NWS FAIL It – NWS FAIL It 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**

F5  
CRT2

a. THC

L THC – deflect in each axis

√THC: '+' and '-'

Reselect THC contacts:

THC L – ITEM 1,2,3 EXEC (no \*)

b. L SBTC

L SBTC – full aft;  $\sqrt{> 95\%}$

– full fwd;  $\sqrt{< 15\%}$

c. Rudder/Brake

RUD PED – full L;  $\sqrt{> 87\%}$  and ch  $\Delta < 9\%$

– full R;  $\sqrt{> 80\%}$  and ch  $\Delta < 9\%$

– null; between L 14% and R 4%

BK PED – depress to verify unrestricted movement (~20 to 25°)

L2  
CRT2

d. L Body Flap Switch

BDY FLP – UP, DN

√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



- L2                   g. L Panel Trim Switches  
                       TRIM R – R,L  
                       P – UP, DN  
                       Y – R,L
- CRT2               √PNL TRIM L: R,Y – R/L  
                       P – U/D
- F3                   L,R TRIM RHC/PNL – ENA  
                       (Wait 5 sec; no crew insight)  
                       L,R TRIM RHC/PNL – INH
- h. Repeat steps b and d thru g for R cntlrs/sws:  
                           RHC R DES – ITEM 26,27,28
- i. DDUs
- O14:E               cb MNA DDU L – op  
 O16:E               MNC DDU R – op  
                       (Wait 5 sec)
- O14:E               cb MNA DDU L – cl  
 O16:E               MNC DDU R – cl  
 O15:E               MNB DDU L,R (two) – op  
                       (Wait 5 sec)  
                       cb MNB DDU L,R (two) – cl
8. MEDS CHECKOUT
- MDU Checkout
- F6/F7               Power ON all forward MDUs (9) and IDPs (3)  
 F8/C2               Verify appropriate display appears (expect big 'X' for  
                       any DPS Display whose IDP is deassigned)
- Flight Critical/IDP Interface Checkout
- F6/F8               On CDR 1, CDR 2, and PLT 1 MDUs:  
                       Ensure on primary ports  
                       Sel FLT INST: ORBIT: ADI displays  
                       Verify no OFF flags in following configs:  
                           On CDR 1 and CDR 2, √FC BUS 4,1,2,3  
                           On PLT 1, √FC BUS 1,2,3,4
- F6/F7               Reconfig MDUs as desired (use only one IDP  
 F8/C2               with three MDUs max if in GROUP B(C) PWRDN)

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

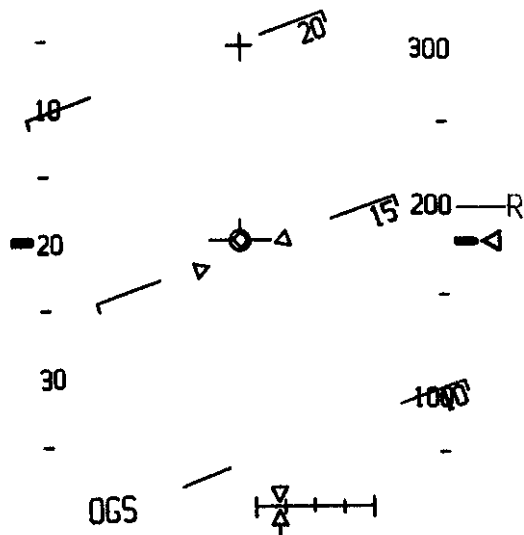
F6/F8 √Readouts for L(R) HUD DATA BUS 1,2(3,4)

CRT1 DED DIS OFF – ITEM 6 EXEC (\*)

HUD LOW VALUE TEST

NOTE

No HUD high value test exists



Cont next page

10. MODE LAMP TEST

Test Start

CRT1 MODE LT ON – ITEM 7 EXEC (\*)

F2/F4 √PITCH AUTO,CSS lt (two) – on  
√ROLL/YAW AUTO,CSS lt (two) – on  
√SPDBK/THROT AUTO,MAN lt (two) – on  
√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, RGA (four) – OFF  
O15, cb MNA,B,C ADTA (four) – op  
O16 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

L2 BRAKES (three) – OFF  
ANTISKID – OFF

O17 ATVC (four) – OFF

If reqd, go to GPS PWRDN

## 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 '-'

AFT CONTROLLER C/O						
THC	PUSH	PULL	LEFT	RIGHT	UP	DOWN
DISP	+X	-X	+Z	-Z	-Y	+Y

- \* 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 CNTLR PWR – OFF \*

Reselect RHC CHs:  
 CRT RHC A DES – ITEM 13,14,15 EXEC (no \*)

5. RECONFIG TO NOMINAL  
 A6U FLT CNTLR 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

**ELEVON PARK, GNC 201**

1. Perform G2 TO G8 TRANSITION (DPS)
- O16:F 2. ASA 4 – ON
3. Perform G8 TO G2 TRANSITION (DPS)
- R2 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 UC – MNC  
LC – MNC  
  
If OV104:  
A13 GPS PRE AMPL UC – ON  
LC – ON
2. PWR UP GPS RECEIVER  
  
\* If GPS just PWRed off, wait \*  
\* at least 30 sec \*  
  
A13 GPS PWR – ON  
√ENCRYPT – NORMAL  
Wait at least 30 sec  
GNC I/O RESET
3. INITIALIZE GPS RECEIVER  
GNC 55 GPS STATUS  
√NAV – ITEM 18 (\*)  
INIT – ITEM 15 EXEC (\*)  
√MODE – INIT  
NAV – ITEM 18 EXEC (\*)  
√MODE – INS

## GPS PWRDN

1. CHECK GPS RECEIVER MODE  
SPEC 55 GPS STATUS  
√NAV – ITEM 18 (\*)
2. PWR OFF GPS RECEIVER  
A13 GPS PWR – OFF
3. PWR OFF GPS ANTENNA PRE-AMPS  
GPS PRE AMPL UC – OFF  
LC – OFF





- A13
5. PWR OFF GPS RECEIVER (if reqd)  
GPS PWR – OFF
  6. PWR OFF GPS ANTENNA PRE-AMPS (if reqd)  
GPS PRE AMPL UC – OFF  
LC – OFF

## GPS INCORPORATION

- CRT
1. GPS functioning properly:
 

GNC SPEC 55 GPS STATUS

    - √STAT = BLANK or BATT
    - √MODE = INS
    - √DG FAIL = BLANK
    - √QA1 P1  $\sigma \leq 175$  (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, O16 ASA (four) – OFF  
C3 √FCS CH (four) – Auto  
R2 HYD CIRC PUMP (three) – OFF
2. Initial Elevon Positioning  
Perform G2 TO G8 TRANSITION, steps 1-4 (DPS)  
C3 FCS CH 1,2,3 – OFF  
O14,O15, O16 ASA (four) – ON  
R2 HYD CIRC PUMP X – ON  
CRT2 GNC 42 SWITCH/SURF  
√All CH 4 Elevon Positions move to  $U7.5 \pm 0.8$

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, steps 2-3 (DPS),  
then:  
C3 FCS CH 1,2,3 – AUTO  
Perform G2 TO G8 TRANSITION, steps 3-4 (DPS),  
then:  
√Elevon positions

Cont next page

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



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MPS

MPS VACUUM INERT ..... 8-2

**MPS**

8-1

ORB OPS/ALL/GEN K

**MPS**

**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

OM

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

O

9-1

ORB OPS/ALL/GEN K

## ON-ORBIT OMS BURN

OMS

### 1. OMS BURN PREP

C2            Install OMS-2/ORBIT OMS BURNS  
Wedge        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

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,  
O15:F,  
O16:F

√Pri RJD LOGIC,DRIVER (sixteen) – ON

O14:E,  
O15:E,  
O16:E

√cb DDU (six) – cl

Cont next page



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  
 If xfeed Burn:  
 TIG-4 O8 √L(R) OMS TK ISOL (two) – OP (tb-OP)  
 √R(L) OMS TK ISOL (two) – CL (tb-CL)  
 √L,R OMS XFEED B (two) – OP (tb-OP)  
 If straight feed:  
 √L,R OMS TK ISOL (four) – OP (tb-OP)
- 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:

√L(R) OMS XFEED A – CL (tb-CL)  
B – OP (tb-OP)  
√R(L) OMS XFEED (two) – CL (tb-CL)

Otherwise:

L,R OMS XFEED (four) – CL (tb-CL)  
TK ISOL (four) – OP (tb-OP)

CRT

**IF OPS 2**  
DAP: B/INRTL/VERN  
GNC, OPS 201 PRO (√DAP)

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

ORBIT MANEUVER PAD FOR \_\_\_\_\_

OMS BOTH 1

L 2

R 3

RCS SEL 4  +X  
-X  
MULTI-AXIS

TV ROLL 5

TRIM LOAD P 6

LY 7

RY 8

WT 9

TIG 10   /   :   :   .

TGT PEG 7  $\Delta V_X$  19

$\Delta V_Y$  20

$\Delta V_Z$  21

BURN ATT

R 24

P 25

Y 26

$\Delta V_{TOT}$

TGO   :

VGO X

VGO Y

VGO Z

HA

HP

TGT

OMS GMBL CK:		NOTES	
	PRE	POST-BURN	
L PRI	<input type="checkbox"/>	<input type="checkbox"/>	RCS I'CNCT: <input type="checkbox"/> L OMS → RCS <input type="checkbox"/> R OMS → RCS <input type="checkbox"/> NONE
L SEC	<input type="checkbox"/>	<input type="checkbox"/>	
R PRI	<input type="checkbox"/>	<input type="checkbox"/>	
R SEC	<input type="checkbox"/>	<input type="checkbox"/>	
NONE	<input type="checkbox"/>	<input type="checkbox"/>	DOWN MODE OPTIONS: <input type="checkbox"/> 2 OMS → 1 OMS <input type="checkbox"/> 1 OMS → RCS <input type="checkbox"/> NONE
OMS HE REG TEST: <input type="checkbox"/> NONE <input type="checkbox"/> R		-X RCS BURNS:	
L <input type="checkbox"/> NONE <input type="checkbox"/> R GPC OP CL GPC OP CL		BURN ATT	LVLH ATT
A	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P 15 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	R <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
B	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Y 16 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		OM 17 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Y <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		ORBIT BURN MONITOR	
		GPC FILL-INS __ ( __ )	
		<input type="checkbox"/> CRIT BURN	
		<input type="checkbox"/> NON-CRIT BURN	
MAX TIG SLIP __ MIN. <input type="checkbox"/> DO NOT UPDATE TIG <input type="checkbox"/> UPDATE TIG AFTER __ MIN.			

NOTES \_\_\_\_\_

ORBIT MANEUVER PAD FOR \_\_\_\_\_

<p>OMS BOTH 1 <input type="checkbox"/></p> <p>L 2 <input type="checkbox"/></p> <p>R 3 <input type="checkbox"/></p> <p>RCS SEL 4 <input type="checkbox"/></p> <p>TV ROLL 5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>TRIM LOAD P 6 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>LY 7 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>RY 8 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>WT 9 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>TIG 10 <input type="checkbox"/> <input type="checkbox"/> / <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p>TGT PEG 7 <math>\Delta V_X</math> 19 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p><math>\Delta V_Y</math> 20 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p><math>\Delta V_Z</math> 21 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p>	<p>BURN ATT</p> <p>R 24 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>P 25 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Y 26 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	<p><math>\Delta V_{TOT}</math> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p>TGO <input type="checkbox"/> <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/></p> <p>VGO X <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p>VGO Y <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p>VGO Z <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> . <input type="checkbox"/> <input type="checkbox"/></p> <p>HA <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>HP <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>TGT <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ( ) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>
<p> <input type="checkbox"/> +X  <input type="checkbox"/> -X                  MULTI-AXIS             </p>		
<p><b>NOTES</b></p>		
<p>OMS GMBL CK: PRE POST-BURN</p> <p>L PRI <input type="checkbox"/> <input type="checkbox"/></p> <p>L SEC <input type="checkbox"/> <input type="checkbox"/></p> <p>R PRI <input type="checkbox"/> <input type="checkbox"/></p> <p>R SEC <input type="checkbox"/> <input type="checkbox"/></p> <p>NONE <input type="checkbox"/> <input type="checkbox"/></p>		
<p>RCS I'CNCT:</p> <p><input type="checkbox"/> L OMS → RCS</p> <p><input type="checkbox"/> R OMS → RCS</p> <p><input type="checkbox"/> NONE</p>		
<p>DOWN MODE OPTIONS:</p> <p><input type="checkbox"/> 2 OMS → 1 OMS</p> <p><input type="checkbox"/> 1 OMS → RCS</p> <p><input type="checkbox"/> NONE</p>		
<p>OMS HE REG TEST: <input type="checkbox"/> NONE <input type="checkbox"/> R</p> <p>GPC L OP CL GPC R OP CL</p> <p>A <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>B <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> B <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>		
<p>-X RCS BURNS:</p> <p>BURN ATT LVLH ATT</p> <p>P 15 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> R <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Y 16 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>OM 17 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Y <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>		
<p>ORBIT BURN MONITOR</p> <p>GPC FILL-INS ___ ( ___ )</p> <p><input type="checkbox"/> CRIT BURN</p> <p><input type="checkbox"/> NON-CRIT BURN</p>		
<p>MAX TIG SLIP ___ MIN. <input type="checkbox"/> DO NOT UPDATE TIG</p> <p><input type="checkbox"/> UPDATE TIG AFTER ___ MIN.</p>		
<p>NOTES</p>		

9-6

ORB OPS/ALL/GEN K,10

RCS

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**RCS**

## 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

RCS

### 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 – LO  
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

CRT           RCS L – ITEM 2 EXEC (\*)  
MANF VLVS STAT OVRD  
    √1 OP – ITEM 40  
      2 CL – ITEM 41 EXEC  
      3 CL – ITEM 42 EXEC  
      4 CL – ITEM 43 EXEC  
RCS R – ITEM 3 EXEC (\*)  
MANF VLVS STAT OVRD  
    √1 OP – ITEM 40  
      2 CL – ITEM 41 EXEC  
      3 CL – ITEM 42 EXEC  
      4 CL – ITEM 43 EXEC

Perform following pulse sequence twice:

F5           THC: +X, 1 PULSE (fires jets R1A,L1A)  
              -X, 1 PULSE (fires jets F1F,F2F)  
              +Z, 1 PULSE (fires jets F1U,R1U,L1U)  
F6           +Y, 1 PULSE (fires jets F1L,L1L)  
              -Y, 1 PULSE (fires jets F2R,R1R)

CRT           √RCS R, ITEM 3 – (\*)  
MANF VLVS STAT OVRD  
    1 CL – ITEM 40 EXEC  
    2 OP – ITEM 41 EXEC  
    √3 CL – ITEM 42  
    √4 CL – ITEM 43

RCS L – ITEM 2 EXEC (\*)  
MANF VLVS STAT OVRD  
    1 CL – ITEM 40 EXEC  
    2 OP – ITEM 41 EXEC  
    √3 CL – ITEM 42  
    √4 CL – ITEM 43

RCS F – ITEM 1 EXEC (\*)  
JET DES F1U – ITEM 17 EXEC (\*)  
    F2U – ITEM 21 EXEC (no \*)

Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F2U,L2U,R2U)  
      -Z, 1 PULSE (fires jets F1D,F2D,L2D,R2D)  
      +Y, 1 PULSE (fires jets F1L,L2L)  
      -Y, 1 PULSE (fires jets F2R,R2R)

Cont next page

CRT

√RCS F, ITEM 1 – (\*)  
JET DES F1U – ITEM 17 EXEC (no \*)  
MANF VLVS STAT OVRD  
1 CL – ITEM 40 EXEC  
2 CL – ITEM 41 EXEC  
3 OP – ITEM 42 EXEC  
4 OP – ITEM 43 EXEC

RCS L – ITEM 2 EXEC (\*)  
MANF VLVS STAT OVRD  
√1 CL – ITEM 40  
2 CL – ITEM 41 EXEC  
3 OP – ITEM 42 EXEC  
√4 CL – ITEM 43

RCS R – ITEM 3 EXEC (\*)  
MANF VLVS STAT OVRD  
√1 CL – ITEM 40  
2 CL – ITEM 41 EXEC  
3 OP – ITEM 42 EXEC  
√4 CL – ITEM 43

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)

√RCS R, ITEM 3 – (\*)  
MANF VLVS STAT OVRD  
√1 CL – ITEM 40  
√2 CL – ITEM 41  
3 CL – ITEM 42 EXEC  
4 OP – ITEM 43 EXEC

RCS L – ITEM 2 EXEC (\*)  
MANF VLVS STAT OVRD  
√1 CL – ITEM 40  
√2 CL – ITEM 41  
3 CL – ITEM 42 EXEC  
4 OP – ITEM 43 EXEC

Cont next page



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)

F6/F8 DAP: A/INRTL/VERN  
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

R14:C 4. CONFIG FOR VERN MANIFOLD VLV TEST  
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

**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  $-0.01 < \text{Roll Rate} < 0.01$ , 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

### 3. VEHICLE RECOVERY AND FES RESTART

DAP: A3/FREE/VERN(ALT)

If VERN jets available:

O14:F,     √All RJD LOGIC,DRIVER (seventeen) – ON  
 O15:F,  
 O16:F

If VERN jets not available:

√Pri RJD LOGIC,DRIVER (sixteen) – ON

F6,F8

ADI ATT – as reqd

Reconfig to FLIGHT PLAN DAP

DAP: INRTL

If FES reqd:

**SM 88 APU/ENVIRON THERM**

CRT(O1)

If FREON EVAP OUT TEMP > 41

and ≤ 47 degF:

L1

RAD CNTLR OUT TEMP – HI

CRT(O1)

When FREON EVAP OUT TEMP > 50 degF,

L1

RAD CNTLR OUT TEMP – NORM, then

immediately:

FLASH EVAP CNTLR PRI A(B) – ON

CRT(O1)

If FREON EVAP OUT TEMP ≤ 41 or > 47 degF:

L1

FLASH EVAP CNTLR PRI A(B) – ON

### GRAVITY GRADIENT BODY VECTORS

		ATT	EXEC DATA			BODY RATES (±0.002)		
		ID	P	Y	OM	R	P	Y
+	PLBD	A	357.51	0.97	249.18	0.002	0.024	-0.062
	NORTH							
X	SOUTH	B	357.51	359.23	110.91	-0.002	0.024	0.062
L	PLBD	C	177.51	0.77	69.09	0.002	-0.024	-0.062
	NORTH							
V	SOUTH	D	177.51	359.03	290.82	-0.002	-0.024	0.062

## 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

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

## VRCS PTC

### 1. MNVR TO PTC ATTITUDE

DAP: A1/AUTO/VERN

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

When in attitude:

GNC UNIV PTG

BODY VECT - ITEM 14 +1 EXEC

ROT - ITEM 20 EXEC (CUR-\*)

When rates have stabilized (~60 sec):

GNC 20 DAP CONFIG

Change DAP A to A2

### 3. TERMINATE PTC ROTATION

GNC 20 DAP CONFIG

Change DAP A to A1

When rates have stabilized (~60 sec):

GNC UNIV PTG

CNCL - ITEM 21 EXEC

When rates have damped:

Reconfig to FLIGHT PLAN DAP

## ON-ORBIT +X RCS BURN, MM202

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 (\*)

#### 1. AFT RCS/OMS SYSTEM CHECK

If I'CNCT: L(R) OMS to RCS

#### OMS/MPS

O3 √OMS PRESS He TK L,R > 1500 psia  
C3 √L,R OXID,FUEL > 234 psia  
O7 DAP: FREE  
AFT L,R RCS  
TK ISOL (six) – CL (tb-CL)  
XFEED (four) – OP (tb-OP)  
O8 L(R) OMS  
He PRESS/VAP ISOL A(B) – OP  
L,R OMS  
√He PRESS/VAP ISOL B(A) (two) – CL  
√TK ISOL A,B (four) – OP (tb-OP)  
√XFEED A (two) – CL (tb-CL)  
L(R) OMS XFEED B – OP (tb-OP)  
C3 DAP: as reqd

#### CRT

### GNC 23 RCS

OMS PRESS ENA,L(R) OMS –  
ITEM 5(6) EXEC

If no I'CNCT:

O3 √RCS PRESS L,R OXID,FUEL > 190 psia  
√He > 456 psia

O7 AFT L,R RCS  
√He PRESS A(B) (two) – GPC (tb-OP)  
√He PRESS B(A) (two) – CL (tb-CL)  
√TK ISOL (six) – OP (tb-OP)  
√XFEED (four) – CL (tb-CL)

Cont next page

		2. <u>LOAD TGT DATA AND MNVR TO BURN</u>
		ATT
C3		DAP: B1/AUTO/VERN(PRI)
		<u>GNC UNIV PTG</u>
		CNCL – ITEM 21 EXEC
		GNC, OPS 202 PRO
		<u>1: GNC ORBIT MNVR EXEC</u>
		<u>2: GNC SYS SUMM</u>
		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. <u>BURN EXEC</u>
TIG-3:00		
	F6 (F8)	ADI ERR/RATE – MED
		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

F6(F8) 4. POST BURN RECONFIG  
CRT FLT CNTLR PWR – OFF  
C3 GNC, OPS 201 PRO  
DAP TRANS: PULSE/PULSE/PULSE  
DAP: as reqd

O14:E, cb DDU (six) – as reqd  
O15:E,  
O16:E

C3 **If I'CNCT RETURN**  
DAP: FREE

CRT **GNC 23 RCS**  
O8 OMS PRESS ENA,OFF – ITEM 7 EXEC  
L,R OMS XFEED (four) – CL (tb-CL)  
He PRESS/VAP ISOL A – CL

O7 AFT L,R RCS  
√He PRESS A(B) (two) – GPC (tb-OP)  
B(A) (two) – CL (tb-CL)  
XFEED (four) – CL (tb-CL)  
TK ISOL (six) – OP (tb-OP)

C3 DAP: as reqd

O14:F, 5. RECONFIG FOR GROUP B(C)  
O15:F, If Group B(C) PWRDN:  
O16:F Pri RJD LOGIC,DRIVER (sixteen) – OFF  
RJDA 1A L2/R2 MANF DRIVER – ON



## ON-ORBIT -X RCS BURN, MM202

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 (\*)

1. FWD RCS SYSTEM CHECK

O3           √RCS PRESS FWD OXID,FUEL > 190 psia  
                               √He > 456 psia

O8           √FWD RCS He PRESS A(B) – GPC (tb-OP)  
                               √B(A) – CL (tb-CL)

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 <u>Heads Up</u>	Retrograde <u>Heads Up</u>	Burn Att from <u>MNVR PAD</u>
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

NOTE

Ignore computed attitude,  
perform burn in current attitude

TIG-3:00      3. BURN EXEC  
ADI ERR/RATE – MED  
ATT – LVLH  
√ADI ATT

	Posigrade Heads Up	Retrograde Heads Up	Burn Att from MNVR PAD
R	+180.0	+0.0	_____
P	+186.0	+350.0	_____
Y	+0.0	+0.0	_____

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

F6/F8      4. POST BURN RECONFIG  
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

O14:F,  
O15:F,  
O16:F      5. RECONFIG FOR GROUP B(C)  
If Group B(C) PWRDN:  
Pri RJD LOGIC, DRIVER (sixteen) – OFF  
RJDA 1A L2/R2 MANF DRIVER – ON

**ON-ORBIT MULTI-AXIS RCS BURN, MM202**

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 (\*)

**1. AFT RCS/OMS SYSTEM CHECK**

If I'CNCT: L(R) OMS to RCS

<b>OMS/MPS</b>	√OMS PRESS He TK L,R > 1500 psia
O3	√L,R OXID,FUEL > 234 psia
C3	DAP: FREE
O7	AFT L,R RCS
	TK ISOL (six) – CL (tb-CL)
	XFEED (four) – OP (tb-OP)
O8	L(R) OMS
	He PRESS/VAP ISOL A(B) – OP
	L,R OMS
	√He PRESS/VAP ISOL B(A) (two) – CL
	√TK ISOL A,B (four) – OP (tb-OP)
	√XFEED A (two) – CL (tb-CL)
	L(R) OMS XFEED B – OP (tb-OP)
C3	DAP: as reqd
CRT	<b>GNC 23 RCS</b>
	OMS PRESS ENA,L(R) OMS –
	ITEM 5(6) EXEC

If no I'CNCT:

O3      √RCS PRESS L,R OXID,FUEL > 190 psia  
           √He > 456 psia

O7      AFT L,R RCS  
           √He PRESS A(B) (two) – GPC (tb-OP)  
           √He PRESS B(A) (two) – CL (tb-CL)  
           √TK ISOL (six) – OP (tb-OP)  
           √XFEED (four) – CL (tb-CL)

Cont next page

2. FWD RCS SYSTEM CHECK  
O3     √RCS PRESS FWD OXID,FUEL > 190 psia  
                                    √He > 456 psia  
O8     √FWD RCS He PRESS A(B) – GPC (tb-OP)  
                                    √B(A) – CL (tb-CL)

3. 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  
          √BURN DATA per PAD

NOTE

Ignore computed attitude,  
perform burn in current attitude

TIG-3:00           FLT CNTLR PWR – ON  
                          DAP TRANS: as reqd

TIG-0:30           If Inertial hold burn:  
                          |   DAP: B1/INRTL/PRI  
                          If LVLH track burn:  
                              DAP: B1/LVLH/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

4. 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

C3

**If I'CNCT RETURN**

DAP: FREE

**GNC 23 RCS**

CRT

OMS PRESS ENA, OFF – ITEM 7 EXEC

O8

L,R OMS XFEED (four) – CL (tb-CL)

He PRESS/VAP ISOL A – CL

O7

AFT L,R RCS

√He PRESS A(B) (two) – GPC (tb-OP)

√B(A) (two) – CL (tb-CL)

XFEED (four) – CL (tb-CL)

TK ISOL (six) – OP (tb-OP)

C3

DAP: 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

## 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,  
O15:F,  
O16:F

√Pri RJD LOGIC,DRIVER (sixteen) – ON

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  
RJD L5/F5/R5 DRIVER – ON  
Wait 5 sec  
DAP: A/AUTO/VERN(PRI)
- O16:F

┌ | | | ┌

## **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 \_\_\_\_\_

OMS BOTH 1

L 2

R 3

RCS SEL 4  +X  
-X  
MULTI-AXIS

TV ROLL 5

BURN ATT

R 24

P 25

Y 26

$\Delta$ VTOT

TGO

VGO X

VGO Y

VGO Z

HA

HP

TGT

TRIM LOAD P 6

LY 7

RY 8

WT 9

TIG 10   /    :   :

TGT PEG 7  $\Delta$ VX 19

$\Delta$ VY 20

$\Delta$ VZ 21

**NOTES**

OMS GMBL CK: PRE POST-BURN

L PRI

L SEC

R PRI

R SEC

NONE

RCS I'CNCT:  L OMS → RCS  
 R OMS → RCS  
 NONE

DOWN MODE OPTIONS:  
 2 OMS → 1 OMS  
 1 OMS → RCS  
 NONE

OMS HE REG TEST:  NONE  R

L GPC OP CL A    B

R GPC OP CL A    B

-X RCS BURNS: BURN ATT LVLH ATT

P 15    R

Y 16    P

OM 17    Y

ORBIT BURN MONITOR  
 GPC FILL-INS \_\_\_ ( \_\_\_ )  
 CRIT BURN  
 NON-CRIT BURN

MAX TIG SLIP \_\_\_ MIN.  DO NOT UPDATE TIG  
 UPDATE TIG AFTER \_\_\_ MIN.

NOTES

10-21 ORB OPS/ALL/GEN K,10

ORBIT MANEUVER PAD FOR \_\_\_\_\_

OMS BOTH 1

L 2

R 3

RCS SEL 4  +X  
-X  
MULTI-AXIS

TV ROLL 5

TRIM LOAD P 6

LY 7

RY 8

WT 9

TIG 10   /   :   :

TGT PEG 7  $\Delta V_X$  19

$\Delta V_Y$  20

$\Delta V_Z$  21

BURN ATT

R 24

P 25

Y 26

$\Delta V_{TOT}$

TGO

VGO X

VGO Y

VGO Z

HA

HP

TGT

OMS GMBL CK:		NOTES	
PRE	POST-BURN	RCS I'CNCT:	DOWN MODE OPTIONS:
L PRI <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> L OMS → RCS	<input type="checkbox"/> 2 OMS → 1 OMS
L SEC <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> R OMS → RCS	<input type="checkbox"/> 1 OMS → RCS
R PRI <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> NONE	<input type="checkbox"/> NONE
R SEC <input type="checkbox"/>	<input type="checkbox"/>		
NONE <input type="checkbox"/>	<input type="checkbox"/>		

<p>OMS HE REG TEST: <input type="checkbox"/> NONE</p> <p style="text-align: center;">L R</p> <p style="text-align: center;">GPC OP CL GPC OP CL</p> <p>A <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>B <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> B <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	<p>-X RCS BURNS:</p> <p style="text-align: center;">BURN ATT LVLH ATT</p> <p>P 15 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> R <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Y 16 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>OM 17 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Y <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	<p>ORBIT BURN MONITOR</p> <p>GPC FILL-INS __ ( __ )</p> <p><input type="checkbox"/> CRIT BURN</p> <p><input type="checkbox"/> NON-CRIT BURN</p>
---	--	---

MAX TIG SLIP \_\_ MIN.  DO NOT UPDATE TIG

UPDATE TIG AFTER \_\_ MIN.

NOTES

10-22 ORB OPS/ALL/GEN K,10

SEP MANEUVER

SEP MANEUVER..... 11-2

**SEP  
MNVR**

11-1

ORB OPS/ALL/GEN K

## SEP MANEUVER

SEP  
MNVR

- A6U      1. SET UP AFT STATION  
      √SENSE -Z  
      DAP: A1/INRTL/PRI  
      DAP TRANS: as reqd
- F6/F8      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
- A1U      4. PERFORM RR ACQ (if desired)  
      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 K,4

A6U 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 \*

CRT 6. PERFORM OUT-OF-PLANE MNVR  
GNC UNIV PTG  
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

$\sqrt{VGO Z} \geq 0$ ; 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  $\sqrt{DAP}$ : no LO Z  
At TIG, deflect THC to null VGOs

Cont next page

7. PERFORM FINAL SEP

GNC ORBIT MNVR EXEC

CRT  $\sqrt{\text{RCS SEL - ITEM 4 (*)}}$

If  $\Delta VY$  (block 6) +2:  
| TV ROLL - ITEM 5 +2 7 0 EXEC  
If  $\Delta VY$  (block 6) -2:  
TV ROLL - ITEM 5 +0 9 0 EXEC

Set TIG to TIG from step 6 +15:00  
TGT PEG 7  $\Delta Vx$  - ITEM 19 +3 EXEC  
 $\Delta Vy$  - ITEM 20 +0 EXEC  
 $\Delta Vz$  - 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

8. MNVR TO MINIMUM DRAG ATTITUDE  
(-ZLV/-XVV)

A6U DAP: A/AUTO/VERN

CRT GNC, OPS 201 PRO

GNC UNIV PTG

$\sqrt{\text{TGT ID: 2}}$   
BODY VECT: 3  
OM: 0  
START TRK - ITEM 19 EXEC (CUR-\*)

## PGSC

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## PGSC ACT

### NOTE

Not installing optional strain relief on 760XD may facilitate inserting/removing PCMCIA cards. Refer to figures 12-1 and 12-2



Figure 12-1.- Strain relief off.

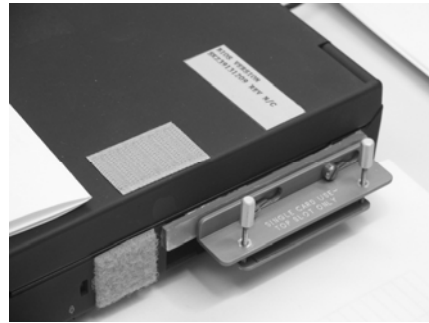


Figure 12-2.- Strain relief on.

### A. PGSC WITH EXPANSION UNIT

1. If activating OCA Router PGSC, go to OCA SETUP, 12-11

#### 2. Unstow:

PGSC with Expansion Unit  
AC PWR cable

#### If PGSC to be networked:

PCMCIA Ethernet card, adapter assemblies  
Ethernet cables  
Network T-connectors  
Network terminators (two)  
Network barrel connectors (if reqd)

#### If WinDecom to be run:

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)

Cont next page

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

F1  
(MO13Q,  
A15,  
MO52J,  
ML85E)

4. √AC UTIL PWR – OFF

NOTE

If needed, reference PGSC figures 12-3 thru 12-6 to identify PGSC ports, connectors

5. Connect PGSC AC PWR cable from AC Util Pwr outlet to Expansion Unit Pwr port
6. √PGSC Expansion Unit fan/louver not obstructed
7. If multiple PGSCs to be powered from same AC Util Pwr outlet, repeat steps 2 thru 6 for each PGSC to be powered from same outlet
8. AC UTIL PWR – ON
9. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:
10. √Windows shut down

PGSC

11. Repeat steps 1 thru 10 for each PGSC to be networked
12. If PGSC to be networked, go to PGSC NETWORK, A. INITIAL SETUP, 12-30 >>

PGSC

13. PGSC pwr – on
14. Sel appropriate Expansion Unit config at Startup Menu, then press [ENTER]
15. Go to appropriate application setup procedure (e.g., WINDECOM OPS, 12-37, and/or WORLD MAP INITIALIZATION, 12-44), as needed >>

B. PGSC WITHOUT EXPANSION UNIT

1. Unstow:

PGSC  
DC PWR SPLY  
DC PWR cable  
DC PWR SPLY cable

If PGSC to be networked:

PCMCIA Ethernet card, adapter assemblies  
Ethernet cables  
Network T-connectors  
Network terminators (two)  
Network barrel connectors (if reqd)

PWR  
SPLY

2. √DC PWR SPLY PWR sw1 – OFF

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

F1  
(MO13Q,  
A11,A15,  
MO30F,  
MO52J,  
ML85E,  
O19,L12)

4. √DC UTIL PWR – OFF

NOTE

If needed, reference PGSC figures  
12-3 thru 12-6 to identify PGSC ports,  
connectors

5. Connect PGSC DC PWR cable from DC Util Pwr  
outlet to DC Pwr Sply outlet (J1)  
Connect DC PWR SPLY cable from DC Pwr  
Sply outlet (J2) to PGSC pwr port

6. √PGSC fan/louver (at center rear of PGSC) not  
obstructed

Cont next page

12-5 ORB OPS/ALL/GEN K,6

- |          |   |
|----------|---|
|          | 7. If multiple PGSCs to be powered from same DC Util Pwr outlet, repeat steps 2 thru 6 for each PGSC to be powered from same outlet |
|          | 8. DC UTIL PWR – ON   |
| PWR SPLY | 9. DC PWR SPLY PWR sw1 – ON (It on)   |
|          | 10. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:  |
| PGSC     | 11. √Windows shut down  |
|          | 12. Repeat steps 1 thru 11 for each PGSC to be networked  |
|          | 13. If PGSC to be networked, perform PGSC NETWORK, A. <u>INITIAL SETUP</u> , 12-30  |
| PGSC     | 14. PGSC pwr – on   |
|          | 15. Go to appropriate application setup procedure (e.g., WORLD MAP INITIALIZATION, 12-44), as needed                                |

Cont next page

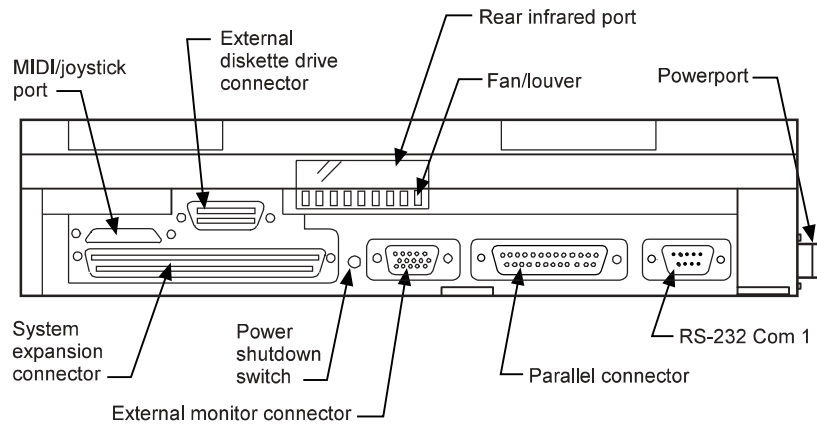


Figure 12-3.- PGSC without Expansion Unit.

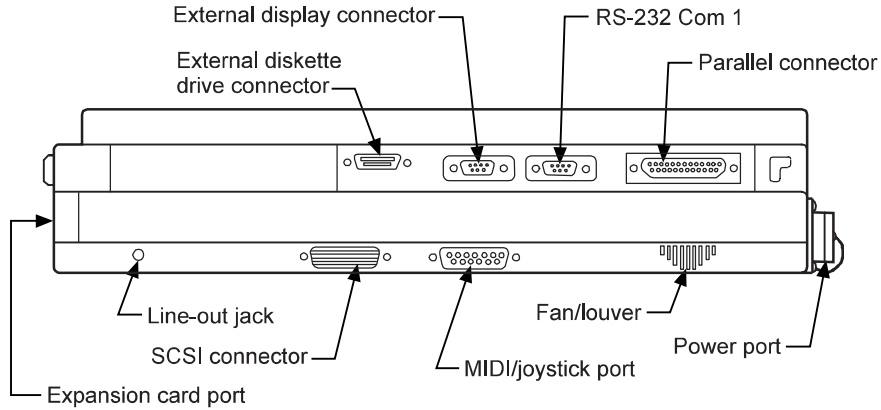


Figure 12-4.- PGSC with Expansion Unit.

## OCA AND PCMMU EXPANSION CARDS

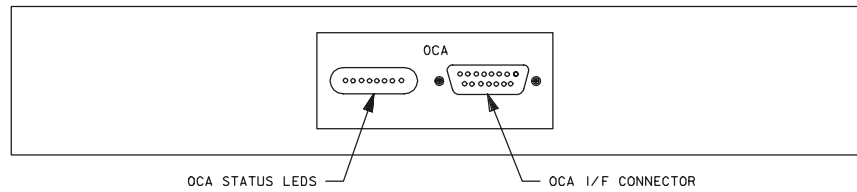
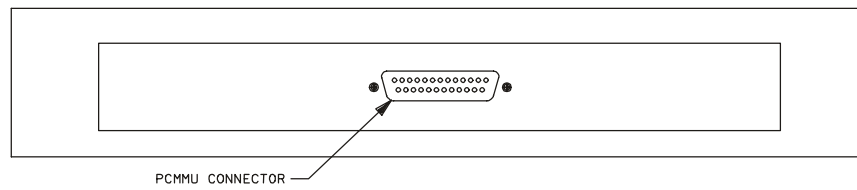


Figure 12-5.- OCA Expansion card.



480351208, PNL 1

Figure 12-6.- PCMMU Expansion card.

## PGSC HARD DISK LATE UPDATE

If late update reqd on STS PGSC portion of OCA Router PGSC hard disk:

- PGSC
- If running Windows NT (OCA Router software):
    1. Press [CNTL]/[ALT]/[DEL]  
Sel 'Shut Down' at 'Logon Information' dialog box  
Sel 'OK'  
When prompted:  
PGSC pwr – off
  - If running Windows 98:
    2. Go to step 5
  - 3. PGSC pwr – on  
Within 15 sec, click on 'STS PGSC' at 'Boot Magic' boot-up menu  
Sel 'Docked (OCA Card)' config at Startup Menu, then press [ENTER]
  - 4. √PGSC pwr – on

**CAUTION**

If PCMCIA card is inserted in PCMCIA card slot for extended period of time, PCMCIA card may become hot

5. Insert PCMCIA card containing late PGSC updates

Cont next page

6. ✓'PCMCIA card' icon appears in system tray

- \* If 'PCMCIA card' icon does not appear in \*
- \* system tray: \*
- \* ✓PCMCIA card properly inserted with \*
- \* correct side up (bottom release button \*
- \* extends outward and can be folded in) \*
- \* If no joy, eject PCMCIA card and \*
- \* reinsert \*
- \* If still no joy: \*
- \* Shut down Windows \*
- \* Eject PCMCIA card \*
- \* Power up in Windows 98 \*
- \* Repeat steps 5 and 6 \*

7. Double-click 'Shuttle Apps'>'Late PGSC Update'

8. If referred to this procedure from OCA SETUP or PGSC ACT, follow instructions on PGSC monitor but shut down Windows (versus restart) >>

9. Follow instructions on PGSC monitor



## OCA SETUP

### 1. Unstow:

- OCA Router PGSC with Expansion Unit
- KFX PGSC with external floppy drive
- AC Pwr cables (if not prerouted)
- DC Pwr cable (if not prerouted)
- DC Pwr Sply cable (if not prerouted)
- DC Pwr Sply
- OCA I/F cable (if not prerouted)
- PGSC Modem cable (if MFX ops reqd)
- PCMCIA Ethernet card, adapter assemblies
- Ethernet cables
- Network T-connectors
- Network terminators (2)
- Network barrel connectors (if reqd)

#### NOTE

At a minimum, network equipment should be configured for OCA Router and KFX PGSCs.

Network must always be properly terminated when connected to powered PGSCs

If adding OCA Router PGSC to existing network, perform the following for each PGSC on network:

- PGSC
2. If time permits for PGSC shutdown and bootup process:
    - Shut down Windows
    - Go to step 6If time not available, proceed with step 6
  3. Click on 'PCMCIA card' icon in system tray  
Click on popup window displaying 'Stop *NAME\_OF\_NETWORK\_CARD*', wait for prompt
  4. Press [ENTER] at network card dialog box displaying 'You may safely remove this device'
  5. Remove PCMCIA Ethernet card from PCMCIA card slot
  6. Repeat steps 2 thru 5 for each PGSC on network

Cont next page

## OCA ROUTER PGSC SETUP

7. Config network equipment for OCA Router PGSC, KFX PGSC, and Color Printer (if reqd) per:  
Figure 12-12  
PGSC Usage Chart (if available) or UTILITY  
OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG  
(REF DATA FS, UTIL PWR)
  
8. 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)
  
9. Config PGSC Modem cable (if MFX ops reqd) and  
OCA I/F cable per figure 12-7
  
10. 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
  
11. √AC UTIL PWR – OFF
  
12. Connect AC PWR cable between AC Util Pwr outlet  
and OCA Router PGSC per:  
PGSC Usage Chart (if available) or UTILITY  
OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG  
(REF DATA FS, UTIL PWR)

### NOTE

Following step will prevent unnecessary  
pwrn of AC Util Pwr outlet

Cont next page

13. If reqd, perform COLOR PRINTER UNSTOW AND ASSEMBLE, 12-46, then:
14. AC UTIL PWR – ON

OCA  
Router  
PGSC

15. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:
16. √Windows shut down
17. Insert PCMCIA Ethernet card into PCMCIA card slot

NOTE

After powering on OCA Router PGSC,  
allow ~2 min for completion of bootup  
process

18. PGSC pwr – on
19. Press [CTRL]/[ALT]/[DEL] to log onto Windows NT  
√Password field blank on 'Logon Information' dialog  
box  
Sel 'OK'  
Wait ~10 sec for logon sequence to complete
20. Verify data rate:  
Double-click 'OCA Control Panel Applet' icon on  
desktop

- |                               |   |
|-------------------------------|---|
| * If error msg displayed:     | * |
| * Acknowledge msg             | * |
| * PGSC pwr – off              | * |
| * Eject,reinsert PCMCIA card  | * |
| * Repeat steps 19 thru 21     | * |
| * If no joy:                  | * |
| * PGSC pwr – off              | * |
| * Replace PCMCIA card,adapter | * |
| * Repeat steps 18 thru 20     | * |

Cont next page

√'Local OCA Card-1' display on desktop  
In 'OCA-FLIGHT VC-2D' section of 'Local OCA  
Card-1' display:  
√SEND – 2(4)M

- \* If send rate out of config: \*
- \* Sel 'Control'>'Transmit Rate'>'2(4) \*
- \* Mbps OCA internal clock (Shuttle \*
- \* Ku Channel 2(3))' \*

#### KFX PGSC SETUP

21. 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
22. √DC UTIL PWR – OFF
23. Connect DC PWR cable, DC PWR SPLY, and DC PWR SPLY cable between DC Util Pwr outlet and KFX PGSC per:  
PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)
24. DC UTIL PWR – ON

KFX  
PGSC

25. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then: |
26. √Windows shut down
27. Insert PCMCIA Ethernet card into PCMCIA card slot
28. PGSC pwr – on

Cont next page

12-14 ORB OPS/ALL/GEN K,6

29. Repeat steps 27 and 28 for each PGSC to be added to network
30. If reqd, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-49, then:
31. Verify network connectivity using PingMaster:  
Double-click 'Shuttle Apps'>'Network Config'>'PingMaster'  
√'Status' column of 'Network Primary' and 'Network Nodes' sections for networked PGSCs  
If status is 'Good Response' for networked PGSCs, press [CTRL]/[x] to exit PingMaster (if desired)
- \* If status is not 'Good Response', verify \*
  - \* proper network cable and card \*
  - \* connections, then recheck status in \*
  - \* PingMaster \*

KFX

PGSC

32. Double-click 'Shuttle Apps'>'KFX'  
Arrange 'KFX' window as desired
33. Retrieve OCA Data Diskette from FDF  
Insert diskette in external floppy drive of KFX PGSC

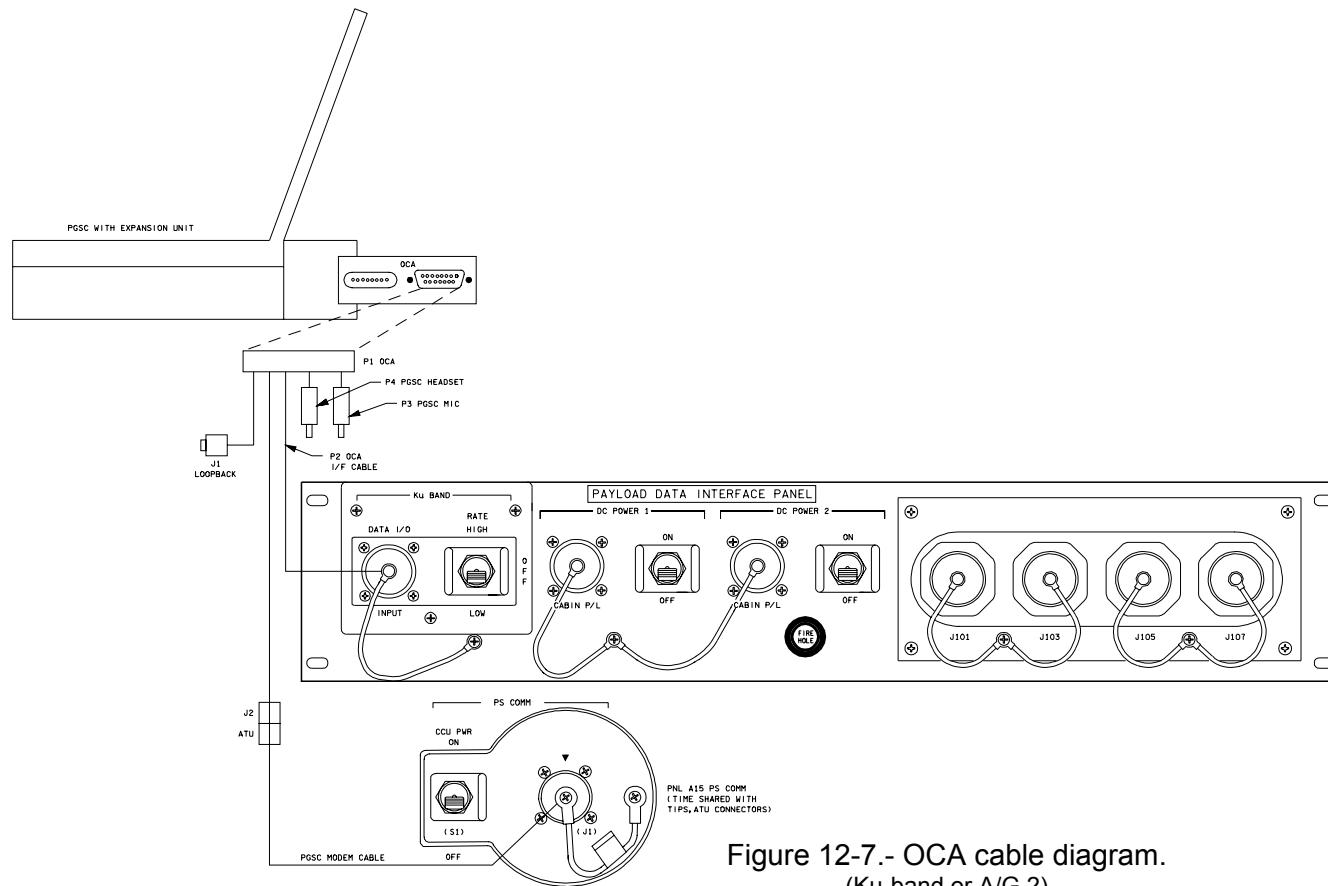


Figure 12-7.- OCA cable diagram.  
(Ku-band or A/G 2)

## 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, 12-18  
See OCA FILENAMES, 12-19, for file naming  
convention

PGSC Copy(Move) desired files to c:\oca-down\  
dcs(payloads)  
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 (if desired)

If MFX application not activated:

Perform OCA S-BAND MODEM (MFX)  
ACTIVATION, 12-21, then:

If minimized:

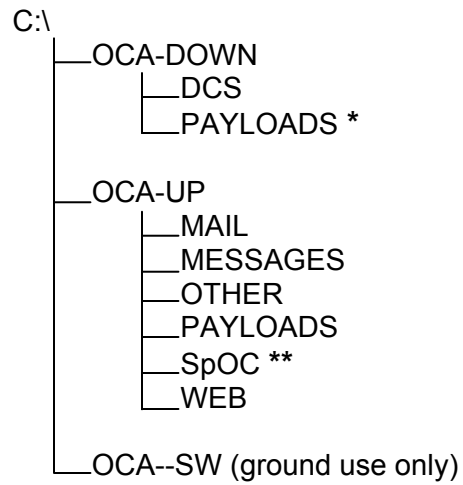
- √Icon Title displaying File Name, Send/Receive  
Status

#### NOTE

For detailed file xfer information, following  
steps must be completed prior to file xfer  
initiation

- Sel 'Eile' 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



\* PAYLOADS Directory: Directory may contain flight-specific subdirectory

\*\* SpOC Directory: Directory will contain latest SpOC updates. To create SpOC update disk, copy all files in c:\oca-up\spoc\uplink to a:\uplink



## **OCA FILENAMES**

### UPLINKED FILES

SpOC updates:	a:\uplink\ (c:\oca-up\spoc\)
Ops notes:	c:\oca-up\other\opsxxxx.doc
Graphics files:	c:\oca-up\other\othrxxxx.bmp
Uplinked personal mail*:	c:\oca-up\mail\
Uplinked Payload files:	c:\oca-up\payloads\

### LOCATION

### DOWNLINKED FILES

Personal mail, other*:	c:\oca-down\mail\
Payload files:	c:\oca-down\payloads\

### LOCATION

### 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
fltcd02.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

- PGSC
1. CONFIGURE S/W FOR FILE DOWNLINK  
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

    - √'KFX File Transfer Preview' display active
    - Sel 'downlink' button (button with '↓')
    - √'File Transfer Status' display appears
    - √Displaying xfer status

\* If error displayed, repeat step 5 \*

## OCA S-BAND MODEM (MFX) ACTIVATION

### 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

12-21 ORB OPS/ALL/GEN K,6

- ┌ | | | ┌
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. 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 PWR 1(2) KU BAND RLY – cl

PDIP

4. √KU BAND RATE in correct posn  
If OCA 2 Mbps, KU channel 2 – LO  
If OCA 4 Mbps, KU channel 3 – HI

OCA

Router

5. √OCA Router set to correct transmit rate:  
If KU channel 2:  
| ‘Control’>‘Transmit Rate’>‘2 Mbps OCA...’  
If KU channel 3:  
| ‘Control’>‘Transmit Rate’>‘4 Mbps OCA...’
6. Verify that OCA Interface Cable is well seated to both PDIP panel and OCA card in Router
7. Perform OCA LOOPBACK TEST, 12-28 |  
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

## NETMEETING VIDEO CONFERENCING

### OBJECTIVE:

This procedure is to be used to assemble the Ultraport Camera with the A31p for NetMeeting. This procedure also includes basic steps to initiate and end a NetMeeting session

1. UNSTOW  
Ultraport Camera  
VLHS  
VLHS To VTS Interface Cable
- PGSC 2. CONFIGURING ULTRAPORT CAMERA
  - 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 12-8)

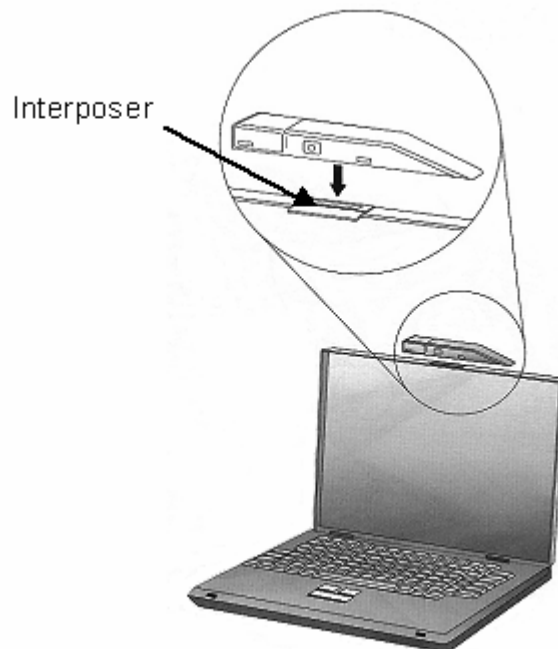


Figure 12-8.- Ultraport Camera position.

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 12-8 and 12-9
  - 2.5 Release latch to properly secure Ultraport Camera (refer to figure 12-9)

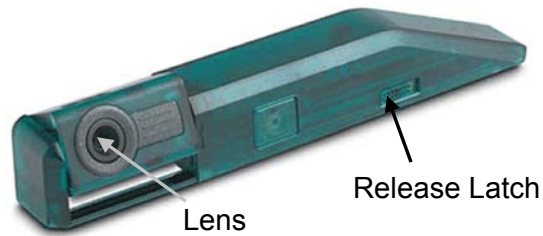


Figure 12-9.- Ultraport Camera.

- 2.6 ✓Ultraport Camera properly secured and does not disconnect
  - 2.7 Rotate lens so that lens is directed towards user (refer to figure 12-9)
- Headset, PGSC
3. Configure VLHS To VTS Interface Cable and VLHS as shown in figure 12-10  
Connect cable's headphone and mic jacks to PGSC as shown in figure 12-10

Cont next page

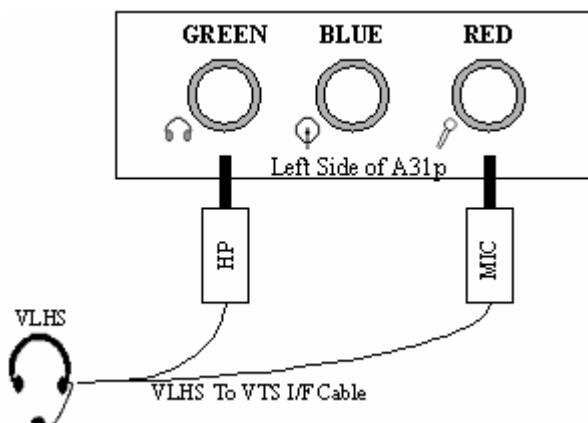


Figure 12-10.- Headset configuration.

#### 4. LAUNCHING NETMEETING

4.1 ✓PGSC connected to network

4.2 PGSC pwr – on

#### CAUTION

NetMeeting will not operate properly if KFX is running (on any PGSC) at the same time

4.3 If running KFX on any 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

4.7 Inform MCC ready for 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  
Move and hold release latch towards angled side of Ultraport Camera and remove Ultraport Camera from PGSC (refer to figure 12-9)  
Stow VLHS, VLHS To VTS Interface Cable, Ultraport Camera (as needed)

Camera

PGSC 6. Startup KFX on appropriate PGSC as needed

## OCA LOOPBACK TEST

### NOTE

Perform procedure on OCA Router  
PGSC running in Windows NT

1. LOGON TO WINDOWS NT  
OCA Router Press [CTRL]/[ALT]/[DEL] to log onto Windows NT  
PGSC Sel 'OK' on 'Logon Information' dialog box  
Wait ~10 sec for logon sequence to complete  
Double-click 'OCA Control Panel Applet' icon on  
desktop  
√'Local OCA Card-1' display on desktop
2. INITIATE INTERNAL LOOPBACK TEST  
From 'Local OCA Card-1' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Internal Loopback'  
  
√'Local OCA Card-1' display:  
Successful Test – Animated signal moving inside  
PC icon  
Unsuccessful Test – 'Frowny face' displayed  
inside PC icon  
Inform MCC of results
3. TERMINATE INTERNAL LOOPBACK TEST  
From 'Local OCA Card-1' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Stop Loopback Testing'
4. INITIATE EXTERNAL LOOPBACK TEST  
Disconnect OCA I/F cable from PDIP panel  
Connect PDIP end of OCA I/F cable to loopback port  
on PGSC end of cable  
See figure 12-11 for cable config  
  
From 'Local OCA Card-1' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'External Loopback #1'

Cont next page

- √'Local OCA Card-1' display:
  - Successful Test – Animated signal moving outside PC icon
  - Unsuccessful Test – 'Frowny face' displayed inside PC icon
- Inform MCC of results

5. TERMINATE EXTERNAL LOOPBACK TEST

- From 'Local OCA Card-1' display:
  - Sel 'OCA Self Tests' on menu bar
  - Sel 'Stop Loopback Testing'

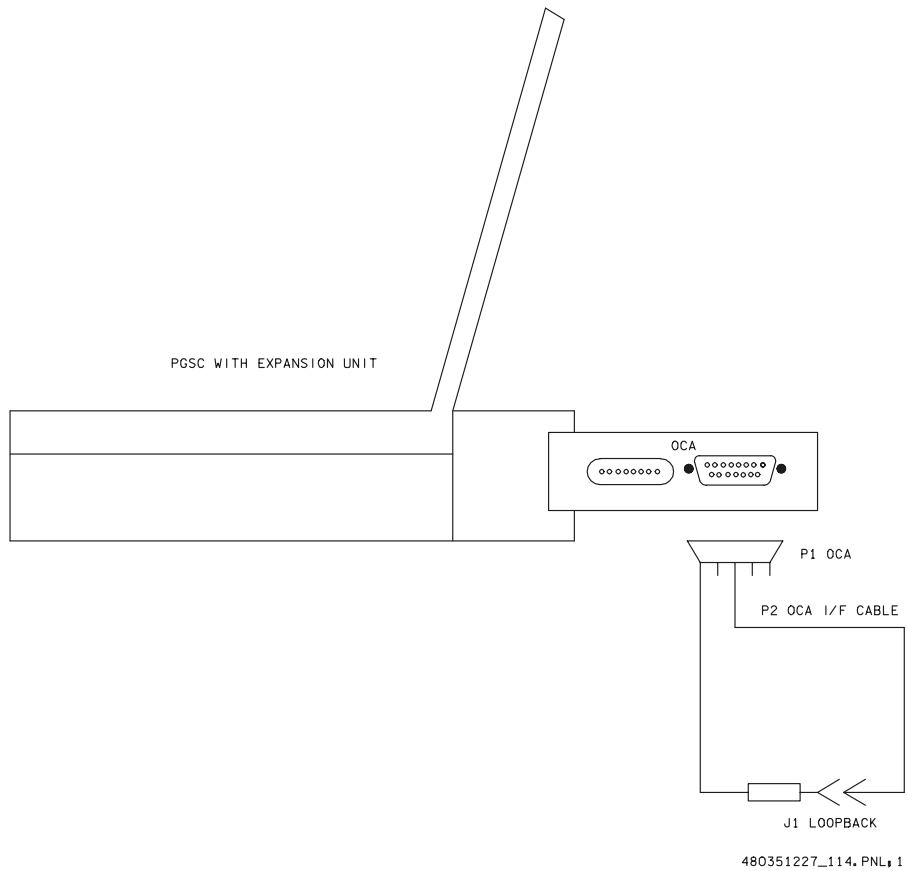


Figure 12-11.- OCA cable diagram – loopback.

## PGSC NETWORK

### A. INITIAL SETUP

#### NOTE

Procedure assumes PGSC ACT, 12-3, performed for each PGSC to be networked

1. If setting up network for OCA Router PGSC, go to OCA SETUP, 12-11

#### NOTE

Use red color-coded terminators and T-connectors for PGSC network

2. Unstow:
  - PCMCIA Ethernet card, adapter assemblies
  - Ethernet cables
  - Network T-connectors
  - Network terminators (2)
  - Network barrel connectors (if reqd)
3. Configure network equipment per:
  - Figure 12-12
  - PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)

√Network properly terminated

#### NOTE

If another resource (e.g., ESC) requires use of a specific PCMCIA card slot, use PCMCIA card slot which would avoid network card reconfiguration

- PGSC
4. Insert PCMCIA Ethernet card into any PCMCIA card slot of unpowered PGSCs
  5. PGSC pwr – on

Cont next page

12-30 ORB OPS/ALL/GEN K,6

6. If Expansion Unit attached:  
Sel appropriate Expansion Unit config at  
Startup Menu, then press [ENTER]

7. If PGSC locks up during bootup or during  
network ops:

- \* ✓PCMCIA Ethernet cards properly \*
- \* inserted into PCMCIA card slots \*
- \* ✓Adapters properly mated to network \*
- \* T-connectors \*
- \* ✓Network cables and terminators \*
- \* properly mated to T-connectors \*

8. ✓'PCMCIA card' icon appears in system tray

- \* If 'PCMCIA card' icon does not appear in \*
- \* system tray: \*
- \* ✓PCMCIA Ethernet card properly \*
- \* inserted with correct side up (bottom \*
- \* release button extends outward and \*
- \* can be folded in) \*
- \* If no joy, eject PCMCIA Ethernet card \*
- \* and reinsert \*
- \* If still no joy, shut down Windows, \*
- \* repeat steps 5 thru 8 \*

NOTE

Windows will attempt to connect to all  
mapped drives

9. Repeat steps 4 thru 8 for each PGSC to be  
networked

Cont next page

12-31 ORB OPS/ALL/GEN K,6

10. Verify network connectivity using PingMaster:  
 Double-click 'Shuttle Apps'>'Network  
 Config'>'PingMaster'  
 ✓'Status' column of 'Network Primary' and  
 'Network Nodes' sections for networked  
 PGSCs  
 If status is 'Good Response' for networked  
 PGSCs, press [CTRL]/[x] to exit PingMaster  
 (if desired)
  - \* If status is not 'Good Response', \*
  - \* verify proper network cable and \*
  - \* card connections, then recheck \*
  - \* status in PingMaster \*
11. For each networked PGSC, go to appropriate  
 application setup procedure (e.g., WINDECOM  
 OPS, 12-37 and/or WORLD MAP  
 INITIALIZATION, 12-44) as needed >>

B. RECONFIG

NOTE

Procedure assumes PGSC ACT, 12-3,  
 performed for each PGSC to be added  
 to network.

Use red color-coded terminators and  
 T-connectors for PGSC network

1. If reqd, unstow additional network cables, cards,  
 adapters, terminators, and T-connectors
- PGSC 2. If OCA Router PGSC on network and running  
 Windows NT:  
 Press [CTRL]/[ALT]/[DEL] to log onto  
 Windows NT  
 Sel 'Shut Down' at 'Logon Information' dialog  
 box  
 Sel 'OK'

When prompted:  
 PGSC pwr – off

Cont next page

3. If time available for shutdown and bootup process of non-OCA Router PGSCs on network:
  - Shut down Windows
  - Go to step 7If time not available, proceed with step 4
4. Click on 'PCMCIA card' icon in system tray  
Click on popup window displaying 'Stop *NAME\_OF\_NETWORK\_CARD*', wait for prompt
5. Press [ENTER] at network card dialog box displaying 'You may safely remove this device'
6. Remove PCMCIA Ethernet card from PCMCIA card slot
7. Repeat steps 3 thru 6 for each PGSC on network

NOTE

Network must always be properly terminated when connected to powered PGSCs

8. Reconfigure network cables, cards, adapters, terminators, and T-connectors per:
  - Figure 12-12
  - PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)
  - √Network properly terminated
9. Insert PCMCIA Ethernet cards into PCMCIA card slots of all PGSCs to be networked
10. If PGSC powered off:
  - PGSC pwr – on
  - If reqd, sel appropriate Expansion Unit config at Startup Menu, then press [ENTER]
11. Perform A. INITIAL SETUP, steps 8 thru 11, 12-31

Cont next page

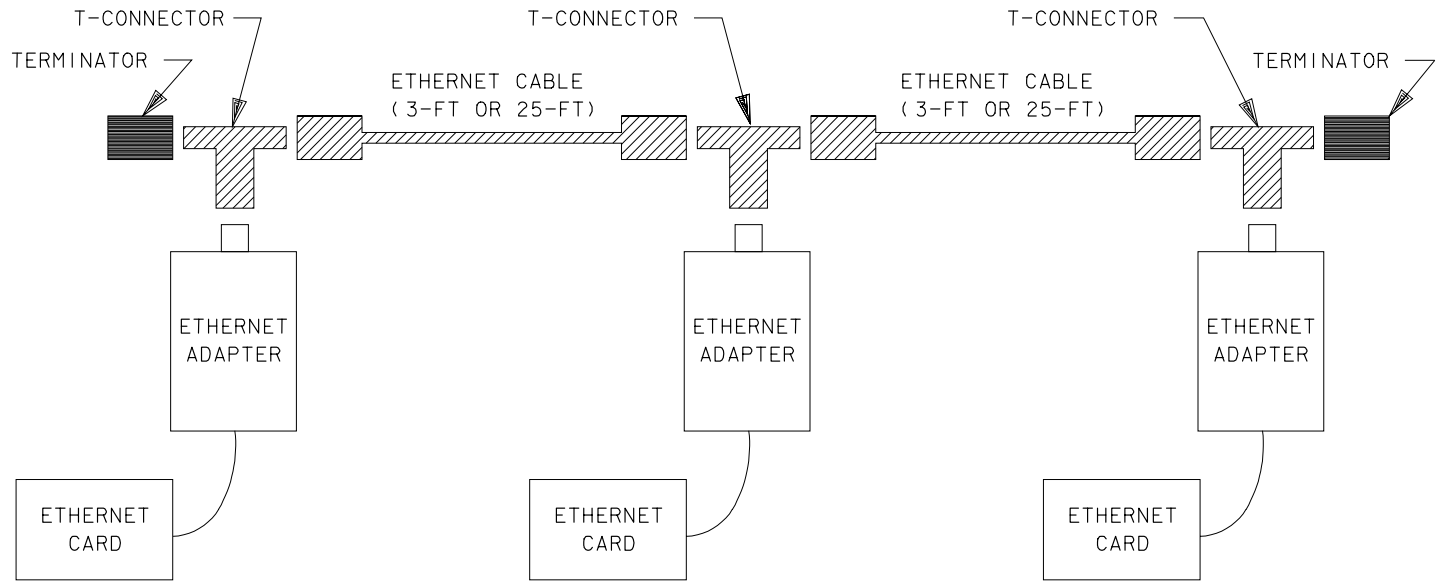
- PGSC
- C. TEARDOWN
1. Single-click 'PCMCIA Card' icon in system tray
  2. Click on popup window displaying 'Stop *NAME\_OF\_NETWORK\_CARD*', wait for prompt
  3. Press [ENTER] at dialog box displaying 'You may safely remove this device'
  4. Depress release button to eject PCMCIA card from PCMCIA card slot
  5. Remove PCMCIA card
  6. Disconnect network cables from network T-connectors
  7. Disconnect network T-connectors from network adapters
  8. Stow network equipment

- PGSC
- D. PGSC NAMING
1. √MCC for new PGSC name
  2. Double-click 'Shuttle Apps'>'Network Config'>'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



12-35

ORB OPS/ALL/GEN K,6



ETHERNET CARDS CAN BE  
INSERTED INTO EITHER PCMCIA  
CARD SLOT ON NETWORK PGSC

480351233\_114. ART 1

Figure 12-12.- Network setup diagram.

## PCMCIA CARD REMOVAL

- PGSC
1. If RS-422 PCMCIA card:  
Shut down Windows  
√Power off completed  
Go to step 5
  2. Single-click 'PCMCIA Card' icon in system tray
  3. Click on popup window displaying 'Stop  
*NAME\_OF\_CARD*', wait for prompt
  4. Press [ENTER] at dialog box displaying 'You may  
safely remove this device'

### CAUTION

If PCMCIA hard disk drive is inserted in  
PCMCIA card slot for extended period  
of time, PCMCIA card may be hot

5. Depress release button to eject PCMCIA card from  
PCMCIA card slot
6. Remove PCMCIA card

## 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)
  
- C3  
MO30F      2. VOI PCMMU PWR – 1(2)
  - 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
  
- O5  
(MO30F)      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, 12-30

Cont next page

6. Double-click 'Shuttle Apps'>'Windecom'> appropriate WinDecom application  
After ~30 sec, verify 'Tlm Pkt-Net' and 'Tlm Pkt-Com' displays appear

End user  
PGSC

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  
Decom  
PGSC

1. Double-click 'Shuttle Apps'>'Windecom'> 'WinDecom Shutdown'  
Sel 'OK' to shut down telemetry system >>

#### C. TROUBLESHOOTING

##### NOTE

The following individual steps may fix the problem. Exit procedure as needed

PCSC

If dynamic data not displayed on WinDecom 'Tlm Pkt-Net' and/or 'Tlm Pkt-Com' displays:

1. √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 1, above

√End user PGSC(s) receiving WinDecom data

Cont next page

2. Repeat A. ACT, step 2, 12-37
3. Disconnect PCMMU cable at both ends, connect backup PCMMU cable between orbiter PCMMU port and PGSC Expansion Unit PCMMU port
4. Replace WinDecom PGSC with backup PGSC with PCMMU Expansion Unit

If end user PGSC(s) not receiving WinDecom data:

5. √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
6. √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
7. 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  
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

8. 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' of any PGSC)
    - √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
9. √Current TFL and WinDecom data output config can support end user application(s):
- Open 'Packet & TFL Info' table (from 'Shuttle Apps'>'WinDecom' of any PGSC)
  - 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

10. 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

## SETTING TIMES AND STATE VECTOR

- PGSC
1. Double-click 'Shuttle Apps'>'Time Utilities'>'Time-Vector Server'
  2. Sel 'Update' on menu bar  
Sel 'Time Values'
  3. If PGSC configured to receive WinDecom data:  
At bottom of 'Update Time Values' dialog box,  
verify 'Auto Synch PGSC with PCMMU'  
checked (√) on  
√'Receiving PCMMU data' is displayed
    - \* If 'Not receiving PCMMU data' displayed: \*
    - \* Sel 'Exit' to close dialog box \*
    - \* Perform WINDECOM OPS, \*
    - \* C. TROUBLESHOOTING, 12-38, \* |
    - \* then: \*
    - \* Repeat steps 2-3 \*

Sel 'Exit' to close dialog box

Sel 'Update' on menu bar  
Sel 'State Vector'  
At bottom of 'Update State Vector' dialog box,  
verify 'PCMMU feed' checked (√) on  
√'Receiving vector PCMMU data' is displayed  
Sel 'Exit' to close dialog box  
Minimize 'Time/State Vector Server' application
  4. If PGSC not configured to receive WinDecom data:  
Set GMT, MET, and/or launch values as reqd  
Sel 'Apply'  
Sel 'Exit' to close 'Update Time Values' dialog  
box  
Sel 'Update' on menu bar  
Sel 'State Vector'

Cont next page



GNC 34 ORBIT TGT

PGSC

Update state vector info using data from SPEC 34 display  
Sel 'Apply'  
Sel 'Exit' to close 'Update State Vector' dialog box  
Sel 'File' on menu bar  
Sel 'Exit'

## WORLD MAP INITIALIZATION

- PGSC
1. Double-click 'Shuttle Apps'>'World Map'
  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, 12-38 \*
        - \* 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
    - GNC 34 ORBIT TGT
    - Update state vector info using data from SPEC 34 display
    - Sel 'Apply'
    - Sel 'Exit' to close 'Satellite Data' display



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## 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

25-ft network data cable and T-connector

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 12-13)

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 12-14)

### NOTE

Network must always be properly terminated when connected to powered PGSCs

Cont next page

If Printer to be set up as Network Printer:

Connect network cable, T-connector to Printer Network Port (see figure 12-14)

Connect other end of network cable to T-connector of networked PGSC

If Printer to be set up as Local Printer:

Connect parallel cable between Printer Parallel Port and KFX PGSC Parallel Port (see figure 12-14)

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

If OCA Router not configured, perform OCA SETUP, 12-11

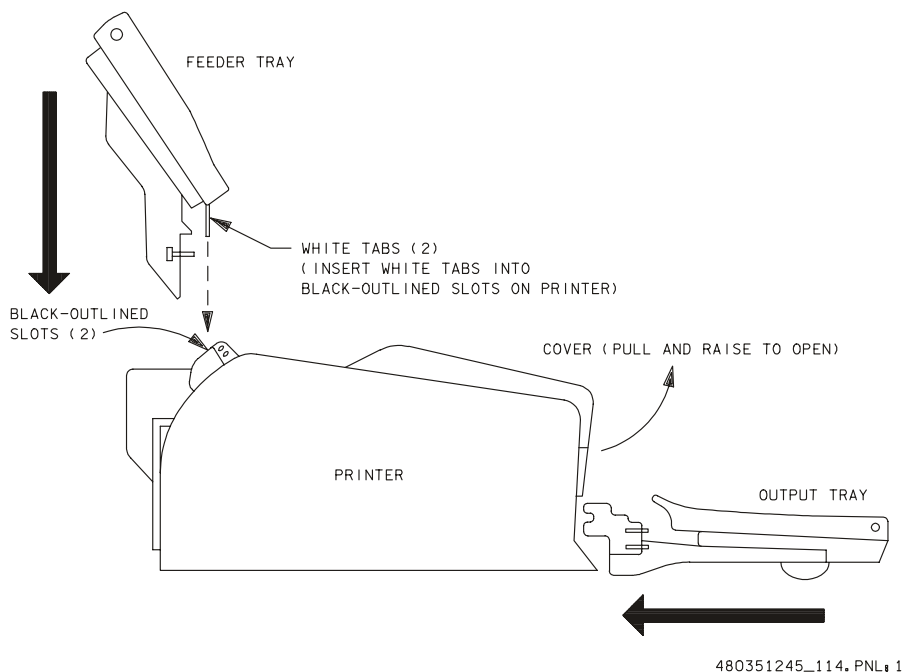
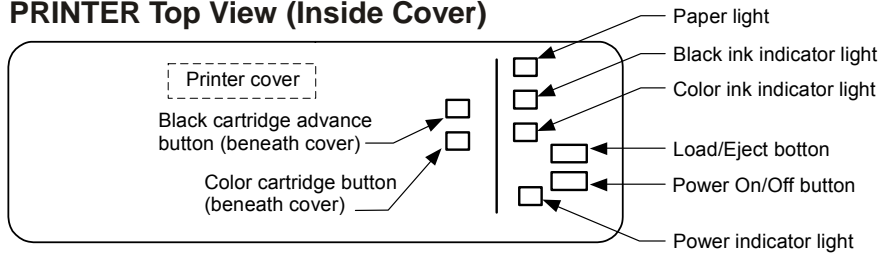
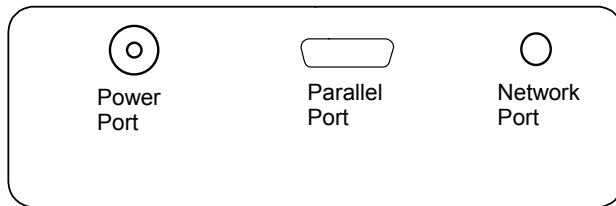


Figure 12-13.- Side view of printer and trays, ready for assembly.

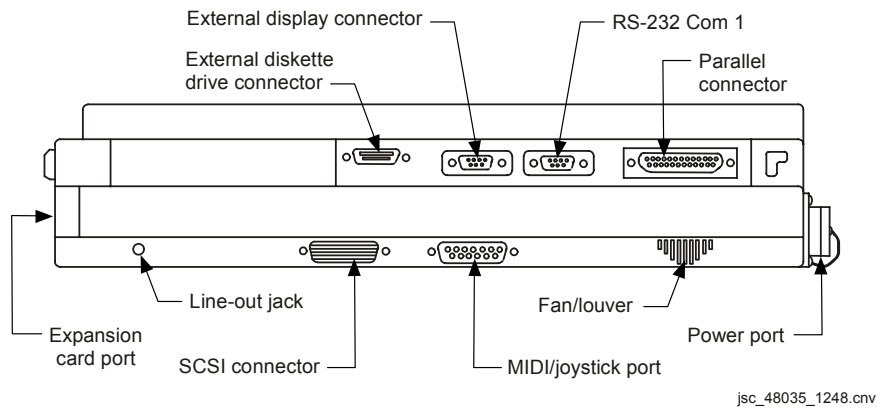
**PRINTER Top View (Inside Cover)**



**PRINTER Back View**



**PGSC with Expansion Unit**



jsc\_48035\_1248.cnv

Figure 12-14.- 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
- PGSC 3. √OCA Router PGSC pwr – on
- Printer 4. Printer pwr – on (see figure 12-14)  
√Flashing green pwr light (~5 min)
5. √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, 12-54
6. If paper jam, go to COLOR PRINTER PAPER JAM, 12-51
7. If printer quality acceptable, Printer pwr – off (to terminate SELF-TEST)
8. Notify MCC: Status of SELF-TEST results

## COLOR PRINTER STOW

- Printer
1. Printer pwr – off (press pwr button once)  
√Printer It – 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. Verify PGSCs powered from same pwr outlet as Color Printer are shutdown
  4. AC UTIL PWR – OFF
  5. Disconnect AC PWR cable from AC Util Pwr outlet, if reqd
  6. Remove paper from Paper Feeder Tray and stow it
- Printer
7. Remove Paper Feeder Tray from Printer (disconnect via thumbscrews)
  8. Remove Paper Output Tray from Printer (disconnect via thumbscrews)
  9. Disconnect AC PWR cable from Printer
  10. If Printer set up as Network Printer:  
Disconnect network cable, T-connector from Printer Network Port (see figure 12-14) |  
If Printer set up as Local Printer:  
Disconnect parallel cable between Printer Parallel Port and KFX PGSC Parallel Port (see figure 12-14) |
  11. 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' from Windows taskbar
  2. Sel 'Settings'
  3. Sel 'Printers'
  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 'Main' tab
  8. Verify 'Automatic' selected (●)
  9. Sel 'OK' to exit

## COLOR PRINTER PAPER JAM

- Printer
1. Printer pwr – off (press pwr button once)
  2. ✓Printer It – off
  3. ✓Paper Feeder Tray clear of obstruction  
✓Paper Output Tray clear of obstruction
  4. Raise Printer cover (see figure 12-13) |  
✓Inside of Printer clear from obstruction
  5. If paper jam cleared, perform COLOR PRINTER  
WARMUP AND SELF-TEST, 12-49, then: |
  6. If paper jam continues, notify MCC
  7. If reqd, go to COLOR PRINTER STOW, 12-50 |

## 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

- Printer
1. ✓Printer ready (notice steady green pwr light)
  2. Raise Printer cover (see figure 12-13)

### 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

- Printer
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, 12-49, 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, 12-52

### NOTE

Perform following steps from PGSC connected to Printer via parallel cable or networked to Printer

- PGSC
3. Sel 'Start' from Windows taskbar
  4. Sel 'Settings'
  5. Sel 'Printers'
  6. Right-click appropriate printer icon:  
Parallel: Local Color Printer  
Network: Network Color Printer
  7. Verify 'Set as default' selected (✓)
  8. Sel 'Properties'
  9. Sel 'Utility' tab
  10. Sel 'Head Cleaning'  
Sel 'Next'
  11. Sel 'Black', 'Color', or 'Both'  
Sel 'Next'
  12. When cleaning complete (~5 min), sel 'Nozzle Check'  
If test still missing sections, repeat steps 10 and 11
  13. If nozzle test nominal, click 'OK' to exit

## 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, 12-52
  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' from Windows taskbar  
Sel 'Settings'  
Sel 'Printers'
  5. Right-click appropriate printer icon:  
Parallel: Local Color Printer  
Network: Network Color Printer
  6. Verify 'Set as default' selected (✓)  
Sel 'Properties'
  7. Sel 'Utility' 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

┌ | | | ┌

## EXECUTE PACKAGE PRINTING

### NOTE

Perform following procedure(s) if instructed by MCC. Perform from PGSC connected to Printer via parallel cable or networked to Printer

### DOCUMENTS

PGSC Double-click 'Shuttle Apps'>'Color Printer'>'DOCS Printing'

### PICTURES

Double-click 'Shuttle Apps'>'Color Printer'>'PICS Printing'

## PILOT WITH RHC

### NOTE

It is assumed PGSC (with STS load)  
set up without Expansion Unit

#### A. EQUIPMENT SETUP

1. Unstow:

PILOT HC  
PILOT Y-Cable  
Elastic Strap (1)  
Tie-wraps (2)

- 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
- PGSC
4. Shut down Windows
- PWR SPLY
5. DC PWR SPLY PWR sw1 – off
- F1
6. DC UTIL PWR – OFF (utility outlet for PGSC)
- PGSC
7. If present, disconnect any cable from PGSC RS-232 port and secure
8. Disconnect DC PWR SPLY cable from PGSC pwr port
- PILOT HC
9. PILOT HC pwr – OFF (down posn)

Cont next page

- |                  |   |
|------------------|---|
| PILOT<br>Y-Cable | 10. Connect PILOT Y-Cable to PGSC RS-232 port<br>Connect PILOT Y-Cable to PGSC pwr port<br>Connect PILOT Y-Cable to PILOT HC (see figure 12-15) |
|                  | 11. Connect DC PWR SPLY cable to PILOT HC   |

NOTE

Adjust elastic strap to not press screen suspend sw (small vertical button by left hinge) or else screen will blank

- |          |   |
|----------|---|
| PGSC     | 12. 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 |
| F1       | 13. DC UTIL PWR – ON (utility outlet for PGSC)  |
| PWR SPLY | 14. DC PWR SPLY PWR sw1 – ON  |

B. PILOT OPERATION WITH RHC

- |          |   |
|----------|---|
| PGSC     | 1. PGSC pwr – on  |
| PILOT HC | 2. PILOT HC pwr – ON (up position)  |
| PGSC     | 3. Double-click 'Shuttle Apps'> 'PILOT w/RHC'<br>Agree to quit all Windows Apps |
|          | 4. Follow instructions for HC calibration<br>(after ~30 sec)                    |
|          | 5. Menu Selection Values:<br>Modify as desired<br>'Enter' twice to run sim      |

Cont next page



6. 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
7. Post Simulation
  - [space bar] – cycles through data to main menu
  - 'b' – cycles back through post run data
8. Terminate PILOT
  - Enter 'q' to quit (returns to Windows)

PILOT HC 9. PILOT HC pwr – OFF (down posn)

NOTE

PGSC will function with HC off. If cable config changed, all pwr must be off

C. PILOT DISCONNECT and STOWAGE

- |               |  |
|---------------|--|
| PILOT HC      | 1. Confirm PILOT HC pwr – OFF (down posn)  |
| PGSC          | 2. Shut down Windows   |
| PWR SPLY      | 3. DC PWR SPLY PWR sw1 – OFF   |
| F1            | 4. DC UTIL PWR – OFF (utility outlet for PGSC)                                       |
| PILOT Y-Cable | 5. Disconnect cables from PGSC and HC (remove PGSC from behind elastic if necessary) |

CAUTION

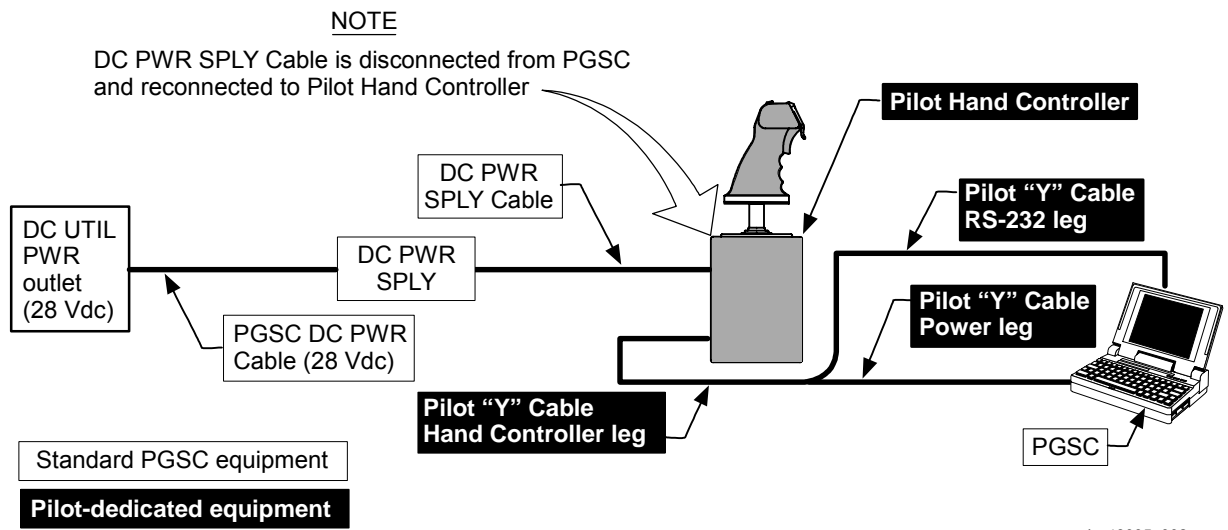
When pushing buckle lever to release, keep thumb clear from underneath (pinch hazard)

Cont next page

- PILOT HC
  - 6. Unsecure HC, press buckle on top strap, loosen strap, repeat for bottom strap
  - 7. Stow PILOT HC and Y-Cable in original locker
  - 8. Cut loose tie-wraps and elastic strap from window and secure after final on-orbit PILOT session
- PGSC
  - 9. Reconfigure PGSC as desired

D. TROUBLESHOOTING

- 1. If HC appears to have bias, calibrate HC at main menu – enter 'c', follow onscreen instructions
- 2. If DOS prompt appears (sometimes after bad sim crash), enter 'win' to restart Windows
- 3. If program hangs:
  - Enter [CTRL]/[C] to get to DOS prompt, once at prompt, restart Windows (step 2), restart PILOT normally
  - If [CTRL]/[C] does not work, force Windows restart with [CTRL]/[ALT]/[DELETE] simo



jsc48035\_002a.cnv

Figure 12-15.- Pilot with RHC setup diagram.

## PILOT WITHOUT RHC

### NOTE

No PILOT equipment reqd,  
only PGSC with STS load

- PGSC A. PILOT OPERATION WITHOUT RHC
1. Double-click 'Shuttle Apps' > 'PILOT w/out RHC'  
Agree to quit all Windows Apps

2. 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

3. 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
4. Post Simulation
  - [space bar] – cycles thru data to main menu
  - 'b' – cycles back thru post run data
5. Terminate PILOT  
Enter 'q' to quit (returns to Windows)

B. TROUBLESHOOTING

1. If DOS prompt appears (sometimes after bad sim crash), enter 'win' to restart Windows

Cont next page

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2. If program hangs:

Enter [CTRL]/[C] to get to DOS prompt, once at prompt, restart Windows (step 1), restart PILOT normally

If [CTRL]/[C] does not work, force Windows restart with [CTRL]/[ALT]/[DELETE] simo

## UPDATING SpOC APPLICATIONS USING OCA DATA DISKETTE (ODD)

### NOTE

Procedure assumes KFX application run from KFX PGSC during OCA ops. Crew not reqd to perform following procedure for PGSC(s) networked to OCA Router PGSC during OCA ops.

MCC ground personnel automatically update SpOC applications on PGSC(s) on STS network during OCA ops

- PGSC
1. If OCA Data Diskette (ODD) was not in KFX PGSC floppy drive during OCA ops:  
Retrieve ODD from FDF  
Insert ODD into KFX PGSCs external floppy drive  
Copy all files under C:\OCA-UP\SPOC\UPLINK to A:\UPLINK
  2. Insert ODD into PGSC requiring updates to SpOC applications
  3. Double-click 'Shuttle Apps'>'Floppy Update'
  4. At 'Floppy Update' dialog box, sel 'OK'
  5. At 'Floppy Update Status' dialog box, verify no errors generated  
If errors generated, contact MCC >>
  6. If asked to view complete update status:  
Sel 'Yes' or 'No'  
Go to step 7  
  
Sel 'OK'
  7. Remove ODD, repeat steps 2 thru 6 for other PGSCs as needed
  8. Reinsert ODD into KFX PGSCs external floppy drive

## PGSC HARD DISK SWAP

- PGSC
1. If running Windows NT (OCA Router software) on OCA Router PGSC:  
Press [CNTL]/[ALT]/[DEL]  
Sel 'Shut Down' at 'Logon Information' dialog box  
Sel 'OK'  
When prompted:  
PGSC pwr – off  
Go to step 3
  2. Shut down Windows  
√Automatic pwr off of PGSC
  3. Open PGSC monitor to 180°  
Slide two side latches back and hold latches in back posn  
Open Keyboard
- CAUTION**  
Some components under Keyboard  
contain sharp edges
4. Remove hard disk (right component):  
Pull plastic tape to expose hard disk drive handle  
Slide thumbs under handle  
Lift to remove
  5. Insert new hard disk:  
Press only on shaded area until it snaps into connector  
Push hard disk drive handle under lip  
Stow old hard disk drive in carrying case
  6. Close keyboard
  7. PGSC pwr – on
  8. If PGSC intended for use on STS network,  
go to PGSC NETWORK, D. PGSC NAMING,  
12-34

## **PGSC SWAP ON EXPANSION UNIT**

- PGSC1
1. Shut down Windows  
√Automatic pwr off of PGSC
  2. Close PGSC monitor
  3. Firmly turn security key to 'eject' position until PGSC slides away from Expansion Unit
  4. Remove, stow PGSC
- PGSC2
5. √Sliding door of PGSC Sys Expansion connector – op
  6. Slide PGSC onto Expansion Unit
  7. Push PGSC back, connecting PGSC Sys Expansion connector to Expansion Unit connector
  8. √Connection secure
  9. Security key – locked
  10. PGSC pwr – on



## PGSC DEACT

- PGSC
- √Floppy disk drive – empty  
Stow floppy disk(s) in originating locker
  - If running Windows NT (OCA Router software) on  
OCA Router PGSC:  
Press [CNTL]/[ALT]/[DEL]  
Sel 'Shut Down' at 'Logon Information'  
dialog box  
Sel 'OK'  
When prompted:  
PGSC pwr – off  
Go to step 6
  - Close any running applications  
Shut down Windows
- √Automatic pwr off of PGSC  
If no Expansion Unit attached:
- PWR SPLY  
F1  
(MO13Q,  
A11,A15,  
MO30F,  
O19,L12,  
MO52J,  
ML85E)
- DC PWR SPLY PWR sw1 – OFF (lt off)
  - UTIL PWR – OFF
- If Expansion Unit attached:
- F1  
(MO13Q,  
A15,  
MO52J,  
ML85E)
- AC UTIL PWR – OFF
- Disconnect cables
  - Stow PGSC assembly, PGSC accessories

## 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]

Cont next page

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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]

Cont next page

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]

Cont next page

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]

## WORLD MAP 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]
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 border on/off	[CTRL]/[B]
Toggle caption on/off	[CTRL]/[A]
Turn on all window decorations	[CTRL]/[W]
Save WorldMap configuration	[CTRL]/[S]
Exit application	[ALT]/[F4]

## 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

S/V           /      :      :       
          DAY HR MIN SEC

1. If OPS 2:  
   SPEC 34

X( )                                        

2. If OPS 3:  
   GNC 0 GPC MEMORY  
   ITEM 26 + 2 1 0 EXEC

Y( )                                        

Z( )                                        

X	BC56	VX	BC62
Y	BC5A	VY	BC66
Z	BC5E	VZ	BC6A

VX( )                                        

VY( )                                        

VZ( )                                        

### NOTE

Default for PGSC SpOC applications is set to accept state vector data in ft (position) and ft/sec (velocity). When entering GPC display data into SpOC application, ensure SpOC application is configured to accept default units of ft and ft/sec

S/V           /      :      :       
          DAY HR MIN SEC

S/V           /      :      :       
          DAY HR MIN SEC

X( )                                        

X( )                                        

Y( )                                        

Y( )                                        

Z( )                                        

Z( )                                        

VX( )                                        

VX( )                                        

VY( )                                        

VY( )                                        

VZ( )                                        

VZ( )

## RELOAD STS 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, sel '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 PGSC intended for use on STS network:  
Go to PGSC NETWORK, D. PGSC NAMING, 12-34



## RECONFIGURE OCA/KFX FOR KU CHANNEL 3(2)

### NOTE

MCC will configure ground for OCA via  
Ku channel 3(2)

- PDIP      1. Ku BAND RATE – HI(LO)
- OCA      2. On 'Local OCA Card-1' window:  
Router    If changing to Ku Ch 3:  
            Sel 'Control'>'Transmit Rate'>'4 Mbps OCA  
                    Internal clock (Shuttle Ku channel 3)  
            If changing to Ku Ch 2:  
            Sel 'Control'>'Transmit Rate'>'2 Mbps OCA  
                    Internal clock (Shuttle Ku channel 2)
3. If reqd, config router bootup rate:  
                a. Open 'Change Transmit Rate' folder on  
                    desktop  
                b. If changing to Ku Ch 3:  
                    Double click 'Boot Up 4 Mbps' file  
                    If changing to Ku Ch 2:  
                    Double click 'Boot Up 2 Mbps' file  
                c. Acknowledge message dialog
- KFX      4. On "KFX" window:  
PGSC      Sel 'View'>'Options'  
(typically    Sel 'Network' tab  
Proshare    Change 'Maximum Xmit rate' to 4000(2000)  
PGSC)      Click 'OK'  
            Click 'Yes' in response to "Restart KFX ?" dialog

## UMBILICAL WELL TPS CAMERA IMAGERY DOWNLOADING

1. √MCC that camera is powered and ready
2. Unstow:
  - A31p laptop (SEG33115360-303) (as reqd)
  - DC pwr supply, 28VDC (SEG33116428-301) (as reqd)
  - PGSC network h/w: Ethernet card/adaptor assy, terminator (as reqd)
  - 1394 Converter (SED33117251-301)
  - IEEE 1394 Crew Cabin cable (SED33113436-303)
  - IEEE 1394 cable assy (firewire) (SEZ33112995-303)

A16  
(DTV bag)

If PGSC not already configured for power:

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
6. Configure hardware per figure 12-16 below:

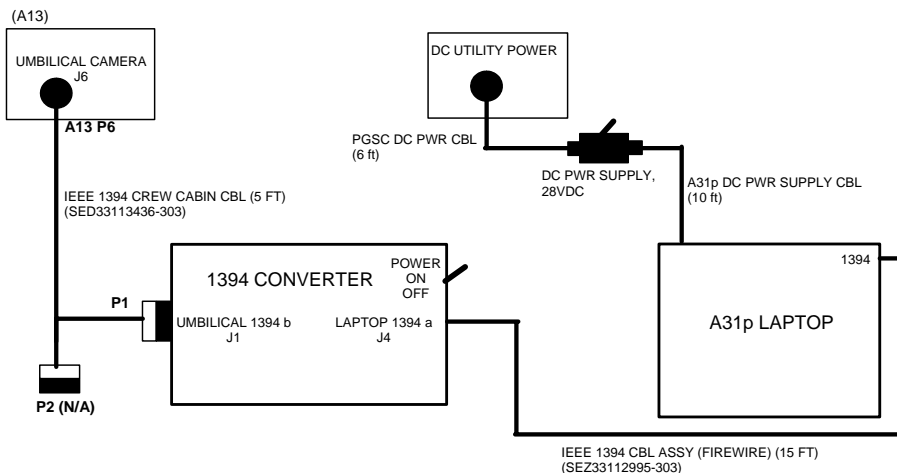


Figure 12-16.- Hardware configuration.

Cont next page

If PGSC not already configured for power:

7. DC UTIL PWR – ON

PWR SPLY 8. DC PWR SPLY PWR sw1 – ON (It on)

PGSC 9. √PGSC pwr – off

NOTE

The 1394 CONV must be powered on first before PGSC boots to Windows

CONV 10. PWR sw – ON (It on)

If no It,

Replace batts (batt life – 4 hr)

If PGSC not already networked:

PGSC 11. Configure PCMCIA Ethernet card, T-connector, Ethernet cable, terminator (if reqd) to add PGSC to network

12. Insert Ethernet card into PCMCIA card slot of PGSC

13. PGSC pwr – on

If 'Found New Hardware Wizard' appears:

Sel 'Next'

Sel 'Search for a suitable driver for my device (recommended)'

Sel 'Next'

Sel 'Specify a location'

Sel 'Next'

Sel 'Browse' button

Sel 'C:\Program Files\Kodak\KODAK DCS Camera Manager\DCS Camera Drivers\ProDriver' directory

Sel 'Open'

Sel 'OK'

Sel 'Next'

Sel 'Finish'

14. √'PCMCIA card' icon appears in system tray of PGSC

15. Double-click 'Shuttle Apps'>'KODAK DCS Camera'>'KODAK DCS Camera Manager' ("KODAK Professional DCS Camera Manager" box displayed)
16. ✓'Camera Folders' tab selected
17. ✓'CARD1/FOLDER01' selected (red), note image qty shown in "( )", expect approx 30
18. Under 'Copy to Computer':
  - ✓No boxes selected (**DO NOT** delete files)
  - Sel 'Copy...'
19. Under 'Copy To':
  - Sel 'C:\oca-down\dcs\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)
20. When "Saving Files" completed, go to "My Computer: C:\oca-down\dcs\umbilical", ✓ object qty matches "CARD1\FOLDER01" qty  
If not, ✓MCC
21. Sel 'X(Close)' to return to desktop
- CONV 22. PWR sw – OFF (It off)
23. Stow Converter box,cables

NOTE

MCC will downlink images as soon as practical

## RELOAD A31p PGSC

### OBJECTIVE:

This contingency procedure is used to reload the Windows hard drive in the A31p PGSC using A31p Reload CDs (1 of 2 and 2 of 2) located in FDF CD Kit

- A31P  
PGSC
1. Shutdown PGSC
  2. PGSC pwr – on (sel [F12] when “Press F12 to choose Temporary boot device” message appears)
  3. √Boot Menu appears
  4. Insert A31p Reload CD 1 of 2 into CD-ROM drive
  5. Sel ‘CD-ROM drive’ (option #3) from boot menu and press Enter
  6. When prompted to overwrite hard drive, enter ‘y’ to start reload software
  7. When “Span Volume [1] Done...” dialog box appears, insert A31p Reload CD 2 of 2 into CD-ROM drive
  8. Enter ‘OK’ to continue loading
  9. After completion of loading, follow instructions on screen to remove CD and reboot PGSC
  10. If reloading Windows hard drive in LCC PGSC:

### NOTE

This sequence of messages will appear twice

- a. Within 5 sec, sel any key at ‘Timer’ window to disable timer
- b. Sel ‘PGSC - Windows’ at ‘OSL2000’ window
- c. Press Enter to continue
- d. Repeat steps a thru c then continue to step 11

Cont next page

11. Allow computer to proceed through mini-setup (the computer will reboot automatically after this stage is completed)
12. Sel 'Next' from Network Identification Wizard window
13. From Network Identification Wizard / "Users of This Computer" window; perform the following:
  - a. Verify radio button for 'Windows always assumes the following user has logged onto this computer:' is selected
  - b. Verify user name is PGSCx
  - c. Verify password field is blank
  - d. Sel 'Next'
14. Sel 'Finish' from Completing the Network Identification Wizard window
15. If PGSC intended for use on STS network as a Windows PGSC:

NOTE

Do not install the RF LAN card or Ethernet card until PGSC NAMING is complete

For PGSC NAMING, go to PGSC NETWORK, D. PGSC NAMING, 12-34

16. If PGSC intended for use as LCC PGSC, restart PGSC

## 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

- A31p
1. Exit all applications
  2. Perform shut down  
sel ► Start ► Shut Down ► Shut Down ► OK
  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 12-17. A31p Hard Drive is attached to Hard Drive cover

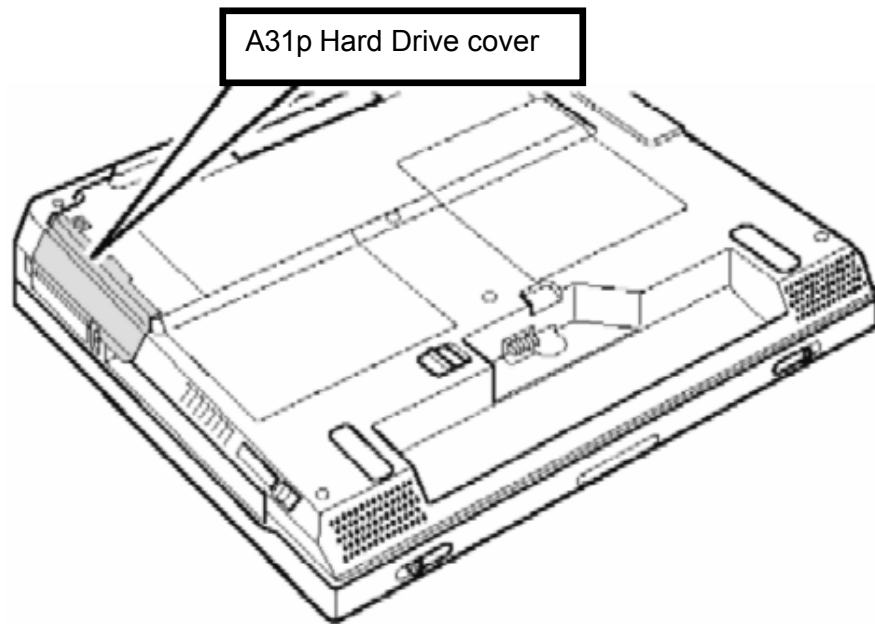


Figure 12-17.- A31p Hard Drive location.

7. Refer to figure 12-18 for removing A31p Hard Drive | Gently pull cover and A31p Hard Drive out from the A31p Laptop to remove from slot

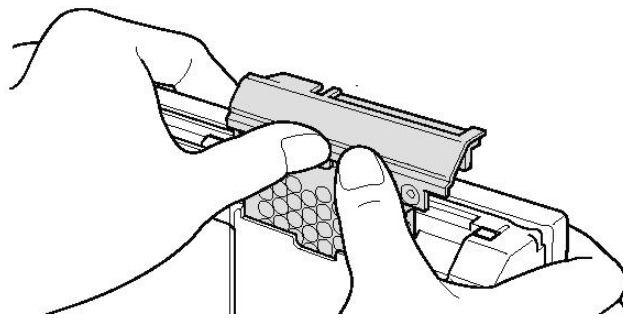


Figure 12-18.- A31p Hard Drive removal.



8. Remove cover from A31p Hard Drive (refer to figure 12-19)

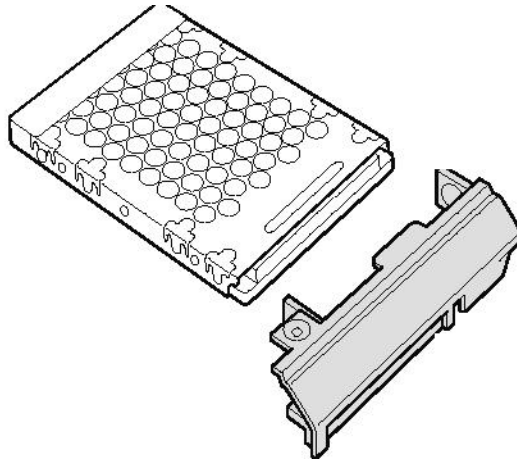


Figure 12-19.- A31p Hard Drive cover removal.

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 PGSC is intended for use on STS network, go to  
PGSC NETWORK, D. PGSC NAMING, 12-34
14. 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 ► Shut Down ► Shut down ► OK
4. √PGSC shut down complete

### NOTE

Refer to figure 12-20 for switch and lever locations

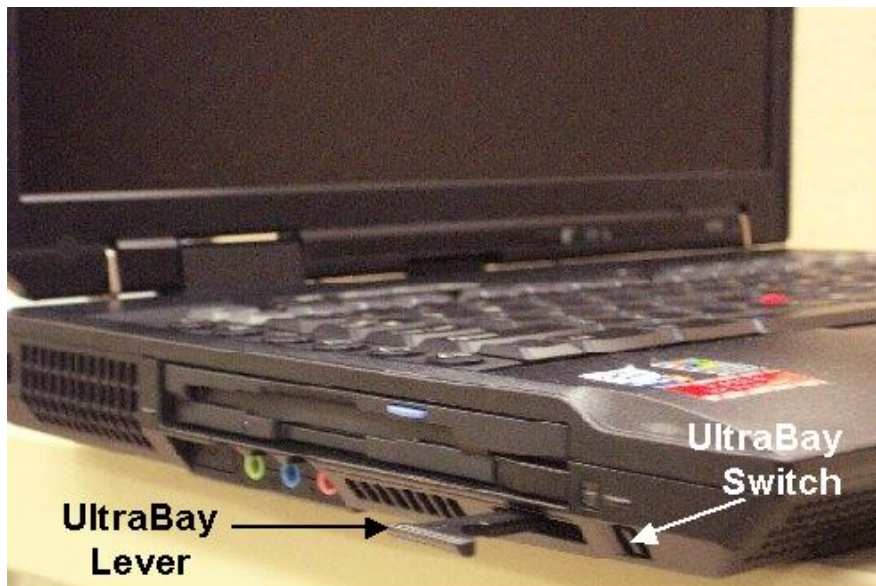


Figure 12-20.- Ultrabay location in A31p Laptop.

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:

Ultrabay Adapter

**CAUTION**  
A31p Hard Drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data

- a. Raise black security latch (refer to figure 12-21)

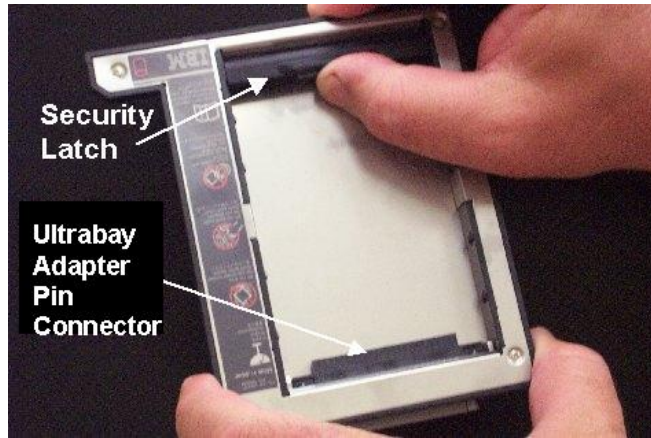


Figure 12-21.- A31p Ultrabay Adapter.

- 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 12-22)



Figure 12-22.- Inserting device into 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 12-23)



Figure 12-23.- A31p Ultrabay Adapter and A31p Hard Drive final configuration.

- f. ✓ Black security latch does not protrude from A31p Ultrabay Adapter

- A31p
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 spare A31p Hard Drive and if PGSC is intended for use on STS network, go to PGSC NETWORK, D. PGSC NAMING, 12-34
  13. Report procedure complete to MCC





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## DEORBIT MANAGER INITIALIZATION

- PGSC
1. Double-click 'Shuttle Apps'>'Deorbit Manager'
  2. Sel 'Update'>'Shuttle State Vector' menu option  
If reqd, update state vector info using data from  
SPEC 34 display or WinDecom  
Sel 'Apply'  
Sel 'Exit' at 'Update Shuttle Vector' display
  3. Sel 'Update'>'GMT or Launch Time Values' menu  
option  
If reqd, update MET  
Sel 'Apply'  
Sel 'Exit' at 'Update Time Values' display
  4. 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
  5. Sel 'Mass Properties'>'Cargo Status' menu option  
If reqd, update cargo status  
Sel 'OK' at 'Cargo Status' display
  6. If cabin leak:
    - \* Sel 'Cabin Leak Filter' checkbox \*
    - \* When Cabin Leak application displayed, \*
    - \* update cabin leak data as reqd \*
    - \* Minimize Cabin Leak application \*
  7. In Deorbit Opportunities Table, sel desired landing  
site and sel 'Target' button or double-click desired  
landing site
  8. Sel 'Mnvr PAD' button to view/copy Deorbit  
Maneuver PAD for selected landing site

- 
- 
9. When finished viewing Mnv PAD, sel 'Close' at 'Deorbit Maneuver PAD' display
  10. Repeat steps 7 thru 9 to view Mnv PAD for other landing site as needed
  11. Exit application as needed



COMPOUND 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  
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**CSA-CP**

**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 Kit
- CSA-CP Kit 2. Unstow:  
CSA-CP/Sampling Pump  
Zero Filter
- 3. Sampling Pump sw – ON

NOTE

MODE pb (black) located between two red alarm lights.

Audible beeps occur when MODE pb depressed during unit activation

- 4. 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

- 5. √Display indicates readings for CO, HCN, HCL and record values in DATA RECORDING TABLE, 13-16

Cont next page

6. Sampling Pump sw – OFF
7. If any reading higher than listed values below, proceed to step 8 for sensor rezeroing:
  - CO ≤ 4 ppm
  - HCL ≤ 0.4 ppm
  - HCN ≤ 0.4 ppmIf readings less than or equal to listed values, go to step 22
8. Unscrew, remove Sampling Pump Inlet (blue) Filter; temp stow
9. Unscrew tethered end caps on Zero Filter

NOTE

Pump inlet fitting has outside  
and inside threads

10. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug (arrow on Zero Filter should point toward Sampling Pump)
11. Sampling Pump sw – ON
12. After 2 min, press MODE pb (11 times) until 'GO CAL' displayed at top
13. 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 12
14. Press "+" button
  - √'ZERO' displayed at top
15. Press "E" button, verify 'ZEROING' displayed
  - Wait 15 sec
  - √'ZERO' displayed at top

Cont next page

16. Press MODE pb once  
After 15 sec, verify nominal display  
(gas concentrations)
17. ✓ Display readings for CO, HCN, HCL less than  
or equal to values below  
If readings higher than values below, notify MCC:  
CO ≤ 4 ppm  
HCL ≤ 0.4 ppm  
HCN ≤ 0.4 ppm
18. Sampling Pump sw – OFF
19. Remove Zero Filter from Sampling Pump inlet  
Replace tethered endcaps and tighten finger tight
- CSA-CP Kit 20. Stow Zero Filter

NOTE

Damage to O-ring can occur if overtightened

21. 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

22. Deactivate CSA-CP  
Press, hold 'MODE' pb until 'RELEASE' displayed
23. Temp stow:  
CSA-CP/Sampling Pump at crew-selected  
location. Call MCC with location
24. Stow CSA-CP Kit

## PASSIVE SAMPLING WITH DATA LOGGING

1. Unstow from temp:  
CSA-CP/Sampling Pump
2. Demate CSA-CP from Sampling Pump
3. Temp stow:  
Sampling Pump

### 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

6. Transfer CSA-CP to desired location

### NOTE

After activating/deactivating logger, nominal display (gas concentrations) returns in ~10 sec

7. 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

Cont next page

8. Conduct sampling session
9. Record value  
Notify MCC of results
10. Press, hold MODE pb until 'RELEASE' displayed  
√Unit off
11. Unstow from temp:  
Sampling Pump

NOTE

CSA-CP should be oriented with display  
visible when facing front panel of  
sampling pump

12. Mate CSA-CP to Sampling Pump. Slide CSA-CP  
into sampling pump bracket as far forward  
(toward inlet) as possible. Tighten Velcro straps
13. Temp stow:  
CSA-CP/Sampling Pump

## ACTIVE SAMPLING WITH PUMP AND DATA LOGGING

1. Unstow from temp:  
CSA-CP/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

### NOTE

When activated, there is an audible beep, fault LED illuminates momentarily, and pwr LED stays illuminated

4. Sampling Pump sw – ON
5. Transfer active sampling assembly to desired location

### NOTE

After activating/deactivating logger, nominal display (gas concentrations) returns in ~10 sec

6. 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

Cont next page

13-7 ORB OPS/ALL/GEN K,10

7. Conduct active sampling session  
Record values  
Notify MCC of results
8. At end of active sampling, press, hold MODE pb  
until 'RELEASE' displayed  
√Unit off
9. Sampling Pump sw – OFF
10. Temp stow:  
CSA-CP/Sampling Pump



## CSA-CP BATTERY CHANGEOUT

1. If CSA-CP/Sampling Pump active:
  - Sampling Pump sw – OFF
  - Press, hold MODE pb until 'RELEASE' displayed
  - √CSA-CP off
  - If not active, go to step 2
2. Demate CSA-CP from Sampling Pump
- CSA-CP Kit 3. Unstow:
  - Batt Pack, 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" with marker
- CSA-CP Kit 7. Stow:
  - Used Batt Pack
8. Install replacement Batt Pack, press firmly to seat electrodes
9. Replace panel, press firmly, turn fasteners (two) 1/4 turn cw to lock

### NOTE

CSA-CP should be oriented with display visible when facing front panel of sampling pump

10. Mate CSA-CP to Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps

Cont next page

11. If contingency, activate CSA-CP/Sampling

Pump:

Press, hold MODE pb until 'RELEASE'  
displayed

√CSA-CP on

Sampling Pump sw – ON

If not contingency, temp stow CSA-CP/Sampling  
Pump

12. Stow:

CSA-CP Kit

## SAMPLING PUMP BATTERY CHANGEOUT

- IFM Kit 1. Unstow:  
Small Flathead Screwdriver  
Marker
- CSA-CP Kit 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" with marker
7. Install replacement Batt Pack, press firmly to seat electrodes
8. Replace cover plate, turn screw cw until tight
- IFM Kit 9. Stow:  
Screwdriver
- CSA-CP Kit 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:  
CSA-CP Kit
2. Unstow from temp:  
CSA-CP/Sampling Pump  
Unstow from CSA-CP Kit:  
Zero Filter

### NOTE

Audible beeps occur when MODE pb depressed during unit activation

3. 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

4. √Display indicates readings for CO, HCN, HCL
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 passive operation of CSA-CP desired, then:
  - Demate CSA-CP from Sampling Pump
  - If active sampling desired, use as configured
- 18. Stow Zero Filter in CSA-CP Kit
  - Temp 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**

MET	LOCATION	DATA READINGS	REMARKS
___/___:___		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

SHUTTLE  
AUD DOS

## 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  $\geq 99$  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

## 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  $\geq 99$  dB or if Dosimeter has been on  $\geq 20$  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

CUE CARD  
CONFIG

CUE CARD CONFIGURATION

FAB USE ONLY

15-1

ORB OPS/ALL/GEN K

CUE CARD  
CONFIG

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FAB USE ONLY

15-2

ORB OPS/ALL/GEN K

TOP

**WCCS COMM PLAN**

CREW/CHNL	WALL UNIT	A/G1	A/G2	A/A	ICOM A	ICOM B
_____/A1 _____/A2	A	_____	_____	_____	_____	_____
_____/B1 _____/B2	B	_____	_____	_____	_____	_____
_____/C1 _____/C2	C	_____	_____	_____	_____	_____
_____/D1 _____/D2	D	_____	_____	_____	_____	_____
_____/E1 _____/E2	E	_____	_____	_____	_____	_____

ORB OPS-1a/O/B

(reduced copy)

FAB USE ONLY

CC 15-3

ORB OPS/ALL/GEN K



TOP  
BACK OF 'WCCS COMM PLAN'



HOOK  
VELCRO



ORB OPS-1b/O/B

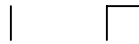


(reduced copy)

FAB USE ONLY

CC 15-4

ORB OPS/ALL/GEN K





FAB USE ONLY

CC 15-5

ORB OPS/ALL/GEN K,5

(reduced copy)

TOP

HOOK  
VELCRO

HOOK  
VELCRO

NO	GNC SPEC	OPS		NO	SM OPS 2		
		2	8		SPEC	NO	SPEC
43	CONTROLLERS		X	88	APU/ENVIRON THERM	97	PL RETENTION
20	DAP CONFIG	X		86	APU/HYD	89	PRPLT THERMAL
1	DPS UTILITY	X	X	76	COMMUNICATIONS	60	SM TABLE MAINT
6	GPC/BUS STATUS	X	X	68	CRYO SYSTEM	2	TIME
0	GPC MEMORY	X	X	168	CRYO PALLET/CARGO		
21	IMU ALIGN	X		1	DPS UTILITY		
45	NWS		X	67	ELECTRIC		
34	ORBIT TGT	X		66	ENVIRONMENT		
23	RCS	X	X	77	EVA - MMU/FSS		
33	REL NAV	X		69	FUEL CELLS		
41	RG/ADTA/RCS		X	6	GPC/BUS STATUS		
25	RM ORBIT	X		0	GPC MEMORY		
40	SENSOR TEST		X	87	HYD THERMAL		
22	S TRK/COAS CNTL	X		85	MASS MEMORY R/W		
44	SWITCHES		X	62	PCMMU/PL COMM		
42	SWITCH/SURF		X	94	PDRS CONTROL		
2	TIME	X	X	95	PDRS OVERRIDE		
55	GPS STATUS	X	X	96	PDRS STATUS		
<b>ORBIT SPEC (R11)</b>				900-902	TEXT SPEC INDEX		

ORB OPS-2a/O/J

FAB USE ONLY

CC 15-6

ORB OPS/ALL/GEN K

(reduced copy)

TOP  
BACK OF 'ORBIT SPEC (R11)'

	0	1	2	3	4	5	6	7	8	9
00	TK1	TK1 HTR 1	FC1 O2	MNA	CABIN P	1	OX TK P	OX TK P	1 EGT	C He TK P
01	TK2	TK1 HTR 2	FC1 H2	MNB	O2 SYS 1 FLOW	2	FU TK P	FU TK P	2 EGT	L He TK P
02	TK3	TK2 HTR 1	FC2 O2	MNC	O2 SYS 2 FLOW	3	LEAK/TK P	ENG	3 EGT	R He TK P
03	TK4	TK2 HTR 2	FC2 H2	AC1	CABIN PPO2 A	4	OX TK P	OX TK P	1 OIL IN T	C He REG P
04	TK5	TK3 HTR 1	FC3 O2	AC2	CABIN PPO2 B	5	FU TK P	FU TK P	2 OIL IN T	L He REG P
05	TK1	TK3 HTR 2	FC3 H2	AC3	N2 SYS 1 FLOW	1	LEAK/TK P	ENG	3 OIL IN T	R He REG P
06	TK2	TK4 HTR 1	FC1	AC1	N2 SYS 2 FLOW	2	OX TK P	OMS TVC	APU 1	LO2 MANF P
07	TK3	TK4 HTR 2	FC2	AC2	CABIN FAN ?P	3	FU TK P	OX TK P	APU 2	LH2 MANF P
08	TK4	TK5 HTR 1	FC3	AC3	AV BAY 1 T	4	LEAK/TK P	OMS KIT	APU 3	
09	TK5	ADTA	FC1	RGV AA	AV BAY 2 T	5	RCS JET	PAYLOAD CAUTION	APU 1	SYS 1
10	L RHC	FCS SAT	FC2	IMU	AV BAY 3 T	1 OUT P	1 FLOW	1 EVAP OUT T	APU 2	SYS 2
11	R/AFT RHC	FCS CH BYPASS	FC3		CAB HX OUT T	2 OUT P	2 FLOW	2 EVAP OUT T	APU 3	SYS 3

ZIPTONED PARAM USED WHEN PUKIT INSTALLED     
 PARAM INH IF TANKS NOT INSTALLED     
 PARAM INH ON-ORBIT

ORB OPS-2b/O/E

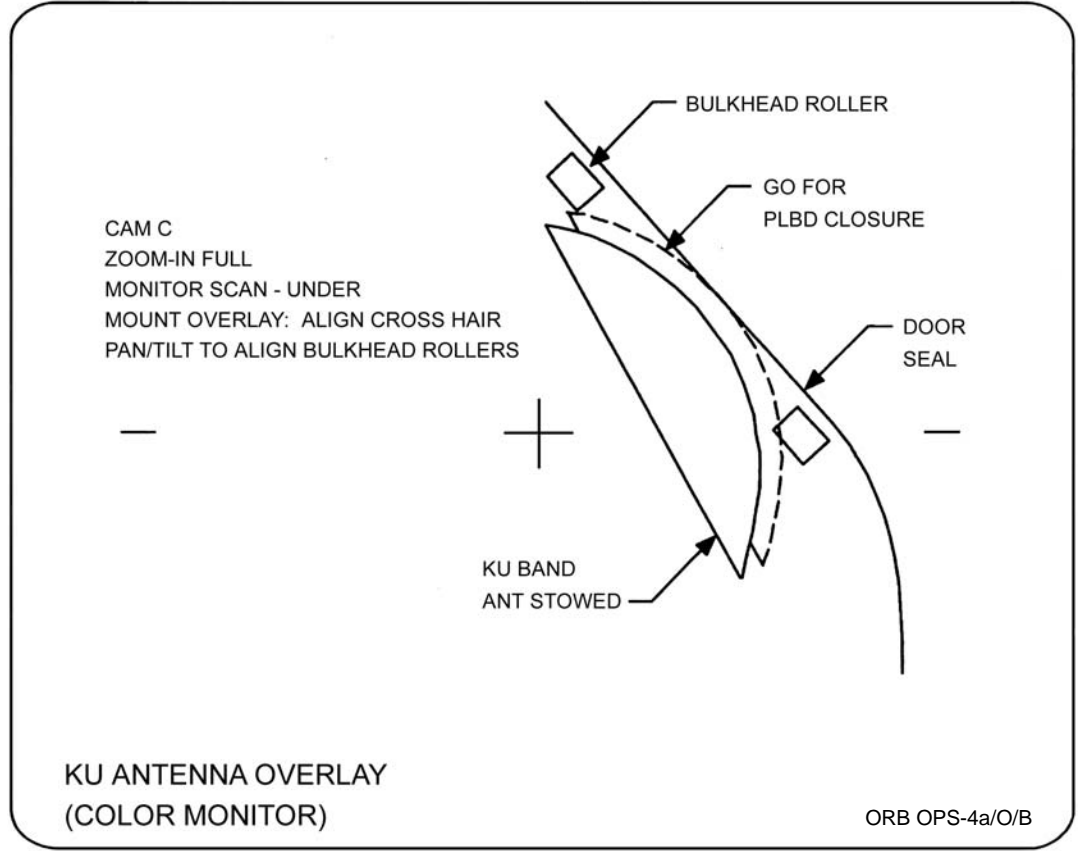
FAB USE ONLY

CC 15-7

ORB OPS/ALL/GEN K

(reduced copy)

Fabricate as a Transparency



(reduced copy)

**URINE COLLECTION (w/o UMS)**

- √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

NOTE

FAN SEP will run for ~30 sec after hose stowage

- Stow hose in cradle
- √WCS ON It – off

**URINE/FECES COLLECTION**

- √FAN SEP same as HOSE BLOCK
- √New bag in WCS Coffee Can
- MODE – COMMODE/MANUAL/EMU

NOTE

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

NOTE

No WCS Coffee Can airflow until slide vlv cl

- COMMODE CNTL – OFF (BACK/DN)
- Remove, clean, stow urinal funnel
- Clean seat as reqd
- Close WCS trash bag, place in WCS trash module
- Place new bag in WCS Coffee Can

NOTE

FAN SEP will run for ~30 sec after MODE – AUTO

- Stow hose in cradle
- MODE – AUTO
- √WCS ON It – off

NOTE

This Cue Card to fly for missions manifesting WCS w/o UMS

TOP

HOOK  
VELCRO

**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 (first or second 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 – ccw. 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)
- \* – FWD
- \* √WCS ON It – on
- \* Allow 5 min for commode contents to soften, then
- \* reattempt compaction. If no joy, attempt compaction
- \* 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

Stow tools

HOOK  
VELCRO

ORB OPS-5a/O/H

FAB USE ONLY

CC 15-9

ORB OPS/ALL/GEN K

(reduced copy)

TOP  
BACK OF 'URINE COLLECTION (w/o UMS)'

**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

HOOK  
VELCRO

**WCS CLEANING**

Urinal:

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

HOOK  
VELCRO

ORB OPS-5b/O/G

FAB USE ONLY

CC 15-10

ORB OPS/ALL/GEN K

(reduced copy)

**URINE COLLECTION (w/UMS)**

- Y-Vlv - WCS
- WCS/UMS sw - WCS
- Install urinal funnel
- √FAN SEP same as HOSE BLOCK
- √MODE - WCS/EMU (√airflow)
- Urinate
- Remove, clean, stow urinal funnel

**CAUTION**  
Allow FAN SEP to run for  
30 sec before proceeding

- WCS/UMS sw - UMS
- Y-Vlv - UMS

**URINE/FECES COLLECTION**

- Y-Vlv - WCS
- WCS/UMS sw - WCS
- Install urinal funnel
- √New bag in WCS trash can
- √FAN SEP same as HOSE BLOCK
- √MODE - WCS/EMU (√airflow)
- COMMODE CNTL - UP (wait 15 sec)
- FWD
- Ensure proper seal, restrain body
- Urinate/defecate
- √Transport tube

**NOTE**

No WCS Trash Can airflow until slide vlv cl

- COMMODE CNTL - OFF (BACK/DN)
- Remove, clean, stow urinal funnel
- Clean seat as reqd
- Seal WCS trash bag, place in WCS trash module
- Place new bag in WCS trash can

**CAUTION**  
Allow FAN SEP to run for  
30 sec before proceeding

- WCS/UMS sw - UMS
- Y-Vlv - UMS

**NOTE**

This Cue Card to fly for missions manifesting WCS, UMS

TOP

HOOK  
VELCRO

**WCS COMPACTOR OPS (DUAL-VANE)**

- Tools reqd: 1/4-in Torque Wrench
- 4-in Extension
- 1/4-in to 3/8-in Adapter
- Set Torque Wrench to 50 in-lb (first or second compaction)

MODE - OFF

**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, go to CONTINGENCY OPS

**SECOND COMPACTION**

Rotate Compactor crank - ccw. Stop when torque limit obtained. At completion of compaction, √net clear of transport tube. If torque limit reached while gauge in yellow region, go to CONTINGENCY OPS

- \* **CONTINGENCY OPS** (Vanes won't rotate or
- \* jammed vane)
- \* MODE - WCS/EMU (√airflow)
- \* COMMODE CNTL - UP (wait 20 sec)
- \* - FWD
- \* Allow 5 min for commode contents to soften,
- \* then reattempt compaction. If no joy, attempt
- \* compaction every 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 - DN
- \* MODE - OFF

Stow tools

HOOK  
VELCRO

ORB OPS-6a/O/I

FAB USE ONLY

CC 15-11

ORB OPS/ALL/GEN K

(reduced copy)

TOP  
BACK OF 'URINE COLLECTION (w/UMS)'

**UMS 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
- Place Apollo Bag in Outer Bag
- Remove Outer Bag Internal Seal Cover
- Force gas out and seal
- Stow Apollo Bag in commode or wet trash
- Stow UCD in wet trash

**FAN SEP FAILURE**

CAUTION

Do not run both FAN SEPARATORS  
at same time

If low or no airflow in WCS:  
MODE – 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)  
MODE – WCS/EMU (√airflow)

If airflow still low or if no airflow, √MCC

HOOK  
VELCRO

**WCS CLEANING**

Urinal:

- Inspect/replace prefilter (once/day or as reqd)
- Discard old prefilter in WCS dry trash
- Disconn Y-Vlv w/bracket and stem hose
- Inspect/replace urinal Hose Screen
- Reconn Y-Vlv w/bracket and stem hose to WCS

Commode:

- Use Sanitation Agent/Dry Wipes to clean seat and  
transport tube above gate vlv
- Discard in WCS trash module

HOOK  
VELCRO

ORB OPS-6b/O/H

(reduced copy)

**EDO WCS URINE COLLECTION**

- Unstow urinal hose
- √Airflow
- √URINAL READY It – on (5-15 sec)
- Install urinal funnel
- Urinate
- Remove, clean, and stow urinal funnel
- Stow urinal hose

**EDO WCS URINE/FECES COLLECTION**

- Unstow urinal hose
- √Airflow
- √URINAL READY It – on (5-15 sec)
- Install urinal funnel
- Open commode lid
  - √Fecal bag installed (gold dot UP)
  - √COMMODOE FAN – ON (audible 1-15 sec)
  - √All Its – off (except URINAL READY It)

- \* If COMMODOE FAULT It – on: \*
- \* Verify airflow (commode Fan 1 fault \*
- \* Controller has started Fan 2) \*
- \* Continue w/commode use \*
- \* If COMMODOE FAULT It – blinking: \*
- \* √MCC \*
- \* If SERVICE CANISTER It – on: \*
- \* Fecal Canister will need servicing soon \*
- \* Continue w/commode use \*
- \* If SERVICE CANISTER It – blinking: \*
- \* Go to EDO WCS FECAL CANISTER \*
- \* CHANGEOUT (Cue Card) \*

- Restrain body
- Urinate/defecate
- Remove, clean, and stow urinal funnel
- Stow urinal hose
- Clean seat as reqd
- Raise seat
- Insert fecal bag lid (tab up), √Lid seated

(Cont Next Column)

**NOTE**

This Cue Card to fly in place of current urine collection Cue Card for missions manifesting EDO WCS

TOP

HOOK  
VELCRO

**EDO WCS URINE/FECES COLLECTION (Cont)**

- Unlatch compactor and rotate to compact position,
- √Engaged in 3 slide brackets
- Latch compactor in place

- \* If compactor rotation impeded: \*
- \* √COMPACTOR ARM LOCK PIN – raised \*
- \* √COMPACTOR CLEANING LATCH \*
- \* PIN – engaged \*

- √READY TO COMPACT It – on
- COMPACT pb – push
- √READY TO COMPACT It – off (as compacting begins)
- on (as compacting ends)

- \* If Commode FAULT It – on: \*
- \* √MCC \*

- Unlatch compactor and rotate to stowed position
- Latch compactor in place
- √All Its – off
- Install new fecal bag (gold dot UP)
- Lower seat
- Close commode lid, √Seat lid latch – latched

**EDO WCS CLEANING**

- Urinal:
  - Inspect/replace urine screen (once/day or as reqd)
  - Discard old prefilter in AUX WET TRASH

- Commode:
  - Use Sanitation Agent/Dry Wipes to clean seat
  - Discard in AUX WET TRASH

HOOK  
VELCRO



(reduced copy)

TOP  
BACK OF 'EDO WCS URINE COLLECTION'

**EDO WCS FECAL CANISTER CHANGEOUT**

Commode lid – up  
Remove used canister:  
CANISTER HANDLE – loosen  
CANISTER – Rotate to position 4 (LOAD)  
– Remove  
Install CANISTER LID (snap in place on full used canister)  
Stow used canister

Install new canister:  
CANISTER – Align black mark w/arrow at position 4 (LOAD)  
– Insert into PLENUM  
– Rotate to position 3 (LOCK)  
CANISTER HANDLE – Tighten  
– Fold flat against canister  
RESET/TEST – CANISTER RESET  
√SERVICE CANISTER It – off  
Commode lid – cl

**EDO WCS SWITCH FUNCTION**

URINAL SEL sw – Selects which fan/separator will be in use when urinal ops controlled by EDO WCS controller automatically

WCS PWR SEL sw – AUTO 1(2) defines which power source used by controller. AUTO 1 is MNA. AUTO 2 is MNB

MAN 1(2) position turns on fan/separator 1(2) for manual ops (no fault lts). Commode Fan 1(2) will turn on as well

FAN PWR sw – AUTO position lets controller select commode Fan (#1 always first); will automatically switch to commode Fan 2 if commode fault detected. Fan 1(2) positions activate commode Fan 1(2) as desired

HOOK  
VELCRO

**EDO WCS URINE OR FECES COLLECTION  
MANUAL OVERRIDE PROCEDURE**

NOTE

These procedures assume all attempts at operating EDO WCS thru controller have failed. Select system 1 first; use system 2 if system 1 fails. Fault LEDs will not operate when in manual

Commode:

Close commode lid  
√URN DIV VLV – FAN SEP 1(2)  
WCS PWR SEL – MAN 1, OFF 2(OFF 1, MAN 2)  
√Commode Fan Start (audible)  
Raise commode lid  
√Airflow of commode  
Defecate  
Compact – Using MANUAL COMPACTION (Cue Card) procedures  
Close commode lid  
WCS PWR SEL – OFF 1, OFF 2  
Use this procedure for remainder of flight

Urinal:

URN DIV VLV – FAN SEP 1(2)  
WCS PWR SEL – MAN 1, OFF 2(OFF 1, MAN 2)  
√Urinal airflow  
Urinate  
Wait 30 sec (allows for full clearing of liquids), then:  
WCS PWR SEL – OFF 1, OFF 2  
Use this procedure for remainder of flight

**CONT WASTE COLLECTION – UCD/APOLLO BAG**

Unstow bags  
Complete urination in UCD  
Remove Apollo Bag Seal Cover  
Seal to buttocks and defecate  
Force gas out and seal  
Place Apollo Bag in Outer Bag  
Remove Outer Bag Internal Seal Cover  
Force gas out and seal  
Stow Apollo Bag in wet trash  
Stow UCD in wet trash

HOOK  
VELCRO

TOP

### EDO WCS MANUAL COMPACTION

#### WITH TOOLS

OBJECTIVE: Extend/retract Compactor Piston w/battery-powered Screwdriver or Robbins Wrench in event of compactor failure

TOOLS REQD: 1/4-in to 3/8-in Adapter  
Battery-powered Screwdriver or Robbins Wrench

1. Raise seat
2. Install Fecal Bag lid
3. Unlatch Compactor, rotate to compact position, latch in place
  - \* If Compactor rotation impeded: \*
  - \*   √COMPACTOR ARM LOCK PIN – raised \*
  - \*   √COMPACTOR CLEANING LATCH PIN – engaged \*
4. Rotate Manual Drive cw to extend Compactor Piston
5. Rotate Manual Drive ccw to retract Compactor Piston
6. Unlatch Compactor, rotate to stowed position, latch in place
7. Install new Fecal Bag
8. Lower seat
9. Close commode lid

#### BY HAND (No more than three times consecutively)

OBJECTIVE: Manually compact Fecal Bag in event of Compactor failure

TOOLS REQD: None

1. Raise seat
2. Install Fecal Bag lid
3. Push Fecal Bag and lid to bottom of Transport Tube
4. Install new Fecal Bag
5. Lower seat
6. Close commode lid

ORB OPS-8a/O/B

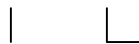
NOTE: This Cue Card to fly for missions manifesting EDO WCS

(reduced copy)

FAB USE ONLY

CC 15-14

ORB OPS/ALL/GEN K



TOP  
BACK OF 'EDO WCS MANUAL COMPACTION'



HOOK  
VELCRO



ORB OPS-8b/O/B



(reduced copy)

FAB USE ONLY

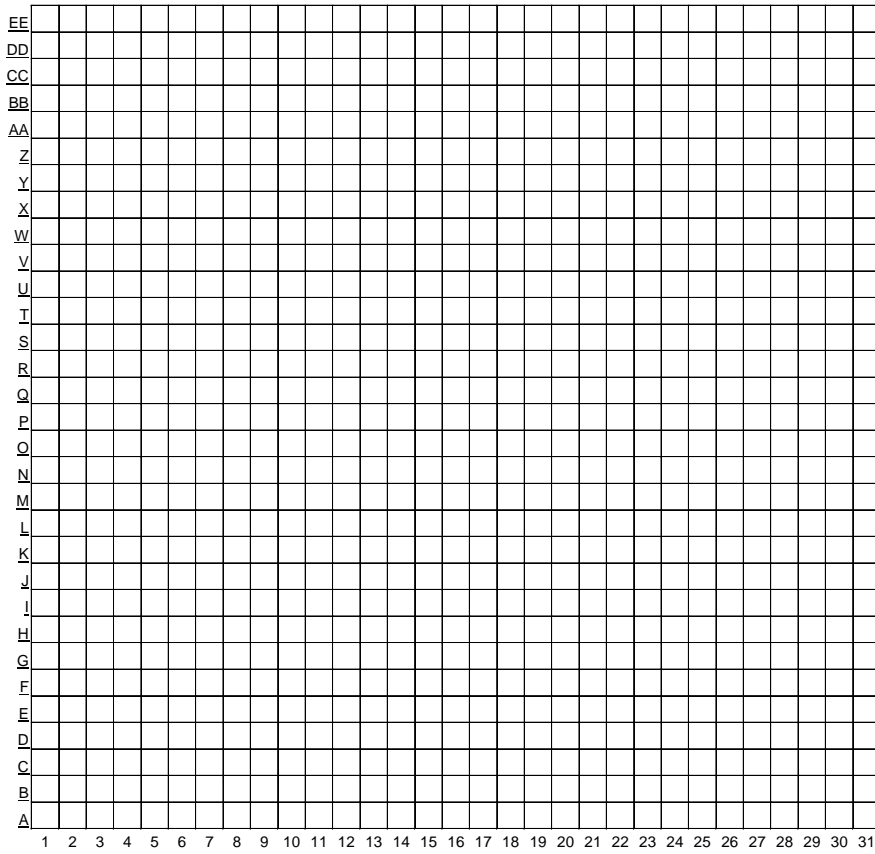
CC 15-15

ORB OPS/ALL/GEN K



Fabricate as a Transparency

PHOTO GRID OVERLAY



ORB OPS-9a/O/B

(reduced copy)

FAB USE ONLY

CC 15-16

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(5 Crewmembers/RED sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
LAUNCH	1	2	
POST BLUE FD2	3	"	
PRE BLUE FD2	"	4	
POST BLUE FD3	5 *	6	
PRE BLUE FD3	7	"	
POST BLUE FD4	"	8	
PRE BLUE FD4	9	"	
POST BLUE FD5	"	10	
PRE BLUE FD5	11	"	
POST BLUE FD6	12 *	13	
PRE BLUE FD6	14	"	
POST BLUE FD7	"	15	
PRE BLUE FD7	16	"	
POST BLUE FD8	"	17	
PRE BLUE FD8	18	"	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-11a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-17

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (5 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST BLUE FD9	19 *	20	
PRE BLUE FD9	21	"	
POST BLUE FD10	"	22	
PRE BLUE FD10	23	"	
POST BLUE FD11	"	24	
PRE BLUE FD11	25	"	
POST BLUE FD12	26 *	27	
PRE BLUE FD12	28	"	
POST BLUE FD13	"	29	
PRE BLUE FD13	30	"	
POST BLUE FD14	"	31	
PRE BLUE FD14	32	"	
POST BLUE FD15	33 *	34	
PRE BLUE FD15	35	"	
POST BLUE FD16	"	36	
PRE BLUE FD16	37	"	

\*Reseal LiOH cans w/Gray Tape and stow  
 ORB OPS-11b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-18

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(5 Crewmembers/BLUE sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
LAUNCH	1	2	
POST RED FD2	3	"	
PRE RED FD2	"	4	
POST RED FD3	5 *	6	
PRE RED FD3	7	"	
POST RED FD4	"	8	
PRE RED FD4	9	"	
POST RED FD5	"	10	
PRE RED FD5	11	"	
POST RED FD6	12 *	13	
PRE RED FD6	14	"	
POST RED FD7	"	15	
PRE RED FD7	16	"	
POST RED FD8	"	17	
PRE RED FD8	18	"	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-12a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-19

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (5 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST RED FD9	19 *	20	
PRE RED FD9	21	"	
POST RED FD10	"	22	
PRE RED FD10	23	"	
POST RED FD11	"	24	
PRE RED FD11	25	"	
POST RED FD12	26 *	27	
PRE RED FD12	28	"	
POST RED FD13	"	29	
PRE RED FD13	30	"	
POST RED FD14	"	31	
PRE RED FD14	32	"	
POST RED FD15	33 *	34	
PRE RED FD15	35	"	
POST RED FD16	"	36	
PRE RED FD16	37	"	

\*Reseal LiOH cans w/Gray Tape and stow  
 ORB OPS-12b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-20

ORB OPS/ALL/GEN K



TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(6 Crewmembers/RED sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMLPT</b>
LAUNCH	1	2	
POST BLUE FD2	3	4	
POST RED FD3	5	"	
POST BLUE FD3	6	7*	
POST RED FD4	"	8	
POST BLUE FD4	9*	10	
POST RED FD5	11	"	
POST BLUE FD5	"	12	
POST RED FD6	13	14	
POST BLUE FD6	"	15	
POST RED FD7	16	"	
POST BLUE FD7	17	18	
POST RED FD8	"	19*	
POST BLUE FD8	20	21	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-13a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-21

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (6 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST RED FD9	22 *	"	
POST BLUE FD9	23	24 *	
POST RED FD10	"	25 *	
POST BLUE FD10	26	27	
POST RED FD11	28	"	
POST BLUE FD11	"	29	
POST RED FD12	30	"	
POST BLUE FD12	31	32	
POST RED FD13	33	"	
POST BLUE FD13	34	35	
POST RED FD14	"	36	
POST BLUE FD14	37 *	38	
POST RED FD15	39 *	"	
POST BLUE FD15	40	41 *	
POST RED FD16	"	42 *	
POST BLUE FD16	43	44	

\*Reseal LiOH cans w/Gray Tape and stow  
 ORB OPS-13b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-22

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(6 Crewmembers/BLUE sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMLPT</b>
LAUNCH	1	2	
POST RED FD2	3	4	
POST BLUE FD3	5	"	
POST RED FD3	6	7*	
POST BLUE FD4	"	8	
POST RED FD4	9*	10	
POST BLUE FD5	11	"	
POST RED FD5	"	12	
POST BLUE FD6	13	14	
POST RED FD6	"	15	
POST BLUE FD7	16	"	
POST RED FD7	17	18	
POST BLUE FD8	"	19*	
POST RED FD8	20	21	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-14a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-23

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (6 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST BLUE FD9	22 *	"	
POST RED FD9	23	24 *	
POST BLUE FD10	"	25 *	
POST RED FD10	26	27	
POST BLUE FD11	28	"	
POST RED FD11	"	29	
POST BLUE FD12	30	"	
POST RED FD12	31	32	
POST BLUE FD13	33	"	
POST RED FD13	34	35	
POST BLUE FD14	"	36	
POST RED FD14	37 *	38	
POST BLUE FD15	39 *	"	
POST RED FD15	40	41 *	
POST BLUE FD16	"	42 *	
POST RED FD16	43	44	

\*Reseal LiOH cans w/Gray Tape and stow  
 ORB OPS-14b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-24

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(7 Crewmembers/RED sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
LAUNCH	1 *	2	
PRE BLUE FD1	3 *	"	
POST BLUE FD2	4	5	
PRE BLUE FD2	6	"	
POST BLUE FD3	7	8	
PRE BLUE FD3	9	"	
POST BLUE FD4	10	11	
PRE BLUE FD4	12 *	13 *	
POST BLUE FD5	14	15	
PRE BLUE FD5	16	"	
POST BLUE FD6	17	18	
PRE BLUE FD6	19	"	
POST BLUE FD7	20	21	
PRE BLUE FD7	22 *	23 *	
POST BLUE FD8	24	25	
PRE BLUE FD8	26	"	

\*Reseal LiOH cans w/Gray Tape and stow  
ORB OPS-15a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-25

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (7 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST BLUE FD9	27	28	
PRE BLUE FD9	29 *	30 *	
POST BLUE FD10	31	32	
PRE BLUE FD10	33	"	
POST BLUE FD11	34	35	
PRE BLUE FD11	36 *	37 *	
POST BLUE FD12	38	39	
PRE BLUE FD12	40	"	
POST BLUE FD13	41	42	
PRE BLUE FD13	43	"	
POST BLUE FD14	44	45	
PRE BLUE FD14	46 *	47 *	
POST BLUE FD15	48	49	
PRE BLUE FD15	50	"	
POST BLUE FD16	51	52	
PRE BLUE FD16	53 *	54 *	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-15b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-26

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(7 Crewmembers/BLUE sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
LAUNCH	1 *	2	
PRE RED FD1	3 *	"	
POST RED FD2	4	5	
PRE RED FD2	6	"	
POST RED FD3	7	8	
PRE RED FD3	9	"	
POST RED FD4	10	11	
PRE RED FD4	12 *	13 *	
POST RED FD5	14	15	
PRE RED FD5	16	"	
POST RED FD6	17	18	
PRE RED FD6	19	"	
POST RED FD7	20	21	
PRE RED FD7	22 *	23 *	
POST RED FD8	24	25	
PRE RED FD8	26	"	

\*Reseal LiOH cans w/Gray Tape and stow  
ORB OPS-16a/nonRCRS/B

**NOTE**

Cue Card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-27

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (7 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST RED FD9	27	28	
PRE RED FD9	29 *	30 *	
POST RED FD10	31	32	
PRE RED FD10	33	"	
POST RED FD11	34	35	
PRE RED FD11	36 *	37 *	
POST RED FD12	38	39	
PRE RED FD12	40	"	
POST RED FD13	41	42	
PRE RED FD13	43	"	
POST RED FD14	44	45	
PRE RED FD14	46 *	47 *	
POST RED FD15	48	49	
PRE RED FD15	50	"	
POST RED FD16	51	52	
PRE RED FD16	53 *	54 *	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-16b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-28

ORB OPS/ALL/GEN K



TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(8 Crewmembers/RED sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
LAUNCH	1 *	2	
POST RED FD2	3	"	
POST BLUE FD2	4	5	
POST RED FD3	6 *	7 *	
POST BLUE FD3	8	9	
POST RED FD4	10 *	11 *	
POST BLUE FD4	12	13	
POST RED FD5	14	15	
POST BLUE FD5	16	17	
POST RED FD6	18 *	19 *	
POST BLUE FD6	20	21	
POST RED FD7	22 *	23 *	
POST BLUE FD7	24	25	
POST RED FD8	26 *	27 *	
POST BLUE FD8	28	29	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-17a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-29

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (8 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
POST RED FD9	30 *	31 *	
POST BLUE FD9	32	33	
POST RED FD10	34 *	35 *	
POST BLUE FD10	36	37	
POST RED FD11	38 *	39 *	
POST BLUE FD11	40	41	
POST RED FD12	42	"	
POST BLUE FD12	43	44	
POST RED FD13	45 *	46 *	
POST BLUE FD13	47	48	
POST RED FD14	49 *	50 *	
POST BLUE FD14	51	52	
POST RED FD15	53	54	
POST BLUE FD15	55 *	56 *	
POST RED FD16	57	58	
POST BLUE FD16	59 *	60 *	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-17b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-30

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**DUAL SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(8 Crewmembers/BLUE sleeps 1st/FD 1-16)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
LAUNCH	1 *	2	
POST BLUE FD2	3	"	
POST RED FD2	4	5	
POST BLUE FD3	6 *	7 *	
POST RED FD3	8	9	
POST BLUE FD4	10 *	11 *	
POST RED FD4	12	13	
POST BLUE FD5	14	15	
POST RED FD5	16	17	
POST BLUE FD6	18 *	19 *	
POST RED FD6	20	21	
POST BLUE FD7	22 *	23 *	
POST RED FD7	24	25	
POST BLUE FD8	26 *	27 *	
POST RED FD8	28	29	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-18a/nonRCRS/B

NOTE

Cue Card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-31

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**DUAL SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (8 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST BLUE FD9	30 *	31 *	
POST RED FD9	32	33	
POST BLUE FD10	34 *	35 *	
POST RED FD10	36	37	
POST BLUE FD11	38 *	39 *	
POST RED FD11	40	41	
POST BLUE FD12	42	"	
POST RED FD12	43	44	
POST BLUE FD13	45 *	46 *	
POST RED FD13	47	48	
POST BLUE FD14	49 *	50 *	
POST RED FD14	51	52	
POST BLUE FD15	53	54	
POST RED FD15	55 *	56 *	
POST BLUE FD16	57	58	
POST RED FD16	59 *	60 *	

\*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-18b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-32

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**SINGLE SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(5 Crewmembers/1 Shift/FD 1-6)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
FD1 LAUNCH	1 *	2	
FD1 PRE SLEEP	3	"	
FD2 POST SLEEP	"	4	
FD2 PRE SLEEP	5	"	
FD3 POST SLEEP	"	6	
FD3 PRE SLEEP	7	"	
FD4 POST SLEEP	"	8	
FD4 PRE SLEEP	9	"	
FD5 POST SLEEP	"	10	
FD5 PRE SLEEP	11 *	12	
FD6 POST SLEEP	13	"	
FD6 PRE SLEEP	"	14	

(FLIGHT DAYS 7-12 ON BACK)

\*Reseal LiOH cans #1/11/18/19/27  
with Gray Tape and stow

ORB OPS-19a/nonRCRS/B

NOTE

Cue card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-33

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (5 Crewmembers/1 Shift/FD 7-12)

FLIGHT DAY	POS A	POS B	CK CMLPT
FD7 POST SLEEP	15	"	
FD7 PRE SLEEP	"	16	
FD8 POST SLEEP	17	"	
FD8 PRE SLEEP	"	18 *	
FD9 POST SLEEP	19 *	20	
FD9 PRE SLEEP	21	"	
FD10 POST SLEEP	"	22	
FD10 PRE SLEEP	23	"	
FD11 POST SLEEP	"	24	
FD11 PRE SLEEP	25	"	
FD12 POST SLEEP	"	26	
FD12 PRE SLEEP	27 *	28	
FD13 POST SLEEP	29	"	

ORB OPS-19b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-34

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**SINGLE SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(6 Crewmembers/1 Shift/FD 1-6)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
FD1 LAUNCH	1 *	2	
FD1 PRE SLEEP	3	"	
FD2 POST SLEEP	"	4	
FD2 PRE SLEEP	5 *	6	
FD3 POST SLEEP	7	"	
FD3 PRE SLEEP	"	8	
FD4 POST SLEEP	9	10	
FD4 PRE SLEEP	11	"	
FD5 POST SLEEP	"	12	
FD5 PRE SLEEP	13 *	14	
FD6 POST SLEEP	15	"	
FD6 PRE SLEEP	"	16	

(FLIGHT DAYS 7-12 ON BACK)

\*Reseal LiOH cans #1/5/13/21/29  
with Gray Tape and stow

ORB OPS-20a/nonRCRS/B

NOTE

Cue card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-35

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (6 Crewmembers/1 Shift/FD 7-12)

FLIGHT DAY	POS A	POS B	CK CMLPT
FD7 POST SLEEP	17	18	
FD7 PRE SLEEP	19	"	
FD8 POST SLEEP	"	20	
FD8 PRE SLEEP	21 *	22	
FD9 POST SLEEP	23	"	
FD9 PRE SLEEP	"	24	
FD10 POST SLEEP	25	26	
FD10 PRE SLEEP	27	"	
FD11 POST SLEEP	"	28	
FD11 PRE SLEEP	29 *	30	
FD12 POST SLEEP	31	"	
FD12 PRE SLEEP	"	32	
FD13 POST SLEEP	33	34	
FD13 PRE SLEEP	35	"	
FD14 POST SLEEP	"	36	

ORB OPS-20b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-36

ORB OPS/ALL/GEN K



TOP

HOOK  
VELCRO

**SINGLE SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(7 Crewmembers/1 Shift/FD 1-6)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
FD1 LAUNCH	1*	2	
FD1 PRE SLEEP	3	"	
FD2 POST SLEEP	5	4*	
FD2 PRE SLEEP	"	6	
FD3 POST SLEEP	7	8	
FD3 PRE SLEEP	9	"	
FD4 POST SLEEP	11	10	
FD4 PRE SLEEP	"	12	
FD5 POST SLEEP	13	14	
FD5 PRE SLEEP	15	"	
FD6 POST SLEEP	17	16	
FD6 PRE SLEEP	"	18	

(FLIGHT DAYS 7-12 ON BACK)

\*Reseal LiOH cans #1/4/21/22  
with Gray Tape and stow

ORB OPS-21a/nonRCRS/B

**NOTE**

Cue card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-37

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (7 Crewmembers/1 Shift/FD 7-12)

FLIGHT DAY	POS A	POS B	CK CMLPT
FD7 POST SLEEP	19	20	
FD7 PRE SLEEP	21 *	22 *	
FD8 POST SLEEP	23	24	
FD8 PRE SLEEP	"	25	
FD9 POST SLEEP	26	27	
FD9 PRE SLEEP	28	"	
FD10 POST SLEEP	30	29	
FD10 PRE SLEEP	"	31	
FD11 POST SLEEP	32	33	
FD11 PRE SLEEP	34	"	
FD12 POST SLEEP	36	35	
FD12 PRE SLEEP	"	37	
FD13 POST SLEEP	38	39	

ORB OPS-21b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-38

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**SINGLE SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT**  
(8 Crewmembers/1 Shift/FD 1-8)

<b>FLIGHT DAY</b>	<b>POS A</b>	<b>POS B</b>	<b>CK CMPLT</b>
FD1 LAUNCH	1	2	
FD1 PRE SLEEP	3	"	
FD2 POST SLEEP	4	5	
FD2 PRE SLEEP	6	7	
FD3 POST SLEEP	8	9	
FD3 PRE SLEEP	10	11	
FD4 POST SLEEP	12	13	
FD4 PRE SLEEP	14	15	
FD5 POST SLEEP	16	17	
FD5 PRE SLEEP	18	19	
FD6 POST SLEEP	20	21	
FD6 PRE SLEEP	22	23	
FD7 POST SLEEP	24	25	
FD7 PRE SLEEP	26	27	
FD8 POST SLEEP	28	29	
FD8 PRE SLEEP	30	31	

ORB OPS-22a/nonRCRS/B

NOTE

Cue card not flown for missions manifesting RCRS  
(reduced copy)

FAB USE ONLY

CC 15-39

ORB OPS/ALL/GEN K

TOP  
 BACK OF 'SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT'

HOOK  
 VELCRO

**SINGLE SHIFT ORBITER  
 CO2 ABSORBER REPLACEMENT**  
 (8 Crewmembers/1 Shift/FD 9-14)

FLIGHT DAY	POS A	POS B	CK CMLPT
FD9 POST SLEEP	32	33	
FD9 PRE SLEEP	34	35	
FD10 POST SLEEP	36	37	
FD10 PRE SLEEP	38	39	
FD11 POST SLEEP	40	41	
FD11 PRE SLEEP	42	"	
FD12 POST SLEEP	43	44	
FD12 PRE SLEEP	45	46	
FD13 POST SLEEP	47	48	
FD13 PRE SLEEP	49	50	
FD14 POST SLEEP	51	52	

ORB OPS-22b/nonRCRS/B

(reduced copy)

FAB USE ONLY

CC 15-40

ORB OPS/ALL/GEN K

TOP

HOOK  
VELCRO

**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

FD	OHS H/N	MET INSTALLED
1	N/A	N/A
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

ORB OPS-23a/O/D

(reduced copy)

FAB USE ONLY

CC 15-41

ORB OPS/ALL/GEN K

TOP  
BACK OF 'URINE PRETREAT CHANGEOUT'

HOOK  
VELCRO

#### 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

#### 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

ORB OPS-23b/O/D

(reduced copy)

FAB USE ONLY

CC 15-42

ORB OPS/ALL/GEN K

HOOK  
VELCRO

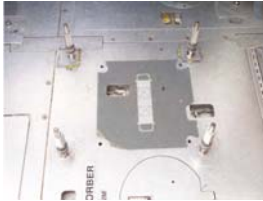
## ERGOMETER

### Ergometer setup locations:

- Seat 3 - facing stbd
- Seat 4 - facing port
- Seat 5 - facing port
- Seat 6 - facing port
- Seat 7 - facing stbd



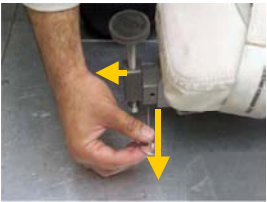
① Temp stow accessory bag at setup location. Note display panel is under pedal cranks.



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 QDs (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.

HOOK  
VELCRO

ORB OPS-24a/O/A

(reduced copy)

FAB USE ONLY

CC 15-43

ORB OPS/ALL/GEN K,1

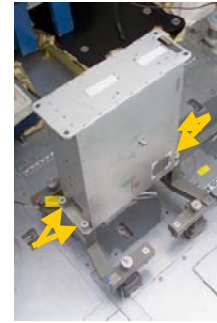
HOOK  
VELCRO



10 Reconfigure seat pip pin and seat assembly from green to yellow. Secure blocks together using Velcro tab. Tighten knob.



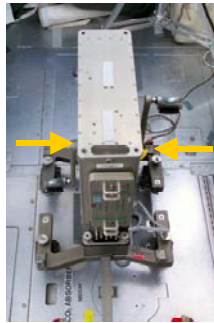
11 **CAUTION:**  
Ensure ergometer and power panel are OFF before making connections. Note: Steps will interrupt power to other loads on utility panel. Connect display panel to ergometer and connect Pre-routed power cable.



12 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



13 Tighten pedals into pedal cranks using wrench if necessary (red = right / blue = left. Note: blue is reverse threaded).



14 Secure pedal cranks onto ergometer using hexagonal wrench.



15 Install seat stem foot. Secure with pip pin and tighten by ORB OPS-24b/O/A

When ready to exercise:  
**DC UTIL PWR – ON**  
**ERGOMETER ON/OFF – ON**  
**?DATA - MANUAL**

HOOK  
VELCRO

ORB OPS-24b/O/A

(reduced copy)

FAB USE ONLY

CC 15-44

ORB OPS/ALL/GEN K,1

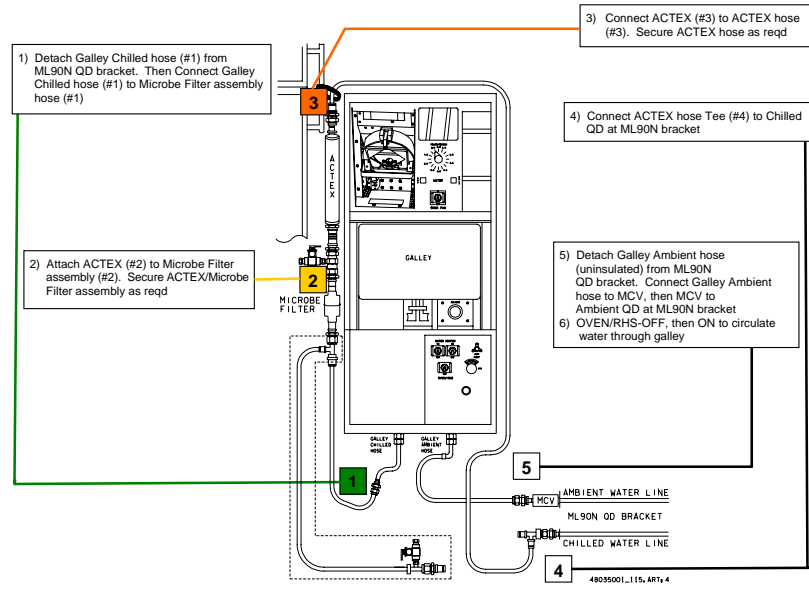


TOP  
HOOK  
VELCRO

### GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION

#### 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



#### NOTE

Water Transfer Hose only present for flights where water transfer is scheduled

HOOK  
VELCRO

ORB OPS-44a/O/A

(reduced copy)

FAB USE ONLY

CC 15-45

ORB OPS/ALL/GEN K,10

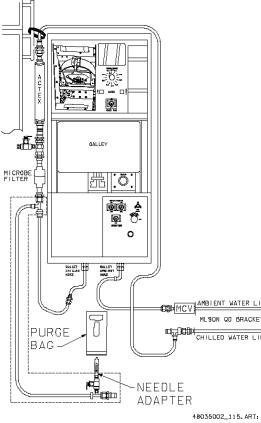
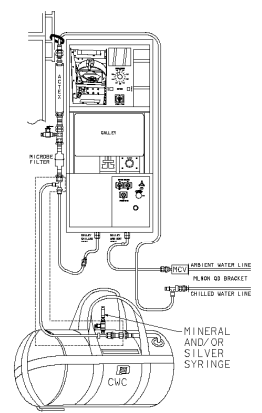
TOP, BACK OF 'GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION'

HOOK  
VELCRO

**CWC (Contingency Water Container) Fill**

**NOTE**

Have towel ready for possible release of water when mating/demating connections. To minimize possibility of contamination avoid touching internal parts of QDs or connections. Squeezing CWC while filling may cause backflow into connecting equipment. Assumes GIRA setup already complete

<u>WATER TRANSFER HOSE PURGE</u>	<u>CWC FILL</u>	<u>CWC SAMPLING</u>
<p>Water Transfer Hose Purge is reqd if first CWC fill or three days since last fill</p> <ol style="list-style-type: none"> <li>1) Retrieve Needle Adapter and Purge Bag from Sample Purge Kit. Remove cap from Needle Adapter, attach to injection port, then attach Purge Bag to Needle Adapter</li> <li>2) Open valve on Injection Port. Fill Purge Bag to capacity. Secure Purge Bag in Ziplock Bag and stow in Dry Trash. Replace cap on Needle Adapter, remove and temp stow until needed</li> </ol> 	<ol style="list-style-type: none"> <li>1) For Potable CWC fill inject Minerals, then Silver Biocide. For Technical CWC fill, inject Silver Biocide ONLY. Unstow CWC(s) Mineral and/or Silver Biocide Kit(s). As reqd, report condition of CWC(s) to MCC-H. Connect CWC QD to Water Transfer Hose QD. Start 52 minute countdown clock</li> <li>2) Attach syringe to Injection Port. Open valve on Injection Port and completely inject solution. Fully withdraw syringe plunger, then reinject residual solution. Close valve on Injection Port then remove, cap and stow syringe. Repeat injection protocol, as reqd</li> <li>3) Terminate CWC fill on MCC-H call or as indicated by countdown timer, if no comm. Fill out CWC label. Note MET, insert green (blue) label in CWC window. Apply decals to CWC ends, mark CWC S/N on the end decals</li> </ol> 	<p>If sample reqd, retrieve Sample Adapter, and Sample Bags from Sample/Purge Kit. Connect Sample Bag to appropriate adapter (Blue = Potable, Green = Technical). Connect adapter &amp; Sample Bag to CWC QD then OPEN valve on sample adapter. Squeeze CWC until Sample Bag is filled to capacity. CLOSE valve, remove Sample Bag from adapter and fill out Sample Bag label, secure in Ziplock Bag and stow in crew designated location. Detach/temp stow Sample Adapter</p>

HOOK  
VELCRO

ORB OPS-44b/O/A

(reduced copy)

FAB USE ONLY

CC 15-46 ORB OPS/ALL/GEN K,10

## **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)**

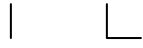
Directory content: 297 files/14 folders  
Directory size: 230 MB  
File dates: 2/24/2005

### **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



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FAB USE ONLY

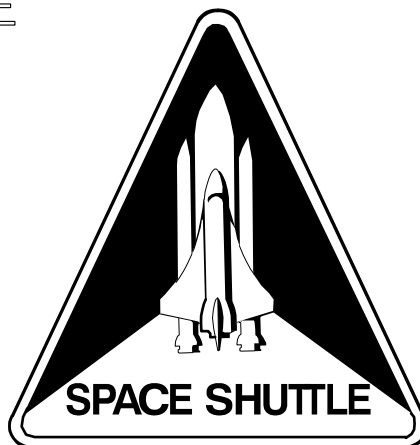
15-48

ORB OPS/ALL/GEN K,10



Space Shuttle Program  
FLIGHT DATA FILE

JSC-48035  
GENERIC, REV K



**ORBIT OPS  
CHECKLIST**

**STS  
ALL**

Flight Cover (trim bottom to expose tabs)